

COMMUNITY WATER REUSE CASE STUDY

The Ecovillage at Currumbin, Queensland, Australia

The Ecovillage at Currumbin is situated on a 110 hectare site in the Gold Coast of Australia. This village provides for 144 eco-homes in a variety of residential configurations together with community facilities including a small village centre and a school. The Ecovillage incorporates a wide range of sustainability features including autonomy in water, wastewater and energy.

The Orenco Textile Filter followed by micro filtration was found to be the most appropriate wastewater management scheme for the project. The wastewater treatment and recycling plant at the Ecovillage at Currumbin has Australia's first Textile Media Packed Bed Reactor system, and is also a world's first.

The sewage treatment and recycled water treatment plant at the Ecovillage is designed to treat 60,000 L/day of sewerage from the village. The plant consists of five major pieces of equipment. Primary treatment tanks, secondary treatment using the textile filters, total odour neutralisation using activated carbon filters, tertiary filtration using continuous micro filtration and disinfection using UV irradiation and residual disinfection using chlorine.



Figure 1. The EcoVillage at Currumbin

The focus of the project was very much on the environment and sustainability, and design of the wastewater treatment system mirrored this philosophy.

Using the criteria set by the project engineers, Innoflow were part of the project team that produced a wastewater management solution that met with the developer's high expectations and strict requirements and the potential buyer's economic aesthetic and practical demands.

Table 1. Design Constraints

Constraint	Solution	Comment
Provide consistent, high quality water for all of the village's non-potable needs as required	Install a recycled water system with the ability to treat to Class A+ water on demand	Other, traditional tertiary treatment systems produce Class A+ water as it is produced rather than as it is needed by the community
Slow build-out to ultimate size	Provide a system that can be operated for 1 or all of the homes	The rtPBR process has a 100% turn-down ratio providing consistent performance under any range of flows from 0 to the design flow
Visual impact and aesthetics of the Ecovillage	Design and construct a system with minimal impact on the surroundings	All components of the rtPBR are installed below ground, with only green lids visible The use of passive and active carbon filter vents means the system produces no odours
Maintain the developer's ideal of 'The world's best Ecovillage'	Design and construct a system that innovatively combines the world's most advanced secondary and tertiary treatment technologies	The combination of the passive rtPBR and the physical-barrier Micro filtration plant is a world's first, guaranteeing consistent high quality effluent



Figure 2. The primary treatment tank during plant construction

Table 2. Treatment System Performance

Parameter	Required Value*	Actual Performance**
BOD ₅	10 mg/ltr as an 80% ile	3.37 mg/ltr
Suspended Solids	10 mg/ltr as an 80 th %ile	1.85 mg/ltr
Total Nitrogen	15 mg/ltr as a 50 th %ile	14 mg/ltr
E.Coli	<10 cfu/100ml as a median	1 cfu/100ml
Viruses, Pathogens,	5 log removal	9 log removal

***These are the requirements to meet the Queensland EPA guideline for Class A+ recycled water for non-potable reuse**

****Average performance of system from weekly then monthly sampling over an 18th month period, aside from Viruses and Pathogens, where data is as achieved during the validation challenge testing**



The visual impact and aesthetics of the wastewater management were of utmost importance to the developers, and the low profile finish of the rTPBR exceeded all expectations in this regard.

The footprint for the secondary Packed Bed Reactor is a mere 11m x 9m, for 110 homes

Figure 3. The low-profile treatment plant, Recirc tank in the Foreground, treatment PODs beyond

The combination of the AdvanTex® textile packed bed reactor and the Memcor Continuous flow micro filtration plant is a world's first.

