



Managed Aquifer Recharge

OPERATIONAL CONSTRAINTS

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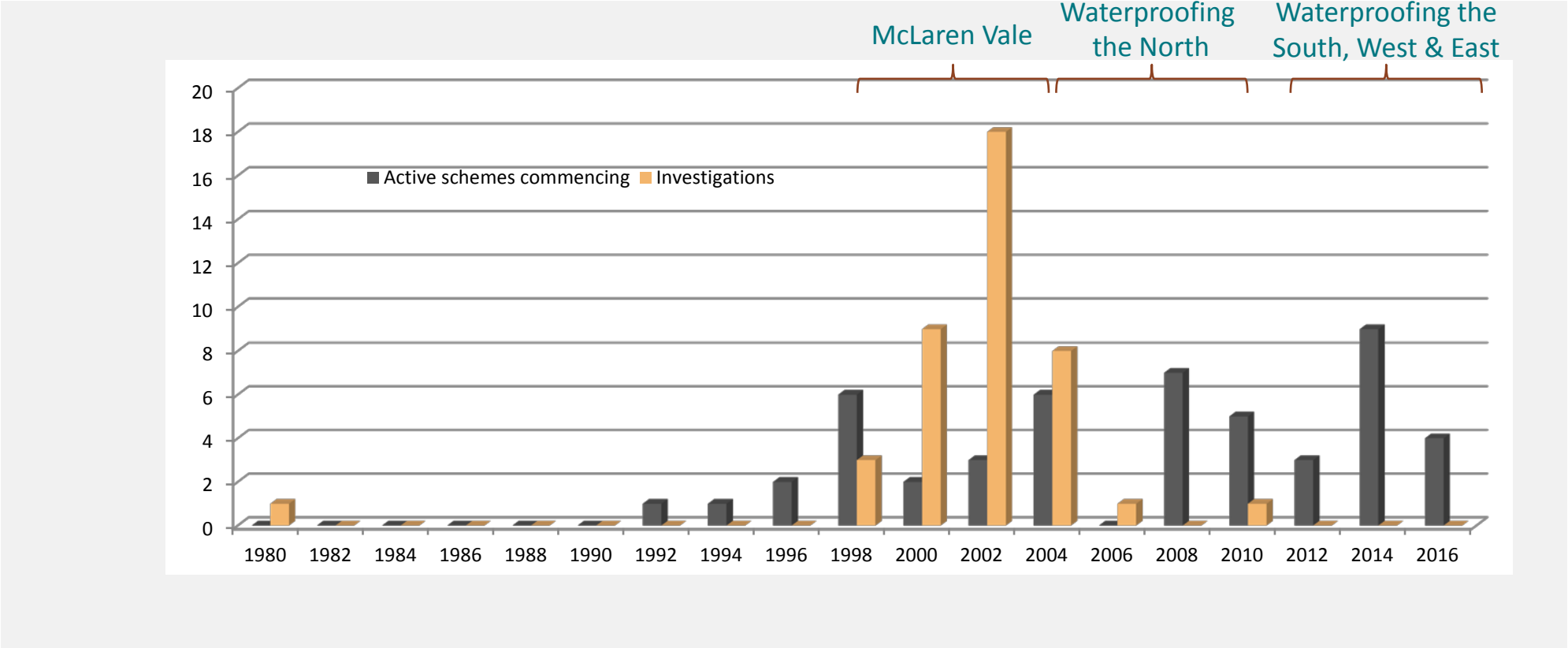
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Current State of MAR in SA

