

ANNEX C

**DRAFT PROJECT OPERATING MANUAL
FOR THE LOXAHATCHEE RIVER WATERSHED RESTORATION PROJECT**

NOTICE TO USERS OF THIS MANUAL

NOTE: As updates and revisions are made to this Draft Project Operating Manual, individual revised pages will be clearly identified with the date of the latest version. It is recommended that this copy of the Draft Project Operating Manual be preserved in good condition so that inserts can be made to keep the manual current.

EMERGENCY REGULATION ASSISTANCE

In the event that unusual conditions arise during non-duty hours, emergency regulation assistance can be achieved by contacting, in order listed, one of the following persons.

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C. INTRODUCTION

The main purpose of an operating manual is for day-to-day use in water control for essentially all foreseeable conditions affecting the Loxahatchee River Watershed Restoration Project (LRWRP) during the Project Implementation Report/Environmental Impact Statement (PIR/EIS) Phase. Preparation of this Draft Project Operating Manual (POM) is pursuant to guidance in 2007 Revised Final Draft Comprehensive Everglades Restoration Plan (CERP) Programmatic Regulations Guidance Memorandum #5, Engineering Manual (EM) 1110-2-3600, Engineering Regulation (ER) 1110-2-8156 and ER 1110-2-240.

C.1 GENERAL PROJECT PURPOSES, GOALS, OBJECTIVES AND BENEFITS

The purpose of LRWRP is to restore and sustain the overall quantity, quality, timing, and distribution of freshwaters to the federally designated “National Wild and Scenic” Northwest Fork of the Loxahatchee River (NWFLR) for current and future generations. This project also seeks to restore, sustain, and reconnect the area’s wetlands and watersheds that form the historic headwaters for the river. These areas include Jonathan Dickinson State Park (JDSP), Pal Mar East/Cypress Creek, Dupuis Wildlife and Environmental Management Areas, J.W. Corbett Wildlife Management Area (WMA), Grassy Waters Preserve (GWP), Loxahatchee Slough, the last remaining riverine cypress stands in Southeast Florida in the Loxahatchee River, and the Loxahatchee River Estuary. Reference **Figure 1-2** and **Figure 1-3** of the PIR/EIS for the project location. Other objectives include restoring and/or maintaining oysters, seagrass and other estuarine communities in the Loxahatchee River estuary and restoring native plant and animal species abundance and diversity in Loxahatchee River watershed natural areas, rivers and in its estuary. The project will be operated in accordance with the 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.

C.2 Existing Features

All of the project features included in this Draft POM, both existing and proposed features, may be components of other plans; however, this Draft POM is describing just the Tentatively Selected Plan.

Flow-way 1

Flow-way 1 is located in the southern project area, bounded by L-8 Canal and M-Canal in the south and the G-92 spillway in the north. This Flow-way uses the M-Canal and C-18 Canal to route water from upstream project basins to the Loxahatchee River.

C.2.1 C-18 Canal

The C-18 Canal is a component of the Central and Southern Florida Flood Control System (C&SF) that was constructed in the 1950’s by the USACE to capture and remove runoff from the adjacent lands. The canal has an east leg which drains from south to north, and a west leg which drains from west to east. The two legs join and continue north and then east to discharge through the S-46 structure, located on the southwest Fork of the Loxahatchee River. The S-46 structure was constructed for flood control purposes, and routes freshwater that historically flowed naturally to the Northwest Fork, away to the Southwest Fork. A second structure, G-92, was constructed by the SFWMD in the mid-1970’s to divert water to the Northwest Fork of the Loxahatchee River (NWFLR), which was cut off from its natural sloughs by the canal construction.

G-92 is located on the north bank of the C-18 Canal and discharges into South Indian River Water Control District's (SIRWCD) C-14 which in turn discharges to the NWFLR and Lainhart Dam. The east branch, containing the S-46 Structure, plus the main canal extends from the southwest fork of the Loxahatchee River, west of the low flat divide and west of the Atlantic Intracoastal Waterway (AIWW) (Mile 288.3), for approximately 10 miles until it terminates at Northlake Boulevard. The west leg, is approximately 7.9 miles long with headwaters consisting of the C-18/J.W. Corbett Wildlife Management Area (WMA). Water surface elevations in the C-18 West leg are controlled by the C-18 Weir, which maintains water surface elevations west of the Beeline Highway at 17.6 ft., National Geodetic Vertical Datum (NGVD). The west leg is often considered part of flow-way 2 and is also described below in flow-way 2.

