EXPERIENCE OF URBAN REUSE IN WAGGA WAGGA, NSW

Len Kennedy, *Supervisor Sewer and Stormwater,* City of Wagga Wagga

ABSTRACT

A 5-year trial to supply tertiary treated sewerage effluent from a primarily domestic Sewerage Treatment Works to a nearby urban area was proposed in conjunction with NSW Department of Energy, Utilities and Sustainability (DEUS).
The trial was to be based on the newly released "*NSW Guidelines for Urban & Residential Use of Reclaimed Water*".
The reclaimed water was supplied to 10 of 2.23 Ha rural residential properties and 75 normal residential properties.
The trial has since been converted to a permanent effluent supply to the properties connected.

1.0 INTRODUCTION

Wagga Wagga City Council has a very long history of reuse of sewage effluents as far back as 1974 when the Lawn Cemetery/Crematorium was established.
This reuse has been successful and accepted by user groups and has been extended over the years to the use of treated sewage effluents on parks, woodlots, sportsgrounds, a racecourse and a golf course.
Treatment consists of primary and secondary processes followed by 30 day detention ponds, in some cases disc filtration, and chlorination before pumping into the supply pipeline.
Receival areas are in some cases supplied directly from the pumped main and in others via a short-term(<5 days) storage dam.
Problems are mainly confined to the presence of algal blooms in the detention ponds, either at the STW's or in the subsequent short-term, on-site storage ponds.

The NSW Government released the draft standard "*NSW Guidelines for Urban & Residential Use of Reclaimed Water"* in 1993. Following representations to DEUS, funds were provided to conduct a 5 year trial using effluent from the Kooringal Sewerage Treatment Works. This works has parallel trickling filter/activated sludge process streams followed by 30+ days of storage in tertiary ponds.
The final pond was adopted as the water source due to it's close proximity to the filtration plant which was gravity fed from the base of the elevated pond.
The adopted filtration plant was supplied by Memtec(NSW) and consisted of a 24 module micro-filtration system with a capacity of 6 L/sec. This plant is fully automated with the only manual requirement being monthly chemical cleans.
Following filtration, the water is adjusted to pH 7.5 using an automated hydrochloric acid dosing pump and associated pH analyser, chlorinated at a set-rate using gaseous chlorine and stored in 2 X 50kL concrete storage tanks arranged in series and fitted with bird and vermin-proof roofs.
Depending on demand, effluent is withdrawn from the storage tanks, chlorinated using liquid pool chlorine to produce a residual of 0.5 mg/L chlorine at the receiving

properties and pumped into the reticulation system. The chlorinator is controlled by an analyser and thus dosage rates take account of both the chlorine demand of the water and the flow-rate signal from the magnetic flow-meter.

The pressure system consists of 4X multi-stage Grundfos pumps controlled by a Grundfos Delta M6 VFD. The controller automatically selects a combination of pumps and speeds to maintain pressure at 6 bar in the system. Maximum flow is approximately 10 L/sec. The system is fitted with a magnetic flowmeter and turbidity analyser. The turbidity analyser is connected such that levels exceeding 2 NTU shutdown the pressure pump system.

The reticulation consists of varying diameter polyethylene pipe laid beneath the footpath allocation in roads and above-ground along the rear property fences of a double row of residences. Risers at appropriate intervals are connected to child-proof taps with removeable handles via flowmeters. Each tap is fitted with the universal “do not drink-effluent” signage.

The local potable water supplier, Riverina Water County Council, also required the installation of a “double-check valve” adjacent to their water meters and anti-syphon devices on all external taps as added safeguards against cross-contamination of the potable supply.

A two-stage monitoring program was designed to provide the initial “proving-up” of the trial followed by on-going testing to ensure standards were being maintained.

2.0 DISCUSSION

2.1 Public Consultation

Council’s first action on receiving funding approval was to conduct a series of public meetings with the intended residential group of owners/occupiers.

These were poorly attended despite a letter-drop and a time/place that was selected to facilitate attendance.

During these meetings the purpose of the trial was explained, that the water was to be used for gardens, washdown and other external uses only. The importance of adequate supervision of children during use was stressed and also residents advised that garden watering was to be restricted to rear yards due to the public having access along footpath areas.

Those attending enquired of the treatment processes involved, testing regimes, safety, cost, impact on garden plants, will it harm the car “duco”and how the retrofitting of the above-ground reticulation would impact their properties.

