STATE OF FLORIDA

FY2012 SECTION 319(h) GRANT WORK PLAN

Submitted February 2012

Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Management
Nonpoint Source Management Section

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INTRODUCTION TO FLORIDA'S FY2012 SECTION 319(h) WORK PLAN

This FY2012 Section 319(h) Work Plan consists of 16 projects that were selected for Section 319 grant funding from the 44 projects submitted for consideration, along with four additional projects to fund the state's base nonpoint source management program. In the spring of 2011, grant solicitation packages were sent out statewide and placed upon the Department's website. Department staff reviewed and evaluated all of the proposals submitted. Projects were prioritized for grant funding using the Project Evaluation Criteria included in the grant solicitation package and the best professional judgment of Department staff. The projects were then presented to the Division's senior managers for final approval of the projects selected for funding. Table 1 provides summary information on all projects in this year's work plan, followed by the proposed scopes of work for the selected incremental projects.

BASE PROGRAM PROJECTS

Over the past 20 years, the state has implemented a wide variety of nonpoint source management programs involving numerous state agencies, the water management districts, and local governments. These programs include non-regulatory and regulatory components, technical assistance, education, technology transfer, extensive interagency coordination and monitoring. The programs include both surface water and groundwater elements.

The Department's FY2012 base program strategy has been adapted from previous years' strategies in light of tightening budgets and through a reevaluation of priorities. The Nonpoint Source Management Section seeks to undertake projects that will increase the environmental effectiveness of our NPS programs, to continue expanding our knowledge about the potential effects of various nonpoint sources on ground and surface waters, and to continue expanding our knowledge about the effectiveness of BMPs in protecting ground and surface waters.

The projects described in this section of the work plan for base funding are intended to provide for:

- Administration of the program and management of selected sub-grantee projects;
- Improvement to the state's surface water NPS bioassessment program;
- Implementation of the Stormwater Erosion and Sedimentation Control Inspector training program;
- Public education designed to reduce individuals' contributions to the nonpoint pollution problem, including misuse and overuse of fertilizers; and
- Demonstration of the effectiveness of certain silviculture BMPs;
- Improved management of onsite sewage systems (OSTDS) in accordance with the state's CZARA approval.

Project 1, NPS Program Administration. Support of the Nonpoint Source Management Section within the Bureau of Watershed Restoration includes supporting the state's efforts to manage the restoration contracts associated with the incremental funding as well as for additional tasks, such as updating the EPA Grants Reporting Tracking System. This funding provides support for staff, equipment, travel, and other expenses that are otherwise unavailable. This project implements the milestones set forth in the Action Plan for NPS Management Program Administration in the 1999 and 2011 Program Update.

Project 2, Implementation of the Florida Stormwater Erosion and Sedimentation Control Inspector Training Program. This program has been implemented since 1997 as a two-day course designed to train construction workers and consultants on proper sediment and erosion control BMP installation, maintenance, and inspection. This grant will continue to support the continuation of that program through its established, trained instructors. This grant will also support the development of an advanced course designed to further increase the effectiveness of the state's NPDES stormwater permitting program by assuring that properly trained inspectors are available for sites with disturbed soils. The advanced course will be designed to include an interactive field day that will highlight proper sediment and erosion control BMP installation, maintenance, and inspection. The advanced course will be aimed at construction workers and consultants and provide hands-on opportunities to learn about erosion and sedimentation control. This project implements the milestones set forth in the Action Plan for NPS Management Program Administration in the 1999 and 2011 Program Update.

Project 3, Green Industries BMP Training Program. This program is designed to implement regional coordination of the Green Industries BMP training program throughout Florida in coordination with the Rookery Bay, Guana-Tolomato-Matanzas, and Apalachicola National Estuarine Research Reserves (NERRs). The Green Industries BMP program is a science-based educational program for Green Industry workers (lawn-care and landscape maintenance professionals) in order to teach environmentally safe landscaping practices that help conserve and protect Florida's ground and surface waters. Overall statewide coordination of this program will be managed through the University of Florida Institute of Food and Agricultural Sciences and DEP. This project implements the milestones set forth in the Action Plan for NPS Management Program Administration in the 2011 Program Update.

Project 4, Bioassessment Program. The responsibility for monitoring the condition of Florida's surface and ground water resources lies with DEP and its restoration partners, including the WMDs and local governments. Overarching goals driving DEP's bioassessment program include assessment of waterbodies, determination of Total Maximum Daily Loads, determination appropriate Site Specific Alternative Criteria, allocation of loads, restoration of waterbodies, and development of scientifically-based assessment tools. This project is designed to increase our ability to monitor and assess the effects of NPS, the effectiveness of BMPs, and the effectiveness of the NPS management program. For the FY12 grant, this project provides for staff salaries of six DEP biologist positions and contract work for independent verification with up to four botanists. This project implements the milestones set forth in the Action Plan for NPS Management Program Administration in the 1999 and 2011 Program Update.

Project 5, Stormwater Management Academy. Florida Stormwater Education and Social Marketing provides the sound science to support statewide efforts to educate the public about nonpoint source pollution issues and change social behavior to reduce pollution. This annual project implements and evaluates public education programs that reduce individuals contribution to nonpoint source pollution by sharing ideas, testing methods, and evaluating pilot projects through the long-standing partnership between DEP and the University of Central Florida Stormwater Management Academy. This project implements the milestones set forth in the Action Plan for NPS Urban Stormwater Management in the 2011 Program Update. This project was competitively selected. *See* Scope of Work, attached and included below.

Project 6, Effectiveness of Silviculture BMPs for Forest Fertilization in Pine Straw prediction Using Sulfur Coated Urea Polymers on Excessively Drained Soils in the Suwannee Valley. This project was competitively selected. *See* Scope of Work, included below.

Project 7, Continuation of the TAPP Program for 2012-2013. This award-winning educational campaign was funded for a portion of the grant requested; specifically, it was for television ads designed to educate citizens on what they can do to reduce personal nonpoint source pollution. This project was competitively selected. *See* Scope of Work, included below.

Project 8, Santa Fe and Suwannee River basin OSTDS Inventory Project. On March 27, 2008, in accordance with the Coastal Zone Management Act, EPA and NOAA found that "the state of Florida has satisfied all conditions placed on approval of the Florida coastal nonpoint pollution control program…." In its approval, EPA noted "most importantly" that Florida is "providing guidance and technical assistance to the local health Department offices to help them systematically implement broad [OSTDS] inspection programs on a county-to-county basis and to educate the public about inspections and maintenance." This project is designed to meet these goals by identifying the type and location of OSTDS systems in the Santa Fe and Suwannee River Basins. This project was competitively selected. *See* Scope of Work, included below.

Project 9, Fort Pierce-Heathcote Botanical Gardens Treatment Train. This project was competitively selected. *See* Scope of Work, included below.

INCREMENTAL LOCAL PROGRAM PROJECTS

Projects 10 through 20: The remaining 11 projects selected for funding are competitive local projects that will meet a variety of urban and agricultural related stormwater needs. All of these selected projects implement Comprehensive Watershed Plans and are identified as incremental projects. Additionally, these projects all meet the goals set out in the Action Plan for NPS Management Program Administration in the 1999 and 2011 Program Update.

TABLE 1. FY12 Grant Funding Request, Project Selection

Project	Type	Title	Lead Agency	Watershed	FY12 319 Funding
1	B	NPS Program Administration	DEP	Statewide	$541,466
2	B	Erosion Sediment Control Training Program	DEP	Statewide	$106,505
3	B	Green Industries BMP Training	DEP	Statewide	$204,128
4	B	NPS Bioassessment Program	DEP	Statewide	$438,157
5	B	UCF-Stormwater Management Academy	UCF-Stormwater Management Academy (SMA)	Statewide	$200,000
6	B	Effectiveness of Silviculture BMPs for Forest Fertilization in Pine Straw prediction Using Sulfur Coated Urea Polymers on Excessively Drained Soils in the Suwannee Valley	UF North Florida Research and Education Center	Lower Suwannee Watershed	$351,139
7	B	Continuation of the TAPP Program for 2012-2013	City of Tallahassee	Lake Jackson, Lake Lafayette, and Lake Munson/Fred George Sink Basins	$75,000
8	B	Santa Fe and Suwannee River basin OSTDS Inventory Project	Bradford, Lafayette, Levy, Suwannee, and Union County Health Departments	Santa Fe and Suwannee River	$179,155
				TOTAL BASE	**$2,095,550**

Project	Type	Title	Lead Agency	Watershed	FY12 319 Funding
9	I	Fort Pierce-Heathcote Botanical Gardens Treatment	City of Fort Pierce	Virginia Avenue Canal, Indian River Lagoon	$510,000
10	I	Paynes Prairie Sheetflow Restoration - Phase 2	City of Gainesville	Sweetwater Branch, Orange Creek Basin, Alachua Sink, Ocklawaha	$467,270
11	I	Revitalize Impaired Waters of Charlotte Harbor Area 2, 2-A ("Northshore")	Charlotte County Utilities	Charlotte Harbor, Peace River	$215,000
12	I	Northern 10-mile Treatment System	Fort Myers	Manuels Branch, Tidal Caloosahatchee River	$360,000
13	I	PC South Algal Nutrient Removal Facility	Indian River County	IR Farms Water Control District South Relief Canal Drainage Basin	$850,000
14	I	Enhancing Nutrient Removal Performance of Agricultural Stormwater Detention/Retention Areas	UF/IFAS	Devil's Garden Slough, Everglades	$340,875
15	I	Micco/Little Hollywood Exfiltration and Second Generation Baffle Box	Brevard County	Sebastian River	$171,289
16	I	Poppleton Creek Tidal Wetlands Creation and Restoration	City of Stuart	Poppleton Creek Watershed, St. Lucie Estuary	$150,000
17	I	18th Street Stormwater Treatment System	City of Vero Beach	Indian River Lagoon	$80,000
18	I	Lori Laine Basin Improvement Project, Phase I	City of Satellite Beach	Banana River, IRL	$503,016
19	I	Lake Forrest Stormwater Retention Pond	Winter Park	Lake Forrest	$195,000
20	I	Dona Bay Phase 1A Watershed Restoration	Sarasota County	Cow Pen Slough, Shakett Creek, and Dona Bay	$200,000
				TOTAL INCREMENTAL	**$4,042,450**
				TOTAL FY12 GRANT REQUEST	**$6,138,000**

PROJECT 1

PROJECT NAME: NPS/Watershed Management Program Administration

PROJECT FUNDING: $541,466

LEAD ORGANIZATION: Florida Department of Environmental Protection

PROJECT ABSTRACT: Florida's NPS Management Program identifies the natural resource management programs, strategies, and resources that currently are in place or that are needed to minimize or prevent nonpoint source pollution effects. The Nonpoint Source Management Program identifies BMPs to control pollution from specific sources of nonpoint source pollution (e.g., agriculture, forestry, OSTDS, urban); identifies programs to assure implementation of programs, activities, and structural and nonstructural BMPs that will minimize or reduce NPS pollution; and coordinates restoration activities with other state and local entities, especially those leading to restoration of impaired waters. Section 319 grant financial support allows the Nonpoint Source Management Section staff to properly administer the grant, to assure that all projects are properly completed, and to enhance the effectiveness of the state NPS/watershed management program.

PROJECT DESCRIPTION: The funds will pay the salaries of 1) an Environmental Specialist to manage selected projects; 2) a Professional Engineer to manage selected projects and BMP development; 3) an Administrative Assistant to track grant-related expenditures and provide administrative/clerical support to the section; 4) an Environmental Specialist OPS position to manage selected projects; and 5) an Environmental Specialist OPS position to provide database support within the EPA Grants Reporting Tracking System, the state's Erosion Control and Inspector Certification Program, and other contract management support. Requested funding also covers travel expenses of DEP staff to meet with project sub-grantees on-site to ensure accountability of project funding and provide site-specific nonpoint source expertise and to provide for additional travel needed in order to assist in the development and implementation of TMDLs. Lastly, the funding is utilized to provide equipment, including monitoring equipment and office equipment (e.g., computers, projectors, etc.) as well as supplies, including monthly billing, printing costs for educational materials, and shipping costs.

PROJECT BUDGET:

Project Funding Activity	319 (h) Amount
1 Administrative Assistant	$34,000
Fringe Benefits (70.80%)	$24,072
1 Environmental Specialist	$45,000
Fringe Benefits (70.80%)	$31,860
1 Professional Engineer	$60,000
Fringe Benefits (70.80%)	$42,480
1 OPS Environmental Specialist	$50,000
1 OPS Environmental Specialist	$36,462
OPS FICA (7.65%)	$6,614

Indirect (33.58%)	$110,978
Computers and other equipment (OCO)	$5,000
Travel	$40,000
Expenses/Supplies	$55,000
Total:	**$541,450**

PROJECT 2

PROJECT NAME: Stormwater, Erosion, and Sedimentation Control Certification Program

PROJECT FUNDING: $106,505

LEAD ORGANIZATION: Florida Department of Environmental Protection

PROJECT ABSTRACT: Implementation of the training program began in late 1997. In the past six years alone, the program has trained over 16,755 inspectors throughout the state of Florida. This training program is a two-day class that follows the curriculum provided in the Florida Stormwater, Erosion, and Sedimentation Control Inspector Training Program Manual. Upon the completion of the class, a proctored examination is administered. In order to obtain the inspection certificate, inspectors must receive a minimum passing grade of 70 percent on the exam. Additionally, the Department offers train-the-trainer workshops designed to prepare new instructors for implementation of the inspector's training program. The workshop covers the guidelines that instructors are required to follow in order to teach the class, plus also it allows instructors the time to work on both their teaching skills and speaking abilities. In order to attend, all participants must be FDEP Certified Inspectors prior to the scheduled workshop date.

PROJECT DESCRIPTION: Florida's NPDES Stormwater regulatory program requires the use of appropriate BMPs during construction to minimize erosion and sedimentation and appropriate BMPs after construction to treat runoff as well as inspections every seven days and within 24 hours after a half inch rain event. The Stormwater, Erosion, and Sedimentation Control Certification Program has been in place since 1997.

The goal of the Stormwater, Erosion, and Sedimentation Control Certification Program is to increase the proper design, construction and maintenance of erosion and sediment controls during construction and to assure the proper long-term operation and maintenance of stormwater systems after construction is completed. The primary program objective is to provide training throughout the State of Florida to both public and private employees in various construction-related fields. The target audience for the training program is inspectors, contractors, and engineers. The inspector training program is a two-day class that includes topics related to stormwater, erosion, and sediment control BMPs. At the end of the second day, a proctored exam made up of 100 multiple-choice questions is administered. In order to qualify as a certified inspector by the Department, a passing score of 70% must be obtained. Additionally, classes are held to trainer instructors in the program. Prospective trainers must achieve a minimum score of 80% on the proctored exam.

Because of the wide success of the program, DEP now believes that it has trained enough instructors to carry on the existing program. DEP will continue to provide materials to those instructors who offer open-enrollment courses for free. DEP believes that advanced training is now needed to ensure that construction sites reduce and eliminate erosion and sedimentation that impact our waters. DEP has therefore created the new Construction Erosion and Sedimentation Control *Advanced* Certification Program. The advanced course will be designed to include an interactive field day that will highlight proper sediment and erosion control BMP installation, maintenance, and inspection. The advanced course will be aimed at construction workers and consultants and provide hands-on opportunities to learn about erosion and sedimentation control.

At this time, this advanced course is intended to be implemented alongside the existing training program.

Federal grant funding will be used to continue the program's one staff position. This position coordinates the implementation of the training courses at locations throughout the state of the existing Stormwater, Erosion, and Sedimentation Control Certification Program. This person will also research and create a new Field Manual to be utilized in the new Construction Erosion and Sedimentation Control *Advanced* Certification Program. In addition to these responsibilities, over the next year the department intends to: develop an interactive CD-Rom for the inspector training class, conduct complete revision to the program manual, host a trainer workshop, which is intended to bring together the trainers from throughout the state to provide the latest revisions for the program, and lastly, we hope to increase trainer participation throughout the state in order to meet the demands for the class.

PROJECT MILESTONES:

Annually: Continue to support the administration of the existing Stormwater, Erosion, and Sedimentation Control Certification Program.

FY12-FY13: Introduce the new Construction Erosion and Sedimentation Control *Advanced* Certification Program.

FY12-FY13: Create and publish the new Construction Erosion and Sedimentation Control *Advanced* Certification Program Field Guide.

PROJECT BUDGET:

Project Funding Activity	**319 (h) Amount**
1 Environmental Specialist	$45,000
Fringe Benefits (70.80%)	$30,389
Indirect (33.58%)	$25,316
Expense (Supplies)	$500
Equipment	$500
Travel	$4,800
Total:	**$106,505**

PROJECT 3

PROJECT NAME: Green Industries BMP Training for Professional Landscapers to Reduce Non-point Source Pollution

PROJECT FUNDING: $204,128

LEAD ORGANIZATION: Florida Department of Environmental Protection

COOPERATING PARTNERS: Rookery Bay, Guana-Tolomato-Matanzas, and Apalachicola National Estuarine Research Reserves; University of Florida Institute of Food and Agricultural Sciences

PROJECT ABSTRACT: The Green Industries Best Management Practices (BMP) for Protection of Water Resources in Florida Training program was developed to provide Green Industry professionals with the knowledge, tools and skills to minimize the environmental impacts of non-point sources of pollution related to their business practices. This program is currently delivered statewide by the University of Florida's Institute for Food and Agricultural Sciences (IFAS) and is based on partnerships between Landscape and Green Industry businesses, local municipalities, scientists and homeowners. Regional coordination takes place through the Rookery Bay NEER in Southwest Florida, Guana-Tolomato-Matanzas NERR in Northeast Florida, and the Apalachicola NERR in Northwest Florida.

The Green Industries Best Management Practices (GI-BMPs) program grew out of the industry's desire to establish uniform professional standards of environmental responsibility. The GI-BMP program is a science-based educational program for Green Industry workers (lawn-care and landscape maintenance professionals) in order to teach environmentally safe landscaping practices that help conserve and protect Florida's ground and surface waters. The BMPs recommended by the program can save both the service provider and the Florida homeowner money, time, and effort; increase the beauty of the home landscape; and protect the health of families, pets, and the environment.

PROJECT OBJECTIVE(S):
The goals of the program include:

- Deliver effective BMP training throughout the state;
- Provide enough of these high quality BMP training opportunities in convenient locations to meet local ordinances and state statutory requirements relating to BMPs;
- Provide train-the-trainer courses in order to allow the BMP training to be offered more frequently and consistently in other communities across the state;
- Support landscape businesses in meeting statutory requirements without undue burden, including tracking and reporting;
- Work with local governments to provide guidance in the development of local fertilizer ordinances;

Identify opportunities to partner with participating landscape companies and municipalities to educate homeowners, homeowner associations, garden centers and other related entities to minimize non-point source pollution and reinforce BMPs community-wide.

PROJECT DESCRIPTION: This project will provide funding to support Green Industries BMP Training Coordinators at each of the three National Estuarine Research Reserves in Florida (Rookery Bay, Guana-Tolomato-Matanzas and Apalachicola). These coordinators will carry out several functions. One, they will deliver/assist with delivering Green Industry BMP classes (in English and Spanish) throughout their respective regions. Second, they will conduct Train-the-Trainer classes to increase the number of approved trainers for this program throughout the state. Third, they will provide oversight of trainers to ensure consistency and quality of the training program and work to educate the industry and communities on the importance of fertilizer and landscape management.

TASKS:

1. Create, produce, order, and distribute materials relating to the Green Industries BMP Training Program including workshop announcements, web postings, letters, decals, certification materials and other training materials as necessary.
2. Conduct in-person trainings, including registration, tracking, attendance, materials, certification, and evaluation.
3. Conduct online trainings, including registration, tracking, materials, certification, and evaluation.
4. Create and conduct DVD trainings, including registration, tracking, materials, certification, and evaluation.
5. Work with DEP NPS Management Section and UF/IFAS to identify, train and monitor a team of trainers in Florida with emphasis on those who speak Spanish and English
6. Conduct surveys pre- and post-training surveys to measure behavior change and quantification of variations in non-point sources of pollution as a result of this program
7. Identify future funding partnerships
8. Meet regularly with program partners to accomplish project objectives and to constantly evaluate

For measures of each of these tasks, please see the 2011 Program Update.

PROJECT BUDGET:

Project Funding Activity	**319 (h) Amount**
3 OPS Environmental Specialists ($45,000/year each)	$135,000
OPS FICA (7.65%)	$10,328
Indirect (33.58%)	$48,801
Expenses	$5,000
Travel	$5,000
Total:	**$204,128**

PROJECT 4

PROJECT NAME: Continuation of NPS Biological Monitoring and Assessment Program

PROJECT FUNDING: $438,157

LEAD ORGANIZATION: Florida Department of Environmental Protection

COOPERATING PARTNERS: Florida Water Management Districts, Local Governments, Florida A&M University

PROJECT DESCRIPTION: The Department's nonpoint source biological assessment program consists of approximately thirty staff that are responsible for a diverse set of activities which are described below. Of the thirty, six full-time positions are funded by Section 319 (see Task 1). Additionally, for FY12, funding is requested for Quality Assurance activities (see Tasks 2-5).

TASK 1: DEP DISTRICT AND CENTRAL LAB BIOLOGISTS

Annual statewide program management and planning activities are conducted through the FDEP central headquarters in Tallahassee. This critical core group consists of part-time administrative support from a grant specialist, and two administrators. This core group plans each year's statewide bioassessment workplan, calling on the 319 biologists positions and state-funded positions to participate.

These positions allow us to fully implement the streams and lakes program for Fiscal Year 2012 and continue preparations for implementation in other waterbody types.

Below is a summary of activities planned for the bioassessment program staff for FY 2012. As it has in past years, the Department's Biocriteria Committee will continue serving as the technical steering group for these activities.

Department Program Activities Using Stream and Lake Bioassessments

- Total Maximum Daily Load (TMDL)/303(d) List Program Chapter 62-303 Florida Administrative Code (also called the Impaired Waters Rule), identifies the scientific criteria that are required to determine what waters are impaired and subsequently must have TMDLs developed for them. The Stream Condition Index (SCI), and Bioreconnaissance (BioRecon) tools are specifically included in the rule with criteria for what is considered biological impairment for these water body types. Therefore, these bioassessment tools will be used extensively in the TMDL program statewide to verify or eliminate waters on the 303(d) list. District as well as Central Lab biologists will perform the field sampling, taxonomic identifications, basic data entry and reporting. The core Tallahassee staff are responsible for providing technical support for database needs, GIS analysis, and other management and administrative activities associated with the TMDL program. The Lake Vegetation Index (LVI) has been proposed for inclusion in 62-303.
- Statewide Water Quality Assessment Program (Section 305(b)) – Biological data will play more of a key role in developing the Department's biennial Section 305(b) Report. Statewide, there will be significantly more biological data from the bioassessment program that will be

independently applied for basin assessments in accordance with Florida's Impaired Waters Rule (Chapter 62-303).

- Basin Assessment Program - The Department's six district field offices carry out monitoring activities from programs developed in the Department's headquarters office. In 2012, the district offices will continue to be heavily involved in using the LVI, SCI, and Biorecon tools to assess watersheds across the state in accordance with the Department's 5-year basin rotation process. This sampling effort will be managed by the Tallahassee core staff in cooperation with the Watershed Assessment Section.
- Fifth Year Inspection (FYI) Program - The Department's FYI program will continue using the SCI in FY 2012. Point source dischargers are required to renew their federal permit every five years and traditionally have had to rely on only chemical data. With the development of the SCI, this tool has proven to be extremely valuable to the FYI program because of its unique ability to detect impairment to the biota. With the SCI, chemistry data and physical data, permitters are able to thoroughly review facilities and be more confident in their environmental decisions. As an expansion of bioassessment capabilities in FY 2012, it is planned to continue sampling estuarine waters for biota to pursue development of regionalized estuarine indices of biological integrity.
- Lake Bioassessment Program - The Lake Vegetation Index (LVI) has been calibrated twice against a human disturbance gradient, and ecologically meaningful benchmarks have been established for its use. This tool is a visual plant survey designed to be done quickly and efficiently by district and central lab biologists. The data are entered into a Vascular Plant Database, which is linked to the statewide biological database. The Standards and Assessment Section proposes addition of the LVI to 62-302 and 62-303. Beginning in 2008, the Standards and Assessment Section assigned benchmark LVI testing sites at which an expected LVI score is established, and sampling teams statewide can assess the same lake(s) to determine if they produce LVI scores within the allowed margin from the established score (+/- 10 points). This benchmark method is the means by which data providers can show that their LVI results are consistent with those of experienced sampling teams. New lake benchmarks are created every year.
- Stream/River Bioassessment Program - Beginning in 2008, the Standards and Assessment Section assigned benchmark SCI testing sites at which an expected SCI score is established, and sampling teams statewide can assess the same stream(s) to determine if they produce SCI scores within the allowed margin from the established score (+/- 10 points). This benchmark method is the means by which data providers can show that their SCI results are consistent with those of experienced sampling teams. New stream benchmarks are created every year.
- Development of report tracking application – A report tracking application will be developed to ease report writing, QA, and posting to the internet. The tracking application will contain templates of the different reports (site assessments, Fifth Year Inspections, Third year inspections, mini-basin studies, etc) to ease report writing and control formatting, as well as examples of the reports. It will track the QA process of the reports and ease posting the reports to the internet once approved.
- Development of algal assemblage tools for both lakes and streams – The development of algal assemblages will allow assessment of an additional biological community and will complement the SCI in streams and the LVI in lakes. It will also adhere to the EPA's recommendation that there is more than one assessment tool used to allow for greater confidence in the results found and possibly diagnose the cause and source of resource degradation.

- Nutrient Criteria Development – SCI and LVI assessments are being made statewide at sites with a variety of nutrient levels to contribute to our understanding of possible dose-response relationships between these indexes and nutrient concentrations and to define the nutrient regime at reference sites as determine by biological criteria. Once developed, algal assemblage tools will also contribute to nutrient criteria development.
- Statewide Biological Database - The Department's statewide biological database (SBIO) is a production grade centralized Oracle database maintained by the Department's Bureau of Information Systems. It is a highly innovative database designed to meet the unique needs of complex biological data, including taxonomic nomenclature and linkage to habitat and physical/chemical components of a bioassessment. SBIO continues with revisions as needed to stay current with the rapidly expanding biological sampling activities as well as changing information technology and data access requirements in the Department. Among the database improvements scheduled for work in FY2011, are:
    - new capabilities to calculate and store the Periphyton and phytoplankton algal communities indices data
    - rewrite SBIO as a module within the existing Laboratory Information Management System (LIMS) to enable better linkage between Biological and Chemical data.

SPECIFIC OUTPUTS: As part of the state's annual NPS program report, a summary will be included of the activities of the 319-funded staff. At a minimum, the following NPS bioassessment program work elements will be included in this report:

- names of all sites sampled by NPS bioassessment methods
- list of Ecosummary Reports generated
- list of other reports or publications prepared
- list of any presentations given at various meetings
- summary of GIS activities
- summary of biological database activities
- copies of Biocriteria Committee meeting minutes
- any other pertinent information

TASK 1 BUDGET:

Task 1 Funding Activity	319 (h) Amount
6 Central lab and District Biologists (.71 year)	$185,031
Fringe Benefits (70.80%)	$131,002
Indirect (33.58%)	$106,124
Total:	**$422,157**

TASK 2: TAXONOMIC REFERENCE COLLECTION VERIFICATIONS

Principal Investigators: Macroinvertebrate Taxonomic Experts

The Department continues to require macroinvertebrate specimen verifications as a basic component of the Bioassessment Program's QA implementation. Collections of organisms must be

maintained that are correctly identified to serve as a reference for comparisons. If species are identified incorrectly, it may lead to the misunderstanding of environmental conditions.

- Verification of reference collection for marine specimens-The DEP Division of Resource Assessment and Management has targeted 250 marine specimens needing verification.
- Verification of reference collection for fresh water specimens-The DEP Division of Resource Assessment and Management has targeted 250 fresh water specimens needing verification.

The following is a list of approved taxonomic experts that will be consulted for specimen verifications.

SPECIFIC OUTPUTS: Deliverables from the above tasks include:

- Updated reference collection of marine specimens; report summarizing verifications.
- Updated reference collection of fresh water specimens; report summarizing verifications.

TASK 2 BUDGET:

Task 2 Funding Activity	319 (h) Amount
Verification of 250 marine specimens @$10/specimen	$2,500
Verification of 250 fresh water specimens @ $6/specimen	$1,500
Total:	**$4,000**

TASK 3: TAXONOMIC REFERENCE COLLECTION VERIFICATIONS

Principal Investigators: Botanists

The Department continues to require plant specimen verifications as a basic component of the Bioassessment Program's QA implementation. Collections of organisms must be maintained that are correctly identified to serve as a reference for comparisons. If species are identified incorrectly, it may lead to the misunderstanding of environmental conditions.

SPECIFIC OUTPUTS: Deliverables from the above tasks include:

- Updated reference collection of aquatic plants; report summarizing verifications.

TASK 3 BUDGET:

Task 3 Funding Activity	319 (h) Amount
Species verification with Botanist 1	$3,000
Species verification with Botanist 2	$3,000
Species verification with Botanist 3	$2,000
Total:	**$8,000**

TASK 4: WORKSHOPS

Principal Investigators: Botanists

The Department continues to require specimen verifications as a basic component of the Bioassessment Program's QA implementation. Collections of organisms must be maintained that are correctly identified to serve as a reference for comparisons. If species are identified incorrectly, it may lead to the misunderstanding of environmental conditions, therefore training is needed.

Plant Identification workshops: Field botany instruction: Use of wetland plant key, recognizing common plant families, field characteristics of common wetland plants with emphasis vascular species found along lakeshores.

Summary: The taxonomy of vascular plants will be explained. This is a wetland field botany training which will take place primarily in the field. This plant taxonomy and ecology course work is relevant to any profession that involves the identification of wetland plants. In addition, this course complements any previous plant ecology course, especially those that deal with plant collecting, sampling and wetland creation. This is a basic botany/ecology training, a prerequisite general biology or botany course is not be necessary but is helpful.

Proposed Itemized Services: Identification of Wetland Plants with an emphasis on field identification on vascular plants common to Florida lake shores:

- Day one, create list of species for lakes and where to locate plants for field use, 8-10 hours
- Day two, collect plant material to be used in training, 8-10 hours
- Day three, teach basic field taxonomy in the field, 2 hours in lab, 6 hours of field work

TASK 4 BUDGET:

Task 4 Funding Activity	**319 (h) Amount**
Expense	$4,000
Total:	**$4,000**

PROJECT 5

PROJECT NAME: Stormwater Management Academy Pollution Prevention Education & Social Marketing (July 1, 2013 – June 30, 2014)

PROJECT FUNDING RECOMMENDED: $200,000 **MATCH: $166,667**
PROJECT FUNDING REQUESTED: $250,000

LEAD ORGANIZATION: University of Central Florida

CONTACT PERSON:
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COOPERATING PARTNERS: Members of the Stormwater Education Task Force that include representatives from Brevard County Stormwater Utility, City of Cocoa Beach Stormwater Utility, City of Palm Bay Stormwater Utility, Osceola County Extension Service, Alachua County, Seminole County Extension Service, and NYPDES Services.

PROJECT ABSTRACT:

Type of Treatment: Education
Summary of Educational Components: Resource sharing and program evaluation method development

The proposed one-year project continues Stormwater Management Academy's (SMA's) role as the state's liaison for nonpoint source pollution education program sharing and evaluation. The project manages the dynamic resource-sharing website, **WatershedEd.com**, which combines accessible media, research results, case studies and facilitated networking into a powerful tool for Florida's educators. The site continues to build into a peer-reviewed and legitimate source of information, guidance, materials, and social data that clarifies program effectiveness and measures the potential for behavior change. During this project, SMA will finalize a methodology to integrate education program evaluation into watershed assessment and management strategies. SMA will also create another series of standardized tools for baseline social data collection on another selected polluting behavior.

The Stormwater Education Task Force continues to sustain the project by voluntarily contributing to the discussion and resources on the Stormwater Education SuperSite (WatershedEd.com). The Stormwater Education Task Force will meet quarterly to share ideas and resources, build consensus, coordinate program delivery and develop new standardized questions for the SuperSite data repository. The Florida Stormwater Education newsletter will be emailed electronically twelve times a year to an expanded email list, providing a dynamic link between program implementers and available educational resources.

SMA will also collect statewide socio-behavioral data on one polluting behaviors of interest as decided by the Stormwater Education Task force members. We will implement a web-based or telephone survey to collect data from Florida residents to contribute to the data repository on WatershedEd.com. The standardized questions will be used for this purpose.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Statewide

PROJECT DESCRIPTION:

National and state environmental protection programs have demonstrated conviction to education and public participation as critical to watershed protection. The U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) program specifically lists public education and participation as elements required for permit compliance. The Florida Department of Environmental Protection (FDEP) Impaired Water's Rule requires that Total Maximum Daily Loads be reduced in listed water bodies through implementation of structural and non-structural best management practices that may include engineering or educational treatments. Investigations summarized in the FDEP report entitled "Nonpoint Source Components of Total Maximum Daily Loads," suggest that public education and technical assistance programs are essential to minimizing nonpoint source pollution contributed by individuals. Furthermore, Florida Statute directs environmental education efforts toward the assembly and distribution of model programs and materials. These recommendations and requirements confirm that government recognizes the critical role that education and public participation play in watershed protection and research confirms that education can successfully influence environmental behavior. Stormwater Management Academy has played a lead role assembling the information and data needed to guide and evaluate public education efforts throughout Florida. By collecting existing social marketing data, education resources, and research results, we facilitate program implementation and evaluation.

Since the 1970's, environmental concern has generated a tremendous amount of research specifically targeting the effectiveness of education programs prompting responsible environmental behavior. It has been documented that public education can effectively change environmental behavior (Hungerford and Volk, 1990) and influence positive environmental action (Emmons, 1997). It has also been demonstrated that active participation in environmental activities significantly influences responsible environmental behavior (Dettmann-Easler & Pease, 1999; Dresner & Gill, 1994; Jordan, Hungerford, & Tomera, 1986). A number of studies have found positive, albeit weak or moderate, relationships between support for the environment and pro-environmental behaviors (Borden and Schettino 1979; Dunlap and Van Liere 1978; Heberlein and Black 1976; Scott and Willits 1994; Thompson and Barton 1994; Van Liere and Dunlap 1981). Research indicates that increased knowledge does not necessarily relate to environmentally responsible behavior when other influencing factors come into play such as normative pressure, monetary incentives, and convenience. It is difficult to change a person's behavior once it is established and it is important to understand the complex influences before behavior change can be predicted.

Social scientists have positively demonstrated social marketing research methods such as focus groups, surveys, and interviews that can clarify the barriers and benefits that can predict the likelihood for behavior change (Kotler 1975; McKenzie-Mohr et al 1999; Kotler & Andersen 2002; Kotler, Lee, & Rothschild 2008). The first step to predicting behavior change is to characterize

polluting individuals in terms of their beliefs, types, influences, and population dynamics. With this information, individual "markets" are segmented based on their polluting potential and likelihood to change. The link between individuals' intentions to act and the likelihood to change behavior is clarified by measures of influencing factors that motivate or prevent action, the "barriers to" or "benefits of" the prescribed action. Linking the potential behavior change to environmental quality is the most challenging aspect of social market outcome evaluation. Outcome evaluation requires the correlation of existing environmental quality and social data and that these data be collected over time to determine trends. A tremendous amount of information is needed to investigate trend analysis throughout the state, too much for a single entity to collect. SMA and our partners continue to collect these data and assemble them on the Stormwater Education Supersite (WatershedEd.com). FDEP tasked the SMA and the Stormwater Education Task Force with the goal of collecting and sharing the socio-behavioral data that can be used for social marketing efforts statewide and we are pleased to continue our successful campaign.

Florida launched the campaign to collect, investigate, collate, and share social marketing data through the SMA Stormwater Education and Social Marketing program in 2001 with support from the Stormwater Education Task Force. We successfully compiled the Stormwater Education Toolkit and the Stormwater Education Supersite (WatershedEd.com). We propose to continue this important effort with funding in the current project. The task force will collect the pertinent information to identify polluting market segments, understand the factors that influence polluting behaviors, and provide the baseline socio-behavioral data to guide Florida's stormwater and nonpoint source education programs. All of this information, including the methods used, the data, and the outcome results are integrated in the Stormwater Education SuperSite (WatershedEd.com).

During the proposed project, SMA also completes a three year effort to develop an outcome evaluation methodology that links individual behaviors, polluting communities, likelihood to change variables, and resulting environmental quality outcomes to estimate pollutant loads associated with nonstructural BMPs such as education program. SMA presents an outcome evaluation tool that clarifies the connection between individual behaviors, polluting communities, likelihood of changing the behavior, and the estimated load reduction that would occur.

The proposed project accomplishes these goals with two objectives that are divided into six (6) distinct tasks described in more detail in the Task Description section. Objective one (1) focuses on the collection and utilization of socio-behavioral data for watershed management and education program evaluation. The purpose of this objective is to facilitate statewide social and behavioral data collection so that changes can be compared temporarily and spatially. These data are integral to segmenting audiences based on their polluting potential, identifying program needs and data gaps, clarifying messages and strategies, evaluating success, and ultimately measuring the potential environmental quality change associated with behavior change. With previous contracts, SMA and the Stormwater Education Task developed a series of standardized social data collection tools, created a metadata form and implemented the data repository in the Stormwater SuperSite, WatershedEd.com. The proposed project will implement a statewide survey to collect socio-behavioral data on nonpoint source polluting behaviors using the standardized collection tools. This objective also includes the delivery of a methodology to incorporate socio-behavioral data into pollutant load assessment models. In previous contracts, SMA worked with Applied Ecology, Inc. to draft and pilot test a methodology. In the proposed project, we complete this effort by incorporating all pilot tests into a final document that describes the process for incorporating non-structural, educational BMPs into pollutant load models. The methodology will clarify effective

education program methods and measurement strategies needed to estimate load reductions. Objective one (1) includes two tasks associated with survey data collection and outcome evaluation.

The second project objective is to build capacity for Florida's nonpoint source public education programs by sharing social marketing tools, educational resources, and the expertise of the Florida Stormwater Education Task Force through the Florida Stormwater Education newsletter, the Stormwater Education SuperSite, WatershedEd.com, and the statewide sharing of these resources at workshops, meetings, and conferences. The decades of experience contributed by the Stormwater Education Task Force contribute significantly to Florida's education efforts through their commitment to project planning and implementation, forum discussion on the Stormwater Supersite, resource and data sharing, recommendations of projects, presentations, and partners, articles, events and topic suggestions for the Florida Stormwater Education newsletter and in-kind matching contributions of time and materials to the project. With membership that includes diverse organizations from throughout Florida, they continue to be the advocates and experts leading the state's nonpoint source and stormwater education directives. Inaugural task force members will be in their 12th year of committee membership, representing a valuable human capital investment. New task force members are continuously added as they commit to project tasks.

The Florida Stormwater Education SuperSite (WatershedEd.com) continues to be a dynamic hub for information sharing, data collection, and networking. Management of the site is implemented by technical and content management contractors, SMA personnel, and task force members manning the discussion boards. Florida Stormwater Education newsletter is integrated into the site, providing a direct link between SuperSite resources and the subscribers who benefit from the articles, resources, and data on the site. SMA personnel deliver the resources, website updates, research results, and pertinent programs at two stormwater related conferences annually and voluntarily present at meetings when invited. Objective two (2) includes four (4) tasks associated with the coordination of task force members at four quarterly meetings (Task 3), the production of twelve (12) electronic Florida Stormwater Education newsletters (Task 4), the continued integration of data and updated resources into the Stormwater Education SuperSite, WatershedEd.com, (Task 5) and the delivery of pertinent outcomes at two conferences (Task 6). More details on task activities, deliverables, and task budgets are provided in the sections that follow.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:

This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and estimated Pollutant Load Reductions were not able to be estimated. However, the project is expected to reduce loads from nonpoint sources in the following ways: The proposed education program provides a method for estimated pollution load reductions from specific types of public education programs. A methodology for data collection and spatial analysis is finalized in the proposed project that details the steps required to estimate load reductions associated with public education programs. The proposed project also builds capacity for education program implementation, contributes to the effectiveness of existing programs, and improves efficiency by sharing resources. The goal is to enhance program effectiveness so that source reductions are achieved statewide. Source reductions lead to load reductions.

TASK DESCRIPTION:

The tasks described in this section are steps integral to completing the project. Although they are presented independently, with distinct deliverables and activities, they are related and together provide a cohesive program. There are six tasks described in this section with activity types detailed under each task that include number of hours dedicated by employees, travel, expenses, and subcontractors specific to the task. In all cases, SMA personnel hourly rates, fringe benefit rates, and indirect rates are calculated as follows:

- Salaries of SMA personnel:
  - Leesa Souto, Director of Public Education and will be paid under the grant at the rate of $36.33/hour for a total of 2080 hours (1 FTE) during the project. In general, she represents the interests of nonpoint source pollution education interests in the state as the leader of the Stormwater Education Task Force, which strives to strategically plan and implement programs and research projects needed to reduce nonpoint sources of pollution. Ms. Souto is responsible for leading the project directives, assigning duties and tasks, interpreting, reporting and presenting all results, writing the methodology to integrate socio-behavioral and environmental data, presenting results to nonpoint source education interests at workshops, conferences, and meetings, and leading the WatershedEd.com SuperSite website efforts.
  - Arzina Jaffer, Research Associate will be paid under the grant at the rate of $18.00/hour for a total of 2080 hours (1 FTE). Arzina's role is to support all project activities by conducting literature reviews, organizing materials, resources, and data for the SuperSite, summarizing meeting minutes, notes and discussion items, coordinating events, workshops, and meetings, acting as project liaison with UCF administrative personnel, and investigating cost/benefit and cost/efficiency analyses.

- Fringe Benefits:
  - The fringe benefit rate is estimated based on the rate at time of writing. The fringe benefit multiplier of 33.4% covers the full-time salaried personnel costs associated with FICA, retirement, state health/HMOP, state life insurance, workers compensation, general liability, unemployment compensation, and termination pool.

- Indirect Rates:
  - The University of Central Florida has an approved Colleges and Universities indirect rate of 45% as approved by The Federal Department of Health and Human Services Division of Cost Allocation on February 21, 2008. For this project, the basis for indirect calculation is the total grant funding. According to the Section FY 2012 Application Guidance for Section 319 Nonpoint Source Management Program Grant Proposal, "Universities and colleges may request overhead/indirect funding up to 10% of the direct 319 costs. Remaining overhead costs may be counted toward the required match." The grant budget request includes 10% overhead/indirect with the remaining 35% of UCFs approved overhead included in the matching budget.

The activity types detailed above are consistent over the six tasks. More details are specified in the tasks broken down below.

Task Number	Task Description
1	Conduct statewide survey
2	Finalize methodology to integrate socio-behavioral data into pollutant load models
3	Coordinate the Stormwater Education Task Force
4	Produce twelve electronic FSE Newsletters
5	Manage WATERSHEDED.COM supersite
6	Networking and information sharing

Task 1: Conduct statewide survey

During Task 1, a subcommittee of Stormwater Education Task Force members will determine the most important standardized questions to utilize in a statewide web-based or telephone survey. Survey responses will be integrated into the on-line data collection tool on the SuperSite (WatershedEd.com) so that results can be reported and compared across the state. SMA personnel will coordinate a task force subcommittee meeting to reach consensus on the most important questions to focus the survey on. Travel costs for two staff members to attend a centrally located meeting are included in the task budget. A subcontractor will be hired to assist with statewide data collection and data entry into the Stormwater Education SuperSite. A statewide survey will collect representative data from residents on the polluting behavior topic recommended by the Task Force subcommittee. SMA personnel will work closely with the survey subcontractor to finalize the data collection method and questionnaire. SMA personnel will upload and share survey data via the SuperSite data repository on WatershedEd.com. Stormwater Education Task Force members

Activity types included in this task are detailed as follows:

- Salaries: Leesa Souto, Director of Public Education and Arzina Jaffer, Research Associate will be paid under the grant for 400 hours and 300 hours respectively. Task Force subcommittee members provide matching in-kind contributions of their loaded salary rates to this task.
- Travel: Instate travel for Leesa Souto to attend one survey subcommittee meeting is requested. This travel is linked to the delivery of final survey results.
- Contractual Services: A contractor will be hired through a competitive selection process to conduct the statewide telephone or email survey.
- Supplies/Other Expenses: Expendable office supplies that are associated with presentations, meetings, and regular operating expenses including such things as printer cartridges, reproduction costs, pens, postage stamps, FedEx expenses, paper, envelopes, name tags, stickers, easel pads, note cards, projector expenses, lap top expenses, etc are included
- Matching indirect costs will be provided by the University of Central Florida.

Task 2: Finalize methodology to integrate socio-behavioral data into pollutant load models

During Task 2, SMA personnel will compile all results and pilot projects conducted in previous contracts to finalize a document that describes a step by step process to collect, qualify and assimilate social data into watershed planning efforts, specifically focusing on developing pollutant load input coefficients that can describe and predict load estimates. A land use intensity index will be finalized that describes the polluting potential of certain land uses based on socio-demographics relevant to a single pollutant of concern. This information will assist management action plans,

clarify evaluation measures, predict reduction goals from educational activities, and inform appropriate strategies for reducing the many sources of nonpoint source pollution.

Activity types included in this task are detailed as follows:

- Salaries: Leesa Souto, Director of Public Education and Arzina Jaffer, Research Associate will be paid under the grant for 410 hours and 200 hours respectively.
- Supplies/Other Expenses: Expendable office supplies that are associated with printer cartridges, reproduction costs, pens, postage stamps, FedEx expenses, paper, envelopes, lap top expenses, etc are included.
- Matching indirect costs will be provided by the University of Central Florida.

Task 3: Coordinate the Stormwater Education Task Force

Task 3 includes all work associated with advising statewide nonpoint source education and social marketing activities through the Stormwater Education Task Force. This includes planning and preparation of four (4), quarterly Task Force meetings and the time associated with the on-going facilitation of statewide discourse and stakeholder involvement in nonpoint source pollution education. Time associated with this facilitation role includes telephone and email time, attendance at meetings where travel is covered by other sources of funding (or donated by SMA personnel), development of presentations requested by stakeholders, participation in local BMAP meetings and planning efforts, responding to education and social marketing questions, and acting as the lead point of contact for nonpoint source education and social marketing correspondence. Specific to the task force meetings, SMA personnel prepares presentations and data collection tools, organizes logistics and venues, creates facilitated exercises and worksheets, prepares agendas, recruits speakers, records the session in minutes and notes, and adds all meeting information to the SuperSite website. The five hour long Task Force meetings are centrally located to facilitate membership travel. Meetings focus the task force committee members on tasks related to SuperSite management, data collection and research methods, and nonpoint source pollution education program implementation. Travel expenses are included in the budget for two SMA staff members to attend meetings. Task Force members contribute in-kind hours to this task and hours are estimated in the budget based on the hours contributed in previous years.

