CHAPTER 5
COMPENSATORY MITIGATION

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5.0 MITIGATION

As defined by the Council on Environmental Quality, Title 40 Code of Federal Regulation (CFR) §1508.20, mitigation requirements include the following:

- Avoiding the impact altogether by not taking a certain action or parts of an action;
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating the impacts over time by preservation and maintenance operations during the life of the action; and
- Compensating for the impacts by replacing or providing substitute resources or environments.

Under the Clean Water Act (CWA) Section 404(b)(1) guidelines implemented through 40 CFR Part 230, the South Florida Water Management District (SFWMD) shall be required to avoid and minimize impacts to waters of the United States (US), then provide compensatory mitigation for unavoidable adverse impacts. Mitigation measures for the Action Alternatives were identified as best management practices (BMPs) and compensatory mitigation, which are discussed in the following sections.

5.1 ENVIRONMENTAL COMMITMENTS

5.1.1 BEST MANAGEMENT PRACTICES

During construction activities for all Action Alternatives, the SFWMD would implement standard construction BMPs to avoid affecting the surrounding environments. Standard construction BMPs include, but are not limited to:

1. Installing siltation fences to prevent erosion and to provide turbidity barriers to minimize suspended solids in the water column;
2. Downstream turbidity shall be monitored to ensure state turbidity standards (29 nephelometric turbidity units) are not exceeded;
3. Watering construction sites and roads to reduce dust generation;
4. Suspending surface-disturbing activities such as grading during periods of particularly high winds;
5. Maintaining construction equipment according to the manufacturer's specifications;
6. Transporting demolition debris to a landfill or otherwise disposed of in accordance with federal, state, and local requirements;

7. Prior to construction, dewatering permits shall be issued by the Florida Department of Environmental Protection (FDEP) under Chapter 373 F.S. The permit would include requirements for the construction contractor to submit a Stormwater Pollution Prevention Plan, which includes turbidity control and monitoring plans; and
8. Although not anticipated for any of the Action Alternatives, if relocation of utility lines is needed, the SFWMD shall coordinate formally with Florida Power and Light once the design process is complete.

5.1.2 THREATENED OR ENDANGERED SPECIES AND SPECIES OF CONCERN

Although specific details will be developed as consultation occurs between the US Amy Corps of Engineers (USACE) and the US Fish and Wildlife Service (USFWS), it is anticipated that at a minimum, the following measures shall be incorporated during project construction to minimize effects on any threatened or endangered species that may occur in the construction site: a) Standard Protection Measures for the Eastern Indigo Snake (2004); b) Habitat Guidelines for the Wood Stork in the Southeast Region (2009); and c) Everglades Snail Kite Management Guidelines (2009).

5.1.3 HAZARDOUS AND TOXIC WASTE

Under the No Action Alternative, the land may be leased or sold for agricultural use. If agricultural activities would commence on the project site, there is the potential for release of petroleum or agricultural chemicals, which would be subject to regulation under the Florida Department of Environmental Protection. During previous construction activities for the A-1 Reservoir, the SFWMD partially remediated a tract of land north of the project site, referred to as the Woerner Tract, by excavating contaminated soils with elevated levels of toxaphene. Portions of the Woerner Track still contain elevated levels of toxaphene. However, under all of the Action Alternatives, those areas of known soil contamination have been excluded from the project footprint so no mitigative measures are required.

For Alternatives 2, 3, and 4, there would be no dumping of oil, fuel, or hazardous wastes in the work area and safe and sanitary measures for disposal of solid wastes would be required. A spill prevention plan shall also be required.

5.2 WETLAND IMPACTS

In accordance with the CWA Section 404(b)(1) Guidelines 40 CFR Part 230, wetland and aquatic resource impacts are first avoided, then minimized to the maximum extent practicable. Section 404 of the CWA requires compensatory mitigation to replace aquatic resource functions unavoidably lost or adversely affected by authorized activities.

Mitigation must meet the requirements of the 2008 Mitigation Rule, 40 CFR Part 230 and 33 CFR Parts 325 and 332. The following sections discuss the project's impacts to wetlands and the compensatory mitigation proposed.

