SOUTH FLORIDA WATER MANAGEMENT DISTRICT

INTERIM OPERATION PLAN

STORMWATER TREATMENT AREA 1 EAST

Final Draft

January 10, 2006

Gary Goforth, Inc.

CERTIFICATION

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Date:_____

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STRUCTURE REFERENCE

Structure Identification	Structure Description	Normal Operations Description
S-155A	21	34
G-300/G-301	23	35
G-311	10	32
S-319	9	31
S-361	11	34
S-362	19	39
S-363 A-C	14	36
S-364 A-C	14	36
S-365 A-C	15	36
S-366 A-E	16	36
S-367 A-E	16	37
S-368 A-F	16	37
S-369 A-D	17	37
S-370 A-C	17	36
S-371 A-C	17	37
S-372 A-E	18	37
S-373 A-B	18	36
S-374 A-C	18	37
S-375	12	35
S-376	21	40
S-377	21	40
STA-1E Levees	21	N/A
Distribution Cells	13	N/A
Distribution Canal	13	N/A
Discharge Canal	20	N/A
S-362 Intake Canal	21	N/A
C-51 Canal Improvements	24	N/A
Recreational Features	26	N/A

TABLE OF CONTENTS

1 PROJECT DESCRIPTION 1
1.1 BACKGROUND 1
1.2 OPERATIONAL OBJECTIVES 3
2 STRUCTURE AND CANAL DESCRIPTIONS 9
2.1 INFLOW CONTROL FACILITIES 9
2.2 INTERIOR CONTROL FACILITIES 12
2.3 OUTFLOW CONTROL FACILITIES 19
2.4 SEEPAGE CONTROL FACILITIES 21
2.5 RELATED FACILITIES 21
3 OPERATION 26
3.1 START-UP OPERATION 28
3.2 NORMAL OPERATION 28
3.3 EXTREME FLOW OPERATION 42
3.4 DROUGHT OPERATIONS 45
3.5 WATER SUPPLY OPERATION 46
3.6 TREATMENT CELLS OUT OF SERVICE 47
3.7 NUTRIENT REMOVAL PERFORMANCE OPTIMIZATION 47
3.8 WCA HYDROPATTERN RESTORATION 47
3.9 DEVIATIONS FROM THE OPERATION PLAN 48
4 OPERATING PERMITS 50
4.1 EVERGLADES FOREVER ACT PERMIT 50
4.2 NPDES PERMIT 50
5 COORDINATION WITH OTHER PLANS 51
6 REFERENCES 52
APPENDIX 1 - STRUCTURE RATING CURVES 54
APPENDIX 2 – ADDITIONAL WATER CONTROL STRUCTURE INFORMATION ... 60
APPENDIX 3 - OPERATIONAL DESIGN ENVELOPES 63
APPENDIX 4 – RELEVANT PROVISIONS FROM THE EFA AND NDPES PERMITS FOR STA-1E 73

LIST OF TABLES

Table 1. Summary of Hydraulic Design Data for Structure G-311 (USACE 2005). 11
Table 2. Summary of Design Information for the Distribution Canal..... 13
Table 3. STA-1E Eastern Flow-way Control Structure Information (USACE 2005). 14
Table 4. STA-1E Central Flow-way Control Structure Information (USACE 2005). 16
Table 5. STA-1E Western Flow-way Control Structure Information (USACE 2005). 19
Table 6. Critical Stages, Depths and Elevations for STA-1E Cells. 38
Table 7. Target Stages in STA-1E. 38
Table 8. Proposed S-362 Discharge Limitations During non-flood Conditions. 40
Table 9. Simulated Stages for the Standard Project Storm (Burns & McDonnell 1995).. 43
Table 10. Probable Maximum Storm (Burns & McDonnell 1995) 44
Table 11. Magnitude and duration of dry-out period (1966-95). 45

LIST OF FIGURES

Figure 1. Overview of the Everglades Construction Project. 2
Figure 2. Schematic of STA-1E..... 3
Figure 3. STA-1E Operation Timeline. 6
Figure 4. Pump Station S-319 With Western C-51 Canal in Foreground. 10
Figure 5. Pump Station S-361. 12
Figure 6. Structure S-375. 13
Figure 7. Typical STA-1E Inflow/Interior/Outflow Structure. 15
Figure 8. Pump Station S-362. 20
Figure 9. STA-1E Project Levees (Burns & McDonnell 2000). 22
Figure 10. Structure S-155A. 23
Figure 11. Structures and canals in the STA-1 Inflow Basin and surrounding area. 24
Figure 12. Design Flows and Stages (Modified from Burns & McDonnell 2000). Stages will vary since actual ground elevations are different than design elevations. 30
Figure 13. Cumulative 30-day Inflows to the Central & Western Flow-ways of STA-1E. 32
Figure 14. Proposed Discharge Limitations at S-362 During Non-Flood Conditions. 41

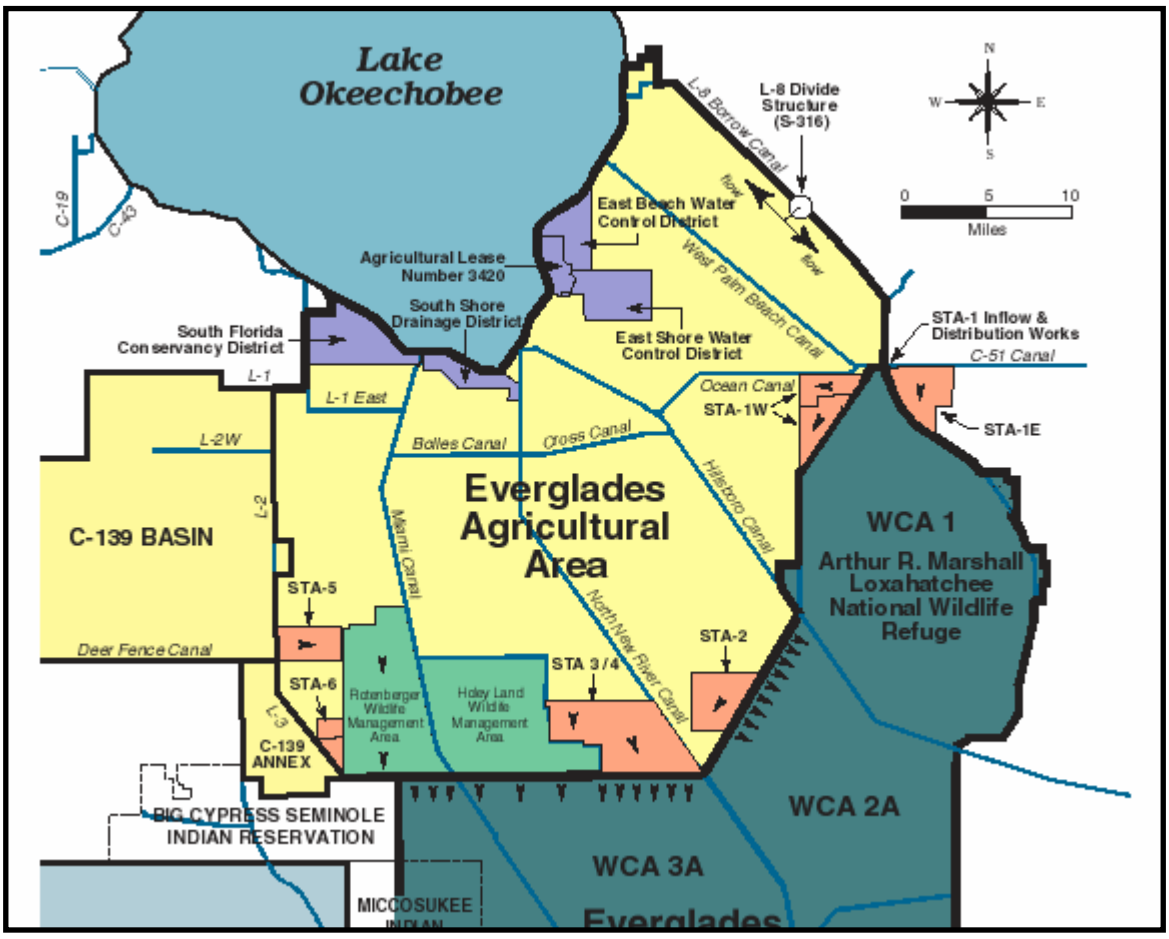
1 PROJECT DESCRIPTION

1.1 BACKGROUND

The South Florida Water Management District (SFWMD), the U. S. Army Corps of Engineers (Corps), the Florida Department of Environmental Protection (FDEP), other agencies and private landowners are cooperating on efforts to improve water quality in the Everglades watershed, and throughout the south Florida ecosystem. This cooperation includes studies and capital projects composing the State of Florida's Everglades Program, the Comprehensive Everglades Restoration Plan (CERP) and Critical Restoration Projects. The Everglades Construction Project consists primarily of six large constructed wetlands, referred to as Stormwater Treatment Areas (STAs) designed to reduce the levels of phosphorus from waters entering the Everglades Protection Area (EPA). Stormwater Treatment Area 1 East (STA-1E) is part of the Everglades Construction Project, required by the Everglades Forever Act (Ch. 373.4592, F.S.) and the Everglades Settlement Agreement. Figure 1 presents an overview of the STAs comprising the Everglades Construction Project. STA-1E is the last of the six STAs to begin operation, and is a critical component of this integrated set of treatment areas designed to work in unison to achieve the water quality and water quantity goals of Everglades restoration.

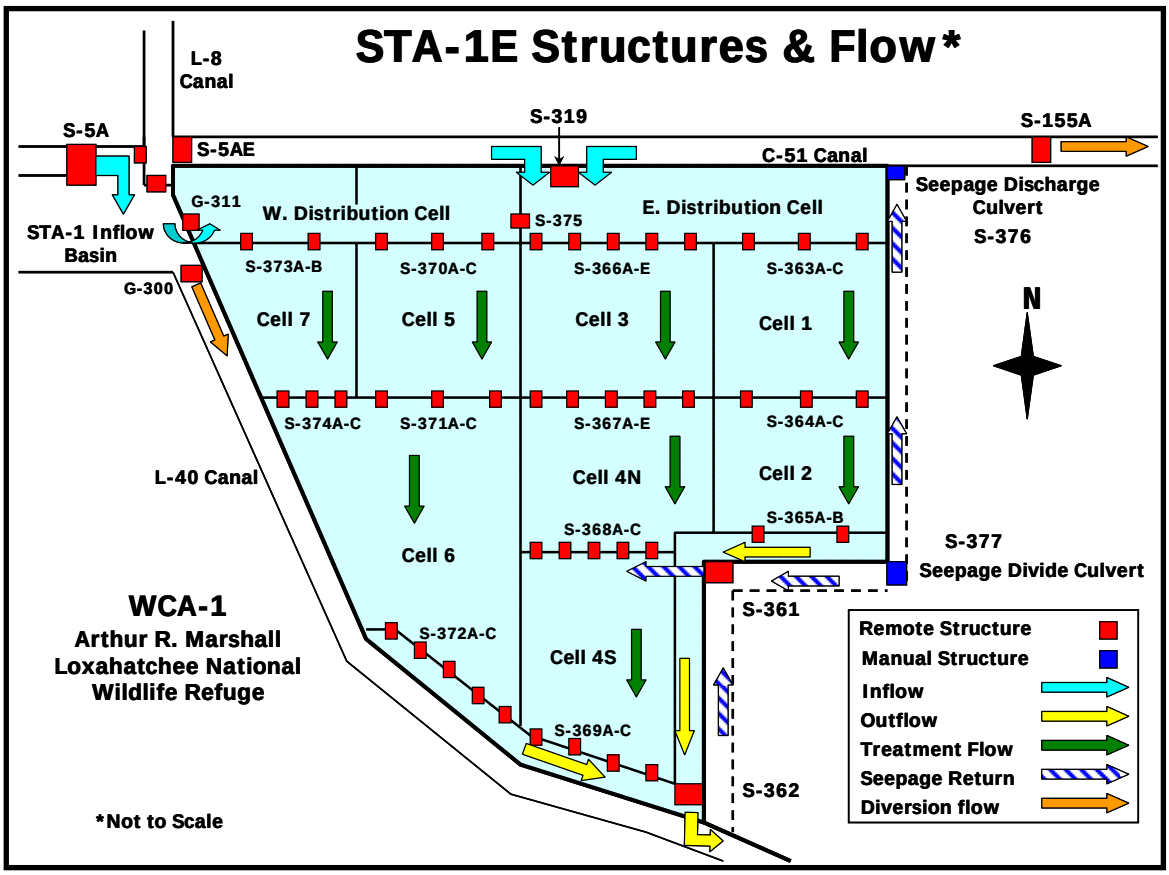
The Everglades Forever Act (EFA), enacted by the Florida Legislature in April 1994, requested that the United States government, acting through the Corps, construct STA-1E in conjunction with the currently authorized C-51 Flood Control Project by July 1, 2002. The required works of the overall ECP are described in the *Everglades Protection Project, Conceptual Design* (Burns & McDonnell 1994). Congress authorized Federal participation in the design and construction of STA-1E in Section 315 of Public Law 104-303, dated 31 October 1996, through the Water Resources Development Act of 1996. That authorizing legislation directed the USACE to complete STA-1E in general conformance to the design intent of the Conceptual Design. STA-1E was designed by Burns and McDonnell Engineering Company, Inc. working under contract to the Corps. Construction of all features of STA-1E, except for Structure G-311, was under the direction of the Corps, and was determined by the Corps to be substantially complete in June 2004. Final construction activities continued through 2005 in large part to repair damages caused by hurricanes in September 2004. The Corps turned over STA-1E to the District in the fall of 2005, with exception of Cells 1 and 2. Cells 1 and 2 will remain under the control of the Corps during the construction, operation and ultimate disposition of a Periphyton-based STA (PSTA) demonstration project. One of the unresolved construction items that will influence operations is that average ground elevations in some of the cells were not raised to the range specified in the design (e.g., the average ground elevation in Cell 7 is almost a foot lower than the average elevation specified in the design). The SFWMD constructed G-311 and is the local sponsor for the federal STA-1E project, assisted in the funding of the capital works and will be responsible for operation and maintenance of the STA.

Figure 1. Overview of the Everglades Construction Project.



STA-1E is approximately 20 miles west of West Palm Beach, Florida, located just south of State Road 80 and Canal C-51, adjacent to the northeast boundary of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) and directly east of the STA-1 Inflow and Distribution Works (referred to as the STA-1 Inflow Basin). STA-1E consists of three parallel treatment paths, or flow-ways, with eight treatment cells flowing from north to south (see Figure 2). This created wetland marsh system will provide an effective treatment area of 5,132 acres within eight treatment cells, and an additional 1,046 acres in the distribution cells upstream of the eight cells. The STA is situated on lands that previously were used primarily for agriculture.

Figure 2. Schematic of STA-1E.



1.2 OPERATIONAL OBJECTIVES

STA-1E was designed to achieve multiple hydrologic and water quality goals, including the following.

1. Hydrologic goals
   a. Increase the quantity of water delivered to the Everglades by approximately 100,000 acre feet per year that presently is sent to the Lake Worth Lagoon.
   b. Provide flood protection to the western C-51 Basin. Stormwater runoff from the western C-51 Basin is currently being discharged east untreated to the Lake Worth Lagoon or west to the STA-1 Inflow Basin via the S-5AE structure. To the maximum extent practicable given the other operational constraints described below, STA-1E will be operated to increase the existing level of flood protection benefits to the western C-51 Basin as authorized by the federal project.
   c. Reduce the quantity of freshwater discharged to tide through the Lake Worth Lagoon, as discussed above.

2. Water quality goals
   a. Reduce the amount of phosphorus entering the Everglades from the Everglades Agricultural Area and the East Beach Water Control District. Stormwater runoff from the S-5A Basin and the East Beach Water Control District of the Everglades Agricultural Area (EAA) is currently discharged to the STA-1 Inflow Basin, where it is sent to STA-1W for treatment, unless the capacity of STA-1W is exceeded, whereupon it is discharged untreated into the Refuge.
   b. Provide phosphorus removal for stormwater from the western C-51 Basin.

While not part of the original project design, STA-1E also provides the opportunity to achieve the following benefits:

1. Reduce the amount of phosphorus entering the Everglades from the adjacent Village of Wellington, specifically, the Acme Basin B drainage district that presently discharges untreated stormwater runoff into the Refuge. Approximately 35,000 acre feet per year of untreated runoff presently are discharged into the Refuge from Acme Basin B. The current plan calls for the diversion of this runoff to STA-1E for treatment by September 2007.

2. Reduce the amount of phosphorus entering the Everglades from the adjacent L-8 Basin. The design of STA-1E and STA-1W, which were designed together to treat runoff from the S-5A and C-51 West Basins, anticipated the construction of other facilities for the L-8 basin that would in effect divert the water away from STA-1E, STA-1W, the Refuge and the C-51 Canal. Until the CERP Northern Palm Beach County L-8 Reservoir project is completed (2014), inflows to STA-1E will also include stormwater runoff from the L-8 Basin. Runoff from this basin presently is discharged to multiple receiving waters, including STA-1W, the Refuge and the Lake Worth Lagoon through the C-51 canal. L-8 Basin runoff can also enter the C-51W Canal via the Royal Palm Beach M1 Canal pursuant to the 1997 Memorandum Of Agreement with Indian Trails Improvement District (ITID). This agreement allows for off peak discharges to C-51W after completion of the C-51W/STA-1E project and until an L-8 diversion plan is implemented.

3. Reduce the amount of phosphorus entering the Refuge from Lake Okeechobee water supply deliveries and regulatory releases. It is hydraulically possible to provide water quality treatment of Lake Okeechobee deliveries prior to release to the Refuge should that be desired. There has been a significant increase in water supply deliveries from Lake Okeechobee to the Refuge, estimated to have increased by about 40,000 acre feet per year greater than water supply deliveries during the 1979-88 base period (Burns and McDonnell 2005). In addition, regulatory releases from Lake Okeechobee have also increased to the Refuge, upward of approximately 60,000 acre feet per year (Burns and McDonnell 2005). Operations staff report that over the last 24 months, approximately 80-85% of the time Lake Okeechobee regulatory releases have been made to the L-8 Canal and out to the Lake Worth Lagoon through C-51, and that it is impossible to segregate these lake releases from basin runoff that will be

captured and treated in STA-1E. STA-1E may actually help in providing additional flexibility to treat this water prior to its discharge, however, ***it is recommended that the use of STA-1E and STA-1W for treatment of Lake Okeechobee releases prior to entering the Refuge be discussed with the Technical Oversight Committee to ensure all parties are aware of the water quality ramification of the treatment of this water, and the potential impacts to Settlement Agreement compliance.*** If treatment is not needed, flexibility is available in the STA-1 Inflow Basin facilities to move Lake Okeechobee water through S-5A into STA-1E and out to the C-51 Canal via siphoning at S-319 to supplement water supply for the region or discharge to facilitate movement of these releases to tide.

4. Reduce the dependence on the Refuge to satisfy local water supply demands.

STA-1E is anticipated to treat a long-term average of approximately 165,000 acre feet of runoff annually from a variety of sources, however, the composition and volume of inflows to STA-1E will gradually change over the next ten years, as several major activities are completed in and around the STA. This initial operation plan for STA-1E is intended to serve as an **interim** operation plan in recognition that regional operations will be going through a transition period, and it is intended that this *Plan* will be reviewed and updated periodically as these major activities are completed. In addition to the projects discussed above, the other major regional activities underway that will affect STA-1E operations over the next several years are described below.

1. Construction of performance enhancements is underway in STA-1W which may result in restricted treatment capacity, and therefore possible additional flow to STA-1E, and is scheduled for completion near December 2006.

2. Construction and operation of a periphyton-based STA (PSTA) demonstration project are being managed by the Corps. According to the *Draft Operations Plan* for the PSTA project, flows in the Eastern Flow-way (Cells 1 and 2) will be reduced from the design peak discharge of 860 cfs to approximately 55 cfs (SAIC 2005). This activity is scheduled to be completed in December 2007. If the PSTA project demonstrates the feasibility of this technology, there may be future refinements to STA-1E as a result of full-scale implementation. The associated design and construction activities have not yet been scheduled. Until further notice, the Corps will be responsible for the operation of the Eastern Flow-way.

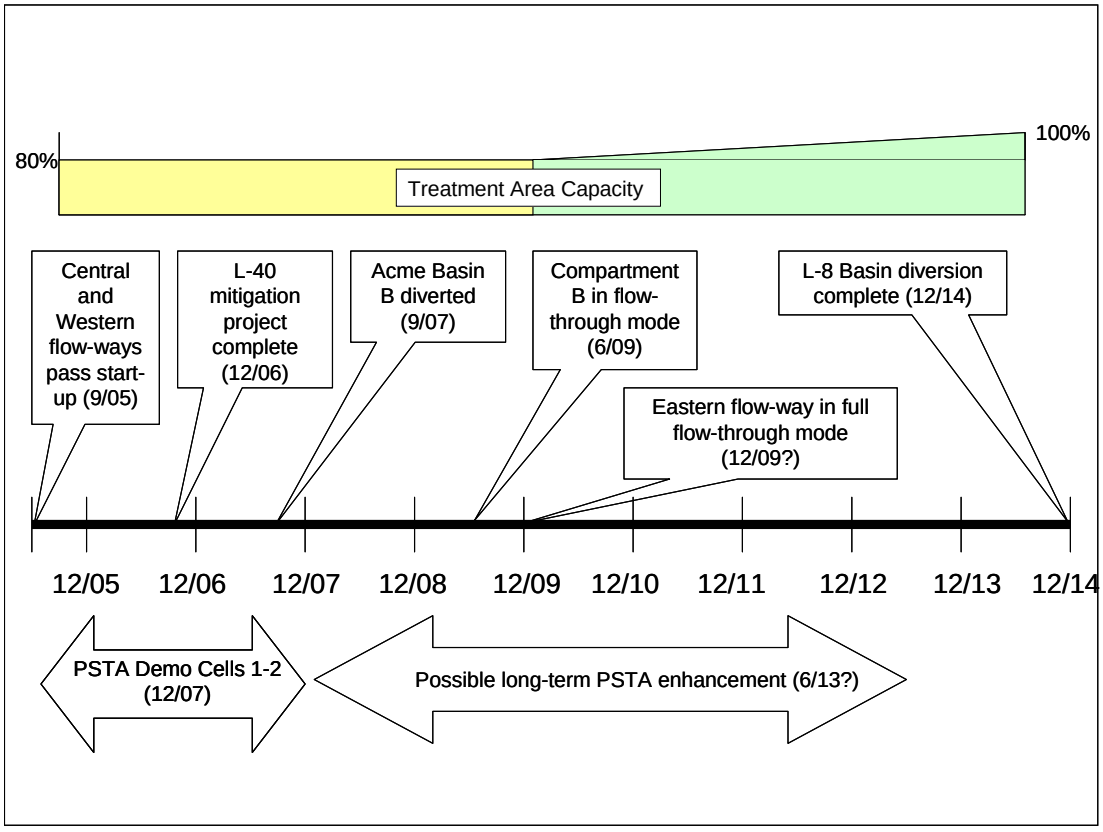
3. Construction by the Corps of features downstream of the STA-1E outflow pump station and within the L-40 borrow canal designed to mitigate the impacts of discharges to the Refuge. The construction activities may directly affect the discharge from the STA. In addition, the State operating permit for STA-1E contains a provision limiting discharge until the construction is complete and shown to be effective (see Section 3.1.4 below for discussion of options). Subject to confirmation by the Corps, it is assumed that construction will begin by December 2005 and be completed by December 2006.

4. Additional projects are being planned to relieve the hydraulic and nutrient overload of STA-1W though re-direction to other treatment areas. The EAA Regional Feasibility Study recently evaluated the feasibility of diverting a portion of the S-5A Basin runoff west for treatment in the full build out area of Compartment B (Burns & McDonnell 2005). It is assumed that this diversion will be completed by June 2009.

Figure 3 presents a time line of these activities. **Until these activities have been implemented, STA-1E will need to be operated in an adaptive manner that balances the water quality, flood control and water supply purposes of STA-1E and adapts to future changes in the regional water management system.**

In accordance with the District's practice and the operating permit for STA-1E, this *Interim Operation Plan* shall be reviewed periodically and revised as appropriate. The review of this *Plan* shall be done in consultation with the FDEP, the USFWS and the Corps. All elevations referenced in this *Interim Operation Plan* are based on the 1929 National Geodetic Vertical Datum.

Figure 3. STA-1E Operation Timeline.



Principles of Interim Operations. Flows and phosphorus loads entering the Refuge have been higher than anticipated in the 1994 Conceptual Design of the Everglades Construction Project. This is due in part to a delay in the diversion of L-8 Basin runoff away from the Everglades, more releases from Lake Okeechobee for water supply and regulatory purposes, and more inflows than anticipated from sources upstream of S-5A. Therefore, during the interim period until other actions to reduce these flows and phosphorus loads have been implemented, STA-1E will need to be operated in an adaptive manner that balances the water quality, flood control and water supply purposes of STA-1E and adapts to future changes in the regional water management system. STA-1E was designed to work in concert with STA-1W and accordingly, this *Interim Operation Plan* was developed to work in concert with the STA-1W Operation Plan. The following principles of interim operation were developed by the District after consultation with staff from the FDEP, Dept. of Interior and USACE.

1. Discharge of untreated water into the Refuge through the G-300 & G-301 structures should be terminated to the maximum extent practical by diverting the flow through the G-311 structure for treatment in STA-1E prior to discharge to the Refuge, or for discharge to the C-51W canal by gravity through the S-319 pump station and discharge to tide or meet downstream water supply demand.

2. Until the L-8 basin runoff is diverted north into the proposed CERP project, the S-155A divide structure should be operated in conjunction with STA-1E to pass at least the same volume of stormwater to tide as L-8 presently discharges to C-51. This will be a mixture of L-8 and C-51W basin runoff.

3. STA-1E and STA-1W should be operated in an attempt to keep their inflows within the range anticipated in the design of enhancements, with an expected mean inflow of approximately 165,000 AF/yr for STA-1E and approximately 180,000 AF/yr for STA-1W. These mean inflows include the anticipated diversion of approximately 35,000 AF/yr of runoff from the Acme Basin B into STA-1E.Until L-8 Basin runoff is fully diverted & excess flows and phosphorus loads from the S-5A Basin are resolved, flows to STA-1E and STA-1W will likely exceed their design range.

4. The PSTA demonstration project constructed in Cell 2 by the Corps will be operated in an attempt to treat the same hydraulic and nutrient unit loading that STA-1E was designed for. (Note - despite repeated requests by the District, the Corps does not plan to operate the PSTA demonstration project in accordance with this principle.)

5. Until the Corps' L-40 mitigation project is completed and shown to be effective, and except as necessary to avoid or recover from upstream flooding conditions, discharges from STA-1E should be limited to minimize impacts to presently unimpacted area.

Operation Permits. The operation of STA-1E is authorized by the permits issued pursuant to the Everglades Forever Act and the Clean Water Act by the FDEP. Relevant conditions from the STA-1E operating permits are provided in Appendix 4. In accordance with the State operating permits, STA-1E will be operated so as not to adversely affect adjacent lands with regards to flooding impacts and water supply needs of the region.

Operation Plan Modifications. This *Interim Operation Plan* will be reviewed and revised more often than other STA plans, utilizing adaptive management to respond to changes in regional water management to meet the operational objectives in concert with the needs of the region. In order to better understand and evaluate potential water quality impacts associated with the intrusion of treated water into the interior marsh of the Refuge, collection and analysis of hydrological and certain water quality data will be conducted before and during the initial operation of STA-1E by the USFWS and the District. This STA-1E *Interim Operation Plan* should be reviewed and may be revised as appropriate based on downstream monitoring and upstream levels of service.

2 STRUCTURE AND CANAL DESCRIPTIONS

Overview. During the interim operation period, pump station S-319 is the primary inflow structure for the Eastern and Central flow-ways. S-319 discharges into the East Distribution Cell, where it can be distributed to four locations (see Figure 2):

1. the Eastern Flow-way (Cells 1 and 2) via structures S-363A-C;
2. the Central Flow-way (Cells 3, 4N and 4S) via structures S-366A-E;
3. when capacity is available, to the West Distribution Cell via structures S-375 for conveyance to the Western Flow-way (Cells 5, 6 and 7) through structures S-370A-C and S-373 A-B; or
4. under certain conditions discussed below, to the STA-1 Inflow Basin

During the interim operation period, spillway G-311 is the primary inflow structure for the Western Flow-way. Stormwater runoff and seepage return entering the STA through pump station S-361 are delivered directly into Cell 4S (see Figure 2). After treatment in the STA, water is discharged into the Refuge through pump station S-362. The following sections describe the associated project water control structures, canals and related features of STA-1E.

2.1 INFLOW CONTROL FACILITIES

2.1.1 Pump Station S-319

Description. Inflow pump station S-319 will convey stormwater runoff and other flow from the C-51 Canal. S-319 has five diesel engine-driven pumps with a total nominal capacity of 3,980 cfs. Three 960 cfs pumps and two 550 cfs pumps comprise the pumping units. The design pumping capacity of S-319 was taken as the expected discharge capacity of all permitted discharges to STA-1E (generally at a rate of one inch per day), plus seepage inflow adjacent to the C-51 West Canal and base flow from an adjacent tributary, the Callery-Judge Canal. Seepage rates included in the capacity of S-319 include both seepage directly to the C-51 Canal induced by the difference in water levels between the canal and water impounded behind levees adjacent to the canal, plus seepage along the east perimeter of STA-1E which can be returned to the C-51 West Canal. S-319 discharges to the East Distribution Cell where it can then be routed to various treatment cells. Under certain conditions, water from the distribution cells can also be released back through the S-319 pump station by gravity to the C-51 West Canal.

Pump Station Details.

Discharge Capacity (each pump):	960 cfs	550 cfs
Number of Pumps:	3	2
Maximum Headwater Elevation (SPF):	19.2 ft NGVD	19.2 ft NGVD
Maximum Tailwater Elevation (SPF):	23.1 ft NGVD	23.1 ft NGVD
Pump Size:	120 inches	90 inches
Pump Speed:	130 rpm	185 rpm
Engine Size:	1650 hp	970 hp

Two (2) 12.0 ft high by 13.0 ft wide multiple shutter flap valve gates per bay are located at downstream end of discharge tubes.

