Sydney WATER

Fostering Workforce Resilience by Bridging Operational Excellence and Capital Delivery for the Next Generation

James Gourley, ASM Mohiuddin, Zoe Heytman, Ben Blayney

Agenda

01 Context & challenges

02 What is the Integrated Water Hub Model?

03 Method – how the model works

04 Outcomes & impact

05 What's next & broader application

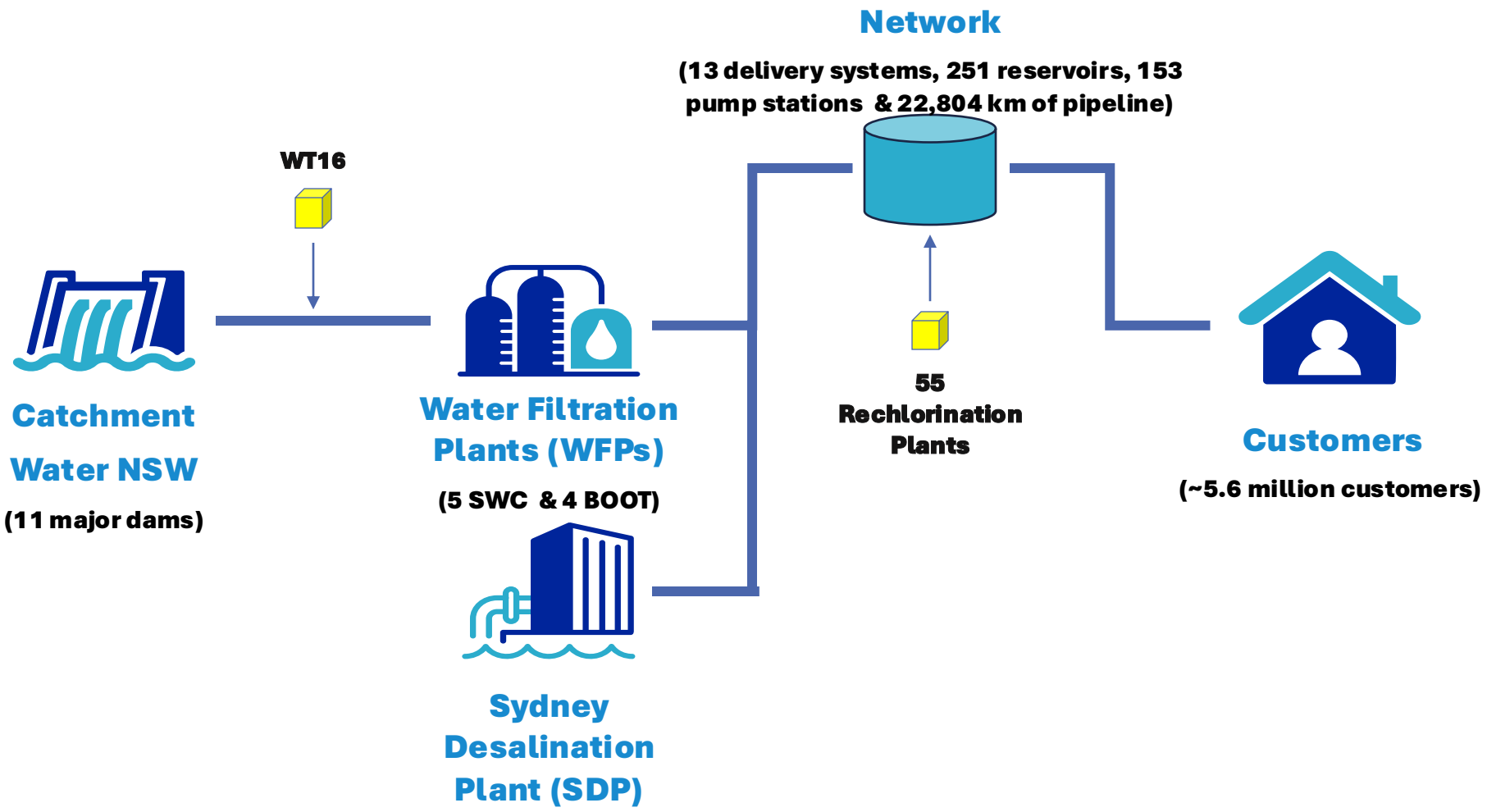
06 Q&A

Context & challenges

Significant system wide Challenges

- Climate change (Droughts, floods, bushfires)
- System Performance expectations
- Regulatory changes
- Housing growth
- Ageing infrastructure & workforce

Sydney's Water Supply System



What is the Integrated Water Hub Model?

