CASE STUDY

An Affordable Wastewater Collection and Treatment Solution for Municipalities and Communities

PIOPIO, NEW ZEALAND

Problem Located in rural New Zealand, the farming community of Piopio was in need of a wastewater treatment system. In this area where run-off from dairy farms into streams and rivers can be a cause for concern, failing septic tanks at individual homes and shops were also having an increasingly negative effect on the local environment.

Solution Situated within the geographical boundaries of the Waitomo District, Piopio was identified by the District Council as meeting the requirements for wastewater funding through the Ministry of Health. Accordingly, the District began the process of searching for the most effective solution, ultimately selecting an Orenco® Effluent Sewer and AdvanTex® Treatment System.

Scenic Community Threatened by Wastewater Crisis

Considering how small it is – a population of under 400 – Piopio is home to a surprising assortment of retail attractions and services, including a museum, several bed & breakfast establishments, and the award-winning "Fat Pigeon Café," not to mention an 18-hole golf course located just north of town. Travelers headed south on State Highway 3 often stop in Piopio to refuel before beginning the scenic, 90-minute drive to New Plymouth.

However, in 2007, this picturesque community of farmland and rolling hills was on the verge of a wastewater crisis. Located in a valley on alluvial soils, the area experiences frequent rainfall compounded by poor drainage, thus creating a high water table, especially in the wintertime.

Treated effluent from Piopio's wastewater treatment system is well within permit limits and receives final aeration via a rock outfall before being dispersed into the nearby Mokau River.

Photo courtesy of Innoflow Technologies.

Municipal and Community Market

Project Overview

PIOPIO, NEW ZEALAND

Design Parameters
- 198 homes and businesses (with a potential build-out of 250)
- 1 school
- 35,600 gpd (135 m^3) average daily flow
- 60,000 gpd (227 m^3) peak daily flow

Permit Limits
- 20 mg/L BOD_5
- 30 mg/L TSS
- 30 mg/L TKN
- 10 mg/L NH_3-N
- 15 mg/L TP
- 500 MPN/100 mL FC

Effluent Quality*
- 6 mg/L BOD_5
- 8 mg/L TSS
- 6 mg/L TKN
- 4 mg/L NH_3-N
- 7 mg/L TP
- 7 cfu/100 mL FC

Start-Up Date
- April 2012

**Samples collected between 3 April 2012 and 3 October 2013 and analyzed by a third party.*

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These conditions, combined with septic tanks in excess of thirty years old, meant that nearly all soakage fields (drainfields) were failing.

Although residents may not then have realized their urgent need for a sewer and sewage treatment system, the township had been identified by the governing Waitomo District Council as qualifying for wastewater funding through the national Ministry of Health. Piopio requested a solution that could handle the wastewater needs of all the homes and businesses in the township, plus the Piopio College for middle and high school students.

