ANNEX C
DRAFT PROJECT OPERATING MANUAL

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COMPREHENSIVE EVERGLADES RESTORATION PLAN

LAKE OKEECHOBEE WATERSHED RESTORATION PROJECT

PROJECT OPERATING MANUAL

JACKSONVILLE DISTRICT
U.S. ARMY CORPS OF ENGINEERS

NOTICE TO USERS OF MANUAL

It is recommended that hardcopies of the Final Project Operating Manual (POM) be preserved in good condition so that inserts can be made to keep the POM complete and current. As revisions are incorporated into the Final POM, each page containing a revision, identified by the revision date at the bottom of the page, will be inserted at the appropriate location in the document (except at times when the entire POM is being replaced and superseded by a subsequent edition). It is anticipated that this DRAFT POM will be updated to a preliminary POM (PPOM) and subsequently a final POM.

EMERGENCY REGULATION ASSISTANCE

In the event that unusual conditions arise, emergency regulation assistance can be achieved by contacting the following, in the order listed.

	U.S. Army Corps of Engineers, Jacksonville District, Water Management Section	**Phone**
1	**Water Management Section Staff**	(904) 232-2840 Office
2	**Water Management Section Chief**	(904) 232-3034 Office

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C DRAFT PROJECT OPERATING MANUAL

C.1 Introduction

The main purpose of this draft Project Operating Manual (POM) is for day-to-day use in start-up operations in water management for essentially all foreseeable conditions affecting the integration of the LOWRP. The project will be operated in accordance with the final POM to achieve the goals, purposes, and benefits outlined in the PIR, including the quantity, timing, and distribution of water for the natural system, and other water-related needs identified through the process outlined in Guidance Memorandum #4. Report preparation is pursuant to ER 1110-2-240, and is in accordance with guidance contained in EM 1110-2-3600, ER 1110-2-8156, and the programmatic regulations GM #5. All elevations referenced in this DPOM are in feet, and reference the National Geodetic Vertical Datum 1929 (NGVD29).

Modifications and/or revisions to the POM will occur during subsequent project phases. Development of the POM is an iterative process that will continue throughout the life of the project. The POM will be updated at specific intervals during the detailed design, construction and operational testing and monitoring phases of the project. Refinements to the operating criteria in the POM will be made as more information is obtained on project detailed design, data, operational experience, and general information gained during these phases. It is also anticipated that once the POM is completed and the long-term operations and maintenance phase is underway, it may be necessary to revise the POM from time to time based on additional scientific information, new Comprehensive Everglades Restoration Plan (CERP) or non-CERP activities being implemented, and new CERP updates. This draft POM is based upon preliminary designs and modeling assumptions during the planning process and is valid during the PIR/EIS phase. The preliminary and final POMs will provide additional detail as it becomes available.

C.2 General Project Purposes, Goals, Objectives, and Benefits

The purpose of the LOWRP is to modify structural and operational components of the Central and Southern Florida (C&SF) Project to achieve restoration of the Everglades and the south Florida ecosystem. Other water-related needs such as urban and agricultural water supply and flood protection will be considered as part of the LOWRP. The project features will be operated in accordance with this POM to achieve the purposes set forth in the PIR. In addition to managing the high volume flows from Lake Okeechobee to the estuaries and storage of water, operations will be conducted to achieve the quantity, timing, and distribution of water for the natural system and other water-related needs.

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

- The construction of a storage wetland attenuation feature (K-05) and associated levees and control structures
- The construction of wetlands adjacent to the Kissimmee River, restoring wetlands along the historic Kissimmee River floodplain
- Aquifer Storage and Recovery (ASR) wells distributed throughout the Lake Okeechobee watershed

C.3 Project Features

The LOWRP consists of multiple existing features including canals, rivers and lakes as well as proposed new features including water control structures, a Wetland Attenuation Feature (WAF), Aquifer Storage and Recovery (ASR) well systems, wetlands and canals.

C.3.1 Existing Features

Existing features of the LOWRP include C&SF basins and structures. The structures are listed below according to their parent basin (Lake Okeechobee or the Kissimmee River) (See **Figure C-1** for Map).

C.3.1.1 Lake Okeechobee

S-127 Pump, Spillway and Lock: S-127 is a pump station and navigation lock located on the northwest shore of Lake Okeechobee in the alignment of Levee 48 about 12 miles southwest of the town of Okeechobee. Pumping into the lake is initiated when the headwater elevation reaches 14.0 ft. (NGVD29) and terminated when it drops to 13.25 ft. (NGVD29) and in storm conditions the stage can be lowered to 13.0 ft. (NGVD29). In drought conditions the spillway may be used to backflow for irrigation purposes.

C.3.1.2 Kissimmee River

KI-1: KI-1 is a three-barrel culvert located through L-48, about 5.5 miles west of the town of Okeechobee. Control is by a submersible gate on a concrete box inlet structure. The purpose of the structure is for emergency flood control, maintaining drainage from the L-59 canal into the Kissimmee River (C-38) and shortly to Lake Okeechobee. Gates are kept full open during hurricane alerts in order to pass the maximum flow possible. Also known as G-34 by the South Florida Water Management District (SFWMD).

KI-2: KI-2 is a single-barrel culvert located through L-48, about 7 miles west of the town of Okeechobee. Control is by a submersible gate on a concrete box inlet structure. The purpose of the structure is to release water from Paradise Run of the old Kissimmee River into the Kissimmee River (C-38). Gates are kept full open during hurricane alerts in order to pass the maximum flow possible. Also known as G- 33 by the SFWMD.

S-65E/S-65EX1: S-65E is a gated spillway with flow controlled by six cable operated vertical lift gates and a lock structure with two pairs of sector gates. S-65EX1 is a three bay ogee spillway with flow controlled by three vertical slide gates located approximately 170 feet west of S-65E. The structures are located on C-38 about 7.3 miles downstream from S-65D and are the last control structure on C-38 before Lake Okeechobee. The purpose of these structures is to maintain canal stages in C-38 below the upstream flood design stage and restrict downstream flood stages and channel velocities down to reasonable levels as well as passing sufficient high volume flow during low-flow periods to maintain downstream stages and irrigation demands. The structure operates to maintain an optimum headwater elevation of 21.0 ft. NGVD through manual or automated control.

