Adelaide's Alternative Water Market

Current Status and Trends

Hydrological Society

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SOUTH AUSTRALIA

Government of South Australia

Adelaide and Mount Lofty Ranges
Natural Resources Management Board

inside infrastructure

seed consulting services

ALANO

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Agenda

- Defining the Alternative Water Market in Adelaide
- Trends in the Alternative Water Market in Adelaide
  - Price & Non-Price Benefits
- Current Opportunities
- Conclusion

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DEFINING THE MARKET

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Alternative Water Project

Conceived by the Adelaide and Mt Lofty Ranges Natural Resources Management Board

Aim:

Identify and explore opportunities in the alternative water market:

Reticulated:

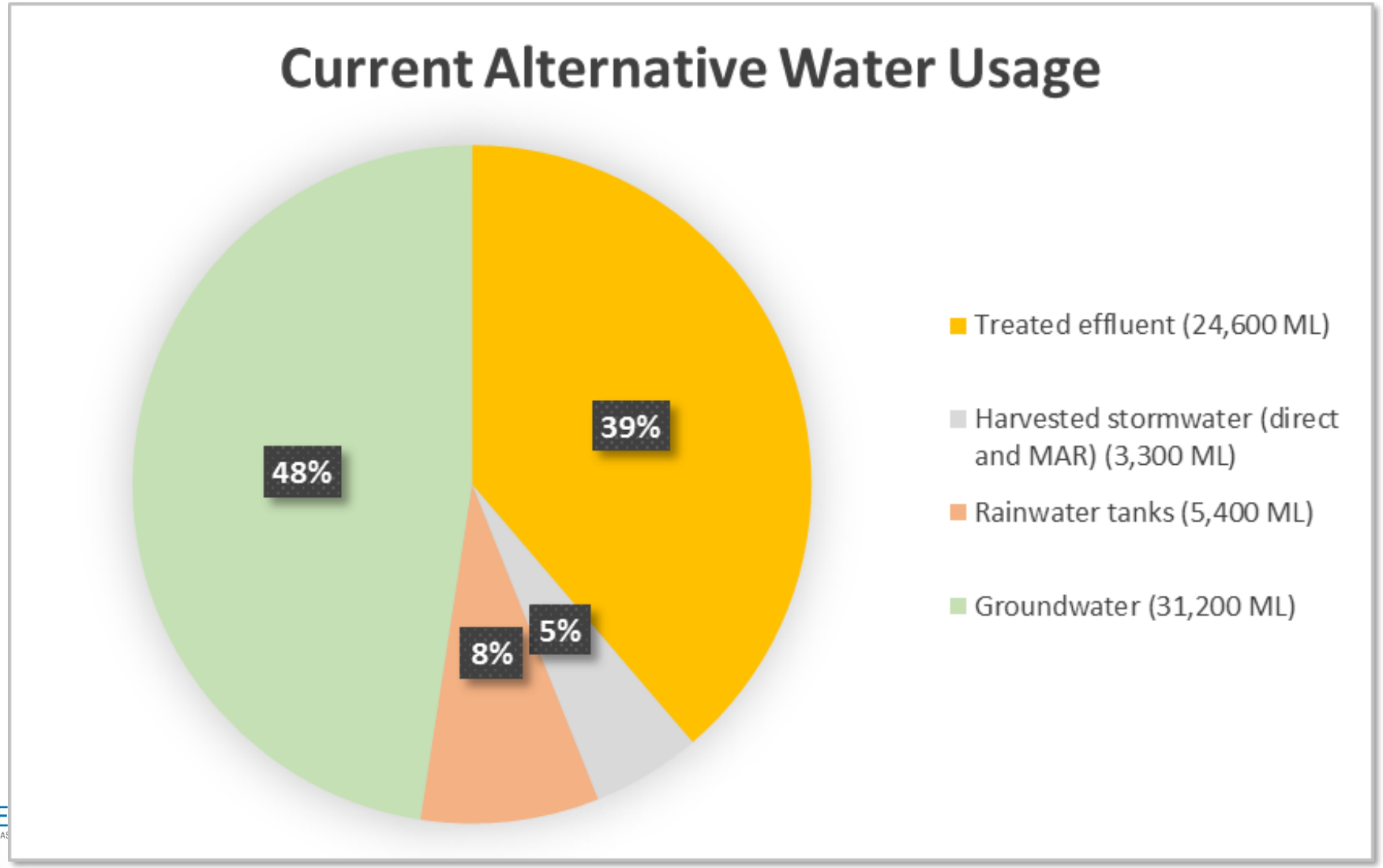
- Groundwater
- Stormwater
- Treated effluent
- Rainwater

Excludes un-reticulated rainwater, dams or potable water

Historic Adoption

- Roof rainwater harvesting quantities unknown
- 1951: 6.4 GL/a provided by groundwater
- 1952: 0.23 GL/a managed aquifer recharge (MAR) for irrigation
- 1971: Treated effluent for agriculture in Northern Adelaide
  - now the Virginia Pipeline Scheme
  - Class C since 1971, Class A since 1999