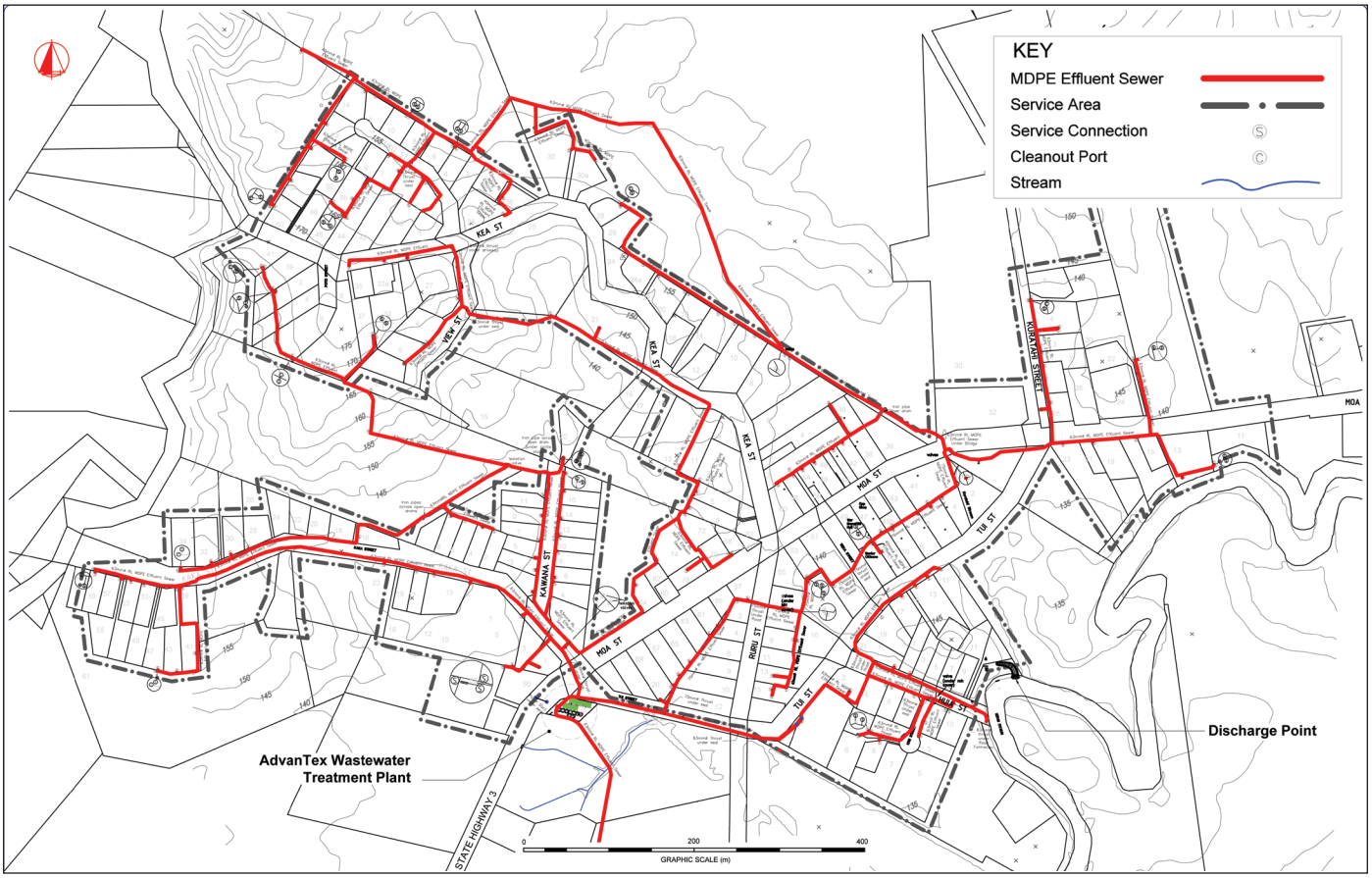
An Effective Partnership: Orenco Systems and Innoflow Technologies

After a thorough bidding process in which various treatment options – such as grinder pumps and conventional gravity sewer with pump stations – were also considered, the Council eventually chose an Orenco Effluent Sewer and AdvanTex Treatment System, due to their reputation for low operating and capital costs, as well as robust quality of treatment.

Total project costs were USD $2,810,000 + Goods and Services Tax (GST). Costs included design and installation of effluent sewer, treatment system, and rock outfall; supply and installation of 198 septic tanks for households and businesses, plus disposal of old tanks; and a two-year operating contract.

According to Christiaan Van Rooyen, Group Manager over assets for the Waitomo District Council, "The Orenco treatment plant offered by Innoflow Technologies was selected by the Council as it provided the overall lowest whole-of-life cost, whilst meeting the regulatory requirements of the Regional Council and public health needs of the community."

Innoflow's Kevin Higham adds, "Because the effluent would be discharged into a nearby river, we had to have guaranteed results, and that's what AdvanTex provides." Based in Auckland, Innoflow Technologies



All 198 homes and businesses in Piopio are connected to the Orenco Effluent Sewer and AdvanTex Treatment System. The system has minimized the bad odors that previously emanated from the creek that runs through town.

