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 16,152 acres of land of which 14,705 acres are wetlands and 1,447 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 actual wetland acreages may slightly change for each alternative as the designs of each project are completed.

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	296.5	164.5	75.8	0	537
Alternative 3: Deep FEB	550	0	75.8	0	626
Alternative 4: STA	370	164.5	270	250	1,055

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 537 acres of wetlands and waters of the US as a result of levee and canal fill, as well as canal excavation. Of the 537 acres of impacts, 296.5 acres of wetlands would be filled to construct the levee, 164.5 acres of canals and ditches would be filled to raise the elevation of the ditch/canal to be consistent with the adjacent wetlands, and 76 acres of canal would be excavated.

5.2.2.3 Alternative 3 (Deep FEB)

The direct impacts associated with Alternative 3 (Deep FEB) result in 626 acres of wetlands and waters of the US as a result of levee fill as well as canal excavation. Of the 626 acres of impacts, 550 acres of wetlands would be filled to construct the levee and 76 acres of canal would be excavated. 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 1,055 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 1,055 acres of impacts, 370 acres of wetlands would be filled to construct the levee, 164.5 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 HYDROLOGICAL AND VEGETATION IMPROVEMENTS

Currently, hydrology on the A-1 project site is rainfall driven. During the rainy season, over 12 inches of standing water can be seen in the wetlands. Conversely, no standing water is present in the wetlands during the dry season. The site contains four types of waters of the US: canals and ditches, scraped wetlands, scrub/shrub wetlands, and exotic scrub/shrub wetlands.

The canals are approximately 50 feet wide and estimated 12 feet deep while the ditches are 20 feet wide and estimated 6 feet deep. The canals and ditches contain floating aquatic vegetation consisting of spatter-dock (Nuphar spp.) and water lettuce (*Pistia Stratiotes*). The canals and ditches typically support wildlife species such as alligators, turtles, and fish.

The scraped wetlands contain a variety of wetland plant species, such as water primrose (*Ludwigia peruviana*), bushy aster (*Aster dumosus*), marsh fleabane (*Pluchea rosea*), flat-sedge (*Cyperus spp.*), jointed spikerush (*Eleocharis interstincta*), and water-hyssops (*Bacopa caroliniana*). Typical water depths in this wetland community are approximately 6 inches of water.

The scrub/shrub wetlands, species such as Carolina willow (Salix caroliniana), wand goldenrod (*Solidago stricta*), bushy broomsedge (*Andropogon glomeratus*), salt bush (*Baccharis glomerulifolia*), elephant grass, primrose willow (*Ludwigia peruviana*) and cattail (*Typha spp.*). Typical water depths in this wetland community are approximately 12 inches.

The exotic scrub/shrub wetlands contain 90% nuisance and exotic species dominated with Elephant grass (*Pennisetum purpureum)* and castor bean (*Ricinus communis*). Typical water depths in this wetland community are approximately 12 inches.

On October 29, 2012, a multi-agency site visit was conducted by the SFWMD, FDEP, USFWS, United States Environmental Protection Agency (USEPA), and the USACE, and again on December 5, 2012 (USACE did not attend). The FDEP completed a detailed field visit report on for each site visit (Appendix C). The field report depicts the route taken by vehicle around the A-1 project site, and shows photographs of the various wetland communities and hydrological conditions on various portions of the site.

5.3.1.1 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.

5.3.1.2 Alternative 2 (Shallow FEB)

Under Alternative 2, the four wetland communities would be converted from the existing condition, as described in the No Action Alternative, 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, with levels around 1-foot for 6 months out of the year. The Shallow FEB would be operated in a manner to ensure the STA 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 that negatively affects the vegetation. During this period of time of high water within the Shallow FEB, the wetland community within the FEB is expected to be freshwater marsh vegetation. Conversely, the Shallow FEB 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 Shallow FEB would contain wet prairie vegetation. 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.

5.3.1.3 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 and depths greater than 4 feet 30% of the time. Due to the greater depth capacity, this Alternative may hold additional water during excess rain events. The monthly water depths average between two and five feet, with water levels around 2 feet for 7 months out of the year. 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. Similar to the Shallow FEB, the anticipated lift may not be as beneficial as a typical restoration project.

5.3.1.4 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 in the No Action Alternative, 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, with levels

around 1.5 feet for 6 months out of the year. 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. However, once operated under a National Pollutant Discharge Elimination System (NPDES) permit, the wetlands within the proposed STA would no longer be jurisdictional waters of the United States and therefore, may not be appropriate to be utilized as compensatory mitigation.

5.4 UMAM ASSESSMENT

The USACE utilizes Unified 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). These scores have not been reviewed by the applicant or the coordinating agencies, but will be finalized after public review and provided in the final EIS.

