Hawkesbury Nepean Catchment

Nutrient Management and Offset/Trading Program

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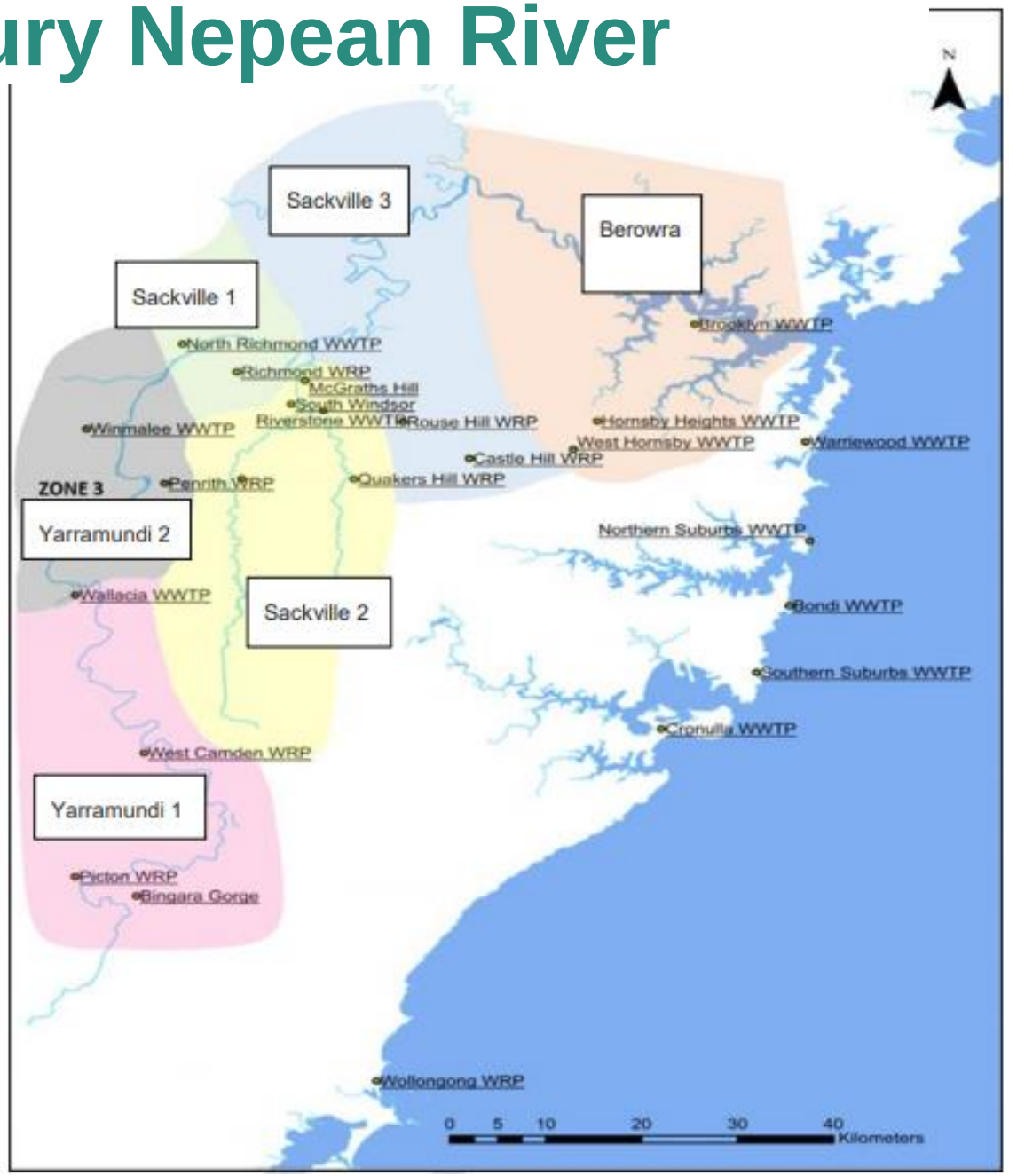
Outcomes for today

- Raise awareness of risks facing the HN River system
- Present historical improvements delivered by Sydney Water
- Introduce an alternate approach to nutrient management and regulation

The Hawkesbury Nepean River



A brief history of the river….

