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# SMART IRRIGATION

## 4. KEEP IT DRY AND AERIFY

Managing turf in Las Vegas is like growing grass on the moon with bad water, or so says John Pollok, director of golf course maintenance for Spanish Trail Country Club in Las Vegas.

He's been overseeing maintenance of the private club's 27-holes since last July, after managing the grow-in of a renovated nine holes last spring. Though the new nine has a recently installed Toro/Rain Bird hybrid irrigation system that's already helping save water, part of Pollok's job is to evaluate the water use on the other 18 holes.

A combination of leveling all the irrigation heads, upgrading 20-plus-year-old nozzles and reprogramming the irrigation systems to run with a crop coefficient of 1.1 vs. 1.5 has saved an average of 10 million gallons of water per month.

"That's substantial when you're paying \$700 per acre feet," he says. "All of these things add up to savings. I like to keep a little drier golf course than most."

Spanish Hills will spend more than \$1.2 million on this year on water expenses.

All of the water is reclaimed, which means the maintenance staff battles high pH, bicarbonate and sodium levels, which is a recipe for poor water and nutrient retention.

To mitigate these factors, Pollok aerifies with a Soil Reliever, then topdresses with a 90/10 mix of sand and Dakota Peat, then



makes a pass with a Toro OnePass to process the cores and mix in the topdressing material. Finally crews drag the surface to work the organic matter back into the soil.

The results of the aerification and topdressing program have been good so far, Pollok says, though he says it'll be three to five years before it fully pays off.

"We're seeing a flush of growth after we aerify, which is a product of opening up the soil and getting the air and organic matter down there to retain nitrogen and moisture," he says.

Pollok doesn't just rely on observations to ensure his programs are working, though. He conducts quarterly soil and water tests through consultant Corey Angelo, who works with Brookside Laboratories.

"We base our entire fertility program around our soil test," Pollok says. "Prices of fertilizers have gone up. If I'm putting on a product our soils don't need, that's money wasted. And since our water is not the best, we want to make sure we're documenting what's in it, because that dictates a lot of what we do as well."

But just because his water quality is not the best, that doesn't mean Pollok is not interested in saving it.

"We turf managers need to make sure our irrigation systems are working as efficiently as possible," Pollok says. "The added tools of aerifying, deep-tining and adding organic matter are only going to make matters better."

More than half of the 18-hole golf facilities in the Southwest, Southeast and upper West/Mountain regions have had their irrigation water analyzed since 2003. Golf facilities with more holes, higher budgets and private facilities are more likely to test the quality of their irrigation water.\*

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## 5. MAKE ROOM FOR MONITORS

Though only 3 percent of golf courses use soil-moisture sensors to schedule their irrigation systems, according to GCSAA research, superintendents who use the technology say it's an area of opportunity for saving water, thanks to recent product improvements, increased drought conditions and a focus on water conservation across the nation.

Golf course superintendents with soil-monitoring technology say they'll cut an average of 10 percent of their typical water use, according to a May 20 New York Times article. Depending on the volume used and cost of water, the systems can pay for themselves within the first year. The Times reported that an Advanced Sensor Technology subsurface system including 18 wireless sensors, 3 routers and gateways, software and help from an agronomy support staff, would cost slightly more than \$11,000.

Shawn Emerson, the superintendent

at Scottsdale, Ariz.'s Desert Mountain Golf Club, which has six courses and 500 acres of turf, told the Times the facility would save more than 100 million gallons of effluent water for the year. That equates to between 18 million and 20 million gallons per course and, based on current prices, about \$130,000 in savings.

The Card Sound Golf Club in the Florida Keys installed wireless sensors in April, the Times reported. The facility's high salt content recycled water requires superintendent Sean Anderson to regularly flush his greens with fresh water. Before the club installed sensors, he used about 150,000 gallons every two weeks.

"We have actually cut in half the amount



of water we were using," he told the Times. "To me, it sort of shows that the sky is the limit with this technology." GCI

**Approximately 3 percent of golf facilities use soil-moisture sensors to aid in irrigation scheduling.\***

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CASE STUDY 1



# Win-Win IRRIGATION

Tennessee's Indian Hills Golf Club was in need of more water, and its corporate neighbor was looking to rid itself of some.

It was an offer too good to resist.

Indian Hills Golf Club, an 18-hole, semi-private club located in Murfreesboro, Tenn., had always relied on two small wells to fill its irrigation reservoirs, and this supply typically dried up around the end of July or the first of August, says superintendent Brad Marcy.

"The well pumps don't pull out enough water to keep our reservoirs full," says Marcy, who operates with a \$400,000 annual maintenance budget and a staff of 14. "So we really didn't water much more than tees and greens because our water source was so weak and limited."