Activity types included in this task are detailed as follows:

- Salaries: Leesa Souto, Director of Public Education and Arzina Jaffer, Research Associate will be paid under the grant for 600 hours and 720 hours respectively. Task Force subcommittee members provide matching in-kind contributions of their loaded salary rates to this task. At a minimum, seven (7) different in-kind contributors will provide their in-kind hours as match.
- Travel: Instate travel for Leesa Souto and Arzina to attend four meetings is requested that includes four hotel nights and 2067 miles at 0.445/mile. This travel is linked to the delivery of task force meeting minutes, presentations, and notes.
- Contractual Services: Elise Cassie will be paid under a subcontract to attend task force meetings to gather resources and information for the SuperSite.
- Supplies/Other Expenses: Expendable office supplies that are associated with presentations, meetings, and regular operating expenses including such things as printer cartridges,

reproduction costs, pens, postage stamps, FedEx expenses, paper, envelopes, name tags, stickers, easel pads, note cards, projector expenses, lap top expenses, etc.
- Matching indirect costs will be provided by the University of Central Florida.

Task 4: Produce twelve electronic Florida Stormwater Education newsletters

During Task 4, twelve (12) Florida Stormwater Education newsletters are delivered to subscribers all over the state. Elise Cassie and Gerry Cervanka of Editype Inc. remain committed to newsletter reporting and electronic delivery. SMA personnel contribute articles and events and coordinate materials for the newsletter. The Stormwater Education Task Force is also engaged in newsletter development by writing articles, contributing events, and recommending topics.

Activity types included in this task are detailed as follows:

- Salaries: Leesa Souto, Director of Public Education and Arzina Jaffer, Research Associate will be paid under the grant for 200 hours and 160 hours respectively.
- Contractual Services: Elise Cassie will be paid under a subcontract to seek contributors and write articles for the newsletter. Gerry Cervanka of Editype, Inc will design and send out the electronic newsletter.
- Matching indirect costs will be provided by the University of Central Florida.

Task 5: Manage WatershedEd.com supersite

Task 5 involves SMA personnel, Stormwater Education Task Force members and contractors in the management and updating of the Stormwater Education SuperSite (watersheded.com). A Stormwater Education Task Force Forum Discussion Committee meeting will be coordinated as part of this task and travel to one centrally located meeting for one SMA staff member is included in the budget. Stylefish, Inc will continue to provide minor technical support for the site with Gerry Cervanka of Editype assuming the lead webmaster role. Elise Cassie will continue to be the content manager and librarian of the SuperSite. Webhosting is estimated based on the hosting costs in precious contracts.

Activity types included in this task are detailed as follows:

- Salaries: Leesa Souto, Director of Public Education and Arzina Jaffer, Research Associate will be paid under the grant for 350 hours and 460 hours respectively. Task Force subcommittee members provide matching in-kind contributions of their loaded salary rates to this task.
- Travel: Instate travel for Leesa Souto to attend one forum discussion subcommittee meeting is requested. This travel is linked to the delivery of website forum discussion posting and relevant resources.
- Contractual Services: Elise Cassie will be hired to be the content manager and librarian of the SuperSite. Gerry Cervanka of Editype will be the lead webmaster and site administrator. Stylefish, Inc, the website central management system developer will stay on for technical assistance and costs for website hosting are requested. Elise Cassie and Gerry Cervanka offer part of their time as matching in-kind services.
- Supplies/Other Expenses: Matching materials, resources, case studies and data will be provided by the Stormwater Education Task Force.

- Matching indirect costs will be provided by the University of Central Florida.

Task 6: Networking and information sharing

In task six (6), SMA personnel travel to present the project outcomes, recruit participants, and network with stakeholders at two relevant stormwater conferences. Budget estimates are based on travel to Florida Stormwater Association conferences as estimated in previous contracts.

Activity types included in this task are detailed as follows:

- Salaries: Leesa Souto, Director of Public Education and Arzina Jaffer, Research Associate will be paid under the grant for 120 hours and 240 hours respectively.
- Travel: Instate travel for Leesa Souto and Arzina Jaffer to attend two state conferences to exhibit and present information. This travel is linked to the delivery of conference proceedings, increased SuperSite visitation and newsletter subscriptions, and task force recruitment.
- Supplies/Other Expenses: Funding is requested to cover the cost to print educational brochures and other materials to inform conference attendees about the project.
- Matching indirect costs will be provided by the University of Central Florida.

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Statewide Survey	Survey results	1	12
2	Methodology to integrate social and environmental data	Methodology publication	1	12
3	Coordinate stormwater education task force	Meeting minutes; sign in sheets; presentations	1	12
4	Twelve Florida stormwater education newsletters	Newsletters	1	12
5	Stormwater education supersite management	Link to WatershedEd.com; data on Forum discussion postings; site visitation data	1	12
6	Networking and information sharing	Conference agendas; presentations	1	12

PROJECT BUDGET BY TASK:
Requested grant expenses and matching contributions are provided for each task in the table below. The activity types for each task are broken out and match sources are specified.

Task Number	Activity Type	319 Funding Requested	Match Funding	Match Source
1	SALARIES	$19,932	$8700	TASK FORCE
1	FRINGE	$6,657	$0	
1	SUPPLIES	$150	$0	
1	TRAVEL	$320	$0	
1	CONTRACTUAL	$25,000	$5,000	CONTRACTOR
1	INDIRECT (10% CHARGED/35% MATCH)	$5,206	$18,221	UCF
2	SALARIES	$18,495	$0	
2	FRINGE	$6,177	$0	
2	SUPPLIES	$100	$0	
2	INDIRECT (10% CHARGED/35% MATCH)	$2,477	$8,670	UCF
3	SALARIES	$34,758	$14,400	TASK FORCE
3	FRINGE	$11,609	$0	
3	SUPPLIES	$1,100	$0	
3	TRAVEL	$1,360	$0	
3	CONTRACTUAL	$500	$0	
3	INDIRECT (10% CHARGED/35% MATCH)	$4,933	$17,265	UCF
4	SALARIES	$10,146	$0	
4	FRINGE	$3,389	$0	
4	CONTRACTUAL	$2,700	$0	
4	INDIRECT (10% CHARGED/35% MATCH)	$1,623	$5,682	UCF
5	SALARIES	$20,995	$16,422	TASK FORCE
5	FRINGE	$7,012	$0	
5	SUPPLIES	$0	$40,000	TASK FORCE
5	TRAVEL	$250	$0	
5	CONTRACTUAL	$41,298	$2,600	CONTRACTOR
5	INDIRECT (10% CHARGED/35% MATCH)	$6,959	$24,357	UCF
6	SALARIES	$8,679	$0	
6	FRINGE	$2,899	$0	
6	SUPPLIES	$1,000	$0	
6	TRAVEL	$2,709	$0	
6	INDIRECT (10% CHARGED/35% MATCH)	$1,529	$5,350	UCF
Total:		$250,000	$166,667	
Total Project Cost:		$416,667		
Percentage Match:		60%	40%	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

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PROJECT 6

PROJECT NAME: Effectiveness of Silviculture Best Management Practices for Forest Fertilization in Pine Straw Production Using Sulfur Coated Urea Polymers on Excessively Drained Soils in the Suwannee Valley

PROJECT FUNDING REQUEST: $351,139 **MATCH:** $234,093

LEAD ORGANIZATION: University of Florida, North Florida Research and Education Center

CONTACT PERSON: Patrick Minogue, Assistant Professor of Silviculture
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COOPERATING PARTNERS:

Florida Department of Agricultural and Consumer Services, Division of Forestry
Florida Department of Environmental Protection
Burch Family Farms

PROJECT ABSTRACT:

Type of Treatment: Under Florida DEP 319 funding in 2008 (G0247), two large-scale forest fertilization BMP demonstration/monitoring projects were established to assess the effectiveness of Florida silviculture BMP's for the application of various rates of diammonium phosphate (DAP) to mid-rotation slash pine (*Pinus elliottii* Eng.) plantations being managed for pine straw production. The study locations contrast fertilization responses on clay vs. deep sandy soils, having very different nutrient holding capacity and leaching potential. At both sites, vertical movement of NOx-N to depths below the rooting zone was apparent two years following two sequential applications of 125 N. This represents the maximum amount of N (250 lb N/acre) to be applied within a three year period under current BMP guidelines. Monitoring through February 2012, two years following the second fertilization, is being continued at both locations under partial DEP contracted services support.

Two of the largest forest products companies are marketing new, durable polymer sulfur coated urea products which are a by-product of the paper manufacturing process. Georgia Pacific is producing Nutramine® and Weyerhaeuser is producing Arborite®, sulfur coated urea (SCU) products containing various amounts of nitrogen, and micronutrients in some formulations. Weyerhaeuser research scientists are currently field testing various SCU products for forestry in the Coastal Plain of the southern US (Dr. Steve Emerson, Weyerhaeuser, personal communication).

We propose monitoring the environmental fate of applied nitrogen following two sequential applications of sulfur coated urea (SCU) for our existing study location having excessively drained soil and high leaching potential. The applied nitrogen from DAP

treatment has largely dissipated from the upper 2 m soil depth, and three years will have elapsed since the last fertilization before SCU is applied in March 2013. New funding will also facilitate continued monitoring of previous treatment effects on soil P, and nutrient budgets in raked and un-raked stands. The Suwannee Valley region supports the largest pine straw industry in Florida, and fertilization to enhance straw production is common, despite the potential to contaminate shallow groundwater.

Summary of Estimated Pollutant Load Reductions: This project is providing cornerstone information regarding fate of NH_4, NOx, total Kjeldahl nitrogen (TKN) and total phosphorous (TP), for fertilization in pine straw production. Fertilization is widely practiced by pine straw growers, who recognize that pine straw yields may double on some sites. The potential to over fertilize is supported by high straw revenues, which can exceed $300 per acre per year. Based on the results from the original study with DAP and the proposed monitoring of SCU applied at the same nitrogen rates, current Florida Silviculture BMPs fertilization guidelines will be evaluated and possibly improved for better protection of groundwater quality. Current BMPs do not address the use of slow release fertilizers.

Summary of Educational Components: An integrated IFAS Extension objective is to provide training and educational programs for pine straw growers and producers to safeguard water quality in Florida. Partially funded through the 2008 DEP 319 grant, a *Pine Straw Producers Working Group* was formed as a part of our Extension program, which currently reaches 137 pine straw growers in north and central Florida. Information regarding efficient fertilization practices will be disseminated through our IFAS Extension programs including workshops, grower tours, University of Florida web-based publications, and per-reviewed journal publications.

Summary of Monitoring: The environmental fate of applied nitrogen and fertilization growth responses following 0, 25, 75, and 125 lb N per acre, applied to slash pine stands with and without pine straw removal, will be determined. Specifically, NO_x , NH_4, TKN and TP concentrations will be monitored periodically following each of two sequential March fertilizations using groundwater monitoring wells, and by soil nutrient analyses and lysimeter extracts of the soil solution at various depths to six ft. Soil monitoring will be bi-weekly for the first three months (or as long as necessary) following fertilization events, and then quarterly. Lysimeter monitoring will be done frequently immediately following fertilization, to coincide with rainfall events which are monitored with a weather station on-site. Nutrient budgets for fertilization in pine straw production are being determined by monitoring foliar nutrient status, periodic sampling of liter-fall mass and nutrient content, pine bale mass and nutrient content, and soil nutrients including the N and P forms listed above as well as K, Ca, Mg, and organic matter (OM). Monitoring wells in the treatment area and at a distant control location are already present. Continuous monitoring of rainfall, tree crown rain through-fall, wind speed, air psychometric parameters, and soil moisture and temperature at various depths is being recorded with elaborate solar and battery powered instrumentation already on site.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

This project utilizes one of the previously funded monitoring sites in Suwannee County, FL (approximately 13 miles west of Live Oak, FL). It is located in an 18-year-old slash pine plantation

and is on an excessively drained deep sandy soil (Quartzipsamments). These soils occur over unconfined Floridan Aquifers in the Suwannee Valley Region and Florida Sand Ridge; representing a worst case scenario with respect to leaching potential and groundwater contamination.

Geographic Location: Suwannee County, Florida
Impacted Watershed Name: Lower Suwannee Watershed
Size of Project Impact: State wide
Size of Drainage Area: N/A
Latitude: 30.29972°N
Longitude: 83.20222°W
Hydrologic Unit Code: 031102050102
Land is owned by: Burch Family Farms

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: This work will determine the effectiveness of current silviculture fertilization BMP's and will provide better information for nutrient management so that the benefit of fertilization is captured by tree crops and the adverse effects on water resources are minimized.

List 303(d) listed waterbody affected: The project site is located in the Lower Suwannee River Basin (3422B).

WBID: 3422B
Impairment: Dissolved oxygen and nutrients are listed as parameters of concern. This project will continuously monitor N and P concentrations of shallow groundwater at the project site.

PROJECT DESCRIPTION:

Project Objective(s)

The scope of this monitoring project includes applied and basic questions regarding the fate of applied N for a wide range of (SCU) fertilization rates, forest stand level nutrient budgets, and effects of straw removal on nutrient cycling, tree growth, straw harvest yields, and soil chemical and physical properties. The goal is to determine biological and economic thresholds for fertilization in pine straw production as well as to ensure soil resource sustainability and protection of water quality. Specifically, we will:

1. Determine the environmental fate of N following two sequential annual fertilizations using a wide range of SCU application rates (0, 25, 75, 125 lb N per acre) in a replicated study, to evaluate and assess the effectiveness of current silviculture fertilization BMP's to reduce nonpoint source pollution, as is consistent with EPA's "iterative process" for long-term BMP improvement.

2. Compare leaching potential, soil physical properties, and nutrient budgets for fertilization in raked and non-raked stands to refine forest fertilization BMP's and provide new information regarding the efficient use of fertilizers in pine straw production in the Suwannee Valley and excessively drained soils of the Coastal Plain.

3. Determine tree growth and pine needle yield responses following a wide range of N fertilization rates to determine cost-effective fertilization practices for deep sandy soils where the potential for leaching of applied nutrients is significant.

4. Provide pertinent information in support of Extension training and education programs for fertilization practices associated with pine straw production.

A Statement of the problem

While fertilization in conventional silvicultural practice may be declining somewhat (Albaugh et. al 2007), due to increasing fertilizer costs and reduced timber values, pine straw production is an expanding industry in the north and central Florida region, with estimated revenues in excess of $79 M in 2005 for Florida alone (Hodges et. al 2005). Because of high annual revenues (in excess of $300 per acre/year) and the potential to double straw yields with fertilization in some conditions (Morris et. al 1992), growers may be applying fertilizers at luxury consumption rates, necessitating new research and science-based educational programs to safeguard water quality. A paucity of research is available regarding nutrient budgets and pine straw yield responses for this practice in the Coastal Plain of the southeastern US, particularly for the excessively drained sandy soils of the Florida Sand Ridge, where most pine straw production occurs in this state. Florida's largely unconfined aquifer and clear water springs are threatened by nitrogen (N) and phosphorus (P) pollution from mineral and organic fertilizer sources. Improved understanding of the fate of applied N and P and economic timber and pine straw response to fertilization will support better recommendations regarding efficient fertilization regimes for this practice, which will ultimately help to protect water quality in Florida and the region.

Previous Work and Information Gaps

Forest Fertilization

Fertilizers, in particular N plus P, are commonly applied in southern pine stands in the Coastal Plain of the southeastern United States at establishment or periodically during the rotation to increase financial returns by enhancing growth rates and shortening the time to harvest (Jokela et. al 1991, Jokela and Stearns-Smith 1993, Fox et al. 2007a). As a body of research beginning in the 1960's identified diagnostic tools to predict responses to fertilization with N, P, or both (Wells et. al 1973, Comerford and Fisher 1984), the practice of forest fertilization became more common (Albaugh et al. 2007, Fox et. al 2007b). During the 1970's and 1980's field trials demonstrated that N and P are the most limiting nutrients to pine growth and that a large and consistent growth response to forest fertilization with the combination of N (150-200 lb/Ac) and P (25-50 lb/Ac) occurred on the majority of soil types (Fisher and Garbett 1980, Comerford et. al 1983, Gent et. al 1986, Allen 1987, Jokela and Stearns-Smith 1983, Hynynen et. al 1998). The number of acres of mid-rotation pine plantations in the southeastern US receiving N+P fertilization increased from 15,000 acres annually in 1988 to between 1.2 and 1.4 million acres per year in 2000 (Fox et al. 2007a).
Fertilization for Pine Straw Production

Pine straw producers in North Florida typically apply repeated applications of mineral fertilizers, with diammonium phosphate, ammonium nitrate, and urea being most common (Minogue et. al 2007). Nutrient use efficiencies for fertilization of southern pines are typically about 50% (Fox et al 2007a). Nitrogen and phosphorus removals from pine straw raking are largely a function of the

harvestable area, site productivity, and stand conditions. Studies in the Georgia Piedmont showed removals for a single raking varied widely, ranging from 5-60 lb N and 0.5-5 lb P per acre (Morris et. al 1992). Morris et al. (1992) provide specific fertilization recommendations for Piedmont old field or cutover sites, different stand ages, raking frequencies, and various site types, but they do not recommend fertilization for sandhill sites characterized by soils with surface horizons greater than 40 inches deep without fine textured subsoils. Specific guidelines for sandy Coastal Plain soils are lacking in the literature.

Potential Concerns with Straw Removal

Pine straw serves many important purposes in the tree stand and there are concerns that its removal can have detrimental effects on tree growth and stand health. Mineralization of pine straw is part of normal nutrient cycling in pine stands (Switzer and Nelson 1972, Gholz et. al 1985, Jorgensen and Wells 1986). Nutrients can be replaced by fertilization, but pine straw also has an important effect on soil moisture, improving water infiltration and reducing evaporative water loss in much the same way as it does when used in ornamental applications as mulch (Duryea 2003). Decomposing pine needles add to soil organic matter thus improving nutrient availability and soil water holding capacity. Removing pine straw can increase tree water stress on dry sites (McLeod et. al 1979, Ginter et. al 1979), and can also increase soil bulk density (Haywood et. al 1998). In the Florida Sand Ridge region there are large areas of deep sand, excessively drained soils with little soil profile development (CRIFF group G), where silvicultural practices should strive to maintain soil organic matter, thus providing better soil moisture availability and tree nutrition (Jokela and Long, 2000). Pine litter also protects the soil from erosion, improves water infiltration (Pote et. al 2004) and insulates against rapid temperature changes. Because of these important benefits of pine litter in the forest, it is recommended that pine straw should not be removed more than five times during the stand's life (Duryea, 2003).

Impacts of Forest Fertilization on Water Quality

Many published reviews have examined the impacts of forest fertilization on water quality (Tamm et al. 1974, Fredriksen et al. 1975, Norris et. al 1991, Bisson et. al 1992, Binkley and Brown 1993, Shephard et al. 1994, Binkley et al. 1999, Anderson 2002, Fulton and West 2002, Aust and Blinn 2004, Michael 2004, Grace et al. 2005). All of these reviews have reached a similar conclusion that standard forest fertilization practices, usually occurring one to three times in a 30 to 50 year rotation, are not detrimental to water quality. However, many pine straw producers are fertilizing annually without adequate guidance regarding appropriate fertilizer rates or precision in application. In their recent review, Binkley et al. (1999) emphasized the need for further studies examining effects of repeated applications and larger scale studies, as we are conducting. Most studies have focused on only two forms of N, nitrate and ammonium. Very little is known about other forms on N, such as dissolved organic N, which is the predominant form of nitrogen in streams of conifer forests of the southeast. Our study will assess TKN as well as NO_X and NH_4 to quantify nitrogen in organic complexes.

Because soils in Florida have low P-fixing capacity the fate of applied phosphorus is of special concern. Only one study (Harris et al. 1980) in the US has reported the effects of phosphorus fertilization on soil solution chemistry in forests. This is a significant gap in the literature which is being addressed in our study. Also, the effect of phosphorus fertilization is often delayed. Riekerk (1989) reported the maximum concentration of P was observed in streams in a significantly wet

year four years after fertilization, suggesting that short-term studies may not be sufficient to determine leaching losses. Our study will quantify P leaching for four years following annual fertilization through quantification of total phosphorus.

Pines grown on the sandy, excessively drained sites of the Sand Ridge do not respond well to fertilization (Fisher and Garbett 1980) and nutrient leaching to groundwater, which can be only 10 m from the surface, is a real concern (German 1997). On an excessively drained, deep sandy site in the Florida Sand Ridge the flux of nitrate-nitrite movement observed using lysimeters at a four foot depth was observed only 12 weeks following spring DAP fertilization (Minogue et al. 2007, Minogue et al. 2011). Our study will determine nutrient dynamics and leaching potential in eighteen year old slash pine stands growing on locations representing the extreme high leaching potentials in north Florida.

Florida Silvicultural Fertilization BMP's

Existing silvicultural fertilization BMP's include several specific criteria and recommend "developing a nutrient management plan based on soil, water, plant and organic material sample analysis based on desired timber yields to supply nutrient inputs efficiently; so that the benefit of fertilization is captured by target vegetation and the adverse effects to water resources are minimized " (anonymous 2003). The current BMP guidelines stipulate certain maximum amounts:

Forestry fertilization BMP's for elemental N:

- No more than 1000 lbs/acre over any 20-year period.
- No more than 250 lbs/acre for any 3-year period
- No more than 80 lbs/acre during the first 2-years of newly established plantations

Forestry fertilization BMP's for elemental P:

- No more than 250 lbs/acre over any 20-year period
- No more than 80 lbs/acre for any 3-year period

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:

This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and Estimated Pollutant Load Reductions were able to be estimated by using the following methodology:

> A comparison of the fate of applied nitrogen from DAP versus a new slow release polymer SCU developed for use in forestry will be made in the same pine stand at mid rotation age, under essentially the same field conditions, except for annual weather fluctuations. All parameters of nutrient fate except volatility losses are being measured. Together with results from the previous monitoring project, models are being developed to quantify nutrient budgets and potential leaching losses using DAP or SCU fertilizer materials in a forest system. The primary objective of this study is to provide a scientific basis for verification or improvement of current Silvicultural BMPs to protect water quality in Florida. Current guidelines do not address SCU or other slow release materials.

TASK DESCRIPTION:

Task Number	Task Description
1	Lysimeter installation
2	Pre-third fertilization well monitoring
3	Pre-third fertilization soil water monitoring
4	Pre-third fertilization soil analyses
5	Pre-third fertilization pine stand measurements
6	Third fertilization
7	Post-third fertilization well monitoring
8	Post-third fertilization soil water monitoring
9	Post-third fertilization soil analyses
10	Post-third fertilization pine stand measurements
11	Forth fertilization
12	Post-forth fertilization well monitoring
13	Post-forth fertilization soil water monitoring
14	Post-forth fertilization soil analyses
15	Post-forth fertilization pine stand measurements
16	Extension outreach activities
17	Data analysis, reporting, and journal manuscript preparation

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Lysimeter installation	Initiation of soil water monitoring following the QAPP	Month 1 July 2012	Month 3 Sep. 2012
2	Pre-third fertilization well monitoring	Characterization of pre-treatment groundwater level and nutrient conditions following the QAPP	Month 1 July 2012	Month 8 Feb. 2013
3	Pre-third fertilization soil water monitoring	Determination of pre-treatment soil water nutrient conditions following the QAPP	Month 1 July 2012	Month 8 Feb. 2013
4	Pre-third fertilization soil analyses	Determination of pre-treatment soil nutrient conditions following the QAPP	Month 7 Jan. 2013	Month 8 Feb. 2013
5	Pre-third fertilization pine stand measurements	Measurement of pre-treatment stand conditions following the QAPP	Month 5 Nov. 2012	Month 8 Feb. 2013
6	Third fertilization	Completion of the third fertilization	Month 9 Mar. 2013	Month 9 Mar. 2013
7	Post-third fertilization well monitoring	Characterization of post-treatment groundwater level and nutrient conditions following the QAPP	Month 9 Mar. 2013	Month 20 Feb. 2014
8	Post-third	Determination of post-treatment soil	Month 9	Month 20

	fertilization soil water monitoring	water nutrient conditions following the QAPP	Mar. 2013	Feb. 2014
9	Post-third fertilization soil analyses	Determination of post-treatment soil nutrient conditions following the QAPP	Month 9 Mar. 2013	Month 20 Feb. 2014
10	Post-third fertilization pine stand measurements	Measurement of post-treatment tree height, diameter and stand conditions following the QAPP	Month 9 Mar. 2013	Month 20 Feb. 2014
11	Forth fertilization	Completion of the forth fertilization	Month 21 Mar. 2014	Month 21 Mar. 2014
12	Post-forth fertilization well monitoring	Characterization of post-treatment groundwater level and nutrient conditions following the QAPP	Month 21 Mar. 2014	Month 33 Mar. 2015
13	Post-forth fertilization soil water monitoring	Determination of post-treatment soil water nutrient conditions following the QAPP	Month 21 Mar. 2014	Month 33 Mar. 2015
14	Post-forth fertilization soil analyses	Determination of post-treatment soil nutrient conditions following the QAPP	Month 21 Mar. 2014	Month 33 Mar. 2015
15	Post-forth fertilization pine stand measurements	Measurement of post-treatment tree height, diameter and stand conditions following the QAPP	Month 21 Mar. 2014	Month 33 Mar. 2015
16	Other measurements and project site maintenance	Continuous measurement of weather conditions, soil moisture and temperature at various depths; periodic measurements of litter-fall mass and nutrients, pine foliage nutrients, straw mass and nutrients, and canopy characteristics (LAI)	Month 1 July 2012	Month 33 Feb. 2015
17	Data analysis, reporting, and manuscript preparation	Continuous, as data become available they will be analyzed and findings made available.	Month 1 July 2012	Month 36 June 2015

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
	NOTE: Activity amounts below in parentheses are from 319 grant funding.			
1	Lysimeter installation (Salaries - $2,768, Supplies - $0, Sub-contracting - $0, Travel - $664, Indirect cost - $343)	$3,774	$1,249 $1,267	Univ. of FL FL Div. of Forestry
2	Pre-third fertilization well monitoring (Salaries - $3,044, Supplies - $1,258, Sub-contracting - $1,320, Travel - $487, Indirect	$6,719	$2,223 $2,256	Univ. of FL FL Div. of Forestry

	cost - $611)			
3	Pre-third fertilization soil water monitoring (Salaries - $6,365, Supplies - $881, Sub-contracting - $17,480, Travel - $2,035, Indirect cost - $2,676)	$29,437	$9,741 $9,884	Univ. of FL FL Div. of Forestry
4	Pre-third fertilization soil analyses (Salaries - $12,454, Supplies - $1,679, Sub-contracting - $12,672, Travel - $1,195, Indirect cost - $2,800)	$30,799	$10,192 $10,341	Univ. of FL FL Div. of Forestry
5	Pre-third fertilization pine stand measurements (Salaries - $4,428, Supplies - $0, Sub-contracting - $0, Travel - $1,062, Indirect cost - $549)	$6,039	$1,998 $2,028	Univ. of FL FL Div. of Forestry
6	Third fertilization (Salaries - $2,491, Supplies - $1,500, Sub-contracting - $0, Travel - $398, Indirect cost - $439)	$4,828	$1,598 $1,621	Univ. of FL FL Div. of Forestry
7	Post-third fertilization well monitoring (Salaries - $3,044, Supplies -$1,258 , Sub-contracting - $1,320, Travel - $487, Indirect cost - $611)	$6,719	$2,223 $2,256	Univ. of FL FL Div. of Forestry
8	Post-third fertilization soil water monitoring (Salaries - $6,365, Supplies - $881, Sub-contracting - $17,480, Travel - $2,035, Indirect cost - $2,676)	$29,437	$9,741 $9,884	Univ. of FL FL Div. of Forestry
9	Post-third fertilization soil analyses (Salaries - $12,454, Supplies - $899, Sub-contracting - $12,672, Travel -$1,195 , Indirect cost - $2,722)	$29,941	$9,908 $10,053	Univ. of FL FL Div. of Forestry
10	Post-third fertilization pine stand measurements (Salaries - $4,428, Supplies - $0, Sub-contracting -$0 , Travel - $1,062, Indirect cost - $549)	$6,039	$1,998 $2,028	Univ. of FL FL Div. of Forestry
11	Forth fertilization (Salaries -$2,491 , Supplies - $1,500, Sub-contracting - $0, Travel - $398, Indirect cost - $439)	$4,828	$1,598 $1,621	Univ. of FL FL Div. of Forestry
12	Post-forth fertilization well monitoring (Salaries - $3,044.20, Supplies - $1,258, Sub-contracting - $1,320, Travel - $487, Indirect cost - $611)	$6,719	$2,223 $2,256	Univ. of FL FL Div. of Forestry
13	Post-forth fertilization soil water monitoring (Salaries - $6,365, Supplies - $881, Sub-contracting - $17,480, Travel - $2,035, Indirect cost - $2,676)	$29,437	$9,741 $9,884	Univ. of FL FL Div. of Forestry
14	Post-forth fertilization soil analyses (Salaries - $12,454, Supplies -$899 , Sub-contracting - $12,672, Travel - $1,195, Indirect cost - $2,722)	$29,941	$9,908 $10,053	Univ. of FL FL Div. of Forestry

15	Post-forth fertilization pine stand measurements (Salaries -$4,428 , Supplies - $0, Sub-contracting - $0, Travel - $1,062, Indirect cost - $549)	$6,039	$1,998 $2,028	Univ. of FL FL Div. of Forestry
16	Other measurements and project site maintenance (Salaries - $37,914, Supplies - $8,502, Sub-contracting - $18,400, Travel - $10,087, Indirect cost - $7,490)	$82,393	$27,265 $27,664	Univ. of FL FL Div. of Forestry
17	Data analysis, reporting, and manuscript preparation (Salaries - $34,591, Supplies - $0, Sub-contracting - $0, Travel - $0, Indirect cost - $3,459)	$38,050	$12,592 $12,774	Univ. of FL FL Div. of Forestry
	Total:	$351,139	$234,093	
	Total Project Cost:	$585,232		
	Percentage Match:	60%	40%	

PROJECT BUDGET BY CATEGORY:

Project Funding Activity	319 (h) Amount	Matching Contribution	Match Source
Salaries and Fringe Benefits			
University of Florida			
Dr. Miwa, Asst. Scientist	$21,504		
Ph.D. Grad. Student	$60,210		
OPS Hourly	$77,414		
Div. of Forestry, FLDACS		$100,516	FL Div. of Forestry salary match
J. Vowell			
R. Lima			
Travel	$25,880	$17,382	FL Div. of Forestry travel match
Equipment	$ 0		
Supplies/Other Expenses	$21,393		
Contractual Services	$112,816		
Direct Costs	$319,217		
Indirect	$31,922	$116,195	Univ. of FL un-recovered indirect costs (36.4% of direct costs, no equipment)
Total:	$351,139	$234,093	Univ. of FL total - $116,195 FL Div. of Forestry - $117,898
Total Project Cost:	$585,232		
Percentage Match:	60%	40%	

ADDITIONAL REQUIRED INFORMATION:

- Does the project utilize innovative uses of technologies/BMPS?

  This project utilizes new polymer SCU products being developed for forestry. Current BMPs do not address slow release fertilizer use. Sophisticated field instruments

continuously monitor weather and soil moisture content and temperature to 6 ft depths to support the development of new models explaining nutrient fate for DAP and SCU fertilizers in forest systems.

- Does the project fall within a watershed undergoing BMAP development?

  Our Suwannee County project site is located in the Middle Suwannee BMAP Planning Unit and at approximately 13 miles west of Live Oak.

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The following were included as attachments to this proposal and are available upon request from DEP:

☑ Monitoring Plan: **Attachment 1**

☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):

- ☑ Regional site locator map showing the project site relative to the surrounding area: **Attachment 2**
- ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: **Attachment 3**
- ☑ A detailed site map showing the conceptual elements of your proposed project: **Attachment 4**

Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.:

- ☑ Attachment **5:** Second-Year Result of "Effectiveness of Silviculture BMPs for Forest Fertilization in Pine Straw Production to Protect Water Quality in Florida"

PROJECT 7

PROJECT NAME: Continuation of the Tallahassee Think About Personal Pollution (TAPP) Program for 2012-2013

PROJECT FUNDING RECOMMENDED: $75,000 **MATCH: $91,000**
PROJECT FUNDING REQUESTED: $353,245 MATCH: $363,926

LEAD ORGANIZATION: City of Tallahassee

CONTACT PERSON:
John Cox, Planning Chief
Stormwater Management Group, B-35
300 South Adams Street
Tallahassee, FL 32301
Tel: (850) 891-6867
Fax: (850) 891-6880
Email: John.Cox@talgov.com

COOPERATING PARTNERS: The City of Tallahassee will continue to operate and manage, and administrate the TAPP Program. Other private companies and individual consultants in the public relations, media, and video communications field that have committed to provide significant in-kind contributions and match toward the TAPP Program include: RB Oppenheim Associates, Governance Inc., Oppenheim Research Inc., JSS Enterprises, Maria Balingit Design, and local media outlets. Other cooperating partners may be selected based on expertise and ability to offer in-kind contributions at similar levels.

PROJECT ABSTRACT:

Type of Treatment: The TAPP Program does not provide direct treatment of stormwater. However, the Program is aimed at educating the public to encourage simple behavioral changes, which lead to decreased stormwater pollution.

Summary of Estimated Pollutant Load Reductions: The following calculations estimate the anticipated reduction in nitrogen from reduced fertilizer application as a result of TAPP outreach and educational activities. As shown in the Land Use Table below, the Urban and Built-up area of the three target watersheds is approximately 54,641 acres. Because most of this land is predominated by single family residential development, it is assumed that lawns and landscaping constitute about 60 percent (%) of this area. The estimated landscape maintenance area is therefore 54,461 acres x 0.6, which equals 32,785 acres. In 2010 non-farm fertilizer sales reported by the Florida Department of Agriculture and Consumer Services in Leon County totaled approximately 200 tons or 400,000 pounds of nitrogen (N) per year. If distributed evenly over just the landscape area (32,785 acres), this loading would constitute an application rate of approximately 12.2 pounds per acre per year (lbs/ac/yr). Based on existing survey results, it can be assumed that the project effectively changes behavior such that fertilizer use is reduced by 10%, the estimated reduction is 32,785 ac x 12.2 lbs/ac/yr x 0.10, which equals 40,000 lbs N reduced per year. Previous research shows that as much as 12% of applied N may be lost in runoff per year. Therefore, this reduction would be expected to reduce nitrogen loading to surface waters by approximately 4,800 lbs annually.

Similarly, monitoring conducted during the 2009 phase of the TAPP Program in the form of a telephone survey of more than 600 residents show that about 36% of Tallahassee residents within the targeted lake basins have at least one dog. The survey further shows that many residences have more than one. Estimates of the daily waste level generated are roughly 16 tons per day. Assuming only 10% is delivered to area receiving waters this source could amount to 3200 lbs per day. At 23 million fecal coliforms per gram, this level of loss would be sufficient to contaminate the first 0.5 inch of runoff over the City (71,000 acres) to a level of approximately 1000 colony forming units (cfu) per 100 milliliters (mL). Survey results show that TAPP has been able to achieve a 30% reduction in the waste available for wash off, the level of bacteria in runoff from the majority (80%) of storms would be reduced to 700 cfu/100 mL, which is well below the Florida single day water quality standard of 800 cfu/100 mL.

Summary of Educational Components: TAPP is an ongoing public education campaign to reduce personal pollution and to improve the quality of stormwater runoff and groundwater recharge. The primary target audience includes the residents of Tallahassee. However, the Public Service Announcement (PSA)/broadcast element of TAPP reaches the public throughout the region, covering the entire St. Marks and Ochlockonee River contributing area. The PSAs and other public information produced by TAPP are highly transferable and can be incorporated into the State stormwater education task force "tool box" for other municipalities to utilize. In addition to the PSAs, the TAPP Campaign involves outreach through workshops, events, and brochures.

Summary of Monitoring: Best Management Practice (BMP) performance monitoring in the traditional sense (i.e., inflow versus outflow) is not appropriate to evaluate non-structural public education/outreach alternatives such as TAPP.

To evaluate performance, a paired watershed approach was considered. This monitoring method would compare runoff from a small watershed area where outreach was intensively conducted against another where outreach would be absent. However, the results would be misleading in several aspects. The level of intensity applied over a small area cannot routinely be reproduced at the basin scale due to staffing and budget constraints. Therefore, the performance results would be overly optimistic for the program as a whole. Moreover, changes in awareness and behavior would be expected to produce subtle changes in the pollutant loading that would be difficult to detect in the short term following the conclusion of the project. A failure to detect immediate improvement would not necessarily indicate that the program was ineffective. Other factors, such as residual loading, would likely mask the positive effects of the project. As a consequence, paired watershed monitoring was rejected as a performance evaluation option.

However, as discussed below, focus groups and statistically valid survey will be used to gauge the changes in behaviors of area residents. Based on those results, reductions in pollutant loading can be calculated.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Tallahassee Florida in Leon County. The target area for the TAPP Project is located within the St. Marks and the Ochlockonee River Basins in Florida. The larger broadcast coverage area for the TAPP Program encompasses Leon, Jefferson, Gadsden, and Wakulla Counties, and reaches into Taylor, Madison, Liberty, and Franklin Counties in Florida and Thomas and Grady Counties in Georgia.

Impacted Watershed Name: Lake Jackson, Lake Lafayette, and Lake Munson/Fred George Sink Basins
Size of Drainage Area: 123,700 acres
Latitude: 30.4719194 N (Centroid of targeted basins)
Longitude: 84.2558027 W
Hydrologic Unit Code: 3120001-3
Land is owned by: N/A
Land Uses within the watershed: The land use and acreage compiled and listed in the table that follows is from the Tallahassee/Leon County Interlocal GIS Existing Land Use coverage for the target watershed area. The target area, which covers nearly the entire urban services area of Tallahassee and Leon County, is classified as urban build up land in accordance with the Florida Land Use and Cover Classification System (FLUCCS) code. Land use within the City limits of the target watershed area is more intensive than shown on the table, consisting of about 60% developed and 40% green space and vacant land.

Land Use	Acres	%
Urban and Built-Up		
Residential Single Family	31,145	25
Residential Multi Family	3,246	3
Commercial and Services	3,365	3
Institutional	8,024	6
Transportation, Communication, Utilities	8,851	7
Green Space and Vacant	63,197	51
Open Water and Wetlands	5,902	5
Land Use Totals (Acreage and %)	123,730	100

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: The TAPP Program serves to implement similar goals of the Northwest Florida Water Management District's Surface Water Improvement and Management (SWIM) Program, established for the Lake Munson, Lake Lafayette, and Lake Jackson, to "improve public education and awareness."

List 303(d) listed waterbody affected: Lake Jackson, Lake Lafayette, Lake Munson

WBID: 582B, 756, 756A, 756C, 807, 807C, 807D

Impairment: The project addresses a reduction in both nutrients [N and phosphorus (P)] and fecal coliforms.

PROJECT DESCRIPTION: This phase of TAPP is envisioned to begin in October 2012. During the first three months of the project, the TAPP team will work to include recommendations from citizens received in the recent surveys and focus groups as to the most important points to be emphasized to the community. In addition Oppenheim Research Inc. will conduct qualitative research consisting of new focus group studies to test visual elements and messages of the proposed media campaign.

Beginning in the spring of 2013, the main media campaign of the TAPP Program and outreach activities will be initiated. The television advertising campaign will again be professionally produced and distributed for broadcasting by the existing TAPP team of Gary Yordon (Governance, Inc.) and RB Oppenheim Associates. Ads will be designed to promote specific practices intended to reduce nonpoint source pollution. Two new video (TV) messages will be produced that highlight attainable actions to reduce pointless personal pollution. The new ads,

along with several selected from TAPP's existing library of Public Service Announcements (PSAs), will be broadcast over a wide selection of TV networks and stations and on the City of Tallahassee's WCOT TV for a four-month period during the spring and summer gardening season of 2013. Paid and donated media increases the degree of saturation to a level that is only possible due to the cooperative relationship that has developed between the team and the television stations that are collaborating partners, which have consistently shown enthusiastic support for the TAPP Program. The media campaign will also be strengthened by billboard advertising. More detail is included in the proposals found in Appendix C.

The television and billboard advertising will direct the audience to the web site, www.TAPPwater.org, for detailed information on specific practices to reduce personal pollution that can easily and inexpensively be incorporated into their everyday activities. In this next phase, the web site will be further improved and made more interactive. Appendix C provides a more detailed description of proposed web site activities and improvements.

Two new TAPP billboard messages will be produced to support the (new) PSAs. As confirmed by existing survey research, the billboards are important tools for message delivery, and the public relations firm RB Oppenheim Associates will secure additional billboard space as in-kind contributions. This increased level of awareness and promotion is made possible through the cooperative relationship that has developed between the team and Tallahassee area outdoor advertising businesses.

Throughout the project, public outreach will be conducted via seminars/workshops for community groups, neighborhoods, lawn maintenance companies, etc. to educate about BMPs that can be incorporated into residents' homesites. The penetration of TAPP messaging will be increased through participation in local festivals and events. Free-standing displays of TAPP literature placed in area nurseries and public places have proven to be beneficial in distributing TAPP informational brochures and fliers. An increase in the number of displays will help to increase awareness and action. Additional collateral material (pamphlets, fact sheets, etc.) will be produced as needed. Citizens who wish to take a pro-active approach to reducing pointless personal pollution will be assisted by TAPP with grants for installing rain gardens.

Follow-up monitoring, as described in Appendix A, is included to determine campaign performance. As in prior phases, a statistically valid post-campaign survey will be designed and conducted to gather data from the target audience. The objective will be to validate how the program has influenced the behavior of local residents. Such analysis can help to quantify effects of the TAPP Campaign on the reduction of pollutant load discharged to the environment. The 2009 and 2011 TAPP survey results will be used for comparison and to document trends in awareness and action. Focus groups will be designed and conducted to help determine campaign messaging.

In addition, in 2012 the TAPP Program is planning to expand its focus to include underserved lower income areas of Tallahassee. The basic framework is included in the outreach task described in more detail below. The Project Coordinator will work with other program areas to set up events and will also work with other City departments and community agencies specializing in providing services to underserved populations to provide more focus in these areas.

In order to maintain the momentum of the Campaign and continue to educate the public on simple activities that reduce water pollution, the City of Tallahassee funded the program in years when grant funding was not available.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:

This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and Estimated Pollutant Load Reductions were able to be estimated by using the following methodology:

TAPP is an educational campaign, and thus, it is not feasible to use a computer model to determine pollutant load reductions. The following calculations estimate the anticipated reduction in N from reduced fertilizer application as a result of the educational activities. As shown on the Land Use Table, the Urban and Built-up area of the three target watersheds is approximately 54,641 ac. Because most of this land is predominated by single family residential development it is assumed that lawns and landscaping constitute about 60% of this area, the estimated landscape maintenance area thereforeis 54,641 x 0.6 = 32,785 ac. Application rates of N in fertilizer of approximately 3 tons per square mile were previously compiled by USGS for the Tallahassee/Leon County area. Therefore, application over the target watershed area of 123,700 ac (193 square miles) is expected to be approximately 580 tons of N/year. If distributed evenly over just the landscape area (32,785 acres) this loading would constitute an application rate of approximately 35lbs/ac/yr Based on existing survey data it can be assumed that the project effectively changes behavior such that fertilizer use were reduced by10%, the estimated reduction is 32,785ac. x 35lbs/ac/yr x 0.10 = 114,748 lbs N reduced per year. If only 5% of applied N is lost in runoff per year this reduction would reduce N loading to surface waters in the basin by approximately 5,737 lbs annually.

Similarly, monitoring conducted during the 2009 phase of the TAPP Program in the form of a telephone survey of more than 600 residents show that about 36% of Tallahassee residents within the targeted lake basins have at least one dog. The survey further shows that many residences have more than one. Estimates of the daily waste level generated is roughly 16 tons per day. Assuming only 10% is delivered to area receiving waters this source could amount to 3200 lbs. per day. At 23 million fecal coliform per gram this level of loss would be sufficient to contaminate the first ½ inch of runoff over the City (71,000acres) to a level of approximately 1000 cfu/100mL. Survey results show that TAPP has been able to achieve a 30% reduction in the waste available for wash off, the level of bacteria in runoff from the majority (80%) of storms would be reduced to 700 cfu/100mL levels well below the Florida single day water quality standard of 800 cfu/100mL.

TASK DESCRIPTION:

Task Number	Task Description (DEP-recommended tasks highlighted below)
1	Project set up and administration
2	Assessment and performance evaluation (monitoring)
3	Advertisement production
4	Website management and improvement

5	Marketing and public relations plan
6	Targeted outreach campaign
7	Reporting

Task 1. Project Set Up and Administration

Description: Overall grant management responsibilities will remain with John Cox, the City of Tallahassee Stormwater Pollution Reduction Program (SPRP) Program Manager, with assistance provided by Katie Hallas, the TAPP Project Coordinator (PC) and Koren Taylor with the City's Environmental Policy and Energy Resources Department (EPER). The PC's main tasks will be to coordinate all aspects of the Program, liaison with the public, provide technical support, prepare reports and analyses, distribute resources, compile educational materials, produce educational materials, produce PowerPoint presentations, and manage technical support for the web site. The PC will work with all sub-contractors and TAPP administration to manage the campaign activities. Substantial technical and administrative support is also provided by the City of Tallahassee, Stormwater Management Group and others.

Task 2. Assessment and Performance Evaluation (Monitoring)

Description: As has been highly effective in previous phases, we will rely on the recommendations of our experienced partners, focus groups and surveys to guide messaging and evaluate performance. Two focus groups will be established to determine the messages for this phase of TAPP. One of these focus groups will be heavily weighted toward the underserved lower income areas of Tallahassee to gather suggestions for better delivery of the TAPP messages to these areas. Special effort will be made during the analysis of the results to determine the effectiveness of the newer TAPP components in changing behaviors in these underserved lower income target areas. At the beginning of the Campaign, a focus group will evaluate the TAPP materials and messages, and help determine the primary messages that should be relayed during this phase of the campaign. At the end of the Campaign, a focus group will also be utilized to determine the effectiveness of the Campaign and why or why not the participants decided to adopt TAPP principles.

A post-campaign survey of citizens will be conducted at the conclusion of the campaign. The objective will be to design and conduct a statistically valid post-project survey and analysis to gauge the effectiveness of the project. Results from the two focus groups and the post-campaign survey, as well as a review of information from similar programs will be compiled to estimate the percentage change in behavior and predict improved water quality (pollutant load reduction) throughout the duration of the campaign. For more information, please see Appendix A.