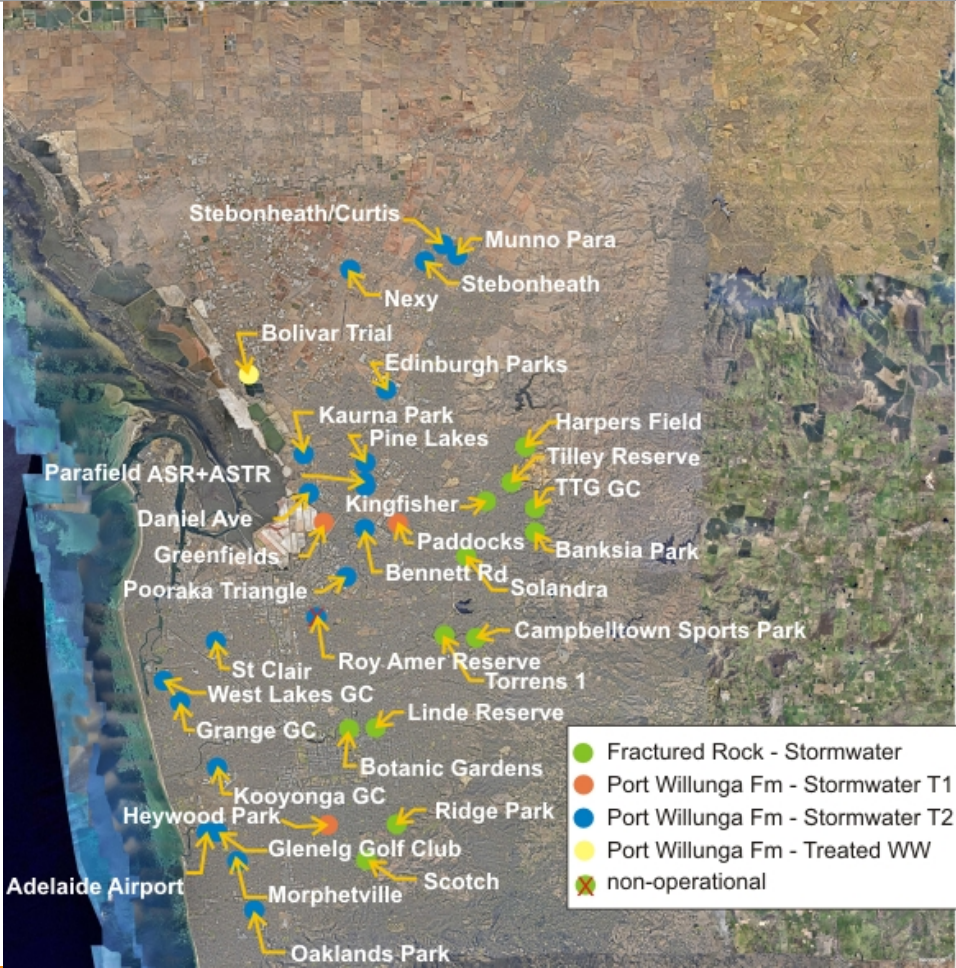
- Australian researchers led from SA, and with industry participation, have produced 30% of the all journal papers published on MAR 2009-2014. This is 5 times more than the next research grouping
- The Bolivar ASR Research trial (1997 – 2010) was an industry leading research project that is still the most comprehensive water study site of its type. It set the bench mark for managing clogging, understanding changes in water quality during ASR operations, including geochemistry and pathogen inactivation.
- Currently a total of 48 operational sites in the metropolitan Adelaide area (does not include Angas Bremmer, Barossa or Northern areas)
- Investment in MAR >\$350 million (assuming matched grant funding)
 - Waterproofing the North (City of Salisbury, Playford & Tea Tree Gully) ~\$85 Million
 - Waterproofing the West ~\$71.5 Million
 - Waterproofing the South ~\$32 Million
 - Various other schemes (SA Water, Botanic Gardens, Golf Courses etc) ~ \$150 Million