Operational Control and Data Acquisition. Local and remote operation of Pump Station S-319 are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater and tailwater data are available to the remote operators, while headwater and tailwater staff gauges are available for local operation. In addition, each engine/pump bay has engine instrument panels, used for manual control, and an engine automatic control panel, used for automatic control. Manual control includes start/stop controls for the diesel engine, vacuum pump and oil pre-lube pump. It also includes open/close controls for the backflow gates, engine speed control, and engine emergency stop.

Figure 4. Pump Station S-319 With Western C-51 Canal in Foreground.

2.1.2 Gated Spillway G-311

Description. The G-311 structure, a three-bay gated spillway with a symmetrical ogee weir, is situated in the southeast corner of the West Distribution Cell in the L-40 levee, and serves to deliver water between the STA-1 Inflow Basin and STA-1E. The STA-1 Inflow Basin is located directly north of the Refuge and is used to convey discharges from S-5A to either STA-1W or STA-1E. The Inflow Basin also permits the transfer of flow between STA-1E and STA-1W, allowing utilization of both STAs in the treatment of runoff from both the S-5A Basin and the C-51 West Basin. When discharges at S-5A exceed the hydraulic capacity of STA-1W, or when other conditions require it, the excess flows can be diverted to the STA-1E West Distribution Cell by G-311. The G-311 structure also has the capability to direct flows from the S-319 pump station into the STA-1 Inflow Basin, where it can then be directed into STA-1W through the G-302 inflow structure or discharged directly into the Refuge through the

G-300 and/or G-301 diversion structures. A summary of design information for G-311 is presented below in the table below. Additional hydraulic design information is presented in Appendix 2.

Operational Control and Data Acquisition. Local and remote operation of G-311 are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation.

Table 1. Summary of Hydraulic Design Data for Structure G-311 (USACE 2005).

Design Conditions	Normal Operation (S-5A to STA-1E)	Normal Operation (S-5A to STA-1W)	S.P.F Condition	P.M.F Condition
Discharge	1,550 cfs	1,360	495 cfs	3,600 cfs
Headwater Elevation (1)	19.0	18.3	19.4	20.6
Tailwater Elevation (2)	18.75	18.5	20.1	21.5

Notes: (1) Headwater is west side of structure.
(2) Tailwater is east side of structure.

2.1.3 Inflow Pumping Station S-361

Description. Inflow Pumping Station S-361 is a secondary inflow pumping station that discharges directly into treatment Cell 4S of STA-1E. S-361 is located on the southeastern perimeter of STA-1E at the northeast corner of Cell 4S. It provides drainage and flood control service to those lands south and east of S-361 which were tributary to the C-51 West Canal but which have been hydraulically severed as a result of the construction of STA-1E. Those lands consist of the Rustic Ranches subdivision and agricultural lands west of Flying Cow Road and south of Rustic Ranches, referred to as Section 24. In addition, seepage accumulated along the east line of STA-1E may be pumped into STA-1E by S-361. The design capacity of S-361 is 75 cfs, 48 cfs for permitted discharges and 27 cfs for accumulated seepage. S-361 has three vertical electric pumps, each rated at approximately 25 cfs capacity for a total capacity of 75 cfs. Diesel power is available for backup power.

Design Headwater Range:	10.0 ft – 12.0 ft NGVD
Maximum Headwater Elevation:	16.0 ft NGVD
Maximum Tailwater Elevation:	18.5 ft NGVD
Pump Diameter:	20 inches
Pump Speed:	884 rpm

Operational Control and Data Acquisition. Local and remote operation of Pump Station S-361 are possible. Remote operation is from the District's West Palm Beach Operations Control Center. Telemetry required for remote operation and status of the pump station has

been provided. Headwater and tailwater data are available to the remote operators, while headwater/tailwater staff gauges are available for local operation. In addition, S-361 pumps may be operated automatically in response to headwater stage to maintain a water surface elevation in the seepage collection canal between 10 ft and 12 ft during typical conditions.

Figure 5. Pump Station S-361.

2.2 INTERIOR CONTROL FACILITIES

2.2.1 Distribution Cells and S-375

Description. The STA-1E Distribution Cell is divided into the East Distribution Cell and the West Distribution Cell by a north-south levee with a culvert structure, S-375, located in the southern portion. This north-south levee permits Florida Power and Light access to its transmission lines within the STA. Structure S-375 is a three-barrel culvert (8-ft x 8-ft reinforced concrete box (RCB)). The culverts are 84 ft long with slide gates mounted on the headwall. Movement of water between the eastern and western portion of the distribution cells is governed by the operation of the S-375 gated box culverts. After inflow water is directed into the eastern or western portion of the distribution cell, it is then routed to one or more of the three flow-ways. The design peak flow through S-375 is westward into the West Distribution Cell at 1,580 cfs (527 cfs per culvert) with a headwater elevation of 20.44 ft NGVD and a tailwater elevation of 18.68 ft NGVD (Burns and McDonnell 2000).

Operational Control and Data Acquisition. Local and remote operation of S-375 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-375 gates may be operated automatically in response to tailwater stage to maintain a water surface elevation in the West Distribution Cell at or below a target elevation during typical operation conditions.

Figure 6. Structure S-375.

2.2.2 Distribution Canal

Description. Along the north side of the southern levee of the East and West Distribution Cells is a Distribution Canal, which conveys water to the Cell Inlet Structures (S-363, S-366, S-370 and S-373). This canal also receives water from structure G-311 for conveyance to Cells 5 and 7. The Distribution Canal is divided into three sections: (a) East Leg, the canal conveying water to Cells 1 and 3; (b) West Leg, the canal conveying water to Cells 5 and 7; and (c) S-319 discharge canal.

Table 2. Summary of Design Information for the Distribution Canal.

	Discharge (cfs)	Mean Velocity (fps)	Bottom Width (ft)	Bottom Elevation (ft NGVD)
S-319 Discharge Canal	3,980	0.1 – 0.8	158.0	1.50 – 4.0
West Leg	250-1,980	0.1-0.7	40.0	4.0
East Leg	300-2,000	0.1-0.7	40.0	4.0

2.2.3 Eastern Flow-way

Once inflow water is directed to the eastern portion of the distribution cell, it can be routed to Cell 1 of the eastern most flow-way via the S-363 A-C structures where it would continue in a north-to-south path into Cell 2 via the S-364 A-C structures. Treated water would then be

routed from Cell 2 into the discharge collection canal via the S-365 A-B structures and then discharged into the Refuge through the S-362 discharge pump station. All S-363, S-364, and S-365 structures are gated box culverts; discharge rating curves are provided in Appendix 1. Control Structure information is summarized in the table below.

Table 3. STA-1E Eastern Flow-way Control Structure Information (USACE 2005).

Structure	**S-363A-C**	**S-364A-C**	**S-365A-B**
Location	Cell 1 (Inlet)	Cell 2 (Inlet)	Cell 2 (discharge canal inlet)
Inlet structure type	Headwall w/slidegate	Headwall w / slidegate	Headwall w/slidegate
Number of barrels	1	1	1
Number of structures	3 (A-C)	3 (A-C)	2 (A-B)
Culvert dimension	8’ x 8’	8’ x 8’	8’ x 8’ RCB
Culvert length (ft)	67.5	63.75	63.75
Invert elevation (ft)	9.5	7.75	6.25
Max. operational cell depth (ft)	PSTA Cell	PSTA Cell	PSTA Cell
Outlet structure type	Projecting	Projecting	Projecting
Peak discharge per structure (cfs)	287	287	430
HW stage at peak flow (ft)	23.0	19.7	18.4
TW stage at peak flow (ft)	19.7	18.4	14.75

Note: Additional modeling was not conducted after the new ground elevations were surveyed, so the stage values in this table should be taken as preliminary estimates only.

S-363 (Cell 1 Inflow Control Structures). Structures S-363 A-C are a series of three 8 ft x 8 ft RCB culverts located on the south levee of the East Distribution Cell between the East Distribution Cell and Treatment Cell 1. The design peak flow per structure is 287 cfs (861 cfs total) with a headwater elevation of 20.44 ft NGVD and a tailwater elevation of 19.84 ft NGVD. Local and remote operation of S-363 gates are possible. Remote operation via telemetry is from the District’s West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-363 gates may be operated automatically in response to tailwater stage to help maintain a water surface elevation in Cell 1 at or below a target elevation during typical operation conditions.

S-364 (Cell 2 Inflow Control Structures). Structures S-364 A-C are a series of three 8 ft x 8 ft RCB culverts located between Cell 1 and Cell 2. The design peak flow per structure is 287 cfs (861 cfs total) with a headwater elevation of 19.10 ft NGVD and a tailwater elevation of 18.50 ft NGVD. Local and remote operation of S-364 gates are possible. Remote operation via telemetry is from the District’s West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-364 gates may be operated automatically in response to headwater stage to maintain a water surface elevation in Cell 1 at or below a target elevation during typical operation conditions.

Figure 7. Typical STA-1E Inflow/Interior/Outflow Structure.

S-365 (Cell 2 Outflow Control Structures). Structures S-365 A-B are a series of two 8 ft x 8 ft RCB culverts located between Treatment Cell 2 and the Discharge Canal. The design peak flow per structure is 430 cfs (860 cfs total) with a headwater elevation of 17.47 ft NGVD and a tailwater elevation of 14.75 ft NGVD. Local and remote operation of S-365 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation.

2.2.4 Central Flow-way

Inflow water that is directed to the eastern portion of the distribution cell can also be routed to treatment cell 3 of the central flow-way or, under certain hydraulic conditions it is feasible to backflow through the S-319 Pump Station to the C-51 canal. Inflow water will enter treatment cell 3 via the S-366 A-E structures, where it would continue in a north-to-south path into treatment cell 4N via the S-367 A-E structures and then into treatment cell 4S via the S-368 A-E structures. Treated water would then be routed from treatment cell 4S into the discharge collection canal via the S-369 A-D structures and discharged into the Refuge through the S-362 discharge pump station. All S-366, S-367, S-368, and S-369 structures are gated box culverts; discharge rating curves are provided in Appendix 1. Control Structure information is summarized in the table below.

Table 4. STA-1E Central Flow-way Control Structure Information (USACE 2005).

Structure	S-366A-E	S-367A-E	S-368A-E	S-369A-D
Location	Cell 3 (Inlet)	Cell 4N (Inlet)	Cell 4N (Outlet)/ Cell 4S(inlets)	Cell 4S (discharge canal inlet)
Inlet structure type	Headwall w/slidegate	Headwall w/slidegate	Headwall w/slidegate	Headwall w/slidegate
Number of barrels	1	1	1	1
Number of structures	5(A-E)	5 (A – E)	5 (A – E)	4 (A-D)
Culvert dimension	8' x 8' RCB	8' x 8' RCB	8' x 8' RCB	8' x 8' RCB
Culvert length (ft)	73.5	64.5	66.75	66.75
Invert elevation (ft)	7.50	7.00	5.25	3.75
Outlet structure type	Projecting	Projecting	Projecting	Projecting
Peak discharge per structure (cfs)	308	308	328	410
HW stage at peak flow (ft)	21.6	19.81	18.4	17.4
TW stage at peak flow (ft)	19.8	18.38	17.4	14.60

Note: Additional modeling was not conducted after the new ground elevations were surveyed, so the stage values in this table should be taken as preliminary estimates only.

S-366 (Cell 3 Inflow Control Structures). Structures S-366 A-E are a series of five 8 ft x 8 ft RCB culverts located on the south levee of the East Distribution Cell between the East Distribution Cell and Treatment Cell 3. The design peak flow per structure is 308 cfs (1,540 cfs total) with a headwater elevation of 20.44 ft NGVD and a tailwater elevation of 19.75 ft NGVD. Local and remote operation of S-366 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-366 gates may be operated automatically in response to tailwater stage to help maintain a water surface elevation in Cell 3 at or below a target elevation during typical operation conditions.

S-367 (Cell 4N Inflow Control Structures). Structures S-367 A-E are a series of five 8 ft x 8 ft RCB culverts located between Treatment Cell 3 and Treatment Cell 4N. The design peak flow per structure is 308 cfs (1,540 cfs total) with a headwater elevation of 19.46 ft NGVD and a tailwater elevation of 18.85 ft NGVD. Local and remote operation of S-367 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-367 gates may be operated automatically in response to headwater stage to maintain a water surface elevation in Cell 3 at or below a target elevation during typical operation conditions.

S-368 (Cell 4S Inflow Control Structures). Structures S-368 A-E are a series of five 8 ft x 8 ft RCB culverts located between Treatment Cell 4N and Treatment Cell 4S. The design peak flow per structure is 328 cfs (1,640 cfs total) with a headwater elevation of 18.44 ft NGVD and a tailwater elevation of 17.75 ft NGVD. Local and remote operation of S-368 gates are

possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-368 gates may be operated automatically in response to headwater stage to maintain a water surface elevation in Cell 4N at or below a target elevation during typical operation conditions.

S-369 (Cell 4S Outflow Control Structures). Structures S-369 A-D are a series of four 8 ft x 8 ft RCB culverts located between Treatment Cell 4S and the Discharge Canal. The design peak flow per structure is 410 cfs (1,640 cfs total) with a headwater elevation of 16.00 ft NGVD and a tailwater elevation of 14.60 ft NGVD. Local and remote operation of S-369 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation.

2.2.5 Western Flow-way

Inflow water that is directed to the western portion of the distribution cell can be routed to Cells 5 and 7 of the western most flow-way or, under certain hydraulic conditions can flow from the western distribution cell to the STA-1 Inflow Basin or back to the eastern distribution cell where it can be released back to the C-51 canal by back siphoning through the S-319 pump station. Water traveling to Cell 5 via the S-370 A-C structures can continue in a north-to-south path into Cell 6 via the S-371 A-C structures. Water traveling to Cell 7 via the S-373 A & B structures can continue in a north-to-south path into Cell 6 via the S-374 A-C structures. Treated water can then be routed from Cell 6 into the discharge collection canal via the S-372 A-E structures and discharged into the Refuge through the S-362 discharge pump station. All S-370, S-371, S-372, S-373 and S-374 structures are gated box culverts; discharge rating curves are provided in Appendix 1. Control structure information is summarized in the table below.

S-370 (Cell 5 Inflow Control Structures). Structures S-370 A-C are a series of three 8 ft x 8 ft RCB culverts located on the south levee of the West Distribution Cell between the West Distribution Cell and Cell 5. The design peak flow per structure is 304 cfs (912 cfs total) with a headwater elevation of 18.68 ft NGVD and a tailwater elevation of 18.00 ft NGVD. Local and remote operation of S-370 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-370 gates may be operated automatically in response to tailwater stage to help maintain a water surface elevation in Cell 5 at or below a target elevation during typical operation conditions.

S-371 (Cell 6 Inflow Control Structures). Structures S-371 A-C are a series of three 8 ft x 8 ft RCB culverts located between Cell 5 and Cell 6. The design peak flow per structure is 304 cfs (912 cfs total) with a headwater elevation of 17.82 ft NGVD and a tailwater elevation of

16.75 ft NGVD. Local and remote operation of S-371 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-371 gates may be operated automatically in response to headwater stage to maintain a water surface elevation in Cell 5 at or below a target elevation during typical operation conditions.

S-372 (Cell 6 Outflow Control Structures). Structures S-372 A-E are a series of five 8 ft x 8 ft RCB culverts located between Cell 6 and the Discharge Canal. The design peak flow per structure is 316 cfs (1,580 cfs total) with a headwater elevation of 15.40 ft NGVD and a tailwater elevation of 14.70 ft NGVD. Local and remote operation of S-372 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation.

S-373 (Cell 7 Inflow Control Structures). Structures S-373 A-B are a series of two 8 ft x 8 ft RCB culverts located on the south levee of the West Distribution Cell between the West Distribution Cell and Cell 7. The design peak flow per structure is 334 cfs (668 cfs total) with a headwater elevation of 18.68 ft NGVD and a tailwater elevation of 17.47 ft NGVD. Local and remote operation of S-373 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-373 gates may be operated automatically in response to tailwater stage to help maintain a water surface elevation in Cell 7 at or below a target elevation during typical operation conditions.

S-374 (Cell 7 Outflow Control Structures). Structures S-374 A-C are a series of three 8 ft x 8 ft RCB culverts located between Cell 7 and Cell 6. The design peak flow per structure is 223 cfs (669 cfs total) with a headwater elevation of 17.35 ft NGVD and a tailwater elevation of 17.00 ft NGVD. Local and remote operation of S-374 gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-374 gates may be operated automatically in response to headwater stage to maintain a water surface elevation in Cell 7 at or below a target elevation during typical operation conditions.

Table 5. STA-1E Western Flow-way Control Structure Information (USACE 2005).

Structure	S-370 A-C	S-371 A-C	S-372 A-E	S-373 A-B	S-374 A-E
Location	Cell 5 (Inlets)	Cell 5 Outlets/ Cell 6 Inlets	Cell 6 Outlets/ discharge canal inlet	Cell 7 (Inlets)	Cell 7 Outlets/ Cell 6 Inlets
Inlet Structure Type	Headwall w/slidegates	Headwall w / slidegates	Headwall w/slidegates	Headwall w/slidegates	Headwall w/slidegates
Number of Barrels	1	1	1	1	1
Number of Structures	3 (A-C)	3 (A-C)	5 (A-E)	2(A-B)	3 (A – C)
Culvert Dimension	8’ x 8’ RCB	8’ x 8’ RCB	8’ x 8’ RCB*	8’ x 8’ RCB	8’ x 8’ RCB
Culvert Length (ft)	70.5	67.5	66	73.5	66
Invert Elevation ft NGVD	6.50	4.5	3	5.50	4.5
Outlet Structure Type	Projecting	Projecting	Projecting	Projecting	Projecting
Peak Discharge per Structure (cfs)	304	304	316	334	223
HW stage at peak flow (ft)	20.5	17.3	16.3	20.5	16.5

Note: Additional modeling was not conducted after the new ground elevations were surveyed, so the stage values in this table should be taken as preliminary estimates only.

2.3 OUTFLOW CONTROL FACILITIES

Discharges from STA-1E will occur at two locations: Pump Station S-362 and Structure G-311 (described above in Section 2.1).

2.3.1 Pump Station S-362

S-362 is the outflow pumping station drawing treated water from the STA-1E internal discharge collection canal and discharging into the L-40 Borrow canal. This pumping station consists of seven pumps: five diesel engine-driven pumps (three 960 cfs pumps and two 550 cfs pumps) and two additional 110 cfs electric motor driven pumps, with a combined nominal capacity of 4,200 cfs. During storm conditions, S-362 may be required to pump up to its maximum capacity to prevent overtopping of the external levees. This pump serves as the primary point of discharge from STA-1E. The design pumping capacity of S-362 was taken as the full discharge capacity of inflow pump station S-319 (3,980 cfs), the estimated inflow capacity of inflow pump station S-361 (75 cfs), and direct rainfall on STA-1E.

Pump Station Details.

Discharge Capacity (each pump):	960 cfs	550 cfs	110 cfs
Number of Pumps:	3	2	2
Maximum Headwater Elevation:	21.5 ft NGVD	21.5 ft NGVD	21.5 ft NGVD
Maximum Tailwater Elevation:	21.0 ft NGVD	21.0 ft NGVD	21.0 ft NGVD
Pump Size:	120 inches	90 inches	42 inches
Pump Speed:	130 rpm	185 rpm	442 rpm
Engine Size:	970 hp	560 hp	300 hp

Operational Control and Data Acquisition. Local and remote operation of Pump Station S-362 is possible. Remote operation is from the District's West Palm Beach Operations Control Center. Telemetry required for remote operation and status of this pump station has been provided. Headwater and tailwater data are available to the remote operators, while headwater/tailwater staff gauges are available for local operation. In addition, at each engine/pump bay have engine instrument panels, used for manual control, and an engine automatic control panel, used for automatic control. Manual control includes start/stop controls for the diesel engines, vacuum pumps and oil pre-lube pump. It also includes open/close controls for the backflow gates, engine speed control, and engine emergency stop.

Figure 8. Pump Station S-362.

2.3.2 Discharge Canal

The STA-1E Discharge Canal receives outflow from Cells 2, 4S, and 6 and conveys it to S-362. The canal is divided into three legs: (1) the east leg serving Cell 2; (2) the west leg serving Cells 6 and 4S; and (3) the S-362 intake canal, formed by the confluence of the east and west legs.

East Leg. The East Leg runs east-west along the downstream end of Cell 2 then turns 90 degrees and runs south along the eastern boundary of the STA-1E to the confluence with the West Leg. The canal runs the entire length of Cell 2 to help with seepage control from the Cell. The design discharge is 900 cfs, with a mean channel velocity of 0.47 ft per second, an invert of –6.5 ft NGVD to 5.0 NGVD, and a bottom width of 15 ft.

West Leg. The West Leg runs parallel to L-40 along the downstream end of Cell 6 and Cell 4S to the confluence with the East Leg Canal. The canal terminates at the southwest boundary

of Cell 6 to reduce seepage from the Refuge. The design discharge is 3,300 cfs, with a mean channel velocity of 1.23 ft per second, an invert of –6.5 ft NGVD to 2.5 NGVD, and the bottom width varies between 50 ft and 25 ft.

S-362 Intake Canal. The East and West Leg Canals come together approximately 320 ft upstream of S-362 to form the Intake Canal. The design discharge is 4,200 cfs, with a mean channel velocity of 0.75 ft per second, an invert of –6.5 ft NGVD, and a bottom width of 191 ft.

2.4 SEEPAGE CONTROL FACILITIES

Seepage return. Seepage along the east side of STA-1E adjacent to treatment cells 1, 2, and 4S is collected in a seepage collection canal, located immediately outside of the exterior levee (L-85). The seepage collection system connects directly to the C-51 canal by gravity or collected seepage can be routed into cell 4S via the S-361 pump station. Pump stations S-319 and S-361 provide control of STA-1E seepage to ensure adjacent lands are not impacted by the project. Seepage Canal Culvert S-376 is a two barreled 48-in CMP culvert with flashboard risers that connects the seepage canal to the C-51 to assist in the maintaining the seepage along the eastern perimeter of the project. In addition, Seepage Canal Culvert S-377 is a two barreled 48-in CMP culvert with gates that connects the northeastern leg of the seepage canal with the southeastern leg to assist in the maintaining the seepage along the eastern perimeter of the project. Both S-376 and S-377 were also designed to allow conveyance of water supply from C-51 Canal to the Rustic Ranches subdivision and the agricultural lands located directly east of Cell 4S.

2.5 RELATED FACILITIES

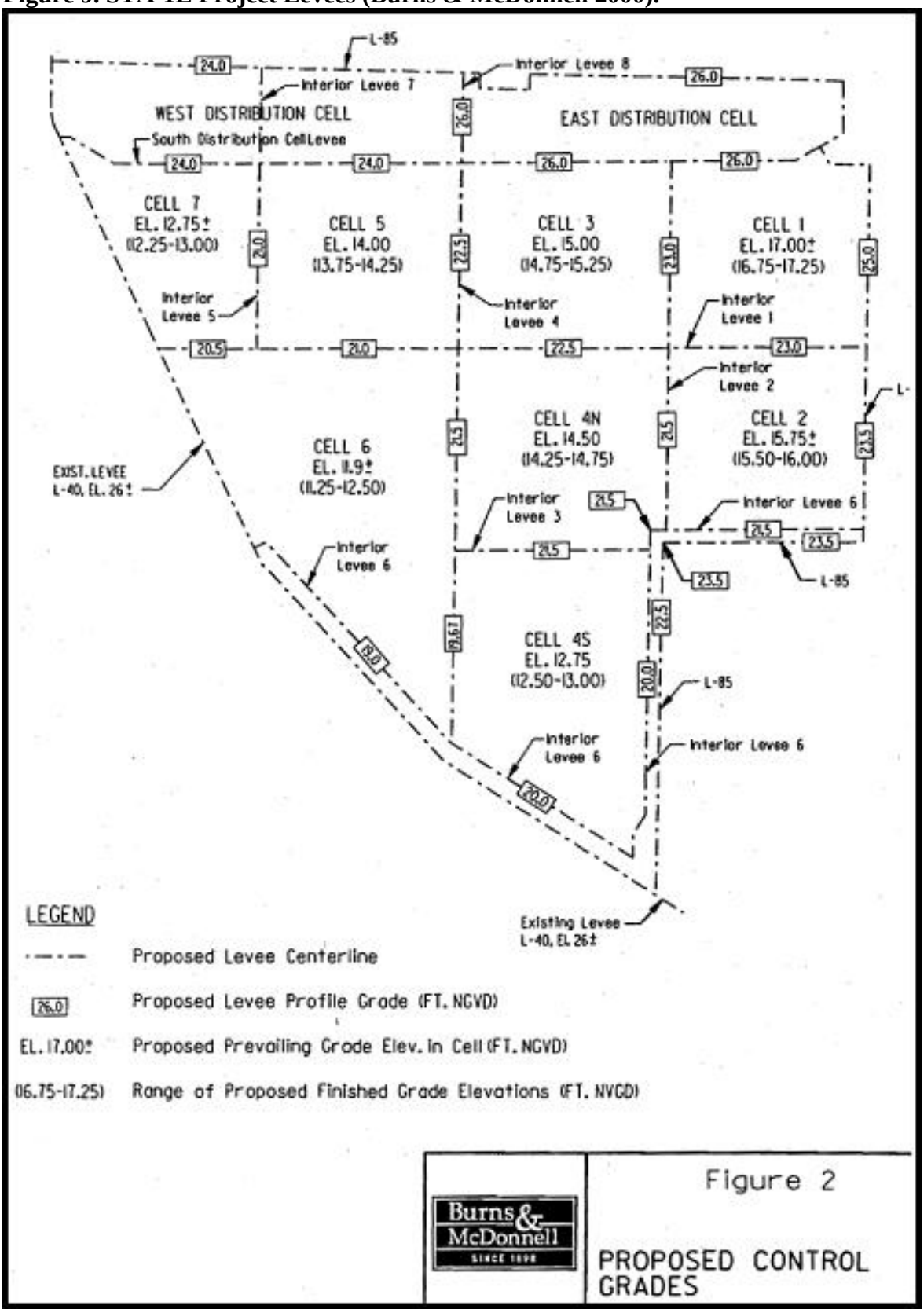
2.5.1 STA-1E Levees

The STA is bounded on all sides by a perimeter levee, while each treatment cell is also bounded by one or more interior levees. A summary of the levee grade information is contained in Figure 9 below.

2.5.2 S-155A

Structure S-155A is a gated spillway located within the existing C-51 Canal approximately 800 feet west of State Road 7, and serves as a divide structure between the Western C-51 and Eastern C-51 basins. S-155A was designed to pass flood discharges from the Western C-51 Basin, and S-5A basins to the east, when STA-1E no longer has the capacity for additional inflows. S-155A was designed to discharge 1,460 cfs to the east with less than one foot of head loss, corresponding to a headwater of 11.5 ft and a tailwater of 10.6 ft NGVD. During Standard Project Flood conditions, S-155A is designed to pass 1,500 cfs with a headwater of 19.2 ft and a tailwater of 15 ft, with a maximum head differential of 11.3 ft (USACE 2005). Additional hydraulic design information for S-155A is presented in Appendix 2.

Figure 9. STA-1E Project Levees (Burns & McDonnell 2000).



Structure S-155A contains an ogee-shaped spillway and is equipped with two 14-ft wide x 14-ft high gates. Structure S-155A has a maximum discharge of 4,800 cfs in the event of a need to divert this amount under emergency or extreme inflow and rainfall conditions. S-155A discharges are reduced when the Eastern C-51 Basin is subject to flooding. Flooding conditions in the Eastern C-51 Basin are defined as when either the S-155A tailwater exceeds 11.7 ft or discharge at S-155 reaches design capacity (4,800 cfs).

Operational Control and Data Acquisition. Local and remote operation of S-155A gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, S-155A gates may be operated automatically in response to tailwater stage to maintain a water surface elevations in the Western C-51 Basin at or below a target elevation during typical operation conditions.

Figure 10. Structure S-155A.

2.5.3 G-300 and G-301

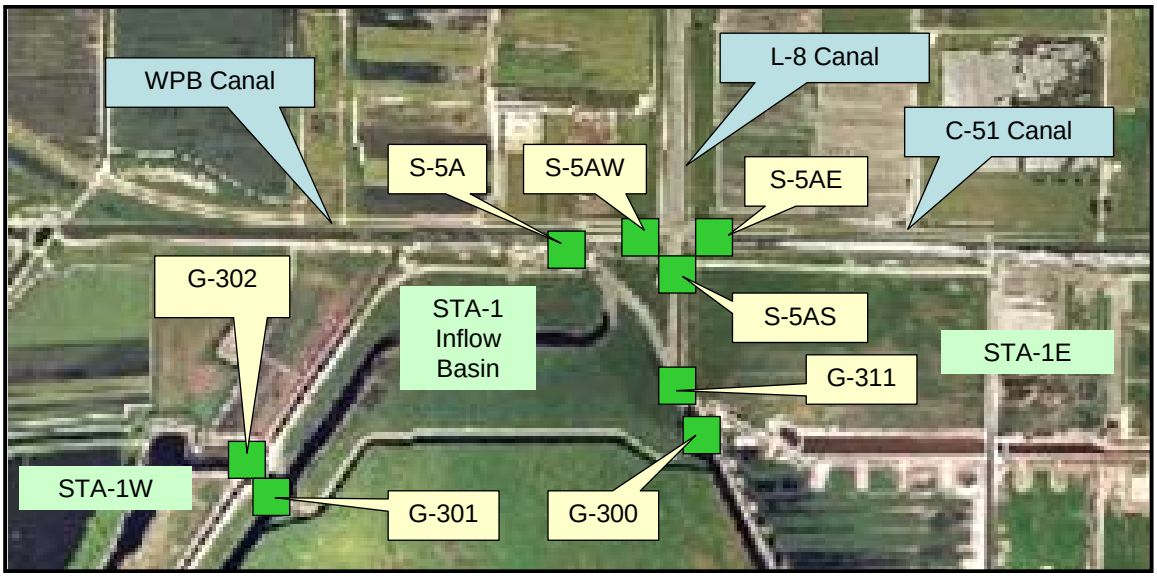
Structures G-300 and G-301 are reinforced concrete ogee-shaped weir spillways with vertical gates installed on the crest of the spillway. G-300 is located within the STA-1 Inflow Basin in the alignment of the existing L-40 Borrow Canal and structure G-301 is located within the STA-1 Inflow Basin in the alignment of the existing L-7 Borrow Canal (see Figure 11). G-300 is equipped with two 20-ft wide x 8.4-ft high gates while G-301 is equipped with three 22-ft wide x 11.7-ft high gates. Each roller gate is operated by a horizontally-mounted, hydraulically-actuated, piston/cylinder device. Each structure has four wing walls constructed of sheet piling projecting at a 45-degree angle from the corners of each structure. The wing walls have a concrete cap that supports a fence. A 15'-18' wide service bridge is provided for access across the spillway. The bridge is designed for an HS20-44 truckload. The design

elevation and length of the separation levee between the STA-1 Inflow Basin and the Refuge is 20.0 ft NGVD and 6,100 ft respectively.

