ANNEX C
DRAFT PROJECT OPERATING MANUAL

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C.1 INTRODUCTION

The main purpose of this Draft Project Operating Manual (DPOM) is to provide an overview of water management operations after the integration of the Central Everglades Planning Project Post Authorization Change Report (CEPP PACR) project elements (A-2 Reservoir and A-2 Stormwater Treatment Area [STA]). The DPOM is intended to provide the operating criteria associated with the proposed CEPP PACR features to achieve the goals, purposes, and benefits outlined in the report. Report preparation is pursuant to Engineering Regulation (ER) 1110-2-240, and is in accordance with guidance contained in Engineering Manual (EM) 1110-2-3600, ER 1110-2-8156, and the Programmatic Regulations Draft Guidance Memoranda (GM) #5. All elevations referenced in this DPOM are in feet, and reference the National Geodetic Vertical Datum of 1929 (NGVD) unless noted otherwise.

The final Project Operating Manual (POM) assumes completion of all CEPP and CEPP PACR components. The POM will undergo several updates and refinements over time as explained in Section 6 of the PACR and in this Annex. The triggers, thresholds, and knowledge gained over time will be used in future modeling and updates, and the POM will be developed in coordination with, and consistent with, the CEPP Adaptive Management Plan. Modifications and/or revisions to the POM will occur during subsequent project phases. Development of the POM is an iterative process that will continue throughout the life of the project. The POM will be updated at periodic intervals during the detailed design, construction and operational testing and monitoring phases of the project. Refinements to the operating criteria in the POM will be made as more project design details, data, operational experience, and general information are gained during these project phases. An interim POM will be developed based on the implementation schedule and shall cover operation as individual component or groups of components become fully functional and shall include operation criteria for construction periods. It is also anticipated that once the POM is completed and the long-term operations and maintenance phase is underway, it may be necessary to revise the POM from time to time based on additional scientific information and implementation of new Comprehensive Everglades Restoration Project (CERP) or non-CERP activities. The adherence to the authorized project purposes will be sustained through the periodic revisions to the POM.

The operations discussed herein represent the start-up operational strategy, recognizing that constraints in the system may be removed over time due to the completion of many of the CEPP and CEPP PACR components as well as other CERP and Non-CERP Projects. This draft is presented with the recognition that multiple revisions and operational refinements will occur over the life of the project, as described below in **Figure 1-1**.

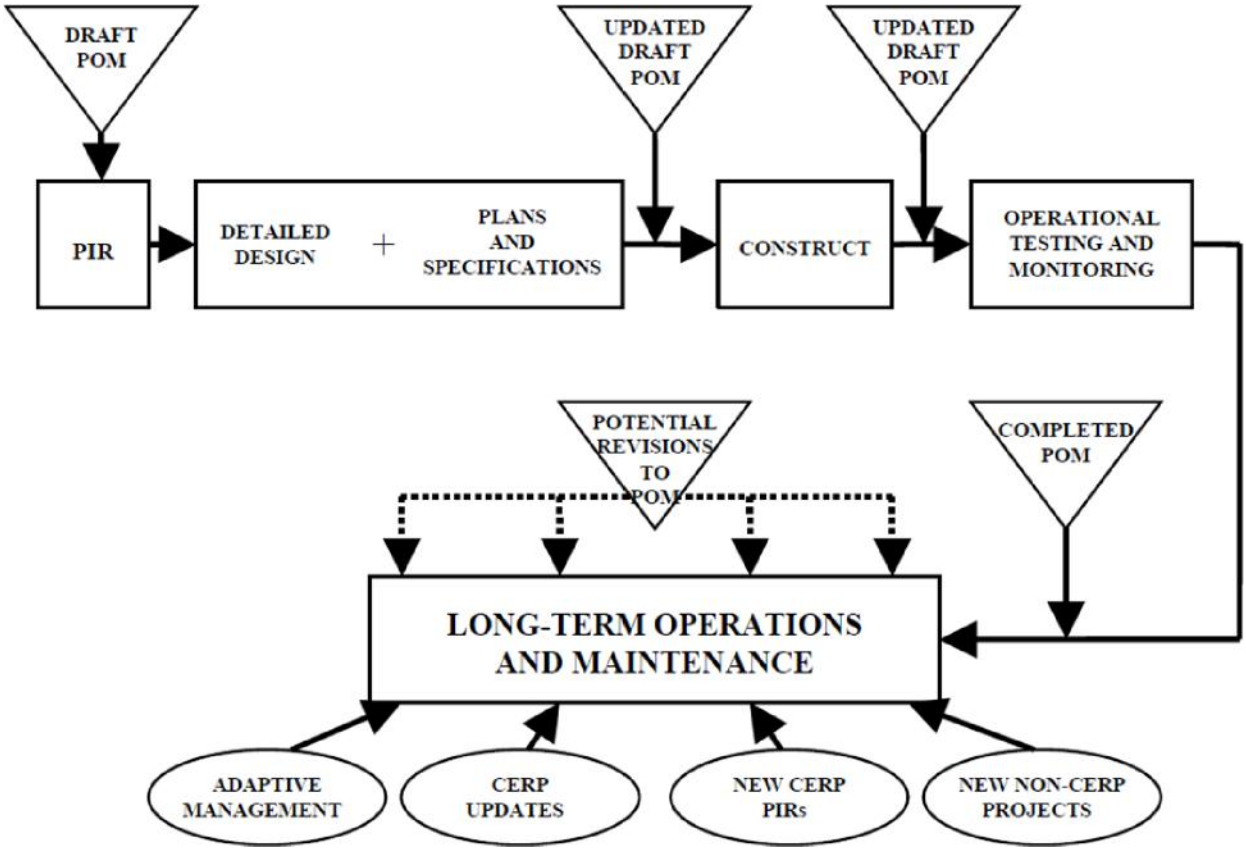

Figure 1-1. Evolution of the Project Operating Manual

C.2 GENERAL PROJECT PURPOSES, GOALS, OBJECTIVES, AND BENEFITS

The purpose of the CEPP PACR is to reduce the damaging discharges to the Northern Estuaries from Lake Okeechobee, and improve the quantity, quality, timing, and distribution of water flows to the central Everglades (Water Conservation Area 3 [WCA-3] and Everglades National Park [ENP]). The CEPP PACR is composed of project components that were identified in CERP, reducing the risks and uncertainties associated with project planning and implementation. This study approach is consistent with the recommendations from the National Research Council to utilize Incremental Adaptive Restoration to both achieve timely, meaningful benefits of CERP and to lessen the continuing decline of the Everglades ecosystem.

The goals of the CEPP PACR include the enhancement of ecological values, economic values and social well-being. The goal of enhancing ecological values can be realized through the achievement of the CEPP PACR objectives as listed: restore seasonal hydroperiods and freshwater distribution to support a natural mosaic of wetland and upland habitat in the Everglades system; improve sheetflow patterns and surface water depths and durations in the Everglades system in order to reduce soil subsidence, the frequency of damaging peat fires, the decline of tree islands, and salt water intrusion; reduce high volume discharges from Lake Okeechobee to improve the quality of oyster and submerged aquatic vegetation (SAV) habitat in the Caloosahatchee and St. Lucie Estuaries; and restore more natural water level responses to rainfall

to promote plant and animal diversity and habitat function. The goal of enhanced economic values and social well-being can be realized through the achievement of the remaining CEPP PACR objective to reduce damaging discharges to the Northern Estuaries.

CEPP PACR objectives are planned to be fulfilled through a variety of changes including:

- Construction of the A-2 Reservoir and associated A-2 STA to be operated integrally with the State's A-1 Flow Equalization Basin (FEB) and STA-2 and STA-3/4
- Canal conveyance improvements in the Miami and North New River

The Tentatively Selected Plan (TSP) consists of 240,000 acre-feet (ac-ft) reservoir and associated 6,500 acre STA and the necessary canal conveyance improvements (**Figure 3-9**). The TSP will provide approximately 370,000 ac-ft on an average annual basis of additional water flow to the central Everglades by redirecting (through the Everglades Agricultural Area [EAA]) Lake Okeechobee water which is currently being discharged to tide via the St. Lucie and Caloosahatchee Estuaries to the A-2 Reservoir to capture, store and attenuate flow rates, prior to water quality treatment using available storage and/or off-peak capacity of the state-operated A-1 FEB (See **Figure 3-2**), STA-2 (See **Figure 3-4**) and STA-3/4 (See **Figure 3-5**) and the proposed A-2 STA. The cross sections for the reaches of the Miami Canal and the North New River Canal within the EAA will be expanded to increase the conveyance capacity and the ability to bring flows from the lake to the A-2 Reservoir. Following water quality treatment, this additional flow quantity will be re-distributed as inflows to WCA-2A and WCA-3A (See **Figure 3-6**), and the TSP features will modify the quantity, quality, timing, and spatial distribution of flows into and through WCA-3A, WCA-3B (See **Figure 3-6**), and ENP to Florida Bay in order to meet the project objectives.

As project components become operational and the project objectives begin to be realized, numerous ecological benefits are expected. With completion of the CEPP PACR components, some of the water which is currently being discharged to the Northern Estuaries would be able to be sent south to the central Everglades. Restoration of the environmental conditions within WCA-3A, WCA-3B, ENP, and Florida Bay would contribute to the increased survival and reproduction of many important native species. Re-establishment can occur for tree islands and other landscape characteristics that are important for the endemic species of the Everglades system. Increased availability of fish and amphibians, which serve as essential prey sources for many predators in the ecosystem, would raise productivity in the ecosystem and a healthier, natural pattern of vegetation would be restored. Habitat function would be increased and the unique plant and animal diversity that defines the Everglades would be maintained. Management of the region’s water resources would be maintained. These measures would also increase recreation opportunities.

C.3 PROJECT FEATURES

C.3.1 EXISTING FEATURES

C.3.1.1 Lake Okeechobee

C.3.1.1.1 Spillway S-351

S-351, which has a design capacity of 1,500 cfs, is a gated spillway located in L-D2, the perimeter dike of Lake Okeechobee, at the connection of the Hillsboro Canal and the North New River Canal to Lake

Okeechobee. It is adjacent to the S-2 Pump Station. S-351 can release water by gravity from Lake Okeechobee to help meet water requirements in the Hillsboro and North New River Canal service area, to the Lower East Coast, and to ENP. It also can discharge water from the EAA to Lake Okeechobee when the Lake level is lower than the EAA canal level. S-351 is operated unless the water level in Lake Okeechobee is too high, and then S-2 is utilized. It will also prevent wind-induced water levels from entering the Hillsboro Canal and North New River Canal. S-351 will be used, under certain conditions, to make regulatory or water supply releases from Lake Okeechobee into WCA-2A or WCA-3A. See **Figure 3-1** for structure location.

C.3.1.1.2 S-2 Pump Station

S-2, which has a design capacity of 3,600 cfs, is a pump station located at the connection of the North New River Canal and Hillsboro Canal to Lake Okeechobee, about two miles northwest of the town of Belle Glade. It is adjacent to Spillway S-351. Pumping at S-2 is initiated when S-6, G-370, G-434 and G-435 Pump Stations cannot maintain the stage in the Hillsboro-North New River Canal at the S-351 tail water location below 12.5 feet, NGVD, unless the water level in Lake Okeechobee is low enough to permit gravity discharge into the lake through S-351 at a desirable rate, or when flooding occurs in the basin and S-2 continues to pump until the stages within the EAA can be practically controlled by the southern pump stations. The minimum desirable stage in the Hillsboro Canal or North New River Canal is 10.0 feet, NGVD. S-351 is closed when S-2 is pumping. See **Figure 3-1** for structure location.

C.3.1.1.3 Spillway S-354

S-354, which has a design capacity of 1,450 cfs, is a gated spillway located in L-D9, the perimeter dike of Lake Okeechobee, at the connection of the Miami Canal to Lake Okeechobee. It is adjacent to the S-3 Pump Station. S-354 permits releases to be made from Lake Okeechobee to help meet water requirements in the Miami Canal service areas. It also can discharge water from the EAA to Lake Okeechobee when the Lake level is lower than the EAA canal level. S-354 is operated unless the water level in Lake Okeechobee is too high, and then S-3 is utilized. It will also prevent wind-induced water levels from entering the Miami Canal. S-354 will be used, under certain conditions, to make regulatory or water supply releases from Lake Okeechobee into WCA-3A via the Miami Canal. See **Figure 3-1** for structure location.

C.3.1.1.4 S-3 Pump Station

S-3, which has a design capacity of 2,580 cfs, is a pump station located at the connection of the Miami Canal to Lake Okeechobee just north of the town of Lake Harbor. It is adjacent to Spillway S-354. Pumping is initiated when the G-372 Pump Station and Structure G-373 cannot maintain the stage in the Miami Canal below 12.5 feet, NGVD, unless the water level in Lake Okeechobee is low enough to permit gravity discharge into the lake through S-354 at a desirable rate, or if flooding occurs in the basin and S-3 continues to pump until the stages within the EAA can be practically controlled by the southern pump stations. The minimum desirable stage in the canal is 10.0 feet, NGVD. S-354 is closed when S-3 is pumping. See **Figure 3-1** for structure location.