Across the way, Indian Hills' neighbor, a General Mills processing facility, needed a way to get rid of the wastewater it used to clean equipment instead of treating it and sending it into the city's sewer system — a process that incurred a substantial cost.

So two years ago representatives from the General Mills facility proposed footing the \$1



# SMART IRRIGATION

By Michael Zawacki



million price tag to divert the wastewater from its facility to Indian Hills' irrigation reservoirs. The plan would transfer about 500,000 gallons per day for 236 days per year.

"We would no longer be dependent upon our well pumps for water," Marcy says.

For both parties it's an apparent win-win water scenario.

Marcy, though, had initial reservations about the quality of the plant's wastewater. Elevated mineral content or other contaminants potentially could have harmed the course's 419 bermudagrass fairways and its bentgrass greens. However, extensive water quality assurance tests haven't yet raised any major red flags with the course, he says.

"Right now I'm concerned about the lack of calcium in the water, which weighs down the sodium and pushes it through the soil profile," he says. "For right now we'll continue to strictly monitor it and conduct weekly testing to make sure the sodium level is where we want it. We'll improve the water's quality as we go when it's needed, and to do that we'll use a calcium product to reduce the sodium issues in the water."

As of mid-June, construction crews were breaking ground and laying the pipe to divert the wastewater from the General Mills facility to Indian Hills. The project is scheduled for completion early this month. GCI



Top left: A rock trencher gets ready to cut a trench that will hold the pipe that will bring as much as 500,000 gallons of water a day to Indian Hills Golf Club.

Top right: An inflatable device called "The Big Blue Bladder" dams part of the river to allow workers to lay the 12-inch pipe from one bank to the other.

Bottom left: The finished river crossing in mid-June. The \$1 million project is scheduled for completion early this month.



## CASE STUDY 2

By Robert Diebold

# Silver Stone saved BIG

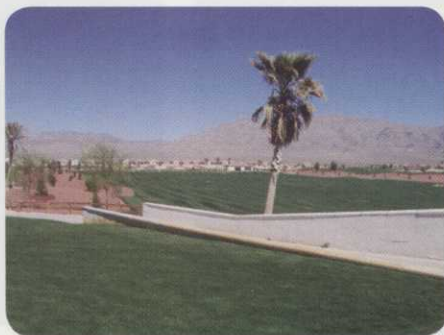
A Las Vegas club finished a four-phase improvement plan in 2008 that's expected to save 68 million gallons of water per year.

During the last four years, Silver Stone Golf Club underwent a plan to improve the course's operating costs, make it more aesthetically pleasing and – most importantly considering its Las Vegas locale – conserve water.

Ninety acres of the 27-hole golf course were originally designed to be landscaped areas and were initially irrigated by overhead sprinklers. This design created two big problems as the course matured: the planted areas required a considerable amount of water and more chemicals and labor to control weeds. Though it's difficult to know how much water was designated to the landscaped areas, the course as a whole at that time was using about 1,195 acre-feet per year.

Given the water shortages in the Las Vegas valley and the water price hikes over the last few years (water costs are at \$3.25 per 1,000 gallons), International Golf Maintenance knew a move to a drought-tolerant golf course was in order.

Four years ago IGM started the first phase of the transformation of the original 90 acres of out-of-play landscape. The first step was to remove all existing irrigation and unwanted plants, which included anything that wasn't drought tolerant, such as deer grass, mock or-



Silver Stone Golf Club converted landscaped areas to native plants and removed turf from out-of-play areas. Above: The driving range before (left) and after the changes.

ange, crepe myrtles and clover groundcover. The second phase included installing plant material. IGM chose to use native plants like Creosote, Brittle Bush and Yucca; these plants only require supplemental water until they're established. After they're growing on their own, they thrive off of the 4 inches of rain Silver Stone receives annually.

The third phase included spreading 18,000 tons of red decomposed granite (DG) around the groups of plantings. DG's purpose is twofold; it creates an aesthetically pleasing desert look while providing dust control.

IGM just finished the fourth and final

phase of the project, which involved removing more than 20 acres of turf (mainly around tees and from out-of-play areas). This move is expected to save nearly 4 million gallons of water per month during the hottest parts of the year, which equates to nearly \$15,000 in water costs during a summer month. Removing turf, adding drought-tolerant plants and installing DG cost the facility about \$900,000, most of which was reimbursed by the Southern Nevada Water Authority (SNWA). The total cost for all four phases was \$2.5 million.

Silver Stone's stakeholders are happy with the results – one of them being named "Most Improved Course" by Vegas Golfer Magazine, which membership director Terry Clark expects to help member referrals, sales and guest play. IGM doesn't expect the changes to create cost efficiencies in pesticides or labor for the first few years or until weed populations have diminished. In the future, though, it expects maintenance costs to decrease 8 percent.

