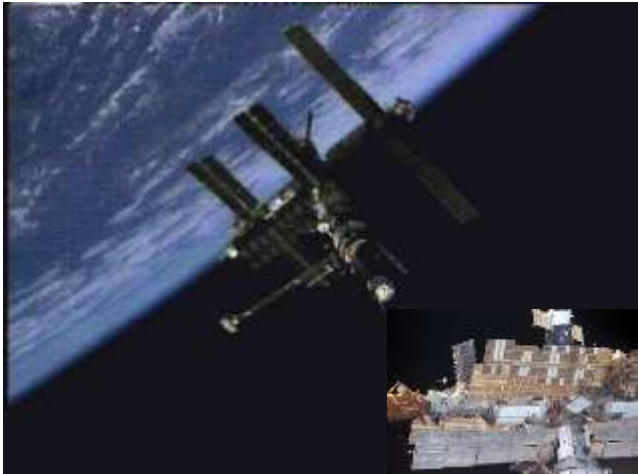


Net Zero Discharge

*A key element/goal for
Sustainable Water Cycle Management*



*Dr Charles Essery
Managing Director
Sustainable Water Solutions
Pty Ltd*

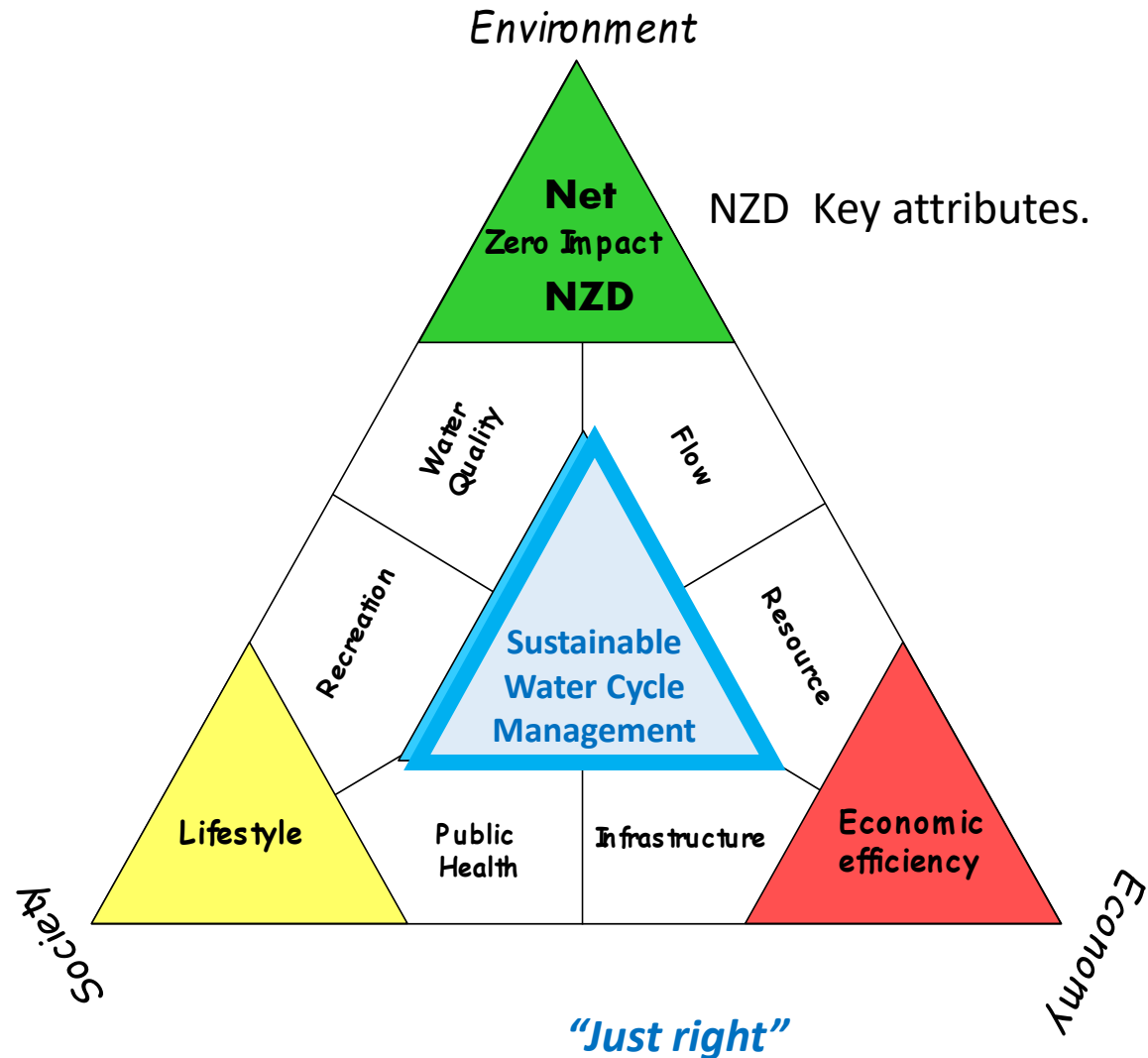
Sydney, Australia



*Sustainable Water
Solutions Pty Ltd*



Triple dimensions of Sustainable Water Cycle Management approach - keep it simple

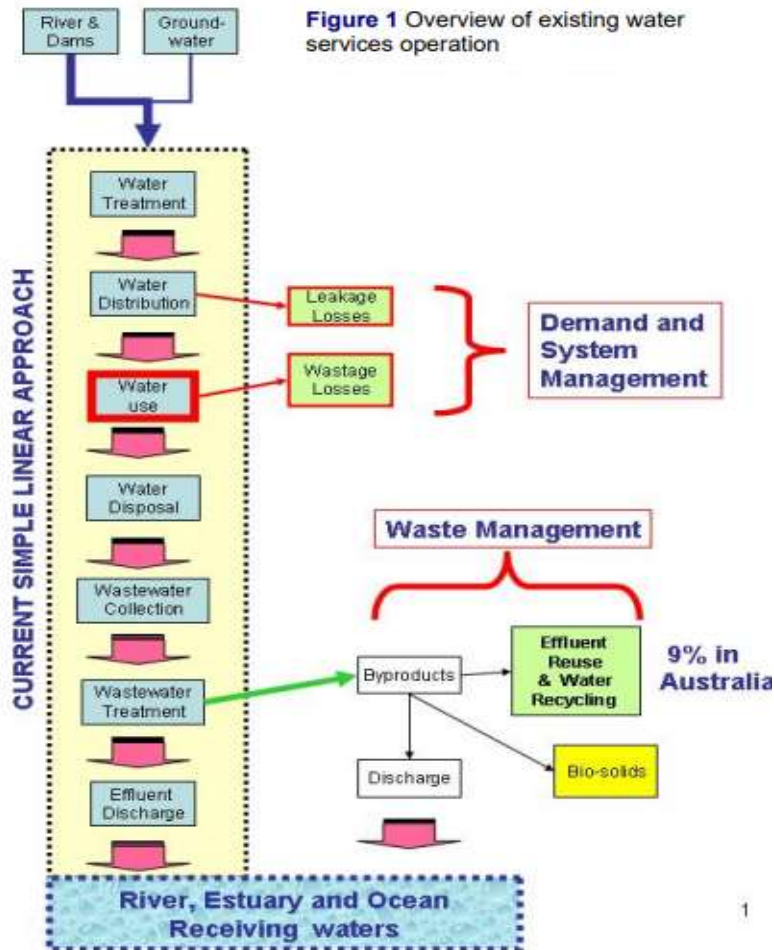


Element	Attribute	Issue
Water	Can be fully recycled to Potable	Politics, Health, Environmental agenda
Solids	Extensive landscape uses	Impurities
Dissolved "salts"	Brine streams from Membrane process elements	Viewed as waste stream
Minerals	Valuable elements that can be recycled and have market value	Technology & markets
Grease & Oils	Trade waste interception plus WWTP digestion	Viewed as waste stream
Biogas	Gas production for WWTP use and excess export	Should be no barriers
Energy recovery	WWTP generate heat, recycle it to maximum eg Heat pump	Technology challenges