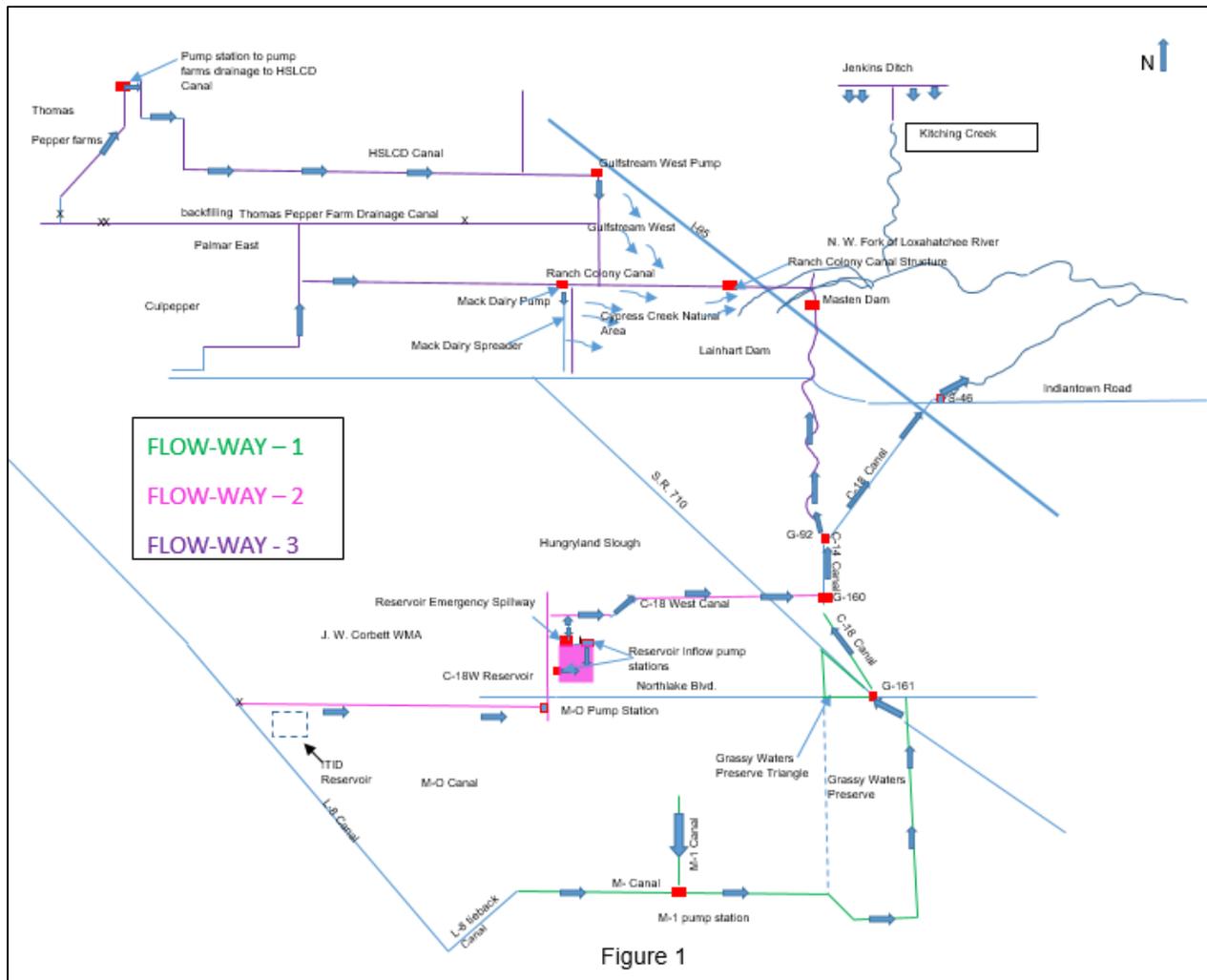


Figure C-1. Existing and proposed features in the three flow-ways.

C.2.2 L-8 Canal

This canal is located in western Palm Beach County and extends north from its intersection with the West Palm Beach Canal (C-51) for 4.0 miles then northwest for 17.9 miles then west for 3.9 miles to connect with C-10A at Lake Okeechobee, with flow being controlled by the S-76 structure. The purpose of the L-8 Canal is to protect the developed agricultural area around the southeastern shore of Lake Okeechobee

from overflow by flood waters originating in the wide flat area located to the north of and east of the levee alignment. There is no single structure that serves to maintain the water surface elevation in the L-8 Canal. The simultaneous operation of a network of structures (at the C-51 intersection, Lake Okeechobee, and the L-8 Tieback Canal) is intended to maintain water levels in the range of 12.5 ft. NGVD29.

C.2.3 M-Canal

The M-Canal provides a hydraulic connection between the L-8 Canal, via the L-8 Tieback Canal to the City of West Palm Beach. Water from the tie-back canal is pumped by the City of West Palm Beach's Control 2 Pump Station into the M-Canal. The M-Canal then flows eastward, through the Grassy Waters Preserve (GWP) marsh and ultimately to Lake Mangonia and Clear Lake. The City of West Palm Beach (CWPB) water treatment plant is located on the northeast shore of Clear Lake where the water is withdrawn to be treated and distributed as municipal water supply.

C.2.4 G-92

G-92 is a single-barreled concrete box culvert that is located in the north bank of the C-18 Canal, approximately 2 miles southwest of the turnpike crossing of C-18. The purpose of G-92 is to deliver water to the NWFLR via SIRWCD Canal 14 (C-14). G-92 also functions to remove flood waters when conditions warrant.

C.2.5 Grassy Waters Preserve Triangle

The Grassy Water Preserve (GWP) Triangle is located northwest of the intersection of Beeline Highway (SR710) and Northlake Boulevard. Since the construction of Northlake Boulevard, this portion of the GWP has experienced the hydrologic separation from the rest of the GWP area. Hydrologic restoration of this area will occur through earth work and the strategic construction of a swale that will allow water discharged from G-161 to be spread west to facilitate hydration of this area.

Flow-way 2

Flow-way 2 is located in the central portion of the project area. Its primary canal conveyances are the M-O Canal and C-18W Canal. The watersheds that contribute to these canals include the Indian Trail Improvement District (ITID) basin via the M-O Canal, J.W. Corbett Wildlife Management Area (WMA), Hungryland Slough, "Mecca" property (area of proposed C-18W Reservoir), and natural area east of the North Palm Beach County Airport via the C-18W Canal.