S-84/S-84X: S-84 is a gated spillway with flow controlled by two cable operated, vertical lift gates and S-84X is an Ogee spillway with on vertical slide gate adjacent to S-84. These are located on C-41A canal about 12 miles downstream of S-83 and about a mile upstream from the junction of C-41A and C-38. The purpose of the structure is to maintain optimum upstream stages in C-41A; pass design flood without exceeding the upstream flood design; restrict downstream flood stages and channel velocities to reasonable levels; and prevent backflow from Lake Okeechobee through C-38 through high lake stages.

The structure operates to maintain an optimum headwater elevation between 24.3 ft. and 25.2 ft. (NGVD29) through automated controls.

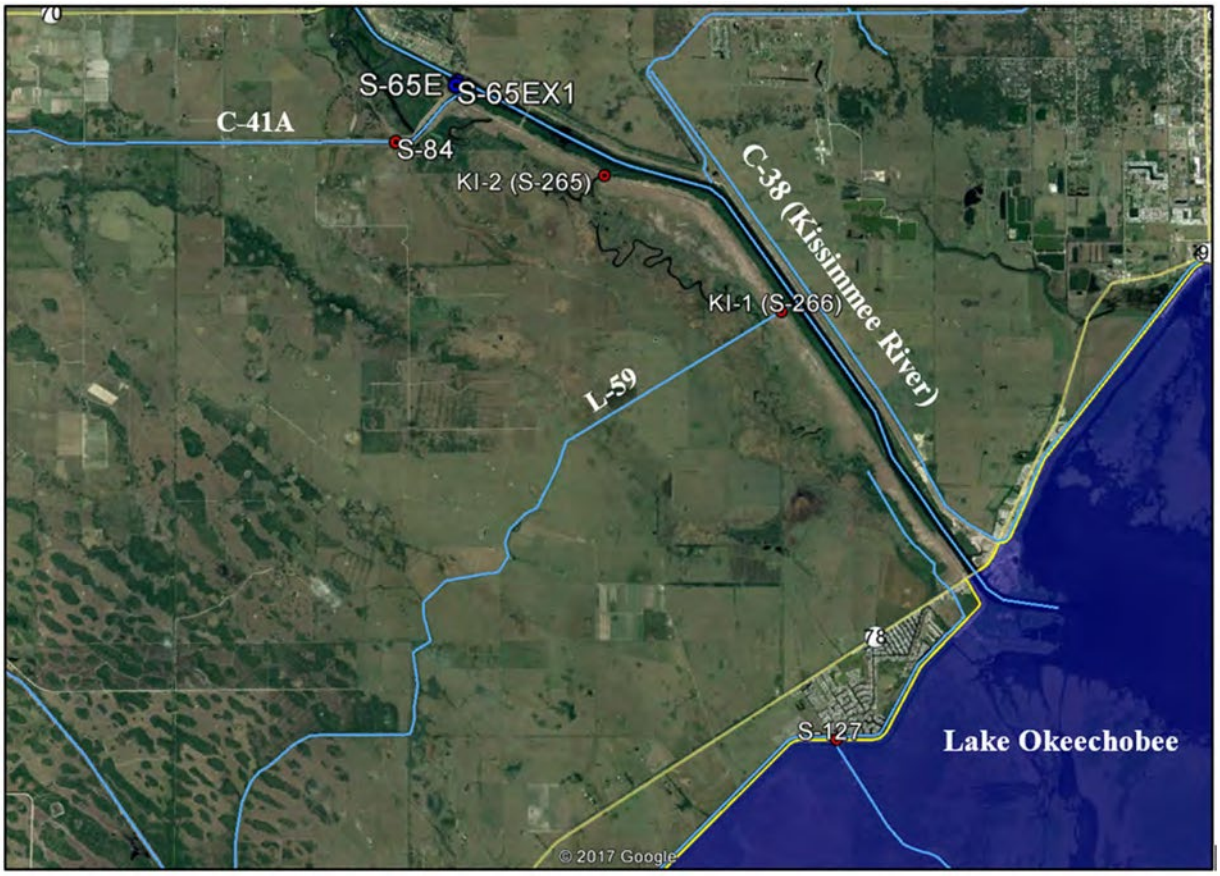

Figure C-1. LOWRP map of existing structures.

C.3.2 Modified Features

The L-59 will be altered significantly surrounding the K-05 WAF. The WAF, as proposed, straddles the existing L-59 canal and associated embankments. The canal will be plugged on the west end of K-05 so that the feature embankments can cross the space and contain water. The proposed culvert S-723 will provide equivalent flood control from the L-59 drainage basin into the WAF during wet periods. The eastern part of L-59 will be plugged and integrated into Paradise Run.

The existing culvert KI-1 through Herbert Hoover Dike (HHD) tie back levee will be abandoned as part of this project. The existing culvert KI-2 may be used for an auxiliary spillway for Paradise Run or may be abandoned.

C.3.3 Proposed Features

The features as outlined in the following subsections have been proposed as part of LOWRP. In addition to construction of new features, there would be modifications to existing features.

C.3.3.1 New Features

The new features can be seen in **Figure C-2** and are discussed in the following sections.

Figure C-2. LOWRP map of new features (circles indicated general proposed ASR well locations).

C.3.3.1.1 K-05 Wetland Attenuation Feature

The K-05 wetland attenuation feature (WAF) would be located west of the Kissimmee River approximately seven miles southwest of the town of Okeechobee. The northern bounds of the feature will be located approximately 300 feet from C-41A, the eastern bounds approximately 1.5 miles from the Kissimmee River, the southern bounds approximately 300 feet to the north of State Road 78, and the southwestern bounds approximately 300 feet from canal C-40. The feature will have approximately 46,000 ac-ft of storage consisting of around 27 miles of embankments and approximately 13,600 acres of feature and setbacks (setbacks being free space between project features and existing infrastructure). The feature is intended to have a nominal 4 feet storage depth, an average 15.5 feet high perimeter embankment with two internal embankments to mitigate wind/wave run up effects, a perimeter toe road, and a perimeter seepage canal measuring 20 feet deep with a 30 feet bottom width. The internal embankments will be located to divide the feature into thirds; the exact locations will vary depending on the results of a future wind/wave analysis performed during detailed design. Perimeter canals will have two seepage pumps located on the northwestern and southwestern part of K-05 WAF. The internal embankments will each have gated culverts to equalize the water levels in the feature on either side of the internal embankment. There will be two emergency spillways which will be ogee weirs. Water will be pumped into the feature at a pump station just downstream of S-84 on the C-41A canal. The outlet of the feature will be through a gated spillway on the east embankment of the southernmost cell and into a canal which will flow east to the Kissimmee River. The control structures proposed for the K-05 WAF and Paradise Run can be seen

in **Figure C-3** and **Figure C- 4** and listed in **Table C-1.** A more detailed map of the structures can be found in the Engineering Appendix (PIR Appendix A, Annex C-1).

