

Chapter 5A: Restoration Strategies – Design and Construction Status of Water Quality Improvement Projects

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SUMMARY

To address water quality concerns associated with existing flows to the Everglades Protection Area (EPA), the South Florida Water Management District (SFWMD or District), Florida Department of Environmental Protection (FDEP), and United States Environmental Protection Agency (USEPA) engaged in technical discussions starting in 2010, which resulted in an interagency Framework Agreement (FDEP and USEPA, 2012). The primary objectives were to establish a Water Quality Based Effluent Limit (WQBEL) that would achieve compliance with the State of Florida's numeric total phosphorus (TP) criterion in the EPA and to identify a suite of additional water quality improvement projects to work in conjunction with the existing Everglades Stormwater Treatment Areas (STAs) to meet the WQBEL (SFWMD, 2012b). Based on this collaborative effort, a suite of projects (**Figure 5A-1**) has been identified that would achieve the WQBEL, as documented in the Restoration Strategies Regional Water Quality Plan (RWQP) (SFWMD, 2012a).

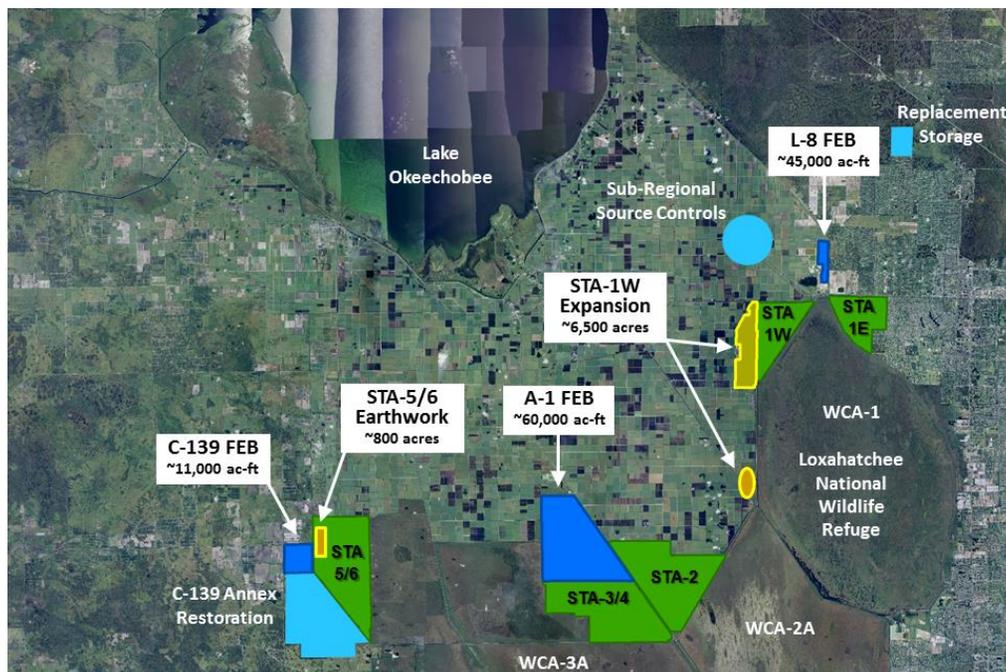


Figure 5A-1. Key projects for the Restoration Strategies Regional Water Quality Plan.

On September 10, 2012, Everglades Forever Act (EFA) Watershed Permit (0311207) and National Pollutant Discharge Elimination System (NPDES) Watershed Permit (FL0778451) were issued by the Florida Department of Environmental Protection (FDEP, 2012a & b, respectively) along with associated Consent Orders OGC No. 12-1149 (EFA) and OGC No. 12-1148 (NPDES) for operations of the Everglades STAs and to outline the additional facilities and structures required to achieve the WQBEL. The Consent Orders contain associated milestones for each project identified in the Regional Water Quality Plan (RWQP) and outline dates when key project activities must be met. In addition, the Consent Orders outline that Everglades STA discharges are anticipated to meet the WQBEL once all the Consent Order activities are complete and sufficient discharge data exists to assess WQBEL compliance.

Under the Restoration Strategies Program, the projects have been divided into three flow paths—Eastern, Central and Western—which are delineated by the source basins that are tributary to the existing Everglades STAs. The identified projects primarily consist of Flow Equalization Basins (FEBs), STA expansions, and associated infrastructure and conveyance improvements. As presented in the previous report (SFWMD, 2014), the primary purpose of FEBs is to attenuate peak stormwater flows prior to delivery to STAs and provide dry season benefits, while the primary purpose of STAs is to utilize biological processes to reduce phosphorus concentrations in order to achieve the WQBEL. To date, FEBs have not been constructed or operated in conjunction with STAs. Therefore, it is anticipated that several years of adaptive operational testing and monitoring will occur to allow the evaluation of various sub-regional and project-specific operational scenarios.