C.3.1.2 Everglades Agricultural Area

(See **Figure 3-1** for Everglades Agricultural Area Map)

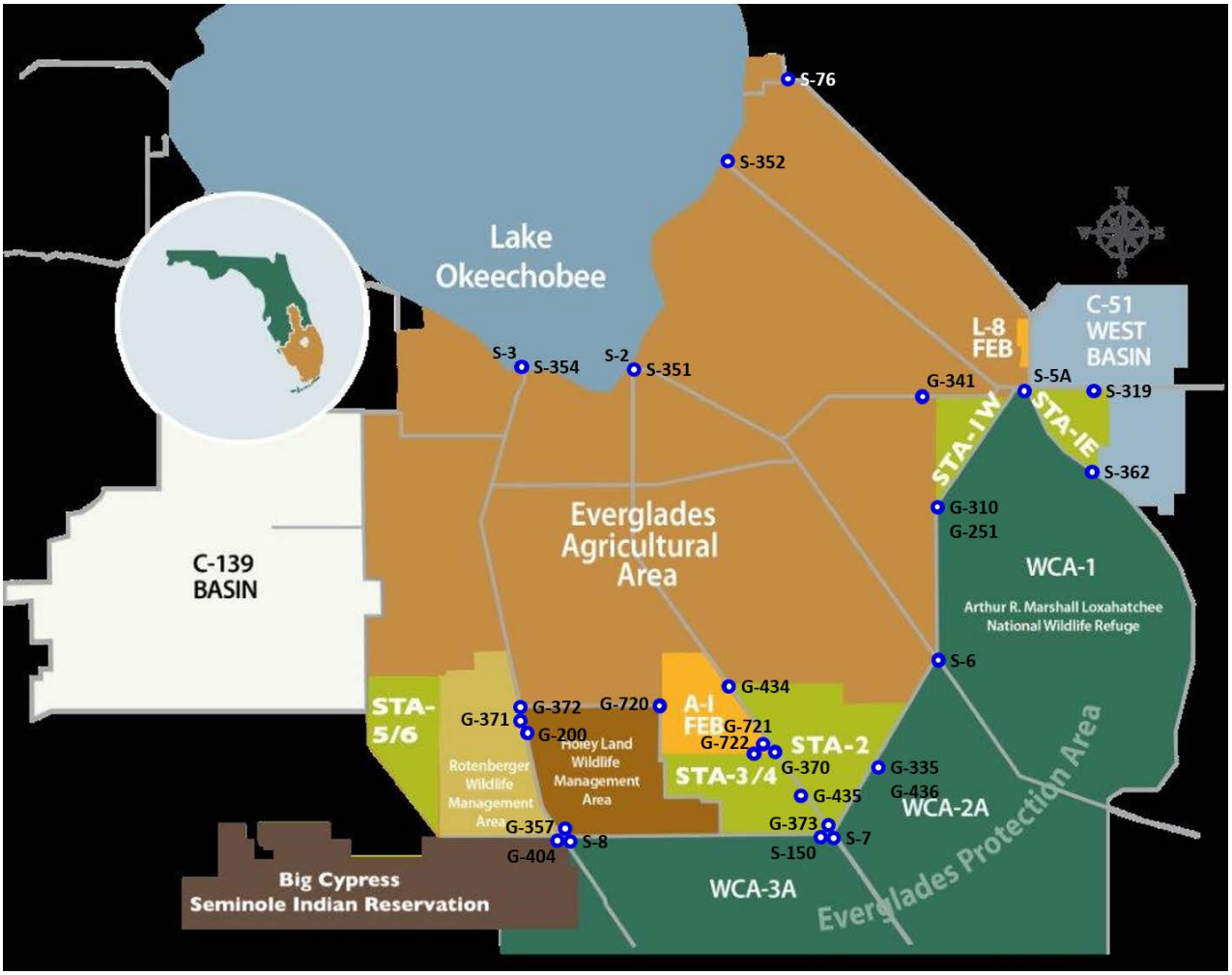

Figure 3-1. Everglades Agricultural Area Map

C.3.1.2.1 S-6 Pump Station

The primary purpose of S-6, which has a design capacity of 2,925 cfs, is to convey stormwater runoff from the EAA collected by the Hillsboro Canal into STA-2. S-6 is located in the alignment of the Hillsboro Canal just north of WCA-2A. In addition to conveying EAA runoff to STA-2, S-6 may also be used in conjunction with G-338 and G-339 to divert Hillsboro Canal flows around STA-2. The minimum desirable stage in the canal is 10 feet, NGVD. S-6, in combination with S-2 can, when pumping at their maximum rates, remove 3/4 inch per day from the 146 square mile tributary drainage area. STA diversion, or the delivery of surface water to the Everglades Protection Area without entering an STA, may occur under one or more of the following scenarios: maintenance, flood control, to avoid substantial damage to the treatment facilities, to address conflicts with the Endangered Species Act (ESA), to address conflicts with the Migratory Bird Treaty Act (MBTA) and for low flow water supply purposes.

C.3.1.2.2 S-7 Pump Station

The primary purpose of S-7, which has a total capacity of 2,490 cfs, is to convey STA-3/4-treated stormwater to WCA-2A. S-7 is located in the alignment of the North New River Canal at the western corner

of WCA-2A, about 30 miles southeast of the town of Belle Glade and immediately east of Highway U.S. 27. In addition to conveying STA-3/4 discharges, S-7 may also be used (when G-371 is open) to divert North New River Canal flows or Lake Okeechobee releases around STA-3/4. S-7 also has an adjacent gated spillway that allows water to enter WCA-2A via gravity when downstream stages are low. This spillway can be used also to supply water from the WCAs to the North New River Canal.

C.3.1.2.3 S-8 Pump Station

The primary purpose of S-8, which has a total capacity of 4,160 cfs, is to convey STA-3/4- and STA-5/6-treated stormwater to WCA-3A. S-8 is located in the alignment of the Miami Canal at the northern boundary of WCA-3A. In addition to conveying STA discharges, S-8 may also be used (when G-373 is open) to divert Miami Canal flows around STA-3/4. S-8 also has an adjacent gated spillway that allows water to enter WCA-3A via gravity when downstream stages are low. See Section 3.3.3 Modified Features for potential S-8 confluence modifications. This spillway can be used also to supply water from the WCAs to the Miami Canal.

C.3.1.2.4 Structure S-150

Structure S-150, which has a total capacity of 1,000 cfs, is a control structure that can convey STA-3/4 discharges and Lake Okeechobee regulatory and water supply releases to northeastern WCA-3A when water levels in WCA-3A are low enough to permit gravity inflows. S-150 is located at the northeastern corner of WCA-3A just west of S-7. When WCA-3A is high, S-150 can also release water from WCA-3A into the North New River Canal.

C.3.1.2.5 G-434 Pump Station

The primary purpose of G-434, which has a total capacity of 1,120 cfs, is to convey stormwater runoff collected by the North New River Canal or released from the A-1 FEB into STA-2 Cells 4, 5, and 6. G-434 may also be operated to convey limited flows to STA-2 Cells 1, 2, and 3. G-434 is located northwest of STA-2 Cell 5 and just east of the North New River Canal.

C.3.1.2.6 G-435 Pump Station

The primary purpose of G-435, which has a total capacity of 480 cfs, is to convey stormwater runoff collected by the North New River Canal or released from the A-1 FEB into STA-2 Cells 7 and 8. G-435 is located northwest of STA-2 Cell 7 and just east of the North New River Canal.

C.3.1.2.7 G-372 Pump Station

The primary purpose of G-372 is for flood protection to the upstream S-3/S-8 Basin. G-372, which has a design capacity of 3,700 cfs, conveys stormwater runoff from the EAA collected by the Miami Canal into STA-3/4 and/or the A-1 FEB. The secondary objective of G-372 is to convey Lake Okeechobee releases to STA-3/4 for eventual conveyance to the downstream environment (i.e. WCAs and ENP) during times when Lake Okeechobee releases are required and WCA-3A conditions allow. During dry hydrologic periods, water can also be delivered from Lake Okeechobee, when available, to maintain hydration of treatment cells. S-354 would be opened to release water from Lake Okeechobee, and G-372 would pump this water into STA-3/4. It is located near the northwest corner of the Holey Land Tract at the Miami Canal.

C.3.1.2.8 G-370 Pump Station

The primary purpose of G-370 is for flood protection to the upstream S-2/S-7 Basin. G-370, which has a design capacity of 2,775 cfs, conveys stormwater runoff from the EAA collected by the North New River Canal into STA-3/4 and/or to the A-1 FEB. G-370 can be used also to pass to STA 3/4 water released from the A-1 FEB. The secondary objective of G-370 is to convey Lake Okeechobee releases to STA-3/4 for eventual conveyance to the downstream environment (i.e. WCAs and ENP) during times when Lake Okeechobee releases are required and WCA-2A or WCA-3A conditions allow. During dry hydrologic periods, water can also be delivered from Lake Okeechobee, when available, to maintain hydration of treatment cells. S-351 would be opened to release water from Lake Okeechobee, and G-370 would pump this water into STA-3/4.

C.3.1.2.9 Miami Canal Divide Structure (G-373)

G-373 primarily serves as an STA-3/4 diversion structure and is located in the Miami Canal approximately seven miles north of the S-8 Pump Station. G-373 is normally closed and serves to separate stormwater runoff in the Miami Canal from STA-3/4 and STA-5/6-treated stormwater. As stated above, STA diversion may occur under one or more of the following scenarios: maintenance, flood control, to avoid substantial damage to the treatment facilities, to address conflicts with the Endangered Species Act (ESA), and to address conflicts with the Migratory Bird Treaty Act (MBTA). The structure can also be operated to provide water supply deliveries south from Lake Okeechobee to the Big Cypress Seminole Tribe of Florida Reservation or WCA-3A or north from WCA-3A to the EAA.

C.3.1.2.10 North New River Canal Divide Structure (G-371)

G-371 primarily serves as an STA-3/4 diversion structure and is located in the North New River Canal just northwest of the S-7 Pump Station. G-371 is normally closed and serves to separate stormwater runoff in the North New River Canal from STA-3/4-treated stormwater. As stated above, STA diversion may occur under multiple scenarios. The structure can also be operated to provide water supply deliveries south from Lake Okeechobee to WCA-2A or north from WCA-2A to the EAA.

C.3.1.2.11 G-404 Pump Station

G-404 is located on the Miami Canal at its confluence with the L-4 Borrow Canal. The pump station is located south of Structure G-357 and north of the S-8 Pump Station, and adjacent to the southeastern corner of the Rotenberger Wildlife Management Area. There are two operational objectives for G-404:

1. to supply the northwest corner of WCA-3A with treated discharges from STA-3/4 and STA-5/6, and

2. to provide supplemental irrigation water supply to the Big Cypress Seminole Tribe of Florida Reservation (G-404 would be operated in conjunction with G-409 in this scenario). Although not explicit project objectives, there is another ancillary benefit of G-404; during storm events, G-404 may supplement the capacity of S-8 to remove STA-3/4 discharges. G-404 has a total nominal capacity of 600 cfs. See Section 3.3.3 Modified Features for potential S-8 confluence modifications.

C.3.1.2.12 Structure G-357

G-357, which is located northwest of the S-8 Pump Station, is a control structure primarily used to facilitate the movement of water from the L-4 Borrow Canal to the Miami Canal. G-357, when closed, also prevents back flow from the L-4 Borrow Canal to the Miami Canal when the G-404 Pump Station is operating. If Miami Canal water levels are higher than the L-4 Borrow Canal water levels, G-357 may also be opened to allow gravity flow to the L-4 Borrow Canal from the Miami Canal during water supply operations. See Section 3.3.3 Modified Features for potential S-8 confluence modifications.

C.3.1.3 Restoration Strategies - A-1 Flow Equalization Basin

In July 2015 and as part of the Restoration Strategies Regional Water Quality Plan, the SFWMD achieved substantial completion for the A-1 Flow Equalization Basin (FEB). Operational testing and initial filling period started in August 2015. The A-1 FEB project supplements water quality treatment capabilities of STA 2 and STA 3/4, expands water storage south of Lake Okeechobee, and offers additional flexibility related to flood protection. The primary operational objective of the A-1 FEB is to improve the operations of STA-2 and STA-3/4 by attenuating peak flows and temporarily storing stormwater runoff collected by the North New River and Miami Canals. The A-1 FEB also assists in maintaining minimum water levels and reducing the frequency of dryout conditions within STA-2 and STA-3/4, which improves treatment performance (SFWMD 2015 and 2016).

The A-1 FEB, approximately 60,000 ac-ft of storage, is located north of STA-3/4 and west of STA-2. The east boundary of the A-1 FEB abuts against the North New River Canal. The Holey Land and the A-1 FEB share a common boundary on the south west quadrant of the A-1 FEB. The A-1 FEB has a footprint of approximately 15,000 acres and currently the operational depth is 4.00 feet, between elevations 9.94 and 13.94 feet NGVD. The location of the A-1 FEB is shown in **Figure 3-1**.

The A-1 FEB can receive runoff from the Miami Canal via the pump station G-372 and the gated spillway G-720. Runoff from the North New River Canal enters the A-1 FEB through the pump station G-370 and the gated spillway G-721. Inflows are conveyed to the northern end of the A-1 FEB by above grade interior channels that are parallel to the east and west A-1 FEB perimeter levees. The water is distributed to enable sheet flow from north to south within the facility to minimize short-circuiting and maximize hydraulic residence time. Releases from the A-1 FEB can be directed to STA 3/4 and STA 2 through G-722 and the G-724 Culverts. A detailed schematic of the A-1 FEB is shown in **Figure 3-2**.

A proposed schedule guiding A-1 FEB operations was derived from CEPP modeling[1] and is shown in **Figure 3-3**. The figure categorizes depths into 5 operational zones. A table associated to the schedule (see **Table 3-1**) recommends operational responses for each of the zones, in this case, discharge rates from the FEB for specific times of year. Also, the ability of STA treatment cells in STA-2 and STA-3/4 to receive FEB water play a role in establishing FEB discharges.

The A-1 FEB operational schedule also provides a range of preferred water depths throughout the year, shown as the zone between the dashed lines in **Figure 3-3**. The maximum depth of the preferred operational range in **Figure 3-3** is 3.00 ft at the beginning of the dry season and it reduces to 2.60 ft during the wet season months, June through September. Keeping the stage below the upper preferred stage

[1] SFWMD. 2017. A-1 Flow Equalization Basin. Revised Project Operations Manual. Work in Progress Draft. December.

limit (out of the High discharge zone) will provide plenty of storage to capture moderate runoff events in the A-1 FEB. The preferred range can be modified by water managers depending on existing conditions, short and long-term forecast. The presumption is that discharges will be made from the FEB to operate within this range[2].

Under normal conditions, operational strategies for the A-1 FEB are examined on a weekly basis by the SFWMD STA Group and the Water Management Section. Factors considered in delineating A-1 FEB operations are, but not limited to: antecedent, current and forecast conditions (dry, normal, wet), available storage in the A-1 FEB, and conditions (depth and water quality conditions) in STA 2 and STA 3/4.

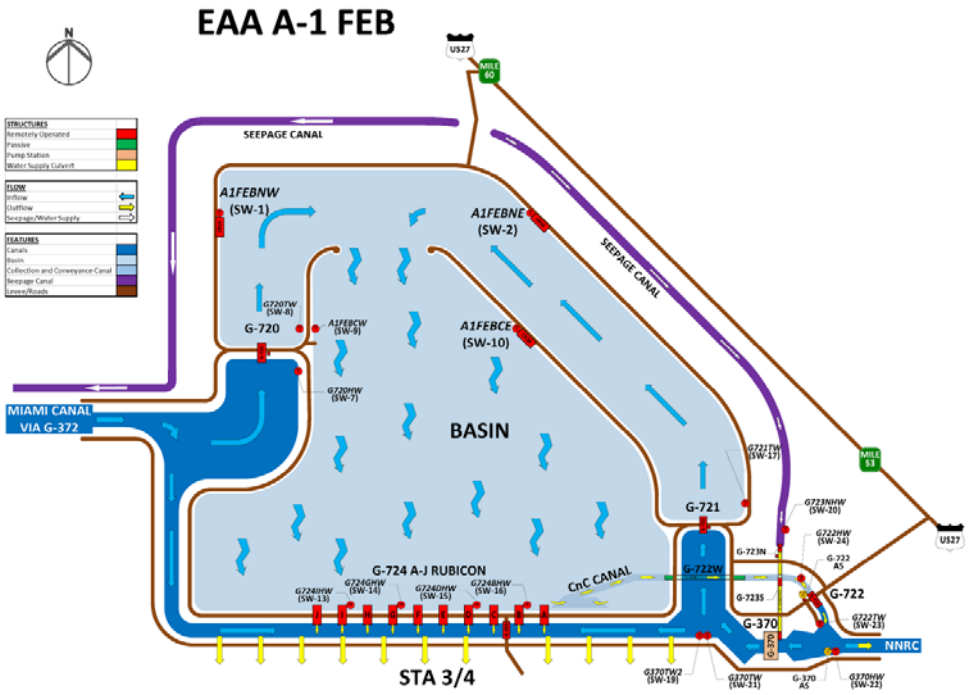

Figure 3-2. A-1 FEB Schematic

[2] Pumping units at G-370 and G-372 have nominal capacity of 925 cfs. With an approximate surface area of 15,000 acres, it will take approximately 8 days for one unit to increase the depth in the A-1 FEB by 1.0 ft, or 8 unit-days to achieve the same result.