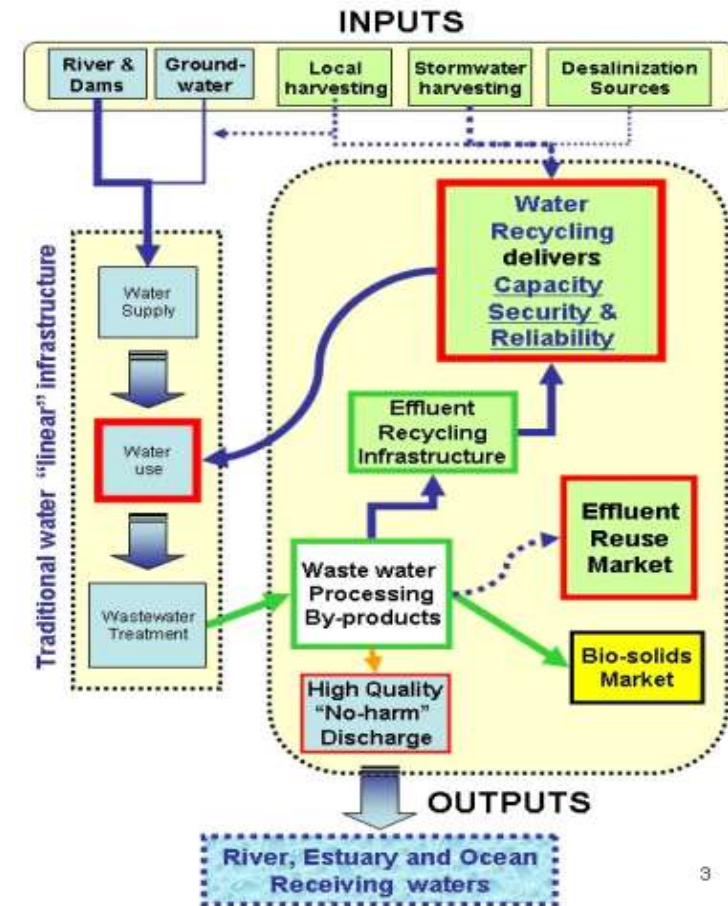
Current discharge wasted resource profile & What is Net Zero Discharge NZD?

- **Greatest misconception** – Wastewater is the issue, infact it's 99+% water that is used to transport waste away from us to a place we can't see, the WWTP!
- Currently, major cities around the world use receiving waters (**rivers, lakes, estuaries oceans**) as **dumping grounds to minimise cost.**
- **When regulated**, the **water industry can quickly deploy** technology and processes that meet stringent "***tertiary level plus***" discharge licences.
- Some licences are so strict, some **current wastewater water discharges** are **cleaner than water supply they extract their drinking water from!**
- Quite simply, my definition of NZD is the "***opportunity to finely tune existing technologies and regulations to add the dimensions of full lifecycle cost and Triple Bottom Line evaluation/accounting/performance.***"

Old traditional approach vs SWCM approach to managing our interaction with the water cycle



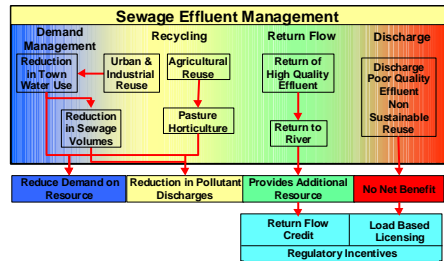
“NO-harm” or Net Zero Discharge
 + Potable Recycling
 + Effluent Return Flow Credits



