South Florida Water Management District

INTEGRATED STORMWATER TREATMENT AREA-5 & STA-6

Pollution Prevention Plan

August 2007

Submitted in accordance with the Everglades Forever Act, §373.4592, Fla. Stat., and the State of Florida's National Pollutant Discharge Elimination System Program, §403.0885, Fla. Stat.

CERTIFICATION

I hereby certify, as a Professional Engineer in the State of Florida, that the information in this Pollution Prevention Plan was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse without specific verification or adaptation by the Engineer. This certification is made in accordance with the provisions of the Laws and Rules of the Florida Board of Professional Engineers under Chapter 61G15-29, Florida Administrative Code.

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Date: _____

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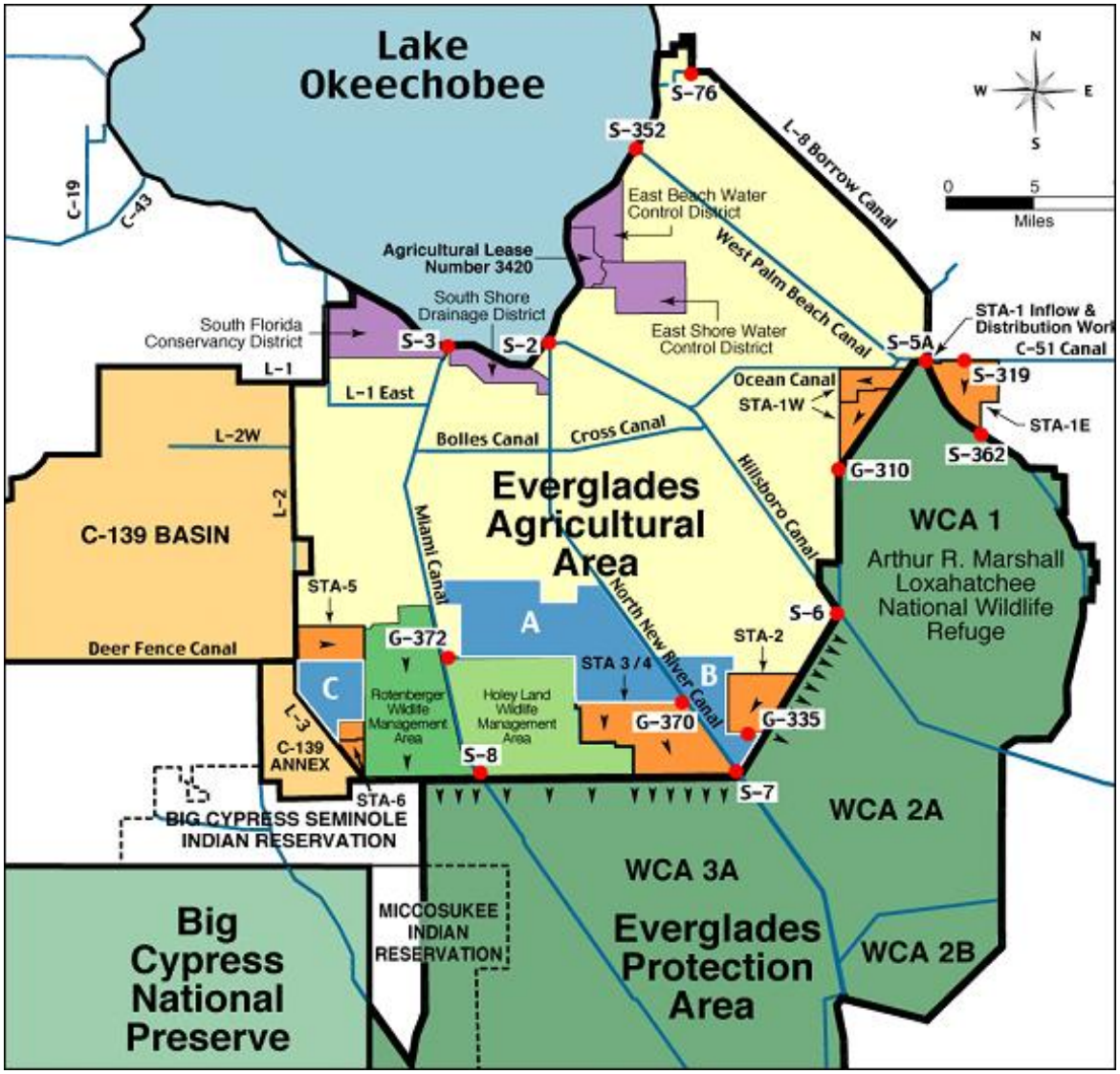
I. BACKGROUND

The South Florida Water Management District (District), in accordance with the Everglades Forever Act (EFA), §373.4592, Fla. Stat., and an agreement with the federal government, is implementing the Everglades Construction Project (ECP) in an effort to restore the quality of the water entering the Everglades Protection Area (EPA). The ECP consists of the construction of six treatment marshes that will use natural physical, chemical and biological processes to remove excess nutrients, particularly total phosphorus (TP), from stormwater runoff and other sources prior to discharge into the EPA. Stormwater Treatment Area 5 (STA-5), located adjacent to the northwest corner of the Rotenberger Wildlife Management Area (RWMA), and STA-6, located adjacent to the southwest corner of the RWMA, are the subject of this integrated Pollution Prevention Plan (PPP).

The original STA-5 consisted of 4,110 acres of effective treatment area and began operation in Water Year 2000, and was the subject of the February 2000 PPP. The original STA-6 consisted of 897 acres of effective treatment area and began operation in 1997; no PPP was developed for STA-6 as that STA did not require an NPDES permit.

