

WONGA WETLANDS, A LIVING EXAMPLE OF RECYCLED WATER MANAGEMENT.

Wonga Wetlands, a model of sustainable recycled water management

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ABSTRACT

In 1985 Albury City Council started planning for the design and construction of a new advanced biological nutrient removal Wastewater Treatment Plant (WWTP) to provide sewer treatment services to cater for the future growth of the city.

The new WWTP was named 'Waterview WWTP'. Waterview WWTP was designed with a wet weather overflow lagoon, inlet screening, flow balance tank, bioreactor, clarifiers, media filtration and UV disinfection. During the development approval process, it was confirmed that a Murray River discharge approval would not be granted, therefore Council had to review other effluent disposal/reuse options.

Council investigated several options to overcome the 'no river discharge' requirement, finally deciding on a "100% on-ground reuse plan". This on ground re-use plan would include irrigating several tree plantations over 160 hectare, irrigated pasture comprising 80 hectare and a wetland system (Wonga) which makes use of 80 hectares of degraded farmland on the Murray river floodplain.

During the development of the re-use plan Council was unaware of how significant Wonga Wetlands would be to the community and the environment in the future. Today Wonga is recognised as a national tourism and environmental show piece, and a great example of beneficially reusing recycled water.

1.0 INTRODUCTION

Wonga Wetlands is situated on Wiradjuri country nestled along the Murray River and only a short 5 kilometres drive from Albury and less than 1 kilometre from the Waterview WWTP, and is accessible via the Riverina Highway. This provides access to a large resident and visitor base from significant regional centres, which ensures future utilisation of the wetlands and its facilities.

The Wonga Wetland development, which was opened in 1999, was established as a sustainable solution to wastewater management and reuse. This resulted in recreating the flow of water into the area, matching the natural wetting, and drying cycle of a floodplain, and reviving the ephemeral wetland. Today 176 species of birds, plus numerous other species inhabit the area. Council also utilises the environmental qualities of Wonga to run education programs for local school group to educate our future generations in wastewater effluent management, environmental management, chemistry, and biology. It also opens their eyes to circular economy and environmental conservation.

Since opening, the wetlands have organically grown into a popular nature-based destination. However, as it was not originally designed as a tourist product, there is scope

to enhance the visitor experience and improve amenity and services with the construction of a new Visitor Education and Experience Centre.

Since the opening of Waterview WWTP in 1999, 100% of the city's recycled water is discharged into a holding dam from which water is directed to the cities reuse systems.

2.0 DISCUSSION

Since 1999 Albury City Council has recycled 100% of the cities treated wastewater effluent. The effluent can be distributed to Councils hardwood plantation, native revegetation areas, improved pastures, and Wonga Wetlands. Zero percent of Councils wastewater effluent is discharged into the nearby Murray River. This innovative re-use system is a perfect example of circular economy and reusing the city's waste in a sustainable way. Wonga's visitor numbers have increased every year and the variety of events and programs that Council operate out of the site have diversified as the public and community interest in the site grows. Due to the increased use of the site and the high demand of student education programs ran at Wonga, Council is developing a new Visitor Education and Experience Centre. This new facility will ensure the programs and events ran out of Wonga can continue to diversify and educate our future generations on the importance of wastewater effluent re-use to preserve this valuable resource and educate them on wetland ecosystems.

2.1 Hardwood Plantations

During summer recycled water is used on Councils 80 hectare floodplain tree plantation made up of Flooded Gums and Red Gums. This irrigation system comprises of 12,000 above ground sprinklers a 400 micron filter and a pump station delivering 120 L/s of water to the system.



Figure 1: *Hardwood plantation – Flooded Gum*

2.2 Native vegetation irrigation

Around the Waterview WWTP site, Council has another 30 hectares of irrigated native revegetation comprising of gums, silver wattles, tea tree and native grasses growing alongside three degraded creek lines. This site was originally a soft wood plantation comprising of pines. The pines were harvested in 2018 and Council is in the process of rehabilitating this land to restore it to natural habitat. Thirty (30) above ground water cannons are used to irrigate this revegetation site. Council has worked with local school groups to revegetate this area and the riparian vegetation along the water courses to minimise effluent run off, waterway erosion and provide a nature corridor for the native wildlife.



Figure 2: *First year revegetation area under the sprinkler and 5 year revegetation area in the foreground.*

2.3 Native vegetation irrigation

Councils' main effluent disposal method is the irrigation of 60 hectares of improved pasture. Here six 20 mm water cannons operate daily during dry periods disposing of 140 L/s. Cattle periodically graze these pastures and are rotated ahead of the water cannons so they are moved around the site allowing a minimum of 8 days before they graze on previous irrigated land.



Figure 3: *Improved Pastures – farmed land*

Council operates 6 (six) water monitoring bores and soil moisture loggers; these are designed to ensure Councils irrigation practices do not waterlog the soil and potential contamination to the ground water, can be monitored from the re-use sites. The soil loggers help identify moisture levels in the soil.

