4. Projects that Provide a Net Ecosystem Benefit

Section 4 describes those projects proposed to achieve an NEB compared to replacing the barrier at the south end of the Cape Coral North Spreader Canal (NSC). Section 4.1 provides a summary list of all the projects. Section 4.2 describes those projects for which Cape Coral will be responsible and which will constitute the full extent of its obligations in fulfillment of the requirements of the Consent Order.

Section 4.3 includes other agreed-upon projects that entail additional responsibilities and commitments for identified stakeholders. The projects, activities and commitments in Section 4.3 enhance the NEB, but are not essential to meeting the requirements of the Consent Order. Section 4.4 describes outlines commitments to administrative actions necessary for implementation of the projects in Sections 4.2 and 4.3. Section 4.5 describes other projects that the Stakeholder Group recommends, but which have not been accepted as commitments by any of the stakeholders. Section 4.5 describes administrative commitments necessary for implementation of the projects in Sections 4.2 and 4.3. The projected benefits of the package of projects as a whole are discussed in Section 4.6. Technical aspects of all projects that were discussed by the Stakeholders during the EMA process are summarized in Appendix C.

Several of the items in Sections 4.2 refer to the adoption of ordinances or other actions to be taken by the City of Cape Coral as conditions of an ERP to be issued by the FDEP. It is understood that such actions may only be taken by the City of Cape Coral after they have been considered at public hearing and after complying with other processes as may be required by law. It is also understood that the Cape Coral Council cannot bind itself or future Councils to any course of action. If the City of Cape Coral fails to adopt the ordinances identified in Section 4.2 of the NSEMA Stakeholders Group Report, any agreement based on the Stakeholder Group Report and any permit's associated with the Stakeholder Group Report, shall be voided, and the application process to replace a boatlift barrier structure shall be re-initiated and the City of Cape Coral shall have no further obligation to undertake any of the other identified NEB projects.

4.1 Summary List of NEB Projects and Actions

Projects and Actions to be implemented by the City of Cape Coral

NEB Projects

1. Adopt a Cape Coral Fertilizer Ordinance
2. Implement Condition-Based Timing for Development of Public Sewer System
3. Provide Storm Water Treatment Improvements
4. Amend the Cape Coral Seawall Engineering Design Standard to Provide Structure Which is Beneficial to Marine Habitat
5. Coordinate to Improve Flows, Timing, and Distribution of Water to the State Park and Aquatic Preserve
6. Septic Systems Inspection and Maintenance Program Development Study
7. Water Quality Monitoring

Other ERP Commitments

8. Maintain the Cape Coral Canal Dredging Profile
9. Implement Boating Related Enhancements

Projects to be implemented by Lee and Charlotte Counties, Cape Coral, SFWMD, SWFWMD, FDEP and/or others

1. Gator Slough Channel Improvement
2. Yellow Fever Creek/Gator Slough Storm Water Transfer Facility
3. Yucca Pens Hydrologic Restoration Plan
4. Yucca Pens Preserve Ditch Plugging and ATV Trail Restoration
5. Charlotte Harbor Flatwoods Hydrologic Restoration
6. Matlacha Pass Hydrologic Restoration
7. Multi-jurisdictional Coordination to Improve Watershed Flows, Timing, and Distribution of Water to the State Park and Aquatic Preserves
8. CHNEP Committees as Forums for Discussion and Monitoring
9. Study of Ecosystem Enhancement Opportunities West of the NSC
10. Storm Water Treatment Areas
11. Sediment Management Plan (Between the NSC and the Pass)
12. Monitoring to Assess Achievement of Expected NEB and Support Adaptive Management

Administrative and Implementation Measures

1. Designate a Point of Contact for the City of Cape Coral
2. Use of NSEMA Escrow Account Funding for Projects to be Implemented by Cape Coral and Others

Other Potential NEB Projects That Do Not Have Sponsors

1. Habitat Enhancement Pilots on the West Side of the NSC
2. Revise Land Development Codes to Reduce Stormwater Runoff and Fertilizer use

A hydrodynamic box model was developed to quantitatively evaluate the potential effects of implementing NEB and Threshold projects. The model is introduced at the end of Section 2 and is thoroughly discussed in Appendix D. The model was initially used to determine how inflow and outflow patterns, and salinity, in the NSC vary under existing conditions. Variations in freshwater inflow produced corresponding variations in flows through the NSC. Based on the results of the modeling, tidal action was observed to have the greatest influence over NSC flows, and drives the daily hydrologic communication between the canal and Matlacha Pass. Only during periods of very high inflows from the watershed can the freshwater effects be observed.

The model was also used to compare flow and salinity between different scenarios. Model comparisons were made for the following conditions:

- Existing inflows with the barrier replaced at the old location vs no barrier,
- Existing inflows with the barrier replaced at the new location vs no barrier,
- Existing inflows with no barrier and existing breaches vs existing inflows and additional breaches,
- Existing inflows with no barrier vs existing inflows with a partial barrier,
- Existing inflows with no barrier vs future inflows with no barrier, and
- Future inflows with NEB projects implemented vs future inflows with Threshold projects (includes barrier).

An understanding of the NSC's tidal nature and of how it functions hydraulically was gained from these efforts. The resulting knowledge helped focus on those projects that could provide the most ecosystem benefits to the NSC system.

4.2 *Projects and Actions to be Implemented by the City of Cape Coral*

This section includes descriptions of those projects for which Cape Coral will be responsible and which will constitute the full extent of its obligations in fulfillment of the requirements of the Consent Order. These projects will be implemented as conditions to an Environmental Resource Permit, as described in Section 5 of the *Findings.* The projects are divided into two categories: NEB projects and other ERP Commitments.