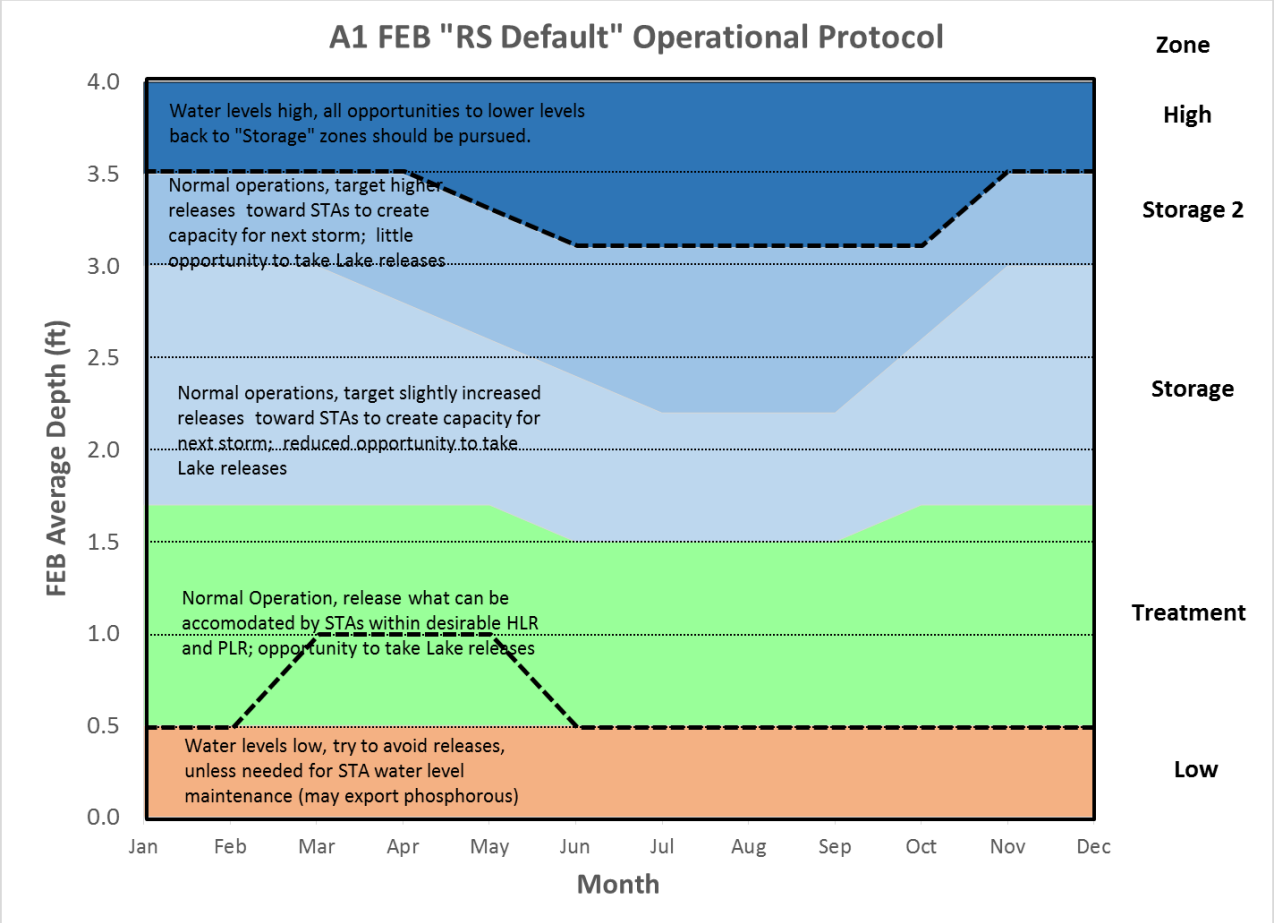

Figure 3-3. A1 FEB Operating Zones

Table 3-1. Inflow and Outflow Criteria for A1 FEB Operations

Zone	Inflow Priority	Inflow vs Outflow priority	Target Weekly Outflows (24 hr operation avg cfs)	Target Weekly Outflows (8 hr operation avg cfs)	Equivalent Depth Reduction with no Rain or Inflow	Outflow Routing Priority
Low	Send up to first 200 cfs (24 hr avg) or 600 cfs (8 hr avg) of combined Miami and NNR runoff to STA3/4 & STA2B, even when above target stages (a.k.a. FEB bypass), remainder into A1 FEB	Inflow of runoff from Miami and NNR canals has priority operation. Once runoff being processed falls below FEB bypass volume, initiate target release from FEB based on operating zone.	0 As needed to provide STA water supply	0 As needed to provide STA water supply	0.00	Outflows can be released via the G722 and/or G724 structures based on desired outflow distribution to downstream STAs 3/4 and 2B. In "Treatment" zone, releases can be reduced or increased per desired HLR/PLR for STAs, in "Storage", "Storage 2" and "High" zones, target releases should be made and spatially distributed to STAs per desired HLR/PLR balance for STAs
Treatment			100	300	0.10	
Storage			490	1,470	0.50	
Storage 2			1,460	4,380	1.50	
High			Max Practicable	Max Practicable	Max	

NNR: North New River

C.3.1.3.1 G-720 Gated Spillway

The G-720 spillway is a reinforced concrete, gated structure with discharge controlled by three cable-operated, vertical lift roller gates. Spillway G-720 is used in conjunction with pump stations G-372 and G-370 to provide inflows from the Miami Canal and North New River Canal into the A-1 FEB through the STA 3/4 inflow-Supply Canal. Simultaneously, a portion of the flows through G-372 can be sent to the inflow canal for STA 3/4. G-720 has a design discharge capacity of 2,775 cfs. The spillway is located at the east end of the STA 3/4 Supply Canal, at the point where the Supply Canal turns south to reach STA 3/4 Inflow Canal.

C.3.1.3.2 G-721 Gated Spillway

The G-721 spillway is a reinforced concrete, gated structure with discharge controlled by two cable-operated, vertical lift roller gates. Spillway G-721 is used in conjunction with pump stations G-370 and G-372 to provide inflows from the North New River Canal and Miami Canal into the A-1 FEB through the STA 3/4 inflow-Supply Canal. Simultaneously, a portion of the flows through G-370 can be sent to the inflow canal for STA 3/4. G-721 has a design discharge capacity of 1,850 cfs. The spillway is located at the east end of the STA 3/4 Inflow Canal, close to the G-370 Pump Station.

C.3.1.3.3 G-722 Gate Culvert

Structure G-722 is a three (3) barrel cast-in-place reinforced concrete culvert with discharge controlled by three vertical slide gates. The culvert is located underneath the access road to Pump Station G-370. G-722 is one of the outflow structure to convey gravity discharge from the A-1 FEB into the North New River Canal, at the headwater side of pump station G-370. These flows are available to be pumped to STA-3/4 via G-370 or into STA-2 using G-434 or G-435. G-722 has design discharge capacity of 2,000 cfs.

Outflows from the A-1 FEB are collected along the Collection and Conveyance canal located at the southern boundary of the A-1 FEB, passed through the G-722W culvert (inverted syphon, no gates) underneath the inflow canal to G-721, and finally delivered on the headwater side of G-722.

C.3.1.3.4 G-724A-J Structures

Structures G-724A-J is a set of ten (10) single barrel cast-in-place reinforced concrete box culverts located across the A-1 FEB's southern perimeter levee and spaced approximately one half mile apart. A-1 FEB outflows can be conveyed to STA-3/4 via G-724A-J, operated individually or in clusters, when the water level in the STA-3/4 inflow canal is below the water level of the A-1 FEB. Each culvert is equipped with a vertical lift aluminum slide gate and controls package, manufactured by Rubicon™. Each culvert has an approximate rated capacity of 200 cfs.

C.3.1.3.5 Other structures

Seepage in the eastern side of the A-1 FEB is conveyed to the G-370 pump station discharge bay through structures G-723N and G-370S seepage pump. Structure G-723S allows discharge from the A-1 FEB under low stages, by diverting flows from the canal upstream of G-722 into the G-370S seepage pump.

C.3.1.4 Stormwater Treatment Areas 2 and 3/4

STA-2 (**Figure 3-4**) is located in western Palm Beach County immediately west of WCA-2A. The STA is situated generally on and surrounding the former Brown's Farm Wildlife Management Area, Woerner Farm and the Okeelanta Farm. The original STA-2 consisted of three treatment cells (1, 2 and 3) and began operation in 2000. STA-2 was expanded by approximately 2,000 acres in December 2006 with the construction of Cell 4 and then further expanded by approximately 7,000 acres with the construction of Cells 5, 6, 7 and 8 (also known as Compartment B) which were flow capable in 2010 and permitted to operate in September 2012. Currently, STA-2 has a total of eight treatment cells and five flowways, and a total effective treatment area of approximately 15,500 acres. STA-2 receives stormwater runoff primarily from the S-2/S-6 Basin and can receive runoff from the S-2/S-7 Basin or A-1 FEB discharges from G-722. During dry hydrologic periods, water can be delivered from Lake Okeechobee, when available, to maintain hydration of treatment cells.

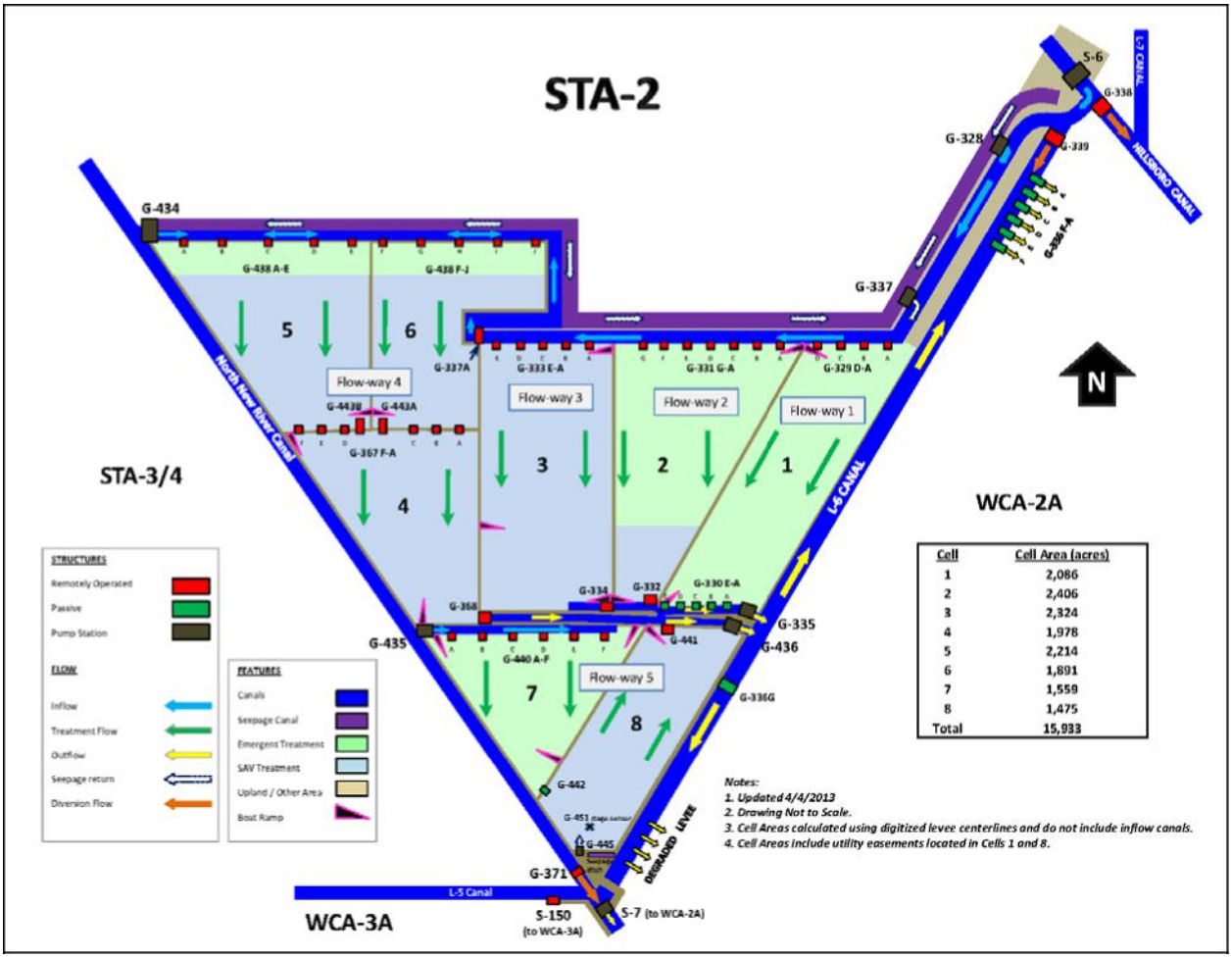

Figure 3-4. STA-2 Map

STA-3/4 (**Figure 3-5**) is also located in western Palm Beach County, west of STA-2, east of the Holey Land Wildlife Management Area and north or WCA-3A. STA-3/4 began operation in 2004 and has a total of six treatment cells and three flowways, and a total effective treatment area of approximately 16,300 acres. A 445-acre section of Cell 2B is the site of the STA-3/4 Periphyton-based STA (PSTA) Project, aimed at

testing and evaluating PSTA treatment technology. STA-3/4 receives stormwater runoff from the S-2/S-7 Basin (collected by the North New River Canal), the S-3/S-8 Basin (collected by the Miami Canal), the A-1 FEB and Lake Okeechobee by means of STA-3/4 inflow pump stations, G-370 and G-372. During dry hydrologic periods, water can be delivered from Lake Okeechobee, when available, to maintain hydration of treatment cells.