STA-1 Inflow Basin structures, G-300, G-301, G-302, and G-311, will be operated to maintain stages below 19.4 ft NGVD within the Inflow Basin. Flow diversion to the Refuge via structures G-300 and G-301 will begin at an elevation of 18.5 ft NGVD. Other operational strategies may be applied to maintain Inflow Basin stage elevations below 19.4 ft NGVD for events smaller than the SPS and PMS conditions.

Operational Control and Data Acquisition. Local and remote operation of S-155A gates are possible. Remote operation via telemetry is from the District's West Palm Beach Operations Control Center. Headwater, tailwater stage and gate position information are available to the remote operators, while headwater and tailwater staff gauges and gate position indicators are available for local operation. In addition, automatic operation of G-300 and G-301 is available to maintain headwater stages below 19.4 ft NGVD.

Figure 11. Structures and canals in the STA-1 Inflow Basin and surrounding area.



2.5.4 C-51 Canal Improvements

The C-51 Canal was enlarged over a distance of about 3.3 miles from 1/2 mile east of Ousley Farm Road to Pump Station S-319. This section of the C-51 Canal was widened progressively from 30 feet to 70 feet (east to west) and deepened progressively from a bottom elevation of 1.6 ft to -6 ft (east to west). A berm on the south side of C-51 was constructed with the dredge material for the enlarged reach. The berm provides access to the canal and controls overland flow.

2.5.6 STA-1E Recreational Facilities

The addition of recreational facilities is proposed to provide public access to STA-1E. The proposed recreational facilities include an asphalt parking area, road improvements a composting toilet, landscaping and an information kiosk. Pedestrian gates, signage and fencing as needed to define public access areas and to protect sensitive equipment are also proposed.

3 OPERATION

Introduction. This section describes the general operations associated with STA-1E. Operations are classified in the following modes:

1. Start-up operation
2. Normal operation
3. Extreme flow operation
4. Drought operation, and
5. Operation to take one or more treatment cells out of service

Phases of STA-1E Interim Operation. Operation of an STA typically occurs in four phases. Prior to completion of construction, there may be **construction transition operations** specifically designed to establish and maintain water levels to accelerate the growth of treatment vegetation. In the case of STA-1E however, there were no construction transition operations. The **start-up phase** of operation begins after construction is completed and continues until net improvement in phosphorus and mercury is demonstrated in each of the treatment flow-ways. Upon successfully demonstrating net improvement, the flow-way may begin initial discharges. For STA-1E, the Corps deemed construction as substantially complete in June 2004 whereupon the District began managing water levels for vegetation establishment. Net improvement in the Central and Western Flow-ways was demonstrated in August 2005 and routine discharges occurred shortly thereafter (note – discharges to control seepage had occurred previously). Because of the PSTA demonstration project, the Eastern Flow-way will likely be in the Start-up Phase for an extended period. Following completion of the start-up phase for all the flow-ways, a **stabilization phase** of operation will then begin and continue until the performance of the STA achieves the optimal treatment performance anticipated during design. For STA-1E, the stabilization phase will last until the 12-month flow-weighted mean phosphorus concentration is less than or equal to 50 ppb. The stabilization phase is anticipated to last one to two years. Thereafter, STA-1E will be in the **normal (or post stabilization) phase**.

STA-1 East Flow Patterns. Stormwater runoff is conveyed to STA-1E from Pump Station S-319, structure G-311, and Pump Station S-361. Pump Station S-362 is the outflow pumping station. The overall treatment area (Figure 2) is divided into eight cells forming three parallel flow-ways. The general direction of flow in each flow-way is from north to south. Water enters the flow-ways from one of two Distribution Cells. The Distribution Cells run the entire width of the northern portion of STA-1E, and is bounded by the C-51 Canal on the north, the existing Levee 40 on the west, Flying Cow Road on the east, and Cells 1, 3, 5, and 7 on the south. The Distribution Cell is divided into two sections, East and West, due to the significant change in the existing ground elevation within the cell. The Eastern and Central flow ways are preceded by the East Distribution Cell, which primarily receives inflows from Pump Station S-319. The Western Flow-way is preceded by a West Distribution Cell which can receive flows from either the STA-1 Inflow Basin through G-311, or from S-319 through S-375.

STA-1 Inflow Basin. STA-1E will be operated in coordination with the structures comprising the STA-1 Inflow Basin (see Figure 11 above). The STA-1 Inflow Basin is designed to allow the diversion of water to the Refuge and redirection of flows between STA-1E and STA-1W, in order to utilize both of the STAs in the treatment of runoff from the C-51 West and S-5A Basins, prior to discharge into the Refuge. **Diversion** occurs when water from the STA-1 Inflow Basin is directed untreated into the Refuge through the G-300 or G-301 Structures. **Redirection** occurs when water is redirected from STA-1E to STA-1W through the G-311 Gated Spillway for treatment. This *Interim Operation Plan* contemplates that redirection of flows from STA-1 Inflow Basin to STA-1E will only occur whenever the discharge from Pumping Station S-5A exceeds the hydraulic capacity of STA-1W or when other contributing factors warrant such redirection in order to optimize system performance. Runoff from the C-51 West Basin could be directed to STA-1W through the G-311 Structure, however, the present design of STA-1E is such that no redirection should be necessary as a result of hydraulic limitations in STA-1E, except in response to extreme storm events. Should regional needs warrant the delivery of water from the STA-1 Inflow Basin to the C-51 West Canal, it would be possible under certain conditions to move water through G-311 into the STA-1E distribution cells and subsequently to C-51 through the S-319 Pump Station by gravity.

Eastern Flow-way Operation. The Eastern flow-way is comprised of Cells 1 and 2, which are two cells in series. Cell 1 receives inflow from the East Distribution Cell through structure S-363A-C and discharges to Cell 2 through structures S-364A-C, which in turn discharges through S-365A-B to the easterly leg of the Discharge Canal system leading to outflow pump station S-362. The Corps will maintain operational control over the Eastern Flow-way until after the PSTA Demonstration Project is completed.

Central Flow-way Operation. Cells 3, 4N, and 4S form the Central flow-way. Cell 3 receives inflows from the East Distribution Cell through S-366A-E and discharges to Cell 4N through S-367A-E, which in turn discharges to Cell 4S through S-368A-E. Cell 4S then discharges through S-369A-D to the westerly leg of the Discharge Canal system leading to S-362.

Western Flow-way Operation. The Western flow-way is comprised of Cells 5, 6, and 7. Cells 5 and 7 receive inflow from the West Distribution Cell through S-370A-C and S-373A-B and discharges to Cell 6 through S-371A-C and S-374A-C, which in turn discharges through S-372A-E to the westerly leg of the Discharge Canal system leading to outflow pump station S-362.

Treatment Cell Operation. Operation of the STA-1E treatment cells involves balancing the flows among the flow-ways and maintaining water levels within the STA to optimize the efficiency of the treatment area as defined by performance of removing the pollutants, particularly phosphorus, for which the treatment wetland was designed, and providing regional flood control and water supply. The treatment cells are designed to have an operational depth of between 6 inches and 4.5 feet to encourage colonization by and continued viability of wetland plants to maximize, to the greatest extent possible utilizing available technology,

uptake of phosphorus from the stormwater passing through the cells. Long-term storage of the phosphorus is expected to be provided by peat accretion in STA-1E. Maximum depths vary among the treatment cells based on the varied topography in STA-1E (see Table 8 and Section 3.2 below for details).

3.1 START-UP OPERATION

3.1.1 General Start-up Operation

The operational goal during STA startup is to provide hydrologic conditions conducive to wetland vegetation establishment, while avoiding release of total phosphorus and mercury. The STA permits preclude flow-through operation until phosphorus and mercury concentrations demonstrate a net improvement compared to the source water. A complete description of the permit and performance conditions can be found in the FDEP operating permits for STA-1E; Specific Conditions that are relevant to operation of STA-1E are summarized in Appendix 4 (FDEP 2005).

3.1.2 Central and Western Flow-way

The central and western flow-ways demonstrated net improvement with respect to phosphorus and mercury, and approval to discharge from these flow-ways was received from FDEP on September 20, 2005. At this time (December 2005), due to the low density of desired vegetation in Cell 6, target stages are reduced to 1.0 ft to promote further growth of Submerged Aquatic Vegetation (SAV). The stage of Cell 7 is a consequence of the stage in Cell 6. It is anticipated that these cells will be returned to their between-storm target stage of 13.35 ft when Cell 6 contains an adequate density of SAV required for wetland treatment.

3.1.3 Startup Operation for Eastern Flow-way

The eastern flow-way remains under the control of the Corps and it is anticipated that flow-through will occur after the PSTA demonstration project construction is completed and net improvement is demonstrated. The target vegetation in Cell 1 is emergent vegetation while the target vegetation in Cell 2 is SAV. A draft PSTA Operation Plan has been prepared and is under review at this time (December 2005) (SAIC 2005).

3.2 NORMAL OPERATION

3.2.1 Background

During the interim operation period, pump station S-319 will provide the primary inflow to the Central Flow-way of STA-1E; G-311 will provide the primary inflow to the Western Flow-way, and the PSTA demonstration project inflow pumps will provide the primary inflow to the Eastern Flow-way through completion of the project (2008); after the PSTA demonstration project is completed (2008), S-319 will also provide the primary inflow to the Eastern Flow-way.

Normal operations are defined as flow-through operations for flows up to and including the design flow rate of 3,980 cfs. The flow distribution and stages anticipated during the design of STA-1E are represented in Figure 12 (modified from Burns & McDonnell 2000). Water levels in the STA will be adjusted through operation of the inflow pumps and adjustment of the gates on the interior and outlet structures. Initial operating guidelines are provided below, however, as the STA vegetation matures, the target water levels and gate openings may need to be refined based on actual operating experience.

STA-1E will be in an **interim** operations period until the completion of the regional water resource projects described in Section 1.2 above. The overarching operational objective is to maximize the use of the treatment area subject to the following conditions:

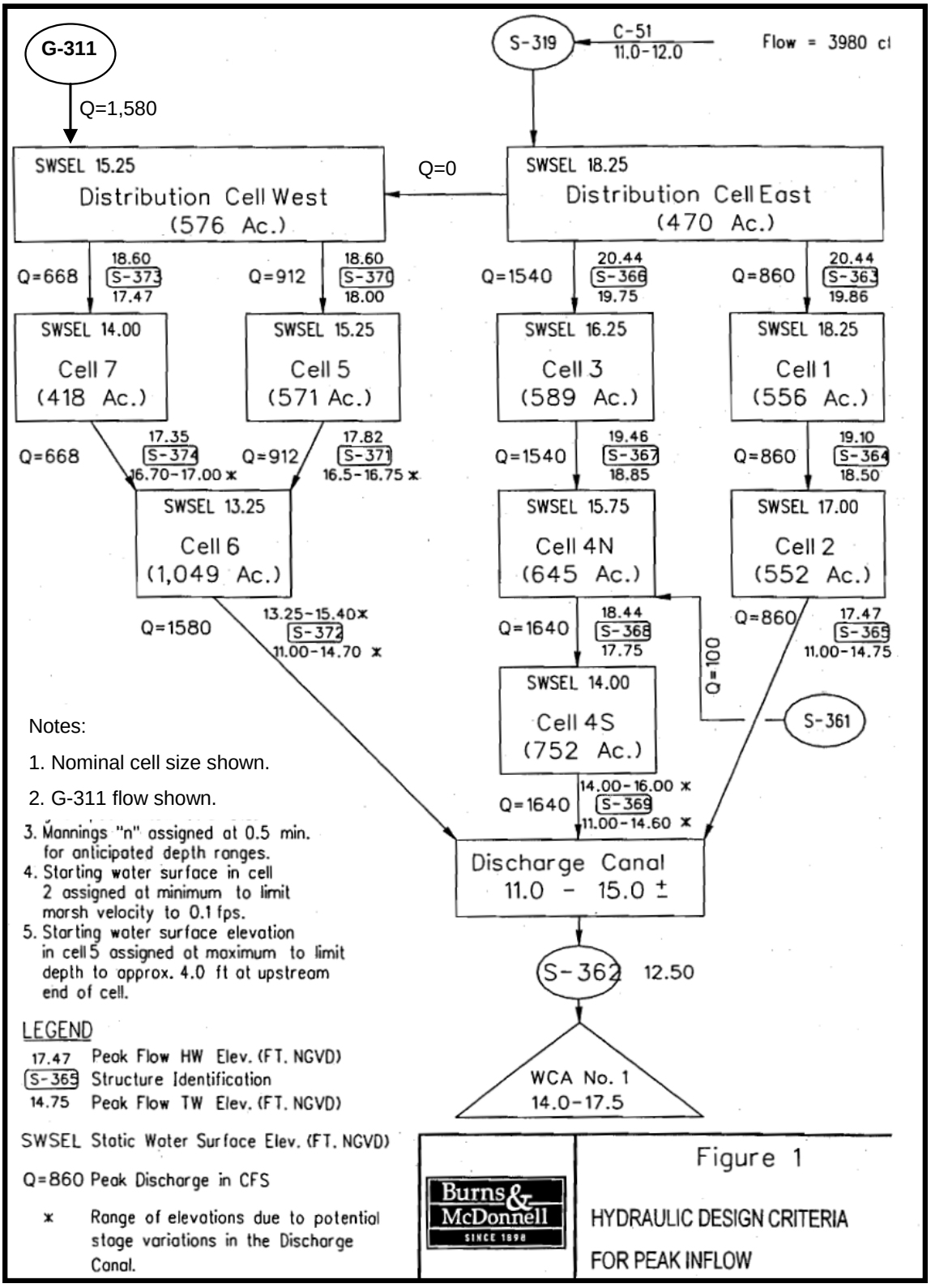
1. avoid overloading the STA;
2. synchronize the operation of STA-1E and STA-1W to avoid overloading STA-1W;
3. terminate diversion of untreated water to the Refuge through G-300 & G-301 except under flood conditions;
4. minimize the capture and treatment of Lake Okeechobee regulatory releases;
5. balance the STA inflows among the operational treatment cells.

To achieve these multiple operational goals of STA-1E, guidance is provided in this Section 3 of the *Interim Operation Plan*.

Avoid Overload of STA-1W and STA-1E. STA-1E and STA-1W should be operated in an attempt to keep their inflows within the range anticipated in the design of enhancements, with an expected mean inflow of approximately 165,000 AF/yr for STA-1E and approximately 180,000 AF/yr for STA-1W. Until L-8 is fully diverted & excess flows and phosphorus loads from the S-5A Basin are resolved, flows to STA-1E and STA-1W may exceed their design range. To avoid the hydraulic or nutrient overload of the STA while at the same time providing regional flood control, the inflow volumes and nutrient loads will be maintained within a range of values anticipated during the design of the STA-1E enhancements, also referred to as the "operational design envelope" (Goforth 2005). Inflow volumes will be proportionately reduced to compensate for the restrictions in flow to Cells 1 and 2 while the Corps conducts the PSTA demonstration project. To assist in avoiding overload to the remaining treatment cells, operational design envelopes were developed and are presented for each flow-way (see Figure 13 and Appendix 3). Use of the operational design envelope will also ensure that runoff from the L-8 basin and Lake Okeechobee releases that are captured by STA-1E will not overload the STA – and that an equivalent volume is discharged east through S-155A. A detailed accounting of L-8 runoff and Lake releases entering STA-1E will be prepared as part of the annual South Florida Environmental Report.

Treatment of L-8 Basin Runoff. The intent of this *Interim Operation Plan* is to utilize the constructed facilities to preserve the existing level of flood protection for the L-8 Basin, including the amount of time to recover control elevations between storms. Nothing herein precludes these facilities from being operated to improve the level of flood protection for the L-8 basin or reduce the amount of time to recover control elevations between storms provided there is available treatment capacity in the STAs and no untreated water is sent to the Refuge.

Figure 12. Design Flows and Stages (Modified from Burns & McDonnell 2000). Stages will vary since actual ground elevations are different than design elevations.



Treatment of Acme Basin B Runoff. At the present time, no modifications to the daily operations of STA-1E are anticipated after the completion of the works necessary to divert runoff from Acme Basin B to STA-1E for treatment, presently scheduled for completion in September 2007.

Structure Operations. Proposed structure operations developed and presented herein represent an initial estimate of those operations necessary to achieve the various operational goals of STA-1E. Due to the interim nature of operations within the first several years, topographic deviations from the design, and the potential for inter-basin transfers, STA-1E will require substantially greater operator intervention to achieve the desired flow distributions than is the case for the other stormwater treatment areas of the Everglades Construction Project. Temporal and spatial variations in the distribution of inflows, as well as in the hydraulic response of the treatment areas as vegetative communities mature, will require periodic review and refinement as needed in structure operations to develop and maintain balanced flow distributions. Short-term deviations from the operations described in this Section are anticipated, as District personal will exercise their best professional judgment based upon existing regional and on-site conditions and data available at the time.

3.2.2 S-319 Operation

During the interim operation period, pump station S-319 will provide the primary inflow to the Central Flow-way of STA-1E. S-319 will also supply water to the Western Flow-way when there is available hydraulic and treatment capacity. After the PSTA demonstration project is completed and flow-through capability is achieved in Cells 1 and 2, S-319 will also provide the primary inflow to the Eastern Flow-way. In general, the operation of S-319, and subsequent operation of STA-1E, is dictated by upstream water conditions. During the wet season, when the tributary basin needs are generally focused on flood control, the stage in the C-51 West Canal is held in the range of 11.0 – 12.0 ft NGVD. During the dry season, when the tributary basin needs are generally centered on water supply, the stage in the C-51 West Canal is held higher, in the range of 11.5 - 12.5 ft NGVD.

During the interim period, S-319 will capture water from multiple sources, including C-51W basin runoff, L-8 basin runoff, Lake Okeechobee, and Acme Basin B upon completion of the diversion works, up to the hydraulic and treatment capacity of the STA; excess water in the C-51 Canal will be released to tide through S-155A. Operations staff indicate that it will be impossible to avoid capturing some Lake Okeechobee regulatory releases prior to the completion of the L-8 reservoir due to the inability to segregate lake releases from basin runoff, particularly when the Lake is above 16.0 ft, which is the general flood stage in the L-8 canal. To ensure that STA-1E is not overloaded, pumping at S-319 will be modulated to maintain the total inflow volume/load at or below the long-term average flows and phosphorus loads anticipated in development of the *Long-Term Plan* (Burns & McDonnell 2003), adjusted for any flow-ways that are off-line. As an example, Figure 13 presents the long-term 30-day cumulative flows and loads for the Central and Western Flow-ways derived from the 31-yr period of record used in the Long-Term Plan; Appendix 3 contains a complete set of design

envelope charts. When the District revises the projected input data sets for STA-1E, the design envelope can be revised accordingly.

Assessments of available pumping capacity will be made on a regular basis by comparing actual inflow volumes and loads with the design envelope values. Flow volumes in excess of the allocation will be discharged to tide through S-155A. In recognition of the potential burden of Lake regulatory releases on STA-1E and the need to preserve sufficient capacity within STA-1E to capture runoff from local storm events, the allocation will be set at a percentage (e.g., 70%) of the long-term average value. Should significant rainfall occur during the allocation period resulting in an increase in stage in the C-51 West Canal above the threshold for flood control operation (12.5 ft NGVD measured at the headwater of S-155A) the allocation target can be suspended, with the understanding that the subsequent allocation will be reduced to reflect the actual pumping volume. This algorithm should allow flexibility to provide improved flood protection in the C-51 West Basin while preserving the anticipated annual range of flows and loads to each flow-way anticipated during design of the enhancements.

Operation of S-319 Using the Allocation. If available capacity exists, as determined by the allocation described above, S-319 will be operated in concert with S-155A to manage the stage in the C-51 West Canal within the general range of 11.0 – 12.0 ft in the wet season, and within the general range of 11.5 – 12.5 ft in the dry season. Should significant rainfall occur during the allocation period resulting in an increase in stage in the western C-51 canal above the threshold for flood control operation (12.5 ft measured at the headwater of S-155A) the allocation targets can be suspended with the understanding that the subsequent allocation will be reduced to reflect the actual pumping volume. To minimize the amount of L-8 runoff entering the STA, structure S-5AE will be closed if a local storm event causes C-51W stages to rise and lake regulatory releases are not being made to tide. Operation of the STA-1E inflow structures will be coordinated to avoid exceeding 4.5 ft deep in the treatment cells, including reducing the pumping units at S-319. To protect the structural integrity of the STA levees, the pumps at S-319 should be shut off if the tailwater stage rises to 23.0 ft.

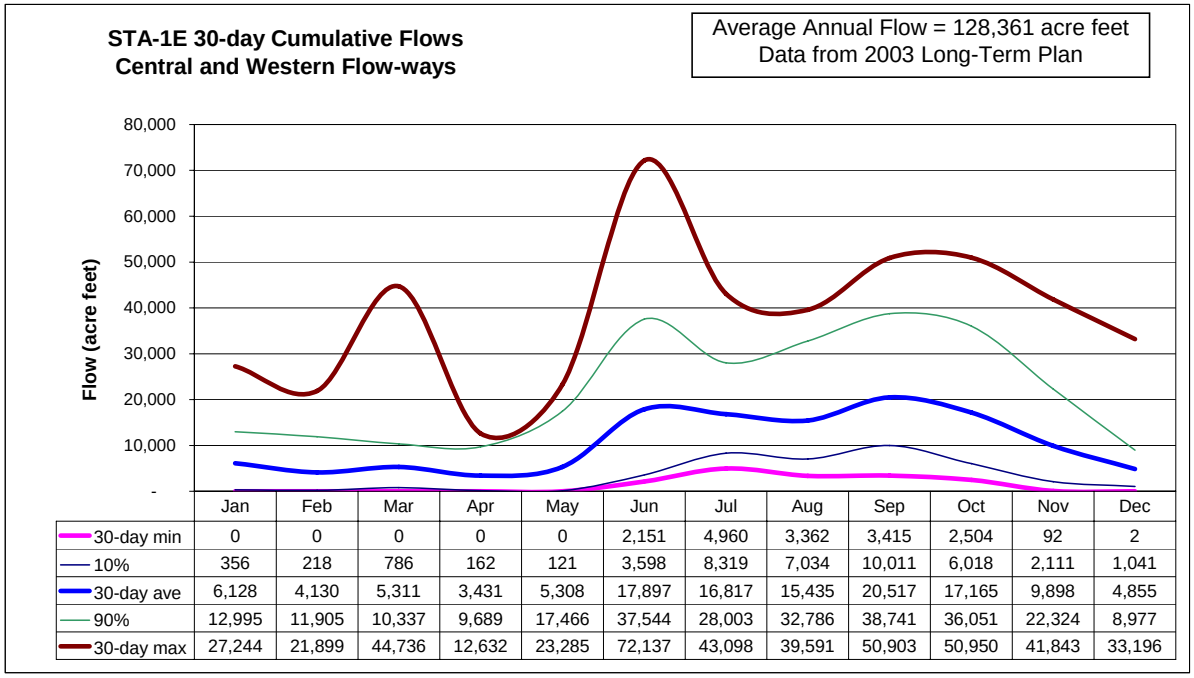
When the need warrants, S-319 can also siphon water from the East Distribution Cell to C-51.

3.2.3 G-311 Operation

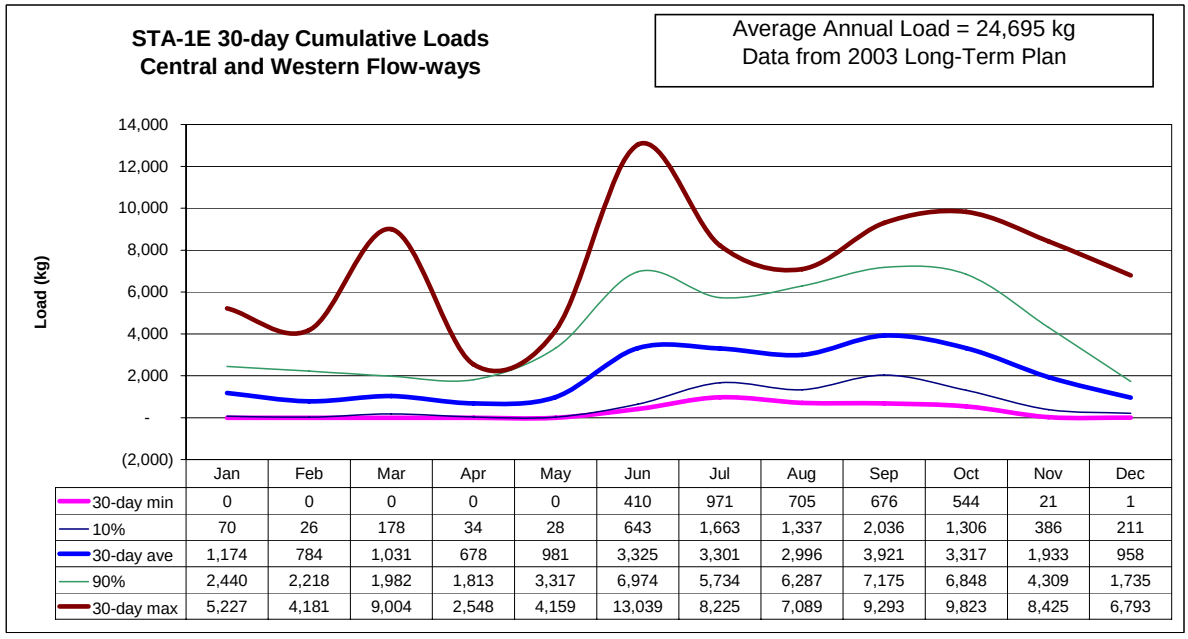
The G-311 spillway is designed to allow bidirectional movement of water between the STA-1 Inflow Basin and STA-1E in order to utilize both of the STAs to treat runoff from the C-51 West and S-5A Basins, prior to discharge into the Refuge. During the interim operation period, structure G-311 will be operated primarily to distribute flow from S-5A and the STA-1 Inflow Basin to STA-1E, and will provide the primary inflow to the Western Flow-way of STA-1E. The design capacity of G-311 is approximately equal to the design peak capacity of the western flow-ways, approximately 1,550 cfs with a headwater elevation (west side of structure) of 19.0 ft and a tailwater stage of 18.75 ft. Until the STA-1W enhancements are completed and the three STA-1W flow-ways are fully operational, discharges from S-5A that are above the capacity of STA-1W and up to approximately 1,580 cfs will be sent to the

western flow-way of STA-1E through G-311. It is necessary to increase the stage that triggers the opening of the G-300 and G-301 diversion structures from elevation 18.0 ft to accommodate the use of G-311. The original design of the structures recommended a gate opening threshold of 19.0 ft, but Operations staff elevation felt that a gate opening stage of 18.5 ft NGVD will provide an increased safety factor for the separation levee.

Figure 13. Cumulative 30-day Inflows to the Central and Western Flow-ways of STA-1E.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	2,151	4,960	3,362	3,415	2,504	92	2
10%	356	218	786	162	121	3,598	8,319	7,034	10,011	6,018	2,111	1,041
30-day ave	6,128	4,130	5,311	3,431	5,308	17,897	16,817	15,435	20,517	17,165	9,898	4,855
90%	12,995	11,905	10,337	9,689	17,466	37,544	28,003	32,786	38,741	36,051	22,324	8,977
30-day max	27,244	21,899	44,736	12,632	23,285	72,137	43,098	39,591	50,903	50,950	41,843	33,196



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	410	971	705	676	544	21	1
10%	70	26	178	34	28	643	1,663	1,337	2,036	1,306	386	211
30-day ave	1,174	784	1,031	678	981	3,325	3,301	2,996	3,921	3,317	1,933	958
90%	2,440	2,218	1,982	1,813	3,317	6,974	5,734	6,287	7,175	6,848	4,309	1,735
30-day max	5,227	4,181	9,004	2,548	4,159	13,039	8,225	7,089	9,293	9,823	8,425	6,793

During the interim operation period, inflow volumes at G-311 will have priority over S-319 for allocation of inflow capacity because of the regulatory and legal requirements to minimize bypass of untreated water to Refuge. At the present time (December 2005), STA-1W is not fully operational due to the recovery from the 2005 & 2005 hurricanes and the construction and grow-in associated with enhancements. The operational intent is to send as much of S-5A discharges to STA-1W as practical without unduly stressing the vegetation during recovery from the hurricanes and implementation of the enhancements. To minimize bypass of untreated water to the Refuge, S-5A discharges in excess of the amount sent to STA-1W will be sent to STA-1E**, as long as the hydraulic and treatment capacities of STA-1E are not exceeded** (see Appendix 3 for the operational design envelopes for the Western Flow-way). Assessments of available capacity in the Western Flow-way will be made on a regular basis by comparing actual inflow volumes and loads with the design envelope values. When STA-1W returns to full operation, a volumetric-based operating decision, e.g., 75% of the S-5A flows to STA-1W and 25% to STA-1E, may be possible.