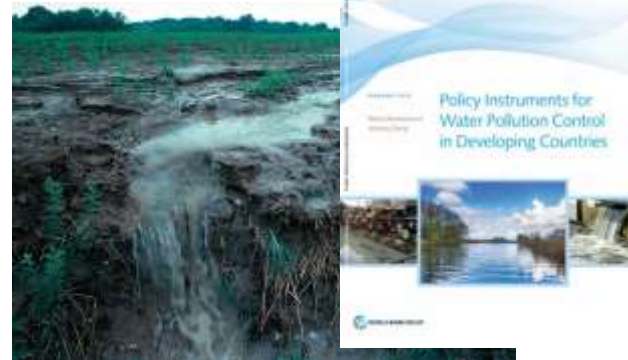
Tools available to achieve NZD



**LIFE CYCLE
MANAGEMENT**



EFLUENT/RETURN FLOWS



**LOAD BASED
POLLUTION
LICENCES**

Environment



Society

Economy

NATURAL RESOURCE MANAGEMENT

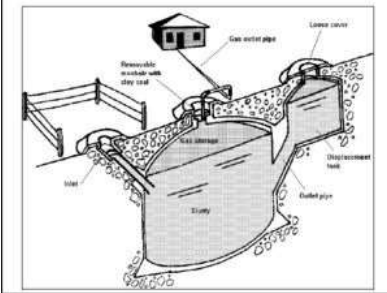


WATER RIGHTS, LICENSING AND TRADE



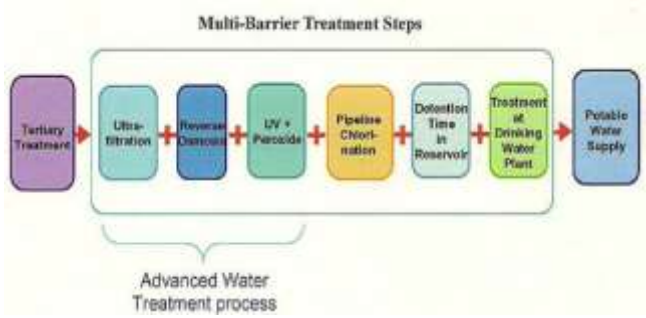
**DRINKING WATER
STANDARDS**

Innovative technologies/design can deliver NZD

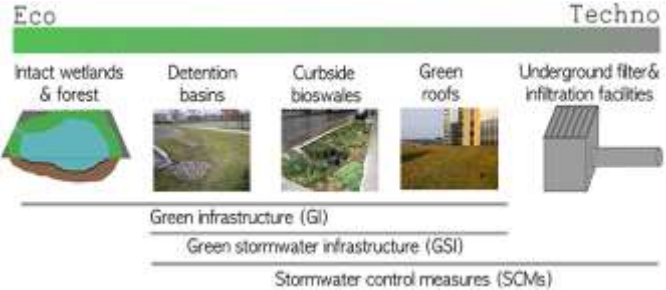


BIODEGESTERS AT WWTP OR DECENTRALISED

ADVANCED WATER TREATMENT PROCESS TRAINS



DENCENTRALISED WATER SUPPLY, TREATMENT AND RECYCLING



WSUD, STORMWATER USE, TREATMENT AND MINING



RAINWATER HARVESTING & TREATMENT

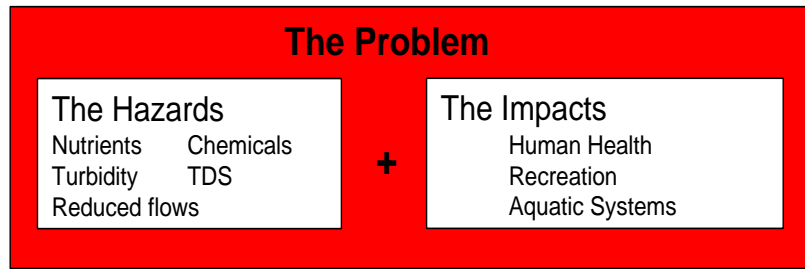


BIOSOLIDS & MINERAL/SALT MINING

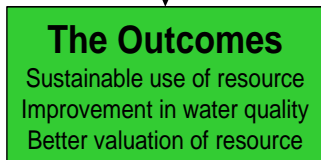
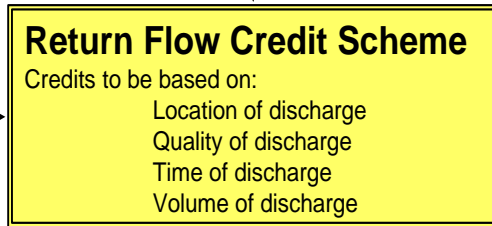