Located on the edge of the township, the fifteen AX100 units in Piopio's wastewater treatment system draw little attention, as they are low-profile and produce minimal noise or odor. These low-maintenance units can also be installed further above ground, if desired. Photo courtesy of Innoflow Technologies.

has been a distributor of Orenco products for approximately 16 of its 20+ years in business. During that time, Innoflow has completed several hundred commercial wastewater projects, including about 20 effluent sewers, such as the one in Piopio.

"Throughout the entire project, Innoflow has acted professionally," comments Van Rooyen, "and we are very pleased with the level of service we have received as they continue to operate the system according to contract."

The District Council's initial two-year contract with Innoflow provided for the design and installation of an Orenco Effluent Sewer, an AdvanTex Treatment System, and a rock outfall for the final aeration of effluent prior to dispersal into the Mokau River. The contract also included the purchase and installation of 198 interceptor tanks for all local homes and businesses, plus the disposal of old septic tanks. Finally, a subsidiary of Innoflow would provide operating services for the duration of the contract.

Concerns Put to Rest

Piopio and the surrounding countryside are rather hilly, which is why the township's Orenco Effluent Sewer is comprised of approximately 65% STEP (septic tank effluent pump) units and just 35% STEG (septic tank effluent gravity) units. Nevertheless, the small-diameter collection lines that feed into the AdvanTex Treatment System are well-suited for a variety of terrain, as they are buried just 30-36" deep (76-91 cm) and designed to follow the contour of the land.

Although residents of Piopio were initially quite anxious about how the installation of new tanks would affect their gardens, driveways, and the overall appearance of their homes, Innoflow took great care in allaying these fears by engaging directly with homeowners through a lengthy public consultation process that included discussion of specific tank placements as well as methods of remediation – such as top-soil replacement, hand-seeding, and raking – that Innoflow would employ following installation.

In the end, property owners took note of the relative simplicity of the process, with the placement of most residential septic tanks accomplished in less time than expected. Furthermore, installing the shallowly buried collection lines that connect each home to the wastewater system was also a fairly quick and easy process, thus minimizing disruption to the daily activities and traffic flow within the community.

Satisfying Results

As the system at Piopio approaches its two-year anniversary, effluent test results continue to be excellent, averaging well below allowable limits set by the District Council. Van Rooyen states, "The plant has

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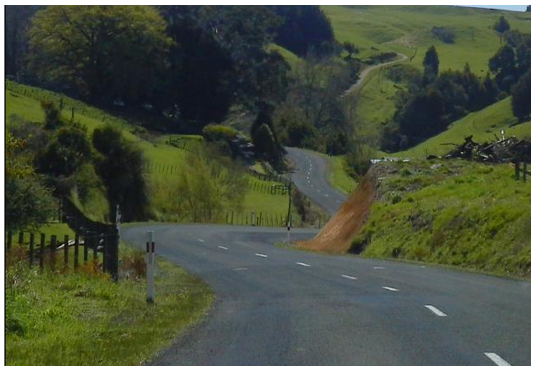
been operating for over 18 months with no issues, and all test results to date have been within the limits of our Resource Consent."

Allen Scholtz, former Operations Manager for the Waitomo District Council, adds, "I think the end result demonstrates that we did choose the best solution for the project. The big factors were price and quality of results. The key was that we did not compromise quality for the sake of affordability."



With an effluent sewer system, shallowly buried collection lines follow the contour of the land, making them relatively easy to install despite the hilly terrain around Piopio.
Photo courtesy of Gaynor McCartney.

Local citizens are also satisfied with the way things have turned out regarding their new wastewater treatment facility. Placed near the southern edge of town in a residential area just off the main road, the site is well-landscaped and, according to Higham of Innoflow "does not look like a sewage facility."

Before the system was built, the creek that runs through town was known to give off a distinctly unsavory odor, undoubtedly caused by contaminated groundwater, which found its way from the failing soakage fields of nearby homes and into the stream.