Task 3. Advertisement Production

Description: The focus of this element in the next phase of TAPP will continue to promote pollution reduction actions through information and education of the public. As described in Appendix C, Governance, Inc. will produce two additional video (television) ads with significant in-kind contributions. The foci of the ads will reflect the results of the pre-campaign focus group and staff and partner recommendations. In particular, one of the new PSAs will be

targeted towards the underserved lower income communities. The newly produced ads will accompany ads produced in the previous phases of the grant and by the City of Tallahassee.

Task 4. Web site Management and Improvement

Description: The current www.TAPPwater.org web site which houses information on ways to reduce nonpoint source pollution will be continued and improved. The site, hosted by JSS Enterprises, Inc. will provide easily accessible information on reducing "pointless personal pollution"; information on area ecology, lakes and stream systems; and links to multiple sources of information to reduce nonpoint source pollution. All TAPP publications will be available for download from the site. All of the web interfaces will be user-friendly and regularly updated. The web site will include interactive features to request presentations/inforamtion or leave feedback. A portion of the site will be interactive to engage visitors' intereste and to demonstrate how stormwater flows through various lake basins. This web site will be linked to the City of Tallahassee's web site, www.talgov.com.

Task 5. Marketing and Public Relations Plan

Description: A marketing and public relations plan will be developed and executed by RB Oppenheim Associates public relations firm, as in the previous phases of the Campaign. The plan will involve press releases, press kits, media interviews on local radio and television station talk show programs, news articles, multi-media articles, social media postings, and pro bono benefits from network and cable providers. Five ads (three selected from the twelve designed in previous TAPP campaigns and two to be developed in this phase) will be broadcast on all major stations throughout the region, for a five month period (March-July) in 2013. The television commercials will run on the cable channels through COMCAST Cable and on the local ABC, NBC, FOX, and CBS affiliate stations. The ads will also be available to WCOT, the City of Tallahassee television station. The TAPP Program will continue to have a regional impact due to the wide coverage area of the media outlets airing TAPP ads.

Billboards will be placed in each of the three targeted lake basins and throughout Tallahassee, Florida. Other media means will be utilized to publicize TAPP messages and continue educating the public. These will include advertisements in smaller local publications, neighborhood association publications, local magazines, community group newsletters or web sites of other organizations. Ads produced in Task 3 will be available for such use (please see Appendix C for more information).

Task 6. Targeted Outreach Campaign

Description: A targeted outreach program aimed at reducing nonpoint source pollution from privated and public properties will be implemented through seminars and workshops offered throughout Tallahassee. TAPP personnel will coordinate with neighborhood associations, civic and church groups, developers, local nurseries and fertilizer retailers to schedule seminars, arrange meetings with local organizations, and facilitate presentations by assuring that supplies of educational materials are available to seminar instructors. The City staff will develop and administer contracts with a team of local master gardeners to assist as TAPP instructors at local events and neighborhood staff, at the direction of the Grant Manager and PC, will provide substantial outreach coordination, technical assistance, and administrative support with

development and updating of PowerPoint presentations and other educational materials and assist resource personnel contracted to make presentations in any way necessary.

Outreach instructors will be contracted to assist at seminars, workshops, and demonstration projects, and to participate in other TAPP activities as needed. The instructors play a vital role in the dissemination of information and the formation of relationships with the public.

It is expected that a minimum of twenty neighborhood associations, affiliated groups or community organizations will participate in TAPP presentations. At each presentation, the following topics will be covered:(a) the unique nature of our local geography and the importance of controlling runoff; (b) how individual properties contribute to nonpoint source pollution entering area lakes and water courses; (c) practical methods to prevent pointless personal pollution; and (d) gardening practices that can slow the flow of water from property. Additionally, TAPP will provide an informational exhibit at local festivals, community events, and fairs.

To the degree possible, TAPP personnel will work with area nurseries, local government representatives, landscape companies, and yard maintainence workers to provide information on non-point source pollution and yard best management practices. Educational materials and posters will be placed in local nurseries for public distribution and staff clinics will be offered in order to support the project messages communicated to the public.

To encourage public participation in best management practices, the Rain Garden Grant Program within the TAPP Campaign is available to decrease the cost of installing a rain garden, which is designed to retain stormwater runoff and associated pollutants on the property. Homeowners will be able to apply for reimbursement funds for the placement of an approved rain garden on their property. The community has enthusiastically embraced the rain garden concept and the use of rain barrels as well. A measure of past success can be found in the number of area retail outlets now offering rain barrels and rain garden plants for sale.

Tangible public information will be provided through pamphlets and booklets.The *TAPP* and *Rain Gardens* brochures, *TAPP Guide to a Water–Friendly Yard*, the *Rain Barrel Manual,* and *Rain Gardens: A How To Manual for Homeowners* will continue to be used in outreach efforts. TAPP calendars for 2013 will be produced, as well as other education materials.

To aide the distribution of information, literature displays will be placed at various locations throughout the City of Tallahassee, distributing TAPP materials and other pamphlets and booklets that encourage the reduction of pointless personal pollution. The existing displays have extended the reach of TAPP messaging to many more citizens beyond that of other outreach activities alone. For this phase of the campaign, additional displays will be placed with vendors such as Wal-Mart, Home Depot, the Leon County Extension Office, local nurseries, City of Tallahassee buildings, and local libraries. TAPP will seek to also partner with organizations such as Habitat for Humanity and Rainbow Rehab, to encourage best management practices in their development projects.

In addition, in 2012 the TAPP Program is planning to expand its focus to include underserved lower income areas of Tallahassee. The basic framework is: City staff will establish a contract with a new Community Outreach Instructor, who is well respected in these underserved

neighborhoods. This individual will provide input on strategies to present the TAPP messages in a way that addresses the different goals, interests, and concerns of these communities. The Project Coordinator will also work with other City program areas to set up rain barrel events to offer rain barrels at a reduced cost in these areas. The TAPP Program will also work with other City departments, including the Energy Services Department that has developed several innovative approaches to working in these underserved areas, including the Neighborhood REACH Program. Local neighborhood churches and community centers will be targeted and contacted to help focus more outreach events in these areas.

Task 7. Reporting

Description: Progress reports will be submitted quarterly throughout the life of the project by the dates called for in the agreement. A draft final report will be prepared for submittal to DEP 60 days prior to agreement expiration. The draft report will be reviewed by DEP prior to completion of the final report. A final project report will be prepared that incorporates DEP comments and will be submitted by agreement expiration. Five paper copies of the report in addition to an electronic version in either Adobe or Word format will be submitted to DEP. Five copies of other final work products will be submitted, including tapes of the audio and video messages, the hardcopy manual containing the scripts, copies of press releases, and any fact sheets, brochures, or other materials distributed to the public.

DELIVERABLES: (DEP-recommended tasks highlighted below)

Task Number	Task Description	Deliverable	Start	Complete
1	Project Set up and administration	Administration of program	Month 1	Month 12
2	Assessment and performance evaluation (monitoring)	Two focus groups; statistically valid post-project survey and associated task reports	Month 1	Month 8
3	Advertisement production	Video scripts; television ads	Month 1	Month 3
4	Web site management and improvement	User-friendly web site supporting the goals of this project with respect to public education.	Month 1	Month 12
5	Marketing and Public Relations Plan	Marketing and public relations plan; aired television ads; a listing of other media productions employed to market the program to educate the public and copies of materials produced under this task; a minimum of six billboards.	Month 1	Month 10
6	Targeted outreach campaign	Presentation to a minimun of	Month 1	Month 11

		20 neighborhood associations and other local groups; participation in at least 12 community festivals, fairs, or similar events; production and printing of educational materials; a list of participants including developers, nurseries, landscape companies, and other businesses that participate in outreach efforts; TAPP displays at local venues; placement of at least 20 new rain gardens in Tallahassee.		
7	Reporting	Quarterly progress reports; draft final report due 60 days prior to agreement expiration; and final report due by agreement expiration along with other materials produced for this project	Month 1	Month 12

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Project Set up and administration	$0.00	$147,441.00	City of Tallahassee
2	Assessment and performance evaluation (monitoring)	$25,000	6,000.00	Oppenheim Research, Inc.
3	Advertisement production	$50,000.00	85,000.00	Governance, Inc.
4	Web site management and improvement	$13,195.00	$5,995.00	JSS Enterprises, Inc.
5	Marketing and Public Relations Plan	$221,000.00	$103,500.00	RB Oppenheim Associates, Inc.
6	Targeted outreach campaign	$44,050.00	$13,250.00	City of Tallahassee
7	Reporting	$0.00	$4,000.00	City of Tallahassee
	Total:	$353, 245.00	363,926.00	
	Total Project Cost:	$717,171.00		
	Percentage Match:	49.25%	50.75%	

ADDITIONAL REQUIRED INFORMATION:

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. The project promotes and utilizes a significant number of nonstructural approaches to nonpoint source control. These include the promotion of rain gardens, rain water harvesting, composting, adoption of fertilizer and pet waste ordinances, and fertilizer applicator training certification tracking.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The fee is $7.95 per Equivalent Residential Unit (ERU) per month

- Does the project fall within a watershed undergoing BMAP development?

  No. However, once the Wakulla River and the Lake Munson Total Maximum Daily Loads (TMDLs) are adopted, it is believed that the Florida Department of Environmental Protection (FDEP) will begin the Basin Management Action Plan (BMAP) development process. It is expected that by 2012 when this project is set to begin that BMAP development will be well underway. In addition, in 2010 the FDEP commissioned Wetland Solutions, Inc. to develop a Wakulla Springs Report using input from the Wakulla Springs Working Group. The TAPP Program will likely be the most significant educational effort to be discussed and included in the Wakulla Springs Report.

REFERENCES CITED:

EPA, FDEP, MRI, and the Florida Community College Consortium for Preventing Pollution Education (2005) *Implementing and Effective NPS Pollution Education Program.* World Wide Web Address: www.stormwater.ucf.edu/toolkit/vol1/Contents/pdfs/NPS/nps_education.pdf.

FDEP (2000) *Florida's Nonpoint Source Management Program, January 2000.*

FDEP (2001) *Basin Status Report: Ochlockonee and St. Marks.*

Moore Consulting Group (2005) *CLEAR Campaign Summary Report.*

NFWMD (1988) *Surface Water Improvement and Management Program.* Program Development Series 88-1.

NWFWMD (2006) *Surface Water Improvement and Management Program: Priority list for the Northwest Florida Water Management District.* Prepared under the auspices of Chapter 373, Florida Statutes, Program Development Series 06-02.

Wilbur, Jack (2006) *Getting Your Feet Wet with Social Marketing: A Social Marketing Guide for Watershed Programs.* Utah Department of Agriculture and Food. Salt Lake City, Utah.

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment A

- ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment B
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment B
- ☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.: Attachment C

PROJECT 8

PROJECT NAME: Santa Fe and Suwannee River Basin Onsite Sewage Treatment and Disposal Systems (OSTDS) Inventory Project

PROJECT FUNDING REQUEST: $179,155 **MATCH**: $20,227

LEAD ORGANIZATION: Suwannee County Health Departments

CONTACT PERSON: Michael S. Mitchell
915 Nobles Ferry Rd
Live Oak, Florida 32064
Tel: (386) 362-2708
Fax: (386) 208-1567
Email: Michael_Mitchell@doh.state.fl.us

COOPERATING PARTNERS: Bradford, Lafayette, Levy and Union County Health Departments

PROJECT ABSTRACT: The Florida Department of Environmental Protection is currently developing Basin Management Action Plans (BMAPs) for the Santa Fe and Suwannee River Basins. Attachment 1 details the locations of these basins. These BMAPs currently call for an electronic inventory of OSTDS within these basins. A few counties have already accomplished this and the aforementioned county health departments are proposing to contribute to the effort of creating a countywide electronic database of OSTDS permits. Attachment 2 details the locations of these counties. The majority of the OSTDS records in the participating counties are currently in paper file form and is not easily accessible. The creation of this database will also provide the opportunity to reconcile county health department OSTDS records with either the county property tax record or the county property appraiser's records and account for unrecorded OSTDS. This database will then be imported into the Carmody Web-Based Program allowing access by any interested party, including all cooperating BMAP agencies. The creation of this database would allow easy access, analysis and mapping of the OSTDS within the Santa Fe and Suwannee River Basins. The inventory will also provide a necessary platform for the development of specific plans of action to minimize the impacts these OSTDS have on the ground water and surface water in these basins. It will be critical in identifying OSTDS within these two basins that are in need of repair and tracking maintenance on these systems. The accessibility of the web-based program will allow the public, OSTDS contractors and county health departments to record and track maintenance from the same database, therefore improving awareness and accountability for OSTDS maintenance.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Bradford, Lafayette, Levy, Suwannee and Union Counties
Impacted Watershed Name: Santa Fe and Suwannee River
Size of Project Impact: Bradford: 192,100 acres; Lafayette: 350,668 acres; Levy: 903,884 acres; Suwannee: 442,816 acres; Union: 159,847 acres
Hydrologic Unit Code: 03110206

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: Santa Fe and Suwannee BMAP

List 303(d) listed waterbody affected: Santa Fe and Suwannee River Basins
WBID: 3605F, 3422B

PROJECT DESCRIPTION: The participating county health departments propose to scan and index all OSTDS documents, permits, forms and plans. The location of the OSTDS will be improved after the data has been reconciled with any current DOH records and either the county property tax record or the county property appraiser's records. The finished database will then be imported to the Carmody Web-based Management Program and Septic Search, allowing this data to be accessed by the public, including all cooperating BMAP agencies and OSTDS contractors. This will be accomplished through a collective effort between county health department staff and Carmody Data Systems. Carmody Data Systems has successfully created similar databases for health departments statewide. The Carmody Web-Based Management Program is currently used by many Septic Contractors to document OSTDS maintenance of Aerobic Treatment Units currently along the Suwannee and Santa Fe River and will be helpful in tracking ongoing maintenance for OSTDS within these basins. Once the project is finished, the participating health departments and OSTDS contractors will continue to keep the data current.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:

Estimated Pollutant Load Reductions were not able to be estimated. However, the project is expected to reduce loads from nonpoint sources in the following ways: This project will provide the necessary electronic inventory and tools for all parties involved to accurately track maintenance and identify OSTDS repair needs within the subject basins. Pollutant loads from OSTDS will be reduced by repairing failing systems and improving maintenance. In addition, the resulting mapping from this project will enhance the evaluation of the impacts of OSTDS pollutant loads and the development of plans to reduce them.

Task 1 - Prepare Database for Scanning
The first step will be to setup scanning and indexing software that is compatible with the Carmody OSTDS Web-base Management Program and Septic Search and current health department files. Currently, the only software that meets these criteria is *e-file*. The database will be configured and mapped to the corresponding counties OSTDS data. The database will then be ready for document scanning.

The Environmental Health Staff and the health department administrative assistants will organize, prepare and box the documents to the scanned. Once the documents have been returned to the appropriate health department, each environmental health department will determine the next step (filing per their CHD's policy).

Deliverables: A fully prepared scanning database ready to get current OSTDS data for each of the following counties: Bradford, Lafayette, Levy, Suwannee, and Union.

Task 2 - Inventory and Scanning
All OSTDS paper files will be scanned and indexed using *e-file*. After scanning, the inventory will be reconciled with the current DOH records and either the county property tax record or the county property appraiser's records.

Bradford Counties have approximately 9,500 files that date from 1973 to present.

Lafayette County has approximately 5,000 files that date from 1978 to present.
Levy County has approximately 26,000 files that date from 1978 to present.
Suwannee County has approximately 13,000 files that date from 1982 to present.
Union Counties have approximately 4,800 files that date from 1973 to present.

The scanned documents and database will be sorted by document type. The database will be used as a management tool. Carmody will make the database available to the public through the Septic Search website, allowing quick and efficient access to all scanned OSTDS documents. The database for Bradford and Union Counties will also be part of Bradford-Union County's OSTDS public access program.

The vendor will provide six (6) months of technical support to all the listed county health departments following the scanning and reconciliation of records task. This support will be provided as part of the corresponding county health department subcontract.

Based on the agreement with the contractor, either the contractor will provide a scanner or the local health department will purchase a scanner capable of scanning 8-1/2" X 11" documents. The health departments will continue to scan the new final approved OSTDS permits into the database to keep the database as current as possible.

Deliverables: All reconciled OSTDS records in a single electronic database for use by all. One (1) scanner capable of scanning 8-1/2" X 11" documents; six (6) months of technical support by the vendor following the scanning and reconciliation of records task.

Task 3 – Public Awareness and Education
The updated public access database will require public awareness and education on the use and availability of the system. User training, which teaches the environmental health staff how to update and input new permits, will be done at the local county health departments. Public Workshops (a maximum of 3 at each location) will be provided for the following groups: public offices (such as building & zoning, property appraiser, and other county and state agenies), realty industry, and the OSTDS service providers. Education materials will be provided for distribution to the public and for the real estate industry to encourage use of the new access system to its full potential. One kiosk will be installed at each local below:

Location	Address
Bradford County Health Department	1801 N. Temple Ave. Starke, FL 32091
Union County Health Department	495 E. Main Street, Lake Butler, FL 32054

The kiosks are for use by the public for direct access to OSTDS records, saving time for both the public and the county health department's staff. Advertising of public workshops will be the responsibility of each county health department.

Deliverables: Copies of advertisements released and education materials used; copies of workshop agendas and other evidence of workshops conducted; any other support documentation produced under this task; kiosks installed, operable and accessible to the public at the above locations; and phone lines for kiosks with internet connection and firewalls installed and operable. Note: any and all hardware and equipment provided as part of the public awareness and educational task shall become property of the corresponding county health departments.

Task 4 –Administration and Reporting
Each county health department's staff will submit progress reports and invoices to DEP monthly. A draft and final project report will be produced using either Word or Adobe format and include but not be limited to:

- Progress and problems encountered implementing the program.
- Number of OSTDS inventoried.
- An assessment of the usefulness of the inventory system.
- Project cost accounting related to the grant for the overall project.
- Any recommendations for enhancements or expansions of the use of the system by the corresponding counties.

Following the receipt of comments from DEP staff, the corresponding environmental health supervisor will revise the draft report for final submittal to the DEP. Any additional work products, such as manuals, meeting minutes and articles resulting from this agreement will be due to the DEP along with the final report. Five paper copies and an electronic version of the report are to be submitted to DEP by the expiration date.

Deliverables: Monthly progress reports and invoices with support documentation of expenditures made toward the project; draft final report; final report (paper and electronic versions); any additional project work products.

For the timeframe below, each county will be completed within the timeframe below once the project in the county is started.

Task Number	Task Description	Deliverable	Start	Complete
1	Prepare Database for Scanning	Preparation completed	Month 1	Month 1
2	Inventory and Scanning	All Records Scanned	Month 1	Month 6
3	Public Awareness and Education	Workshops Conducted	Month 4	Month 6
4	Administration and Reporting	Monthly Reports Draft Reports Final Project Report	Month 2 Month 5 Month 6	Month 6 Month 5 Month 6

ADDITIONAL REQUIRED INFORMATION:

- Does the project fall within a watershed undergoing BMAP development?

  Yes. The projects fall within the Suwannee and Santa Fe Watersheds.

The following were included as attachments to this proposal and are available upon request from DEP:

1. Map of the Suwannee and Santa Fe River Basin
2. Map of Counties Involved in Proposal

BRADFORD CHD

BRADFORD CHD BUDGET BY CATEGORY:

CATEGORY	SECTION 319 GRANT FUNDS	MATCH FUNDS	MATCH SOURCE
Salaries			
Senior Clerk	$0	$967	Bradford CHD
Environmental Supervisor I	$0	$2,926	Bradford CHD
Travel	$0	$0	
Equipment	$0	$0	
Contractual Services			
Inventory, Training, Education, Outreach and Project set up (license)	$22,525	$0	
Supplies/ Other Expenses			
Supplies	$500	$0	
SUBTOTALS	**$23,025**	**$3,893**	
TOTAL PROJECT COST	**$26,918**		

BRADFORD CHD BUDGET NARRATIVE:

Salaries:

Senior Clerk (60 hours @ $11.20/hr. with 43.89% fringe benefits = $967)
Environmental Supervisor I (80 hours @ 27.83/hr with 31.47% fringe benefits = $2,926)

Contractual Services:

Inventory, Training and Education Outreach:
Inventory Scanning – Scan and index all paper files form 1973 forward, as there are no existing files prior to 1973; estimated 7,200 files; estimated 15–20 documents per file; Includes up to 25 data fields for property identifiers agreed upon by Environmental Supervisor I; scanning and indexing software and databases to be compatible with Carmody Program and Septic Search; scanning locations to be in either Bradford or Union Counties.

Training and Education Outreach - All materials that can be made and copied at the Bradford County Health Department will be. In addition, the training will also be conducted at the Bradford County Health Department.

Inventory Project Set Up:
Includes such things as software and scanning station license, rental space, equipment set up, software identifier set up, scanner, build and populate scanning database, reconcile OSTDS records with tax records and import, etc. **(estimated cost $14,850)**

Reconciling Inventory Data:
Inventory 24 Boxes of OSTDS Files **($300 per box) = $7,200**

Training and Technical Support:
Train CHD staff to use the scanning software to maintain the inventory = **5/hrs x $95/hr = $475**

Supplies and Other Expenses:
Supplies = **$500**

LAFAYETTE CHD

LAFAYETTE CHD BUDGET BY CATEGORY:

CATEGORY	SECTION 319 GRANT FUNDS	MATCH FUNDS	MATCH SOURCE
Salaries			
Senior Clerk	$0	$393	Lafayette CHD
Environmental Specialist I	$0	$494	Lafayette CHD
Environmental Supervisor II	$0	$2,123	Lafayette CHD
Travel	$0	$0	
Equipment	$0	$0	
Contractual Services			
Inventory, Training, Education, Outreach and Project set up (license)	$26,500	$0	
Supplies/ Other Expenses			
Supplies	$1,000	$0	
SUBTOTALS	**$27,500**	**$3,010**	
TOTAL PROJECT COST	**$30,510**		

LAFAYETTE CHD BUDGET NARRATIVE:

Salaries:

Senior Clerk (25 hours @ $11.00/hr. with 42.79% fringe benefits = $393)
Environmental Specialist I (25 hours @ 15.50/hr with 27.40% fringe benefits = $494)
Environmental Supervisor II (75 hours @ 21.12/hr with 34.04% fringe benefits = $2,123)

Contractual Services:

Inventory, Training and Education Outreach:

Inventory Scanning – All OSTDS paper files from 1978 to present will be scanned and indexed, as there are no existing files prior to the above year. Each of the estimated 5,000 files contain about estimated 10–20 documents. The database will includes up to 25 data fields for property identifiers agreed upon by Environmental Supervisor II. The scanning and indexing software and databases (*e-file*) will be compatible with Carmody Program and Septic Search. The scanning location will be in Lafayette or Suwannee County or another area approved by the Environmental Supervisor II in Lafayette County.

Training and Education Outreach - All materials that can be made and copied at the Lafayette County Health Department will be. In addition, the training will also be conducted at the Lafayette County Health Department.

Inventory Project Set Up:
Includes such things as software and scanning station license, rental space, equipment set up, software identifier set up, scanner, build and populate scanning database, reconcile OSTDS records with tax records and import, etc. **(estimated cost $14,950)**

Reconciling Inventory Data:
Inventory 4 file cabinets of OSTDS Files **($2,400 per box) = $9,600**

Training and Technical Support:
Train CHD staff to use the scanning software to maintain the inventory = **5/hrs x $95/hr = $475**

Supplies and Other Expenses:
Supplies = **$1,000**

LEVY CHD

LEVY CHD BUDGET BY CATEGORY:

CATEGORY	SECTION 319 GRANT FUNDS	MATCH FUNDS	MATCH SOURCE
Salaries			
Senior Clerk	$0	$3,252	Levy CHD
Environmental Health Director	$0	$2,660	Levy CHD
Administrative Support	$0	$1,595	Levy CHD
Travel	$0	$0	
Equipment	$0	$0	
Contractual Services			
Inventory, Training, Education, Outreach and Project set up (license)	$62,500	$0	
Supplies/ Other Expenses			
Supplies	$1,000	$0	
SUBTOTALS	**$63,500**	**$7,507**	
TOTAL PROJECT COST	**$71,007**		

LEVY CHD BUDGET NARRATIVE:

Salaries:

Senior Clerk - 200 hours @ $11.29/hr. with 44% fringe benefits = $3,252
Environmental Health Director - 60 hours @ $34.10/hr with 30% fringe benefits = $2,660
Administrative Support - 50 hours @ $22.15/hr with 44% fringe benefits = $1,595

Contractual Services:

Inventory, Training and Education Outreach:

Inventory Scanning – All OSTDS paper files from 1978 to present will be scanned and indexed, as there are no existing files prior to the above year. Each of the estimated 26,000 files contain about estimated 10–20 documents. The database will includes up to 25 data fields for property identifiers agreed upon by Environmental Health Director. The scanning and indexing software and databases (*e-file*) will be compatible with Carmody Program and Septic Search. The scanning location will be in Levy County.

Training and Education Outreach - All materials that can be made and copied at the Levy County Health Department will be. In addition, the training will also be conducted at the Levy County Health Department.

Inventory Project Set Up:

Includes such things as software and scanning station license, rental space, equipment set up, software identifier set up, scanner, build and populate scanning database, reconcile OSTDS records with tax records and import, etc. **(estimated cost $16,425)**

Reconciling Inventory Data:
Inventory 19 file cabinets of OSTDS Files **($2,400 per box) = $45,600**

Training and Technical Support:
Train CHD staff to use the scanning software to maintain the inventory = **5/hrs x $95/hr = $475**

Supplies and Other Expenses:
Supplies = **$1,000**

SUWANNEE CHD

SUWANNEE CHD BUDGET BY CATEGORY:

CATEGORY	SECTION 319 GRANT FUNDS	MATCH FUNDS	MATCH SOURCE
Salaries			
Environmental Specialist I	$0	$1,119	Suwannee CHD
Environmental Specialist II	$0	$683	Suwannee CHD
Environmental Supervisor II	$0	$2,123	Suwannee CHD
Travel	$0	$0	
Equipment	$0	$0	
Contractual Services			
Inventory, Training, Education, Outreach and Project set up (license)	$44,800	$0	
Supplies/ Other Expenses			
Supplies	$1,000	$0	
SUBTOTALS	**$45,800**	**$3,925**	
TOTAL PROJECT COST	**$49,725**		

SUWANNEE CHD BUDGET NARRATIVE:

Salaries:

Environmental Specialist I (50 hours @ 17.79/hr with 25.75% fringe benefits = $1,119)
Environmental Specialist II (25 hours @ 20.67/hr with 32.19% fringe benefits = $683)
Environmental Supervisor II (75 hours @ 21.12/hr with 34.04% fringe benefits = $2,123)

Contractual Services:

Inventory, Training and Education Outreach:

Inventory Scanning – All OSTDS paper files from 1982 to present will be scanned and indexed, as there are no existing files prior to the above year. Each of the estimated 13,000 files contain about estimated 10–20 documents. The database will includes up to 25 data fields for property identifiers agreed upon by Environmental Supervisor II. The scanning and indexing software and databases (*e-file*) will be compatible with Carmody Program and Septic Search. The scanning location will be in Lafayette or Suwannee County or another area approved by the Environmental Supervisor II in SCHD.

Training and Education Outreach - All materials that can be made and copied at the Suwannee County Health Department will be. In addition, the training will also be conducted at the Suwannee County Health Department.

Inventory Project Set Up:
Includes such things as software and scanning station license, rental space, equipment set up, software identifier set up, scanner, build and populate scanning database, reconcile OSTDS records with tax records and import, etc. **(estimated cost $17,925)**

Reconciling Inventory Data:
Inventory 11 file cabinets of OSTDS Files **($2,400 per box) = $26,400**

Training and Technical Support:
Train CHD staff to use the scanning software to maintain the inventory = **5/hrs x $95/hr = $475**

Supplies and Other Expenses:
Supplies = **$1,000**

UNIONS CHD

UNIONS CHD BUDGET BY CATEGORY:

CATEGORY	SECTION 319 GRANT FUNDS	MATCH FUNDS	MATCH SOURCE
Salaries			
Senior Clerk	$0	$645	Union CHD
Environmental Specialist II	$0	$1,247	Union CHD
Travel	$0	$0	
Equipment	$0	$0	
Contractual Services			
Inventory, Training, Education, Outreach and Project set up (license)	$18,830	$0	
Supplies/ Other Expenses			
Supplies	$500	$0	
SUBTOTALS	**$19,330**	**$1,892**	
TOTAL PROJECT COST	**$21,222**		

UNIONS CHD BUDGET NARRATIVE:

Salaries:

Senior Clerk (40 hours @ $11.20/hr. with 43.89% fringe benefits = $645)
Environmental Specialist II (50 hours @ 18.61/hr with 33.98% fringe benefits = $1,247)

Contractual Services:

Inventory, Training and Education Outreach:

Inventory Scanning – Scan and index all paper files form 1973 forward, as there are no existing files prior to 1973; estimated 3,600 files; estimated 15–20 documents per file; Includes up to 25 data fields for property identifiers agreed upon by Environmental Supervisor; scanning and indexing software and databases to be compatible with Carmody Program and Septic Search; scanning locations to be in Bradford and Union Counties.

Training and Education Outreach - All materials that can be made and copied at the Union County Health Department will be. In addition, the training will also be conducted at the Union County Health Department.

Inventory Project Set Up:

Includes such things as software and scanning station license, rental space, equipment set up, software identifier set up, scanner, build and populate scanning database, reconcile OSTDS records with tax records and import, etc. **(estimated cost $13,555)**

Reconciling Inventory Data:
Inventory 16 Boxes of OSTDS Files **($300 per box) = $4,800**

Training and Technical Support:
Train CHD staff to use the scanning software to maintain the inventory = **5/hrs x $95/hr = $475**

Supplies and Other Expenses:
Supplies = **$500**

PROJECT 9

PROJECT NAME: Fort Pierce - Heathcote Botanical Gardens Treatment Train

PROJECT FUNDING REQUEST: $510,000 **MATCH**: $380,000

LEAD ORGANIZATION: City of Fort Pierce

CONTACT PERSON: Jack Andrews, City Engineer
100 North U.S. 1, P.O. Box 1480
Fort Pierce, FL 34954
Tel: 772-460-2200, ext 143
Fax: 772-460-6847
Email: jandrews@ftpierceeng.com

COOPERATING PARTNERS: Heathcote Botanical Gardens, City of Fort Pierce Engineering Department, St. Lucie County Engineering Department, SFWMD Martin County Service Center, SJRWMD/Indian River Lagoon Program

PROJECT ABSTRACT:

Type of Treatment: This project will construct a treatment train including installations of six different stormwater Best Management Practices (BMPs) over 24 months on 60 acres of land, owned jointly by St. Lucie County and the City of Fort Pierce and planned for development as a recreational stormwater park by Heathcote Botanical Gardens in the City of Fort Pierce. This project will address the construction of three of the six stormwater BMPs, including: (1) enhancing littoral zones along an existing stormwater lake shoreline; (2) the installation of vegetated mats within the existing stormwater sand mine lake; and (3) construction of bio swales along the western boundary of the park. The other three BMPs include lake enlargement, weir construction and installation of an alum-injection plant at the lake. The new 60-acre Heathcote Botanical Gardens and Recreational Park is set on the edge of a sand mine lake, which receives stormwater from a 1,242-acre watershed of urban and commercial land. The project will include public education including coverage of the project in the City of Fort Pierce quarterly newsletters and as news items in local sections of newspapers. Further, the Heathcote Botanical Gardens will construct a kiosk reporting the stormwater story at the Park project site. These three BMPs of the treatment train project are estimated to reduce TP by 152 lbs/yr or 32%, and TN by 1957 lbs/yr or 28% and are anticipated to reduce pollutant loadings currently degrading water quality and reducing sea grass propagation downstream in the Indian River Lagoon. Collectively, the entire six BMP treatment train is anticipated to reduce TN by 95% and TP by 60%. This proposed 319 program request is $510,000 to be used for a $880,000 project. Funds will be utilized for construction in late 2012.

Summary of Estimated Pollutant Load Reductions: This project is estimated to reduce TP by 152 lbs/yr or 32%, and TN by 1957 lbs/yr or 28%.

Summary of Educational Components: The City of Fort Pierce and Heathcote Botanical Gardens will jointly implement the public education component for this project. It will include coverage of the project in the City of Fort Pierce quarterly newsletters issued to residents and news items in local sections of several local newspapers. Press releases will be distributed upon project completion and educational signage will be provided on site.

Further, the Heathcote Botanical Gardens will construct a kiosk reporting the stormwater story on the Park project site that will educate visitors and residents about the stormwater treatment story.

Summary of Monitoring: Water quality monitoring is planned for the project and will measure pre-construction water quality and post construction samples. A report for DEP will be issued at the end of the project.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: City of Fort Pierce, St. Lucie County
Impacted Watershed Name: Virginia Avenue Canal drainage system
Size of Project Impact: 60 acres
Size of Drainage Area: 1,242-acre basin
Latitude: 27°N 25′ 50″
Longitude: 80°E 17′ 21″.
Hydrologic Unit Code: 03080202-009
Land is owned by: St. Lucie County and City of Fort Pierce

Land Uses within the watershed:

Land Use	Acres	%
Residential	**723**	**58**
Industrial/Commercial	**250**	**20**
Forested	**269**	**22**
Land Use Totals (Acreage and %)	**1,242**	**100**

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: This project supports actions noted in the Indian River Lagoon Comprehensive Conservation & Management Plan, and is listed in the City of Fort Pierce Stormwater Mater Plan, 2000.

List 303(d) listed water body affected: Indian River Lagoon

WBID: 5003B

Impairment: Removal of nutrients and mercury via BMP treatment train. BMAP Action Plan activities in progress.

PROJECT DESCRIPTION: The Fort Pierce - Heathcote Gardens Treatment Train project is located at the confluence of two drainage basins: the Virginia Avenue Canal drainage system, which drains 1,242 acres of a highly developed urban section of Fort Pierce, and the northernmost reach of the 5000-acre Savannas wetland prairie. Based on Dr. Harvey Harper's suggestion in DEP's Stormwater Quality Applicant Handbook, the best way to reduce nutrient loads is to provide a set of Best Management Practices (BMP)s in a row, also called a treatment train, since no single BMPs can reduce the nutrient loads to meet new standards. This project will construct a stormwater treatment train over two phases.

The treatment train includes six different BMPs that will address untreated stormwater flowing from the 1242-acre Virginia Avenue Canal drainage system and will be constructed over a 24-month time period on 60 acres of land acquired under a Florida Communities Trust Program Grant, currently owned jointly by St. Lucie County and the City of Fort Pierce and managed as a recreational park by Heathcote Botanical Gardens, a non-profit organization within the City of Fort Pierce. This proposal will address the construction of three of the six stormwater BMPs, including:

(1) enhancing littoral zones along an existing stormwater lake shoreline; (2) the installations of vegetated mats within the existing stormwater sand mine lake; and (3) construction of bio swales along the western boundary of the park.

The 60-acre Heathcote Botanical Garden and Park is set on the edge of a sand mine lake, which is currently fed by stormwater flowing from the 1,242 acres to the west through a series of canals, weirs, culverts and gate valves. These current canal features provide minimal stormwater treatment and stormwater attenuation prior to discharging the runoff from these basins to the Indian River Lagoon, an Outstanding Florida Water body. The sand mine lake is more than a stormwater treatment facility, it also serves as a stormwater harvesting source for water irrigation for the adjacent city-owned Indian Hills Golf Course to the north, and will become the focal point of the new recreational Park, providing public recreational opportunities and enhanced habitat for plants and wildlife. Currently, the sand mine lake provides some water quality treatment. However, through modifications of the lake size and the configuration of its inlet and outlet, and the implementation of additional Best Management Practices (BMPs), the total nitrogen and total phosphorus within the lake that ultimately discharges to the Indian River Lagoon, will be further reduced.

The following three BMP's will be installed during Phase 1 and are proposed in this application (scheduled for construction October 2012-March 2013) and anticipated to reduce TN by more than 32% and TP by more than 26%:

- Expansion of littoral zone area
- Installation of one acre of vegetative mats (project staff have discussed increasing the proposed single acre to two acres to allow for an increase in long-term pollutant removal rates. Currently, the extremely high long-term project maintenance costs for the mats could eliminate this possibility (estimated at $200,000/acre annually).
- Construction of bio-swales on west side of the lake.

The following three BMP's will be installed during Phase 2 and will be proposed in a future TMDL Water Quality Restoration Grant completed for submittal July 2011 (scheduled for construction October 2011-September 2012) are anticipated to reduce TP by more than 30% and TN by more than 60%:

- Expansion construction of 20-acre sand mine lake
- Installation of Weir
- Construction of alum-injection plant at lake.

Water quality monitoring is planned for the project and will measure pre-construction water quality and post construction samples. A report for DEP will be issued at the end of the project.

The City of Fort Pierce and Heathcote Botanical Gardens will jointly implement this project's public education component. It will include coverage of the project in the City of Fort Pierce quarterly newsletters issued to residents and news items in local sections of several local newspapers. Press releases will be distributed upon project completion and educational signage will be provided on site. Further, the Heathcote Botanical Gardens will construct a kiosk reporting the stormwater story on the Park project site that will educate visitors and residents about the stormwater treatment story.

The Phase 1 treatment train is estimated to reduce TP by 152 lbs/yr or 32%, and TN by 1957 lbs/yr or 28%. This project is anticipated to reduce pollutant loading currently degrading water quality and reducing sea

grass propagation downstream in the Indian River Lagoon. The proposed 319 program request is $510,000 to be used for a $880,000 project. Funds will be utilized for construction in late 2012.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: This proposal is for a structural BMP project. In the below estimated pollutant load reduction, the applicant used the following model: **Harper Model**

BMPs Installed		**TP lbs/yr**	**TN lbs/yr**
BMP #1 Expand Littoral Zones			
Pollutant Loads	Pre-Project	513	7390
	Post-Project	487	7001
	Load Reduction	26	389
	% Reduction	5%	5%
BMP #2 Vegetative Mats		**TP lbs/yr**	**TN lbs/yr**
Pollutant Loads	Pre-Project	487	7001
	Post-Project	390	5602
	Load Reduction	97	1399
	% Reduction	20%	20%
BMP #3 Bio Swales		**TP lbs/yr**	**TN lbs/yr**
Pollutant Loads	Pre-Project	390	5602
	Post-Project	361	5433
	Load Reduction	29	169
	% Reduction	7%	3%
TOTAL		**TP lbs/yr**	**TN lbs/yr**
Pollutant Loads	Pre-Project	513	7390
	Post-Project	361	5433
	Load Reduction	152	1957
	% Reduction	32%	28%

Calculations based on methodology from the March 2010 Draft, Florida Department of Environmental Protection (FDEP) Environmental Resource Permit "Stormwater Quality Applicant's Handbook."

EMCS USED IN MODEL: The annual nutrient load generated from the runoff of the 1242-acre Fort Pierce basin is broken down by land use within the basin as provided in the City of Fort Pierce Master Stormwater Study of the basin. Nutrient loading and current level of treatment provided by

the Sand Mine Lake was determined using the March 2010, Draft FDEP Environmental Resource Permit "Stormwater Quality Applicant's Handbook" criteria as follows:

Area Description	Acreage	Runoff ac-ft/yr	EMC Nitrogen (ppm) (mg/l)	Nitrogen Load lb/ yr	EMC Phosporus (ppm) (mg/l)	Phosphorus Load lb/ yr
Residential	723	1413	1.85	7,097	0.31	1190
Commercial	246	654	2.48	4,402	0.23	409
Industrial	4	11	1.14	33	0.23	7
Open	269	357	1.15	1,113	0.06	57
Total	**1,242**	**2,435**		**12,645**		**1,663**

EMC = Event Mean Concentration

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. The Board of County Commissioners at St. Lucie County and City of Fort Pierce City Council hold title jointly.

Task Number	Task Description
1	Survey 60-acre project site
2	Complete engineering design plans for three treatment train BMPs and gain SFWMD ERP permit and ACOE nationwide permits
3	Prepare, send, receive, evaluate and award construction bid
4	Construct stormwater treatment train facilities for three BMPs to treat the 1,242-acre drainage area
5	Provide post-grant award project administration
6	Implement a water quality monitoring program to measure pre and post construction pollutant loadings
7	Implement the planned educational component at the new recreation park targeting the residents and visitors

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Survey 60-acre project site	A complete survey of the project site.	N/A	Completed
2	Complete engineering design plans for all four treatment train BMPs and gain SFWMD ERP permit and ACOE nationwide permits	A complete set of design and construction drawings, an construction specifications.	N/A	Completed
3	Prepare, send, receive,	A construction contract	Month 2	Month 3

	evaluate and award construction bid	with a notice to proceed given to the responsible low bidder.		
4	Construct stormwater treatment train facilities for all BMPs to treat the 1,242-acre drainage area	The acceptance of the completed facilities according to design.	Month 3	Month 15
5	Provide post-grant award project administration	Quarterly reports to DEP, stormwater-monitoring reports, and preliminary and final project reports will be written by the grant administrator.	Month 1	Month 24
6	Implement a water quality monitoring program to measure pre and post construction pollutant loadings	Bi-monthly stormwater reports, storm event auto sampler reports, and twice-a-year stormwater analysis reports will be comple	Month 1	Month 24
7	Implement the planned educational component at the new recreation park targeting the residents and visitors	Quarterly information regarding the status of the project conveyed to the public. Slides will be taken throughout the design and construction phases of the project and will be provided with the final report. Educational signage will be provided on site.	Month 1	Month 24

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Survey (contractual)	$0	$80,000	FP SW Utility
2	Engineering Design/Permits (contractual)	$0	$260,000	FP SW Utility
3	Bidding/Award (salaries)	$0	$10,000	FP SW Utility In-kind
4	BMP Construction (contractual) Littoral zones Vegetative Mats Bio Swales	 $50,000 $360,000 $30,000	$0	
5	Grant Administration (salaries)	$0	$10,000	FP SW Utility In-kind

6	Water Quality Monitoring (contractual)	$70,000	$10,000	FP SW Utility
7	Educational Component (contractual)	$0	$10,000	FP SW Utility Heathcote In-kind
Total:		$510,000	$380,000	
Total Project Cost:		$890,000		
Percentage Match:		57%	43%	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. The project includes vegetative mats, expanded littoral zones and bio swales.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The ERU = $30/yr.

- Does the project fall within a watershed undergoing BMAP development?

  Yes. The BMAP under development is in the South Indian River Lagoon (St. Lucie /Loxahatchee).

REFERENCES CITED:

March 2010 Draft, FDEP Environmental Resource Permit "Stormwater Quality Applicant's Handbook."

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment 1

- ☑ Site Maps (in graphic file format (i.e. - .**doc**, .jpg, .tiff)):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment 2
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – water bodies and water courses), site boundaries, and aerial imagery if available: Attachment 3
  - ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment 4

  Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- ☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from landowners or match contributors, etc:
  - ☑ Attachment 5, Project's Detailed Cost Estimate
  - ☑ Attachment 6, Pollutant Loading Calculations
  - ☑ Attachment 7, Project Site Photographs

PROJECT 10

PROJECT NAME: Paynes Prairie Sheetflow Restoration – Phase 2

PROJECT FUNDING RECOMMENDED: $467,270 **MATCH:** $1,159,271
PROJECT FUNDING REQUESTED: $1,062,400 **MATCH**: $2,656,000

LEAD ORGANIZATION: City of Gainesville

CONTACT PERSON:
Stewart E. Pearson, P.E.
Public Works Department
P.O. Box 490, MS # 58
Gainesville, FL 32602-0490
Tel: (352) 334-5070 (x 5803)
Fax: 352) 334-2093
Email: pearsonse@cityofgainesville.org

COOPERATING PARTNERS: The Orange Creek Basin Working Group, Florida Department of Environmental Protection, Division of Recreation and Parks, Paynes Prairie Preserve, St. Johns River Water Management District, Gainesville Regional Utilities, Alachua County of Environmental Protection, Florida Department of Transportation

PROJECT ABSTRACT:

Type of Treatment: The proposed Sweetwater Branch/Paynes Prairie Sheetflow Restoration Project (PPSRP) is a nutrient reduction project whose best management practices (BMP) include a 1) water reclamation plant upgrade, 2) Sweetwater Branch channel improvements to stabilize the channel, capture sediment and trash, 3) create a 125 acre treatment wetland to provide a unique and innovative approach to achieving TMDL requirements, 4) construct a mile and a quarter long sheetflow distribution channel and 5) back fill almost two miles of existing canal to eliminate short circuiting. Note: 1) above is excluded from funding request.

This combination of BMP¨s provides an innovative treatment train using physical and biological processes that yields significant environmental benefits to Alachua Sink and the Park. The anticipated removals are for 61,194 lb/yr total nitrogen (N), and 18,937 lb/yr for total phosphorus (P). It should be noted that P is not a pollutant of concern, however it is included for information todemonstrate that the discharge to the native prairie habitat will not adversely be impacted by the discharge.

TMDL – This project is to remove excess total nitrogen (TN) identified in the Nutrient TMDL for Alachua Sink, WBID 2720A in Table 49, on page 69 for Wastewater (41,090 lb/yr) and NPDES Stormwater (45% of current stormwater outfalls or 12,284 lb/yr). Neither of the allocations is attached to a permit for compliance.

Additional TN will be removed resulting from the public access component of the project that anticipates about 500 visitors per day, at full build out, whom will be served by an On Site Treatment Disposal System (OSTDS). The OSTDS design includes a treatment module

to reduce the total nitrogen to the project goal of less than 10 milligrams per liter (mg/l). The selected module will be based on the "Bold & GoldTM" or the subsurface upflow wetland (SUW) as reported *in On-Site Sewage Treatment and Disposal System, Evaluation for Nutrient Removal*, April 17, 2011 (Chang, Wanelista, et.al.)

Summary of Estimated Pollutant Load Reductions: Pollutant load reductions for the treatment train and the On-Site Treament Disposal System (OSTDS) are estimated as follow:

- Sediment Basin and Forebay: These elements are estimated to capture 95% (10.2 million lbs./annually) of the sediment transported. The Basin captures the coarse material, the Forebay the finer sediments and colloidal material. The Basin is cleaned annually and the Forebay every 10 years; annualized data is presented. Peak flow analysis determines that 95% of the daily flow of Sweetwater Branch is less than the design flow for the wetland system (25 cubic feet/second), the balance, storm event flows, are bypassed to the prairie.
- The Trash Trap is estimated to capture 75% of the floating trash volume (4,500 cubic feet) annually.
- The Wetland Treatment System and the OSTDS reduce the TN and TP by 67% (124,785 lbs.) and 35% (2,948 lbs.), respectively, annually.

