



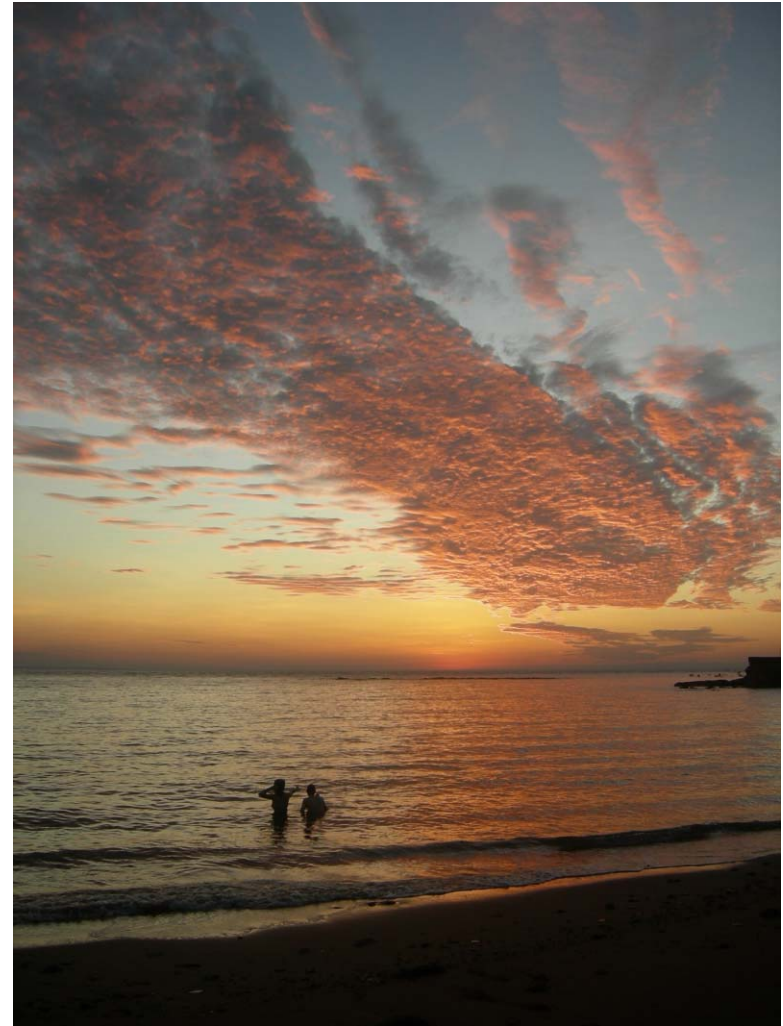
WSUD in the wet-dry tropics

WSUD in wet-dry tropics

- Why? Is this just a crazy idea from the Gringos in the South?
- Key drivers for WSUD in Darwin
- Barriers to implementation
 - Technical / Design Issues
 - Organisational / political / social barriers

WSUD in Darwin

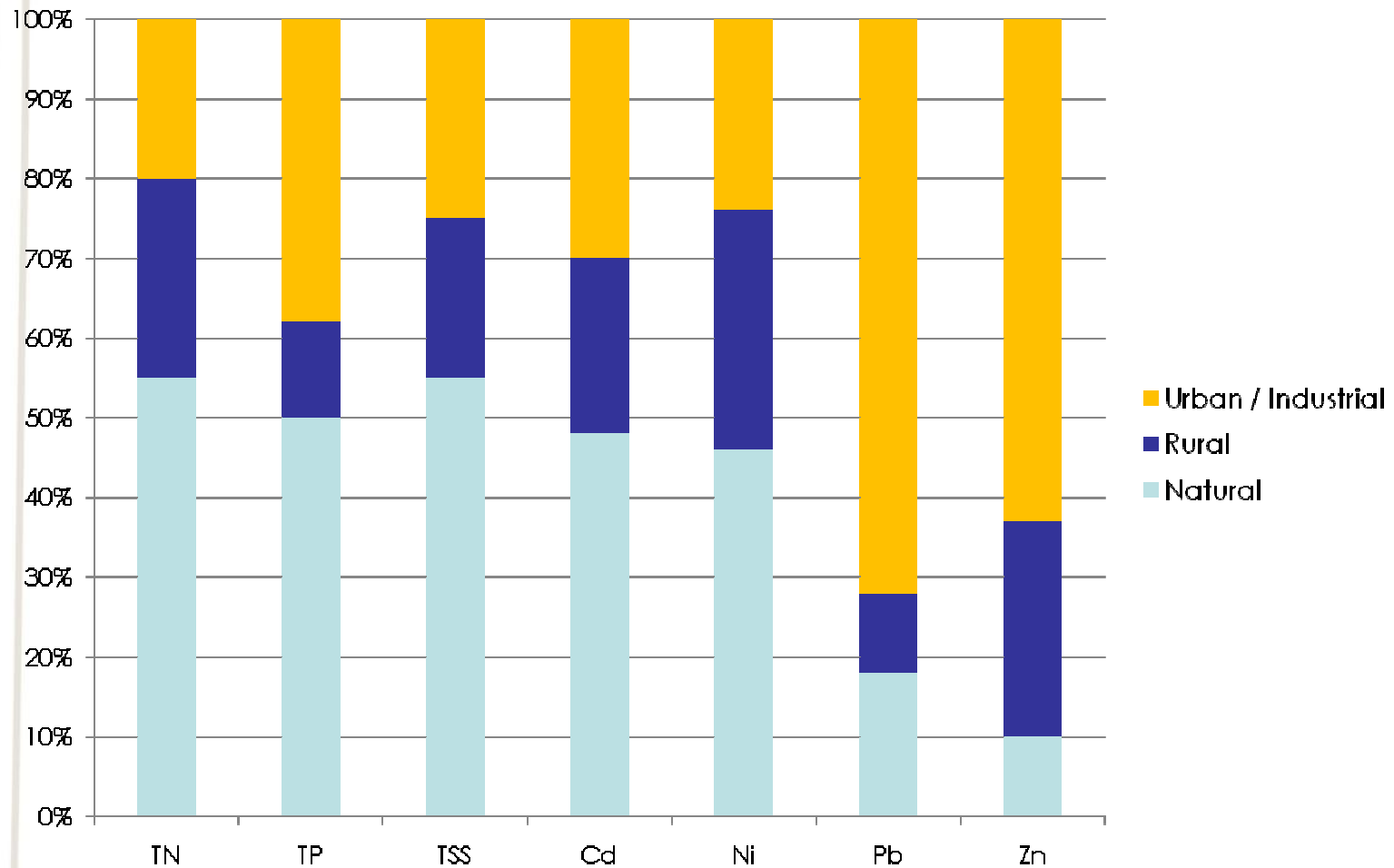
- Darwin Harbour is a key natural resource, with environmental, social and economic values
- Urban stormwater is a key contributor to pollutant loads in the Harbour
- Development in Darwin is expected to be rapid (although from a low base)