Movement of water through G-311 and further east through S-375 into the Central and Eastern Flow-ways was not anticipated during the design, and will be limited by the higher ground elevations in the East Distribution Cell, stages in eastern distribution cell, and other conditions.

Transfer between STA-1E and STA-1W. The operation of STA-1E will be synchronized with the operation of STA-1W in order to alleviate overloading of the STA-1E. When sufficient hydraulic and treatment capacity exists in STA-1W, and STA-1E does not have sufficient capacity, water can transfer from STA-1E to STA-1W through G-311 for treatment in STA-1W. To effect this transfer, inflows to the East Distribution Cell from S-319 will be conveyed through S-375 and then through G-311 and the STA-1 Inflow Basin to STA-1W.

3.2.4 S-361 Operation

Pump station S-361 will operate to control elevations in the seepage collection canal and to maintain flood protection for the upstream basin. The pumps at S-361 are programmed to maintain the seepage collection canal between elevations 10.0 and 12.0, as measured at the headwater of S-361. During construction of the PSTA demonstration project, minimal seepage is anticipated as the area will likely not be receiving any inflow. The seepage return and other inflow from S-361 will not count against the inflow allocation for S-319. The pumps at S-361 should be shut off if the tailwater stage (i.e., in Cell 4S) reaches 18.5 ft.

3.2.5 S-155A Operation

S-155A and S-319 will be operated in concert to manage the stage in the C-51 West Canal within the general range of 11.0 – 12.0 ft in the wet season, and within the general range of 11.5 – 12.5 ft in the dry season. Until the L-8 basin runoff is diverted north into the proposed CERP project, an operational goal is for the S-155A divide structure to pass at least the same volume of stormwater to tide as the L-8 canal presently discharges to C-51. This volume is estimated to be approximately 150,000 AF/yr, which will be a mixture of L-8 and C-51W

basin runoff, and Lake Okeechobee releases. The use of the operational design envelope described in Section 3.2.2 above for S-319 pumping allocation should achieve this goal.

Structure S-155A was sized to discharge 1,460 cfs from the Western C-51 Canal Basin to the east with less than one foot of head loss, corresponding to a headwater of 11.5 ft and a tailwater of 10.6 ft NGVD. This design scenario could occur when S-5A discharges are taking up the capacity of Western Flow-way in STA-1E (1,580 cfs) and there is a need for full discharge from the C-51W basin. If there is no capacity to the east through S-155A, the S-5A discharges would have to be sent through G-300 and G-301 instead of into STA-1E, and S-319 pumps would convey the Western C-51 Canal Basin runoff into STA-1E.

The S-155A spillway gates should be opened and closed gradually to provide an even transition to the new flow regime and to minimize hydraulic effects downstream. The tailwater stage should be allowed to build up before the next gate opening operation takes place. The two spillway gates should be operated at the same gate opening.

3.2.6 G-300 & G-301 Operation

The EFA operating permit for STA-1E requires the termination of discharge of untreated water into the Refuge through G-300 & G-301, unless the STA is operated under hurricane warnings, tropical storm warnings, or other extreme weather conditions, and/or when water conditions within STA-1E may damage existing marsh vegetation. STA-1 Inflow Basin structures, G-300, G-301, G-302, and G-311, will be operated to maintain stages below 19.4 ft NGVD within the Inflow Basin. It is necessary to increase the stage that triggers the opening of the G-300 and G-301 diversion structures from elevation 18.0 ft to accommodate the use of G-311. The original design of the structures recommended a gate opening threshold of 19.0 ft, but Operations staff elevation felt that a gate opening stage of 18.5 ft NGVD will provide an increased safety factor for the separation levee. Therefore, flow diversion to the Refuge via structures G-300 and G-301 will begin at an elevation of 18.5 ft NGVD. Other operational strategies may be applied to maintain Inflow Basin stage elevations below 19.4 ft NGVD for events smaller than the SPS and PMS conditions. Structures G-300 and G-301 are intended to act in parallel and discharge 4,800 cfs directly to the Refuge in the event of a need to divert this amount under emergency or extreme inflow and rainfall conditions. They may also be operated during water supply conditions to move water into the Refuge or withdraw water from the Refuge.

3.2.7 S-375 Operation

During the interim operation period, the primary source of inflow to the Western Flow-way will be S-5A discharges through the G-311 structure, and hence, it is anticipated that G-375 will be operated much less frequently than contemplated during design. If available capacity exists in the Western Flow-way, as determined by comparison of actual flows to the operational design envelope for the Western Flow-way (see Appendix 3) and consideration for imminent inflows from G-311, S-375 may be opened to pass water from S-319 into Cells 5 and 7. Movement of water through G-311 and further east through S-375 into the Central and

Eastern Flow-ways was not anticipated during the design, and will be limited by the higher ground elevations in the East Distribution Cell, stages in eastern distribution cell, and other conditions.

3.2.8 General Operation of the Treatment Cells

Balance flows among treatment cells. To optimize STA-1E phosphorus removal performance, the inflows should be balanced among the flow-ways to the extent practical. During the construction and operation of the Corps' PSTA demonstration project, the operation of Cells 1 and 2 will be under the control of the Corps. According to the Operating Plan for the PSTA demonstration project, flows through Cells 1 and 2 will be limited to a maximum of 55 cfs, significantly below the design peak flow of 860 cfs (SAIC 2005). The Eastern Flow-way structures S-363, S-364 and S-365 will remain under the control of the Corps. As long as the PSTA demonstration project restricts flow to the Eastern Flow-way, to the maximum extent practical, the gates at structures S-366, S-370 and S-373 will be modulated to balance inflows among the central and western flow-ways. Regular guidance for allocation of flow to each flow-way will be developed based on a comparison of actual cumulative 30-day flows to the cumulative 30-day flows from the flow-way specific design envelopes based on proportional area of flow-way (see Appendix 3). Due to the interim nature of operations within the first several years, topographic deviations from the design, and the potential for inter-basin transfers, STA-1E will require substantially greater operator intervention to achieve the desired distributions than is the case for the other stormwater treatment areas of the Everglades Construction Project. Temporal and spatial variations in the distribution of inflows, as well as in the hydraulic response of the treatment areas as vegetative communities mature, will require periodic review and refinement as needed in structure operations to develop and maintain balanced flow distributions. Short-term deviations from the operations described in this Section are anticipated, as District personal will exercise their best professional judgment based upon existing regional and on-site conditions and data available at the time.

Operating Depth Ranges. In general, STA treatment cells are designed to have a operational depths between 6 inches and 4.5 feet to encourage colonization by and continued viability of wetland plants and optimize uptake of phosphorus from the stormwater passing through the cells. Site-specific circumstances in STA-1E resulted in deviations from this general guidance, as described below.

Minimum Depth. To the maximum extent practicable, a minimum static water level of 0.5 feet above the average ground elevation of the treatment cells will be maintained to avoid dryout of the treatment cells, subject to available water from the upstream watershed.

Maximum Depth. The design of STA-1E levees considered the relatively large ground slope across the treatment area and the water surface elevation anticipated during storm events. The perimeter levee grades were established at least 5 ft above the approximate average stage based on steady-state modeling of the peak design inflow of 3,980 cfs through the STA. This resulted in maximum depths below 4.5 ft in some cells, primarily those in the Eastern Flow-way. In addition, due to actual ground elevations being less than design average ground

elevations in some cells, the maximum depths at the stages identified during design corresponding to the peak design flow exceed the 4.5 ft limit in Cell 4N and Cell 7, as shown in Table 6. To the maximum extent practicable, a maximum water level of 4.5 feet above the average ground elevation of the treatment cells will not be exceeded to avoid long-term damage to the treatment vegetation and protection of the levees. Hence, the maximum stages in Cell 4N and Cell 7 were revised slightly from the design values in order to avoid exceeding the 4.5 ft maximum depth. The revised maximum stages are presented in Table 7.

Target depths between storm events. Recommended target depths for the different treatment vegetation communities have varied over the years as operating and performance experience has been gained. In general, emergent cells will be maintained at approximately 1.25 ft above average ground level, while SAV cells will be maintained at approximately 1.5 ft above average ground level. Table 7 identifies the average ground elevation, target vegetation community, target depth and associated target stage between storm events for each STA-1E treatment cell. Due to as-built ground elevations below design values in Cell 7, the target depths for Cells 6 and 7 had to be adjusted slightly.

Depth-duration after storm events. To a certain extent, the operation of the inflow and outflow pump stations can be modulated to minimize damage to the treatment vegetation caused by prolonged durations of high water levels; this will optimize long-term treatment performance of the STA. Previously, the operating guidance (and permit condition) for the STAs has been to ensure that water levels are at the maximum depth of 4.5 ft for no more than 10 days, however, concerns have been raised that 10 days at 4.5 ft is too long to maintain viable treatment vegetation. To minimize impacts to STA-1E treatment vegetation and associated treatment performance, the following depth-duration thresholds are proposed during non-flood conditions:

- avoid 4.5 ft for more than 3 consecutive days
- avoid 4.0 ft for more than 7 consecutive days
- avoid 3.5 ft for more than 10 consecutive days

To meet these targets, operational guidance for the outflow pump station is proposed in Section 3.2.9 below.

Table 6. Critical Stages, Depths and Elevations for STA-1E Cells.

Cell	Area (acres)	Design Peak Flow (cfs)	Design Average Gr. El. (ft NGVD)	District Survey Average Ground Elevation (ft NGVD)	Design Average Stage Under Peak Inflow (ft NGVD) (See notes 1 and 2)	Maximum Depth at Design Average Stage (ft)	Exterior Levee Grade (See note 3) (ft NGVD)
East Distribution Cell	470	3,980	N/A	16.49	20.44	3.95	26.00
West Distribution Cell	576	1,580	N/A	14.25	18.68	4.43	24.00
Cell 1 (Note 2)	556	860	17.00	16.79	19.56	2.77	25.00
Cell 2 (Note 2)	552	860	15.75	15.61	18.16	2.55	23.50
Cell 3	589	1,540	15.00	15.49	19.59	4.10	N/A
Cell 4N	645	1,540	14.50	14.04	18.65	4.61	N/A
Cell 4S	752	1,615	12.75	12.57	17.00	4.43	22.50
Cell 5	571	912	14.00	13.81	17.91	4.10	N/A
Cell 6	1,049	1,580	11.90	12.12	16.00	3.88	26.00
Cell 7	418	668	12.75	11.85	17.43	5.58	26.00

Notes: 1. Due to actual ground elevations being different than design average ground elevations, these values are only estimates until further modeling and observations can provide more accurate values.
2. Interior levee grades are set at least 3 ft above these values; exterior levee grades are set at least 5 feet above these stages.
3. Levee grade elevations from Burns and McDonnell Addendum to DDR (2000); elevation shown is lower of exterior levees, if more than one is present.
4. Average ground elevations are the arithmetic average of the surveyed data points and may differ from the spatially-average ground elevation.

Table 7. Target Stages in STA-1E.

Cell	Area (acres)	Design Average Gr. El. (ft NGVD)	District Survey Average Ground Elevation (ft NGVD)	Target Vegetation	Target Depth (ft)	Target Stage (See note 4) (ft NGVD)	Minimum Stage (ft)	Maximum Stage (See note 5) (ft)	Maximum Operational Depth (See note 5) (ft)	Structure Measured for Targets (HW)
East Distribution Cell	470	N/A	16.49	N/A	N/A	N/A	N/A	N/A	N/A	
West Distribution Cell	576	N/A	14.25	N/A	N/A	N/A	N/A	N/A	N/A	
Cell 1 (Note 2)	556	17.00	16.79	Emergent	1.25	18.04	17.29	19.56	2.77	S-364
Cell 2 (Note 2)	552	15.75	15.61	SAV	1.50	17.11	16.11	18.16	2.55	S-365
Cell 3	589	15.00	15.49	Emergent	1.25	16.74	15.99	19.59	4.10	S-367
Cell 4N	645	14.50	14.04	SAV	1.50	15.54	14.54	18.54	4.50	S-368
Cell 4S	752	12.75	12.57	SAV	1.50	14.07	13.07	17.00	4.43	S-369
Cell 5	571	14.00	13.81	Emergent	1.25	15.06	14.31	17.91	4.10	S-371
Cell 6	1,049	11.90	12.12	SAV	1.23	13.35	12.62	16.00	3.88	S-372
Cell 7	418	12.75	11.85	Emergent	1.50	13.35	12.35	16.35	4.50	S-374

Notes: 4. Unless otherwise noted, operating ranges are +/- 0.2 ft of target stage. Cells 1 and 2 will be operated by the Corps until the PSTA demonstration project is completed.
5. The proposed maximum operational stages in Cells 2 and 7 are lower than the design average stage under peak flow due to the 4.5 ft maximum depth constraint; these may be revised after analysis of new modeling results.
6. Average ground elevations are the arithmetic average of the surveyed data points and may differ from the spatially-average ground elevation.

3.2.9 Outflow Pump S-362 Operation

Pump station S-362 is the primary outlet for STA-1E, and will be operated to maintain water levels in the discharge canal upstream of the pump station generally between 11 ft and 15 ft. The operating permit requires that until the Corps' L-40 Mitigation Work is completed and shown to be effective, and except as necessary to avoid or recover from upstream flooding conditions, discharges from STA-1E should be limited to minimize impacts to presently unimpacted area. One operational aspect that will assist in minimizing these impacts is continuous (i.e., 24-hour per day) pumping in lieu of more routine 8-hr pumping shift and 16 hours of non-pumping in a 24-hour period. Continuous pumping utilizes one-third the pumping rate for the same volume in a 24-hr period, with associated reductions in downstream velocities and reductions in treatment cell pulsing. In addition, modeling conducted by the Corps indicated that higher pumping capacities increase the hydraulic impacts within the interior of the marsh, hence the continuous (24-hour) pumping operation is likely to minimize impacts to the Refuge, and therefore will be implemented as often as practical.

Flood Conditions. When necessary to avoid or recover from upstream flooding conditions (i.e., when C-51 Canal stage of 12.5 ft at S-155A), including pre-storm drawdown and lowering water levels in anticipation of a wind event to minimize wind erosion of levees, there will be no limit on the pumping rate at S-362.

Non-flood Conditions. When not necessary to avoid or recover from upstream flooding conditions, it is proposed that discharges shall be initially limited to 550 cfs. To minimize damage to the treatment vegetation caused by prolonged durations of high water levels and to ensure optimal long-term treatment capacity, additional pumping units will be turned on if the following depth-duration thresholds are likely to be met in any of the treatment cells:

- avoid 4.5 ft for more than 3 consecutive days
- avoid 4.0 ft for more than 7 consecutive days
- avoid 3.5 ft for more than 10 consecutive days

If additional pumping units are required, the relation between the most recent 30-day flow-weighted mean discharge total phosphorus concentration, the tailwater stage, and the discharge rate expressed in Table 9 and Figure 14 shall be used as a guide. If turning on additional pumping units S-362 doesn't achieve the desired depth-duration, pumping will be reduced at S-319, as long as the C-51 Canal is not in flood protection mode, i.e., the stage at the headwater of S-155A will remain less than 12.5 ft.

In addition, operations will allow for an adequate rest period following periods of prolonged duration at high depth within the treatment cells.

Table 8. Proposed S-362 Discharge Limitations During non-flood Conditions.

S-362 Tailwater Stage (ft NGVD)	Most Recent 30-day Flow-weighted Mean TP (ppb)	Discharge Limit (cfs)	Possible Combination of Pumps
< 14.5	<10	4,200	All units
	10<TP<20	3,650	3@960 & 1@550 & 2@110
	20<TP<30	3,020	2@960 & 2@550
	30<TP<40	2,470	2@960 & 1@550
	40<TP<50	2,060	2@960 & 1@110
	>50	1,620	1@960 & 1@550 & 1@110
14.5 < TW < 16	<10	4,200	All units
	10<TP<20	3,020	2@960 & 2@550
	20<TP<30	2,470	2@960 & 1@550
	30<TP<40	2,060	2@960 & 1@110
	40<TP<50	1,620	1@960 & 1@550 & 1@110
	>50	960	1@960
>16	<10	4,200	All units
	10<TP<20	2,470	2@960 & 1@550
	20<TP<30	2,060	2@960 & 1@110
	30<TP<40	1,620	1@960 & 1@550 & 1@110
	40<TP<50	960	1@960
	>50	550	1@550

Pre-storm draw down. The intent of a pre-storm drawdown of the STA-1E cells is to provide storage in STA-1E prior to a heavy rainfall event. Pre-storm draw downs may be based on National Weather Service Advisories. If storage in the STA-1E can be created by discharging treated water to WCA-1 prior to the storm event, pre-storm draw downs may be initiated. If a major storm is predicted, the outflow culverts should be opened such that the water levels in the treatment cells are reduced to, or below, the target stages in Table 7.

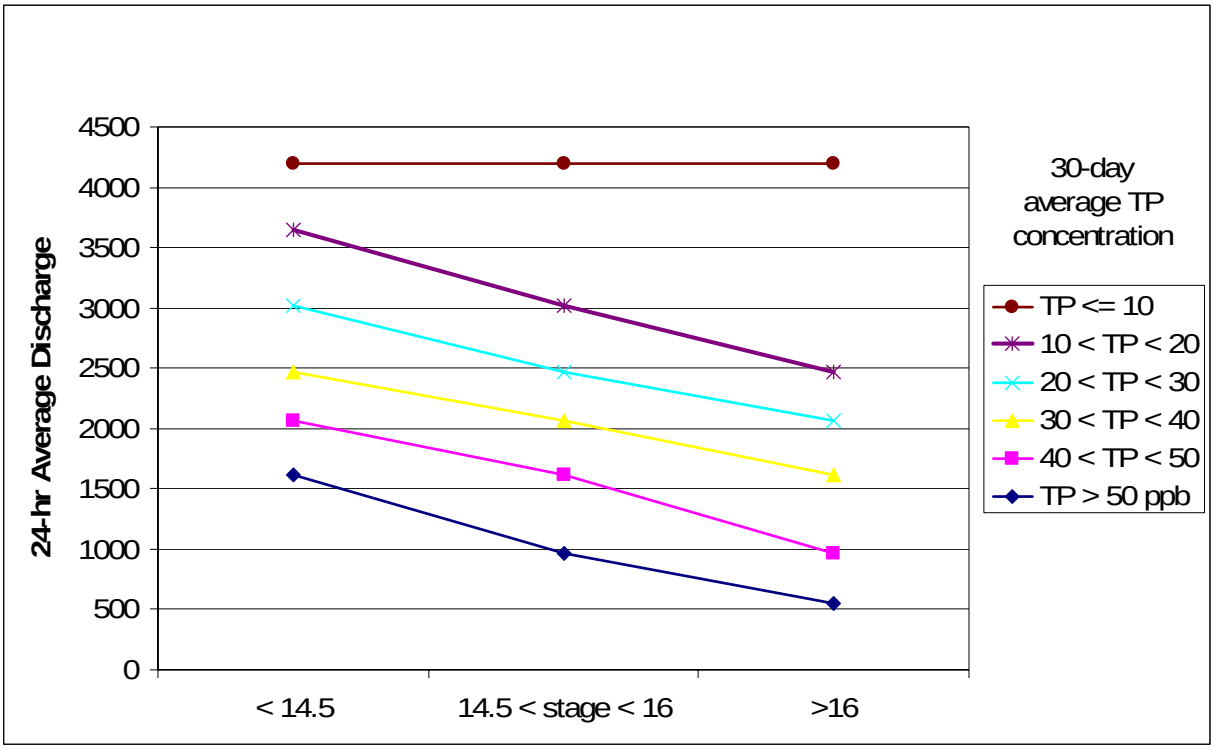
Maintenance operations. Exercising the pumping units is authorized by the EFA operating permit for maintenance purposes. It is anticipated that this operation would be conducted during non-flood conditions and subject to the 550 cfs limitation. Since operation of the 960 cfs pumps would occur, back-siphoning through one or more of the flap gates at S-362 could be done during maintenance pumping to keep a net flow at 550 cfs or less.

3.2.10 Seepage Control Facilities

Pump station S-361 has been programmed to maintain the seepage collection canal between elevation 10-12 ft NGVD. The flashboards in S-376 and S-377 will be adjusted seasonally to assist in the maintaining the seepage along the eastern perimeter of the project. Both S-376 and S-377 were also designed to allow conveyance of water supply from C-51 Canal to the

Rustic Ranches subdivision and the agricultural lands located directly east of Cell 4S, and the flashboards will need to be adjusted seasonally to assist in this conveyance.

Figure 14. Proposed Discharge Limitations at S-362 During Non-Flood Conditions.



Summary of Operations During Normal Conditions

- Inflow pump station S-319 will be operated in an attempt to keep the inflow volumes and phosphorus loads within the range anticipated in the design of performance enhancements.
- During the interim period, G-311 will be operated in concert with STA-1W structures to minimize bypass of untreated water to the Refuge; S-5A discharges in excess of the amount sent to STA-1W will be sent to STA-1E, as long as the hydraulic and treatment capacities of STA-1E are not exceeded.
- STA-1E cell inflow structures S-363, S-366, S-370, and S-373 will be opened accordingly to allow up to a maximum inflow of 3,980 cfs.
- Through 2008, the Corps of Engineers will be responsible for coordinating operation of Cells 1 and 2 to support a PSTA demonstration project.
- STA-1E treatment cell inflow/interior/outflow flow control structures will be opened accordingly to achieve the target stages in Table 7, and to maintain stages within the minimum and the maximum range identified in Table 7.
- Seepage return pumping via S-361 will occur as required; the flashboards at S-376 and S-377 will be adjusted seasonally to assist in maintaining the seepage along the eastern perimeter and providing water supply to lands adjacent to Cell 4S.
- STA outflow pumping via S-362 will occur as required.

3.3 EXTREME FLOW OPERATION

Discretion in the operation of STA-1E structures is reserved by the District Operations staff to operate STA-1E as necessary to account for flood protection, excess precipitation and upstream and downstream conditions. The following discussion is offered only as general guidance.

STA-1E has been designed to accommodate estimated flows resulting from extreme precipitation events, the Standard Project Storm (SPS) and the Probable Maximum Storm (PMS) as described below (Burns & McDonnell 1995). Inflows resulting from precipitation events smaller than the SPS and PMS events should fall under "Normal Operating Conditions" for the STA. Stages within STA-1E will rise and fall with the passing of the extreme storm event, and will be influenced by the rainfall amount, the stage at the initiation of rainfall, the operations during the event, and the volume of pumping before and during the event.

Diversion to WCA-1. Under certain extreme hydrologic conditions, such as concurrent flooding in both the C-51 and S-5A basins, it could be possible that both STA-1E and STA-1W exceed their ability to accept water from western C-51 Basin, and S-5A basins. In those cases, then water may be diverted directly to WCA-1 through G-311, G-300, and G-301. Within 48 hours of implementation, this operation should be discussed with Refuge personnel, as appropriate. Coordinated operations of G-311, G-300, G-301 and G-302 will be necessary for these diversion activities.

3.3.1 Standard Project Storm

The Standard Project Storm (SPS; 120% of the 100 year/24-hour storm) rainfall depth is estimated as 23.6 inches for a 24-hour duration. For the purpose of this *Interim Operation Plan*, it is assumed that Cells 1 and 2 would be used to their full hydraulic capacity if an SPS event occurred prior to the completion of the PSTA demonstration project. For the 1995 General Design Memorandum, Burns & McDonnell simulated the flows and associated stages in STA-1E for the SPS, although with slightly different flows and cell configuration – Cell 7 separated from Cells 5 and 6. (Note – the District is currently conducting 2-dimensional hydraulic modeling of STA-1E; results will be reported when finalized.) Treatment cell stages at the beginning of the 24-hour SPS event were simulated at the maximum design operational stages. Discharges from each cell were assumed to be fixed at the design peak flows (listed in Table 7) due to the limitation on the outflow pumping capacity, and the rise in stage within each cell was simulated. No discharge was simulated through S-155A, as it was assumed that the eastern C-51 Basin was in flood control mode. A discharge of 495 cfs from STA-1E through G-311 into the STA-1 Inflow basin was assumed, and the G-300/G-301 diversion structures were open. During an SPS event the maximum pumping into the East Distribution Cell via S-319 is restricted to the design discharge of 3,980 cfs. The simulated flows and stages are presented in Table 10.

The draft Water Control Plan for STA-1E lists the Standard Project Flood (SPF) headwater stage for S-319 at 19.2 and the tailwater (i.e., inside the EDC) at 23.1 ft (USACE 2005).

Based on the above, during an SPS event, all the inflow, outflow, and internal structures should be operated at maximum capacities. If a major storm is predicted, the outflow culverts should be opened such that the water levels in the treatment cells are reduced to at or below the static water level.

Table 9. Simulated Stages for the Standard Project Storm (Burns & McDonnell 1995)

Structure	Flow (cfs)	Max. Headwater (ft)	Max. Tailwater (ft)
G-311	495 (east to west)	19.4	20.1
G-300	1,580	19.4	19.0
G-301	3,600	19.4	19.0
S-375	1,795	22.2	20.2
S-362	Approx. 3,740	17.9	18.9
S-361	63	12.3	19.3
S-363	830	22.1	21.4
S-364	830	21.1	20.9
S-365	830	20.75	18.3
S-366	1,360	22.2	20.6
S-367	1,360	19.7	19.4
S-369	1,360	19.1+/-	18.1 +/-
S-370	1,100	20.2	19.4
S-371	1,100	19.1	18.8
S-372	1,100	18.5+/-	18.2 +/-
S-373	450	20.1	19.2
S-374	450	18.7	18.3

Slightly different flows and cell configuration – Cell 7 separated from Cells 5 and 6.

Summary of STA Structure Operations During SPS Event:

- STA-1E inflow Pump Station S-319 will be operated, allowing up to maximum inflow of 3,980 cfs to the East Distribution Cell. Of this flow 1,795 cfs will be conveyed to the West Distribution Cell
- All inflow/interior/outflow flow control structures will be fully opened.
- Operational discretion for structure operations is reserved by the District Operations staff, to account for flood protection, excess precipitation and upstream and downstream conditions.

3.3.2 Probable Maximum Storm

The Probable Maximum Storm (PMS) rainfall depth is estimated as 47.2 inches for a 24-hour duration. For the purpose of this *Interim Operation Plan*, it is assumed that Cells 1 and 2

would be used to their full hydraulic capacity if an SPS event occurred prior to the completion of the PSTA demonstration project. For the 1995 General Design Memorandum, Burns & McDonnell simulated the flows and associated stages in STA-1E for the SPS, although with slightly different flows and cell configuration – Cell 7 separated from Cells 5 and 6. Treatment cell stages at the beginning of the 24-hour SPS event were simulated at the maximum design operational stages. Discharges from each cell were assumed to be fixed at the design peak flows (listed in Table 7) due to the limitation on the outflow pumping capacity, and the rise in stage within each cell was simulated. It was assumed that flow over the interior levees would occur from Cells 1 and 2 to the west. No discharge was simulated through S-155A, as it was assumed that the eastern C-51 Basin was in flood control mode. During a PMS event the maximum pumping into the East Distribution Cell via S-319 is restricted to the design discharge. A discharge of 3,600 cfs from STA-1E through G-311 into the STA-1 Inflow basin was simulated, as it was assumed that the STA would not be able to accommodate the S-319 inflows on top of the precipitation, and the G-300/G-301 diversion structures were open. The maximum stage in Cells 3-7 was calculated to be 21.5 ft considering both direct rainfall on those cells and excess rainfall diverted from Cells 1 and 2 over the interior levees. The simulated flows and stages are presented in Table 11.

The draft Water Control Plan for STA-1E lists the headwater stage for S-362 at 21.5 ft, consistent with the water surface elevation calculated by Burns & McDonnell in 1995 (USACE 2005).

Based on the above, during an SPS event, all the inflow, outflow, and internal structures should be operated at maximum capacities. If a major storm is predicted, the outflow culverts should be opened such that the water levels in the treatment cells are reduced to at or below the static water level.

Table 10. Probable Maximum Storm (Burns & McDonnell 1995)

Structure	Flow (cfs)	Max. Headwater (ft)	Max. Tailwater (ft)
G-311	3,600 (east to west)	20.6	21.5
G-300	1,475	20.6	20.0
G-301	3,325	20.6	20.0
S-375	3,600	23.1	22.2
S-319	Approx. 3,600	C-51 Canal	22.2
S-362	Approx. 3,740	21.5	21.0
S-361	<63	12.3	21.5
All Cells	See SPS table above	21.5	21.5

Slightly different flows and cell configuration – Cell 7 separated from Cells 5 and 6.

3.4 DROUGHT OPERATIONS

3.4.1 General operation during droughts

Subject to water availability, operations of the STA should maintain water depths at a minimum of 0.5 feet above the average ground elevation in the treatment cells to minimize potential negative effects of dry out on project performance. The ability to maintain this minimum water elevation is determined primarily by the availability of water from the upstream watershed and on local rainfall. In the extreme case that there is no water available from the upstream watershed and/or from rain, the treatment cells may dry out. The severity and duration of the dry conditions that may lead to reduced project performance is currently unknown, as is the magnitude and duration of the potential depression of project performance. Analysis of the monthly compliance monitoring data collected at the project outflow monitoring station will be useful in making these determinations.

To the greatest extent practicable operations of STA-1E will maintain stages at or above 0.5 feet above the average ground elevation in the treatment cells to minimize potential negative effects of drought on subsequent project performance (see Table 8).

Operating the STA at the recommended target depths in Table 8 will help achieve this goal. The ability to maintain this minimum water elevation is determined primarily by the availability of water from the upstream watershed and on rainfall. In the extreme case that there is no water available from the upstream watershed and/or from rain, the treatment cells may dry out. After an extended dryout, there is a potential that the water quality improvement performance of subsequent discharges of water from treatment cells may be adversely affected. The severity and duration of the dry conditions was analyzed by Burns and McDonnell (2000), during their initial design, for the thirty year period of record (1965-1995). The simulated magnitude and duration of the dry-out period (water depth below 6 inches) is given below in Table 12.

If the 12-month flow-weighted average Total Phosphorus concentration exceeds FDEP permit compliance requirements and this exceedance can be related to dryout, then the Annual Report will identify the causes and specify remediation measures.