Gaynor McCartney, a long-time resident of Piopio who maintains an informational website about the township, commented, "I think most of us are just so pleased that the many years are over, of waiting to get the problems sorted out. To say that the creek used to smell a bit is a big understatement, but now the smell is all gone."

As stated on McCartney's website, "Piopio is a small, friendly, rural community" with "all necessities for the traveling public" where "friendly accommodation is one of our pleasures." Now that the township has a reliable, efficient wastewater system, Piopio can continue to be a favorite stopping-off point for those passing through, in addition to being a lovely refuge for those who call it home.

Municipal and Community Market

Total Project Cost
- USD $2,810,000 + GST (Goods and Services Tax)

Funding Sources
- New Zealand Ministry of Health grant
- Waitomo District grant

Maintenance Costs
- Innoflow O&M contract: USD $11.63 per connection
- Covers operation of Effluent Sewer and Treatment System

Collection System/Primary Treatment
- Effluent Sewer with STEP/STEG units

Secondary Treatment
- 15 AX100 units
- 2 blend tanks of 6,000 US gal each (23 m^3)
- 5 recirculation tanks of 6,000 US gal each (23 m^3)

Tertiary Treatment
- Ultraviolet (UV) disinfection

Dispersal
- Discharge via rock outfall to river

Monitoring and Control
- Orenco TCOM™ remote telemetry control panel

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– Allen Scholtz, former Operations Manager, Waitomo District Council

For information about Prelos™ Sewer, AdvanTex® Wastewater Treatment, or Orenco Controls™, contact Orenco Systems®, Inc.

Orenco® WATER

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Data used by Orenco to derive the representations and conclusions contained within this Case Study were current as of March 2014.