MAR Activity



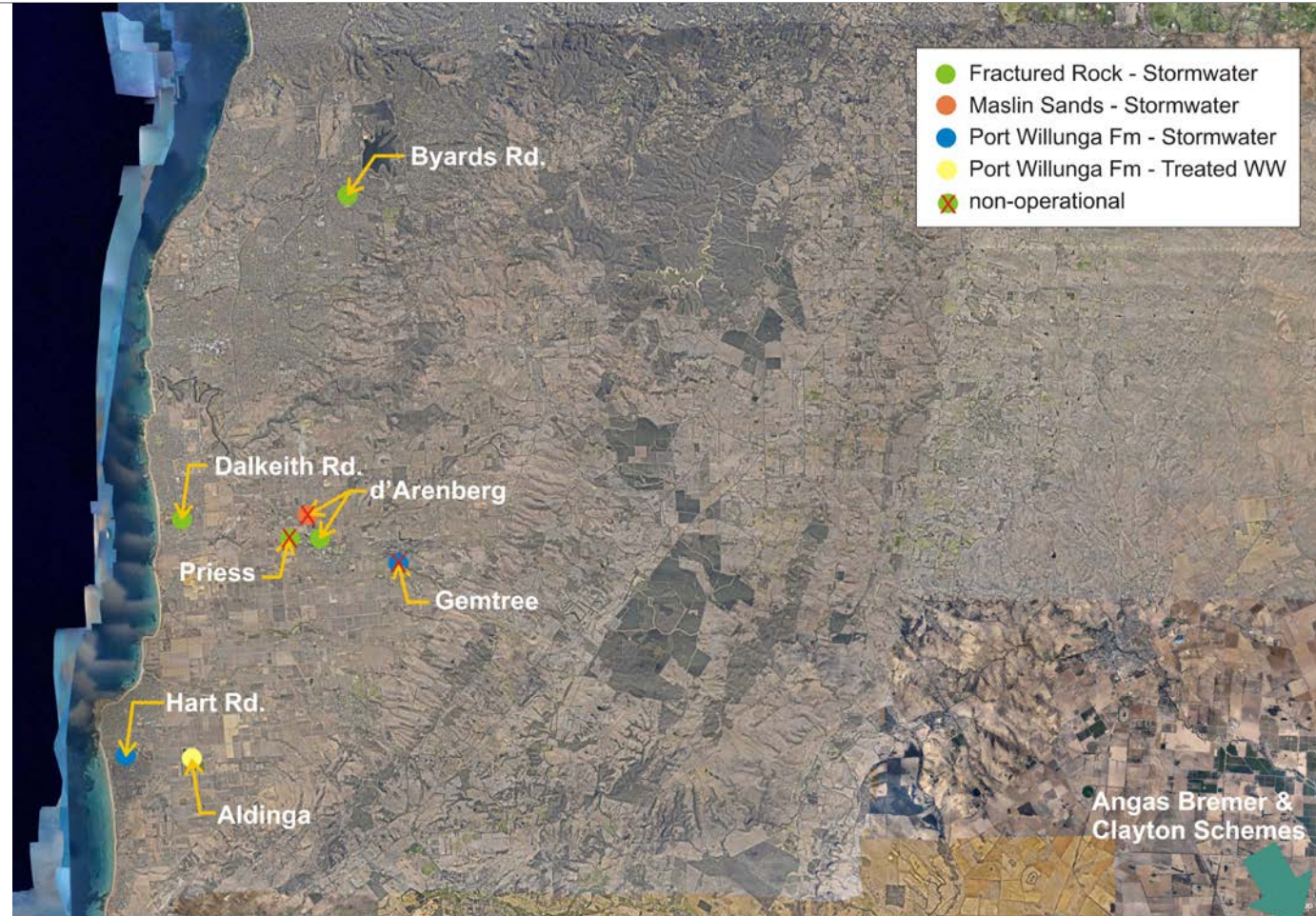
Metro & Northern Schemes

MAR Schemes
Northern Metro Area

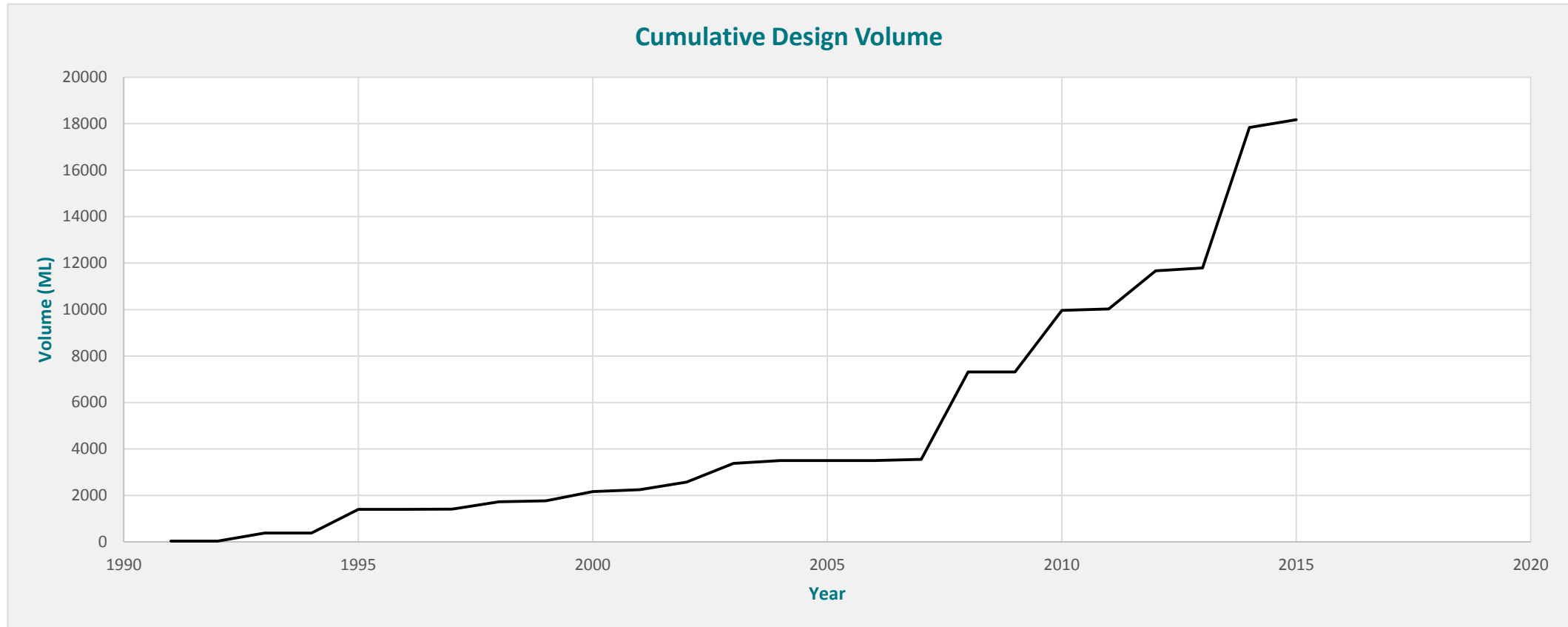


Southern Metro Schemes

MAR Schemes
Southern Metro Area



Active Schemes Design Harvest Volume



Operational Constraints - 1

- Business cases and therefore capital requirements are often poorly conceived
 - results in potential unfunded liability for proponent or compromises in design
- Design
 - Too many parties “learning on the job” at the clients expense – Risk methodology gets a bad name
 - Incorrect selection of materials for operating environment (results in high O&M costs for owners)
 - Risk is potential scheme failure which will give methodology a poor reputation
 - Constructors do not understand how these systems are meant to work which leads to:
 - Poor risk assessment around design of scheme, project construction & implementation
 - Schemes do not operate effectively (leaving project with high O&M costs) - Typical O&M costs \$0.25 - \$0.35 /kL
 - Underfunded which leads compromises in scheme design & therefore schemes do not meet target harvest volumes
 - In poorly designed schemes it may take 2 full seasons to “debug” before schemes begin to achieve optimum operating performance
- Tight delivery time frames associated with funding grant milestones

Operational Constraints - 2

- Monitoring
 - Limited O&M data despite a number of schemes in operation for nearly 10 years
 - Limited physical monitoring data on actual scheme performance
 - Only some of the more recent schemes have monitoring wells installed
 - Design compromises have meant in many older schemes data not captured beyond 1 year
 - Operational monitoring different to compliance monitoring
- Maintenance
 - Lost harvest opportunities due to poor design
 - Balancing maintenance whilst maintain injection – challenge for operators

Operational Constraints - 3

- Source Water
 - Changes in catchment over time e.g. new land developments
 - Changes in rainfall/runoff relationship over time as catchments develop
 - Changes in water quality linked to storm intensity & duration
 - Variability in rainfall - banking
- Receiving Water
 - Most schemes in brackish parts of aquifer = low recovery efficiency on initial cycles

Legislative Constraints - 1

- WAPs do not align with EPP