SEWER MINING

New South Wales (Australia) Return Flow/Effluent Credit Scheme (2004)

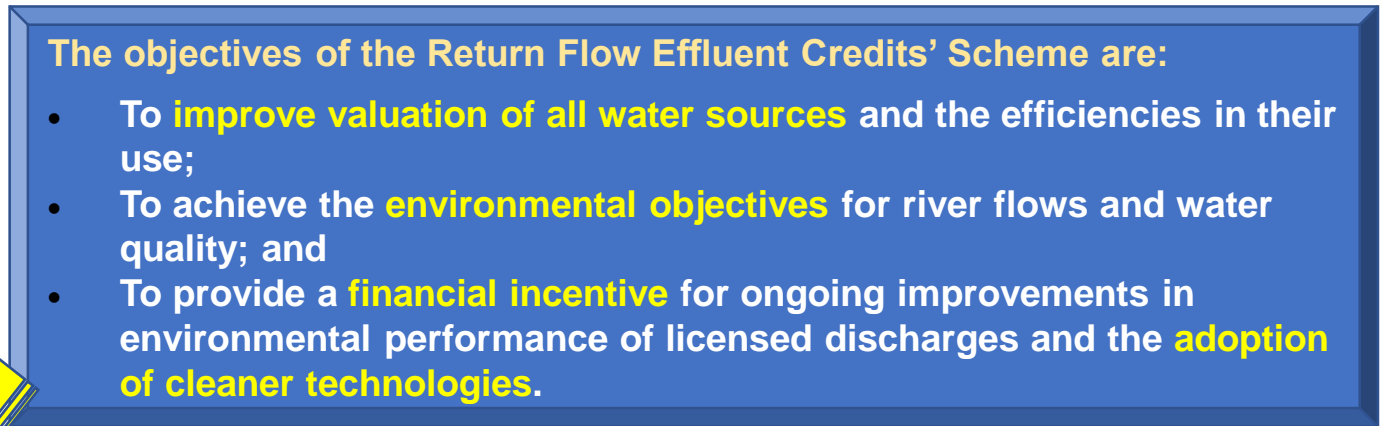
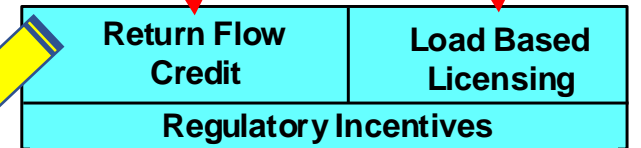
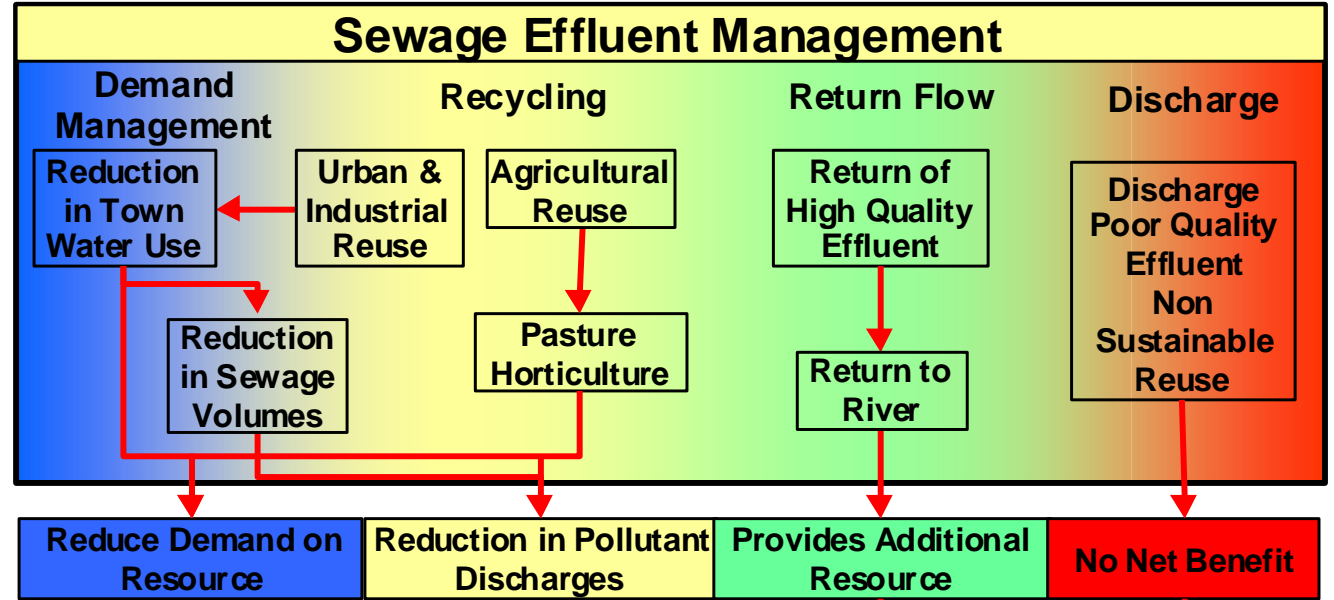


