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

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SUMMARY

In June 2012, the State of Florida and the U.S. Environmental Protection Agency (USEPA) reached consensus on new restoration strategies for further improving water quality in the Everglades. These strategies will expand water quality improvement projects to achieve an ultra-low total phosphorus (TP) water quality standard established for the Everglades. Under these strategies, the South Florida Water Management District is implementing a regional water quality plan to complete six water treatment and storage projects in three flow paths—Eastern, Central and Western—between Lake Okeechobee and the Greater Everglades (SFWMD, 2012a). As shown in **Figure 5A-1**, the projects in the Restoration Strategies Regional Water Quality Plan (RWQP) include more than 6,500 acres of new Stormwater Treatment Areas (STAs). The technical plan also calls for 116,000 acre-feet (ac-ft) of additional water storage through construction of Flow Equalization Basins (FEBs). These impoundments will capture runoff during storm events and provide a more steady flow of water to the Everglades STAs, helping to maintain desired water levels needed to achieve optimal performance.

Under the Restoration Strategies Program, planned efforts also involve implementing additional source controls in areas of the eastern Everglades where TP levels in stormwater runoff have been historically higher. Additionally, a robust Science Plan has been developed to ensure continued research and monitoring to improve and optimize the performance of the STAs (see Chapter 5C of this volume). Overall, the technical plan is part of a revised watershed National Pollutant Discharge Elimination System (NPDES) permit issued by the Florida Department of Environmental Protection (FDEP) and approved by the USEPA for operation of the District's current network of five Everglades STAs (STA-1E, STA-1W, STA-2, STA-3/4, and STA-5/6) south of Lake Okeechobee. The NPDES permit along with a new state-issued watershed Everglades Forever Act (EFA) permit establishes stringent TP limits—Water Quality Based Effluent Limit, or WQBEL—for water discharged into the Everglades Protection Area.

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. Currently, work is already under way on several components of the plan's first two phases in the Central and Eastern flow paths. As a new chapter in this year's Volume I, Chapter 5A provides an overview of the status on the Restoration Strategies projects and related activities and milestones described in the RWQP, pursuant to the NPDES and EFA watershed permits and their associated Consent Orders contain associated milestones for each project identified in the RWQP. An overview of the current Restoration Strategies projects and their status during the 2012–2013 reporting period is summarized below.

Eastern Flow Path

- **L-8 FEB:** Building on a strategically located 950-acre former rock mine, the L-8 FEB is a deep-ground reservoir capable of storing 45,000 ac-ft of water. Initially, this project will function as a multipurpose FEB to capture, store, and deliver water to STA-1E, STA-1W, the Loxahatchee River, and for other restoration purposes. When the STA-1W expansion is completed and in-basin storage for the Loxahatchee River comes online, the L-8 FEB will transition to primarily delivering consistent flows needed to optimize performance of STA-1E and STA-1W as part of the RWQP.

  Project Status: Inflow works/pump station in final design; construction initiated

  Expected Completion Date: December 2016

- **L-8 Divide Structure (G-541):** This structure will be a fully automated water control structure located within the L-8 canal, just east of the L-8 FEB. It will assist the movement of stormwater into the L-8 FEB for storage and, when needed, assist in directing water from the FEB south to STA-1E and STA-1W. G-541 will be designed to function within the current operational criteria for the L-8 canal to maintain flood control for the basin.

  Project Status: In detailed design

  Expected Completion Date: September 2018

- **S-375 Structure Expansion (G-716):** The new G-716 structure will be constructed to expand the capacity of the existing S-375 structure, located within STA-1E. During high flow events in the C-51 West Basin or when STA-1E is already receiving optimal flows, the S-375 and G-716 will divert water to the L-8 FEB for storage prior to being redirected to the STAs for treatment.

  Project Status: In detailed design

  Expected Completion Date: December 2018

- **S-5AS Structure Modifications:** Implementation of projects in the Restoration Strategies plan will increase the use of the existing S-5AS structure to direct stormwater runoff north to the L-8 FEB for storage. As a result, some upgrades and repairs to the structure are required to ensure more efficient operations and increased use at higher stages and flow rates.