Alternative Water Usage:
65 GL/a; 40% of total usage



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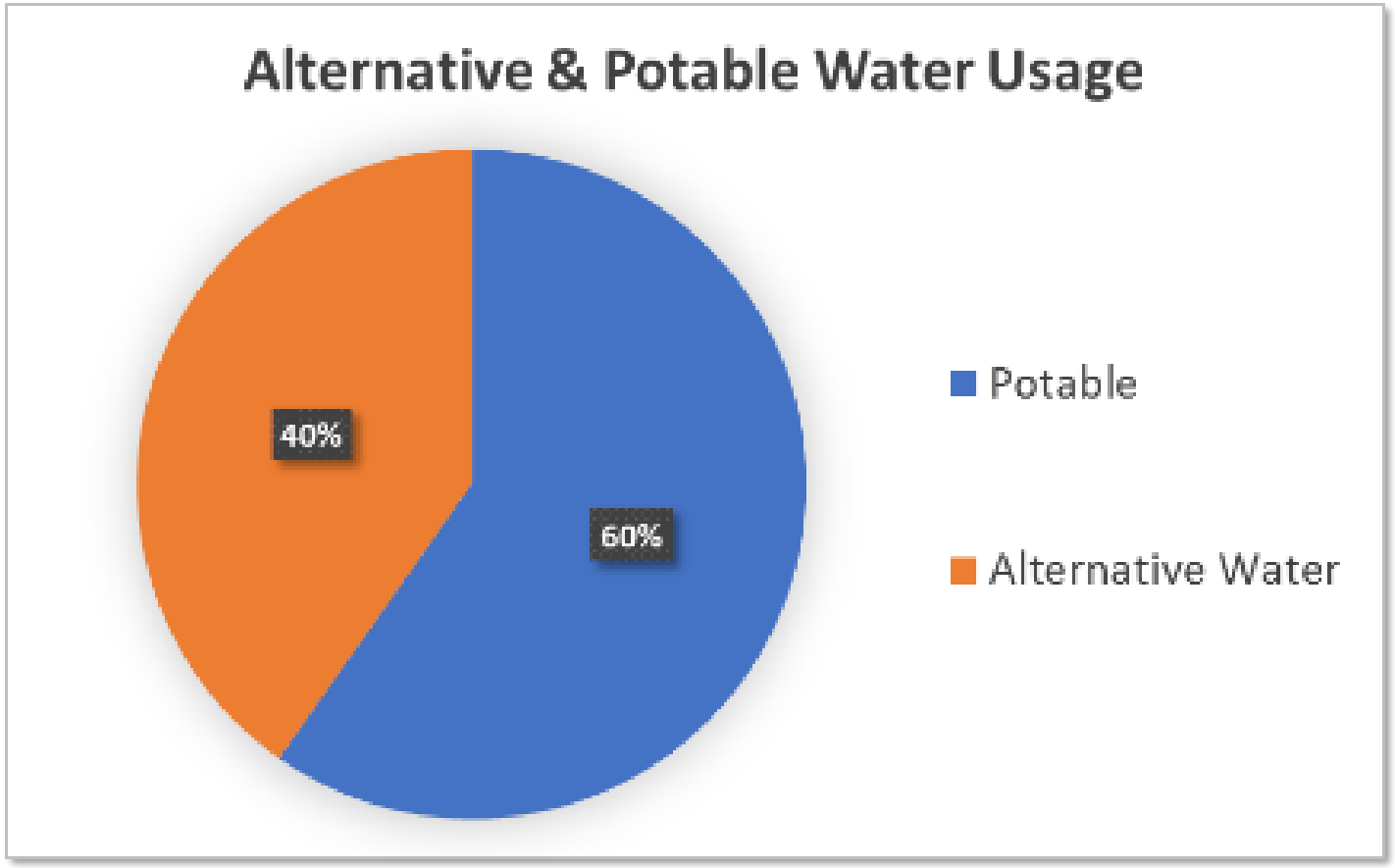
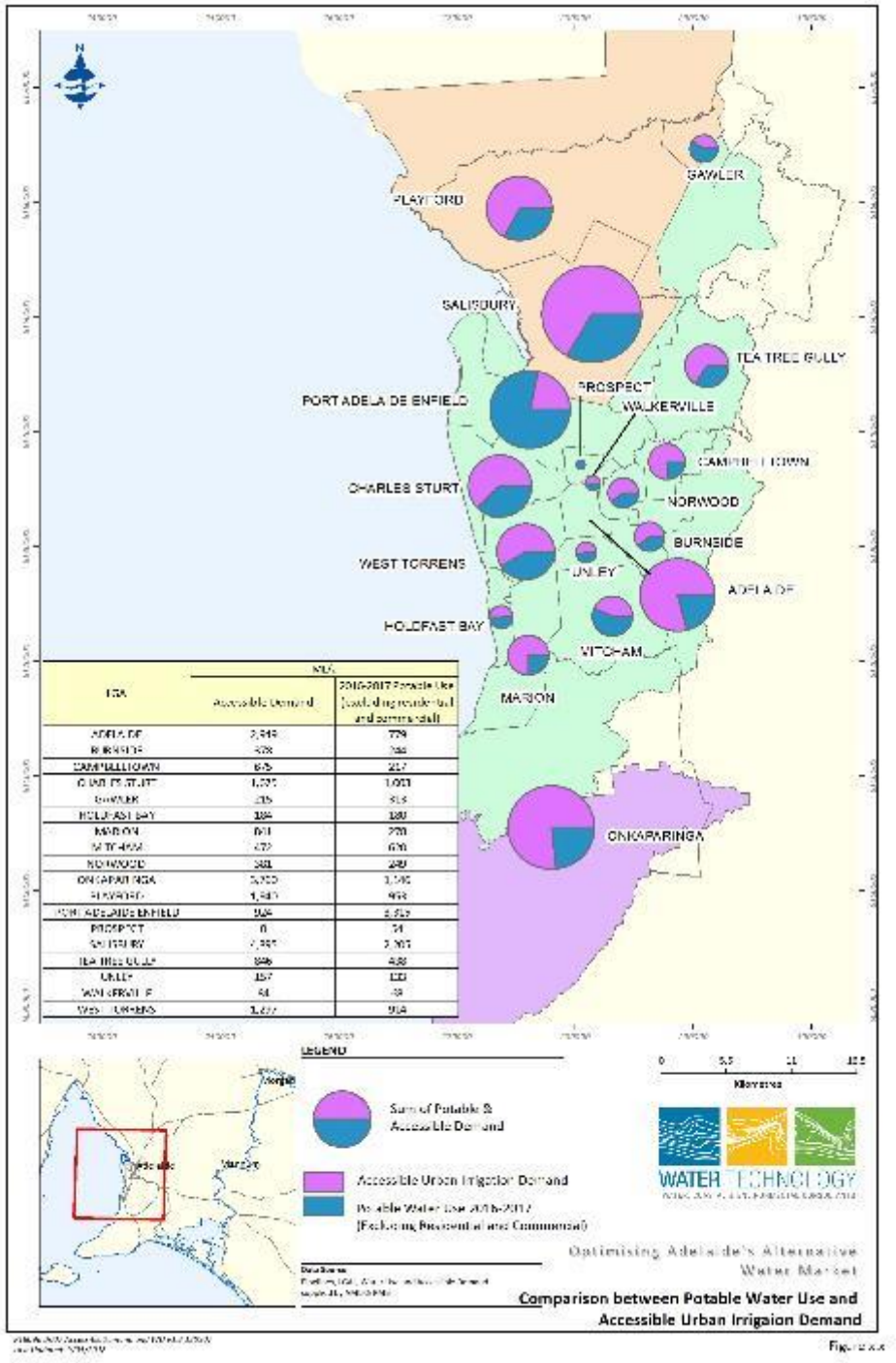
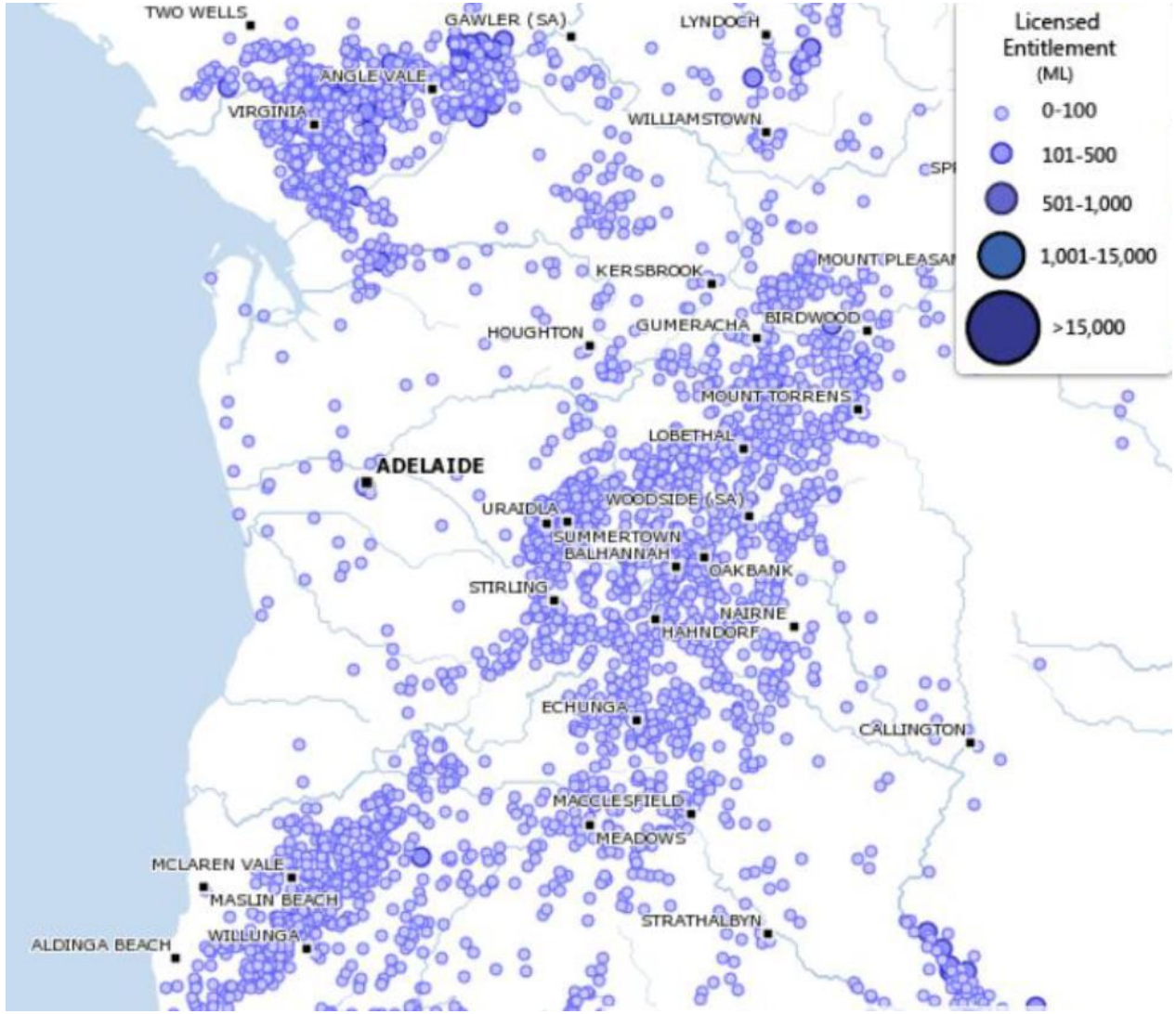