C.2.6 M-O Canal

The M-O Canal is located at the southern boundary of the J.W. Corbett WMA.

C.2.7 C-18W Canal

The west leg of the C-18 Canal, is approximately 7.9 miles long with headwaters consisting of the C-18/J.W. Corbett WMA. Water surface elevations in the C-18 West leg are controlled by the C-18 Weir, which maintains water surface elevations west of the Beeline Highway at 17.6 ft., National Geodetic Vertical Datum (NGVD).

Flow-way 3

Flow-way 3 is located within southern Martin County and consists of the watersheds within the northern portion of the project study area. These watersheds contribute to the northwest fork of the Loxahatchee River via the Ranch Colony Canal and Cypress Creek, Moonshine Creek, Hobe Grove Ditch, and Kitching Creek tributaries.

C.2.8 Cypress Creek Canal

The Cypress Creek Canal is located at the southern boundary of Gulfstream west area.

C.2.9 S-114D

S-114D is an existing culvert structure located at the eastern terminus of the southern Nine Gems canal, allowing discharge into the Hobe St. Lucie Control District (HSLCD) canal. The culvert structure provides regulation of the southern Nine Gems canal, while providing controlled discharge into HSLCD and ultimately the Cypress Creek Canal.

C.2.10 S-114E

S-114E is an existing uncontrolled culvert structure located on the HSLCD that helps control discharge for the upper portions of the HSLCD canal as well as provides drivable access across the HSLCD canal.

C.2.11 S-115A

S-115A is an existing water control structure consisting of culverts with drop-structure inlet control. Modifications to the existing structure include telemetry operated gates to help maintain desired water surface elevations on the Pal-Mar East property, while simultaneously providing additional control of discharges into the Cypress Creek Canal.

C.2.12 S-115B

S-115B is an existing water control structure consisting of culverts with drop-structure inlet control. Modifications to the existing structure include telemetry operated gates to help maintain desired water surface elevations on the Pal-Mar East property, while simultaneously providing additional control of discharges into the Cypress Creek Canal.

C.2.13 S-115C

S-115C is an existing water control structure consisting of culverts with drop-structure inlet control. Modifications to the existing structure include telemetry operated gates to help maintain desired water surface elevations on the Pal-Mar East property, while simultaneously providing additional control of discharges into the Cypress Creek Canal.

C.3 Proposed Features

Flow-way 1

C.3.1 S-100 Pump Station

S-100 is a pump station that will deliver up to 75 cfs, via 3-25 cfs pumps from the Indian Trail Improvement District (ITID) Lower Basin into the M-Canal to augment GWP when G-161 is operating and reduce reliance upon the regional system. Operations of the M-1 Basin allow for water to be pumped to the M-Canal when stages are above 17.0 ft. NGVD29 (15.5 ft. NAVD88) in the dry season and 15.0 ft. NGVD29 (13.5 ft. NAVD88) in the wet season. Additionally, the M-Canal is to be maintained 0.2-0.3 feet below GWP stages and at a maximum elevation of 18.9 ft. NGVD29 (17.4 ft. NAVD88).

C.3.2 G-161 Water Control Structure

G-161, also known as the Northlake Boulevard Structure, is a multi-purpose feature that will facilitate hydroperiod restoration of GWP, maintain existing level of service of flood protection, and provide improved conveyance for the regional water system. The design allows for variable flow rates between 0 and 150 cfs, adjustable as needed for conservation or flood risk management purposes. The structure will consist of two 60-in diameter culvert barrels with a total length of 240 ft. The barrels will be controlled by slide gates and have a flow line elevation of 11.1 ft. NGVD29 (9.6 ft. NAVD88). G-161 is a feature of CERP and was constructed by SFWMD in 2007. During the Pre-construction Engineering Design (PED), determination regarding potential structure modification or replacement will be analyzed to ensure G-161 is compliant with USACE standards.

C.3.3 G-160 Water Control Structure

G-160, also known as the Loxahatchee Slough Structure, is a reinforced concrete gated spillway with two vertical lift gates, located in the C-18 Canal east leg, just upstream of its intersection with the C-18W Canal. The purpose of this structure is to enhance delivery of water to the NWFLR and improve the wetland hydroperiods within the Loxahatchee Slough. In addition, the structure passes upstream flood water from the upstream portions of the drainage area without exceeding the upstream flood design stages and restricts downstream flood stages. G-160 is a feature of CERP and was constructed by SFWMD in 2004. During the Pre-construction Engineering Design (PED), determination regarding potential structure modification or replacement will be analyzed to ensure G-160 is compliant with USACE standards.

Flow-way 2

C.3.4 C-18W Reservoir

The C-18W reservoir is a 9,455 ac-ft above-ground reservoir on approximately 1,600 acres of a 1,920 acre former citrus grove. The reservoir will provide pumped diversion and storage of excess flows from the adjacent C-18W Canal, J.W. Corbett WMA, and from ITID upper basin via the M-O Canal. The reservoir will release water back to the C-18W Canal for delivery to Lainhart Dam and the Loxahatchee River downstream. The embankment height will be approximately 20.5 feet above natural ground elevation with a normal design pool depth of approximately 7.5 feet and a normal pool elevation of 28 ft. NAVD88.