Summary of Educational Components:

Project Educational Program

Water quality enhancement is the primary goal of this Project; however, an important secondary goal is to enhance the public use of the facility so that visitors understand the series of facilities and the process that reduces the excess pollutants to naturally sustainable levels. A conceptual design of the public use facilities has been developed, and this conceptual design was based on five goals established by the project team. These goals include the following: provide accessible outdoor recreation, tell the story of water, communicate the wild, connect to the regional trail network, and sit lightly on the landscape. Accomplishing these goals will occur incrementally as more of the public access facilities are constructed in each of the phases.

Phase 1 consists of a web site and video, created in 2009, that introduces the project to the local and internet community. The web address is: http://www.cityofgainesville.org/GOVERNMENT/CityDepartmentsNZ/PublicWorks/PaynesPrairieSheetflowproject/tabid/648/Default.aspx and has a link to the video. The video is resident on the City's public access channel as a feature item and serves as an example of the type educational outreach message for the; brochures, signage both wayfinding and interpretative and programming envisioned for the facility. The emphasis in all these media will be the natural resource use, sustainability of the process and the robustness of the resulting created ecosystem with its plants and animals.

Phase 2 of the program will add the basic on site facilities. These facilities are: Entry Building with restrooms, ~ 4 miles of trails both surfaced and boardwalk, open classroom pavilion, 6 shade structures and viewing platforms, 16 interpretive sites with graphics and narratives and the treatment facilities: sediment basin, trash trap, forebay, treatment

wetlands and ancillary island enhancements, distribution channel, 1300 acres of restored prairie and OSTDS. This phase will be implemented concurrent with the listed treatment facilities.

Phase 3 facilities, the Visitor Center and Tower, are planned to be constructed as funding becomes available. The Visitor Center, ~ 2000 sq. ft., will accommodate up to 80 for meetings or trainings, have air conditioning or natural ventilation depending on climatic conditions, and be accessible to all visitors. The Tower will rise about 60 feet above the trail level, have 5 viewing platforms of which the first will be accessible to all visitors. Solar panels will mounted on top to supply some energy for use on the project.

Educational Programming: The Florida audience for the facility is best represented by the population in Florida Planning Council Regions; Northeast, North Central and Withlacoochee, with a population of about 2,381,000. The facility will be open 365 days a year and planners anticipate up to 500 visitors a day or 182,500 per year, which is a bit more than 7% of the targeted population. Details on programming are not yet developed due to project completion date of 2014. However, the video referenced above serves as an example of the type educational outreach message envisioned for the facility. The emphasis will be the natural resource use, sustainability of the process and the robustness of the resulting created ecosystem with its plants and animals. The schedule for field activities, workshops and presentations will be developed. During the construction phase two activities are planned; 1) public walking tours and 2) photo journal of construction activities on the website. The public walking tours will be scheduled every 6 months. These one day events will have an opportunity for public to see the progress and understand some of construction complexities in completing the project. The Photo Journal will be updated monthly with current photos of the construction activities and progress.
Effectiveness Assessment - A card and website questionnaire will be available to participants for offering their opinion on the adequacy of the media and content of the educational material. A compilation of the responses and interpretation the data will be included in an annual report on the facility.

Summary of Monitoring:

This project requires monitoring for; the Sedimentation Basin, the Trash Trap, the Treatment Wetland and the On-Site Treatment Disposal System (OSTDS).
Sediment Basin - Records of the volume and weight will be kept the first year of operation to quantify the volume of sediment captured by the facility. This data can be compared to the design estimates. Screenings of the material will also be performed to document the grain size captured.

Trash Trap - Records of the volume and weight will be kept the first year of operation to quantify the volume of sediment captured by the facility. This data can be compared to the design estimates.

Treatment Wetland - This project requires two protocols for monitoring; Maintenance of Operations to demonstrate facility efficacy and Storm Event to demonstrate treatment effectiveness during the defined rainfall events.

Maintenance of Operations Monitoring
Monitoring of the water levels and water quality at the inlets and outlets is anticipated as well as the robustness of the desired wetland plant communities. .

Inflows and outflows will be monitored for the following parameters:
- Field parameters: temperature, pH, dissolved oxygen, specific conductance.
- Nutrients: total suspended solids, total phosphorus, ortho-phosphorus, total kjeldahl nitrogen, ammonium nitrogen, nitrate/nitrite nitrogen

Two types of basic vegetation monitoring are proposed:
- Aerial photography and interpretation
- Semi-quantitative plant cover estimates

Storm Event Monitoring

The Storm Event monitoring is to be integrated with the Maintenance Monitoring to develop the essential data required by 319 funding. For this project it is proposed that one storm event series be conducted two years (two growing seasons) later after the newly planted wetland has had a opportunity to mature.

OSTDS Monitoring - This monitoring will collect up to 12 samples of the influent to the OSTDS and up to 18 sampling events of the groundwater flowing from the discharge area from a minimum of three ground water wells. Data collected will be; total suspended solids, the five day carbonaceous biochemical oxygen demand, total kjehldahl nitrogen, total nitrogen, soluble reactive phosphors, total phosphors, fecal coliform and e. coli..

A more complete explanation is presented in Attachment 1.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: City of Gainesville, Alachua County
Impacted Watershed Name: Sweetwater Branch/Orange Creek Basin/ Ocklawaha
Size of Project Impact: The foot print of the easement for the project is 263 acres, the constructed wetland is 125 acres.
Size of Drainage Area: 2,130 acres
Latitude: 82o 19′ 31″ W
Longitude: 29o 36′ 55″ N
Hydrologic Unit Code: 030801021105

Land is owned by: The City of Gainesville owns 30 acres, has a long term lease for an additional 225 acres from the Florida Division of State Lands over the remaining project site.

Land Uses within the watershed:

Land Use	Acres	%
Residential	**1669.2**	**78.37**

Industrial/Commercial	**0**	**0**
Agricultural	**33.8**	**1.59**
Forested	**187.9**	**8.82**
Wetlands	**239.1**	**11.23**
Land Use Totals (Acreage and %)	**2130**	**100**

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: ***Orange Creek Basin Surface Water Improvement And Management Plan, Review Draft April 5, 2011*** The Paynes Prairie Sheetflow Restoration Project is referenced on pages 37 and 58 of the cited document.
List 303(d) listed waterbody affected: Alachua Sink
WBID: 2720A
Impairment: Based on the water quality data provided by the St. Johns River Water Management District (SJRWMD), Alachua Sink was determined to have elevated nutrient and chlorophyll *a* (chl*a*) values, with an average Trophic State Index (TSI) score of 78 from 2000 through 2002. For this period, the average annual total nitrogen (TN), total phosphorus (TP), and chl*a* concentrations were 4.33 milligrams per liter (mg/L), 1.279 mg/L, and 40.8 µg/L, respectively. For all years of record, the annual TSI was above 60. The mean color of Alachua Sink during this period was calculated as 106 platinum cobalt units (PCUs). (Gao, Gilbert, Magley 2006)

PROJECT OBJECTIVE(S): The proposed project will restore sheetflow to Paynes Prairie that emanates Sweetwater Branch. At a minimum this project is expected to provide the following benefits:

1. Restore (re-hydrate) over 1,300 ac of formerly-impacted wetlands in Paynes Prairie;
2. Improve water quality in Alachua Sink and cost effectively attain regulatory TMDL requirements for the City of Gainesville and the Florida Department of Transportation;
3. Create the opportunity for a city park, the "Sweetwater Branch Wetland Park" which will include about 150 ac of high-quality wetland wildlife habitat and a public use area for bird-watching and nature study;
4. Naturally assimilate other nutrients, sediments and other pollutants in the Sweetwater Branch in order to protect the Paynes Prairie, Alachua Sink, and the Floridan Aquifer; and
5. Restore part of the overall water flow to Paynes Prairie, which has been impacted by diversion of water from the Prairie at other locations.

Comprehensive Watershed Plan

This proposed project is the product of comprehensive watershed plan that emerges though the combination and integration of state, regional and local plans. At the State level the Total Maximum Daily Load (TMDL) program defines the 5 phase process for defining impaired waters and the monitoring of the results of actions taken to correct the impairment. At the regional water shed level the jurisdictional responsible parties participate with FDEP representatives in developing strategies to reduce the pollutant(s) of concern through administrative, regulatory or structural measures. In this instance the 2007 Orange Creek Basin Management Action Plan provides specific actions and dates for completion. This activity occurs within the Phase 4 element of the TMDL program. At the local level the jurisdictional representatives prepare watershed management plans to address their impaired water bodies. These plans evaluate efficacy of actions and establish

priorities for those actions based on the availability of resources to complete the action. This activity occurs within the Phase 5 element of the TMDL program. In this instance, the Sweetwater Branch Water shed Management Plan presents proposals to implement pollutant reduction. Specifically this project is known as Project 11 (Table 8-2) and has a „highest" priority ranking.

PROJECT DESCRIPTION: The project conceptual plan (See Attachment 3, Figures 1 & 2) represents the culmination of focused efforts from a partnership of organizations including the Florida Department of Environmental Protection, St. Johns River Water Management District, City of Gainesville, Alachua County and the Florida Department of Transportation.

Sweetwater Branch is a natural stream which runs through Gainesville urban area, and flows through Paynes Prairie and into Alachua Sink via a manmade canal. Sweetwater Branch receives stormwater runoff, treated wastewater and septic discharge from the Gainesville urban area.

The conceptual plan for re-establishing sheetflow of high quality water on Paynes Prairie includes the following four components: 1) upgrades to the Main Street Wastewater Reclamation Facility to optimize nitrogen and phosphorus removal; 2) Sweetwater Branch channel improvements to stabilize the channel, capture sediment and trash, 3) construction of a 125 acre constructed trestment wetland that will polish the flow from Sweetwater Branch; 4) construction of a mile and a quarter long sheetflow distribution Channel that will restore the natural sheetflow of water from the enhancement wetland onto Paynes Prairie; and 5) removal of two miles of drainage canals on Paynes Prairie.

Water entering the Sheetflow Restoration Area must be of sufficient quality to allow the reestablishment of desirable, native wetland plant communities and wildlife habitat. This will require reductions in phosphorus in addition to nitrogen. Project studies have established the necessary quality levels to ensure that these criteria can be achieved through the proposed combination of Main Street Wastewater Reclamation Facility upgrades and the Sweetwater Branch Treatment Wetland. These studies have also determined that additional assimilation of residual nutrients will naturally occur within the Sheetflow Restoration Area so that background nutrient levels similar to estimated pre-development concentrations will be achieved.

The Paynes Prairie Sheetflow project will be divided into phases; the first phase is the improvements to the Main Street Water Reclamation Facility to optimize phosphorus removal. The goal of the improvements will be to lower total phosphorous levels below 0.3 mg/L through the addition of a chemical removal process. The goal of the project is to provide total nitrogen and total phosphorous levels below 3.0 mg/L and 0.3 mg/L, respectively to the sheetflow area.

The Treatment Wetland is located on City of Gainesville property and within Paynes Prairie Preserve State Park. The City of Gainesville has exchanged a parcel of land within the Optimum Park Boundary for a 225 acre easement over the project site. The St Johns River Water Management District, Alachua County and the city have purchased a 276 acre parcel (Edwards Property) and exchanged two thirds of the property with the Florida Department of Environmental Protection, Division of State Lands for an easement over the project site.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:

This proposal is for a structural BMP project. In the below estimated pollutant load reduction, the applicant used the following model:

- Sediment Basin and Forebay: Newton's and Stokes Laws.
- Treatment Wetland: The steady state k-C* model of Kadlec and Knight (1996)
- Sheetflow Area: The steady state k-C* model of Kadlec and Knight (1996)
- OSTDS: Calculations by Applicant based on data in *On-Site Sewage Treatment and Disposal Systems Evaluation for Nutrient Removal*, University of Central Florida, Chang, Wanelista, et. al., April 2011. Assumed 70 mg/l, TN for influent and effluent of 10 mg/l, TN.

Estimated Pollutant Load Reductions were able to be estimated by using the following methodology:

The pollutant load reduction methodology for the Wetland is not listed in the application document and, therefore, is included for reviewer reference.

5.8.1.2 Enhancement Wetland Water Quality Performance Assessment

Three empirical wetland water quality models were previously used to provide comparative estimates for the performance of the proposed Sweetwater Branch Treatment Wetland and for the additional nutrient assimilation that could occur in the proposed Sweetwater Branch Sheetflow Restoration area (WSI, 2006b). The tanks-in-series formulation of the k-C* model (Kadlec and Knight, 1996) is a first-order, steady-state algorithm that estimates long-term average performance based on long-term average inflow conditions. The Dynamic Nitrogen Model (WSI, 2005) and Dynamic Model for Stormwater Treatment Areas Version 2 (DMSTA2; Walker and Kadlec, 2005) provide daily estimates of wetland performance based on daily input data sets. Both of the dynamic models explicitly include climatic effects (rainfall and evapotranspiration) and provide the ability to model wetland systems that receive highly variable inflows and nutrient concentrations.

While the k-C* model is relatively simple and based on long-term average conditions, it is widely accepted for use, has been extensively peer reviewed, and has been calibrated with data from hundreds of wetlands. The two dynamic models that were previously used are conceptually better able to simulate the dynamic behavior of wetlands receiving stormwaters but have less critical review for use in North Florida and fewer relevant calibration data sets. For these reasons the k-C* model is considered to be the best tool for estimating wetland performance at this time and was used to support the design of the proposed Enhancement Wetland.

P-k-C* Model
Kadlec and Wallace (2009) promote the P-k-C* model as the preferred tool for sizing constructed wetlands and determining removal rate parameters from operational data. This model is a variant of the previously-published tanks-in-series (TIS) formulation of the first-order k-C* model (Kadlec and Knight, 1996). The model equation is given below and incorporates the following key principles:

- Wetland removal processes are area-based and follow first-order kinetics.
- For some parameters, internal cycling results in non-zero background concentrations (C*).

- Physical factors that influence the hydraulic efficiency of wetlands, including topography, wetland geometry, vegetation density and spatial distribution, and wind fetch lead to non-plug-flow conditions and should be included in calculations.
- Factors that describe pollutant mixtures or contaminant "weathering" should also be included in the model.

[EQUATION EXCLUDED IN WORKPLAN]

In the earlier TIS model, the effects of hydraulic efficiency were described by the parameter N, the number of TIS. In the updated model, N has been replaced by P and combines the effects of hydraulic efficiency and pollutant mixtures or weathering such that P < N (Kadlec and Wallace, 2009).

For certain parameters where removal mechanisms are correlated with temperature or season, it is necessary to correct the value of k for the ambient water temperature:

[EQUATION EXCLUDED IN WORKPLAN]

Values for the model parameters k, C*, and P used for this analysis are modified from Kadlec and Knight (1996) and summarized in Table 5.8.1. These model parameters represent global medians and are typical of a wide range of wetlands receiving elevated nutrients and solids. It should be noted that the value of C* for TN is variable and depends to some extent on site conditions (soil nitrogen storages and TN in precipitation). A C* value for TN of 1.0 mg/L appears to be realistic based on ambient nitrogen levels observed on Paynes Prairie. A P value of 3 is a reasonable assumption for single constructed wetland cells (Kadlec and Wallace, 2009).

[EQUATION EXCLUDED IN WORKPLAN]

Sequential Nitrogen k-C* Model

Because nitrogen occurs in a number of different oxidation states in constructed wetlands and numerous biological and physical-chemical processes can transform nitrogen between these different forms, a more complex version of the TIS model is required to predict nitrogen-removal performance (Kadlec and Knight, 1996).

Organic nitrogen, NH4-N, NO3-N, and nitrogen gasses are the primary nitrogen forms in surface waters. A fraction of Org-N is mineralized to NH4-N in aquatic and wetland systems. The reduction in Org-N using the TIS model is given by the following equation:

[EQUATION EXCLUDED IN WORKPLAN]

Water temperature and pH determine the extent to which NH4-N is distributed between ammonium (ionized form) and its volatile form (un-ionized ammonia). NH4-N can in turn be oxidized to NO3-N through aerobic microbial processes (nitrification). Depending on the amount of Org-N found in the source water, NH4-N can be both produced and consumed in wetlands. The following two-step reaction model from Kadlec and Knight (1996) can be used to estimate the concentration of NH4-N (CAN):

[EQUATION EXCLUDED IN WORKPLAN]

Oxidized nitrogen presents the same difficulty as ammonium: it is produced (nitrification) as well as consumed (nitrate reduction) in wetlands. Oxidized nitrogen may also be used in plant growth in the absence of significant ammonium nitrogen. The three-step equation from Kadlec and Knight (1996) was used to estimate the combined effects of all processes on NO3-N concentrations (CNN):

[EQUATION EXCLUDED IN WORKPLAN]

Uncertainty

One method of accounting for stochastic variability is to review applicable wetland operational data and evaluate the distribution of measured outflow concentrations around the model-estimated long-term average concentration (Kadlec and Wallace, 2009). This type of approach yields factors that relate the average value (model estimate) to various confidence levels that measured outflow concentrations will be in compliance with permit limits. The following factors were used in this analysis as multipliers on estimated long-term average wetland outflow concentrations (Kadlec and Wallace, 2008):

- TN – 80th Percentile = 1.31
- TN – 90th Percentile = 1.53
- TP – 80th Percentile = 1.65
- TP – 90th Percentile = 2.29

For example, if the annual average wetland outflow TN concentration was estimated to be 2.0 mg/L, it could be presumed that 80% of the monthly average values would not exceed 2.62 mg/L (1.31 x 2.0).

BMPs Installed		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment ** lbs/yr**	**Other cf/yr**
Sedimentation Basin Forbay & Trash Trap						**Trash Trap**
Pollutant Loads	Pre-Project	*			**4,518,881**	**6,000**
	Post-Project	*			**225,944**	**1,500**
	Load Reduction	**5,908,300**			**4,292,936**	**4,500**
	% Reduction	**95**			**95**	**75**
Treatment Wetland		**TSS lbs/yr**	**TP^ lbs/yr**	**TN^ lbs/yr**	**Sediment lbs/yr**	**Other lbs/yr**

Pollutant Loads	Pre-Project		**8,521**	**187,357**		
	Post-Project		**5,573**	**62,990**		
	Load Reduction		**2,948**	**124,367**		
	% Reduction		**35**	**66**		
OSTDS^^		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project			**N/A**		
	Post-Project			**488**		
	Load Reduction			**418**		
	% Reduction			**86**		
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**Other cf/yr** **Trash Trap**
Pollutant Loads	Pre-Project		**8,521**	**187,357**	**4,518,881**	**6,000**
	Post-Project		**5,573**	**63,478**	**225,944**	**1,500**
	Load Reduction	**5,908,300**	**2,948**	**124,785**	**4,292,936**	**4,500**
	% Reduction	**95**	**35**	**67**	**95**	**75**

Notes: **The Sediment Basin captures the coarse sediment; see Sediment above. ***The Forebay captures the finer sediments and colloidal material; see TSS above. * Included with the Sediment data. The Sediment Basin is cleaned annually, the Forebay every 10 years: annualized data is presented. ^ Source: Preliminary Engineering Report, Jones Edmunds & Associates, January 2010 ^^Calculations by Applicant based on data in *On-Site Sewage Treatment and Disposal Systems Evaluation for Nutrient Removal*, University of Central Florida, Chang, Wanelista et. al., April 2011. Assumed 70 mg/l, TN for influent and effluent of 10 mg/l, TN.

EMCS USED IN MODEL:

Sediment Basin and Forebay: Modeling for these facilities used the following methodology:

Based on the results of the stormwater sampling, Jones Edmunds developed a number of regression curves to determine the most appropriate way to correlate sediment loads with available flow data. From these regressions, the curve relating total event load and event mean flow (see Figure 5.4.1) showed a strong correlation and appeared to be the most reasonable and meaningful relationship for predicting sediment loads from the available streamflow data.

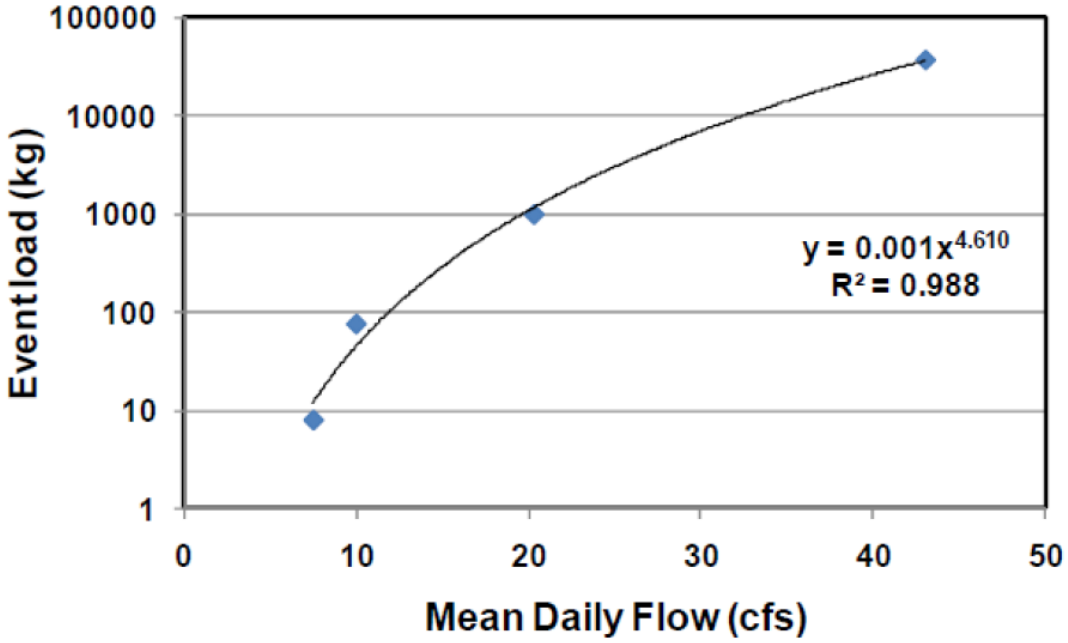


Figure 5.4.1 Regression Analysis of Total Event Load vs. Mean Flow

However, extrapolating this curve beyond the observed flows resulted in unrealistic sediment loads due to its exponential nature. Based on Dr. Nunnally's previous assessments of Sweetwater Branch, it was assumed that the sediment transport in Sweetwater Branch transitions from being a transport limited stream to a supply-limited stream as flow increases. Therefore, the sediment loading is expected to approach an asymptotic maximum as stream flow increases. To model the different transport regimes, a relationship between concentration vs. flow (see Figure 5.4.2) was developed from the sample data. This linear relationship was used to predict sediment loads for mean flows beyond those measured in the sampling effort (flows greater than 43 cfs).

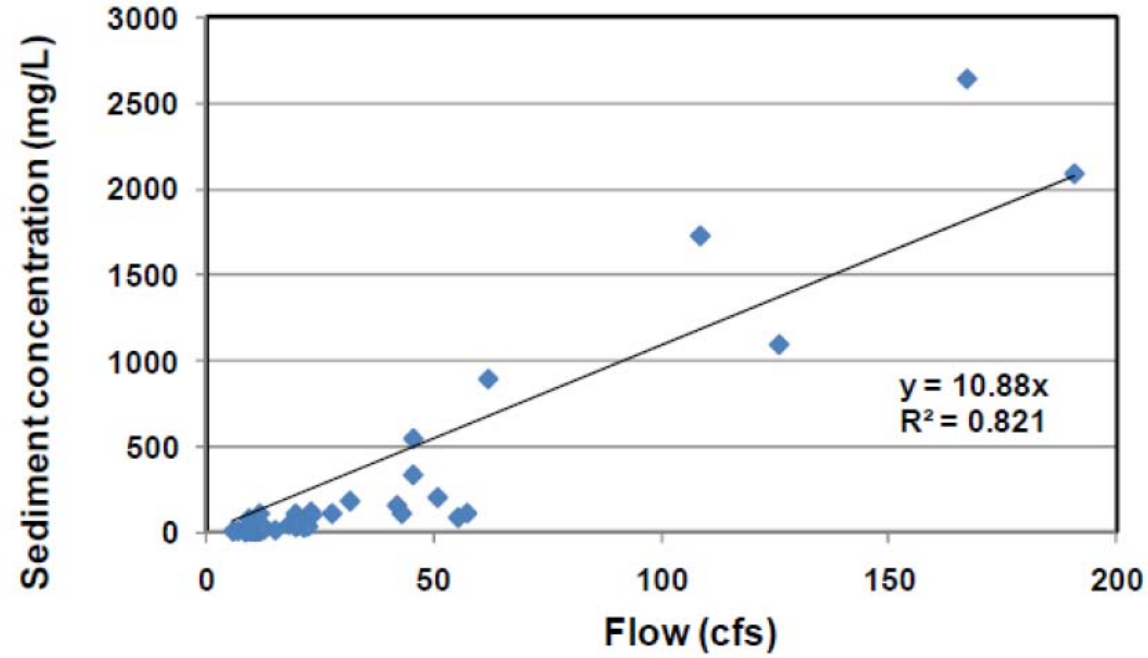


Figure 5.4.2 Regression Analysis of Suspended Sediment Concentration vs. Flow

The results from these two regressions were applied to a dataset of daily mean flows for 1997 to 2008 compiled from 15-min interval data from the SJRWMD Williston Road gauge. Figure 5.4.3 shows the results of the load estimates using the combined regression relationships.

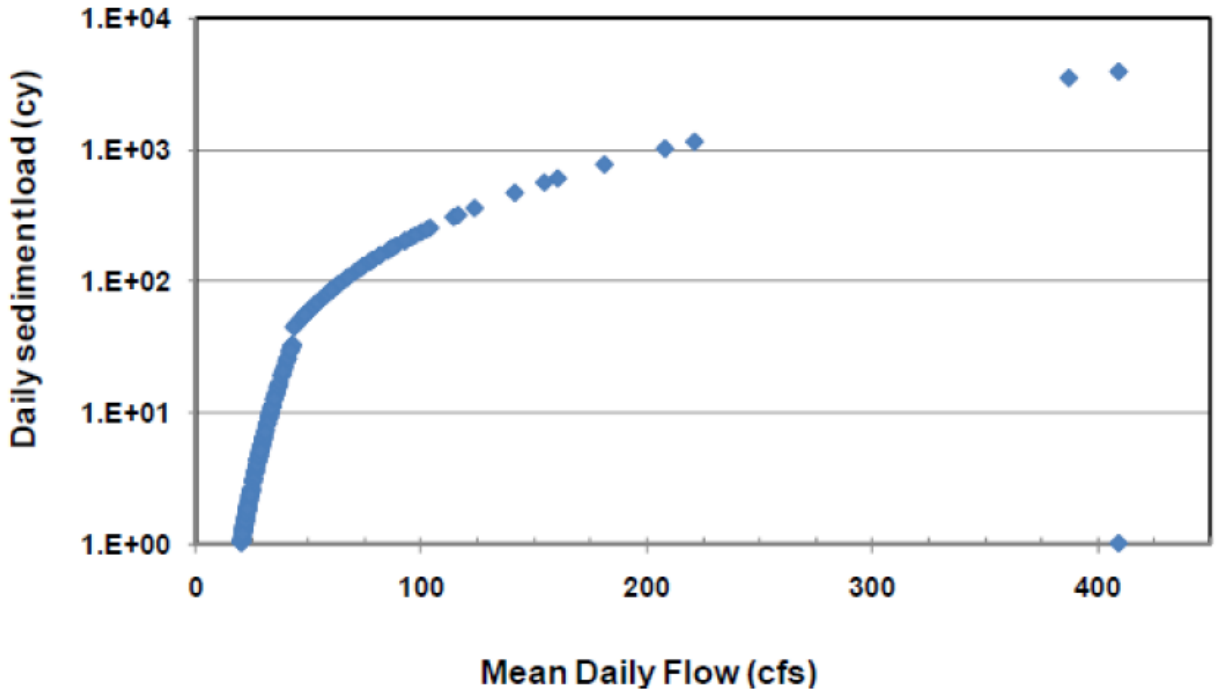


Figure 5.4.3 Daily Sediment Load vs. Mean flow

Table 5.4.2 shows a statistical summary of the estimated daily sediment loads for the period of record.

Table 5.4.2 Statistical Summary of Daily Sediment Loads 1997-2008 (CY)	
Mean	4.9
Standard Error	1.38
Median	0.04
Mode	0.45
Standard Deviation	88.7
Minimum	0.0
Maximum	3,902.1
Sum	20,086.3
Confidence Level (95.0%)	2.71

The daily estimates above were grouped by year and summed to develop the annual loads in Table 5.4.3.

Table 5.4.3 Annual Sediment Loads		
Year	Mean Daily Flow, cfs	Annual Sediment Load, CY
1997	14.4	718
1998	16.9	6,016
1999	12.1	373
2000	10.9	609
2001	13.3	957
2002	11.7	444
2003	12.6	610
2004	12.5	3,920
2005	16.0	4,417
2006	10.9	636
2007	10.7	631
2008	9.5	755
Average	13	1,674

These data were then summarized by year, resulting in a mean annual load of roughly 1,700 CY. The estimated maximum annual sediment load is approximately 6,000 CY over the past 10 years. In addition to the annual sediment load estimates, the design team considered sediment loads that occur during extreme storm events. These were estimated using the relationship shown in Figure 5.4.3. Table 5.4.4 summarizes the sediment loads estimated for the design storms.

Table 5.4.4 Sediment Loads Estimated for the Design Storms	
Storm Event	Sediment load (CY) Concentration vs. Flow Regression
10-year/24-hour storm	3,081
25-year/24-hour storm	6,299
100-year/24-hour storm	12,352

In establishing the design criteria for nominal storage capacity, the design team's goal was to provide a system that would facilitate routine maintenance for average annual conditions as well as protection and storage capacity during extreme storm events. To account for this, the Sedimentation Basin and Forebay were sized to withstand the annual average loading in addition to the 10-year/24-hour storm (3,081 CY) and the 25-year/24-hour storm (6,300 CY), respectively.

The minimum capacities calculated for the Sedimentation Basin and Forebay are approximately 9,500 and 46,100 CY, respectively (see Table 5.4.5 for details). The volume needed is directly related to the desired maintenance frequency. The Sedimentation Basin will be maintained annually while the Forebay will be cleaned every 10 years. Descriptions of the maintenance procedures for the Sedimentation Basin and foreboay are provided in Section 7.1. To be conservative, the Forebay capacity is not credited with any removal that occurs in the Sedimentation Basin during a larger event. In addition, the Forebay is loaded with the annual sediment to compensate for the potential re-suspension of material in the Sedimentation Basin in an extreme storm event.

Table 5.4.5 Settling Facilities Storage Requirements for Maintenance and Design Storm Treatment

	Sedimentation Basin	Forebay
Mean annual sediment load, CY =	1,674	1,674
Design storm sediment load, CY =	3,081	6,299
Maintenance frequency, yrs =	1	10
Max sediment accumulation, % =	0.50	0.50
Minimum Capacity required, CY =	9,510	46,078

Trash Trap EMC: A rough estimate of the amount of gross pollutants, meaning trash and litter, in Sweetwater Branch was generated assuming 80 wet lb/acre (Allison, 1998) across the watershed. This method was checked against an estimated loading based on the land use (RBF Consulting, 2003). Both methods yielded similar loading rates as shown in Table 5.5.1. Approximately 20 to 25% of gross pollutants are floatable. The system was designed based on double the estimated value, or 12,000 ft3/year of floating debris.

Table 5.5.1 Gross Solids and Floating Debris Estimate

	Gross Solid Volume (ft^3/year)[3]	Floatable Debris (ft^3/year)[4]	Floatable Wet Weight (lbs/year)[3]	Floatable Dry Weight (lbs/ac/year)[5]
Estimate[1]	29,000	5,800	89,000	27,000
Design Values[1]	58,000	12,000	178,000	54,000
Estimate[2]	30,000	6,000	94,000	28,000

[1] Based on RBF Consulting, 2003 estimates for commercial, residential, and light-industrial Land Use Types.
[2] Based on Allison *et al.* (1998) estimate of 80 lb/ac/yr, wet weight for a typical mixed-use watershed.
[3] Assumes a typical pollutant density (wet) of 15.5 lb/ft^3.
[4] Assumes 20% of the Gross Solid Volume is Floatable Debris.
[5] Assumes a wet-to-dry ratio of 3.3 to 1.

Treatment Wetland EMC: The treatment wetland receives flow from the upstream water reclamation plant and Sweetwater Branch:

- The existing plant has a maximum permitted AADF of 7.5 MGD (11.6 cfs). As influent flows reach the permitted capacity, effluent TN is expected to increase to about 8.0 mg/L with 7.2 mg/L as NO3-N+NO2-N.
- Sweetwater Branch - 1.79 mg/l

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by the City of Gainesville for the 30 acre parcel and the 225 acre easement on state lands.

TASK DESCRIPTION:

Task Number	Task Description
3	Mobilization – Project Mobilization
3A	Construction of the Overflow Channel Spillway: Completed construction and stabilization of the first weir structure. An as-built survey and photographs of the completed construction will be included in the 319 Project Report.
4	Construction of the Overflow Channel: Completed construction and stabilization of the Eastern Overflow Channel. An as-built survey and photographs of the completed construction will be included in the 319 Project Report.
5	Construction of one half of the Sheetflow Distribution Channel: Completed construction and stabilization of one half of the Sheetflow Distribution Channel. An as-built survey and photographs of the completed construction will be included in the 319 Project Report.
6	Project Administration and Inspection: Administrative responsibilities will include financial accounting, invoicing, and grant reporting to the Florida Department of Environmental Protection. Construction inspection may be carried out by City staff or a contractor. Quarterly Progress Reports and Invoices; problems encountered during the project; and a detailed financial accounting of the project costs, including grant and match funding.
7	Presentation of Project at a Professional Conference: City Staff will present the project at a professional conference and possibly show the project video. Photographs of the construction progress will be presented. The portion of the work included in the 319 grant will be highlighted and the project funding source will be discussed.
8	As-Built Survey: The City will obtain an As-built survey of the project components included in Phase II, including the Overflow Channel Spillway, Overflow Channel, and the Eastern ½ of the Sheetflow Distribution Channel. The survey will be compared to the construction plans to ensure that the work was carried out in accordance with the design and project permits. If necessary, the contractor will correct any significant deviations from the plans and the City will conduct a second as-built survey.
9	Draft a Project Report: The Draft Project Report will include a Summary of Quarterly Progress Reports and the as-built survey that will confirm that the project components included in Phase II were built in accordance with the approved plans and specifications.

10	Final Project Report: The Draft Project Report will be revised after the City receives comments from FDEP. The Final Project Report will be submitted to FDEP.
11	Quality Assurance Plan: This Plan will be drafted, reviewed and finalized for the monitoring of the sediment basin, the trash trap, the treatment wetland. The treatment wetland is to be monitored immediately after it is operational and after two growing seasons.
12	Monitoring: Data identified in the Quality Assurance Project Plan will be gathered during the third year of operation of the facility.
13	Monitoring Report: The summary Report will be drafted and finalized as per DEP protocol

DELIVERABLES:

Task Number	Task Description	Deliverable	Start Month	Complete Month
1	Grant Award	Notice of Award	1	
2	Grant Agreement	Executed Agreement	2	6
3	Mobilization	Construction Contract	7	8
3A	Phase II Construction, Overflow Channel Spillway	Photographs of Construction Progress	4	16
4	Phase II Construction, Overflow Channel	Photographs of Construction Progress	4	16
5	Phase II Construction, Sheetflow Distribution Channel	Photographs of Construction Progress	4	16
6	Project Administration and Inspection	Monthly update of Construction Journal on website	7	23
7	Presentation of Project at a Professional Conference, such as Florida Stormwater Association.	Conference Agenda	24	27
8	As-Built Survey	As-Built Survey of Phase II components.	16	20
9	Draft 319 Project Report	Draft Report	24	27
10	Final 319 Project Report	Final Report	28	31
11	Quality Assurance Plan	Approved Plan	17	23
12	Monitoring	Data on Storm Treatment	54	57
13	Monitoring Report	Report	58	60

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
3	Mobilization	N/A	$1,912,320	City of Gainesville

3A	Phase II Construction, Overflow Channel Spillway	$65,200	$45,640	City of Gainesville
4	Phase II Construction, Overflow Channel	$309,700	$216,790	City of Gainesville
5	Phase II Construction, Sheetflow Distribution Channel	$687,500	$481,250	City of Gainesville
6	Project Administration and Inspection	N/A	N/A	
7	Presentation of Project at a Professional Conference, such as Florida Stormwater Association	N/A	N/A	
8	As-Built Survey	N/A	N/A	
9	Draft 319 Project Report	N/A	N/A	
10	Final 319 Project Report	N/A	N/A	
11	Quality Assurance Plan	N/A	N/A	
12	Monitoring	N/A	N/A	
13	Monitoring Report	N/A	N/A	
Total:		$1,062,400*	$2,656,000*	
Total Project Cost:		$3,718,400*		
Percentage Match:		29%	71%	

*Grant funding for the 319(h) program has been reduced and resulted in a cut to the budget for this project. Actual total grant funding for this project is $467,270. This budget table represents the proposed project; tasks paid for with the 319(h) grant will be limited upon award of funds.

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes. The total estimated project cost is $19,146,700. The City of Gainesville will continue to apply for additional grants until reaching a goal of 30% overall cost share funding.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. This project incorporates two individual innovative technologies and a variety of components in the treatment train; plant upgrades, a sediment basin, a trash trap, a treatment wetland and 1300 acres of sheet flow over a prairie. The two individual technologies are the

trash trap and the treatment wetland. Trash Trap: The floating trash removed from the water provides any observers with the perception that the water is of higher quality than a water body that has lots of floating debris and the captured leaf materials will reduce nutrient loading to receiving water bodies that occurs during decomposition. Treatment Wetland: The treatment wetland is innovative because of the passive, non-energy consumption, means that reduces the TN to environmentally benign levels. Treatment Train: The treatment train is an assembly of a variety of physical and biological processes which cumulatively demonstrate great efficacy in solving a complex problem and merit being judged as an "innovative" work.

Additionally the OSTDS will serve as a larger scale pilot for a passive means of achieving exceptional TN and related parameters reduction for onsite wastewater disposal. The design is based on research that is focused on reducing this non-point source of TN as a contributor to nutrient water impairment. The body of work generating this means of reducing TN is relatively new and is judged to be an innovative way to achieve the desired outcome for this waste stream.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The stormwater utility fee is $8.15/month/billing unit. The wastewater fee can range between $20.00 and $50.00/month/residential customer and more for commercial.

REFERENCES CITED:

Jones Edmunds, Inc., January 2010 Preliminary Engineering Report for the Sweetwater Branch/Paynes Prairie Sheetflow Restoration Project. Prepared for City of Gainesville Dept. of Public Works and Gainesville Regional Utilities. P.O. Box 490, Mail Station # 58, Gainesville, FL 32602-0490.

Jones Edmunds, Inc., January 2010 Sweetwater Branch/Paynes Prairie Sheetflow Restoration 30.1% Plans Submittal. Prepared for City of Gainesville Dept. of Public Works and Gainesville Regional Utilities. P.O. Box 490, Mail Station # 58, Gainesville, FL 32602-0490.

Wetland Solutions Inc., December 2006. Effect of Main Street Water Reclamation Facility Pretreatment Alternatives on the Sizing of Sweetwater Branch Off-line Wetland. Prepared for City of Gainesville and Florida Department of Environmental Protection. 2809 NW 161st Court, Gainesville, FL 32609

Sweetwater Branch/Paynes Prairie Sheetflow Restoration Team (Knight, Keller, Hutton, Rankeillor, Pearson, et al), March 2006. A Conceptual Plan for Sweetwater Branch/Paynes Prairie Sheet Flow Restoration. Public Works Department, P.O. Box 490, Mail Station # 58, Gainesville, FL 32602-0490

Gao, Gilbert, and Magley, January 2006. Nutrient TMDL for Alachua Sink, WBID 2720A. Florida Department of Environmental Protection, Division of Water Resource Management, Bureau of Watershed Management, Northeast District, Ocklawaha Basin, 2600 Blair Stone Road, Mail Station 3555, Tallahassee, FL 32399-2400

Jones, Edmunds & Associates, June 2004. Sweetwater Branch Watershed Management Plan. Prepared for: City of Gainesville Public Works Department, P.O. Box 490, Station 58, Gainesville, Florida 32602-0490. 730 NE Waldo Road, Building A, Gainesville, Florida 32641.

Orange Creek Basin Working Group, May 27, 2008. 2007 Orange Creek Basin Management Action Plan for Newnans Lake, Orange Lake, Lake Wauberg, Hogtown Creek, Sweetwater Branch, Tumblin Creek, and Alachua Sink. In Cooperation with the Florida Department of Environmental Protection, Division of Water Resource Management, Bureau of Watershed Management, 2600 Blair Stone Road, Mail Station 355, Tallahassee, FL 32399-2400

Total Maximum Daily Load Program as authorized by 403.067(2) and (3), Florida Statutes (F.S.) and as further implemented by 62-303, Florida Administrative Code.

Chang, Wanelista, et. al., April 2011. On-Site Sewage Treatment and Disposal Systems Evaluation for Nutrient Removal for Florida Department of Environmental Protection, Bureau of Watershed Management, 2600 Blair Stone Road, Mail Station 355, Tallahassee, FL 32399-2400

Individual Environmental Resource Permit Application # 4-001-125967-1 at https://permitting.sjrwmd.com/epermitting/jsp/Search.jsp?option=permitNumberOption, St. Johns River Water Management District.

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment 1

- ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment 2
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment 3
  - ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment 4

Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- ☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.: Attachments 5A, Funding Partners 5B, Project Estimate (60% design)

PROJECT 11

PROJECT NAME: Revitalize impaired waters of Charlotte Harbor Area 2, 2-A ("Northshore")

PROJECT FUNDING REQUEST: $215,000 MATCH: $318,000

LEAD ORGANIZATION: Charlotte County Utilities

CONTACT PERSON: Ruta Vardys, PE
Project Engineer
25550 Harborview Rd., Suite 1
Port Charlotte, FL 33980
Tel: 941-764-4302 Fax: 941-764-4319
Email: Ruta.Vardys@charlottefl.com

COOPERATING PARTNERS: Charlotte County Public Works Stormwater Utilities (CCU), Charlotte County Health Department (DOH), Charlotte Harbor National Estuary Prohram (CHNEP), Charlotte Harbor Environmental Center, Inc. (CHEC), Charlotte County Extension through the Florida Yards and Neighborhoods and Sea Grant Marine Extension Programs (EES), and Charlotte Harbor Community Redevelopment Area Advisory Committee (CRAAC)

PROJECT ABSTRACT: As part of an on-going and incremental initiative in order to revitalize the impaired waters of Charlotte Harbor, Charlotte County Government will apply an innovative and comprehensive approach towards eliminating nonpoint source pollution created by 100% urbanized areas within the Peace River 5,229.43 acre watershed (North Shore Area 2, 2-A). This approach involves attacking pollution on several fronts including pollution created by On Site Treatment and Disposal Systems (OSTDS), untreated stormwater run-off, and control of pollution caused by pesticides, herbicides and fertilizers. These efforts will reduce the nonpoint source pollutant load and mitigate the resulting ecological impacts that are impairing the receiving water bodies of Charlotte Harbor.

Type of Treatment: The project will include constructing central wastewater service to 42 properties in order to replace inadequate OSTDSs (BMP 1), restoring, modifying the storm conveyance system and retrofitting structural BMP's by installing vortex separators to improve removal of sediment and pollutants (BMP 2), and educating property owners on Best Management Practices (BMPs) when applying pesticides, herbicides and fertilizers (BMP 3).

Summary of Estimated Pollutant Load Reductions: The anticipated pollutant load reductions as a result of this project are as follows: 33% reduction in TSS/Sediment*, 94% reduction in TP, 86% reduction in TN, and 88% reduction in BOD.

* The StepL model did not differentiate between TSS and sediment. Additionally, the StepL model did not account for the TSS/sediment loading rate caused by OSTDSs, therefore the TSS/sediment pollution reduction percentage is not truly representative of the final TSS/sediment reduction amount which would approach 50% if the OSTDSs TSS/sediment were included.

Summary of Educational Components: The educational component involves holding workshops at community centers and distributing literature to area residents about Best Management Practices for Protection of Water Resources in cooperation with the Florida Friendly Yards program. A permanent sign will be posted in the area educating the public about the program and the overall impact.

Summary of Monitoring: The monitoring program will begin prior to construction to establish a baseline of pollutant loading at stormwater discharge points and at strategic locations where stormwater enters the stormwater system. Upon completion of the BMP's, additional and on-going testing will be performed comparing inflows and outflows from the newly restored/modified grassy swales and installed vortex separators and at locations tested prior to construction.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS: There are two main watersheds impacted by this project, the Charlotte Harbor and Peace watersheds. Both watersheds are large in comparison to the subject project site. However, the severity of the pollutant loading created by this smaller area adjacent to these water bodies will provide a higher concentration of pollutant removal than other areas at this time.

Area 2, 2-A, also known as the Northshore area, is located directly on the Peace River (HUC 03100101). The acreage of this area is 19.94 acres.

Geographic Location: Charlotte Harbor, Charlotte County
Impacted Watershed Name: Peace River and Charlotte Harbor
Size of Project Impact: 19.94 acres
Size of Drainage Area: 19.94 acres
Latitude: 26 degrees 57.7 min
Longitude: 82 degrees 3.5 min
Hydrologic Unit Code:
Region 3 – South Atlantic Gulf Region
03100101: Peace
03100103: Charlotte Harbor
Land is owned by: Charlotte County
Land Uses within the watershed:

Land Use	Acres	%
Residential	**19.94**	**100**
Land Use Totals (Acreage and %)	**19.94**	**100**

POLLUTION REDUCTION STRATEGY: The overall strategy of this project is to address the nonpoint source pollutant loading directly into the impaired waters of the Peace River and Charlotte Harbor. There are a number of factors impacting Charlotte Harbor and the Peace River and a significant effort will be required to address all pollutants. However, Charlotte County (the County) is taking some important initial steps to address these issues with this proposed project.