The design and construction of the treatment and storage projects are planned to occur in three phases over a 12-year timeframe, with completion of all projects set for 2025. In Water Year 2014 (WY2014) (May 1, 2013–April 30, 2014), eight Consent Order milestones were completed on five projects (A-1 FEB, L-8 FEB, L-8 Divide Structure, S-5AS Modifications, STA-1W Expansion Phase I) in two flow paths. The A-1 and L-8 FEBs are currently under construction in the Eastern and Central flow paths, respectively. In the Eastern Flow Path, two primary conveyance features, the L-8 Divide Structure and S-5AS Divide Structure, are in the design phase or transitioning to the construction phase according to the Consent Order milestones and the STA-1W Expansion Phase I. An overview of the current Restoration Strategies projects, their status, and milestones met during the WY2014 reporting period is summarized below.

RESTORATION STRATEGIES PROJECTS

In accordance with the EFA and NPDES permits and associated Consent Orders, the following section reports on the WY2014 status of the current Restoration Strategies projects within the Eastern, Central, and Western flow paths. The key projects and associated project components are highlighted in **Figures 5A-1** through **5A-7**, respectively. The specific activities and associated permit-mandates deadlines and completion dates during the WY2014 reporting period are summarized in **Table 5A-1**. Financial reporting for the Restoration Strategies program and projects during Fiscal Year 2014 (October 1, 2013–September 30, 2014) is provided in Appendix 1-5 of this volume.

Table 5A-1. Consent Order corrective actions met during WY2014.

Eastern Flow Path Corrective Actions and Deadlines		
<u>Activities</u>	<u>Deadline</u>	<u>Date Met</u>
<i>L-8 Flow Equalization Basin (FEB) 45,000 acre-feet</i>		
Submit state and federal permit applications	1/31/2014	5/13/2013
Construction status report	3/1/2014	2/25/2014
<i>L-8 Divide Structure</i>		
Complete design of structure	9/30/2014	3/5/2014
<i>S-5AS Modifications</i>		
Complete design of structure modification	9/30/2014	4/17/2014
<i>STA-1W 4,700 Acre Expansion</i>		
Complete land acquisition for expansion	9/30/2013	4/23/2014
Initiate design of expansion	9/30/2013	8/26/2013
Central Flow Path Corrective Actions and Deadlines		
<i>A-1 Flow Equalization Basin (FEB) 54,000 acre-feet</i>		
Complete design of A-1 FEB	8/1/2013	8/1/2013
Initiate construction of A-1 FEB	6/30/2014	10/10/2013

EASTERN FLOW PATH



Figure 5A-2. Eastern Flow Path project components: L-8 FEB, L-8 Divide, S-5AS Structure Modifications, and S-375 Structure Expansion.

L-8 FEB

The L-8 FEB is a 950-acre former rock mine in central Palm Beach County (**Figure 5A-2**) located north of the STA-1E and STA-1W, adjacent to and west of the L-8 canal. The site has a unique geology and the project is capable of storing approximately 45,000 ac-ft of water to attenuate peak flows and optimize STA-1E and STA-1W inflow volumes. In order to fully utilize the L-8 FEB, additional project features—inlet structure, discharge pump station, embankment protection measures, and strategic dredging to totally interconnect the cells—are required. To utilize the full storage capacity of the L-8 FEB for flow attenuation of water redirected from the STA-1 Inflow Basin, the new inlet structure will have a capacity of 3,000 cubic feet per second (cfs) and will be able to fill the reservoir to its intended maximum operational pool stage of +16.5 feet North American Vertical Datum (ft NAVD) (+18.0 ft National Geodetic Vertical Datum, or NGVD). The discharge pump station will have a capacity of approximately 450 cfs for delivery of flows from the L-8 FEB to L-8 Canal. The discharge pump station will be able to drawdown the FEB to an elevation of -37.0 ft NAVD (-35.5 ft NGVD), which is approximately 5 feet above the bottom of the reservoir. Overall, the project design will establish additional connections among the cells and create a configuration that maximizes the exchange of water

among cells. In addition, the contractor currently building the reservoir infrastructure proposes to empty the reservoir to the expected low operational level and refill it with surface water runoff before the District accepts the completed project. This will allow the District to begin operations of the FEB's enhanced delivery system to the existing STAs at completion, with water discharged from the reservoir meeting Florida Class III water quality requirements.

