APPENDIX F
PLAN FORMULATION AND EVALUATION

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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F PLAN FORMULATION AND EVALUATION

F.1 INITIAL APPROACHES FOR DEVELOPING ALTERNATIVES

Prior to deciding to reaffirm the Winsberg Yellow Book plan, USACE and USFWS team members had considered two approaches to develop alternatives. In the first approach, alternatives were developed, in conjunction with the USFWS team member, as follows: The team recommended building the suite of alternatives based upon 1) a varied number of wetland cells, 2) the presence or absence of a buffer cell, and 3) an available source of water. A buffer cell would be designed for treatment. The second approach was developed by CH2MHill under contract with USACE, Jacksonville District. This approach involves a number of different hydroperiod designs for the site.

The approach that was ultimately used for alternative development was to reaffirm the Winsberg site and plan from the Yellow Book.

In evaluating these two approaches, it was noted that all 26 initial alternatives developed and listed below are various combinations of the basic management measures. These alternatives were developed before a more detailed engineering and real estate evaluation was conducted. Therefore, the acreages used in these alternative development approaches are different than those in the final approach used in the main body of the draft PIR. A third approach was used to develop the array of alternatives that was ultimately used. It is the approach described in the plan formulation portion of the report in Section 5.

F.1.1 First Approach For Building a Suite of Alternatives

These alternatives were developed in conjunction with the U.S. Fish and Wildlife Service (USFWS) team member.

Recommend building the suite of alternatives based upon 1) varied number of wetland cells 2) presence or absence of a buffer cell, and 3) source of water. A buffer cell would be designed for treatment rather than habitat, and would enhance the remaining wetland acreage by assimilating some of the nutrients and other pollutants in the source water. Estimates of the treatment capabilities of such a buffer cell will help determine the appropriate size of the cell. Consider as a starting point a 15-acre buffer (about 10 percent of the wetland area). Alternative 1 in this suite of alternatives is the No Action Alternative

- Alternative 2: One wetland cell with buffer cell. Source water from SRWRF.
- Alternative 3: One wetland cell with buffer cell. Route water first through Wakodahatchee, then Winsberg.

- Alternative 4: One wetland cell with buffer cell. Additional treatment at SRWRF.
- Alternative 5: One wetland cell without buffer cell. Source water from SRWRF.
- Alternative 6: One wetland cell without buffer cell. Route water first through Wakodahatchee, then Winsberg.
- Alternative 7: One wetland cell without buffer cell. Additional treatment at SRWRF.
- Alternative 8: Two wetland cells with buffer cell. Source water from SRWRF.
- Alternative 9: Two wetland cells with buffer cell. Route water first through Wakodahatchee, then Winsberg.
- Alternative 10: Two wetland cells with buffer cell. Additional treatment at SRWRF.
- Alternative 11: Two wetland cells without buffer cell. Source water from SRWRF.
- Alternative 12: Two wetland cells without buffer cell. Route water first through Wakodahatchee, then Winsberg.
- Alternative 13: Two wetland cells without buffer cell. Additional treatment at SRWRF.
- Alternative 14: Four wetland cells with buffer cell. Source water from SRWRF.
- Alternative 15: Four wetland cells with buffer cell. Route water first through Wakodahatchee, then Winsberg.
- Alternative 16: Four wetland cells with buffer cell. Additional treatment at SRWRF.
- Alternative 17: Four wetland cells without buffer cell. Source water from SRWRF.
- Alternative 18: Four wetland cells without buffer cell. Route water first through Wakodahatchee, then Winsberg.
- Alternative 19: Four wetland cells without buffer cell. Additional treatment at SRWRF.

Multiple cell use allows for operational flexibility. With regards to water quality, this flexibility allows the operator to maintain optimal water stages that promote better contaminant settling in the water column and entrapment at the sediment layer. Design-stage levels will promote the growth of various vegetation types that will enhance water quality by the removal of contaminants via, primarily, bioaccumulation.

