SECTION 7
IMPLEMENTATION OF SELECTED ALTERNATIVE PLAN

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SECTION 7
IMPLEMENTATION OF SELECTED ALTERNATIVE PLAN

7.1 PLAN SELECTION PROCESS

7.1.1 Stakeholder/Team Involvement

Stakeholders such as non-governmental interest groups and the public are not official members of the Project Delivery Team (PDT). However, stakeholders were given the opportunity to attend PDT meetings and provide comments for consideration by the PDT. CERP program implementation also includes periodic Regional Project Delivery Team (RPDT) meetings (noticed on the CERP website: http://www.evergladesplan.org), which provide a periodic forum for stakeholders to receive information on project issues and status and to provide input to CERP program managers. Stakeholders were provided the opportunity to voice their comments, concerns, and issues during project-specific public meetings. Stakeholders were also provided the opportunity to comment during the public and agency review that occurred after the Draft PIR was issued in February 2005 and the Revised Draft PIR was issued in December 2005. Input received from stakeholders throughout the Site 1 Impoundment PIR development process was considered by the PDT and CERP program managers, and is generally reflected in this PIR. Coordination with agencies and stakeholders is described in Appendix E ("Agency/Public Coordination"). Comments received by agencies and stakeholders are summarized in Annex B ("NEPA Information").

7.1.2 Integration of Objectives and Performance Measures

The PDT developed planning objectives that were used in the evaluation of the management measures and the initial and final arrays of alternative plans. The ecological sub-team developed project-specific performance measures based on the Everglades Ridge and Slough and Lake Worth Lagoon Conceptual Ecological Models (CEMs). The performance measures were incorporated into the plan evaluation process and used to develop habitat units (environmental benefits). Habitat units were used in system formulation evaluation to select the plan and to justify the selected alternative plan based on a next-added increment analysis.

7.1.3 Description of Adherence to Guidance and CERP Requirements

Policy review led by Headquarters-USACE occurred throughout the PIR development process concurrent with major project milestones, such as the Feasibility Scoping Meeting (FSM), Alternative Formulation Briefing (AFB), and issuance of the Draft PIR in February 2005. Subsequent to the issuance of the Draft PIR, an Issue Resolution Conference (IRC) was held in June 2005 to identify remaining policy issues requiring further resolution. A Revised Draft was issued in December 2005 due to modifications to the Project Assurances and Savings Clause Methodology. A final Project Guidance Memorandum was prepared by Headquarters-USACE in July 2006. This Final PIR adheres to the actions required in the Project Guidance Memorandum.

The Site 1 Impoundment PIR was prepared in accordance with the requirements of the CERP

Programmatic Regulations (33 CFR Part 385) dated November 12, 2003. The PIR complies with the requirements of the Programmatic Regulations. The Programmatic Regulations required the development of six program-level Guidance Memoranda containing detailed requirements for preparing PIRs and performing project-specific evaluations. Draft versions of the Programmatic Guidance Memoranda were issued in April 2005. At the time that this PIR was being completed, the six guidance memoranda had not yet been finalized, nor was there final concurrence on the contents of the Guidance Memoranda by the Department of the Interior (DOI) and the State of Florida as required by WRDA 2000. Although this PIR was prepared prior to the finalization of the six Program-Wide Guidance Memoranda, the PIR does generally comply with the draft Programmatic Guidance memoranda.

7.1.4 Independent Technical Review and Legal Review

Independent technical review (ITR) conducted by the USACE Jacksonville District staff occurred throughout the PIR development process, concurrent with major project milestones. Independent technical review was conducted in accordance to the policies and procedures of the Jacksonville District. Issues raised and recommendations provided by technical review team were addressed by the PDT and incorporated into the Draft, Revised Draft, and Final PIRs as appropriate.

Subsequent to the completion of the preliminary Final PIR, dated April 2006 an external ITR was performed on the Revised Draft PIR (issued for public and agency review in December 2005). The purpose of this external ITR was to assess compliance with previous ITR activities, and to identify any outstanding technical issues that were not previously identified that should be resolved prior to completion of the Final PIR. This external ITR was completed in April 2006. A subsequent external ITR was conducted to review the design refinements made to the preliminary Final PIR design and associated cost increases. This external ITR was completed in July 2006. Both external ITRs were conducted by the Wilmington District Regional Planning Center, Wilmington Office, the Wilmington District Regional Engineering Center, Wilmington Office, the Savannah District Real Estate Office, and the Hydrologic Engineering Center. The Final PIR reflects the resolution of all technical issues raised as a result of both the internal and external ITR activities.

Legal review and certification of the Draft and Final PIRs was conducted in accordance with the requirements of USACE Engineering Regulation (ER) 1105-2-100 (Appendix H “Review and Approval of Decision Documents”).

7.1.5 Value Engineering

A formal Value Engineering (VE) study was conducted from 15 May 2006 to 19 May 2006 including participants from SFWMD, their consultants, and USACE Jacksonville District design team members. Potential savings were identified in the Final VE Study Report which is located in the addendum to Appendix A. Five design proposals/recommendations from the Final VE Study were incorporated into the Recommended Plan as design refinements with a total cost savings of approximately $10,390,000. Another five design proposals were identified in the VE study that may be investigated further during detail design efforts.

7.1.6 Design Criteria Memorandum Refinements

Joint coordination with SFWMD included discussions of design parameters, interpretations of USACE Regulations, industry practices, and required agreements as stated in the Final PIR, Appendix A.2.2. These coordinated efforts resulted in the production of the Design Criteria Memorandum(s) (DCMs) that provided the Jacksonville District, as well as the SFWMD's Architectural/Engineering consultants, guidance to perform proper embankment height design (and other feature designs). The DCMs pertinent to this project include DCM-1 to determine Hazard Potential Classification of the reservoir and embankment reaches, DCM-2 to determine minimum embankment height with wind and wave analyses, and DCM-3 to determine ungated spillway configurations for uncontrolled overflow to preserve embankment integrity.

Using the DCMs, Value Engineering, and designs from the Acceler8 project, more detailed design has been performed on the project and the following project features are those that have design changes from that presented in the Revised Draft PIR. More detailed information , including the rationale for these design refinements is contained in the Addendum to Engineering Appendix A.

- L-508I Internal Levee: Deleted from the Final PIR plan.

- L-508N Perimeter Embankment: Embankment height increased 1-foot, from 16 feet to 17 feet above average natural grade. Extent of embankment armoring changed from 4,000 feet of linear placement to armoring around the entire pool-side perimeter. Armoring material changed from riprap to composite of soil cement plate and stair-step.

- S-525A Inflow Pump Station: Reduced total pump capacity from 1,360 cfs to 650 cfs pumping capacity. Reduced Pump Station capacity eliminates need for Hillsboro Canal (HC) Improvement feature. The HC improvement has been deleted from the plan.

- S-526B Service and Auxiliary Spillway (unnumbered emergency overflow spillway in Revised Draft PIR): Changed from a single elevation crest with a 50-foot length to a dual crested spillway with a total length of 69-foot. Detailed engineering information provided in L-508N Perimeter Embankment (now D-1 Embankment) section.

- S-526C Auxiliary Spillway (new in Plan): Added spillway in L-40 Levee with a single elevation crest and a 500-foot crest length. Detail engineering information provided in L-508N Perimeter Embankment (now D-1 Embankment) section.

- S-527A Fixed Weir: Changed from a notched concrete weir with stilling basin to a sheetpile-concrete cap weir with riprap downstream protection.

- S-527B Gated Culverts: Changed construction dewater technique from wellpoint to use of a constructed cofferdam.

- S-528A Gated Culverts: Deleted from Final PIR plan with the L-508I Levee. Detail engineering information provided in the L-508I Internal Levee section.

- Extent of required earthwork such as clearing and grubbing have primarily increased with the increase in armoring (need of space for construction thereof).

7.2 SELECTED ALTERNATIVE PLAN SELECTION

After comparing the plans in the final array of alternatives, Alternative C was selected by the PDT as the plan to be recommended for this PIR. The selected alternative plan consists of a 1,800-acre project footprint with a 1,660-acre interior impoundment to a depth of approximately eight feet. The selected alternative plan is not significantly different from the plan for the Site 1 Impoundment identified in the 1999 C&SF Project Comprehensive Review Study (Restudy). Stakeholders have consistently supported an impoundment at this location as part of an overall Everglades ecosystem restoration plan in these and other prior studies, and the project lands were acquired in 1996 with federal funds appropriated via the 1996 Federal Farm Bill.

Alternative C best achieves the majority of the project objectives. This alternative would create the most beneficial ecological effects for both the natural system area within Loxahatchee National Wildlife Refuge (LNWR) and the estuarine portions of the Hillsboro Canal. Alternative C produces a greater amount of NER benefits than Alternative B. Alternative C is cost effective and is considered the "best buy" after performing an incremental cost analysis. The degree of risk and uncertainty associated with the construction and operation of Alternative C is minimal, since the materials, methods, and features of the project are consistent with other similar civil works projects in South Florida. In summary, Alternative C is the most cost effective plan for achieving the objectives of the proposed project, provides the greatest amount of National Ecosystem Restoration (NER) benefits, and is consistent with the goals and objectives of the CERP. Consideration of the acceptability of the proposed project indicates that the selected plan is feasible and would result in the most complete alternatives.

Results from design refinements that took place after the Revised Draft and preliminary Final PIR did not affect the selection of Alternative C as the recommended plan. The majority of the costs to construct the impoundment are contained in the embankment and armoring of the embankment. Since release of the Revised Draft, coordination efforts between SFWMD and USACE have resulted in acceptable design criteria for reservoirs and dams which meet both State and Federal regulations and guidelines. If wind-wave analysis results were available and equally applied to Alternative B during the plan formulation phase, it would not have affected the selection of Alternative C as the recommended plan. This is mostly due to the non-linearity impact of wind and waves on embankment height design that would create the most cost differential between the two alternatives. It is expected that alternative comparisons under the new criteria would result in Alternative C having an even greater cost effectiveness than that provided in this report.

7.2.1 Location and Description

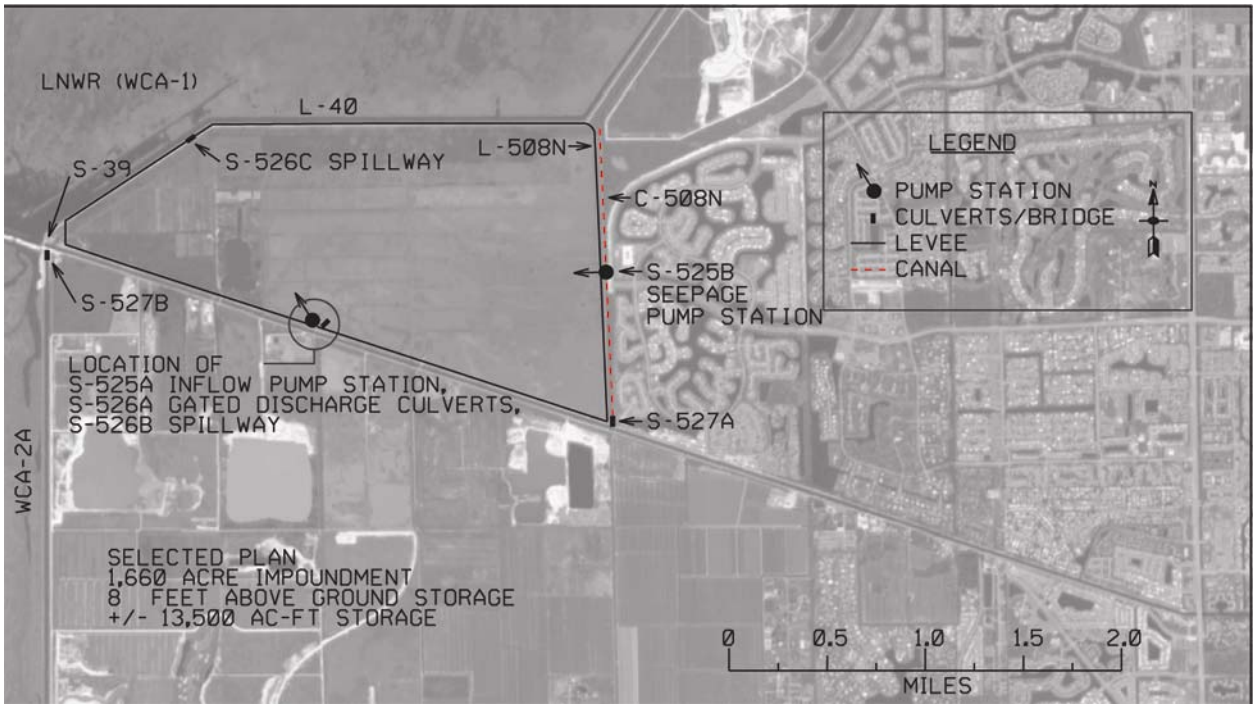
The selected plan for the Site 1 Impoundment project (**Figure 7.2-1**) is located in southwest Palm Beach County, west of the City of Boca Raton. The project site is an approximate 1,800-acre triangle of land located south and east of the LNWR and just east of SFWMD's existing S-39 water control structure (which provides water supply releases from the C&SF Project to the

Hillsboro Canal basin). The project site is bordered by the Hillsboro Canal to the south, the C&SF L-40 Levee to the north, and the Lake Worth Drainage District's (LWDD) E-1W-S Canal to the east. The project site offers the advantage of being adjacent to one of the primary C&SF Project canals (Hillsboro Canal) and the existing protective levee (L-40 Levee) surrounding LNWR, which was incorporated into the design of the project as one of the project impoundment embankments, thereby reducing embankment construction costs. The continuous straight-line edges of the project site reduce embankment length providing additional cost savings.