Watershed Management Plan: The BMP's proposed for this project specifically address Priority Actions addressed in The Charlotte Harbor National Estuary Program's (CHNEP) Comprehensive Conservation and Management Plan which was prepared to address the source of pollutants into

the harbor. See list of Attachments for excerpts of the CHNEP plan. The proposed project addresses a number of these actions specifically as follows:

- Priority Action WQ-1 (p. 72): Maintain or improve water quality from year 2000 levels.
- Priority Action WQ-D (p. 76) requires that nonpoint-source pollutants associated with stormwater runoff be addressed by retrofitting best management practices (BMPs) to maintain or improve water quality and flows.
- Priority Action WQ-J (p. 82) of this report requires that central sewers be developed within 900-feet of waters such as estuarine shorelines, rivers, creeks, canals, and lakes.
- Priority Action WQ-L (p. 84) is to increase the use of personal and home best management practices by consumers throughout the watershed to reduce nonpoint-source pollution.
- Priority Action WQ-M (p. 85): Support public involvement programs addressing water quality issues.
- Priority Action SG-D (p. 124): Produce watershed and estuary communication tools.
- Priority Action SG-K (p. 131): Present scientific information in a form readily understood by the majority of people.

Additionally, the Southwest Florida Water Management District has prepared a Surface Water Improvement and Management (SWIM) Plan specifying that nonpoint source pollutant loadings must be identified, measured, and reduced and also specifies public education as critical to controlling pollutant loading as well. See list of Attachments for pages extracted from the SWIM Plan.

List 303(d) listed waterbody affected: There are a number of impaired water bodies within Charlotte Harbor and the Peace River. Below is a list from the 2009 verified Group 2 and 2010 verified Group 3 303(d) lists along with their impairments.

WBID:		
Peace River – Mid Estuary	WBID NO.: 2056B	Nutrients, Iron
Peace River – Low Estuary	WBID NO.: 2056A	Nutrients, Iron
Charlotte Harbor – Mid	WBID NO.: 2065A	Nutrients

Impairment: The project will specifically address pollutants contributing to the Nutrients impairments by reducing Total Nitrogen, Total Suspended Solids (TSS), Total Phosphorous and Biological Oxygen Demand (BOD). Additionally, the project will address the health and safety of the citizens by reducing pathogenic bacteria that are introduced through the stormwater system from failing OSTDSs and chemicals produced by herbicides and pesticides.

PROJECT DESCRIPTION:

Overview: Charlotte County (County) is applying for this grant in order to fund a project that will address sanitary sewer and stormwater/drainage improvements in an older neighborhood that is typical of many Charlotte Harbor neighborhoods. This neighborhood has been experiencing a number of problems due to aging and failing septic tanks, especially during large rain events. The proposed improvements will address the health and safety of the citizens and reduce the level of nonpoint source pollutants introduced into the impaired waters of Charlotte Harbor. This grant effort is a cooperative initiative involving personnel and resources from Charlotte County Utilities,

Public Works, the University of Florida Environmental Extension Services for Charlotte County, the Department of Health, and several other local environmental organizations. See list of Attachments to review letters in support of this collaborative effort by the participating organizations.

Background: Charlotte County has a number of areas located adjacent to impaired waterways where wastewater is treated using OSTDSs and stormwater is handled by an overland drainage system entering directly into impaired receiving waters. To address the pollution entering the receiving waters, Charlotte County is developing a county-wide plan to provide central sewer to areas presently served by OSTDSs. There is also an opportunity to combine these efforts with improving overall stormwater quality into a larger project. For this project, a pilot area was selected that exemplifies the typical area characteristics in order to determine the most effective way to eliminate pollution entering the impaired receiving waters. The effectiveness of this program will determine whether future projects will need to be modified in order to improve nutrient, sediment, and other pollutant removal.

The identified subdivision for this project was developed during the 1950's as a residentially zoned community. The current characteristics include ¼ acre residential platted lots and include roadways and roadside drainage swales. Stormwater is conveyed directly to the river via the roadside drainage swales and an overland drainage system. Wastewater, in the specific areas to be addressed, is currently treated using OSTDSs. The area selected for these improvements is adjacent to and directly feeds into the impaired waters of the Peace River and ultimately Charlotte Harbor. The OSTDSs in these areas were largely constructed in the 1960's and are inadequate with many in failure. During large rain events, these failing systems pose a significant health, as well as environmental, risk.

The project takes a comprehensive approach by not only providing central sewer to these neighborhoods and eliminating on-site septic systems, but also by addressing stormwater quality and, as well as educating citizens on pollution prevention methods.

BMP 1 Eliminate OSTDSs and Provide Central Sewer: The project will include the construction of the wastewater collection infrastructure to serve 42 properties located in the Northshore Ave. area (Area 2, 2-A). See the list of Attachments (II through IV) for maps of this area. The project includes abandoning all existing OSTDSs and connecting the properties to the central wastewater infrastructure for immediate access to the wastewater system. This will involve the construction of 2,600 linear feet of low pressure force main and installing related components at each residence in order to connect to the central wastewater system.

Benefits to the State of Florida in meeting its water quality objectives: The state has long analyzed the effects of septic tanks on waterbodies and EPA and DEP both recognized the importance of controlling this source of pollution in the 2008 CZARA approval. The project will benefit the area by removing nutrient sources associated with these failing septic tanks, which are located directly on and adjacent to the Peace River (see map, below). Grant funding will be utilized for the construction of the sewer only and will not be used for connection fees and will therefore not benefit individuals, but rather the waterbody itself. This type of retrofit is the equivalent of transporting previously untreated stormwater into a new stormwater treatment system; here, however, the pollution is moved via groundwater and stormwater both and would difficult to treat with conventional BMPs. Instead, it is more effective to remove the source of pollution and treat the sewage generated by the households. This project ranked second out of the 44 proposals seen

and was seen as one of the more cost effective projects for removing nutrients. By providing for sewer in this critical area, the project removes forever a nonpoint source of pollution and allows for the sewage to be treated properly and released in accordance with NPDES requirements. The sewering phase alone is expected to remove 245.5 lbs/yr of TP; 626.7 lbs/yr of TN and 2,559.2 lbs/yr of BOD from the Peace River.

This effort is intended as a sub-project of a larger program. The County is in the conceptual stages of developing a long-term initiative intended to bring centralized wastewater infrastructure to a remaining portion of the mid/central and west regions of the County that are presently unsewered. Realization of this vision will potentially result in centralized wastewater availability to approximately 100,000 additional properties within the Urban Service Area. The classification of Charlotte Harbor and Lemon Bay as FDEP & EPA verified impaired waters, along with the newly developed wastewater model, will provide the key additional supportive information and criteria to promote the need for this centralized wastewater facilities expansion strategic plan. Areas contributing to the degradation of the impaired waters, based on the age of the existing individual OSTDSs, proximity to surface water bodies and other factors will be utilized for this strategic plan.

BMP 2 Improved Stormwater Management and Drainage: Once the OSTDSs are eliminated, the drainfield area, formally treating wastewater, will now be available for stormwater detention and treatment. For the average drainfield size in the area, this increases stormwater detention and permeation capacity for an average 10,000 square foot lot by 10%. This was determined based upon a 1-inch rain event producing 8300 cu ft of stormwater on an average lot and the average drainfield volume of 900 cu ft. Additionally, the grassy swales and overall stormwater conveyance system will be restored and rehabilitated to improve the existing treatment system; namely percolation rates into the soil. During the restoration process, the soils will be examined and replaced with appropriate fill material and vegetation in order to provide maximum sediment retention and treatment during smaller rain events which are short in duration and conveyance is minimal.

During heavy rain events the same system will retain the previously collected sediment ensuring that previously collected material and pollution will not enter the receiving waters. Since the smaller rain events occur more often during the year and carry more of the sediment and nutrients, overall sediment removal and treatment should be increased, thereby greatly reducing impacts on the receiving waters. The potential to regrade the former Onsite System area into a slight depression will also provide an additional opportunity for detaining stormwater for percolation and treatment directly into the ground preventing further direct run off into the receiving waters.

To further improve stormwater treatment and capture pollutants particularly during heavy rain events, vortex separators will be installed in strategic locations upstream of storm drainage outlet facilities serving the 19.94acre area. Vortex separators treat stormwater by removing sediment within a small footprint and little to no retention time. The current stormwater system does not provide this type of treatment resulting in sediment and other pollutants entering directly into the receiving waters of the Peace River and further downstream to Charlotte Harbor. The preliminary plan and project costs provide for the installation of 2 vortex separator units. However, the final number, actual size, type (whether with inlet chute and skirt or a more advanced design), and location will be determined upon final design of the improved BMP.

BMP 3 Public Information/Education: In order to maximize exposure of the project goals and to promote BMPs to minimize the impact of fertilizers, pesticides and herbicides, the County will implement a multi-pronged approach to disseminate information to the public. The County will capitalize on existing environmental organizations focused on the Charlotte Harbor Estuary and its restoration. Activities will include participation in these organizations' sponsored events, utilization of these organizations Web site resources and the dissemination of written material to these organizations. Furthermore, the County will sponsor a minimum of two (2) workshops to explain project goals and successes and to distribute material specific to the use of potential pollutants. Finally the use of strategically located permanent land marks will be used to educate future generations (within proximity of the Harbor, stormwater retention ponds, and public parks). By using these various distribution channels the County expects to reach 15,000 citizens at a minimum. As part of the development of the final water quality monitoring plan a survey mechanism will be determined. The analysis of the post water quality data will include a discussion of the impact that the education program had on pollutant reduction.

The educational outreach program materials will focus on: environmental impacts of fertilizers, pesticides and herbicides; advising the public to purchase fertilizers, pesticides, and herbicides with the proper product specifications; the demonstration of appropriate application methods; and alternative options more friendly to the environment.

Specific to the project area, while the County hopes to reach 100% of the citizens within these areas, it is assumed that materials and programs may reach only 50% of the neighborhood population. As such, of the 50% of the households reached, it is expected that half of these households reached will comply with the recommended methods. As a result, the County anticipates that a 25% reduction in environmentally unsafe uses of fertilizers, pesticides and herbicides will be realized in this area.

Effectiveness Monitoring Program: Prior to project construction, analyses will be performed of existing stormwater discharge quality at points of entry into the stormwater system and at the point of discharge. Upon completion of the project, a monitoring program will be implemented to demonstrate the effectiveness of the project components.

CHNEP and CHEC both run monitoring programs collecting data at various stations throughout the Charlotte Harbor area. Key opportunities to capture data include random sampling and specific storm event sampling. Sampling points, as defined by the Health Department, will be identified to demonstrate load reductions within close proximity to former OSTDS sites. A Quality Assurance Project Plan will be prepared to control water quality sample collection, testing, and reporting.

Through these efforts, the pollution impact of these 100% urbanized areas on the impaired waters of Charlotte Harbor will be significantly reduced. The successful project will provide the affected citizens with central wastewater service and improved stormwater treatment at an overall reduced cost. Furthermore, the project provides an opportunity to inform the public on how to protect our most important asset, the Charlotte Harbor Estuary.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: This proposal is for a structural BMP project. In the below estimated pollutant load reduction, the applicant used the following model:

The County used the STEPL model downloaded from the EPA.GOV website to demonstrate the pre- and post project loadings. Input data was tailored to local conditions. For example, Area 2, 2-A has a 56% septic tank failure rate as reported by the DOH (See list of Attachments). The model was used to determine conditions with and without septic and with the existing grassy swales operating at 50% efficiency prior to calculating the load reductions potentially realized by the fully restored and modified grassy swales and vortex separators. The STEPL model uses the term Oil and Grease Separator, instead of the common industry term Vortex Separator, used throughout the rest of this proposal. The reductions were determined in order to complete the table below. See list of Attachments for STEPL Load results.

BMP Installed		**TSS****	**TP**	**TN**	**BOD**
Central WW*		**lbs/yr**	**lbs/yr**	**lbs/yr**	**lbs/yr**
Pollutant Loads	Pre-Project	4303.0	263.8	740.9	2983.0
	Post-Project	4303.0	18.3	114.2	423.8
	Load *** Reduction	0.0	245.5	626.7	2559.2
	% Reduction	0%	93%	85%	86%
Restore Grassy Swales*		**TSS**	**TP**	**TN**	**BOD**
		lbs/yr	**lbs/yr**	**lbs/yr**	**lbs/yr**
Pollutant Loads	Pre-Project	4,303.0	18.3	114.2	423.8
	Post-Project	3,103.0	16.5	110.1	368.3
	Load Reduction	1,200.0	1.9	4.1	55.5

	% Reduction	28%	10%	4%	13%
Vortex Separator*		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**BOD lbs/yr**
Pollutant Loads	Pre-Project	3103.0	16.5	110.1	368.3
	Post-Project	2900.0	15.9	106.4	368.3
	Load Reduction	203.0	0.6	3.7	0.0
	% Reduction	7%	4%	3%	0%
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**BOD lbs/yr**
Pollutant Loads	Pre-Project	4303.0	263.8	740.9	2983.0
	Post-Project	2900.0	15.9	106.4	368.3
	Load Reduction	1403.0	247.9	634.5	2614.7
	% Reduction	33%	94%	86%	88%

* Includes treatment performance of grassy swales at existing efficiency level (50% est.)

** The STEPL model does not differentiate between TSS and sediment.

*** The STEPL model did not register TSS/sediment loading for OSTDSs. It is estimated that the failing septic systems annually contribute an additional 641 lbs of TSS/sediment. We expect this additional load to be eliminated (as well as 100% reduction in any pollutant generated by the OSTDSs) with the removal of the OSTDSs once central wastewater infrastructure is installed.

EMCS USED IN MODEL: The default settings were used in the STEPL model for pollutant loads and rainfall amounts according to reference statistics for Charlotte County, FL and the Florida Ortona Lock 2 weather station.

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by Charlotte County.

TASK DESCRIPTION:

Task Number	Task Description
1	Prepare Quality Assurance Project Plan (QAPP) and Final Water Quality Monitoring Plan
2	Project Design
3	Public Involvement

4	Construction Contract Awards
5	Pre-construction Testing
6	Complete Construction of BMP # 1 – Central Sewer
7	Complete Construction of BMP # 2 – Improve Stormwater Treatment (Restoration and Vortex Separator)
8	Complete BMP # 3 – Implement Educational Program
9	Implement Monitoring Program
10	Prepare Final Report

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Prepare Quality Assurance Project Plan (QAPP) and Final Water Quality Monitoring Plan	Submit Copy of QAPP and Final Monitoring Plan	Notice of Award	Month 1
2	Project Design	Submit Construction Plans & Permits	Month 1	Month 3
3	Public Involvement	Submit Pictures of Workshop Events, Sign-in Sheets, and Signage	Month 2	Month 3
4	Construction Contract Awards	Provide Bid Results and Copy of Contract Award	Month 3	Month 5
5	Pre-construction Testing	Submit Copy of Test Results	Month 4	Month 5
6	Complete Construction of BMP # 1 – Central Wastewater System and Restoration	Submit Copy of Final As-Built Certification, Service Connection Inspection Approvals, Pictures of Permanent Sign	Month 6	Month 9
7	Complete Construction of BMP # 2 – Improve Stormwater Treatment	Submit Copy of Final As-Built Certification	Month 6	Month 9
8	Complete BMP # 3 – Implement Educational Program	Submit Pictures of Workshop Events, Sign-in Sheets, and Signage	Month 9	Month 11
6a,7a,8a	Construction Inspection	Daily Inspection Reports, Approved Invoices	Month 6	Month 11
9	Implement Monitoring Program (Post and On-going)	Provide Test Results	Month 11	Month 12 and On-going
10	Prepare Draft Final Report	Submit Draft Report for Review	Month 12	Month 14
11	Final Project Report	Submit Final Report	Month 14	Month 16

Tasks 1,2,4,5 – Project Design - Construction Plans & Permitting

County staff including project engineers, project managers, and inspectors will be responsible for the design process, coordinating construction activities, implementing the monitoring program, and finalizing grant reporting requirements. Below are specific tasks:

- Quality Assurance Project Plan (QAPP) to address water quality monitoring
- Construction Plans and Specifications
- Construction Permits
- Construction Inspection of Central Wastewater Collection System
- Construction Inspection of Roads, Swales, and Impacted Drainage Structures Restoration
- Construction Inspection of Installation of Vortex Separator Units
- Implementation of Educational Program
- Implementation of Water Quality Monitoring Program
- Regular Progress Reports
- Draft Project Report
- Comprehensive Final Report
- Annual Effectiveness Monitoring Reports for Years One through Three
- Enter monitoring results into the Florida Stormwater Database

Construction plans and specifications will be developed for the wastewater collection system and installation of the vortex separators. The construction documents will include detailed sediment and erosion control plans. Pre-construction testing will be planned and carried out in order to gather pre-project pollutant loads. Necessary construction permits also will be obtained.

Task 3 – Public Involvement

A minimum of two (2) Neighborhood meetings will be held to educate and involve neighborhood residents about the project and involve them in the central sewer and stormwater BMP design process. It is important that the neighborhood meetings take place prior to finalizing construction documents so that modifications can be made to the plans as necessary to address concerns of local residents.

Task 6, 7 – Construction and Restoration

Once the construction plans have been completed and permits obtained, construction will take place. County staff will provide inspection services to ensure that project is constructed according to County and regulatory standards. The signage for the educational outreach program will be installed at this time as well.

Task 8 – Implement Educational Program

County and State staff will conduct community outreach workshops providing training and distribute literature on BMPs in using pesticides, herbicides, and fertilizers to area residents. An informational session will also be held at the annual Charlotte Harbor Nature Festival to update residents on the impacts that the project will have on reducing pollutant loading in Charlotte Harbor. Educational materials will be distributed to individual home owners describing the connection between the improvements being made and overall pollutant load reduction into the

receiving waters. The materials will address BMPs for reducing and properly using pesticides, herbicides, and fertilizers. Also, the partnering members will further develop an action plan to disseminate and educate the public on the use of fertilizers, pesticides and herbicides.

Task 9 – Effectiveness Evaluation

Project effectiveness monitoring will be provided in order to demonstrate that the project goals have been met. A project monitoring plan will be finalized prior to this stage in order to plan the most effective sampling and testing protocols.

Task 10, 11 – Final Report Preparation

County staff will prepare the final report to the EPA fully documenting the project and its outcomes.

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1 – 4	Engineering/Design Services		$27,500	Charlotte County Wastewater MSBU, Charlotte County Public Works MSBU
5, 9	Monitoring Program (sample collection, testing, up to first results upon completion)	$4,750	$5,750	Charlotte County Public Works MSBU
6	Complete Construction of BMP # 1 – Central Wastewater System and Restoration	$173,500	$47,500	Charlotte County Wastewater MSBU
7	Complete Construction of BMP # 2 – Vortex Separator(s)	$25,300	$29,800	Charlotte County Public Works MSBU
8	Complete BMP # 3 – Implement Educational Program	$1,750	$2,250	Charlotte County Environmental Extension - Florida Friendly Yards and Neighborhoods; CHEC; CHNEP
10, 11	Prepare Final Report (engineering services)		$4,600	Charlotte County Wastewater MSBU
6, 7	Construction Inspection	$6,900	$8,100	Charlotte County Wastewater

				MSBU
6, 7	Collection Fees (MSBU)		$7,500	Charlotte County Wastewater MSBU
6, 7	Statutory Uncollectible (MSBU)		$19,250	Charlotte County Wastewater MSBU
6, 7	Interest		$6,500	Charlotte County Wastewater MSBU
1 - 11	Program Administration	$2,800	$3,250	Charlotte County Wastewater MSBU
6	Connection Fees*		$156,000	Charlotte County Wastewater MSBU
Total:		$215,000	$318,000	
Total Project Cost:		$ 532,750		
Percentage Match:		40 %	60%	
* Connection fees pertain to costs for construction of wastewater treatment plant and transmission capacity as well as carrying costs for utilities infrastructure.				

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. Charlotte County is using a multi-pronged approach to not only remove pollutants by using innovative technology that minimizes impacts to the environment, but also to prevent pollutants entering the stormwater system through an on-going educational program. Eliminating Onsite Treatment and Disposal Systems by connecting residences to the central wastewater system will effectively remove all related pollutants created via this source as well as restore previously unavailable land for stormwater percolation and treatment. The swale restoration aspect of the project takes advantage of a stormwater system that is already in place and in need of rejuvenation. The potential to create minor depressions in the area of the previous Onsite System also presents a further opportunity to utilize existing resources with minimal environmental impact to treat stormwater in situ. Further stormwater treatment during heavy rain events will be addressed using the advanced stormwater vortex separators which are an innovative technology for removing pollutants in-line during a storm event without requiring a large treatment or retention area. Their small foot print minimizes their impact on the environment. The education program includes permanent signage in the vicinity of the project as well as literature that can be referred to at a later date in addition to live workshops and training. Combined, these

efforts will significantly reduce the pollutant load not only with an immediate impact, but also into the future through education and prevention.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The monthly fees are as follows:

Match Source Name	Description	ERU/Fee
Charlotte County Utilities	Charlotte County Wastewater MSBU	Developed - $6,600Avg./ERU; Vacant - $4,275 (36 dev./6 vac. ERUs)*
Charlotte County Public Works	Charlotte County Recurring Stormwater and Drainage MSBU (improvement and long term maintenance)	Developed - $56.76 Vacant - $49.71 (Annual)

  * If paid over a 20 year period, annual payments are $330. Note that the total cost to the owner will be higher due to the requirement of an electric panel, at an estimated cost of $400 for each home, to be installed at their own expense. Inclusive of this expense, the total cost per owner is $7,000.

- Does the project fall within a watershed undergoing BMAP development?

  Yes. The project falls within the Peace River watershed which flows into the Charlotte Harbor watershed, both of which have impaired WBIDs for nutrients. A TMDL has not been created, the BMAP will follow once the TMDL has been created.

REFERENCES CITED:

Assessing the Densities and Potential Water Quality Impacts Of Septic Tank Systems in the Peace and Myakka River Basins, *September 2003, Charlotte Harbor Environmental Center, Inc. and Water Resources and Issues*
http://www.checflorida.org/

Charlotte Harbor National Estuary Program, *2008 update, Charlotte Harbor Comprehensive Conservation and Management*
1926 Victoria Avenue, Fort Myers, FL 33901
http://www.chnep.org/CCMP/CCMP.htm

Charlotte County Department of Health, *Analytic Parameters of Standing Water in Port Charlotte, Sampled August 8, 2008*
18500 Murdock Circle, Murdock, FL 33952
http://www.doh.state.fl.us/chdCharlotte/index.html

Charlotte County Department of Health, *Septic Tank Failure Rates for Area E-mail, May 19, 2009*

18500 Murdock Circle, Murdock, FL 33952
http://www.doh.state.fl.us/chdCharlotte/index.html

National Stormwater Best Management Practice Database
http://www.bmpdatabase.org/

South West Florida Water Management District, *November 2000, Charlotte Harbor Surface Water Improvement (SWIM) Program*
http://www.swfwmd.state.fl.us/documents/plans/charlotte_harbor_2000.pdf
Brooksville Headquarters, 2379 Broad Street, Brooksville, FL 34604-6899

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Attachment I: Monitoring Plan
- ☑ Attachments II through IV :Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
    - Regional site locator map showing the project site relative to the surrounding area: Attachment II Site Map
    - Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment III Site Map
    - A detailed site map showing the conceptual elements of your proposed project: Attachment IV Site Map

- ☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.:

    - Attachment V: Partnership Letters
        - Charlotte County Public Works
        - Charlotte County Department of Health
        - Charlotte Harbor National Estuary Program
        - Charlotte Harbor Environmental Center, Inc.
        - University of Florida IFAS Extension Charlotte County
        - Charlotte Harbor Community Redevelopment Area Advisory Committee
    - Attachment VI: Charlotte Harbor National Estuary Program Plan Excerpt
    - Attachment VII: South West Florida Water Management District, Charlotte Harbor Surface Water Improvement Plan Excerpt
    - Attachment VIII: Vortex Separator Performance Test Results
    - Attachment IX: Charlotte County Department of Health Sample Point Test Results
    - Attachment X: Charlotte County Department Septic Tank Failure for Areas
    - Attachment XI: STEPL Modeling Results

PROJECT 12

PROJECT NAME: Northern 10-Mile Treatment System

PROJECT FUNDING REQUEST: $360,000 **MATCH:** $340,000

LEAD ORGANIZATION: City of Fort Myers, FL

CONTACT PERSON: Melanie Grigsby, Stormwater Resources Manager
2200 Second Street, P.O. Drawer 2217
Fort Myers, FL 33902-2217
Tel: 239-321-7467
Fax: 239-344-5943
Email: mgrigsby@cityftmyers.com

COOPERATING PARTNERS: South Florida Water Management District, City of Fort Myers, DEP

PROJECT ABSTRACT:

Type of Treatment:
The City of Fort Myers seeks to improve the water quality on the Manuels Branch outfall to the Caloosahatchee River. Both the lower Manuels Branch and the Caloosahatchee River are listed on the State's 303d list as impaired waterbodies. The City of Fort Myers' North 10-Mile Water Quality Improvement Project is located in WID 3240I, Planning Unit Caloosahatchee Estuary, Basin Manuel Branch, north of Hanson Street and west of the railroad tracks in a narrow section of right of way approximately 4.6 acres in size. The City is constructing a stormwater quality treatment system for the stormwater runoff associated with two industrial areas. It will work in conjunction with other stormwater treatment projects in the watershed to improve the overall water quality of Manuels Branch (an impaired waterbody) and the Caloosahatchee River (an impaired waterbody). By creating a STA in this industrial area, the City will reduce the discharge of nutrients, suspended solids and sediments into Manuels Branch. The project is nearly completely designed and will soon be ready for permitting. It can be ready for construction immediately after permitting.

Summary of Estimated Pollutant Load Reductions:
The project will result in two-fold improvements—a reduction of pollutants from run-off into two impaired waterbodies. The new STA will have an annual estimated water quality load reduction of 89,000 lbs/year for TSS, 50 lbs per year for TP, 12,000 lbs/year BOD and 60 lbs/year for TN.

Summary of Educational Components: The City has been working directly with the industrial businesses in the area to reduce the pollutants discharged in stormwater runoff by providing cost effect solutions to treat some stormwater on their facility. The City will visit each site in the drainage area to ensure needed BMPs are installed on site as well as provide training and stormwater education to assist workers in identifying potential pollutant sources. Printed materials will be used in the training and will be left behind. In addition, all of the stormwater education materials and training will be used in other industrial areas of the city that have similar nonpoint pollutant problems.

Summary of Monitoring: Due to the nature and objectives of the Manuels Branch Water Quality Improvement Project, there are two separate monitoring objectives. The first objective is to evaluate the operation of the alum treatment system. The objectives of monitoring the alum treatment system are:
1. To demonstrate the system's effectiveness at removing the fine suspended particulate matter associated with the two industrial parcels,
2. To monitor the system's operation, and
3. Fine tune the alum dose rate to optimize the effectiveness of the system against the chemical usage.

The second objective is to monitor the water quality in the canal itself for any potential adverse impacts related to the treated water discharged from the alum treatment system itself.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Fort Myers, Lee County
Impacted Watershed Name: Caloosahatchee Watershed via Manuels Branch
Size of Project Impact: 976 acres (size of Manuels Branch watershed)
Size of Drainage Area: 215 acres
Latitude: 26.6272582
Hydrologic Unit Code: HUC 03090205-Caloosahatchee River
Land is owned by: City of Fort Myers, FL

Land Uses within the watershed:

Land Use	Acres	%
Residential	0	0
Industrial/Commercial	215	100
Agricultural	0	0
Forested	0	0
Wetlands	0	0
Land Use Totals (Acreage and %)	215	100

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan:
The City of Ft. Myers desires to improve the water quality of the Manuels Branch outfall to the Caloosahatchee River. The City plans to accomplish this by constructing a stormwater quality treatment system for the stormwater runoff associated with two industrial areas. Manuels Branch (an impaired water body) is part of the Caloosahatchee Watershed which feeds into Lower Charlotte Harbor. The tidal Caloosahatchee area is currently dominated by the urbanized areas of Cape Coral, Fort Myers and North Fort Myers. Urban expansion is expected to continue west and north along the US 41, I-75 corridor.

The Caloosahatchee Watershed in turn feeds into Lower Charlotte Harbor. The SRWMD ranked Lower Charlotte Harbor as a Tier 2 waterbody on the SFWMD priority list approved in 2001. In 2003, the SFWMD Governing Board designated Lower Charlotte harbor a priority SWIM waterbody pursuant to Florida Statutes Section 373.453.

This project is eligible for "incremental" Section 319 funding. Projects that are identified in or otherwise implement "comprehensive watershed plans" are eligible for a portion of the incremental funds. This project is identified in two comprehensive watershed plans that contain all nine required EPA elements.

This project is contained within the SFWMD Lower Charlotte Harbor Surface Water Improvement and Management Plan, February 2008, as the SFWMD's plan to mitigate water quality issues within the watershed. In Appendix IV "Local Government Capital Improvement Project List", the plan acknowledges that one of the important local roles in maintaining water quality is the completion of capital improvement programs that improve water quality. The City of Fort Myers' Northern 10-Mile Canal WQ Improvements are included on this list. [Page 76]

The project is also contained within the Caloosahatchee River Watershed Protection Plan (January 2009). The purpose of the CRWPP is to provide an overall strategy for improving quality, quantity, timing and distribution of water in the Caloosahatchee Estuary and to re-establish salinity regimes suitable for the maintenance of a healthy, naturally diverse and well-balanced estuarine ecosystem. One of the two key conditions negatively impacting the waterway's overall health is excessive nutrient loading. Nutrient loading results in eutrophication—typically indicated by blooms of algae, low dissolved oxygen (DO) and periodic fish kills. Excessive nutrient loading has been a concern for many years, when the state determined that the Caloosahatchee Estuary had reached its nutrient loading limits. One of the water quality projects identified for maximizing nutrient load reductions in the Caloosahatchee River Watershed is the Northern 10-Mile Treatment System (page 6.4-8). It is identified as CRE 123 on page 6.4-17.

List 303(d) listed waterbodies affected:

Manuels Branch -- WBID 3240I
Tidal Caloosahatchee Basin -- WBID 3240 A, B, C
Impairment: Excessive nutrient loading has been identified as one of the two key conditions negatively impacting the Caloosahatchee River's overall health. Suspend solids is a major contributor to the impairment of Manuels Branch. This project will directly improve that condition by reducing the level of nutrients, suspended solids and sediments discharging directly into the Caloosahatchee River via Manuels Branch.

In March 2011, the EPA published "Final Total Maximum Daily Loads for the Manual Branch WBID 32401 Nutrients and Dissolved Oxygen" (referring to Manuels Branch). In this report, EPA states the current condition of the watershed and models several scenarios for reduction. The TMDL scenario determines how much the current loadings would need to be reduced to achieve the applicable water quality standards (dissolved oxygen) and nutrient (nitrogen and phosphorus) interpretation of the narrative to protect against imbalance of flora and fauna. The predicted loading from the current conditions watershed model are incrementally reduced in the receiving waterbody model until the dissolved oxygen concentrations are above 4 mg/l and daily average concentration of 5 mg/L.

PROJECT DESCRIPTION:

This innovative project will contribute to a more balanced State NPS program. The project addresses three priority program areas—urban, construction and onsite wastewater treatment and disposal systems. The project also addresses the priority methods of public education, training, technical assistance, BMP implementation, and science pursuit.

The project area includes a Portland cement and ready-mix concrete plant and pre-casting industrial facility. The drainage area is approximately 215 acres. Observations on site indicated that runoff from this source area catchment is comprised of very fine hetero-disperse Portland cement and concrete particle matter (PM). The PM is very cohesive in nature as can be seen by the agglomeration of fine white PM residue on catchment vegetation and surfaces. The cohesive and agglomeration properties of this fine hetero-disperse PM can be beneficial in flocculation but will likely lead to the clogging of an on-site filter system. The chemical composition of cement and concrete-based PM in the runoff, for example high pH, high turbidity and fine hetero-disperse PM change the water chemistry of the runoff water and have the potential to degrade receiving waters accepting untreated discharges. The observed fineness of the PM illustrates the difficulty of separating the PM without extended retention time, very low surface overflow rates from a treatment system or application of coagulation-flocculation followed by extended gravitation sedimentation.

Watershed Management Plan:

The City proposes to divert stormwater runoff to a stormwater treatment system to remove the fine, suspended particulate. The stormwater treatment system shall be designed to provide treatment for the four-hour, two-inch rainfall event. Volumetric flows above this will be bypassed and routed to Manuels Branch. Stormwater runoff associated with the remaining parcels that currently discharge to the eastern terminus of Manuels Branch will be routed around the stormwater treatment system, continuing to discharge to Manuels Branch as before.

A water quality analysis was performed by the Department of Environmental Engineering Sciences at the University of Florida to measure rain fall runoff particle size distribution (PSD) and suspended sediment concentrations (SSC) for the purpose of recommending treatment options. Results of the study indicated that the activities on the industrial land use catchments generate very fine cementitious hetero-disperse PM, very high levels of SSC, very high turbidity, and high pH; consistent with observed activities on the contributory catchments.

The treatment suggested in the water quality analysis report was to provide 2-hour settling basin in conjunction with alum injection at an alum dosage range of 20 to 50 mg/L as alum. Given the high pH levels documented by the study, dosage with alum will assist in lowering the pH towards neutral. Management of the residual-sludge separated in the basin was recommended to be facilitated by an adjacent sanitary sewer collection system for transport to the City of Fort Myers wastewater treatment plant (WWTP).

Alum treatment was recommended as the BMP based on the results of the chemical and quantitative analysis of the water quality grab samples. The analytical results identified that the particle sizes are very fine. The City proposes to divert stormwater runoff from the two industrial areas to a treatment system to remove the fine, suspended particulates.

In brief, the water quality treatment system consists of a stormwater pump station with an overflow weir, a redirection of existing ditches to allow upstream areas not included in the treatment process to bypass the pump station, and a treatment pond with an overflow weir that will introduce the treated stormwater (beyond the pond's capacity) back into Manuels Branch. The water quality treatment system is designed to provide treatment of the runoff directly associated with the two industrial parcels located north and east of the eastern terminus of Manuels Branch.

An Alum injection treatment system is proposed for the removal of the Total Suspended Solids (TSS) associated with the runoff from the Cement Industries sub-basin and the Industrial Area sub-basin. The basic water quality (alum) treatment system will consist of the following components:

- A stormwater pump station,
- A bypasss channel
- An alum dosing station
- A flocculation/settling pond, and
- An automated alum floc removal and disposal system.

Periodic management of the residual-sludge separated by the basin can be facilitated by discharge to an adjacent sanitary sewer transporting the residual-sludge to the wastewater treatment plant where the WWTP facilities and operations will more effectively manage the sludge.

Public Outreach. The City has been working directly with the industrial businesses in the area to reduce the pollutants discharged in stormwater runoff by providing cost effect solutions to treat some stormwater on their facility. The City will visit each site in the drainage area to ensure needed BMPs are installed on site as well as provide training and stormwater education to assist workers in identifying potential pollutant sources. Printed materials will be used in the training and will be left behind. In addition, all of the stormwater education materials and training will be used in other industrial areas of the city that have similar nonpoint pollutant problems.

Monitoring Effectiveness. Project shall be monitored in accordance with attached Water Monitoring Plan.

BMPs Installed		**TSS**	**TP**	**TN**	**BOD**
BMP # 1		**lbs/yr**	**lbs/yr**	**lbs/yr**	**lbs/yr**
Pollutant Loads	Pre-Project	**118,000**	**100**	**600**	**2400**
	Post-Project	29,000	**50**	**540**	**1200**
	Load Reduction	**89,000**	**50**	**60**	**1200**
	% Reduction	**75**	**50**	**10**	**50**
TOTAL		**TSS**	**TP**	**TN**	**BOD**
		lbs/yr	**lbs/yr**	**lbs/yr**	**lbs/yr**
Pollutant Loads	Pre-Project	**180,000**	**100**	**362**	**700**
	Post-Project	**45,000**	**50**	**326**	**350**
	Load Reduction	**136,000**	**50**	**36**	**350**
	% Reduction	**75**	**50**	**10**	**50**

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by City of Fort Myers.

TASK DESCRIPTION:.

Task Number	Task Description
1	GRANT CONTRACT-- Grant contracts must be signed Deliverable—Signed grant contract with DEP
2	CONSTRUCTION PLANS -- Construction plans are currently 90% complete. The plans will need to be brought to completion.
3	PERMITTING -- A draft permit application has been prepared and can be submitted in a timely manner. Permit review will take 2-3 months.
4	ADVERTISEMENT FOR BID-- Specifications shall be developed and available to the public along with the construction plans to encourage a competitive bid. The project shall be advertised for a period of 30 days. Deliverable-Copy of bid documents.
5	CONSTRUCTION—Construction of the project shall proceed once the plans have been finalized, necessary permits obtained and a contractor has been selected. The construction shall be monitored by City staff to ensure compliance with the construction plans with site meetings held with staff and all involved contractors to encourage clear communication. The contractor shall install the required construction Best Management Practices and have a Stormwater Inspector that has received the certification through the FDEP Florida Stormwater, Erosion, and Sedimentation Control Inspector Training Program onsite at all times. After the construction has been deemed substantially complete, City staff shall perform a walk through to create a punch list of items for the contractor to address.

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Signed FDEP Contract	Contract	0	Month 1
2	Final Design and Permitting	Construction Plans, Permits	Month 0	Month 4
3	Advertise Project for Bid	Bid results tabulation, Contract for Construction	Month 4	Month 6
4	Construction (BMP Implementation)	Pay Applications, Inspection Reports	Month 8	Month 14
5	Construction Close Out	Project Certification to Permitting Agency and Close Out Documents	Month 14	Month 16

6	Post-Implementation Monitoring	Lab Results	Month 16	Month 26
7	Educational trainings and materials	Copy of printed brochures	Month 16	Month 17
8-1	Prepare and Submit Draft Final Report	Draft Report	Month 26	Month 27
8-2	Prepare and Submit Final Report	Final Report	Month 27	Month 28
9	Maintenance of Project	Out of ordinary projects will be reported to DEP	Month 28	On-going

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	SIGNED FDEP CONTRACT Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$0	City of Fort Myers
2	FINAL DESIGN AND PERMITTING Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$60,000	City of Fort Myers Stormwater Utility, South Florida Water Management District
3	ADVERTISE PROJECT FOR BID Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$10,000	City of Fort Myers Stormwater Utility
4	CONSTRUCTION (BMP IMPLEMENTATION) Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public	$360,000	$207,000	City of Fort Myers Stormwater Utility

	education			
5	CONSTRUCTION CLOSE OUT Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$5,000	City of Fort Myers Stormwater Utility
6	POST-IMPLEMENTATION MONITORING Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$15,000	City of Fort Myers Stormwater Utility
7	EDUCATIONAL DISPLAYS Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$3,000	City of Fort Myers Stormwater Utility,
8	PREPARE AND SUBMIT DRAFT AND FINAL REPORTS Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$5,000	City of Fort Myers Stormwater Utility
9	MAINTENANCE OF PROJECT Activity Type: salaries, travel, equipment, supplies, sub-contracting, contractual services, monitoring, public education	$0	$35,000	City of Fort Myers Stormwater Utility
Total:		$360,000	$340,000	
Total Project Cost:		$700,000		
Percentage Match:		51%	49%	

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. The project is innovative and includes best management practices. Alum treatment was recommended as the BMP based on the results of the chemical and qualitative analysis of the water quality grab samples. The analytical results identified that the particle sizes are very fine with a d50 and a d90 generally between 2 and 7 microns respectively. The particle shape was observed to be more of a platelet than a sphere, further hindering the settling time of the particulate matter and keeping the particles suspended in the solution.

  Alum coagulation is successful at removing suspended solids from captured stormwater. A goal of treatment was to reduce turbidity to less than 29 NTU (Class1) using a low cost reliable treatment process that can be employed using low maintenance.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The monthly fee is $4.80 PER ERU.

- Does the project fall within a watershed undergoing BMAP development?

  Yes. Manuels Branch (an impaired water body) is part of the Caloosahatchee Watershed.

- The project located in an environmental justice area. At least 51% of the project's benefit is received by a special designation area, in this case an Enterprise Zone.

REFERENCES CITED:

EPA, Region 4: "Final Total Maximum Daily Loads for the Manual Branch WBID 32401 Nutrients and Dissolved Oxygen", March 2011. (attached)

University of Florida, Department of Environmental Engineering Sciences: "Draft Report for Ft. MyersProject, Rainfall-Runoff PSD and SSC Analysis With Treatment Recommendations", January 29, 2010. (attached)

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment A
  - ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
    - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment B
    - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment B
    - ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment B

- ☑ Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.: Attachment C

PROJECT 13

PROJECT NAME: PC South Algal Nutrient Removal Facility

PROJECT FUNDING REQUEST: $850,000 **MATCH:** $8,280,000

LEAD ORGANIZATION: Indian River County

CONTACT PERSON: Keith McCully, P.E.
1801 27th Street
Vero Beach, Florida 32960
Tel: 772-226-1562
Fax: 772-778-9391
Email: kmccully@ircgov.com

COOPERATING PARTNERS: State of Florida – DEP Agreement No. LP31010 ($250,000)

PROJECT ABSTRACT:

Type of Treatment: An Algal Nutrient Removal Facility system will remove dissolved nutrients from **10 million gallons per day** of stormwater and canal water and from **1.5 million gallons per day** of reverse osmosis reject water. The Algal Nutrient Removal Facility (ANRF) used a patented water treatment technology developed specifically to enhance water quality of polluted waters through the active cultivation of attached algae upon an engineered surface. By cultivation is meant the production and periodic harvesting of the attached algae (epiphytic and periphytic) and the community of organisms that become established on and around the algae. This living community of plants and organisms is known as algal turf and includes not only the algal biomass, but also associated invertebrates, bacteria, fungi, organic residues, and inorganic precipitants. Through the community's biological and chemical dynamics, nutrient pollutants are removed from the water column, dissolved oxygen is increased, and oxidation of reduced substances is facilitated. The result is a treated effluent reduced in nutrients, high in dissolved oxygen, and relieved of many potentially biologically deleterious and toxic substances

Summary of Estimated Pollutant Load Reductions: The projected facility performance as noted in the load and load reduction table is annual reduction of phosphorus of 2,447 pounds; annual reduction of nitrogen of 9,830 pounds, and annual reduction of suspended solids of 25,389 pounds.

Summary of Educational Components: The project has several educational components. It will provide a place for school children to observe firsthand an efficient pollution reduction system that utilizes natural process to achieve pollutant removals. The project will also demonstrate that such a facility can produce a useful and valuable byproduct - the harvested algal biomass. The facility will also highlight the fact that high quality, valuable wetlands can be constructed and easily maintained if they are provided with a clean water source. The County's stormwater educator will showcase the facility as a correct way to use natural processes and systems to remove pollution from the Indian River Lagoon.

Summary of Monitoring: A monitoring plan will include provisions for composite sampling of influent and effluent, as well as the RO Concentrate for the nutrient series to include total phosphorus, total nitrogen, TKN, Ammonia-N, and NOx-N, with ortho phosphorus taken once monthly as a field filtered, grab sample. Composite samples will

include time-sequenced samples—typically 100 ml every three hours. Samplers shall be refrigerated automatic samplers, such as those manufactured by Sigma or Isco. Composite will be collected weekly, and after four weeks, these collected samples will be combined into a monthly composite sample. This composite sample will be delivered to a NELAP certified laboratory, along with necessary blanks, splits, and duplicates.

Field sampling will include weekly daytime pH, DO, Conductivity and Water Temperature, using a calibrated YSI type meter. Additional grab samples to be gathered monthly shall include Color, Alkalinity, TSS, TVSS, Ca, Mg, Cu, Zn and Fe. Quarterly sampling will be done on all three sites for Pb, Hg, Se, Cd and Cr.

Harvested material shall be weighed wet with each harvest, either directly or by determining wet density and volume. Three composite samples shall be analyzed for percent moisture, and these composited on a monthly basis for analysis for phosphorus, nitrogen, carbon, and ash.

A QAPP plan will be developed and receive approval by FDEP prior to initiation of monitoring. This plan and all sampling and testing protocols and procedures shall comply with DEP SOP FQ 1000 March 31, 2008 (effective 12/3/08); FDEP QA requirements per F.A.C. 62-160; 40 CFR Part 136; and other guidelines and rules as applicable.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Vero Beach; Indian River County
Impacted Watershed Name: Indian River Farms Water Control District South Relief Canal Drainage Basin
Size of Project Impact: The ANRF will be approximately 4.5 to 5 acres with associated peripheral facilities requiring another 10 acres. The developed site will be approximately 15 acres. The total site property is approximately 39 acres. The site not used by the treatment facility will become a protected gopher tortoise habitat, approximately 24 acres, including cell tower lease areas.
Size of Drainage Area: 17,163 acres
Latitude: 27d36'15"N
Longitude: 80d23'10"W
Hydrologic Unit Code: 03080203
Land is owned by: Indian River County
Land Uses within the watershed: (from GIS information – wetlands and forested areas extrapolated)

Land Use	Acres	%
Residential	**8,067**	**47**
Industrial/Commercial	**721**	**4.2**
Agricultural	**3,948**	**23**
Forested	**446**	**2.6**
Wetlands	**463**	**2.7**
Right of Way	**2,746**	**16**
Institutional	**772**	**4.5**
Land Use Totals (Acreage and %)	**17,163**	**100**

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: Indian River Lagoon Comprehensive Conservation and Management Plan (IRL CCMP), Action Plans and Associated Priority Levels: PS-1 – High; FSD-1 – High; FSD-2 – High; FSD-4 – High; FSD-6 – Medium; FSD-13 – High; FSD-14 – High.

List 303(d) listed waterbody affected: Indian River Lagoon (IRL Central B Project Zone)

WBID: 5003B

Impairment: The health of the Indian River Lagoon's seagrass is the benchmark for measuring the progress of the TMDL process. Healthy seagrass and increasing seagrass coverage is indicative of a health Lagoon. The project will dramatically reduce the amount of dissolved nutrients (nitrogen and phosphorus) entering the Indian River Lagoon (IRL) through the Indian River Farms Water Control District's (IRFWCD) South Relief Canal. Therefore, the project will dramatically reduce the potential for harmful algal blooms, including macroalgae such as *Gracilaria sp.*, in the IRL that can be detrimental to seagrass and marine life. The project will also significantly reduce the amount of suspended solids and sediment that enter the IRL and it may also reduce to a lesser degree the color of the water. It will also increase the water's overall dissolved oxygen levels. Management of these parameters will benefit the IRL's seagrasses by reducing muck deposits, reducing settlement of sediment on seagrass leaves, improving oxygen availability, and increasing the penetration of light through the water column.