- Natural flow highly reduced by weirs and dams for drinking water and irrigation
- Eastern catchment cleared for agriculture, grazing and urban growth
- Water quality issues reported as early as 1860’s
- Tanneries and Abattoirs discharged pollutants to river system
- Sand and Gravel mining increases river width/depth
- Turf farms and market gardens established on flood plains
- Wastewater Treatment introduced between 1940 and 1980

Protecting the HN River System

- Sydney Water preparing for increased development in Western Sydney
- Want to improve liveability in a cooler, greener, better ‘Parkland City’
- HN River has a history of algal blooms and weed outbreaks
- River in better condition now, but don’t want it to deteriorate
- Seek to reconnect communities to their local waterways
- Many local waterways are in very bad condition
- Requires deliberate and co-ordinated action to manage them

The Drivers

Why change now?

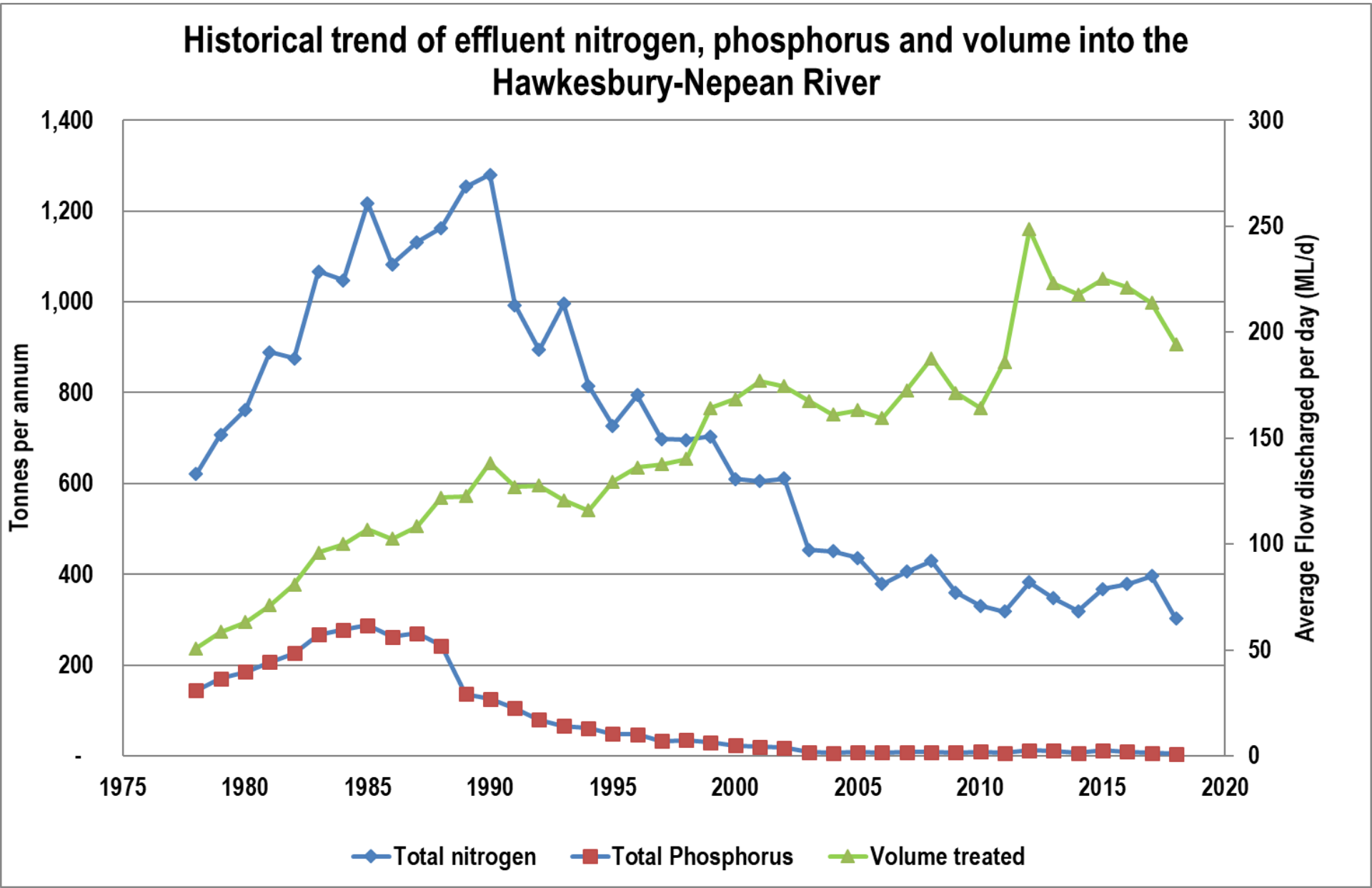
- Opportunity to do something better with land use changes
- Changing community attitudes
- River in ok condition (lock it in)
- Limited ability to further reduce nutrients at a reasonable cost
- SW and GSC – “to maintain or restore water quality and waterway health