Project Status: Construction under way on the inflow works, outflow pump station, and levee revetment

WY2014 Update: Construction of the L-8 FEB is on schedule and has met the milestone for construction status report (**Table 5A-1**). The levee revetment work, which consists of armoring the interior levee to prevent erosion, is nearing completion. Construction of the inflow works and the outflow pump station is ongoing (**Figure 5A-3**).



Figure 5A-3. Aerial view of inflow works construction (top) and L-8 FEB pump station construction (bottom) (photos by the SFWMD, May 2014).

L-8 Divide Structure (G-541)

This project includes the design and construction of a fully automated, reinforced concrete water control structure to be located within the L-8 Borrow Canal, east of the L-8 FEB. The current structures in the L-8 Tieback Canal are located at the junction of the M Canal at West Palm Beach's Control Pump Station #2 and in the L-8 Canal the S-76 located near Lake Okeechobee. To avoid impacts to surrounding lands, a new divide structure will be required within the L-8 Canal (**Figure 5A-2**). The structure has been designed to allow current operational criteria for flows within the L-8 Canal, while allowing stages within the southern L-8 Canal to be raised in order to hydraulically move water north from the STA-1 Inflow Basin to the new L-8 FEB. The structure will also be used to allow flows to be directed south from the L-8 FEB to STA-1E and STA-1W.

Project Status: Design complete; transitioning into construction

WY2014 Update: The final design for the new L-8 Divide structure has been completed, meeting the Consent Order milestone (**Table 5A-1**). Construction is ahead of schedule and anticipated to begin in October 2014.

S-5AS Modifications

The existing S-5AS structure is located at the southern termination of the existing L-8 Canal where it enters the STA-1 Inflow Basin (**Figure 5A-2**). The two cable-operated vertical lift gates, which have been automated, are remotely controlled in accordance with operational criteria. Under the Restoration Strategies plan, the S-5A Basin and C-51 West Basin runoff will be directed north through S-5AS to the L-8 FEB. In addition, the use of the S-5AS structure will increase and require upgrades. These upgrades include replacing the existing steel gates with stainless steel gates, implementing a concrete deflector at the north end of the structures apron, and dredging the basin just north of the structure to create a larger stilling basin in order to reduce the effects of the increased velocities.

Project Status: Design complete; transitioning to construction

WY2014 Update: The final design for structure modifications has been completed, meeting the Consent Order milestone (**Table 5A-1**). Construction is expected to begin in October 2014.

STA-1W Expansion Phase I

STA-1W Expansion is a combination of the existing STA-1W footprint and the additional treatment area required (**Figure 5A-1**). For the purpose of this section, the STA-1W Expansion project will consist of all features necessary to make the Eastern Flow Path projects perform consistent with the WQBEL. An approximately 6,500-acre STA expansion (5,900 acres of effective treatment area) that is included as a new project for the Eastern Flow Path, which is currently planned in two phases. Phase 1 is a 4,700-acre expansion and Phase 2 is a 1,800-acre expansion. Conceptually, both phases will be considered during the preliminary design phase, but each expansion is planned for detailed design and construction to occur separately.

The design of the existing STA-1W was constrained by the available land and the need to maximize the effective treatment area while maintaining the necessary hydraulics to move water through the wetland system for both water quality treatment and flood control purposes. During the design of STA-1W Expansion Phase I, the integration of the existing STA-1W with the STA-1W Expansion Phase I and the associated infrastructure, configuration and operational protocols to utilize both facilities in series to optimize performance will be incorporated. The

final design will incorporate the best available information to ensure appropriate vegetation partitioning and water depths.

Project Status: In preliminary design

WY2014 Update: Land acquisition has been completed for Phase 1 of the STA-1W Expansion, meeting the Consent Order milestone (**Table 5A-1**). Due to unanticipated third party legal challenges, the closing date on the required lands for the STA-1W Expansion Phase I was delayed. The District received a letter dated January 31, 2014 from the Florida Department of Environmental Protection (FDEP) indicating closing delays beyond March 10, 2014 would result in stipulated penalties. Final title documents were signed at the closing on April 17, 2014. A stipulated penalty of \$44,000 was paid to FDEP and the consent order milestone met. Despite the delay, the District anticipates none of the subsequent milestones will be affected.

The initiate design milestone was also achieved. Site specific hydraulic modeling and alternative configurations are being evaluated to incorporate into the preliminary design. While the project is in the design phase, the land is being leased to continue sugar cane farming until the start of construction. Boundary surveys and initial Phase I/Phase II Environmental assessments have been conducted; geotechnical borings to assess the on-site material for constructability and topographic surveys have all been completed in support of the design process.