PROJECT DESCRIPTION:

PC South will greatly improve the IRL's health by significantly removing suspended solids and dissolved nitrogen and phosphorus from the waters of the IRFWCD South Relief Canal before the waters enter the IRL, while increasing oxygen levels. This will benefit and protect seagrasses and associated fauna, providing them with an environment suitable for their growth and reproduction. As seagrasses are preserved and proliferate, fish and wildlife populations will increase. The potential for dangerous IRL algal blooms, including macroalgae such as *Gracilaria sp.*, caused by high nutrient loadings will also be greatly reduced. A secondary benefit will be the creation of a significant source of treated water for irrigation purposes for commercial, industrial, and residential users, thus lowering their consumption of water from the surficial and Floridian aquifiers, thereby promoting water conservation and preserving groundwater. This will also benefit the IRL by reducing the quantity of freshwater discharged into it on a daily basis. Another benefit is the creation of very high quality wetlands and associated wildlife habitat, and permanent preservation of endangered gopher tortoise habit. The County will investigate the potential for aquifer recharge since the treatment facility lies on the one-mile sand ridge, a prime aquifer recharge area. The project will also produce a usable byproduct in the form of high quality compost, fiber products, livestock feed, or methane gas.

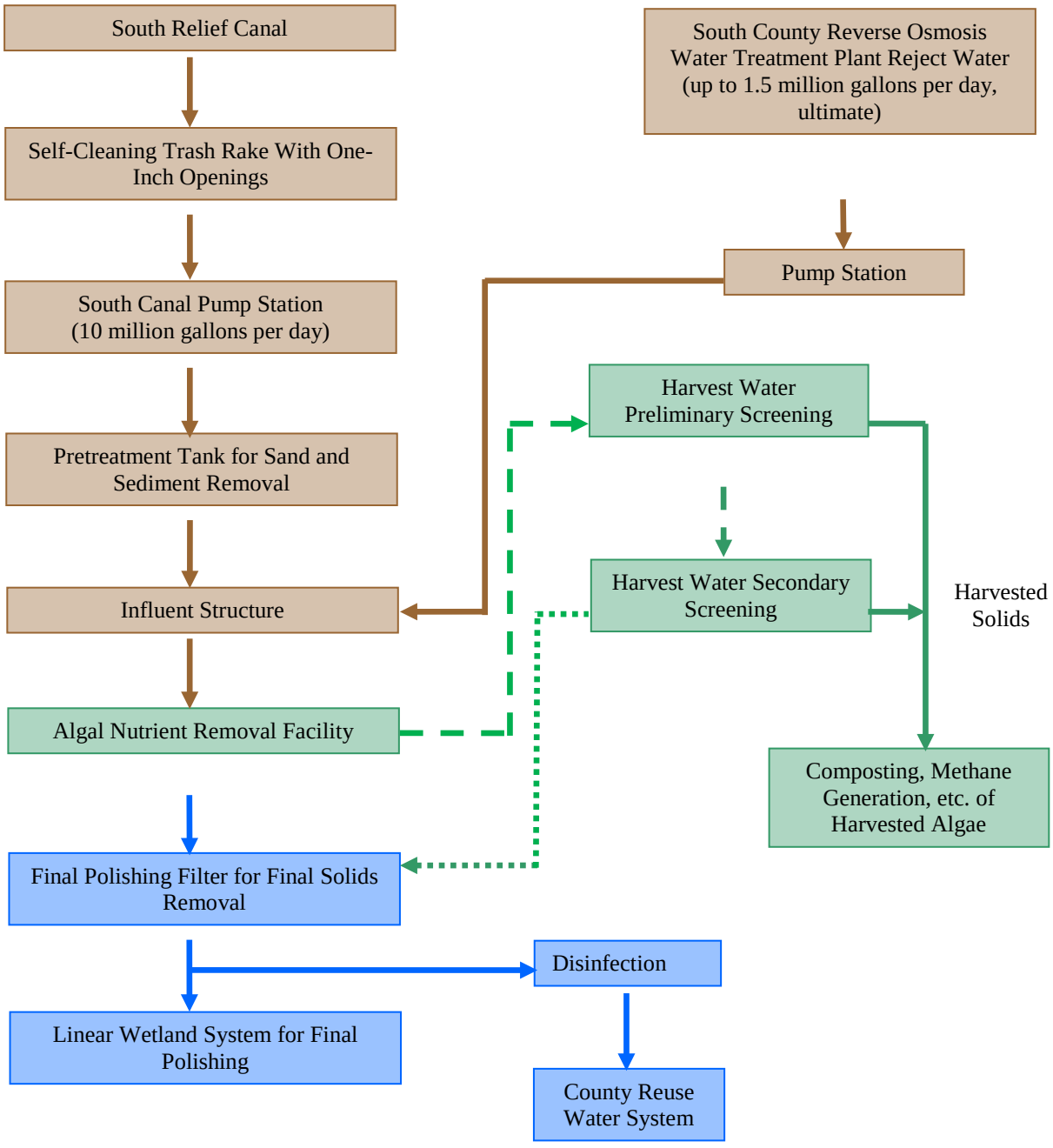
PC South will treat **10 million gallons per day** of polluted water from IRFWCD's South Relief Canal and up to **1.5 million gallons per day** of reverse osmosis reject water. The South Relief Canal flow averages 26 MGD with nutrient-rich contributions from a 17,163-acre drainage basin that is a mix of developed industrial, residential, commercial, and agricultural land. Undeveloped County property surrounding PC South will be protected and converted into a permanent gopher tortoise preserve.

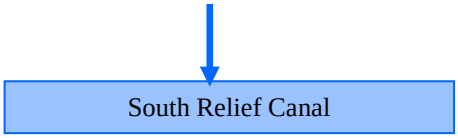
PC South will remove dissolved nitrogen and phosphorus from the polluted water. One or more final polishing filters, similar to wastewater treatment type filters, will be included in the treatment train downstream of the ANRF to remove all remaining solid particles from the treated

water and a linear wetland system will provide final polishing. Besides removing nutrients from 10 million gallons per day of South Relief Canal water, the facility will receive and treat up to 1.5 million gallons per day of reject water from the South County Reverse Osmosis (RO) Treatment Plant. The RO reject water (currently discharged into the South Relief Canal untreated) will be blended with the canal water and the ANRF will remove dissolved nitrogen and phosphorus from the blended water. Hydrogen sulfide present in the RO reject water will be dissipated into the atmosphere as the mixture flows over the ANRF surface. Initially, up to 3 million gallons per day of treated canal water will be disinfected and placed into a proposed County reuse water system. The remaining water will be returned to the South Relief Canal where it will continue its journey to the IRL.

A simplified flow schematic of the proposed treatment train is presented in Figure 1.

Figure 1 – Simplified Flow Schematic





At least 10 million gallons per day of South Relief Canal water will be directed through a box culvert to a duplex pumping station that will lift the water into a sediment removal basin. Highly efficient and mechanically simple variable speed Archimedes screw pumps are proposed. Preceding the pumps will be a Duperon self-cleaning FlexRake with one-inch openings. Thus, all solids one-inch and larger will be removed from the canal water prior to entering the pump station. These captured solids will be disposed of at the County landfill or an energy conversion facility. Easily settelable solids will be removed in the sediment recovery basin and the recovered solids will be reused in an environmentally friendly way. From the sediment recovery basin, the water flows by gravity into the facility's influent structure and ANRF distribution system. A separate pumping station located at the South County RO Water Treatment plant will pump RO reject water into the influent structure where it will mix and blend with the canal water. Up to 1.5 million gallons per day of reject water will be pumped to PC South for treatment and dilution.

PC South's ANRF floway (which is the treatment surface) will cover a land area of approximately 4.5 to 5 acres. It consists of a large, gently sloped impervious surface that is overlaid with a rough grid-like material. Nutrient rich waters are discharged from the influent structure's flow distribution system onto the floway, creating a surging, laminar flow and an algal turf is cultured on the grid material. The algae grows naturally and eventually a dominant algal community will predominate the treatment area, and serve as the primary production base for the algal turf ecosystem. The floway is alive and it is a complex miniature ecosystem. Living within the algae are a multitude of small invertebrates, insects, microbes, and other organisms that feed off the algae and the organic material present in the canal water and RO reject water. As the algal turf grows, it forms dense mats over the floway and it is very effective at removing dissolved nitrogen and phosphorus. It also removes to a smaller extent, a variety of other pollutants found in the water including color, while adding substantial quantities of dissolved oxygen – a byproduct of photosynthesis. Hydrogen sulfide associated with the RO reject water will be harmlessly dissipated into the atmosphere as the water travels down the floway. The treated water collects in a concrete trough at the bottom of the gently sloped floway.

From time-to-time, the algae must be harvested to remove the nutrients and minerals assimilated into the algae tissue, and to sustain an optimatl ecostructure within the algae turf community. During the warmer months, it is projected that one half of the floway will be harvested each week, which equates to biweekly harvesting of the total system. Algal production decreases during colder months, requiring harvesting only every three to four weeks. Harvesting is accomplished by scraping the floway with a special squeegee-like blade mounted to the front of a small tractor. The scraping dislodges the algal turf, which is washed into a collection trough where it is removed at a centralized harvesting station by a Duperon self-cleaning FlexRake or similar screening device with one-quarter inch or less openings. The captured algal mass drops onto a concrete pad where it is transported to a nearby composting area by a small skid steer loader. Alternatively, methane generation of the combined PC South and Egret Marsh algae will be investigated, as well as other potentially effective processes that generate viable by-products.

Dirty harvest water containing pieces of algae and sediment particles that pass through the FlexRake will be processed by two filters - a pretreatment filter and a polishing filter. These filters will remove most of the remaining solids, which will be added to the composting process, and the

filtered water will be routed to the final polishing filter system, where it mixes with the treated water from the non-harvested floway section. Treated water destined for irrigation will be taken from the final polishing filter's discharge, disinfected, and placed into a new reuse water system for residential, commercial, and industrial customers. Initial reuse water flows are expected to be 3 million gallons per day.

The main polishing filter receives all of the water treated by the ANRF plus the filtered harvest water. This filter will be similar to those commonly used at wastewater treatment plants and it will remove virtually all remaining solid particles from the water.

Finally, the processed water is discharged from the filter into a linear wetland system. This system will polish the water for discharge plus provide much needed high quality habitat for birds and other wildlife. Water exiting the wetland systems will be released back into the South Relief Canal where it will flow into the IRL.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: For estimating watershed loading, exclusive of the RO Concentrate addition, the Spreadsheet Tool for Estimating Pollutant Loads (STEPL) was initially applied, with the land use breakdown as previously noted. In developing these loads, grass swales and dry detention were noted as the existing BMP elements. Event Mean Concentrations used were those applied to Florida conditions[1] shown in Table 1, which are similar to the default values within the STEPL model. Load projections for the entire watershed are noted in Table 2.

There is available long term USGS flow data[2] for the PC-South Relief Canal which represents the composite influence of the runoff and base flow associated with the majority of the watershed. Data from 1956 to 1982[3] reveals an annual average flow of 37.7 cfs or 24.4 MGD, with a standard deviation of 13.7 cfs (8.9 MGD); a minimum annual average of 15.2 cfs (9.8 MGD) and a maximum annual average of 61.6 cfs (39.8 MGD). Using the average flow rates and the STEPL post BMP loading values, the average annual concentrations within the canal can be estimated, as noted in Table 3. Included in this table is the actual concentrations as monitored in the South Canal, using data from USGS from 1972-1977, from Indian River Farms Water Control District from 2000, and from the ongoing PC-South ATS™ Pilot System.

Table 1: Event Mean Concentrations PC-South Relief Canal Watershed

	Total P	Total N	TSS	BOD
Land Use	**EMC mg/L**	**EMC mg/L**	**EMC mg/L**	**EMC mg/L**
Agricultural	0.14	2.02	70	13
Commercial	0.29	1.34	88	12
Residential	1.05	2.61	39	8
Industrial	0.31	2.06	94	10
Forest/Open	0.05	1.44	11	15
Institutional	0.31	2.07	39	8
Wetlands	0.05	1.14	5	1.5

Table 2: STEPL Load Projections for PC-South Relief Canal

[1] CDM, "Little Wekiva Basin Watershed Management Plan" 2005 Orange County, Florida.
[2] USGS Station 02253500 Lat 27° 36' 11"; Long 80° 23' 24"
[3] In 1982 RO Concentrate discharge to the canal was initiated and flows reflect this addition after 1982.

1. Total load by subwatershed(s)

Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)
	lb/year	lb/year	lb/year	t/year
PC-South	145,960	19,464	666,393	1,994
Total	145,960	19,464	666,393	1,994

2. Total load by land uses (with existing BMPs)

Sources	N Load (lb/yr)	P Load (lb/yr)	BOD Load (lb/yr)	Sediment Load (t/yr)
Urban	34,489	6,109	120,671	278
Cropland	24,800	1,971	231,858	217
Pastureland	29,067	2,243	93,306	45
Forest	1,220	43	929	1
Feedlots	0	0	0	0
User Defined	3,333	1,332	9,418	7
Septic	322	126	1,316	0
Gully	0	0	0	0
Streambank	0	0	0	0
Groundwater	0	0	0	0
Total	93,232	11,825	457,497	547

Table 3: Comparison of Average Concentrations PC-South Relief Canal

Source	TP mg/L Average	TN mg/L Average	TSS mg/L Average	BOD mg/L Average
Calculated from STEPL and USGS Flow Data	0.159	1.25	15	6
Field Data USGS, IRFWCD, IRC	0.240	1.05	11	<2

These values are reasonably similar. The field data will be used in the following analysis regarding design loads and projected reductions. To complete this review, the flows and water quality associated with the RO Concentrate, which is to be blended at an average ratio of 10:1 with flows from the South Relief Canal, needs to be included. The RO Concentrate is a highly mineralized, low suspended solids flow with a near neutral pH, and water temperatures consistently at about 26° C. The flow rate is presently about 1 MGD. Based upon data collected during the ongoing pilot investigation, the design water quality for the RO Concentrate is as noted in Table 4.

Table 4: Design Concentrations Ro Concentrate, South Relief Canal and 10:1 Blend

	Units	RO Concentrate Value Average	Canal Value Average	10:1 Design Blend Annual Value Average
Total P	mg/L	0.033	0.240	0.221
Total N	mg/L	1.57	1.05	1.10
Ammonia-N	mg/L	0.94	0.09	0.17
TSS	mg/L	<2	11	10
Alkalinity	mg/L as $CaCO_3$	723	178	228
Conductivity	micros/cm	6,135	1,941	2,322
Color	pcu	11	39	36

* Value is typically directly related to concentration in feed water
** Typically directly related to water temperature

Accordingly, based upon flows of 10 MGD from the canal and 1 MGD as RO Concentrate, the annual design loads to the Algal Turf Scrubber® (ATS™) treatment unit shall be as noted in Table 5. To determine the reduction associated with these loads through the Algal Turf Scrubber®, a first order model —ATSDEM—which is based upon the Monod relationship. ATSDEM was developed by HydroMentia, Inc. of Ocala, Florida[4], and will be applied to the water quality and flow conditions. The model is based upon projections of specific growth rates and community productivity for the Algal Turf Community, which has been shown to be a function of total phosphorus levels; hydraulic loading rate; temperature; tissue nutrient levels and average standing crop. Critical input parameters are noted in Table 6.

Table 5: Design Pollutant Loads from 11 MGD Design Flow Blend

Design Pollutant Loads	Units	10:1 Design Blend Annual Value
Total P	lb/year	7,400
Total N	lb/year	36,834
TSS	lb/year	334,851

Table 6: Critical Input Parameters ATSDEM

Parameter	Units	Value Range
Maximum Specific Growth Rate	1/hr	0.02-0.04

[4] This model was developed as part of the Contact C-13933 between HydroMentia, Inc and the South Florida Water Management District. "S-154 Pilot Single Stage Algal Turf Scrubber® Final Report" Submitted to the South Florida Water Management District. March 2005.

μ		
Optimal Growing Temperature	°C	28-31
Tissue Phosphorus Level*	% of dry weight	0.35-1.0
Tissue Nitrogen Level*	% of dry weight	2.00-3.50
Average Standing Crop**	Dry-g/m^2	50-120
V'ant Hoff-Arrhenius Coefficient **Q**	dimensionless	1.05-1.10
Half rate concentrationTP $\mathbf{K_p}$	μg/L	60-100
Half Rate Value Linear hydraulic Loading Rate $\mathbf{K_h}$	Gpm/ft	9-15
Initial Standing Crop	Dry-g/m^2	10-20

Because there is wide variability in ATS™ performance based upon water temperature, it is reasonable to model the system on a monthly basis. Water Quality input data for an average month, taken from the historical data base is noted in Table 7. The algal turf information is interpolated from data collected from both the ongoing PC-South ATS™ pilot and the operational Egret Marsh Stormwater Park ATS™ facility [5] [6], presently under operation.

Table 7: ATSDEM Water Quality and Algal Turf Input Data

	Average TP mg/L	**Average TN mg/L**	**Average Water T °C**	**Average Standing Crop g/m^2**
Month	10:1 Blend	10:1 Blend	10:1 Blend	
January	0.136	0.75	19.7	50
February	0.112	0.72	20.4	55
March	0.333	0.84	22.9	70
April	0.171	1.06	24.4	90
May	0.326	1.37	27.4	100
June	0.267	1.63	28.1	110
July	0.148	1.14	28.9	110
August	0.325	1.54	28.8	100
September	0.267	1.02	27.8	90
October	0.227	1.10	25.8	70
November	0.167	1.12	23.7	60
December	0.172	0.72	19.5	50
Alkalinity 228 mg/L as $CaCO_3$ pH = 7.81 Tissue P = 0.60% Tissue N = 2.40% Initial Standing Crop 10 g/m^2				

[5] "Egret Marsh 10 MGD Algal Turf Scrubber® Final Basis of Design Report" July, 2005. Prepared for Indian River County by HydroMentia, Inc.

[6] Contract G0143 319(h) grant to Indian River County. "Egret Marsh Stormwater Park Algal Turf Scrubber® 319 (h) Grant Quarterly Performance Report Quarter 1" Prepared for Indian River County for submittal to FDEP by HydroMentia, Inc. January 2011

The ATSDEM projections are presented in Table 8. These are reasonable conservative projections, when compared to actual pilot performance from January through April 2011, as shown in Table 9. These projections are conservative, but congruent with the data collected to date associated with the ATS™ PC-South pilot study, as shown in Table 10, with the actual performance notably higher than the ATSDEM projections.

Suspended solids removal through the ATS™ has been typically been about 50% when influent TSS are less than 15 mg/L. Quite often laboratory data is reflected as <5 mg/L which is reported as the limit of detection. 50% reduction is a reasonable projection.

Table 8: ATSDEM Performance Projections

$\mu_{max\ (1/hr)}$	0.032
K_{sp} (µg/L)	50
K_{sh} (gpm/lf)	11
T opt °C	30
Q	1.09

	Influent TP µg/l	Effluent TP µg/l	TP removed lb	TP Areal Removal Rate g/m^2-yr	Influent TN mg/l	Effluent TN mg/l	TN removed lb	TN Areal Removal Rate g/m^2-yr	Algal Turf Net Productivity g/m^2-day	Effluent pH
January	136	110	75	16	0.75	0.64	301	65	7.50	8.02
February	112	86	74	16	0.72	0.62	295	63	7.35	8.01
March	333	265	193	42	0.84	0.57	774	166	19.26	8.34
April	171	108	178	38	1.06	0.81	714	154	17.77	8.30
May	326	213	321	69	1.37	0.92	1,284	276	31.96	8.68
June	267	148	337	73	1.63	1.16	1,350	290	33.61	8.73
July	148	65	235	50	1.14	0.81	939	202	23.38	8.45
August	325	193	374	81	1.54	1.01	1,498	322	37.30	8.83
September	267	178	253	54	1.02	0.66	1,013	218	25.21	8.50
October	227	168	168	36	1.10	0.86	674	145	16.78	8.27
November	167	127	113	24	1.12	0.96	452	97	11.26	8.12
December	172	144	78	17	0.72	0.61	314	67	7.81	8.02
Averages	**225**	**151**		**45**	**1.12**	**0.82**		**182**	**21.04**	**8.39**
Totals			**2,402**				**9,607**			

Table 9: Comparison ATSDEM Performance Projections to Pilot Results January through April 2011

		Influent mg/L		Effluent mg/L		Areal Removal Rate g/m^2-yr		Productivity g/m^2-day		pH	
		ATSDEM	Pilot Data	ATSDEM	Pilot Data	ATSDEM	Pilot Data	ATSDEM	Pilot Data	ATSDEM	Pilot Data
Jan	TP	136	82	110	57	16	22	7.50	6.03	8.02	8.37
	TN	0.75	0.64	0.64	0.49	65	170				
Feb	TP	112	80	86	45	16	28	7.35	14.32	8.01	8.54
	TN	0.72	0.66	0.62	0.42	65	208				
Mar	TP	333	257	265	45	42	165	19.26	20.98	8.34	8.35

	TN	0.84	1.28	0.57	0.56	166	589				
Apr	TP	171	99	108	30	38	54	17.77	23.28	8.30	8.21
	TN	0.81	1.13	0.81	0.66	154	369				

In addition to the ATS™, the proposed facility will include about 1 acre of polishing wetlands, intended to permit settling of periodically sloughed algae and some buffering of pH and water temperature, as well as providing wildlife habitat. The removal rates in terms of nutrients and solids through such a wetland/pond system is comparatively modest. At the Egret Marsh Stormwater Park, the ATS™ is followed by a wetland\pond system, which over nine months has provided an average removal rate of 5 g/m^2-yr for TP and 25 g/m^2-yr for TN. These removals are reflected in the loading and load reduction table included as part of this application.

BMPs Installed		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**
BMP #1 (ATS)				
Pollutant Loads	Pre-Project	**33,851**	**7,400**	**36,834**
	Post-Project	**16,925**	**4,998**	**27,229**
	Load Reduction	**16,926**	**2,402**	**9,607**
	% Reduction	**50%**	**32.5%**	**26.1%**
BMP #2 (wetland pond)		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**
Pollutant Loads	Pre-Project	**16,925**	**4,998**	**27,229**
	Post-Project	**8,463**	**4,953**	**27,004**
	Load Reduction	**8,463**	**45**	**225**
	% Reduction	**50%**	**0.9%**	**0.8%**
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**
Pollutant Loads	Pre-Project	**33,851**	**7,400**	**36,834**
	Post-Project	**8,462**	**4,953**	**27,004**
	Load Reduction	**25,389**	**2,447**	**9,830**
	% Reduction	**75.0%**	**33.1%**	**26.7%**

EMCS USED IN MODEL: The Event Mean Concentrations used in the initial load development are sown in Tables 1 and 3. These were compared to actual historical concentrations for the target water source—the South Relief Canal, as shown in Table 3, and the two values were noted to be reasonably close. The historical values were used in developing reduction projections.

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by the applicant, Indian River County.

TASK DESCRIPTION:

Task Number	Task Description
1	Project Design – Prepare engineering design drawings and technical specifications. This information will be provided to bidders to secure bids for the Work and the information will then be used to construct the project.
2	Permitting – Obtain permits from various regulatory agencies, including U.S. Army Corps of Engineers, Florida Department of Environmental Regulation, St. Johns River Water Management District, Indian River Farms Water Control District, and Indian River County.
3	Bid the Work and Award the Construction Contract – Bid the project and award the construction contract to the apparent responsible low bidder.
4	Construct the Project
5	Monitor Results and Submit Final Project Report – Monitor the project's pollution removal effectiveness for up to one year and upon completion, prepare and submit a final project report.

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Project Design	Final construction drawings and technical specifications	Month 0	Month 12
2	Permitting	Issuance of all necessary permits from regulatory agencies	Month 3	Month 12
3	Bid the Work and Award the Construction Contract	Bidding documents and selection of construction contractor	Month 13	Month 16
4	Construct the Project	Successful construction of the project	Month 17	Month26
5	Monitor Results and Submit Final Project Report	Final project report	Month 27	Month 42

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Project Design	$0	$150,000	Indian River County Funding
2	Permitting	$0	$20,000	Indian River County Funding
3	Bid the Work and Award the Construction Contract	$0	$10,000	Indian River County Funding
4	Construct the Project	$750,000	$7,844,000	Indian River

			(Indian River County funds) and $156,000 (FDEP Contract LP31010)	County Funding and FDEP Contract LP31010
5	Monitor Results and Submit Final Project Report	$100,000	$100,000	Indian River County Funding
	Total:	$850,000	$8,280,000	
	Total Project Cost:	$9,130,000		
	Percentage Match:	10.3 %	89.7	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. This facility will be the second full-scale facility of its kind in Indian River County and the nation. Several BMPs are used for this project: primary screening using self-cleaning trash rakes; grit/sediment removal; biological nutrient removal using the algal nutrient removal facility; additional suspended solids removal using micro-screening or other highly efficient screens; final effluent polishing using high quality wetland systems; and disinfection of effluent used for irrigation reuse. Additionally, the harvested algal biomass is a useful byproduct. A more detailed description of the innovative technology behind the Algal Nutrient Removal Facility treatment step follows.

  The Algal Nutrient Removal Facility or ANRF is an engineered system that provides for the sustained cultivation of a community of attached (periphytic and epiphytic) algae. Through engineered design and flow control, high levels of biomass productivity can be maintained. Predictable nitrogen and phosphorus removal results from the routine recovery of excess productivity. Recovered biomass is processed into marketable end products including high grade compost or livestock feed.

  The Algal Nutrient Removal Facility offers the advantage of high areal removal rates for both nitrogen and phosphorus, which result in reduced land area requirements and treatment costs.[7] Effluent from the ANRF process is highly oxygenated, often exceeding saturation during the daytime, and typically well above 5 mg/l dissolved oxygen (DO)

[7] For example, STA systems may achieve phosphorus removal rates of 1-4 g-P/m^2-yr or less than 0.10 lb-P/acre-day; WHS™ units at high nutrient concentrations may achieve as high as 25 g-P/m^2-yr removal or about 0.62 lb-P/acre-day; ANRF systems at comparatively low nutrient concentrations have been documented as achieving well over 50 g-P/m^2-yr or 1.24 lb-P/acre-day. The implication is that an ANRF unit may provide treatment in 1 acre equivalent to 50 acres of STA or treatment wetlands.

during the nighttime. ANRF units have relatively short hydraulic detention, and thereby avoid accumulation of heavy sediment loads. As algae rely heavily upon dissolved bicarbonate, carbon dioxide and carbonate as a carbon source, pH levels within the ANRF effluent can increase during the daytime as alkalinity shifts towards hydroxyl alkalinity. This change in water chemistry allows engineered ANRF systems to be optimized for the precipitation and recovery of pollutants including phosphorus. ANRF units have also been shown to be effective at removing ammonia aand nitrate + nitrite nitrogen; and recovering trace metals and select organic compounds. The ANRF technology was specifically developed to offer low cost treatment even under low nitrogen and phosphorus conditions.

The PC South Algal Nutrient Removal Facility system will be composed of the following:

1. Influent flow delivery system, which will be a low head, high flow pumping system (e.g. axial flow or Archimedes pumps).
2. Intermittent release control device or flow surger, designed to pulse flows in a manner emulative of oscillatory waves. This device is an automatic siphon mechanism placed on a surger box. The intermittent surging of water helps disrupt the algal cell wall boundary which enhances the rate of diffusion of nutrients, particularly at low concentrations.
3. An influent distribution system designed to distribute water equitably along the width of the ANRF floway, with flow introduced from the flow surger.
4. A sloped ANRF floway that includes an impervious surface over which is installed a geotextile grid, which serves as an attachment matrix for the algae. Floway length is determined by treatment requirements and influent characteristics.
5. An effluent and harvest flume that runs the full width of the ANRF floway. Typically this flume is triangular in cross section, with a variable cross sectional area, increasing as flows accumulate. The slope is designed to ensure at least 1.5 fps velocity throughout the flume, which ensures conveyance of the harvested material. The flume serves both as a means to move effluent, and, during harvest, to transport harvested algae to an automated self cleaning bar screen (FlexRake).
6. An automatic FlexRake, typically as manufactured by Duperon Corporation of Saginaw Michigan. The FlexRake facilitates capture and removal of harvested algae filaments, as well as continuous removal of sloughed algae and incidental solids[8].
7. Algae harvest equipment for dislodging and moving excess production into the effluent flume

- Does the project fall within a watershed undergoing BMAP development?

  Yes. BMAP Watershed = Indian River Lagoon; Location = IRL Central B Project Zone, WBID 5003B

REFERENCES CITED:

Indian River Lagoon Comprehensive Conservation and Management Plan (IRL CCMP)

[8] In some cases in which high levels of suspended solids reduction is required, additional processes such as wedge wire screens, hydroscreens, or sand filters may be included to further polish the effluent after coarse screening through the Flex Rake.

CDM, "Little Wekiva Basin Watershed Management Plan" 2005 Orange County, Florida.

Egret Marsh 10 MGD Algal Turf Scrubber® Final Basis of Design Report" July, 2005. Prepared for Indian River County by HydroMentia, Inc.

Contract G0143 319(h) grant to Indian River County. "Egret Marsh Stormwater Park Algal Turf Scrubber® 319 (h) Grant Quarterly Performance Report Quarter 1" Prepared for Indian River County for submittal to FDEP by HydroMentia, Inc. January 2011

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment #1 - The final monitoring plan is anticipated to be similar to the attached monitoring plan. The County is presently following the attached monitoring plan for an operating pilot plant algal nutrient removal facility that will provide design data for the full scale PC South project.

- ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment #2
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment #3
  - ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment #4

- ☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.: Attachment #5 – Copy of FDEP Contract 31010 (less attachments)

PROJECT 14

PROJECT NAME: Enhancing Nutrient Removal Performance of Agricultural Stormwater Detention/Retention Areas

PROJECT FUNDING REQUEST: $ 340,875 **MATCH:** $237,517

LEAD ORGANIZATION: Agricultural and Biological Engineering (ABE) Department, Southwest Florida Research and Education Center (SWFREC), Institute of Food and Agricultural Sciences (IFAS), University of Florida (UF), Immokalee, FL.

CONTACT PERSONS: Dr. Sanjay Shukla, Associate Professor, ABE/SWFREC, UF/IFAS, 2685 State Road 29 N, Immokalee, FL 34142
Tel: (239) 658-3425, Fax: (239) 658-3469,
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Dr. Alan Hodges, Extension Scientist, Food and Resource Economics Department, UF/IFAS, 1113 McCarty Hall Gainesville, FL 32611
Tel: (352) 392-1881, Email: awhodges@ufl.edu

COOPERATING PARTNERS: C&B Farms, Florida Fruit and Vegetable Association (FFVA), Gulf Citrus Growers Association (GCGA), Southwest Florida Vegetable Advisory Committee (See Attachments 6-9)

PROJECT ABSTRACT:

Type of Treatment: Water quality and cost effectiveness' of retrofitted agricultural stormwater detention/retention systems (SDRS) will be demonstrated in this project. Agricultural SDRS are one of the most important BMPs to reduce the edge-of-the-farm loads of nitrogen (N) and phosphorus (P). Most of the farms (e.g. vegetable, sugarcane, citrus) in shallow groundwater regions of Florida require drainage to protect crops from flood damage. These farms are required to have SDRS to store the first inch of runoff before discharging to downstream locations. Most SDRS were designed and constructed with focus on flood damage and were not necessarily built for optimum water quality treatment. These SDRS can be retrofitted to enhance N and P treatments. Results from a recently completed demonstration project (Shukla et al., 2011), at a vegetable farm in the Everglades basin, showed that the N and P treatment efficiencies were 22 and 20%, respectively. This treatment efficiency level is lower than literature suggested values and it leads us to believe that agricultural SDRS may not be providing the expected treatment. One of the main outcomes of the above demonstration project was the identification of modifications to enhance N and P treatments.

As a next logical step, we propose to implement three modifications at the SDRS used in the previous project to demonstrate the increased N and P load reductions and determine its economic feasibility ($/lb of N and P retained). These modifications include: *1) relocation of inflow (drainage pumps) locations away from the outflow to increase the travel time within the SDRS for enhanced retention of particulate and dissolved N and P; 2) plugging of the inner borrow ditch at multiple locations to avoid short circuiting and force water to follow a longer pathway (increase travel time) for increased retention of particulate (settling)and dissolved (soil and plant) N and P retention by soil and plant; and 3) raising the*

elevation of the outflow control structure to increase storage volume and reduce net outflow of water and nutrients. These modifications are relatively easy to implement and involve treatment trains (reduced discharge volume, increased settling, and increased soil P adsorption and plant uptake). Lessons learned from the earlier project reveal that these retrofits are possible at most SDRS in north and south Florida. Results from the proposed project will also be beneficial for certain urban SDRS (e.g. increased pathway and storage).

Summary of Estimated Pollutant Load Reductions: Most agricultural SDRS are aboveground (with dike) and receive pumped drainage which makes them different than traditional urban SDRS. Therefore, the use of models suggested in the 319 Proposal Guideline is not likely to provide reliable nutrient load reductions estimates for retrofitted agricultural SDRS. We used field data from previous project (Shukla et al., 2011) and literature values to estimate expected nutrient load reductions. In its current condition (without modification), the N and P load reductions from the SDRS were 2,829 lbs/yr (22% treatment efficiency) and 452 lbs/yr (20% treatment efficiency), respectively. The literature suggests that a properly designed SDRS should have higher removal efficiencies than those observed during the previous demonstration project. The reported theoretical average estimate of P treatment efficiency for South Florida is 55% (Bottcher and Izuno, 2002). In a survey conducted by the US EPA (1999) on urban detention areas, the reported average N treatment efficiency was 40%. *Using these values (55% for P and 40% for N), the expected additional N and P load reductions will be 2,281 lb/yr (23% higher than current reductions) and 812 lb/yr (44% higher than current reductions), respectively.* Given such high level of potential N and P load reductions, the benefits of modified SDRS need to be demonstrated in the field.

Summary of Educational Components: Educational events (UF/IFAS field-days and grower workshops) will be organized to disseminate the project findings to landowners and producers, state agencies, environmental organizations, and other stakeholders to promote the adoption of these modifications. Pre- and post-test will be used to determine the knowledge gained and obtain grower feedback. Presentations at interagency meetings and scientific meetings will also be made to reach science and engineering professionals. To reach a wider audience, results will be published through
web-based extension publication (UF/IFAS EDIS) and agricultural industry magazines. A multi-media presentation will be made available at the UF/IFAS website.

Summary of Monitoring: After making the modifications during the first year of the project, the inflow and outflow N and P loads along with the weather and soil data will be *monitored for two years* to quantify the N and P treatment efficiency of the retrofitted SDRS. The modified SDRS treatment efficiency will be compared to the original SDRS to demonstrate the nutrient treatment benefits of the retrofits. We will also collect the modification cost and additional economic data to determine the cost- effectiveness ($/lb of N and P treated) of the retrofits for increasing its acceptability to the stakeholders. Inflow (three drainage pumps) and outflow (one discharge structure) will be equipped to measure both nutrient concentrations (NO3-N, TKN, and TP) and flow volume to calculate loads entering and leaving the SDRS and load reductions. *The data collected as part of the earlier demonstration project, combined with the use of existing (UF/IFAS) hydrologic and water quality monitoring system and weather monitoring system (provided by the grower-cooperator) will increase the cost-effectiveness of the proposed project.*

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Clewiston, FL

Impacted Watershed Name: Devil's Garden Slough/Everglades Watershed
Size of Project Impact: 37 acres
Size of Drainage Area: 276.2 acres
Latitude: 26.455
Longitude: -80.969
Hydrologic Unit Code: 030902020700
Land is owned by: Charles W. Obern, C&B Farms
Land Uses within the watershed:

Land Use	Acres	%
Residential	**0**	**0**
Industrial/Commercial	**8.9**	**3.22**
Agricultural	**207.97**	**75.3**
Forested	**0**	**0**
Wetlands	**59.33**	**21.48**
Land Use Totals (Acreage and %)	**276.2**	**100**

The Devil's Garden Slough (DGS) watershed is a sub-watershed of the larger Everglades watershed (Northern and Southern Everglades). The agricultural hydrology and water quality of the DGS watershed is similar to the Everglades watershed as well as other watersheds with shallow water table. Results from this demonstration project will be beneficial to similar SDRS located in farms (agronomic and horticultural crops) throughout the state.

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: The demonstration site lies within the C-139 Basin of the South Florida Water Management District (SFWMD) and is a tributary basin to the Everglades Protection Area (EPA). The C-139 basin is governed by the Everglades Forever Act (EFA). The SFWMD has developed source control strategies for the C-139 basin in accordance with the requirements of the EFA and the Long-Term Plan. The source control activities fulfill the USEPA requirements for a comprehensive watershed management plan. The project site also discharges to a 303(d) listed waterbody as identified below.
List 303(d) listed waterbody affected: L-3 Canal
WBID: FL-3260A
Impairment: Nutrients

PROJECT DESCRIPTION: To meet the TMDLs in Florida, innovative practices that not only focus on BMP implementation but also optimize their actual performance will be needed. Although agricultural BMPs targeting both source control and on-farm nutrient treatment are being promoted, several of them, especially the ones that treat N and P, may not be functioning to their potential. Agricultural SDRS are the most important treatment BMPs for farms located in shallow water table regions of north and south Florida. Most of these SDRS were not specifically constructed to optimize their nutrient treatment potential but were rather primarily designed for flood control. These SDRS can be modified to increase the nutrient load reduction. State-wide retrofitting of these existing SDRS can greatly improve the ability of basins such as the Everglades and St. Johns River to meet the nutrient load reduction targets.

Background

The EFA, passed in 1994, set out to "pursue comprehensive and innovative solutions to issues of water quality, water quantity, hydroperiod, and invasion of exotic species which face the Everglades ecosystem" (F.S. 373.4592). The legislation recognized that the health of the Everglades was impacted by the elevated level of phosphorus (P) found in waters flowing into the EPA (Attachment 2). To achieve the EFA goals, P discharge limits have been established for the Everglades tributary basins. One of these basins, the C-139 basin, is the second largest tributary of P to the EPA and is located in southeast Hendry County (SFWMD, 2010). Nutrients (N and P) are also the main water quality concerns in other areas of Florida such as the Caloosahatchee River and St Lucie basins, where BMAP is being implemented. Stormwater from agricultural areas accounts for a large fraction of the total N and P loads from the south and north Florida basins. Among the agricultural land uses, there are those (e.g. vegetable, citrus, sugarcane) that require extensive drainage through pump, for flood protection. For these land uses, storage and treatment of stormwater is essential to reduce the N and P loads to downstream waterbodies. Areas that require pumped drainage are located in shallow water table regions of both north and south Florida. The SDRS are the main storage and treatment mechanisms for reducing the N and P loads. Almost all SDRS in Florida were built to meet the downstream flood control by providing for storage of the first 1 inch of stormwater runoff. Although constructed to meet water discharge regulations, SDRS also have water quality functions. The current BMP program within the C-139 basin, which uses a numerical system for differentiating BMPs for their presumed water quality treatment effectiveness, assigns the most points to this BMP. The Water Quality/Quantity BMP Manual for Vegetable and Agronomic Crops, a joint effort of the agricultural industry, state agencies (FDACS, WMDs, FDEP), and UF/IFAS, describes the AGIs as providing, "very good removal of particulate matter depending upon the degree of adsorption and pollutants" (FDACS, 2005). Despite the high potential N and P reduction ability of SDRS in Florida, limited field verifiable data exists on their true efficacy in reducing N and P discharges from vegetable, sugarcane, citrus, and other agricultural land uses. Given the high cost of constructing SDRS and the percent of farm area devoted to them, efforts are needed to optimize the SDRS N and P treatment to help meet concentration and load targets.

Prior Demonstration Project (2009 - 2010)

A demonstration project was carried out to evaluate the effectiveness of a SDRS at a vegetable farm within the C-139 Basin, a sub-basin of the greater Everglades (Attachments 2 and 3). This project monitored the SDRS for P and N load reductions for the July 2009-July 2010 period. Results showed that N and P loads entering the SDRS were 12,773 lbs/yr and 2,299 lbs/yr, respectively, which represent the loads that would be discharged downstream if no treatment were provided. The N and P loads leaving the SDRS (farm outlet) were 9,945 lbs/yr and 1,847 lbs/yr, respectively, which shows that the SDRS provided a 2,829 lbs/yr reduction in N loads and a 452 lbs/yr reduction in P loads. The 22% and 20% N and P treatment efficiency observed is lower than the estimates for urban detention areas (40% N and P) and also lower than literature suggested values for agricultural detention areas (55% P). This is mainly due to the fact that the majority of agricultural SDRS, including the SDRS in this project, were designed primarily with flood control in mind, rather than being designed and constructed for both flood control and water quality treatment. Despite the fact that retrofits have been promoted for urban stormwater BMPs for some time, the retrofitting of agricultural SDRS has not received the same level of attention. Innovative approaches to increase the effectiveness of agricultural SDRS deserve further attention. Considering that a large proportion of agricultural land throughout Florida contains SDRS, there exists a unique opportunity to take advantage of this existing stormwater infrastructure and enhance it to provide even greater stormwater pollutant removal benefits.

Objectives

The current proposal aims to demonstrate how a SDRS can be modified to increase N and P load reductions. These modifications were identified during the previous demonstration project (Shukla et al., 2011) described above. Specific objectives of the project are:

1) Design and implement retrofits to a SDRS located in a vegetable farm in south Florida
2) Monitor nutrient inflow and outflows from the retrofitted SDRS for two years to evaluate its N and P treatment effectiveness and compare it to the previous results to determine the additional treatment from the retrofits.
3) Disseminate the project results through a wide array of educational activities and materials.

Project Area

C&B Farms is a 1,677-acre vegetable farm (1,225 cultivated acres, Attachment 3) located in the southeast corner of the C-139 Basin and immediately northwest of one of the SFWMD's Stormwater Treatment Areas (Attachment 2). To reduce the amount of P entering the Everglades, the EFA mandates that landowners within the C-139 Basin shall collectively maintain historic loads that were observed during an established baseline period (1979-1988). In 2002, the source control program for implementation of Best Management Practices (BMPs), as mandated by Rule 40E-63 (FAC), was initiated to ensure that these historic levels are met (SFWMD, 2010b). Despite implementation of these practices, the C-139 Basin has been mostly unable to comply with the EFA. Due to inability to achieve compliance, focus is being placed now on proper implementation and optimization of these practices.

SDRS Modifications

A variety of modifications were identified in the previous demonstration project (Shukla et al., 2011) of which three were selected for their relative ease of implementation and economic feasibility as well as their applicability to most SDRS in Florida. The three modifications, selected for this project to provide treatment train, are described below.

Modification 1: Relocation of Drainage Inflow Away from Outflow

During the previous demonstration project (Shukla et al., 2011), it was observed that two of the three inflow sources (pumps) were located relatively close to the discharge structure compared to the third inflow source (Attachment 4). Such proximity results in short pathway and low residence time within the SDRS, which reduces the N and P treatment due to decreased settling and soil and plant retention when these two pumps are used. To increase residence time, the two pumps will be moved to locations as far as possible from the discharge structure (Attachment 4). In determining their final locations, different practical considerations such as ditch bottom elevation will be taken into account. The desired end result of this modification will be increased residence time which will in turn enhance settling of particulate N and P and increase soil adsorption and plant uptake of dissolved N and P.

Modification 2: Plugs for Inner Perimeter Ditch

In South Florida, most SDRS are aboveground due to the relatively high water table present during most of the year and require the construction of a dike surrounding the SDRS. The dike construction results in the presence of "borrow" ditches on the inside and outside perimeter of the SDRS due to the need for fill material to construct the dike. The drainage from different parts of the farm is conveyed to the outer ditch, from where it is pumped into the SDRS using the "throwout" pumps. The inner borrow ditch does not serve such a purpose and, in fact, causes short circuiting by routing water directly to the discharge structure without covering most of the SDRS floor. This short circuiting was observed during the previous demonstration project (Shukla et al., 2011). To

reduce this short circuiting, the inner borrow ditch will be plugged at several locations (Attachment 4). The result of this modification, similar to that of the previous one, will be: increased residence time and enhanced settling, and uptake of particulate and dissolved N and P as well as other agricultural chemicals.

Modification 3: Increased Stormwater Storage Capacity

Nutrient load leaving the SDRS depends on the volume of outflow and concentration of N and P in the outflow. While nutrient concentration mainly depends on the ability of the soil to retain P and the uptake by plants, the outflow volume mainly depends on the storage capacity of the SDRS. If SDRS storage capacity can be increased, it can lead to reduced N and P load by reduced volume as well as enhanced N and P uptake by soil (surface and subsurface) and plants. Most of the SDRS in South Florida, including the SDRS at the demonstration site, were designed to store only the first inch of stormwater runoff. However, during the previous demonstration project it was observed that the discharge control structure elevation was not taking advantage of all the available storage of the SDRS. The design discharge elevation of the SDRS (top of the weir) is such that discharge begins without inundating a large portion of the SDRS which does not take advantage of the soil and plant nutrient retention capacity of non-inundated areas (Attachment 5). This was especially noted when the SDRS was full during higher than average rainfall that occurred during March, 2010. During this time, it was observed that the SDRS provided very little nutrient retention since the inflow water was passing through the SDRS quickly and not allowing for any settling out or plant uptake. In order to take full advantage of the SDRS storage capacity, the control structure elevation could be increased while still maintaining the required freeboard. For example, increasing the current outflow weir elevation by 6 in (15 cm) will result in inundating most of the SDRS before discharge occurs (Attachment 5). We plan to apply for Environmental Resource Permit (ERP) modification to the SFWMD to receive permission to increase the control structure elevation. The modified discharge elevation will be designed to protect the jurisdictional wetlands within the SDRS. This ERP modification application will be submitted upon contract execution. Once approved, the implementation of this modification will be achieved by simply adding board(s) to the outflow culvert flashboard riser structure for increased water and nutrient storage and treatment.

Rationale for Modifications

The above proposed modifications follow the established guidelines for urban stormwater detention systems (ARC, 2011) as well as the few guidelines that exist for agricultural stormwater systems. The Gulf Citrus BMP Manual (FDACS, 2006) recommends that "detention systems should be specifically designed to maximize circulation, mixing and residence time of inflow within the design pool by means such as: maximum separation of inflow and outflow points, locating inflow inverts below the control elevation, use of multi-cell ponds or flow baffles and other locally effective means to avoid dead storage areas." The proposed modifications attempt to achieve maximized circulation, mixing and residence time by increasing flow path, minimizing short circuiting and by taking advantage of available storage capacity.