As part of the adaptive implementation process envisioned by the *Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals* (Long-Term Plan), it was anticipated that further refinements to the recommended water quality improvement measures would be made at the earliest achievable dates as more scientific and engineering information was obtained (SFWMD 2003 & 2004). One of the key assumptions during the development of the Long-Term Plan was that Compartments B and C (see **Figure 1**) would be under consideration for use as part of the Everglades Agricultural Area (EAA) Storage Reservoir Project, a component of the Comprehensive Everglades Restoration Plan (CERP), through FY 2010 and for this reason should not be considered for other Everglades restoration uses until FY 2011. Subsequent to completion of the Long-Term Plan, conceptual level analyses indicated that all of the EAA Storage Reservoir Project's CERP water storage goals could be achieved on Compartment A, and that Compartments B and C would not be needed to meet the storage objectives of the EAA Storage Reservoir CERP Project. In light of the availability of the land in Compartments B and C, STA-5 was expanded with a new third flow-way to assist in optimizing the treatment effectiveness of the STAs in improving water quality entering the EPA. This 1,985-acre expansion of STA-5 began start-up operation in December 2006, although the drought conditions delayed vegetation grow-in, and brought the total effective treatment area for STA-5 to approximately 6,095 acres (see **Figure 2**). STA-6 was recently expanded by an additional 1,387 acres, referred to as STA-6 Section 2, which brought the total effective treatment area for STA-6 to approximately 2,284 acres. Because of the necessity to synchronize operations of STA-5 and STA-6, this integrated PPP incorporates both of these expanded treatment areas.

Figure 1. Regional Overview



The District is also moving forward with design and construction of approximately 6,230 +/- acres of additional treatment areas on the remaining acreage of Compartment C to further assist in optimizing the effectiveness of the STAs in improving water quality entering the EPA.

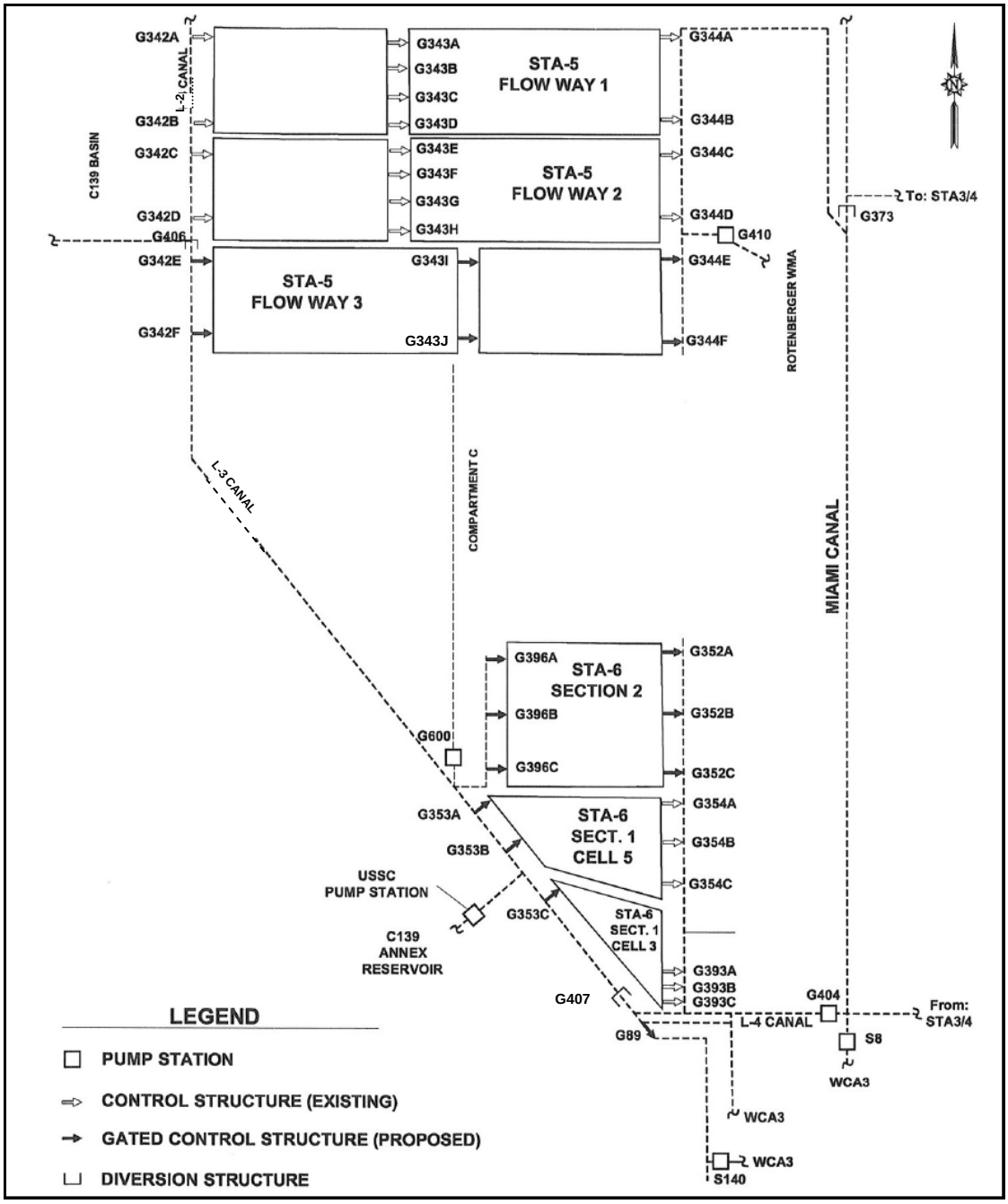
This sequence of incremental expansion necessitates an **interim phase of operation** for STA-5 and STA-6 until normal flow-through operation of the full expansion. This **interim phase of operation** is anticipated to consist of two periods:

Interim Period 1. Flow through operation of approximately 5,007 acres of existing STA-5 and STA-6; during this period start-up operations (i.e., no flow through) will take place for the initial expansion area.