In the first approach to building a suite of alternatives, we considered only water from the SRWRF because a major objective from the Yellow Book was "to create a wetland from water, which would be normally lost to deep-well injection and any future benefit." This refers to treated wastewater from the SRWRF. Using

water not going to deep-well injection would not meet that objective. As you will see in the discussion of the third and final approach that was used, we evaluated other sources of water to create the wetlands.

Long-hydroperiod wetlands were included to reflect the hydrologic regime of the Wakodahatchee Wetlands, a nearby, functioning, wetland constructed by Palm Beach County. Short-hydroperiod wetlands were included because they are perhaps more representative of the wetland communities that existed in the project vicinity prior to human disturbance. Two primary trade-offs exist between short- and long-hydroperiod wetlands. First, the two would support different plant communities, with a greater extent of emergent marsh in the long-hydroperiod wetland and wetter prairie in the short-hydroperiod wetland. Second, the two would support different water deliveries from the SRWRF; i.e., year-round deliveries of greater volumes would be possible with the long-hydroperiod wetland.

F.1.2 Second Approach For Building a Suite of Alternatives

Start with SRWRF as the water source, Winsberg Farm site for wetlands, and discharge to groundwater. Then use the remaining list of measures in various combinations to produce alternatives. The initial list of alternatives will be screened to a smaller subset, and this small set of alternatives will be evaluated in detail.

- *Alternative 2 (20) (corresponds to Alt 17): Long Hydroperiod Wetlands.* This alternative would send the same quality of water to Winsberg Farm as is sent to Wakodahatchee Wetland. About 150 acres of wetland and associated embankments would be constructed. The area would be inundated almost continuously. Water level would fluctuate +/- 1 foot except during large storms. Refer to DEP letter of August 2002 that presented sampling requirements, that if met, then the proposed Winsberg Farm could proceed. Sponsor sampled ground water and surface water at the edge of Wakodahatchee Wetlands and demonstrated that WQ criteria were not exceeded, except for odor and color.

- *Alternative 3 (21): short-hydroperiod wetlands.* About 150 acres of wetlands would be constructed. This alternative would use the same quality of water that is sent to Wakodahatchee. This alternative represents a large fluctuation of water levels, as compared to Alternative 2: Long Hydroperiod Wetlands. The area would be allowed to dry during part of the year. This would support different vegetation and different wildlife than alternatives with continuous inundation. The total water per year delivered under this alternative would be less than under alternatives with continuous inundation.

- *Alternative 4 (22): Long plus Short.* About 150 acres of wetlands would be constructed. The western 75 acres would be continuously inundated, long-hydroperiod wetlands. The eastern 75 acres would be short-hydroperiod wetlands. This alternative would use the same quality of water that is sent to Wakodahatchee. This alternative would provide some of the benefits of Alt 2 Long-Hydroperiod Wetlands and Alt 3 Short-Hydroperiod Wetlands. Water flow would be intermediate between these two alternatives.

- *Alternative 5 (23): Western Long-Hydroperiod Wetlands.* Construct 75 acres of wetland habitat on the western half of the Winsberg Farm property. The site would receive water from SRWRF that is the same quality as is sent to Wakodahatchee Wetland. (Refer to Florida Department of Environmental Protection [FDEP] letter of August 2002 that presented sampling requirements that, if met, allowed the proposed Winsberg Farm project to proceed. Sponsor sampled ground water and surface water at the edge of Wakodahatchee Wetlands and demonstrated that WQ criteria were not exceeded, except for odor and color. The area would be inundated nearly continuously. There would be a mix of trees, herbaceous and woody shrubs, and emergent plants. The water level in deep and shallow areas would fluctuate +- one foot except during large storms.

- *Alternative 6 (24): Western Short.* Construct 75 acres of short-hydroperiod wetlands in the western half of Winsberg. The site would receive water from SRWRF that is the same quality as is sent to Wakodahatchee Wetland.