National drivers

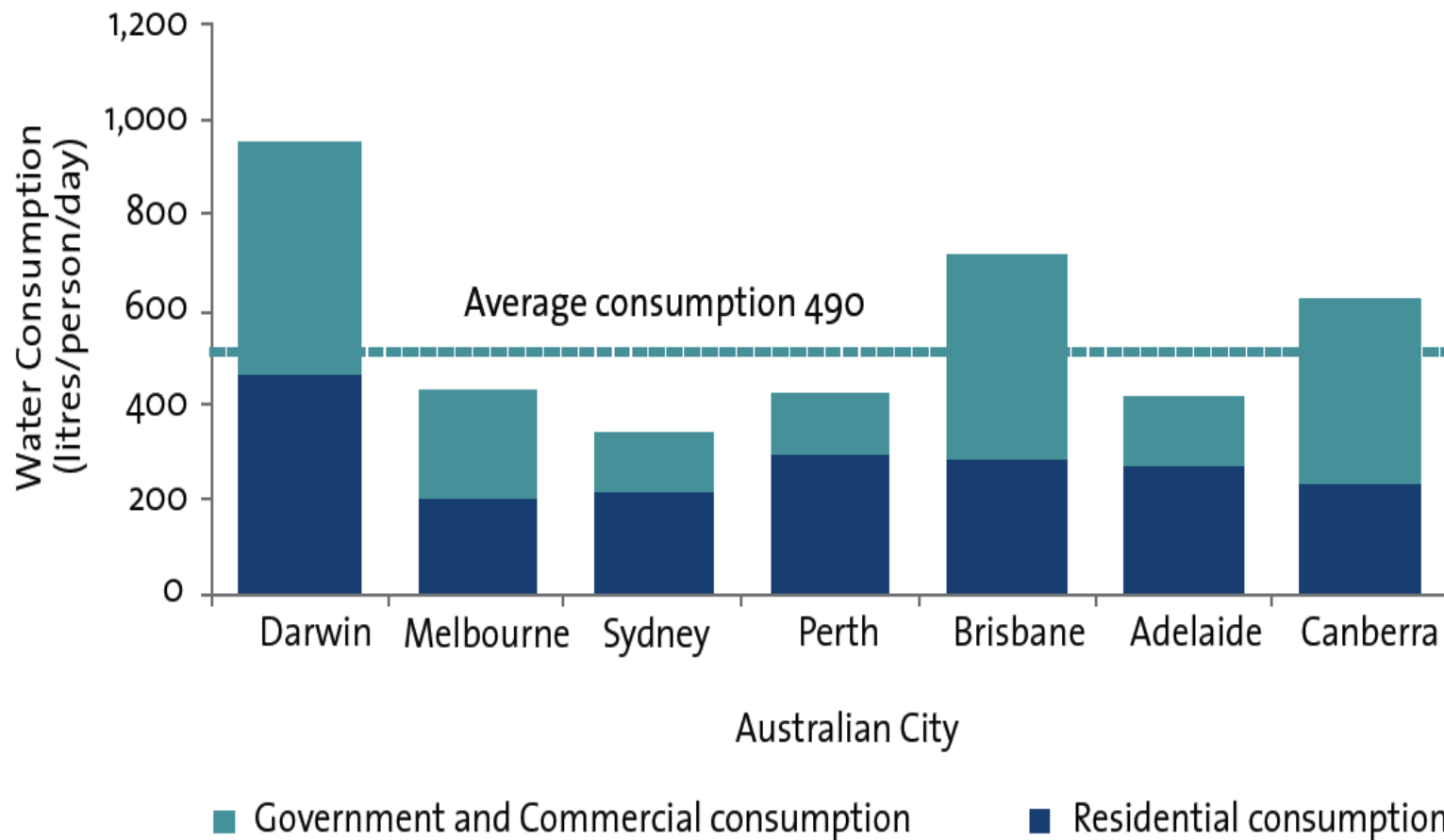
- National Water Initiative
- National Water Quality Management Strategy
- Australian Runoff Quality
- National WSUD framework documents

Pollutant loads to Darwin Harbour



Padovan 2001

Water consumption litres per person per day for Australian cities



Waterway impacts



Barriers to water sensitive urban design

Institutional barriers

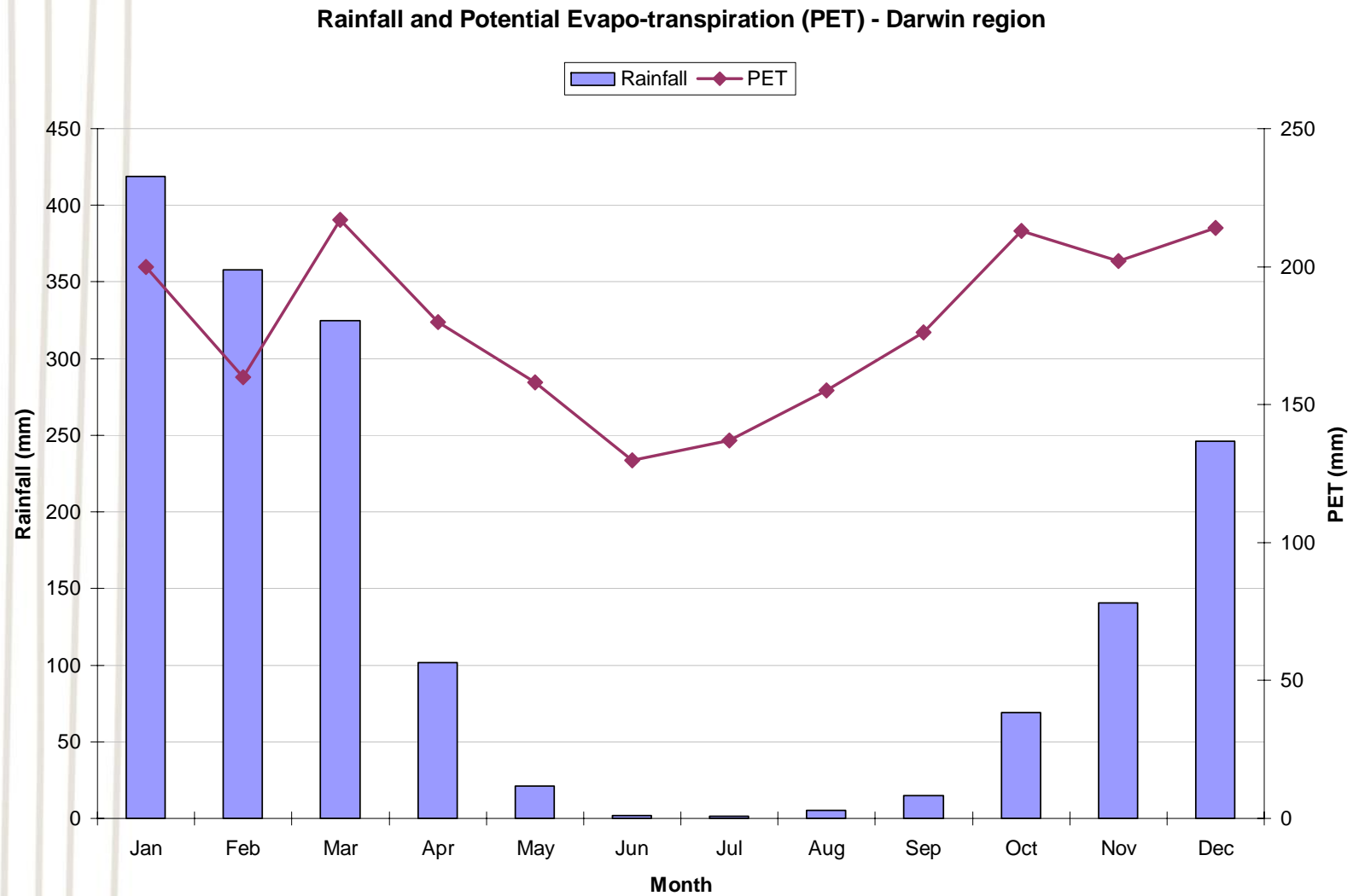
- Community perception of
 - abundant rain
 - good water quality
- Historical lack of integrated planning (WSUD relies on integration)
- WSUD in its infancy in the wet dry tropics
- Capacity to deliver WSUD
- Enforcement (e.g. sediment and erosion controls, low flow pipe)
- Potable water conservation as an example