NEB Projects

4.2.1 Adopt a City of Cape Coral Fertilizer Ordinance

Within 12 months following the approval of the North Spreader Environmental Resource Permit by the Florida Department of Environmental Protection (FDEP) the City shall adopt a fertilizer ordinance that meets the requirements of the Model Ordinance for Florida-Friendly Fertilizer Use on Urban Landscapes as set forth in §403.9337 Florida Statutes, and that contains the provisions listed below and further discussed in Appendices C and E. The provisions are intended to address the specific circumstances of the City of Cape Coral and to increase consistency with the Lee County fertilizer ordinance.

- A four-month blackout period from June 1 – September 30.
- A blanket requirement for 50% slow-release nitrogen.
- Change the annual application limit to 4lbs nitrogen per 1,000 square feet (from 7lbs in the state model)
- No fertilizer shall be applied within ten (10) feet from any water body or seawall other than by careful hand dispersion methods which assure that no fertilizer is dispersed into the water.

The ordinance shall also provide ongoing public education regarding fertilizer use. Provisions of the ordinance shall be separate and severable, so that if any are successfully challenged, the remainder shall remain in force. Cape Coral will coordinate with Lee County and others to enhance the effectiveness and reduce the cost of public education and enforcement.

4.2.2 Implement Condition-Based Timing for Development of Public Sewer Systems

Definitions:

- Section(s): Land area as defined in the Public Land Survey System.
- Developable Land: Parcels upon which buildings can be developed, which excludes public rights-of-way, canals, lakes, and parks.
- Septic System: An on-site sewage treatment and disposal system as referenced in Florida Administrative Code, Department of Health, Rules 64E-6.005 and 64E-6.006, for which there is a Florida Department of Health permit application or permit issued on record.
- Septic Systems per Acre: The ratio of Septic Systems per acre of Developable Land.

Following FDEP's issuance of an Environmental Resources Permit authorizing this program, the City of Cape Coral shall design and install a public sewer system in the areas north of Pine Island Road as provided for herein.

Within 36 months following Florida Department of Environmental Protection issuance of an Environmental Resources Permit authorizing this program the City shall award a contract for the construction of a public sewer system Section 184423 and the portion of Section 074423 which is south of Bonefish Canal, except as otherwise provided due to factors described below.

The requirement for the design and installation of a public sewer system in any other Section of the City north of Pine Island Road shall be based upon Septic Systems per Acre. The computation of Septic Systems per Acre is illustrated as follows:

- A typical home site in the City has an area of approximately 10,000 square feet and is typically comprised of two 5000 square foot platted lots. When such a Section is completely comprised of these typical home sites (excluding area which is not Developable Land) and is fully developed with single-family homes (100% buildout), the Section has a Septic Systems per Acre density of approximately 4.36 (and 4.36 single family homes per acre). Septic System per Acre densities at selected lesser buildout levels for such a typical residential area are:
    - 1.53 – Corresponds to a 35% density level (4.36 x 35%).
    - 1.74 - Corresponds to a 40% density level (4.36 x 40%).
    - 1.96 - Corresponds to a 45% density level (4.36 x 45%).
    - 2.18 - Corresponds to a 50% density level (4.36 x 50%).

The Septic Systems per Acre in each Section shall be updated annually as of January 1 of each calendar year based on the information then available. A summary report listing the results by Section shall be provided to the FDEP not later than March 1 of each calendar year.

The City of Cape Coral City staff shall submit, to the Department of Community Affairs an amendment to the City of Cape Coral Comprehensive Plan permitting the municipal extension of public utilities into the Urban Reserve by June, 2010. The development of public sewer systems as provided for herein is subject to the Florida Department of Community Affairs approval of this amendment to the City of Cape Coral Comprehensive Plan permitting the municipal extension of public utilities into the Urban Reserve.

Within 36 months following submittal of an annual report to the FDEP which indicates one or more Sections in the area north of Bonefish Canal, west of Burnt Store Road and South of Kismet Parkway have reached a Septic Systems per Acre density of 1.53 or higher, or which indicates one or more Sections in any other area of the City north of Pine Island Road have reached a Septic Systems per Acre density of 1.96 or higher, the City shall award a contract for the construction of a public sewer system in the affected Section(s), except as otherwise provided due to factors described below.

The development of public sewer systems in Cape Coral is affected by practical considerations including canals, major roadways, master lift stations, force mains, and other factors which divide the land areas. Hence, in some areas the development of sewers in a Section may be excluded from the requirement in order for the construction and operation of the sewer system to be functional and cost effective. Sewer development of an equivalent area in a different Section will be added to the project scope to compensate for an area excluded due such considerations. Sewers in excluded areas would then be included with an adjacent Section when the sewers in that Section are later developed based on the Septic Systems per Acre density criterion.

4.2.3 Storm Water Treatment Improvement

Within 5 years following FDEP issuance of an Environmental Resources Permit authorizing this program the City of Cape Coral shall accomplish the replacement of storm water catch basin inlets having no

detention features at existing outfalls in the area north of Pine Island Road, west of Burnt Store Road and south of Kismet Parkway in the City of Cape Coral. The new basins shall contain bleed-down orifices set at the flow line of the swale with the top of the basin set a minimum of 0.6 ft. above the invert of the bleeder, as conceptually illustrated in Figures C- 2 and C-3. Lee County shall receive TMDL credit in proportion to its financial contribution to this project. The timetable for implementation of this project is dependent on the availability of funds from the Lee County contribution to the escrow fund. Reallocation of these funds to other projects may result in adjustment of the deadline for implementation to up-to-ten years.

4.2.4 Revise the Cape Coral Seawall Engineering Design Standard to Provide Structure which is Beneficial to Marine Habitat

The permittee shall establish a program to biologically enhance the tidally influenced canal systems north of Pine Island Road through the creation of living shorelines. Living shorelines shall be considered as a permanent structural component (habitat area) constructed water-ward of a seawall that by design and by its very existence encourages the growth of intertidal vegetation (mangrove, juncus or other marsh type) and or macro faunal organisms (oysters etc.) consistent with euryhaline systems. Permanent shall mean in existence and functional throughout the life of the adjacent seawall.