- Catchment Plans – Surface water allowable harvest volumes
 - Not all surface water bodies prescribed
 - Uncertainty about allowable volumes
 - Rules on volumes that can be harvested change from one scheme to the next
- Offsite migration of injected water & constraints of EPP
- Rights & protection of MAR operators to recover water (Section 128 temporary measure)
- Testing & Trials –
 - Permit requirements lengthy (and unnecessary?)
 - Not aligned with funding milestones therefore this important step is often skipped.

Legislative Constraints -2

- Assessing storage capacity of aquifer system (completed but limitations as focus on maintaining sub-artesian conditions so aquifer capacity underestimated.
- Provisions for discharge of saline groundwater when flushing aquifers for freshwater storage.
- Adequate provisioning for enabling hydrogeological investigations to be completed (e.g. injection and recovery trials) without requirement for permits.
- Unintentional consequences of Ministerial statements

Conclusions - 1

- MAR Policy should reside with one agency
- Suggest MAR policy should be incorporated in NRM Act.
 - Provide consistency in rules across all PWRAs
 - Eliminates need for section 128 & operators have clear rules
 - Water quantity (SW and GW) can be preserved.
 - Water Quality criteria are in place (but need updating)
- Should practitioners be licensed to avoid giving methodology a bad name?
- Should operators have appropriate certification? (TAFE Course currently which provides a tech certificate).
- Remove barriers that prevent effective investigation /risk assessment around scheme viability.
- Incorporate a banking option in the policy.
- Integration of WAPs to align with EPP

Conclusions – 2

- Adequate provisioning for enabling investigations to be completed (e.g. injection and recovery trials) without requirement for permits. Critical steps/risks are not missed.
- Clear direction/policy on the need for disinfection of recovered water for reuse
- Status of approved schemes i.e. website
- New reporting framework being developed by DEWNR & EPA which will assist in capturing information
- Provisions (if any required) to convert ASR schemes to ASTR schemes to achieve potable reuse
- Zoning of aquifers for storage of water of various types (partial)
 - Environmental values assigned (project by Peter Newland @ EPA). Where has progressed to?