Interim Period 2. Flow through operation of approximately 8,379 acres of treatment area; during this period construction and start-up operations of the full Compartment C build out will occur.

Upon completion of these interim periods of operation, the long-term operations should commence, with approximately 14,600 acres of effective treatment area in the combined STA-5 and STA-6. This PPP will be modified upon completion of the final design of the remaining components.

Figure 2. Schematic of Initial Expansion (from URS 2005).



II. MISSION STATEMENT

The District recognizes that stormwater runoff from the Everglades Agricultural Area (EAA) within the S-8 Basin, the C-139 Basin, and the C-139 Annex contains excessive levels of phosphorus. The EFA recognized that stormwater runoff from these sources contain levels of phosphorus exceeding the interim goal for total phosphorus of 50 parts per billion (ppb). In addition, the EFA and the District recognized the need to improve the timing, distribution and volume of inflow (collectively referred to as hydropattern) along the currently over-drained northwest portion of Water Conservation Area 3A (WCA 3A) and to the RWMA. In summary, the District is implementing expansions of STA-5 and STA-6 in order to reduce levels of phosphorus and otherwise improve water quality in the EPA, and to improve the hydropattern of the EPA and RWMA.

III. PURPOSE

This PPP provides a summary of normal operations for STA-5 and STA-6, and describes factors which may impact those operations. STA-5 and STA-6 shall be operated in accordance with this document to achieve their design objectives, to improve downstream water quality in the EPA, and to improve the hydropattern in the EPA and RWMA.

This PPP is based upon information from (a) the *Conceptual Design Document for the Everglades Protection Project*, dated February 15, 1994, (b) the *General Design Memorandum for STAs 5 and 6*, dated July 1996 (c) the *Final Design Report for STA-5 Works*, dated September 1997, (d) the draft document *STA-5 Assessment of Operational Impacts* (Burns & McDonnell, December 1999), (e) the STA optimization research plan, (f) the C-139 Basin Water Quality Monitoring Program, (g) operational experience from the existing STAs summarized in the annual *South Florida Environmental Reports* and its predecessor the *Everglades Consolidated Reports*, (h) October 2003 *Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals*, (i) November 2004 Revisions to Pre-2006 Strategies, ECP Basins, (j) *Basis Of Design Report STA-5 Flow-way 3* (URS, January 2006), (k) *Basis of Design Report STA-6 Section 2* (URS January 2006), (l) *Hydraulic Modeling and Water Quality Performance Assessments for STA5/6 Expansion* (URS January 2006), (m) *Everglades Agricultural Area Regional Feasibility Study* (ADA/Burns & McDonnell October 2005), (n) Draft *Hydrologic and Hydraulic Analysis of Compartment C Build-out for the STA-5 and STA-6 System* (URS June 2007), (o) *Operational Plan Update Technical Memorandum* (URS July 2007), (p) *Integrated Operation Plan for STA-5 and STA-6* (Goforth July 2007), and (q) updated basin data (Goforth, in press). By operating in accordance with these documents, the objectives of the ECP for phosphorus will be achieved, in accordance with the EFA, §373.4592(9)(e) and (9)(h), Fla. Stat.

STA-5 and STA-6 are dynamic systems, subject to variation in rainfall, hydraulic and nutrient loading, inflow water quality, and interior vegetative conditions. As a result, this

PPP is only intended to provide an understanding of the range of conditions under which the STA-5 and STA-6 system has been designed and will be operated. This document is not intended to reflect absolute limitations upon operation of STA-5 and STA-6; instead, system operation will at all times require the District operating personnel to exercise their best professional judgment based upon existing regional and on-site conditions and data available at the time. The specific operating criteria for each structure are described in the *Integrated Operation Plan for STA-5 and STA-6*.

While this PPP characterizes the operational expectations for STA-5 and STA-6, it also recognizes that operation may fluctuate outside of these descriptive ranges. For example, extreme storm events could result in inflows to the STAs which exceed the system's treatment capacity. As a result, the PPP describes measures that will be taken by operators in order to minimize any adverse impacts that could occur upstream, within or downstream of the STAs under those circumstances.

IV. OBJECTIVES

In accordance with the 1994 *Conceptual Design for the Everglades Protection Project*, the *Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals* (Long-Term Plan), and subsequent design documents, the primary objectives of STA-5 and STA-6 include the following:

A. REDUCE PHOSPHORUS LEVELS TO ACHIEVE COMPLIANCE WITH WATER QUALITY STANDARDS

Working in combination with the implementation of best management practices in the contributing watersheds, STA-5 and STA-6 are designed to reduce the long-term, annual flow-weighted average concentration of TP from the C-139 Basin, a portion of the S-8 Basin and C-139 Annex, to below the interim goal of 50 ppb. TP concentrations are expected to be further reduced with the iterative adaptive implementation process of the Long-Term Plan. The Long-Term Plan was identified as the Best Available Phosphorus Reduction Technology (BAPRT) in the Water Quality Standards for Phosphorus Within the Everglades Protection Area. As part of this adaptive implementation process incorporated in the Long-Term Plan, the flow and phosphorus contributions from these areas were recently updated, and revised inflow projections for the interim period are presented in **Table 1**. The actual distribution of inflow to STA-5 and STA-6 may differ from the values in Table 1 in an attempt to balance the phosphorus loading rate or hydraulic loading rate among the treatment areas.

Table 1. Estimated Inflows to STA-5 and STA-6 for the Interim Period.

STA	Effective Treatment Area acres	Source Water	Average Volume AF/yr	Average TP Load kg/yr	Average TP Conc ppb
STA-5	6,095	C-139 Basin	176,258	51,153	235
STA-6	2,284	C-139 Basin, C-139 Annex, S-8 Basin	70,218	7,729	89
Total	8,379		246,476	58,882	194

Note: A portion of this inflow may be diverted if it exceeds the hydraulic or treatment capacity of the STAs.