Current Environmental Regulations

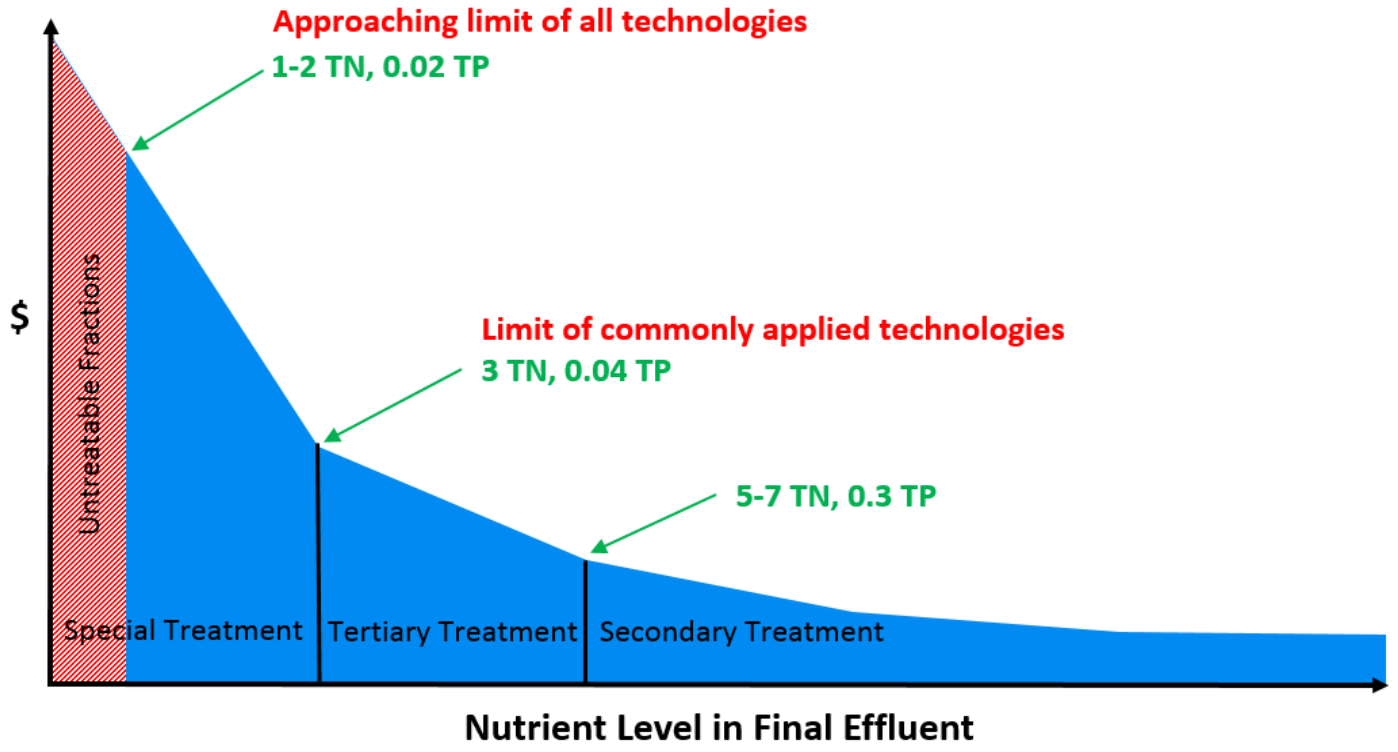
EPA issue licences setting out discharge requirements