C.3.5 Aquifer Storage Recovery (ASR) System (ASR-1, ASR-2, ASR-3 and ASR-4)

This ASR system will consist of four wells (ASR-1, ASR-2, ASR-3, and ASR-4) open to permeable zones of the Floridan Aquifer System and will be located at the C-18W Reservoir to facilitate surface storage capacity and to provide greater flexibility with reservoir operations. ASR wells will recharge from and

recover into the C-18W reservoir. Each well will pump surface water into the Floridan Aquifer System at 5 million gallons per day (MGD). Water will be recovered at a rate of 5 MGD (8 cfs at each well) and discharged into the C-18W reservoir, for subsequent distribution into the C-18W Canal.

C.3.6 M-O Canal Connector Canal

This canal will provide a connection between the ITID M-O Canal and the area upstream of the planned Seminole-Pratt Whitney Road Culverts and C-18W Reservoir. The purpose of the M-O Connector is to transfer excess water from the ITID upper basin to the C-18W Reservoir.

C.3.7 M-O Canal Connector Pump Station

This 150 cfs pump station will be located at the eastern terminus of the M-O Canal. Topography requires a pump station to move water from the M-O Canal to the connector canal for delivery to the C-18W Reservoir.

C.3.8 S-101A

Structure S-101A is an inflow pump station located on the north side of the C-18W reservoir. It is designed to pump excess runoff water from the C-18W canal into the C-18W reservoir.

C.3.9 S-101B

Structure S-101B is an uncontrolled broad crested spillway located on the C-18W embankment. It is designed as a dual structure: 1) service spillway to provide allowable discharges for the C-18 basin and 2) auxiliary (emergency) spillway to provide discharges during large flood events. It was designed for the PMP rainfall event. S-101B will have an 80 ft. wide concrete crest at an elevation 28.1 ft. NAVD88, with a design capacity of 1,960 cfs.

C.3.10 S-102

Structure S-102 is an outflow structure located on the northern C-18W reservoir and discharges into the C-101N to the C-18W canal. It is a gate controlled box culvert that provides discharges from the C-18W reservoir during normal and drawdown operations. The structures is not design to operate during flood events.

C.3.11 S-103E AND S-103W

Structures S-103E and S-103W are located in the north side of the reservoir and at the end each seepage collection canal. These structures are box culverts that are controlled via gates on the headwater side. Additionally, each culvert will contain a flap gate on the downstream end to help prevent back flows from the C-18W canal. These culverts will provide outflow for excess runoff water captured in the seepage collection canal.

C.3.12 S-104

Structure S-104 is located south of the C-18W reservoir. It was designed as an ungated box culvert with bi-directional flow. The culvert is located on the seepage collection canal and provides drivable access to the C-18W reservoir.

C.3.13 S-105

Structure S-105 is located within the proposed levee L-101W. It is designed as an uncontrolled culvert with flap gates on the downstream side to prevent back flow from the seepage collection canal. S-105 will be convey water from the C-101W canal to the seepage collection canal.

C.3.14 S-106

Structure S-106 is an inflow and seepage control pump station. It is designed to pump water from the seepage collection canal into the C-18W reservoir. Additional pumps provide seepage control, pumping seepage back into the C-18W reservoir.

C.3.15 S-107

Structure S-107 is located within levee L-101W, west of the C-18W reservoir. It is designed as a drop structure and culvert located at the Corbett WMA. The drop structure shall contain telemetry operated gates to aid in controlling water surface elevations within the Corbett WMA. Flap gates at the tailwater end control back flow from the seepage collection canal. The culvert is designed to convey excess runoff water from the Corbett WMA to the C-101W canal.

C.3.16 S-109

Pump station S-109 is located between the headwater of the existing M-O canal and the headwater of the proposed C-101W canal. It is designed to pump excess runoff water from the M-O canal into the C-101W canal.

Flow-way 3**C.3.17 S-112 Cypress Creek Canal Water Control Structure**

S-112 will be the primary control structure along the Cypress Creek Canal. S-112 will be a gated ogee spillway that will provide improved capability for management of water elevations within the canal during the wet and dry season while also maintain the current flood protection for the surrounding developments. This will be an operable water control structure consisting of an ogee spillway with gates and two bays that will be located in the Cypress Creek Canal upstream of the flow-through marsh discharge (S-111S). This structure has several purposes: 1.) hold additional water in the canal during dry conditions to reduce regional groundwater drawdown; 2.) control wet season discharge velocities to reduce downstream flashiness overall and minimize channel incision in Cypress Creek; and 3.) maintain the current level of flood protection for surrounding developments.

C.3.18 S-110 Pump Station for Gulfstream West Flow-Through Marsh

An inflow pump station for the Gulfstream West Flow-through marsh, which draws water from the HSLCD canal. The structure is intended to maintain an operational water surface elevation (from 14 - 16 ft. NAVD88) within the marsh footprint.

C.3.19 S-111N Gulfstream West Flow-Through Marsh Plunge Pool

A plunge pool and weir structure which discharges pumped water into the Gulfstream West Flow-through marsh. This structure will assist in maintaining desired discharge rates and water surface elevations within the marsh.

C.3.20 S-111S Gulfstream West Flow-Through Marsh Discharge Structure

A notched weir structure that provides regulation of water surfaces within the Gulfstream West Flow-through Marsh. The notched weir will provide uncontrolled discharge capacity and was designed with varying notch elevations and widths for both ecological and flood control discharge capabilities. S-111S is located downstream of the Cypress Creek Canal gated spillway S-112, and also the outlet of the realigned HSLCD ditch that discharges from the north into Cypress Creek Canal.

C.3.21 Hobe Grove Ditch connection (has no number)

Earthwork and grading will connect the Hobe Grove Ditch to the historic Moonshine Creek.