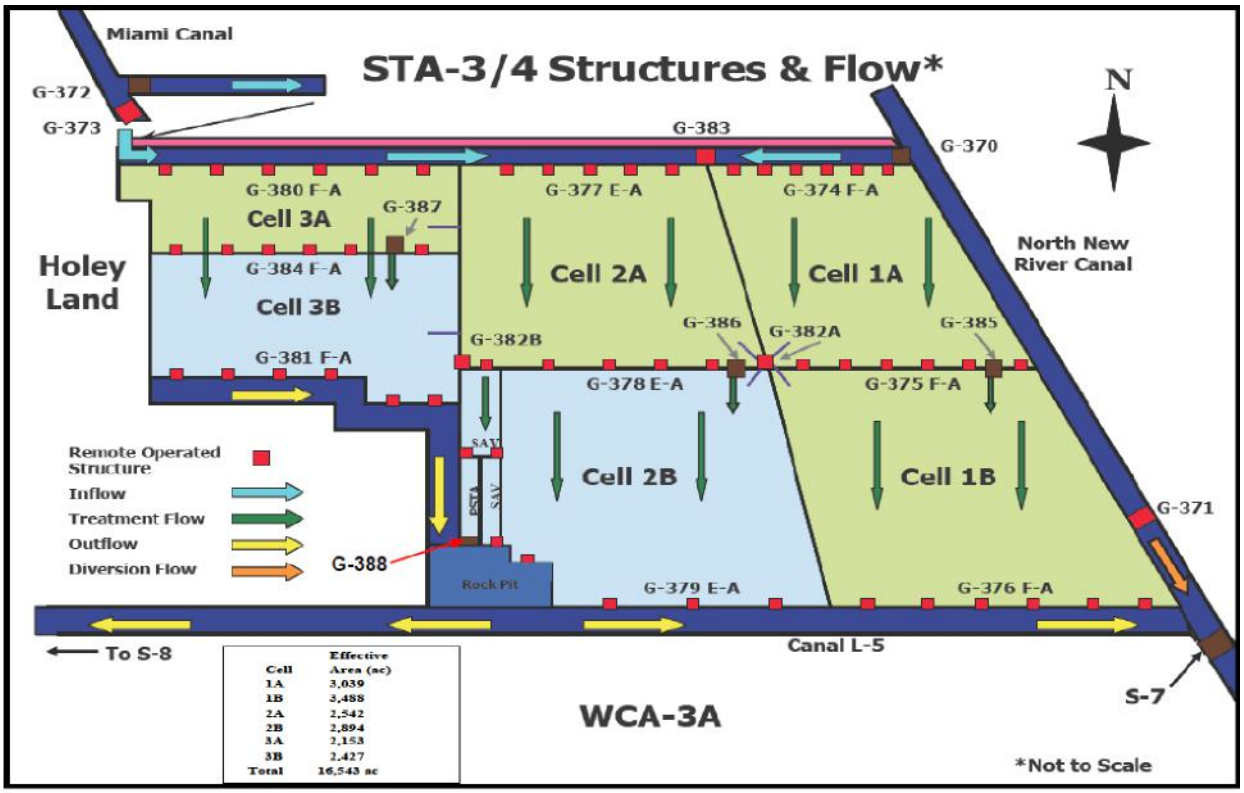

Figure 3-5. STA-3/4 Map

C.3.1.4.1 G-335 Pump Station

G-335, which has a total capacity of 3,040 cfs, is one of two outflow pump stations for STA-2 and is located at the southeast corner of STA-2 Cell 1. G-335 discharges STA-2-treated stormwater to the L-6 Canal. Treated stormwater within the L-6 Canal is then conveyed to northwestern WCA-2A via uncontrolled box culverts G-336A, B, C, D, E and F and to western WCA-2A via G-336G and a 4,800-foot degraded reach of the East L-6 Levee located north of S-7.

C.3.1.4.2 G-436 Pump Station

G-436, which has a total capacity of 1,600 cfs, is one of two outflow pump stations for STA-2 and is located just south of G-335 at the northeast corner of STA-2 Cell 8. Similar to G-335, G-436 discharges STA-2 treated stormwater to the L-6 Canal. Treated stormwater within the L-6 Canal is then conveyed to northwestern WCA-2A via uncontrolled box culverts G-336A, B, C, D, E and F and to western WCA-2A via G-336G and a 4,800-foot degraded reach of the East L-6 Levee located north of S-7.

A schematic of STA-3/4 is presented in **Figure 3-5**. Untreated waters from the North New River Canal (S-2 and S-7 Basins) and the Miami Canal (S-3 and S-8 Basins), the A-1 FEB and Lake Okeechobee are directed into the STA at its northern boundary by means of pump stations, G-370 and G-372, respectively. Diversion structure G-371 is located on the North New River Canal at the southeast corner of the STA. Diversion Structure G-373 is located on the Miami Canal just south of G-372.

Under normal STA operations, diversion structure G-371 (located in the North New River Canal at the southeast corner of STA-3/4) and diversion structure G-373 (located in the Miami Canal just south of G-372) would be closed, and STA-3/4 inflow pump stations would convey stormwater runoff from the Miami Canal, the North New River Canal and the A-1FEB to the STA-3/4 Inflow/Supply Canal. The STA-3/4 Inflow/Supply Canal is located between G-370 and G-372 and is adjacent to the north boundary of the Holey Land Wildlife Management Area and borders the north side of the STA-3/4.

C.3.1.5 Water Conservation Area 3A and 3B

WCA-3A has an area of 767 square miles and is located in western Broward County and northwestern Miami-Dade County. Inflows to the area are from the S-11s, S-8, S-150, S-140, G-407, S-190, G-123, S-142, S-9, S-9A, G-64 and a levee cut on the L-4 (G-404 discharges). Outflows from WCA-3A are primarily made through the S-12s, S-333, S-343A, S-343B, S-344, and S-151 (see **Figure 3-6** for a layout of WCA-3A and its features).

WCA-3B is approximately 154 square miles and is located in south-central Broward County and north-central Miami-Dade County. Inflows to WCA-3B are by way of S-151 and outflows are controlled via S-30, S-31, S-32, S-32A, and S-337 (See **Figure 3-7** for a layout of WCA-3B and its features). S-335 on the L-30 canal is used to control seepage out of WCA-3B. S-152 is a temporary structure through the L-67A used as part of the DECOMP test. There are also two discharge structures, S-355A and S-355B, along L-29 south of WCA-3B that are designed to move water from WCA-3B into the L-29 Canal, although the operation of these structures has not been previously authorized for more than short-term, temporary operations.

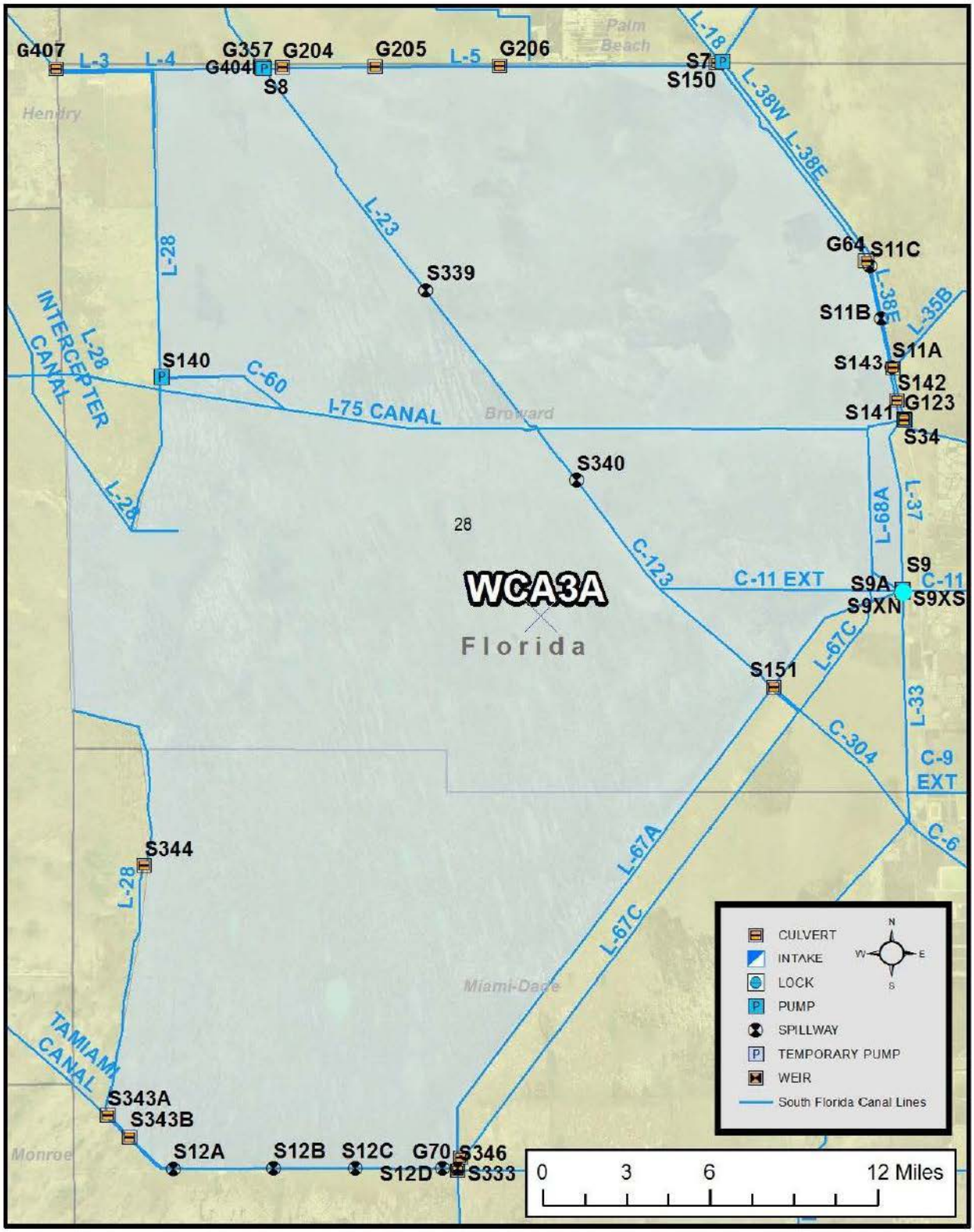

Figure 3-6. WCA-3A Map

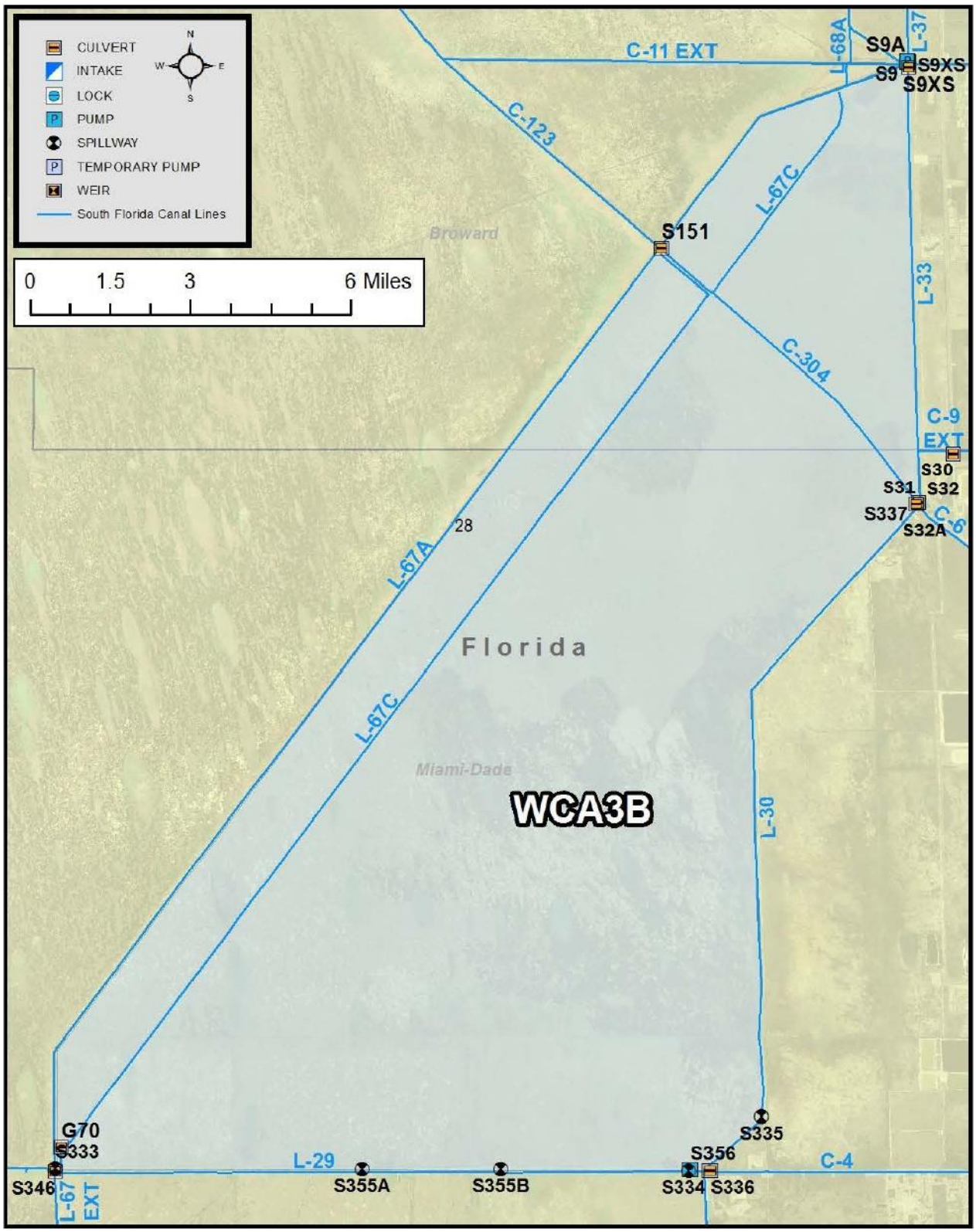

Figure 3-7. WCA-3B Map

C.3.1.6 South Dade Conveyance System

The South Dade Conveyance System (SDCS) supplies water to ENP and to District canals (C-6, C-4, C-1, C-102, C-103, C-113, and C-111) in Miami-Dade County during conditions of low natural flow. The purpose of the SDCS is supplying water to South Miami-Dade County canals to maintain water table elevations at high enough stages is to prevent saltwater intrusions into the Biscayne Aquifer. Design flows for the SDCS were based on maintaining South Miami-Dade County canal stage elevations at or above 2.0 feet, NGVD to prevent saltwater intrusion (See **Figure 3-8** for a layout of the SDCS and its features).