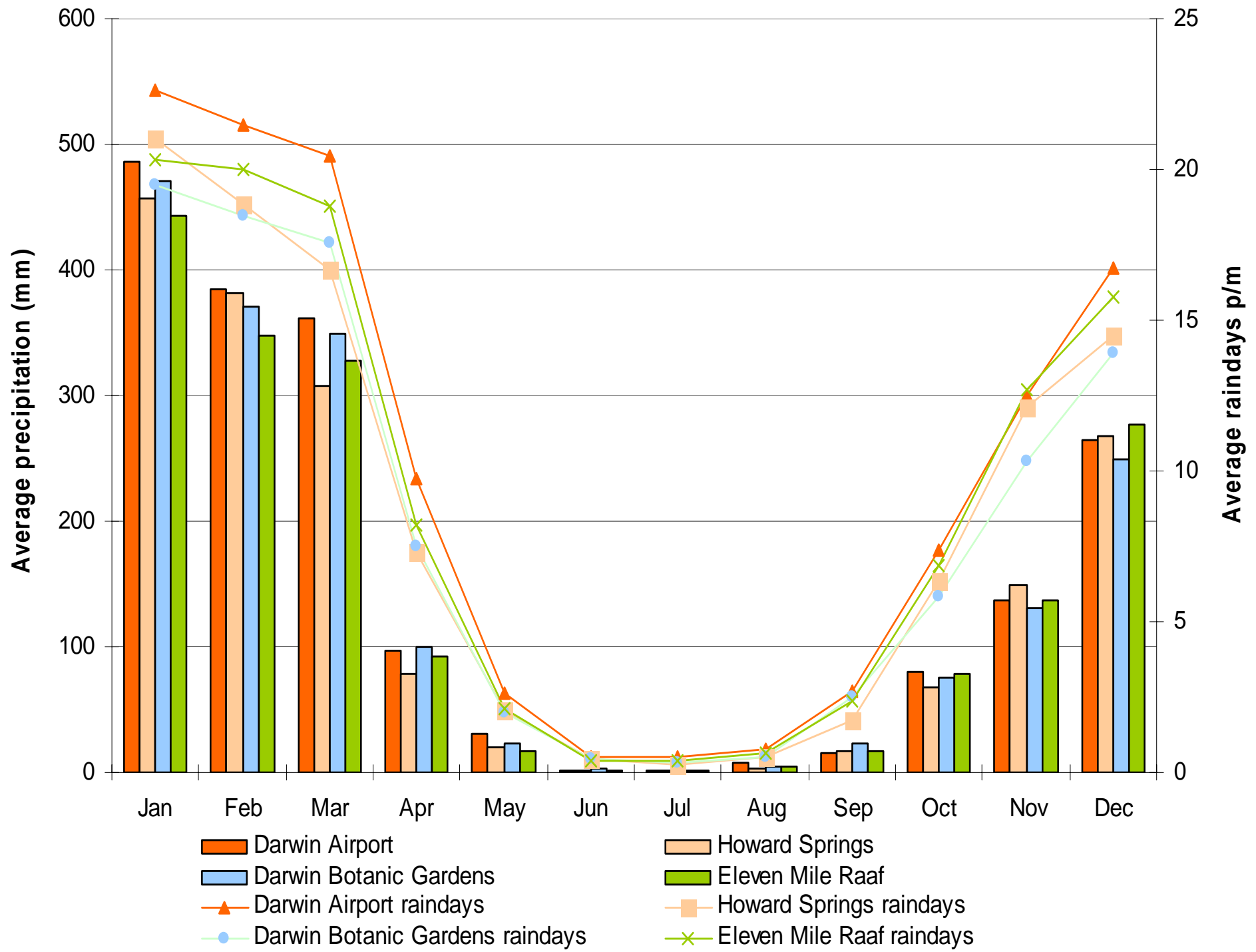
Technical barriers

- Climate-related
 - Intense wet season rainfall
 - Treatment system design
 - Rainwater/stormwater reuse effectiveness
- Potable water conservation
 - Solutions for Darwin need to be different
- Mosquitoes
 - Tropical diseases
- Significant gaps in technical knowledge
 - Pollutant loads
 - Pollutant modelling parameters
 - Stream stability processes

Climate

DESIGN ISSUES

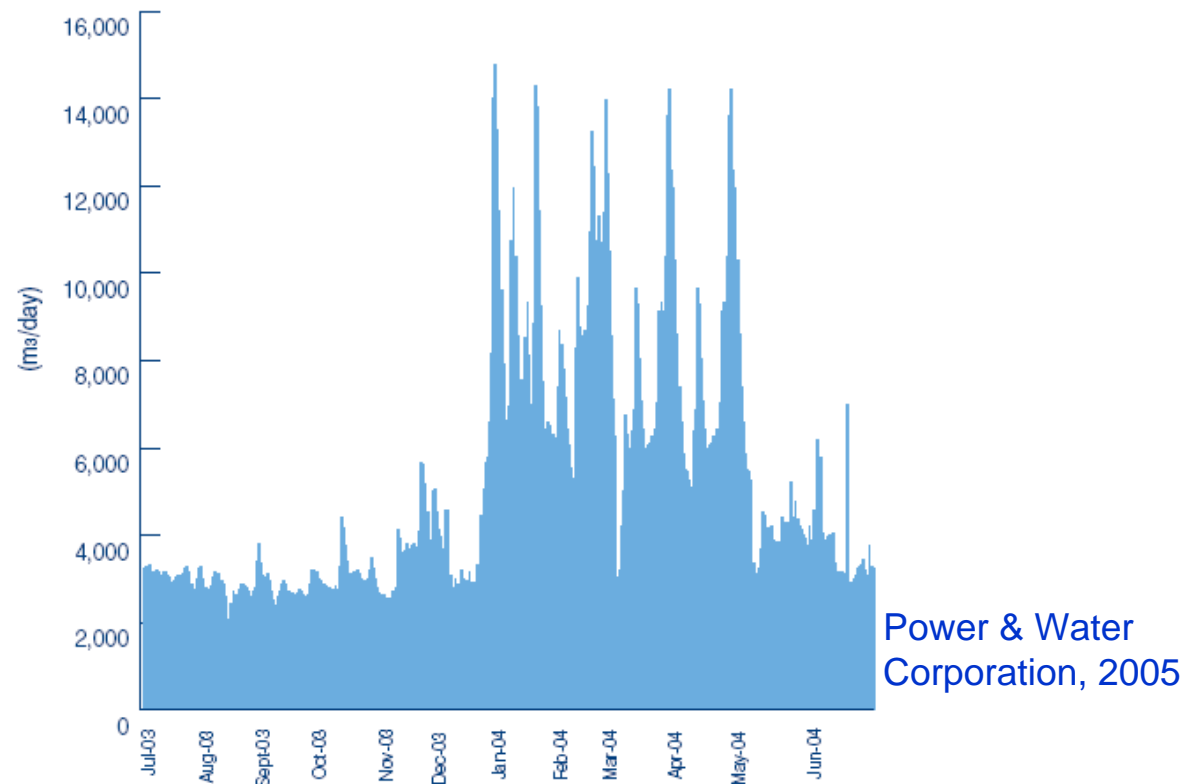




WSUD IN DARWIN

- Wastewater
 - Significant volumes of infiltration and ingress during wet season