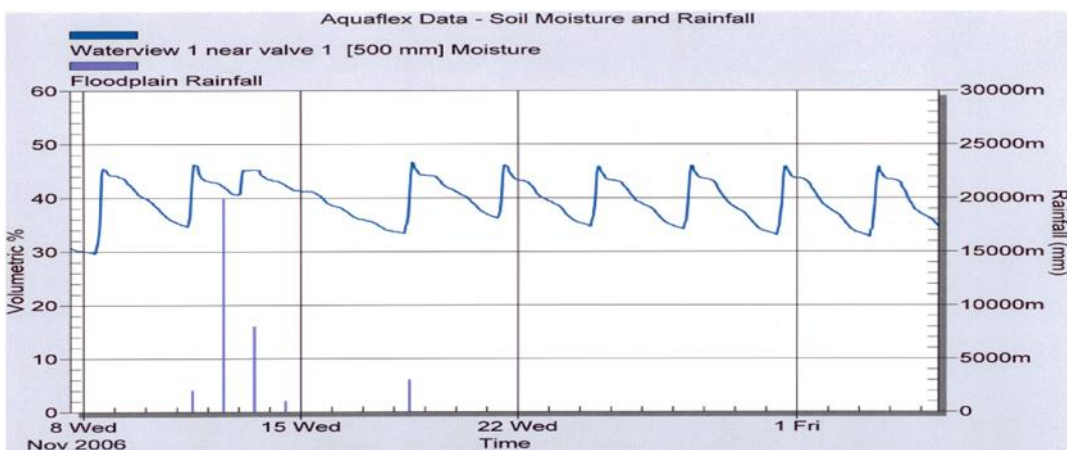


Figure 4: *Trend from the soil moisture loggers around Councils irrigated sites.*

2.4 Recycled water system – Wonga Wetlands

As winter approaches, Council commence diverting the majority of recycled water from the irrigation systems to the 80-hectare wetland system (Wonga Wetlands).

Wonga wetlands consists of seven inter-linked lagoons and covers an area of around 80 hectares (equivalent to 40 Melbourne Cricket Grounds). The lagoons are constructed on a former beef cattle farm. The lagoons are of varying depth with a maximum of 4.5 metres. They hold approximately 880 megalitres of water. In the warmer months, they gradually dry up through evaporation and percolation through the gravels and sands that make up the Murray River floodplains. Construction of Wonga Wetlands, which fills in winter and dries out in summer, has in fact returned the natural water flow of the area to pre-European settlement. This restoration of the natural water flow has resulted in the return of birds, and with no farming activities, has also seen the return of fauna and the re-establishment of

flora. Wonga Wetlands is an example of living conservation at Albury. It has grown from a degraded farmed floodplain to a nationally recognised wetland, that attracts visitors from around the world.

By accident this operational philosophy has created an environmental must see when visiting Albury. Council never planned for Wonga Wetlands to be a visitor attraction but when you have 176 different species of birds using the site plus numerous other animals it's hard to stop people coming. Who would have thought that using recycled water could turn 80 hectares of degraded floodplain into a visitor must see ecological site as well as providing a leading educational hub for local schools.

In March 2022 the operational philosophy for Wonga Wetlands was presented at the G20 Water Dialogue in Indonesia. The Dialog allowed innovative water conservation projects to be shared to countries around the world. Wonga was used as an example to demonstrate a living model of recycled water enhancing the floodplain landscape, and how an ecosystem-based approach to water management can provide sustainable and educational outcomes.

The wetlands are now open seven days a week to cater for public demand and continuing utilisation of the site all year round.



Figure 5: *Wonga wetlands in 1999 before receiving recycled water.*



Figure 6: *Wonga wetlands today*

2.5 Wonga Facilities current and future

The diverse uses of Wonga have grown over the years, and with it the development of new facilities and spaces. There are significant nature-based and cultural assets, as well as supporting facilities, at the wetlands today. These include:

- Seven lagoons covering approximately 80 hectares.
- Heritage homestead visitor centre with indigenous display;
- Aquatic Education Centre, which includes a classroom space (for education and research), small theatrette, offices, storeroom and a small kitchen;
- Three walking trails;
- Indigenous campsite replica;
- Ancient river red gums and Indigenous scar trees;
- Six bird hides;
- Wedding venue site;
- Diverse native flora and fauna;
- Toilet, picnic and barbecue facilities;
- Pedestrian/cycle links to Albury (via the Wagirra Trail and Yindymarra sculpture Walk)

The current facilities at Wonga are outdated, which limits utilisation, user amenity and the visitor experience (as well as limiting revenue generating opportunities). To cater for the growth and increased use of the outdated facilities Council, is currently in the detailed design phase of developing a new Visitor Education and Experience Centre.

The new visitor centre will support a range of education, research, community and visitor uses within the wetlands. Its location is also an important arrival node for all visitors and the facility subsequently serves as the hub for all wetlands programs and activities.