Current Usage

- Distribution of potable/alternative water is diverse
- Networks provide ~26% of usage in the Central Zone
- Groundwater may account for remainder



Groundwater Usage



Source: Bureau of Meteorology (2018)

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CURRENT TRENDS

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Alternative Water Benefits

1. Effluent reuse decreases nutrient loads to Gulf St Vincent
    - Especially nitrogen and phosphorous
    - Nutrients in treated effluent may encourage vegetation growth
2. Stormwater reuse also decreases pollutant load to Gulf St Vincent
    - Especially suspended solids
    - Stormwater reuse reduces impacts on urban watercourses
3. Lower usage of River Murray, surface reservoirs and desalination
4. Water independence: from households to golf clubs

Alternative Water Costs

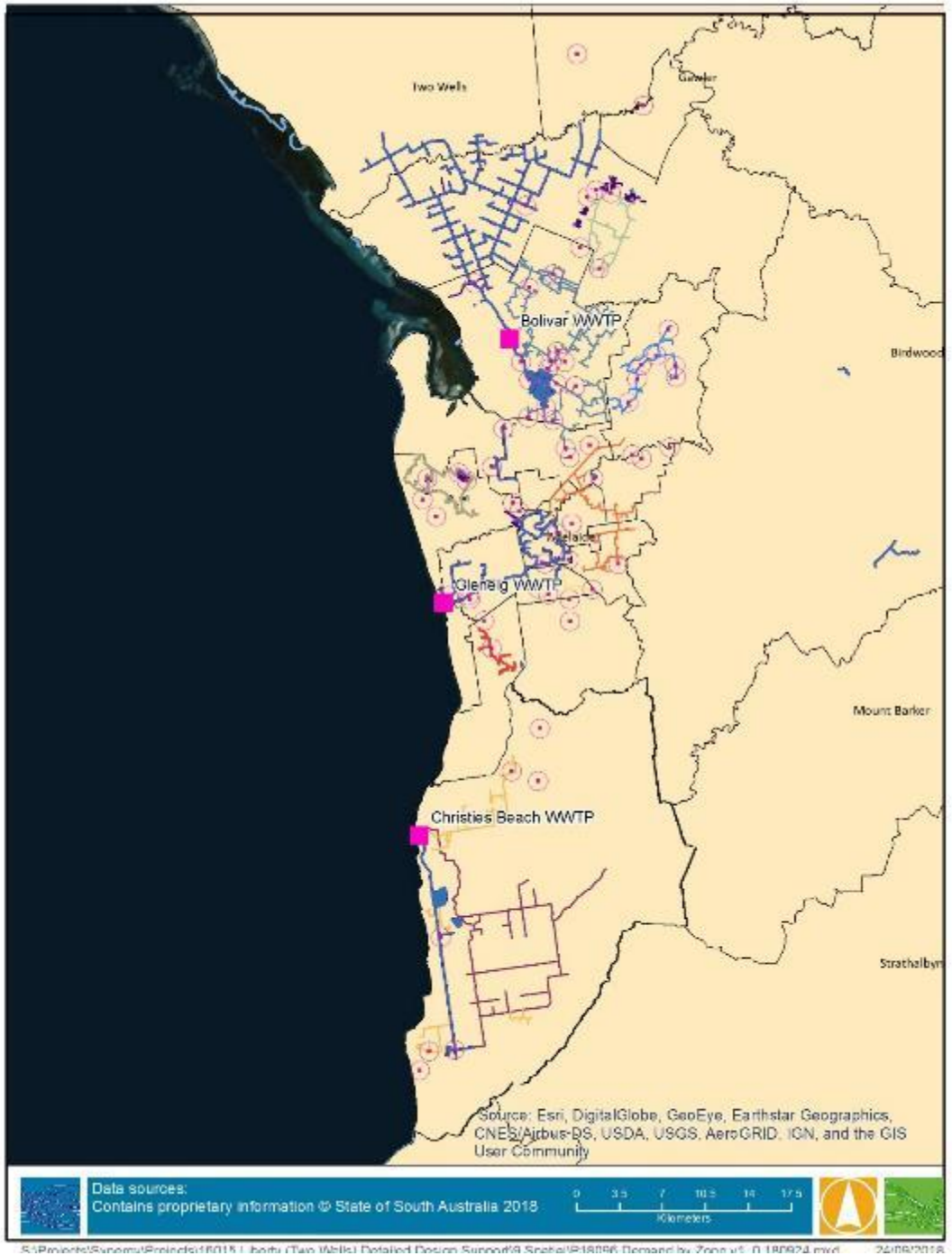
1. Variable quality & inconsistent supply from MAR and rainwater
2. Generally unsuitable for drinking
   - Cannot be connected to potable distribution
3. Requires risk management
   - ‘purple pipe’ equipment
   - signage etc.
4. Public perception of low quality water