- Load and concentration limits
- Prescriptive conditions focussed on engineering
- Encourages traditional servicing solutions
- Most plants comfortably meet current limits (esp load limits)
- Current limits are too high (at most plants)
- Need to tighten limits but don’t know by how much
- Prefer a flexible, outcome focused regulatory framework

Historic loads from Treatment Plants

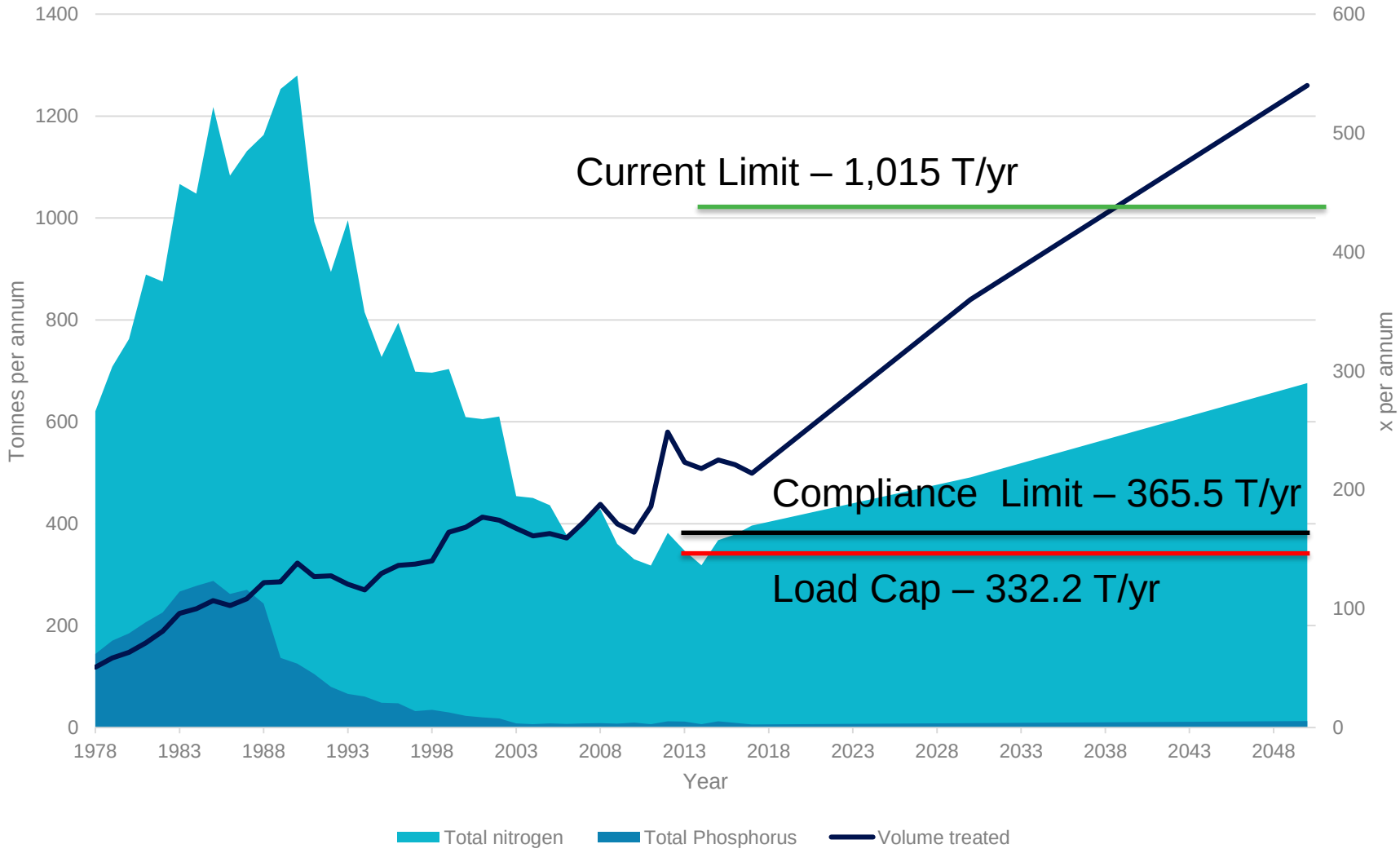


Limited ability to improve treatment performance

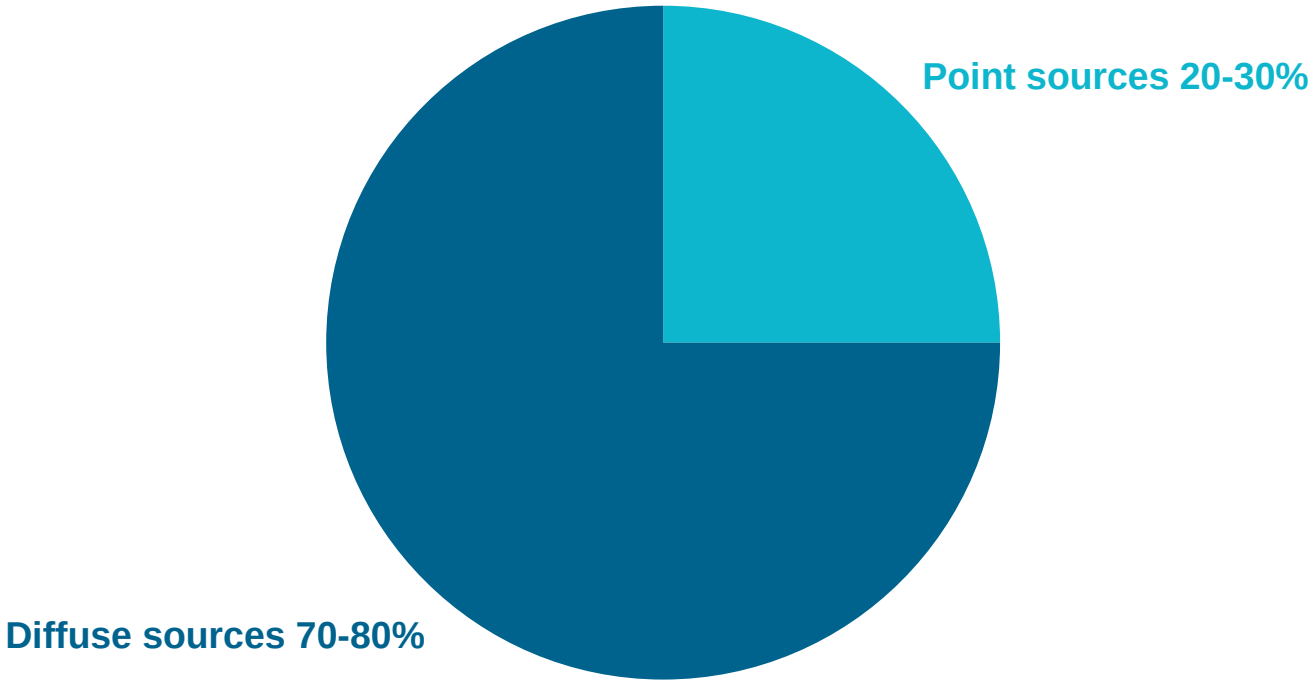


- EPA have adopted two performance standards for treatment plants
  - Good Performance – TN 6mg/L and TP of 0.1mg/L
  - Best Practice Performance - TN 3mg/L and TP of 0.05mg/L
  - Existing HN plants must achieve good performance by 2024.

The Future


1400
1200
1000
800
600
400
200
0
Tonnes per annum
600
500
400
300
200
100
0
x per annum
1978
1983
1988
1993
1998
2003
2008
2013
2018
2023
2028
2033
2038
2043
2048
Year
Current Limit – 1,015 T/yr
Compliance Limit – 365.5 T/yr
Load Cap – 332.2 T/yr
Total nitrogen
Total Phosphorus
Volume treated

Diffuse and point sources of pollution in the Hawkesbury-Nepean River



Sydney Water's wastewater treatment plants make up the majority of the point source discharges into the Hawkesbury-Nepean River, however, on average this is only 20-30% of all nutrient pollution.