Effectiveness of SDRS Modifications

Water Quality Effectiveness

After implementing the three modifications, the SDRS will be instrumented to monitor water quantity and quality of the inflow and outflow. The monitoring period will be two years and will cover both dry and wet seasons. The inflow (three drainage pumps) and outflow (one discharge structure) (Attachment 4) will be equipped to measure both nutrient concentration and flow volume to calculate nutrient loadings entering and leaving the SDRS to determine the load

reductions. Inflow from pumps will be measured by monitoring the RPM through RPM sensors. The data from RPM sensors will be used in conjunction with the pump equations developed during the previous demonstration project. The outflow from the SDRS will be estimated from the combination of a velocimeter installed in the culvert and measured stage. Inflow (pumped) and outflow (discharge weir) will be equipped with automated water samplers to collect flow-weighted water quality samples that will be analyzed for NO3- N, TKN, and TP. The total N (TN = NO3-N +TKN) and total P (TP) loads from the three pumps will be added to determine the net inflow loads. These loads will then be subtracted from the discharge TN and TP loads, respectively, to determine the overall yearly TN and TP load reductions. Twenty five soil samples from different areas within the SDRS, will be taken before the modifications and after the end of the monitoring period and will be analyzed for TN and TP. Changes in soil TP and TN before and after the monitoring period will be used to determine soil nutrient retention as a result of the modifications. Percent treatment efficiency of the SDRS will be estimated as 100% (inflow – outflow)/inflow. The nutrient load reduction (lb/yr) and treatment efficiency of the modified SDRS will be compared to the values for the original SDRS to determine the increase in treatment performance.

Cost - effectiveness

Cost-effectiveness of the proposed AGI modifications will be conducted using standard economic-engineering analytic methods. As-built costs for pump relocation, ditchplugs, and outflow weir modification will be amortized over the useful life (20 years for equipment, 50 years for structural improvements), at a 5 percent annual interest rate reflecting the average long-term cost of capital. Ongoing management, maintenance and repair expenses will be tracked by the grower cooperator, and also estimated as a share of original investment costs. Total annualized costs for the system, together with data on N and P load removal rates will be evaluated in terms of cost per lb of nutrient removed and cost per acre treatment area managed. The economic efficiency of the modified SDRS will be compared to prevailing costs for conventional Stormwater Treatment Areas, as reported by Sano et al. (2005). Economic analyses of the modifications will help state agencies in incorporating it in the current BMP cost-share programs which will facilitate its implementation in several basins in Florida.

Basin - wide Applicability and Public Education

Upon completion of the demonstration, the implemented modifications will be promoted to other landowners in the C-139 Basin as well as other basins (e.g. Everglades tributary basins and Northern Everglades (Kissimee, St Lucie, and Caloosahatchee)) with the goal of decreasing the nutrient loads discharging into the Everglades and meeting the TMDLs. The previous demonstration project noted that there are over 60 SDRS in the C-139 Basin alone occupying more than 10,000 acres which highlights the available potential for increased load reductions at the basin-scale by taking advantage of implementing these retrofits in existing SDRS (Shukla et al., 2011). As previously mentioned, this could be especially significant since the majority of existing agricultural SDRS were not designed and constructed with an explicit focus on water quality treatment resulting in most of these systems being suitable candidates for retrofits to improve their performance. Additionally, this demonstration will add to the existing body of knowledge related to stormwater detention area performance in urban settings since several of the structural components are similar between the rural and urban versions of this BMP. Results from this demonstration project will be disseminated to agricultural landowners and producers, stage agencies, and other interested stakeholders. The educational activities will include: 1) two UF/IFAS field days; 2) two UF/IFAS grower workshops; 3) publication of results in EDIS (UF/IFAS Extension); 4) multi-media presentation on the UF/IFAS

website; 5) publication in agricultural industry magazines; and 6) presentations at two science/engineering professional conferences. Increase in the knowledge gained at the two grower workshops will be determined by pre- and posttests.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:
Most agricultural SDRS are above- ground (with dike) and receive pumped drainage which makes them different than traditional urban SDRS. Use of models suggested in the proposal application are not likely to provide a reliable nutrient load reductions estimates for the retrofitted agricultural SDRS. Therefore, post-project loads were estimated using literature estimates of treatment efficiency. The pre-project TP and TN loads presented in table below are actual loads measured at the demonstration site for the July 2009-July 2010 period (Shukla et al., 2011). In its current condition (without modification), the N and P load reductions from the SDRS were 2,829 lbs/yr (22% treatment efficiency) and 452 lbs/yr (20% treatment efficiency), respectively. The literature suggests that a properly designed SDRS should have higher removal efficiencies than those observed during the previous demonstration project. The reported theoretical average estimate of P treatment efficiency for South Florida is 55% (Bottcher and Izuno, 2002). In a survey conducted by the US EPA (1999) on urban detention areas, the reported average N treatment efficiency was 40%. *Using these values (55% for P and 40% for N), the expected additional N and P load reductions will be 2,281 lb/yr (23% higher than current reductions) and 812 lb/yr (44% higher than current education), respectively.*

BMPs Installed		**TP lbs/yr**	**TN lbs/yr**
BMP #1 (Modification 1, 2, and 3)			
Pollutant Loads	Pre-Project	**1,847**	**9,945**
	Post-Project	**1,035**	**7,664**
	Load Reduction	**812**	**2,281**
	% Reduction	**44%**	**23%**

EMCS USED IN MODEL: Not applicable (Please see above). The TN and TP Event Mean Concentrations (EMC) measured during the previous demonstration project (2009-2010) were 3.66 mg/L and 0.540 mg/L, respectively.

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by Charles Obern. Charles Obern is a grower cooperator that has collaborated with the applicant in other demonstration projects related to agriculture, water quality and water quantity. See Attachment 6 for letter expressing Charles W. Obern's agreement to cooperate in this demonstration project.

TASK DESCRIPTION:

Task Number	Task Description
1	**Plan of work.** A project orientation meeting between the project team and the grower cooperator will be held within one month of the grant award to discuss an

	overview of the project's objectives, project plans and methods, proposed project schedule, decision points, and deliverables. Following this meeting, the project team will prepare a work plan that describes the project in detail including specific project and task objectives, and deliverables associated with each task.
2	**BMP* Design Plan and Permitting.** Engineering designs will be prepared for the three SDRS retrofits. The relocation of two pumps (Attachment 4) will be determined based on the ditch depth and other practical considerations (e.g. accessibility). The ditch plug locations and elevations (Modification # 2) will be determined based on the analyses of stage-volume relationship and spatial distribution of inundated areas using the hydrologic data collected during the previous demonstration project (Shukla et al., 2011). The exact locations of the ditch plugs will also consider the soil P storage capacity (SPSC) of different parts of the SDRS determined in the previous demonstration project (Shukla et al., 2011). The height of the weir (modification #3) will be determined using the inundation maps of the SDRS for different weir elevations along with the SPSC values. An example of increased inundation for a 6-in increase in outflow weir elevation is shown in Attachment 5. Although Modifications #1 and 2 are not likely to require modified ERP permit, design of all three retrofits will be submitted to the SFWMD for approval.
3	**BMP Implementation.** After receiving the permits, construction bids will be requested to select a contractor to implement the retrofits. The selected contractor with cooperation from the UF/IFAS team will perform the necessary work required to implement the three SDRS retrofits identified above. Cost of these modifications will be tracked to conduct the economic analyses. The BMP implementation will be documented by surveys and digital photo, and the modifications will be geo-referenced within a GIS layer of the SDRS.
4	**Development of Quality Assurance Project Plan (QAPP).** A Quality Assurance Project Plan (QAPP) will be developed to ensure that the data collected as part of this demonstration project meets the FDEP requirements. The QAPP will be based on US EPA and FDEP Standard Operating Procedures. The QAPP will be submitted to the FDEP for review and approval.
5	**Monitoring Implementation.** All necessary equipment and instrumentation will be installed at the demonstration site. Most of the instruments from the previous demonstration project (not a federally funded project or FDEP 319 project) will be used for this project (see budget table). The three pumps and discharge structure will be monitored in accordance with the methods described above and in the attached monitoring plan (Attachment 1) to achieve the project objectives identified above.
6	**BMP Water Quality and Cost Effectiveness Monitoring and Analyses for Year 1.** Once the BMPs have been implemented, the QAPP approved, and all necessary monitoring system installed, data collection will begin. Weather, soil, water quantity and quality, and economic data will be collected for the first year (Year 1, June-May) of the demonstration project. The data will be used to calculate the N and P load reduction (lb/year), percent treatment efficiency, and cost effectiveness of the modifications $/lb N and P load reduction) for Year 1.
7	**BMP Water Quality and Cost Effectiveness Monitoring and Analyses for Year 2.** Collection of data will continue for the second year of the demonstration project

	(Year 2, June-May). The data will be used to calculate the N and P load reduction lb/year), percent treatment efficiency, and cost effectiveness of the modifications ($/lb N and P load reduction) for Year 2.
8	**Public Education.** To educate the public and especially relevant stakeholders, several educational materials and events will be prepared and planned during and at the conclusion of the demonstration project. To provide targeted technical assistance, two training workshops will be hosted during the second and third years of the project to educate landowners on the practical implementation of these BMPs. The target audience will be landowners who have stormwater systems that can potentially be enhance through implementation of these retrofits. Each workshop will aim to educate landowners/growers and will include knowledge transfer evaluation through the use of pre- and post-tests. Two UF/IFAS Field Days will be organized with the goal of educating landowners, state agency professionals, research professionals, environmental organizations and the general public on the benefits of these agricultural stormwater retrofits. Attendance at these field days is generally between 30 and 100 participants. A similar field day will also be scheduled, but will take place at the demonstration site to allow participants to see the practical implementation of these retrofits. The team members will be available to present the results at local, state, and federal agency meetings (e.g. Northern Everglades Inter-agency meeting) and other meetings organized by grower organizations in an effort to disseminate the results to an even wider group of interested parties. In addition to specific events, several print- and web-based materials will be prepared. These include, but are not limited to, one UF-IFAS web-based technical document (EDIS publication), one article in industry magazines promoting the benefits of the retrofits and one web-based multimedia presentation (UF/IFAS website).
9	**Final Report.** At the conclusion of the demonstration project, a final report documenting results from all the above tasks will be prepared. The report will summarize the results of the project and will include the N and P load reductions and treatment efficiency and cost-effectiveness of the retrofits ($/lb load reduced) for the SDRS. Results from this project will be related to the earlier results (Shukla et al., 2011) to determine the increase in nutrient treatment performance. Factors (e.g. weather and farm management) affecting the treatment efficiency will be discussed. The basin-wide implementation of the retrofits will also be discussed.

* Three retrofits or modifications to the SDRS identified above.

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Plan of Work	A report containing the project work plan	Month 1	Month 3
2	BMP Design Plan and Permitting	A report containing detailed drawings describing the modification implementation and the permit from the	Month 1	Month 5

		SFWMD.		
3	BMP Implementation	A report containing the locations of three modifications, pre and post constructions pictures, post-construction elevations, and pictures of retrofit implementations.	Month 6	Month 7
4	Development of Quality Assurance Project Plan (QAPP)	Copy of QAPP	Month 5	Month 7
5	Monitoring Implementation	Report including the locations of monitoring, instruments used, pictures of monitoring implementation, and methods for measuring water and nutrient inflow, outflow, and storage.	Month 7	Month 8
6	BMP Water Quality and Cost Effectiveness Monitoring and Analyses for Year 1	A report summarizing the results (nutrient concentrations, weather and soil data, economic data, water and nutrient inflow and outflow, nutrient load reductions and treatment Efficiencies, and cost-effectiveness of nutrient removal) for Year 1 of monitoring	Month 9	Month 24
7	BMP Effectiveness Monitoring and Analyses for Year 2	A report summarizing the results (nutrient concentrations, weather and soil data, economic data, water and nutrient inflow and outflow, nutrient load reductions and treatment Efficiencies, and cost-effectiveness of nutrient removal) for Year 2 of monitoring	Month 21	Month 36
8	Public Education	A report containing copies of educational materials (presentations and draft copy of publications) and summaries of outreach events/workshops (number	Month 9	Month 40

		of audience, results of pre- and post tests)		
9	Final Report	Final report containing results from all project tasks and water quality and cost effectiveness of the SDRS modifications.	Month 32	Month 40

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Plan of Work*, **	$11,602	$3,919	UF/IFAS
2	BMP Design Plan and Permitting	$15,495	$5,878	UF/IFAS
3	BMP Implementation	$24,822	$1,959	UF/IFAS
4	Development of Quality Assurance Project Plan (QAPP)	$5,047	$1,959	UF/IFAS
5	Monitoring Implementation†, ††	$23,097	$25,476	UF/IFAS, C&B Farms
6	BMP Water Quality and Cost Effectiveness Monitoring and Analyses for Year 1	$94,882	$25,472	UF/IFAS
7	BMP Effectiveness Monitoring and Analyses for Year 2	$94,882	$25,472	UF/IFAS
8	Public Education	$14,152	$2,959†††	UF/IFAS, SW FL Vegetable Advisory Committee
9	Final Report	$25,907	$9,796	UF/IFAS
1-10	Overhead @ 10%	$30,989		
1-10	Unrecovered IDC	$0	$89,484	UF/IFAS
1-10	Other Associated IDC	$0	$45,143	UF/IFAS
	Total:	$340,875	$237,517	
	Total Project Cost:	$578,392		
	Percentage Match:	59%	41%	

* Project personnel includes a Graduate Research Assistant (0.45 FTE for three years), a Field assistant (0.7 FTE , for 27 months), an OPS (total 300 hours), an Engineer (0.22 FTE for 40 months; 319 cost is for 0.1 FTE, 0.12 FTE is UF/IFAS match), and two faculty (Sanjay Shukla, 0.07 FTE and Alan Hodges, 0.05 FTE, 40 months, UF/IFAS match). **Fringe rates: Graduate Research Assistant = 8.8%, Field assistant and OPS = 2.4%, Engineer = 34.5%, and two faculty (Sanjay Shukla and Alan Hodges) = 28.3. † Hydrologic and water quality monitoring systems owned by UF/IFAS provided for this project as a match. †† A weather station provided by grower cooperator (Attachment 6)

for this project as a match. ††† Contribution from the Southwest Vegetable Advisory Committee for organizing grower workshops (Attachment 9).

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. The proposed demonstration project intends to implement three practices to enhance the N and P load reduction of an agricultural SDRS. The combination of the three retrofits will result in increased mixing, residence time, settling of particulate N and P and uptake of dissolved N and P that would be greater than if just one of these practices were implemented. These three retrofits will form a treatment train by increasing the surface flow pathways and residence time, enhancing subsurface pathways for nutrient laden drainage, and reducing the stormwater volume leaving the farm.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The landowners in the C139 basin pay "Basin Tax" (as part of the EFA) assessed by the SFWMD for construction and maintenance of Everglades Stormwater Treatment Area # 5.

- The project located in an environmental justice area. At least 51% of the project's benefit is received by a special designation area. Specifically, Hendry County is included in the Second Rural Area of Critical Economic Concern identified by the Governor's Office of Trade, Tourism and Economic Development. Hendry County has also been designated as a federal Enterprise Community and a Florida Enterprise Zone.

REFERENCES CITED:

ARC, 2001 Atlanta Regional Commission (ARC), 2001. Georgia Stormwater Management Manual. Available at http://www.georgiastormwater.com. Accessed in May 2011.

Bottcher, D. and F. Izuno. 2002. Introduction to best management practices for phosphorus control on organic soils. EDIS, University of Florida, Florida Cooperative Extension, EDIS, Gainesvile, FL.

FDACS. 2005. Water quality/quantity best management practices for vegetable and agronomic crops. Office of Agricultural Water Policy, Florida Department of Agricultural and Consumer Services (FDACS), Tallahassee, FL.

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Sano, D., A.W. Hodges and R.L. Degner. Economic analysis of water treatments for phosphorous removal in Florida. University of Florida/IFAS, Extension Document FE576, 7 pages, Nov. 2005. Available at http://edis.ifas.ufl.edu/fe576.

SFWMD. 2010. 2010 South Florida Environmental Report – Volume I, Chapter 4. West Palm Beach, Fl: South Florida Water Management District.

SFWMD. 2010b. Chapter 40E-63 Florida Administrative Code. Everglades Program, Appendix B2 (C-139 Basin Performance Measure Methodology). West Palm Beach, Fl: South Florida Water Management District.

Shukla, S., J.M. Knowles, and A. Shukla. 2011. Report entitled "Evaluation of Agricultural Impoundments for Reducing Farm-scale P Discharge in South Florida" submitted to the South Florida Water Management District, West Palm Beach, FL.

University of Florida, Southwest Florida Research and Education Center, Immokalee, FL. 67 pp.

USEPA. 1999. Preliminary data summary of urban storm water best management practices. Washington, DC: US Environmental Protection Agency.

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment 1

- ☑ Site Maps and Figures
  - ☑ Attachment 2 - Regional site locator map showing the project site relative to the surrounding area.
  - ☑ Attachment 3 - Treatment area map.
  - ☑ Attachment 4 - Detailed site map showing the conceptual elements of Modifications #1 and #2.
  - ☑ Attachment 5 - Detail of conceptual elements of Modification #3.

- ☑ Other Relevant Information
  - ☑ Attachment 6 – Letter of support and match ($4,600) from grower cooperator, Charles W. Obern, C&B Farm.
  - ☑ Attachment 7 – Letter of support from Ron Hamel, Executive Vice President, Gulf Citrus Growers Association
  - ☑ Attachment 8 – Letter of support from Kerry Kates, Director of Water and Natural Resources, Florida Fruit & Vegetable Association
  - ☑ Attachment 9 – Letter of support and match ($1,000) from Fred Heald, Chairman, SW Florida Vegetable Advisory Committee

PROJECT 15

PROJECT NAME: Micco/Little Hollywood Exfiltration and Second Generation Baffle Box

PROJECT FUNDING REQUEST: $171,289.42 MATCH: $178,280.82

LEAD ORGANIZATION: Brevard County

CONTACT PERSON: Carolina Alvarez, E.I., Project Manager
Brevard County Natural Resources Management Office
Watershed Management
2725 Judge Fran Jamieson Way, Suite A219
Viera, FL 32940
Tel: 321-633-2014 ext. 56472
Fax: 321-633-2168
Email: Carolina.Alvarez@BrevardCounty.us

PROJECT ABSTRACT:

Type of Treatment: The proposed Micco/Little Hollywood stormwater project includes two separate projects in adjacent drainage basins that outfall to the Sebastian River: a treatment train consisting of 6 inlet baskets and 800 feet of exfiltration pipe upstream of the North Outfall and a second generation baffle box installed upstream of the South Outfall. The Sebastian River is a 1998 303(d) listed waterbody impaired for nutrients and dissolved oxygen and is part of the Indian River Aquatic Preserve. The Indian River is an estuary of National significance and is presently under BMAP development for its TMDL. (Attachments #1-3 show the location of the projects.)

The first proposed project consists of a treatment train that includes an exfiltration system with a total of 800 connected feet of 42-inch exfiltration pipes installed along both sides of Riverview Drive. Inlet traps will be installed in six proposed inlets to provide pre-treatment of the stormwater runoff. The pre-treatment will allow for effective maintenance and will reduce the amount of sediment and debris entering the exfiltration system, extending its effectiveness and lifespan. This proposed exfiltration system provides treatment to a 14.78 acre drainage basin consisting of residential homes with no current stormwater treatment. This drainage basin discharges through an outfall (N Outfall) pipe into the Sebastian River.

The second proposed BMP consists of a second generation baffle box added to a modest existing stormwater treatment system to increase the effectiveness. Currently, a part of this 37.43 acre drainage area receives limited stormwater treatment in existing roadside swales and one exfiltration pipe that leads to the outfall (S Outfall) into the Sebastian River.

Summary of Estimated Pollutant Load Reductions: Estimated TN load removed by the exfiltration system is 70.69 pounds per year and TP load removed is 10.02 pounds per year based on the Pollutant Load Screening Model (PLSM) utilized by FDEP to set the TMDL for the downstream Indian River Lagoon. The estimated pollutant load reduction for the Baffle box is 59.98 pounds per year TN and 6.90 pounds per year TP, using the same model. The combined estimated pollutant load reductions for the proposed project are 130.67 pounds of TN per year and 16.92 pounds of TP per year. Land use was determined from Brevard

County aerials and confirmed by field inspection of each of the drainage basins. The land use within each drainage basin is generally homogenous. Both aerial and street level photos of the project area are included in attachments 2(a) and 2(b) and 4.

Summary of Educational Components: The Indian River Lagoon Comprehensive Conservation and Management Plan identified public education as a high priority action for pollution education. Education of the general public is also a primary objective in the Micco/Little Hollywood stormwater treatment train project. The Brevard County Natural Resources Management Office Community Outreach Specialist will work with the local HOA and directly with residents. A detailed informational public forum will be held at the monthly HOA meeting and a live demonstration will be given of an operating baffle box, using a transparent, and to-scale model. Printed brochures and a resident survey will be mailed to homes in the vicinity of the construction location. The survey, which will be fashioned after a UCF Stormwater Management Academy residential survey, will be conducted both before and after construction in the project area to measure the residents' perception of pollution prevention and stormwater runoff. The brochures will explain the project and also cover topics on healthy habits for cleaner water including, proper fertilization, proper disposal of yard waste, pet waste, car care wash water and proper disposal of vehicle fluids. All storm inlets in the drainage basin will be marked with an information marker instructing residents to keep the curbs clean. A permanent sign will be posted near the baffle box to provide additional information to residents.

Summary of Monitoring: The proposed treatment train system will be monitored by collecting and analyzing sediment/debris and stormwater runoff. The inlet traps and baffle box will be sampled for sediment and debris and analyzed to estimate the amount of pollutants removed from the stormwater runoff prior to discharge into the Sebastian River. The stormwater runoff discharging from the outfall of the exfiltration system (into the Sebastian River) will be sampled and analyzed for daily rainfall, flow, and the following parameters:

Total Cadmium, Total Chromium, Total Copper, Total Zinc, NO2+NO3, TKN, Total Ammonia, or Total N, Total Phosphorus, Ortho Phosphate, TSS, Oil/Grease and Fecal coliform.

Monitoring will be conducted for one year prior to construction (pre-condition) and then for one year after the installation of the exfiltration system to evaluate the effectiveness of the BMP. Pre-construction monitoring would commence upon notification of award. A preliminary monitoring plan is attached (#7).

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

The Little Hollywood neighborhood of Micco, Florida, is located in southern Brevard County and borders the Sebastian River in the vicinity of its confluence with the Indian River and across from the Sebastian Inlet.

The Indian River Lagoon system has been designated as the most ecologically diverse estuary in North America, but it has been highly modified. The Lagoon is threatened by stormwater runoff, highly modified freshwater inflows, and other factors. Increases in population, land use changes, and alterations of natural drainage patterns have resulted in impacts to water quality and the ecological health of the IRL and its watersheds. The Indian River Lagoon National Estuary Program was established in 1990 to address threats and to

manage the resource for the future generations. The Indian River Lagoon was designated in 1991 as one of the first "Estuaries of National Significance" in the country.

The Indian River Lagoon Basin is in Phase 4 of FDEP TMDL development, with Development of BMAPs currently underway.

Geographic Location: Micco, Brevard County, FL (see attachment #1)
Impacted Watershed Name: Sebastian River
Size of Project Impact: 0.11 acres
Size of Drainage Area: 52.21acres
Latitude: 27.847241
Longitude: 80.498282
Hydrologic Unit Code: 03080202
Land is owned by: Brevard County
Land Uses within the watershed:

Land Use	Acres	%
Residential	**49.15**	**92**
Forested	**3.06**	**8**
Land Use Totals (Acreage and %)	**52.21**	**100**

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: This proposed project will continue the County's efforts to reduce nonpoint source pollutants to the Indian River Lagoon (IRL) and its tributaries. At this project site, one of many urban sub-watersheds, untreated or insufficiently treated stormwater runoff currently discharges to the IRL via the Sebastian River. Implementing structural stormwater Best Management Practices like the proposed inlet basket and exfiltration system and the second generation baffle box will provide incremental, treatment train steps towards the overall goals of the SJRWMD and Indian River Lagoon Surface Water Improvements and Management Plan (2002 updated SWIM), as well as the Indian River Lagoon National Estuary Program's Comprehensive Conservation and Management Plan (2008 updated CCMP).
Four goals identified on page 7 of the 2008 CCMP include:

- To attain and maintain water and sediment of sufficient quality to support a healthy estuarine lagoon ecosystem;
- To attain and maintain a functioning, healthy ecosystem which supports endangered and threatened species, fisheries, commerce and recreation;
- To achieve heightened public awareness and coordinated interagency management of the Indian River Lagoon ecosystem.
- To identify and develop long-term funding sources for prioritized projects and programs to preserve, protect, restore and enhance the Indian River Lagoon system.

The SWIM and CCMP both identify stormwater runoff as detrimental to the lagoon's health. For example, freshwater lowers the salinity of the receiving waters and affects the seagrass community. Total suspended solids introduce nutrients and other pollutants into the lagoon and create turbid and muck conditions. Turbidity reduces light penetration, affecting sea grasses and decomposing muck reduces the oxygen concentration in the waterbody. Nutrients drive excessive algal growth, causing low DO and decreased water

clarity. Both turbidity and muck accumulation from elevated TSS reduce the success of seagrass beds by limiting the light penetration and smothering the bottom.
This proposed project implements 2 types of structural BMPs. The Exfiltration BMP reduces both the volume of freshwater runoff and the amount of TSS and nutrients entering the lagoon. The Baffle Box BMP removes solids and their associated pollutants, such as oil and grease, and nutrients from the discharging stormwater runoff, reducing the pollutant load to the Indian River Lagoon.

List 303(d) listed waterbody affected: Sebastian River Above Indian River and the Indian River Lagoon

WBID: 3129A

Impairment: Nutrients and Dissolved Oxygen

PROJECT DESCRIPTION:

The Micco/Little Hollywood Stormwater project addresses the problem of excessive sediment, nutrients, and freshwater discharges, which currently enter the Indian River Lagoon via the Sebastian River at the south end of the County's jurisdiction.

The project drainage area consists of 2 sub-basins with over 52 acres of mostly residential area along the west bank of the Sebastian River near its confluence to the Indian River in Micco.

In the 14.78 acre north drainage basin, untreated stormwater runoff currently flows along the edge of pavement to an inlet and discharges through an outfall. Construction of 800 total feet of 42 inch perforated exfiltration pipe is proposed to provide 0.57 inches of treatment volume. This system will take runoff from both sides of Riverview Drive at six new inlets. Each proposed inlet will have an inlet trap installed to pre-treat the runoff prior to entering the exfiltration system before discharging to the project's North outfall.

In the 37.43 acre south drainage basin, limited treatment of stormwater runoff is currently provided in roadside swales. The length of the outfall pipe is perforated, providing additional treatment prior to discharging to the Sebastian River.

A second generation baffle box is proposed to be installed within the existing system between the roadside swales and the perforated pipe. This proposed BMP will capture stormwater runoff prior to discharging to the Sebastian River at the project's South outfall. The South outfall is adjacent to the local marina/park operated and maintained by the Little Hollywood Improvement Association. (see attachments for locations).

These treatment trains will provide the following:

- reducing the volume of freshwater from stormwater runoff from entering the lagoon via infiltration of the exfiltration system,
- reducing the loading of nutrients to the lagoon from the residential streets via runoff volume reduction and physical removal of nutrient-laden sediment and debris with the inlet traps and baffle box,
- reducing the loading of TSS (sediment) from the watershed via the inlet traps and baffle box.

Each of the targeted pollutants (TN, TP and TSS) treated with the installation of these stormwater BMPs have been identified as contributors to the impairment of the Indian River Lagoon System.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: The TN load removed in the 14.78 acre basin by the exfiltration and inlet trap BMP is 70.69 pounds per year. The TP load removed is 10.02 lbs/yr and the TSS load removed is 748.05 lbs/yr. The TN load removed in the 37.43 acre basin by the second generation baffle box is 59.98 lbs/yr. For TP removal, 6.90 lbs/yr and TSS removal, 2,777.81 lbs/yr, based on the Pollutant Load Screening Model (PLSM) utilized by FDET to establish and implement TMDLs for the Indian River Lagoon and the Derived Efficiency (DE) method from the Final Report Baffle Box Effectiveness Monitoring Project DEP Contract No S0236. TSS reduction was calculated using The Draft Stormwater Treatment Applicant's Handbook. (See references)

BMPs Installed		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**
Exfiltration				
Pollutant Loads	Pre-Project	**1,206.53**	**13.16**	**92.88**
	Post-Project	458.487	**3.14**	**22.19**
	Load Reduction	748.05	10.02	70.69
	% Reduction	**62%**	**76%**	**76%**
Baffle Box		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**
Pollutant Loads	Pre-Project	**4,133.64**	**44.54**	**314.86**
	Post-Project	**1,355.83**	**37.64**	**254.88**
	Load Reduction	**2,777.81**	**6.90**	**59.98**
	% Reduction	**67.2%**	**15.5%**	**19.05%**

EMCS USED IN MODEL: Source: EPA's April 2007 document titled Total Maximum Daily Loads for the Northern and Central Indian River Lagoon and Banana River Lagoon, Florida Nutrients and Dissolved Oxygen.
For Residential (1200) land use EMC were TN =2.23 mg/l and TP=0.316mg/l
For Forested (4120) Land use EMC were TN= 0.70 mg/l and TP=0.090 mg/l
(Please see references)

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. The work will occur in the platted County Right of Way.

TASK DESCRIPTION:

Task Number	Task Description
1	Surveying, construction plans and permitting: Construction plans and specifications will be developed for the proposed project. The construction documents will include a survey and a detailed stormwater pollution prevention plan. Necessary construction permits will be obtained.
2	Installation of 800 total feet of 42 inch exfiltration pipe with 6 inlets and other baskets.
3	Installation of a 9 ft x 3 ft second generation baffle box.
4	An informational meeting will be conducted in the area to educate residents about the purpose of the BMP and to provide basic stormwater education. A sign will be installed in a visible location at the baffle box. Printed educational printed materials will be developed and mailed to the residents in and around the project zone. These educational materials will include tips for residents to improve the quality of stormwater runoff coming off their property, including: not blowing grass clippings or raking leaves into the street, maintaining vehicles to prevent leaking of automotive fluids, proper application of fertilizers and pesticides, reduction of litter, picking up pet waste, etc. A pre/post residential survey will be conducted in the project area to evaluate the effect of the project and educational information on the residents' perception/ awareness and behavior of pollution prevention and stormwater runoff. All inlets in the project zone will be marked with a storm drain marker that promotes keeping the curbs clean. A copy of printed materials, photo of an installed storm drain marker, as well as the numbers distributed/installed will be provided as a deliverable. A copy and results of the residential construction survey will also be provided as a deliverable.
5	Monitoring the effectiveness of pollutant reduction of each BMP using pre-construction outfall water quality monitoring and post-construction water quality outfall monitoring, as well as captured materials analysis from inlet traps and baffle box.

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Surveying, construction plans and permitting:	Construction plans, survey, specifications and	Month 1	Month 4

	Construction plans and specifications will be developed for the proposed project. The construction documents will include detailed stormwater pollution prevention plan. Necessary construction permits will be obtained.	necessary permits.		
2	Construction of 800 total linear feet of 42 inch exfiltration pipe and 6 inlet traps.	Copy of final as-built certification	Month 4	Month 8
3	Construction of a 9 ft. x 3 ft. second generation baffle box	Copy of final as-built certification	Month 4	Month 8
4	Educational activities: informational meeting, printed materials, stormdrain inlet markers, permanent sign, and pre/post-construction residential survey.	A copy of the presentation and sign in sheet from meeting; copies of printed materials; a photo of an installed storm drain marker from the area; the numbers of each item distributed; a copy of and the results of the pre/post residential survey; photo of baffle box sign.	Month 1	Month 12
5	Monitoring for effectiveness	Monitoring plan and report.	Month -12	Month 24

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Survey, construction plans, specifications inspections and necessary construction permits.	$0	$24,500 (contractual) $5,101.20 (in-kind)	Brevard County Stormwater Fund
2	Construction of 800 linear feet of 42 inch exfiltration pipe and six inlet traps (Contractual)	$171,289.42	$99,731.58	Brevard County Stormwater Fund
3	Construction of a 6 ft. X 3	$0	$30,000.00	Brevard County

	ft. second generation baffle box		(contractual) $10,000.00 (in-kind)	Stormwater Fund
4	(a) Educational meetings & door hangers/flyers. (b) Storm drain markers. (c) A post construction residential survey. (d) sign	$0	$1,963.64 (in-kind)	Brevard County Stormwater Fund
5	Monitoring both North and South Outfall (water quality) 12 months prior to construction and 12 months post construction and analyzing inlet trap and baffle box debris 3 times.	$0	$2,984.40 (in-kind) $4,000.00 (contractual)	Brevard County Stormwater Fund
	Total:	$171,289.42	$178,280.82	
	Total Project Cost:	$349,570.24		
	Percentage Match:	49%	51%	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. Inlet traps will be installed in each inlet in the project area to capture pollutants before entering the exfiltration system. The baffle box is a retro-fit BMP which will pre-treat the water that currently flows through an existing exfiltration pipe prior to discharging to the Sebastian River.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The monthly fee is $3.00.

- Does the project fall within a watershed undergoing BMAP development?

  Yes. A BMAP is being developed for the Sebastian River tributary to the Indian River Lagoon.

REFERENCES CITED:

2009 Indian River Lagoon Group 5 Basin/Central District - Verified List (Cycle 1 Revised and Readopted May 2009) Hydrologic Unit: Indian River Lagoon

April 2007 EPA's Total Maximum Daily Loads for the Northern and Central Indian River Lagoon and Banana River Lagoon, Florida. Nutrients and Dissolved Oxygen.

2002 updated SJRWMD and Indian River Lagoon Surface Water Improvements and Management Plan (SWIM)

2008 updated Indian River Lagoon National Estuary Program's Indian River Lagoon Comprehensive Conservation and Management Plan (CCMP)

Final Report Baffle Box Effectiveness Monitoring Project DEP Contract No. S0236.

The March 2010 Draft Stormwater Treatment Applicant's Handbook

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment
- ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment 1
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachments 2-3
  - ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment 6

Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.: Attachment 4

PROJECT 16

PROJECT NAME: Poppleton Creek Tidal Wetlands Creation and Restoration

PROJECT FUNDING REQUEST: $150,000 MATCH: $200,000

LEAD ORGANIZATION: City of Stuart

CONTACT PERSON:
Sam Amerson, P.E.
121 SW Flagler Ave
Stuart, FL 34994
Tel: 772-288-5332
Fax: 772-288-5381
Email: samerson@ci.stuart.fl.us

COOPERATING PARTNERS: Martin County, Florida Communities Trust, Martin County Arts Council.

Martin County is committed to constructing 3.7 acres of Stormwater Treatment Area in the upper Poppleton Creek Basin in 2015 per an Interlocal Agreement with the City of Stuart, which improvements are complimentary to those proposed herein.

Florida Communities Trust has accepted a City of Stuart/Martin County Interlocal Agreement as part of the Poppleton Creek Watershed Management Plan, and the City has incorporated the proposed BMP subject site into the FCT Management Plan.

Martin County Council for the Arts has agreed to incorporate the proposed project into its Eco-Art design and education plan. Eco-artists will be part of the design and construction team.

PROJECT ABSTRACT:

Type of Treatment: Wetland detention via hydrologic modification of existing red mangrove forest and conversion of existing vacant uplands into additional mangrove wetlands, the 4.3 acre project is located below 95% of Poppleton Creek Watershed and will be connected to the Creek at the property's east and west ends in order to treat both tidal and stormwater flows in Poppleton Creek.

Summary of Estimated Pollutant Load Reductions: The STPL model estimates reductions of 13,224 lbs/year TSS, 881 lbs/year BOD, 75.1lbs/year N, and 25 lbs/year P. Literature values specific to intertidal red mangrove forests suggest actual nutrient load reductions will be higher than the model indicates.

Summary of Educational Components: Design and construction will be a collaborative effort with Martin County Arts Council Eco-Art program, which has been widely advertised and promoted by the Arts Council.

Project frontage along Palm City Road will be used to notice the public about the project through signage. City of Stuart web pages (under Public Works) for Stormwater and

Watershed Program will have a new project summary and description updated regularly from concept to design to construction and operation of the project.

Project performance will be reported through additions to the existing City Watershed Performance Evaluation Report, also available through the City website. Monthly mailings to City Utilities customers will include educational information related to the project.

The project will also be presented to the Rivers Coalition, an organization of 56 member organizations dedicated to restoring the St. Lucie Estuary and Indian River Lagoon to good health. The Rivers Coalition meets monthly at City Hall.

Summary of Monitoring: SFWMD monitored Poppleton Creek water quality bi-weekly from 11/01 to 9/03. SFWMD recently agreed to resume monitoring of this tidal tributary, so pre- and post-project water quality monitoring data will be available for comparison. The existing data indicate during low freshwater discharge conditions, TN = 0.71 mg/l and TP = 0.112 mg/l. During normal freshwater discharge conditions TN = 0.77 mg/l and TP = 0.155 mg/l.

This project is unusual in that it will treat both background tidal flows and wet season stormwater flows. Depending on final project design, additional monitoring may be conducted up and down stream of the project.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: City of Stuart, Martin County
Impacted Watershed Name: Poppleton Creek Watershed
Size of Project Impact: 4.3 acres
Size of Drainage Area: 525 acres
Latitude: 27.1889 degrees N
Longitude: 80.2562 degrees W
Hydrologic Unit Code: 03090202-3210
Land is owned by: City of Stuart
Land Uses within the watershed:

Land Use	Acres	%
Residential	**150**	**30**
Industrial/Commercial	**300**	**60**
Forested	**30**	**6**
Wetlands	**20**	**4**
Land Use Totals (Acreage and %)	**500**	**100**

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: St. Lucie NEEPP River Watershed Protection Plan dated January 2009 prepared by South Florida Water Management District. The Plan identifies nutrient load reduction targets for urban land uses, but not specific projects such as that proposed here that would produce the desired reduction in nutrient loading.

The proposed project will treat Poppleton Creek waters through every tidal exchange, as well as stormwater discharges via the Creek. Project location below 95% of the Poppleton

Creek Watershed enables diversion of waters into the project and treatment of stormwater from nearly the entire watershed.

List 303(d) listed waterbody affected: St. Lucie Estuary

WBID: 3210

Impairment: St. Lucie Estuary is listed as impaired with respect to dissolved oxygen and nutrient loading. The South Fork Tidal Watershed is listed as impaired with respect to nutrients. The proposed project modeled by STEPL results in 3.7% reduction in BOD to the Estuary from the Poppleton Creek Basin, with 2.7% reduction in P, 1.3% reduction in N and 5.2% reduction in TSS. Reductions in BOD and TSS are particularly important in this segment of the Estuary, as Florida Oceanographic weekly reports of water quality in the Estuary published in the Stuart News consistently report the South Fork Tidal segment as more turbid than any other segment.

PROJECT DESCRIPTION: Poppleton Creek Watershed is essentially built out, and all stormwater outfalls are equipped with baffle boxes. The only significant remaining opportunity for BMP implementation is within the 4.3 acre City-owned property south of and adjacent to Poppleton Creek and east of and adjacent to Palm City Road. This property is proposed for construction of a red mangrove wet detention system.

The subject property contains approximately 1.4 acres of cleared uplands and 2.9 acres of mixed exotics and red mangroves. The project concept is to clear exotics and remove upland areas to create tidal wetlands, then direct tidal flows into and through the overall property. The property's configuration with respect to curves in the natural Creek is advantageous to "picking" tidal flows up at east and west ends, and re-directing them through created red mangrove wetlands and into existing red mangrove wetlands from the south.

Assuming 1.1' average tidal stage, the project would treat more than four acre-feet at slack high tide and approximately 30 acre feet with every tidal exchange. Greater exposure and treatment would occur when stormwater forces downstream against the tide.

We note that the STEPL model assumes only stormwater-forced treatment would occur within the project, while in reality, it will provide functional treatment of impaired waters with every tide change. In particular, we expect denitrification functions to be more effective at removing N than the model predicts, as the combination of created wetlands and redirection of tidal flows through existing mangroves will result in 4.2 acres of largely anaerobic soils being inundated at least twice a day.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: In the below estimated pollutant load reduction, the applicant used the following model: The STEPL model was used to estimate pollutant loads by land use and BMP effectiveness in reducing loading. An electronic copy of the model is enclosed with this application.

BMPs Installed BMP #1		TSS lbs/yr	TP lbs/yr	TN lbs/yr	BOD lbs/yr
Pollutant Loads	Pre-Project	**252450**	**831.2**	**5789.7**	**23260.8**
	Post-Project	**239226**	**806.2**	**5714.5**	**22379**
	Load Reduction	**13224**	**25**	**75.1**	**881.8**
	% Reduction	**5.2**	**2.7**	**1.3**	**3.7**

EMCS USED IN MODEL: Event Mean Concentrations are automatically calculated in the STEPL model used to evaluate the project.

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by City of Stuart.

TASK DESCRIPTION:

Task Number	Task Description
1	The proposed project site was previously permitted by FDEP as a spoil site for removal of accumulated muck sediments from Poppleton Creek. Based on the City's experience removing muck sediments from Frazier Creek, the tidal tributary north of Poppleton Creek, a larger spoil site was required, so the subject site was not used for dredging (which was completed in 2004). Plans for the proposed construction of red mangrove forest and connections to Poppleton Creek will be designed in coordination with Martin County Arts Council and FDEP, and permitting processed as an amendment to the existing permit. Deliverables will be permitted construction plans.
2	Connect 1.4 acres Created Wetlands to Creek and to 2.8 acres restored mangrove wetlands. Construction will include clearing exotics from the site, removal of sod, grading uplands down to intertidal elevation, creating broad shallow intertidal swales at east and west ends of the project, and planting the created and cleared areas with red mangrove seedlings. A maintenance access will be constructed to tidal inlet points to facilitate sampling. Deliverables will be progress photographs, pay applications from contractors, and Certificate on Completion by the project engineer.
3	Design and construction will be a collaborative effort with Martin County Arts Council Eco-Art program, which has been widely advertised and promoted by the Arts Council. Project frontage along Palm City Road will be used to inform the public about the project through permanent signage. City of Stuart web pages (under Public Works)

	for Stormwater and Watershed Program will have a new project summary and description updated regularly from concept to design to construction and through operation of the project. Project performance will be reported through additions to the existing City Watershed Performance Evaluation Report, also available through the City website. Monthly mailings to City Utilities customers will include educational information related to the project. The project will also be presented to the Rivers Coalition, an organization of 56 member organizations dedicated to restoring the St. Lucie Estuary and Indian River Lagoon to good health. The Rivers Coalition meets monthly at City Hall. Deliverables will include documentation of each public education technique listed above.
4	Effectiveness Evaluation and Report Results. The City has analyzed two years worth of Poppleton Creek Watershed data collected by SFWMD and compared it to two years of St. Lucie Estuary Data at the Roosevelt Bridge in order to evaluate background estuarine tidal effects on Poppleton Creek water quality. SFWMD is about to resume Poppleton Creek sampling at the same location, 600 feet upstream of the proposed project. These data provide significant insight into nutrient and tidal effects that will likely be affected by the project. None of the heavy metals sampled over two years present evidence of adverse stormwater effects on the Creek. Cr and As are generally BDL, and Cu concentrations at highest levels of 31 ug/l appear associated with estuarine background levels. In general, total N and P in Poppleton Creek appear to be dominated by estuarine conditions, regardless of Specific Conductivity levels. When the estuary is dominated by freshwater inflows from major canals, background N and P are slightly lower within Poppleton Creek, indicating watershed inflows dilute nutrient concentrations rather than exacerbate them. When Specific Conductance is high in the estuary, these conditions are generally reflected in Poppleton Creek. When Specific Conductivity is lower in the Creek than in the larger estuary, we can assume freshwater inflows from surface and groundwater are significant contributors. Under these particular conditions NOx and NH4 do not track background estuarine values as closely as TN and TP. These species are both more variable and sometimes higher in Poppleton Creek than in background estuarine waters, as opposed to other constituents of interest. It may be assumed that BMP effectiveness will improve as the red mangroves planted in former uplands grow in. Thus sampling the project will begin in year 3. Sampling will be coordinated with SFWMD so that their background data can be used for comparison to project data. Sampling will include specific conductivity, DO, and the full suite of nutrients. Sampling will be hourly over the full duration

	of one tidal cycle, from low tide to low tide, for a total of seven sampling events. Two of these events will be coordinated with City rain gauge data to include two rainfall events of at least 0.75" one during the wet season (June through October) and one in the dry season. Sampling will be discrete rather than composite in order to obtain an accurate evaluation of mangrove effects on the constituents of interest over the tide cycle. Load reductions will be calculated based on the full seven sets of data. Deliverables will include tabulated raw data from the project plus SFWMD data, and will include load reduction calculations

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Construction plans and permits	Permitted construction plans	Month 1	Month 7
2	Connect created wetlands to restored wetlands and creek	pay applications and certificate of completion	Month 9	Month 12
3	Public Education	Baseline monitoring report per permit	Month 6	Month 36
4	Effectiveness Evaluation	Final Report	Month 24	Month 36

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Design and permitting	$0	$40,000	City of Stuart and Arts Council
2	Connect created and restored wetlands to Creek	$75,000	$75,000	City of Stuart
3	Public Education	$50,000	$75,000	City of Stuart
4	Effectiveness Evaluation	$25,000	$10,000	City of Stuart
Total:		$150,000	$200,000	
Total Project Cost:		$350,000		
Percentage Match:		43%	57%	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

Yes. Construction of a combination of stormwater and tidal diversion into created and restored wetlands providing water quality treatment for both acute stormwater flows and steady state tidal exchange treatment is not a traditional BMP method. Its benefits could be applicable at many locations within the Estuarine basin.

Since both Poppleton Creek watershed discharges and background tidal waters exceed the TMDL for the St. Lucie Estuary for P (0.082 mg/l), and literature values for N and P removal by red mangrove wetlands (1,2) exceed those estimated by the STEPL model, we anticipate better than modeled removal of both nutrients. Further, red mangroves are reportedly more effective at removing nutrients than other species of mangroves (3).

Finally, this treatment technology is very low maintenance. Once exotics are removed, land surface elevations are modified to assure 24 hour tidal inundation and red mangroves are planted, the ecotones created are very resistant to exotic infestation and the treatment system itself should not require additional maintenance for decades.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. The monthly fee is $3.76/ERU, one ERU = 3707 square feet impervious area = one single family home. Other uses are scaled up based on impervious surface area per parcel.

- Does the project fall within a watershed undergoing BMAP development?

  Yes. A BMAP is being developed for the St. Lucie Estuary and lower intertidal reaches of its tributary, Poppleton Creek, WBID 3210.

REFERENCES CITED:

Maintenance of Estuarine Water Quality by Mangroves Occurs During Flood Periods. Wang, M; Zhang, J; Tu, Z; Gao, X; and Wang, W. Marine Pollution Bulletin November 2010.

The Dynamics of Benthic Nutrient Pools and Fluxes in Tropical Mangrove Forests. Alongi, Daniel M. Journal of Marine Research, January 1996.

Effects of Nutrient Enrichment on Within Stand Cycling in a Mangrove Forest.
Feller, I.C.; Whigham, D.F.; O'Neill, J.P. and McKee, K.L. Ecology, October 1999.