Purple pipe - the alternative water market icon (Source: City of Playford)

Waste Water Treatment Plant Utilisation

WWTP	2014 Supply capacity WITH upgrades (ML/a)	2014 Supply capacity WITHOUT upgrades (ML/a)	2018 Treated Effluent USED (ML)	2018 Average salinity (mg/L)
Bolivar	60,000	38,000	17,000 -21,000	1100
Glenelg	22,000	4,000	1,000 -1,300	1100
Christies Beach	16,500	16,500	4,000 - 8,000	700
Aldinga	550	500	500	1150

Source: MAHEEPALA ET AL 2014, ESCOSA 2016 WBWC 2018 AND SA WATER 2016



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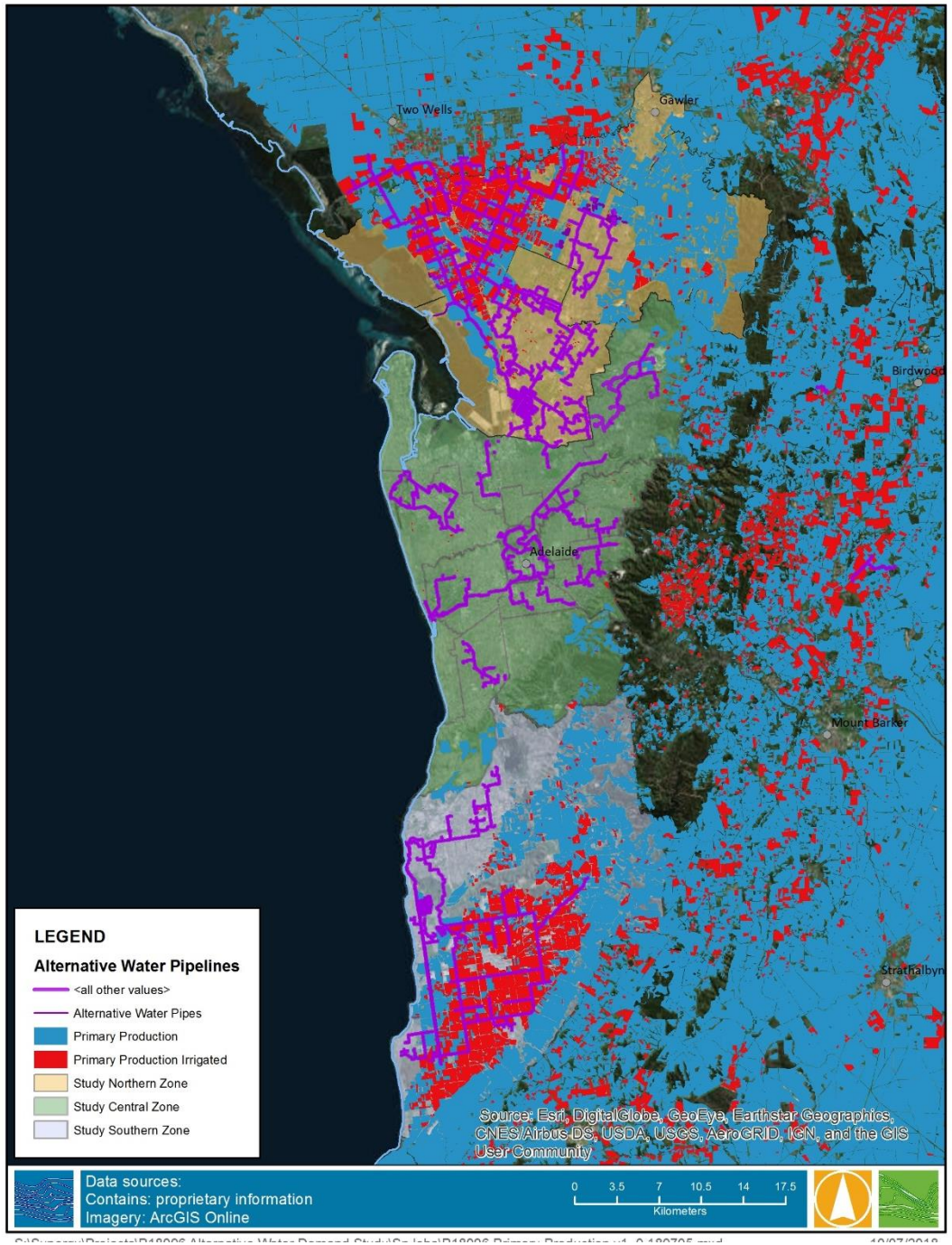

