

Alternative Water Sources

Editor's Note: Water quality and availability remains the number-one issue facing golf today and the near future. The following articles discuss how two clubs sought solutions to those challenges.)

'Horizontal Well' Taps Surficial Aquifer, Returns Investment

By Tom Trammell, CGCS

In August of 2000, I was facing quite a dilemma at Hawks Nest in Vero Beach. My charge was maintaining one of the top golf courses in Florida, we were already in a drought, we were going into the dry season (and the busy season) and



Tom Trammell, CGCS, stands in front of the horizontal well installed more than one year ago. The well provides more than 300,000 gallons of water per day for irrigation usage. Trammell notes that he has made sizeable savings over the last year due to improved water quality and reduced electrical cost for pumping from the shallow source. Hawk's Nest is scheduled to add one more well in the summer of 2002.

my water supply was terribly inadequate. My two conventional vertical wells were yielding approximately 40 gallons per minute and the effluent that I had been promised by the county was not arriving. Even though the two existing wells were running 24 hours a day, the course was still short 400,000 to 500,000 gallons per day.

Some effluent arrived, but not nearly enough. Fortunately, I remembered a presentation that I had attended in 1990. The subject was "horizontal wells" that tap the surficial aquifer a few feet below the surface.

In my files were the brochures that I had stored away from the presentation with the appropriate phone numbers. To make a long story short, I called and received a "re-education" on horizontal wells and decided that they may be the answer for our golf course. My green committee was a little suspect at first, because no one had heard of a "horizontal well."

I asked the company to come in and give a presentation to the committee. The company presented a short video, made a presentation, answered questions, and the committee said, "Go ahead." I was a little nervous, because it was all on my recommendation, but I plunged forward and had the well installed.

I am writing this article in March of 2002 and, here in Florida, we were still in the midst of a drought. The horizontal well not only has provided ample, good quality water (and continues to do so), I am using less electricity because the well is only 18 feet deep. Additionally, I am applying fewer soil supplements because of the quality of the water, and I am recycling anything that is unused. I was able to make a presentation to my green committee that demonstrated our horizontal well would pay for itself in 10 years.

The horizontal well taps the water that lies near the surface and directly beneath the golf course in a surficial water zone. This technology has the ability to recover water from this resource and deliver it in sufficient quantity to satisfy irrigation and lake augmentation needs. Surplus water that is not used in actual irrigation is returned to the surficial aquifer to be reused later. The system can be permitted to be used as a stand-alone water supply source or to supplement existing water supplies.

The horizontal wells are site specific. However, they work in most places in Florida. To determine if a horizontal well will work at your golf course, you need to spend approximately \$2,500 to \$3,000 for a 25- to 30-foot boring and have a hydrologist run computer models. The report will be pretty accurate and give you a much better idea of what you will get with the horizontal well than you

will ever have when you drill a conventional vertical well.

This is a technology whose day has come. If your site will accommodate a horizontal well, then chances are you will not only have a more-than-adequate supply of good quality water; you will also have a return on your investment.

Club Taps Surficial, Floridan Aquifers, Processes in Own RO Plant

By Michael Caglioni, P.G. and Peter Brooks, CGCS

The Everglades Club is located in the Town of Palm Beach, which is located on an elongated barrier island, the Island of Palm Beach, bounded to the west by the man-made saline estuary of Lake Worth/Intracoastal Waterway, to the east by the Atlantic Ocean, and to the north and south by man-made inlets. The Everglades Club is a private, par 70, 18-hole golf club that covers 70 acres.

The original irrigation water supply was potable drinking water purchased from the Town of Palm Beach Utilities, which purchases its bulk water from the City of West Palm Beach. The City of West Palm Beach obtains its raw water from a surface water body, Clear Lake, and is treated mainly through green sand filtration. The Everglades Club irrigation water was supplied by transferring a drinking water source to the barrier island and then to the golf course. When using potable water purchased from the Town of Palm Beach, The Everglades Club Golf Course had an average monthly water bill of \$20,000.

Alternative Water Source No. 1: Surficial Aquifer

In order to reduce the irrigation costs to the golf course, the Everglades Club investigated the potential of installing its own well field for irrigation purposes. Hydrogeologic investigations indicated that the Everglades Club could install a shallow, surficial aquifer well field that would supply brackish raw water with a total dissolved solids range of 2,000 to 6,000 milligrams per liter to an on-site, reverse osmosis plant for treatment. The finished water is to be utilized for irrigation of the golf course. The Everglades Club received a permit from the South Florida Water Management District to withdraw 146 million gallons per year total from both surface water and ground water (surficial aquifer) sources.

Topography plays an important part in the surficial hydraulic regime of a barrier island and, therefore, the Everglades Club. Normally, the water table will approximate the topography (contours) of the land surface. The height of the water table above mean sea level is a function of the elevation of the land surface, the nature of the hydrogeology (aquifer characteristics), and the amount of rainfall. The topography of the Everglades Club golf course is relatively low, approximately six feet above mean sea level at the eastern edge of the property. To the east of the golf course is a topographic high (consolidated and unconsolidated sand dune to ± 15 feet MSL) on which housing and roadways have been