For all new and replacement seawall construction in the tidally influenced canals north of Pine Island Road, a revetment shelf, pile supported structure, reef ball system or some similar structure of not less than one square foot of habitat area per one linear foot of shoreline seawall shall be constructed. Habitat area square footage shall be calculated from the horizontal, and shall include only that portion of the structure that is intertidal and will effectively provide the habitat value. When appropriate, the Permittee shall direct the creation of the habitat areas at stormwater outfall locations.

Habitat areas are recognized to be dynamic, both in terms of natural flora and faunal recruitment and succession, and in the floral and faunal character desired by the upland property owner. The permittee may, at its discretion, authorize changes in habitat type, and the resultant change in floral and faunal character. Any change in habitat type authorized by this condition shall preclude the destruction of the floral and faunal character that inhabits the previously existing structure.

Habitat areas shall be maintained to be free from exotic and invasive plants, refuse, boat or other storage and etc. Any mangrove vegetation growing on a habitat area may be trimmed to no less than six feet above the substrate.

The FDEP provides blanket authorization for the construction of seawalls on the North Spreader Canal and feeder canals to these revised design standards subject only to permitting by the City of Cape Coral.

Within 3 months following the amendment to the engineering design standard the City shall initiate a public education program regarding the benefits and maintenance of both structure and vegetation near and along seawalls to marine habitat and water quality. The education program will include information regarding the restrictions and requirements for the maintenance of vegetative plantings as required in regulations promulgated by FDEP.

4.2.5 Cape Coral Coordination to Improve Flows, Timing and Distribution of Water to the State Park and Aquatic Preserve

The City of Cape Coral does not have control over upstream discharges as they relate to water quality, quantity or timing. The City currently is positioned, however, through the Alligator Slough conveyance, as a pass through for water from upstream sources through the City's weir and canal system, into the receiving waters of Matlacha Pass. If additional water is made available by any regional project

specifically for the State lands lying west of the North Spreader Canal (Charlotte Harbor Aquatic Preserve and State Park) the City will convey the additional water through the Alligator Slough and into the receiving waters of Matlacha Pass to the extent that the City's existing weir system is capable of so directing such flows and providing that such water conveyance is consistent with the City's utility commitments.

The City of Cape Coral will arrange quarterly meetings with FDEP for the purpose of discussing Best Management Practices. Lee and Charlotte Counties, South Florida Water Management District, Southwest Florida Water Management District, Ding Darling National Wildlife Refuge and other stakeholders may participate in the meetings and may provide input as needed. The first quarterly meeting will occur within 3 months following FDEP's issuance of an Environmental Resources Permit authorizing this program. Cape Coral may fulfill this obligation by participation in the quarterly watershed coordination meetings convened by the Southwest Florida Regional Planning Council pursuant to item 4.3.7 below.

The purpose of these quarterly meetings is for the participants to develop and maintain Best Management Practices with respect to the optimum achievable volume, timing, and spatial distribution of water with respect to the identified needs of the ecological systems in the State Park and Preserves.

4.2.6 Septic Systems Inspection and Maintenance Program Development Study

Within 12 months following FDEP issuance of an Environmental Resources Permit authorizing this program the City of Cape Coral shall submit a Septic Systems Inspection and Maintenance Development Study to the FDEP. The resources of Lee County, Lee County Health Department, and the FDEP will be required to complete this development study. The study will address all elements necessary to implement an effective septic systems inspection and maintenance program:

- Jurisdiction authority, which may be Lee County, Lee County Health Department, FDEP, or Cape Coral
- Coordination with existing Florida Administrative Code, Department of Health, Rules 64E- 6.005 and 64E-6.006 regarding onsite sewage treatment and disposal systems
- State legislation
- Personnel and all other resources necessary to accomplish inspections
- Costs
- Funding mechanisms, including consideration of a utility
- Record keeping
- Forecast timing for implementation

4.2.7 Water Quality, Flow and Elevation Monitoring

This section describes the monitoring activities to be performed by the City of Cape Coral under the ERP. These activities also form part of the monitoring program to evaluate NEB achievement described in Section 4.3.12.

North Spreader Tidal Canal System Water Quality Monitoring and Troubleshooting

Within 6 months following FDEP issuance of an ERP authorizing this program the City of Cape Coral shall establish a minimum of five (5) additional water quality sampling stations (in addition to the six it currently maintains) in the North Spreader tidal canal system (the NSC itself and feeder canals) to enhance monitoring of water quality trends and the ability to determine on a timely basis if undesirable changes have occurred and to help assess the impacts of NEB projects as described in Section 4.3.12. New and existing stations will be located so as to ensure that water quality data can be gathered for the north, central and southern sections of the NSC and outside the southernmost extent of the canal. The

locations for the additional sampling stations are subject to approval by the FDEP. The additional and the existing water quality sampling stations in both the tidal and fresh water canals shall be sampled monthly. Critical variables to be monitored include chlorophyll a, NO_2NO_3, NH_3, TKN, TN, TP, turbidity, TSS, fecal streptococcus, and hydrographic data (temperature, conductivity, DO, and pH.

If an undesirable water quality trend develops at a particular sampling station, additional sampling and research will be conducted by the City of Cape Coral to determine the source of the contaminant(s) and to determine what steps may be required by the responsible parties to cause correction. However, in no event shall the City be required to take any particular enforcement action or to undertake any particular corrective action.

Monitoring of Flows, Elevations and Salinities to Validate Box Model

Within 6 months following FDEP issuance of an ERP authorizing this program the City of Cape Coral shall establish a program of flow and elevation monitoring that includes continuous monitoring of water surface elevations and salinity at three breaches within the NSC – one each in the northern, central, and southern sections – and outside the southernmost extent of the NSC throughout the wet and dry seasons at 15 minute intervals. The breaches to be monitored shall 1A, 8 and 13, or other breaches as determined by FDEP.

