CASE STUDY

An Affordable Wastewater Collection Solution for Municipalities

VICTORIA, PRINCE EDWARD ISLAND

Problem

The Community of Victoria, PEI needed to replace its antiquated, failing septic systems with an environmentally-sensitive, cost-effective solution suited to the unique requirements of its location. In addition, the treatment system had to accommodate the highly-variable daily flows common to a summer vacation destination.

Solution

Victoria chose an Orenco® Effluent Sewer, followed by an AdvanTex® AX100 Treatment System, because of the system's outstanding treatment and low operating and lifetime costs. The system is scalable and is capable of treating flows of up to 95,000 Lpd (25,000 gpd) during the tourist season, with peaks of over 180,000 Lpd (50,000 gpd).

Scalable, Award-Winning Wastewater Solution

The Community of Victoria is a picturesque, rural fishing village located on Prince Edward Island in the Canadian Maritime Provinces. Its natural beauty, period buildings, and attractions make it a popular tourist destination. The community's public health and development potential, however, was hampered by its sanitation problems. Many historic buildings in the town core were using antiquated septic systems, which were frequently failing and in need of upgrades. Most of the small lots

Photo courtesy of Ron Garnett - AirScapes.ca

Surrounded by water, the small town of Victoria, PEI, needed a community wastewater solution that was both environmentally-sensitive and affordable. After installing an Orenco Effluent Sewer followed by Orenco's AdvanTex Treatment System, the community and its consulting engineer have won multiple awards, including the 2011 "Sustainable Community Award" from the Confederation of Canadian Municipalities.

Municipal Market

Project Overview

VICTORIA, PEI, CANADA

Design Parameters
- Peak flows of 95,000-180,000 Lpd (25,000-50,000 gpd) during the tourist season
- Actual Flows of 15,000 Lpd (4,000 gpd) during the winter season and 57,000 Lpd (15,000 gpd) during the summer season

System Engineer
- Kelly Galloway, P. Eng.
  Engineering Technologies, Canada Ltd.

Installation Date
- 2008

Project Cost
- $2,500,000 CDN ($2,100,000 US)

Rate Structure
- $515 per EDU, annually

Collection System
- 63 connections; collection tanks
- STEG & STEP systems

Secondary Treatment System
- 10 AdvanTex AX100 filter pods

Dispersal
- Pressure-dose sand filter with the addition of a drip irrigation system during the tourist season

Operation
- One part-time operator monitors the system via an Orenco TCOM™ control panel

AdvanTex Effluent Quality
- 6 mg/L BOD
- 5 mg/L TSS
- System also exceeds treatment requirement for TN

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could not support a modern septic system meeting current codes. As a result, residents and business owners were forced to use a "bubble gum" approach to the problem, employing frequent septic tank pumping to get through the busy summer tourist season. Provincial regulators would not approve new development or expansion of businesses until the Village solved its septic problems.

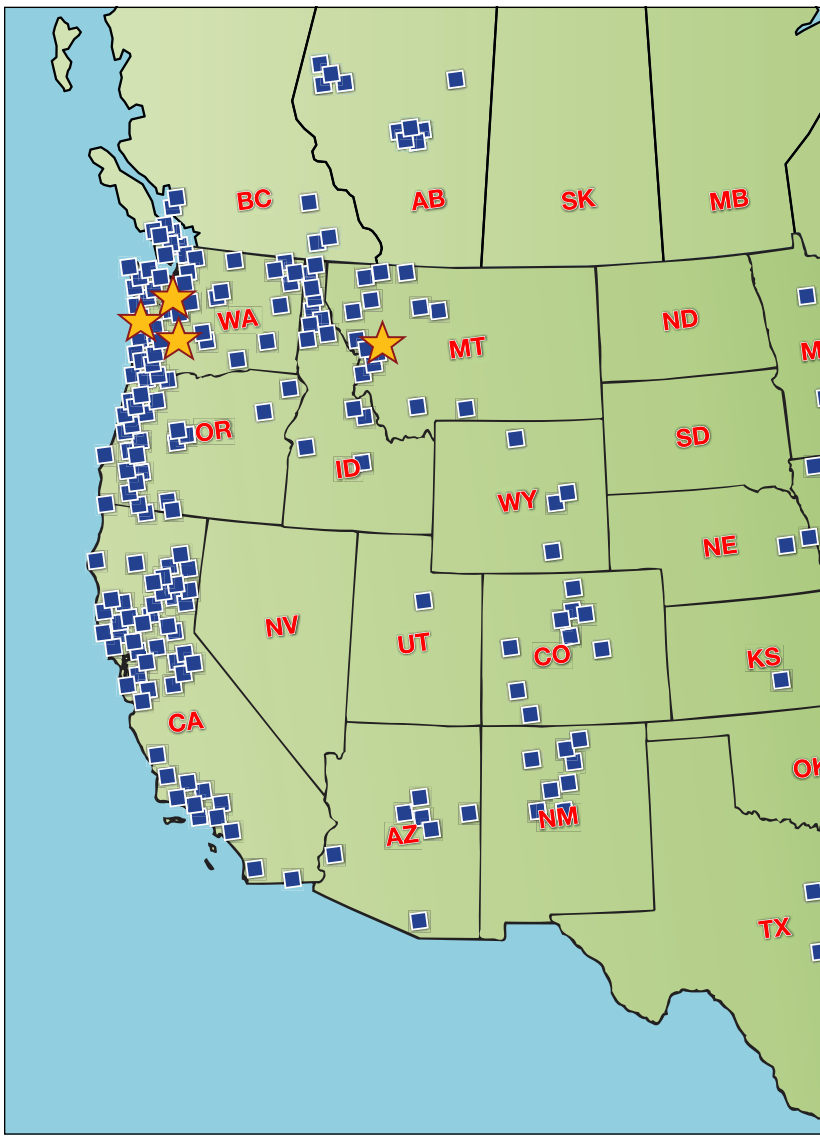
When community members searched for a cost-effective, sustainable wastewater system, they had specific parameters in mind. First, because residential lots in the village center were laid out in the 1800's and were not large enough to accommodate traditional onsite wastewater systems, they needed a compact solution. Second, because treated effluent might negatively affect the nearby harbor and estuary, direct effluent discharge to the bay was not a popular option with residents and businesspeople who depended on Victoria's coastal waters for their livelihood. Third, because Prince Edward Island relies on groundwater for its drinking water, the system needed to work well as part of an integrated, sustainable, watershed-based approach.