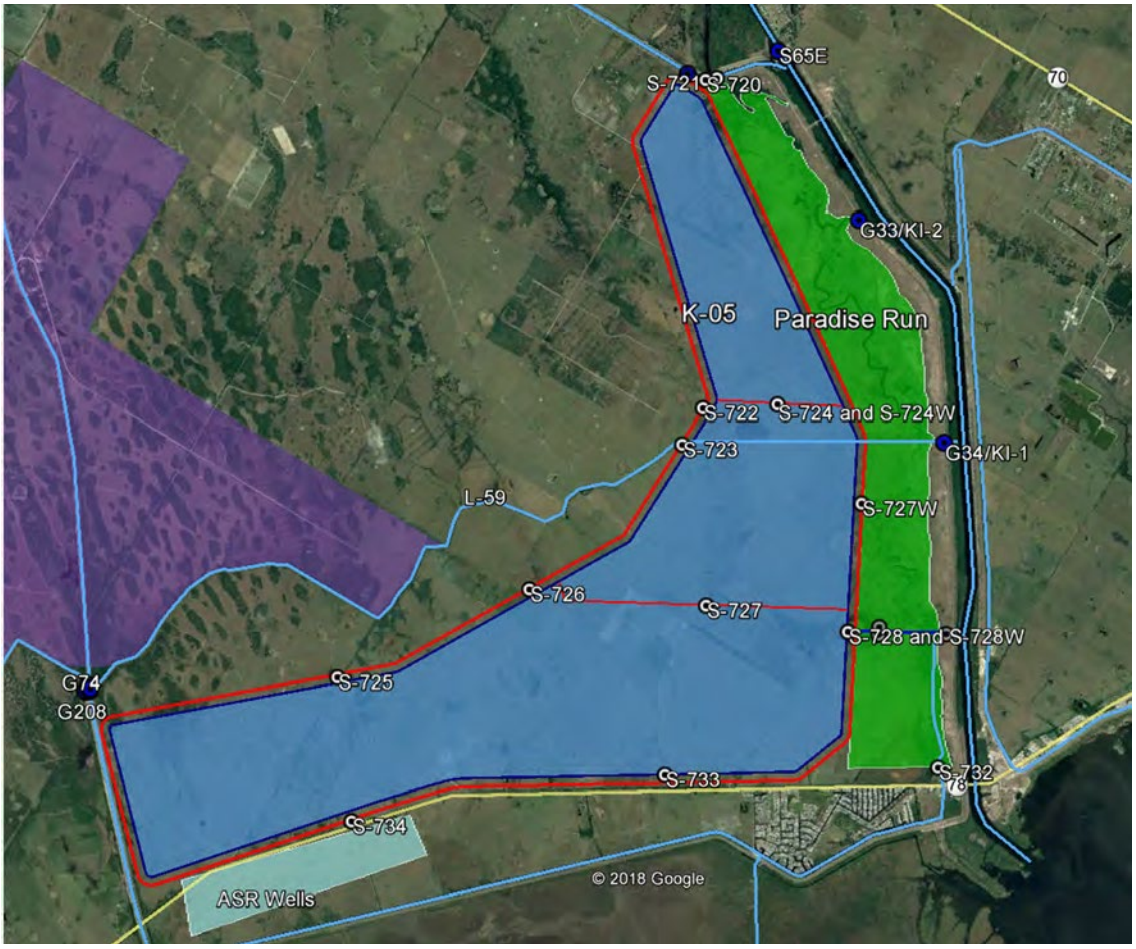

Figure C-3. Water control structures of K-05/Paradise Run

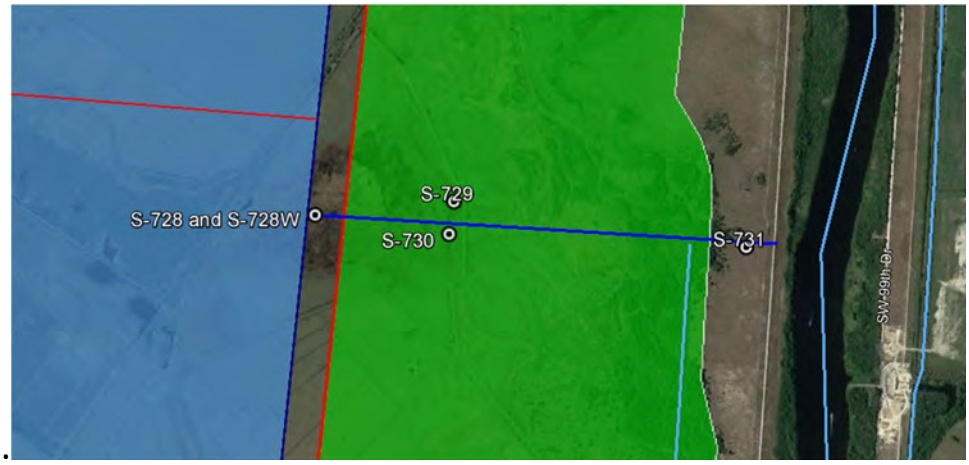

Figure C- 4. Water control structures of K-05/Paradise Run detail

Inlet Structures: Main inlet pump station for K-05 WAF is S-720 which is located at the north end of the WAF. It will be located on the C-41A canal just downstream (east) of the S-84 spillway structure. The pump station will house pumps capable of pumping approximately 1,600 cfs. It will pump water from the C-41A canal, but effectively Lake Okeechobee water, as there are no control structures between S-84 and the lake, into the north cell of the K-05 WAF. Additional inlets into the K-05 WAF will include 25 ASR wells. Some of the wells will be installed in the UFA at 7.7 cfs each (116 cfs total flow) and some of the wells will be installed in the APPZ at 7.7 cfs each (77 cfs total flow). A flood control culvert will also contribute to water in the WAF during wet periods. S-723 will be a gated culvert providing flood control to the area to the west of the WAF where the L-59 will be plugged.

Outlet Structures: There will be a spillway (S-728) on the K-05 WAF at the southernmost cell through the eastern embankment which will release water out of the feature into a new canal which leads to the Kissimmee River (C-38). The spillway will have a capacity of 1,500 cfs. There will be two auxiliary spillways: one adjacent to S-728 to be named S-728W and one in the center cell through the east embankment discharging into Paradise Run to be named S-727W (combined structure with S-727). Water will also outflow into the ASR wells co-located with the WAF, the configuration of this conveyance has not been determined during this draft stage of the POM.