Table 11. Magnitude and duration of dry-out period (1966-95).

Treatment Cell	Average Annual Water Deficit, Acre-ft	Average Annual Dry-out period (Days)
1	218	22
2	2067	102
3	6	1
4N	205	21
4S	0	0
5	8	1
6	0	0
7	0	0

3.4.2 Operations Following STA Dry Out

Management activities following a dry out will vary depending on the severity of the drought and the attendant loss of vegetation. For mild to moderate loss of vegetation, slowly raising depths to 1.0 ft is recommended. For severe loss of vegetation, it may be necessary to limit the initial depth to 0.5 ft to promote re-establishment desirable vegetation. The length of time to retain water in the STA before initiating flow-through should be based on achieving a net reduction in the weekly phosphorus concentrations. This recommendation should be revisited periodically to ensure it is achieving water quality goal of annual net improvement.

3.4.3 Responding to Dryout Conditions

In accordance with the State operating permit Specific Condition 10, the District shall evaluate and correct adverse dryout effects on the water quality performance of STA-1E. If the compliance requirements in the permit are not met due to dryout conditions, then the District shall propose modifications to the *Interim Operation Plan* as appropriate and submit the revised plan to the Department.

Summary of Operations During Drought Events:

- Structures S-363, S-366, S-370 and S-373 are maintained open to allow for available inflows to enter project treatment cells.
- Outflow Structures S-365, S-369 and S-372 will be closed to detain available water within treatment cells.
- All treatment cell interior structures will remain open.
- Outflow pump station S-362 will not discharge until desirable water levels and vegetative conditions within treatment cells have improved allowing for treatment cell discharge.

3.5 WATER SUPPLY OPERATION

It is hydraulically possible to provide water quality treatment of Lake Okeechobee deliveries prior to release to the Refuge should that be desired. There has been a significant increase in water supply deliveries from Lake Okeechobee to the Refuge over the last 15 years, estimated to have increased by about 40,000 acre feet per year greater than water supply deliveries during the 1979-88 base period (Burns and McDonnell 2005). In an effort to minimize the delivery of Lake water (and phosphorus) to the Refuge, the District recently evaluated the use of pumps along C-51W just east of STA-1E, and coordination of STA-1E operations will be necessary if permanent pumps are put in place.

If treatment of Lake water sent to the Refuge to meet the WCA-1 Regulation Schedule is required, STA-1E could help to treat this water prior to its discharge, however, ***it is recommended that the use of STA-1E and STA-1W for treatment of water supply deliveries prior to entering the Refuge be discussed with the Technical Oversight Committee to ensure all parties are aware of the water quality ramification of the treatment of this water, and the potential impacts to Settlement Agreement compliance.*** If treatment is not needed, flexibility

is available in the STA-1 Inflow Basin facilities to move Lake Okeechobee water through S-5A into STA-1E and out to the C-51 Canal via siphoning at S-319 to supplement water supply for the region.

When S-5AE releases are insufficient to meet water supply demands in the western C-51 basin, S-155A will be closed and S-319 will cease pumping to maintain higher stages in western C-51. The stage in C-51, from structure S-5AE to S-155A, can be maintained during dry conditions between 8.5 and 9.0. S-155A may be operated to provide water to the eastern C-51 basin and to maintain the optimum stage in eastern C-51 at 8.5. This will provide substantial additional groundwater recharge during dry conditions to meet public water supply needs and develop and preserve wetland systems.

In addition, Lake Okeechobee releases could be sent to STA-1E if advantageous to convey water to the C-51W canal. When C-51W is not in flood control mode, Lake water could be conveyed through S-5A and then through G-311 for discharge by siphoning through S-319 into C-51W canal to meet downstream water supply demand or discharge regulatory releases to tide.

3.6 TREATMENT CELLS OUT OF SERVICE

Treatment cells and/or flow-ways may be isolated, or "taken off-line", when deemed necessary or desirable. Cells 1 and 2 can be taken off-line by closing structures S-363 A-C and S-364 A-C. Cells 3, 4N, and 4S can be taken off-line by closing structures S-366 A-E, S-367 A-E, and S-368 A-E. Cells 5, 6, and 7 can be taken off-line by closing structures S-370 A-C; S-371 A-C and S-374 A-C; and S-373 A-B.

3.7 NUTRIENT REMOVAL PERFORMANCE OPTIMIZATION

Operations shall be conducted to distribute the flows and water levels within STA-1E to optimize the phosphorus reduction performance and shall be updated as necessary to include the results of the District's Process Development and Engineering (PD & E) program being implemented as a part of the Long-Term Plan (SFWMD 2003).

3.8 WCA HYDROPATTERN RESTORATION

Upon the completion of the STA-2, discharges from the S-6 pump station were diverted from the Refuge to STA-2 for treatment and subsequent discharge to WCA-2A. Discharges from STA-1E shall serve to make up for the deficit created by the implementation of the S-6 diversion, consistent with the overall restoration goal of bringing more water into the Everglades system. STA-1E discharges are consistent with the hydropattern restoration provisions of Rule 62-302.540(7)(b), Florida Administrative Code.

In accordance with Subsection (4)(b) of the EFA, the SFWMD shall operate the STAs in order to improve and restore the Everglades water supply and hydroperiod. STA-1E shall be operated to achieve the goal of providing additional flows to the Everglades Protection Area and shall, to the maximum extent practicable, be coordinated with and consistent with the Lower East Coast Water Supply Plan, the Lake Okeechobee and Water Conservation Areas Regulation Schedules, and the Comprehensive Everglades Restoration Plan. To help achieve this goal STA-1E shall be operated to capture and treat water from the western C-51 Basin that previously was lost to tide. In the interim period until L-8 Basin runoff is diverted, some C-51W runoff will continue to go to tide.

3.9 DEVIATIONS FROM THE OPERATION PLAN

This *Interim Operation Plan* for STA-1E is meant to be updated regularly based on field observations of stage-flow relationships, structure flow calibrations, STA performance and other factors. Best professional judgment on the part of the District's Operations staff shall be used in the operation of the STA structures to deviate from these guidelines to account for flood protection, excess precipitation, site specific conditions, and upstream and downstream conditions. It is anticipated that after the first year of flow-through operation, and annually thereafter, this *Interim Operation Plan* will be reviewed to identify any needed revisions.

3.9.1 Deviations from the Water Control Plan

The Corps of Engineers developed a Water Control Plan for STA-1E (USACE 2005). Deviations from that Water Control Plan may require advanced notification and approval from the Corps, as discussed below.

3.9.2 Deviation from Normal Operation

The USACE, Jacksonville District Engineer is occasionally requested to deviate from the normal regulation of the project. Prior approval for a deviation is to be obtained from the Jacksonville District Office (SAJ) except as noted below. The Jacksonville District Office will in turn obtain the necessary approvals from the South Atlantic Division (SAD) except as noted below. Deviation requests usually fall into the following categories:

EMERGENCIES. Some emergencies that can be expected include drowning and other accidents, failure of project facilities, and flushing of pollutants. Antecedent conditions, as well as forecasted storm events, may result in SFWMD declaring an Emergency Authorization Order which would result in an Emergency Deviation. Necessary action under emergency conditions is taken immediately, unless such action would create an equal or worse condition. The Jacksonville District Office should be informed as soon as practicable. Written confirmation should be furnished after the incident. SAJ will report these deviations to SAD.

UNPLANNED MINOR DEVIATIONS. There are unplanned instances where there is a temporary need for a minor deviation from normal regulation, although they are not considered

emergencies. A change in releases is sometimes necessary for construction, maintenance, or inspection. These requested deviations are usually for duration of a few hours to a few days. Each request is analyzed on its own merits. Consideration is given to upstream watershed conditions, potential flood threat, conditions of lakes, and possible alternative measures. In the interest of maintaining good public relations, the request is complied with, providing there are no adverse effects on the overall project regulation for authorized project purposes. Approval for minor deviations will normally be obtained from the Jacksonville District by telephone. A written confirmation will be furnished after the deviation is completed. SAJ will report these deviations to SAD.

PLANNED DEVIATIONS. Each condition 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 will be presented to the Jacksonville District along with recommendations for review and approval. SAJ will report these deviations to SAD and obtain approval.

In light of the uncertainty in specifying operating criteria necessary to optimize phosphorus removal in STA-1E, the SFWMD should seek the authority to refine the operations described in this plan without seeking Corps approval, as long as those operations are within the overall range of water depths and flows anticipated in the project design documents. The following text is recommended for incorporation into the Water Control Plan:

> "In order to meet the project treatment objectives it may be necessary for SFWMD to make deviations due to change in local conditions or inaccuracies discovered in the WCP. In general these deviations would be of a corrective nature within the overall range of water depths and flows anticipated in the project design documents, and done with the intent of improving the ability of the SFWMD to meet project objectives. Written notification of these deviations will be provided to the Jacksonville District Office, who will report these deviations to SAD."

4 OPERATING PERMITS

4.1 EVERGLADES FOREVER ACT PERMIT

On August 30, 2005, the Florida Department of Environmental Protection (FDEP) issued an Everglades Forever Act permit 0195030 to the SFWMD for the construction, operation and maintenance of STA-1E. Relevant provisions of that permit are included in Appendix 4.

4.2 NPDES PERMIT

On August 30, 2005, the Florida Department of Environmental Protection (FDEP) issued an Industrial Wastewater Facility permit FL0304549 to the SFWMD for STA-1E that authorizes discharge under the National Pollutant Discharge Elimination System (NPDES). Relevant provisions of that permit are included in Appendix 4. The STA-1E Project shall be operated in accordance with the Pollution Prevention Plan (PPP) developed for STA-1E as part of the NPDES permit application. The PPP is included in its entirety as Appendix 5. If the permitted facilities are demonstrated to not be achieving compliance with the requirements of this permit, the permittee shall modify the PPP or the Operations Plan as appropriate.

5 COORDINATION WITH OTHER PLANS

STA-1E shall be operated to achieve the goal of providing additional flows to the Everglades Protection Area and shall, to the maximum extent practicable, be coordinated with and consistent with the Lower East Coast Water Supply Plan, the Lake Okeechobee and Water Conservation Areas Regulation Schedules, and CERP. As modifications to the Central and Southern Florida Project are analyzed through the Lower East Coast Regional Water Supply Plan, Lake Okeechobee and Water Conservation Areas Regulation Schedule, and CERP, the hydraulic and treatment capacities of the current STA designs will be evaluated. If it is deemed necessary, these studies will recommend additional treatment facilities. The operational plans for the STAs will be reviewed by SFWMD staff involved with the aforementioned studies, and modified for consistency with said studies accordingly.

In addition, the operation of STA-1E should be coordinated with two documents developed by the USACE:

1. Operations, Maintenance, Repair, Replacement, and Rehabilitation Manual
2. DRAFT Stormwater Treatment Area 1-East (STA-1E) Water Control Plan.

Finally, there may be aspects of operations that need to be coordinated with the *Vegetation Management Plan for STA-1E* developed by District staff.

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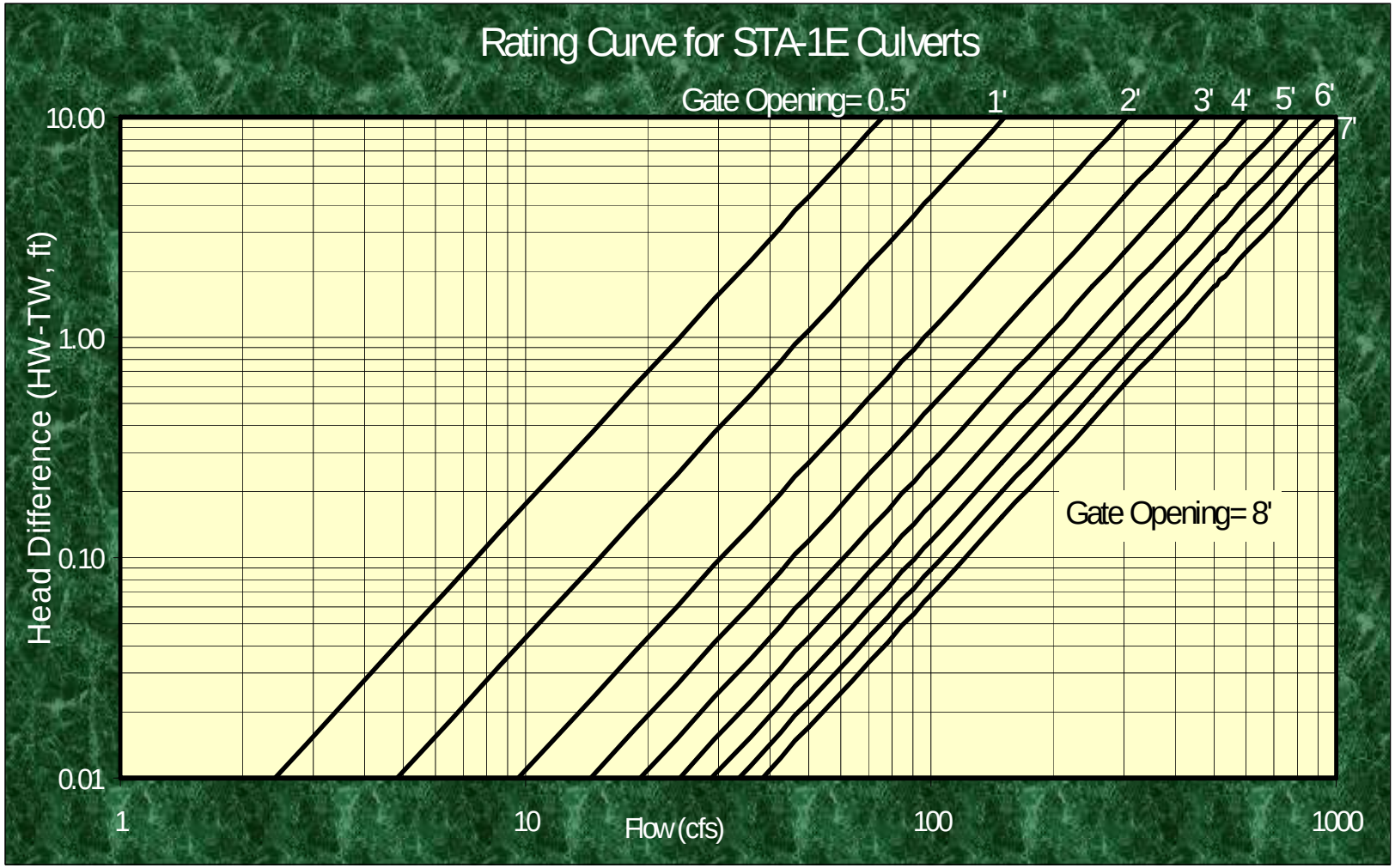
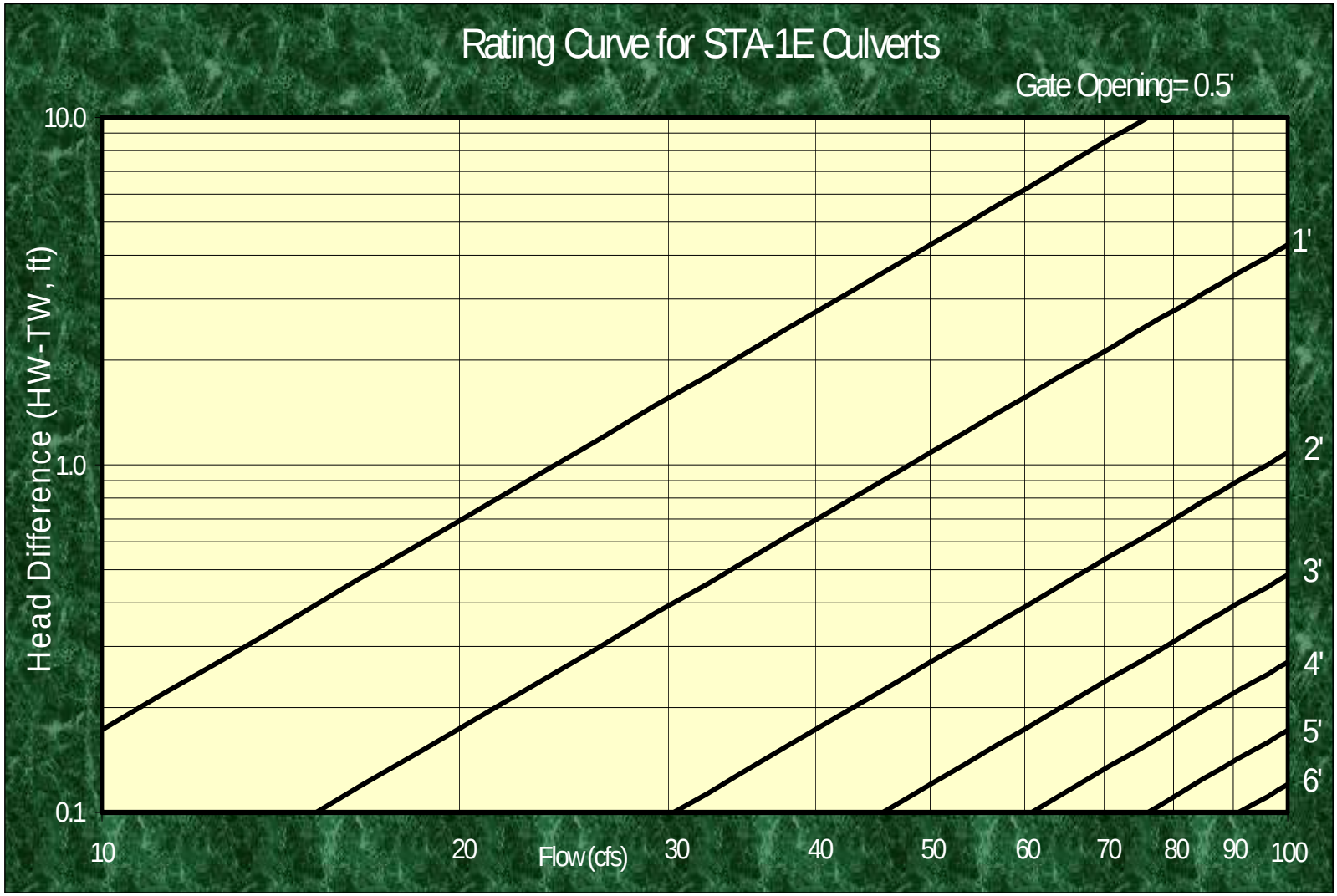
APPENDIX 1 - STRUCTURE RATING CURVES

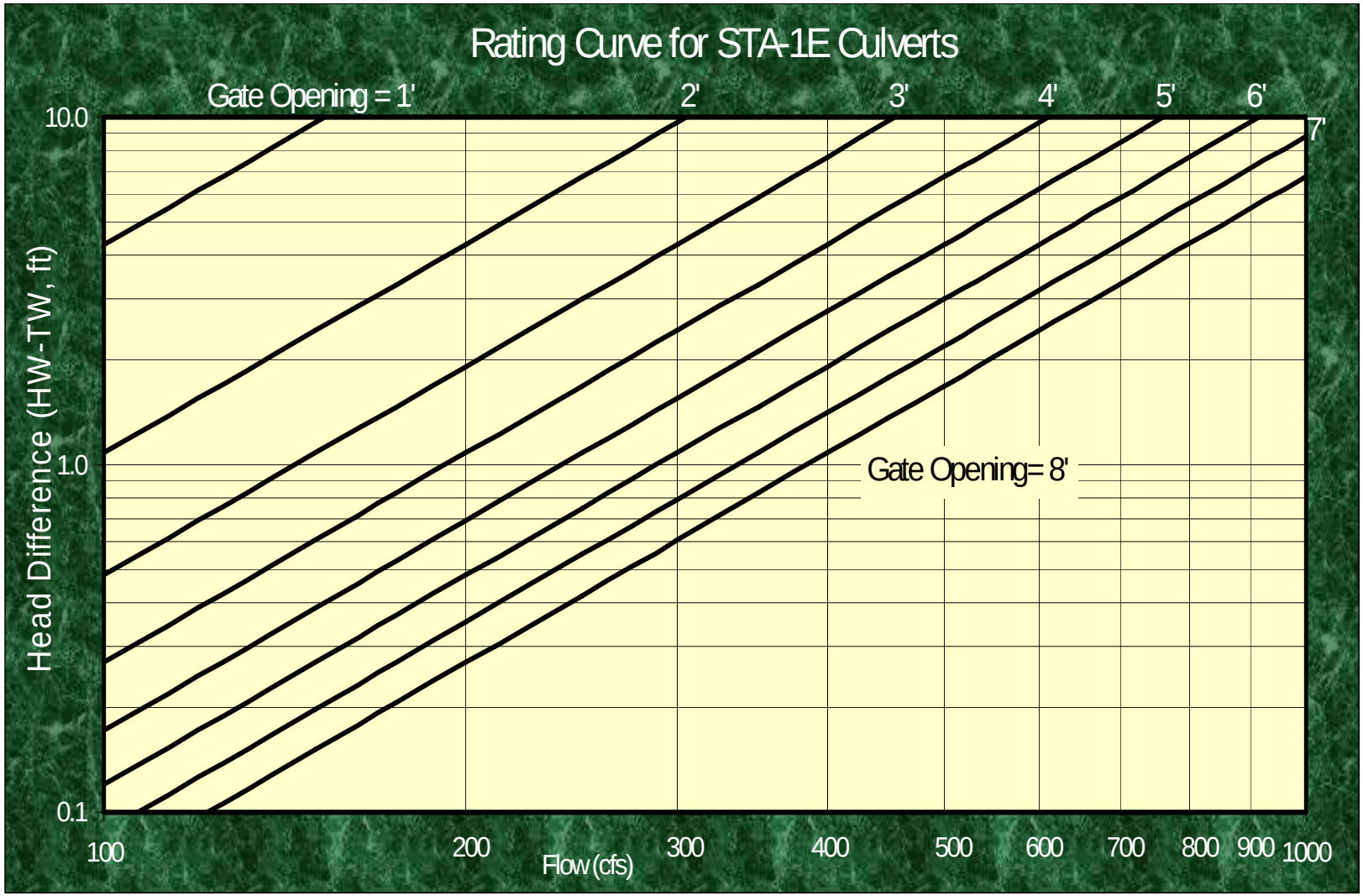
Rating Curves for 8x8 concrete box culverts: 1-1000 cfs (from USACE 2005)



Rating Curves for 8x8 concrete box culverts: 10-100 cfs (from USACE 2005)



Rating Curves for 8x8 concrete box culverts: 100-1000 cfs (from USACE 2005)



Head differential and velocity through the 8x8 box culverts as a function of gate opening and flow (from USACE 2005)

Gate Opening (ft)		Flow (cfs)												
		1	50	100	150	200	250	300	350	400	450	500	550	1000
0.5	Head (ft)	0.00	4.32	17.28	38.87	69.11	107.98	155.49	211.64	276.43	349.86	431.92	522.62	1727.68
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
1	Head (ft)	0.00	1.08	4.32	9.73	17.30	27.03	38.92	52.98	69.20	87.58	108.12	130.83	432.48
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
2	Head (ft)	0.00	0.27	1.09	2.45	4.35	6.79	9.78	13.31	17.39	22.01	27.17	32.88	108.68
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
3	Head (ft)	0.00	0.12	0.49	1.10	1.95	3.04	4.38	5.97	7.79	9.87	12.18	14.74	48.72
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
4	Head (ft)	0.00	0.07	0.28	0.62	1.11	1.73	2.50	3.40	4.44	5.62	6.93	8.39	27.73
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
5	Head (ft)	0.00	0.05	0.18	0.41	0.72	1.13	1.62	2.21	2.88	3.65	4.50	5.45	18.02
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
6	Head (ft)	0.00	0.03	0.13	0.29	0.51	0.80	1.15	1.56	2.04	2.58	3.18	3.85	12.74
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
7	Head (ft)	0.00	0.02	0.10	0.22	0.38	0.60	0.86	1.17	1.53	1.94	2.39	2.89	9.56
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63
8	Head (ft)	0.00	0.02	0.07	0.17	0.30	0.47	0.67	0.92	1.20	1.52	1.87	2.27	7.49
	Velocity (ft/s)	0.02	0.78	1.56	2.34	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	15.63

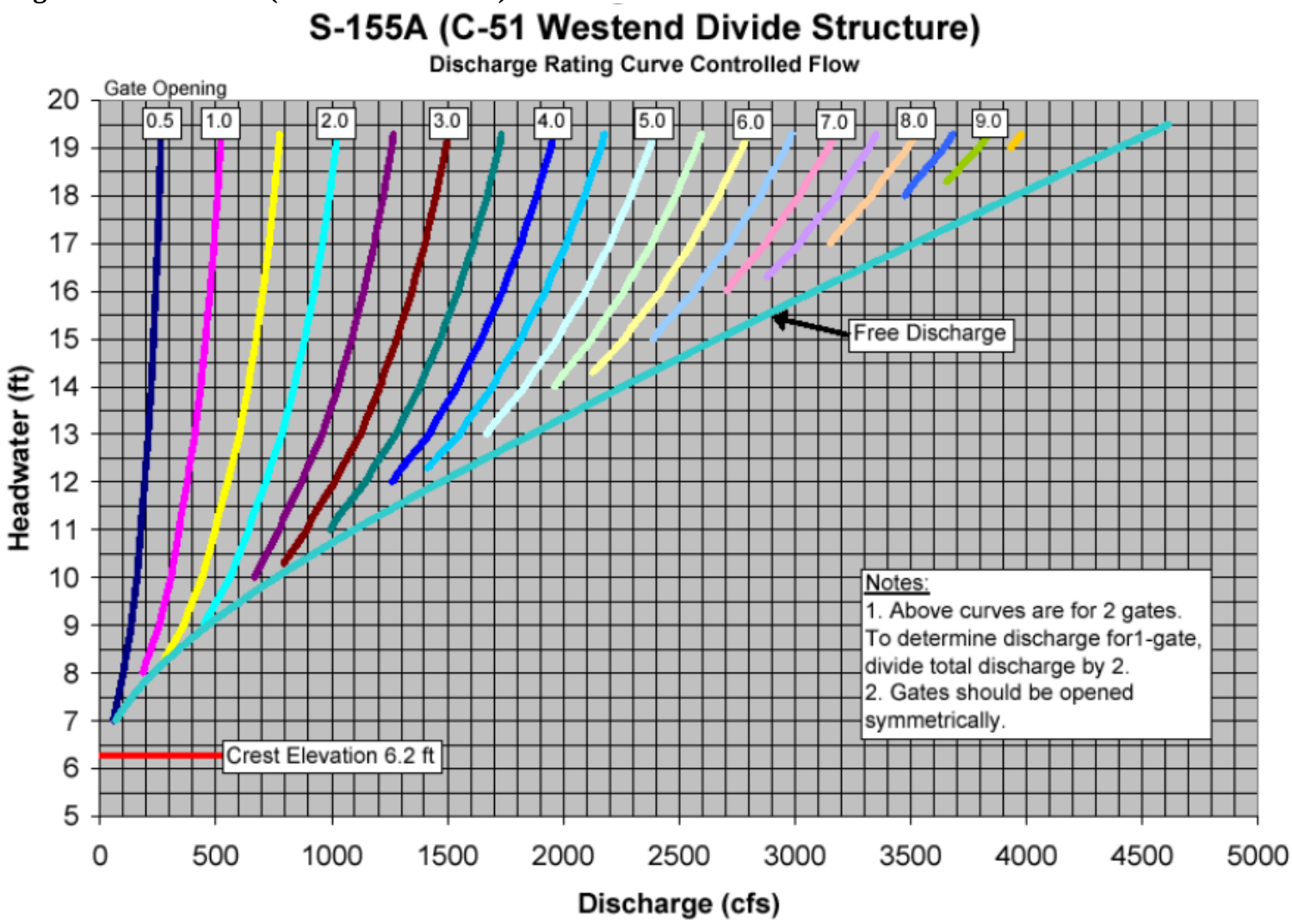
Rating Curves Based on:

$$\Delta H(Q, GO) := \frac{\left(\frac{Q}{C \cdot A(GO)}\right)^2}{2 \cdot g} + \left[\frac{\left(\frac{Q}{h \cdot w}\right)^2 \cdot n^2 \cdot L}{2.21 \frac{ft}{sec^2} \cdot \left(\frac{h \cdot w}{2 \cdot h + 2 \cdot w}\right)} \right] *$$

