



## Florida Department of Transportation Research

### Stormwater Harvesting Using Retention and In-Line Pipes for Treatment Consistent with the New Statewide Stormwater Rule

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Detention (periodically dry) and retention (permanently wet) ponds are common in Florida. Since the 1970s, stormwater management has been required for development in Florida in order to protect the state's waters. Ponds collect runoff from streets and parking lots and slow it down on its way to nearby streams or rivers. On open ground, rain soaks into the ground, percolates down into groundwater, and slowly makes its way to outlets. Paving and runoff accelerate the process, concentrating and speeding runoff water into local water bodies. This causes rapid increases in nutrients and pollutants, which can have serious impacts on environmental and human health.

Water collected in detention and retention ponds is available for immediate reuse. Stormwater harvesting is defined as any method for using detained stormwater for beneficial purposes, such as irrigation, wetland rehydration, industrial processes, preventing salt water intrusion, and others. Reuse water can be pumped directly from the pond, but filtration is required. In this project, researchers from the University of Central Florida developed additional filtration options to reuse water; nitrogen and phosphorus were primary focuses among other many studied contaminants.

At the time of the study, only horizontal wells and sand filters in cartridges were approved for water reuse. The researchers replaced sand with more advanced filter media and tested for pollution removal and filtration rates. The new media, biosorption activated media (BAM), were then pilot-tested at existing detention ponds and in a simulated linear flow setting, similar to the swale runoff collection beside highways.

The researchers tested several filter setups. Down-flow and up-flow filters were installed to improve the quality of detention pond water. To remove the debris that collected in filters, provisions were made for backwashing the filter media. A mobile, pipe-in-pipe system was also tested; it had a high



*Researchers install a pipe-in-pipe filtration apparatus next to a pond on the UCF campus.*

filtration rate, but water quality improvement was marginal. Results confirmed that a lower filtration rate is more desirable for removing nutrients.

In test swales equipped with beds of BAM, pollutants were removed more effectively than with sandy soils (Type A-3) typical of Florida. Analysis of water percolating down from the filter bed showed improved water quality, especially when new sod was used. A pipe or a vault under the filter bed can be used to collect and store treated water for later use.

Because water withdrawal can impact surrounding groundwater, this factor must be considered in any stormwater reuse design. Researchers addressed this issue by using a model called Stormwater Harvesting and Assessment for Reduction of Pollution (SHARP), which predicts interactions among groundwater, ponds, rainfall and runoff.

As the population of Florida grows, protection and strategic use of the state's water resources become increasingly crucial. Reusing some of the billions of gallons of water that fall on Florida offers an important means of addressing this need and conserving valuable resources.

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For more information, visit <http://www.dot.state.fl.us/research-center>