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Project Case Study: Alternative approach

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Sunserra at Crescent Bar is a resort community of 207 individual and clustered residential homes bordering a new golf course. It is located on the Columbia River in Quincy, Wash., on a dogleg portion of Crescent Bar surrounded by steep basalt cliffs. The golf course was designed in the center of the development, separating the singlefamily homes.

A new golf course development uses onsite cluster system below the fairways for wastewater treatment.

BY DENNIS F. HALLAHAN, P.E.

Project
Sunserra at Crescent Bar, Quincy, Wash.

Design engineer
Eco-Nomic Environmental Services, Ephrata, Wash.

Product application
An onsite wastewater system for a 207-home resort community uses Infiltrator Systems' chambers for drainfields beneath a golf course's fairways.

Sunserra at Crescent Bar is a resort community of 207 individual and clustered residential homes bordering a new golf course. It is located on the Columbia River in Quincy, Wash., on a dogleg portion of Crescent Bar surrounded by steep basalt cliffs. The golf course was designed in the center of the development, separating the singlefamily homes.

Prior to the addition of the golf course and the expansion of the development, the Washington Department of Ecology imposed restrictions on the use of enlarged lagoon systems for wastewater treatment, a design previously used in this area. This was the catalyst for the developer, Sunserra Construction LLC, to push project engineers to search for an alternative approach that would enable them to obtain approvals to complete the development.

Project challenges and development

The nature of the development and project timing required that the onsite septic system and the drainage lines for the golf course and clubhouse needed to be installed simultaneously beneath the fairways of the golf course. Drip irrigation, surge tanks, as well as oversized drainfields, were considered. The final design specified a gravelless system using Infiltrator Systems' Quick4 standard chambers in alternating drainfields and reserve areas (to use for replacement systems in the unlikely case that the primary system fails). In this project, replacement systems were constructed up front because it was less expensive than potentially shutting down the golf course to install a new system in the reserve area.

Because the drainfields were designed under the golf course fairways, long-term function and reliability were critical factors. The golf course owners did not want the system to be accessed during the golf season because of system failure or for repairs, as this would require the golf course to close and pose a major economic hardship.

Another factor that complicated system design was the potential for unpredictable and erratic flows because of the resort nature of the development with a fluctuating population. The chosen design offered the greatest level of surge protection without the additional expense, safety, reliability, and aesthetic problems associated with surge systems.

Rugged terrain also posed a challenge as engineers worked to create a system that could follow natural drainage over rugged terrain to pump to the chambers. In addition, another hurdle that

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needed to be overcome was the integration of 5 miles of distribution lines with the golf course's irrigation and drainage lines.

Coordination between the golf course designer, Reven Fonteneau; the engineer, Certified Designer John Glassco of Eco-Nomic Environmental Services; Grant County regulators; the developer; and the excavating contractor Dennis Freese and Sons was required throughout the system design, approval process, and installation.

□ In the over 250 golf courses I have designed, this is the first in which the golf course design and the resort wastewater treatment system were integrated in this way, □ said Fonteneau.

Regulatory compliance and system design

The soils in this area of the Columbia River Gorge are typically 100-foot deep, medium and fine sand deposits with wastewater application rates of about 0.8 gallons per square foot per day. The Grant County regulations required a maximum system flow of 3,500 gallons per day (gpd) per system (17 systems in total). In response to this, Glassco designed each system to handle a capacity of 3,120 to 3,480 gpd. The system design includes 17 primary systems (serving about 15 homes each) and 17 replacement systems including drainfields, using a total of 7,122 Quick4 Standard Chambers. According to county regulations, flows from the units were not allowed to combine. The design factor for each system was adjusted to use a single pump model through the use of automatic distributing valves and transport lines constructed of multiple diameters of pipe.

County regulations stipulated that the septic system could be no deeper than 36 inches. In addition, a 16-inch-deep irrigation system for the golf course needed to be designed and built above it.

All of the greens and traps for the golf course have independent drainage systems constructed in concert with the septic systems.

In addition to the Quick4 Standard Chambers, the design includes seventeen 6,000-gallon septic tanks, sixteen 2,500-gallon pump chambers, two 1,500-gallon additional tanks, and 334 custom-cast concrete vaults all provided by Wilbert Precast of Spokane. Orenco Systems, Inc., provided pumps, controls, and 17 automatic distributing valves for the project. HD Fowler Co. of Wenatchee provided the pipe and fittings, which include more than 5 miles of 1-inch-diameter, lateral piping and almost 3 miles of effluent and transport lines following the septic tanks.

Project installation began in March 2005 and was completed in May. The lowest house in each group has the septic tank closest to it. Sewage from the homes flows from the cluster's septic tank to the pump chambers via 4-inch PVC pipe. Each drainfield is 40 feet by 240 feet and has six, time-dosed zones. The drainfields are 36 inches deep with transport lines at a shallower depth and the golf course's 16-inch irrigation system above and below them. The distribution and check valves are mounted at the drainfield and are supplied with two transport lines, one for each pump in the chamber.

When the pump shuts off, the check valve opens and drains the line. Each drainfield is custom designed to accommodate the differing transport line sizes. The replacement drainfields handle the peak flows, safeguarding the golf course from the possibility of a weekend overload.

At Sunsera, Eco-Nomic Environmental Services provided tried and true engineering principals to arrive at a new, unique solution.

Many systems were evaluated, such as drip irrigation, and when a cost-benefit analysis was performed, the chamber system provided the most benefit at the least cost. Everyone involved with the project, including county regulators and the construction contractor, were open to trying new products and ideas that resulted in the system being placed under the fairways with the construction of the replacement systems up front. This innovative, creative, and open thinking made the project possible.

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