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Stakeholders & Price Sensitivity

Stakeholder	Focus on Price
SA Water	Medium
Local Government	Low-Medium
Private Industry	High
Customers (golf, councils)	Low to High
Regulators	Low

Alternative Water Character

Source	Owner	Regulation	Quality	Variability	Distance from Demand
Groundwater	Many	Medium	Medium	Low	Low
Treated effluent	Few	High	Low-High	Low	High
Stormwater/ MAR	Some	Low/High	Low/High	High/Low	Low
Rainwater	Many	Low	High	High	Low

Top Five Themes Driving Trends

Stakeholders prioritised key themes:

1. Demonstrate the benefits of alternative water
2. Coordinating body/working together
3. Link and integrate infrastructure
4. Water trading
5. Demand and quality

Regulators, SA Water, councils and the public perceive the **non-price benefits** of alternative water use

Non-Price Benefits

- Reducing erosion damage to waterways

Coastal Protection: 1968 & Today

Non-Price Benefits

Reducing emissions to the gulf

Water independence

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Price Benefits

- Major grants for flooding, sewage and stormwater
  - Funding can successfully integrate WSUD
- Network pumping power costs ~$0.50/kL
- 1,050 km of pipeline infrastructure
- Trucking costs ~$42/kL

However, profitability may not be the focus of small schemes (c.f. non-price benefits)

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CURRENT ACTIVITIES

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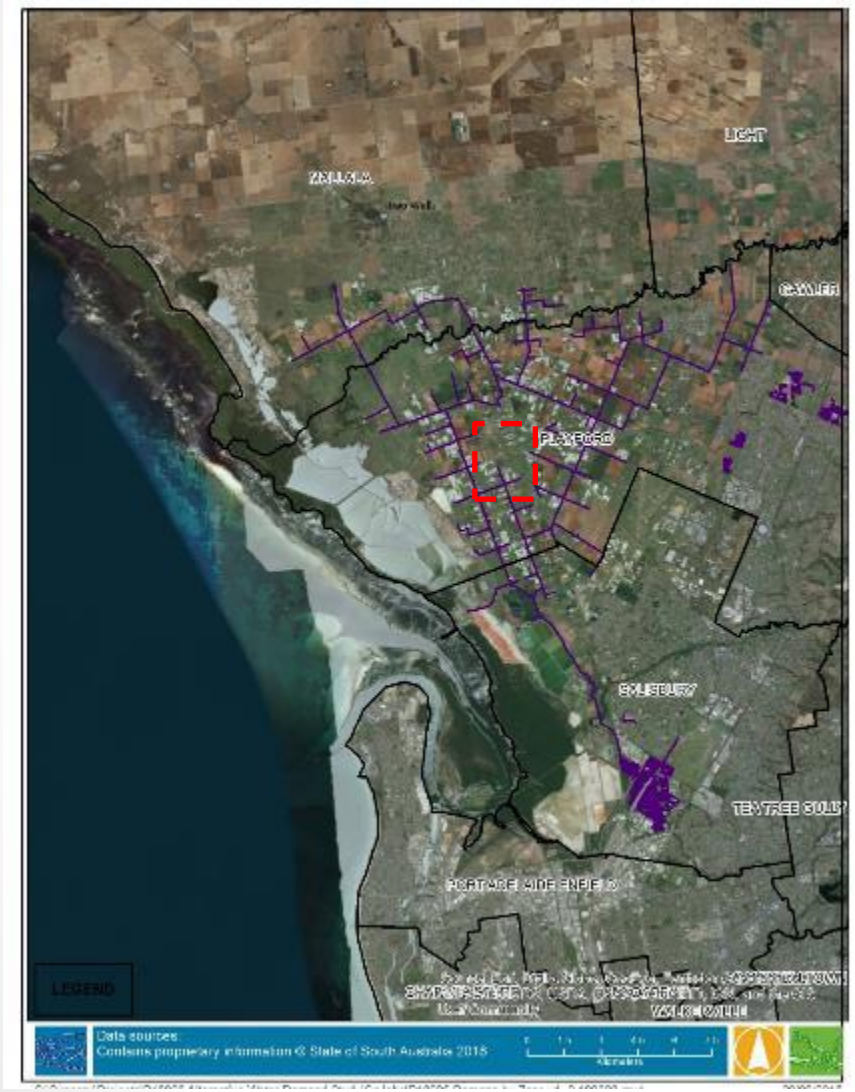
Blending Alternative Water Resources