Seepage Structures: Two seepage pumps (S-725 and S-733) will move water from the seepage canal back into the WAF, each being 100 cfs capacity. S-725 will be located in the south cell at the northwest embankment and S-733 will be located in the south cell at the south embankment. Two weirs (S-722 and S-726) will also be located within the seepage canal to prevent water in the canal from stacking at the southern end. These will include S-722 located in the center cell along the west embankment and S-726 located in the south cell at the northwest embankment. See **Figure C-3**.

C.3.3.1.2 Paradise Run Wetlands

The Paradise Run wetlands area is located downstream of S-65E on the west bank of the Kissimmee River (C-38) north of the Buckhead Ridge community. It consists of approximately 3,600 acres of historic Kissimmee River channel and flood plain. This project will consist of clearing the historic channel; adding a pump station at the north end of the site (S-721); adding two culverts through the WAF outlet canal (gated culvert S-729 and riser culvert S-730); adding an outlet culvert from the south end of the wetlands into the HHD rim canal (L-48); and potentially adding a levee/berm surrounding the area depending on modeling results and more detailed site investigations.

C.3.3.1.3 Kissimmee River Center Wetlands

The Kissimmee River-Center wetlands areas is located between S-65D and S-65E on the west bank of the C-38 canal. It consists of approximately 1,200 acres of lowland flood plains of the historic Kissimmee River with spoils mounds from the C-38 construction toward the south end of the site. The project will consist of adding a pump station on the C-38 canal at the north end of the feature to deliver water to the west into a created river channel that mimics the historic Kissimmee River. Water will exit the site through an existing culvert at the south end of the site. Water would then flow through a canal and enter the C-38 about 1 mile downstream.

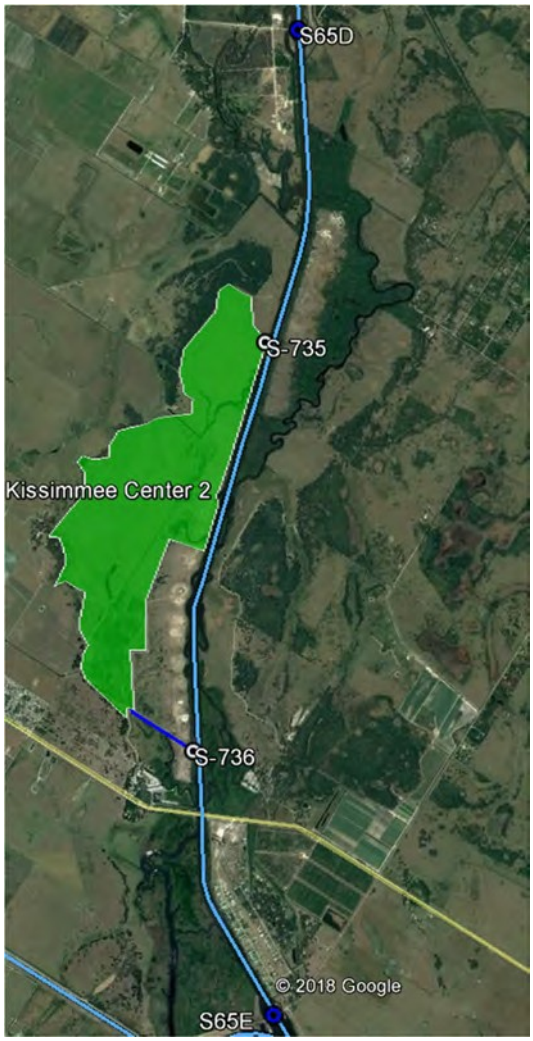

Figure C-5: Kissimmee River Center Wetlands

C.3.3.1.4 Aquifer Storage and Recover Wells

The project will consist of 80 ASR wells located throughout the Lake Okeechobee watershed. Some wells will be co-located with the K-05 WAF and will be integrated into its operations. Of the 80 wells, 50 will be in the Upper Floridan Aquifer (UFA) and 30 in the Avon Park Permeable Zone (APPZ) depending upon the results of the initial exploratory testing at each well cluster location. The wells will range in depth from 500 to 1200 feet and are expected to pump at 7.7 cfs each. The ASR wells located adjacent to the WAF (Figure C-3) will use water from within the WAF as a source and ASR water recovery would be released into the WAF. The other ASRs located in the Okeechobee watershed (Figure C-2 noted by red circles) will receive source water directly from Lake Okeechobee and ASR water recovery would be sent to Lake Okeechobee. The sources, capacities and efficiencies are listed below for each type proposed. Though the quantity, distribution, and efficiency of the proposed ASR wells may change depending upon results of initial exploratory testing at each well cluster location. The efficiencies are conservative estimates based on the USACE report, “Aquifer Storage and Recovery Regional Study” May 2015. Once aquifer testing has been complete, the report and model will be updated with representative efficiencies.

- ASR wells linked to the K05 WAF (approximately 25)
    - Some will be from the UFA at 116 cfs total capacity and 70% efficiency
    - Some will be from the APPZ at 77 cfs total capacity and 30% efficiency
- ASR wells linked to Lake Okeechobee (55)
    - Some will be from the UFA at 270 cfs total capacity and 70% efficiency
    - Some will be from the APPZ at 154 cfs total capacity and 30% efficiency

Table C-1: Structure Summary

Structure/ Feature Number	Structure/Feature Type	Design Capacity (cfs)	Location
S-720	Inflow Pump for K-05 WAF	1,600	North Cell
S-721	Inflow Pump for Paradise Run (PR)	200	North Paradise Run
S-722	Weir to maintain upper water levels in seepage canal	not applicable	West Perimeter Central Cell
S-723	L-59 Inflow Culvert for flood control	200	L-59 at Perimeter Canal
S-724	Cell Division Spillway	1,500	North to Central Cell
S-724W	Ungated Cell Spillway	1,500	North to Central Cell
S-725	Seepage Pump	100	North Perimeter of South Cell
S-726	Weir to maintain upper water levels in seepage canal	not applicable	North Perimeter of South Cell
S-727	Cell Division Spillway	1,500	Central to South Cell
S-727W	Ungated Cell Spillway	1,500	Central Cell to Paradise Run
S-728	Primary WAF Outlet	1,500	East Perimeter of South Cell
S-728W	Emergency Ungated Spillway	1,500	East Perimeter of South Cell
S-729	Gated Culvert from north PR to Outlet Canal and south PR	200	Outlet Canal
S-730	South Paradise Run Inlet Riser Culvert from Outlet Canal and north PR to south PR	50	South Paradise Run
S-731	Spillway to C-38 from outlet canal	1,700	Outlet Canal
S-732	Outlet Riser Culvert from south PR to L-48	100	South Perimeter Paradise Run
S-733	Seepage Pump	100	South Perimeter of South Cell
S-734	Seepage Canal Emergency Outlet Riser Culvert to L-48	190	South Perimeter of South Cell
S-735	Inflow Pump Kissimmee River Center (KRC)	100	North End of KRC
S-736	Outlet Riser Culvert (KRC)	75	South End of KRC