CENTRAL FLOW PATH

A-1 FEB

The A-1 FEB (**Figure 5A-1**) is a shallow, above-ground impoundment for the temporary storage of stormwater runoff, with a capacity of approximately 60,000 ac-ft at an approximate maximum operating depth of 4 feet. The A-1 FEB is intended to attenuate peak stormwater flows and temporarily store excess water from within the central EAA, collected by the North New River and Miami Canals to subsequently improve inflow delivery rates to STA-2 (including Compartment B) and STA-3/4. By managing basin runoff in the Central Flow Path in a more advantageous manner, the impacts of storm-driven events would be reduced for STA-2 and STA-3/4. The A-1 FEB will also improve operations of the STAs in the dry season by providing water during periods of drought and low-water conditions. Discharges from these STAs flow into Water Conservation Areas 2A and 3A, part of the EPA marsh where the 10 µg/L TP criterion is applied.

Attenuating and managing excess water flows from the Central Flow Path in the A-1 FEB will enhance operations and improve phosphorus treatment performance in STA-2 and STA-3/4 so that these STA discharges achieve the WQBEL.

Inflows will be conveyed to the A-1 FEB via two operable water control structures (**Figure 5A-4**). The A-1 FEB will receive runoff from the Miami Canal via existing pump station G-372, and from the North New River Canal via existing pump station G-370. After inflows are conveyed to the north end of the FEB, the water will be spread utilizing the northern scraped area to enable sheet flow from north to south. The existing STA-3/4 seepage canal will be used as an internal collection canal to assist in conveying water out of the FEB. Outflows will be conveyed by operable water control structures to the North New River Canal to the STA-3/4 inflow/supply canal. The seepage pumps in the existing pump station G-370 will be upgraded and used to draw water from the FEB when the water level is low.

Project Status: Under construction

WY2014 Update: Final design for the A-1 FEB was completed in July 2013 and received Governing Board approval to move forward to the construction phase in October 2013 (Table 5A-1). Work began utilizing the existing infrastructure on site. Considerable progress has been achieved on the construction of the perimeter levees, which includes crushing rock on site for use in levee construction, additional canal excavation, and internal earthwork (Figures 5A-5 and 5A-6). Also, construction of the inflow and outflow water control structures has started and is in progress (Figure 5-7). Currently, construction of the A-1 FEB is on schedule to meet the Consent Order milestone date by July 2016.