  Project Status: In detailed design

  Expected Completion Date: September 2016

- **STA-1W Expansion:** STA-1 West removes excess phosphorus and other nutrients from water flowing into the Arthur R. Marshall Loxahatchee National Wildlife Refuge and other parts of the Greater Everglades. The expansion of STA-1W will double its effective treatment area, further reducing TP concentrations. The expansion will take place in two phases, with the total STA area of approximately 6,500 acres.

  Project Status: Planning phase

  Expected Completion Date: December 2018

Central Flow Path

- **A-1 FEB:** With a capacity of 60,000 ac-ft, the A-1 FEB is the largest of three proposed FEBs in the Restoration Strategies plan. The A-1 FEB will attenuate peak stormwater flows, temporarily storing water so it can be delivered at a steady rate to STA-2 and STA-3/4 to improve their performance. As a shallow FEB, the A-1 will also contain emergent vegetation to help reduce TP concentrations before moving water to the STAs.

  Project Status: Design completed; transitioning into construction
  Expected Completion Date: July 2016

Western Flow Path

- **C-139 FEB:** A portion of the STA inflows will be redirected to an approximately 11,000 ac-ft FEB located south of Deer Fence Canal and west of STA-5 Flow-way 3 to attenuate peak flows and optimize STA inflow volumes.

  Project Status: Conceptual phase
  Expected Completion Date: December 2024

- **STA-5 Earthwork:** The construction of internal earthwork improvements will result in approximately 800 additional acres of effective treatment area in STA-5 Cells 2A and 3A.

  Project Status: Conceptual phase
  Expected Completion Date: December 2024

Additional Components

- Sub-Regional Source Controls: As part of the RWQP, the District is building upon the success of the existing Best Management Practices Regulatory Program by focusing on areas and projects with the greatest potential to further improve water quality. The East Beach Water Control District 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, selected as a priority sub-basin. This interest is based on promising preliminary results of University of Florida Institute of Food and Agricultural Sciences research on a comprehensive canal management program at a research plot level. 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.

INTRODUCTION AND BACKGROUND

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).

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. 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. The Eastern Flow Path contains STA-1E and STA-1W. The additional water quality projects for this flow path include an FEB in the S-5A Basin with approximately 45,000 acre-feet (ac-ft) of storage and an STA expansion of approximately 6,500 acres (5,900 acres of effective treatment area) that will operate in conjunction with STA-1W. The Central Flow Path contains STA-2 (including Compartment B) and STA-3/4. The additional project is an FEB with approximately 54,000 ac-ft of storage that will attenuate peak flows to STA-3/4 and STA-2. The Western Flow Path contains STA-5/6 (including Compartment C). An FEB with approximately 11,000 ac-ft of storage and approximately 800 acres of effective treatment area (via internal earthwork) within STA-5/6 are being added to the Western Flow Path.