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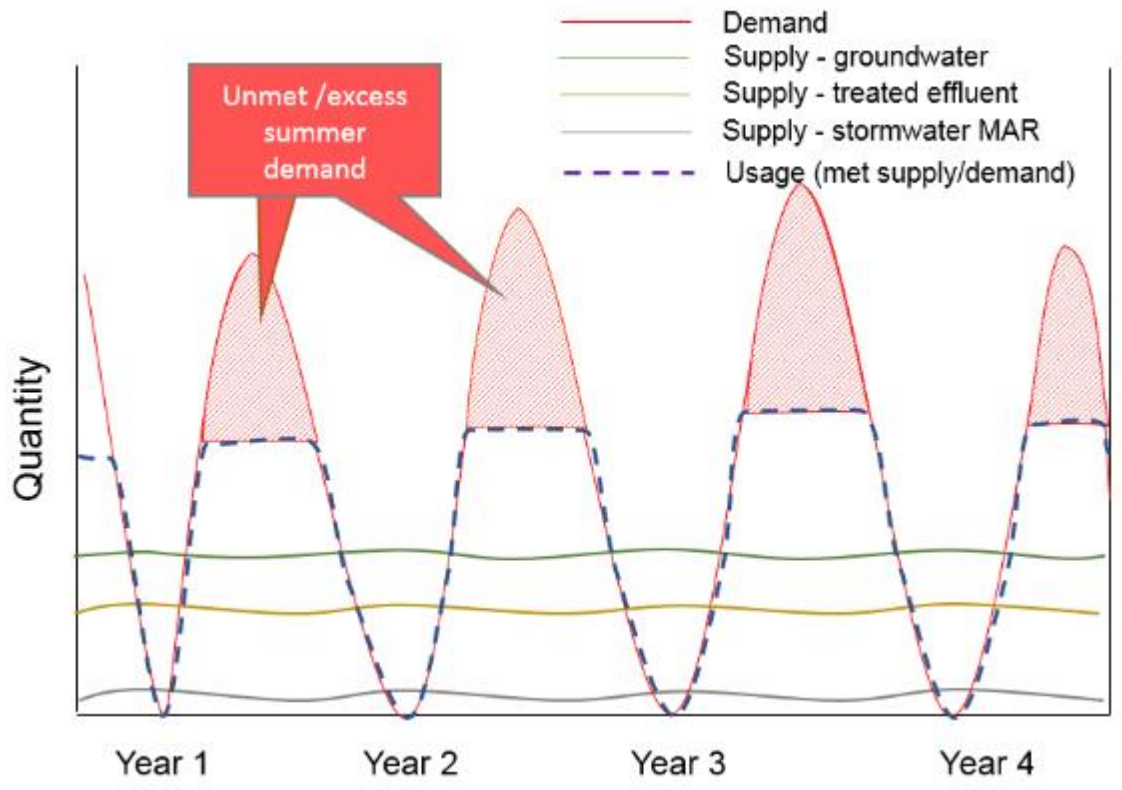
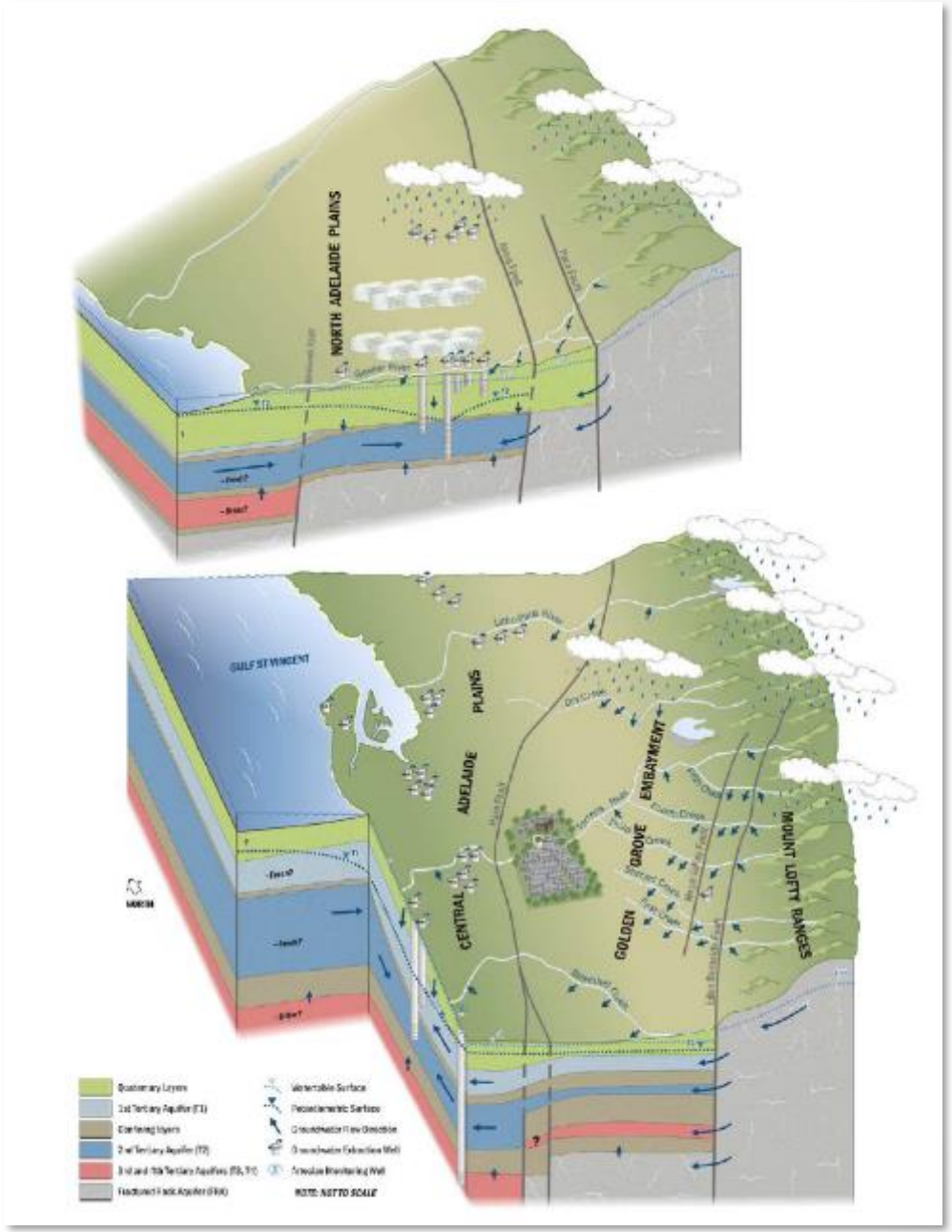
MAR: Helping Supply Meet Demand