Timeframe

The activities described in this section shall continue for a minimum of five years, to support the monitoring program described in Section 4.3.12. After five years, and as public sewers are installed in areas adjacent to canals, the need for water quality sampling stations in those canals will be re-evaluated and may be relocated or abandoned if determined to be un-necessary for ongoing water quality monitoring.

Adaptive Management

The variables to be monitored, location of monitoring stations and other provisions of this section may be modified at the request of the Coordination Group described in Section 4.3.12, with the concurrence of the City of Cape Coral.

Resources

Up to $10,000 of escrow account funds shall be allocated for the purchase by Cape Coral of equipment needed to conduct the monthly water quality and continuous flow and elevation monitoring portions of this program.

<u>Other ERP Commitments</u>

4.2.8 Maintain the Cape Coral Canal Dredging Profile

The City of Cape Coral will maintain the dredging profile for the City maintained portion of the canal system north of Pine Island Road at 5 feet below mean low water (MLW) and in accordance with the other provisions of the Environmental Resources Permit #36013749-001-E1. Dredging activities shall be conducted no deeper than 6 feet below MLW to achieve the 5 feet below MLW profile. The City will not seek to increase these permitted depths.

4.2.9 Implement Boating Related Enhancements

Within 12 months following FDEP issuance of an Environmental Resources Permit authorizing this program the City of Cape Coral shall implement a series of boating related management actions. The actions, mainly relating to prohibiting power boats at Sirenia Vista Park and providing boater education, will enhance the local aquatic and estuarine environment and will include items listed in Appendix C.

4.3 Projects to be Implemented by Lee and Charlotte Counties, Cape Coral, SFWMD, SWFWMD, FDEP and/or Others

Section 4.3 describes other agreed-upon projects that entail additional responsibilities and commitments for identified stakeholders. The projects, activities and commitments in Section 4.3 enhance the NEB, but are not to be considered in meeting the requirements of the Consent Order. These projects will not be included in the North Spreader Canal Ecosystem Management Stakeholder Group Report, which pursuant to the Consent Order focuses only on the commitments of the City of Cape Coral to be included in the ERP.

4.3.1 Gator Slough Channel Improvement

This Lee County project has three components: (1) Gator Slough flow way and water quality improvement; (2) Redistribution of Gator Slough/Powell Creek water originating from northern reach (Charlotte County) and construction of a filter marsh to improve water quality; and (3) Construction of ditch plugs and installation of risers to mimic natural system in the region.

The original extent of work for this project, which is all up-stream of US 41, is nearing completion and is included in the calculation of the NEB threshold. Additional flow way restoration and management strategies to achieve agreed upon watershed targets for retention of peak flows, timing of releases and minimum flows are included in the calculation of NEBs.

4.3.2 Yellow Fever Creek/Gator Slough Storm Water Transfer Facility

This Lee County project is in the design phase and includes the restoration of historic flows that were altered by urban development. In doing this, flows to Gator Slough will be reduced.

The interconnect facility will transfer water during high-flow periods from Gator Slough to the south and east in Yellow Fever Creek rather than through Gator Slough to Matlacha Pass and assure minimum flows to Matlacha Pass during low-flow periods. These are considered as a contribution to the NEB.

4.3.3 Yucca Pens Hydrologic Restoration Plan

This project was initiated by SFWMD and the preliminary study phase was completed on January 28, 2010. The goal of the project is to restore historic sheet flow to Yucca Pens Unit. The project investigated the potential for restoring the historic outfall to the following systems: 1) Yucca Pen Creek, 2) Durden Creek, 3) Greenwell Branch, 4) Longview Run, and 5) Gator Slough. Restoration of the historic flow will reduce the amount of water that has been redirected to Gator Slough and lessen the impact of damaging point discharges through the Gator Slough Canal.

A Technical Memorandum was completed on January 28, 2010 in the form of a Multifunctional Water Management Plan (Plan) with recommendations for hydrologic restoration of the Yucca Pens project area including the requirements for restoration planning, planning level conceptual design, and permitting for

the project. This included developing a list of proposed improvement alternatives with an emphasis on BMPs and passive (low maintenance) conceptual design (planning level only). The Plan lists the required permits for each of the proposed hydrologic improvements and provide an order of magnitude cost estimate for each recommendation. It is anticipated that projects recommended from this Plan will result in NEB.

4.3.4 Yucca Pens Preserve Restoration

This project has been initiated by SFWMD and is in place for 2010. Yucca Pens Preserve is a 231 acre Conservation 20/20 preserve in northwest Lee County just east of Burnt Store Road. The preserve consists of three distinct areas which are disjunct from one another, but for the most part adjacent to state conservation land. Most of the preserve consists of wet flatwoods and wet prairie that are currently dissected by agricultural ditches and former ATV trails. Both systems convey water off the site unnaturally. This proposal would allow ditch plugging or backfilling to stop the unnatural conveyance of water, allowing the water to stay on site longer through sheet flow and decrease the exotic plants on site. Benefits will include a more natural wetland flow and decreased sedimentation through channelized water flows. The approximate cost for the project is $90,000. Lee County will provide 50% cost share through in kind services including oversight, exotic plant control and design and permitting costs.

4.3.5 Charlotte Harbor Flatwoods Hydrologic Restoration

This project is associated with the Southwest Florida Feasibility Study (SWFFS), a cooperative SFWMD and Corps of Engineers project. The purpose of this element of SWFFS is to address hydrologic improvements to the Charlotte Harbor Flatwoods/Yucca Pens area. Current options include constructing a low berm along the south side of public land just north of Gator Slough to re-direct surface water runoff to the west along historical flow paths instead of allowing it to discharge to Gator Slough to the south, and installing a groundwater flow barrier along the north side of Gator Slough to reduce the potential for water table drawdown by the canal.

The District and COE will consider funding the recommended activities. A draft evaluation report is scheduled for release in late 2009, and funding shall be requested from Congress in 2010.