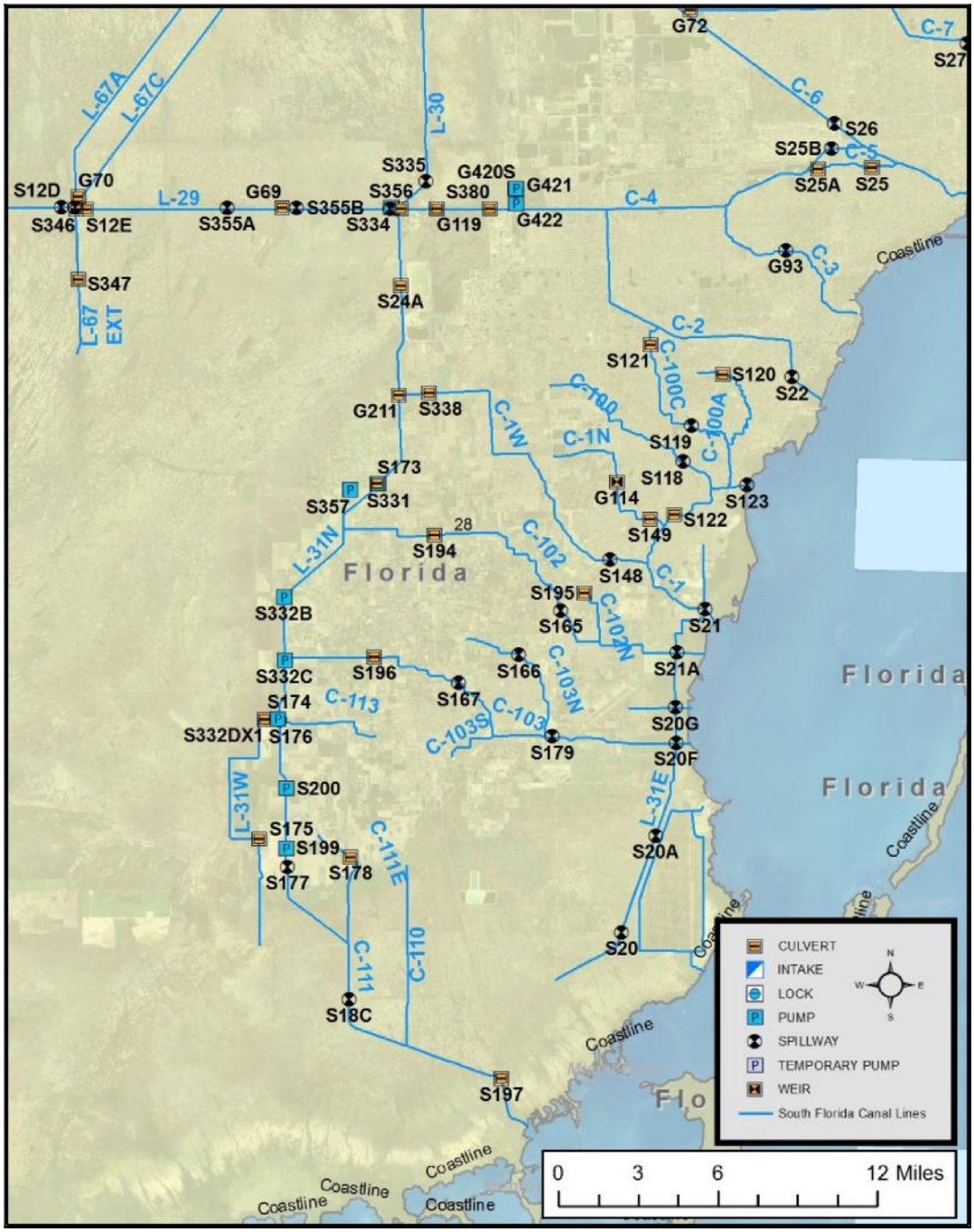

Figure 3-8. South Dade Conveyance System Map

C.3.2 PROPOSED FEATURES – CEPP PACR

The features as outlined in the following subsections would be implemented as part the CEPP PACR. Preliminary Operating Criteria for the new features listed below can be found in **Section C.7** of this DPOM. The descriptions and operations of the authorized CEPP project features (new and modified) can be found in the CEPP PIR Annex C DPOM.

C.3.2.1 New Features

C.3.2.1.1 A-2 Reservoir and A-2 STA

The CEPP PACR consists of the A-2 Reservoir and the A-2 STA, as shown in **Figure 3-9**. Total reservoir storage capacity is approximately 240,000 ac-ft. It would be located north of the Holey Land WMA and west of the A-1 FEB. The A-2 Reservoir is comprised of the storage area (10,500 acres) and a new A-2 STA area (6,500 acres) located on the west side, abutting the Miami Canal. Average ground elevation is around 10.0 feet NGVD and the maximum operational depth for the reservoir portion is 22.6 feet. The purpose of the A-2 Reservoir would be to capture EAA runoff and regulatory releases from Lake Okeechobee for delivery to the central Everglades (WCA 3A and ENP) and to supply needs in the Miami and North New River basins, while maintaining the pre-project capability to provide flood control and water quality treatment for the existing EAA runoff and Lake Okeechobee discharges. During the Preconstruction, Engineering, and Design (PED) phase, design of the A-2 Reservoir components will be assessed in further detail as described in **Appendix A Section A.10.1.5**.

Figure 3-9. A-2 Reservoir and A-2 STA Schematic

Inflows from the Miami Canal and/or the North New River Canal will be directed to the A-2 Reservoir through a new A-2 Reservoir Inflow-Outflow canal, located along the north boundary of the A-1 FEB, A-2

Reservoir, and A-2 STA and to a new inflow pump station (P-1). The magnitude of the flows coming to the pump station will be controlled by two gated spillways, SW-2 located in the Inflow-Outflow Canal near the Miami Canal and SW-3 located near the North New River Canal. The A-2 Reservoir Inflow-Outflow canal will also assist in seepage management. The new A-2 Reservoir Inflow-Outflow canal will cross underneath US 27 through a bridge crossing. A second crossing will be required at the west end of the new A-2 Reservoir Inflow-Outflow canal on the eastern levee of the Miami Canal. Water entering the A-2 Reservoir could be diverted to the A-2 STA through structures C-3 or C-4, to the A-1 FEB through structure C-10, or could be discharged into the STA 3/4 Supply Canal through structure C-9 to be treated in STA 3/4 or sent to the A-1 FEB through G-720 and/or G-721. Water distribution will enable sheet flow from east to west in the A-2 STA, and north-to-south in the A-1 FEB. Water leaving the A-2 STA will go first into the A-2 STA Discharge Canal and then conveyed to the Miami Canal downstream of G-373 through structure C-2. These general flow paths will minimize short-circuiting and maximize hydraulic residence time. Structure C-1 connecting the A-2 Reservoir to the A-2 Reservoir Inflow-Outflow canal may be used to return water back to the Miami and North New River basins.

The preferential route to move Miami Basin and North New River Basin runoff and Lake Okeechobee releases will be through the A-2 Reservoir and then distributed to the A-1 FEB and the STAs (A-2, 3/4 and 2). All of the existing water control structures associated with the A-1 FEB, STA 3/4, and STA 2 will be operated in a manner so that maximum flexibility is maintained. One example is sending releases directly to the A-1 FEB if the A-2 Reservoir is high or if it is off-line due to maintenance or construction work. A similar approach in sending releases directly to STA 3/4 or STA 2 can be taken if both the A-1 FEB and the A-2 Reservoir are off line or their capacity has been depleted. Another possibility could be to use the A-2 Reservoir/A-2 STA combination in a flow-through mode, when volumes into the A-2 Reservoir and outflows from the A-2 STA to the Miami Canal are matched, in such a way that depths in the reservoir and STA do not increase. For this later case, there will be no flows from the A-2 Reservoir to the A-1 FEB or directly to STA 3/4.

Maximum depth in the A-2 Reservoir should be limited to 22.6 feet (stage ~32.53 feet NGVD)[3] and to 4.00 feet (stage ~14.5 feet NGVD) in the A-2 STA. It is expected that the currently implemented depth operational guidelines for the A-1 FEB, STA 3/4 and STA 2 will remain once the A-2 Reservoir and A-2 STA components become operational. Maximum depth in the A-1 FEB is 4.00 feet (stage ~13.9 feet NGVD). Maximum depths in all STA cells will remain at 4.00 feet and current target stages will continue to be used.

Environmental deliveries to the Everglades from the A-2 Reservoir will usually come from the A-2 STA and/or STA 3/4. Amount and timing of the environmental deliveries will be defined by the Rainfall Driven Operations protocol consistent with CEPP (see CEPP PIR, Annex C, Section 7.1.7).

Note that deliveries for water supply to the basins could come from water stored in the A-2 Reservoir at such times when additional capacities are available beyond those identified for restoration flows to the Everglades and through the structure designed for such deliveries.

Under water supply conditions in the Miami and/or North New River basins, water stored in the A-2 Reservoir could be used for water supply deliveries if the depth in the reservoir is above 8.2 feet, by maintaining canal levels at appropriate water supply levels (levels that allow pumping from canal to the agricultural lands). Ona day-by-day basis, this operation will be possible if excess capacity is available after

[3] For the A-2 Reservoir and A-2 STA site, the NAVD to NGVD conversion is NGVD = NAVD + 1.43, all given in feet

Everglades restoration operations are implemented. Modeling suggests that the remaining water in the A-2 Reservoir below 8.2 feet in depth should be used for environmental purposes. If during water supply operations the full canal conveyance capacity is not being utilized, additional releases from the lake to the A-2 Reservoir could take place according to the operational protocol for Lake Okeechobee (see **Section C.7.1.1**).

If the A-2 Reservoir cannot supply enough water for irrigation to the basins, then deliveries from Lake Okeechobee will be implemented.

The following considerations will be taken into account during day-to-day operations of the A-2 Reservoir and A-2 STA:

- Prevalent operations mode at that point in time (Flood Control or Water Supply)
- Conditions on the ground (wet, normal, dry)
- Lake Okeechobee stage and Water Control Plan regulatory release guidance (i.e., LORS 2008)
- Conditions in the Northern Estuaries
- Conditions (depth and treatment capacity) in the A-1 FEB, STA 2 and STA 3/4
- Conditions and environmental needs in WCA-2A and WCA-3A
- Short term weather forecast
- Mid to long term climate outlooks
- Maintenance needs or requirements
- Unexpected or declared emergency conditions
- Required WCA-3A/ENP environmental deliveries from A-2 STA, STA 2 and STA 3/4 according to Rainfall Drive Operations Plan (currently Rainfall Plan)

The following structures facilitate the operations of the A-2 Reservoir and A-2 STA (**Figure 3-9**):

P-1 Pump Station

P-1 will serve as the inflow structure into the A-2 Reservoir, collecting water from the Miami Canal and/or the North New River Canal through the A-2 Reservoir Inflow-Outflow canal. The structure will be a pump station with a capacity of 4,600 cfs, capable of sustain pumping at a minimum upstream (headwater) elevation of 5.93 feet NGVD at the section upstream from the trash rack (3.93 feet NGVD downstream from the trash rack). Following recommendations from SFWMD Water Control Operations, the pump station will be designed and built with a mixture of medium size pumps to allow operations to establish a steady flow near the bottom of the range (especially during wet period when large flows need to be pulled from long distances far from the pump station). All pumping units will have the capability of being operated remotely from the SFWMD Operations Control Center (OCC). The recommended mixture of pump capacities also considers the need for maintenance:

- 4 units each ~800 cfs = ~3,200 cfs
- 2 unit of ~400 cfs = ~800 cfs
- 3 units each of ~200 cfs = ~600 cfs

- Total pump station capacity = ~4,600 cfs

The pump station should be able to operate against depths in the A-2 Reservoir in the range of 0 to 24.00 feet (total static head of 28.00 feet). P-1 would be located on the northern levee for the A-2 Reservoir, about 2.8 miles west of the North New River Canal. Structures SW-2 and SW-3 will help in metering the magnitude of the flows from the Miami and the North New River canals reaching the pump station. Pump Station P-1 will help also in managing seepage from the A-2 Reservoir and the A-2 STA.

SW-1 Overflow Spillway

Overflow spillway located on the north embankment of the A-2 Reservoir with a crest elevation of 32.53 feet NGVD and a design capacity of 340 cfs.

SW-2 Gated Spillway

This structure will be a gated spillway located on the A-2 Reservoir Inflow-Outflow Canal just east of the Miami Canal. This structure will be used to modulate the discharge reaching P-1 from the Miami Canal. This structure will also be operated to return water back to the Miami Canal from the A-2 Reservoir. Design discharge for this structure is 3,000 cfs. This structure will have the capability to be operated remotely from the OCC.

SW-3 Gated Spillway

This structure will be a gated spillway located on the A-2 Reservoir Inflow-Outflow Canal just west of the North New River Canal. This structure will be used to modulate the discharge reaching P-1 from the North New River Canal. This structure will also be operated to return water back to the North New River Canal from the A-2 Reservoir. Design discharge for this structure is 3,000 cfs. This structure will have the capability to be operated remotely from the OCC.

SW-4 Gated Spillway

Gated spillway located in the STA 3/4 Inflow Canal, just south of the diversion to the A-1 FEB G-720. It will be operated as a divide structure and will add flexibility to manage independently the two reaches of the STA 3/4 Inflow Canal, from G-372 to S-4, and from G-370 to S-4. Design discharge for this structure is 4,000 cfs. This structure will have the capability to be operated remotely from the OCC.

C-1 Gated Culvert

The structure would be a gated culvert. It will be used to provide water back to the Miami Canal and the North New River Canal or to drawdown the A-2 Reservoir. C-1 would be located on the northern embankment of the A-2 Reservoir just west of Pump Station P-1. Design discharge for this structure is 2,500 cfs. This structure will have the capability to be operated remotely from the OCC.

C-2 Ungated Culvert

The structure will be an ungated culvert that would serve as the outflow structure from the A-2 STA to the Miami Canal, discharging south of the G-373 structure. C-2 would be located on the south west corner of the A-2 STA. This structure will be a conflict structure that will go underneath the inflow canal for pump station G-372 and discharge downstream of G-373. Design flow capacity for this structure is 650 cfs.

C-3 Gated Culvert

The structure would be a gated culvert connecting the A-2 Reservoir to the north-east cell (Cell 3) of the A-2 STA. The C-3 culvert will be located within the embankment separating the A-2 Reservoir from the A-2 STA. Design flow capacity for this structure is 325 cfs. This structure will have the capability to be operated remotely from the OCC.

