

# State-of-the-Art Water Plant Expansion

## St. Lucie West has a new state-of-the-art, high-technology water plant.

The St. Lucie West Service District's water plant began operating in 1988 as one of the largest low pressure reverse osmosis (RO) treatment plants in the US. Our new plant uses the same RO treatment, but we're now using raw water from the deeper Floridan Aquifer well.

To date, St. Lucie West's drinking water has come from shallow (surficial) aquifers. Because of St. Lucie West's growth, we are beginning to overdraw the shallow aquifer. This is contributing to wetlands drying and lower lake levels. Three new Floridan Aquifer wells are drilled to 1,300 feet below the ground—a much more plentiful source of raw drinking water for our community. Each well supplies 1,400 gallons of water per minute or 2 million gallons per day.

In addition to being a more plentiful source of raw water, these new Floridan Aquifer wells are completely isolated from the shallow aquifer and will reduce the draw from the lakes in St. Lucie West by about 50% on a yearly basis, and almost entirely during the dry winter months.



**RO membranes**

## Reverse Osmosis (RO) is the future of water treatment.

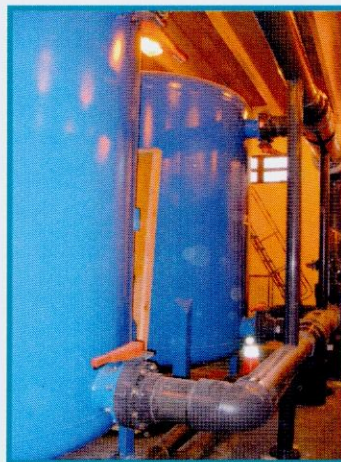
The state-of-the-art RO process uses high pressure to force water through thin, semi-permeable RO membranes, leaving unwanted contaminants behind. RO treatment units recover about 85% of the water that is forced through the membranes. The other 15% washes away contaminants filtered out during the process, such as salt

and calcium. These membranes must be cleaned every six months with a mild detergent to remove any silt.

The waste flow water (which is similar to sea water) from the RO units is injected into the Boulder Zone using a special "injection" well.

Our new RO system can treat up to 3.4 million gallons of water per day—that's equivalent to 225 15,000-gallon swimming pools!

**Creating perfect water.** The RO process removes virtually all impurities from the water, leaving the water with no taste. The water is also very corrosive because of its purity and low pH. The new plant uses calcite contactors to add hardness and make the water less corrosive. The hardness also adds "taste" to the water. In these calcite contactors, the purified water flows up through a bed of calcium carbonate (ground marble) where the water dissolves the calcium—adding the mineral back into the water—which creates a desired "hardness" and raises the pH.



**Calcite contactors**

## Where does the 15% go?

The waste flow from the reverse osmosis (RO) process is basically concentrated well water. All contaminants removed from the potable water during the RO process end up in the waste flow, commonly called concentrate or brine. This waste water has about 75% of the strength of sea water.

In Florida, there is a geological formation about 1/2 mile below the surface that contains salt water instead of freshwater. We inject our waste flow into this salty formation for disposal. The several "confining" layers between the surface and the injection zone protect drinking water sources.

Our new system will inject about 15% of the raw water into the injection well—about 500,000 gallons per day into this zone.



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## How are odors removed from the raw water?

Raw well water often has a “rotten egg” smell that comes from its high levels of natural sulfur. This sulfur is harmless, but it is removed for aesthetic purposes as part of the treatment process.

The water flows from the calcite contactors into large tanks called degassifiers. These degassifiers remove the hydrogen sulfide (sulfur) and excess carbon dioxide from the water. The unwanted gasses are removed as the water cascades down through a loose media inside the tanks and air is forced up through the water.



**Raw water pumps**

## Millions of gallons, ready on demand.

The treated water is stored in an enormous potable water storage tank at the water plant. Water from is stored in a 2 million gallon tank to satisfy the peaks and valleys of water demand throughout the day.

**High service pumps deliver direct to your door.** The pump room is one of the most impressive aspects of the plant expansion. High-service pumps draw the clean water from the potable water storage tank and pump it out to your home or business. These four pumps can deliver 4,500 gallons per minute or 6.3 million gallons per day. They are designed to meet peak drinking water and fire service demand for St. Lucie West.

**Various chemicals ensure safe, healthy water.** Many natural chemicals go into the treatment process, helping to ensure your health and well-being. Acid is used to lower the pH for the reverse osmosis (RO) treatment. Caustic feed raises the pH after the RO treatment to stabilize the water. An anti-foulant keeps the membranes clean and chlorine is the disinfectant that keeps the drinking water safe for use. In addition, we add fluoride into the water—which is very important for children’s growing teeth.

**In an emergency, a generator keeps the plant up and running.** The 1,800-horse power emergency generator sits just inside the pump room. This mammoth diesel-run machine can provide up to 1,350 KW of power—100% of what is needed for both the new water plant and the existing wastewater operation.



**Emergency generator**