C.3.22 S-117 Weir in Hobe Grove Ditch

S-117 will be a fixed crest weir within Hobe Grove Ditch that will assist in promoting additional flow down the historic Moonshine Creek while improving surrounding groundwater elevations.

C.3.23 C-116 Spreader Swale (east and west of Jenkins Ditch)

Jenkins Ditch is located at the north end of JDSP and provides drainage for an upstream community directly into the park. The purpose of this swale is to help redistribute flows to historic Kitching Creek channel that are located to the west and east of Jenkins Ditch.

C.3.13 S-116 Gated Culvert Structure in Jenkins Ditch

S-116 will be a gated culvert structure within Jenkins Ditch that will aid in dispersing water into the spreader system (C-116) for rehydration of Kitching Creek.

C.3.24 S-113N Mack Dairy Pump Station

An inflow pump station for the Mack Dairy Spreader Swale (C-114) which is designed to send water from the Cypress Creek Canal into Cypress Creek Natural Area.

C.3.25 S-113S Mack Dairy Pump Station Plunge Pool

A plunge pool and weir structure which discharges pumped water into the C-114. This structure will assist in maintaining desired discharge rates and water surface elevations within the spreader swale and Cypress Creek Natural area.

C.3.26 C-114 Mack Dairy Spreader Swale

The Mack Dairy Spreader Swale (C-114) will extend approximately 3,500 ft. south from the Cypress Creek Canal, parallel to Mack Dairy Road. It will have an average depth of 3 ft., bottom width of 5 ft., 3H:1V side slopes, and the western edge of the spreader will be higher elevation than the eastern edge. The purpose of the Mack Dairy Road spreader is to assist in distributing water in a southerly and easterly direction to rehydrate the Cypress Creek Natural Area. This design for the distribution of water was to mimic historical flow patterns from the west (Culpepper area) that have been interrupted due to urban development.

C.3.27 Thomas Pepper Farm Pump Station (has no number)

The Thomas Pepper farm is located to the west of Pal-Mar East Property and Pratt Whitney Road (SR-711). Because the canal and ditch removals for restoration of Pal-Mar East will disrupt the existing drainage for the farm, an existing drainage ditch that runs along the northern boundary of Pal-Mar will be deepened and/or widened to handle additional flow from the Thomas Pepper farm. A new pump will be required to re-route the farm's drainage under Seminole Pratt Whitney Road and into the newly expanded drainage canal. The pump location will likely be required to be on the site of the Pepper farm (outside of project lands) and therefore will likely require to be turned over to the property owner for operation.

C.3.28 Gulfstream East Earthwork (has no number)

The existing drainage ditches in Gulfstream East will be filled and the site will be re-graded to the pre-agricultural topographic condition. The Hobe Grove Ditch and Moonshine Creek are partially separated due to heavy vegetation and sediment. The proposed feature will connect the Hobe Grove Ditch and Moonshine Creek.

C.3.29 HSLCD Berm Improvements (has no number)

The HSLCD berm is located along the north side of the Pal-Mar East property. The intent of the berm improvements is to allow the removal of ditching and pipes from the Pal-Mar East property to effect wetland restoration. Improving the berm will prevent overflow from the wetlands into the HSLCD canal.

C.3.30 S-114A

S-114A will be a gated culvert structure that will provide discharge capability from the Nine Gems natural area into the Nine Gems southern canal. This structure will provide improved operational control of water elevations for ecological improvement, while still allowing for conveyance offsite during larger storm events.

C.3.31 S-114B

S-114B will be a gated culvert structure that will provide discharge capability from the Nine Gems natural area into the Nine Gems southern canal. This structure will provide improved operational control of water elevations for ecological improvement, while still allowing for conveyance offsite during larger storm events.

C.3.32 S-114C

S-114C will be a gated culvert structure that will provide discharge capability from the Nine Gems natural area into the Nine Gems southern canal. This structure will provide improved operational control of water elevations for ecological improvement, while still allowing for conveyance offsite during larger storm events.

C.4 Removed Features

Flow-way 3.

On the Pal-Mar East property, internal drainage ditches will be filled and small drainage pipes and culverts will be removed to reduce drainage and improve hydroperiods and ecology within the area. Improvements to the existing berms will be necessary at irregular intervals along the Pal-Mar East northern and eastern border to ensure water is held on site during larger storm events. This berm improvement will become L-111.

C.5 Project Relationships

The project area is bounded on the north by the C-44 Canal, one of the primary outlets for Lake Okeechobee, and on the south by the C-51 Canal, which is a secondary outlet for the L-8 Canal area via water control structure S-5AE. The western boundary of the project is the L-10/L-12 Canal.

C.6 Major Constraints

During dry conditions, the C-18W Reservoir may not have sufficient water levels to make releases. In order to maintain the existing level of flood control, project culverts, and spillways may make releases that are not beneficial for environmental needs.

C.7 Standing Instructions to Project Operators

Once the Operational Testing and Monitoring Phase (OTMP) of the Loxahatchee River Watershed Restoration Project is complete, SFWMD will be responsible for the day-to-day water management operations of the newly constructed project features. During normal conditions, the project shall be operated in accordance with the approved Preliminary Project Operating Manual or Final Project Operating Manual. Deviation from normal operations will be permitted as stated in Section C.14.