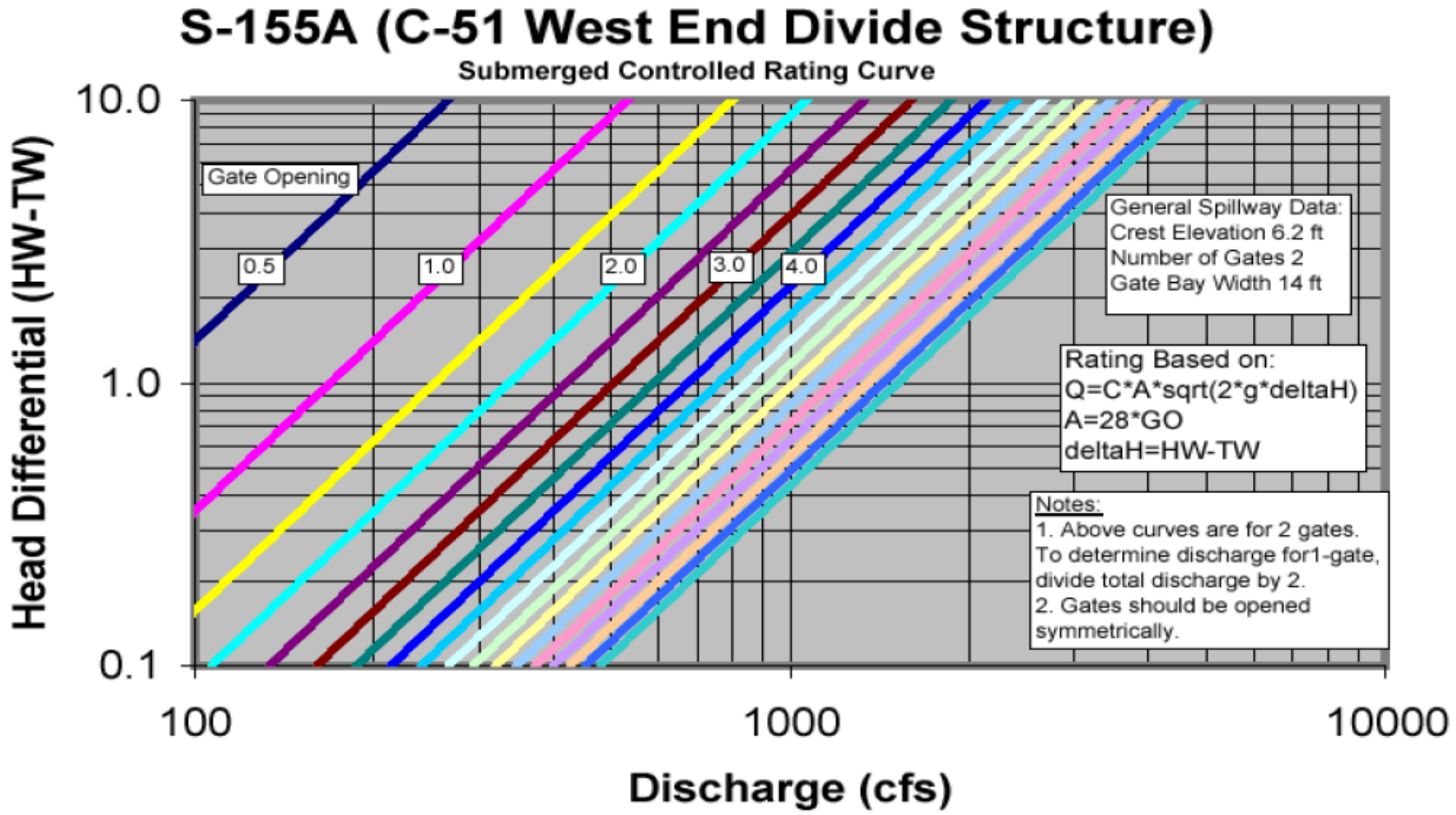
$C := 0.75$ Discharge Coefficient for the Orifice Equation

Where Q = flow
GO = gate opening
n = Manning's "n" = 0.013
g = acceleration due to gravity
A = area of flow
L = length of box culvert
h = head differential
C = discharge coefficient = 0.75
w = flow width = 8 ft

Rating Curve for S-155A (from USACE 2005)



Rating Curve for S-155A (from USACE 2005)



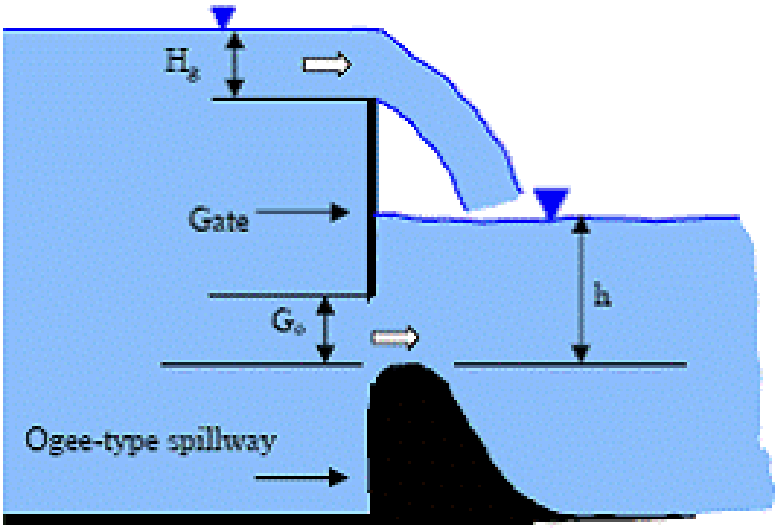
APPENDIX 2 – ADDITIONAL WATER CONTROL STRUCTURE INFORMATION

Summary of Additional Hydraulic Design Data for S-155A (USACE 2005)

Design Conditions		**Crest Data**	
Baffle Block Elevation	-0.35	Shape	Ogee
Baffle Block Elevation (ht.)	1.70	Design Head ft	5.30
Baffle Block Elevation (width)	1.70	Net Crest Length	28.00
Rows of Baffle Blocks	2	Number and Width of Piers	1 / 3.00
Distance from toe of Ogee to 1st Row of Baffle Blocks	15.75	Upstream Apron Elev.	-1.50
Distance from toe of Ogee to 2nd Row of Baffle Blocks	20.00	Weir Control	Vertical Slide Gates
Training Wall Elevation	16.50		
End Sill Elevation	-1.20	**Gates**	
Slope from apron to Top of End Sill	1 on 10	Number of Gates	2
		Gate Bay Width	14.00
Canal Section		Gate Height	14.00
Side Slopes (Vertical on Horizontal)	1 on 2.5	Gate Clearance Elevation	20.20
Upstream Bottom Width	40.00	Base of Breastwall El.	20.20
Upstream Bottom Elevation	-2.00		
Downstream Bottom Width	40.00	**Stilling Basin**	
Downstream Bottom Elevation	-2.00	Design Discharge	1,460
		Apron Elevation	-2.00
Structure Protection Elevation		Apron Length from Toe of Ogee to Toe of Endsill	34.50
Machinery Floor Elevation	19.20		
Upstream Riprap Protection Elevation	18.00		
Downstream Riprap Protection Elevation	17.00		
Downstream Riprap Requirements			
Velocity at the Downstream Endsill	4.65 ft/sec		
Velocity at the Upstream Apron	7.65 ft/sec		

Summary of Additional Hydraulic Design Data for G-311 (USACE 2005)

Design Conditions	Normal Operation (S-5A to STA-1E)	Normal Operation (S-5A to STA-1W)	
Stilling Basin Design		**Channel Section**	
Discharge	3,600 cfs	Upstream bottom width (ft)	30.0
Headwater Elevation	17.5	Upstream bottom elevation	-2.0
Tailwater Elevation	14.75	Upstream side slopes	1 on 2.5
Structure Geometry		Downstream bottom width (ft)	50.0
Shape	Symmetrical Ogee	Downstream bottom elevation	2.0
Elevation	10.0	Downstream side slopes	1 on 2.5
Design head (ft)	N/A	**Riprap**	
Net length (ft)	60.0	Upstream riprap length (ft)	100.0
Min. Static Tailwater	10.0	Downstream riprap length (ft)	88.0
Max Static Headwater	20.0	**Stilling Basin**	
Number of Gates	3	Elevation	4.0
Width X Height (ft)	20.0 X 11.0	Length	17.5
Clearance Elevation	20.5	Endsill elevation	6.0
Breastwall elevation	20.5	Baffle block elevation	8.0
		Rows of baffle blocks	1



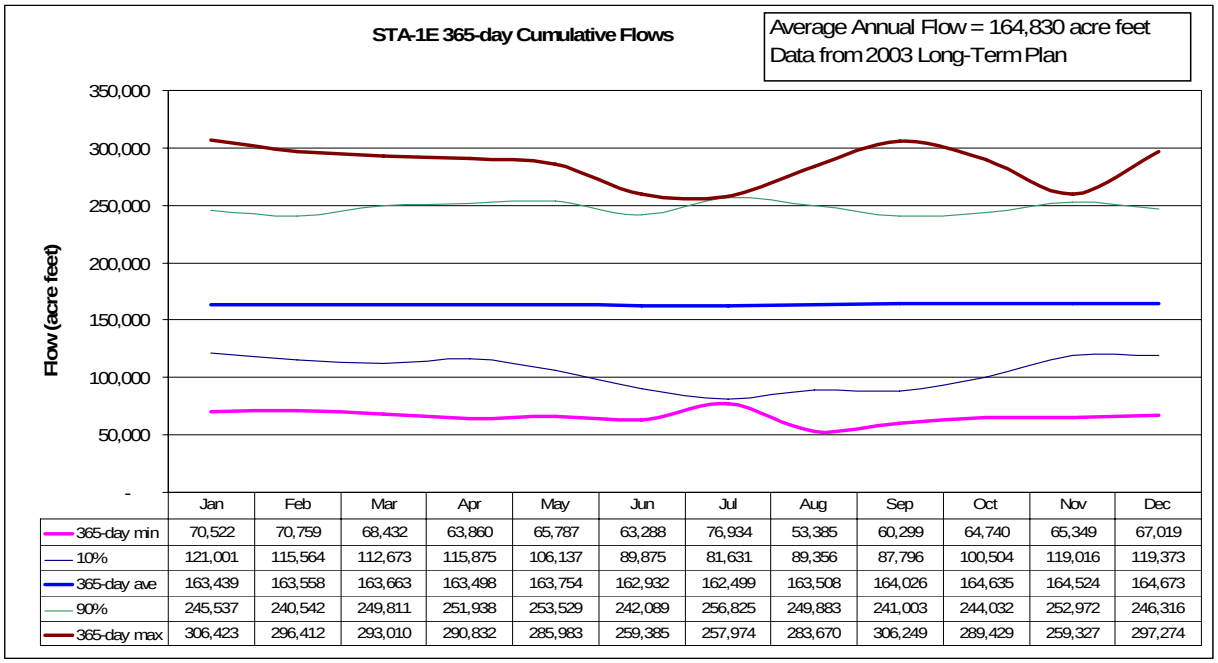
Flow Equations for Spillway G-311 (From J. Gonzalez)

The initial theoretical flow equations at G-311 are proposed below. When streamgauging data are available, the flow equations can be improved.

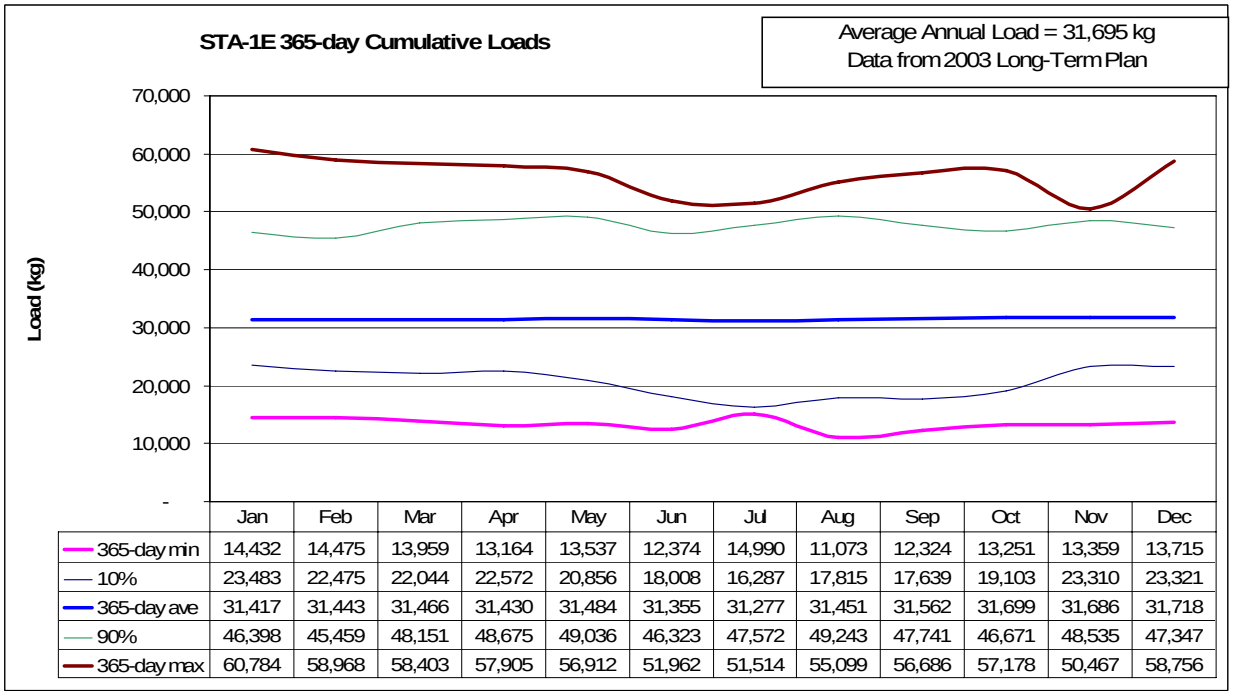
Flow Condition	Equation	Restriction	Remarks
Controlled Submerged (CS)	$Q = L\sqrt{gy_c^{\,3}}$ $y_c = aG_0\left(\frac{H-h}{G_0}\right)^b$ a=1.102, b=0.324	$\frac{h}{G_0} \geq 1.0$	Also known as submerged orifice
Controlled Free (CF)	$Q = L\sqrt{gy_c^{\,3}}$ $y_c = aG_0\left(\frac{H}{G_0}\right)^b$ a=0.86, b=0.35	$\frac{h}{G_0} < 1.0 \;\&\; \frac{H}{G_0} \geq \frac{1}{K}$ $K = 2/3$	Also known as free orifice
Uncontrolled Submerged (US)	$Q = L\sqrt{gy_c^{\,3}}$ $y_c = aH(1-\frac{h}{H})^b$ a=0.838, b=0.167	$\frac{h}{G_0} < 1.0, \frac{H}{G_0} < \frac{1}{K}, \& \frac{h}{H} \geq K$ $K = 2/3$	Also known as submerged weir
Uncontrolled Free (UF)	$Q = L\sqrt{gy_c^{\,3}}$ $y_c = aH$ a=0.7	$\frac{h}{G_0} < 1.0, \frac{H}{G_0} < \frac{1}{K}, \& \frac{h}{H} < K$ $K = 2/3$	Also known as free weir
Over-the-top	$Q = C_d L\sqrt{H_g^{\,3}}$ C_d =3.053	$H > (H_g + G_0)$	Computed as a free weir flow
Transitional Flow	No transition region		

where,
L: spillway width;
Q: discharge at the spillway, subscript represents the flow condition;
C_d : discharge coefficient;
G_o : gate opening;
G_h : gate height;
g: acceleration of gravity;
HW: head water stage;
TW: tail water stage;
SE: spillway sill elevation;
H: head water depth above sill elevation, $H = HW - SE$;
h: tail water depth above sill elevation, $h = TW - SE$;
H_g : head of the approach flow, above the gate, $H_g = HW - G - G_h$.

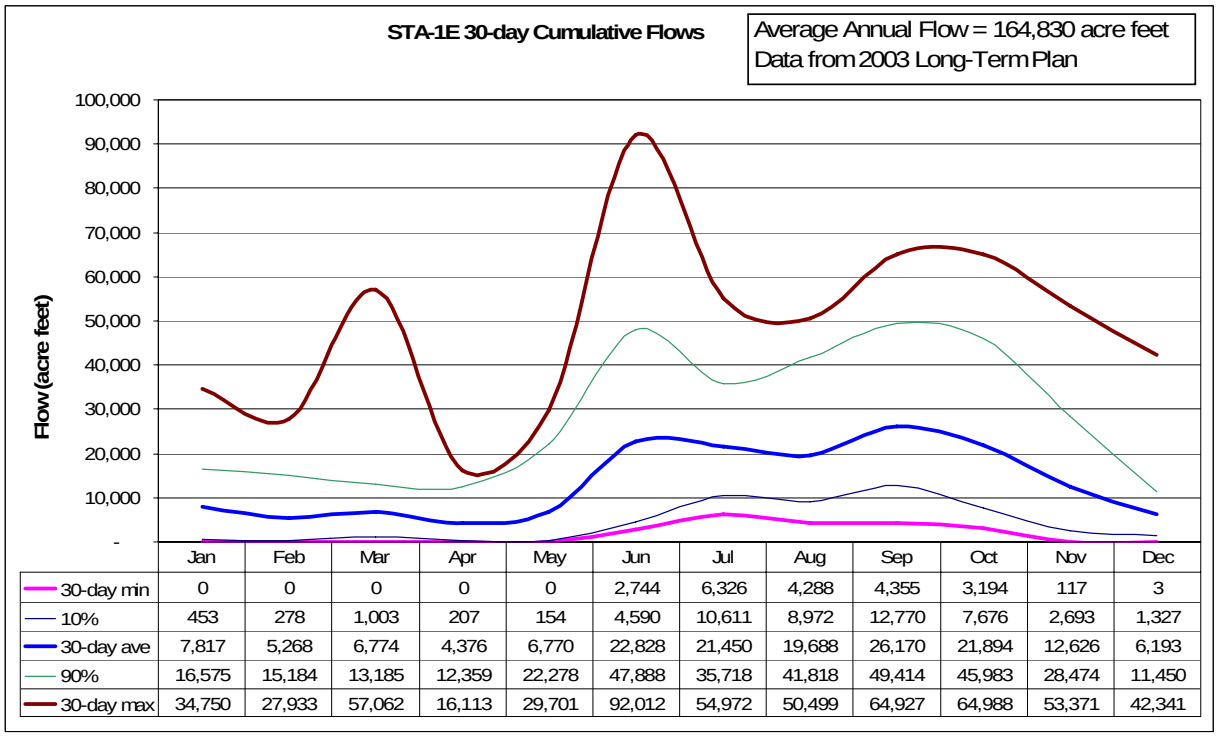
APPENDIX 3 - OPERATIONAL DESIGN ENVELOPES



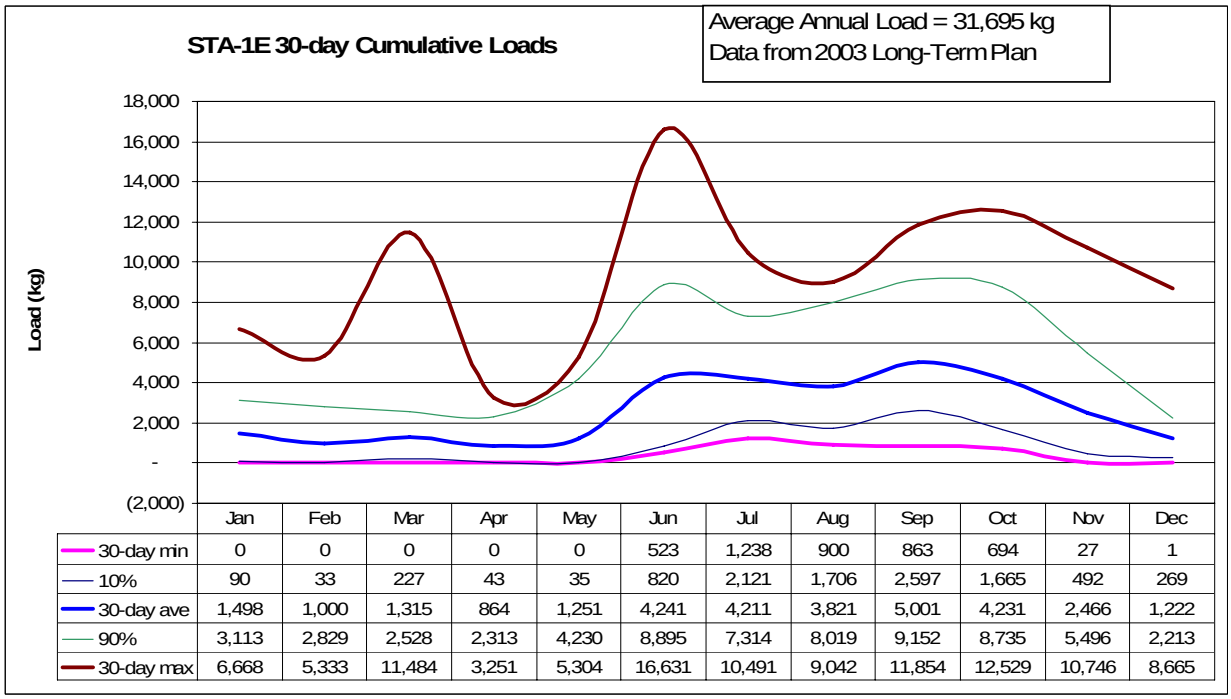
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	70,522	70,759	68,432	63,860	65,787	63,288	76,934	53,385	60,299	64,740	65,349	67,019
10%	121,001	115,564	112,673	115,875	106,137	89,875	81,631	89,356	87,796	100,504	119,016	119,373
365-day ave	163,439	163,558	163,663	163,498	163,754	162,932	162,499	163,508	164,026	164,635	164,524	164,673
90%	245,537	240,542	249,811	251,938	253,529	242,089	256,825	249,883	241,003	244,032	252,972	246,316
365-day max	306,423	296,412	293,010	290,832	285,983	259,385	257,974	283,670	306,249	289,429	259,327	297,274



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	14,432	14,475	13,959	13,164	13,537	12,374	14,990	11,073	12,324	13,251	13,359	13,715
10%	23,483	22,475	22,044	22,572	20,856	18,008	16,287	17,815	17,639	19,103	23,310	23,321
365-day ave	31,417	31,443	31,466	31,430	31,484	31,355	31,277	31,451	31,562	31,699	31,686	31,718
90%	46,398	45,459	48,151	48,675	49,036	46,323	47,572	49,243	47,741	46,671	48,535	47,347
365-day max	60,784	58,968	58,403	57,905	56,912	51,962	51,514	55,099	56,686	57,178	50,467	58,756



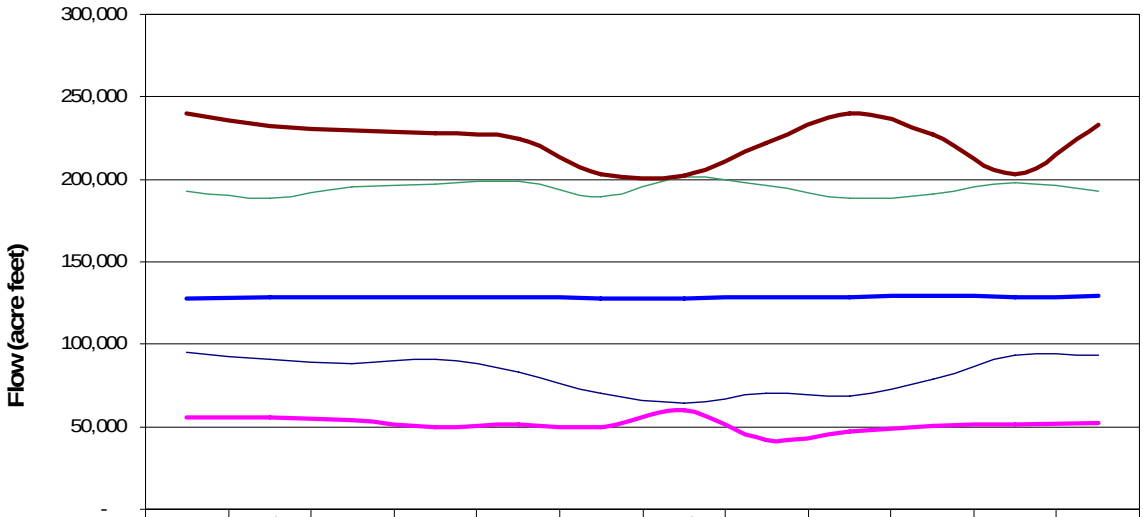
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	2,744	6,326	4,288	4,355	3,194	117	3
10%	453	278	1,003	207	154	4,590	10,611	8,972	12,770	7,676	2,693	1,327
30-day ave	7,817	5,268	6,774	4,376	6,770	22,828	21,450	19,688	26,170	21,894	12,626	6,193
90%	16,575	15,184	13,185	12,359	22,278	47,888	35,718	41,818	49,414	45,983	28,474	11,450
30-day max	34,750	27,933	57,062	16,113	29,701	92,012	54,972	50,499	64,927	64,988	53,371	42,341



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	523	1,238	900	863	694	27	1
10%	90	33	227	43	35	820	2,121	1,706	2,597	1,665	492	269
30-day ave	1,498	1,000	1,315	864	1,251	4,241	4,211	3,821	5,001	4,231	2,466	1,222
90%	3,113	2,829	2,528	2,313	4,230	8,895	7,314	8,019	9,152	8,735	5,496	2,213
30-day max	6,668	5,333	11,484	3,251	5,304	16,631	10,491	9,042	11,854	12,529	10,746	8,665

STA-1E 365-day Cumulative Flows
Central and Western Flow-way

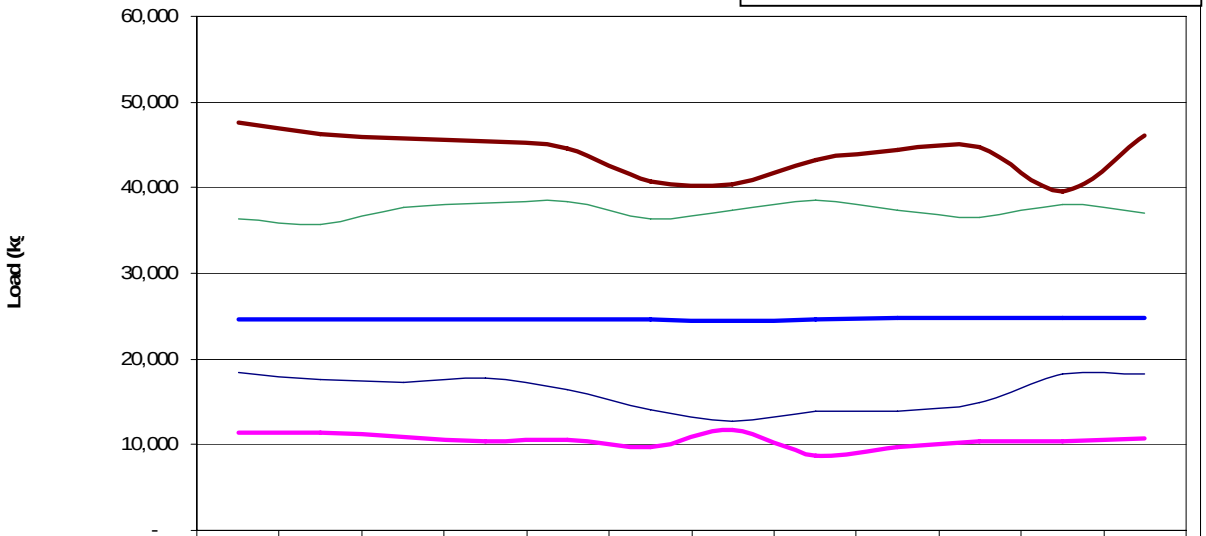
Average Annual Flow = 128,361 acre feet
Data from 2003 Long-Term Plan



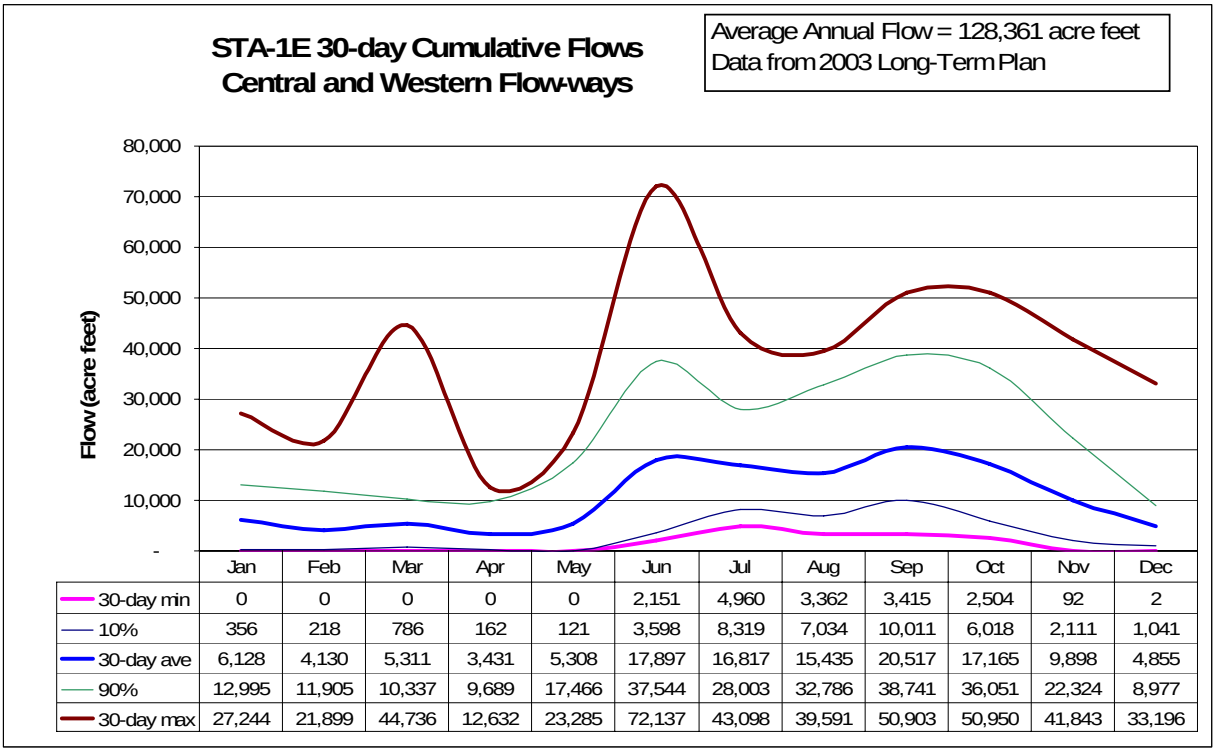
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	55,289	55,475	53,651	50,066	51,577	49,618	60,316	41,854	47,274	50,756	51,234	52,543
10%	94,864	90,602	88,336	90,846	83,211	70,462	63,998	70,055	68,832	78,796	93,309	93,589
365-day ave	128,136	128,229	128,312	128,183	128,383	127,739	127,399	128,190	128,597	129,074	128,987	129,104
90%	192,501	188,585	195,852	197,519	198,767	189,798	201,351	195,908	188,946	191,321	198,330	193,112
365-day max	240,235	232,387	229,720	228,012	224,210	203,358	202,252	222,397	240,099	226,912	203,312	233,063