Palmerston WSP



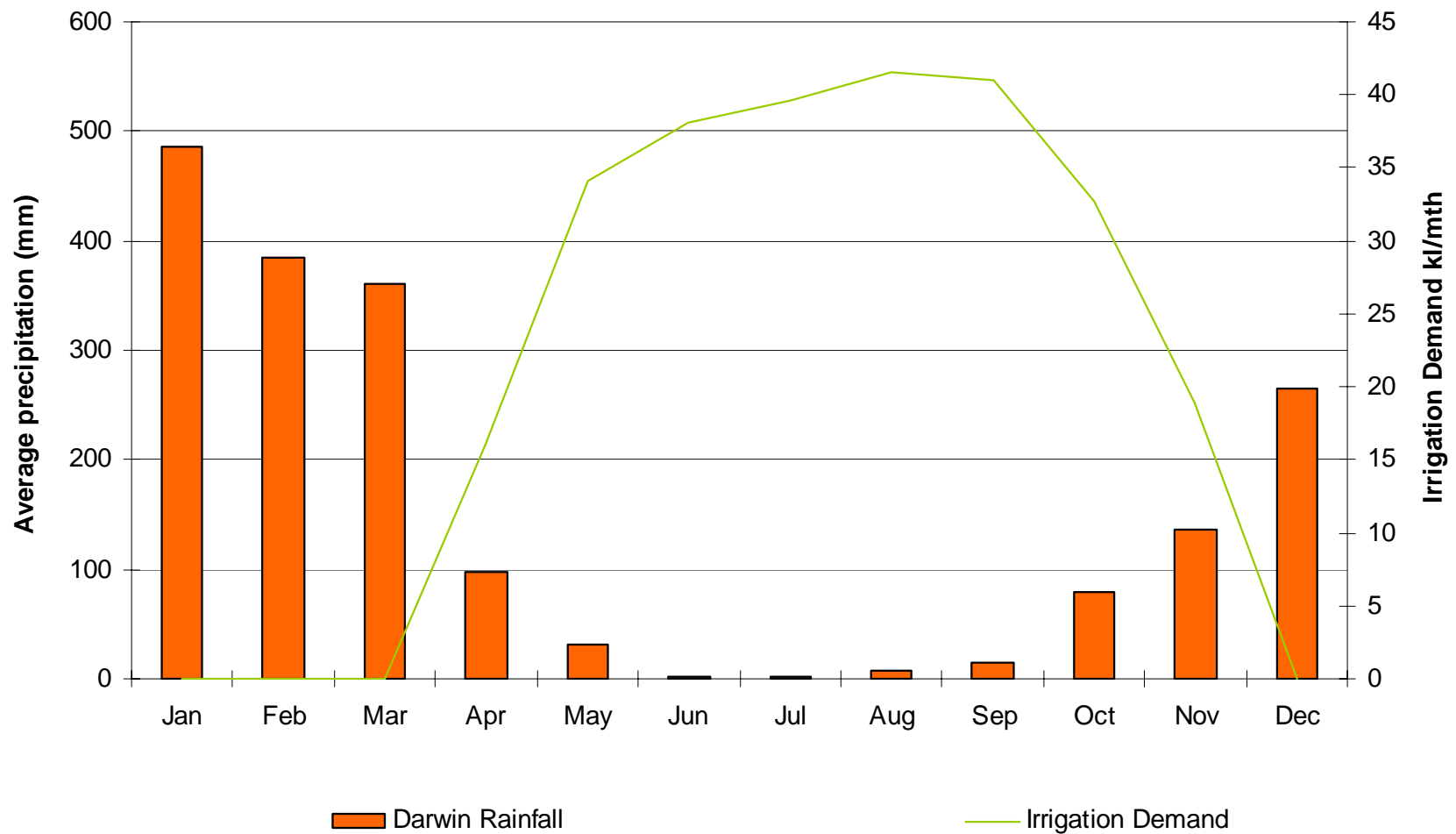
Stormwater treatment

Climate of the wet-dry tropics underpins design

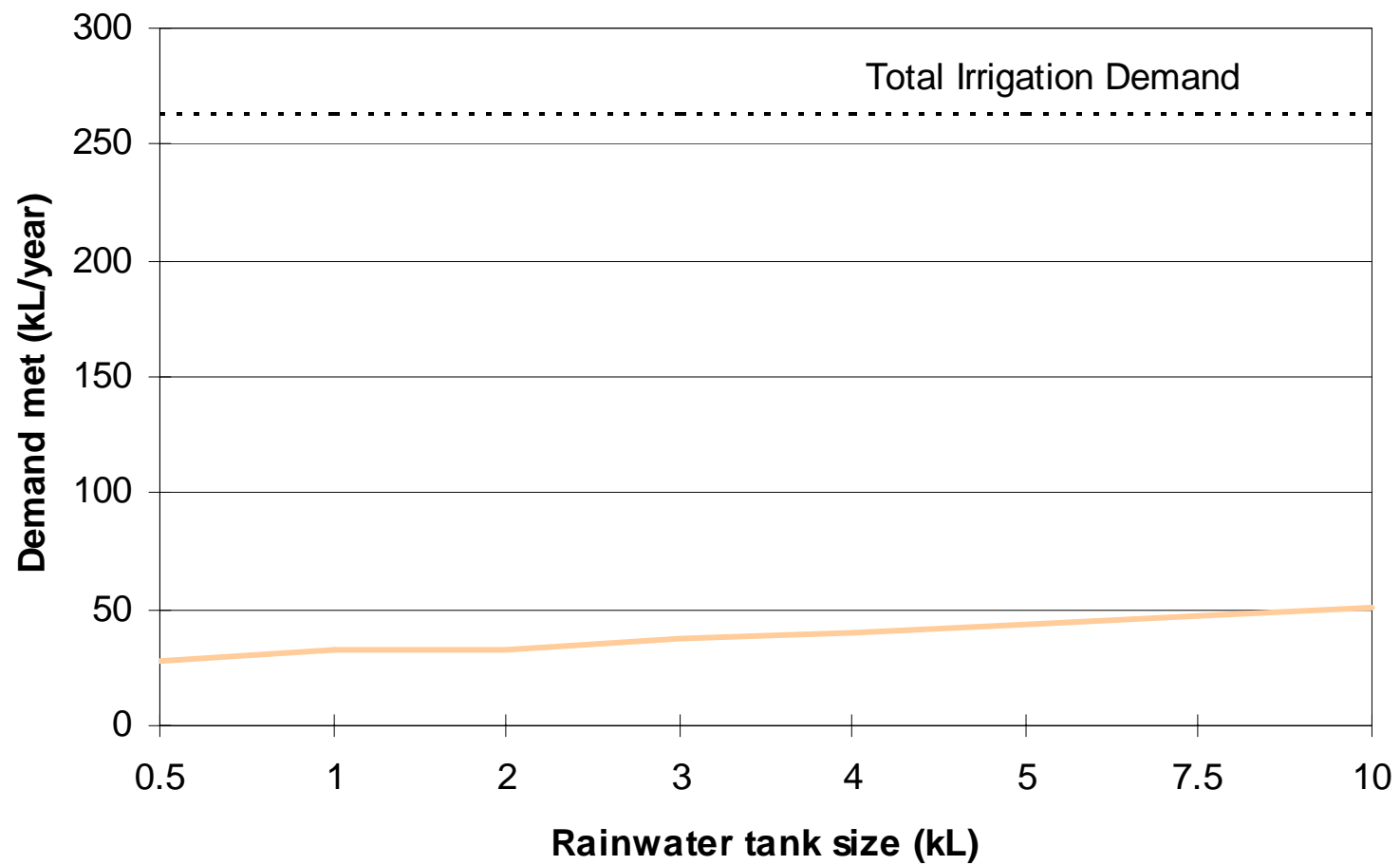