5.2.1 SITE CONDITIONS

The A-1 project site contains 16,517.9 acres of land of which 14,656.9 acres are wetlands and 1,861.0 acres are uplands. Alternatives 2, 3, and 4 will involve the placement of fill material within wetlands to construct levees, berms, pump stations. The alternatives also propose to excavate soils to remove stockpiled material and fill interior ditches and canals to achieve designed elevations. The impacts to waters of the US for each alternative are described below. The calculations of the impacts were revised since the draft EIS as the project designs were further refined.

5.2.2 DIRECT IMPACTS

The wetland impacts for each alternative are summarized on **Table 5.1**:

Table 5-1 Wetland Impacts for each alternative

Impact Type/Area	Proposed Levee Fill (in acres)	Proposed Canal Fill (in acres)	Proposed Canal Excavation (in acres)	Holey Land Wildlife Management Area (in acres)	Total (in acres)
Alternative 1: No Action	0	0	0	0	0
Alternative 2: Shallow FEB	280.1	112.8	43.0	0	435.9
Alternative 3: Deep FEB	533.6	0	43.0	0	576.6
Alternative 4: STA	353.6	112.8	270	250	986.4

5.2.2.1 Alternative 1 (No Action)

Under the No Action Alternative, the site could either remain undisturbed or the SFWMD could lease or possibly sell the property to allow agricultural activities to resume. If the site were to remain undisturbed, there would be no impacts to wetlands or waters of the US; therefore, there would be no compensatory mitigation requirements. If the agricultural activities would resume on the project site, the wetlands would be cleared of vegetation,

and pumping would drain the water off of the lands. Although the work associated with the agricultural activites would result in an overall loss of wetlands, the agricultural activities are exempt under Section 404 of the Clean Water Act.

5.2.2.2 Alternative 2 (Shallow FEB)

The direct impacts associated with Alternative 2 (Shallow FEB) result in 435.9 acres of wetlands and waters of the US as a result of levee and canal fill, as well as canal excavation. Of the 435.9 acres of impacts, 280.1 acres of wetlands would be filled to construct the levee and backslope muck piles, 112.8 acres of canals and ditches would be filled to raise the elevation of the ditch/canal to be consistent with the adjacent wetlands, and 43.0 acres of freshwater marsh wetlands would be excavated to construct a canal. The impacts to 112.8 acres of canals and ditches would be an improvement to the wetland habitat as the fill would be placed in the canal/ditch to raise the canal bottom up to surrounding wetland elevation. The SFWMD has revised the designs in response to comments received from the Florida Fish and Wildlife Commission and incorporated areas within the interior FEB to have sloped levees with a wider base. Although the internal levee slope design increases wetland impacts by additional 101.8 acres of fresheater marsh, the sloped levee would create transitional littoral zones and allow wildlife species the ability to vacate the area easier as waters rise. The existing muck piles would be backsloped along the interior levee in two areas to create a maximum of 30:1 (H:V) slope.

5.2.2.3 Alternative 3 (Deep FEB)

The direct impacts associated with Alternative 3 (Deep FEB) result in 576.6 acres of wetlands and waters of the US as a result of levee fill as well as canal excavation. Of the 576.6 acres of impacts, 533.6 acres of wetlands would be filled to construct the levee and 43.0 acres of canal would be excavated. In addition, 10,820 acres of the deep FEB footprint will be flooded more frequently compared to the Shallow FEB or the STA resulting in adverse impacts to wetlands. Alternative 3 would not require fill in canals or ditches.

5.2.2.4 Alternative 4 (STA)

The direct impacts associated with Alternative 4 (STA) result in 986.4 acres wetlands and waters of the US as a result of levee and canal fill, canal excavation, and excavation/fill of freshwater wetlands. Of the 986.4 acres of impacts, 353.6 acres of wetlands would be filled to construct the levee, 112.8 acres of canals and ditches would be filled, 270 acres of canals would be excavated, and 250 acres of freshwater wetlands would be impacted (125 acres of excavation to dig the canal and 125 acres of fill to build the levee adjacent to the canal) to construct a canal connection within the Holey Land Wildlife Management Area.