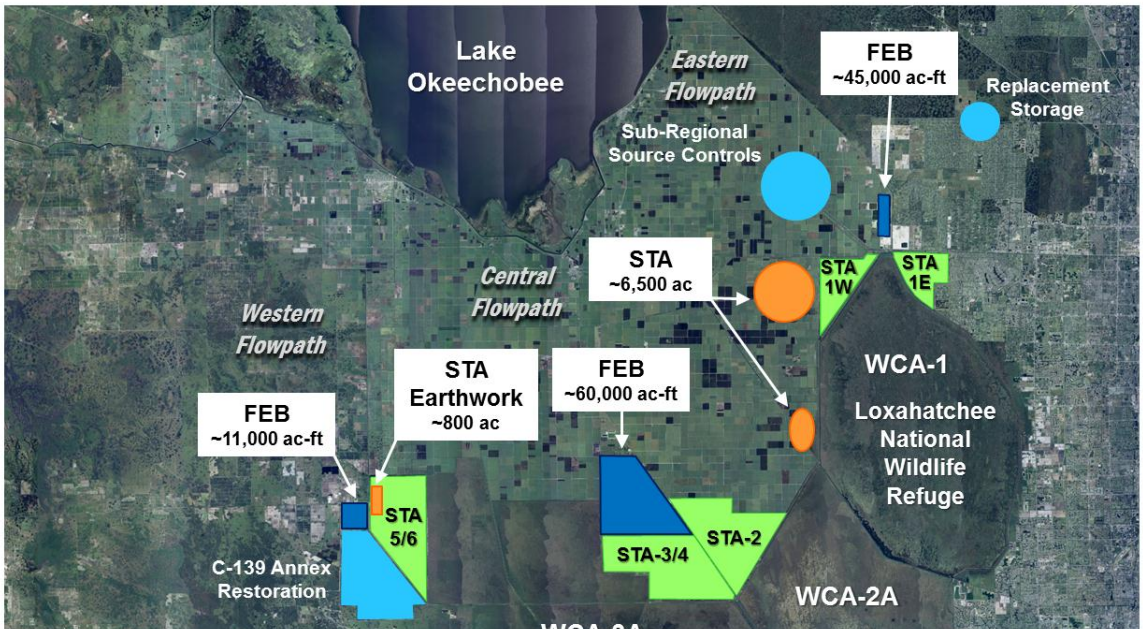

Figure 5A-1. Key projects for the Restoration Strategies Regional Water Quality Plan.

FLOW EQUALIZATION BASINS – DESCRIPTION AND PURPOSE

In the Restoration Strategies Program, a new feature, Flow Equalization Basins (FEBs) are introduced to assist the Everglades STAs in achieving 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 that are integrated with STA-2 and STA-3/4 operations, which will ultimately guide routine FEB operations.

Wetlands, including Everglades STAs, are affected by several factors including water depth, vegetation type, geometry, inflow water quality, and hydraulic loading, as well as the intensity, duration, and timing of flow events. Everglades STAs are typically subject to large and sustained flow pulses due to the hydrological and land use characteristics of South Florida. In general, if the volume of water that is displaced during flow pulses is large, detention time and phosphorus removal performance will likely be less than optimal. To assist the Committee on Independent Scientific Review of Everglades Restoration Progress, Kadlec (2011) prepared a draft document summarizing the effect of pulsing on wetlands and evaluating the potential improvements to wetland performance as flow pulses are reduced. Kadlec's analyses indicate that storage reservoirs operated to reduce pulse flows have the potential to significantly improve the performance of Everglades STAs (Kadlec, 2011).

Recent modeling using the Dynamic Model for Stormwater Treatment Areas (DMSTA) evaluating the effect of FEBs operated to attenuate pulse flows to STAs demonstrated that an FEB can reduce the required STA expansion area by thousands of acres. Therefore, based on more than 20 years of STA operational experience, best professional judgment of District staff, and the information summarized above, reducing flow pulses to Everglades STAs is a key objective of the water quality improvement projects. Consequently, storage reservoirs or FEBs are included for all three project flow paths.

REGULATORY FRAMEWORK

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 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.

The WQBEL is a numeric discharge limit that will be applied to all permitted discharges from Everglades STAs to the EPA to assure that such discharges do not cause or contribute to exceedances of the 10 micrograms per liter (µg/L) total phosphorus (TP) criterion (expressed as a long-term geometric mean) established under 62-302.540, Florida Administrative Code (SFWMD, 2012a). The TP criterion is measured at a network of stations across the EPA marsh and is intended to prevent imbalances of aquatic flora and fauna. As a two-part test, the WQBEL is measured at the discharge points from each STA and requires that the TP concentration in STA discharges shall not exceed (1) 13 ppb as an annual flow-weighted mean in more than three out of five water years on a rolling basis, and (2) 19 ppb as an annual flow-weighted mean in any water year.

Two other components of the RWQP are the sub-regional source control projects and the Science Plan (SFWMD, 2013). An overview of sub-regional source controls is presented in the following section, and the Science Plan update is discussed in Chapter 5C of this volume.

SUB-REGIONAL SOURCE CONTROLS

As part of the Restoration Strategies RWQP, the District is building upon the success of the existing Best Management Practices (BMP) Regulatory Program by focusing on areas and projects with the greatest potential to further improve water quality. The District's goal is to design water quality improvement projects in strategic on-site locations or through sub-regional source control projects in series with the on-site BMPs to further reduce TP loads to the STAs.

