INNOFLOW TECHNOLOGIES
INNOVATIVE WASTEWATER MANAGEMENT

WASTEWATER MANAGEMENT - CASE STUDY

Solan Estate Subdivision – Waimauku, Auckland

The Solan Estate Subdivision is a high density development in the North of Auckland with 37 residential sections. This development was to be a show piece and was closely monitored by the local authority. The wastewater system that has been installed had to meet very high standards.

The developer had to ensure that there would be **no adverse effects** from this project on the neighbouring school, residential area or stream that ran through the property. Therefore, the treatment plant had to consistently produce a high quality discharge even under constant high loadings.

Figure 1. Solan Estate Subdivision – treatment plant located at entrance.

In this fast growing region the developer also wanted to maximise his project returns by minimising the lot sizes. The area to be developed was very limited, including a waterway running right through the middle of the development. The size of a standard disposal field was considered uneconomical in relation to the size of the development and a solution was required to cut down the percentage of disposal area in the development.

Using this set of criteria Innoflow Technologies NZ Ltd. (ITNZL) produced a wastewater management solution that met with the developers high expectations, the council's strict requirements and the potential buyers economic, aesthetic and practical demands.

The local authority required that a conventional sewer system gravity fed to lifting pump station was used as the collection system. This then delivered the raw effluent to a Recirculating Packed Bed Reactor (rPBR) treatment plant discharging to a planted area utilising dripline irrigation. An automatically controlled chlorine dosing disinfection system provided high quality recycled water back to each individual household for controlled reuse.

This is the **first time in New Zealand** that a communal system has achieved this type of recycling. The following pages detail the system components and technical specifications. Also shown are the expected performance figures for this wastewater management system.

Table 1. Design Constraints

Constraint	Solution	Comment
Limited area for treatment plant	Utilise land not suitable for residential development	Treatment system was on edge of main road – with no detrimental visual aspect
Waterway through development	Ensure high level of treatment to mitigate possible contamination	A dispensation was given based on the high quality to allow smaller setbacks
Maximise land available for residential development	Reduce disposal field size by providing a recycle system that reduced the volume of water being applied to the field	- Use water reduction fixtures - Reuse disinfected effluent for toilet flushing - Reuse disinfected effluent at controlled taps
Council required standard gravity sewer	Utilise engineered centralised septic tanks to buffer flows and remove solids	Pump station has disproportionately high maintenance requirements compared with the treatment plant (monthly vs quarterly)
High density development requires failsafe plant operation	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

Figure 2. Photo showing the rPBR treatment system bed and tanks area.

Table 2. Treatment System Performance

Parameter	Required Value*	Expected Performance
BOD_5	Not specified	< 5 mg/ltr consistently
Suspended Solids	Not specified	< 5 mg/ltr consistently
Discharge Areal Loading	5 ltr/m^2/day	5 ltr/m^2/day at peak flows only
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 Auckland Regional Council*

A consistently high level of treatment from the treatment plant allowed the subsurface drip irrigation disposal field to be in close proximity to a waterway through the development.

This area was also planted out with a selection of New Zealand native trees to provide an aesthetic appealing feature in the subdivision and enhance evapo-transpiration.

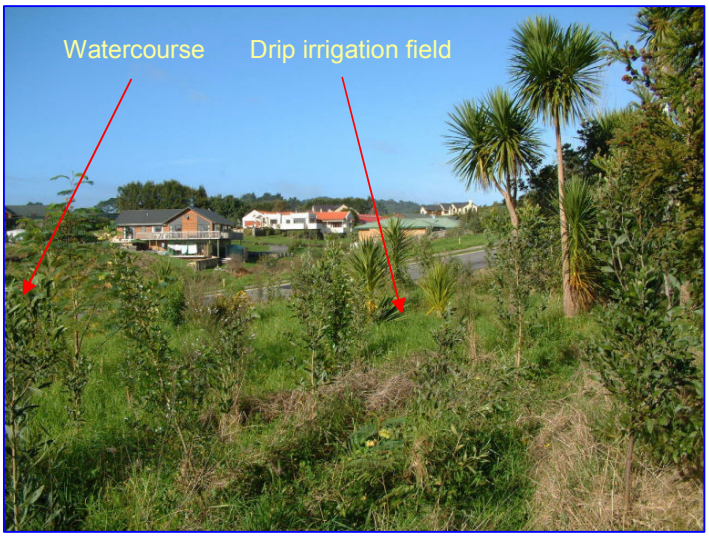

Figure 3. Sectorised irrigation field

Figure 4. Control panel comparison

The entire treatment system is controlled using an RTU remote/ monitor/ manage control panel. All pumps, controllers and meters are connected and controlled from this panel. This set up provides extra safety in the management of the system.