The purpose of the Site 1 Impoundment Project is to provide an alternative source of water supply for environmental and urban demands and for aquifer protection in the Hillsboro Canal basin, thereby reducing the effect of water supply withdrawals from LNWR. The project also reduces seepage out of LNWR and provides increased groundwater recharge. The cumulative net effect of the project is to increase the quantity of water in the natural system, particularly during dry periods. The impoundment will function by capturing excess storm runoff in the Hillsboro Canal's urban drainage basin, pumping that water into the impoundment and storing it for later release, thus reducing the quantity of runoff that would otherwise be lost to tide. Water supply demands met by the impoundment would reduce the necessity for releases from the regional system, which is consistent with the overall Everglades restoration effort. The impoundment may also provide opportunities to increase flood damage reduction capabilities through operational changes to the C&SF Project and local drainage systems. Additionally, the impoundment may provide limited water quality improvements in the Hillsboro Canal.

The impoundment would primarily capture flows from the Hillsboro Canal Basin. If storage capacity exists in the impoundment, other sources of water may also be captured, including excess water delivered out of LNWR when the Refuge stages are over (or anticipated to be over) the regulation schedule for that area as well as from the North Springs Improvement District (NSID) south of the project site.

FIGURE 7.2-1: PROJECT MAP



This project will improve ecosystem function within LNWR by reducing the need for releases for water supply and aquifer protection from the regional system, thereby increasing the net amount of water in the natural system consistent with overall ecosystem restoration objectives. This will also result in an increase in the quantity of beneficial water for the natural system within Everglades National Park (ENP). Water quality within WCA-2A would also be improved by diverting and capturing untreated discharges that are periodically discharged from NSID into WCA-2A. Additionally, utilization of the captured runoff increases ability to meet local demands for water supply and aquifer protection during the most critical times, dry periods. The project site will also support recreational features.

As part of the system formulation evaluation, an Aquifer Storage and Recovery (ASR) system associated with the impoundment was also evaluated and shown to be beneficial for increasing the efficiency of the impoundment to meet demands for water supply and aquifer protection. The feasibility of the ASR is currently being analyzed in a separate pilot project to determine the technical feasibility, the design requirements, and water quality treatment requirements necessary to implement ASR on a large-scale basis in South Florida. Depending on the outcome of the ASR Pilot Project, a future PIR may be prepared to obtain approval and authorization of an ASR system associated with the Site 1 Impoundment project.

7.2.2 Selected Alternative Plan

The Site 1 Impoundment Selected Alternative Plan has been modified due to design refinements resulting from DCMs, Acceler8, Value Engineering and District optimization efforts. The current features of the plan include: (1) 1,800-acre project footprint with a 1,660-acre,

approximately eight-foot deep above ground impoundment, (2) inflow pump station, (3) discharge gated culvert, (4) one combined service / auxiliary non-gated spillway and one auxiliary non-gated spillway, and (5) seepage control canal with associated pump station and overflow weir. An additional gated culvert structure is designed to control stages in L-36 Borrow Canal and NSID discharges into the Hillsboro Canal.

Impoundment Design - The total footprint for the selected plan is approximately 1,800 acres, with an effective storage area of approximately 1,660 acres. The above-ground impoundment has a normal full pool of approximately eight feet deep. At the normal full pool depth, the impoundment will store approximately 13,500 ac-ft of water. New embankment heights are 17 feet above average interior grade on the eastern and southern perimeter. The existing L-40 Levee that forms the northern and western perimeter remains with the approximate levee height of 16 feet above average interior grade. The eastern boundary seepage canal of the impoundment includes a 30-foot wide littoral shelf along the entire length to provide habitat benefits.

Pump Stations - *S-525A Pump Station* - The S-525A Pump Station is the impoundment's inflow pump plant with a total pumping capacity of 650 cfs, which includes four 150 cfs diesel engine driven and one 50 cfs electric pump(s). The S-525A Pump Station is located on the southern boundary of the impoundment, adjacent to the Hillsboro Canal. The pump station is designed to capture available storm runoff during events and back-pump seepage intercepted in adjacent and nearby canals that is conveyed to the Hillsboro Canal. For operational flexibility any combination thereof can be used to maintain optimum stages in the Hillsboro Canal.

S-525B Pump Station - The S-525B Pump Station is the impoundment's "eastern" seepage pump plant with a total pumping capacity of 150 cfs, which includes two 75 cfs electric pumps. The S-525B Pump Station is located on the eastern boundary of the impoundment off the C-508N Seepage Canal. The pump station is designed to return pump seepage intercepted by the seepage canal back into the impoundment. The pump station is used to maintain seepage canal stages between 7.20 ft. NGVD and 7.70 ft. NGVD.

Culverts - *S-526A Culvert*- The S-526A gated culvert is co-located with S-525A Pump Station on the southern boundary of the impoundment adjacent to the Hillsboro Canal. The structure controls releases from the impoundment to meet water supply demands and maintain optimal canal stages. S-526A is a three-barrel, reinforced concrete pipe (RCP) gated culvert structure with a design discharge flow of 700 cfs.

S-527B Culvert - The S-527B gated culvert is located near the impoundment's southwestern corner on the C&SF L-36 Borrow Canal at the confluence with the Hillsboro Canal. The structure will control discharges from the L-36 Borrow Canal (including North Springs Improvement District discharges) into the Hillsboro Canal, thus controlling stages in the L-36 Borrow Canal to improve WCA-2A seepage control. Excess water discharged through the structure may then be pumped into impoundment storage to meet future water supply demands if storage capacity exists. S-527B is a two-barrel, box gated culvert structure with a design discharge flow of 600 cfs.

Weirs - The S-527A fixed weir is located near the impoundment's southeastern corner on the eastern boundary C-508N Seepage Canal at the confluence with the Hillsboro Canal. The structure will allow discharge of excess collected seepage to Hillsboro Canal should S-525B Pump Station experience a power outage. S-527A is an un-gated straight crested weir structure with a design flow of 200 cfs and a hydraulic head of 0.75 feet (8.75 ft-NGVD).

Canals - *C-508N Canal* - The C-508N Canal is a seepage canal located along the eastern boundary. The seepage canal intercepts seepage and allows the return pumping of seepage into the impoundment by the S-525B Seepage Pump Station. Should S-525B experience a power outage, the excess seepage is allowed to be discharged into the Hillsboro Canal by gravity flow structure S-527A Weir. The optimal design seepage canal stage is 7.50 ft. NGVD. A 30-foot wide littoral shelf is incorporated along the entire canal length to provide fish and wildlife habitat.

Hillsboro Canal- Since the design pumping capacity of the S-525A inflow pump station was reduced to 650 cfs and Hillsboro Canal having an existing conveyance capacity of approximately 800 cfs (S-39 tainter-gate structure's design flow), there is no longer a need to improve the canal as part of the selected alternative plan.

Impoundment Embankments - The impoundment has a perimeter L-508N Embankment on the southern and eastern boundary that will tie into the existing C&SF L-40 Levee. L-508N Embankment height will be a minimum of 17.0 feet above the average impoundment interior grade. No modifications to the existing C&SF L-40 Levee are expected if the crest height is 26.0 ft. NGVD or greater.

Revetment - The revetment includes armored sloped surfaces on pool side and grass on the downstream side. Revetment also includes a footer on the pool side for toe protection. Armoring will consist of a composite surface of soil cement. For L-508N Embankment, smooth soil cement plate will be placed in the lower non-wave impact zone with stepped-formed used on remaining slope to crest. For L-40 Levee, smooth soil cement plate will be placed from toe to crest with a thicker plate used within the wave impact zone lower and upper limits.

Non-Gated Spillways - The impoundment's S-526B dual crested service / auxiliary overflow spillway, 19-foot and 50-foot, respectively, is located on the southern boundary in proximity of structures S-525A and S-526A, and will discharge into the Hillsboro Canal. The service spillway was designed to meet the Hillsboro Basin's permittable discharge rate when precipitation occurs and the impoundment is full. The auxiliary crest is set at the 100-year surcharged pool level to protect embankment integrity in case of extreme events by allowing additional discharge from the impoundment.

The S-526C auxiliary overflow spillway, 500-foot, is located on the western boundary (L-40 Levee) and will discharge into the LNWR. The spillway was designed to allow the impoundment to safely pass the Probable Maximum Flow (PMF) as a High Hazard Potential Classification structure, while maintaining cost-effectiveness, not impacting the public located to the east of the impoundment, and minimizing possible impact to LNWR. The crest elevation was set above the simultaneous combined 100-year precipitation and Category 1 Hurricane wind

events before flow as overtopping occurs. Wave over-wash is expected to occur more frequently, but only on the order of several hours versus days as in the case of overtopping.

Fish And Wildlife Design Features - Approximately 5.3 acres of shallow aquatic habitat will be created along the eastern boundary of seepage canal C-508N by constructing an intermittent series of littoral shelves 30 feet wide. These littoral shelves create additional wading bird foraging opportunities by concentrating feeder fish in their preferred habitat of shallow waters. Excavation inside the impoundment for the purpose of constructing the perimeter embankment has not been optimized. Excavation for seepage canals, intake and discharge pools do not alone provide the required quantity of material to fully construct all embankments. Identifying additional excavation in the impoundment's interior during detail design phase will create fish refuge during periods when the impoundment pool elevation approaches average ground elevation. Several borrow pits and/or mined lakes can be partially backfilled with excavated spoil materials to create viable fish and wildlife habitat. The spatial extent of the areas will be further quantified in the next design phase.

Recreation - The recreation plan includes elevated boardwalks, viewing platforms, picnic shelters, canoe launches, and information kiosks at two sites within the Site 1 Impoundment Project footprint. The two sites are located near the S-525A Pump Station and at the western end of the impoundment near the existing S-39 water control structure.

Existing Features - C&SF S-39 Tainter Gate- S-39 is a reinforced concrete spillway located at the abutment of the C&SF L-40 and L-36 Levees on the Hillsboro Canal. The primary purpose of this structure is to make releases from LNWR for water supply needs along the Hillsboro Canal during the dry season. The spillway can also be used to discharge excess water from LNWR when Hillsboro Canal tail water conditions allow and when the water is not needed in WCA-2 or WCA-3. S-39 will remain in place and the design will have no impacts on operations of the structure although it may have a diminished usefulness as CERP features are implemented.

C&SF S-39A Culvert- S-39A is a three-barrel, flashboard controlled CMP culvert structure located on the L-36 Borrow Canal at its confluence with the Hillsboro Canal. This structure, together with S-38B, controls the seepage rate from WCA-2A by regulating the canal stage in the north half of the L-36 Borrow Canal. The S-39A structure will be removed and replaced with gated culvert S-527B.