C.8 Operational Strategy to Meet Project Objectives

The LRWRP culverts, water control structures, pump stations, spillways and reservoir will operate to restore and sustain the overall quantity, quality, timing, and distribution of freshwaters to the federally designated "National Wild and Scenic" Northwest Fork of the Loxahatchee River (NWFLR) for current and future generations. In addition, to restore, sustain, and reconnect the area's wetlands and watersheds

that form the historic headwaters for the river. These areas include Jonathan Dickinson State Park (JDSP), Pal Mar East/Cypress Creek, Dupuis Wildlife and Environmental Management Areas, J.W. Corbett Wildlife Management Area (WMA), Grassy Waters Preserve (GWP), Loxahatchee Slough, the last remaining riverine cypress stands in Southeast Florida in the Loxahatchee River, and the Loxahatchee River Estuary.

C.8.1 Achieving Natural System Goals, Objectives and Benefits

The C-18W reservoir will provide pumped diversion and storage of excess flows from the adjacent C-18W Canal, J.W. Corbett WMA and from the M-O Canal. In addition, water will be released back to the C-18W Canal as needed during dry conditions to deliver to the Lainhart Dam and the NWFLR to support restoration target flows and to reduce the number and extent of minimum flows and levels violations. Also, G-160 operations will increase stages in the Loxahatchee Slough which will improve hydroperiods that in return will allow more controlled flow to the Loxahatchee River and G-161 operations will provide conveyance of the regional water from the GWP to the NWFLR.

C.8.2 Flood Damage Reduction

C.8.2.1 Normal and Emergency Operations

The C-18W Reservoir will have two main outflow structures. A gated 300 cfs capacity culvert consisting of two 48-inch barrels will be located along the northern embankment of the reservoir, near the inflow pump station, and will be used for normal operations. An emergency overflow spillway with a crest elevation set lower than the embankment design elevation will be a passive structure allowing emergency discharges from the reservoir to the C-18W Canal to occur.

C.8.2.2 Hurricane or Tropical Storm Operations

The hurricane season begins on 1 June and runs through 30 November. When there are tropical depressions, tropical storms, and or hurricanes in the Atlantic/Caribbean Basin or Gulf Coast of Florida, the National Hurricane Center (NHC) issues tropical or cyclone public advisories, forecast advisories, forecast discussions, and strike probability forecasts. Water management operations within the LRWRP area for hurricanes or tropical storms should follow Water Management SFWMD Emergency Preparedness Manual – Suggested Hurricane Operating Procedures, updated annually.

C.8.2.3 Storage area Weir Discharge

There are two project features that will store water. The first storage feature is a proposed 9,455 ac-ft. above-ground reservoir. There will not be a weir discharge for the reservoir. As noted above in **section C.8.2.1**, a gated culvert will discharge from the reservoir for normal operations and a spillway for emergency overflows. The second storage feature is a flow-through marsh with collection ditches, and spreader berms. Water depth in the marsh will be maintained at an average depth of 3 ft. A notched weir will discharge at a variable rate depending on marsh depth.

C.8.2.4 Uncontrolled Discharge

The reservoir auxiliary spillway will be a 50-ft wide concrete spillway crest at an elevation lower than the embankment design elevation. The design discharge capacity of the auxiliary spillway is 1,960 cfs.

C.8.3 Water Quality

The primary objective of this project is to restore the wet and dry season flows to the NWFLR in order to maintain appropriate floodplain ecological conditions by restoring connections between natural areas to improve hydrology, sheetflow, hydroperiods, and natural storage. Culverts and spillways, a reservoir and flow-through marsh will operate to accomplish this goal which may improve the overall water quality of the river and estuary.

C.8.4 Water Supply Operations

The proposed Cypress Creek Canal water control structure can hold more water in the canal during dry conditions which will lead to better ground water levels by reducing the groundwater drawdown. In addition, G-161 will transport regional water from Grassy Waters Preserve through the system to the NWFLR. The project will not negatively impact water supply.

C.8.5 Recreation

There are no specific operations for recreation; however, operations to improve wet and dry season flows to the NWFLR will restore native plant and animal species abundance and diversity in Loxahatchee River watershed natural areas and estuary. This will enhance recreational opportunities and experience such as canoeing and fishing.

C.8.6 Fish and Wildlife

As noted above in Item, project features will operate to improve wet and dry season flows to the Northwest Fork of the Loxahatchee River, which will restore native plant and animal species abundance and diversity throughout the Loxahatchee River watershed natural areas and estuary.

C.8.7 Navigation

There are no specific operations for navigation; however, operations to improve wet and dry season flows to the NWFLR will improve conditions for canoeing and kayaking along the river.

C.9 Pre-Storm/Storm Operations

Canals and operable structures will follow existing pre-storm operating criteria for the area. Pre-storm drawdown of the reservoir will be based on National Weather Service Advisories and SFWMD forecasts. The depth of the reservoir will depend on the available storage or level in the reservoir before the storm.

C.10 Consistency with the Identification of Water Resources or Allocations of Water for the Natural System.

The Programmatic regulations (Section 385.28(a)(6)(vi) for the CERP require that the Operating Manual be consistent with the reservation or allocation of water for the natural system as describe in the PIR. The operating criteria within this Operating Manual are consistent with the operating criteria used to identify the water available for the natural system and other water-related needs.

C.11 Consistency with the Identification of Water and Reservations or Allocations for the Natural System.

The LRWRP does not eliminate or transfer an existing legal source of water when compared to the conditions that existed on 11 December 2000. Therefore, the LRWRP demonstrates compliance with the Water Resources Development Act (WRDA) OF 2000.

C.12 Drought Contingency Plan

During a drought in the project area, operations will be in accordance with SFWMD Rules, Chapter 40E-21, Water Shortage Plan.