Potential Control Measure



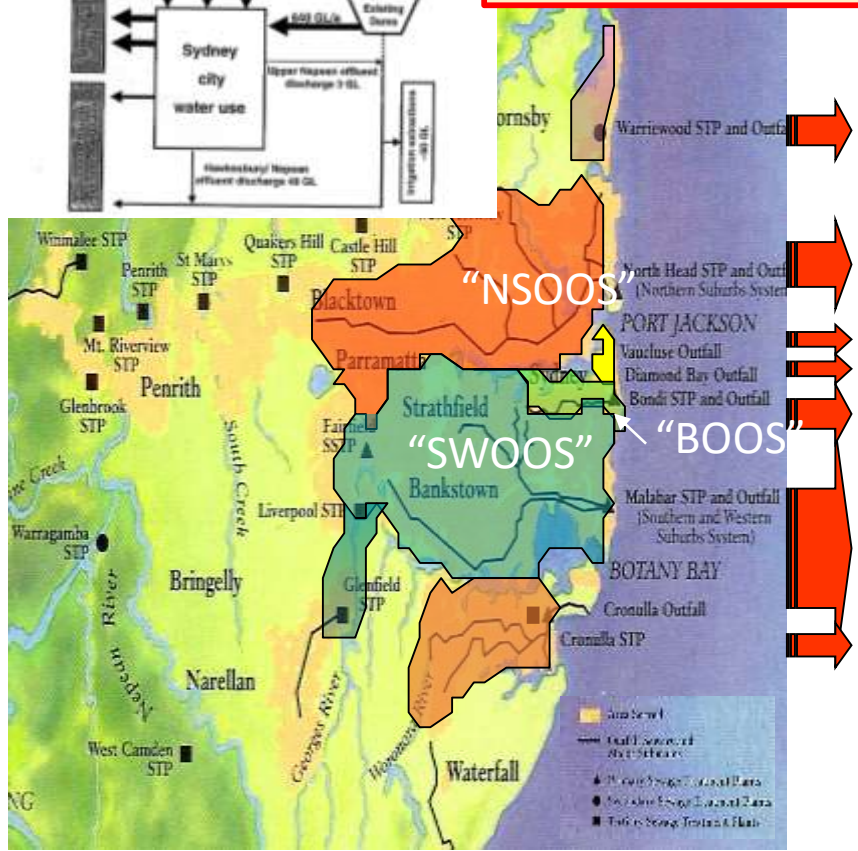
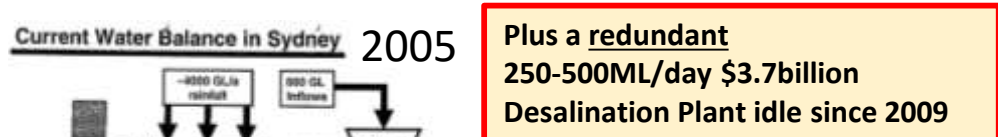
•Best Available Technologies
•Education