B. HYDROPATTERN RESTORATION

The facilities associated with STA-5 and STA-6 will be operated, to the maximum extent practical, to improve the quantity, timing and distribution of water (collectively referred to as hydropattern) flowing into the northwest corner of WCA 3A. In accordance with the conditions of the U.S. Army Corp of Engineers permit for the ECP (No. 199404532), this will be accomplished in two phases. Initially, treated water from STA-5, commingled with treated water from STA-3/4, will be directed west via the L-4 borrow canal by means of the G-404 pump station. This water will mix with treated water from STA-6 in the northwest corner of WCA 3A after passing through a small cut in the southern L-4 levee, and is intended to make up for water that has been diverted away from this area through STA-5. In accordance with the Corps permit, flow of water across the fully degraded L-4 south levee cannot occur until water quality improvement measures are implemented to achieve the numeric phosphorus criterion in the EPA. The implementation of regional hydropattern restoration activities is anticipated in the Long-Term Plan to commence in WY2010-2012.

The facilities associated with STA-5 will also be operated, to the maximum extent practical, to improve the hydropattern of the RWMA. Treated water from STA-5 is discharged into the RWMA through pump station G-410, and distributed along an inflow distribution canal along the northwestern border of the RWMA.

C. SOURCE OF TREATED WATER SUPPLY TO THE SEMINOLE TRIBE OF FLORIDA'S BIG CYPRESS RESERVATION

In addition to improving hydropattern in WCA-3A, the operation of G-404 and associated works shall direct treated water from STA-5, commingled with Lake Okeechobee water and treated water from STA-3/4, westerly in the L-4 Canal. This will serve as water supply for the Big Cypress Seminole Indian Reservation consistent with the Seminole Tribe of Florida/District Water Rights Compact. The District constructed a 190-cfs pump station (G-409) to direct this water supply into the distribution works of the Reservation.

V. ACTION PLAN

The District intends to meet the design objectives of STA-5 and STA-6 to comply with the EFA and water quality standards by operating within the operational guidelines established in subsection **V.A.** below. However, STA-5 and STA-6 were not designed to function under all possible conditions. For example, extreme storm events could create conditions that would necessitate the District to divert flows from the STA-5 treatment system in order to prevent damage to the structural and vegetative integrity and to prevent upstream flooding. Accordingly, subsection **V.B.** describes circumstances requiring deviation from normal operational guidelines. The specific operating criteria for each structure are described in the *Operation Plan for Integrated STA-5 and STA-6*. Subsection **V.C.** describes operations during the interim period associated with the start-up of the expanded treatment cells. Finally, subsection **V.D.** provides information on the District's research program described in the Long-Term Plan and directed at improving the treatment efficiency of the STAs.

A. STA-5 AND STA-6 NORMAL OPERATIONAL GUIDELINES

STA-5 and STA-6 were designed to work in combination with watershed BMPs to reduce the annual average flow-weighted TP outflow concentration to below the interim target of 50 ppb. This design was based on average annual discharge values, long-term flow-weighted mean TP concentrations and analytical methodologies presented in the Long-Term Plan. That objective is expected to be reached by operating the system in accordance with the following guidelines.

1. Anticipated Rainfall Ranges (upper and lower limits)

It is expected that STA-5 and STA-6 shall operate within normal operating guidelines when the tributary basins' annual rainfall values are within the ranges of the period of record used to evaluate performance. For STA-5, the C-139 Basin annual rainfall values varied from 36.2 inches to 60.24 inches during the WY1995-2007 period of record. For STA-6, the local annual rainfall values varied from 28.5 inches to 57.5 inches during the WY1998-2007 period of record.

2. STA Source Inflow Variations

The combined average annual inflow volume into STA-5 and STA-6 was estimated during the development of the EAA RFS as approximately 238,000 acre-feet per year for the Interim Period. A recent update has increased this estimate to a long-term average annual inflow volume of 246,500 acre-feet per year, including a reduction in STA-6 watershed by the recently expanded STA-5 and STA-6 (Goforth, in press). During normal operations annual inflow volumes and associated TP loads into STAs are expected to fluctuate in response to variations in rainfall and runoff from the upstream basins. The minimum and maximum annual flows from the C-139 Basin for the WY1995-2007 period were 53,500 ac-ft and 302,600 ac-ft, respectively. This represents

a variation of –70% to +73% of the average annual flow for that same period. The minimum and maximum annual flows from the STA-6 tributary basins for the WY1998-2007 period were 49,000 ac-ft and 90,600 ac-ft, respectively. This represents a variation of –30% to +29% of the average annual flow for that same period.

3. Phosphorus Load Variations

The estimated combined average annual inflow TP load to STA-5 and STA-6 was recently estimated to be approximately 58,882 kg per year for the Interim Period (Goforth, in press). During normal project operations this load value is expected to fluctuate with variations in inflow volumes. The minimum and maximum annual TP loads from the C-139 Basin for the WY1995-2007 period were 16,700 kg/yr and 97,100 kg/yr, respectively. This represents a variation of –67% to +90% of the average annual load for that same period. The minimum and maximum annual TP loads from the STA-6 tributary basins for the WY1998-2007 period were 5,000 kg/yr and 10,100 kg/yr, respectively. This represents a variation of –35% to +31% of the average annual load for that same period.

4. STA Flow Capacities

A summary of the anticipated flow conditions for STA-5 and STA-6 is presented in **Table 3** for each of the interim operation periods.

Table 3. Summary of Interim Period Flow Conditions for STA-5 and STA-6.

