

Win Win with Waste Water

This presentation is about the re-use of waste-water in conjunction with community to gain greater community benefit from a waste stream.

At Burnie City Council in Tasmania, in my previous position, I was involved in the implementation of LEAN systems as a way to improve council performance. We focussed on the identification and elimination of waste.

Wastes come in a number of forms and our focus at Burnie included: wasted movement, wasted energy, wasted space; wasted time waiting; over-processing; over producing; rework; wasted transportation and Inventory.

The initiative I am presenting today focusses on another waste and that is wasted resources within the waste stream.

A little geography for you; Jamestown is in the Mid-North region of South Australia with about 14 other councils forming the Legatus Region. Northern Areas has a land area of 3070 square kilometres, a population around 4500 people and a dozen settlements varying from populations of 9 people in Tarcowie to 600 each in Gladstone and Laura and 1500 or so in Jamestown.

Anyone heard of Elon Musk? – The big Battery? 12 kilometres out of Jamestown. Practically Elon's second home.

Jamestown is about 60kms from the coast and has an annual rainfall average of 440mm. Highest annual rainfall on record is around 820mm and the lowest 220mm. There are no mountain water fed creeks or rivers however there is one spring in Jamestown that has a constant but minimal flow. What water that can be taken from this natural water source is reused in street irrigation.

Jamestown has a CWMS water management process - that is a Community Waste Water System which involves the collection through mains and pump stations of household effluent from septic tanks which provide primary treatment. The effluent is transferred by mains and pump stations to a treatment plant – pretty basic one; and stored in lagoons for a further period of treatment through hypochlorite dosing and sunlight exposure.

Water is then reused in irrigation.

Here you see the location of Jamestown and the treatment plant. Also shown is the location of a particular block of land.

A bit of history for you: In the mid to late 1800's the South Australian government surveyed and set about establishing townships. Those surveys imagined much larger communities than has been the case and as a result land set aside for public open space often forms a border around townships. In many cases the land is managed by local government and is often leased to community groups to use for agricultural production.

So this block of land has been leased for some years to the Jamestown Apex Club who have cut hay on the block, generated from natural rainfall.

This slide shows 4 ponds. Affectionately known as our poo ponds. Only two of them are lined. Two of them; the ones on the right and left shouldn't have any water in them but you can see from the photograph that they were at capacity when this photo was taken in late 2016. They are unlined and our licence through the EPA and Department of Health and the Aging requires that ponds are lined to meet current standards.

Three years ago, Northern Areas Council was facing the prospect of spending more than \$200,000 to line the third evaporation pond that took water from its Jamestown treatment plant, which services about 500 homes and had budgeted to do so. The pond on the right is an overflow pond.

We had a year of high rainfall, around 770mm and we had environmental overflows into a creek that flows only in high rainfall at the town end of the CWMS site.

This graph shows the disparity between inflow and outflow to existing irrigation. The upper line being inflow and the lower the outflow to irrigation. There was opportunity to do something more with the water volume. The existing plan was to reline a pond which would provide greater evaporation. In a high rainfall year like we were experiencing clearly that wasn't going to solve the problem. Council was on notice from the EPA and fines would be imposed on council for further overflows.

At the same time the Apex club had been asking for water for irrigation and proposed a bold plan, the outcome of which was to raise more money through more intensive management of the land in the middle of the town/ponds sandwich.

We went through the process; reporting to council and engaging the Apex Club to get a plan together to improve on the current plan for wastage.

(Explain the slide first – point to it)

A design was developed with two size and price options. The approved installation included a 100metre pivot arm to move between 3 pivot points to provide irrigation to 12 hectares of the available land. From the design report I give you the following:

“irrigation daily use of only 25kL per day for November and 83kL day average for September. The average influent into the waste water treatment plant (WWTP) is approx 9,000kL a month (300kL/d). The limits of this proposed disposal to irrigation design are from the road boundary carrying an existing rising main with treated effluent to a class B standard which would require no additional tertiary treatment for disposal to irrigation.

The allocated council land area, which is under cropping is 12 hectare and the irrigation area served by three locations of 100 M radius centre pivot is approx 31,410 sqM. The centre pivot will be manually towed to the three base stations that will cover the whole area under irrigation and have a total area of 94,247 sqM. This would enable disposal of 420kL of treated effluent per day if required. The proposed crop on the land is Lucerne which is said to be able to tolerate copious amounts of water.”