STA-1E 365-day Cumulative Loads
Central and Western Flow-way

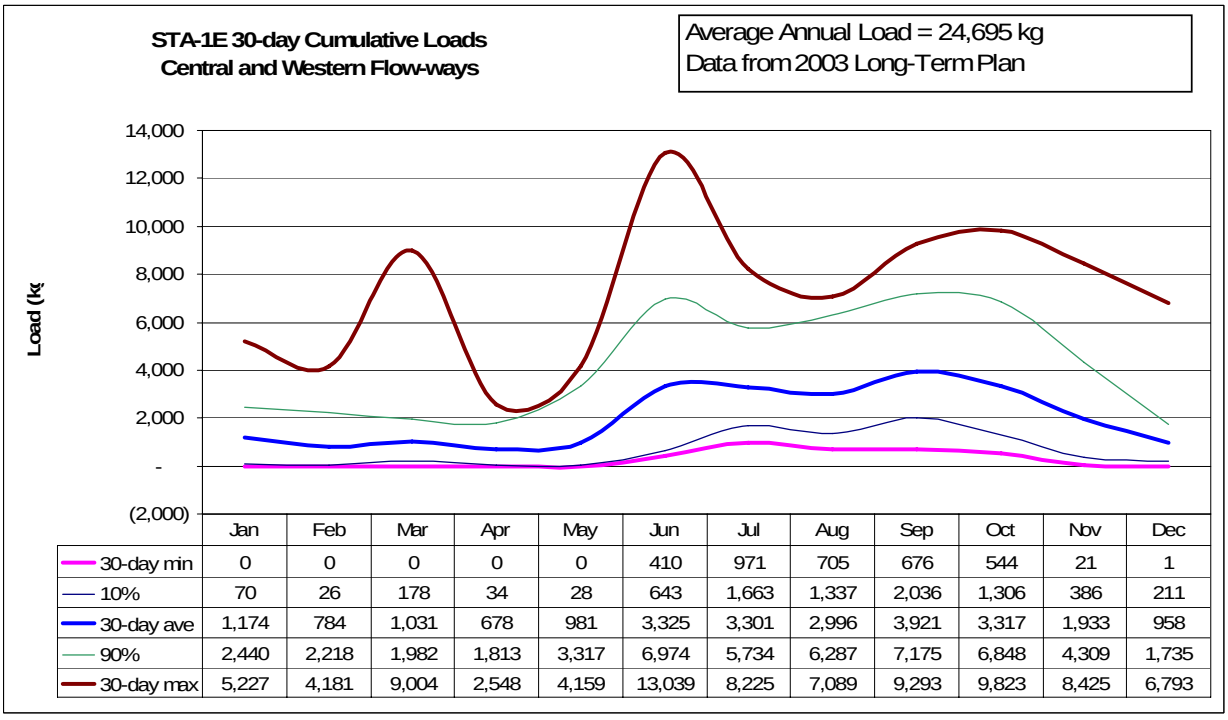
Average Annual Load = 24,695 kg
Data from 2003 Long-Term Plan



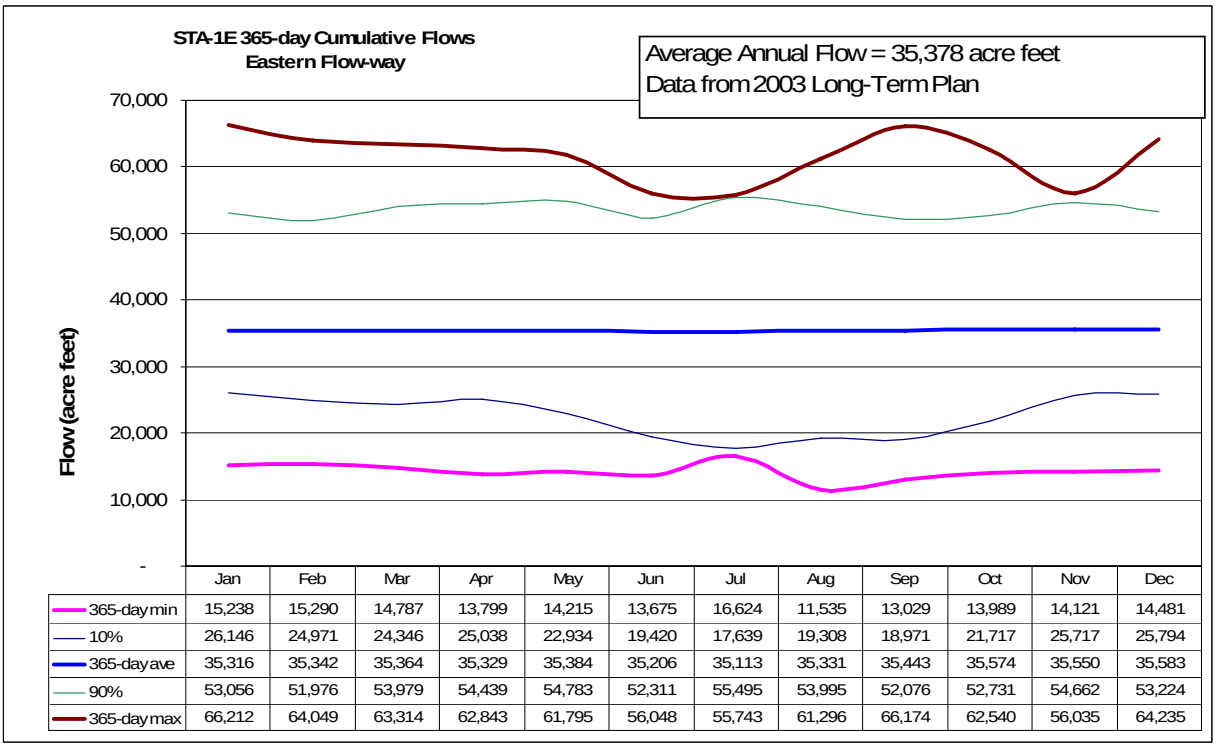
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	11,315	11,349	10,944	10,321	10,613	9,702	11,752	8,682	9,662	10,389	10,474	10,753
10%	18,411	17,621	17,282	17,697	16,351	14,118	12,769	13,967	13,829	14,977	18,275	18,284
365-day ave	24,631	24,652	24,669	24,641	24,684	24,583	24,521	24,658	24,744	24,852	24,841	24,867
90%	36,376	35,640	37,751	38,161	38,444	36,317	37,297	38,607	37,429	36,590	38,051	37,120
365-day max	47,655	46,231	45,788	45,398	44,619	40,738	40,387	43,198	44,442	44,828	39,566	46,065



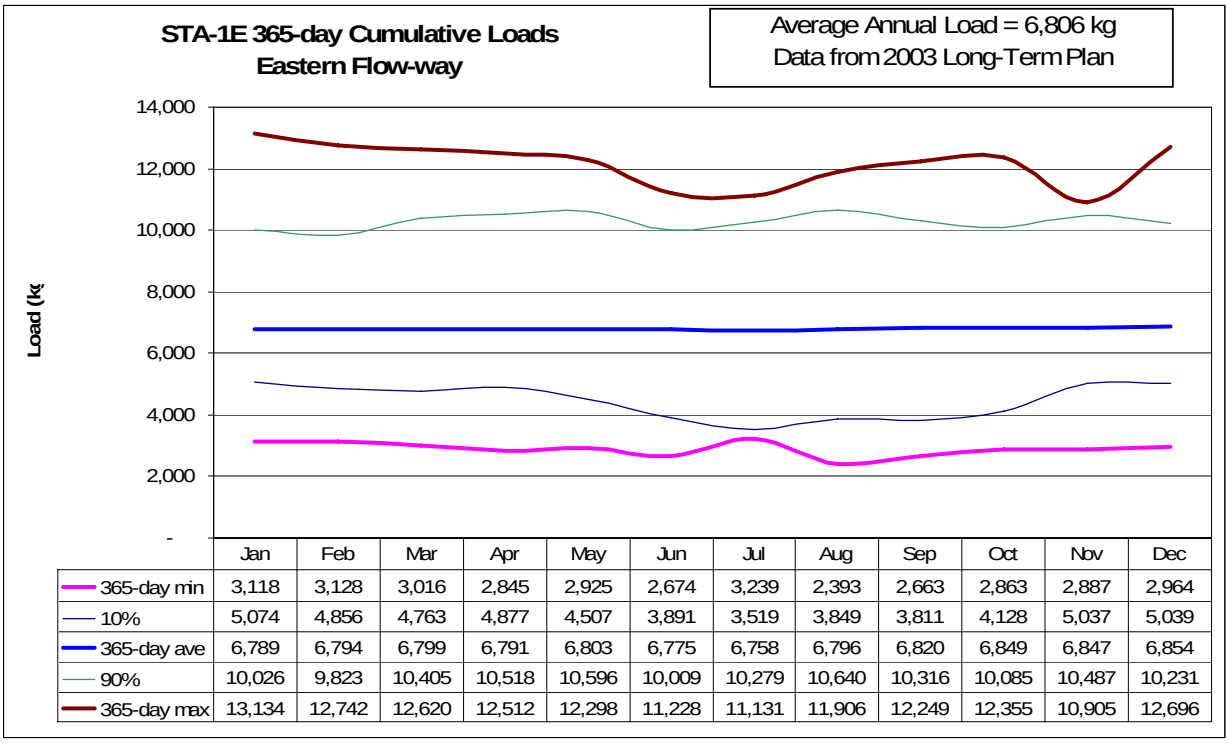
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	2,151	4,960	3,362	3,415	2,504	92	2
10%	356	218	786	162	121	3,598	8,319	7,034	10,011	6,018	2,111	1,041
30-day ave	6,128	4,130	5,311	3,431	5,308	17,897	16,817	15,435	20,517	17,165	9,898	4,855
90%	12,995	11,905	10,337	9,689	17,466	37,544	28,003	32,786	38,741	36,051	22,324	8,977
30-day max	27,244	21,899	44,736	12,632	23,285	72,137	43,098	39,591	50,903	50,950	41,843	33,196



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	410	971	705	676	544	21	1
10%	70	26	178	34	28	643	1,663	1,337	2,036	1,306	386	211
30-day ave	1,174	784	1,031	678	981	3,325	3,301	2,996	3,921	3,317	1,933	958
90%	2,440	2,218	1,982	1,813	3,317	6,974	5,734	6,287	7,175	6,848	4,309	1,735
30-day max	5,227	4,181	9,004	2,548	4,159	13,039	8,225	7,089	9,293	9,823	8,425	6,793



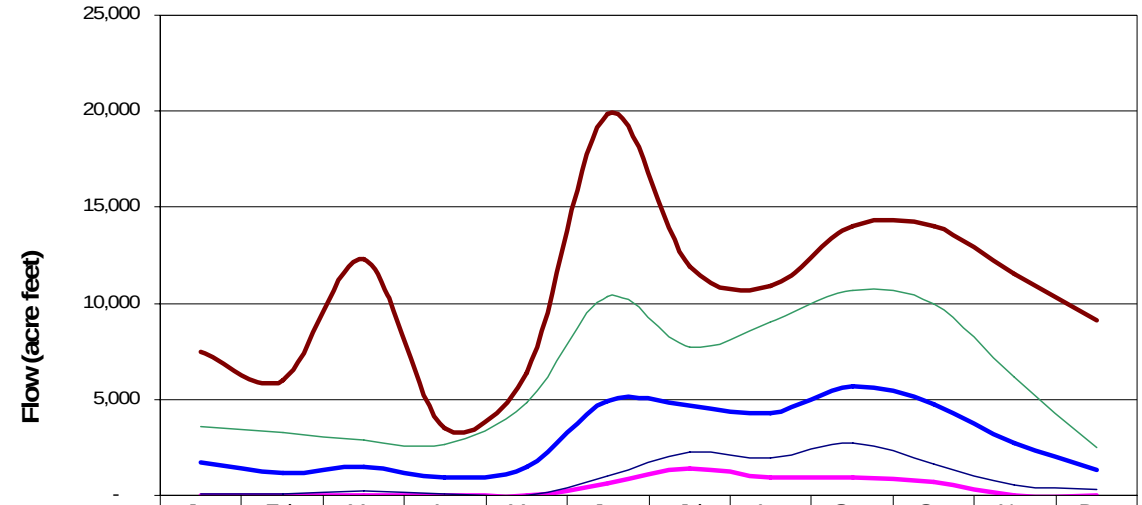
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	15,238	15,290	14,787	13,799	14,215	13,675	16,624	11,535	13,029	13,989	14,121	14,481
10%	26,146	24,971	24,346	25,038	22,934	19,420	17,639	19,308	18,971	21,717	25,717	25,794
365-day ave	35,316	35,342	35,364	35,329	35,384	35,206	35,113	35,331	35,443	35,574	35,550	35,583
90%	53,056	51,976	53,979	54,439	54,783	52,311	55,495	53,995	52,076	52,731	54,662	53,224
365-day max	66,212	64,049	63,314	62,843	61,795	56,048	55,743	61,296	66,174	62,540	56,035	64,235



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	3,118	3,128	3,016	2,845	2,925	2,674	3,239	2,393	2,663	2,863	2,887	2,964
10%	5,074	4,856	4,763	4,877	4,507	3,891	3,519	3,849	3,811	4,128	5,037	5,039
365-day ave	6,789	6,794	6,799	6,791	6,803	6,775	6,758	6,796	6,820	6,849	6,847	6,854
90%	10,026	9,823	10,405	10,518	10,596	10,009	10,279	10,640	10,316	10,085	10,487	10,231
365-day max	13,134	12,742	12,620	12,512	12,298	11,228	11,131	11,906	12,249	12,355	10,905	12,696

STA-1E 30-day Cumulative Flows Eastern Flow-way

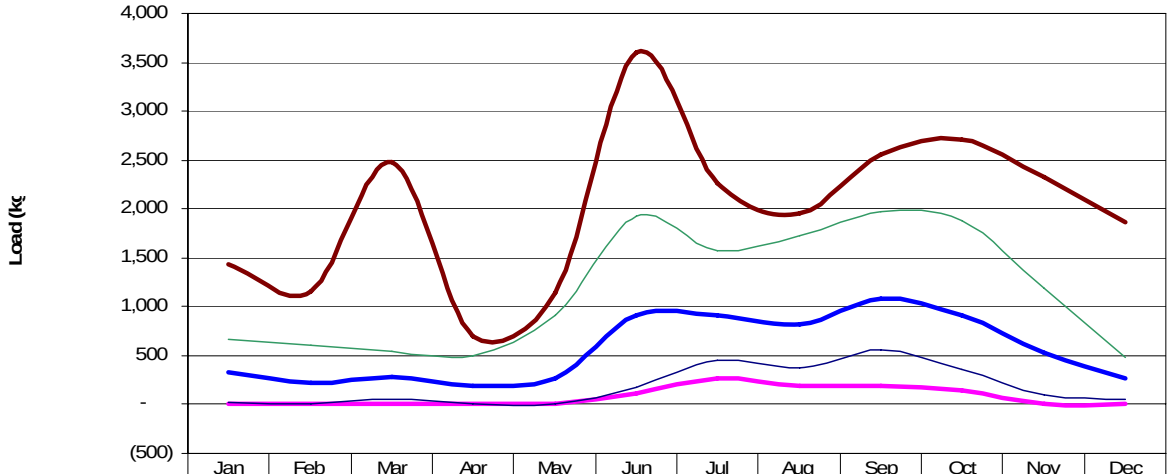
Average Annual Flow = 35,378 acre feet
Data from 2003 Long-Term Plan



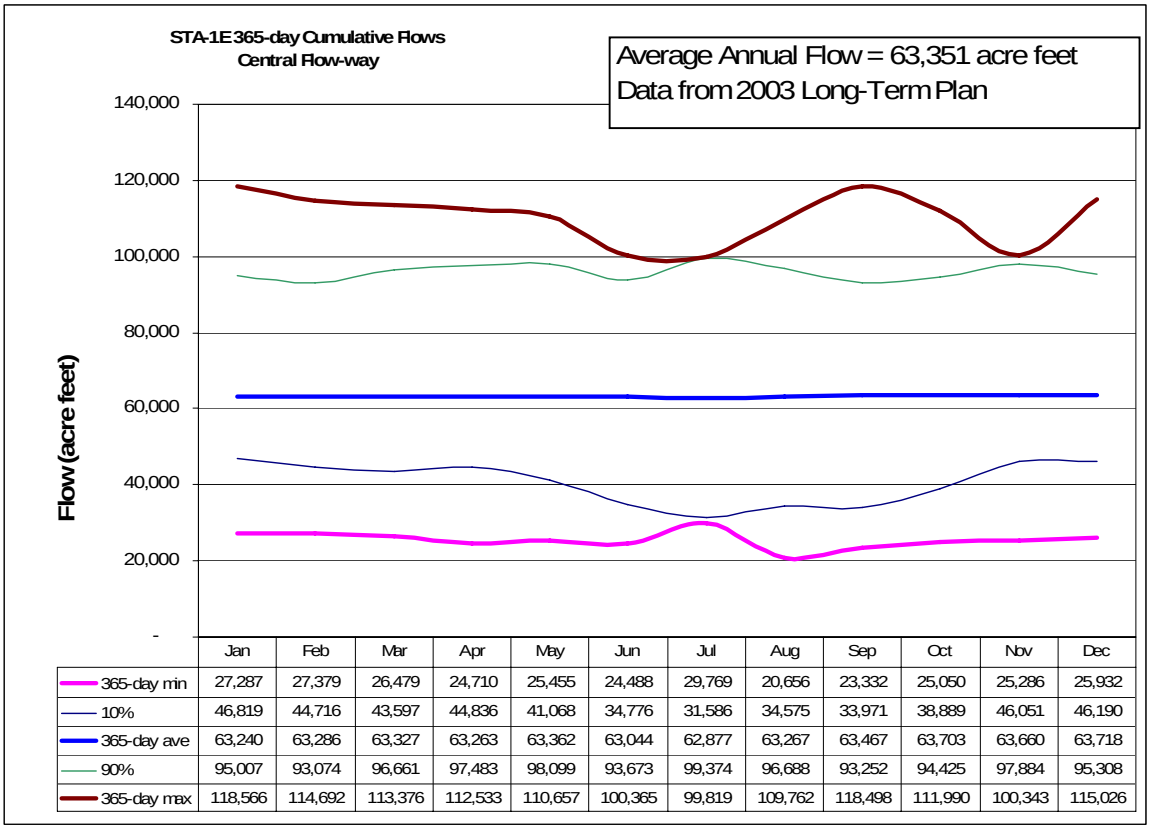
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	593	1,367	927	941	690	25	1
10%	98	60	217	45	33	992	2,293	1,939	2,759	1,659	582	287
30-day ave	1,689	1,138	1,464	946	1,463	4,933	4,635	4,254	5,655	4,731	2,728	1,338
90%	3,582	3,281	2,849	2,670	4,814	10,348	7,718	9,036	10,677	9,936	6,153	2,474
30-day max	7,509	6,036	12,330	3,482	6,418	19,882	11,878	10,912	14,029	14,043	11,532	9,149

STA-1E 30-day Cumulative Loads Eastern Flow-way

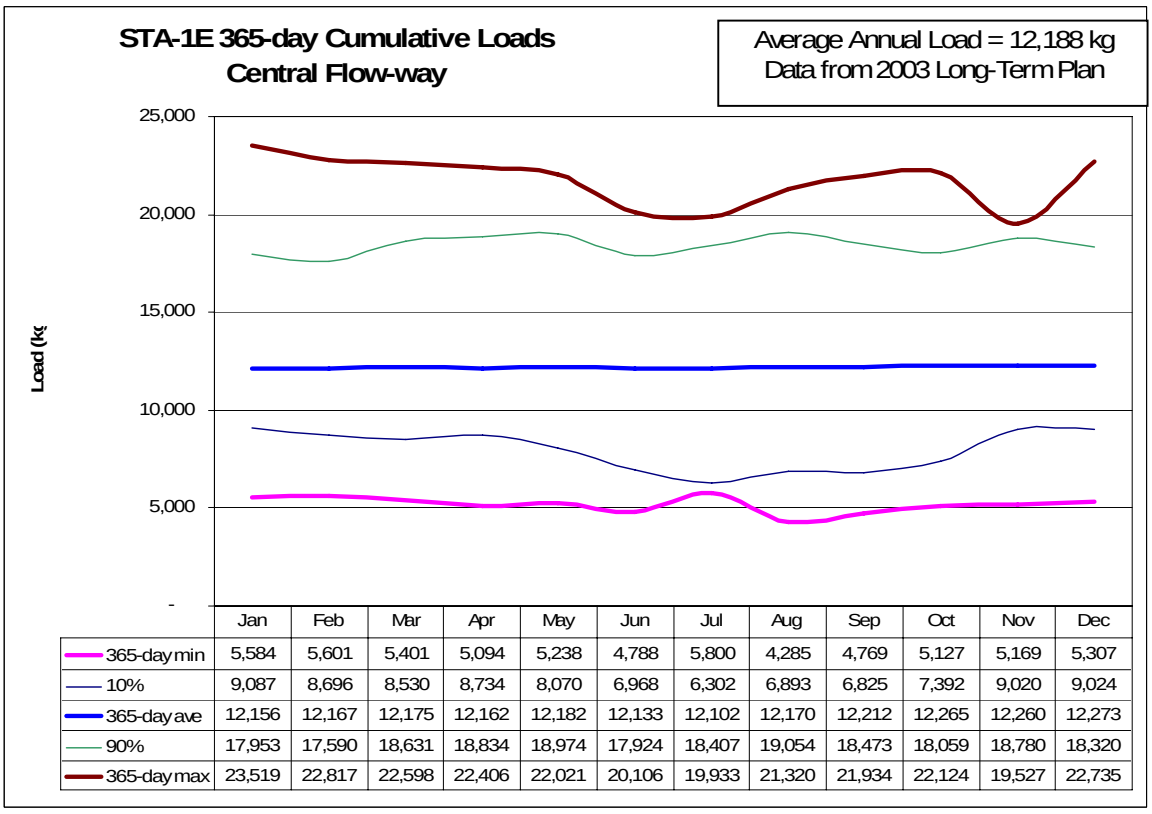
Average Annual Load = 6,806 kg
Data from 2003 Long-Term Plan



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	113	268	194	186	150	6	0
10%	19	7	49	9	8	177	458	369	561	360	106	58
30-day ave	324	216	284	187	270	916	910	826	1,081	914	533	264
90%	673	611	546	500	914	1,922	1,580	1,733	1,978	1,887	1,188	478
30-day max	1,441	1,152	2,482	702	1,146	3,594	2,267	1,954	2,561	2,707	2,322	1,872



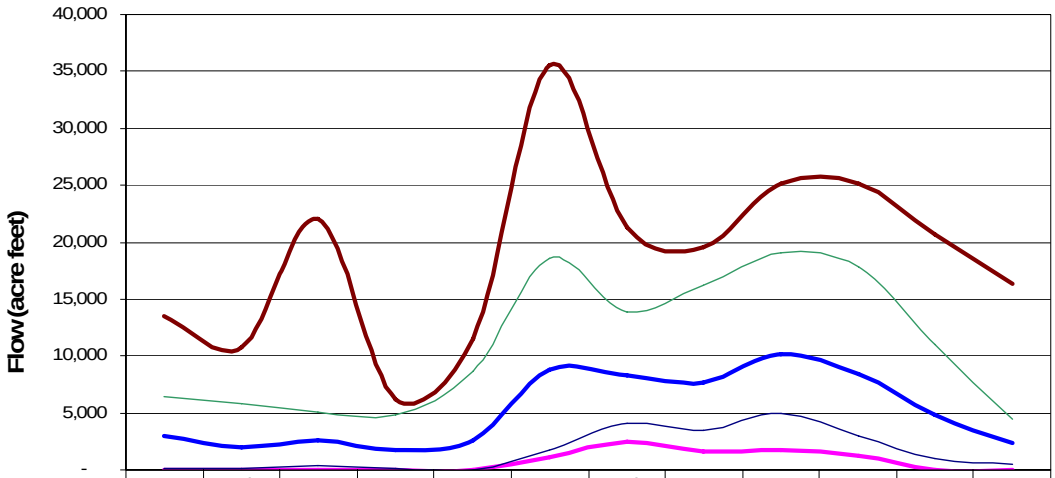
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	27,287	27,379	26,479	24,710	25,455	24,488	29,769	20,656	23,332	25,050	25,286	25,932
10%	46,819	44,716	43,597	44,836	41,068	34,776	31,586	34,575	33,971	38,889	46,051	46,190
365-day ave	63,240	63,286	63,327	63,263	63,362	63,044	62,877	63,267	63,467	63,703	63,660	63,718
90%	95,007	93,074	96,661	97,483	98,099	93,673	99,374	96,688	93,252	94,425	97,884	95,308
365-day max	118,566	114,692	113,376	112,533	110,657	100,365	99,819	109,762	118,498	111,990	100,343	115,026



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	5,584	5,601	5,401	5,094	5,238	4,788	5,800	4,285	4,769	5,127	5,169	5,307
10%	9,087	8,696	8,530	8,734	8,070	6,968	6,302	6,893	6,825	7,392	9,020	9,024
365-day ave	12,156	12,167	12,175	12,162	12,182	12,133	12,102	12,170	12,212	12,265	12,260	12,273
90%	17,953	17,590	18,631	18,834	18,974	17,924	18,407	19,054	18,473	18,059	18,780	18,320
365-day max	23,519	22,817	22,598	22,406	22,021	20,106	19,933	21,320	21,934	22,124	19,527	22,735

STA-1E 30-day Cumulative Flows Central Flow-way

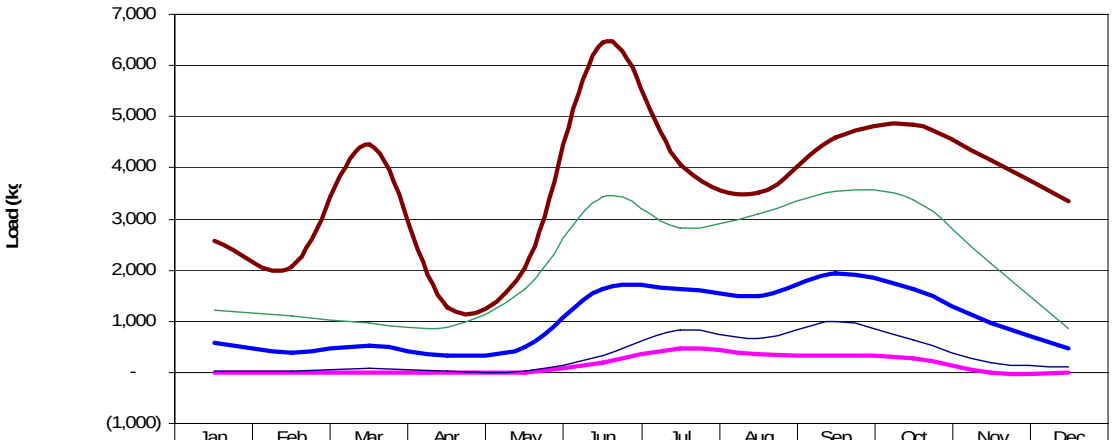
Average Annual Flow = 63,351 acre feet
Data from 2003 Long-Term Plan



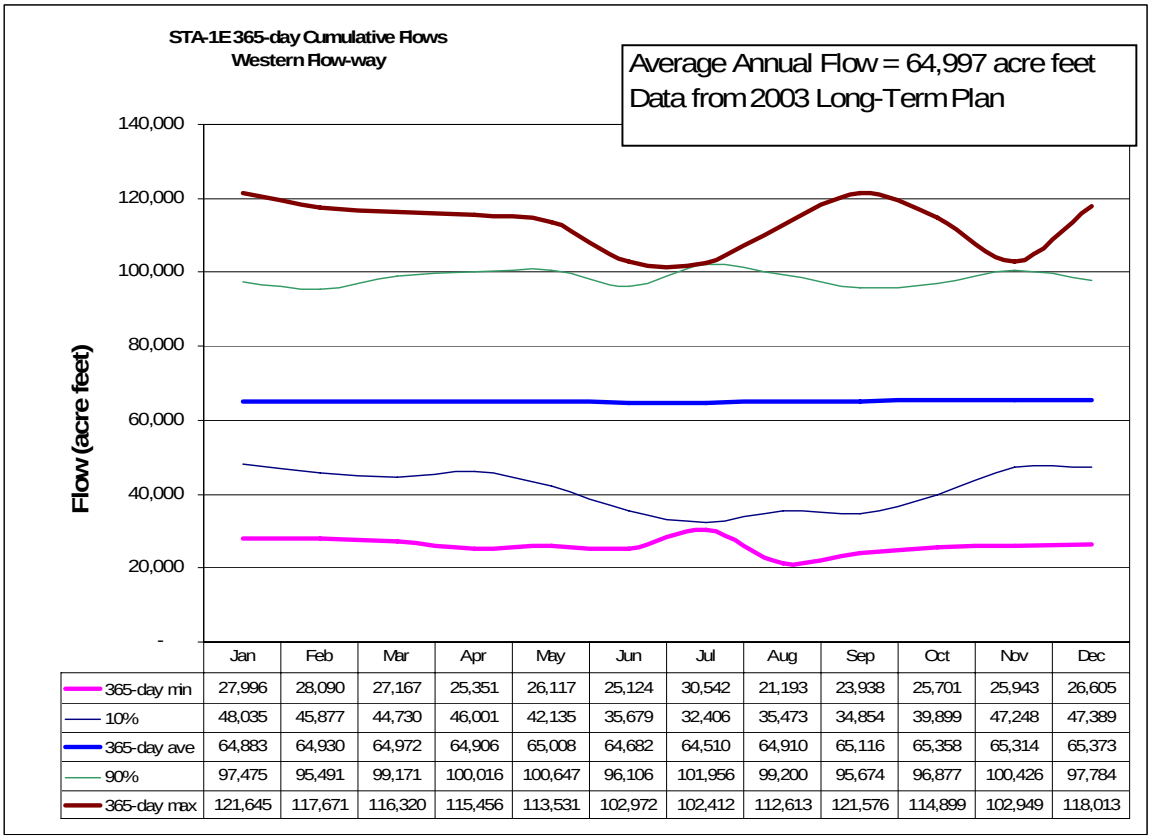
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	1,062	2,448	1,659	1,685	1,236	45	1
10%	175	107	388	80	59	1,776	4,106	3,472	4,941	2,970	1,042	514
30-day ave	3,025	2,038	2,621	1,693	2,620	8,833	8,300	7,618	10,126	8,471	4,885	2,396
90%	6,413	5,875	5,102	4,782	8,620	18,530	13,821	16,181	19,120	17,793	11,018	4,430
30-day max	13,446	10,808	22,079	6,234	11,492	35,602	21,271	19,540	25,122	25,146	20,651	16,383