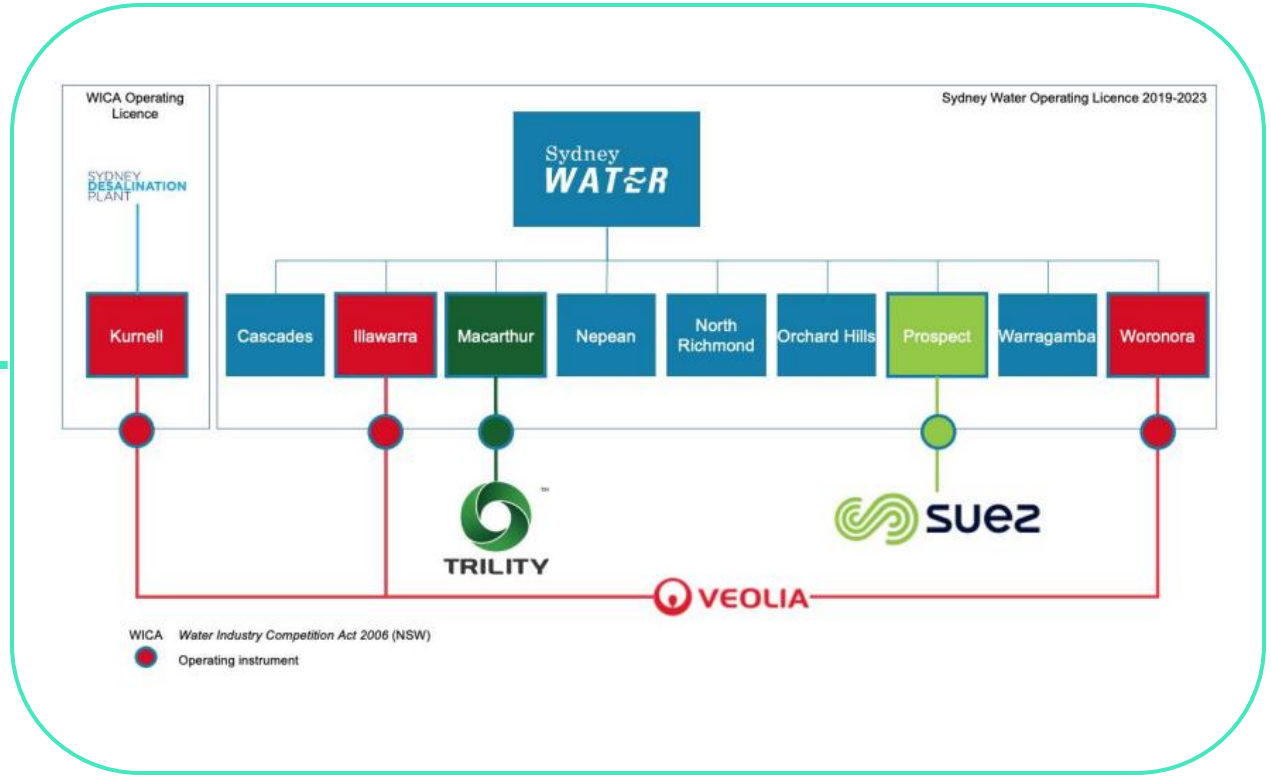
A collaborative, embedded workforce model for operational and delivery excellence

Integrated Water Hub Model

Water Supply & Production

- Water Quality Scientists
- Operational Process Engineers
- Project Interface Managers
- Operations Engineers

Water Treatment Operations



Integrated Water Hub Model

The value of embedding technical expertise within operations

1. **Decentralised expertise, centralised strategy**
2. **Collaborative, cross-functional integration**
3. **Seamless support across delivery models**
4. **Real-time responsiveness and trusted relationships**