Operation Period	STA	Effective Treatment Area (acres)	Inflow Structures	Anticipated Peak Inflow (cfs)	Outflow Structures	Anticipated Peak Outflow (cfs)
Interim Period 1	STA-5	4,110	G-342A-D	<1200	G-344A-D	<1200
Interim Period 1	STA-6	897	G-353A-C	500	G354A-C, G393B	500
Interim Period 2	STA-5	6,095	G-342A-F	<1200	G-344A-F	<1200
Interim Period 2	STA-6	2,284	G-396A-C & G-353A-C	1,058	G-352A-C, G354A-C & G-393A-C	1,058

Note: For the period 6/00 – 4/07 the peak inflow to STA-5 was 944 cfs, and approximately 20% of the southern C-139 Basin runoff was diverted through G-406. Outflow from STA-5 is limited by the capacity at the S-8 pump station.

5. Anticipated BMP Performance

The C-139 BMP regulatory program requires that TP loads do not exceed historic levels, adjusted for hydrologic variability. This regulatory program, along with STA-5 and STA-6, when operating in a normal operational mode, is expected to result in a reduction of the long-term flow-weighted annual average TP concentration in STA discharges to below 50 ppb.

6. Anticipated Vegetative Conditions

After the start-up and stabilization phases of operation, and during normal project operation, the District shall manage interior water levels to maintain marsh vegetation within the treatment system in a mature and productive condition. Vegetation within the western treatment cells of the expanded STA-5 is expected to consist predominantly of cattail and open water areas. Vegetation within the eastern treatment cells of the expanded STA-5 is expected to consist predominantly of submerged aquatic vegetation (SAV) and a mixture of emergent vegetation. However, the percentages of cattail and other vegetative coverage will fluctuate in response to variations in climatic, biological and inflow water quality and quantity conditions.

Vegetation within Cells 3 and 5 of STA-6 consists predominantly of emergent vegetation with some open water areas. Vegetation within STA-6 Section 2 is expected to consist predominantly of SAV. However, the percentages of emergent and other vegetative coverage will fluctuate in response to variations in climatic, biological and inflow water quality and quantity conditions.

7. Operating Levels

Subject to water availability, the minimum operating water depth for STA-5 and STA-6 during normal project operations is 0.5 feet above average ground elevation. The maximum operating water depth for STA-5 and STA-6 during normal project operations is less than 4.0 feet above average ground elevation. The target operating level for STA-5 during normal project operations will range from 1.25 ft above average ground elevation for the emergent cells to about 2 ft above average ground for the SAV cells.

NOTE: The perimeter (exterior) levees have been designed and constructed to provide for adequate freeboard to maintain levee structural integrity and to withstand the effects of severe rainfall events, wind setup and wave action.

8. Preventive Maintenance

Preventive maintenance of STA-5 and STA-6 project features may be required on a routine basis to avert severe property damage, maintain upstream flood protection and ensure continued functionality and efficiency of the conveyance and treatment systems. During preventive maintenance, individual treatment flow-ways may be temporarily taken off-line and/or water levels within treatment cells may be adjusted through operations of various project structures. To minimize the impacts to operation during times of preventive maintenance, the District shall lower stages to minimal levels and/or take treatment flow-ways off-line independently, for as short a period of time necessary to complete maintenance activities. Specific maintenance activities will include:

a. Water Control Structure Maintenance

The District shall maintain water control structures to ensure that the facilities are conveying prescribed volumes and are functioning properly. Similarly, the District shall service pump stations to ensure that pumps are functioning properly and not leaking contaminants into upstream or downstream waters.

b. Levee and Canal Maintenance

The District shall maintain all levees to ensure continued structural integrity. Activities shall include maintenance of cover vegetation through regular mowing and/or appropriate use of herbicides. Levees will also be inspected regularly in response to factors such as rapid changes in flow rates, high water stages and normal wear and tear, any of which could potentially cause levee destabilization. Project canals will be maintained via periodic dredging, as needed to restore water conveyance and depths to design criteria.

c. Vegetative Maintenance

The District shall control invasive and/or exotic plant species through periodic use of approved herbicides both inside the treatment system and along the project perimeter. Vegetative maintenance shall also include physical removal of excess vegetation at inflow, outflow and interior locations to ensure adequate conveyance.

B. DEVIATION FROM NORMAL OPERATIONAL GUIDELINES

Under some circumstances, operation of STA-5 and STA-6 may deviate from normal operation guidelines. Under those circumstances, including those defined below, the District shall take measures to minimize any adverse impacts, and shall take measures to avoid continued deviations from the normal operations. During these deviations from normal operation guidelines, every consideration shall be given to minimizing impacts upstream, within and downstream of the treatment area.

1. Excessive rainfall or flooding conditions.

When waters at the interior of the treatment cells reach critical depths identified below, or when an oncoming storm event is expected to cause interior waters to approach or exceed these depths, the District shall divert a potion of the inflows through the G-407 diversion structure. Accordingly, the District may divert STA inflow when any of the four factors listed below occur, creating unavoidable conditions that could cause loss of life, personal injury, or property damage. Since the diversion structures are not part of the treatment system, the diversions described above will not constitute bypass as defined in general condition V.1 of the NPDES permit. However, the District shall keep records of all diversions, including the date, flow, water quality, duration, and conditions warranting the diversion. Those records will be included in the annual report submitted to the Department.

a. Maximum Stage Elevations.

When waters at interior structures within the STAs approach or exceed a depth of 4.0 feet, the District may divert inflows through the diversion structures; or

b. Threats to Structural Integrity

When interior water depths or the rates of inflows threaten the structural integrity of the interior and exterior project levees, the District may divert inflows through the diversion structure; or

c. Threats to Vegetative Survival and Treatment Efficiency

When interior water depths, rates of inflows, or the duration of sustained inundation creates conditions threatening the survival of marsh vegetation and the treatment efficiency of the project, the District may divert inflows through the diversion structure; or,

d. Upstream Flooding

When the water levels upstream of the STA inflow structures rise to a level such that flood protection for the contributing basin is threatened, the District shall divert flows through the diversion structure. The specific operating criteria for each structure will be described in the *Integrated Operation Plan for STA-5 and STA-6.*

Example: Operation of STA 5 When Experiencing Excessive Rainfall or Flooding Conditions

Under normal operating conditions, the G-342 A-F inflow structures will be operated fully opened to allow for maximum design inflow into the project up to 1,790 cfs. The G-343 interior structure gates will be opened, and the G-344 outflow structures will be operated fully opened to allow for maximum discharges. Concurrent with the operation of these STA-5 structures, diversion structure G-407 will be operated as needed to allow for diversion of flows preserving historic basin flood protection.