•Law
•Policy
•Regulation



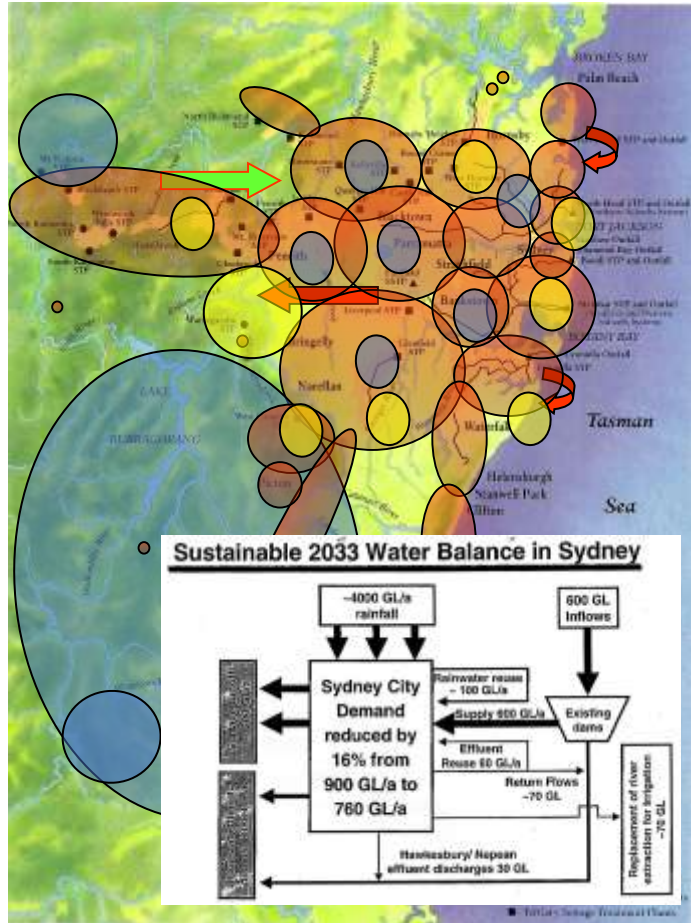
Sydney's current and future NZD scenario?

