

Pilot Study of Alternative Water Supply:
Reclaimed Water Pretreated with Wetland Plants
For the Removal of Nutrients and Pharmaceuticals
Prior to Membrane Water Treatment

The purpose of this study is to show the feasibility of using natural and manmade wetlands and their natural plants for the removal of nutrients (Nitrates and Phosphorus), and certain pharmaceuticals (Naproxen, Ibuprofen, and Estrogen), before being treated in a membrane process (Nanofiltration, Reverse Osmosis, or EDR) for potable use or being released into reservoirs to mix with other source water during times of drought.

The pilot will use the effluent from a conventional extended aeration wastewater plant, the effluent will be post filter, and the filter is a 5 micron cloth Aqua-Aerobics filter. The filtered effluent will then be sent through a manmade wetland that will be made up of two cells 55 feet long and 10 feet wide and 5 feet deep. Each cell will contain a different make up of native plants and the flow will be controlled by a levee system. The plants will be established on floating mats to facilitate root growth and plant rotation and harvesting to study the bioaccumulation in the plants.

It has been shown that different species of wetland plants can remove significant levels of nutrients and pharmaceuticals from wastewater effluent. The concentration and continual bioaccumulation of these chemicals in the drinking water and food chains is of increasing concern to the public. Recent events in the news have spotlighted the need not only for cleaner water supplies, but ways to make the water supply go farther for less money and more people.

We are in a unique position in Charlotte County Florida, we have an abundant supply of water, and we sit on one of the biggest aquifers in the nation, The Floridian Aquifer.

However, we should not take that for granted and we should be looking to the future.

We are also uniquely placed to utilize the native plants that thrive in our tropical environment for the removal of pharmaceuticals. Bulrushes, cattails, and fanworts and others thrive in this environment.

How will we run the study?

The race ways will be placed to use the natural slope of the land as much as possible, and the levees will be constructed to slow the water to give it the maximum contact time, usually 2-4 days in the wetland environment. Each raceway holds approximately 40,000 gallons, with six race ways that 240,000 gallons, if we take a side stream of 50 to 100 thousand gallons a day from the filter we will have plenty of water to maintain our contact time.

We will take benchmark readings on the pharmaceutical content of our effluent after filtration, and we will take samples at the outfall of each raceway to monitor the removal efficiency of each course.

The Raceways will be planted as follows:

1. Species one only
2. Species two only
3. Species three only
4. Species one and Species two
5. Species two and Species three
6. Species three and Species one

The vegetation will be closely monitored for health and signs of distress. The growth of the plants will be recorded and monitored, they will be harvested and replanted as need to assure the continuity of flow.

What will we do with the water?

The water from the raceways will be returned to the chlorine contact basin of the wastewater treatment plant and will eventually end up as reclaimed water or be used in the rapid infiltration basin or it will be sent to the deep well injection station to dilute the brine water of the reverse osmosis drinking water plant.

How long will the study last?

The study should run at least for one year in order to gather data through the change in seasons in the state as well as the change in wastewater characteristics we experience during the winter months and the rainy season. Eighteen months would be ideal for a good solid data base.

Will the raceways be lined?

Yes, the raceways will be lined to prevent water from leeching into the soil.

Will FDEP be involved?

Yes, FDEP will be involved and their approval and input will be sought as the pilot program will be part of the wastewater treatment facility.

How often will samples be collected and tested?

Sampling will be done weekly to monitor the removal progress of each raceway. Sample results will be plotted and graphed to spot trends and to monitor plant health and removal capacity.

Will we you be partnering with any outside agencies or colleges?

We may approach several of the Florida colleges that are currently looking at the nutrient problems in our waterways to see if they would like to assist in this study.

Testing will be conducted by an independent testing laboratory certified in this type of testing.

Cost and schedules?

Engineering will take six months

Actual construction will take seven months

Filling on wetland and plant establishment will take 3 months,

Testing and data collection to begin 16 months from beginning engineering work.

Overall cost estimate \$797,255.75

Funding sought \$797,255.75

Submitted by:

John H. Thompson Jr

941-639-0331

Chief Plant Operator

john.thompson@charlottecountyfl.gov

Burnt Store Water Reclamation Facility

Charlotte County Utilities