

WASTE AS A RESOURCE – AN INNOVATIVE APPROACH

In the late 1980s, population and tourism growth in Hervey Bay had created the need for more sewage treatment facilities. The Environmental Protection Agency would not permit the extra treated sewage to be discharged to local creeks that flow into the bay – an ocean outfall was required. However, in a community where tourism relies on preserving the pristine waters of the region, any impact on the bay was considered unacceptable.

The challenge was to find an environmentally responsible solution that was both economically viable and acceptable to the residents of Hervey Bay. The result is a land-based effluent disposal system that has not only protected the waters of the region, but has also delivered dividends for local farmers, the Council and ratepayers.

HOW IT WORKS:

The scheme consists of three parts – The Pulgul Irrigation Scheme, the Eli Creek Irrigation Scheme (both joined by a 12.5km pipeline) and a stormwater harvesting project.

Pulgul

The Pulgul Irrigation Scheme began as a trial in 1990. Wide Bay Water Corporation purchased a 485-hectare farm to demonstrate the feasibility of irrigating sugar cane, pasture, a eucalypt plantation and tea trees. All trials were successful, and the impact on the cane farm was particularly remarkable, moving from one of the poorest performers to become the area's productivity winner.

Eli Creek

The success generated interest amongst other farmers, particularly in the sugar cane industry. The Corporation purchased a further 320-hectares and established a Water Board to develop and manage a similar irrigation scheme for the Eli Creek catchment.

Within the first year, cane farms using wastewater irrigation showed significant improvements in yield and return [45% increase in tonnes of cane/ha, 62.5% increase in tonnes of sugar/ha and an 80% increase in \$/ha]. The scheme was expanded in 2002, and a pipeline was built to connect it to the Pulgul scheme.

The integrated scheme handles 8 million litres of effluent a day and incorporates five storage facilities, including an 850 ML storage dam. A 26.5km system of pipes carries the wastewater to ten cane farms, two turf farms, two golf courses and a flower farm. In addition the treated water irrigates landscaping at the Hervey Bay airport, Wide Bay Water Corporation offices and a nearby cricket ground, and will also service 380 hectares of hardwood plantation, under development.

Stormwater harvesting

To manage the situation where demand might exceed supply, Wide Bay Water Corporation has incorporated a stormwater harvesting scheme to provide additional water for treatment if necessary – particularly during the peak cane growing period from November to April. Stormwater is stored in flood retardation basins around the city, then released into the sewer during lower night-time flows. This innovative engineering approach helps minimise odour and corrosion in the sewerage network, while preventing contaminants such as oil, animal waste, fertilisers and litter flowing into the bay through the stormwater system.

Wide Bay Water Corporation uses about 80% of its wastewater in the irrigation scheme. Its EPA licence stipulates 90% reuse by 2007 – but the Corporation's goal is to continue expanding the scheme's customer base to recycle 100% of effluent.

A FINANCIAL BOON - THE HALF MILLION DOLLAR WINDFALL

In financial terms, the scheme has saved the Council and ratepayers significant upfront capital and ongoing operational costs compared with a traditional ocean outfall, while also establishing an income stream. A comparison of the two options shows the Wastewater Irrigation Scheme has delivered a bottom-line benefit of \$500,000 a year.

Ocean Outfall Option	\$	Wastewater Irrigation Option	\$
Capital cost of advanced treatment and discharge	12,800,000	Capital cost of irrigation scheme	8,000,000
- minus state government subsidy	6,400,000	- minus subsidies	6,000,000
Net capital costs	6,400,000	Net capital costs	2,000,000
Annual capital and loan payments*	440,000	Annual capital and loan payments*	140,000
Annual operating and maintenance costs	900,000	Annual operating and maintenance costs	800,000
		- minus annual income	100,000
Total annualised costs	1,340,000	Total annualised costs	840,000

*(Capital amortised at 7%)



WATER RECYCLING SCHEME



Wide Bay Water Corporation's innovative wastewater recycling scheme has delivered significant benefits for Hervey Bay's environment, economy and the regional community. The scheme can be replicated and may provide environmental and economic solutions for other regions. Due diligence including management of health and safety risks, robust environmental monitoring systems and documented auditing procedures are essential to its success.

In establishing this successful scheme, Wide Bay Water Corporation has developed the tools and experience to manage stakeholders, deal with regulators, source funding, find markets and manage all environmental aspects to ensure its integrity and viability. For more information contact the Wastewater Recycling Scheme co-ordinator at Wide Bay Water Corporation.

WINNER OF THE NATIONAL AWARD FOR INNOVATION IN LOCAL GOVERNMENT



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PROTECTING THE ENVIRONMENT

The wastewater recycling scheme has prevented tonnes of nutrients and organic matter entering the pristine waters of the region. Reductions include:

- Total Nitrogen 55 tonnes/year
- Total Phosphorous 20 tonnes/year
- Biological Oxygen Demand 30 tonnes/year

Most of the nutrient reduction occurs in the effluent storage dams. The scheme therefore minimises impact on fish habitats and the world-renowned Fraser Island whale management area, which in turn protects the integrity of the region's crucial tourism industry.