Diffuse Nutrient Pollution

- Limited regulation and controls for diffuse pollution
- Contributes 75% of nutrient load each year
- More cost effective projects
- Better environmental outcome
- Additional social and community benefits
- Need to discuss with community

Engagement Activities

Actual river users

- Intercept surveys at 9 locations
- 168 surveys completed Jan 2018

Customer Reference Groups (CRGs)

- Berowra, South Maroota, Schofields, Richmond and Penrith
- Series of 3 Workshops
- Mostly passionate environmental people

Others

- Councils
- Aboriginal Land Council
- Developers

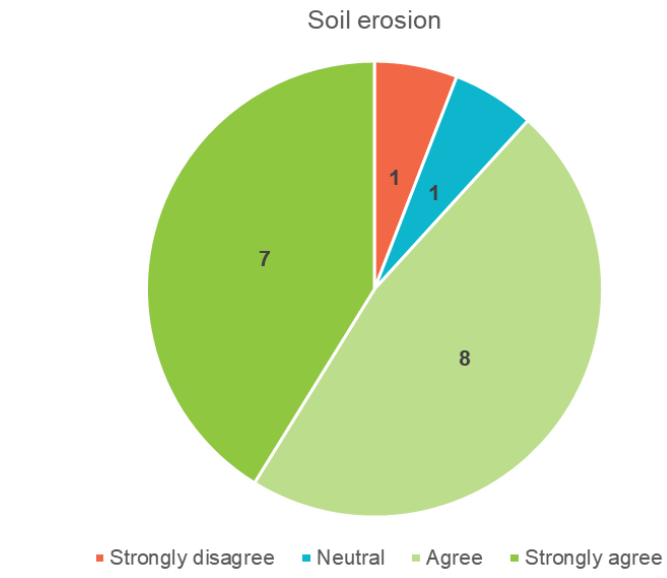
Regular Customers

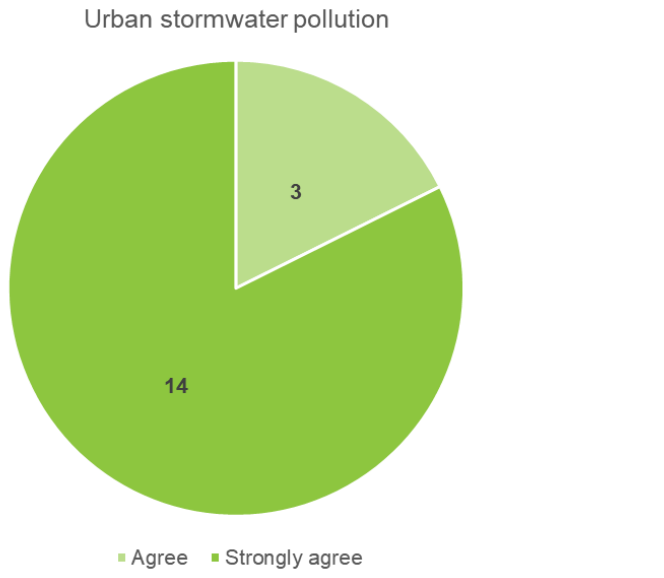
- Phone survey of 600 customers
- Inside and outside the HN catchment