4.3.6 Matlacha Pass Hydrologic Restoration

This Lee County project addresses historical flow paths west of Burnt Store Road and includes the restoration of historical flow ways and base flows, and improving drainage while minimizing flooding downstream of Burnt Store Road and reducing fresh water flow to Gator Slough Canal. Due to the local drainage system along Burnt Store Road, minimal stormwater runoff follows its historical flow paths to the west; and most is conveyed to the south along Burnt Store Road, resulting in excess inflows to Gator Slough. Restoring a portion of this flow west to the estuary would affect Darden Creek and Greenwell Branch, and could reduce annual inflows to Gator Slough and the NSC. Phase 1, drainage culvert upsizing, is currently under construction and is included in the calculation of the NEB threshold. Phase 2, plans for the historical flow way restoration, are being developed at this date and are considered in the calculation of the NEB. This is to be completed by the County within 12 months of adoption of the EMA. The targets for retention of peak flows, timing of releases and minimum flows, design guidelines (including flow distribution quantities) and procedures for coordinating flow management will be addressed at quarterly watershed coordination meetings.

4.3.7 Multi-jurisdictional Coordination to Improve Watershed Flows, Timing, and Distribution of Water to the State Park and Aquatic Preserves

The Southwest Florida Regional Planning Council (SWFRPC) will convene quarterly coordination meetings that may include representatives from the DEP Water Resources, State Park and Preserves, Ding Darling National Wildlife Refuge, Cape Coral, Lee and Charlotte County, the South and Southwest Florida Water Management Districts and others as appropriate. Participants will:

- Review monitoring results conducted by responsible entities
- Set targets for water quality, flow, timing and distribution
- Coordinate water facility project design, permitting and management to achieve targets

This coordination will provide an ecosystem management approach to a broad range of NSEMA stakeholder activities in the NSC watershed. The initial two years of meetings convened by the SWFRPC will be funded from the NSEMA Escrow Fund. Each Stakeholder will be expected to provide monitoring data and technical expertise as appropriate. Other SWFRPC staff services will be negotiated on an as needed basis.

4.3.8 CHNEP Committees as Forums for Updates

The Charlotte Harbor National Estuary Program (CHNEP) will provide a broader review of NSEMA activities through the quarterly meetings for its Citizens Advisory, Technical Advisory, Management, and Policy Committees. These meetings reach interested citizens, business, industry, scientists, resource managers, government officials, and elected officials for a seven-county area, including Lee and Charlotte. The CHNEP agrees to provide these committees with updates on NSEMA activities and monitoring results and to allow opportunities in their agenda for periodic discussions of current issues. The City of Cape Coral and other Stakeholders will provide quarterly reports on NSEMA projects and monitoring results to the CHNEP for web posting and distribution.

4.3.9 Study of Ecosystem Enhancement Opportunities West of the NSC

DEP shall convene a work group that will include, at a minimum, the State Park and Preserve, Ding Darling National Wildlife Refuge, the SFWMD, the City of Cape Coral and Lee County to examine the historic and current channels between the NSC and Matlacha Pass, analyze the potential value of redirecting current flows to achieve a broader distribution of freshwater from the NSC to more closely mimic historic distribution, develop a plan to reduce erosion in some areas, enhance fisheries habitats and reduce exotic vegetation. Up to $50,000 from the escrow account and in-kind contributions from Stakeholder Groups will be used for this study. The work group will also seek funding for implementation as needed provided that the participants shall not be obligated to fund implementation although they are encouraged to do so.

4.3.10 Storm Water Treatment Areas

The Department of Environmental Protection will convene a work group that will include, at a minimum, the State Park and Preserve, the SFWMD, the City of Cape Coral, Lee County and Charlotte County to determine the possibility of having one or more large storm water treatment areas to capture and treat excess flows in the wet season and release water in the dry season to help achieve a more natural timing for the flows to Matlacha Pass. Up to $50,000 in funding from the escrow account and in-kind contributions from Stakeholder groups will be used to support this study. The work group will also seek funding for implementation as needed

provided that the participants shall not be obligated to fund implementation although they are encouraged to do so.

4.3.11 Sediment Management and Habitat Restoration Plan (Between the NSC and the Pass)

Lee County, the City of Cape Coral and West Coast Inland Navigation District (WCIND) will cooperate to develop and implement a Sediment Management Plan for the Ceitus Canal Waterway as defined by Notice General Permit (NGP) 62-341.494 FAC; the supporting map document is Florida Sea Grant publication SGEF-173 and refers to the area as Matlacha Isles/Cape Coral-Northwest. At the minimum, it shall identify sediment sources, sediment transport and fate, Matlacha Isles/Cape Coral-Northwest channel dredge limits in accordance with the NGP or portion thereof, spoil disposal, maintenance frequency, impacts to adjacent shorelines or riparian rights and all other elements necessary for permit. The City shall maintain the channel to permitted depth and width to a minimum 30% reduction in either dimension. Cost share for dredging will be pursued through WCIND and Lee County based on public necessity, benefits received, and origin of sedimentation as determined by the Sediment Management Plan.

Development of the sediment management plan will be completed within six months of approval of the North Spreader Environmental Resource permit by the FDEP. Emergency dredging to insure navigability may be conducted independent of the development or implementation of the Sediment Management and Habitat Restoration Plan.

The use of up to $25,000 of the escrow account funds is authorized to support development of the Sediment Management Plan.

The Sediment Management Plan will be structured to provide physical data that will contribute to answering questions about sedimentation outside of the navigation channel. This will allow DEP to evaluate potential impacts on sea grass beds and other benthic resources in the bay adjacent to Shoreline Drive and Matlacha Pass. Understanding of existing conditions as well as potential impacts will allow DEP to make decisions about what if any restoration is recommended.

Once siltation has been controlled or when otherwise determined to be feasible, seagrass and oyster restoration shall be conducted in the canals and bays south of the former Ceitus boat lift/barrier. The use of up to $100,000 of the escrow account funds is authorized for this purpose.