7.2.3 Real Estate

7.2.3.1 Federal Agriculture Improvement and Reform Act Of 1996 (Farm Bill)

On April 4, 1996, Congress enacted the Federal Agriculture Improvement and Reform Act of 1996 (Public Law 104-127, 110 Stat. 1022). Section 390 of the Federal Agriculture Improvement and Reform Act of 1996 provided the Secretary of Interior over $200,000,000 to *(A) conduct restoration activities in the Everglades ecosystem in South Florida, which shall include the acquisition of real property and interests in real property located within the Everglades ecosystem; and (B) fund resource protection and resource maintenance activities in the Everglades ecosystem* (subsection (b)(3)). Section 390 also allowed the Secretary of Interior

to transfer these funds to the USACE, the State of Florida, or the SFWMD to carry out subsection (b)(3).

On October 3, 1996, a Framework Agreement was signed between the U.S. Department of Interior (DOI), the U.S. Department of the Army, the State of Florida, (FDEP) and the SFWMD. The Framework Agreement provided a framework for the Secretary of Interior to provide Section 390 funds to the other parties for Everglades ecosystem restoration for both the acquisition of real property or the construction of features that were intended to become part of existing or future USACE projects. The Agreement stipulated that except as otherwise provided by law or agreed to by the Secretary of Interior, all Section 390 funds expended would be matched by non-Federal funds on a dollar-for-dollar basis.

In December 1996, DOI and SFWMD executed a Federal Grant Agreement in which DOI provided 50 percent Federal funds to SFWMD for the acquisition of land in the SFWMD's East Coast Buffer/WPA, including the lands required for the Site 1 Impoundment Project, and the SFWMD provided 50 percent State matching funds. The actual acquisition costs and the DOI approved incidental costs of acquisition are split on a 50 percent Federal and 50 percent SFWMD cost share basis according to the terms of the Grant Agreement. This is consistent with the terms of Section 601 (e)(3) of WRDA 2000 (Public Law 106-541).

A thorough discussion of the Federal Agriculture Improvement and Reform Act of 1996 and its effects on this project are located in Appendix D, Section D.8.

7.2.3.2 Lands and Real Estate Interests and Costs

Lands needed for the project were acquired in fee. Total acres required for the selected alternative plan is estimated at 1,800 acres. Of the 1,800 acres required for the selected alternative plan, approximately 140 acres are within rights-of-way of the existing C&SF Project Levee 40, Hillsboro Canal, Canal 36, Structure S-39A and the S-39 Tainter Gate. These lands were required for the original C&SF Project; therefore, no real estate costs are associated with these lands. The SFWMD, the project non-Federal sponsor, owns fee title or an easement interest to these lands within the rights-of-way of the Levee 40, Hillsboro Canal, Canal 36, Structure S-39A and the S-39 Tainter Gate.

For the remaining approximately 1,660 acres, the SFWMD has acquired fee title utilizing both 50 percent Federal funds provided by DOI and 50 percent State funds. The total estimated real estate costs for these lands, which include cost of lands, costs of improvements, relocation payment costs, and administrative costs associated with the acquisition of the lands is $8,404,000.

7.2.3.3 Relocation Assistance

As part of the acquisition of approximately 1,660 acres from the Solid Waste Authority of PBC, relocation assistance was provided to one affected resident in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Public Law 91-646). The funds to relocate the resident were part of the Federal Grant and have been

cost shared on a 50 percent basis.

7.2.4 Implications to C&SF System Operation

It is not anticipated that significant changes to existing C&SF project features and operations will be required as a result of project implementation. Water that would normally be discharged to tide via the Hillsboro Canal would typically be stored in the impoundment when storage capacity exists. As such, the project would neither adversely affect the operation of existing features of the C&SF Project nor the attainment of operational objectives (i.e., maintenance of flood control). No impacts to the maintenance of regulation schedules in Lake Okeechobee and the LNWR are anticipated. No disruption or diminishment in the balance of water flows to the WCAs and the ENP would occur as a result of this project. It is anticipated that flows to the WCAs and the ENP would actually improve with construction and operation of the impoundment as well as the implementation of other CERP projects. Additionally, no reduction in the level of service for water supply to meet municipal, industrial, and agricultural demands is expected.

7.2.5 Project Contribution to the Achievement of Interim Goals and Interim Targets

Section 601(h)(3)(C)(III) of the Water Resources Development Act of 2000 (Public Law 106-541) required the CERP Programmatic Regulations to include the "establishment of interim goals to provide a means by which the restoration success of the Plan may be evaluated the implementation process." Section 385.38 of the CERP Programmatic Regulations (33 CFR Part 385) further describes the intent and the underlying principles for establishing interim goals and a process for developing them. Section 385.39 of the CERP Programmatic Regulations contains the requirement to develop interim targets to measure progress toward meeting the other water-related needs of the South Florida region, and describes the intent, underlying principles, and the process for establishing the interim targets.

RECOVER issued a final report containing recommendations for interim goals and targets on February 17, 2005. Interim goals and corresponding indicators for evaluating progress toward the restoration of the South Florida ecosystem are recommended for the Northern Estuaries, Lake Okeechobee, the Everglades, and the Southern Estuaries regions. Interim targets and corresponding indicators for water supply and flood protection functions throughout South Florida are also recommended.

Since the Site 1 Impoundment project is not expected to significantly affect hydrologic conditions in the Northern Estuaries, Lake Okeechobee, and Southern Estuaries regions, alternative plan affects on the interim goals and indicators for the Everglades region were evaluated. The RECOVER report contains a list of indicators to be evaluated to assess progress toward interim ecosystem restoration goals in the Everglades region.

Compared to existing conditions, the selected plan provides an incremental contribution toward the interim goals for the Everglades by improving the following indicators: increased water volume, improved hydropatterns, total phosphorus (by reducing North Springs Improvement District discharges), and periphyton mat cover and composition, and tree islands. To a lesser

extent, the project also improves the following additional indicators established for the Everglades interim goals: improvement to aquatic and aquatic-dependent fauna populations, including Alligators, wading birds, and snail kites (an endangered species).

With respect to the interim targets for water supply and flood protection, the Site 1 Impoundment improves the following indicators: water volume, water supply to the Lower East Coast, and protection of the Biscayne aquifer against saltwater intrusion.

7.2.6 Project's Contribution to CERP Goals and Purposes

The purpose of the Restudy is defined in Section 1.2.1 of the Yellow Book: "*The purpose of the Restudy is to reexamine the C&SF Project to determine the feasibility of structural or operational modifications to the project essential to the restoration of the Everglades and the south Florida Ecosystem, while providing for other water-related needs such as urban and agricultural water supply and flood protection in those areas served by the project. The intent of the study is to evaluate conditions within the study area and make recommendations to modify the project to restore important functions and values of the Everglades and south Florida ecosystem and plan for the water resources needs of the people of south Florida for the next 50 years.*" The purpose of the Site 1 Impoundment in the Recommended Comprehensive Plan is further identified in Section 9.1.8.11 of the Yellow Book: "*The purpose of this feature is to supplement water deliveries to the Hillsboro Canal during dry periods thereby reducing demands on Lake Okeechobee and the Loxahatchee National Wildlife Refuge*."

Table 7.2-1 lists the CERP Goals as stated in Section 5.5 of the Restudy.

TABLE 7.2-1: CERP GOALS AND OBJECTIVES

Goal: Enhance Ecologic Values
• Increase the total spatial extent of natural areas. • Improve habitat function and quality. • Improve native plant and animal species abundance and diversity.
Goal: Enhance Economic Values and Social Well Being
• Increase availability of fresh water (agricultural/municipal & industrial). • Reduce flood damages (agricultural/urban). • Provide recreational and navigation opportunities. • Protect cultural and archaeological resources and values.

The selected alternative plan would provide a structural component that is essential to the restoration of the Everglades and south Florida Ecosystem. The impoundment would be able to supplement water deliveries to the Hillsboro Canal during dry periods, thereby reducing the demand on the natural system. As a result, the selected alternative plan would improve habitat function and quality by improving hydroperiods and hydropatterns in the natural system by reducing the amount of withdrawals required for agricultural, municipal, and industrial water supplies. Seepage out of the LNWR would also be reduced as a result of the project. Estuarine communities downstream of the project site should benefit by reduction of pulsed flows and subsequent stabilization of salinity. Additionally, reductions in Phosphorus (P) loading and improvements in the quality, quantity, timing and distribution of water within the natural system would improve native plant and animal species abundance and diversity. Beneficial effects would reduce the rate of cattail expansion, improve the abundance and diversity of periphyton, restore the extent of function native tree islands, and also improve foraging and nesting habitat for the snail kite and other water-dependent wading birds.

The creation of an alternate source of water for other water related needs is consistent with the above-stated economic value goal for the CERP and the selected alternative plan does result in some incidental beneficial water supply effects. Additionally, some level of flood damage reduction is also anticipated due to increased storage capacity of fresh water. Recreational opportunities would be produced by adding the boardwalks, footbridges, viewing platforms, picnic shelters, canoe launches and information kiosks at two sites within the footprint. However, $168,000 (October 2005 Price Levels) in average annual recreational benefits would be considered incidental to the $28,500 average annual cost. Recreation would have a 7.2 to 1 benefit to cost ratio. No impacts to navigation or cultural or archaeological resources are expected as a result of project implementation.

The selected alternative plan reflects the goals and purposes of CERP overall and project-specific purposes as initially defined in the Yellow Book. The selected plan would also serve all the goals for CERP as stated in the Yellow Book. Although the selected plan was not specifically formulated to enhance economic and social well being, the selected plan would result in increased water available for water supply and aquifer protection, incidental flood damage reduction, and recreational opportunities. As such, the selected alternative plan would

provide for a significant contribution to the overall CERP Goals and Purposes.

7.2.7 Relationship to Objectives and Constraints

Alternative C, the selected alternative plan, would best meet the CERP and project-specific objectives established for the proposed Site 1 Impoundment. The selected alternative plan would increase the spatial extent of natural areas, improve habitat function and quality, and also improve native plant and animal abundance and diversity. The selected alternative plan would achieve the target hydroperiods and hydropatterns in the LNWR by reducing the amount of water withdrawn from the regional water management system for M&I users, and by reducing seepage from the LNWR. Operation of the selected alternative would also help protect against saltwater intrusion in the study area. The selected alternative plan is the most successful alternative to reduce P loading into the LNWR, which would in turn reduce the rate of cattail expansion in the natural system. The selected alternative plan would also be the most successful alternative to restore the spatial extent of viable tree island habitat in the LNWR.

The selected alternative plan would also meet all of the constraints identified for the proposed Site 1 Impoundment. The impoundment would not reduce the availability of fresh water for agricultural, municipal, and industrial water supply. It would not reduce the level of service for flood damage reduction within the project area. It is anticipated the selected alternative plan would result in incidental and insignificant beneficial effects to water supply and flood damage reduction; however, these improvements were not quantified. The selected alternative plan would improve levels of recreation, but not negatively affect navigation. No impacts to archaeological or cultural resources are anticipated.

7.2.8 Summary of Draft Operating Manual and Forecast of Future Operations

The project impoundment incorporates a seasonal operating schedule that adds cost-effectiveness to the project while reducing benefits insignificantly, i.e. well within the models margin of error limits. Most of the project benefits are achieved during the dry season/periods outside the Hurricane season as the project provides an alternative water source to the natural system. The Hurricane season operating pool between June 15 and November 15 will be set at 15.00ft-NGVD. The reason for the lower pool is to reduce unnecessary embankment height in order to ensure that integrity is maintained for the High Hazard Potential Classification structure design with a wind speed based on the 100-year interval in combination with the Probable Maximum Flow (100-year wind speed for this locale is equivalent to a Category 4 Hurricane). The “off-season” operating pool during the remainder of the year will be set at 18.00 ft-NGVD where the design wind speed is that equivalent to a Category 1 Hurricane. This greater depth makes use of maximum storage going into the dry-season and captures the major portions of winter storm events for maximization of benefits achieved throughout the dry-season.