Method – how the model works

Key practices that bridge operations and capital delivery

How the model works

Integrated R&D programs

25-year R&D program with close engineer-operator collaboration

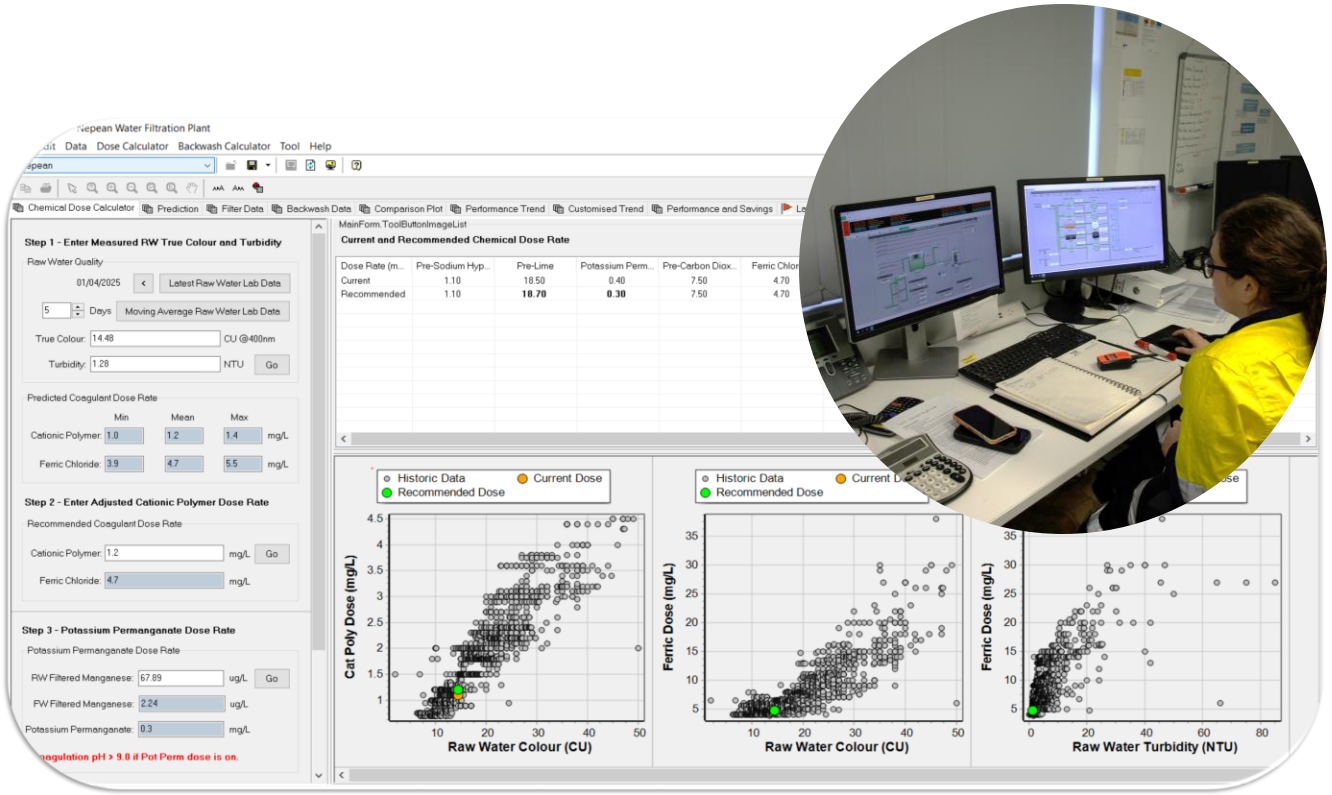
Digital innovation with operational needs in mind

What we built

- SWIFT model that dynamically optimises treatment performance
- Taste-and-odour investigations to identify root cause of Geosmin outbreaks in lagoons
- CT modelling for real time indication of disinfection performance in plant SCADA.

Impact

- Significant efficiency gains during incident response
- 30-50% chemical cost savings.