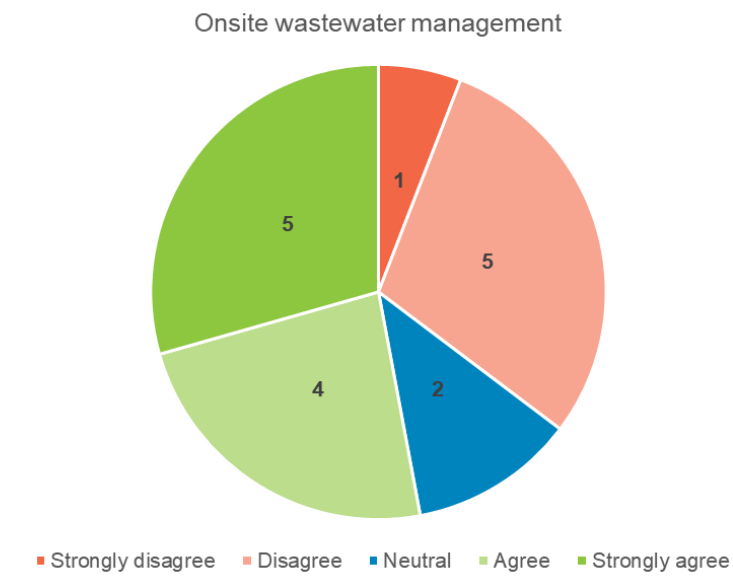
Community Reference Group Findings

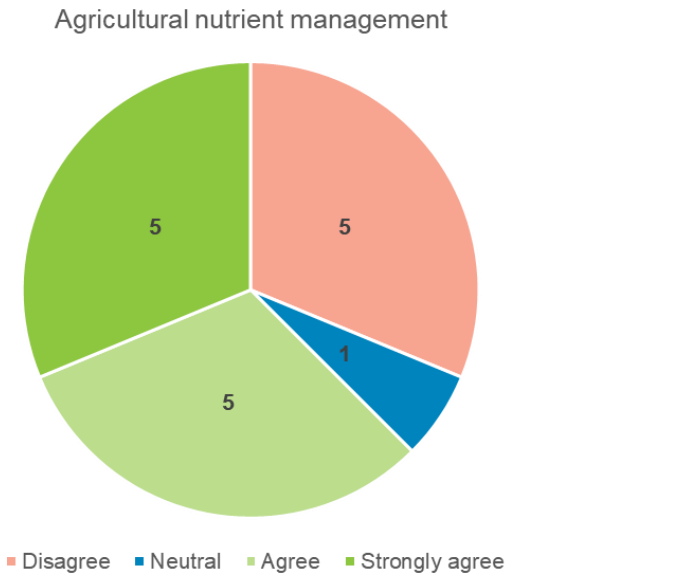
- Strong support for diffuse pollution projects as offsets
- Expectation that Sydney Water continues to use best practice treatment technology
- Concern regarding lack of regulation and/or enforcement of diffuse pollution sources
- Primary areas of concern are sediment/erosion and urban stormwater, particularly given scale of development in the catchment

Sydney Water should get involved with managing this pollution source









Councils and other feedback

- Strong support from councils - collaboration
- Councils under-resourced to manage diffuse pollution
- Developers agree that sediment control is a problem
- Stormwater requirements are old and outdated
- Most developers just meet basic requirements
- Ongoing maintenance of stormwater assets is a big problem.
- Aboriginal land council – largest landholder in Western Sydney

What does the science say?

- Most sections of the HN river system don’t meet water quality guidelines for TN, TP or Chlorophyll a
- Sydney Water treatment plants have a genuine adverse impact on TN levels across the HN river system
- Our effluent contributes to macrophyte growth (aquatic plants and weeds) often combined with diffuse P in sediments
- Our discharges generally have a beneficial impact with respect to TP levels and our flow helps reduce the risk of algal blooms.

Nutrients from all sources impact the River

- Nutrients from treatment plants. Daily continuous contribution throughout the year.
- Diffuse pollution. Very high loads of nutrients introduced to the river during rain events and very little contribution in dry weather.
- BUT…..most pollutants are retained in the river system, so diffuse pollutants enter the river during rain, but accumulate and impact the river in dry weather (along with nutrients from treatment plants)
- Particular problem with nutrient accumulation in tidal wedge and transition from fresh to salt water.