Project operations would involve pumping water contained in the Hillsboro Canal into the western compartment of the impoundment via the inflow pump station. This pumping would occur when storage capacity exists in the impoundment and when water in the canal is not needed to maintain salt water intrusion targets at the existing downstream G-56 structure which acts as a salinity barrier. Seepage collected via a seepage collection canal along the eastern side

of the impoundment would be returned to the impoundment with S-525B Seepage Pump Station. Seepage collected in the Hillsboro Canal would be returned to the impoundment with the S-526A Inflow pump Station. Water stored in the impoundment would be released into the Hillsboro Canal via the outflow gated culverts when there is demand for additional water in the basin and stored volume exists. More detailed information describing proposed project operations is contained in Annex D (Draft Operating Manual).

The Site 1 Impoundment Project as modeled appears to create more water in WCA-2A when there are no downstream demands which results in occasional excessive water conditions (stage and duration) within WCA-2A compared to the NSM. However, the model code does not have the operational flexibility to incorporate typical actual water management operations that would be applied to prevent such occurrences with implementation of the project. Realistically, the project's potential to meet more goals and objectives with monitoring and adaptive management measures is high. For example, when stages in the LNWR or WCA-2A are above their respective regulation schedules, urban demands and water demands for prevention of saltwater intrusion may be met with the additional storage in LNWR and WCA-2A rather than calling for releases from the impoundment. Thus, water stored in the impoundment would be "in the bank" for later use when advantageous to the natural system (i.e. when conservation areas are at or below their stage targets).

Also, the impoundment may occasionally be used to relieve the natural system of excess water such as when localized intense thunderstorms increase stages in the natural areas. Other future CERP projects will also help provide flexibility to manage the system in an optimal manner that decreases potential occurrences of excess water in WCA-2A. The WCA-2B Flows to Everglades National Park Project would convey excess water in WCA-2B directly to Northeast Shark River Slough replacing the historic circuitous course the River of Grass once made that is now obstructed by urbanization and the east coast protection levee. By transporting WCA-2B water away from its current dead-end southeast corner, water from WCA-2A may flow more freely into WCA-2B and southward as needed for the Northeast Shark River Slough and Everglades National Park.

The major outflow from WCA-2A into WCA-3A is via the existing S-11s water control structures (**Figure 3.4-1**). As sheetflow conditions are reintroduced in the Everglades on a large scale with implementation of other CERP projects, natural system water demands for the southern Everglades will be met with additional water secured for the natural system with implementation of the CERP program. The Decompartmentalization project will have a large beneficial impact on the Everglades and is expected to require modification of the WCA-2 and WCA-3 regulation schedules. Thus, implementation of Decompartmentalization may eventually require a revision of the Site 1 Impoundment operations scheme. Finally, if ASR is implemented as a supplementary function of Site 1 as originally recommended in the Restudy, more prompt drawdowns of impoundment stages will alleviate some of the water conditions that may have been created by impoundment storage at higher pools. The key to a successful Site 1 Impoundment Project implementation is the CERP program's capacity to monitor on-the-ground results and provide for adaptive managerial techniques to maximize all goals and objectives of the project and the regional CERP program.

7.2.9 Project Monitoring and Assessment Activities

The Site 1 Impoundment Project is a Category C project according to CERP Guidance Memorandum 23.01 ("Water Quality Considerations for the Project Implementation Report Phase" http://www.cerpzone.org/documents/CGM/cgm_023.01.pdf). As a Category C project, it is a component for which the Comprehensive Plan does not include water quality improvement features or specifically reference water quality improvement as a criterion to be addressed during design. However, when the Site 1 Impoundment Project is implemented the water discharged into the Hillsboro Canal must meet the water quality standards established for a Class III water body or the Everglades Forever Act if the canal discharges to the Everglades. Existing monitoring programs are measuring the background levels of parameters of interest in the Hillsboro Canal. The Site 1 Impoundment Water Quality Monitoring Plan (see Annex D), will focus on the quality of water flowing into the project area and being discharged to the Hillsboro Canal.

The Site 1 Impoundment Project surface water quality monitoring sites are as follows:

- S-525A - inflow pump station;
- S-526A - outflow gated culverts;
- S-527A - fixed weir which transfers seepage into the Hillsboro Canal (HC);
- S-527B - gated culverts which are located in L-36 Borrow canal;
- S-526B - the combined auxiliary/service spillway into HC; and
- S-526C - the auxiliary spillway into the LNWR

Water quality data will be collected at these locations during flow events in order to determine ambient concentrations and to calculate loading rates. There will also be an interior water quality monitoring site. The Water Quality Monitoring Plan is broken into baseline, startup and operational phases. Water column and fish tissue samples will be collected on a regular basis as outlined in the monitoring plan, while sediment samples will be collected during baseline and startup monitoring.

The project's performance measures are the same as or similar to the system-wide performance measures developed by RECOVER to evaluate system-wide effects. The RECOVER performance measures are based on CEMs which illustrate conceptual relationships between environmental drivers (such as agricultural or water management practices), stressors (such as reduced storage volume and degraded water quality), the ecological effects of stressors, and key attributes (such as tree island habitat and wading bird populations) of the ecosystem under consideration. Performance measures are established to evaluate the response of the ecosystem attributes to the expected changes resulting from project implementation.

System-wide ecological monitoring will be conducted for the Site 1 Impoundment by RECOVER as part of the Monitoring and Assessment Plan (MAP). The specific parameters of interest to the Site 1 sub-team monitored by RECOVER are summarized in Annex D. Monitoring will include mapping vegetation within the project's zone of influence, such as the LNWR and WCA-2, including assessments of cattail, periphyton, and tree island communities and coverage. Additionally, wading birds will be monitored as part of the MAP. The MAP lists,

and the team is aware of other ongoing monitoring conducted and used for system-wide assessments and adaptive management such as monitoring and recording of water stages within the Everglades (including WCA-1 and WCA-2A) and snail kite monitoring throughout the WCAs. The monitoring program for the Site 1 Impoundment will rely on the MAP and other on-going efforts for assessment of system-wide effects for the purposes of demonstrating the project's success in contributing to the CERP and for the RECOVER team's process of adaptive assessment.

For project-level performance the SFWMD and USACE will monitor impoundment water stages, water quality, and releases (flow) as part of the Operational and Water Quality Monitoring Plan. Details of this monitoring effort are described in Annex D.

The monitoring plan for the project includes a recommendation for RECOVER to adopt additional water quality monitoring within the estuarine portion of the Hillsboro Canal in order to determine effects within the downstream estuaries. Although the MAP has sampling sites throughout many of the estuarine communities in Palm Beach and Broward Counties, the sub-team believed sampling sites within the downstream reaches of the Hillsboro Canal and northern estuarine resources in Broward County were lacking. Additional sampling site would be necessary to determine system-wide effects and utilize adaptive management for these areas.

The RECOVER Assessment Team will continue to evaluate the need for additional regional ecological monitoring for appropriate incorporation into the MAP. The project monitoring plan has been reviewed by RECOVER and is deemed to be consistent, complimentary, and compatible with the MAP and CERP Guidance Memorandum 40, and does not duplicate existing monitoring efforts. The RECOVER Monitoring Plan Review is located in Annex E. The project team and RECOVER should continue to coordinate and resolve any issues or changes regarding the project monitoring plan.

7.2.10 Project Related Adaptive Assessment Activities

An extensive CERP adaptive assessment and management program that includes a system-wide monitoring and evaluation program is being conducted to support the goals and objectives of CERP. As a component of the CERP, the Site 1 Impoundment Water Quality Monitoring Plan will be closely coordinated with RECOVER's system-wide adaptive assessment program. The adaptive assessment and management program will provide an opportunity to continue investigating concepts and issues related to the overall Site 1 Impoundment Water Quality Plan while implementation of the initial project features is underway. The adaptive assessment program will include continued regional and system-wide evaluation and analysis among other planning activities. The Site 1 Impoundment Water Quality Monitoring Plan focuses on water quality in order to ensure that surface water is not degraded as a result of project activities. The monitoring plan will provide an outline for quantifying water quality, creating a water budget, measuring constituents of interest (i.e. P and N) and measuring and evaluating pollutant sources.

7.2.11 Project Costs

7.2.11.1 Initial Costs

The total estimated initial cost for the selected alternative plan is $ 79,100,000 in October 2005 Price Level. The estimated cost of the selected alternative plan features, including real estate (lands and damages), is shown in **Table 7.2-2**.

7.2.11.2 Investment Costs

Department of the Army ER 1105-2-100 requires that interest during construction (IDC) be computed which represents the opportunity cost of capital incurred during the construction period. Interest was computed for construction and pre-construction engineering and design (PED) costs from the middle of the month in which the expenditures were incurred until the first of the month following the estimated construction completion date. IDC is shown within **Table 7.2-3**.

TABLE 7.2-2: PROJECT COSTS (OCTOBER 2005 PRICE LEVELS)

Site 1 Impoundment (Alternative C: 1,660-acres at 8 ft. depth)	
Construction Costs	**Cost Estimate**
Relocations	$45,000
Reservoirs	$1,175,000
Channels and Canals	$14,139,000
Levees and Floodways	$24,299,000
Pumping Plants	$17,167,000
Floodway Control and Diversion Structures	$4,952,000
Recreation	$306,000
Sub-Total, Construction Cost	**$62,083,000**
Non-Construction Costs	
Lands and Damages	$8,404,000
Planning, Engineering, and Design	$3,815,000
Construction Management	$4,798,000
Sub-Total, Non-Construction Costs	**$17,017,000**
Total Initial Cost	**$79,100,000**

TABLE 7.2-3: TOTAL AND ANNUAL COSTS (OCTOBER 2005 PRICE LEVELS)

Cost Component	**Selected Alternative Plan**
Construction Features	$70,696,000
Lands	$8,404,000
Initial Cost	**$79,100,000**
IDC	
Construction	$6,200,000
Lands	$1,600,000
Total IDC	**$7,800,000**
Total Project Investment	**$86,900,000**
Average Annual Costs	
Interest and Amortization	$5,100,000
Operation, Maintenance, Repair, Rehabilitation, and Replacement	
Restoration	$773,600
Recreation	$5,100
Monitoring	$340,800
Total Annual Equivalent Cost	**$6,219,500**

The cost of a project is the investment incurred up to the beginning of the period of analysis. The investment cost at that time is the sum of construction and other initial costs such as real estate and PED costs plus IDC. The IDC for the construction element of the selected alternative plan is $ $6,200,000, utilizing a 40-month construction period. IDC was computed for real estate using the date the lands are to be certified for the project, which is two months prior to the commencing of construction. The total IDC on real estate is estimated to be $1,600,000.

7.2.11.3 Adaptive Assessment and Monitoring Costs

The current estimate for the average annual monitoring and adaptive assessment activities described in Section 7.2.9 and Annex D is $340,800.

7.2.11.4 Operation, Maintenance, Repair, Replacement, and Rehabilitation Costs

Annual operation, maintenance, repair, replacement and rehabilitation (OMRR&R) costs were estimated for the construction features of the selected alternative plan. The OMRR&R costs were determined by extrapolation from operational cost histories supplied by the SFWMD, by using industry standard cost data and by using data from past and projected future cost trends. The average annual OMRR&R costs including recreation are estimated to be $778,700.

7.2.11.5 Annual Costs

Investment costs were converted to annual costs using an interest rate of 5 1/8 percent and a period of analysis of 41 years to compute interest and amortization. Annual OMRR&R costs and

monitoring and adaptive assessment costs were then added to the interest and amortization costs to determine the average annual cost, which is $6,219,500 for the selected alternative plan.

7.2.11.6 Total Project Cost Summary

The total project cost is the cost of all work associated with preconstruction engineering and design and construction, including real estate and appropriate credit provisions of Section 104 of WRDA 1986 and Section 215 of Public Law 90-483. **Table 7.2-4** represents the Site 1 Impoundment's project first cost (October 2005 price levels) and the fully funded cost. The project first cost is based on the cost estimate from the MCACES estimate (recreation costs have also been added). The project first cost of $79,100,000 will be utilized for the purposes of project authorization. The table also includes a fully funded project cost estimated through the mid point of the construction period (estimated to be August 2008). The fully funded estimate has been estimated in accordance with EM 1110-2-1304 Civil Works Construction Cost Index.