Operational insight → Digital innovation → Resilience

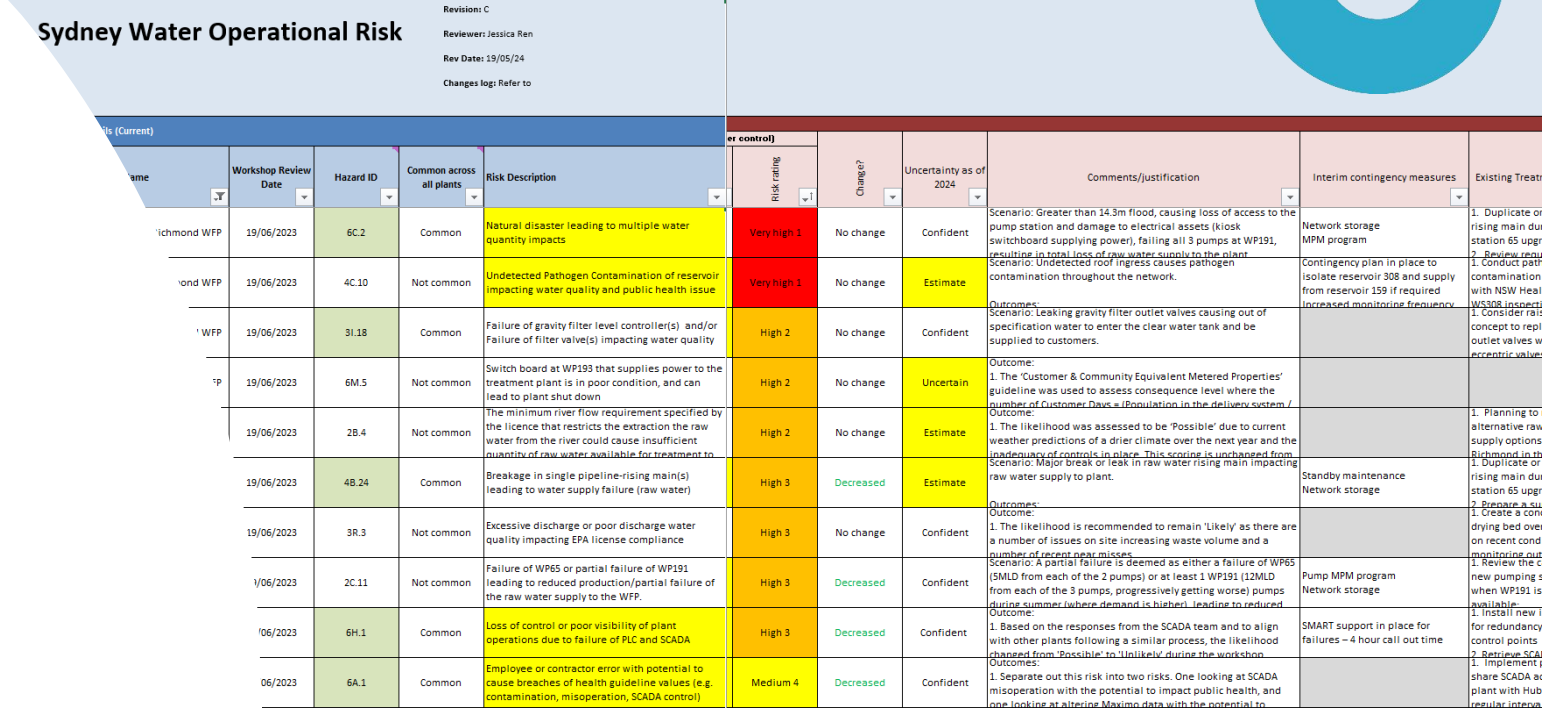
System-wide risk management

Broad stakeholder group formed:

- ✓Catchment authority
- ✓Treatment/Network operations
- ✓Asset management
- ✓Planning
- ✓Reliability engineers
- ✓Water quality
- ✓Public health regulators.

- Common risk matrix across organisations
- Action plan developed and agreed upon:
  - Operational contingency measures
  - Capital projects
- Key investment decision-makers attend sessions for context on critical risks.

Over **400 risks** and **700 actions** identified in three years!