2. *Emergency Discharges.*

The District shall discharge water from STA-5 and STA-6 in accordance with Section 373.439, F.S., including when water conditions within the STAs may damage existing marsh vegetation. The District shall notify the Department within 48 hours of such an occurrence. Such notification shall contain information regarding the circumstances related to the discharge, as well as a projection regarding the anticipated duration of the discharge. In the event any such discharge extends beyond the period specified in the original notification, the District shall notify the Department within 48 hours of the continuation of the discharge, and such notice shall contain additional information regarding the circumstances causing the need for the discharge.

3. Drought Conditions.

In order to preserve the continued viability of the marsh vegetation within the STA-5 and STA-6 treatment cells, the District shall maintain a minimal static water level of 0.5 feet above average interior ground elevation, to the maximum extent practicable. However, during severe drought conditions, the minimum stages may be revised as follows: SAV cells shall still be maintained at 0.5 ft above reference ground elevation to greatest extent practicable, however, emergent cells will be maintained at or above 0.5 ft below reference ground elevation. During periods of drought, seepage return and supplemental water, when available, may be utilized to hydrate treatment cells. The District's ability to maintain this minimum water elevation is determined primarily by the availability of water from rainfall on the project, the upstream watershed, and in the case of STA-5, by the small pump stations G-349, G-350 and G-507, that can supply water from the Miami Canal. In addition, the District will utilize temporary pumps for supplemental water supply for the 3rd flow-way, if water is available. In the event that supplemental water is available, pumps will pump water from the STA-5 Discharge Canal into the project seepage collection canals or directly into the western treatment cells. In the extreme case that there is no water available from the Miami Canal, upstream watershed and/or from rain, the treatment cells may dry out.

Example: Operation of STA-5 During Low Flow or Drought Conditions

Treatment cell interior structures G-343 will be manipulated to detain available water within the treatment cells. When supplemental water is available from the Miami Canal, pump stations G-349B, G-350B, G-507 and temporary pumps (for the 3rd flow-way) will be operated to return water into the SAV treatment cells. Additionally, outflow control structures G-344 A-F will not discharge until water levels or vegetation conditions within the treatment cells have improved.

4. Vegetative Conditions.

Deviation from normal operation may be caused by or necessitated by vegetative conditions as follows:

a. Failure to Achieve Design Performance Criteria

In the event that STA-5 or STA-6 fails to achieve specified performance criteria, and vegetative composition is suspected to be a potential factor, the District shall modify STA operations as necessary in order to respond to undesirable vegetative conditions. Thereafter, operational changes may be made based upon a drop in system performance or new information regarding treatment vegetation is obtained as a result of the District's STA optimization program described in the Long-Term Plan.

b. Vegetative Management

During the start-up period of the newly expanded treatment areas, the growth of desirable vegetation will be encouraged by maintaining appropriate water levels within the treatment cells until the system is capable of achieving design performance objectives. During normal operations, there may be periods when vegetation management activities necessitate deviation from normal operations, such as manipulating water levels or flow conditions, in order to perform vegetation management activities. Additionally, as a result of the STA optimization program, specific large-scale vegetation enhancement activities may necessitate temporarily taking cells off-line with a subsequent vegetative grow-in phase.

C. STA-5 AND STA-6 INTERIM OPERATIONS

The full expansion of STA-5 and STA-6 is anticipated to occur in two phases, with approximately 3,372 acres of additional treatment area presently in start-up operations, yielding approximately 6,095 acres of effective treatment area for STA-5 and 2,284 acres of effective treatment area for STA-6. An additional 6,230 +/- acres of effective treatment area, referred to as Compartment C build out, is currently under design, ultimately yielding approximately 14,600 +/- acres of effective treatment area for the combined STA-5 and STA-6. This sequence of expansion necessitates an **interim phase of operation** of STA-5 and STA-6 until normal flow-through operation of the full expansion. This interim phase of operation is anticipated to consist of two periods:

Interim Operation Period 1. Flow through operation for approximately 5,007 acres of existing STA-5 and STA-6; during this period start-up operations (i.e., no flow-through) for the 3,372 acres of initial expansion area will occur.

Interim Operation Period 2. Flow through operation for approximately 8,379 acres of treatment area.

Operations during these interim periods are summarized below. This PPP will be modified after the final design of the long-term components.

1. *Operations During Interim Operation Period 1*.

During the start-up of the initial expansion areas, operation of the existing treatment cells of STA-5 and STA-6 Section 1 are anticipated to continue basically as before construction, with refinements noted below.

STA-5. Two flow-ways of STA-5 are presently in full flow-through operation. Stormwater runoff from the C-139 Basin will continue to go to STA-5 up to the hydraulic capacity of the STA, with the balance being re-directed through G-406. Under normal

operations, the STA structures will be operated up to the anticipated peak flow of approximately 1,000 cfs.

STA-6. The two existing treatment cells of STA-6 (Cells 3 and 5) are presently in flow-through operation. Pump station G-600 will discharge stormwater runoff from the former agricultural lands in Compartment C to the L-3 Borrow canal. Under normal operations, this control structure is anticipated to allow a peak inflow rate of approximately 150-300 cfs. In addition, flows from the new C-139 Annex discharge facility may discharge up to 452 cfs into the L-3 borrow canal. Inflows to STA-6 will be controlled by the new G-353 inflow structures up to the hydraulic capacity of the STA, with the balance being diverted through G-407. The G-354A-C and G-393A-C structures will control outflow from the STA.