C-4 Gated Culvert

The structure would be a gated culvert connecting the A-2 Reservoir to the south-east cell (Cell 4) of the A-2 STA. The C-4 culvert will be located within the embankment separating the A-2 Reservoir from the A-2 STA. Design flow capacity for this structure is 325 cfs. This structure will have the capability to be operated remotely from the OCC.

C-5 Gated Culvert

The C-5 structure would be a gated culvert connecting Cells 3 and 1 of the A-2 STA. Design flow capacity for this structure is 325 cfs. This structure will have the capability to be operated remotely from the OCC.

C-6 Gated Culvert

The C-6 structure would be a gated culvert connecting Cells 4 and 2 of the A-2 STA. Design flow capacity for this structure is 325 cfs. This structure will have the capability to be operated remotely from the OCC.

C-7 Gated Culvert

The C-7 structure is a gated culvert which allows for water from Cell 1 to flow to the Discharge Canal of the A-2 STA. Design flow capacity for this structure is 325 cfs. This structure will have the capability to be operated remotely from the OCC.

C-8 Gated Culvert

The C-8 structure is a gated culvert which allows for water from Cell 2 to flow to the Discharge Canal of the A-2 STA. Design flow capacity for this structure is 325 cfs. This structure will have the capability to be operated remotely from the OCC.

C-9 Gated Culvert

The C-9 structure is a gated culvert which allows for inflow to the A-2 Reservoir from the STA 3/4 Inflow Canal or for outflow to the STA 3/4 Inflow Canal from the A-2 Reservoir, depending on the stages in the A-2 Reservoir and the STA 3/4 Inflow Canal. The structure will be located within the southern embankment of the A-2 Reservoir, about 0.9 miles west of the existing G-720 gated spillway. Design flow capacity for this structure is 4,500 cfs. This structure will have the capability to be operated remotely from the OCC.

C-10 Gated Culvert

The C-10 structure is a gated culvert located within the embankment separating the A-1 FEB and the A-2 Reservoir. It will allow for water to flow from the A-1 FEB to the A-2 Reservoir and vice versa. Design flow capacity for this structure is 3,000 cfs. This structure will have the capability to be operated remotely from the OCC.

C-11 Ungated Culvert

The C-11 structure will be an ungated culvert which will allow for the hydraulic connection between remnant of the northern reach of the A-1 FEB Seepage Canal and the eastern reach of the A-1 FEB Seepage Canal.

A summary of the geometry and capacity of the above listed structures in the A-2 Reservoir and A-2 STA is provided in **Section C.22**.

A-2 Reservoir Inflow-Outflow Canal

The A-2 Reservoir Inflow-Outflow Canal is located adjacent to the northern boundary of the A-1 FEB, A-2 Reservoir and A-2 STA. Its design capacity is 3,000 cfs. This canal will bring flows from the Miami Canal and or the North New River Canal to the Inflow Pump Station (P-1). This canal will be also used to return water from the A-2 Reservoir back to the Miami Basin and/or the North New River Canal Basin. The Miami Canal connects to the A-2 Reservoir Inflow-Outflow canal through structure SW-2 and to the North New River Canal through structure SW-3. The A-2 Reservoir Inflow-Outflow Canal will help in collecting seepage in the northern boundary of the A-2 Reservoir.

A-2 STA Discharge Canal

The A-2 STA Discharge Canal runs parallel to the western boundary of the A-2 STA. This canal will collect sheet flows from the western cells in the A-2 STA and deliver those flows to the C-2 Structure.

A-2 STA Levee Elevations

Exterior and interior levees in the A-2 STA will have a crest elevation of 18.8 feet NGVD, with the exception of the northern and southern A-2 STA levees which will be at elevation 17.8 feet NGVD.

A-2 Reservoir Embankment Elevations

The embankment around the A-2 Reservoir will have an elevation of 47.03 feet NGVD.

C.3.2.2 Canal Conveyance Improvements

Miami Canal (L-24) (From S-354 to G-372)

The lower two-thirds reach of the Miami Canal (L-24) from the lake spillway S-354 to the G-372 Pump Station location will be enlarged so that the conveyance capacity of the entire canal is increased by 1000 cfs. See **Appendix A: Annex A-1**.

North New River Canal (L-19) (From S-351 to G-370)

The North New River Canal (L-19) from the lake spillway S-351 to the G-370 location will be enlarged to increase the conveyance capacity by 200 cfs. See **Appendix A: Annex A-1**.

C.4 PROJECT RELATIONSHIPS

There are several projects that may affect or be affected by CEPP PACR. The CEPP PACR TSP has been developed based on the operations of existing related projects, and/or related planned projects with approved operating plans, including both CERP and non-CERP activities. A summary of each related

project and its relationship to CEPP PACR is provided below. All project relationships described in the CEPP PIR DPOM are still relevant (CEPP PIR Annex C) to the authorized CEPP and CEPP PACR.

C.4.1 2008 LAKE OKEECHOBEE REGULATION SCHEDULE (2008 LORS)

2008 LORS is the regulation schedule used in the current management of Lake Okeechobee water levels. It was identified to be effective at decreasing the risk to public health and safety, reducing the number of high-volume discharges to the estuaries, and providing critical flexibility to perform water management operations. CEPP PACR benefits gained from sending new water south from Lake Okeechobee are derived in part from operational refinements that can take place within the existing, inherent flexibility of the 2008 LORS, and in part with refinements that are beyond the schedule's current flexibility. Modifications to 2008 LORS will be required to optimally utilize the added storage capacity of the A-2 Reservoir to send the full 370,000 ac-ft/yr of new water available under the CEPP PACR south to the WCA-3A and the ENP, while maintaining compliance with Savings Clause requirements for water supply and existing levels of service for flood protection.

Independent of CEPP PACR implementation, there is an expectation that revisions to the 2008 LORS will be needed following the implementation of other CERP projects and Herbert Hoover Dike infrastructure remediation. The USACE expects to operate under the 2008 LORS until there is a need for revisions due to the earlier of either of the following actions: (1) system-wide operating plan updates to accommodate CERP "Band 1" projects, as described in Section 6.1.3.2 of the CEPP PIR, or (2) completion of sufficient HHD remediation for reaches 1, 2 and 3 and associated culvert improvements, as described in Section 2.5.1 of the CEPP PIR. When HHD remediation is completed and the HHD Dam Safety Action Classification (DSAC) Level 1 rating is lowered, higher maximum lake stages and increased frequency and duration of high lake stages may be possible to provide the additional storage capacity. The future Lake Okeechobee Regulation Schedule which may be developed in response to actions (1) and/or (2) is unknown at this time. It is anticipated that the need for modifications to the 2008 LORS will be initially triggered by non-CEPP actions and that these actions will occur earlier than implementation of CEPP or the CEPP PACR. Therefore, the CEPP PIR or the CEPP PACR, including the POM, will not be the mechanism to propose or conduct the required National Environmental Policy Act (NEPA) evaluation of modifications to the Lake Okeechobee Regulation Schedule.

CERP envisioned that changes to system operations may be required as groups of restoration components come on line and that updates to the system operating manual may be required at certain intervals of overall CERP implementation.

C.4.2 RESTORATION STRATEGIES PROJECTS

To address water quality concerns associated with existing flows to the Everglades Protection Area, the SFWMD, Florida Department of Environmental Protection (FDEP), and United States Environmental Protection Agency engaged in technical discussions starting in 2010. The primary objectives were to establish a Water Quality Based Effluent Limit (WQBEL) that would achieve compliance with the State of Florida's numeric phosphorus criterion in the Everglades Protection Area and to identify a suite of additional water quality projects to work in conjunction with the existing Everglades STAs to meet the WQBEL.

Based on the collaborative effort described above, a suite of projects has been identified that would achieve the WQBEL. 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 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, while the primary purpose of STAs is to utilize biological processes to reduce phosphorus concentrations in order to achieve the WQBEL. The A-1 FEB, operational since July 2015, improves delivery rates to STA-2 and STA-3/4, thereby providing enhanced operation and phosphorus treatment performance to assist in achieving State water quality standards in the Everglades. The proposed CEPP PACR will work in conjunction with the existing Restoration Strategies A-1 FEB as well as STA-2 and STA-3/4.

C.4.3 INDIAN RIVER LAGOON – SOUTH AND C 44 CANAL

Some of the water utilized by agricultural users in the Lake Okeechobee Service Area (LOSA) from Lake Okeechobee will be transferred to WCA-3 and further south as a result of the implementation of the TSP. This transfer is anticipated to occur after the modification of the Lake Okeechobee Regulation Schedule that will allow full utilization of the CEPP PACR TSP. The TSP has identified an additional source of water of comparable quantity and quality that will be available to replace the water sent south. Instead of discharging all water stored in the C-44 reservoir to tide via the S-80 or to meet C-44 Basin agricultural water supply demands, the TSP retains a portion of the water stored in the CERP IRL-S C-44 Reservoir/STA in the regional system for backflow to Lake Okeechobee via the C-44 Canal and raises the Lake Okeechobee stage criteria to allow increased C-44 Canal backflow. The additional C-44 Canal backflow operations to Lake Okeechobee included in the CEPP PACR TSP improves the ability to meet existing permitted demands in LOSA by retaining more water in the regional system and making it available to agricultural users.

The CEPP PACR allows backflow to Lake Okeechobee from the C-44 Canal when S-308 is not open for regulatory discharges and when the stage in Lake Okeechobee is 0.25 feet below the base of the 2008 LORS low sub-band (within the baseflow sub-band), which varies between 13.0 and 14.5 feet NGVD seasonally. This operational assumption is consistent with the existing operational protocols of Lake Okeechobee (2008 LORS) and the SFWMD Lake Okeechobee Water Shortage Management (LOWSM) operations. Discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are otherwise limited to environmental deliveries for the St. Lucie Estuary and C-44 Basin agricultural water supply demands during these backflow operations.

The CEPP PACR TSP operations maintains the 2008 LORS backflow operations envisioned in CEPP and includes the following operation: (1) backflow to Lake Okeechobee from the C-44 Canal is allowed when S-308 is not open for regulatory discharge and the stage in Lake Okeechobee is below 14.5 feet NGVD (no seasonal variability); and (2) discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are made when the stage in Lake Okeechobee is below the baseflow zone of the 2008 LORS schedule (the bottom of this zone varies between 12.6 and 13.0 feet NGVD seasonally) to provide an additional source of backflow water to Lake Okeechobee. The CEPP PACR TSP operations result in an average annual decrease in C-44 Canal backflow volume to Lake Okeechobee of 7,080 ac-ft (97,300 ac-ft in the EARFWO, compared to 90,220 ac-ft in the CEPP PACR TSP).

C.5 MAJOR CONSTRAINTS

All major constraints described in the CEPP PIR DPOM are still relevant (CEPP PIR Annex C) to the authorized CEPP and CEPP PACR.

C.5.1 STA-3/4 AND STA-2 DESIGN AND OPERATIONAL LIMITATIONS

STA operational decisions are based on various factors and STA conditions such as water depths, depth-durations, vegetation conditions, outflow phosphorus concentrations, inflow phosphorus concentrations, phosphorus loading rates, hydraulic loading rates, etc. Many of these parameters are available in real-time and are summarized for the previous week, month and year to assist with operational decisions and ensure STAs are operated consistent with their objective of reducing phosphorus concentrations to improve Everglades water quality.

Essential vegetation rejuvenation and rehabilitation activities, which help to sustain vegetation health and maintain treatment performance, typically occur during the dry season (November – May). These activities may result in portions of STAs or STA cells being temporarily unable to receive inflows (i.e. offline), referred to as STA resting periods, or operated with temporary flow or depth restrictions. STA resting periods were implemented in CEPP PACR water quality modeling for each of the three flowways of STA-3/4 starting 1 April of each year for 45 days with a rotating frequency of once every three years to simulate conditions that would allow essential vegetation rejuvenation and rehabilitation activities. In addition, the water quality modeling of STA-2 and STA-3/4 performed for CEPP PACR included assumptions intended to address STA offline time for major maintenance or rehabilitation activities.

STAs were built specifically for improving Everglades' water quality. However, their vast, shallow waters and rich plant life also make them outstanding habitat for wildlife, including threatened and endangered species. In particular, two avian species protected by Federal law have been observed nesting in the STAs which has resulted in operational limitations. The Everglade snail kite (*Rostrhamus sociabilis plumbeus*), protected by the Endangered Species Act, typically nests from March to August, but has been observed nesting as early as January and as late as October. The Black-necked stilt (*Himantopus mexicanus*), protected by the Migratory Bird Treaty Act, typically nests from April to July. Nesting activity in the STAs for both of these Federally-protected birds has resulted in various degrees of STA operational limitations and is anticipated to continue to affect STA operations in the future.

Other physical or structural limitations (e.g., structure capacities and levee heights) to STA operations are documented in the Operation Plans for STA-2 and STA-3/4. These plans are revised on an as-needed basis by the SFWMD to incorporate new information such as project modifications, updated structure flow ratings, and revised operational guidance. In summary, A-2 Reservoir releases to A-2 STA, A-1 FEB, STA-2 and STA-3/4 may be constrained based on various factors and STA conditions such as those described above.

C.5.2 STRUCTURAL STABILITY

CEPP PACR TSP involve the use of some existing facilities (i.e., G-370, G-372, S-8, S-7), which would be utilized more often under the CEPP PACR TSP than under pre-project operations. It is important that operators consider the limitations of existing facilities being used for the TSP purposes when applying any

necessary adaptive management measures. Existing structures would be operated in accordance with their current operational limits for structural stability; in that same regard, new structures would be operated in accordance with their design operational limits for structural stability.

C.6 STANDING INSTRUCTIONS TO PROJECT OPERATORS

Once the operational testing and initial monitoring phase for the interim operations for the new CEPP PACR components is concluded, the SFWMD will manage the day-to-day project operations of the newly constructed A-2 Reservoir, A-2 STA, control structures, and pump stations. Standing instructions for the project operators would be further developed during the interim operations phase of the project that include refinements in operations due to general and past operational experience, additional scientific information, CERP updates, new CERP or non-CERP activities that have been completed and the status of the removal of the constraints discussed in **Section C.5** of this document.

During normal conditions, the project structures shall be operated in accordance with the approved operating manual. Deviations from the normal operations would be permitted as outlined in **Section C.15** of this DPOM.

The operator has the operational flexibility on where to maintain the canal stage within the limits of the operating criteria to allow the operator to respond to factors such as antecedent, current, and forecasted conditions.