Engineering Technologies Canada, Ltd. (ETC: www.engtech.ca), was retained in September, 2003, to identify and evaluate the various options and recommend a wastewater management solution best suited to the community's needs. After a detailed life-cycle analysis of several conventional and alternative systems, ETC recommended an Orenco Effluent Sewer and AdvanTex Treatment System. Installation was completed in 2008, and the system services 57 residential locations and 6 commercial sites (with a mixture of both STEG — effluent gravity — and STEP — effluent pumping — equipment).

Following primary treatment in collection tanks at each site, treated effluent is pumped to the AdvanTex Treatment System. AdvanTex uses a packed bed textile filter to treat effluent effectively, with low power requirements and low O&M costs. Because effluent is dosed at a specific rate to AdvanTex pods, the system can accommodate widely varying daily flows. The AdvanTex system can also be easily expanded to allow for further development in the area.

After AdvanTex treatment, the effluent is dispersed to two land-based dispersal systems. The pressure-dose

The Victoria Wharf is one of the town's main tourist attractions. Victoria needed a wastewater system that could handle highly variable flows … flows that quadruple during the busy tourist season.



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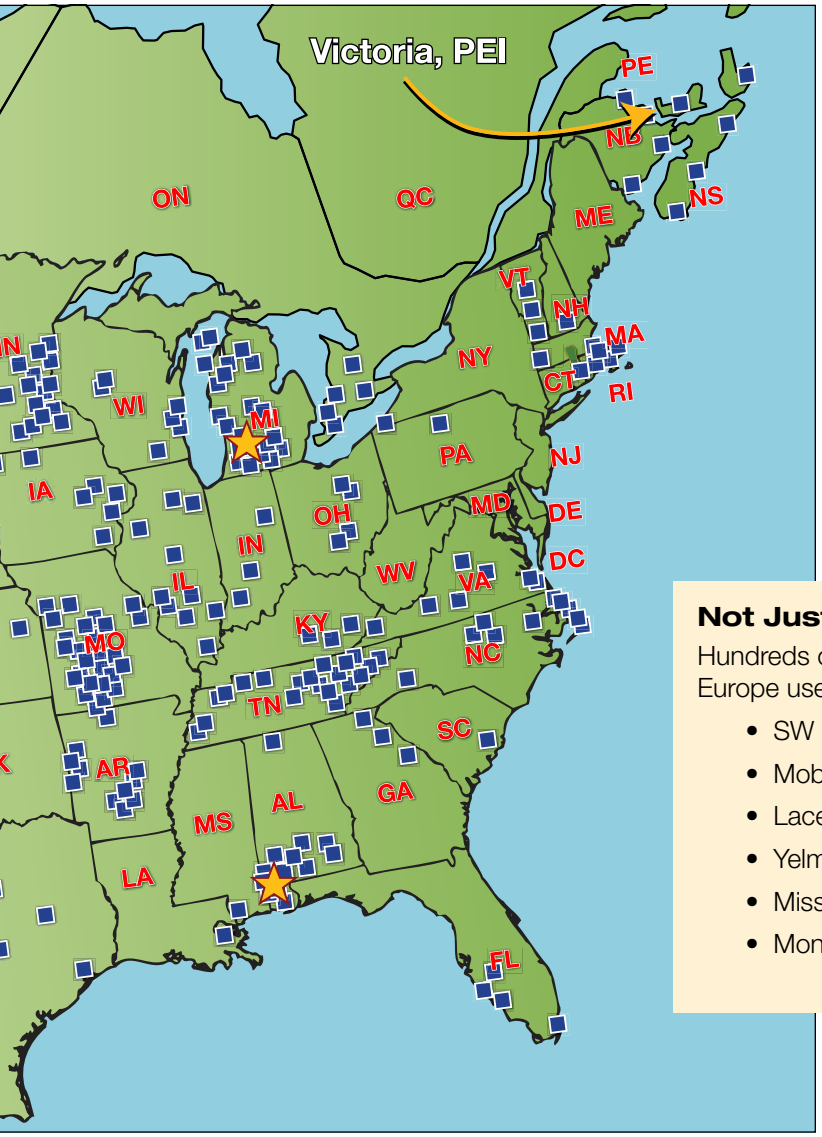
With an Orenco Effluent Sewer, solids are collected in an on-lot underground tank, where they decompose naturally. Only filtered effluent travels to the energy-efficient, low-maintenance treatment system: a modular array of AdvanTex® textile filters in watertight fiberglass containers (above). These textile filters produce such clear, odorless effluent that it is used during the summer for drip irrigation.