The S-5A sub-basin within the Everglades Agricultural Area (EAA) Basin was selected as a priority sub-basin based on the inflow concentrations from Lake Okeechobee into the S-5A, water quality of the farms discharging within the S-5A, potential to affect the inflow to STA-1E and STA-1W, and potential positive impact to the Refuge. Conceptual projects within the S-5A sub-basin 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 East Beach Water Control District (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. This interest is based on promising preliminary results of University of Florida Institute of Food and Agricultural Sciences research on a comprehensive canal management program at a research plot level. This type of demonstration has not been evaluated on a sub-regional scale. 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.

RESTORATION STRATEGIES PROJECTS

In accordance with the EFA and NPDES permits and associated Consent Orders, the following section reports on the WY2013 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-4**, respectively. The specific activities and associated permit-mandates deadlines and completion dates during the WY2013 reporting period are summarized in **Tables 5A-1** through **5A-6**. Financial reporting for the Restoration Strategies program and projects during Fiscal Year 2013 (October 1, 2013–September 30, 2014) is provided in Appendix 1-5 of this volume.

EASTERN FLOW PATH

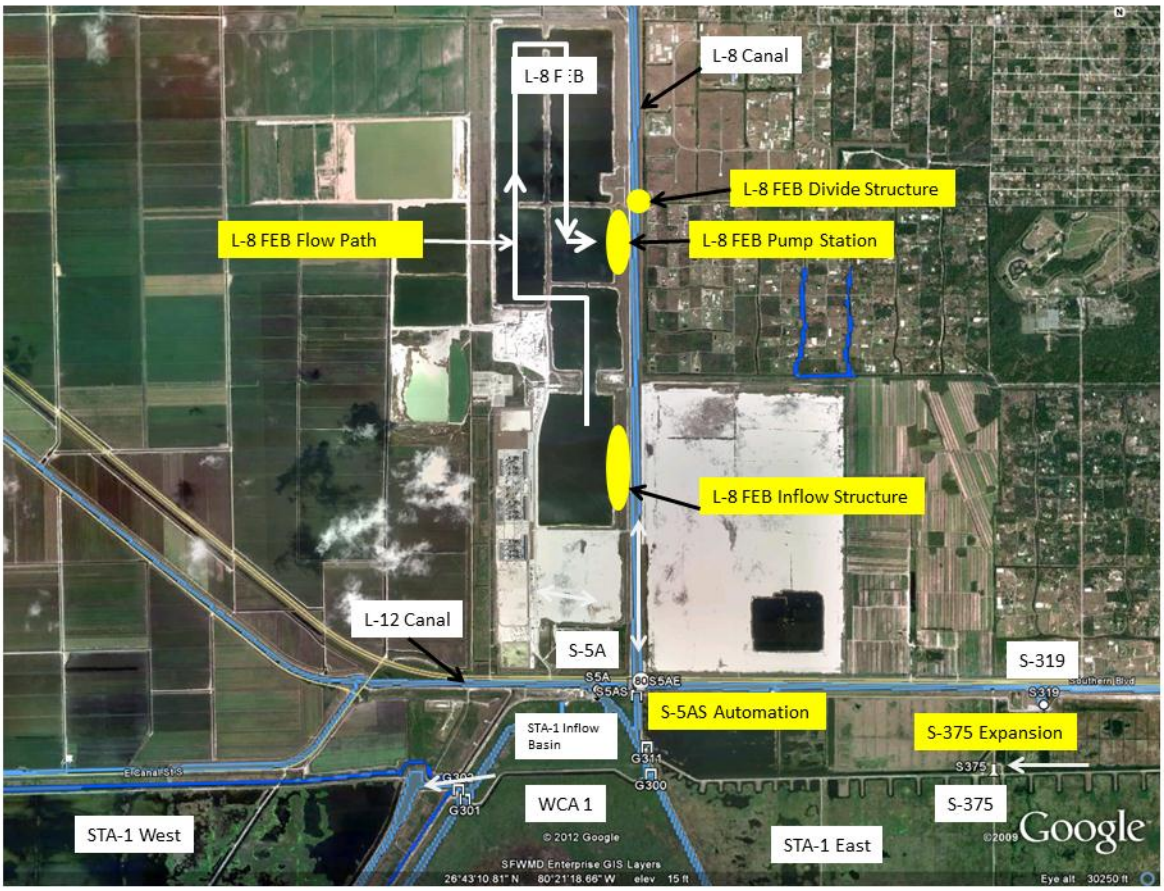

Figure 5A-2. Eastern Flow Path project components: L-8 FEB, L-8 Divide, S-5AS Structure Modifications, and S-375 Structure Expansion.