This combination of technologies provides for a consistent Class A+ recycled water quality at all times, at a much lower running cost than activated-sludge MBR based treatment systems



Figure 4. The Continuous Flow Micro filtration plant provides on-demand Class A+ water when the development requires it

Table 3. System Summary

System Component	Specification	Comment
Design Flow	60,000 litres per day	Peak wastewater flow, including allowance for micro filtration backwash
Collection System	PE Welded 'Smart Sewer'	Designed with pre-welded 'poo-pits' in place of manholes, to minimise stormwater infiltration
Primary Treatment System	135,000 litres	Consists of 3 tanks connected in series. Performance is enhanced through the use of patented Biotube effluent filter technology
Recirculation Blend Tank Size	63,000 litres	Dual chamber tank providing 20/80% volume split for Blend/Recirc tank
Recirculation Pump	4 x Multi-stage turbine (4")	At peak – 4.87 hours run time per day @ 0.750 kW per pump
Packed Bed Reactor Area	72 m ²	This process ensures NO odour production from the treatment plant
Transfer Tank	45,000 litres	All underground
Disinfection System	Continuous Flow Micro filtration system, provided by Memcor	Mixing and storage tank installed under control room shed. Controller connected to telemetry system
Class A+ Reuse	Toilet flushing, Garden watering, Car washing and landscape irrigation	When treated, or as required from the wet weather storage system.

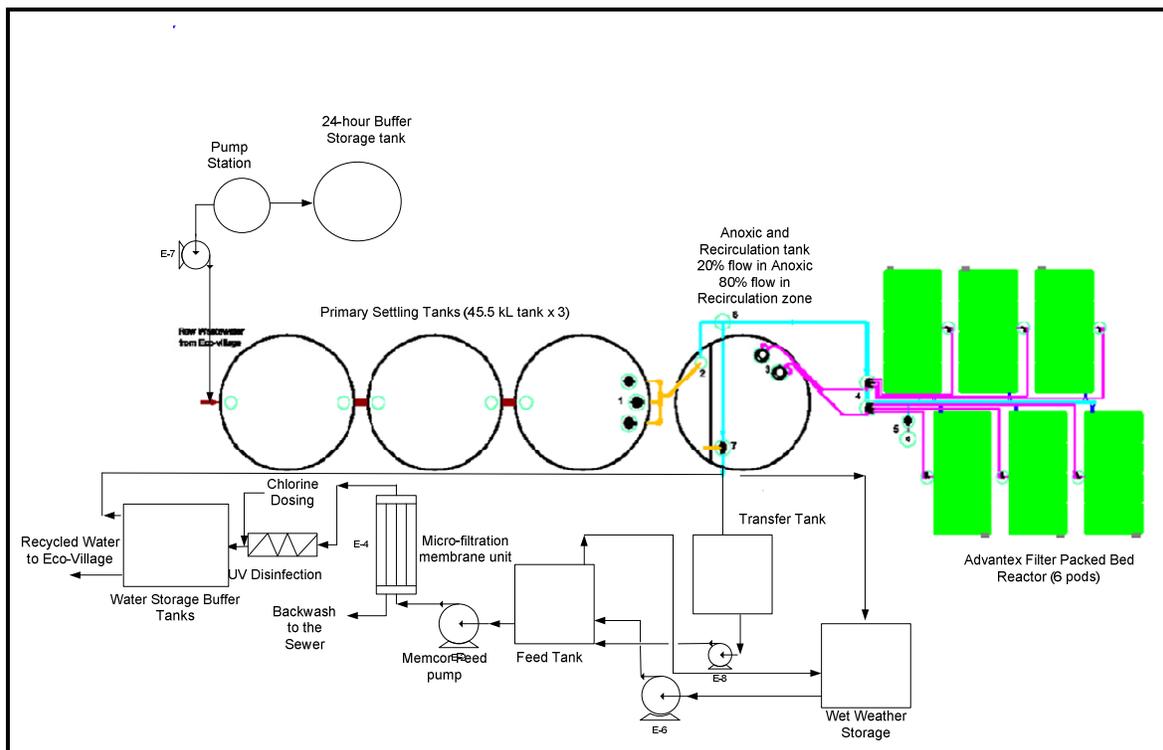


Figure 5. Schematic of the Ecovillage at Currumbin wastewater treatment and recycling plant