COMMUNITY WATER RECYCLING CASE STUDY



Shoal Beach, Hawkes Bay New Zealand

Shoal Beach is a picturesque beach in the central Hawke's Bay, near Te Angiangi Marine Reserve.

The developers of the Shoal Beach Subdivision had a clear goal of what they wanted their development to achieve; they wanted to ensure that their development did not compromise the coastal environment. This was a success, with the development winning the **Hawke's Bay Environmental Awards** business category in 2004.

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



Shoal Beach, Aramoana during site clearing

In order to minimise adverse effects on the surrounding environment and coastal area, wastewater needed to be treated to a very high standard. It was important that the quality of effluent was not compromised in times of low, average or high flows. The view was also taken that as much as possible should be done to utilise the treated wastewater as a resource.

Innoflow Technologies NZ Ltd. was able to produce a wastewater management solution that met with the developers' high expectations, the council's strict requirements and the potential buyers environmental, economic, aesthetic and practical demands.

The wastewater from each household is stored in individual on-lot interceptor tanks fitted with Biotube® Effluent filters. This screened effluent is then delivered by gravity to a Recirculating Textile Packed Bed Reactor (rtPBR) treatment plant discharging to a planted area utilising dripline irrigation. Automatically controlled chlorine dosing disinfection system provided high quality recycled water back to each individual household for controlled reuse.



Table 1. Design Constraints

Constraint	Solution	Comment
Minimise visual impact of treatment and disposal system	Planting around treatment plant provides cover – dripline irrigation buried subsurface has no visual impact	The irrigation network has ensured good plant growth even in the dry summer months
Site close to Ocean and Marine Reserve	Ensure high level of treatment to mitigate possible contamination	
Limited water supply available	Install a recycle system to allow reuse of disinfected treated effluent for toilet flushing and irrigation Use a sectorised land treatment area, able to redirect water to dry areas for summer irrigation	Also further reduces environmental impacts
Seasonal Use	Use rtPBR process designed for very low loading and peak loading	The rtPBR process has a 100% turn-down ratio providing consistent performance under fluctuating loads
Remote location, limited onsite technical assistance	Use control system with telemetry and remote monitor/ management of plant operation	Allows immediate remote troubleshooting and control. This removes the need for an onsite technician



The AdvanTex® Treatment Plant at Shoal Beach



Table 2. Treatment System Performance

Parameter	Required Value*	Expected Performance
BOD ₅	15 mg/ltr	<10 mg/ltr
Suspended Solids	15 mg/ltr	<10 mg/ltr
Discharge Areal Loading	7 ltr/m²/day maximum	4 ltr/m²/day
Recycle Chlorine Residual	> 0.5 ppm	0.5 – 1 ppm

*These figures are the set values in the resource consent for this project issued by the Hawke's Bay Regional Council

The land application area has been split into a number of sectors. Recognising the valuable resource represented, the drip irrigation can be switched from one sector to another, providing excellent summer irrigation, even in times of drought.







The new technology available has enabled more compact, high performance equipment to be used in this project.



The integrated control system showing the main control panel and chlorine dosing system



Table 3. System Summary

System Component	Specification	Comment
Design Flow	60 m³/day	48 m ³ discharge to ground – 12 m ³ recycled
Collection System	Septic Tank Effluent Gravity (STEG) onsite tanks feeding to effluent sewer	
Recirculation Tank Size	58 m ³	All underground
Recirculation Pump	4 x Multi-stage turbine (4")	At peak – 4.58 hours run time per day @ 0.750 kW per pump
Packed Bed Reactor Area	48 m ²	This process ensures NO odour production from the treatment plant
Treated Effluent Tank Size	58 m ³	All underground
Discharge Pump	1 x Multi-stage turbine (4")	At peak – 4 hours run time per day @ 0.75 kW per pump
Disinfection System	Continuous chlorine measurement and automatic control using the latest PID capable Dulcometer chlorine management system	Mixing and storage tank installed under control room shed. Controller connected to telemetry system
Land Treatment Area	14,000 m ²	Pressure compensating dripline irrigation to planted area

The focus on sustainability meant that design had to be tailormade to reduce environmental impacts as much as possible. With the use of interceptor tanks and effluent filters flowing to a *ProSTEP*[™] reticulation system, all the houses were able to gravity feed to the treatment plant, even though the site was nearly completely flat. This reduced electricity requirements by a significant amount and reduced the environmental impact.