- *Alternative 7 (25) (corresponds to Alt 14):* Construct Stormwater Treatment Area (STA) to focus on removing nitrogen from incoming water. Water would then flow to other cells designed for continuous inundation, with mix of shallow and deep areas, and mix of vegetation types. This alternative is proposed under the assumption that water with lower nitrogen and phosphorus would support different vegetation and provide different habitat quality than comparable alternatives that do not pre-reduce nutrients, such as Alternative 2: Long Hydroperiod Wetlands. There will be a need to estimate the size of STA necessary to process the nutrients in the expected 2-3 MGD average flow. The remaining 140 acres would be designed for wildlife habitat. This would require estimation of the STA size necessary to process nutrients (see graph). STA would be in the 2-3 MGD average flow range. The graph below and initial analysis suggest that about 85 acres would be needed to assimilate the ammonia

and phosphorus of the incoming water. It would require permitting under FAC Chapter 62-610, Part IV, and FAC 62-520.

- *Alternative 8 (26) (corresponds to Alt 19): Modify SRWR.F* The SRWRF would be modified to add structures and processes that would reduce nitrogen concentrations from discharged water. This reduced-nitrogen water would then be delivered to Winsberg Farm for habitat cells. This would require a substantial and costly upgrade of the SRWRF to remove nitrogen, an upgrade that may cost as much as $30 million. Assume the water could be discharged to ground water and/or surface water. Other permitting constraints besides nitrogen and ammonia may be imposed upon a discharge to the L-30, since it is on the 303(d) list. Surface-water discharge was screened early. Permit under 62-610, Part IV. This alternative is proposed under the assumption that water with lower nitrogen and phosphorus would support different vegetation and provide different habitat quality than comparable alternatives that do not pre-reduce nutrients, such as "Lake Wako.".

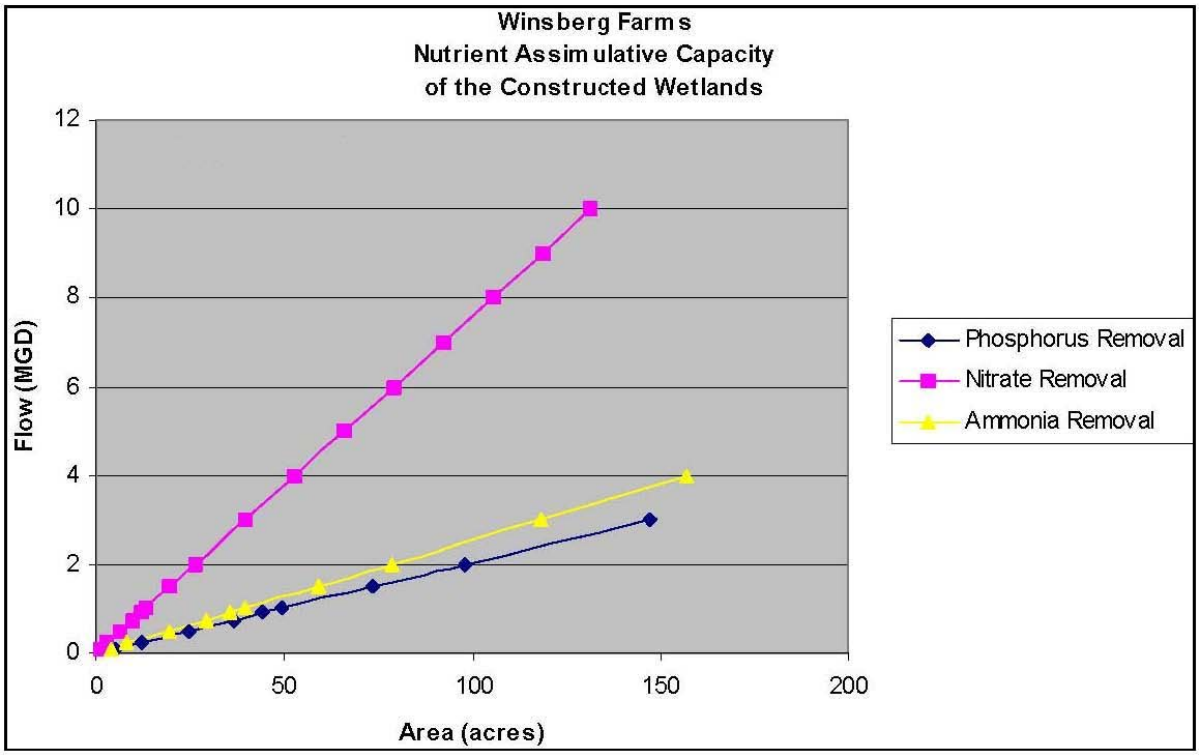

FIGURE F-1: NUTRIENT ASSIMILATIVE CAPACITY

F.2 LOCATION

The locations for Group 1 are depicted in **Figure F-2** are from 2002 aerial imagery. Pipeline costs represent the cost to deliver water from the SRWRF to