Start-up Operations. Beginning on or about December 31, 2006, the third flow-way of STA-5 began start-up operations. This start-up period is anticipated to last from 6-18 months, subject to vegetation grow-in and other factors outside the control of the District, e.g., drought conditions. During start-up operations, water levels have been managed in the western portion of the flow-way (Cell 3A) to encourage the growth of emergent vegetation to the maximum extent practicable. Water levels have been managed in the eastern portion of the flow-way (Cell 3B) to encourage the growth of SAV to the maximum extent practicable. Net improvement in phosphorus and mercury will be documented in the third flow-way prior to discharges from the third flow-way are authorized. Until that time, diversion through G-406 may occur if the C-139 basin inflow exceeds the hydraulic capacity or phosphorus treatment capacity of STA-5 during this interim period.

The newly expanded STA-6 Section 2 began start-up operations on or about December 31, 2006. During start-up operations, water levels have been managed in Section 2 to encourage the growth of SAV to the maximum extent practicable. Net improvement in phosphorus and mercury will be documented in Section 2 prior to flow-through operations are authorized. Until that time, the two existing treatment cells will be operated to capture and treat STA-6 inflows. Diversion through G-407 may occur if the C-139 Annex inflows and re-directed C-139 basin inflow exceed the hydraulic capacity or phosphorus treatment capacity of STA-6 during this interim period.

G-406 Interim Operations. During Interim Operation Period 1, G-406 will be operated as it is presently, within the following criteria:

1. G-406 will remain closed when stages in the L-3 canal (measured at the headwater of G-406) are below 16.0 ft NGVD.

2. When the L-3 stage reaches 16.0 ft NGVD, G-406 will be opened gradually in an attempt to maintain 16.0’ until the G-406 flow rate is approximately 400 cfs.

3. If the L-3 stage continues to rise above 16.0 ft NGVD, flow through G-406 will be allowed to increase from approximately 400 cfs to approximately 500 cfs, while the stage rises to 17.0 NGVD.

4. When the L-3 stage reaches 17.0 ft NGVD, the gate opening at G-406 will be progressively increased until it is fully open in an effort to maintain a stage of 17.0'.

5. At stages above 17.0 ft NGVD, G-406 will remain fully opened. If higher flows were to occur, the stage in the canal would rise based on the ability of the STA to accept flow and the ability of G-406 to divert flow. The overflow crest elevation of the armored earthen plug adjacent to G-406 is 17.5 ft NGVD.

6. Following the storm peak flows/stages, operation of G-406 will follow the above strategy in reverse. If the stages rebound in response to the gate closing, G-406 will be operated according to the rising schedule until stages recede.

7. The STA 5 outlet structures (G-344s) will not be closed or partially closed if the G-406 diversion structure is open, regardless of the stage in the Miami Canal, except under emergency conditions where life or property is threatened.

G-407 Interim Operations. This new divide structure will normally be closed, however, the gates can be opened to divert untreated runoff should the L-3 stage rise above 16.9 ft NGVD. Dynamic hydraulic modeling of the L-3 Canal and STA 5/6 systems performed by URS confirmed that operation of the G-407 Structure, based on the G-406 headwater stage, was effective for maintaining the existing flood protection level of service (URS 2007b). Modeling conducted by URS established the G-407 gate operations in **Table 4** that should be sufficient to maintain the existing flood protection level of service while reducing diversions to WCA3A (URS 2007). After the storm passes, the gate opening at G-407 will be reduced in reverse sequence, using the same criteria in **Table 4**. **In the event that G-406 is closed and the headwater stage at G-407 rises to 16.9 ft, G-407 should be operated as in Table 4, using the headwater stage at G-407.**

Table 4. G-407 Interim Phase Gate Operation Recommendations

G-406 HW Stage (ft NGVD)	G-407A Flow Rate (cfs)
<16.9	0
16.9 to 18.1	500
>18.1	1,400

2. Operations During Interim Operation Period 2.

After flow-through operations commence in the STA-5 3rd flow-way and STA-6 Section 2, and prior to flow-through operations commence for the full build-out, a second **interim period of operations** will occur. General operations are summarized below.

STA-5. With the 3rd flow-way in operation, STA-5 will continue to capture C-139 Basin runoff, and the resulting hydraulic and nutrient loading rates to the STA-5 flow-ways, i.e., on a unit area basis, will be reduced. G-406 will remain open at all times during normal operations.

STA-6. When STA-6 Section 2 begins flow-through operations, STA-6 will continue to capture stormwater runoff from the balance of Compartment C, the C-139 Annex and, to the extent capacity is available, a portion of the C-139 Basin runoff that is diverted from STA-5. With 155% additional treatment area as Section 2 comes on line, the hydraulic and nutrient load to the two existing treatment cells will decrease considerably.

G-407 Operations. This new divide structure will normally be closed, however, the gates can be opened to divert untreated runoff in excess of the capacity of the STA-5/STA-6 system. The gates will be opened in accordance with the guidance in **Table 4.**

3. *Comparison of Interim Operation to Long-term Operation*

No new discharges of waters are anticipated to enter the Everglades as a result of these interim operations. Diversion of C-139 Basin runoff during the interim period shall continue as it does presently. However, once the third flow-way of STA-5 begins flow-through operation, diversion of untreated C-139 Basin runoff will be minimized, and the hydraulic and nutrient load to the two existing STA-5 flow-ways should decrease, as the inflow and treatment capacity increases by 50%. When capacity is available in STA-6, a portion of the C-139 Basin flows diverted through G-406 could be captured by STA-6 inflow structures, thereby minimizing the diversion of untreated water to the EPA through G-407.