TABLE 7.2-4: TOTAL PROJECT COST SUMMARY
(OCTOBER 2005 PRICE LEVELS)

Site 1 Impoundment (Alternative C: 1,660-acres at 8 ft. depth)		
Construction Costs	**Initial Cost Estimate**	**Fully Funded Cost Estimate**
Relocations	$45,000	$47,000
Reservoirs	$1,175,000	$1,252,000
Channels and Canals	$14,139,000	$15,085,000
Levees and Floodways	$24,299,000	$25,882,000
Pumping Plants	$17,167,000	$18,509,000
Floodway Control and Diversion Structures	$4,952,000	$5,339,000
Recreation	$306,000	$330,000
Sub-Total, Construction Cost	**$62,083,000**	**$66,444,000**
Non-Construction Costs		
Lands and Damages	$8,404,000	$8,405,000
Planning, Engineering, and Design	$3,815,000	$3,894,000
Construction Management	$4,798,000	$5,301,000
Sub-Total, Non-Construction Costs	**$17,017,000**	**$17,600,000**
Total Cost	**$79,100,000**	**$84,044,000**

7.2.12 Selected Alternative Plan Effects

USACE planning regulation ER 1105-2-100 (Planning Guidance Notebook) requires that NER benefits be calculated for ecosystem restoration projects. For this project, volume of water

stored by the impoundment and volume of water retained in the natural system were initially evaluated as commensurate surrogate metrics for depicting NER benefits, since hydrologic changes in the adjacent natural areas in response to project implementation are expected to result in desirable ecosystem conditions and this is a direct function of the benefits of the impoundment. To supplement the hydrologic function analysis, habitat units (NER benefits) were also calculated to determine the ecological response within the natural system. Both of these evaluations demonstrate that the proposed Site 1 Impoundment will have a net beneficial effect on the natural system and estuarine portion of Hillsboro Canal. Habitat within the Everglades Ridge and Slough community within LNWR should improve as a result of changes in current hydroperiods and hydropatterns. These hydrologic changes would allow the natural system to rebound from the current scheme that is causing the system to suffer. Although some specific attributes in the natural system may take more time to recover than others, the proposed Site 1 Impoundment would have an immediate beneficial effect. These beneficial effects have been summarized in the following section.

7.2.13 Project Justification

Section 385.26(b)(2) of the CERP Programmatic Regulations (33 CFR Part 385) states that projects are to be formulated and evaluated based on "*their ability to optimize contributions for achieving the goals and purposes of the Plan.*" Sub-paragraph (3) of this section further states that "*the alternative plan to be selected should be the plan that maximizes benefits, both monetary and non-monetary, on a system-wide basis, provided that the plan is justified on a next-added increment basis*".

These requirements necessitate consideration of project alternatives as part of the system of projects that comprise the CERP (i.e., all of the other components of the comprehensive plan are assumed to be in place, together with the plan under consideration), in order to ensure that the project will maximize net benefits (environmental and economic, if applicable) on a system-wide basis. For this project, system-wide effects were evaluated based on hydrologic surrogates as well as environmental benefits.

Section 385.9(a) of the CERP Programmatic Regulations (33 CFR Part 385) also requires that:

"(a) Individual projects shall be formulated, evaluated, and justified based on their ability to contribute to the goals and purposes of the Plan and on their ability to provide benefits that justify costs on a next-added increment basis."

The next-added increment analysis requires an evaluation of the selected alternative plan's system-wide effects in the absence of the balance of those CERP projects that have not been approved. For the Site 1 Impoundment Project, no other CERP projects have yet been approved; therefore, the NAI analysis is based on an analysis of the effects of only the Site 1 Impoundment.

Using volume of water stored by the impoundment and volume of water retained in the natural system as commensurate metrics for the hydrological function analysis, the system formulation and next-added increment (NAI) analyses were performed. The system formulation and NAI NER benefits attributable to this project are shown in **Table 7.2-5**. Using the hydrologic

function surrogates, the system formulation analysis demonstrates that the selected alternative plan, with all of the other components of the CERP would produce 285.3 average annual NER Benefits Units. The NAI evaluation demonstrates that the selected alternative plan alone would produce 75.7 average annual NER Benefits Units. In comparing NAI benefits to system formulation benefits, the selected alternative plan will provide, on its own without the benefit of other CERP projects, 26.5 percent of the system outputs the project was formulated to produce in the hydrologic function analysis. The NER benefits, represented by the NAI, would occur immediately upon construction and operation of the selected alternative plan.

These first 26.5 percent of outputs (75.7 average annual benefit units) come at a price of $78.7 million ($2005) in total investment cost. The remaining 73.5 percent of Site 1 Impoundment outputs (209.6 average annual benefit units), come at a cost of $892 million (in $2005) for the other CERP projects (including Hillsboro Canal ASR, the Palm Beach County Agricultural Reserve Reservoir, Acme Basin B Project, L-8 Project, Strazzulla Wetlands, C-51 Canal ASR, and LNWR Internal Structures) that contribute to the same system-wide outputs associated with the Site 1 Impoundment project. Therefore, for the hydrological function analysis, the Site 1 Impoundment Project on its own delivers 26.5 percent of the benefits the project was formulated to produce at 8.8 percent of the cost of the remaining system-wide benefits associated with other CERP projects. This "best buy" therefore justifies the Site 1 Impoundment selected alternative plan on the NAI basis.

TABLE 7.2-5: NER BENEFITS FOR ALTERNATIVE C (COMBINED HYDROLOGIC FUNCTION RESULTS)

NER Benefits (Combined Hydrologic Function Results)			
Selected Alternative Plan (Alternative C)			
	NAI Average Annual	**SF Average Annual**	**NAI as Percent of SF**
Storage Function	31.2	165.6	18.8
Retention Function	44.5	119.7	37.2
Water Supply Deliveries from LNWR	9.7	31.7	30.6
Deliveries from LNWR to WCA-2A	23.7	36.9	64.2
Discharges to Tide	11.1	51.1	21.7
Total Benefit Units	**75.7**	**285.3**	**26.5**

Additionally, beneficial ecological effects would be supplemented by the implementation of other CERP projects, the same as mentioned above. These system-wide benefits, in congruence with the project specific benefits, would serve to follow the "jump start" that the Site 1 Impoundment provides. Without the construction of the selected alternative plan, the natural system would further decline and increase the amount of time for ecological recovery within the natural system. In addition to the hydrologic function analysis, the Ecological sub-team evaluated "habitat units" (environmental benefits) for the selected alternative plan in order to

further justify the proposed project for both the system formulation and the next-added increment analyses. The sub-team identified key ecological attributes that were quantifiable and best represent the ecological change that would occur. Indices were established and were then multiplied by the spatial extent of each attribute to establish habitat units for each attribute. A more thorough discussion of the Habitat Unit Evaluation Methodology is in Appendix C. The results of the Habitat Unit calculations are displayed in **Table 7.2-6.**

TABLE 7.2-6 NER BENEFITS FOR ALTERNATIVE C (COMBINED ECOLOGICAL FUNCTION RESULTS)

NER Benefits (Combined Ecological Results)			
Selected Alternative Plan			
	NAI Average Annual Habitat Units	**SF Average Annual Habitat Units**	**NAI as Percent of SF**
Periphyton	13,671	34,545	39.6
Cattail Expansion Reduction Rate	668	1,777	37.6
Tree Islands	492	1,635	30.1
Total	14,831	37,957	39.1

For the ecological function analysis, the next-added increment analysis shows that the selected alternative plan can provide, on its own, without the benefit of the rest of the CERP projects, 39.1 percent of the system outputs the project was formulated to produce. These first 39 percent of outputs (14,831 average annual habitat units) come at a price of $78.7 million ($2005) in total investment cost. The remaining 61 percent of Site 1 Impoundment outputs (23,126 average annual habitat units), come at a cost of $892 million (in $2005) for the other CERP projects that contribute to Site 1's system outputs. Therefore, the Site 1 Impoundment Project on its own delivers 39 percent of the benefits the project was formulated to produce at 8.8 percent of the cost of the remaining system benefits. This "best buy" also justifies the Site 1 Impoundment selected alternative plan on the NAI basis.

7.2.14 Incidental Project Effects

The impoundment site would also provide habitat for fish and wildlife, although the operations of the impoundment would not be optimized for that purpose. The impoundment would provide lacustrine habitat for aquatic dependent species. Deepwater fish refugia would also be established within the impoundment, which in turn would provide for foraging habitat for birds as well as reproductive zones for fish and amphibians. The construction of a littoral shelf along the seepage canal would also provide habitat as well as provide for some filtering of pollutants.

The project may also provide incidental improvements in flood damage reduction on adjacent lands served by secondary and tertiary drainage systems connected to the Hillsboro Canal by providing the capability of storing water that is currently (and will continue to be) discharged to tide via the Hillsboro Canal. The incidental beneficial effect on flood damages was not quantified for this project. The project also provides important improvements in the quantity of water available to meet water supply demands of municipal, industrial, and agricultural users in the vicinity of the project and for protection of the Biscayne aquifer against salt water intrusion. However, these effects were not monetized for purposes of performing a National Economic Development (NED) analysis since the selected plan is cost-effective and justified based on environmental outputs. Further information regarding the economic effects of the project is located in Appendix G.

7.2.15 Mitigation Requirements

Mitigation for the proposed project will not be required. Per Section 9.6 (Fish and Wildlife Mitigation) of the Restudy, any unavoidable impacts to wetlands, other aquatic sites, or natural upland habitats are expected to be offset by the ecological improvement brought about through the Comprehensive Plan. A project siting analysis was conducted in Section 4 of this document, demonstrating that the proposed project site is the only practicable location for this project. Avoidance of wetland impacts onsite is not practicable when considering project design and engineering. Minimization of wetland impacts has been accomplished through locating the proposed project on a site with low quality wetlands. Wetlands on the proposed project site have been impacted by human-related activities and have been colonized by invasive species. There are no unique or scarce habitats at the site. Additionally, there are no wetland compensatory mitigation areas onsite. As such, per the Restudy, no mitigation has been proposed as a part of the Site 1 Impoundment.

Further, although some minor adverse effects were modeled in WCA-2A associated with project implementation, any such effects would be minimal and would be prevented through regional operations and through adaptive assessment activities conducted by RECOVER. The simulated adverse effects are associated with increasing the net amount of water in the Everglades Ridge and Slough community. The proposed project's environmental lift in the LNWR would far outweigh any potential minimal adverse effect that may occur in WCA-2A; furthermore, additional water in WCA-2A is a timing issue in the modeling, and not an undesirable condition from a system-wide perspective, since one of the fundamental goals of CERP is to increase the total quantity of water in the natural system. A more thorough discussion of adaptive assessment and other projects affecting WCA-2A is located in Section 7.2.8 of this PIR.

7.2.16 Permits

The State of Florida has enacted a specific regulatory program for authorizing CERP projects. Florida Statute 373.1502 (Comprehensive Everglades Restoration Plan Regulatory Act or "CERPRA") administered by the FDEP contains the requirements for the issuance of permits authorizing the construction and operation of CERP projects. An application for a CERPRA permit will be submitted to FDEP upon completion of the Draft Final PIR. Application for a

CERPRA permit also initiates the Section 401 (Federal Clean Water Act) WQC process and review of the project under the State of Florida's Coastal Zone Management Plan per the requirements of the Federal Coastal Zone Management Act. WQC, as required under Title IV--Section 401 of the Clean Water Act, shall be obtained from the FDEP. Similarly, National Pollutant Discharge Elimination System (NPDES) permits may also be applied for pending FDEP determination of project potential to contaminate surface or groundwater during construction and operations, respectively. The regulatory mechanisms by which authorization for surface run-off during construction or operations may be conducted are as follows:

1. Generic Permit for Stormwater Discharge from Large and Small Construction Activities (Rule 62-621.300(4)(a), Florida Administrative Code [FAC]).
2. Generic Permit for Stormwater Discharge from Phase II MS4s (Rule 62-621.300(7)(a) FAC).