C.3.4 Removed Features

At this time no existing features are being proposed to be removed. It is anticipated that the existing structure KI-1 will be abandoned. KI-2 may be used as an auxiliary spillway for Paradise Run or may be abandoned. Abandonment typically means that the structure will not be removed, but immobilized and the hydraulic connection grouted.

C.4 Project Relationships

Several projects may affect or be affected by LOWRP. This plan has been developed based on the operations of existing related projects, and/or related planned projects with approved operating plans, including both CERP and non-CERP activities. A summary of each related project and its relationship to LOWRP is provided below.

C.4.1.1 2008 Lake Okeechobee Regulation Schedule (2008 LORS)

2008 LORS is the current authorized regulation schedule used in the management of Lake Okeechobee water levels developed during HHD rehabilitation. Independent of LOWRP implementation, there is an expectation that revisions to the 2008 LORS will be needed following the implementation of other CERP projects and Herbert Hoover Dike infrastructure remediation. A change in 2008 LORS based on completed remediation of Herbert Hoover Dike may impact LOWRP operations. Changes to the 2008 LORS and/or the Master Water Control Manual for Lake Okeechobee and Everglades Agricultural Area (1996) or their replacement could also impact the operations of the Paradise Run wetland operations, which includes L-59 canal and its associated structures.

C.4.1.2 Central and Southern Florida Project Water Control Manual Features in Kissimmee River – Lake Istokpoga Basin

The Kissimmee River and its water control structures are regulated by the Master Water Control Manual for Kissimmee River-Lake Istokpoga Basin (1994) and the updated Water Control Plan for S-67, S-67X, S-68X, S-83X, S-84, S-84X, S-65C, S-65D, S-65DX1, S-65DX2, and S-65EX1 (2016). S-65E and S-65EX1 are the last water control structures on C-38 before Lake Okeechobee and will be among the main delivery avenues to the K-05 WAF. S-84 will also likely be a main delivery avenue for the feature. An update of the above documents or their replacement by the Comprehensive Everglades Restoration Plan (CERP) System Operating Manual (SOM) Volume 2 (Kissimmee River – Lake Istokpoga Basin) could impact LOWRP operations. Changes to the 2008 LORS and/or the Master Water Control Manual for Lake Okeechobee and Everglades Agricultural Area (1996) or their replacement could also impact the operations of the Paradise Run wetland operations, which includes L-59 canal and its associated structures.

C.4.1.3 Indian River Lagoon - South

The Indian River Lagoon-South (IRL-S) Restoration Project is now under way and is intended to capture local runoff from the C-44 basin, reducing average annual total nutrient loads and improve salinity in the St. Lucie Estuary and the southern portion of the Indian River Lagoon by providing new water storage and 3,600 acres of new wetlands. The Indian River Lagoon-South project employs a regional approach to address the Martin County and St. Lucie County portions of the lagoon. This project helps to balance the overall environmental needs as defined by LOWRP planning for the St. Lucie Estuary.

C.4.1.4 C-43 West Basin Storage Feature

The Caloosahatchee River (C-43) West Basin Storage Feature project would improve the timing, quantity, and quality of freshwater flows to the Caloosahatchee River and Estuary. The C-43 West Basin Storage Feature would help ensure a more natural, consistent flow of fresh water to the estuary. To restore and maintain the estuary during the dry season, the project would capture and store basin stormwater runoff, along with a portion of water sent from Lake Okeechobee. Managers would then slowly allow water to flow into the Caloosahatchee River, as needed. These features help to better balance the overall environmental needs as defined by LOWRP planning for the Caloosahatchee Estuary.

C.5 Major Constraints

Major constraints related to the movement, storage and/or utilization of water in the project area include the following.

C.5.1 Paradise Run

Paradise Run wetlands will flow out of S-732 south into the L-48 canal which is the rim canal for HHD. The canal runs under State Road 78 near the Buckhead Ridge community. The flow capacity and structural limitations of this bridge are not currently known.

Another potential release point for the north end of Paradise Run is through KI-1/G-34 culvert. The flows for Paradise Run may be constrained by the existing structure and operational capability without modifications.

C.5.2 Existing Legal Users, Levels of Flood Damage Reduction, and Water Quality

Because this project relies heavily on the re-distribution of existing water, without due consideration during preliminary project design, development of this operating plan, and during adaptive management, there would be a risk of violating one or more of the constraints described below. Section 601(h)(5)(A) of the WRDA requires that until a new source of water supply of comparable quantity and quality as that available on the date of enactment of this Act (December 11, 2000) is available to replace the water to be lost as a result of implementation of the Plan, the Secretary and the non-federal sponsor shall not eliminate or transfer existing legal sources of water, including those for:

> "An agricultural or urban water supply; Allocation or entitlement to the Seminole Tribe of Florida under Section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e); The Miccosukee Tribe of Indians of Florida; Water supply for Everglades National Park; or, Water supply for fish and wildlife."

Section 601(h)(5)(B) of the WRDA requires that implementation of the Plan shall not reduce levels of service for flood protection that are in existence on the date of enactment of this Act (December 11, 2000); and in accordance with applicable law.

Florida Statute 373.1501(5)(d) similarly requires that the quantity of water available to existing legal users shall not be diminished by implementation of project components so as to adversely impact existing legal users, that existing levels of flood protection would not be diminished outside the geographic area of the project component, and that water management practices would continue to adapt to meet the needs of

the restored natural environment. Florida Statutes also require that all surface water releases meet state water quality standards.

C.6 Standing Instructions to Project Operators

Once the LOWRP features operational testing and initial monitoring phase for the interim operations phase is concluded, the SFWMD will manage the day-to-day project operations of the newly constructed feature, control structures, pump stations, and wetlands. Standing instructions for the SFWMD project operators would be further developed during the detailed design phase and then in interim operations phase of the project that include refinements in operations due to general and past operational experience, additional scientific information, CERP updates, and new CERP or non-CERP activities that have been completed. USACE will provide oversight and support if needed to SFWMD operations of these features.