After the complete build-out of Compartment C, an additional 6,230 +/- acres will be available to treat the runoff from the C-139 and C-139 Annex. The areal loading to STA-5 and STA-6 treatment cells will further decrease, with an associated decrease in outflow phosphorus levels and diversion of untreated waters to the EPA.

4. Minimizing Phosphorus Levels During the Interim Periods

The combined phosphorus levels entering the EPA from the C-139 Basin, C-139 Annex, and the fallow agricultural area north of STA-6 during the interim periods are anticipated to be lower than the current levels entering the EPA from the same sources. This is due largely to the fact that the C-139 Annex, which presently discharges untreated runoff to

the EPA through the S-140 pump station, will be treated in the existing treatment cells of STA-6, up to the capacity of STA-6. Phosphorus levels entering the EPA from the C-139 Basin are not anticipated to increase over present levels, as the existing hydraulic and treatment capacity of STA-5 should not be diminished during the interim period. In addition, the landowners in the C-139 Basin are implementing farm-level best management practices which should result in lower phosphorus levels than are occurring presently. Phosphorus levels will further diminish after the full expansion within Compartment C is in flow-through operation.

In order to optimize reductions in phosphorus to the EPA during the interim period, the District shall, to the extent consistent with its responsibilities as the local sponsor of the C&SF Project:

(1) reduce phosphorus loading to the EPA compared to 1979-1988 base period;

(2) optimize the quantity of waters sent through the STAs, subject to their hydraulic, structural and biologic design limitations, consistent with the provisions of this permit.

5. Conclusions

These interim operations are not anticipated to increase the total volume of waters or phosphorus loads flowing to the EPA. The combined phosphorus levels entering the EPA during the interim period are anticipated to be lower than the current levels entering the EPA from the same sources. Phosphorus levels will further diminish after the full expansion within Compartment C is in flow-through operation.

The District is committed to achieving the load reductions of the Settlement Agreement and the design objectives of the ECP as enhanced by the Long-Term Plan, and ultimately, the restoration of the Everglades. During the interim period prior to completion of all components of the ECP, including the complete build-out of Compartments B and C, the District is further committed to optimizing the treatment of phosphorus in the watershed. These interim operations reflect the District's best efforts to achieve those interim objectives.

D. STA OPTIMIZATION

The EFA, Section 373.4592(4)(d)3., Fla. Stat., requires the District to conduct research on optimizing the treatment performance of the STAs, recognizing that additional reductions in TP outflow concentrations, beyond the interim goal of 50 ppb, will be beneficial to the EPA. In accordance with this requirement, the Long-Term Plan includes research activities designed to enhance STA performance. Based upon the results of these and other research efforts, the operation of STA-5 and STA-6 will be periodically adjusted to optimize treatment efficiency of the project, in accordance with the EFA, §373.4592(9)(j)3., Fla. Stat.

VI. COMMITMENT TO WATER QUALITY IMPROVEMENT

A. COMPLIANCE WITH WATER QUALITY STANDARDS

The District is committed to the implementation of its responsibilities pursuant to the EFA, §373.4592, Fla. Stat., and its agreements with the federal government. Water quality conditions both upstream and downstream of STA-5 and STA-6 will be monitored through a series of programs, the permits for this project, and the Long-Term Plan. While these projects are directed toward compliance with interim water quality goals, the District is implementing structural, vegetation and operational enhancements designed to achieve compliance with all water quality standards. Currently, the District has submitted a permit application, required by section 373.4592(10), Florida Statues, which includes the *Long Term Plan for Achieving Water Quality Goals for the EPA.* In addition to the recent STA-5 and STA-6 expansion, the District is moving forward with the implementation of approximately 6,230+/- acres of additional treatment area within the entirety of the Compartment C. Revisions to STA-5 and STA-6 operations will occur as these components are implemented, and this PPP will be revised as appropriate.

B. EMERGENCY SUSPENSION AND RESCHEDULING OF SAMPLING

Under hurricane, tropical storm warnings, or other extreme weather conditions, the District's normal water quality sampling schedule may be suspended and rescheduled, as necessary. The District shall notify the Department's Southeast District and the Water Quality Standards and Special Projects Program section at the addresses and telephone numbers listed in the STA-5 and STA-6 permits, of any anticipated sampling suspension or rescheduling associated with hurricanes, tropical storms, or other extreme weather events that may require deviation from the normal sampling schedule. The District shall resume the normal sampling schedule as soon as possible. Within 14 days following the cessation of emergency conditions, the District shall notify the Department of when normal sampling is expected to resume.

VII. POLLUTION PREVENTION TEAM

Numerous District personnel will be responsible for the management of this project during the operational phase of the project including; Chip Merriam and Terrie Bates of Water Resources Management, Dean Powell, Deb Drum, Tracey Piccone and Hongying Zhao of the Watershed Management Department, John Mitnik of the Everglades Restoration Resource Area, Linda Lindstrom and Linda Crean of the Environmental Resources Assessment Department, Ron Mierau, George Hwa, Muluneh Imru, Karen Estock, Susan Sylvester, Matahel Ansar and Neil Larson of the Operation & Maintenance Department and Kirk Burns of the Office of Counsel. The permit administrator for this project is Ron Bearzotti of the Everglades Restoration Resource Area who can be reached at (561) 682-6291.

VIII. BASELINE CONDITIONS

Documents evaluating baseline water quality conditions for the EPA, ENR and the Refuge have been previously completed and submitted to the Department, including: *Water Quality Criteria in the Everglades Protection Area*, SFWMD (Bechtel, Krupa, Hill, Xue), May 1996 and *the Everglades Nutrient Removal Project Annual Monitoring Report*, SFWMD, 1995, 1996, 1997 and 1998, and *the Everglades Annual Reports* (SFWMD 1999, 2000, 2001, 2002, 2003, 2004), Basin-Specific Feasibility Study, and Long-Term Plan (2003 and 2004).