each site. Real estate costs in **Table F-1** represent the costs to acquire the identified acreage to use for wetland restoration.

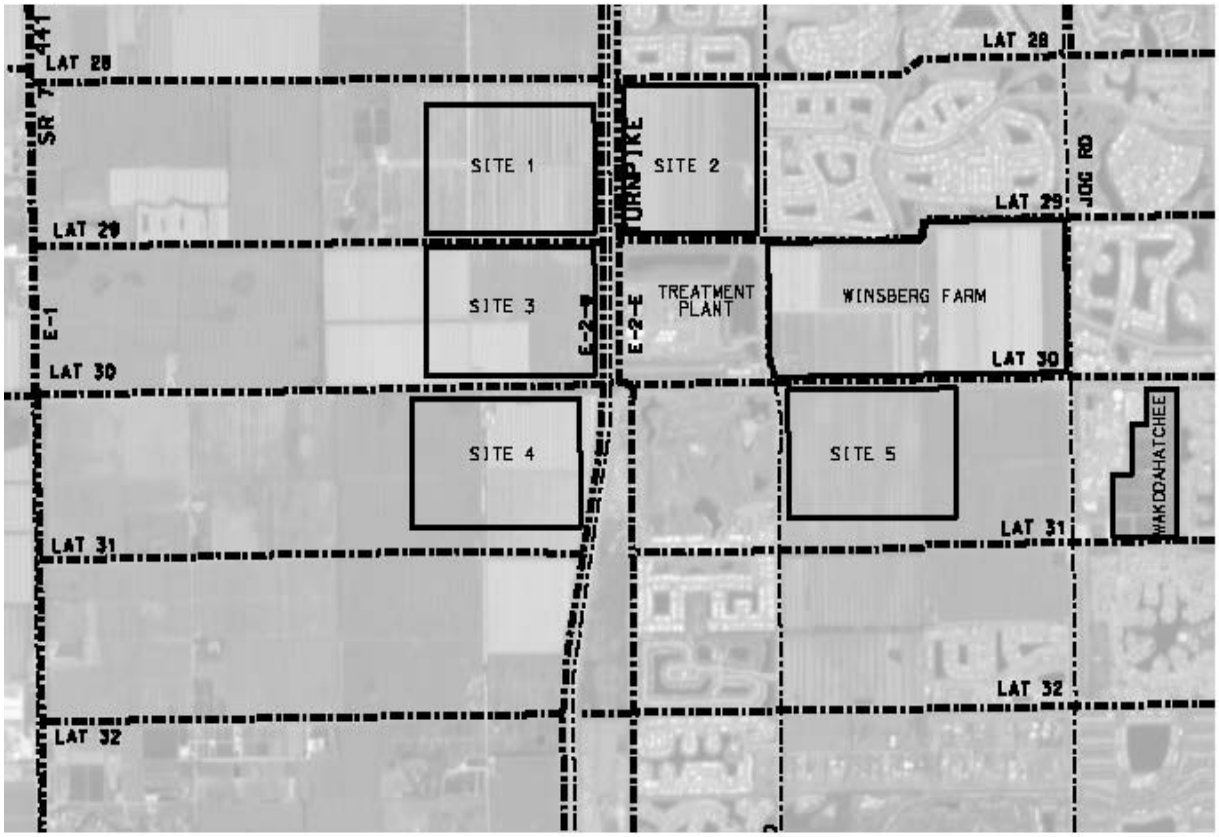

FIGURE F-2: LOCATIONS OF GROUP 1 SITES CONSIDERED

TABLE F-1: COST TO ACQUIRE LAND FOR WETLAND RESTORATION

Site	Acres	Pipeline Distance (feet)	Pipeline Total Cost	Real Estate Cost
1	150	2,900	$311K	$13.5 Million
2	140	2,400	$257K	$12.6 Million + recent residential and commercial development
3	150	1,400	$151K	$13.5 Million
4	150	3,100	$332K	$13.5 Million
5	150	2,600	$279K	$13.5 Million + recent residential and commercial development
Winsberg	150	200	$22K	$13.5 Million