L-8 FEB

Project Status: Inflow works and pump station in final design; construction initiated

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 (**Figure 5A-3**). 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.

Figure 5A-3. Aerial view of L-8 FEB configuration (photo by the SFWMD, early 2013).

Table 5A-1. L-8 FEB project-related activities and associated mandated deadlines and completion dates during WY2013.

Eastern Flow Path Corrective Actions and Deadlines		
Activity	Deadline	Date Met
Eastern Flow Path: L-8 Flow Equalization Basin (FEB) 45,000 acre-feet		
Submit state and federal permit applications	1/31/2014	5/15/2013
Construction status report	3/1/2014	---
Construction status report	3/1/2015	---
Completion of construction (multi-purpose operation begins)	12/31/2016	---
Long-term operations commence	12/31/2022	---

L-8 Divide Structure (G-541)

Project Status: In detailed design

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 will be 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.

Table 5A-2. L-8 Divide Structure project-related activities and associated mandated deadlines and completion dates during WY2013.

Eastern Flow Path Corrective Actions and Deadlines		
Activity	Deadline	Date Met
Eastern Flow Path: L-8 Divide Structure		
Initiate design of structure expansion	10/1/2012	9/10/2012
Complete design of structure expansion	9/30/2014	---
Initiate construction of structure expansion	10/1/2016	---
Complete construction of structure expansion	9/30/2018	---

S-375 Structure Expansion (G-716)

Project Status: In detailed design

The S-375 structure (**Figure 2**) is located within STA-1E in the levee that divides the eastern distribution cell and western distribution cell. The current structure has an approximate capacity of 1,580 cfs. Based on modeling results conducted during preparation of the RWQP, additional flows exceeding the current capacity of the S-375 structure are anticipated. For example, if high flow events from the C-51 West Basin occur, or if storage capacity exists in the L-8 FEB or when STA-1E is receiving optimal flows, water will be conveyed through S-375 and the G-311 structure to the STA-1 Inflow Basin. Therefore, an S-375 structure expansion is required.

The G-716, which will be constructed adjacent to the existing S-375, will consist of three or four-gated box culverts and will be controlled by telemetry. The G-716 will have an approximate design capacity of 2,400 cfs to allow conveyance of full design flows from the S-319 pump station (3,980 cfs) through use of both the S-375 structure and the new structure.

Table 5A-3. S-375 Structure Expansion project-related activities and associated mandated deadlines and completion dates during WY2013.

Eastern Flow Path Corrective Actions and Deadlines		
Activity	Deadline	Date Met
Eastern Flow Path: S-375 Structure Expansion		
Initiate design of structure expansion	9/30/2013	3/4/2013
Complete design of structure expansion	7/30/2015	---
Initiate construction of structure expansion	1/31/2016	---
Complete construction of structure expansion	12/31/2018	---

S-5AS Structure Modifications

Project Status: In detailed design

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.

Table 5A-4. S-5AS Structure Modification project-related activities and associated mandated deadlines and completion dates during WY2013.

Eastern Flow Path Corrective Actions and Deadlines		
Activity	Deadline	Date Met
Eastern Flow Path: S-5AS Structure Modifications		
Initiate design of structure expansion	10/1/2012	9/10/2012
Complete design of structure expansion	9/30/2014	---
Initiate construction of structure expansion	10/1/2014	---
Complete construction of structure expansion	9/30/2016	---

STA-1W Expansion

Project Status: Planning phase

STA-1W Expansion (STA-1WX) 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-1WX 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. Currently, the final footprint of the expansion has not been established. However, a conceptual alternative for potentially available land is generally described below. Once the actual lands available for the project are identified, multiple conceptual designs will be required to determine the most cost effective layout to meet the requirements of the WQBEL.