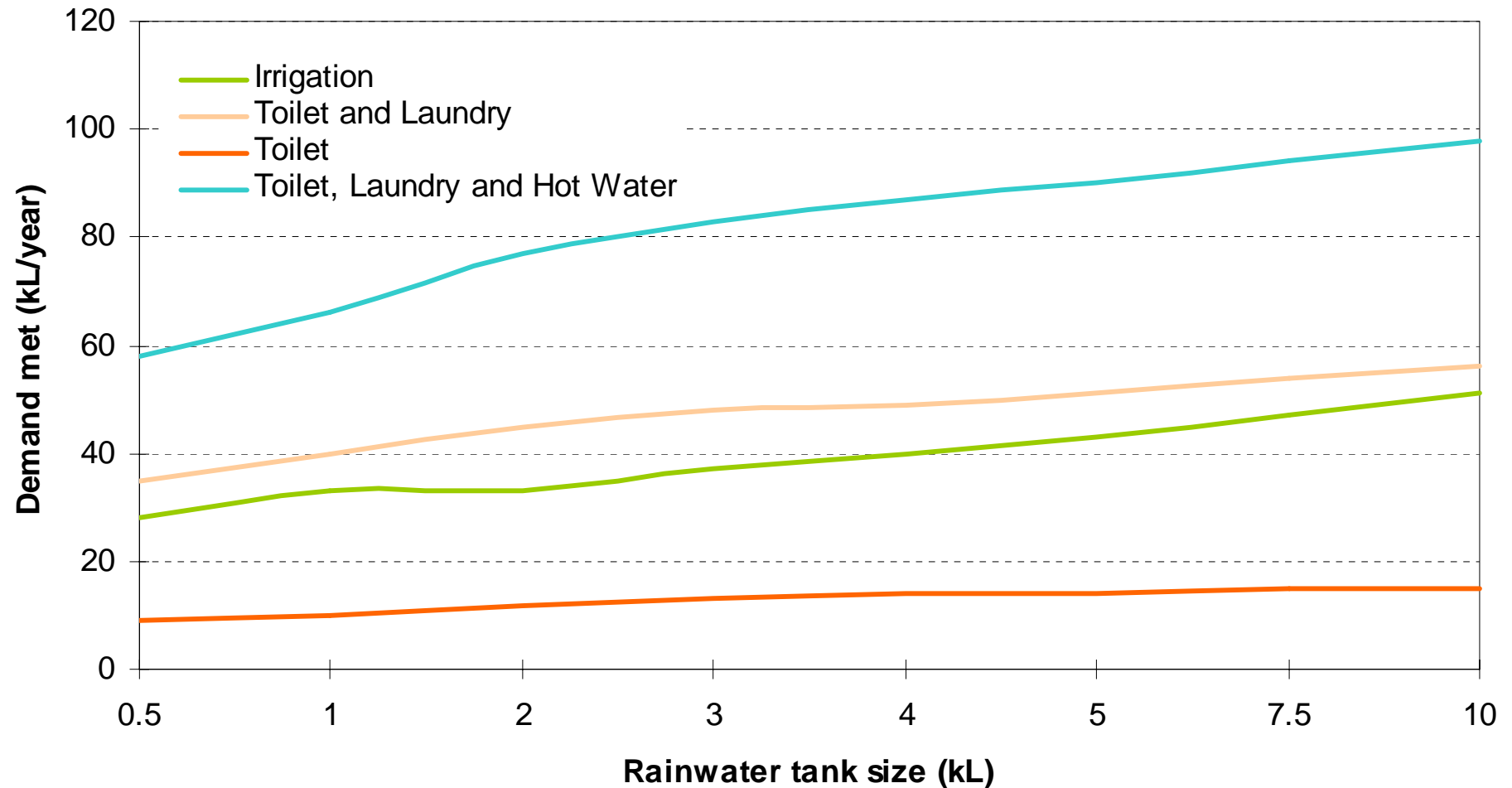
Rainwater Tanks



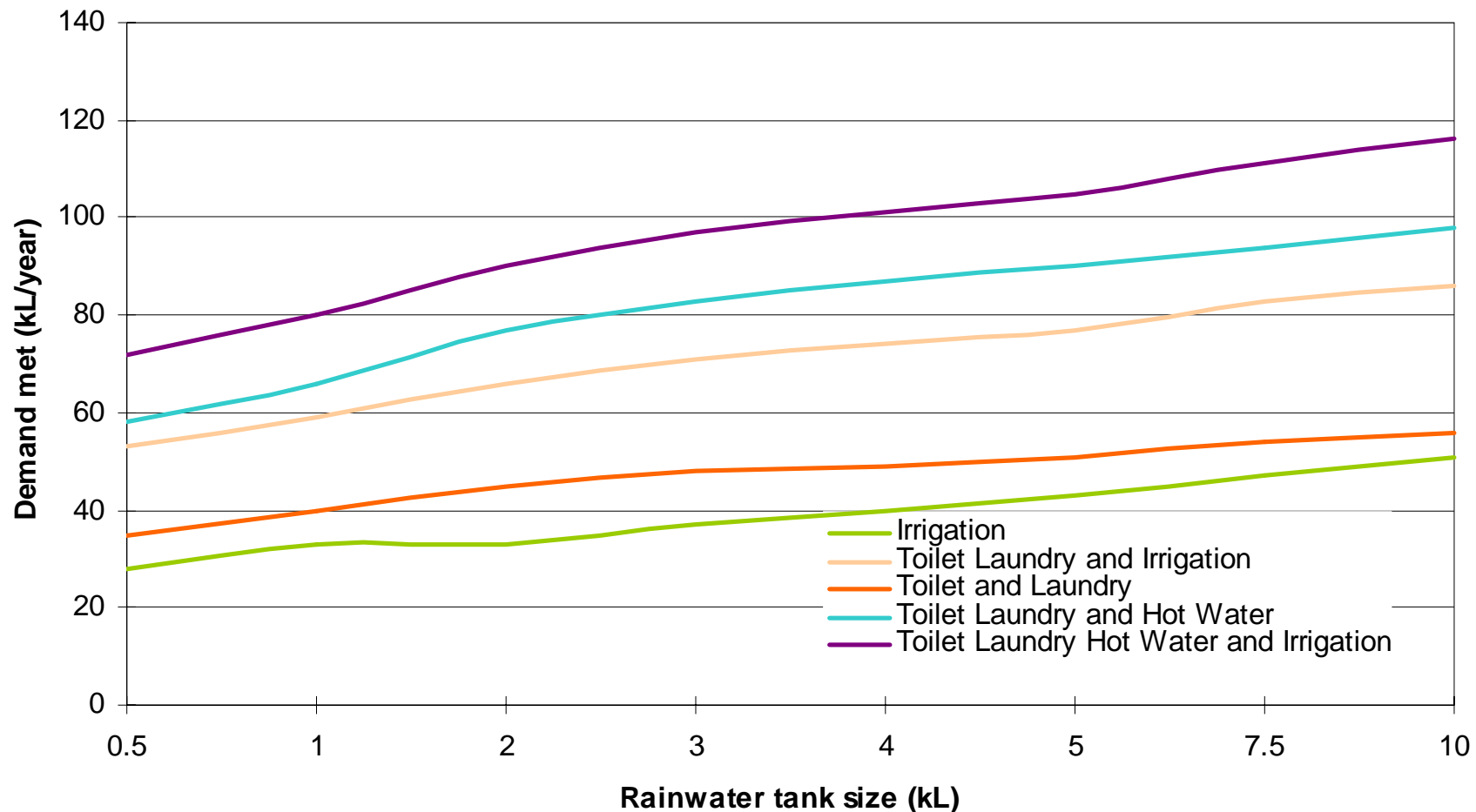
Sizing curve for outdoor demand



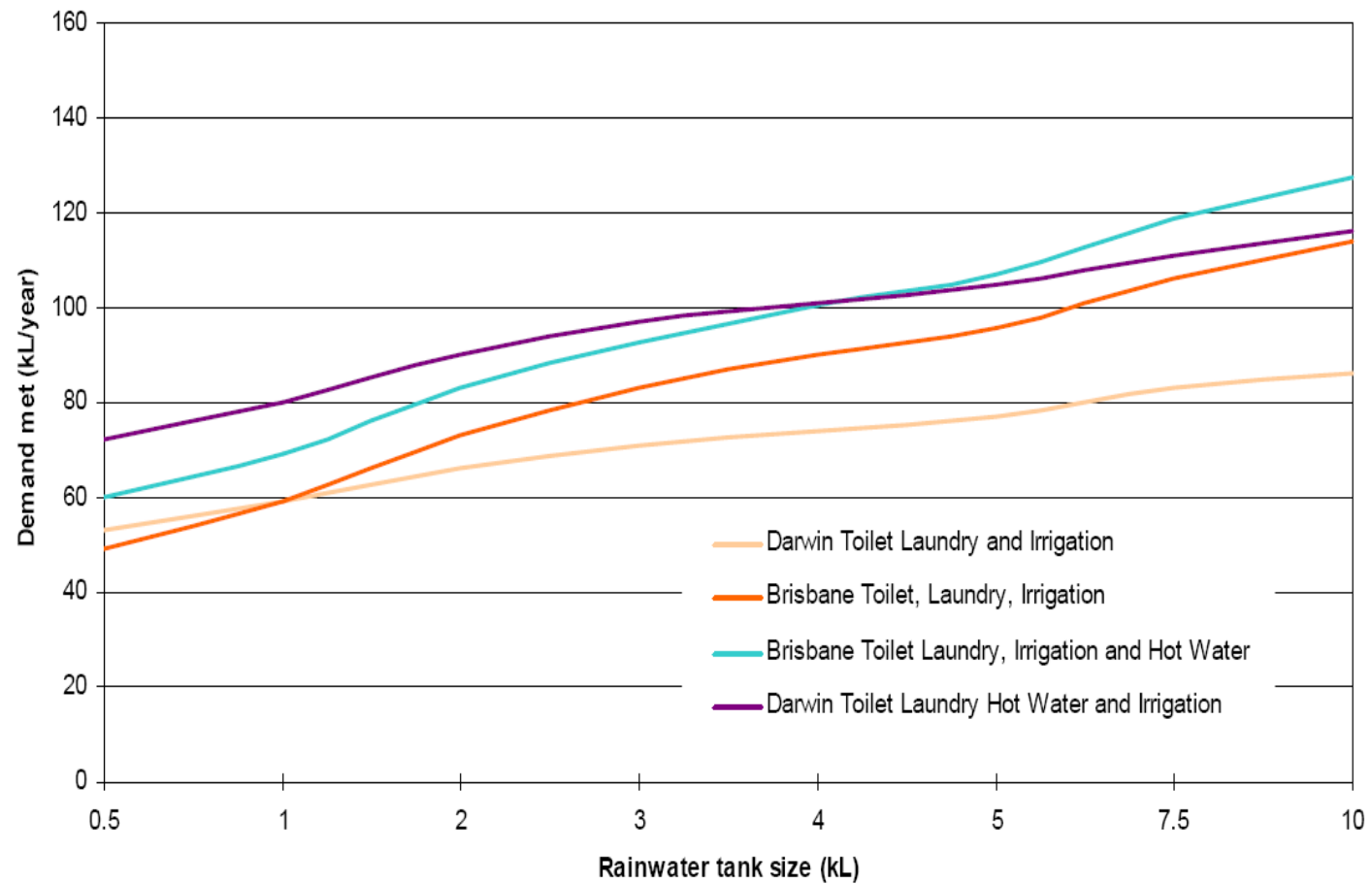