Sydney Water Operational Risk

Revision: C
Reviewer: Jessica Ren
Rev Date: 19/05/24
Changes log: Refer to

Workshop Review Date	Hazard ID	Common across all plants	Risk Description	Risk rating	Change?	Uncertainty as of 2024	Comments/justification	Interim contingency measures	Existing Treat
19/06/2023	6C.2	Common	Natural disaster leading to multiple water quantity impacts	Very high 1	No change	Confident	Scenario: Greater than 14.3m flood, causing loss of access to the pump station and damage to electrical assets (kiosk switchboard supplying power), failing all 3 pumps at WP191, resulting in total loss of raw water supply to the plant	Network storage MPM program	1. Duplicate or rising main du station 65 upgr 2. Review requ
19/06/2023	4C.10	Not common	Undetected Pathogen Contamination of reservoir impacting water quality and public health issue	Very high 1	No change	Estimate	Scenario: Undetected roof ingress causes pathogen contamination throughout the network. Outcomes:	Contingency plan in place to isolate reservoir 308 and supply from reservoir 159 if required Increased monitoring frequency	1. Conduct path contamination with NSW Heal WS308 inspecti
19/06/2023	3I.18	Common	Failure of gravity filter level controller(s) and/or Failure of filter valve(s) impacting water quality	High 2	No change	Confident	Scenario: Leaking gravity filter outlet valves causing out of specification water to enter the clear water tank and be supplied to customers.		1. Consider rais concept to repl outlet valves w eccentric valve
19/06/2023	6M.5	Not common	Switch board at WP193 that supplies power to the treatment plant is in poor condition, and can lead to plant shut down	High 2	No change	Uncertain	Outcome: 1. The 'Customer & Community Equivalent Metered Properties' guideline was used to assess consequence level where the number of Customer Days = (Population in the delivery system /		
19/06/2023	2B.4	Not common	The minimum river flow requirement specified by the licence that restricts the extraction the raw water from the river could cause insufficient quantity of raw water available for treatment to	High 2	No change	Estimate	Outcome: 1. The likelihood was assessed to be 'Possible' due to current weather predictions of a drier climate over the next year and the inadequacy of controls in place. This scoring is unchanged from		1. Planning to alternative raw supply options Richmond in th
19/06/2023	4B.24	Common	Breakage in single pipeline-rising main(s) leading to water supply failure (raw water)	High 3	Decreased	Estimate	Scenario: Major break or leak in raw water rising main impacting raw water supply to plant. Outcomes:	Standby maintenance Network storage	1. Duplicate or rising main du station 65 upgr 2. Prepare a su
19/06/2023	3R.3	Not common	Excessive discharge or poor discharge water quality impacting EPA license compliance	High 3	No change	Confident	Outcome: 1. The likelihood is recommended to remain 'Likely' as there are a number of issues on site increasing waste volume and a number of recent near misses		1. Create a con drying bed over on recent cond monitoring out
/06/2023	2C.11	Not common	Failure of WP65 or partial failure of WP191 leading to reduced production/partial failure of the raw water supply to the WFP.	High 3	Decreased	Confident	Scenario: A partial failure is deemed as either a failure of WP65 (5MLD from each of the 2 pumps) or at least 1 WP191 (12MLD from each of the 3 pumps, progressively getting worse) pumps during summer (where demand is higher), leading to reduced	Pump MPM program Network storage	1. Review the c new pumping s when WP191 is available
/06/2023	6H.1	Common	Loss of control or poor visibility of plant operations due to failure of PLC and SCADA	High 3	Decreased	Confident	Outcome: 1. Based on the responses from the SCADA team and to align with other plants following a similar process, the likelihood changed from 'Possible' to 'Unlikely' during the workshop	SMART support in place for failures – 4 hour call out time	1. Install new for redundancy control points 2. Retrieve SCA
06/2023	6A.1	Common	Employee or contractor error with potential to cause breaches of health guideline values (e.g. contamination, misoperation, SCADA control)	Medium 4	Decreased	Confident	Outcomes: 1. Separate out this risk into two risks. One looking at SCADA misoperation with the potential to impact public health, and one looking at altering Maximo data with the potential to		1. Implement share SCADA ac plant with Hub regular interva