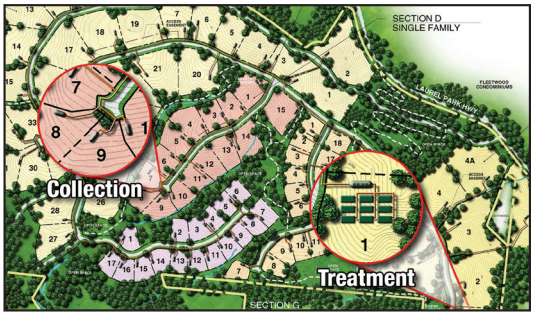
HOW IT WORKS

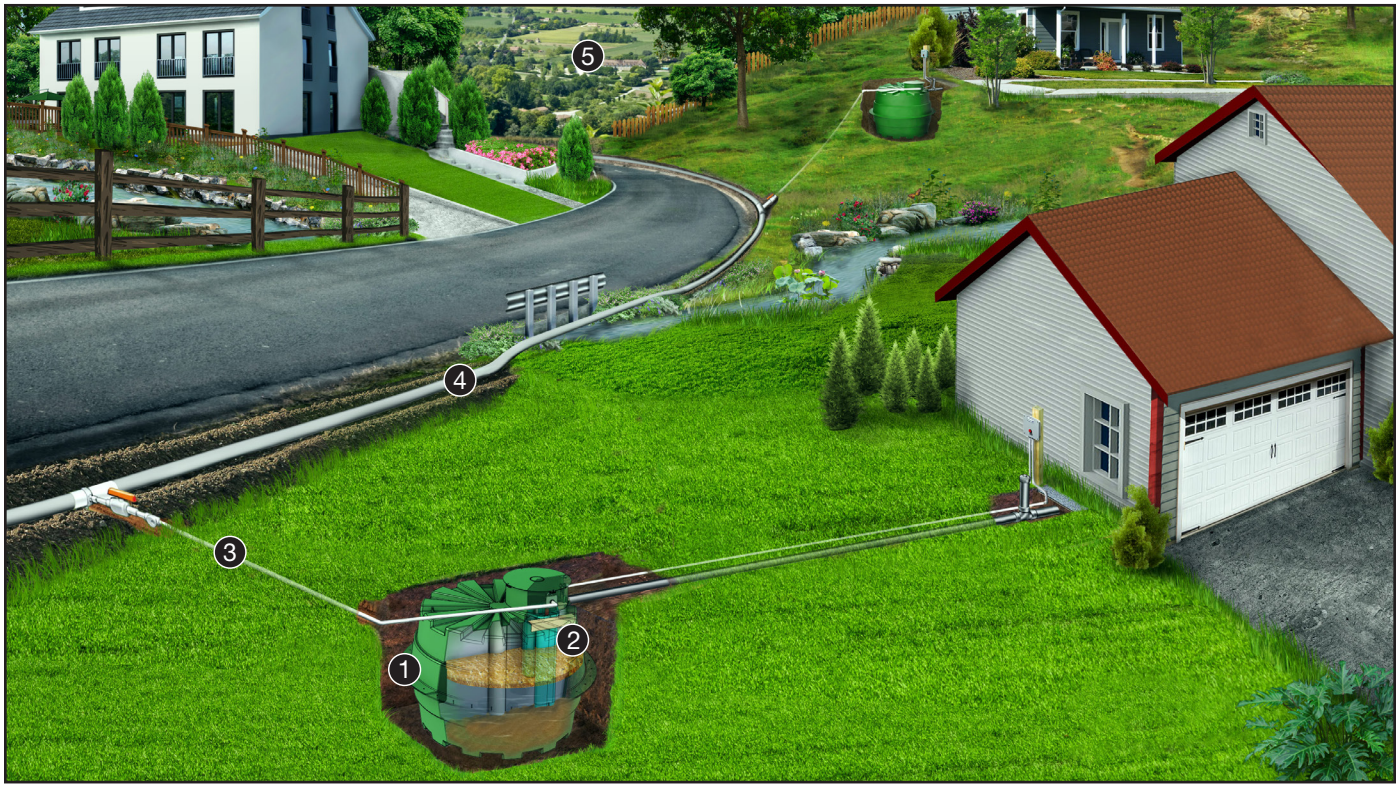
Prelos™ or Orenco® Liquid-Only Sewer to AdvanTex® Treatment System

In a Prelos or Orenco liquid-only sewer, every property in a community or subdivision uses a Prelos Processor or on-lot tank for collecting household wastewater. Solids remain in the tank for passive, natural treatment.

After filtering, the effluent is discharged (by either pump or gravity) through shallowly buried, small-diameter collection lines that follow the contour of the land.

The filtered effluent then flows to a nearby AdvanTex Treatment System (see reverse).