Rainwater tank reuse volumes and indoor demands



Rainwater tanks - indoor and outdoor demands combined



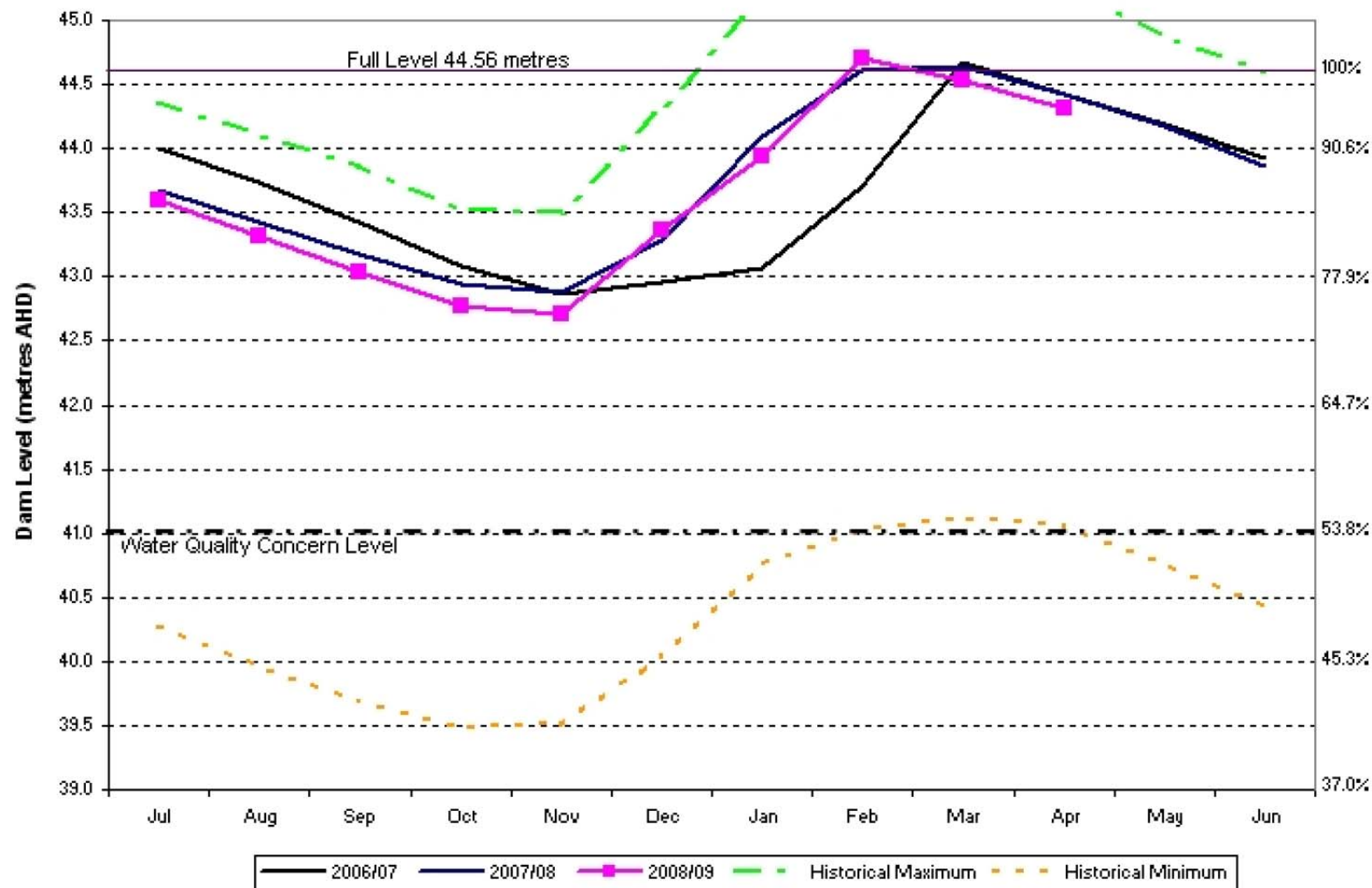
Rainwater tanks save more water in Darwin or Brisbane?

