

Mandurah Managed Aquifer Recharge for irrigation

Land use / development type	Scale
Public Open Space	Precinct

Stormwater controls	Scale
N/A	

Efficient use of water	Scale
Reuse of wastewater	Precinct

Water reuse	Scale
Managed recharge	Precinct

Site conditions	
Soils	Leached quartz sand
Groundwater	Superficial

Local government	Location
City of Mandurah	Ocean Road

The City of Mandurah has been growing at a very high rate, with a 70% population increase between 2006 and 2011. The increasing population has required more public open space than is currently available, particularly for active recreation. Surveys between 2002 and 2006 found no active open spaces south of the Dawesville Channel.

An opportunity was identified for the creation of an area of public open space at the corner of Ocean Road and Dawesville Bypass. The new area would require ongoing irrigation; however, there was no obvious source of water available in the area.

Initial groundwater feasibility studies indicated increased pumping volumes could lead to saltwater intrusion into the superficial groundwater system. As a result, the DWER would not issue further groundwater licenses to the City.

Alternative water source options were considered by the City of Mandurah. Scheme water was deemed too expensive for irrigation and the use of potable water for irrigation is inconsistent with Waterwise principles.

The City also considered the use of synthetic turf, a small desalination plant, and a tertiary wastewater treatment plant. All options were associated with very high capital and/or ongoing costs, which were considered to be excessive for POS development and supply of irrigation water.

Managed Aquifer Recharge (MAR) was proposed as an option that would use treated wastewater from the nearby Caddadup Wastewater Treatment Plant (WWTP). Since operation, treated wastewater has been infiltrating into the surrounding superficial groundwater system, creating a water resource for ongoing sustainable abstraction.

A hydrogeological review and risk assessment was completed that identified a 10-metre thick layer of low-salinity groundwater beneath the WWTP. The groundwater lens was situated above a clay layer, which helps prevent saline water intrusion.

The feasibility assessment found the cost of the MAR option to be approximately 25% of the cost of supplying water via a new, tertiary wastewater treatment plant.

The MAR design centred around five extraction bores at the WWTP site, with each bore operating at a

low flow rate of 1.5 L/sec and two 280 kL holding tanks located at the WWTP site. This also required construction of a 1.3 km 160mm OD high density polyethylene non-potable water supply pipeline from the treatment plant to the Ocean Road recreation area.



Key Project Features

- Treated wastewater is recharging the superficial groundwater through infiltration basins
- Water is extracted at the WWTP through 5 extraction bores pumping at 1.5 L/sec into two holdings tanks.
- DWER issued the City with a 120,000 kL/annum groundwater licence for the MAR scheme.
- St Damien's Catholic School using the fit-for-purpose recharged water recorded savings of 80% on irrigation costs in comparison to potable scheme water.

Annual inflow into the Caddadup WWTP was initially 605,900 kL/annum, with annual inflow increasing as the population increases and development in the Dawesville region continues. Based on this inflow, the Department of Water and Environmental Regulation issued the City with a license to take 120,000 kL/annum from the groundwater source at Caddadup WWTP.

Initial water consumption at the Ocean Road POS was estimated to be 43,000 kL/annum, dropping to 37,000 kL/annum as the oval is established. The surplus water extracted through the MAR scheme license is supplied to the two primary schools located next to the Ocean Road playing field at the price it costs the City to procure the water. This has reduced

irrigation costs for St Damien's Catholic school by 80%.

The MAR scheme has enabled the City to provide a new, irrigated area of public open space that previously was not possible due to prohibitive environmental and economic factors.

Development Costs¹

Water costs from the MAR scheme are \$0.56/kL compared to \$1.10/kL for the tertiary wastewater treatment plant option and \$2.20/kL for scheme water. The MAR scheme was \$600,000 cheaper to build and \$15,000 per annum cheaper to maintain than the tertiary treatment plant, which would have only supplied the 37,000 kL/annum for the POS. The MAR scheme provides 120,000 kL/annum.

The Department of Sports and Recreation provided \$1.2 million for the playing field and MAR project. It became apparent in 2010 that a \$700,000 shortfall had developed and the project was put on hold until further funding was obtained. It took four years to secure the funding for the remainder of the project when the Department of Regional Development awarded \$1.59 million to the City in 2014 to complete the project.

Total Expenditure	\$683,000
Water supply infrastructure	\$655,000
Monitoring bores, modelling and data approval	\$28,000

Operational Costs¹

Annual costs	\$20,720
Operational expenses	\$0.56/kL
CPI of 2.75% per annum	\$0.02 kL/annum

¹All costs are site-specific and are an approximation for guidance purposes only



Outcomes

The MAR scheme provides the City of Mandurah with a sustainable and cost effective source of water for irrigation of playing fields in the vicinity of the Caddadup WWTP.

The City was able to install two 280 kL tanks onsite at the Caddadup WWTP. These tanks supply water to one 320 kL tank at Ocean Road reserve and one 100 kL tank at Saint Damien's Catholic School.

The capital and operational costs of the Ocean Road Reserve MAR groundwater irrigation scheme to irrigate the new Ocean Rd reserve were significantly lower than scheme water or other alternatives.

St Damien's Catholic School and Ocean Road Primary School are only charged for the cost of supplying the MAR groundwater for irrigation of their playing fields at a

rate of \$0.44/kL. This represents a saving of 80% for St Damien's Catholic School, while Ocean Road Primary School has been able to mix groundwater with scheme water.

The Ocean Road POS has provided a growing population with a playing field for general fitness activities and a space for sporting clubs to establish.

Contact details for further information

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