Capital delivery integration

Bridging frontline knowledge with project design and delivery

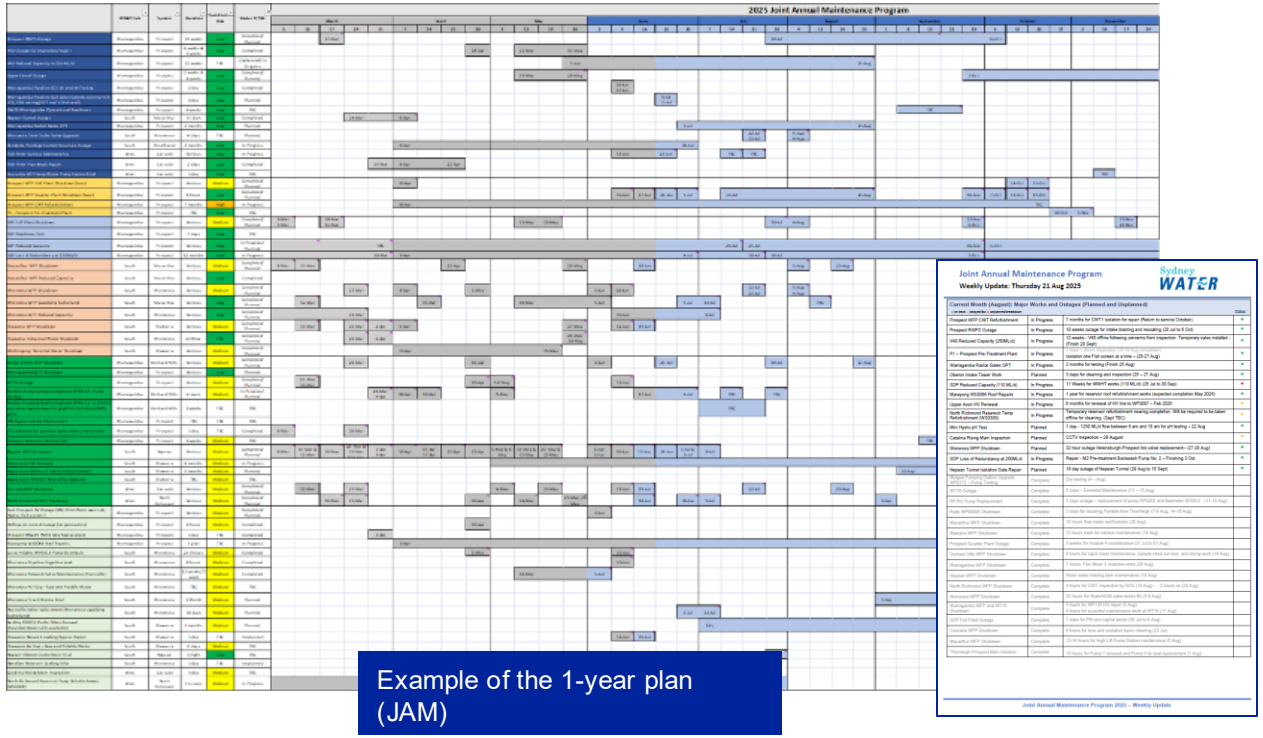
- PIMs embedded in operational hubs
- Bridge operations and projects for seamless delivery without impacting supply
- Align design with operational needs and risk priorities
- Support prioritisation across a multi-billion-dollar, 10-year capital program
- Prepare internal resources and train operators for new technology
- Manage interim risk for deprioritised projects
- Deliver safe, operable, and maintainable assets from day one.

Joint maintenance planning

Coordinate two outage plans:

- 1-year plan (Joint Annual Maintenance - JAM)
- 5-year plan (longer term look ahead).

Holistic and coordinated asset maintenance and outage planning (incl contingency) across the full water supply system including key recycled water schemes.



Example of the 1-year plan (JAM)

Warragamba Pipeline Outage

Over 6 organisations involved

Incident Response

Impact:

- Engineers embedded in hubs with strong operator relationships
- Deep understanding of plant context enables rapid mobilisation
- Tailored technical guidance during incidents
- Centralised team outposted to hubs enables effective knowledge sharing across plants.

Outcome:

- Managed numerous events operating plants beyond design envelope
- Example: In 2022, Orchard Hills & Nepean operated at more than twice their design envelope through collaboration across operations, process and supply teams
- Maintained water quality and supply under extreme conditions
- Work extensively recognised across the organisation.