C.13 Flood Emergency Action Plan.

The Flood Emergency Action Plan will be completed for LRWRP prior to construction completion. The Flood Emergency Action Plan to be developed should be consulted for related emergency preparation and action. Local emergency management offices will be provided copies of the Flood Emergency Action Plan as necessary. The plan may be used to supplement Hurricane or Tropical Storm regulations. As outlined in Engineering Regulation 1130-2-530, the Emergency Action Plan shall include:

- A written Emergency Notification Procedure for serious abnormal conditions to provide for safety of people in the vicinity of the storage area and also trigger immediate response for remedial assistance to the levee/water control structure.
- A description or list of conditions leading to emergency situations and ways of dealing with them should they occur.
- Storage area de-watering procedures.
- Levee/water control structure failure inundation maps.
- Listing of location, types, and quantity of emergency repair materials and equipment.
- Details outlining responsibilities for inspection and execution of emergency repairs.
- List of contractors available within reasonable distance of the project area.

C.14 Deviation from Normal Operating Criteria

The USACE District Commander is occasionally requested by the non-Federal sponsor to approve deviations from normal operating criteria. Prior approval for a deviation is required from USACE-South Atlantic Division (SAD) except as noted in **section C.14.1**. Deviation requests usually fall into the following categories:

C.14.1 Emergencies

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

non-Federal sponsor, the State of Florida (Florida Department of Environmental Protection [FDEP], Florida Forest Service, and SFWMD), and the Department of the Interior shall be informed.

C.14.2 Unplanned Deviations

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

C.14.3 Planned Deviations

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

C.15 Rate of Release Change

The reservoir will release water back to the C-18 West as needed and available during low flow periods for delivery to Lainhart Dam and the NWFLR in order to do the following:

1. Support dry and wet season restoration flows to facilitate floodplain hydration.
2. Reduce exceedances and violations of the minimum flows and levels criteria.

C.16 Seepage Control

Seepage control at C-18W Reservoir will be accomplished using a seepage canal that completely surrounds the perimeter of the reservoir. Seepage control pump stations are located on the north and west sides of the reservoir to maintain constant water levels.

C.17 Initial Storage Area Filling Plan

The Initial Storage Area Filling Plan (ISAFP) is defined as the deliberate impoundment of water to meet project purposes. It is a continuing process as successively higher water levels are attained. The initial

reservoir filling is the first test of containing levees and water control structures to perform the function for which they were designed. In order to monitor this performance, the rate of filling will be controlled to the extent feasible to allow as much time as needed for a predetermined monitoring program including the observation and analysis of instrumentation data. Information furnished in the ISAFP will generally be concerned with action that can be taken without a significant impact to project purposes, provided no unsafe conditions are observed. An ISAFP will be developed during design and construction. This plan will include, but is not limited to, the following:

1. Preferred filling rate and the available options to control the rate of filling as well as the consequences of operation with the prime objective of controlling the rate of reservoir rise.
2. The most likely type of problem(s) that may develop during initial filling and the monitoring necessary to detect those problems.
3. A description of the proposed hydrologic data collection and transmission system and a plan for reading the instruments and evaluating the data with regard to the filling plan.
4. A plan for inspecting the dam and downstream areas prior to and during filling, including the relationship between frequency of inspection and rate of pool rise
5. Instructions for observers on conditions that require immediate attention of personnel authorized to make emergency decisions. Clearly identify who is responsible for decisions and how they can be contacted. Alternative decision makers should be identified.
6. An emergency plan listing responsibilities, name and/or positions, telephone numbers, page numbers, and radio frequencies to be used.
7. Water quality requirements, if any, for the initial filling.

C.18 Non-Typical Operations for Reservoir/Storage/Treatment Area Performance

Non-typical operations would apply during periods of extreme drought or rainfall. During drought conditions, it may be necessary to pump water more often at lower rates or to release water more slowly from the reservoir.

C.19 Aquifer Storage and Recovery (ASR) System Plan

A 4-well ASR system will be constructed at the C-18W reservoir to augment surface storage capacity and provide greater flexibility in reservoir operations. The ASR system consists of four ASR wells open to permeable zones of the Floridan Aquifer System plus associated treatment and conveyance components. Surface water will be recharged into the Floridan Aquifer System from the reservoir at a rate of 5 MGD. Water will be recovered by pumping from the aquifer into the reservoir for subsequent distribution into the C-18W Canal. ASR system operation will be integrated with reservoir operations.

C.20 Water Control Data Acquisition System Plan (WCDASP)

The remote automation components installed at the pump stations and other structures are the Remote Terminal Unit (RTU) and communication channel to SFWMD control center. Access for the RTU to the control center is via field interface units (FIU). The automation components of all pump stations and structures that will eventually be operated and maintained by SFWMD will conform to SFWMD standards. Equipment used in data acquisition essential to the water control management function will be included

in the WCDASP, which will be further developed during the plans and specifications phase. This will include all hardware and software to be used for acquisition, transmission, processing, display, and dissemination of hydrometeorologic, water quality, and project data for the purposes of supporting the water control goal. This includes, but is not limited to, uninterruptible power supplies, field data collection platforms, data communication devices and circuits. The WCDASP will also identify the site location of all hardware included in the plan. Hardware referencing and gage reference datum will be determined through coordination with appropriate agencies such as the U.S. Geological Survey (USGS) and SFWMD. The WCDASP will be completed during the plans and specifications phase and will be a subset of the Water Control Data System that is specific to the LRWRP.

