Questions & Answers
L-8 Flow Equalization Basin

What is a Flow Equalization Basin (FEB)?

A flow equalization basin (FEB) is a constructed storage feature used to capture and store peak stormwater flows. Water managers can move water from an FEB into a stormwater treatment area (STA) at a steady rate to optimize performance and better achieve water quality improvement targets.

How does an FEB benefit Everglades water quality?

STAs are shallow freshwater marshes divided into treatment cells by interior levees. The wetland plants take up phosphorus – storing some nutrients in their stems and leaves. As the plants naturally die and sink to the bottom, excess phosphorus is also stored in the wetland sediment buildup. As a result, water flowing out of an STA has significantly less phosphorus than storm runoff flowing in. STAs perform best when inflows provide for stable water levels and water remains within each treatment cell an adequate period of time before discharge into the Everglades.

Flows are delivered to stormwater treatment areas based on real-time rainfall events. This can sometimes result in large volumes of water entering the STA at a high rate. These big inflows of water – which also carry larger amounts of phosphorus – can create strong currents and high levels, which have the potential to uproot and damage the phosphorus-removing vegetation. During high-flow conditions, the water also moves through the treatment cells faster than the ideal time needed for nutrient sorption and settling. In this situation, the STA is less effective in removing phosphorus from the water.

Conversely, during extended dry periods with little or no stormwater inflows to the STAs, submerged aquatic vegetation dies from the lack of water, and the exposed sediment oxidizes. When water returns to the STA (especially if at a high volume), the stored phosphorus is released from the sediment into the water. With less vegetation to take in the nutrient, the STA will experience a temporary decline in phosphorus-removing performance. The longer the duration of dry conditions, the longer the expected period of recovery before the STA can return to optimum performance levels.

An FEB allows water managers to moderate inflows to the STAs during extreme wet and dry conditions by capturing and storing peak stormwater runoff. The stored water will then be delivered to the STAs in a more balanced manner to attenuate inflow rates, sustain appropriate vegetation and optimize STA phosphorus removal. Better performing STAs mean less phosphorus entering the Everglades, which results in improved water quality.

What is the L-8 FEB, also known as the L-8 Reservoir?

The L-8 FEB is a belowground reservoir at a former rock mining site in Palm Beach County. The project is located immediately west of the L-8 canal and north of SR 80 (Southern Boulevard), approximately 20 miles west of the City of West Palm Beach. From north to south the project measures approximately 2.8 miles and from east to west approximately 0.8 miles. The L-8 FEB consists of seven interconnected cells and encompasses a surface area of approximately 1,000 acres. The reservoir also includes an exterior embankment with a top elevation of 23 feet NAVD.

What is the specific purpose of the L-8 FEB?

The L-8 FEB will capture flows from the S-5A and C-51 West basins that are currently routed directly to STA-1 East and STA-1 West. Capturing these flows in the FEB first will allow more optimal and controlled conveyance to these STAs, reducing the impact of storm-driven inflows.

What is the storage volume for the L-8 FEB?

The L-8 FEB is capable of storing 15 billion gallons of water – enough to fill 34,000 football fields one foot deep.

What is the depth of the reservoir?

The reservoir depth is approximately 53 feet below ground surface.

Why is the location of the reservoir beneficial?

The L-8 FEB is strategically located adjacent to and west of the L-8 canal, in close proximity to the C-51 West, S-5A and L-8 drainage basins. With minor infrastructure improvements, water can readily be diverted from the south through the S-5AS water control structure into the L-8 canal and then to the reservoir, allowing for attenuation of these basin flows prior to discharge to the STAs.

Why is a belowground reservoir suitable for storing water? Won't seepage from the adjacent groundwater prevent its use for storage?

The reservoir is located on a unique geologic feature within South Florida. The permeability of the rock at the site is low enough to allow mining in "the dry." As part of the initial purchase agreement, on-site tests were conducted to ensure compliance with acceptable seepage rate provisions. The low rate of groundwater seepage into the formation enables the remaining excavated area to be used for belowground water storage. Belowground storage at this location minimizes water loss through seepage and reduces levee safety concerns.

What, if any, impact will the reservoir have on local groundwater and nearby wells?