Overall, those attending were very supportive, particularly when they realised the water would be free for the duration of the trial!! Of the 85 potential customers, only one elderly lady stated she did not want to be supplied with effluent.

2.2 Construction

It was considered critical for this stage to be completed successfully. One-on-one meetings were held with each household to explain where the pipe would be placed, to negotiate around garden sheds and other infrastructure and decide the location of the outlet tap.

Council used it’s own day labour to install the 12m lengths of pipe and cut the small holes in fences etc as we felt this would allow for increased flexibility when the inevitable problems arose.

On-going letter-box drops were held throughout the process to ensure residents were kept informed regarding progress.

2.3 Commissioning

Before water could be delivered to the area, it was essential the necessary testing had occurred. Water was diverted to a Council-owned woodlot adjacent to the filtration plant during the testing phase. With successful commissioning results the effluent was then diverted to the urban area, initially at low pressure, with plenty of notice in advance. The inevitable leaks occurred but most were able to be remedied at short notice with no serious flooding of yards or garden sheds.

2.4 Problems

It rapidly became obvious that it would be very difficult to accurately maintain chlorine levels at the desired levels. Huge variations in water demand meant large swings in chlorine demand with levels at the customer taps varying from 0.1 to 4 mg/L free chlorine. This problem has never been successfully overcome and results in higher levels of chlorine than is necessary so as to avoid periods of zero free chlorine.

During the third year of operation, quarterly servicing of the micro-filtration system revealed a permanent elevation of trans-membrane pressure readings. A lot of investigation eventually identified the source of the problem as an upstream process which dosed polyelectrolyte. Sufficient amounts of this were carried over to cause a permanent problem when combined with the very high levels of algae in the raw water during the summer months. Eventually the membranes had to be replaced at high cost($45,000) and the raw water source changed to a point upstream of the polyelectrolyte dosing.

To gauge variations in customer usage we decided to read the water meters quarterly. This turned into a major undertaking as most of the meters were in backyards requiring access when residents were home. It seemed at times that some people are never home, even at night or on weekends.

2.5 Results

The quality of water being reticulated has consistently been of excellent quality especially when taking into consideration the raw water quality. For example, algal levels up to 50mg/L and pH often around 9.5 during algal blooms.

Test results confirm consistent removal post-filtration of Coliforms, Giardia, Crytosporidium and Virus. This has given the Council much confidence that the health of the residents in the trial area is being adequately safeguarded. This was to be expected as Memcor quote 6-log reductions in bacteria, protozoa and algae and 1-2 log reductions in viral counts.

Consumption varied enormously from less than 50kL/year for some residents to 2500 kL/year for a 2.2 Ha property with a huge garden and lawn area. Consumption during late evenings in summer often exceeded the flow capacity of the filtration unit but the 100kL buffering capacity of the storage tanks meant that demand was met.

There have not been any obvious signs of wastage of effluent such as footpath areas overflowing into the street gutters.

Observations indicate that many residents are watering portions of their front lawns/gardens with effluent. This is almost impossible to prevent and possibly not a huge issue as most pedestrian traffic is local in nature and aware that effluent could likely be used in front gardens/lawns.

2.6 Costs

The capital cost of the scheme, including reticulation was in the order of $250,000. Annual running costs are in the order of $.70/kL.

It is estimated the total annualised costs, including capital, would be in the order of $1.30/ kL. Potable water is available from Riverina Water Council Council for approximately $0.80/kL therefore the supply of effluent at this scale of operation is not economically justified.

3.0 CONCLUSIONS

A public meeting was held with residents to gauge the level of support for making the trial permanent. Residents immediately formed a strong and vocal support group for it's continuation

Council considered it desirable to continue to evaluate the impact (if any) of long-term irrigation using effluent in an urban setting.

Council has agreed to supply the effluent to residents on an on-going basis for 2/3 cost of the potable water supply.

Effluent can be efficiently and safely supplied to an urban residential area utilising micro-filtration technology. However, the small scale of this example means it is not economic when compared with the local potable supply.

The trial will present some interesting public perception problems when the recently announced Stage 4 water restrictions start from July 1.

It is not known at this stage whether the scheme will be exempt and Council has yet to decide what policy it will adopt in regard to the issue.

4.0 ACKNOWLEDGEMENTS

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