5.3 COMPENSATORY WETLAND MITIGATION

The SFWMD provided a compensatory wetland mitigation plan for their preferred alternative, the Shallow FEB, which includes hydrologic and vegetation benefits within the footprint of the project (Appendix C). Although each alternative would vary in degree of on-site ecological benefits, it is anticipated that the hydrology and the vegetation community within the footprint of the project would change by retaining additional water on the site.

The SFWMD is proposing to receive credit for providing and retaining the hydrology within the project footprint and improving the aquatic habitat. Although the attenuation of water within the footprint is expected to decrease soil loss due to oxidation and reduce water column total phosphorous from the No Action Alternative, the various depth of water and differing operation plans would result in different site conditions between the Alternatives. Each Alternative would contain different wetland communities, each supporting different wetland dependent birds, mammals, reptiles, amphibians, and animal species. Therefore, each Action Alternative would have different aquatic function and values.

Under Alternatives 2, 3, and 4, the SFWMD would remove exotic vegetation as maintenance once the proposed project is constructed. Routine maintenance of the levees, as well as any wetland areas within the project footprint would also be performed. Reporting maintenance activities, as well as monitoring the vegetation is included in the South Florida Environmental Report (SFER), which is produced annually and provided to the USACE and all interested parties.

Hydrologic monitoring and water quality monitoring shall also be conducted as part of normal operations. The monitoring shall be consistent with permit compliance for the constructed project and for operational improvements. This information is also reported on an annual basis in the SFER.

5.3.1 Alternative 1 (No Action)

In the event agricultural activities would resume, the area would be drained and there would be a loss of hydrology on the project site. The natural wetland vegetation would be removed and the site would be planted with agricultural vegetation, possibly sugar cane or sod. Therefore, no compensatory mitigation is needed for the No Action Alternative.

5.3.2 Alternative 2 (Shallow FEB)

Under Alternative 2, the four wetland communities would be converted from the existing condition, as described in Section 3.7.1, to a freshwater marsh consisting primarily of cattail

(*Typha domingensis*). Other native species expected within the shallow FEB may consist of emergent aquatic vegetation (EAV) such as sawgrass (*Cladium jamaicens*e), Carolina willow (*Salix caroliniana*), bulrush (*Scirpus* spp), pickerel weed (*Pontederia cordata*), duck potato (*Sagittaria lancifolia*), and Illinois pondweed (*Potamogeton illinoensis*).

The Shallow FEB would contain water depths ranging from 0 to 4 feet, and is expected to be inundated with approximately 1.5 feet or more of water for 60% of the time. The monthly water depths average between 1 and 3.5 feet. The Shallow FEB would be operated in a manner to ensure STA 2 and STA 3/4 contains appropriate water levels. The Shallow FEB would be operated to take up to 4 feet of water and continue to store the excess water even if the water levels remain high for a period of time. During this period of time of high water events, the freshwater marsh wetland community within the Shallow FEB is expected to be inundated with water that negatively affects the vegetation. Conversely, as water will be pumped from the Shallow FEB to supply water STA 2 and STA 3/4, the Shallow FEB will most likely dry earlier than the existing STAs and may not contain standing water during the dry periods. During this time, it is anticipated that the freshwater marsh wetland community within the Shallow FEB would be negatively affected by the drought. Therefore, the ecological benefit or "lift" of both hydrology and vegetation will be affected by the changes and may not be as beneficial as a typical restoration project.

5.3.3 Alternative 3 (Deep FEB)

For the deep FEB, the four wetland communities would be converted from the existing condition, as described in the No Action Alternative, to a vegetation community consisting mainly of freshwater floating aquatic vegetation (FAV) species, similar to those found in the canals and ditches.