Section 4.3.12 – Monitoring to Assess Achievement of Expected NEB and Support Adaptive Management

Objectives

The purpose of this monitoring program will be to assess the impacts of the NEB projects and the degree to which desired NEBs are being achieved, gather data to assess the accuracy of the box model, and to provide information to allow adaptive management of the North Spreader system and related NEB projects

Geographic Focus

The geographic focus of the monitoring program will be in the NSC, the mangrove fringe and the area immediately to the south of the NSC. The area to the south of the NSC is of particular concern because it appears to have the potential to concentrate impacts in a relatively small area.

Timeframes

The program shall be implemented within 6 months of issuance of an ERP implementing this agreement by the Department of Environmental Protection, and shall remain in place for a period of 5 years thereafter. At the end of that period participants in the program shall assess whether to continue the program, discontinue it, or continue it with modifications.

Responsibilities Under the Monitoring Program

FDEP and Lee County in consultation with the Coordination Group described in Sections 4.2.7 and 4.3.7 will provide guidance to the monitoring program.

FDEP and Lee County will develop proposed metrics and protocols for the monitoring program. These proposals will be presented to the Coordination Group at its first quarterly meeting for review, refinement and adoption. Suggested guidance for the development of these metrics and protocols is provided in Appendix H.

The Coordination Group will review the results of the monitoring at its quarterly meetings, refine the assessment metrics and protocols as needed, and coordinate adaptive management activities in response to the information gathered,

FDEP and Lee County in consultation with the Coordination Group will provide an annual assessment of the monitoring data collected to date.

The responsibilities of the City of Cape Coral under this program include water quality, flow and elevation monitoring and are described in Section 4.2.7. Cape Coral's responsibilities under the ERP will be limited to those described in Section 4.2.7.

Other responsibilities will be determined in consultation with the Coordination Group. It is understood that most of the activities described in *Elements of the Monitoring Program* below will be conducted or supported by the position described under *Resources*.

Resources

Up to $150,000 of escrow account funds shall be allocated over the initial five-year life of the program to enable a half-time position to support the implementation of the monitoring program described below. This position shall be housed in the FDEP, Lee County, or another entity agreed to by the FDEP, Lee County and the Coordination Group.

Elements of the Monitoring Program

Continuous monitoring of flows and salinity for box model validation;

These activities are Cape Coral responsibilities and are described in Section 4.2.7

Monthly water quality monitoring;

These activities are Cape Coral responsibilities and are described in Section 4.2.7

Wet and Dry Season Hydrographic Monitoring

In addition, hydrographic monitoring will be conduced for a 14-day period in both the wet and dry seasons at the following sites:

- north, central, and south sections of the NSC,
- three of the breaches (one each in the north central and southern section of the NSC),
- 3-5 sites in the mangrove fringe that are reasonably accessible, and
- at a site outside of the southern extent of the NSC.

Variables to be monitored include:

1) hydrographic data (temperature, conductivity, DO, PH) monitored continuously over the 14 day period;
2) elevations;
3) water quality sampled once at each of three sites with the following analytes – total nitrogen, total phosphorous and chlorophyll a.

Emergent vegetation

Aerial photography is expected to provide important data on the spatial extent and nature of the emergent vegetation in the mangrove fringe. The South Florida Water Management District (SFWMD) and Lee County currently collect aerial photography in the area of the NSC, biennially and annually, respectively. Available photos will be used to establish a baseline against which future data can be compared. Available data will be examined to characterize the past temporal variability in the spatial extent, and possibly the nature, of the emergent vegetation. It is recommended that future estimates of the areal extent of the emergent vegetation be provided by the existing monitoring programs.

Submergent vegetation

The SFWMD and the FDEP Aquatic Preserve currently monitor seagrasses in the Matlacha Pass area. The SFWMD monitoring program provides biennial estimates of the areal extent of seagrasses. The FDEP Aquatic Preserve samples a series of fixed transects and collects data for a number of variables including percent cover, species composition, epiphyte cover, shoot density, etc. It is recommended that the SFWMD monitoring program continue to be used to estimate the areal extent of seagrasses in the area.

Up to five (5) additional transects will be established in the area outside the southern extent for future monitoring. The protocols currently employed by the Aquatic Preserve should be employed. The presence and species composition of macroalgae should also be monitored at these transects.

Biota monitoring.

Throw trap sampling will be used to monitor fish populations, using methods currently employed by the Florida Fish and Wildlife Commission Fisheries Independent Monitoring Program or the U.S. Fish and Wildlife Service. Frequency and sites of monitoring will be determined in consultation with the Coordination Group.

Existing oyster beds in tidal creeks in the mangrove fringe and in the area outside the southern extent of the NSC will be monitored. The methods to be employed will follow those currently used by researchers at the Florida Gulf Coast University or by Sarasota County Environmental Management.

Bird rookeries are currently monitored on a monthly basis in the area by the Ding Darling National Wildlife Reserve staff. These data will be reviewed and relationship to the potential effects NEB projects assessed

Data Management and Assessment

It is recommended that the current data management activities used in the various sampling programs be employed, with no need for a central data management system. However, there is value in establishing a website that can be used to upload and disseminate data collected as part of the NSEMA.

4.4 Other Potential NEB Projects That Do Not Have Sponsors

These are projects that the Stakeholder Group agrees could possibly provide NEBs but do not have a sponsor or funding source. [This Section 4.4 will not be included in the *North Spreader Canal Ecosystem Management Stakeholder Group Report*, which pursuant to the Consent Order focuses only on the commitments of the City of Cape Coral. It will be included in the *NSEMA Stakeholder Group Findings and Conclusions*.]

4.4.1 Habitat Enhancement Pilots on the West Side of the NSC

Initial discussions of this project focused on using rock from public and private construction projects in Cape Coral to create habitat for mangroves, marsh grasses, oysters, juvenile fish, etc. Further analysis indicated that this would be much more costly than initially anticipated and there were concerns about unintended consequences. The Stakeholder Group agreed that pilot projects could be developed to test the rock placement and other habitat enhancement methods, possibly using fisheries enhancement grants.

