Water Reuse in action in South Australia: a review of agricultural and municipal reuse schemes and innovation.

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BACKGROUND

In Australia, water reuse projects have been successfully implemented in agriculture, domestic dual reticulation, industrial and municipal use (Figure 1). Virginia is home to Australia's largest concentration of greenhouse fruit and vegetable production. The Bolivar WWTP Virginia Pipeline Scheme (VPS) is one of the largest schemes in the world and was designed to protect ground water resources in the northern Adelaide Plains
The recycled water is pumped via an 18 km pipeline and is providing 240 growers with 19million m3 of recycled water each year.

The recycled water from the Bolivar WWTP is also reused to supply the Mawson Lakes residential and business precinct with a design capacity of 10,000 people (Figure 1). The development features a state-of-the art recycled water system to complement the potable water supply, and is the first scheme of its type to combine both recycled water and stormwater. The recycled water is mixed with stormwater from the Parafield Stormwater Harvesting Facility and is further chlorinated to produce a Class A recycled water supply. The water is used for toilet flushing, domestic garden watering, and irrigation of municipal parks and gardens and reduces potable water use in the area by up to 50 percent.

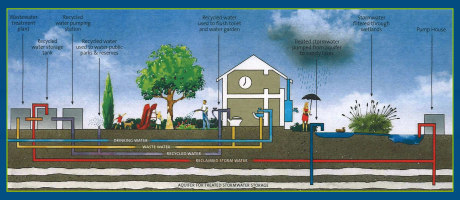

Figure 1: Schematic Outline of Mawson Lakes Dual-Reticulation Scheme

AQUIFER RECHARGE THROUGH ASR/ASTR

Aquifer Storage and Recovery (ASR)

The use of alternative water sources such as stormwater or recycled water is receiving growing attention worldwide. Among a range of possible uses, managed aquifer recharge of stormwater offers advantages such as additional natural treatment and storage to buffer seasonal variations in water supply.

In winter or when demand for recycled water at Virginia and Mawson Lakes is low, the recycled water is discharged to the sea. Research has been undertaken to evaluate options for storing and retrieving the recycled water through Aquifer Storage and Recovery (Figure 2). The project involved the injection of recycled water diverted from the VPS into a brackish limestone aquifer for subsequent reuse during the summer irrigation season.
The trial was found to be economically feasible, excluding water treatment and pipeline costs, it was found that the cost of the recycled water ASR is between 8 and 18c/KL (AU $) depending on the volume of water recovered per well, the depreciation rate and the assumed working life of wells and pumps.

The distribution of the injectant in the aquifer was identified by collecting water quality data from 8 fully penetrating observation wells and 8 shallower piezometers. The contrasting quality of injectant and groundwater enabled studies of geochemical reactions, fate of NOM, attenuation of DBP, EDC's, pathogens, nutrients, metals and suspended solids. Well clogging has been studied and maintained. Recovery efficiency was found to be high and not an impediment to economic operation.

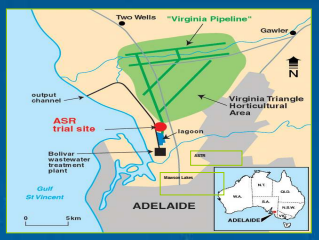

Figure 2: ASR Trial Location North of Adelaide along WWTP

Aquifer Storage Transfer and Recovery (ASTR)

The Aquifer Storage Transfer and Recovery (ASTR) research project is the first in the world to harvest, treat and store urban stormwater, using an initially brackish aquifer with the aim of providing a safe drinking water supply. After treatment in an engineered wetland, 200-400 x 103 m3/yr of water from the Parafield Stormwater Harvesting Scheme is being injected into the aquifer with the intent of recovering drinking water from a nearby well (Figure 3).

ASTR forms a case study site and Australian component to the Reclaim Water project, funded by the European Union investigating 'Water reclamation technologies for the safe artificial recharge of wastewater. The ASTR project also forms a component of the Water Proofing Northern Adelaide Initiative with support by the Australian Government, National Water Commission.

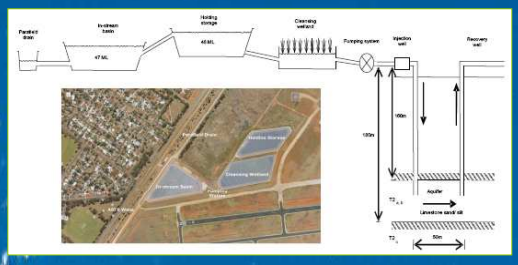

Figure 3: ASTR Demonstration Site at Parafield, North of Adelaide

CONCLUSION

This poster highlighted the reuse activities and innovative approaches that are being evaluated to storing and reusing recycled water in South Australia. All of the reuse options presented here provide information and assist with the development of new schemes. Most of the projects were undertaken with a risk management framework which provide information on range of issues that need to be addressed by public health, environment and natural resource regulators and managers. An integrated approach looking at all possible reuse solutions needs to be taken into account when choosing the best option.

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