sand dispersal bed (mantle) operates year-round, while a subsurface drip irrigation system comes on line during the busy summer season to provide the total required effluent dispersal capacity.

Another key part of the integrated approach was a water efficiency program in which regular toilets were replaced with low-flow models (6 litres/flush or less), and water meters were installed at each connection. In addition to reducing potable water demands, this helped reduce the amount of effluent needing treatment and allowed ETC to reserve more land at the wastewater treatment site for future expansion.

Victoria's system is also scalable. While all 10 AdvanTex AX100 pods are used for peak summer flows, in the slower winter season the system uses only 3 pods and 2 pumps, conserving energy and extending equipment life.

Since the system is so robust and reliable, only a part-time operator is needed. This was a critical factor for the Community. According to Kelly Galloway, P. Eng., the system's designer, "Operation and maintenance associated with traditional, 'big city' sewage treatment solutions can be onerous and time-consuming, requiring advanced, high-level operators. If these technologies are misapplied they can be a huge burden on small rural communities, often making up the biggest portion of their utility costs." The operator monitors the system remotely and is notified if any maintenance is needed via an Orenco TCOM™ telemetry panel. Effluent quality is excellent;

Not Just for Villages!

Hundreds of communities in North America, Australasia, and parts of Europe use Orenco sewers. Larger communities include …

- SW Barry County, Michigan: . . . . . 4,500 connections
- Mobile, Alabama: . . . . . 4,000 connections
- Lacey, Washington: . . . . . 2,800 connections
- Yelm, Washington: . . . . . 1,800 connections
- Missoula, Montana: . . . . . 1,500 connections
- Montesano, Washington: . . . . . 1,300 connections

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though BOD and TSS levels of 15 mg/L each were anticipated, actual levels are 6 mg/L and 5 mg/L, respectively. The system also exceeded the desired treatment requirement for Total Nitrogen.[1]

For the system's design, Galloway won the 2009 Engineers PEI Award for Engineering Achievement; subsequently, the Community of Victoria was honored with the 2010 "Municipal Achievement Award" from the Federation of PEI Municipalities and the 2011 "Sustainable Community Award" from the Confederation of Canadian Municipalities.

Photo courtesy of The Studio Gallery, Victoria, PEI

Historic period buildings (above) and landmarks such as the Victoria Lighthouse (right) draw tourists and stimulate the local economy.

"ETC was successful in solving Victoria's challenging sanitation problems, which had eluded resolution via traditional engineering solutions for over 20 years," said Garry MacDonald, P. Eng., in his nomination of Galloway for the Engineers PEI Award. While more than 2,500 AdvanTex AX100 filters have been installed elsewhere, MacDonald noted that "[This was the] first municipal-scale STEG/STEP effluent sewer collection system in PEI … [and the] first major municipal scale, synthetic packed-bed filter (PBF) treatment system in Atlantic Canada."[2]

Hilary Price, Administrator for the Community of Victoria, puts it this way: "The AdvanTex system was installed and became totally operational in 2008 … [It] has been a stimulus for expansion in our tourism businesses and has allowed our residential population to dramatically increase. Prior to the installation of this central sewage system, the community periodically experienced bad odours from failing septics. The new central sewage system rectified this problem and removed the serious public health hazard caused by failing septic systems … This system has exceeded our expectations in dealing with our wastewater disposal."[3]

"Residents and tourists alike enjoy the quality of life offered by Victoria: sport fishing, clamming, bird watching, photography, water sports, pristine beaches, and coastal sunrises and sunsets are just some of the many eco-based activities and attractions. Protection and enhancement of the delicate ecosystem in the Victoria Harbour and the Westmoreland River estuary is of paramount importance to the village residents and tourists."

~ Hilary Price, Community of Victoria

For more information about Orenco Effluent Sewers and AdvanTex® Treatment Systems, contact Orenco Systems®, Inc., at 800-348-9843.

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[1] *ETC Environmental Results Report, p. A1*
[2] *Engineers PEI Award nomination form, p. 3*
[3] *E-mail conversation, January 21, 2011*