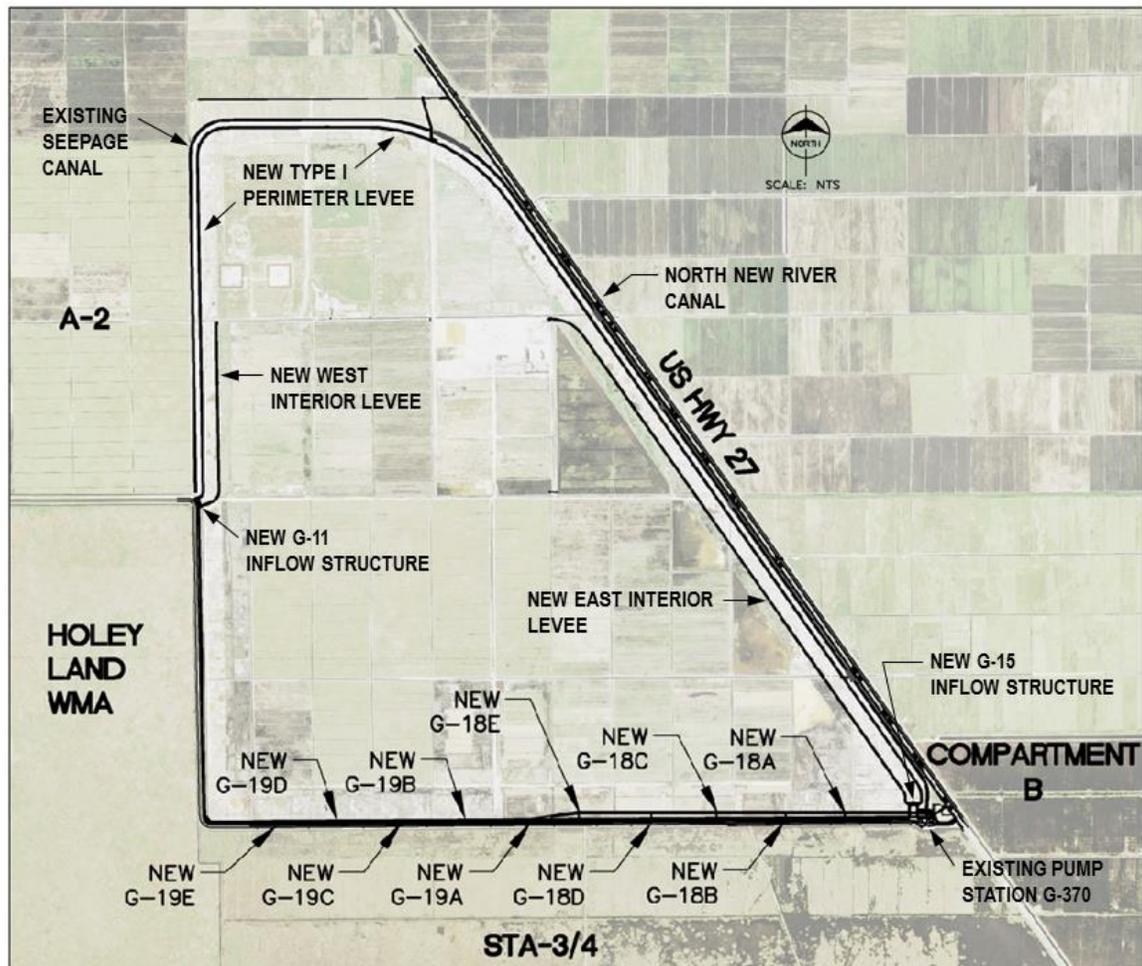


Figure 5A-4. Project design of the A-1 FEB with inflow features, outflow features, levees, and seepage canals.



Figure 5A-5. Aerial view of A-1 FEB level construction (photo by Aerial Innovations of Florida, Inc., June 2014).



Figure 5A-6. A-1 FEB on-site rock crushing for levee construction (photo by the SFWMD, June 2014).



Figure 5A-7. Aerial view of A-1 FEB water control structures construction (photo by the SFWMD, June 2014).

ADDITIONAL COMPONENTS

Sub-regional Source Controls

Conceptual projects within the S-5A sub-basin (**Figure 5A-1**) were considered based on a combination of factors, including water quality of farm discharges, proximity and potential impact to the STA, and having willing local participants.

The larger sub-regional source control planning and implementation effort is anticipated to begin in October 2015. An opportunity to begin a project early was presented, developed and implemented in water year 2013 and is what is reported on here. The first sub-regional source control project is the three-year cooperative agreement between SFWMD and The East Beach Water Control District in Belle Glade on a sub-regional canal cleaning implementation and demonstration project within the S-5A sub-basin. The project includes evaluation of data associated with existing water quality, floating aquatic vegetation and canal sediment conditions under current practices, in contrast with feasible comprehensive canal management practices.

Project Status: Conceptual design and monitoring phase

WY2014 Update: The EBWCD in Belle Glade volunteered in June 2013 to participate in a three-year cooperative agreement with the SFWMD on a sub-regional canal cleaning implementation and demonstration project within the S-5A sub-basin. The cooperative agreement with the East Beach Water Control District is currently in the monitoring phase. The EBWCD project includes evaluation of data associated with existing water quality, floating aquatic vegetation and canal sediment conditions under current practices, in contrast with feasible comprehensive canal management practices. The activities funded by this project are above and beyond existing BMP plan regulatory requirements.

District water quality staff has been collecting samples from the canals that are a part of the demonstration project. Monitoring will continue through September 2016, at which time an analysis and report will be completed with the results.

Replacement Feature – Mecca Shallow Impoundment

The Mecca property (**Figure 5A-1**) is approximately 1,920 acres of former citrus grove that was purchased by the SFWMD from Palm Beach County in December 2013. The proposed conceptual plan for the site is to construct a shallow water storage feature approximately five feet deep that will enable the capture of excess flows from the C-18 western basin. These flows will then be discharged back to the C-18 canal to be delivered to the Loxahatchee River when needed to support the recovery strategy for the reduction of Minimum Flows and Levels exceedances and violations and to better meet restoration targets for this Wild and Scenic River.

Project Status: In preliminary design

WY2014 Update: In December 2013 land acquisition was completed for the Mecca Parcel. Initial Phase I and Phase II environmental assessments were completed along with boundary surveys and legal descriptions as required in the real estate transaction. Additionally, 150 acres located in the northwest quadrant of the Mecca Parcel was part of the land exchange with the Florida Fresh Water Conservation Commission to site a gun range at that location.

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