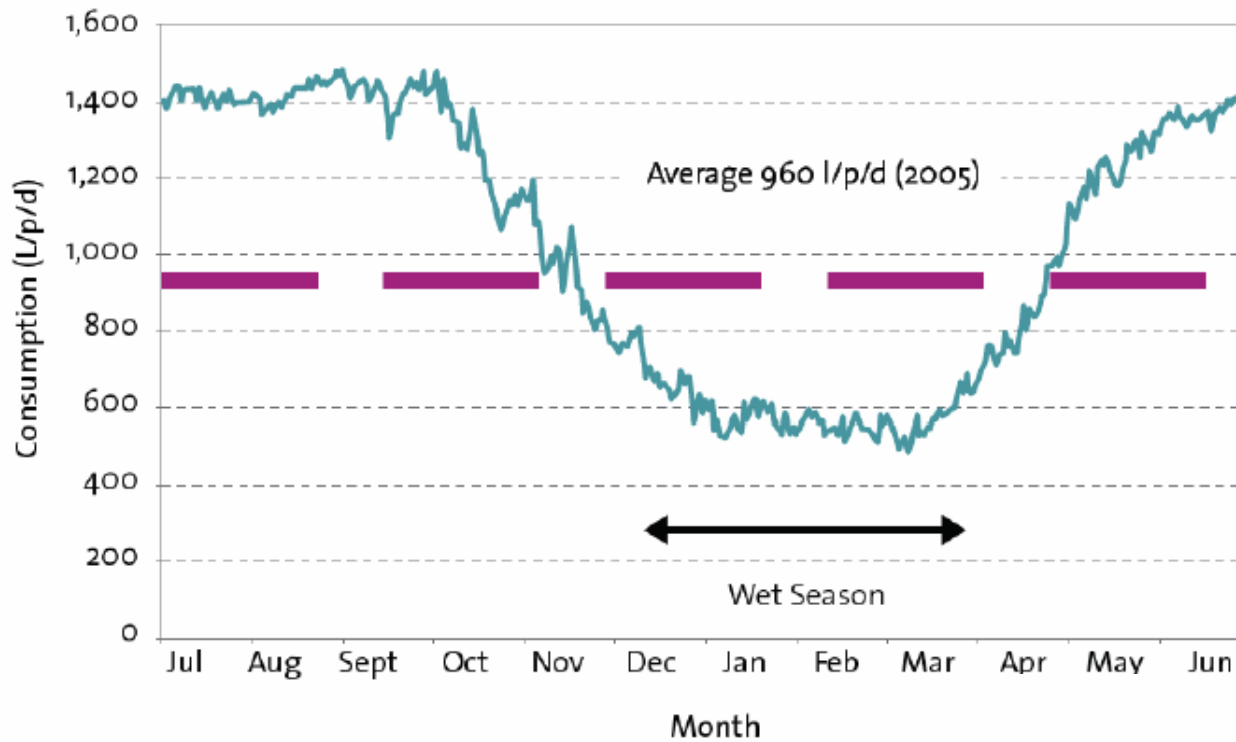


Potable water conservation

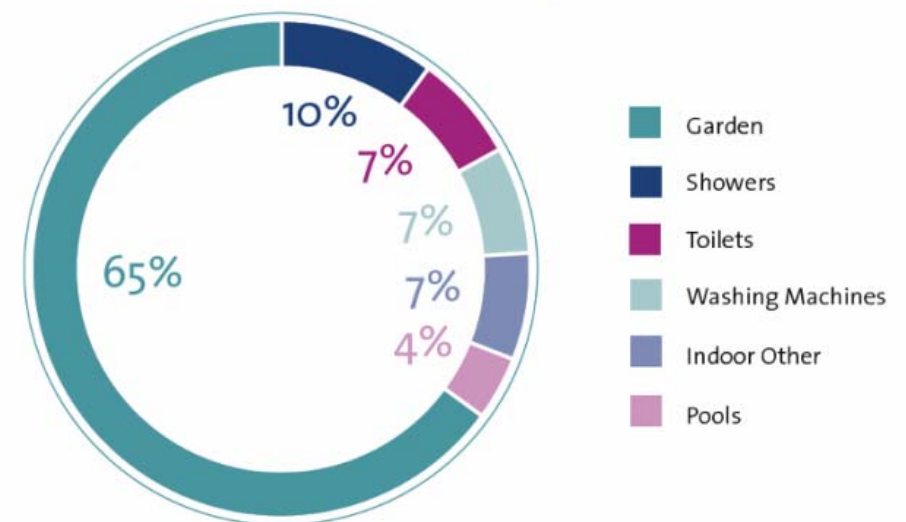


Darwin River Dam Level



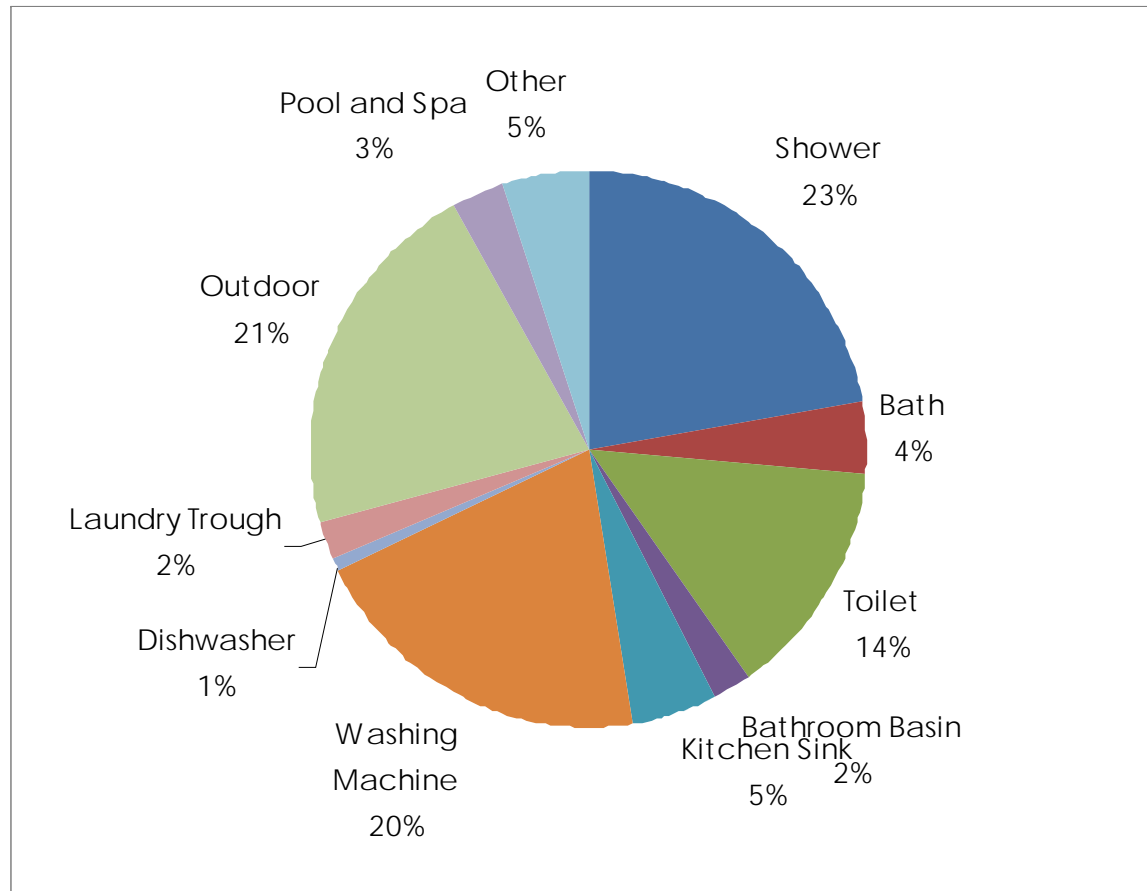


Where we use our water
 Single Residential (House) Household Demand
 Estimated % only



Darwin residential water demands

Sydney residential water demands







Mosquitoes





Established practices to minimise the mosquito breeding risk

- Create habitat for mosquito predators
 - Deep pools
 - Open water zones
 - Vegetation which allows fish access
 - Maintain refugia in the dry season
- Avoid creating mosquito habitat
 - Retain water for short periods only
 - Avoid isolated pools
 - Manage weeds, sediment build up
 - Water level fluctuations can interrupt mosquito life cycle