Strong relationships and plant-aligned expertise enable rapid, effective incident response

Partner Collaboration & Process Network

Cross-sector alignment for consistent performance and innovation

- Quarterly process network sessions for knowledge sharing
- Joint operational meetings to exchange learnings
- Shared R&D program with Sydney Water, TRILITY, and Veolia
- Promotes collaborative innovation and consistent standards
- Builds a shared operational vision and efficiency.

Sydney WATER

SYDNEY DESALINATION PLANT

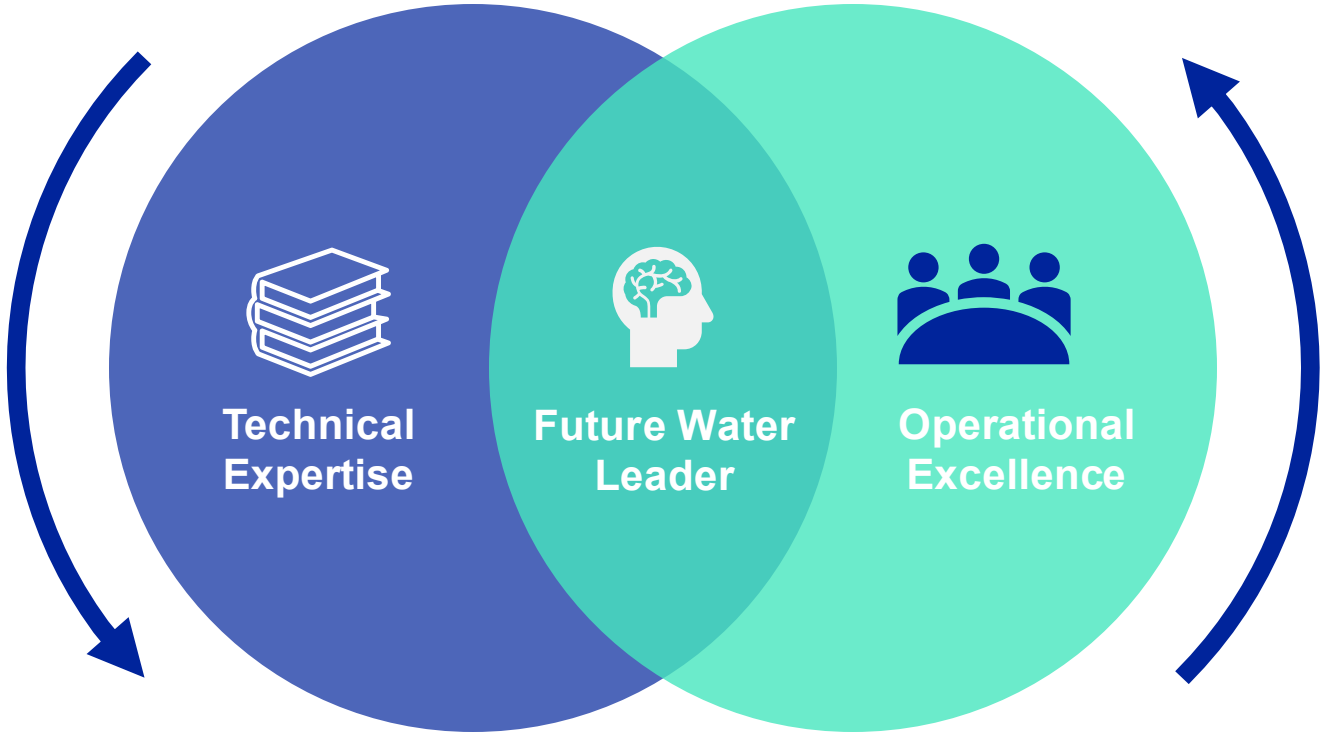
VEOLIA

TRILITY

suez

Building the Next Generation of Engineers

- Water treatment fundamentals
- Design
- Optimisation
- Water quality management.



- Apply theory in practice
- Understand operational context
- Learn from experienced staff
- Build adaptability.