4.4.2 Revise Land Development Codes to Reduce Stormwater Runoff and Fertilizer Use

This project would entail implementation of low impact development codes for new development, remodeling and retrofit. These codes would include at a minimum pervious pavement, cisterns and rain gardens to capture and hold water to reduce runoff. The codes would also include requirement for native landscaping throughout Cape Coral as an alternative to required sod that increases fertilizer use. Fifty percent native with a minimum 10 ft vegetated buffer at water's edge is suggested.

4.5 Administrative and Implementation Measures

4.5.1 City of Cape Coral Designated Point of Contact

Within one month of FDEP's issuance of an Environmental Resources Permit authorizing this program the City of Cape Coral shall designate a position to serve as the designated point of contact for matters regarding the Section 4.2 projects of the NSEMA. This point of contact shall publish change of status reports regarding Section 4.2 projects of the NSEMA on the City's web site quarterly.

4.5.2 Use of Escrow Funds for Projects to be Implemented by the City of Cape Coral and Others

The NSEMA escrow established under the Second Amended Consent Order in FDEP Case Number 06-2345-DF shall be utilized to reimburse the City of Cape Coral for the costs of all projects described above to the exhaustion of the funds, with the exception of the development of public sewer systems.

However, the commitment of the City of Cape Coral to Section 4.2 projects shall be governed by the language of Section 4.2 and the Environmental Resource Permit, and is not limited to the amount of activity that can be funded by the escrow account. As of the writing of this report the total cost of the projects in Section 4.2 and escrow account commitments to projects in Section 4.3, exclusive of public sewer systems, is expected to exceed the available escrow funds by almost $1,164,480. Expected costs or allowable escrow account funding are outlined below for each project eligible for escrow account funding. Expected costs are based on the conceptual descriptions of projects in this report, and on conceptual engineering estimates provided by the City of Cape Coral.

4.2.1 Cape Coral Fertilizer Ordinance

The City of Cape Coral expects a lump sum of $5,000 in incidental costs for development of the ordinance. No estimate has been developed for defense of the ordinance if it is challenged.

4.2.2 Revise the Cape Coral Seawall Engineering Design Standard to provide structure which is beneficial to marine habitat

Amend seawall design standard	$5,000
Develop public education program	$5,000
(Additional costs may be incurred in the production and dissemination of public education materials.)	
Total	$10,000

4.2.3 Storm Water Treatment Improvement

This project will require the replacement of approximately 1,520 catch basins at an expected cost of $2,424 each, for a total of $3,684,784.

4.2.4 Condition Based Timing for Development of Public Sewer Systems

The expected cost for sewering all sections of Cape Coral north of Pine Island Road is $480,000,000. Costs for sewering of sections west of Burnt Store Road, and south of Kismet will be a subset of this number. Note that these costs will not be reimbursed or defrayed by escrow account funds.

4.2.5 Cape Coral Coordination to Improve Flows, Timing and Distribution of Water to the State Park and Aquatic Preserve

This commitment is not expected to entail the expenditure of funds, although it will entail the investment of time and operational resources.

4.2.6 Septic System Inspection and Maintenance Program Development Study.

Up to $50,000 in escrow account funds may be used to support this study.

4.2.7 Water Quality Monitoring

This commitment is expected to entail the expenditure of up to $10,000 for the purchase of additional monitoring equipment.

4.2.8 Maintain the Cape Coral Canal Dredging Profile

This commitment is not expected to entail the expenditure of funds.

4.2.9 Implement Boating Related Enhancements

Ordinance development	$0
Post Lee County Boaters Guide	$12,000
Post Seagrass Alert & tidal gauge	$3,000
Tidal gauge and navigation warning	$3,000
Runoff catch basin system	$100,000
Total	$118,000

4.3.7 Multi-jurisdictional Coordination to Improve Watershed Flows, Timing and Distribution of Water to the State Park and Aquatic Preserves

Each quarterly meeting hosted by the East Central Florida Regional Planning Council is expected to cost approximately $1,500. Eight meetings during the initial two years of this project will be funded from the escrow account, for a total of $12,000.

4.3.9 Study of Ecosystem Enhancement West of the NSC

Up to $50,000 of escrow funds may be used to support this study.

4.3.10 Stormwater Treatment Areas

This project will require significant investment of funds. Phase I of the Stormwater Treatment Area whitepaper in Appendix F may require up to $300,000. Up to $50,000 of escrow account funds may be used to initiate the study.

4.3.11 Sediment Management Plan

This commitment is expected to entail the expenditure of up to $25,000 to support a study of factors contributing to the sedimentation. Up to $100,000 of escrow funds may be used for restoration of seagrasses and other areas affected by the sedimentation.

4.3.12 Water Quality Monitoring

This commitment is expected to entail the expenditure of up to $150,000 over the initial five-year life of the program to enable a half-time position to support the implementation of the monitoring program.

Summary

4.2.1 Cape Coral Fertilizer Ordinance	$5,000
4.2.2 Revise the Cape Coral Seawall Engineering Design	$5,000
4.2.3 Storm Water Treatment Improvement	$3684,480
4.2.4 Condition Based Timing for Development of Public Sewer Systems	N/A
4.2.5 Cape Coral Coordination to Improve Flows	N/A
4.2.6 Septic System Inspection and Maintenance Program Development Study	$50,000
4.2.7 Water Quality Monitoring	$10,000
4.2.8 Maintain the Cape Coral Canal Dredging Profile	N/A
4.2.9 Implement Boating Related Enhancements	$118,000
4.3.7 Multi-jurisdictional Coordination to Improve Flows	$12,000
4.3.9 Study of Ecosystem Enhancement West of the NSC	$50,000
4.3.10 Stormwater Treatment Areas	$50,000
4.3.11 Sediment Management Plan	$125,000
4.3.12 Water Quality Monitoring	$150,000
TOTAL COSTS LESS SEWERS(*)	$4,264,480
ANTICIPATED NSEMA ESCROW FUNDS AVAILABLE	$3,100,000
BALANCE – EXPECTED CITY FUNDING	$1,164,480

(*) 4.2.4 Expected cost to sewer all sections of Cape Coral north of Pine Island Rd$480,000,000

4.6 Projected Ecosystem Benefits

Given the selection of the projects described above, the Stakeholder Group expects that the following ecosystem benefits should be obtained. The realization of these goals will be a long-term effort and require the cooperation of numerous stakeholders. Estimates of ecosystem benefits for listed projects are presented in Table 4-1. The predicted benefits of many, but not all of the projects could be quantified, as noted.