Gaps in Technical Knowledge

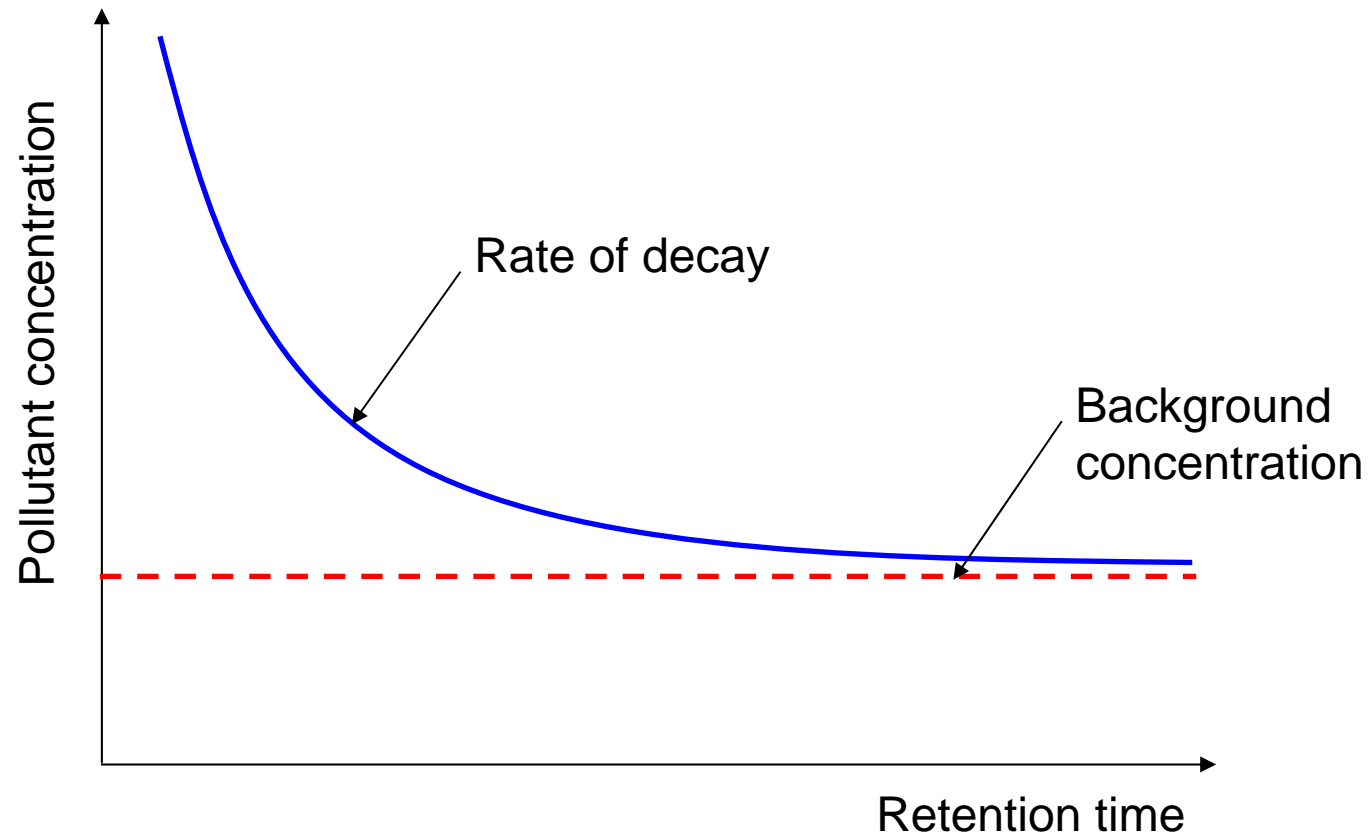
Water consumption

- Good data on a community-wide scale
- Gap in household-scale data
 - Wet season vs. dry season
 - Effect of water conservation practices
 - Different dwelling types
 - Old/new suburbs
 - Detailed studies on attitudes/demographics and impacts on water conservation

Pollutant loads

- Some monitoring in urban catchments
 - Average wet season loads
 - Wet season pattern
- Are most pollutants washed off at the start of the wet season?
- Does land use/impervious fraction matter?
 - is there a difference between old and new suburbs?
- How important is construction stage sediment?

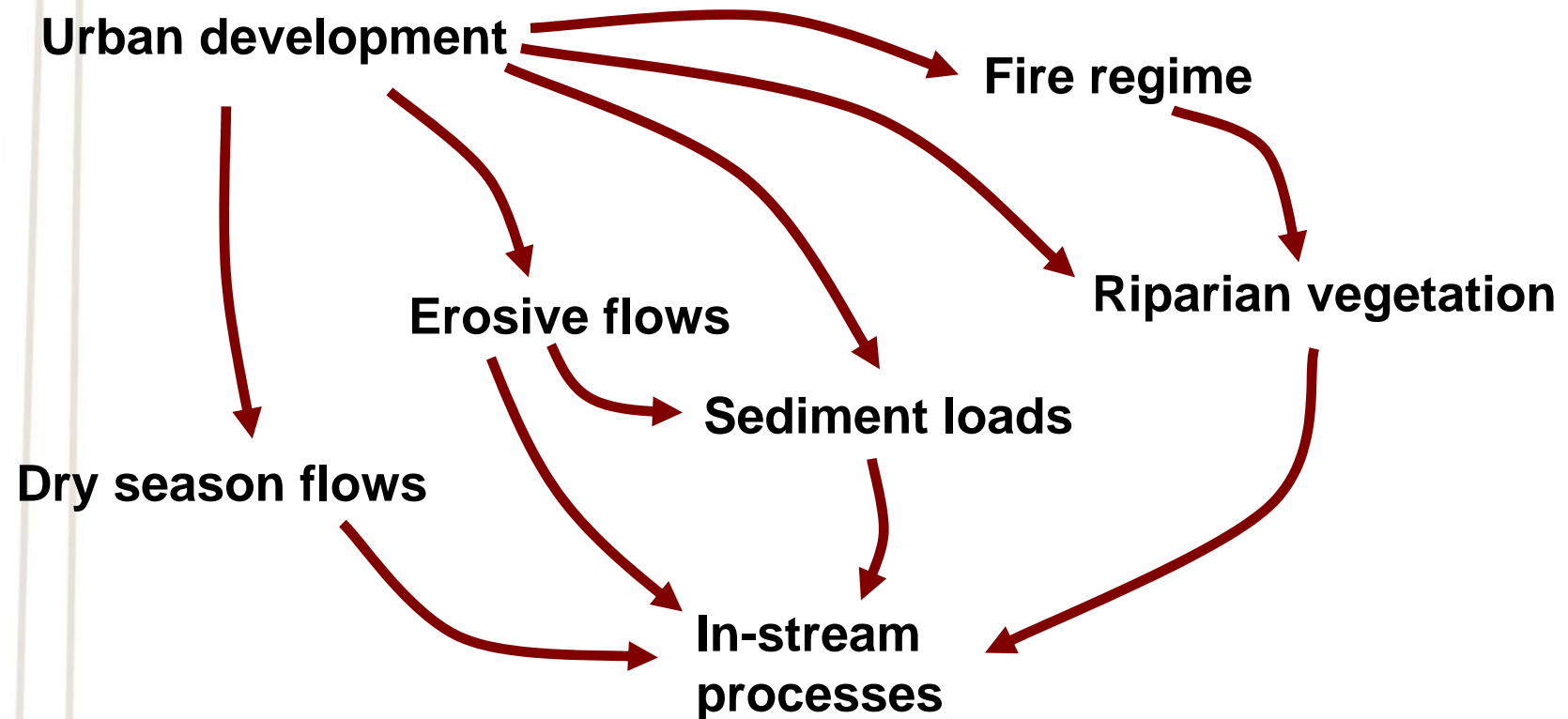
Treatment processes



Waterway stability processes



Waterway stability processes



Few examples of WSUD in the wet dry tropics

- Queensland:
 - Townsville is at a similar stage in the process
- Clues from wet tropics (e.g. Singapore) and semi-arid zones (e.g. Australian inland towns)