The only potential source of air pollution would be from diesel-powered pump station(s), construction equipment, and construction activities. Preliminary modeling of the one diesel-powered project pump station (S-525A) has revealed that it may require either a Non-Title V Air General Permit or a Title V Air Permit (consisting of Air Construction and Air Operation permits). The S-525A station, which will consist of 4 pumps, may meet the threshold for either a Non-Title V or a Title V permit, depending on actual operations. However, whether or not a pump station will be required to undergo the regular permitting process will depend on its status with regards to conditional exemptions from Title V Air Permitting. For internal combustion engines, such exemptions are largely contingent on the annual hours of use and the fuel consumption rate of the system. Pump station engines that use less than 250,000 gallons per year of diesel fuel qualify for a non-Title V Air Permit when the projected nitrogen oxides emissions (related to ozone pollution) are less than 100 tons per year. This classification only requires that the responsible party submit a completed General Purpose Internal Combustion Engines Air General Permit Notification Form (FDEP Form No. 62-210.920(3)) to the Department and throughout the term of the general permit (with an annual $100 fee). If a facility meets the threshold of a Title V source, the permittee will be required to obtain issuance of both an air construction ($4,500 one-time fee) and regular air operation ($250 annual fee) permit. The responsible party may avoid making application for these two authorizations if its emissions source qualifies for a Title V Air General Permit.

This project has been, and will continue to be, coordinated with USEPA for compliance with Section 309 of the Clean Air Act (CAA), and the USEPA, FDEP and Broward County Environmental Protection Department (BCEPD) in accordance with Section 176 of the CAA and 62-210.300 F.A.C. A State of Florida non-Title V or Title V Source air permit application (for pump stations) will be submitted to the FDEP and/or the BCEPD, as appropriate, prior to construction. Both FDEP and the Broward County Department have concurred with the Corps that the type of Air Permit required for each project pump system will be formally determined when operations plans (annual hours of use) have been finalized and manufacturer data (fuel consumption) is made available.

7.2.17 Environmental Commitments

The USACE, its non-Federal sponsor the South Florida Water Management District, and contractors commit to avoiding, minimizing, or mitigating for adverse effects during construction activities by taking the following actions:

1. Employ BMPs with regard to erosion and turbidity control. Prior to construction, the construction team should examine all areas of proposed erosion/turbidity control in the field, and make adjustments to the plan specified in the plan control device as warranted by actual field conditions at the time of construction.

2. The contract specifications will prohibit the contractor from dumping oil, fuel, or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. A spill prevention plan will be prepared by the contractor.

3. Demolition debris would be transported to a landfill or otherwise disposed of in accordance with Federal, State, and local requirements. Concrete or paving materials would be disposed of in accordance with Federal, State, and local requirements.

4. Inform contractor personnel of the potential presence of threatened and endangered species in the project area, the need for precautionary measures and the Endangered Species Act prohibition on taking listed species.

5. The following special measures will be incorporated during project construction to minimize effects to any listed species that may be present: a) standard protection measures for the Eastern Indigo Snake; b) standard protection measures for the Florida Manatee; c) management guidelines for the Bald Eagle in the Southeast Region and Bald Eagle Standard Local Operating Procedures for Endangered Species; d) Audubon's Crested Caracara Standard Local Operating Procedures for Endangered Species; e) gopher tortoise surveys and relocations; f) a Burrowing owl survey; and g) habitat guidelines for the Wood stork in the Southeast Region will be followed. If new electrical lines are constructed near open water to service new pumps, the publication *Suggested Practices for Raptor Protection on Powerlines: The State of the Art in 1996* shall be consulted for recommended measures to protect bald eagles from electrocution.

Both the FFWCC and the USFWS have been consulted for recommendations on avoidance of impacts to federally listed and state listed species. Both the FFWCC and USFWS will be consulted in the event that colonial or solitary wading bird nests are observed within the construction footprint. In addition, Florida burrowing owls are known to inhabit ruderal areas, such as canal banks and road berms, in the vicinity of the project. If owls are observed within the Site 1 Impoundment construction footprint, the FFWCC will be consulted for management measures and the contractor may be required to obtain a permit. More information on FFWCC permit requirements and applications can be found on the web at: http://wld.fwc.state.fl.us/permits/permits.html.

6. The USACE and the SFWMD agree to maintain an open and cooperative informal consultation process with the USFWS and FFWCC throughout the design, construction, and

operation of this restoration project.

7. To protect cultural resources conditions stipulated by the SHPO will be followed. Language will be included in construction contract specifications outlining the steps to be taken in the event that undiscovered historical properties are encountered. An informational training session, developed by a professional archaeologist, will be conducted for the contractor's personnel to explain what kinds of archaeological/cultural materials might be encountered during construction of the impoundment, and the steps to be taken in the event these materials are encountered. A professional archaeologist will conduct periodic monitoring of the project area during construction to determine if activities are impacting unanticipated cultural resources.

8. As required under WRDA 2000, the PDT has evaluated water to be reserved for ecosystem restoration. This is addressed in the Project Assurances Section of ***Annex C*** of this report.

9. As likewise required under WRDA 2000, the selected alternative plan has been evaluated in the light of its potential effects on existing legal sources of water and the level of service for flood protection. This is addressed in the Project Assurances Section of ***Annex C*** of this report.

10. Compliance with the State of Florida's requirements for approval of CERP projects is also addressed in the State Compliance Report of ***Annex C***.

7.2.18 Environmental Operating Principles

The USACE has reaffirmed its commitment to the environment by formalizing a set of "Environmental Operating Principles" applicable to all its decision-making and programs. These principles foster unity of purpose on environmental issues, reflect a new tone and direction for dialogue on environmental matters, and ensure that employees consider conservation, environmental preservation and restoration in all USACE activities.

Environmental sustainability can only be achieved by the combined efforts of Federal agencies, tribal, state and local governments, and the private sector, each doing their part, backed by the citizens of the world. These principles help the USACE define its role in that endeavor. The principles provide the USACE direction on how to better achieve its stewardship of air, water and land resources, while demonstrating the connection between water resources, protection of environmental health and the nation's security. By implementing these principles, the USACE will continue its efforts to develop the scientific, economic and sociological measures to judge the effects of its projects on the environment and to seek better ways of achieving environmentally sustainable solutions.

The principles are consistent with NEPA, the Army's Environmental Strategy with its four pillars of prevention, compliance, restoration and conservation, and other environmental statutes and WRDAs that govern USACE activities. They will be integrated into all project management processes.

The following paragraphs explain the seven Principles and how the Site 1 Impoundment Project meets them.

Principle One: Strive to achieve environmental sustainability. An environment maintained in a healthy, diverse condition is necessary to support life.

Natural resource specialists agree that the remaining ecosystems in south Florida no longer maintain the functions and richness that defined the pre-drainage system. These measures of ecological health will continue to decline without preventative actions. Not only is it certain that these natural systems will not recover their defining attributes under current conditions, it is unlikely that the current, degraded ecological conditions can be sustained in the future.

The Site 1 Impoundment is one of 68 different projects constituting the CERP. Congress approved the CERP as the "framework for modifications and operational changes to the C&SF Project that are needed to restore, preserve, and protect the south Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection (WRDA 2000). As such, the primary purpose of the CERP is the restoration of the Everglades ecosystem, including specific safeguards to ensure that the benefits to the natural system are achieved and maintained, while providing for other water-related needs of the south Florida region.

Principle Two: Recognize the interdependence of life and the physical environment. Proactively consider environmental consequences of USACE programs and act accordingly in all appropriate circumstances.

The proposed Site 1 Impoundment would provide immediate benefits to the Everglades ecosystem. Hydroperiods and hydropatterns would return to more natural levels. Damaging water withdrawals from the LNWR would be reduced. Untimely discharges of fresh water to the estuaries would be partially eliminated, leading to increased salinity and the recovery of the estuarine ecosystem in the project area. As such, there would be no overall negative environmental consequences as a result of the proposed Site 1 Impoundment.

Principle Three: Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.

The proposed Site 1 Impoundment would be located between the Everglades and urban development. Every effort was made to provide for a beneficial effect in the adjacent natural system and also to ensure that the proposed project would not impact the adjacent residential development. The proposed impoundment would provide additional resources for the human environment through improved recreation in both the LNWR and the impoundment itself. The Site 1 Impoundment will have no negative effect on water resources for urban utilities or flood damage reduction within this area of south Florida.

Principle Four: Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that impact human health and welfare and the continued viability of natural systems.

The Site 1 Impoundment PIR complies with all applicable laws such as the NEPA, Clean Water Act, Endangered Species Act, and any other applicable legislation. The proposed Site 1 Impoundment would produce both NED and NER benefits. The proposed impoundment will enhance both ecologic and economic values and social well-being. The impoundment will increase the spatial extent of natural areas, improve habitat and functional quality, and improve native plant and animal abundance and diversity. These improvements will occur through the improvement of hydroperiods and hydropatterns in the natural system. More water will be made available to the natural system by offsetting withdrawals by urban utilities. Improving fish and wildlife habitat as a result of project implementation should enhance recreational opportunities within the LNWR. Additionally, recreational opportunities will be provided on public lands.

Principle Five: Seek ways and means to assess and mitigate cumulative impacts to the environment; bring systems approaches to the full life cycle of our processes and work.

The Corps takes a watershed approach for all Ecosystem Restoration initiatives. Rather than focusing on one specific area, all projects are examined in order to determine the effects within the entire affected natural system. By doing this, the USACE is able to avoid and minimize any potential project impacts that may occur as a result of the implementation of any project. Foreseeable impacts have been assessed as part of the PIR process and considered in the plan selection. Management measures have been proposed to follow throughout construction to limit or avoid any negative impacts. In addition, a system-wide monitoring plan of the natural environment will be in place to continue to assess all impacts, and along with adaptive management of the project and other CERP components, will maximize benefits to the system while identifying and limiting any negative effects.

Principle Six: Build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and impacts of our work.

As part of the Adaptive Management strategy for the CERP, three sub-teams from RECOVER meet monthly to discuss ways to improve the overall effects of the CERP program. The three RECOVER teams are the Planning, Evaluation, and Assessment team. These three teams collectively are composed of many individuals with separate disciplines in order to integrate their specific knowledge of science, economics, and sociology. The teams evaluate the different environmental effects that are expected to occur as a result of CERP implementation, and also assess possible impacts to any areas that can be beneficially adjusted through Adaptive Management. RECOVER reviewed the proposed Site 1 Impoundment PIR as it was being developed and provided input as to how the project could best be implemented and operated.

Principle Seven: Respect the views of individuals and groups interested in USACE activities, listen to them actively, and learn from their perspective in the search to find innovative win-win solutions to the nation's problems that also protect and enhance the environment.

As part of the NEPA process, the USACE sent out a scoping notice to provide information to the public and/or other agencies in order to encourage participation and receive commentary about the proposed project. Further public input was encouraged through public meetings, stakeholder meetings, and RPDT meetings. The USACE fully addressed and considered all public

commentary concerning the proposed Site 1 Impoundment.

7.3 PROJECT ASSURANCES

As a result of laws passed by both the Federal government and the State of Florida, CERP PIRs are required to ensure the interests of the stakeholders, including the Federal government and the State of Florida, are adequately addressed by the project being recommended for approval and implementation. The following paragraphs summarize those legislative requirements related to project assurances and the Savings Clause and the evaluations performed to address those requirements. A more complete evaluation of the Project Assurances necessary for the Site 1 Impoundment is located in the Project Assurances Section of Annex C of this PIR.

The basic principles and methodologies used to identify water were based on the procedures and guidance contained in draft Programmatic Regulations Guidance Memorandum 4 ("Identifying Water Needed to Achieve the Benefits of the Plan"), available at the time this PIR was being developed. The Savings Clause evaluations were based on the draft Programmatic Regulations Guidance Memorandum 3 ("Savings Clause Requirements") available at the time this PIR was being developed.

7.3.1 Summary of Statutory Requirements

7.3.1.1 Project Specific Assurances

Section 601(h)(4) of the WRDA 2000 identifies requirements for project specific assurances in PIRs, PCAs, and operating manuals. PIRs, in relevant part, must include identification of quantity, timing, and distribution of water for the natural system and identification of water to be reserved under State Law. Sec. 601(h)(4)(A) Project Cooperation Agreements cannot be executed "*until any reservation or allocation of water for the natural system identified in the Project Implementation Report is executed under State law*." Sec. 601(h)(4)(B) Operating manuals must be consistent "*with the water reservation or allocation for the natural system described in the project implementation report and the project cooperation agreement for the project or group of projects*." Sec. 601(h)(4)(C)

7.3.1.2 WRDA 2000 Savings Clause

Section 601(h)(5)(A) of WRDA 2000, requires that existing legal sources or water supplying agricultural and urban users, the Miccosukee and Seminole Tribes, Everglades National Park, and water for fish and wildlife available on the date of enactment of WRDA 2000 may not be eliminated or transferred as a result of implementation of CERP projects until a new source of comparable quantity and quality is available. This requirement necessitates that existing legal sources of supply to each of the six users identified in WRDA as of December 2000 be identified in the study area and a determination made about whether the project will affect those sources.