The lifting pump station is controlled by a separate control panel supplied by the drainage contractors. It is interesting to compare the size of the control panel for the pump station (below) and that for the entire plant and recycling operation (above).

The new technology available has enabled more compact, high performance equipment to be used in this project. Furthermore, there are considerable cost savings in the on going maintenance of the treatment plant.

Table 3. System Summary

System Component	Specification	Comment
Design Flow	23.2 m^3/day	17.2 m^3 discharge to ground – 6 m^3 recycled
Collection System	Traditional gravity sewer to pump lifting station	Local authority requirement
Centralised Septic Tanks	3 x 27 m^3	Dual Biotube™ Effluent Filter outlet
Recirculation Tank Size	27 m^3	All underground
Recirculation Pump	2 x Multi-stage turbine (4")	At peak – 6.2 hours run time per day @ 0.375 kW per pump
Packed Bed Reactor Area	175 m^2	This process ensures NO odour production from the treatment plant
Treated Effluent Tank Size	27 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
Disposal Field	3500 m^2	Pressure compensating dripline irrigation to planted area

The area designated for the treatment system was very limited with sewer lines, lot boundaries, a stormwater retention pond, state highway boundaries and right of way boundaries. The sizing, shape and positioning of the components of the treatment system were planned in close consultation with the developer. A small fence surrounds the plant reducing its visual impact from the road. Not many people could actually guess what the structure is.

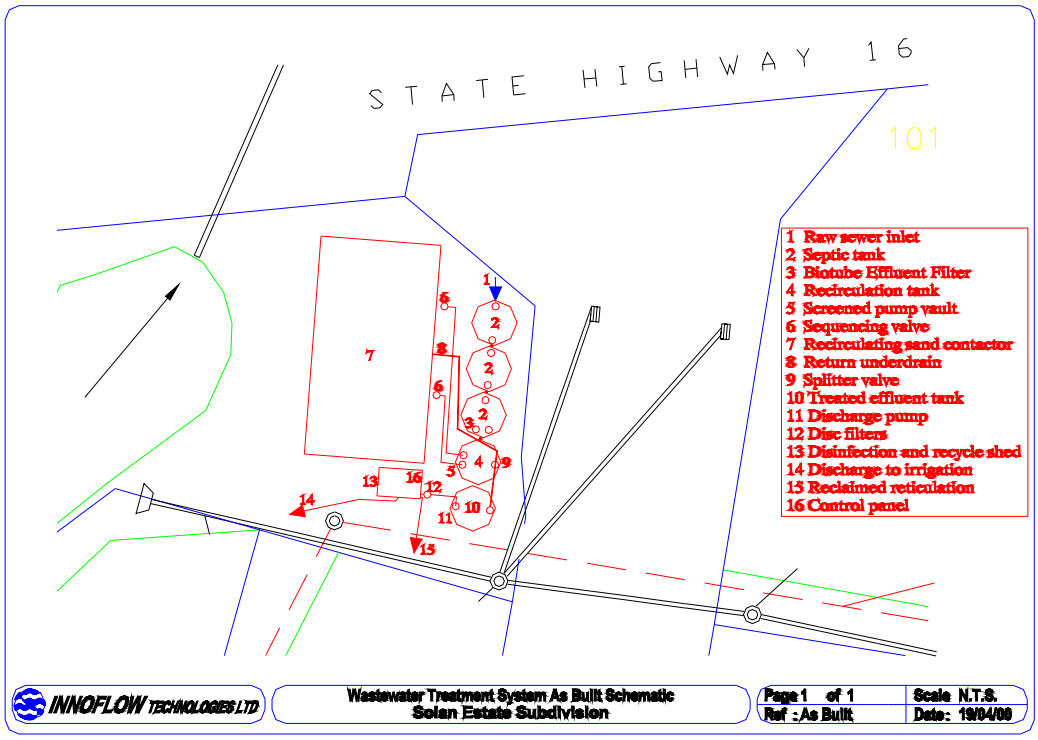

Figure 4. Schematic as built of the wastewater treatment system.