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-1WX, the integration of STA-1W with STA-1WX as well as the infrastructure, configuration and operational protocols of the existing STA-1W will be evaluated to determine if it can be utilized more effectively. Conceptual designs will consider site hydraulics, vegetation distribution, and available land. The final design will incorporate the best available information to ensure appropriate vegetation partitioning and water depths.

Table 5A-5. STA-1W Expansion project-related activities and associated mandated deadlines and completion dates during WY2013.

Eastern Flow Path Corrective Actions and Deadlines		
Activity	Deadline	Date Met
Eastern Flow Path: STA-1W 4,700 Acre Expansion		
Complete land acquisition for expansion	9/30/2013	---
Initiate design of expansion	9/30/2013	---
Submit state and federal permit applications for expansion	7/30/2014	---
Complete design of expansion	7/30/2015	---
Initiate construction of expansion	1/31/2016	---
Construction status report	3/1/2017	---
Construction status report	3/1/2018	---
Complete construction of expansion	12/31/2018	---
Initial flooding and optimization period complete	12/31/2020	---
Eastern Flow Path: STA-1W 1,800 Acre Expansion		
Complete land acquisition for expansion	3/31/2018	---
Initiate design of expansion	10/1/2018	---
Submit state and federal permit applications for expansion	8/1/2019	---
Complete design of expansion	7/31/2020	---
Initiate construction of expansion	11/30/2020	---
Construction status report	3/1/2021	---
Construction status report	3/1/2022	---
Complete construction of expansion	12/31/2022	---
Initial flooding and optimization period complete	12/31/2024	---

CENTRAL FLOW PATH

A-1 FEB

Project Status: Design completed; transitioning into construction

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. The FEB will facilitate this in concert with the STAs in three ways:

1. Attenuate peak water flows and temporarily store runoff from the central EAA, thereby minimizing the discharge of untreated water into the EPA
2. Improve inflow delivery rates to STA-2 and STA-3/4, thereby providing enhanced operation and phosphorus treatment performance
3. Assist in maintaining minimum water levels and reducing frequency of dryout conditions within STA-2 and STA-3/4, which will sustain phosphorus treatment performance

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.