Section 601(h)(5)(B) of WRDA 2000 states that implementation of the recommended plan shall not reduce levels of service of flood protection in existence as of December 2000 and in accordance with applicable law.

Section 601(h)(5)(C) of WRDA 2000 states that there will be no effect on the Seminole Indian Tribe of Florida compact among the Seminole Tribe of Florida, the State, and the SFWMD.

7.3.1.3 Programmatic Regulations (33CFR Part 385)

Subpart E of the Programmatic Regulations for the CERP, entitled "Ensuring Protection of the Natural System and Water Availability Consistent with the Goals and Purposes of the Plan" contains requirements addressing the pre-CERP baseline water availability, elimination or transfer of existing legal sources of water, flood protection, interim goals, evaluation of progress toward other water related needs, operating manual, the development of several programmatic guidance memoranda, and periodic reporting to Congress.

Since the Programmatic pre-CERP Baseline was not formally established at the time of PIR development, the Savings Clause analysis for the Site 1 Impoundment PIR is based on SFWMM simulations representative of year 2000 conditions (i.e., 2000 land use and 2000 actual water supply withdrawals).

7.3.1.4 State of Florida Statutory Regulations

The PIR contains adequate documentation addressing criteria contained in Section 373.1501 sufficient for FDEP approval. Section 373.470, Florida Statutes, requires that prior to executing a PCA with the USACE, a PIR that contains sufficient information to receive FDEP approval under Section 373.026(8)(b), Florida Statutes, must first be completed. The SFWMD must demonstrate, using information in the PIR, that criteria set forth in Section 373.1501(5), Florida Statutes, is complied with in order to receive approval of the project component by the FDEP. The State Compliance Report in Annex C of this PIR addresses the Section 373.1501(5) criteria associated with implementation of the selected alternative plan.

Water Reservations (Section 373.223[4], F.S.) provides the legal framework for water that may be reserved from use for the protection of fish and wildlife or for the protection of public health and safety. When water is reserved under this statute, it is not available to be allocated for use under a consumptive use permit and is protected for the natural system. The statute also requires existing legal uses of water be protected so long as such existing use is not contrary to the public interest. Additionally, the statute directs that reservations shall be reviewed periodically to assess changed conditions and revised as necessary. Reservation of water is by administrative rule. The SFWMD anticipates that both CERP and non-CERP related reservations will be adopted for Everglades protection.

7.3.1.5 State and Federal Assurances

The State of Florida will protect the water for the natural system in South Florida by taking the following actions: 1) the State will use its water reservation authority to reserve the beneficial water made available for the natural system from each project as required by WRDA 2000; and 2) the State will protect the existing water that the PIR identifies is available and beneficial to the natural system, using resource protection authority under Florida law.

The following language sets forth these commitments:

> "The overarching objective of the Plan is the restoration, preservation, and protection of the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The Federal Government and the non-Federal sponsor are committed to the protection of the appropriate quantity, quality, timing, and distribution of water to ensure the restoration, preservation, and protection of the natural system as defined in WRDA 2000, for so long as the project remains authorized. This quantity, quality, timing, and distribution of water shall meet applicable water quality standards and be consistent with the natural system restoration goals and purposes of CERP, as the Plan is defined in the programmatic regulations. The non-Federal sponsor will protect the water for the natural system by taking the following actions to achieve the overarching natural system objectives of the Plan:
>
> 1. Ensure, through appropriate and legally enforceable means under Federal law, that the quantity, quality, timing, and distribution of existing water that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report is available and beneficial to the natural system, will be available at the time the Project Cooperation Agreement for the project is executed and will remain available for so long as the Project remains authorized.
>
> 2a. Prior to the execution of the Project Cooperation Agreement, reserve for the natural system the beneficial water that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report will be made available by the project.
>
> 2b. After the Project Cooperation Agreement is signed and the project becomes operational, make such revisions under Florida law to this reservation of water that the non-Federal sponsor determines, as a result of changed circumstances or new information, is beneficial for the natural system.
>
> 3. For so long as the Project remains authorized, notify and consult with the Secretary of the Army should any revision in the reservation of water or other legally enforceable means of protecting water be proposed by the non-Federal sponsor, so that the Federal Government can assure itself that the changed reservation or legally enforceable means of protecting water conform with the non-Federal sponsor's commitments under paragraphs 1 and 2. Any change to a reservation of water made available by the project shall require an amendment to the 'Project Cooperation Agreement.'"

7.3.2 Summary of Evaluation Results

7.3.2.1 Supplemental Analyses in Support of Identifying Water Made Available by the Project

Upon approval of the program-wide guidance memoranda required by Section 385.5 of the CERP Programmatic Regulations, supplemental analyses and documentation will be completed to update the identification of water for the natural system and water for the other water-related needs of the region resulting from the Site 1 Impoundment Project. The updated analyses and documentation will use the procedures in the final approved versions of Guidance Memorandum 4 "Identifying Water Needed to Achieve the Benefits of the Plan". This updated information will be the basis for modifying, if appropriate, any reservation or allocation of water for the natural system associated with the implementation of the Site 1 Impoundment Project, and will be included in a periodic update of the total quantity of water that is expected to be generated by the CERP required by Section 385.35(b) of the CERP Programmatic Regulations. If available, these analyses and documentation will be an attachment to the Chief of Engineers Report in support of this project.

7.3.2.2 Water Made Available by the Project for the Natural System

The Site 1 Impoundment project will provide additional water for the natural system in northern and central Loxahatchee National Wildlife Refuge (LNWR) and Everglades National Park which will be reserved or allocated for the natural system under State of Florida law in accordance with the requirements of Section 601(h)(4) of the Water Resources Development Act of 2000. Details of these results can be found in Annex C, Sections VI.B.

7.3.2.2.1 Site 1 Impoundment Project Effects

The Site 1 Impoundment Project does not include wetland or natural area improvement features, nor does it include STAs or any other project-level features involving the delivery of water necessary to attain the environmental benefits resulting from the project. Therefore, there is no project-level beneficial water for the natural system to be identified for this project.

7.3.2.2.2 Estuarine Portion of Hillsboro Canal

The Site 1 Impoundment does result in a small amount of habitat improvement in the estuarine portion of the Hillsboro Canal by reducing the amount of basin runoff discharged to this area. A portion of this runoff is stored in the impoundment and released to meet water supply and resource protection needs in the basin. The attenuation of runoff and improved timing of delivery of water from the impoundment back into the Hillsboro Canal is expected to improve benthic habitat in the estuarine portion of the canal near the Intracoastal Waterway. This positive effect does not result from delivering an additional quantity of beneficial water to this area.

7.3.2.3 Water Made Available by the Project for Other Water-Related Needs of the Region

The Site 1 Impoundment project involves storage of Hillsboro Canal basin runoff that would be discharged to tide without the project, and releasing the stored water to meet water supply and resource protection needs in the Hillsboro Canal basin. This reduces the demand on the LNWR as a source of supply to meet those needs, and creates an additional source resulting in an overall net increase in the volume of water available to perform these functions. Details of these results can be found in Annex C, Section VI.C.

7.3.2.4 Project Effects on Existing Legal Sources of Water

Under normal conditions, implementation of the Site 1 Impoundment project will result in a transfer of a portion of the existing legal source of water for municipal and agricultural water supply in the Hillsboro Canal basin from canal deliveries via the C&SF Project to water stored in and delivered out of the Site 1 Impoundment. Preliminary evaluations also indicate that the water delivered from the impoundment will be of comparable (or better) water quality than that delivered via the Hillsboro Canal from Lake Okeechobee for water supply purposes. However, it should also be noted that project operations will not preclude operations of the regional water management system to make deliveries from existing sources during drought conditions or if the impoundment were to become inoperable. Furthermore, the transfer of a portion of the existing legal source of water to the Hillsboro Canal basin that will occur as a result of the Site 1 Impoundment project will not be enabled until the operational testing and verification phase of the project is completed and it has been verified that the project will operate as designed and consistent with the Assurances and Savings Clause evaluations. A planning-level evaluation of the water quality of discharges from the impoundment to the Hillsboro Canal indicated that discharges are expected to meet water quality standards. Routine water quality monitoring will be performed as part of long-term OMRR&R of the project to ensure that discharges from the impoundment will comply with water quality standards.

Implementation of the Site 1 Impoundment project will not result in a significant change in the quantity of water available to fish and wildlife from existing legal sources of water in the project area. It is noted that the overall increase in the quantity of water retained in the natural system will transfer a portion of the water budget for LNWR from canal deliveries via the C&SF Project to local rainfall retained in LNWR, but this hydrologic change (transferring a portion of the existing legal source for maintaining desirable water levels from canal deliveries to local rainfall and water stored in the surficial aquifer) is the purpose of the project. The new source will be of comparable quantity and better water quality. Furthermore, the transfer of a portion of the existing legal sources of water for the LNWR does not preclude operations of the regional water management system to make supplemental deliveries to the LNWR during drought conditions to compensate for water supply releases from the LNWR to the Lower East Coast. Details of these results can be found in Annex C, Section VI.D.

7.3.2.5 Project Effects on Level of Service for Flood Protection

Potential effects of the storage reservoir on water levels on adjacent lands were evaluated. In

response to these evaluations, the project includes a seepage management system consisting of a seepage canal and pump to ensure that adjacent lands are not adversely affected. Details of this evaluation and flood protection features can be found in Annex C, Section VI.E.

7.4 SELECTED ALTERNATIVE PLAN IMPLEMENTATION

7.4.1 Implementation of Project Components

The initial Project Management Plan (PMP), which established the initial schedule and budget for the project, was completed and approved in October 2003. The draft PIR was completed in February 2005, but due to changes in the Project Assurances and Savings Clause evaluations (see Annex C), a revised draft PIR was completed and issued for public and agency review in December 2005. Final review and completion of the PIR is currently scheduled to occur in August 2006, at which time the report will be forwarded for final Washington-level review prior to approval by the Secretary of the Army. As both the USACE and SFWMD are interested in expediting this initially authorized project, the USACE and SFWMD are completing advanced design and construction of elements of the Site 1 Impoundment project as part of the State of Florida's Acceler8 program. Completion of the detailed design including Plans and Specifications in accordance with the procedures established for the Acceler8 program is scheduled to be completed in June 2007. The non-Federal sponsor anticipates construction on the Acceler8 project will commence in September 2006 with construction of the S-527 B culvert structure and full scale construction will be completed by October 2009. The SFWMD would fund the design and construction of the Acceler8 project in advance of the Congressional authorization and appropriation of funds in anticipation of receiving the Federally-established cost-share reimbursement at a later date once the approval and appropriation of funds occurred.

Ideally, earthwork construction would commence at the beginning of the dry season in South Florida as more efficient construction methods can be used with the minimal possibility of incurring weather delays. If necessary, construction can occur during the wet season but more delays would be anticipated. The wet season normally starts with the onset of tropical storms in June and extends through October. The dry season normally extends from November through May.

7.4.2 Costs: Engineering and Design, Construction, LERRDS, OMRR&R

The estimated cost for the Site 1 Impoundment selected alternative plan as listed is $79,100,000. This figure includes all estimated project costs. Breakdown of the costs is contained in **Table 7.4-1**.

TABLE 7.4-1: PROJECT COSTS (OCTOBER 2005 PRICE LEVELS)

Work Phase	USACE	SFWMD	Total
Plans & Specifications	$3,815,000	$0	$3,815,000
Real Estate	$4,202,000	$4,202,000	$8,404,000
Construction	$66,881,000	$0	$66,881,000
Total	$74,898,000	$4,202,000	$79,100,000

The Site 1 Impoundment was authorized by WRDA 2000 at a total cost of $38,535,000, ($56,750,000 at current (October 2005) Price Levels); therefore, the current estimated cost of $79,100,000 is above the Section 902 cost criteria and Congressional authorization will be required. Note that if the at-risk expedited project method is selected, the cost breakdown between the USACE and the SFWMD will change significantly.