Alternative 3 would contain water depths ranging from 0 to 12.5 feet, and is expected to be inundated with approximately 1.5 feet or more of water for 60% of the time. The monthly water depths average between 2 and 5 feet. Due to the greater depth capacity, this Alternative may hold additional water during excess rain events. Similar to the Shallow FEB, the Deep FEB will also be operated in a manner that ensures the STAs 2 and 3/4 receive preferential quantities of water to ensure more consistent water levels in the STAs. The Deep FEB would be operated to take up to 12 feet of water and continue to store the excess water even if the water levels remain high for a period of time. During this period of time of high water events, the freshwater marsh wetland community within the Deep FEB is expected to be inundated with water that negatively affects the vegetation. Conversely, as water will be pumped from the Deep FEB to supply water STA 2 and STA 3/4, the Deep FEB will most likely dry earlier than the existing STAs and may not contain standing water during

the dry periods. During this time, it is anticipated that the freshwater marsh wetland community within the Deep FEB would be negatively affected by the drought. Similar to the Shallow FEB, the anticipated lift may not be as beneficial as a typical restoration project.

5.3.4 Alternative 4 (STA)

The STA would have a maximum operating depth of 4 feet. For the STA alternative, the four wetland communities would be converted from the existing condition, as described inSection 3.7.1, to two types of wetland communities: EAV and submerged aquatic vegetation (SAV). The STA would be designed to route water through specified EAV cells or SAV cells, each with a specific operating depth to support the wetland community. EAV cells would be operated at target depths between 1.25 and 1.5 feet of water, while the SAV cells would be operated at target depths between 1.5 and 2.0 feet of water during normal operations. The vegetation community expected in the EAV cells consist of sawgrass (*Cladium jamaicens*e), Carolina willow (*Salix caroliniana*), bulrush (*Scirpus* spp), pickerel weed (*Pontederia cordata*), duck potato (*Sagittaria lancifolia*), and Illinois pondweed (*Potamogeton illinoensis*), while the vegetation found in the SAV cells would include native plant species similar to the EAV but may also contain coontail (*Ceratophyllum demersum*), muskgrass (*Chara* spp.), pondweeds [*Potamogeton* spp. (esp. *P. illinoensis*, *P. pusillus*)], and Southern naiad (*Najas quadalupensis*).

Alternative 4 would contain water depths ranging from 0 to 4 feet, and is expected to be inundated with approximately 1.5 feet or more of water for 60% of the time. The proposed STA would contain average monthly water depths between 1.5 and 2.5 feet. The STA would be operated as an additional STA and would not be utilized to store excess water or provide water preferentially to STA 2 or STA 3/4 to ensure more consistent water levels in those STAs. As seen in the existing STAs, the emergent and submerged cells are heavily utilized by a variety of wildlife species including wading birds, ducks, hawks, fish, amphibians, and alligators.

5.4 UMAM ASSESSMENT

The USACE utilizes Uniform Mitigation Assessment Methodology (UMAM) to determine the function and value of the wetlands. The SFWMD has performed a preliminary UMAM assessment and submitted their UMAM proposal for the pre- and post-project conditions for review. The UMAM specifically assessed the construction and operation of the SFWMD's preferred alternative, the shallow FEB. If another alternative is selected as the least environmentally damaging practical alternative, the SFWMD will provide a separate UMAM assessment for the other alternative. However, the USACE is providing an

estimated UMAM score for the other alternatives (Deep FEB and STA) for purposes of this Environmental Impacts Statement (EIS).

5.4.1 ALTERNATIVE 2 (SHALLOW FEB)

The impacts from the Shallow FEB project would result in a loss of 280.1 acres of wetlands as a result of fill to construct the levees, 43.0 acres of wetland impact for canal excavation, and 112.8 acres of fill in canals. The post project site conditions within the Shallow FEB would improve the aquatic function and value from the existing site conditions. By providing hydrology to the wetlands and improving elevations, the low quality wetlands on the site would be improved. Wetland impacts resulting from construction of the Shallow FEB would result in the loss of 205.1 functional capacity units while the improvements to the wetlands within the interior of the shallow FEB is expected to result in a gain of 1,729.4 functional capacity units (FCUs). Overall, the project may result in a net gain of 1,524.3 functional capacity units. See **Table 5-2** and **Table 5-3** below for a breakdown of the impacts and the credits.