4.6.1 NEBs for Water Quality

The Stakeholder Group acknowledged that the retention of freshwater inflow to the NSC that would be provided by the replacement of the south barrier would provide some water quality benefits through settlement of pollutants. The barrier would also restrict the freshwater flow to Matlacha Pass at the south end of the NSC, increasing salinity to the south and reducing salinity to the north. Several of the proposed NEB projects to be implemented by the City of Cape Coral and others will provide water quality benefits in excess of those resulting from barrier replacement as follows:

- Water quality benefits would be provided by adoption of the proposed fertilizer ordinance. It is anticipated that compliance with the ordinance will help ensure that only necessary amounts of nitrogen and phosphorus are used (for example reducing fertilizer application is reclaimed water is used for irrigation), and that fertilizer is applied in locations, with methods and materials, and on a schedule that will minimize potential for over-enrichment of surface waters. Both training for commercial users and public education will be used.

- Replacing septic tanks with public sanitary sewer will reduce the potential for groundwater contamination and seepage to canals, thus lowering loading rates of nutrients and other contaminants.

- The Stormwater Treatment Improvement project would provide approximately 25% more stormwater retention and subsequent treatment than the barrier, thus providing a NEB with regard to water quality. Also, runoff will be captured and stored in roadside swales, allowing treatment to take place before the runoff enters the estuarine system.

- Changes in the City's seawall engineering standards will benefit water quality by reducing wave energy and promoting mangrove growth along canal banks, thus creating a more "living" shoreline. Suspended solids will be less likely to remain suspended, and will also become sequestered in the mangroves.

- Projects to be completed with or by others will also benefit water quality. The Yucca Pens Restoration, Charlotte Harbor Flatwoods Restoration, and Matlacha Pass Restoration projects, described above, should all encompass water quality treatment components. These benefits will be optimized through coordination efforts described in Section 4.2.7 and 4.3.7. The septic tank maintenance program when implemented can also significantly reduce nutrient and other pollutant loading from failed septic tanks.

4.6.2 NEBs for Water Flow and Volume

Replacing the barrier and boatlift would eliminate flows through the south end of the NSC and increase flows and velocities, with possible increased erosion of mangroves and bank material in existing and possible new channels connecting the NSC and Matlacha Pass. Increased flow velocities also present a potential boating hazard. Several projects will provide benefits to the local ecosystem in terms of water volume, timing, and distribution when compared to the affects of barrier replacement:

In the Watershed

- Replacing septic tanks with public sanitary sewer will reduce the flow of freshwater to the estuary. Treated effluent will be used for irrigation, where much more will be taken up by vegetation or infiltrate farther inland than currently.

- The Stormwater Inlet Improvements project will result in runoff being captured prior to entering the NSC and Matlacha Pass. Water from the swales will slowly discharge, or will infiltrate into the shallow groundwater, thus reducing high flows to the estuary and moderating the salinity range, which is beneficial to fish and wildlife.

- Other projects, including Yucca Pens, Charlotte Harbor Flatwoods, and Matlacha Pass restoration projects have the potential for producing hydrologic benefits. As these projects

develop, alternatives for the retention of stormwater, re-direction of runoff and stream flow to historical pathways, and moderation of extreme freshwater flows to the estuary will be introduced.

- The Gator Slough and Yellow Fever Creek projects will help re-establish historical drainage area boundaries, also improving regional surface water flow patterns.

In the Canals and Receiving Waters

- The projects with the most potential for benefiting water volume, timing, and distribution characteristics are the ones calling for the coordinated management of flows that will be developed by the City and others (Sections 4.2.7 and 4.3.7). Although the goals for water management that will be coordinated by the management group are not now quantified, there is much that can be accomplished once regional and local goals for hydrologic restoration are established.

- The salinity levels of water flowing to Matlacha Pass are higher in both wet and dry seasons in the NEB scenario; than with the Threshold scenario (barrier replaced). The higher salinity is desirable for some species.

- Flows through the west bank breaches during both the wet and dry season are up to twice as high in some cells with the barrier replaced than with the NEB projects and no barrier. Higher flows increase erosion of mangroves, lower salinity and can affect boating safety.

- Only a 21-24 percent of the total net flow is through the south end of the NSC with the barrier out because of the flows out the breaches. Replacing the barrier will reduce salinities north of the barrier, raise salinities south of the barrier and reduce natural tidal action.

4.6.3 NEBs for Habitat

Replacing the barrier and boatlift would potentially lower the salinity and increase flows and velocities, and could have change the suitability of the habitat for certain species. Although the modeling results suggest that changes would not be extreme, the barrier could cause periodic lower salinities in the NSC, jeopardizing estuarine vegetation, fish, and wildlife. The water quality, quantity, timing and distribution improvements from NEB projects described above are expected to provide a significant NEB with regard to enhancement of both freshwater and estuarine habitats.

- Significant habitat improvements are expected from the changes to the “living shoreline” seawall engineering standards, and providing hard bottom habitat along the west side of the NSC. Providing additional growing areas for mangroves will enrich shoreline communities of fish, birds, and invertebrates.

- The Yucca Pens and Charlotte Harbor Flatwoods Hydrologic Restoration Studies will also result in habitat benefits, although alternatives for providing NEBs are not yet established.