The biggest benefit, however, is the projected water savings. The facility is on track to use 985 acre-feet of water this year compared to 1,195 before the changes – a savings of more than 68 million gallons. GCI

*Robert Diebold is the superintendent at Silver Stone Golf Club.*

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**GROW GREEN**

## CASE STUDY 3

By Michael Zawacki

# Going eau NATURAL

Cutting the number of irrigated acres of rough, introducing natural areas and upgrading sprinkler heads is conserving water at Indiana's Chariot Run Golf Club.

When superintendent Roger Meier arrived at Chariot Run Golf Club in 2005, the 18-hole Harris Entertainment resort property in Laconia, Ind., was irrigating 80 acres of tall fescue and bluegrass rough and 35 acres of bentgrass fairways.

The facility's water is supplied primarily by a rainwater-fed, 7-acre irrigation lake. When

that reservoir is depleted the course must tap into city water, an expensive fallback for which Meier budgets \$30,000 annually. Chariot Run is located in a transition zone in the eastern part of the state, so summer can be very dry or very wet.

"It was critical for us to take conservation measures and reduce our water needs," says Meier, who operates with an \$850,000 annual maintenance budget and oversees a crew of 19 in June, July and August. "There are no water restrictions mandated to us, but it's something my staff and I believe in for success at our club."

In 2006, Chariot Run embarked on an extensive bunker renovation and redesign project. The course hired architect Randy Hoffacker from RJH Golf Design, Louisville, Ky., for the redesign and it was Hoffacker who suggested changing grass lines and introducing a native mixture of fine fescue around the bunkers.

"Hoffacker is a big fan of golf course designers Coore and Crenshaw, and they do a lot of natural, rough-looking bunkers," Meier says. "That's where he got a lot of his ideas from for this project."

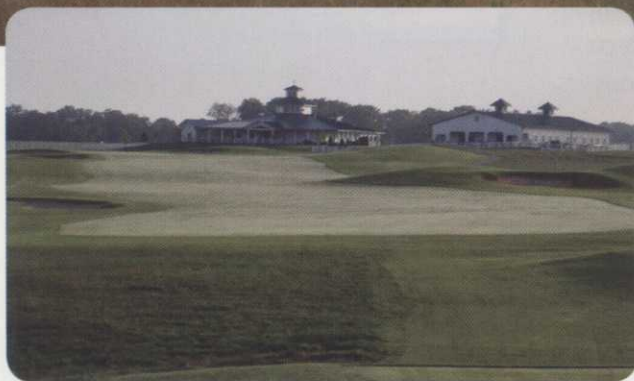
Making this change and allowing several acres of out-of-play areas to go "natural" reduced Meier's maintained rough acreage by about 55 acres.

In addition, they reduced the course's bentgrass acreage by converting its bentgrass driving range floor to tall fescue and they've started the process of reducing several fairways as well. "Our goal is to reduce our bentgrass fairways to about 27 to 28 acres," Meier says.

The property's general manager, though, needed to approve this plan before the transition could take place. Hoffacker assisted in selling the concept by creating a presentation that superimposed native grasses around a specific bunker, providing an accurate visual on what the final concept would look like. The budget for the bunker renovation/restoration project was roughly \$380,000.

One initial problem, though, was they couldn't find a sod grower who grew native grasses. "So we had four acres on the property that had been established with the native grasses when they built the site," Meier says. "We stripped that whole field using a 22-inch sod cutter and brought the cut and prepped grasses in so the construction crew from Professional Golf Services, based in Fort Worth, Texas, could lay it and redo the bunkers."

The native grasses are low-fertility and Meier has had some growing pains. "They're clump-type grasses and they don't spread like bluegrass does," he



Chariot Run Golf Club integrated native grasses during an extensive 2006 bunker renovation and redesign project. Before (inset) and after (top).







Chariot Run Golf Club's 13th hole as it is today with native grasses (left) and before the grasses were introduced (below).



says. "So we've actually had to do some plug-in in some places."

Outside of this issue, though, the positives far outweigh the negatives, Meier says.

"The advantage of having those grasses is that they're drought tolerant," he says. "You don't have to irrigate and put all of that labor and maintenance into those bunkers. When we changed all of those grasses it allowed us to reduce our maintained acreage of primary rough that we were mowing – the turf-type tall fescues. We estimate we've eliminated about 55 acres of turf-type tall fescue that we were mowing, irrigating and fertilizing."