As a result of comment on the draft EIS, the cooperating agencies reviewed the UMAM scores for the Shallow FEB and commented on the water environment and the risk, and the scores have been revised accordingly. The UMAM sheets are included in this Final EIS as Attachment 2 (UMAM Mitigation Sheets).

The wetlands within the Shallow FEB meet USEPA's *Guiding Principles for Constructed Treatment Wetlands*, which states "in general, wetlands constructed or restored for the primary purpose of treating wastewater will not be recognized as compensatory mitigation to offset wetland losses" (Appendix C) because the purpose of the wetlands is not for water quality treatment, but storage of water which would be provided to the STAs that actually treat the water. Although it is recognized that the wetlands within the Shallow FEB would offer some ancillary treatment benefits, their purpose is water storage. The USACE does not have any remaining concerns with the mitigation plan for the Shallow FEB. The USACE agrees that the Shallow FEB would provide wetland benefits and the loss of wetland function and value is offset.

Table 5-2 Alternative 2 (Shallow FEB) UMAM Assessment for Impacts

Habitat	acreage	Pre-UMAM	Post-UMAM	Delta	Time lag	Risk	FCU
Freshwater marsh fill	280.1	0.53	0	-0.53			-148.5
Fill in canals and	112.8	0.30	0	-0.30			-33.8

ditches							
Freshwater marsh excavation	43.0	0.53	0	-0.53			-22.8
Total							-205.1

Table 5-3 Alternative 2 (Shallow FEB) UMAM Assessment for Mitigation

Habitat	acreage	Pre-UMAM	Post-UMAM	Delta	Time lag	Risk	FCU
Scrub/Shrub wetlands (Exotic Degraded Wetlands)	10,504.3	0.33	0.53	0.20	3 yr/ 1.07	1.50	1,313.0
Exotic Scrub/Shrub wetlands (Exotic Dominated Wetlands)	203.2	0.23	0.53	0.30	3 yr/ 1.07	1.50	38.0
Canals and Ditches	112.8	0	0.53	0.53	3 yr/ 1.07	1.75	32.2
Uplands to emergent marsh	1,214.7	0	0.53	0.53	3 yr/ 1.07	1.75	346.2
Total							1,729.4

Ledger System:

The UMAM assessment for Alternative 2 (Shallow FEB) results in a surplus of credits. The surplus of credits demonstrates that the project results in an overall benefit to the environment as compared to the existing site conditions. The SFWMD has requested to utilize the remaining credits to offset any unavoidable wetland impacts for future SFWMD's Restoration Strategies projects. The remaining credits would be tracked under a ledger system. The identified Functional Capacity Units surplus is approximately 1,524.3 credits for the Shallow FEB (**Table 5-6**). If another alternative were selected, the SFWMD would also propose to utilize any excess credits for future SFWMD Restoration Strategy projects. For this discussion, the Shallow FEB alternative is discussed.

Table 5-4 Alternative 2 (Shallow FEB) Ledger

Project	Total Functional Capacity Units
A-1 Shallow FEB Total Credits	1,729.4
A-1 Shallow FEB	-205.1
Total Credits	1,524.3

The Shallow FEB Alternative would provide significantly more mitigation credit than is needed to offset the impacts from construction. The USACE has evaluated whether it is appropriate to utilize the excess functional capacity units from the Shallow FEB Alternative as compensatory mitigation to offset wetland impacts for future projects. The Shallow FEB will be operated as a water storage site to enhance the operation of the STAs. The shallow FEB will accept water during storm events, and supply water to the existing STAs during the dry season. The USACE recognizes that the Shallow FEB would be susceptible to more drastic changes in water elevations and will sacrificially experience dry-out conditions in favor of STA 2 and STA 3/4. These changes in hydrology will cause the wetland community to change between marsh wetlands and wet prairie wetlands, with dryer dry periods. The USACE recognizes that this is a great benefit for water quality purposes within the EPA and an improvement to the current site conditions on the project site. However, the effects from changes in hydrology on the wetlands at the project site may not make appropriate mitigation to offset future impacts for other projects, especially if there is dissimilar vegetation or hydroperiod as this would be out of kind. This option would be evaluated on a case by case basis for each future project.