During normal conditions, the project structures shall be operated in accordance with the approved operating manual. Deviations from the normal operations would be permitted as outlined in C.13 of this POM.

C.7 Operational Strategy to Meet Project Objectives

The operational strategies described in this plan are intended to meet the goals, objectives, and benefits in the PIR, and include restoration, preservation, and protection of the natural ecosystem, while providing for the other water-related needs of the region, as well as meeting the requirements for protection of health and public safety.

It is important to understand that the draft POM will develop over time as the details of the detailed design of LOWRP components are developed and finalized. The first draft is presented in this document with the recognition that multiple revisions and operational fine-tuning would occur over the life of the project. Thus the operations discussed herein represent the first draft of a start-up operational strategy recognizing that constraints in the system may be temporary due to the completion of many of the LOWRP components as well as other CERP and non-CERP Projects. As design of the project is finalized, the start-up operations for when the WAF is first filled will be finalized as well.

As a general operational strategy, the LOWRP system would be operated to attenuate flows during the wet season and provide water during the dry season when the fresh water flows to Lake Okeechobee would be beneficial to the environmental health and water supply from the lake.

C.7.1 Achieving Natural System Goals, Objectives, and Benefits

Reducing the inflows into Lake Okeechobee during wet periods; reducing the volume of flood control high volume flows from Lake Okeechobee to the sensitive estuaries; and providing more stable lake levels during dry periods can benefit submerged aquatic vegetation as well as wildlife in the basin. A project storage of 46,000 ac-ft for K-05 and 448,000 ac-ft for the ASR wells can reduce the number of days that the estuaries will experience large fresh water flows on both coasts as well as low flows on the Caloosahatchee. The seepage management components of the project are designed to reduce the loss of fresh water from the K-05 WAF. As the designs are finalized for each component, operational specifics will be identified.

C.7.1.1 K-05 WAF Operations

In order to most efficiently utilize the capabilities of K-05 WAF, the operational intent is to receive and store water at periods of high lake stages and return water back during periods of low flows. The accounting period, which would define over what period of time the wells would be expected to have a net gain of zero, has not yet been determined at the time of this draft POM. This is something that will be determined during detailed design and incorporated into the next phase of this POM. Based on the results of the initial optimization, the K-05 WAF was modeled, and is intended to be operated as follows:

- K-05 will accept water when the official Lake Okeechobee elevation is above the blue dashed line in **Figure C-6** (13.1–14.8 feet NGVD29) and the depth in the feature is at or below 4.0 feet.
- K-05 will return water to the lake when the lake elevation is below the orange solid line or when the depth in the feature is above 4 feet in **Figure C-6** (12.7-14.4 feet NGVD29).
- K-05 can also deliver water to Paradise Run wetland but the operations for this have not yet been determined or modeled. Paradise Run will not be dependent upon water from the WAF but it could supplement it.
- K-05 can release to WAF-assisted ASRs (both 70% and 30% efficiency ASRs) when WAF depth > 3.0 ft.
- It is anticipated that water recovery from the K-05 WAF ASR wells will support maintenance of wetland habitat during dry periods such that the risk of dry out is minimized.
- The WAF will be filled from the north cell using S-720 pump station. There will be a flow way (due to existing topography) within the cells such that the south or center cell could be filled before the north. The north cell could also be filled first. The specifics of when each condition may be utilized have not been determined at the time of this draft POM but it is expected that the southern cell will be filled first to provide supply for the ASR well located adjacent to it.

For additional information concerning modeling assumptions for K-05 WAF operations, please refer to **Appendix A**, **Annex A-3**.

C.7.1.2 Aquifer Storage and Recovery Wells

The operational intent of the ASR wells is to pump water into the aquifer during wet periods and pump water out into the system during dry periods. The volume of water pumped out during dry periods shall not exceed the volume pumped into the aquifer during wet periods. The operational intent is to receive and store water at periods of high lake stages and return water back during periods of low stages. The ASR wells located adjacent to the WAF (**Figure C-3**) will use water from within the WAF as water supply and then also to return water to them. The other ASRs located in the Okeechobee watershed (**Figure C-2** noted by red circles) will use water from the lake to supply water. The exact location of each ASR well has not been determined at this time but have been denoted by general areas identified on the map in **Figure C-2**. The accounting period for the ASR operations has not been determined at the time of this draft POM but will likely be over a longer multi-year period. Based on the results of the initial optimization, the ASR wells were modeled, and are intended to be operated as follows:

- The UFA ASR wells will accept water when the official Lake Okeechobee elevation is above the purple dashed line in **Figure C-7** (13.0 to 14.9 feet NGVD29).

- The APPZ ASR wells will accept water when the official Lake Okeechobee elevation is above the purple solid line in **Figure C-7** (13.2 to 14.8 feet NGVD29).
- The ASR wells will return water to Lake Okeechobee or K-05 when the official Lake Okeechobee elevation is below the green dotted line in **Figure C-7** (12.8 to 14.5 feet NGVD29).