F.3 REAFFIRMING THE YELLOW BOOK PLAN

In accordance with Guidance Memorandum No. 2 of the Six Program-Wide CERP Guidance Memoranda, Section 2.4 Plan Formulation, the following discussion is to reaffirm that the planning conditions for the Winsberg site have not changed from those described in the Yellow Book.

Conditions have not changed at the Winsberg Farm site from those in the Yellow Book.

F.3.1 Problems

The following problems discussed in the Yellow Book have generally not changed in the project area:

- Loss of wildlife and habitat in eastern Palm Beach County due to heavy development; and
- Water currently sent to deep-well injection is lost to the natural environment.

F.3.2 Opportunities

The opportunities described below have generally not changed in the project area from those discussed in the Yellow Book:

- Retain for the natural system some of the treated water from Palm Beach County's SRWRF that is currently disposed of by deep-well injection;
- Create a wetland to increase the spatial extent of the natural wetland habitat;
- Create populations of native wildlife;
- Increase water supply to meet consumptive water demand and create ecosystems; and
- Provide a high-quality environmental education experience. This would complement and/or expand the educational features of the Wakodahatchee Wetlands.

F.3.3 Goals

The following goals have generally not changed from those stated in the Yellow Book:

The goals of this project are to capture water from the Palm Beach County Southern Regional Wastewater Reclamation Facility (SRWRF) that is currently being lost from the ecosystem to deep-well injection and use this water to

construct wetlands and wildlife habitat in the area. These are the same goals as stated in the Yellow Book.

F.3.4 Objectives

The objectives shown below in **Table F-2**, developed by the Project Delivery Team (PDT), have not changed from those contained in the Yellow Book**:**

TABLE F-2: GENERAL CERP OBJECTIVES

CERP Objective: Increase habitat and functional quality.	
Winsberg Objective 2	Create wetlands in eastern Palm Beach County.
Winsberg Objective 3	Increase wildlife habitat.
CERP Objective: Increase species abundance and diversity.	
Winsberg Objective 2	Create wetlands in eastern Palm Beach County.
Winsberg Objective 3	Increase wildlife habitat.
CERP Objective: Increase availability of freshwater (agricultural/municipal/industrial).	
Winsberg Objective 1	Increase local water resource availability for natural systems and other uses.

Winsberg Farm specific objectives as discussed in the Yellow Book:

1. Create a wetland; and
2. Create the wetlands using water from the SRWRF that would normally be lost to deep-well injection. This will return water to the natural system.

F.3.5 Existing Conditions

The existing conditions generally have not changed from the Yellow Book. The Winsberg property was and continues to be a working vegetable farm. The sponsor has completed construction of a portion of the project described in the Yellow Book in anticipation of receiving cost-share credit.

F.3.6 Future Without-Project Conditions

The future without-condition generally has not changed from the Yellow Book. Although project lands were not discussed in the Yellow Book, it is reasonable to assume that project lands would be developed consistent with surrounding

lands. Surrounding lands are being developed as residential and commercial property.

The future without-condition assumes the Winsberg site will be fully developed as residential property with unencumbered land use.

F.3.7 Constraints

While constraints for this project area are not discussed in the Yellow Book, it is reasonable to assume that the constraints normally associated with the CERP project and with USACE projects in general apply. These constraints have not changed and the following assumptions remain valid:

- CERP – No elimination or transfer of waters;
- CERP – Maintenance of flood protection;
- CERP – No effect on tribal compact;
- No impact on listed species; and
- Meet all applicable environmental requirements.