6 –12 months to operational readiness

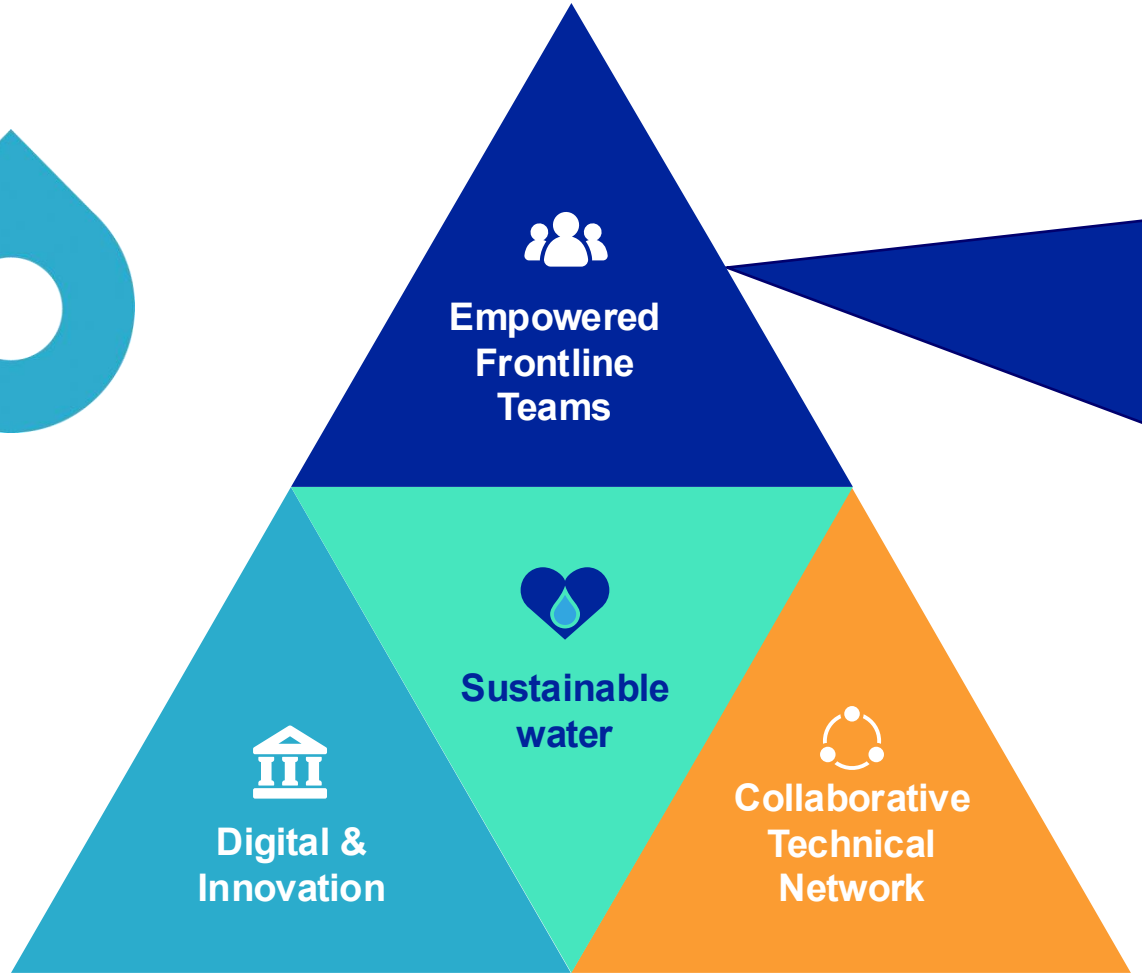
Outcomes & impact

What the model has delivered across operations, capital, and workforce

Outcomes

- Faster incident response
- Accelerated technology adoption
- Integration of risk assessment outcomes in asset renewal planning
- More resilient workforce

Future-proofing operations



- Building resilience through integrated operations and technical expertise
- Driving innovation with digital tools and shared knowledge
- Future-proofing our workforce to adapt and thrive.

Conclusions

Embedding expertise into operations builds agility and continuity

Operational insights shape more maintainable, fit-for-purpose assets

Shared structures drive innovation and consistency across the sector.


Thank you
sydneywater.com.au
Sydney
WATER