ENVIRONMENTAL MANAGEMENT AND MONITORING

Prior to the development of the schemes, full environmental impact studies were undertaken. These examined a range of issues including soil and landscape assessment, effluent characterisation and a water and nutrient balance. The water balance model was a critical component of the scheme – determining the level of water used by different crops, the amount of land required, and the impact of climatic influences (including rainfall and evaporation). Other factors considered in the scheme's development included the nutrient requirements of different crops, site-specific soil characterisation and an evaluation of groundwater resources.

A strict Environmental Management Plan covers the irrigation schemes. Wastewater is diverted to large storage dams for a minimum 30-day detention, then distributed to several users, including a number of cane farms. Each farm must prepare a farm management plan, which forms the basis of their Environmental Management Plan. This ensures the wastewater is used in a safe and productive manner.

Salinity and soil sodicity are the two biggest risks to the environmental sustainability of the scheme. A comprehensive monitoring and testing program has been established to assess stream run-off quality (especially salinity), nutrients (nitrogen and phosphate) and groundwater levels and quality. Samples are taken regularly from groundwater bores and surface water sampling points, and analytical tests are conducted in a laboratory established by Wide Bay Water Corporation. Additionally, all wastewater and stormwater treated for reuse is tested and analysed regularly to ensure it complies with Environmental Protection Agency licensing requirements. An annual status report details activities and monitoring results.

Wide Bay Water Corporation also continues to develop strategies to model ongoing population growth and treated wastewater quantities so that they match effluent storage capacity and land requirements for irrigation under worst case scenarios.

LEGEND



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|-------------------------------------|---|
| 1 Pulgul wastewater treatment plant | 7 850 ML storage |
| 2 Pulgul storage basins | 8 Cane farms |
| 3 Pulgul farm | 9 Golf courses |
| 4 Hardwood plantations | 10 Eli Creek wastewater treatment plant |
| 5 Turf farms | 11 Stormwater harvesting |
| 6 Flower farm | |

Stormwater harvesting basins

While conventional engineering seeks to keep stormwater out of sewerage systems to prevent overflows in times of heavy rain and flood, Wide Bay Water Corporation has developed an innovative project to merge the two systems in a controlled process that provides a number of benefits. Detention ponds capture run-off from urban areas and roads, preventing pollutants from entering the waterways. The ponds also help with flood mitigation while providing an attractive amenity for the residents of Hervey Bay. The stormwater is then flushed through the sewerage network during low effluent flow periods, shifting stale sewage that can cause odours and corrode pipes – thereby extending the life of the infrastructure. The diverted water is then treated and routed into the wastewater irrigation system to top up supplies to connected farms and industries.

General landscaping

The city's airport, Wide Bay Water Corporation offices and a local cricket ground are just some of the landscaped areas that stay green and lush through irrigation from the wastewater reuse scheme.

Golf courses

An average 18-hole golf course uses 100 megalitres of water a year. The wastewater recycling scheme supplies two golf courses in Hervey Bay. This source substitution conserves enough town water resources to supply the needs of about 600 homes.

Turf farm

The wastewater irrigation scheme has provided opportunities for farming operations that traditionally struggled to exist in the Hervey Bay region, because of its lack of rivers and groundwater supplies. A turf farm near the Eli Creek treatment plant has been able to use the treated water to irrigate for some time, while the construction of the pipeline connecting Eli Creek and Pulgul has enabled another turf farm to establish - the farmer specifically buying land alongside the pipeline to connect to the scheme.

Pulgul Farm

With no major rivers or groundwater supplies in the area, sugar cane was farmed using dryland methods. Wide Bay Water Corporation entered into a share farm arrangement with a local farmer on 70 ha of land at Pulgul to investigate the opportunities for irrigation using wastewater. The farm had been one of the worst performers in the district. In 1992 the wastewater was connected to the property. Within five years, the farm went from being the least productive to winning the Maryborough Cane Productivity Award for the highest sugar cane yield per hectare. The success of Pulgul Farm led other cane farmers to connect to the scheme.

Cane Farms

The success of Pulgul Farm led to the establishment of the Eli Creek irrigation scheme - developed with cane farmers in mind. An 850 ML storage facility was created to ensure consistent supply, and eight farms connected. A ninth farm has connected via the pipeline linking the two irrigation schemes. Irrigation has seen cane yields increase by more than 40% and dollar return increase by 80% compared with previous dryland practices. Cane farmers have effectively drought proofed their operations and improved their competitiveness at a time when the state's sugar industry is in crisis.

Hardwood plantations

Wide Bay Water Corporation is establishing hardwood plantations around each scheme's major storage dam to ensure the 100% reuse target can be achieved - particularly when demand from the cane industry diminishes during the non-growing season.

