



A COMMERCIAL APPLICATION OF
VIROSEWAGE™ TECHNOLOGY

CASE STUDY:
KILCOY SEWAGE TREATMENT PLANT

“The implementation of ViroSewage™ Technology resulted in significant improvements in removal of phosphorous, nitrogen, suspended solids and biochemical oxygen demand... (and) there was substantial odour reduction.”



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PROBLEM

The Kilcoy Sewage Treatment Plant, Queensland, Australia, had been experiencing poor treated water quality problems due to hydraulic capacity problems. The plant had exceeded its design capacity and was faced with a significant capital investment to upgrade. The Kilcoy Plant was regularly exceeding licence conditions for biochemical oxygen demand and suspended solids, and was experiencing odour problems. The plant was also discharging too much phosphorus into the receiving waters.

VIROTEC TOTAL SOLUTION

The ViroSewage™ Technology application was successful in treating the water to comply with all regulated licence conditions and enhanced settling enabled the sewage treatment plant's capacity to be increased by 50 percent. This ensured that no significant capital investment was necessary. Treated water properties had improved significantly in that colour, clarity, turbidity and phosphorus content were substantially better after application of ViroSewage™ Technology.

Odour had been virtually eliminated from the plant and the bio-solids produced enabled Kilcoy Council to investigate re-use of this now valuable bi-product. The Virotec ViroSewage™ Technology total solution components included design, engineering, application, monitoring and liaison with regulatory authorities.



Odour was virtually eliminated from the plant.

BACKGROUND

The Kilcoy Sewage treatment plant utilizes trickle filtration for the treatment of sewage. The sewage is collected from the township of 1,800-2,000 people. The average daily hydraulic flow is approximately 400 kL with peak flow periods from 6:00 am to 10:30 am daily.

While the current technology can reduce the Biochemical Oxygen Demand (BOD) and the Total Suspended Solids (TSS) load, it does not reduce phosphorus concentrations sufficiently, leaving high nutrient loads in the discharged water. Studies have shown phosphorus availability to be the governing factor for algal blooms and excessive plant growth polluting the waterways.

The original design capacity of the plant had been exceeded, and the ability of the plant to consistently treat the sewage sufficiently, for BOD and TSS, to meet the EPA licence requirements

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had been significantly reduced.

Further expansion of the sewage system, to meet any increase in the population, would greatly increase the possibility of fines, by the EPA, for licence infringement, or require a costly upgrade of the treatment facility.

Factors affecting the treatment capability of the plant include volume, sewage type i.e. septic tank discharge and pollutants such as fats, oils and greases from grease trap cleaning and nutrients from town water runoff and cleaning detergents.



Components of the Kilcoy Sewage treatment plant.

TREATMENT METHODS

After installation of ViroSewage™ Technology, Virotec undertook a comprehensive monitoring program for a period of two months to validate the system's performance. This time period ensured that all flow regimes and raw sewage characteristics were considered.

The ViroSewage™ Technology treatment method is a fairly simple add-on to the existing treatment plant and does not require significant capital investment. The ViroSewage™ Technology dosing plant is linked to the sewage treatment plant's flow meter to ensure correct dosing of ViroSewage™ Technology reagents during the variable input flows.



The ViroSewage™ Technology dosing plant at Kilcoy sewage treatment works.

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RESULTS

ViroSewage™ Technology consisted of dosing the outflow from the trickle filter prior to the input to the secondary clarifier with ViroSewage™ Technology reagents and monitoring the resultant outflow. ViroSewage™ Technology showed a marked improvement of the visual clarity of water in both the secondary clarifier and the V-notch chlorination tank. Visual clarity improved from an initial 200 mm depth to over 2,200 mm depth after only 14 hours of operation. It was also found that the phosphorus concentration was reduced from 14 mg/L to 0.05 mg/L. The colour and turbidity were also reduced from 35 PCU and 16 NTU respectively to ten PCU and one NTU.

Algae from the sides of the tanks and pipes was receding, as a result of the reduction in available phosphorus. The pH range of the outflow from the secondary clarifier was 7.0 to 7.2.

The large reduction in settling time of the secondary clarifier proved that ViroSewage™ Technology had the potential to increase the hydraulic capacity of the plant without costly improvements and upgrades. The magnitude of the increase was 50 percent.

NATA* RESULTS OF VIROSEWAGE™ TECHNOLOGY APPLICATION

Parameter	Raw Sewage	After Conventional Treatment	After ViroSewage™ Technology Treatment
Hydraulic Capacity	2000 EP	2000 EP	3000 EP
Hydraulic Throughput	400 kL/day	400 kL/day	600 kL/day
Total Suspended Solids	365 mg/L	20 mg/L	3.3 mg/L
Biochemical Oxygen Demand	411 mg/L	30 mg/L	10.3 mg/L
Total Phosphorus	53 mg/L	14 mg/L	0.05 mg/L
E-Coli	26,000,000 cfu	10,000 cfu	7,000 cfu
Total Nitrogen	66.3 mg/L	13 mg/L	4.0 mg/L
Total Metals	0.6 mg/L	0.6 mg/L	0.2 mg/L
Colour	125 PCU	35 PCU	10 PCU
Turbidity	276 NTU	16 NTU	1.2 NTU
Clarity	20 mm	200 mm	2,200 mm
pH	8.0 – 9.7	6.8 – 7.3	7.0 – 7.2
Odour Level	Extremely High	High	Extremely Low
Bio-solids quality for composting	–	Poor	Very Good

*National Association of Testing Authorities (NATA) is Australia's National Accreditation Authority.

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TESTIMONIAL

“As operators of Kilcoy Sewage Treatment Plant we were consistently faced with our sewage treatment system having continual stability problems resulting in extremely variable treated water quality.

The most notable change we have found since using ViroSewage™ Technology has been substantial improvement in treated water clarity. The visibility of the water in the discharge flume has been consistently exceptional at all times whilst using ViroSewage™ Technology.

We have also found that there has been significant odour reduction. Odour generated from the digester and primary clarifier had been a continual problem.

We found the Virotec staff were professional and friendly at all times whilst on site. All safety standards were observed. They were helpful in listening to our problems and generally offered a high level of customer service. We now look forward to continue working with Virotec.”

OPERATOR

Kilcoy Sewage Treatment Plant



Representatives from various Councils inspect the application of ViroSewage™ Technology.

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TESTIMONIAL

“Council conducted a trial of ViroSewage™ Technology at Kilcoy Sewage Treatment Plant for several months in late 2002.

The implementation of ViroSewage™ Technology resulted in significant improvements in removal of phosphorous, nitrogen, suspended solids and biochemical oxygen demand. Additionally, the clarity of the treated water was consistently high, and an improvement over our normal system was apparent during the period of the trial.

It was found there was substantial odour reduction from the typical odour generation points, such as the primary clarifier and digester during the trial.

ViroSewage™ Technology would also have enabled Council to look at re-use options for the bio-solids rather than just sending this material to landfill.

Council was impressed with the comprehensive monitoring program implemented by Virotec and the overall technical competence of the Virotec team.”

MJ HILTON
*Chief Executive Officer
Kilcoy Shire Council*

CONCLUSION

ViroSewage™ Technology has proven to be applicable for the treatment of sewage in order to maintain licence conditions, improve treated water quality, remove phosphorus, eliminate odour and increase hydraulic capacity of the treatment plant.