Reducing the facility's irrigated acreage from 126 to 76 acres allowed Meier and his crew to identify, cap and remove 150 irrigation heads from these original sites. In addition, Meier installed 48 quick couplers (about three to four per hole) to aid in hand-watering and is in the process

of installing more efficient part-circle heads around tees, rough perimeters and green surrounds. "We changed a lot of the grass lines – hills that used to be maintained we let them grow natural," he says. "We then tied those lines into areas where we could convert a full-circle head into a part-circle head and really target specific areas and use half the amount of water."

Altogether, Meier estimates the project has reduced the course's water consumption by about 30 percent.

"This is one of the toughest places to grow grass," Meier says. "So it can be a real challenge because we're growing all bentgrass from tee to green."

"It's a unique course and it's something that you don't see everywhere," he adds. "It's rated one of the second toughest in the area because of the native grasses, but people love this course. I've had people tell me it's the closest to Scottish golf as you're going to get." GCI

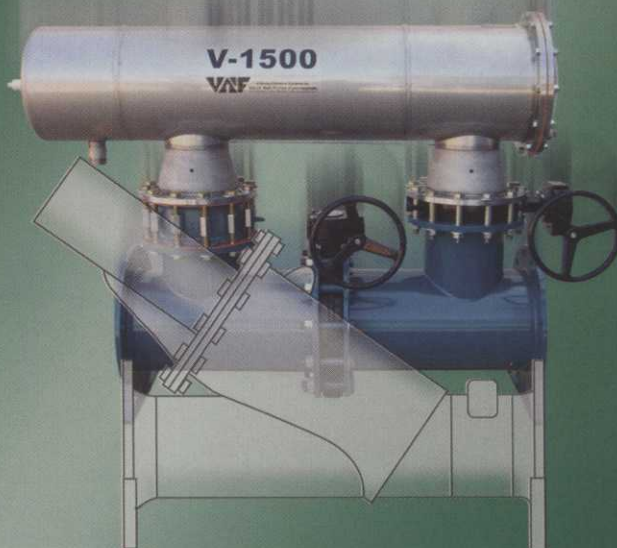


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By Joe Jemsek

## A designer's view

### WHY CHOOSE TURF CONVERSION?

**T**urf conversion is a relatively inexpensive, long-term solution to water conservation. The only way to permanently reduce water consumption is to reduce the amount of irrigated turfgrass. Replacing irrigated turf with non-irrigated or reduced irrigated materials such as pine straw, wood chips, drought tolerant field grasses, or native sand bunkers can reduce water usage by up to 30 percent. The benefits include not only water conservation, but reducing annual maintenance costs and providing a natural look to parkland-style golf courses.

#### What courses are good candidates?

Courses that are irrigated well and located in arid or semi-arid climates can see the greatest return on investment from a turf conversion project. However, any golf course can see cost-saving benefits from a turf conversion by replacing maintained turf with naturalized areas. The ancillary benefits of reducing maintained turf grass, includes cost savings on turf maintenance, chemical applications, utilities and overseeding costs.

#### How much can a course really save?

A typical golf course uses around 6,500 gallons per acre per watering cycle. If a conversion plan eliminated 20 to 30 acres of turf, the water savings could be between 130,000 to 260,000 gallons daily. For example, in Southern California if a course saved 200,000 gallons per day over 200 nights, it would translate to 40 billion gallons and a cost savings of more than \$165,000 per year. In just a few months these cost savings can offset the expense of the turf conversion.

#### How does turf conversion begin?

Before embarking on any turf conversion, solicit the help of a golf course designer and irrigation consultant to analyze the course and the irrigation system. After taking inventory of the site, identify areas for turf removal and develop a plan. For example, tee surrounds are an excellent option and can provide contrasting textures to help define golf features.

Before implementing any changes to the course, display plans near the pro shop and educate staff and players about the planned water conservation efforts. Players will recognize

the course is taking environmentally friendly actions through the management of precious resources like water. Change is difficult, but when informed, players are more willing to accept the conditions during the process.

To get started, replace full-circle sprinkler heads around tees with reduced radius heads and only irrigate tee tops. Rough widths can be reduced by part-circling sprinkler heads in between landing areas and along tree lines. As new irrigation limits are realized, edge grass lines and follow the plan to convert areas.

#### What are the results?

By the next growing season, the advantages of the program will extend far beyond water conservation and will enhance the aesthetic appeal of the course with a contemporary and natural style. Often times, water conservation occurs only in response to water restrictions. Before water restrictions are imposed at your course, consider implementing a turf conversion project. GCI

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JOE JEMSEK IS PRESIDENT OF CHICAGO-BASED JEMSEK GOLF DESIGN.

A before photo and after rendering of what a turf conversion may look like.



JOE JEMSEK