New HN Regulatory Framework

No net increase in nutrient loads

- Zone nutrient allocations, with trading/offsets
  - EPA have capped loads in each river zone at ‘current’ levels
  - Loads re-allocated based on population serves in 2030
- Nutrient offsets
  - Invest in projects to reduce diffuse pollution and apply for credits
  - Sydney Water currently exploring pilot projects to test framework
- South Creek special rules
  - Volume limits (ie, Min and Max flows in dry weather)
  - Lower concentration limits (particularly for new plants)

Nutrient Offsets / Trading

The intent…

- Offsets must:
  - Result in at least the same or a more beneficial effect on the environment
  - Be reliably estimated or ascertained by EPA
  - Occur wholly, or partly, in an area affected by the pollutants
  - Likely to last at least for the offsetting period

- Offset must be in kgs of TN or TP discharged to the H-N, & directly compensate for the specific environmental values impaired by the WWTP discharge being offset

Offset Pilot Program

Project Types

Raingardens

Wetlands & Bioretention

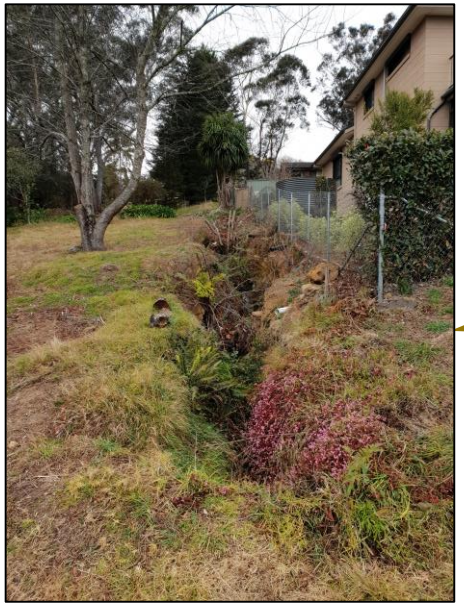
Bank Stabilisation

Project Delivery Process

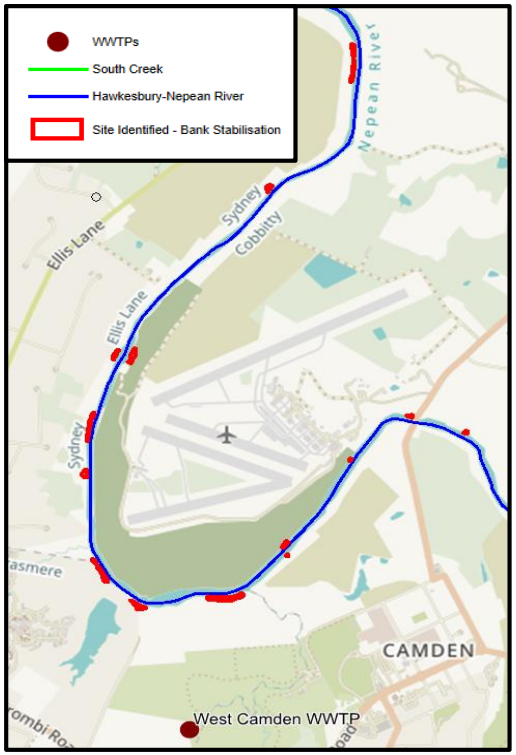
- Site Identification
  - Local Councils
  - Soil Conservation Service
- Design & Construction
  - Community Consultation Groups
  - Local Government
  - Soil Conservation Service
- Maintenance
  - Local Government
  - Conservation Volunteers Australia
- Monitoring & Research
  - Local Government
  - National universities

Raingardens
with Blue Mountains Council

Sydney WATER



Bank Stabilisation with Camden Council



Monitoring and Modelling

- Sydney Water has an enormous longitudinal data set
- Water quality monitoring is not well coordinated (collaboration)
- Developed a hydrodynamic water quality model about 5 years ago
- Improving model capability in South Creek (hydrodynamics)
- Opportunity to improve biogeochemistry and ecosystem response
- Emerging areas of interest
    - Use of N14/15 isotope analysis to develop pollution fingerprint
    - Anthropogenic indicators (Caffeine, Paracetamol)
    - Mineralisation and Transformation of N species (bioavailability)
    - Ratios of N and P that increase eutrophication risks
    - Role of carbon, silica and sediment in eutrophication events

Current Research Programs

- **EPA/OEH**
  - Monitoring in high and low flow conditions
- **Griffith University/Dept of Environment and Science and Queensland Urban Utilities**
  - Transformation of N species and bioavailability
- **Western Sydney University**
  - Monitoring and performance of wetland systems

Sydney