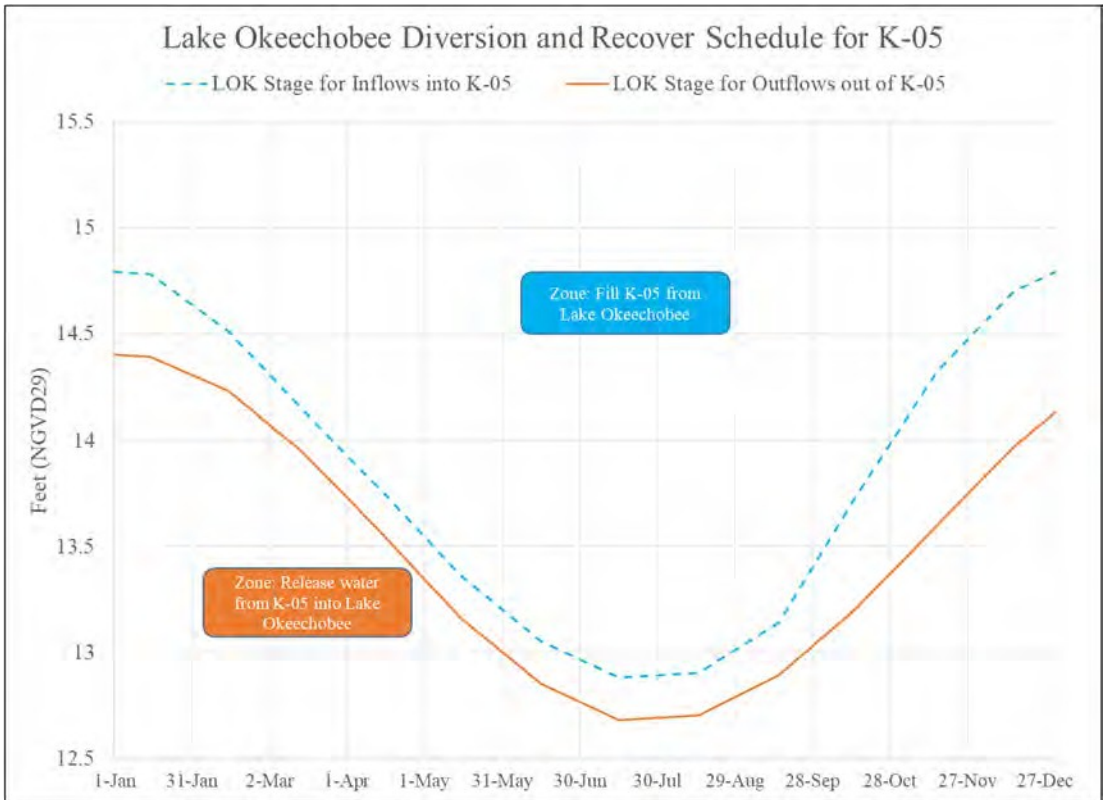

Figure C-6. K-05 diversion and recovery schedules.

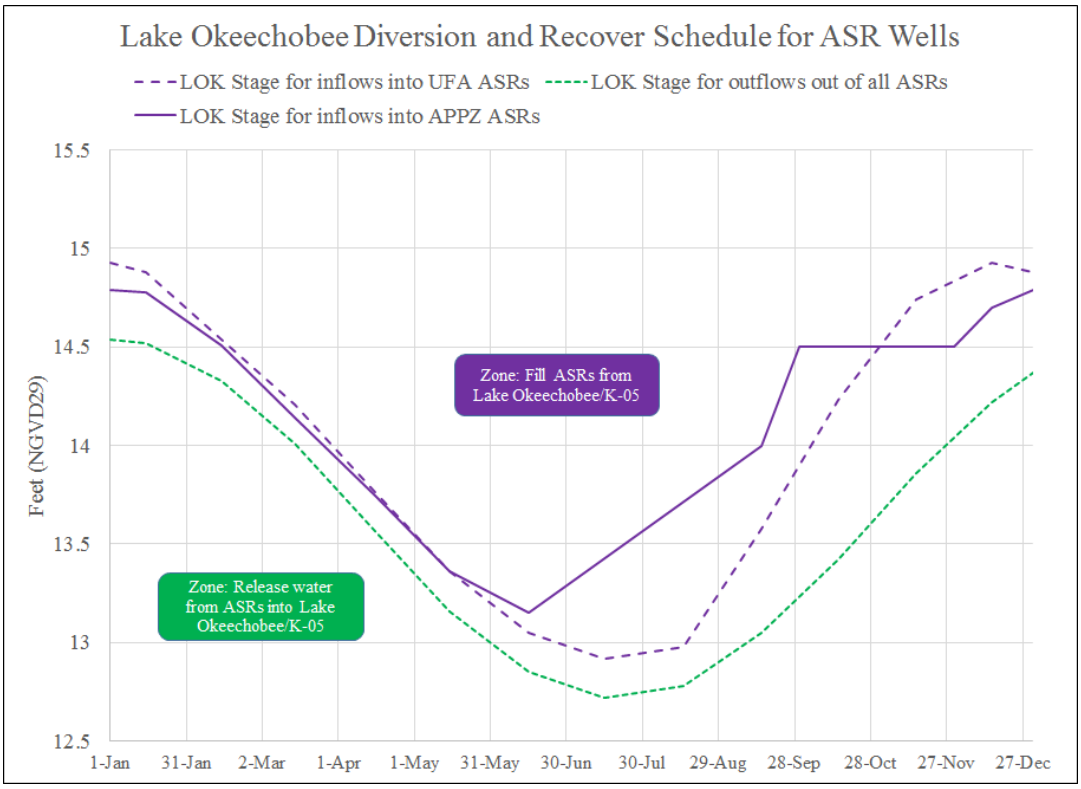

Figure C-7. ASR well diversion and recovery schedules.

C.7.1.2.1 Operational Safeguards for Initial Operations

Initial operations of the K-05 WAF would be closely monitored from the standpoint of levee and structural stability, especially during the initial filling operations.

C.7.1.3 Paradise Run and Kissimmee River Center Wetland Operations

The operational intent of the wetlands in the LOWRP project are to provide water in a restored river bed and flood plains. The restored wetlands should mimic the natural flow variation that the historic Kissimmee River experienced. Inundation of flood plains occurs when flows are high with a slow reduction in stage afterwards during wet periods and a lower flow through the historic river bed during dry periods.

- Paradise Run receives water from C-41A, downstream of S-84, via pump (S-721).
- Paradise Run releases water to C-38 out of a culvert in HHD (S-732).
- Kissimmee River Center accepts water from C-38 through a pump (S-735).
- Kissimmee River Center releases water to C-38 out of an existing culvert and canal (S-736).

C.7.1.3.1 Wetland Rainfall-driven Operations

The wetlands are proposed to be operated under a rainfall-driven operation (RDO) scheme. Unlike regulation schedule-based operations, the RDO estimates inflows, releases and outflow deliveries to Kissimmee River and subsequently Lake Okeechobee based on weekly rainfall and Potential Evapotranspiration (PET). The wetlands are not intended to act as storage for the project and will

release water based upon environmentally ideal water levels in the system which will be determined as project feature designs are developed.

C.7.2 Flood Damage Reduction

The LOWRP is not intended to increase the level of flood protection in the watershed but will maintain existing levels of flood protection.

C.7.2.1 Normal and Emergency Operations

All criteria previously established for normal water control operations would continue under LOWRP. Additional system components constructed as part of LOWRP would use operational criteria based on the modeling of alternatives documented in the PIR and/or subsequent operational refinements during detailed design. Emergency operations have not been established at this time but will be developed as the design is finalized.

C.7.2.2 Hurricane or Tropical Storm Operations

All system components with primary flood control requirements would follow the pre-storm protocols for the C&SF System.

C.7.3 Water Quality

LOWRP will be managed, operated, and maintained to conform to applicable federal and state standards.

