

# COMMUNITY WASTEWATER MANAGEMENT CASE STUDY

## *Jack's Point, Queenstown, NZ*

Jack's Point is a 420ha resort-style development located 8km from the South Island town of Frankton, near Queenstown. The property sits between The Remarkables Mountain Range and Lake Wakatipu, and will ultimately be developed into ~5,000 lots.

The development comprises several medium density housing neighbourhoods, a village containing high-density apartment living, a number of large acreage lots and golf course, all with a 95% open-space requirement.

The water supply for Jack's Point is sourced from the adjacent lake and although the Queenstown municipal wastewater treatment plant is located nearby, capacity and cost issues dictated that a decentralised wastewater management system be specified.



**Figure 1. Jack's Point, Queenstown**

Rather than provide approval for a particular wastewater technology or process, the Otago Regional Council (the licensing authority for the region) instead took an effects-based approach to the discharge consenting process. A requirement for post-development nutrient leaching from the entire development of significantly less than pre-development was specified, and was used in the wastewater selection process.

Tenders were sought from a number of companies, and InnoFlow were awarded the contract, signing up to provide a small diameter Orenco® Effluent Sewer to be used in conjunction with an Orenco AdvanTex® Packed Bed Reactor solution and sub-surface drip irrigation for effluent reuse.

**Table 1. Design Constraints**

Constraint	Solution	Comment
Provide a system which treats to a very high standard, especially with regard to nutrients	Install a wastewater management system with enhanced nutrient reduction capabilities	Post-installation testing of the first 2 neighbourhoods have shown nitrogen results which have allowed an even greater lot yield for later stages
Slow build-out to ultimate size	Provide a system that can be operated for 1 or all of the homes	The STEP Tanks are only provided when the houses are built, yet the effluent sewer can still be operated with limited connections The rtPBR process has a 100% turn-down ratio providing consistent performance under any range of flows from nothing to the design flow
Dispersed neighbourhoods, differing densities of development	Provide a solution that can operate at a community level	The system has been designed and built in clusters, with 200-odd homes connecting to each cluster, minimising the length of low pumpline runs to reuse zones
Visual impact and aesthetics of the development	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



**Figure 2. The primary treatment tank during plant construction**

**Table 2. Treatment System Performance**

Parameter	Required Value	Expected Performance
BOD <sub>5</sub>	10 mg/ltr	<5 mg/ltr
Suspended Solids	10 mg/ltr	<5 mg/ltr
Total Nitrogen	15 mg/ltr	<15 mg/ltr



The visual impact and aesthetics of the wastewater solution was key to the success of the project

Only green lids, and a control building that matches the houses in the development, are visible above ground

**Figure 3. The treatment plant for 105 homes in N5**

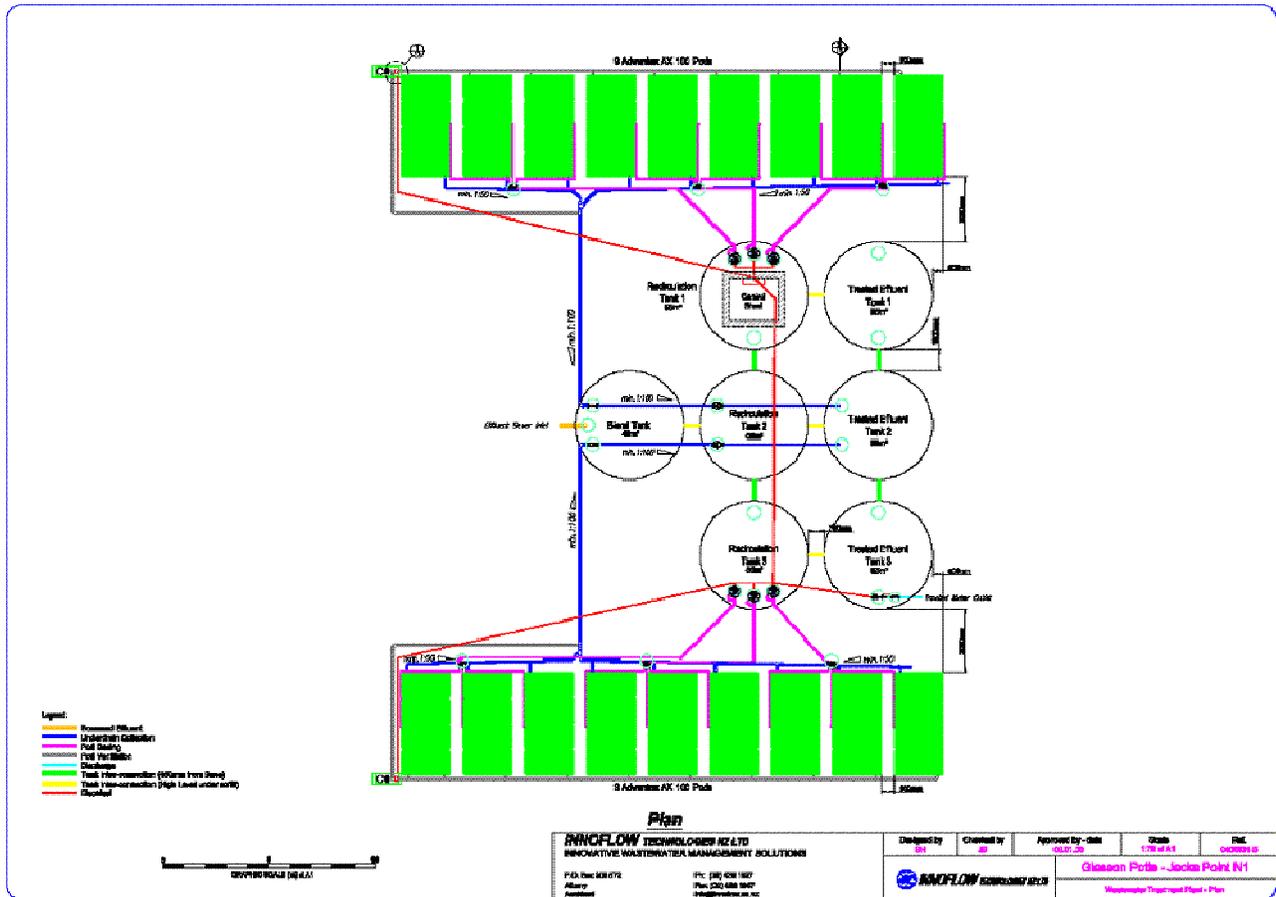
Neighbourhood clustering of the wastewater management solution allows the development to have a true community feel, and represents the true philosophy behind Decentralised Wastewater Treatment with Centralised Management



**Figure 4. One half of N1 during system installation**

**Table 3. System Summary**

System Component	Specification	Comment
Design Flow	268,000 litres per day	Peak wastewater flow from first two neighbourhood systems
Collection System	Orenco Effluent Sewer	On-lot tanks are built only when needed at each developed lot. The initial outlay is simply for a medium-density pipe
Recirculation Blend Tank Size	268,000 litres	Provided as two zones for enhanced nitrogen reduction
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	360 m <sup>2</sup>	Provided as two areas for the two neighbourhoods
Effluent Storage	268,000 litres	Provides an additional 24 hours of emergency storage
Effluent Reuse	Sub-surface drip irrigation	Loaded at 12mm per day given the soil conditions and seasonal occupancy at the site



**Figure 5. The Plant Layout for N1, serving 167 homes**