5.4.2 ALTERNATIVE 3 (DEEP FEB)

The construction of the Deep FEB would result in impacts to 576.6 acres of waters of the US, including 533.6 acres of wetland impacts as a result of fill in freshwater wetlands and 43.0 acres of wetland impacts as a result of canal excavation, as well as the permanent impact to the interior wetlands from water depths that no longer function as wetlands. The construction of the Deep FEB alone would require 318.5 FCUs to be offset (**Table 5-4**). The Deep FEB would offer little wetland benefits on the project site because the reservoir would have depths greater than 4 feet of water 30% of the time, which would flood any rooted vegetation and greatly reduce wetland function and value. Additionally, the Deep FEB is anticipated to exhibit longer durations of water at deeper water depths, which is expected to encourage floating aquatic vegetation to establish. The site may not exhibit

characteristics of a wetland but rather an open water pond or lake. Rooted wetland vegetation that may establish within the Deep FEB during low water levels would die off, resulting in difficulty in reestablishment between the flood/dry cycles. The poor habitat provided within the reservoir would not be an appropriate mitigation to offset the wetland impacts of the project. The USACE would require that the applicant provide an alternative compensatory mitigation plan, possibly purchasing credits at a federally approved mitigation bank or mitigation at another appropriate offsite location.

Table 5-5 Alternative 3 (Deep FEB) UMAM Impacts Assessment*****

Habitat	acreage	Pre-UMAM	Post-UMAM	Delta	Time lag	Risk	FCU
Freshwater marsh fill	576.6	0.53	0	-0.53			-305.6
Excavation for canal	43.0	0.30	0	-0.30			-12.9
Total							-318.5

***the degradation of the internal wetlands from flood/dry cycles is not captured by this table**

5.4.3 ALTERNATIVE 4 (STA)

The impacts from the STA Alternative would result in a loss of 353.6 acres of wetlands as a result of fill to construct the levees, 270.0 acres of wetland impact for canal excavation, 112.8 acres of fill in canals, and 250 acres of excavation and fill of wetlands within the Holey Land. The impacts resulting from construction of the STA will result in a loss of 477.2 functional capacity units. See **Table 5-5** below for a breakdown of the impacts. The SFWMD has not provided a separate compensatory mitigation plan for Alternative 4. The post-project site conditions within the A-1 STA would improve the aquatic function and value from the existing site conditions. However, the STA, once operated, would no longer be considered a water of the US as it would be operated under a NPDES permit. Also, the use of constructed treatment wetlands as compensatory mitigation conflicts with USEPA's *Guiding Principles for Constructed Treatment Wetlands*, which states "in general, wetlands constructed or restored for the primary purpose of treating wastewater will not be recognized as compensatory mitigation to offset wetland losses" (Appendix C). As such, STAs are not typically utilized as compensatory mitigation. However, some exceptions have been permitted by the USACE in cases where the STA itself is for environmental restoration purposes and the losses are offset only for atypical wetlands. In this instance, the exception

would not apply since the atypical wetlands have reverted back to a more natural wetland type and agricultural vegetation does not exist in the wetlands. If the SFWMD were to propose environmental benefits within the interior of the STA as their compensatory mitigation plan, further coordination with the USEPA would be required.

Table 5-6 Alternative 4 (STA) UMAM Assessment for Impacts

Habitat	acreage	Pre-UMAM	Post-UMAM	Delta	FCU
Freshwater marsh fill for levee	353.6	0.53	0	-0.53	-187.4
Fill in canals	112.8	0.30	0	-0.30	-33.8
Excavation in canals and ditches	270	0.30	0	-0.30	-81.0
Excavation/Fill in Holey Land	250	0.70	0	-0.70	-175.0
Total					-477.2