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Transforming a community eyesore

How to convert a polluted 50-year-old golf course to a top-notch (and safe) regional attraction.

By [Dana Gillette, PE](#), [Christopher Marsh, PE](#)

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Balancing cost and risk

After onsite and offsite testing and sampling, engineers developed a soil and groundwater management plan that addressed contamination while simultaneously developing a safe regional park. Engineering controls were implemented to contain contaminated soil. Institutional controls will be put in place to limit human health risks as the site is further developed.

Engineering controls consisted of containing soil onsite under an impervious cap.

The old tees and greens, where arsenic levels were higher than 5.5 mg/kg, were excavated to a depth of up to 2 feet. That soil was placed in a landscape

berm in the center of the site where at 2 feet above the groundwater table the arsenic won't leach into groundwater. A sheet of 25-mil Visqueen, a brand of polyethylene sheeting, was placed over the soil to prevent rain from passing down to the contaminated layer. Finally, a 3-foot cover of clean dirt was placed on top. This final layer makes the berm suitable for landscaping and keeps maintenance workers from inadvertently digging down to the impervious cap.

The site of a new, 20-acre lake that's a kayak trail and park feature had some of the worst groundwater contamination. Designers converted groundwater to surface water by excavating the lake and providing additional cleanup only if necessary. Since arsenic in groundwater is permitted in concentrations up to 10 µg/l but up to 50 µg/l in surface water, this strategy produced the higher allowable limit.

The process of excavating the lake included dewatering to pump the groundwater out of the way during construction. Initially, it was pumped toward the center of the site into an aboveground containment area where it was tested. Once it was confirmed that it was below the 50-µg/l surface allowable limit, the groundwater was allowed to flow into the lake. Regular testing of surface waters conducted throughout construction confirmed that they met state standards and that no unsuitable surface waters discharged into the lake or offsite canal.

Institutional controls in the future will include deed restrictions clarifying that no wells can be used on the property and that the landscape berm containing the contaminated soil may not be modified without

appropriate approvals.

In July 2013, the state approved the site assessment plan documenting that soil cleanup efforts were complete. The Department of Environmental Protection also approved the proposed Natural Attenuation and Monitoring Plan for the site. Royal Palm Beach will collect groundwater samples from onsite monitoring wells and along property boundaries semi-annually for up to five years to confirm that arsenic levels continue to decline.

This compromise approach to soil and groundwater management was worked out closely with the South Florida Water Management District as well as the state.

At the design meetings with the agencies, the design team's groundwater models showed how dewatering activities wouldn't push the contaminated groundwater plume further offsite. During construction, the agencies received testing reports of the dewatering efforts to confirm that results were matching expectations. The design also included a contingency plan that involved continued use of the above-groundwater impoundment and perimeter-recharge trenches in the event of unacceptable results.

Remediation costs included \$260,000 for design and testing; \$260,000 for capping the contaminated soil and removing a small portion to a licensed landfill; and \$310,000 for removing irrigation waterlines that contained asbestos to a licensed offsite disposal site.

The effort pays off

Open only seven months, the now-named Royal Palm Beach 'Commons' is a hit. Pavilion rentals are strong and young families visit regularly. More than 40,000 people came to the grand opening in March. The Fourth of July celebration included a 5K race along the hike/bike trail, food trucks, live music, a beach volleyball tournament, rides, and a fireworks display on the Great Lawn that drew 20,000 visitors.

This ongoing project is an example of what can happen when a community has vision and resources, when a technical team comes up with a balanced approach to cleanup and safety, and when environmental agencies support this approach—a new resource that benefits a community and a region.

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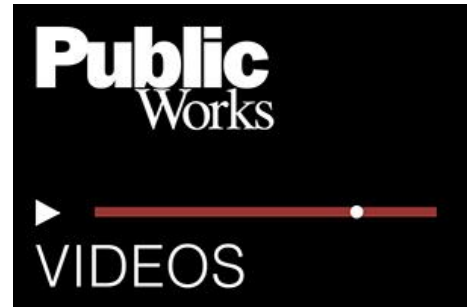
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