The Apex Club has been cultivating the 12-hectare council-owned field for many years, selling the resulting crops to fund community projects. Apex Club Cropping Manager Brett Simpson said they had chosen crops that could grow with available rainfall, like wheat, barley canola and had so far raised between \$6,000 and \$8,000 a year.

The club really wanted to switch to a crop with a higher value like lucerne, but to do that, they needed to be able to irrigate.

The pipeline to the oval passed close by the field, so council set up a spur line, and now about 400 kilolitres of treated wastewater is being delivered to the field three days a week via pivot irrigation.

The lucerne was planted in October 2018, but its growth rate was slowed due to low rainfall and the unusually hot summer. Lucerne has deep roots and will eventually access the groundwater.

The club have made one cut so far, and once it's established, can expect up to four cuts a year depending on the season, each worth about \$13,000.

There's also the harvesting of seed, which could be worth up to another \$25,000.

If everything goes well, that could mean up to \$70,000 more every year for projects like assisting our sporting clubs and supporting locals who have had life-changing accidents or illnesses.

This project has increased the income for the Apex club by up to 8 times their previous for this project and the outcome of that is upgraded social infrastructure. From living in a medium size community and moving to this rural community I have seen and experienced very different engagement of community in social infrastructure provision.

This project provides an ongoing income stream, not just a one-off benefit.

The Jamestown community is typical of rural South Australia where there is a high level of community involvement in the provision of the type of community services carried out by council in larger population bases. That extends to social infrastructure provision.

The benefits to council as an entity are numerous. Here are some:

- Public perception of council as an organisation that can manage all its resources
- Public perception of council as an entity that will partner with community
- The financial benefit to council in the accelerated improvements to social infrastructure in a community like many others dependant on Grants and other income sources
- The financial benefit to council in being able to meet all the needs for waste water dispersal for the present and manage future increases. I did have a problem with storm water infiltration, and that issue has miraculously disappeared now.
- The benefits of relationship building with external agencies like the EPA and Department of Health and Aging.
- Improved operational management of waste water treatment through centralised water treatment. Prior to the irrigation project, water was sent to the irrigating site for final treatment with chlorine dosing at the site. There were ongoing issues with this system and any leak would result in higher risk associated with elevated ecoli counts. A component of this project was to upgrade the water treatment at the main site, once it had undergone its time of UV exposure so that the water leaving the pond site required no additional treatment.
- The challenges to council include development of a reasonable agreement for renewal of the irrigation infrastructure. Council has taken the view that it has a responsibility to collect and distribute waste water and the costs for that need to be borne by the CWMS levy and fund.
- The irrigation demands are now split between competing interests. The original user being the main sports ground incorporating football ground and lawn tennis courts has no other water source and have been used to taking all the water they want whenever they want. They can no longer do that and we have had to develop a program with the users to ensure they share the resource. This dry season has exacerbated the issue.
- The maintenance demands of the scheme have increased in that we have more valves, pumps, power supply and so forth with the increased cost of maintenance which goes with it.

This shows the furthest lined lagoon empty in April this year. The closer pond with the floating solar array, which is another story, is about 80% full. Further on is the emergency overflow area which floods into the creek when full. We are currently redeveloping that area to take sludge for drying and re-processing to sale.

This slide shows the western most pond. It was the pond proposed to be lined and provides for a significant area very useful for evaporation as was the intent of the original scheme. This also provides for additional area for sludge. Subject to the success of the sludge processing on the eastern end, there is potential to develop this area for sludge processing as well.

This is a shot of the water tanks on the irrigation site and the shed for the pumps and control equipment. All the water is processed at the plant. The tanks are filled and the irrigation water is drawn from the tanks rather than relying on supply from the main. We have supply capacity problems if the sports grounds draw water to fill their tanks at the same time as the tanks here.

This slide provides an aerial view of the irrigation site showing the 100metre pivot arm attached to one of its centre pivot locations.

Northern Areas Council and the Jamestown community has realised a number of benefits through recognising that a wasted resource, could provide significant and ongoing benefit to the community through a partnership of council and community and are literally reaping the benefits today.