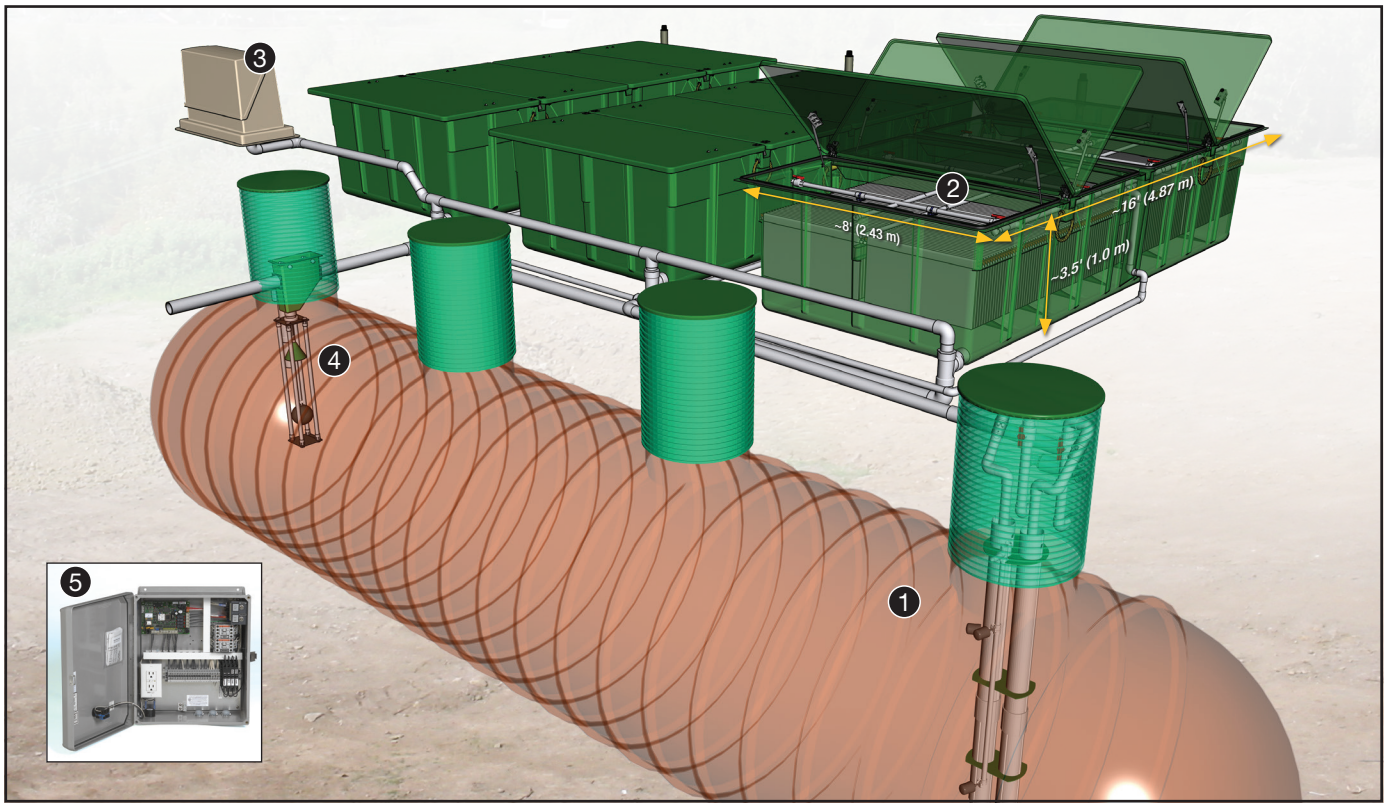
1. Prelos Processors™ or on-lot tanks provide primary treatment, so only liquids are conveyed to the treatment facility.
2. Our patented Biotube® Pump Vault filters out solids, and our pumps can last more than 25 years,[1] requiring minimal or no maintenance.
3. One-inch (25-mm) diameter service lines can be easily installed with a trencher.
4. Small-diameter main lines follow the contour of the ground, saving on excavation costs. No expensive manholes or lift stations are required.
5. The primary wastewater treatment provided by the liquid-only sewer can decrease the capital cost and operating cost of the wastewater treatment plant.[2]

[1] *As seen in the Elkton, Oregon, sewer system.*
[2] *As seen in the Montesano, Washington, sewer system.*

HOW IT WORKS

Prelos or Orenco Liquid-Only Sewer to AdvanTex Treatment System

AdvanTex Treatment Systems are an award-winning[1], affordable, low-maintenance technology. They can be installed in-ground or partially bermed, for a very low profile. Larger units can be purchased with a catwalk for ease of servicing and be set above ground. Filtered effluent from each property's on-lot tank is conveyed through shallowly buried, small-diameter collection lines to a recirc tank at the AdvanTex treatment facility.



1. The recirc tank includes a flow inducer with high-head effluent pumps controlled by a panel. The liquid is pumped to the AdvanTex pod in small, even doses.

2. AdvanTex pods include hanging sheets of textile media where microorganisms grow and naturally digest waste.

3. The vent fan assembly pulls air through the AdvanTex pod to maintain an aerobic environment, while using very little energy.[2]

4. The recirculating splitter valve sends the liquid back through the treatment process when tank levels are low and discharges it when tank levels are high.

5. AdvanTex systems use a telemetry control panel, which allows operators to check on the system without traveling to the site. The panel's dedicated phone line allows real-time remote adjustments and control.

[1] *See www.orenco.com/training/videos*

[2] *Maryland's "Bay Restoration Fund Ranking Documentation," http://mde.maryland.gov/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Documents/BAT%20Ranking%20Document.pdf*