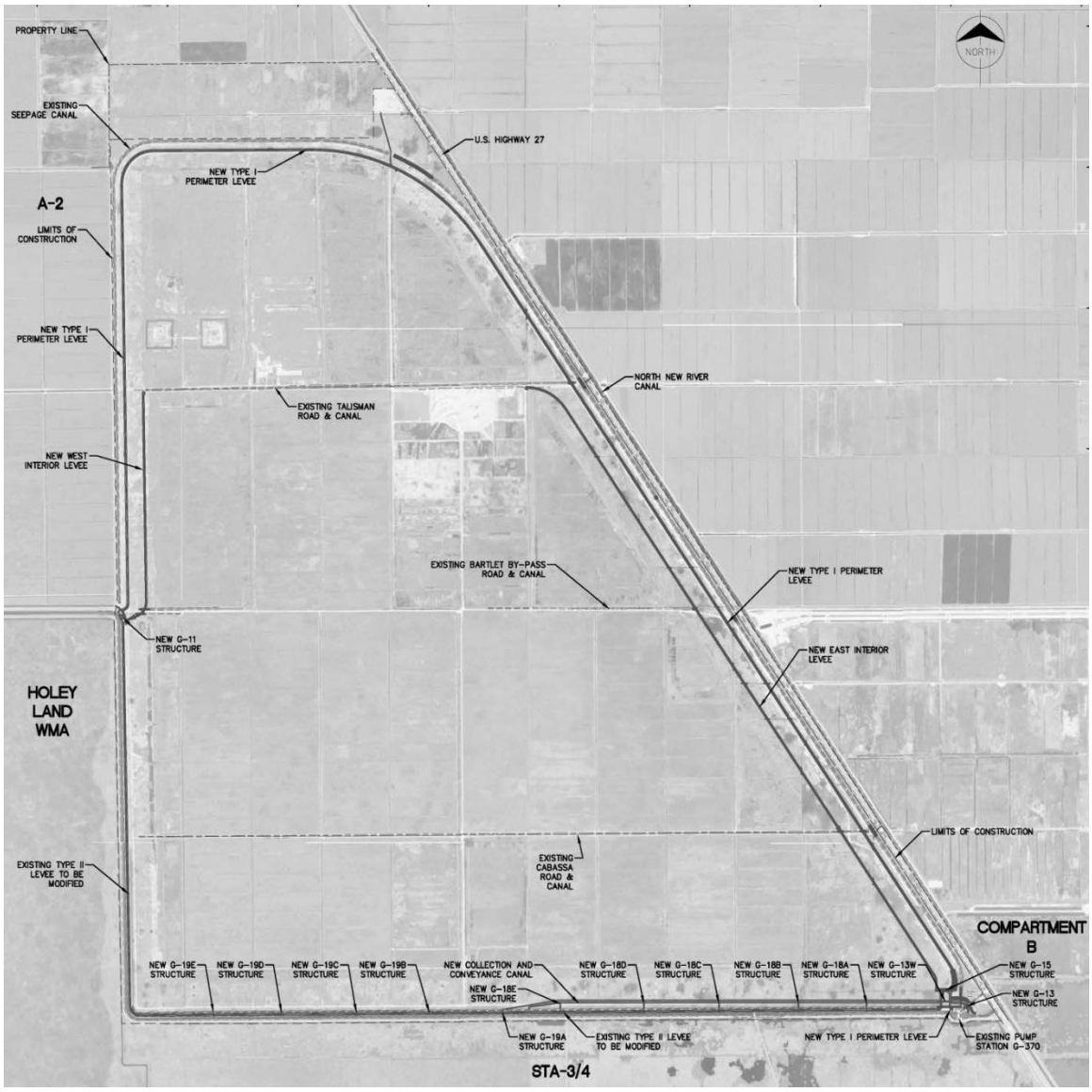

Figure 5A-4. Project design of the A-1 FEB with inflow features, outflow features, levees, and seepage canals.

Table 5A-6. A-1 FEB project-related activities and associated mandated deadlines and completion dates during WY2013.

Central Flow Path Corrective Actions and Deadlines		
Activity	Deadline	Date Met
Central Flow Path: A-1 Flow Equalization Basin (FEB) 54,000 acre-feet		
Initiate design of expansion of A-1 FEB	4/1/2012	12/16/2010
Submit state and federal permit applications	12/1/2012	9/17/2012
Design status report	3/1/2013	2/1/2013
Complete design of A-1 FEB	8/1/2013	7/24/2013
Initiate construction of A-1 FEB	6/30/2014	---
Construction status report	3/1/2015	---
Construction status report	3/1/2016	---
Complete construction of A-1 FEB	7/30/2016	---
FEB Operational monitoring and testing period complete	7/29/2018	---

WESTERN FLOW PATH

The Western Flow Path consists of the C-139 Basin. STA-5 and STA-6 treat the water for phosphorus prior to discharging into the L-4 canal and ultimately into WCA-3A. The projects listed below are scheduled to begin design in 2019. The existing infrastructure will continue to provide existing flood protection to the C-139 Basin through the existing STAs, G-407 gravity structure, and G-508 pump station.

The Western Flow Path projects are intended to manage basin runoff in a more advantageous manner, by reducing the impacts of storm event driven inflows on the STAs, as well as expanding the effective treatment area. This will be accomplished by redirecting a portion of the STA inflows to an approximately 11,000 ac-ft FEB located south of the Deer Fence Canal and west of STA-5 Flow-way 3, for flow attenuation, prior to discharge to STAs for treatment, and by increasing the effective treatment area within the Western Flow Path.

As shown in **Figure 5A-1**, projects in the Western Flow Path primarily consist of:

- **C-139 FEB:** Construction of an approximately 11,000 ac-ft FEB adjacent to the Deer Fence Canal and west of STA-5 Flow-way 3 to attenuate peak flows and optimize STA inflow volumes.
- **STA-5 Earthwork:** Construction of internal earthwork improvements resulting in approximately 800 additional acres of effective treatment area in STA-5 Cells 2A and 3A.

LITERATURE CITED

FDEP. 2012a. STA National Pollutant Discharge Elimination System (NPDES) Watershed Permit (No.FL0778451) and Associated Consent Order (OGC 12-1148). Florida Department of Environmental Protection, Tallahassee, FL. September 10, 2012.

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