C.7.4 Water Supply Operations

The specific operation of LOWRP components, will be developed during the design phases to ensure that existing legal water users are not adversely affected. Generally LOWRP should improve water supply for Lake Okeechobee by discharging water from the feature and pumping water from the ASR wells during dry periods. The additional water will provide more stable water levels while also potentially providing more water in the lake for users during dry periods. At a minimum the project will maintain levels of water supply service for legal users (Savings Clause [Section 601 (h)(5)(A) of WRDA 2000]) but it is anticipated that LOWRP will improve water supply service.

C.7.5 Recreation

Additional recreational opportunities are a benefit of LOWRP. There are abundant recreational facilities within the project area, both private and public; however, no specific water control regulations are required for this purpose. Water levels are not specifically managed for recreation, although levels do affect recreation facilities. For example, boat launching ramps, pleasure crafts, sightseeing vessels, and bank and small boat fishing are all influenced by water levels. Regulations concerning USACE public use areas are contained in other publications.

C.7.6 Fish and Wildlife

The design of LOWRP components are such that hydrologic conditions would be established that significantly benefit fish and wildlife through improvements in the types and diversity of habitats. This includes anticipated estuarine improvements in the St. Lucie and Caloosahatchee Estuaries as a result of

reducing the frequency and magnitude of high volume flows from Lake Okeechobee. The wetlands will replace habitat lost when the Kissimmee River was channelized by restoring the natural flow and flood plains and improve fish and wildlife habitat in this area. The K-05 WAF will provide habitat for many flora and fauna within its interior wetlands and tree islands.

C.7.7 Navigation

There are no authorized project features for navigation within the K-05 WAF.

C.7.8 Other

There is currently no further information for this section.

C.8 Pre-Storm/Storm Operations

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

C.9 Consistency with the Identification of Water and Reservations or Allocations for the Natural System

The Programmatic Regulations [Section 385.28(a)(6)(vi)] for CERP require that the operating manual be consistent with the reservation or allocation of water for the natural system made by the State (in accordance with section 601 of WRDA 2000). In general, the operating criteria within this LOWRP Draft POM are consistent with the operating criteria used to identify the water available for the natural system as described in the PIR. The operating criteria may be further refined during detailed design and captured in the Preliminary POM phase. These refinements would need to be consistent with the reservations described in the PIR.

C.10 Consistency with Savings Clause and State Assurances Provision

In accordance with Water Resources Development Act (WRDA) 2000, CERP projects may not eliminate or transfer existing (as of December 2000) legal sources of water until a new source of water of comparable quantity and quality is available to replace the water lost as a result of project implementation. The implementation of LOWRP would not preclude operation of the C&SF Project to deliver water from Lake Okeechobee to meet agricultural water supply needs. Therefore, no additional sources of water need to be identified since Lake Okeechobee would continue to provide water to agricultural users, the WCAs, and ENP.

C.11 Drought Contingency Plan

Drought contingency plans are regulated by ER 1110-2-1941. There is no drought contingency plan in place for the K-05 WAF. No additional water would be provided to K-05 to prevent dry-out conditions and there is no minimum water depth.

The current drought contingency plan in place for the Lake Okeechobee and the Kissimmee River is located in the *C&SF Project Master Water Control Manual*, Volume 4, Appendix B.

C.12 Flood Emergency Action Plan

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

C.13 Deviation from Normal Regulation

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

C.13.1 Emergencies

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

C.13.2 Unplanned Minor Deviations

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

C.13.3 Planned Deviations

Each circumstance should be analyzed on its own merits. Sufficient data on flood potential, lake and watershed conditions, possible alternative measures, benefits to be expected, and probable effects on other authorized and useful purposes, together with the USACE district recommendation, will be presented by memorandum, facsimile, or electronic mail to the USACE-SAD for review and approval. In

addition, the non-federal sponsors as well as the FDEP and SFWMD should be consulted as part of the process of receiving approval from SAD for the deviation.

C.14 Rate of Release Change

At this time, detailed information on Rate of Release Change has yet to be determined.

C.15 Seepage Control

The total linear length of seepage canal around the K-05 WAF is approximately 20 miles, around the perimeter. Two seepage pumps will move water from the seepage canal back into the WAF feature, each being 100 cfs capacity. S-725 will be located in the south cell at the northwest embankment and S-733 will be located in the south cell at the south embankment. Two weirs (S-722 and S-726) will also be located within the seepage canal to prevent water in the canal from stacking at the southern end. These will include S-722 located in the center cell along the west embankment and S-726 located in the south cell at the northwest embankment.

C.16 Initial Wetland Attenuation Feature Filling Plan

At this time, detailed information on the K-05 Initial Filling Plan has yet to be determined.

C.17 Non-typical Operations for Wetland Attenuation Feature and Wetlands Performance

There are no unforeseen non-typical operations that have been identified in the PIR Phase. This section would be updated in the future if necessary, as non-typical operations may apply during periods of extreme drought, rainfall, routine maintenance or during situations where portions of the project are offline or out of service.

C.18 Aquifer Storage and Recovery System Plan

Please refer to section **C.7.1.2** for the ASR operational strategy.

C.19 Water Control Data Acquisition System Plan

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

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

When not manned, the pump stations will be operated via remote or automated water level controls with close monitoring by operational staff. The pump stations will be manned, if needed, during the periods of high flow events. During critical storm events such as tropical storms and hurricanes, the operation of the pump stations will follow the guidelines of SFWMD's Emergency Preparedness Manual - Suggested Hurricane Operating Procedures.

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

Stage, flow, and any precipitation data for the project will be maintained in SFWMD and USACE databases. The data from the SFWMD operated SCADA system such as stage, flow, and rainfall data will be available at a frequency of less than fifteen minutes.

C.20 Consistency with the Adaptive Management Program and Periodic CERP Updates

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

C.21 Interim Operations During Construction

At this time, interim operations during construction cannot be determined.

C.22 Interim Operations During Operational Testing and Monitoring Phase

It is anticipated that the next phase of this POM, the Preliminary POM will elaborate on details within this draft and be in place during the operations testing and monitoring phase.

C.23 Conceptual Description of Project Operations for Transition from the Initial Operating Regime to the Next-Added Increment

This Draft POM is based on the Initial Operating Regime (IOR) and known conditions. As design for the proposed structures and features is finalized the conditions will be re-evaluated throughout and after detailed design. Conditions of the final design will be incorporated into the Preliminary POM, which will be the next increment of this POM.

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