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment 1
- ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment 2

- ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment 3
- ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment 4

Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

PROJECT 17

PROJECT NAME: 18th Street Stormwater Treatment System

PROJECT FUNDING REQUEST: $80,000 **MATCH:** $53,333.00

LEAD ORGANIZATION: City of Vero Beach

CONTACT PERSON: Matthew T. Mitts, Civil Engineer II
1053 20th Place
Vero Beach, FL 32960
Tel: (772) 978-4870
Fax: (772) 978-4879
Email: mmitts@covb.org

PROJECT ABSTRACT:

Type of Treatment: The project will use a structural pollution control device (PCD) in an existing ditch. The structure shall include baffles, weirs, collection screens and filters to treat stormwater.
Summary of Estimated Pollutant Load Reductions: The PCD will be designed to reduce TSS by 80% and TP and TN loads by 20%.
Summary of Educational Components: The City of Vero Beach will implement a comprehensive public outreach campaign that targets multiple audience segments with social marketing techniques.
Summary of Monitoring: Samples will be collected upstream and downstream of the PCD and analysis done by a lab with an approved QAPP to measure pollutant removal efficiencies.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: City of Vero Beach, Indian River County
Impacted Watershed Name: Indian River Lagoon
Size of Project Impact: Less than 1 acre
Size of Drainage Area: 148 acres
Latitude: 27.65
Longitude: 80.40
Hydrologic Unit Code: 03080203
Land is owned by: All land for this project is owned by the City of Vero Beach or within a public right of way.

Land Use	Acres	%
Industrial/Commercial	**148.00**	**100**
Land Use Totals (Acreage and %)	**148.00**	**100**

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: Many outfalls in the city discharge into the Indian River Lagoon, an Estuary of National Significance and a St. Johns River Water Management District (SJRWMD) Surface Water Improvement and Management (SWIM) program priority water body. Runoff from these outfalls conveys large loadings of suspended solids, nutrients, and floating vegetative debris

into the Indian River Lagoon, seriously degrading estuarine habitat. The runoff also transports large quantities of human generated trash (styrofoam cups, plastic, bottles, etc.) into the Indian River Lagoon. It is recommended that a sediment and flowing debris collection system be used to effect a significant reduction in muck contributing solids, nutrients, floatables and trash into the Indian River Lagoon.

List 303(d) listed waterbody affected: Indian River Lagoon
WBID: 5003C
Impairment: Impaired by Total Nitrogen (TN) , Total Phosphorous (TP), and Dissolved Oxygen (DO). TMDL for these impairments established by FDEP.

PROJECT DESCRIPTION: Due to the amount of outfalls in the City of Vero Beach that carry runoff into the Indian River Lagoon, the City is in a unique position to treat a significant portion of stormwater runoff. The objective of the City is to install structural pollution control devices at locations in the city that have been established based on available funding, drainage basin size, and minimal permitting required by other agencies. The outfall selected at 18th Street drains approximately 148 acres of high intensity and low intensity commercial land types. Removing pollutants from this outfall will bring the City closer to meeting total maximum daily loads into the Indian River Lagoon.

On the east side of the intersection of 18th Street and Indian River Boulevard in Vero Beach is an outfall that collects runoff from approximately 148 acres of commercial land via a series of ditches, swales, catch basins, curb inlets, and pipes. The discharge is a 60" pipe that outfalls directly into the Indian River Lagoon. Upstream of the outfall is a roadside ditch. A structural pollution control device will be placed in the ditch to minimize excavation. The ditch is in public right of way and is easily accessible.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: In the below estimated pollutant load reduction, the applicant used the following model: Harvey Harper method used for annual runoff and EMC values, removal efficiencies based on minimal goals for the PCD selected for this project.

BMPs Installed		**TSS**	**TP**	**TN**	**BOD**
BMP #1		**lbs/yr**	**lbs/yr**	**lbs/yr**	**lbs/yr**
Pollutant Loads	Pre-Project	**94,171**	**388**	**2,650**	**14,065**
	Post-Project	**18,636**	**310**	**2,121**	**11,252**
	Load Reduction	**75,336**	**77**	**529**	**2,813**
	% Reduction	**80%**	**20%**	**20%**	**20%**

EMCS USED IN MODEL: EMCs obtained from "Evaluation of Current Stormwater Design Criteria within the State of Florida" FDEP, June 2007, by Harper and Baker.

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by City of Vero Beach Right of Way.

TASK DESCRIPTION:

Task Number	Task Description
1	The City of Vero Beach Survey Division will prepare a complete survey site locations and adjacent canal locations.
2	The City of Vero Beach will prepare design specifications and construction documents for installation of the improvements. The improvements will be installed on property within existing City rights-of-way or easements.
3	City of Vero Beach personnel will prepare, advertise for, receive, and evaluate bids to supply the designed BMP structure. An award will be made, contracts signed, and Notice to Proceed issued.
4	The City of Vero Beach or selected contractor will construct the stormwater BMP improvements.
5	After the grant has been awarded, the City of Vero Beach grant administrator shall provide ongoing monitoring of project schedules to assure compliance with timelines outlined in the grant contract. Required grant quarterly reports to DEP, construction contract coordination with DEP, QAPP, stormwater monitoring reports, and preliminary and final project reports will be written or coordinated by the grant administrator.
6	Prior to start of construction, the City's water quality monitoring contractor will prepare a QAPP to be approved by FDEP. After construction is completed, water quality monitoring will be undertaken to determine pollutant removal effectiveness of the constructed Pollution Control Device unit.
7	Following construction, the City will implement a comprehensive public outreach campaign that targets multiple audience segments with social marketing techniques. The City will work cooperatively with Indian River County to raise awareness about stormwater pollution and management while engaging audiences in nonpoint source pollution prevention.

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Survey	A complete survey of the project locations	Month 1	Month 2
2	Engineering Design and Permitting	A complete set of design and construction drawings	Month 2	Month 4
3	Prepare, Advertise, Receive, Evaluate and Award Construction Bid	A supply contract with a Notice to Proceed given to the lowest responsible bidder	Month 3	Month 4
4	Construction of Stormwater Facilities	The acceptance of the facilities as completed facilities according to design	Month 5	Month 7

5	Post Grant Project Administration	Quarterly progress reports to DEP; Final Report prepared by the City's water quality monitoring consultant. The Final Report will be delivered as five (5) hard copies and two (2) CD copies, and will include total annual pollutant load reductions in lb / year.	Month 1	Month 24
6	Implementation of Water Quality Monitoring Program	QAPP; Quarterly stormwater reports; storm event auto-sampler reports; and twice-a-year stormwater analysis reports will be completed.	Month 1	Month 24
7A	Implementation of Education Component	80 installed stormdrain markers within basin and surrounding area, 100 Indian River Lagoon informational door hangars placed in basin and surrounding area.	Month 1	Month 24
7B	Implementation of Education Component	Clear view hatches and educational signage installed on site	Month 7	Month 7

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Surveying	$0	$5,000	COVB
2	Engineering and Permitting	$0	$8,000	COVB
3	Bidding	$0	$2,000	COVB
4	BMP Construction	$80,000	$9,833	COVB
6	Public Education	$0	$1,500	COVB
7	Grant Administration	$0	$5,000	COVB
8		$0	$22,000	COVB
Total:		$80,000	$53,333	

Total Project Cost:	$133,333		
Percentage Match:	60%	40%	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. Baffle box includes filter cartridge to further reduce nutrient discharge during low flow conditions.

- Does the project fall within a watershed undergoing BMAP development?

  Yes. The BMAP in development is the Indian River Lagoon BMAP, Central Lagoon, City of Vero Beach.

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment A

- ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment B
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment B

PROJECT 18

PROJECT NAME: Lori Laine Basin Improvement Project, Phase 1

PROJECT FUNDING REQUEST: $503,016 MATCH: $349,554

LEAD ORGANIZATION: City of Satellite Beach

CONTACT PERSON: Allen Potter, Public Works Director
530 Cinnamon Drive
Satellite Beach, Florida 32937
Tel: 321-777-2309
Fax: 321-777-2241
Email: apotter@satellitebeach.org

COOPERATING PARTNERS: Brevard County Natural Resources Management Office
(See Attachment 1, Letter of Commitment.)

PROJECT ABSTRACT:

Type of Treatment: The project will consist of a dry-retention stormwater park, along with skimmer baskets and exfiltration trenches in street rights-of-way.

Summary of Estimated Pollutant Load Reductions: The project is estimated to reduce total suspended solids (TSS) by 1,384 pounds (16.5%) per year; total nitrogen (TN) by 81.38 pounds (16.6%) per year; total phosphorus (TP) by 11.59 pounds (16.3%) per year; sediment by 16,089 pounds (57%) per year; mercury and other metals by 16.5% per year (copper by 0.37 pounds, lead by 0.44 pounds, and zinc by 1.85 pounds); and freshwater discharge by 13.56 acre-feet (35.4 million pounds) (16.5%) per year.

Summary of Educational Components: The project will include [1] a sign at the neighborhood dry-retention stormwater park explaining the impacts of stormwater pollution and the purpose and function of the project, [2] articles in the City's bi-monthly *Beachcaster* newsletter discussing the impact of stormwater runoff on the Indian River Lagoon and the role of residents and this project in improving the Lagoon's water quality, and [3] a local environmental educator conducting 22 classes on stormwater pollution for approximately 400 students (all first, second, and third graders) at the two elementary schools in Satellite Beach.

Summary of Monitoring: Due to the nature of exfiltration BMPs, traditional stormwater-quality monitoring will not be feasible for this project. However, the project will monitor [1] the quantity of water discharged from the project site pre- and post-construction and [2] representative water-quality samples sufficient to characterize the pollutant content of stormwater discharged from the basin. These data will enable us to estimate the percentage of water and the quantities of associated nutrients and metals which are being diverted from the Banana River. Also, for a period of one year after construction, sediment and debris collected from inlet skimmer baskets will be weighed and recorded to quantify the effectiveness of the treatment train in removing sediment and suspended solids.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Satellilte Beach, Brevard County

Impacted Watershed Name: Banana River segment of the Indian River Lagoon

Size of Project Impact: 0.46 acres
Size of Drainage Area: 59.94 acres
Latitude: 28.176376 N
Longitude: 80.597171 W
Hydrologic Unit Code: 030802020203
Land is owned by: City of Satellite Beach
Land Uses within the Watershed:

Land Use	Acres	%
Residential	**59.94**	**100**
Land Use Totals (Acreage and %)	**59.94**	**100**

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: The need for this project is identified in the following comprehensive watershed plans:

1. **The Indian River Lagoon Comprehensive Conservation & Management Plan (IRLCCMP)**, published by the Indian River Lagoon National Estuary Program in November 1996 and updated in 2008.
2. **The Satellite Beach Stormwater-Quality Master Plan (SB-SQMP)**, published by Quentin L. Hampton and Associates (the City's contract engineer) and Stormwater Solutions, Inc. in February 2011.

[The City included in its proposal a detailed description of how the aforementioned plans meet EPA's nine EPA elements of a comprehensive watershed plan and are available from the DEP upon request.] as well as where the Plans identify the project need.]

List 303(d) listed waterbody affected: Banana River segment of the Indian River Lagoon
WBID: 3057A.

Impairment: The water-quality impairments to be addressed by the project include: Discharge of elevated levels of **nutrients** (nitrogen and phosphorus) into the Banana River promotes algal growth that reduces sunlight available for submerged aquatic plants, periodically reduces dissolved oxygen levels, and leads to long-term eutrophication of the waterbody. In 2009, FDEP published nitrogen and phosphorus TMDLs in Rule 62-304, based on the impacts of nutrients on seagrass. The primary objective of this project is to reduce discharge of nutrients into the Banana River.

1. Low levels of **dissolved oxygen** are harmful to finfish, shellfish, and other aquatic life. Reducing nutrients in the Banana River will increase levels of dissolved oxygen in the water.
2. Discharge of elevated levels of **mercury** (and other metals) into the Banana River increases stress on aquatic plants and animals. Mercury found in sediment in stormwater runoff will be removed by the exfiltration system and dry-retention stormwater park.
3. Discharge of elevated levels of **suspended solids, sediment, and debris** into the Banana River reduces the depth of the lagoon and contributes organic matter that forms fine-grained muck and releases additional nutrients into the water column as it decays, decreasing dissolved oxygen levels. The muck is also easily suspended, increasing the turbidity of the water column and reducing light needed for seagrass to flourish.
4. Discharge of elevated levels of **fresh water** into the Banana River changes the salinity regime of this naturally-brackish waterbody, increasing stress on aquatic plants and animals. The project's exfiltration system and dry-retention stormwater park will divert

surface runoff to the aquifer, where it will follow the natural, pre-development route to the open waterbody.

PROJECT DESCRIPTION:

Background. The City of Satellite Beach is a 98% built-out, residential community of 10,109 residents (2010 census) in a 2.9 square-mile area (1,850 acres) on Brevard County's barrier island between the Atlantic Ocean and the Banana River segment of the Indian River Lagoon ***(see Attachment 2, Regional Site Locator Map)***. The City has five major stormwater basins, each of which discharges into a navigable canal system which is connected by five cross-canals to the Banana River segment of the Indian River Lagoon---an NPS priority watershed, an Estuary of National Significance included in the National Estuary Program, an Outstanding Florida Water, a State Aquatic Preserve, and a St. Johns River Water Management District SWIM waterbody. This portion of the Banana River is included in FDEP's current list of impaired waters as Waterbody ID (WBID) 3057A, having problems due to excess nutrients, dissolved oxygen, and mercury.

One of the City's five major watersheds is the 184-acre Lori Laine Basin ***(see Attachment 3, Lori Laine Basin Map)***. The portion of this basin to be served by the proposed project totals 59.94 acres, which is 100% built-out with medium-density, residential development ***(see Attachment 4, Project Area Map and Attachment 5, Basin/Project Area Aerial)***. There is currently no stormwater-quality treatment in the Lori Laine Basin. All of the Lori Laine stormwater-drainage improvements were installed prior to 1970, a decade before stormwater-management regulation by the State began in the late 1970s. Navigable canals dredged on the west side of the City in the 1950s and '60s convey the untreated water from the Lori Laine Basin outfall to the receiving waterbody, the Banana River. (***See Attachments 6 and 7, Pre-construction Photos.)***

Problem. This history has created the following problems which this project will help to address.

1. With 45% impervious surface, 15% directly-connected impervious area, and an aggregate runoff coefficient of 0.353 in the project area, the City discharges more than 10 times the pre-development levels of stormwater runoff into the Banana River. This untreated runoff also carries a variety of pollutants characteristic of urban areas (particularly nutrients, suspended solids, and metals) into the Lagoon. The PLSM model used to develop the Banana River TMDLs indicates the City's stormwater system needs to reduce discharges of nitrogen by 79% and phosphorus by 82% relative to 2000 levels. Limited numbers of grab samples collected by volunteers from the City's outfalls from 1993 to 1996 suggest that, during storm events, the City's watersheds are discharging copper, lead, and zinc, with peak concentrations averaging 10, 12, and 50 micrograms per liter, respectively. The copper and lead average values exceed State standards for industrial discharges into Class III waters. Records from multiple years of sweeping streets and cleaning skimmer baskets indicate that sweeping collects approximately 200 pounds of sediment and debris per acre per year and skimmer baskets collect approximately 270 pounds per acre per year. Disregarding solids that are missed, and thus assuming these two measures adequately estimate total loadings by sediment and debris, skimmer baskets remove approximately 57% of these pollutants in Satellite Beach.
2. Concurrently with development of the City beginning in the mid-1950s, seagrass beds and shellfish populations have declined significantly, with the seagrass now almost entirely one in the vicinity of the City. The Biological Resources volume of the Final Technical Report prepared for the Indian River Lagoon National Estuary Program in 1994 states that the

"distribution and health of seagrass and other SAV [submerged aquatic vegetation] is directly related to water quality and water clarity of estuaries, and can thus be used as an estuary health indicator" **(page 4-1)**. The report's conclusion, codified in the IRL TMDL and being implemented by the City of Satellite Beach, is that water quality must be improved if seagrass is to return to this portion of the Indian River Lagoon.

To improve stormwater runoff in the Lori Laine basin, this project must also address the following specific challenges:

- Type A soils with high infiltration rates and a water table within a few feet of the surface,
- Lack of undeveloped land on which to build stormwater-treatment facilities, along with the prohibitive cost to purchase developed property and demolish existing structures (which, in turn, would reduce the City's tax base),
- Streets with curbs and gutters, and numerous trees and landscaping behind the curbs.

Because of these constraints, the most effective BMPs for this project will be dry retention in a quarter-acre neighborhood park, skimmer baskets, and shallow exfiltration trenches under paving in public rights-of-way.

Activities To Be Funded. To address the problems described above, this project (which will be the first phase of a multi-phase project to improve the Lori Laine basin) will include the following grant-funded activities ***(for an overview of the project's construction area, see Attachment 8, Construction Area Aerial)***:

1. Under paving along Temple Street, install 620' of sock-wrapped, perforated 18" and 24" exfiltration pipe in a gravel-filled trench wrapped with filter cloth, with access manholes at 200' intervals ***(see Attachment 9, Temple Conceptual Elements)***. This will provide 0.08 acre-feet of on-line treatment volume.
2. Modify the contours of the existing quarter-acre neighborhood park and connect it to the new conveyance system to convert it to a dry-retention stormwater park providing 0.45 acre-feet of offline treatment volume.
3. Under paving along Hamlin Avenue, install 1,240' of sock-wrapped, perforated 12" exfiltration pipe in a gravel-filled trench wrapped with filter cloth, with access manholes at 200' intervals ***(see Attachment 10, Hamlin Conceptual Elements)***. This will provide 0.82 acre-feet of off-line treatment volume.
4. Install 1,240' of 30"/36" pipe below and parallel to the perforated 12" exfiltration pipe along Hamlin Avenue to separate the polluted first-flush water from flows which exceed the capacity of the exifiltration system and are discharged into the Banana River.
5. Install control structures so that water from the Temple Street exfiltration pipe and water volume exceeding the exfiltration capacity of the dry-retention stormwater park and the perforated 12" pipe along Hamlin Avenue will flow into the larger 30"/36" pipe and be conveyed to the Banana River ***(see Attachment 11, Exfiltration Pipe Conceptual Elements)***.
6. Install skimmer baskets on all 22 inlets into the new stormwater system in the project area. Data collected in the City over multiple years indicate this BMP will remove approximately 16,089 pounds of sediment and debris annually from the 59.94 acres treated by the project.
7. Fill and abandon 990' of existing 12" stormwater pipe running between homes 100' east of Temple Street between Ellwood and Norwood Avenues.
8. Fill and abandon 1,160' of existing 24"/30" stormwater pipe running behind homes from Temple to Kale Streets between Hamlin and Glenwood Avenues.

The project will also include the following match-funded activities:

1. Conduct pre- and post-construction monitoring ***(see Attachment 12, Monitoring Plan.)***; analyze and report monitoring results. Pre-construction monitoring will involve water quantity and quality; post-construction, water quantity and solids. Because water enters the exfiltration treatment train through 22 inlets along the length of the train, it is infeasible to monitor flow into that train. Therefore, the City will monitor both pre- and post-construction flow conditions from 59.94 acres at the point where the stormwater will leave the new exfiltration treatment train. Pre- and post-construction values will be compared to estimate the reduction in flow due to exfiltration. In addition to water-quantity data, the City will collect and analyze a sufficient number of representative water-quality samples to estimate the concentrations of nutrients and metals discharged from the basin. The City will also measure the volume of sediment removed by the City's vac-truck from structures installed as part of the project, as well as obtain nutrient analyses of representative grab samples taken from the collected sediment. Combined, these measurements will gauge the effectiveness of the project's flow-reduction and sediment-capturing design in reducing pollution loadings of nutrients, metals, and solids. These data, plus information to help improve management of the City's stormwater system, will be shared with the Brevard County Natural Resources Management Office, the SJRWMD, the IRL-NEP, and other interested agencies.
2. Conduct a stormwater-education program to teach the public about the impacts of stormwater pollution and the use of BMPs to improve water quality in the Indian River Lagoon. This program will have three elements:
    - During project construction, a temporary sign will be erected in the neighborhood dry-retention stormwater park, explaining the purpose and function of the project. After construction is completed, the temporary sign will be replaced with a permanent display providing information on the impacts of stormwater pollution and how the project addresses those impacts.
    - During project construction, the City will publish at least three articles in the *Beachcaster*, the City's bi-monthly newsletter which is mailed to each address in the City. These articles will discuss the impact of stormwater runoff on the Indian River Lagoon and the role of residents and this project in improving the Lagoon's water quality.
    - The City will contract with a local environmental educator to conduct 22 classes per school year for approximately 400 students (all first, second, and third graders) at the two elementary schools in Satellite Beach. See ***Attachment 13, Education Proposal*** for a description of the classes, which will demonstrate stormwater pollution and the use of baffle boxes. (This school program will be continued for a total of three years, with funding to be provided by the City of Satellite Beach.)

Expected Results. This project will produce a significantly reconfigured and upgraded stormwater management system that will:

1. Provide a total of 0.12" of exfiltration storage volume for 59.94 acres of a basin which now lacks any treatment.
2. Pre-treat 100% of the water from 59.94 acres, using skimmer baskets in all 22 inlet structures to capture debris, sediment, greases, and oils and prevent them from entering the exfiltration trenches.
3. Educate the public about stormwater's role in degrading the Indian River Lagoon and how to better manage stormwater on a city and individual level.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: This proposal is for a structural BMP project. FDEP is using the PLSM model to implement TMDLs in the Banana River. For the SB-SQMP and this project application, Stormwater Solutions, Inc. has used FDEP's PLSM model to calculate pollutant loadings. BMP removal efficiency was calculated using FDEP's "Lakes Harney and Monroe BMAP BMP Efficiencies" guidance document issued April 2011.

BMPs Installed		TSS lbs/yr	TP lbs/yr	TN lbs/yr	Sediment lbs/yr	CU lbs/yr	PB lbs/yr
BMP #1							
Pollutant Loads	Pre-Project	3,729	32.66	214.88	10,512	0.99	1.19
	Post-Project	3,542	31.03	204.14	4,507	0.94	1.13
	Load Reduction	186.4	1.63	10.74	6,005	0.05	0.06
	% Reduction	5.00%	5.00%	5.00%	57.10%	5.00%	5.00%
BMP #2		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**CU lbs/yr**	**PB lbs/yr**
Pollutant Loads	Pre-Project	1,182.00	9.89	70	4,116	0.32	0.38
	Post-Project	449.2	3.76	26.6	1,765	0.12	0.14
	Load Reduction	732.8	6.13	43.4	2,351	0.2	0.23
	% Reduction	62.00%	62.00%	62.00%	57.10%	62.00%	62.00%
BMP #3		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**CU lbs/yr**	**PB lbs/yr**
Pollutant Loads	Pre-Project	3,487.40	28.7	204.35	13,538	0.93	1.12
	Post-Project	3,022.60	24.87	177.11	5,805	0.81	0.97
	Load Reduction	464.9	3.83	27.24	7,733	0.12	0.15
	% Reduction	13.30%	13.30%	13.30%	57.1	13.30%	13.30%
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**CU lbs/yr**	**PB lbs/yr**
Pollutant Loads	Pre-Project	8,398.00	71.25	489.23	28,166	2.24	2.69
	Post-Project	7,013.90	59.66	407.85	12,077	1.87	2.24
	Load Reduction	1,384.10	11.59	81.38	16,089	0.37	0.44
	% Reduction	16.50%	16.30%	16.60%	57.10%	16.50%	16.50%

EMCS USED IN MODEL: To estimate pre- and post-project pollutant loads and load reductions, EMCs from FDEP's PLSM model were used for TSS, TN, and TP pollutant calculations ***(see Attachment 14, Coefficient Tables 2004).*** Sediment loads and reductions were estimated using street-sweeping and skimmer-basket-cleaning values collected by the City. Copper and lead concentrations are based on grab samples taken at outfalls during the 1990s. (See Project Description, Problem, paragraph [1].)

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by the City of Satellite Beach.

TASK DESCRIPTION:

Task Number	Task Description
1	Conduct survey, geotechnical assessment, & sub-surface utility engineering of project site. Consultants will prepare a complete survey and geotechnical assessment of the proposed BMP locations, and the City's contract engineer will perform sub-surface engineering of the project site.
2	Prepare engineering drawings. The City's engineer will prepare design specifications and other construction documents for installation of BMPs in the project area.
3	Conduct pre-construction water-quantity/quality monitoring. The Brevard County Natural Resources Management Office (NRMO) will begin the monitoring portion of the project by preparing a Quality Assurance Project Plan. NRMO will train Satellite Beach Public Works personnel to operate, and collect data and samples from, the City's autosampler and flow meter, after which Public Works will begin pre-construction monitoring of water volume discharged from the project area. Flow monitoring will include both base flow, if any, and storm events for a period of one year before construction begins. Representative water-quality samples sufficient to estimate the concentrations of nutrients and metals discharged from the basin will also be collected. NRMO will use these data to estimate the quantities of nitrogen, phosphorus, and metals discharged from the watershed prior to construction.
4	Obtain SJRWMD permit. An Environmental Resource Permit will be obtained from the St. Johns River Water Management District.
5	Prepare/publish RFP, select bidder, and execute construction contract for BMPs. City staff and the City's engineer will perform all steps necessary to prepare and publish a request for proposals to construct the project's BMPs, select a bidder, and execute a contract for construction of the BMPs.
6	Conduct stormwater-education program. This program will have three elements: 1. During project construction, a temporary sign will be erected in the neighborhood dry-retention stormwater park, explaining the purpose and function of the project. After construction is completed, the temporary sign will be replaced with a permanent display providing information on the impacts of stormwater pollution and how the project addresses those impacts. 2. During project construction, the City will publish at least three articles in the *Beachcaster*, the City's bi-monthly newsletter which is mailed to each address in the City. These articles will discuss the impact of stormwater runoff on the Indian River Lagoon and the role of residents and this project in improving the Lagoon's water quality. 3. The City will contract with a local environmental educator to conduct 22 classes per school year for approximately 400 students (all first, second, and third graders) at the two elementary schools in Satellite Beach. The classes will demonstrate stormwater pollution and the use of baffle boxes.
7	Construct BMPs. The contractor selected by the City will construct the stormwater BMPs.
8	Conduct post-construction water-quantity and solids monitoring. Satellite Beach

	Public Works will conduct post-construction monitoring of water volume discharged from the project area. Flow monitoring will include both base flow, if any, and storm events for a period of one year after construction is completed. The pre- and post-construction water volume data will be used to measure the effectiveness of the exfiltration BMPs, compared with model calculations upon which their performance was predicted. NRMO will use the water volume and concentration data to estimate the quantities of nitrogen and phosphorus the exfiltration BMPs remove from the discharge. The City will also collect, measure the quantity of, and characterize solids collected by the City's vactruck from the project's 22 skimmer baskets. NRMO will combine these measurements with local rainfall data to gauge the effectiveness of the project's flow reduction and sediment-capturing design in reducing pollution loadings of nutrients, metals, and solids. The analysis results will be described in a report provided to FDEP, the Indian River Lagoon National Estuary Program, the St. Johns River Water Management District, and any other interested parties.

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Conduct survey, geotechnical assessment, and sub-surface utility engineering of project site.	survey(s) and geotechnical assessment report	Month 3	Month 6
2	Prepare engineering drawings.	design specifications and other construction documents	Month 3	Month 12
3	Conduct pre-construction water-quantity/quality monitoring.	Quality Assurance Project Plan and data	Month 3	Month 17
4	Obtain SJRWMD permit.	Environmental Resource Permit	Month 13	Month 15
5	Prepare/publish RFP, select bidder, and execute construction contract for BMPs.	construction contract with Notice To Proceed	Month 16	Month 18
6	Conduct stormwater education program.	1. educational signs at neighborhood stormwater park 2. *Beachcaster* articles 3. Classroom presentations at City's two elementary schools	Month 12	Month 28
7	Construct BMPs.	pictures showing completed BMPs, as-built drawings, copies of invoices	Month 18	Month 26

8	Conduct post-construction water-quantity and solids monitoring.	final monitoring report	Month 27	Month 42

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Conduct survey, geotechnical assessment, and sub-surface utility engineering of project site. **(contractual services)**	$0	$18,000	stormwater utility fee
2	Prepare engineering drawings. **(contractual services)**	$0	$38,622	stormwater utility fee
3	Conduct pre-construction water-quantity/quality monitoring. **(contractual services)**	$0	$5,000	stormwater utility fee
4	Obtain SJRWMD permit **(permit fees)**	$0	$1,000	stormwater utility fee
5	Prepare/publish RFP, select bidder, and execute construction contract for BMPs. **(supplies and printing)**	$0	$3,000	stormwater utility fee
6	Conduct stormwater-education program. **(public education)**	$0	$9,500	stormwater utility fee
7	Construct BMPs. **(contractual services)**	$503,016	$269,432	stormwater utility fee
8	Conduct post-construction waterquantity and solids monitoring. **(contractual services)**	$0	$5,000	stormwater utility fee
Total:		$503,016	$349,554	
Total Project Cost:		$852,570		
Percentage Match:		59%	41%	

ADDITIONAL REQUIRED INFORMATION:

- Does the project utilize innovative uses of technologies/BMPS?

Yes. It will use parallel serial-treatment-trains (instead of a single serial train), with skimmer baskets at all 22 inlets where water enters the system. Each basket will be in series with either (a) a 990' segment of on-line exfiltration pipe; (b) off-line dry retention in a quarter-acre stormwater park created from an existing neighborhood park; or (c) a 1,240' segment of under-paving, off-line exfiltration pipe. In a parallel manner, each of these exfiltration features will discharge into a solid pipe that will convey excess flow to the Banana River with minimal head loss so as to minimize local ponding. The off-line stormwater park and the 1,240-foot exfiltration pipe segment are connected in a manner that will exfiltrate 100% of input flow until the exfiltration system's throughput is exceeded, at which point all excess water in the pond and exfiltration segment will be separated from the exfiltrating, polluted first flush and conveyed to the system outfall ***(see Attachment 15, Schematic of Project Treatment Trains)***.

Because the drainage basin is located in a 100% built-out residential area which lacks any undeveloped space for traditional stormwater BMPs, the project will be constructed within public rights-of-way. The multiple phases of this project will ultimately create a mile-long, multi-stage, treatment train in this area.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?

  Yes. Satellite Beach has a monthly fee of $5.62.

- Does the project fall within a watershed undergoing BMAP development?

  Yes. The project is located on the eastern shore of WBID 3057A of the Banana River (between SR 518 and SR 404), which is undergoing BMAP development.

REFERENCES CITED:

Indian River Lagoon Comprehensive Conservation and Management Plan, Indian River Lagoon National Estuary Program, 1996 and 2008 Update.

Satellite Beach Stormwater Quality Master Plan, Quentin L. Hampton and Associates and Stormwater Solutions, Inc., 2011.

TMDL Report – Nutrient and Dissolved Oxygen TMDLs for the Indian River Lagoon and Banana River Lagoon, FDEP, 2009.

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Attachment 1 – Letter of Commitment (Cooperating Partner)
- ☑ Attachment 2 – Regional Site Locator Map
- ☑ Attachment 3 – Lori Laine Basin Map
- ☑ Attachment 4 – Project Area Map
- ☑ Attachment 5 – Basin/Project Area Aerial
- ☑ Attachment 6 – Pre-construction Photos (1)

- ☑ Attachment 7 – Pre-construction Photos (2)
- ☑ Attachment 8 – Construction Area Aerial
- ☑ Attachment 9 – Temple Conceptual Elements
- ☑ Attachment 10 – Hamlin Conceptual Elements
- ☑ Attachment 11 – Exfiltration Pipe Conceptual Elements
- ☑ Attachment 12 – Monitoring Plan
- ☑ Attachment 13 – Education Proposal
- ☑ Attachment 14 – Coefficient Tables 2004
- ☑ Attachment 15 – Schematic of Project Treatment Trains

PROJECT 19

PROJECT: Lake Forrest Stormwater Retention Pond

PROJECT FUNDING: $195,000 **MATCH:** $130,000

LEAD ORGANIZATION: City of Winter Park, Florida

CONTACT PERSON: Lena O. Petersen
Construction Project & Grant Manager
401 Park Avenue, South
Winter Park, FL 32789
407-599-3225 phone
407-599-3417 fax
lpetersen@cityofwinterpark.org

PROJECT ABSTRACT: The proposed project will retrofit a vacant lot into a dual purpose park. The lot will be developed in conjunction with adjacent right of way drainage improvements to create a chain of treatment practices that will treat run-off from a 26.7 acre basin. This run-off currently reaches Lake Forrest through overland flow and two failing outfalls. Untreated road run-off currently discharges from the existing collection system less than twenty feet from the drain well which controls the lake elevation.

The proposed improvements include a collection system to reduce short circuit overland flow from the right of way at the intersection of Howard and Mulbry Drives, two gross particulate material separators, and a retention pond feature to provide over eight thousand cubic feet of treatment capacity for the pre-screened influent. The pond outfall will be located at the maximum constructible distance from the existing drain well. The upper portion of the lot will serve as a stormwater management public awareness park. Each component of the BMP chain will have an informational placard and contact information to encourage community involvement.

The proposed project benefits include aquifer protection, public awareness, reduced lake pollutant loading, and improved right of way drainage characteristics.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Winter Park, FL, Orange County
Impacted Watershed Name: Howell Branch Creek/Lake Jessup/Middle St. Johns River
Size of Project Impact: 0.5 acres
Size of Drainage Area: 26.7 acres
Latitude: 28.34
Longitude: 81.20
Hydrologic Unit Code(HUC): 3080101
Land Uses within the Watershed (acres and percentages of total):

Land Use	Acres	%
Residential	26.7	100
Land Use Totals (Acreage and %)	26.7	100

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: Improved means of collection of stormwater runoff and the reduction of roadway surface pollutants into Lake Forrest by the construction of a retention pond system. Project is in concert with the Middle St. Johns River Basin SWIM plan initiative to enhance water quality.
List 303(d) listed waterbody affected: Lk. Forrest, Winter Park, Florida
Impairment: Untreated road run-off currently discharges from the existing collection system less than twenty feet from the drain well which controls the lake elevation.

PROJECT DESCRIPTION: The proposed project will retrofit a vacant lot into a dual purpose park. The lot will be developed in conjunction with adjacent right of way drainage improvements to create a chain of treatment practices that will treat run-off from a 26.7 acre basin. This run-off currently reaches Lake Forrest through overland flow and two failing outfalls. Untreated road run-off currently discharges from the existing collection system less than twenty feet from the drain well which controls the lake elevation.

The pollution reduction strategy of this project is to treat stormwater runoff from this residential basin by collection, screening, and surface retention system prior to discharge into Lake Forrest. Installation of this retention system is in concert with the Middle St. Johns River Basin SWIM plan initiative to enhance water quality, emphasizing nutrient loading reduction and lake protection.

The proposed project benefits include aquifer protection, public awareness, reduced lake pollutant loading and improved right of way drainage characteristics.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: In the below estimate pollutant load reduction, the applicant used the following model: Loading rates were estimated using the BMP Efficiency Values for the Lake Jessup BMAP, January 2009.

ESTIMATED POLLUTANT LOAD REDUCTION:

BMPs Installed		TSS kg/yr	TP kg/yr	TN kg/yr	Sediment kg/yr	BOD kg/yr	Other kg/yr TZN	Other kg/yr TPB
Pollutant Loads	Pre-Project	1497.87	15.88	124.93	1338	382	3.24	2.21
	Post-Project	118.18	13.60	87.47	267	267	2.28	1.55
	Load Reduction	1379.69	2.28	37.46	1071	115	0.96	0.66
	% Reduction	95	14	30	80	30	30	30

EMCS USED IN THE MODEL: EMCs of Select Constituents Measured for Various Land Uses in Central and South Florida).
Event Mean Concentration (mg/l)

Land Use	TN	TP	TSS	BOD
Single family residential	2.29	0.30	27.00	7.40

Adapted from Harper, H. H. (1998).

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Title is held by the City of Winter Park, Florida.

TASK DESCRIPTION:

Task Number	Task Description
1	Complete the design/engineering of the project
2	Complete construction of the installation of one nutrient separating baffle box at 30" & 36" outfall draining into the northern end of Lk. Virginia.
3	Submit final report

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Design/engineering	Submit final construction plan	Month 2	Month 10
2	BMP Construction	Submit inspection reports, as-builts, and photos	Month 11	Month 16
3	Final report	Submit draft final report and final report	Month 17	Month 19

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Design/engineering	$0	$12,000	City of Winter Park
2	Construct BMPs. (contractual services)	$195,000	$118,000	City of Winter Park
Total:		$195,000	$130,000	
Total Project Cost:		$325,000		
Percentage Match:		60%	40%	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete project (assuming funds required herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. The pollution reduction strategy is to treat stormwater runoff from a residential drainage basin by way of the installation of two (2) nutrient separating baffle boxes. This second stage BMP project will provide a more comprehensive removal approach for run-off pollutants.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or recurring dedicated fee?

  Yes. The fee schedule for the City of Winter Park is as follows:

CITY OF WINTER PARK - FEE SCHEDULE
Effective: May 1, 2011
STORMWATER FEES
Monthly Stormwater Utility Fees:
Single family residential property: (based on square feet of impervious area:
Class 1 (1,099 and smaller)..... 6.59 (C)
Class 2 (1,100 and 1,699) ..... 8.24 (C)
Class 3 (1,700 and 2,299) ..... 9.89 (C)
Class 4 (2,300 and 2,899) ..... 11.56 (C)
Class 5 (2,900 and 3,499) ..... 13.21 (C)
Class 6 (3,500 and 4,099) ..... 14.85 (C)
Class 7 (4,100 and 4,699) ..... 16.51 (C)
Class 8 (4,700 and 5,299) ..... 18.16 (C)
Class 9 (5,300 and 5,899) ..... 19.80 (C)
Class 10 (5,900 and 6,499) ..... 21.66 (C)
Class 11 (6,500 and 7,099) ..... 23.12 (C)
Class 12 (7,100 and 7,699) ..... 24.77 (C)
Class 13 (7,700 and 8,299) ..... 26.41 (C)
Class 14 (8,300 and 8,899) ..... 28.07 (C)
Class 15 (8,900 and higher) ..... 29.72 (C)
Multi-family residential property:
Apartment unit - per dwelling unit ..... 8.24 (C)
Condominium unit - per dwelling unit ..... 8.24 (C)
Duplex - per dwelling unit ..... 8.24 (C)
Non-residential/commercial property (per ERU)
(ERU = Equivalent Residential Unit of 2,324 sq. ft.) ..... 11.56 (C)

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment A

- ☑ Site Maps in Microsoft Word
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment B-Figure 1
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment B-Figure 2
  - ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment B-Figure 3

Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

PROJECT 20

PROJECT NAME: Dona Bay Phase lA Watershed Restoration

PROJECT FUNDING RECOMMENDED:	**$200,000**	**MATCH:**	$7,997,398
PROJECT FUNDING REQUEST:	$2,440,010	**MATCH**:	$7,997,398

LEAD ORGANIZATION: Sarasota County Environmental Services

CONTACT PERSON: Michael S. Jones
1001 Sarasota Center Blvd.
Sarasota Florida, 34240
Tel: 941-650-9926
Fax: 941-861-0986
Email: mjones@scgov.net

COOPERATING PARTNERS: Southwest Florida Water Management District.

PROJECT ABSTRACT:

Type of Treatment: Attenuation, Wet Detention, and ultimately removal and treatment for potable supply.
Summary of Estimated Pollutant Load Reductions: The entire Dona Bay Watershed Restoration Project is a complex multi year multi phased project. The bulk of nutrient removal from the downstream estuary will be achieved by actually removing water up to 15 mgd once all phases of the project are implemented. Additional nutrient removal will occur by restoring 340 acres of wetlands adjacent to Cow Pen Slough, constructing a new weir at the historic ridgeline that will allow more water to be stored in the canal and watershed, and creating a 380 acre surface water storage facility. This project involves the beginning phases of implementation. An attached report of some early pollutant removal values for nitrogen indicates the potential final removal of 26153-36812 pounds of nitrogen per year.
Summary of Educational Components: There are no planned educational components for these phases of the above referenced project.
Summary of Monitoring: The County conducts monthly water quality sampling at two points in Cow Pen Slough (one upstream and one downstream of the projects). Additionally the County maintains automated data collection sites that measure rainfall and stage which is used with a discharge rating curve to calculate discharge.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Sarasota, Nokomis, and Venice in Sarasota County
Impacted Watershed Name: Dona Bay Watershed, Cow Pen Slough Basin
Size of Project Impact: PH1A-1 = 350 acres, PH1A-2= 2 acres max, PH1A-3 = 7 acres.
Size of Drainage Area: 40,976 acres in the Cow Pen Slough Basin. The Total Dona and Roberts Bay Watershed is 55,151 acres.
Latitude: 27° 10' 40.13" N
Longitude: 82° 24' 23.28" W
Hydrologic Unit Code: 03100201
Land is owned by: Sarasota County Board of County Commissioners

Land Uses within the Cow Pen Slough watershed:

Land Use	Acres	%
Residential	4,987	12
Industrial/Commercial	1,870	5
Agricultural	13,897	34
Forest	10,036	25
Wetlands	9,199	22
Open Water	987	2
Land Use Totals (Acreage and %)	40,976	100

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: Dona Bay Watershed Management Plan.

- http://www.sarasota.wateratlas.usf.edulupload/documentslDonaBayWatersheadMgtPlanChaptersPDF.pdf
- http://www.sarasota.wateratlas.usf.edulupload/documents/ AD DonaBayWatershedMgtPlan TechnicalMemorandums.pdf

List 303(d) listed waterbody affected: Cow Pen Slough, Shakett Creek, and Dona Bay

WBID: 1924 and 1924A.

Impairment: 1924 = Nutrients and DO 1924A = Mercury in Fish Tissue.

PROJECT DESCRIPTION: This cooperative funding application is part of a multiphase implementation plan for the Dona Bay Watershed Management Plan (DBWMP). The existing Dona Bay watershed has been significantly impacted by man-made drainage activities, which increased the efficiency and volume of freshwater being discharged to its tidal estuary. Implementation of the DBWMP will address the water resources issues including: 1) Providing a more natural freshwater/saltwater regime in the tidal portions of Dona Bay by removing a portion of the excess flow; 2) Provide an opportunity for alternative water supply development along with environmental restoration; 3) Provide some flood protection through storage; 4) Provide pollutant load removal and 5) Provide rehydration of wetlands by rerouting flow to the original slough path. The County is nearly complete with design \ permitting for West Pinelands restoration (PHIA-l), the new weir in Cow Pen Slough (PHIA-2), and the conveyance from the new weir to Venice Minerals (PHIA-3). This cooperative funding application is part of a multi-phase implementation plan for the Dona Bay Watershed Management Plan (DBWMP). **This FY2012 project will construct the weir in Cow Pen Slough (PHIA-2) and the 300 acre West Pinelands wetland restoration (PHIA-l).**

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: In the below estimated pollutant load reduction, the applicant used the following model: The model used was a straight spreadsheet model used to calculate removal efficiencies of Nitrogen at the end of Phase 1, Phase 2, and Phase 3.

It is estimated for these phases of the project (PHIA-1 and PHIA-2), there will be a 32% reduction in total nitrogen, a 67% reduction in total suspended solids, and a 48% removal in total phosphorus. This amounts to estimated load reductions of 3554.7 lbs/yr of total nitrogen; 34,221.8 lbs/yr of total suspended solids; and 1,397.1 lbs/yr of total phosphorus removal.

LAND OWNERSHIP STATUS: Land necessary for the construction of treatment infrastructure has been acquired. Land is owned by Sarasota County.

TASK DESCRIPTION:

***Tasks recommended for 319 grant funding highlight below.**

Task Number	Task Description
1	PH1A-2 Cow Pen Slough Weir Construction
2	PH1A-1 West Pinelands Wetland Restoration Construction
3	PH1A-3 Water Conveyance From CPS to Venice Minerals Construction

DELIVERABLES:

Task Number	Task Description	Deliverable	Start	Complete
1	Design and permitting engineer services (PH1A-1)	Submit final construction plan and permit	1/11/09	08/11/11
1	BMP Construction (PH1A-1)	340 acres of wetland restoration, enhancement and creation as-built	10/1/12	10/1/14
2	Design and permitting engineer services (PH1A-2)	Submit final construction plan and permit	1/11/09	08/11/11
2	BMP Construction (PH1A-2)	New operable control structure ob Cow Pen Slough as built	10/1/11	10/1/12
3	Design and permitting engineer services (PH1A-3)	Submit final construction plan and permit	1/11/09	08/11/11
3	BMP Construction (PH1A-3)	72 inch below-ground waterline	10/1/11	10/1/12

PROJECT BUDGET BY TASK:

Task Number	Activity Type	319 Funding	Match Funding	Match Source
1	Design and permitting engineering services for PH1A-1	$0	$606,170	Sarasota County
1	Construct BMPs for PH1A-1. (contractual services)	$1,000,000	$2,184,123 $1,184,123	SWFWMD Sarasota County
2	Design and permitting engineering services for PH1A-1	$0	$308,783	Sarasota County
2	Construct BMPs for PH1A-1. (contractual services)	$1,000,000	$1,214,570 $214,571	SWFWMD Sarasota County
3	Design and permitting engineering services for	$0	$285,058	Sarasota County

	PH1A-1			
3	Construct BMPs for PH1A-1. (contractual services)	$440,010	$2,000,000	Sarasota County
Total:		$2,440,010	$7,997,398	
Total Project Cost:		$10,437,408		
Percentage Match:		23.4%	76.6%	

ADDITIONAL REQUIRED INFORMATION:

- If this is a multi-year project, have you requested sufficient funds to complete the project (assuming funds requested herein are provided)?

  Yes.

- Does the project utilize innovative uses of technologies/BMPS?

  Yes. This project contains a new weir that will inundate the 340 acre wetland restoration area as well as retain water upstream in the watershed. Additionally, this project will construct a 72 inch gravity pipeline that will transport excess water to a 400 acre surface water storage facility that will also provide nutrient removal as well as wet detention.

The following were included as attachments to this proposal and are available upon request from DEP:

- ☑ Monitoring Plan: Attachment 1
- ☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff):
  - ☑ Regional site locator map showing the project site relative to the surrounding area: Attachment 2
  - ☑ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. - waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment 3
  - ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment 4

Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- ☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.:
  - ☑ Attachment 5 "Summary of Environmental Cost Benefits for the Reduction of Freshwater Discharge from Cow Pen Slough to Dona Bay" Michael Jones, August 2009
  - ☑ Attachment 6 Dona Bay Phasing Plan