STA-1E 30-day Cumulative Loads Central Flow-way

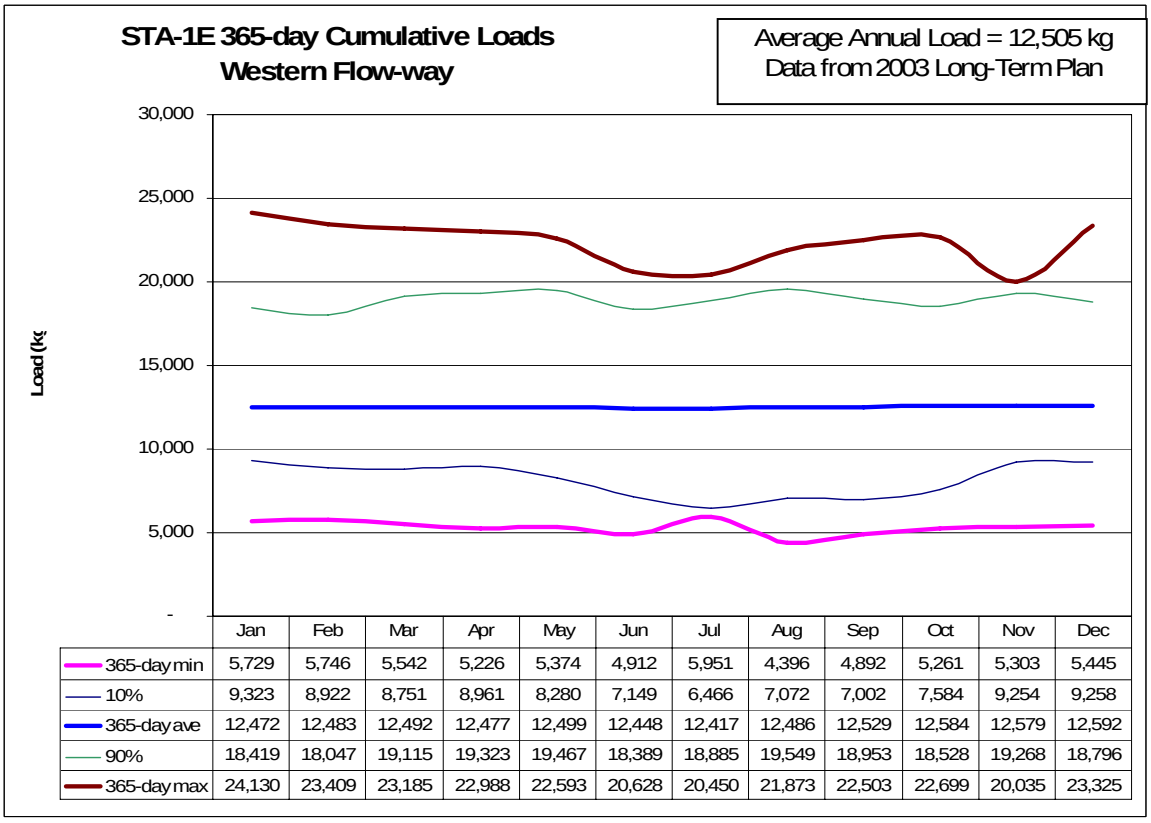
Average Annual Load = 12,188 kg
Data from 2003 Long-Term Plan



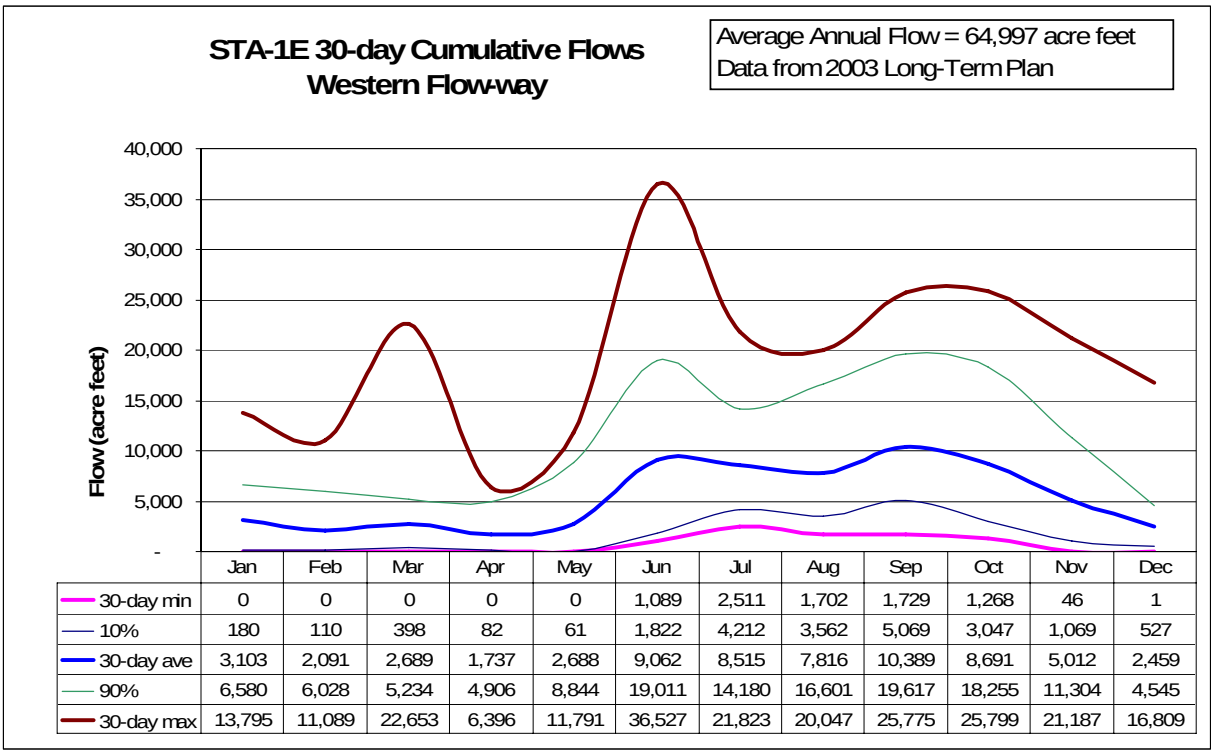
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	202	479	348	334	268	10	0
10%	35	13	88	17	14	317	821	660	1,005	644	190	104
30-day ave	580	387	509	335	484	1,641	1,629	1,478	1,935	1,637	954	473
90%	1,204	1,095	978	895	1,637	3,442	2,830	3,103	3,541	3,380	2,127	856
30-day max	2,580	2,064	4,444	1,258	2,052	6,435	4,059	3,498	4,587	4,848	4,158	3,353



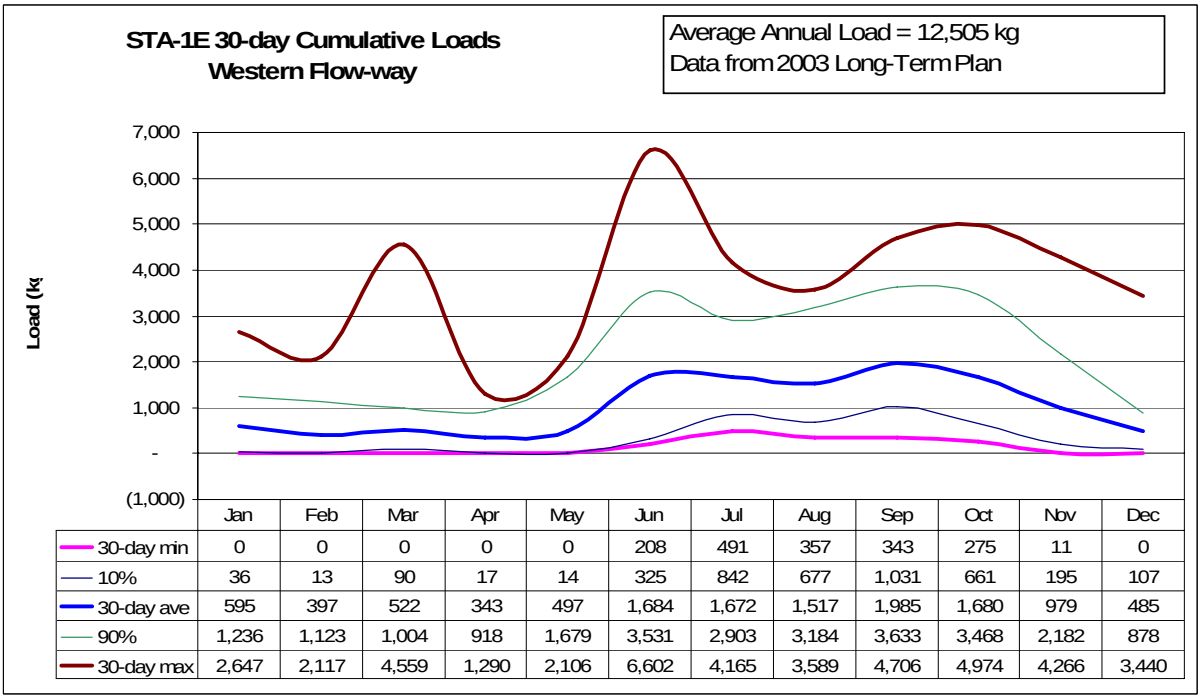
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	27,996	28,090	27,167	25,351	26,117	25,124	30,542	21,193	23,938	25,701	25,943	26,605
10%	48,035	45,877	44,730	46,001	42,135	35,679	32,406	35,473	34,854	39,899	47,248	47,389
365-day ave	64,883	64,930	64,972	64,906	65,008	64,682	64,510	64,910	65,116	65,358	65,314	65,373
90%	97,475	95,491	99,171	100,016	100,647	96,106	101,956	99,200	95,674	96,877	100,426	97,784
365-day max	121,645	117,671	116,320	115,456	113,531	102,972	102,412	112,613	121,576	114,899	102,949	118,013



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
365-day min	5,729	5,746	5,542	5,226	5,374	4,912	5,951	4,396	4,892	5,261	5,303	5,445
10%	9,323	8,922	8,751	8,961	8,280	7,149	6,466	7,072	7,002	7,584	9,254	9,258
365-day ave	12,472	12,483	12,492	12,477	12,499	12,448	12,417	12,486	12,529	12,584	12,579	12,592
90%	18,419	18,047	19,115	19,323	19,467	18,389	18,885	19,549	18,953	18,528	19,268	18,796
365-day max	24,130	23,409	23,185	22,988	22,593	20,628	20,450	21,873	22,503	22,699	20,035	23,325



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	1,089	2,511	1,702	1,729	1,268	46	1
10%	180	110	398	82	61	1,822	4,212	3,562	5,069	3,047	1,069	527
30-day ave	3,103	2,091	2,689	1,737	2,688	9,062	8,515	7,816	10,389	8,691	5,012	2,459
90%	6,580	6,028	5,234	4,906	8,844	19,011	14,180	16,601	19,617	18,255	11,304	4,545
30-day max	13,795	11,089	22,653	6,396	11,791	36,527	21,823	20,047	25,775	25,799	21,187	16,809



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30-day min	0	0	0	0	0	208	491	357	343	275	11	0
10%	36	13	90	17	14	325	842	677	1,031	661	195	107
30-day ave	595	397	522	343	497	1,684	1,672	1,517	1,985	1,680	979	485
90%	1,236	1,123	1,004	918	1,679	3,531	2,903	3,184	3,633	3,468	2,182	878
30-day max	2,647	2,117	4,559	1,290	2,106	6,602	4,165	3,589	4,706	4,974	4,266	3,440

APPENDIX 4 – RELEVANT PROVISIONS FROM THE EFA AND NDPES PERMITS FOR STA-1E

The EFA permit for STA-1E (No. 195030) was issued August 30, 2005.

Operation of STA-1E shall be implemented in three phases. The start-up phase of operation will begin after construction is completed and continue until the Phosphorus and Mercury Start-Up Tests are met. Upon successfully meeting the Start-Up tests, STA-1E may begin initial discharges. A stabilization phase of operation will then begin and continue until the Stabilization Test has been met. Thereafter, STA-1E will be in the normal or post stabilization operations phase.

GENERAL CONDITIONS:

6. **Operation and maintenance responsibilities.** The permittee shall properly operate and maintain the STA and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

9. **Records as evidence.** In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data, and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111, F.S. and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

SPECIFIC CONDITIONS:

Conditions for Construction, Operation, and Maintenance

6. **Project Operation and Maintenance.** The permittee shall operate and maintain STA-1E consistent with the design documents, as may be modified and reflected on the record drawings, and the operations criteria required by Specific Condition 10.

9. **Pump Station Testing and Maintenance.** In order to ensure operational readiness, initial testing is required by the construction contractor for the pump stations authorized by this permit prior to turnover of the pump stations to the permittee for operation. Maintenance requirements for the pump stations include operation of the pumps for approximately 2 to 4 hours per month, as necessary, to maintain their mechanical integrity. Therefore, temporary operation of the pump stations for testing and maintenance purposes is allowed and is not subject to the discharge criteria of the specific conditions of this permit. However, the

permittee shall include all such discharge flows and loads as a part of the monitoring requirements of this permit.

10. **STA Operations Plan.** No later than three months after issuance of this permit, the permittee shall submit to the Department at the addresses listed in Specific Condition No. 2, an Operations Plan for STA-1E. In addition, the permittee shall provide a copy of the Operations Plan to the USFWS (Refuge) and the Corps for review and comment and address the comments through revision of the Operations Plan as necessary. The Operations Plan shall contain the specific provisions for operation of the STA-1E components, and the plan shall include the information described in A-E, below.

A. Minimum Water Level Targets to Avoid Dryout. In accordance with the relevant design documents, the permittee shall, to the maximum extent practicable, maintain a minimum static water level of 0.5 feet above the average ground elevation of the treatment cells to avoid dryout of the treatment cells, subject to available water from the upstream watershed.

B. Responding to Dryout Conditions. The permittee shall evaluate and correct adverse dryout effects on the water quality performance of STA-1E. If the compliance requirements in this permit are not met due to dryout conditions, then the permittee shall propose modifications to the Operations Plan as appropriate and submit the revised plan to the Department.

C. Maximum Water Level Targets. The permittee shall ensure to the maximum extent practicable that maximum water depths of 4.5 feet are not exceeded for more than 10 consecutive days.

D. Principles of Interim Operations. Flows and phosphorus loads entering the Refuge have been higher than anticipated in the 1994 Conceptual Design of the Everglades Construction Project. This is due in part to a delay in the diversion of L-8 Basin supply and regulatory purposes, and more inflows than anticipated from sources upstream of S-5A. Therefore, during the interim period until other actions to reduce these flows and phosphorus loads have been implemented, STA-1E will need to be operated in an adaptive manner that balances the water quality, flood control and water supply purposes of STA-1E and adapts to future changes in the regional water management system. STA-1E was designed to work in concert with STA-1W and capture approximately 100,000 acre feet (AF) /year of water that is presently lost to tide. The STA-1E operation plan should be integrated with the STA-1W Operation Plan and should contain the following:

1. Discharge of untreated water into the Refuge through the G-300 & G-301 structures should be terminated by diverting the flow through the G-311 structure for:
    i. treatment in STA-1E prior to discharge to the Refuge; or

ii. discharge to the C-51W canal by gravity through the S-319 pump station and discharge to tide or meet downstream water supply demand.

2. Until the L-8 basin runoff is diverted north into the proposed CERP project, the S-155A divide structure should be operated in conjunction with S-5AE and S-319 to pass at least the same volume of stormwater to tide as L-8 presently discharges to C-51. This volume is estimated to be approximately 150,000 AF/yr, which will be a mixture of L-8 and C-51W basin runoff.

3. STA-1E and STA-1W should be operated in an attempt to keep their inflows within the range anticipated in the design of enhancements, with an expected mean inflow of ~ 165,000 AF/yr for STA-1E and ~ 180,000 AF/yr STA-1W. These mean inflows include the anticipated diversion of approximately 35,000 AF/yr of runoff from the Acme Basin B into STA-1E. Until L-8 is fully diverted & excess flows and phosphorus loads from the S-5A Basin are resolved, flows to STA-1E and STA-1W will likely exceed their design range.

4. Until the L-40 Work Plan required in Specific Condition 16, below, is completed and shown to be effective, and except as necessary to avoid or recover from upstream flooding conditions, discharges from STA-1E should be limited to minimize impacts to presently unimpacted area. The STA-1E Operations Plan shall be reviewed periodically and revised as appropriate, in consultation with the Department and the USFWS (Refuge).

E. Phosphorus uptake optimization. Operations shall be conducted to distribute the flows and water levels within STA-1E to optimize the phosphorus reduction performance and shall be updated as necessary to include the results of the permittee's Process Development and Engineering (PD & E) program being implemented as a part of the Long-Term Plan. The PSTA demonstration project currently being designed by the Corps for construction in cell 2 shall be operated in an attempt to treat the same hydraulic and nutrient unit loading that STA-1E was designed for.

F. Hydropattern Restoration. STA-1E shall be operated in such a manner as to be consistent with the activities proposed to restore the hydropattern of the Everglades Protection Area, as described in Specific Condition 11 below.

G. Operations Plan Modifications. In order to better understand and evaluate potential water quality impacts associated with the intrusion of treated water into the interior marsh of the Refuge, collection and analysis of hydrological and certain water quality data will be conducted before and during the initial operation of STA-1E by the USFWS and the District. The STA-1E operation plan should be reviewed and may be revised as appropriate based on downstream monitoring and upstream levels of service.

11. **Hydropattern Restoration.** In accordance with Subsection (4)(b) of the EFA, the permittee shall operate the STAs in order to improve and restore the Everglades water supply

and hydroperiod. The permittee shall operate the Everglades Construction Project as specified in the February 15, 1994, Conceptual Design Document (Part VII, Intended Operation of Plan Components), to provide additional increased flow to the Everglades Protection Area (EPA) through the modification of historical operational practices for regulatory releases from Lake Okeechobee and the Water Conservation Areas. Pursuant to Subsection (4)(b) of the EFA, the expectation is that these practices will achieve an average increase inflows of 28 percent to the Everglades Protection Area compared to the baseline years of 1979 to 1988. The STAs shall be operated to achieve the goal of providing additional flows to the Everglades Protection Area and shall, to the maximum extent practicable, be coordinated with and consistent with the Lower East Coast Water Supply Plan, the Lake Okeechobee and Water Conservation Areas Regulation Schedules, and the Comprehensive Everglades Restoration Plan. To help achieve this goal STA-1E shall be operated to capture and treat water from the western C-51 Basin that previously was lost to tide. In the interim period until L-8 Basin runoff is diverted, some C-51W runoff will continue to go to tide.

14. **Water Quantity and Flooding Impacts.** The permittee shall be responsible for ensuring that STA-1E is operated so as not to adversely affect adjacent lands with regards to flooding impacts and water supply needs of the region. The permittee shall hold and save the Department harmless for any and all damages, claims, or liabilities, which may arise from water quantity and/or flooding impacts resulting from the construction and operation of STA-1E.

Conditions for Total Phosphorus and Mercury

17. **Start-Up Phase.** During the Start-Up Phase, the permittee shall monitor phosphorus and mercury concentrations within STA-1E to demonstrate that the project is achieving a net reduction in phosphorus and mercury. Portions of STA-1E may operate independently of each other. Under those circumstances, start-up Phase operation and monitoring within STA-1E shall be performed as follows:

A. *Establishment of Marsh Vegetation.* The permittee shall manage water depths in the treatment cells to facilitate the recruitment of marsh vegetation in accordance with the Operations Plan, which may include recirculating waters within the STA.

B. *Start-Up Monitoring.* On a weekly basis, the permittee shall monitor total phosphorus at the upstream side of inflow pump stations S-319 and S-361 and structure G-311. Total phosphorus shall also be monitored on the upstream side of the S-365, S-369 and S-372 outflow structures (See Figure 1). Mercury shall be monitored in accordance with Exhibit C.

C. *Discharge/Flow-through Operations.* Discharge/flow-through operations, from an individual flow-way that has passed both the Phosphorus and Mercury Start-Up Tests described below, may commence once Start-Up Phase documentation and all supporting data and analyses are submitted to the Department via regular or electronic mail. For flow-ways that have not met these tests within two months after issuance of

the permit, the permittee shall submit status updates regarding progress toward and identifying strategies to achieve these tests.

1. *Phosphorus Start-Up Test*. The Phosphorus Start-Up Test for an individual flow-way is based on when the above samples demonstrate, over a four-week period, a net reduction in phosphorus occurs. This net reduction shall be deemed to occur when the 4-week geometric mean total phosphorus water column concentration from samples collected at the applicable outflow structures is less than the 4-week geometric mean total phosphorus water column concentration collected at the applicable inflow structure(s).

2. *Mercury Start-Up Test*. The Mercury Start-Up Test for an individual flow-way is based on demonstrating a net improvement in total mercury and methyl mercury, in accordance with the provisions of the mercury monitoring condition (2) in Exhibit C.

D. *Initiation of Individual Flow-way (Stabilization and Post-Stabilization) Discharges and Monitoring.* Once flow-through discharges from a flow-way begin, the permittee shall initiate routine water quality monitoring for that flow-way consistent with the monitoring program described in the "Specific Conditions for Monitoring Program" portion of this permit

18. **Stabilization Phase.** Following completion of the Start-Up phase for all the flow-ways, STA-1E shall begin a period of stabilization, in accordance with Subsection 373.4592(9)(h) of the EFA. The stabilization period for STAs is where performance is improving toward the STA's optimal treatment performance and is generally anticipated to last one to two years after the Start-Up phase ends. During that period, compliance with the criteria in Subsection 373.4592(9)(h) of the EFA shall be evaluated as set forth below.

After start-up operations have ended and flow-through operations and discharges have begun from all flow-ways, the permittee shall operate and monitor STA-1E. The stabilization test for STA-1E shall be met when the 12 month flow-weighted average total phosphorus concentration at the outflow station is less than or equal to 50 ppb. Starting 12 months after commencing discharge from all flow-ways, the permittee shall provide rolling 12 month flow-weighted average total phosphorus concentration in monitoring reports. If, after the two years of full flow-through operation, STA-1E has not met this stabilization test, the permittee shall submit a report which shall evaluate reasons for not meeting the stabilization test. The report shall include results from the PD & E component of the Long-Term Plan and any other applicable information. The report shall also include schedules and strategies for implementing an optimization plan to achieve the stabilization test.

19. **Post Stabilization Operations Phase**. At the end of the stabilization period, discharges from STA-1E, via the S-362 pump station, shall meet technology-based effluent limitations (TBELs) in accordance with Section 373.4592(10)(a), F.S. Based upon the Best Available

Phosphorus Reduction Technology (BAPRT), the ECP identified an initial TBEL for phosphorus of a long-term flow-weighted mean of 50 ppb. Compliance with the 50 ppb TBEL shall be as defined in the May 2005 Nearhoof, et al. document attached as Exhibit J. A 10 part per billion (ppb) default numeric phosphorus criterion went into effect December 31, 2003 and was approved by the U.S. EPA on January 24, 2005. Pursuant to Section 373.4592(4)(e)2 of the EFA, the Department adopted a 10 parts per billion (ppb) numeric criterion for phosphorus in the Everglades Protection Area, which was approved by the U.S. EPA on January 24th, 2005, and superseded the default 10 ppb criterion. The criterion was revised and adopted on June 3rd, 2005, and the revised rule was approved by the U.S. EPA on July 27, 2005. Under the State's Long-Term Plan, the goal is to achieve the 10 ppb phosphorus criterion at the earliest achievable date, which will be accomplished through the iterative adaptive implementation process set forth in the Long-Term Plan. The initial 50 ppb TBEL will be revised as appropriate, consistent with the iterative implementation of BAPRT, until such time as the TBEL can achieve compliance with the 10 ppb phosphorus criterion.

Pursuant to Section 373.4592(10), the permittee shall take such action as necessary to implement the pre-2006 projects and strategies of the Long-Term Plan relevant to STA-1E. If implementation of the pre-2006 projects and strategies will not achieve the 10 ppb phosphorus criterion for discharges from STA-1E by December 31, 2006, the permittee will submit the necessary information to demonstrate the applicability of a moderating provision pursuant to Rule 62-302.540(6), F.A.C. Current Long-Term Plan performance estimates for STA-1E after implementation of the pre-2006 projects and strategies range from 15-24 ppb as a long-term flow-weighted mean; therefore, it is anticipated that the initial 50 ppb TBEL for STA-1E will be revised by December 31, 2006, to reflect a new TBEL in this range.

Conditions for Parameters Other than Total Phosphorus and Mercury

20. **Comparison of Outflows to Inflows.** For all water quality parameters indicated in the Monitoring Table other than total phosphorus, mercury, and dissolved oxygen, inflow and outflow samples collected at the sampling locations identified in Table 1 (See Figure 1) shall be used to determine compliance with this specific condition. Compliance with this specific condition shall be evaluated as follows:

A. If the annual average outflow concentration does not cause or contribute to violations of applicable Class III water quality standards, then STA-1E shall be deemed in compliance with this condition.
B. If the annual average concentration at the outflow causes or contributes to violations of applicable Class III water quality standards, but does not exceed, or is equal to, the annual average concentration at the inflow stations, then STA-1E shall be deemed in compliance with this condition.
C. If the annual average concentration at the outflow causes or contributes to violations of applicable Class III water quality standards, and also exceeds the annual average concentration at the inflow station, then STA-1E shall be deemed out of compliance with this condition.

21. **Dissolved Oxygen.** The permittee shall comply with the requirements for dissolved oxygen set forth a Site Specific Alternative Criteria (SSAC) as adopted by Secretarial Order on January 26th, 2004, and herein incorporated by reference as Exhibit I.

22. **Public Health, Safety, or Welfare.** Pursuant to Subsection (9)(h)3 of the EFA, discharges from STA-1E shall not pose a serious danger to the public health, safety, or welfare.

Factors Impacting Compliance

23. **Factors Outside the Permittee's Control.** In the event that non-compliance or failure to achieve performance objectives results for any reason other than those listed below, the permittee shall take appropriate remedial measures.

E. **Emergency Conditions.** Discharges from STA-1E or diversion of waters through the STA-1 Inflow Basin and/or the S-155A structure as defined in the project description shall also be allowed under hurricane warnings, tropical storm warnings, or other extreme weather conditions, and/or when water conditions within STA-1E may damage existing marsh vegetation. When a diversion event or series of proximal diversion events is anticipated due to aforementioned conditions, the permittee shall notify the Department of the anticipated event via email. After major diversion events, the permittee shall submit a diversion summary report to the Department. The diversion summary report shall contain information regarding the circumstances related to the discharge, as well as duration of the discharge and may be submitted in electronic format via email. Summary reports of minor diversions, not associated with Section 373.439 F.S. emergency measures, shall be submitted by the permittee

The NPDES permit (No. FL0304549) was issued on August 30, 2005.

V. Operation and Maintenance Requirements

A. Operation of Treatment and Disposal Facilities

1. The permittee shall ensure that the operation of this facility is as described in the application and supporting documents.

2. The operation of the pollution control facilities described in this permit shall be under the supervision of a person who is qualified by formal training and/or practical experience in the field of water pollution control.

B. Record keeping Requirements:

1. The permittee shall maintain the following records at the SFWMD headquarters office at the address specified above and make them available for inspection:

a. Records of all compliance monitoring information shall be maintained for at least three years after the conclusion of this permit cycle. These records shall include field and laboratory records as identified in 62-160.240 and 62-160.340, F.A.C., including all calibration and maintenance records for continuous monitoring instrumentation, and, if applicable, a copy or copies of the laboratory certification(s) showing the certification number(s) of the laboratory;

b. Copies of all reports, other than those required in items 1. and 6. of this section, required by the permit for at least three years from the date the report was prepared, unless otherwise specified by Department rule;

c. Records of all data, including reports and documents used to complete the application for the permit for at least three years from the date the application was filed, unless otherwise specified by Department rule;

d. A copy of the current permit;

e. A copy of any required record drawings;

f. Copies of the logs and schedules showing project operations and maintenance for three years from the date on the logs or schedule.

VI. Schedules

1. An Operations Plan shall be developed and submitted by the permittee to the Department no later than three months after issuance of the permit.

D. Specific Conditions Related to Pollution Prevention Plan

1. The document entitled "Stormwater Treatment Area 1E Pollution Prevention Plan" dated October 25, 2004, is hereby incorporated by reference and made a part of this permit as Exhibit A.

2. The STA-1E Project shall be operated in accordance with the Pollution Prevention Plan (PPP). If the permitted facilities are demonstrated to not be achieving compliance with the requirements of this permit, the permittee shall modify the PPP or the Operations Plan as appropriate.

22. Bypass Provisions.

a. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless the permittee affirmatively demonstrates that:

1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; and
2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
3. The permittee submitted notices as required under Condition VIII.22.b. of this permit.

b. If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least 10 days before the date of the bypass. The permittee shall submit notice of an unanticipated bypass within 24 hours of learning about the bypass as required in Condition VIII.20. of this permit. A notice shall include a description of the bypass and its cause; the period of the bypass, including exact dates and times; if the bypass has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

c. The Department shall approve an anticipated bypass, after considering its adverse effect, if the permittee demonstrates that it will meet the three conditions listed in Condition VIII.22 a. (1) through (3) of this permit.

d. A permittee may allow any bypass to occur which does not cause reclaimed water or effluent limitations to be exceeded if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Condition VIII.22.a. through c. of this permit. *[62-620.610(22), F.A.C.]*

23. Upset Provisions

a. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the permittee can identify the cause(s) of the upset;
2. The permitted facility was at the time being properly operated;
3. The permittee submitted notice of the upset as required in Condition VIII.20. of this permit; and
4. The permittee complied with any remedial measures required under Condition VIII.5. of this permit.

b. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

c. Before an enforcement proceeding is instituted, no representation made during the Department review of a claim that noncompliance was caused by an upset is final agency action subject to judicial review. *[62-620.610(23), F.A.C.]*