C.6.1 STRUCTURE OPERATIONS

Actual structure operations should achieve or improve on the performance demonstrated by the modeling but should not be required to mimic the operation used by the models. The goal of the structure, whether with continuous staffing (24 hours per day) or partial staffing (e.g. 8 hours per day), is to control the water level within the required or desired range while averaging a stage appropriate for the conditions. For example, the target (average daily stage) may be near the bottom of the range early in the wet season or during especially wet periods and then change to the middle of the operation range at the end of the wet season. For pump stations, a pumping range or ranges should be developed which allows relatively steady running of pumps based on the number of pumps, capacity of the pumps, and stage response (quick or slow) to pumping. Specifically, the pumping range should be large enough to prevent rapid cycling of the pumps. Within the pumping range pumping rates may be changed by varying revolutions per minute (RPM) or changing the number of pumps in response to raising stage levels in the canal. In addition, the operator has operational flexibility on where in the range (top, middle, bottom) to maintain the stage to allow the operator to respond to factors such as 1) high stages in Northeast Shark Slough, 2) expected rain (e.g. the wet season rainfall), 3) large forecast rainfall events, 4) transition from the wet to the dry season, 5) operation during the dry season.

C.7 OPERATIONAL STRATEGY TO MEET PROJECT OBJECTIVES

C.7.1 MAJOR COMPONENTS OPERATIONS

The operational strategies described in this plan are intended to meet the goals, purposes, and benefits outlined in the CEPP PACR by improving the quantity, quality, timing, and distribution of water for the natural system while providing for other water-related needs and meeting the requirements for protection of health and public safety. These goals, purposes, and benefits will not be fully realized until the completion of the construction and implementation of the CEPP and CEPP PACR components. These components will be phased in as they become operational. The interim operations have not yet been developed.

Additional "new" water will be made available for restoration purposes through modified Lake Okeechobee operations and the efficient use of the combined A-2 Reservoir and A-2 STA to improve the quantity, timing, and distribution of environmental deliveries to the WCAs and ENP during the wet and dry seasons. Operational changes to deliver this new water would be conducted in a manner consistent with stage, volume, and/or flow-based restoration targets by treating and delivering water from Lake Okeechobee, water detained by CEPP PACR components, or a combination of both and by providing temporary storage for releases from Lake Okeechobee to reduce the harmful effects of flood control releases on the St. Lucie and Caloosahatchee Estuaries.

It should be recognized that most of the EAA flood control discharge that is currently passed to the WCAs is an important part of the water budget of those areas. Additionally, some regulatory releases from Lake Okeechobee to the WCAs are also beneficial to the WCAs, provided that the regulatory releases have water quality treatment sufficient to maintain compliance with both the legal and restoration goals. However, there are times when the stages in the WCAs are higher than restoration targets. During those times, the runoff and regulatory releases to the WCAs can exacerbate both short and long term impacts due to high stages. The A-2 Reservoir provides an additional 240,000 ac-ft of effective detention volume to attenuate EAA runoff flows and lake water, rather than sending the water to the WCAs when they are not ready to receive additional water. The A-2 Reservoir may be filled and emptied multiple times throughout the year in order to handle flows to the STAs. As a general operational strategy, the A-2 Reservoir would be operated to attenuate flows during the wet season and carry over water from September and October into the dry season when the release to the WCAs would be beneficial or cause less harm.

C.7.1.1 Lake Okeechobee Operations

As a general guideline, the following figure, **Figure 7-1**, displays the Lake Okeechobee stage ranges assumed for the CEPP PACR TSP hydrologic modeling in which a basic decision was made as to when to deliver water from the lake to either the STAs and/or the EAA Reservoir in the Regional Simulation Model for Basins (RSMBN). The net result of utilizing these criteria is the revised seasonal distribution of southward flows, as shown in **Figure 7-2**. In addition, the frequency of harmful peak discharges into the estuaries would be reduced with the CEPP PACR.

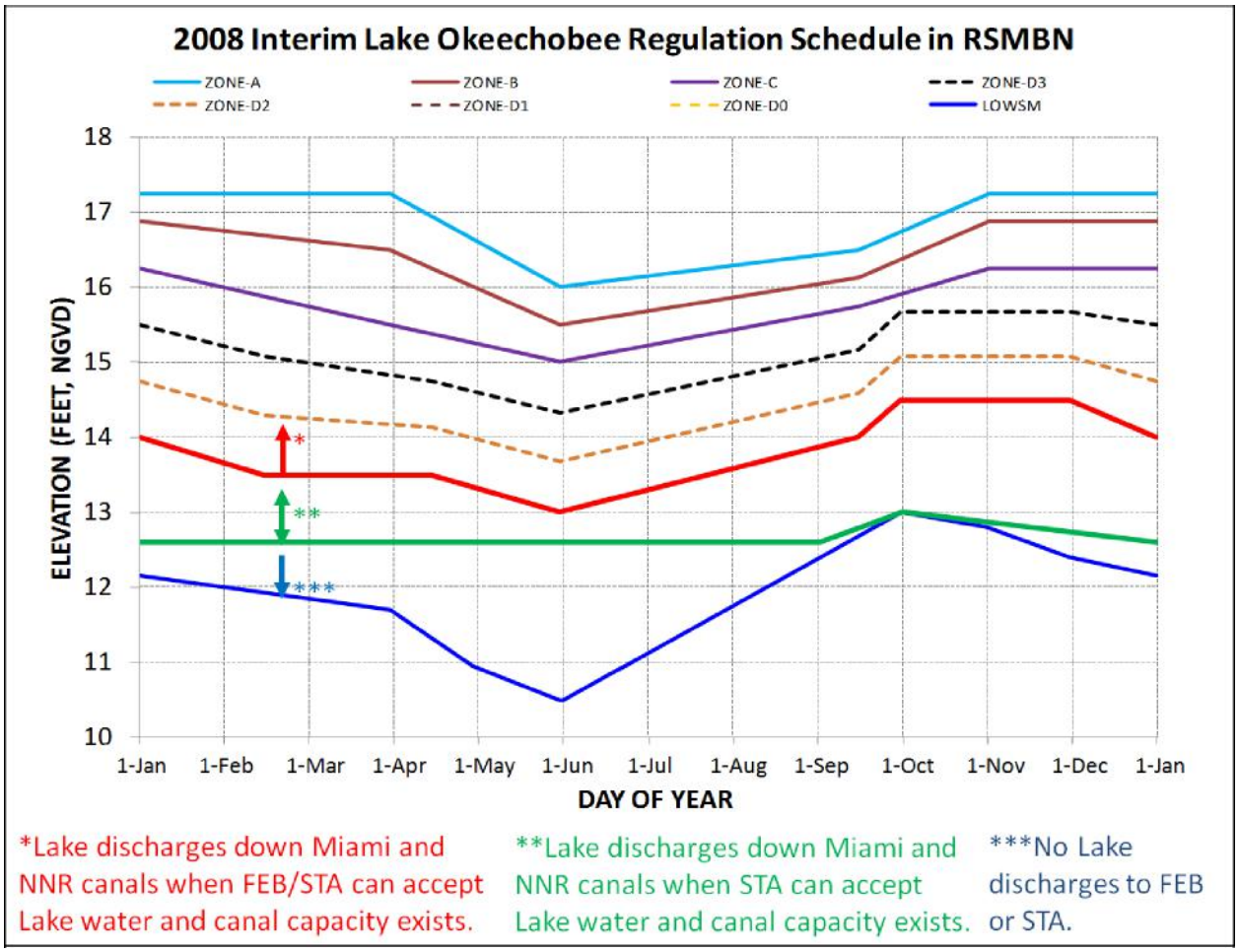

Figure 7-1. 2008 Interim Lake Okeechobee Regulation Schedule in RSMBN

The proposed operational protocols for release of water from Lake Okeechobee provide for an increase in the dry season releases southward without significant increases in the wet season discharges when the WCA stages may be too high. The following figure of average annual monthly simulated releases southward, **Figure 7-2**, shows the considerable increase in the dry season releases southward without significant increases in wet season discharges.

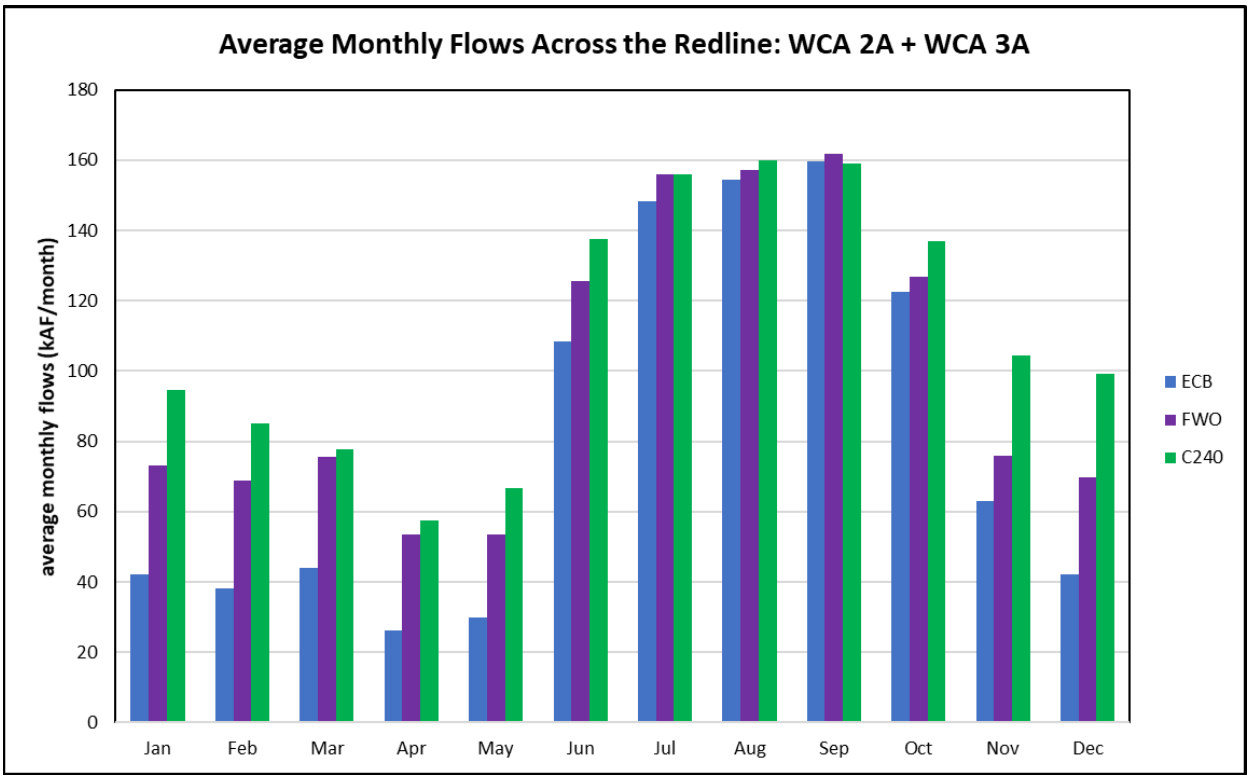

Figure 7-2. Average Monthly Flow Across the Redline: WCA 2A + WCA 3A

C.7.1.2 A-2 Reservoir Operations

The A-1 FEB is a component of the existing condition. Upon the A-2 Reservoir's completion, the reservoir complex will be operated in conjunction with the A-1 FEB and existing STAs. As additional design details are developed during the PED phase, the operational criteria for the A-2 Reservoir will become more refined. The following initial guidance is based on the results of the optimization for the CEPP PACR hydrologic modeling:

- A-2 Reservoir accepts EAA runoff when the reservoir depth is below 22.60 feet
- A-2 Reservoir accepts Lake Okeechobee water when the reservoir depth is below 20.0 feet
- The A-2 Reservoir could provide water back to the Miami and North New River basins when excess capacity is available beyond restoration flows if the depth is higher than 8.2 feet
- A-2 Reservoir discharges discontinued when reservoir depth is below 0.5 feet
- No supplemental water supply is provided to the reservoir to prevent dry out

Initial operations of the A-2 Reservoir would be closely monitored from the standpoint of embankment and structural stability, especially during the initial filling operations. In addition, the quality of the water discharged from the A-2 Reservoir would be monitored to ensure compatibility with the inflow assumptions and discharge requirements for STA-3/4, STA-2, A-2 STA and the Everglades. Operational decisions on the amount of A-2 Reservoir discharges sent to STA-3/4, STA-2, and A-2 STA would consider the vegetative health of the receiving treatment cells as well as their maximum monthly and annual limitations. These decisions would consider the necessity for protection of the combined A-2 Reservoir,

A-2 STA and the existing STAs from harmful over loadings, damaging flows, and detrimentally high water (combination of depth and duration).

C.7.1.3 WCA Operations

The current water management operations for the WCAs, ENP, and ENP-SDCS can be found in the corresponding 2012 WCAs, ENP, and ENP-SDCS Water Control Plan. No operational changes are anticipated from the authorized CEPP in the WCAs. See CEPP PIR Annex C for additional details.

C.7.2 FLOOD DAMAGE REDUCTION

Since the SFWMD monitors on a real-time basis all hydrologic and hydraulic parameters within the EAA area, it is reasonable to expect that the existing levels of service for flood protection will be improved or unchanged with effective utilization of the CEPP PACR. Additional discussion of CEPP PACR Savings Clause compliance is provided in **Annex B** of the CEPP PACR.

C.7.2.1 Normal and Emergency Operations

All criteria previously established for normal water management operations and identified in the CEPP PIR would continue under CEPP PACR. Additional system components constructed as part of the CEPP PACR would use operational criteria contained in this document. Refinements to the DPOM will occur throughout the life of the project.

C.7.2.2 Hurricane or Tropical Storm Operations

All system components with primary flood control requirements would follow the pre-storm protocols for the C&SF System. More specific guidance for pre-storm operations for the A-2 Reservoir and A-2 STA will be provided at a later design stage.

C.7.3 WATER QUALITY

Planning Letter 92-500 requires that all Federal facilities be managed, operated, and maintained to protect and enhance the quality of water and land resources through the conformance with applicable Federal, State, Interstate and local substantive standards.

The WQBEL is a numeric discharge limit applied to permitted discharges from EAA STAs, including STA-2, STA-3/4, and A-2 STA to assure that such discharges do not cause or contribute to exceedances of the 10 micrograms per liter (µg/L) TP criterion within the Everglades Protection Area. The WQBEL was developed to allow for expected year-to-year variability in the STA discharge TP concentration, as observed at the marsh reference sites used to develop the TP criterion, while attaining the long-term TP criterion. The WQBEL must be met for existing flows prior to initiating additional flows as a result of CEPP PACR. Furthermore, the WQBEL will also need to be met when operating the CEPP PACR TSP project features.

Implementation of the recommended CEPP PACR project features is likely to maintain water column TP concentrations within most areas of WCA-3 primarily because of state owned and the proposed A-2 STA treatment facility water quality treatment features will continue to operate as envisioned in the CEPP PACR.