7.4.3 Cost Sharing

Responsibilities for implementing the selected alternative plan for the Site 1 Impoundment will be shared by the USACE, on behalf of the Federal government, and SFWMD as the non-Federal sponsor. The USACE and the SFWMD will cost share equally in the design of the projects resulting from this plan. The SFWMD will acquire and furnish necessary lands, easements, rights-of-way, relocation, and disposal areas (collectively referred to as lands, easements, right-of-ways, relocations and disposal [LERRD]) and will operate and maintain the completed project. Construction contracts to build the projects will be managed by either the USACE or SFWMD to maintain as close to a 50/50 cost share as possible to meet the overall CERP program goal of equal cost sharing. Rules describing how project responsibilities are shared are established in Federal law and related administration implementing policies. Section 601 of WRDA 2000 provides in-kind cost sharing for the non-Federal sponsor for design, construction and operational and maintenance and for treatment of credit between projects to maintain as close to a 50/50 cost share as possible.

7.4.3.1 Cost Sharing of Construction and Land Costs for Recreation Features

Section 601 of the WRDA of 2000 and USACE policy requires that the non-Federal sponsor will provide LERRD.

The total first cost of the restoration features of the project, including the value of LERRD and pre-construction engineering and design costs, will be shared equally between the Federal government and the non-Federal sponsor. The non-Federal sponsor will provide cash or manage a portion of construction as necessary to meet its 50 percent share of the total first cost of the project to be balanced according to Section 601 of WRDA 2000.

Table 7.4-2 shows the apportionment of project costs between the Federal government and the non-Federal sponsor for the selected alternative plan.

TABLE 7.4-2: COST APPORTIONMENT OF SELECTED ALTERNATIVE PLAN (INITIAL COSTS – ROUNDED, OCTOBER 2005 PRICE LEVELS)

Item	Total	Federal	Non-Federal
Construction	$66,881,000	$33,440,500	$33,440,500
LERRD	$8,404,000	$4,202,000	$4,202,000
PED	$3,815,000	$1,907,500	$1,907,500
Total	$79,100,000	$39,550,000	$39,550,000

7.4.3.2 Cost Sharing of Water Quality Treatment Features

There are no water quality treatment features for the Site 1 Impoundment.

7.4.3.3 Cost Sharing of Adaptive Assessment and Monitoring

As previously described in **Section 7.2.9**, the Adaptive Assessment Program has been developed. The program provides essential information that supports the development and implementation of the selected alternative plan. Regional data collected as part of the monitoring program is critical to the refinement of the features of the selected alternative plan by providing the basis for adjustments to design and operation criteria as needed. The monitoring program is a necessary component for ensuring that ecosystem benefits are achieved in the Site 1 Impoundment as well as the watershed natural areas. Section 601(b)(2) of WRDA 2000 specifies that adaptive assessment and monitoring will be cost shared equally by the Federal Government and the non-Federal sponsor (SFWMD). These adaptive management costs have been allocated to construction and OMRR&R for budgeting purposes.

7.4.3.4 Initial Cost of Recreation

Since recreational opportunities are one of the original objectives of CERP and Site 1 Impoundment, cost sharing of the recreation features is cost shared equally by the Federal government and the non-Federal sponsor.

7.4.3.5 Cost Sharing of OMRR&R

Section 601(e)(4) of the WRDA of 2000 specifies that operations and maintenance of authorized projects of the CERP would be cost shared equally by the Federal government and the non-Federal sponsor. Consistent with the provisions of section 601(e)(4) of WRDA 2000 and given the multi-objective nature of the features in this plan, it is appropriate for the OMRR&R associated with this plan to be shared equally between the Federal government and the non-Federal local sponsor. However, the OMRR&R associated with the recreation features is a 100 percent non-Federal cost borne by the local sponsor.

7.4.4 Summary of Federal/Non-Federal Implementation Responsibilities

Implementation of the selected alternative plan will be consistent with procedures described in the Master PMP adopted by the USACE and the SFWMD for the implementation of the CERP and any amendments thereto. The tasks necessary to implement the Site 1 Impoundment selected alternative plan are described in the PMP. The PMP outlines tasks to complete the Detailed Design Phase and Construction Phase. The Detailed Design Phase will include completion of plans and specifications and will be performed by the USACE. Activities within the Construction Phase will be the responsibility of the USACE. LERRDs will be the responsibility of the SFWMD. The Interim Operating Manual will be completed during Detailed Design Phase and will be used during the construction phase. The Interim Operating Manual will incorporate any modifications to the Draft Operating Manual resulting from the Detailed Design Phase. Modifications of the Draft Operating Manual may occur as operational experience and knowledge is gained. The USACE and SFWMD will share in the responsibilities for conducting water management operations during the Operational Testing and Monitoring Phase.

7.4.5 Non-Federal Sponsor Letter of Intent

The sponsor has provided a copy of their Letter of Intent in Annex C.

7.5 DISTRICT ENGINEER'S RECOMMENDATION

I am recommending a plan that is designed to capture, store and redistribute fresh water previously lost to tide and to regulate the quality, quantity, timing and distribution of water flows, that is an integral part of the CERP. The CERP will play an important role in reversing the environmental impacts that have occurred for the past fifty years as a result of the existing C&SF Flood Control System. The Site 1 Impoundment Project is one of the ten CERP projects authorized by Congress in section 601(b)(2)(C)(iii) of the WRDA of 2000, Public Law 106-541; however, due to design refinements and increases in the estimated project costs, this Project requires additional authorization by Congress.

I find that the Site 1 Impoundment Project, an above ground storage reservoir of approximately 1,660 acres located north of the Hillsboro Canal in southern Palm Beach County, is an integral part of CERP and is recommended for construction. The reservoir is proposed to impound water eight feet above the ground and will impound the excess surface water runoff from the Hillsboro Canal Basin as well as releases made from the LNWR (WCA-1). This storage project will provide an alternate source of water to meet water supply demands in the vicinity thereby reducing water releases from the natural system and lessoning the adverse effects of such releases.

Therefore, I recommend that the Site 1 Impoundment Project as described in this section of the report be authorized by Congress for construction with such modifications thereof as the Chief of Engineers, in his discretion, may deem advisable. The total estimated project first cost is $79,100,000 with an estimated Federal first cost of $39,550,000 and an estimated non-Federal first cost of $39,550,000. The estimated total annual cost of operation, maintenance, repair, rehabilitation and replacement is $778,700 with an estimated Federal annual cost of $389,350 and an estimated non-Federal cost of $389,350.

The above recommendations are made with the provision that the non-Federal Sponsor and the Secretary of the Army shall enter into a binding agreement defining the terms and conditions of cooperation for implementing the Project, and that the non-Federal Sponsor agrees to perform the following items of local cooperation:

a) Provide 50 percent of total project costs consistent with the provisions of Section 601(e) of the Water Resources Development Act of 2000.

b) Provide all lands, easements, and rights-of-way, and perform or assure the performance of all relocations determined necessary for the construction, operation, maintenance, repair, replacement and rehabilitation of the Project with valuation being consistent with the following:

i. If the lands, easements and rights-of-way were acquired prior to execution of the Project Cooperation Agreement, the creditable value shall be their purchase price, subject to a determination of reasonableness where appropriate, together with their reasonable and necessary incidental costs of acquisition.

ii. The value of lands, easements, or rights-of-way acquired by the non-Federal Sponsor after the effective date of the Project Cooperation Agreement executed for this Project shall be the fair market value of such real property interests at the time the interests are acquired, together with the reasonable and necessary incidental costs of acquisition.

c) Provide or pay to the Government the cost of providing all retaining dikes, waste weirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, and maintenance of the Project.

d) Give the Government a right to enter, at reasonable times and in a reasonable manner, upon land that the local sponsor owns or controls for access to the Project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project.

e) Assume responsibility for operating, maintaining, replacing, repairing, and rehabilitating (OMRR&R) the restoration features of the Project or completed functional portions of the restoration features of the Project, including mitigation features, in a manner compatible with the Project's authorized purposes and in accordance with applicable Federal and State laws and specific directions prescribed in the OMRR&R manuals and any subsequent amendments thereto. Cost sharing for OMRR&R will be in accordance with Section 601 of WRDA 2000:

"(e) COST SHARING.-

(4) OPERATION AND MAINTENANCE.- Notwithstanding section 528(e)(3) of the Water Resources Development Act of 1996 (110 Stat. 3770), the Non-Federal Sponsor shall be responsible for 50 percent of the cost of operation, maintenance, repair, replacements and rehabilitation activities authorized under this section…"

f) The non-Federal Sponsor shall operate, maintain, repair, replace and rehabilitate the recreational features of the Project with responsibility for 100 percent of the cost.

g) Unless otherwise provided for in the statutory authorization for this Project, comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the WRDA of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal Sponsor has entered into a written agreement to furnish its required cooperation for the Project or separable element.

h) Hold and save the Government free from all damages arising for the construction, operation, maintenance, repair, replacement, and rehabilitation of the Project and any project-related betterments, except for damages due to the fault or negligence of the Government or the Government's contractors.

i) Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the Project to the extent and in such detail as will properly reflect total project costs.

j) Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the Project; except that the non-Federal Sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government.

k) Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on or under lands, easements, or right-of-ways that the Government determines necessary for the construction, operation, or maintenance.

l) As between the Government and the non-Federal sponsor, the non-Federal Sponsor shall be considered the operator of the Project for the purposes of CERCLA liability. To the maximum extent practicable, the non-Federal Sponsor shall operate, maintain, repair, replace, and rehabilitate the Project in a manner that will not cause liability to arise under CERCLA.

m) Prevent obstructions of or encroachments on the Project (including prescribing and enforcing regulations to prevent such obstruction or encroachments) which might reduce ecosystem restoration benefits, hinder operation and maintenance, or interfere with the Project's proper function, such that as any new developments on project lands or the addition of facilities which would degrade the benefits of the Project.

n) Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by the title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and Uniform Regulations contained in 49 CFR part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation and maintenance of the Project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

o) Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

p) Provide 50 percent of that portion of total cultural resource preservation mitigation

and data recovery costs attributable to the Project that are in excess of one percent of the total amount authorized to be appropriated for the Project.

q) Do not use Federal funds to meet the non-Federal Sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized.

Section 601(e)(5)(B) of the WRDA of 2000 authorizes the Secretary of the Army to provide credit to the non-Federal sponsor for work completed by it during the period of construction pursuant to a project cooperation agreement and a determination by the Secretary that the work is integral to the CERP. As part of its initiative for early implementation of certain CERP projects known as the "Acceler8 Program", the non-Federal sponsor has stated that it may construct portions of the Site 1 Impoundment Project consistent with this report, in advance of Congressional authorization and the signing of a project cooperation agreement. The non-Federal sponsor is exploring alternative project delivery methods to expedite implementation of the Site 1 Impoundment Project through the Acceler8 Program. Such delivery methods may include public-private partnerships in which the non-Federal sponsor contracts with a private or not-for-profit entity for services that may include designing, building, operating or financing these components. I believe that it would be in the public interest for this project to be implemented expeditiously due to the early benefits to the surrounding habitat, as well as hydrologic benefits to federal lands and estuaries in other portions of the South Florida ecosystem. Therefore, I recommend that should the non-Federal sponsor construct portions of the Site 1 Impoundment Project prior to the execution of a project cooperation agreement for this project, the non-Federal sponsor be credited for such construction costs at the time the project cooperation agreement for the Site 1 Impoundment Project is executed. Such credit would be applied toward the non-Federal sponsor's share of the costs associated with the implementation of the CERP as authorized by Section 601(e)(5)(C) of WRDA 2000, shall not include cash reimbursements, and shall be subject to: a) the authorization of the Site 1 Impoundment Project by law; b) a determination by the Secretary of the Army that the activities are integral to the CERP restoration project; c) a certification by the District Engineer that the costs are reasonable, allowable, necessary, auditable, and allocable; and d) a certification by the District Engineer that the activities have been implemented in accordance with U.S. Army Corps of Engineers design and construction standards and applicable Federal and State laws.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the State, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Robert M. Carpenter
Colonel, Corps of Engineers
District Engineer