5.4.1 ALTERNATIVE 2 (SHALLOW FEB)

Based on the SFWMD's assessment, the impacts from the Shallow FEB project would result in a loss of 296.5 acres of wetlands as a result of fill to construct the levees, 164.5 acres of fill in canals and 75.8 acres of excavation in canals. The SFWMD is proposing that 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 269.37 functional capacity units while the improvements to the wetlands within the interior of the shallow FEB may result in a gain of 2916.6 functional capacity units (FCUs). Overall, the project may result in a net gain of 2647.23 functional capacity units. See **Table 5-2** and **Table 5-3** below for a breakdown of the impacts and the credits. The UMAM sheets are included in this draft EIS as Attachment 2 (UMAM Mitigation Sheets).

There are concerns for on-site mitigation as an acceptable proposal. The proposed compensation would migitate shallow, short hydroperiods wetlands (marsh and shrub

wetlands) for deeper and longer hydroperiod wetland marshes. The shallow, short hydroperiod wetlands are unique in that they are flooded during the wet season, then dry-out and act as uplands. The cooperating agencies have initially reviewed the SFWMD's UMAM score for the Shallow FEB and have raised concerns with the time lag and risk. Further discussion with the agencies will occur to finalize the proposed compensation.

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

Habitat	acreage	Pre-UMAM	Post-UMAM	Delta	Time lag	Risk	FCU
Freshwater marsh	296.5	0.53	0	-0.53			-197.32
Fill in canals and ditches	164.5	0.30	0	-0.30			-49.35
Excavation in Canal	75.8	0.30	0	-0.30			-22.7
Total							-269.37

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	10,119	0.30	0.60	0.30	2 yr/ 1.03	1.25	2357.93
Exotic Scrub/Shrub wetlands	233.71	0.23	0.60	0.37	2 yr/ 1.03	1.25	67.07
Canals and Ditches	164.50	0	0.60	0.60	3 yr/ 1.07	1.25	73.86
Uplands to emergent marsh	1147.65	0	0.60	0.60	4 yr/ 1.10	1.5	417.74
Total							2916.6

5.4.2 ALTERNATIVE 3 (DEEP FEB)

The Deep FEB would not offer wetland benefits on the project site since the reservoir would be operated at depths up to 12.5 feet. 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 in the Deep FEB. Rooted wetland vegetation is not anticipated to establish at times when the Deep FEB contains deeper water depths, and therefore, the site may not exhibit characteristics of a wetland but rather an open water pond or lake. Therefore, the reservoir itself would not be an appropriate mitigation to offset the wetland impacts. The USACE would require that the applicant provide an alternative compensatory mitigation plan, possibly at a federally approved mitigation bank or another appropriate offsite location. The construction of the Deep FEB would result in impacts to 626 acres of waters of the US, including 550 acres of wetland impacts as a result in fill and 75.8 acres of impacts as a result of excavation in canals and ditches. The construction of the Deep FEB would require 314.2 FCUs to be offset (**Table 5-4**).

Table 5-4 Alternative 3 (Deep FEB) UMAM Impacts Assessment

Habitat	acreage	Pre-UMAM	Post-UMAM	Delta	Time lag	Risk	FCU
Freshwater marsh fill	550	0.53	0	-0.53			-291.5
Excavation in Canals and Ditches	75.8	0.30	0	-0.30			-22.7
Total							-314.2

5.4.3 ALTERNATIVE 4 (STA)

Based on the USACE's draft assessment, the impacts resulting from construction of the STA may result in a loss of 501.5 functional capacity units. See **Table 5-5** below for a breakdown of the impacts. The SFWMD has not provided a compensatory mitigation plan for Alternative 4. The USACE has concerns that the STA itself may not be appropriate mitigation. 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 agricultural 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 5-5 Alternative 4 (STA) UMAM Assessment for Impacts

Habitat	acreage	Pre-UMAM	Post-UMAM	Delta	FCU
Freshwater marsh fill for levee	370.0	0.53	0	-0.53	-196.1
Fill in canals	164.5	0.30	0	-0.30	-49.35
Excavation in canals and ditches	270	0.30	0	-0.30	-81.0
Excavation in Holey Land	250	0.70	0	-0.70	175.0
Total					-501.5

5.5 LEDGER SYSTEM

The SFWMD's UMAM assessment for Alternative 2 (Shallow FEB) may result in a surplus of potential credits. The SFWMD is proposing to utilize the remaining credits to offset any unavoidable wetland impacts for future SFWMD's Restoration Strategies projects. The SFWMD is proposing to create a ledger system to utilize any excess credits generated as a result of this project for future SFWMD Restoration Strategies projects. The SFWMD's proposed surplus is approximately 2,650 credits (**Table 5-6**).

Table 5-6 Alternative 2 (Shallow FEB) Ledger

Project	Total Functional Capacity Units
A-1 Shallow FEB Total Credits	2916.6
A-1 Shallow FEB	-269.37
Total Credits	2647.23

The USACE is evaluating whether it is appropriate to utilize the shallow FEB for 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 STA during the dry season. The USACE expects that the Shallow FEB would be susceptible to more drastic changes in water elevations and sacrificially experience dry-out conditions for the STAs. 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 Shallow FEB site; however, the effects that such extreme hydrology may have on the wetlands on the project site have not been fully evaluated and may not make appropriate mitigation to offset impacts for other sites.