C.7.4 WATER SUPPLY OPERATIONS

The operation of CEPP PACR components will take into account the existing water supply criteria and would be developed to ensure that water supply is not adversely affected. Additional discussion of CEPP PACR Savings Clause compliance is provided in Annex B of the CEPP PACR.

C.7.5 RECREATION

Additional recreational opportunities are a benefit of the CEPP PACR. There are abundant recreational facilities within the project area, both private and public; however, no specific water control regulations are required for this purpose. Water levels are not specifically managed for recreation, although levels may affect recreation facilities. For example, boat launching ramps, pleasure craft, sightseeing vessels, and bank and small boat fishing may all influenced by water levels.

C.7.6 FISH AND WILDLIFE

The design of CEPP PACR components are such that hydrologic conditions would be established that significantly benefit fish and wildlife through improvements in the types and diversity of habitats, including estuaries.

C.8 NAVIGATION

There are no authorized project features for navigation within the WCAs. There is significant recreational boating in the WCAs and associated C&SF Project canals. The minimum stages for the conservation pools in the WCAs help reduce adverse impacts on recreational boating during drought periods.

C.9 OTHER

There is currently no further information for this section.

C.10 PRE-STORM/STORM OPERATIONS

The hurricane season is from 1 June through 30 November. In the event of a tropical depression(s), tropical storm(s), and/or hurricane(s) in the Atlantic/Caribbean Basin or Gulf of Mexico, the National Hurricane Center issues products including tropical cyclone public advisories, forecast advisories, forecast discussions, warnings and strike probability forecasts. The SFWMD meteorologists and the SFWMD Emergency Operations Center (EOC) also provide specific advisories for different regions of SFWMD. Pre-storm canal drawdowns may be initiated up to 72 hours in advance of a severe storm event based upon such forecasts, prevalent conditions within the project area, and/or emergency operations directive(s) by the SFWMD EOC. Any drawdowns would be consistent with SFWMD emergency operations procedures. Pre-storm drawdowns would be dependent on the severity of the storm, amount of predicted rainfall and antecedent moisture condition in the watershed.

C.11 CONSISTENCY WITH THE IDENTIFICATION OF WATER AND RESERVATIONS OR ALLOCATIONS FOR THE NATURAL SYSTEM

The Programmatic Regulations [Section 385.28(a)(6)(vi)] for CERP require that the operating manual be consistent with the reservation or allocation of water for the natural system made by the State (in accordance with section 601 of WRDA 2000). The operating criteria within this CEPP PACR DPOMs are consistent with the operating criteria used to identify the water available for the natural system during wet, average, and dry periods as described in the Project Assurances section of the CEPP PACR. The operating criteria contained in this DPOM will be in accordance with section 601 of WRDA 2000. The operating criteria may be further refined during detailed design and captured in the Preliminary POM phase. These refinements would also need to be consistent with any reservation or allocation of water for the natural system. Additional discussion of the CEPP PACR Assurances analyses is provided in Annex B of the CEPP PACR.

C.12 CONSISTENCY WITH SAVINGS CLAUSE AND STATE ASSURANCES PROVISION

In accordance with Water Resources Development Act (WRDA) 2000, CERP projects may not eliminate or transfer existing (as of December 2000) legal sources of water until a new source of water of comparable quantity and quality is available to replace the water lost as a result of project implementation. The implementation of the CEPP PACR would not preclude operation of the C&SF Project to deliver water from Lake Okeechobee to meet agricultural water supply needs or to the WCAs and ENP to meet environmental demands for water supply in those areas. Therefore, no additional sources of water need to be identified since Lake Okeechobee would continue to provide water to agricultural users and the WCAs and ENP. An explanation of the modeling performed and the results of the evaluation can be found in **Section 5 of the Main Report** and **Annex B**.

C.13 DROUGHT CONTINGENCY PLAN

Drought contingency plans are regulated by ER 1110-2-1941. A drought contingency plan in place for the A-2 Reservoir and A-2 STA has not been developed yet. It is expected that drought operations for the A-2 Reservoir and A-2 STA will be similar to operations implemented during previous droughts for the A-1 FEB and the EAA STAs.

The current drought contingency plan in place for the WCAs, ENP, and ENP-South Dade Conveyance System is located in the *C&SF Project Master Water Control Manual, Volume 4*, Appendix B.

C.14 FLOOD EMERGENCY ACTION PLAN

At this time, a Flood Emergency Action Plan has yet to be determined.

C.15 DEVIATION FROM NORMAL OPERATING CRITERIA

The USACE District Commander is occasionally requested by the non-Federal sponsor to approve deviations from normal operating criteria. Prior approval for a deviation is required from USACE-South Atlantic Division (SAD) except as noted in **Section C.15.1** below. Deviation requests usually fall into the following categories:

C.15.1 EMERGENCIES

Examples of emergencies that may result in a need to deviate from normal operating criteria include: drowning and other accidents; failure of the operation facilities; chemical spills; treatment plant failures; and other temporary pollution problems. Water control actions necessary to abate the problem should be implemented immediately unless such action would create equal or worse conditions. SAD must be informed of the problem and the emergency operating changes as soon as practicable. In addition, the non-Federal sponsor, the State of Florida (FDEP and SFWMD), should be informed.

C.15.2 UNPLANNED MINOR DEVIATIONS

There are unplanned instances that create a temporary need for minor deviations from the normal operating criteria, although these deviations are not considered emergencies. Construction accounts for the major portion of these incidents requiring minor deviations. Examples of activities that may require short-term deviations include construction of utility stream/canal crossings and bridge work. Deviations are also sometimes necessary to carry out maintenance and inspection of facilities. Requests for changes in release rates generally involve time periods ranging from a few hours to a few days. Each request should be analyzed on its own merits. In evaluating the proposed deviation, consideration must be given to upstream watershed conditions, potential flood threat, existing conditions of the reservoir/storage area, and alternative measures that can be taken. In the interest of maintaining good public relations, requests for minor deviations are generally granted, providing that these deviations will not have adverse effects on the ability of the project (or projects) to achieve the authorized purposes. Approval for these minor deviations normally will be obtained from USACE SAD by telephone. Written confirmation explaining the deviation and the cause will be furnished to the SAD water control manager. In addition, the non-Federal sponsor, the State of Florida (FDEP and SFWMD), should be informed.

C.15.3 PLANNED DEVIATIONS

Each circumstance should be analyzed on its own merits. Sufficient data on flood potential, lake and watershed conditions, possible alternative measures, benefits to be expected, and probable effects on other authorized and useful purposes, together with the USACE district recommendation, will be presented by memorandum, facsimile, or electronic mail to the USACE-SAD for review and approval. In addition, the non-Federal sponsor, the State of Florida (FDEP and SFWMD), should be consulted as part of the process of receiving approval from SAD for the deviation.

C.16 SEEPAGE CONTROL

C.16.1 PASSIVE SEEPAGE MANAGEMENT

The A-2 Reservoir and A-2 STA site will have canals on all sides that will intercept seepage from the proposed A-2 Reservoir and A-2 STA, which include the existing Miami Canal, STA 3/4 Inflow Canal and NNR Canal as well as the proposed A-2 Reservoir Inflow-Outflow Canal. The A-2 Reservoir will include a continuous seepage cut-off (or barrier) wall located beneath its perimeter embankment to ensure stability of the perimeter embankment as well as reduce seepage losses from the reservoir. The network of canals surrounding the A-2 Reservoir and A-2 STA as well as the seepage cut-off wall beneath the perimeter embankment of the A-2 Reservoir will together create a passive seepage management system to mitigate seepage effects to areas outside of the A-2 Reservoir and A-2 STA. The performance of this proposed passive seepage management system has been modeled and details about this model are provided in **Section A.9** of **Appendix A**.

C.16.2 ACTIVE SEEPAGE MANAGEMENT

In order to ensure that there would be no seepage impacts to the properties north of the A-2 Reservoir and A-2 STA site, during periods when the A-2 Reservoir is filled, the stage in the A-2 Reservoir Inflow-Outflow Canal will be maintained at the elevation required to prevent seepage impacts to those properties. This will be accomplished by actively maintaining the stage in the A-2 Reservoir Inflow-Outflow Canal by closing the gates at spillways SW-2 and SW-3 and then operating the electric pumps at Pump Station P-1 to pump seepage water from the A-2 Reservoir Inflow-Outflow Canal into the A-2 Reservoir. The performance of this proposed active seepage management system has been modeled and details about this model are provided in **Section A.9** of **Appendix A**.

C.17 INITIAL A-2 RESERVOIR BASIN FILLING PLAN

At this time, detailed information on the A-2 Reservoir initial filling plan has yet to be determined. This plan would be developed as part of the operational testing and monitoring phase.

C.18 NON-TYPICAL OPERATIONS FOR A-2 RESERVOIR PERFORMANCE

There are no unforeseen non-typical operations that have been identified in the CEPP PACR. This section would be updated in the future if necessary, as non-typical operations may apply during periods of extreme drought or rainfall. During drought conditions, for example, it may be necessary to pump water more often at lower rates or to release water more slowly from the A-2 Reservoir.

C.19 WATER CONTROL DATA ACQUISITION SYSTEM PLAN (WCDASP)

This WCDASP discusses data acquisition essential to the water control management function. This would be a subset of the Water Control Data System (WCDS) specific to CERP.

Some of the pump stations and gates located within the project area will be equipped with automation components. All of the automation components which are to be operated and maintained by the SFWMD will conform to SFWMD standards of water control data acquisition. Water control data acquisition for operation of the pump stations will be performed via a real time telemetry system known as Supervisory Control and Data Acquisition (SCADA). The communications for the pump stations will be through either microwave communication towers or through SFWMD's Loggernet telemetry network.

During critical storm events such as tropical storms and hurricanes, the operation of the pump stations will follow the guidelines of SFWMD's Emergency Preparedness Manual - Suggested Hurricane Operating Procedures.

The stage recorders to be installed will be incorporated into the SFWMD real time data acquisition network. Stage data from these sites and flow data and pump on/off data will be accessible by the SFWMD and the Water Management Section, Jacksonville District, USACE via the present telemetry system and/or Geostationary Operational Environmental Satellite (GOES) telemetry and/or interagency data exchange procedures.

Stage alarms are monitored using the SCADA system in the SFWMD Operations Control Center (OCC) in West Palm Beach. Orders for major pump stations are issued as needed by the OCC based on anticipated rainfall and stage trends.

Stage, flow, and any precipitation data for the project will be maintained in SFWMD and USACE databases. The data from the SFWMD operated SCADA system such as stage, flow, and rainfall data will be available on a near real-time basis.

C.20 CONSISTENCY WITH THE ADAPTIVE MANAGEMENT PROGRAM AND PERIODIC CERP UPDATES

After initiation of long-term operations and maintenance of this project, the operating manual may be further modified based on operating criteria approved by the USACE and the SFWMD that results from CERP updates and/or recommendations from the adaptive assessment process as outlined in draft GM #6, Section 6.3.1.

C.21 INTERIM OPERATIONS DURING CONSTRUCTION

At this time, interim operations during construction cannot be determined. Later, when is time to develop interim operations during construction, consideration needs to be given to implementation of an initial growing period with minimal water depths (0.5 ft) before construction is complete, to help establish vegetation. This period will start as soon as levees facing the A-2 side are complete.

C.22 STRUCTURE DESIGN DATA TABLES

This section will be updated to include the Structure Descriptions, after the structures have been further designed during the PED phase. The descriptions will include each structure respective location, purpose, and technical data.

As of January 2018, **Tables 22-1 through 22-6** provide additional details for gravity water control structures required to operate the A-2 Reservoir and the associated A-2 STA. For the area around the A-2 Reservoir, the NAVD to NGVD conversion is NGVD = NAVD + 1.43, all given in feet.

Table 22-1. A-2 Reservoir Pump Stations

Structure Name	No. of Units	Pump Capacities (cfs)	Type	Minimum HW Elev. (ft-NGVD)	Max. Required Flow Capacity (cfs)
P-1	9	4x800 cfs; 2x400 cfs; 3x200 cfs	Electric motor and diesel	5.93	4,600

Table 22-2. A-2 Reservoir Gated Culverts

Structure Name	No. of Gates	Culvert Size (ft)	Gate Type	Invert Elev. (ft-NGVD)	Max. Required Flow Capacity (cfs)	Max. Allowable Flow Velocity (ft/s)	Flow Velocity at Max. Req'd Flow Capacity (pipe flowing full w/ all gates fully open) (fps)
C-1	3	12Wx12H	Roller	-2.57	2,500	6	5.8
C-9	4	16Wx12H	Roller	-2.57	4,500	6	5.9
C-10	3	14Wx12H	Roller	-2.57	3,000	6	6.0

Table 22-3. A-2 STA Gated Culverts

Structure Name	No. of Gates	Culvert Size (ft)	Gate Type	Invert Elev. (ft-NGVD)	Max. Required Flow Capacity (cfs)	Max. Allowable Flow Velocity (ft/s)	Flow Velocity at Max. Req'd Flow Capacity (pipe flowing full w/ all gates fully open) (fps)
C-3	2	7Wx7H	Slide	-1.57	325	6	3.3
C-4	2	7Wx7H	Slide	-1.57	325	6	3.3
C-5	2	7Wx7H	Slide	-1.57	325	6	3.3
C-6	2	7Wx7H	Slide	-1.57	325	6	3.3
C-7	2	7Wx7H	Slide	-1.57	325	6	3.3
C-8	2	7Wx7H	Slide	-1.57	325	6	3.3

Table 22-4. A-2 STA Outflow Ungated Culvert

Structure Name	No. of Barrels	Culvert Size (ft)	Gate Type	Invert (ft-NGVD)	Max. Required Flow Capacity (cfs)	Max. Allowable Flow Velocity (ft/s)	Flow Velocity at Max. Req'd Flow Capacity (pipe flowing full) (fps)
C-2	2	15Wx6H	N/A	-13.07	650	6	3.6

Table 22-5. A-2 Reservoir Inflow-Outflow Canal and STA 3/4 Inflow Canal Gated Spillways

Structure Name	No. of Gates	Spillway Gate Opening Size (ft)	Gate Type	Gate Bottom Elev. in Closed Position (ft-NGVD)	Gate Top Elev. in Closed Position (ft-NGVD)	Max. Required Flow Capacity (cfs)	Max. Allowable Flow Velocity (ft/s)
SW-2	3	25Wx14H	Roller	-0.57	13.43	3,000	6
SW-3	3	25Wx14H	Roller	-0.57	13.43	3,000	6
SW-4	3	25Wx16H	Roller	-0.57	17.93	4,000	6

Table 22-6. Overflow Spillway

Structure Name	Crest Length (ft)	Crest Elevation (ft-NGVD)
SW-1	13.5	32.53

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