It is critical the new facility attracts and engages visitors, supports outdoor recreation and provides environmental and indigenous cultural understanding that aligns with the

wetlands' history and attributes. Figure 7 presents the adopted concept design for the new facility.



Figure 7: *Concept design for the new Wonga Visitor Education and experience centre*

2.6 Visitor experience

Wonga has evolved since its establishment in 1999. Council estimates the visitor numbers to the site to forecast growth and activation opportunities. Figure 8 shows the estimated annual visitation to the wetlands over the past five years, which is tracked using a combination of pedestrian and vehicle entry counters.

The wetlands have seen a strong growth in visitation in recent years, increasing from around 30,500 in 2017 to over 80,000 in 2021. This represents growth of over 50,000 visitors, or 22% p.a., primarily driven by public utilisation.

The most significant growth occurred over the COVID-19 lockdown periods across 2020 and 2021, which is in line with general trends in local park/open space usage observed across Australia during the pandemic.

Another attribute of the wetlands, which attracts visitors, is that the area is drought proof (due to the recreated water flow), which promotes an environment suitable for year round visitation.

The Wonga staff facilitate student education programs that educate the younger generations on the benefits of water recycling, wetlands management, chemistry, biology and conservation. On average the wetlands receive 101 bookings annually which is driven by the educational programs and site tours.

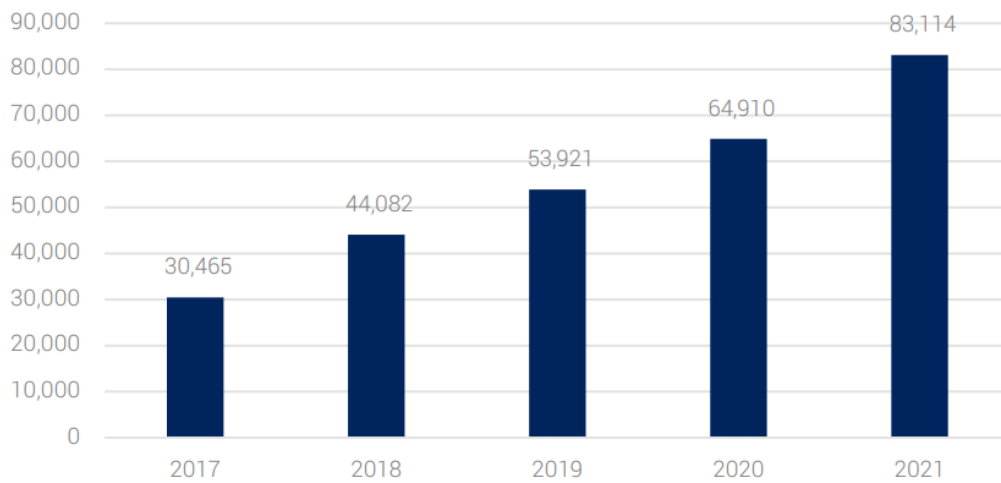


Figure 8: *Wonga Wetland visitor numbers*

2.7 Impacts of the 2022 Floods

In 2022, the flooding events across Australia did not miss Wonga Wetlands. Floodwater covered most of the wetlands for approximately 10 to 12 weeks causing major damage to walking trails, farm fences and lagoon levies. Once the water receded, Wonga Wetlands and the surrounding flood plains have been impacted by extensive weed infestation over the entire site. The floods were an unseasonal event which resulted in prolonged flooding into the summer months, cancellation of school visits and saw the closure of the site to the public for the longest time since opening in 1999. The prolonged flood event has had a damaging impact to the site's historical River Red Gums, with many trees succumbing to saturated substrate and falling over. The floods have also impacted Council's ability to reuse Council's wastewater effluent resulting in our system reaching 100% capacity.



Figure 9: *Wonga Wetland walking trail inundated during the 2022 floods.*

3.0 CONCLUSION

Since the opening in 1999, Wonga wetlands has seen many changes. It started off just being a place out of sight, where the city disposed its wastewater effluent and hidden from the

public. It has now developed into an international bird watching mecca and a place that is enjoyed by thousands of people every week.

Australia is the second driest continent in the world which is why it is so important to work together to develop sustainable ways to reuse water, particularly wastewater effluent. Ephemeral wetlands along the Murray system are a thing of the past due to the complete regulation of the system. Except for flood years, the river is at its peak in Summer and lowest in Winter. This river regulation has been detrimental to our natural ephemeral wetlands leaving our migratory and resident water birds and other wetlands inhabitants with limited places to go. This is why Wonga has continued to attract such a diverse range of fauna.

The new Visitor, Education and Experience Centre will be an important facility for providing a place to run education programs to educate our future generations on the importance of conservation, environmental awareness, and wastewater reuse opportunities.

If any other water utility is fortunate to have a dried-out wetland close to the city's wastewater effluent discharge point, why not invest into opportunities to revive more of these important ecosystems and create a space for our communities to enjoy and learn from.

4.0 ACKNOWLEDGEMENTS

To the Wonga Wetlands staff who help maintain the site and keep the wetlands and facilities in immaculate condition.

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