- Pipelines at maximum capacity during summer
- MAR can provide peak storage



Groundwater (& MAR)

- Close to demand
- Shareable
- Reasonable quality
- Low variability/high security
- <$1.80/kL



Source: Goyder 2016 p. 50

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Waste water lagoon and SURP filtration equipment (Source: Evoqua)

CURRENT OPPORTUNITIES

Technical Options

- Most networks are fully utilised
  - GAP pipeline fully utilised during summer nights
  - Infrastructure (aquifers, pipework, wells) are available for storage
- Decentralised storage solutions minimise water pumping costs from River Murray
  - Groundwater, CWMS & rainwater tanks
- Blending high salinity resources
  - The Bolivar WWTP high salinity stream (15% of total flow) is currently not suitable for re-use due to infiltration of high salinity groundwater from the Port Adelaide area
  - Lower salinity water is available

Conclusion

- Alternative water meets 40% of Adelaide's water needs at less than River Murray/reservoir/desalination costs
- Price and non-price objectives for the use of alternative water are aligning
- ~35 operational MAR schemes and >1,050 km of alternative water pipeline demonstrate capacity to create and meed demand
- Ongoing initiatives are underway to use technology to meet objectives

The Way Forward

- Store up to 19 GL/a of treated effluent in aquifers
  - ~$1/kL for MAR
  - Transfer for ~$0.50/kL to demand

  provides additional water for horticulture below the $1.80/kL price point
- Subsidise alternative water use in households to integrate price/non-price objectives
- Expand WSUD and release WAP to use the aquifer as a transfer/sharing medium
- Locate MAR near demand to optimise transmission networks

Summary

- Adelaide's alternative water infrastructure is leading edge
- Groundwater and treated effluent usage is high

  ….and has further potential to grow
- Price and non-price benefits are coming together as entities coordinate and integrate
- Benefits from integration will be widespread

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