Current "Suck in spit out" approach is not sustainable



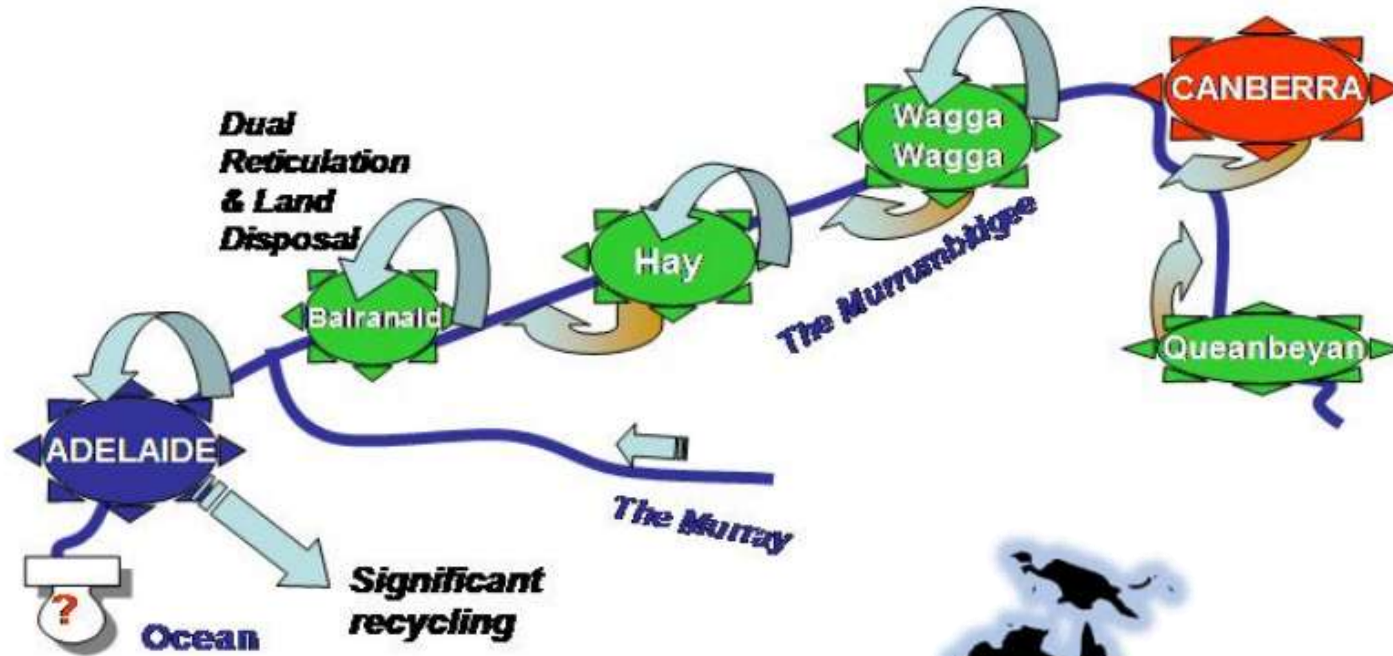
Dry Weather Flow	Treatment
15-20 ML/day	Secondary
350-400 ML/day	Primary
Up to 5 ML/day	Raw
Up to 5 ML/day	Raw
130-150 ML/day	Primary
450-500 ML/day	Primary
40-50 ML/day	Tertiary

Just one scenario for a sustainable, secure, resilient Sydney



- ### The Sustainable Future - SWCM
- Shoalhaven linked, but not ravaged
 - Diversified and decentralised services
 - Recycling water the norm
 - Recycling is a core water business in Sydney
 - Groundwater used in drought & replenished
 - Outfalls used not wasted
 - H/N river flows achieved
 - Demand curbed by true pricing reforms
 - Pollution managed
 - Urban rainwater a first choice supply
 - Price rises for infrastructure improvements
 - Water surplus guaranteed

Regional LWU opportunities for NZD? (lower Murray Darling Basin - 40 day “toilet to tap” cycle)



Canberra (Aus Capital) produces hi quality effluent suitable for advancing to potable water supply discharges near top of catchment



Several regional (local water utilities) treat water extracted from river polluted from agriculture, erosion and upstream city effluent use water and treat at WWTP and discharge back into river



Adelaide (South Australia State Capital) extracts its water supply near the outlet of the 1 million km2 basin with 2million people discharging waste water into it, plus massive agricultural and native pollution

“Its fine, because its unplanned potable recycling!!” BUT “we can’t have planned potable recycling!”

CEO Sydney Water and Chair of Water Services Association Australia



Net Zero Discharge approach/philosophy: can it deliver?

- It can and should be ***“the Gold Standard”!!!*** BUT we must avoid over complication and stifling bureaucratic regulation
- Lack of accountability with Government/Regulators is a hinderance
- Political interference and short term political goals are deadly
- Can be “rorted” by professionals and bluffocrats to achieve personal agenda and retain power
- Transparency and independent review is critical Chain of Custody must be audited just like a tax officer would!
- COMMUNITY and STAKEHOLDER involvement and ownership critical
- The Water Industry can not let the accounting system fail in the way carbon offsetting and trading has. Credibility, reliability and security is imperative.
- ***“Sustainable Water Cycle -Coin”*** anyone?

NET ZERO DISCHARGE a key element Sustainable Water Cycle Management approach/philosophy – give it a go!

The further back you look, the further forward you can see,
(Winston Churchill)

Wise words, unfortunately the current public sector management model ignores history, avoids risk, de-skills professionals, promotes complexity and stifles innovation with endless cycles of restructuring.
(Charles Essery, 2021)