C.21 Consistency with the Adaptive Management Program and Periodic CERP Updates.

After long-term operations and maintenance of the LRWRP has been initiated, the project operating manual may be further modified based on operating criteria approved by the USACE and SFWMD resulting from CERP updates and recommendations from the adaptive management of the LRWRP.

C.22 Interim Operations During Construction

Interim operations will be developed in conjunction with the detailed construction schedule. The interim operations will preserve existing Central and Southern Florida (C&SF) Project authorized purposes and/or achieve the Comprehensive Everglades Restoration Plan (CERP) authorized purposes as identified in the PIR. All interim operations will be conducted to meet the Assurances of Project benefits as set forth in WRDA 2000 and as discussed in the Programmatic Regulations and the Guidance Memoranda.

C.23 Preliminary Operations during Operational Testing and Monitoring (OTMP)

Preliminary operations for the OTMP will be developed in conjunction with the plan for the OTMP and promulgated in the Preliminary POM. All preliminary operations will be conducted to meet the Assurances of Project Benefits as set forth in Section 601 of WRDA 2000 and as discussed in the Programmatic Regulations and the Guidance Memoranda. Some items that may be included in this paragraph are (a) Operational Strategy to meet Project Objectives, (b) Project Relationships and interactions, and (c) Major Constraints. The assumptions and constraints may change in the Final POM.



Figure C-2. Map of Major Canals and the Eight Subwatershed of the Loxahatchee River Watershed.

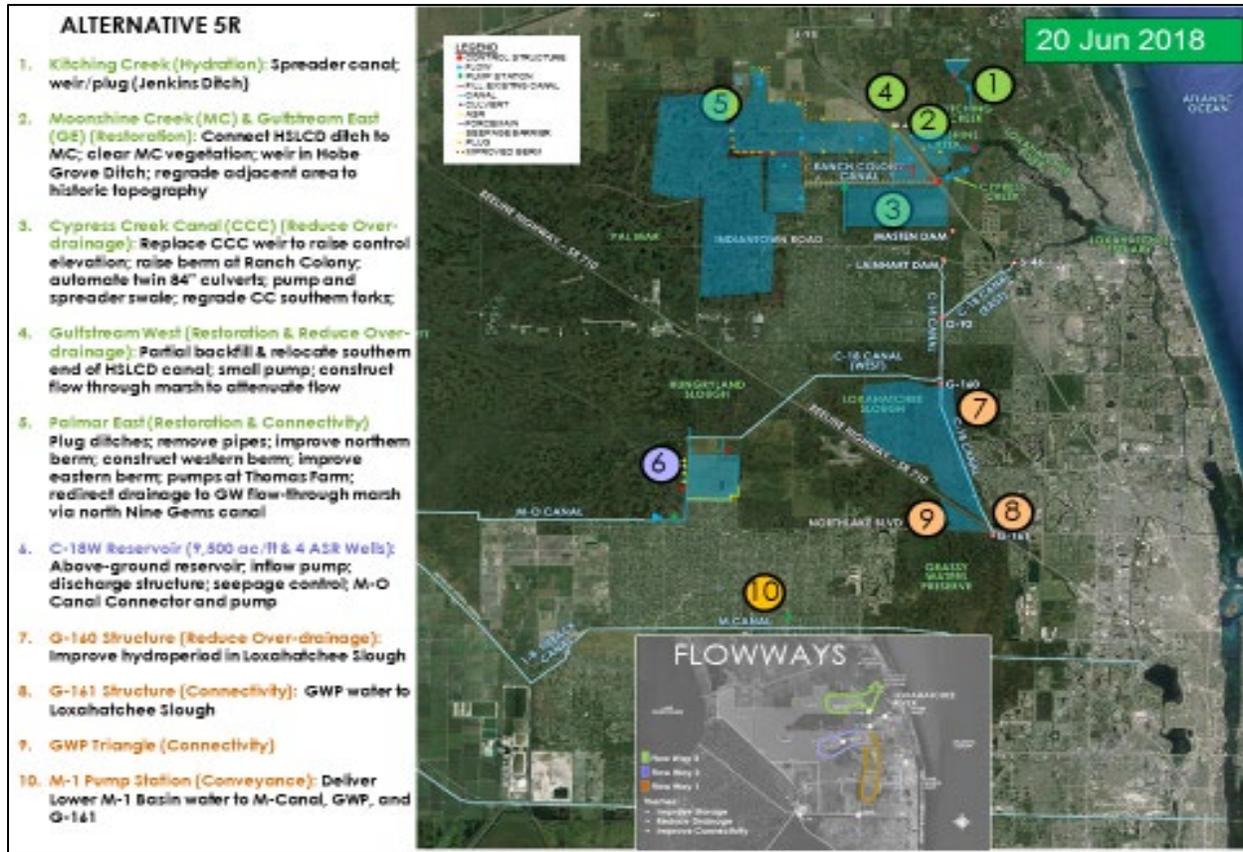


Figure C-3. Map with the location of project features described for alternative 5R.

Note

Tables, Figures, Plates/Operational Schematics and Exhibits (e.g., Structure Descriptions and Rating Curves) are expected to be moved to or appended to the main body of the Draft POM per draft Guidance Memorandum 5 in a subsequent version of the Draft POM. This would be done in a project phase(s) subsequent to completion of the PIR. ANNEX A-1 HYDRAULIC DESIGN of the PIR includes current versions of structure descriptions. ANNEX C-1 of the PIR contains plates, some of which contain map(s) and site plans.