The geology and location of the site minimizes the interaction of the water within the reservoir with local groundwater and any wells in the vicinity.

What was the cost of the facility? Why is additional infrastructure needed?

The SFWMD completed the acquisition of the excavated reservoir from the mining contractor in 2007, at a final cost of approximately $220 million. In addition to the existing storage cells and temporary pumping facilities, new infrastructure will be constructed at a cost of $64 million. That infrastructure will allow for capturing stormwater flows previously discharged to tide. Additionally, the new infrastructure will allow utilization of the full storage capability of the reservoir and protect levees from wind and wave erosion. An aboveground reservoir of comparable storage would cost nearly three times the investment made in this project.

When will the FEB project be completed?

The infrastructure improvements – construction of an inlet structure, outflow pump station and levee revetments that will allow full capability (up to 3,000 cubic feet per second inflow and up to 450 cfs outflow) for the reservoir – will be complete in 2016.

Has the reservoir been utilized since it was initially acquired?

The L-8 Reservoir has provided a number of regional water resource benefits:

- In 2012, approximately 3.1 billion gallons of water from Tropical Storm Isaac were directed into the reservoir to help alleviate flooding.
- The City of West Palm Beach utilized more than 600 million gallons of water from the reservoir for water supply during the 2007 drought and again drew from the reservoir during a prolonged dry period in 2011.
- During a 2011 pilot project, the District used small pumps to send fresh water from the reservoir north to benefit the Loxahatchee River.
- Florida Power & Light (FPL) has used reservoir water for its cooling system, reducing the demand on groundwater supplies.
- The reservoir also was used for flood control to protect local communities during major rain events, including the 2004 and 2005 hurricanes.

Is the quality of the residual water now in the reservoir an environmental concern?

No. The District has been conducting water quality monitoring at the L-8 site since the project was initially approved in 2002. The water quality within the reservoir is good, though chloride and specific conductance levels are elevated slightly above the state water quality standards for fresh water. When the rock and sand were being excavated, the aggregate processing operation retained all wash water within the site. This resulted in chloride-rich water within the processing cell and deposited several feet of fines (rock flour) on the processing cell floor. Dredging to deepen the cells below the commercial rock layers also released chlorides. These residual chloride and specific conductance levels have decreased steadily over time as water has been put in and discharged from the reservoir. However, the temporary pump system has not fully replaced the residual groundwater and wash water that was retained in the reservoir. When the FEB infrastructure is completed, the reservoir will be operated dynamically, and the water that is in the reservoir will be frequently discharged and replaced. As a result, future reservoir water quality will reflect that of the water entering the reservoir from the drainage basins.

Wasn't this project originally a part of the Comprehensive Everglades Restoration Plan (CERP)? Will it still serve that purpose?

Increased storage and improved water quality are primary tenets of Everglades restoration. Operation of the L-8 Reservoir (as a component of the CERP Loxahatchee River Watershed Restoration Project study) was previously focused on deliveries to Grassy Waters, Loxahatchee Slough and the Loxahatchee River. Though the primary purpose will now be as an FEB for attenuating flows to STA-1 East and STA-1 West and improving Everglades water quality, it is expected that the project will continue to provide some deliveries to support flows to the Loxahatchee watershed. In addition, other replacement features will be constructed to continue supporting Loxahatchee River watershed restoration.

Where will the water in the reservoir come from?

Inflows will be directed to the reservoir primarily from the S-5A and C-51 West basins. Some L-8 basin flows will also be accommodated.

Where is the water from the reservoir to be delivered?

While construction of the remaining Everglades Restoration Strategies components are underway, water captured by the reservoir will be used for multiple purposes. In addition to serving as an FEB to attenuate STA flows, it will also provide water to the Grassy Waters Preserve, Loxahatchee Slough and Loxahatchee River to aid in meeting wetland target stages and flows.

Is this project related to the C-51 Reservoir?

No. Directly west of the L-8 project, another rock mine is under construction. Known as the C-51 Reservoir, this separate project is being analyzed by the District and a coalition of utilities as a potential public water supply source.

Photos of the L-8 Reservoir site:

- Updated December 2013