STATE OF FLORIDA

FY2014 SECTION 319(h) GRANT WORK PLAN

Submitted September 2013
Revised July 31, 2014

Florida Department of Environmental Protection

Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Nonpoint Source Management Section

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INTRODUCTION TO FLORIDA'S FY2014 SECTION 319(h)
WORK PLAN

This FY2014 Section 319(h) Draft Work plan consists of fourteen (14) projects that were selected for Section 319 grant funding from the thirty-two (32) projects submitted for consideration; seven (7) projects for Incremental funding along with five (5) additional projects plus two (2) placeholders to fund the state's base nonpoint source management program. In the spring of 2013, 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. For the FY14 319 grant, Florida's senior management has determined that there is enough money in other funding areas to fund the administration of this program (i.e. salaries, supplies, equipment, etc); therefore Florida is choosing to utilize 319 grant dollars toward educational, demonstration and "turn-dirt – in the ground" projects. Table 1 provides summary information on all projects in this year's draft work plan, followed by the proposed scopes of work for the selected base and incremental projects.

BASE PROGRAM PROJECTS

Over the past 22 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 FY2014 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 (NPS) 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 Best Management Practices (BMPs) in protecting ground and surface waters. In light of this commitment, the Division's senior managers have decided to concentrate the 319 funding for FY2014 for specific projects; the previous programmatic projects still have enough funds from previous years to complete those projects.

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

- **Public education** designed to reduce individual's contributions to the nonpoint pollution problem, including misuse and overuse of fertilizers;
- Florida yards and Neighbors **Sustainability of the Florida Friendly Landscaping Program (FYN),** continues to protect water resources by educating Florida residents on "Florida Friendly" landscaping practices that reduce nonpoint source pollution from yards and other landscapes. This year's grant request will: continue the statewide coordination of the county FYN programs to implement the milestones set forth in the Action Plan for NPS Management Program Administration dated 2014.
- Implementation of the **Stormwater Erosion and Sedimentation Control Inspector** training program;
- **Onsite Sewage Treatment Disposal Systems (OSTDS) Management,** continues to help local governments improve (OSTDS) management and to provide education on OSTDS issues. This program is intended to improve Florida's Coastal Zone Management Program for nonpoint source pollution from OSTDS and meet the intent behind the approved CZARA program relating to OSTDSs. This project implements the milestones set forth in the Action Plan for OSTDS in the NPS Management Program Administration 2014 Program Update.
- **Silviculture – this program is to evaluate proposed revisions to the BMP practices to reduce nutrient pollution of ground and surface waters by forest fertilization practices used for both lumber, pulp and pinestraw production. This is an ongoing project to revise prior BMPs which did not meet desired effectiveness levels.**

Project 1, OSTDS, Sanibel Sewer System Expansion Phase IV, Not approved by EPA. Selected Project #1a to replace it.

Project 1a, Continued Expansion and Sustainability of the FLORIDA-FRIENDLY LANDSCAPING™ Program to Protect Water Quality from Stormwater Runoff and Nonpoint Source Solution. The goal for this project is to protect Florida's water resources, both surface water and groundwater, by reducing nonpoint source pollution and nutrient leaching from urban landscapes. The main objectives for this project are to: 1) Educate target audiences who affect urban landscapes on the nine FFL principles, 2) Continue to respond to county and public requests for information and materials; 3) Provide programmatic/technical support to UF/IFAS Extension Service agents statewide who coordinate FFL activities; and 4) Educate landscaping professionals on best management practices that protect surface and groundwater quality. See Scope of Work included below.

Project 4, Use of Submerged Aquatic Vegetation as Bio-filters in Field Ditches to Reduce Farm P Load. The Florida Everglades is the largest subtropical wetland in the United States, covering nearly two million acres. Over the past five decades the ecological integrity of the Everglades has been affected by hydrologic and nutrient imbalances due to urban and agricultural development. Reducing the P load from the EAA (Everglades Agricultural Area) basin is crucial for restoring the Everglades ecosystem. See Scope of Work included below.

Project 10a, Green Swamp Area of Critical State Concern and Area Watersheds. This project will digitally inventory all Onsite Sewage Treatment and Disposal System documents located in the Green Swamp Area of Critical State Concern and the Peace River Watershed Basin. These documents consist of septic system application permit packages, site plans, and related forms that will be digitally scanned into a web-based management and tracking program known as Carmody and Septic Search Compliance Software and Solutions. The project will allow Health Department staff, other local and state agencies, clients, and public access to web based OSTDS files on a 24 hour basis.

Project 11, 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 National Pollutant Discharge Elimination System (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 2014 Program Update. See Scope of Work included below

Project 12, C-43 Water Quality Treatment Testing Facility – Phase I. Phase I consists of the final design, installation, and operation of mesocosms which are a component of the conceptual design. Mesocosms are an appropriate scale to test the effects of varying parameters on the wetland plants' ability to remove TN and DON. Mesocosm units are also appropriate for testing multiple design elements more cost effectively than building larger test and field-scale cells. Contingent upon future funding, the test and field-scale cells are to be constructed, operated, and sampled in subsequent phases which are not included in this grant application. Each phase of implementation will build upon the information and "lessons learned" of the previous phase with the goal of having the field-scale cells incorporated into a full-sized facility operating on site. It is anticipated that the knowledge gained from the demonstrations will be used to construct a full treatment facility at the site. See Scope of Work included below.

Project 13, Extension of the **Effectiveness of Silviculture Best Management Practices for Forest Fertilization in Pine Straw Production Using Polymer Coated Urea Fertilizer on Excessively Drained Soils in the Suwannee Valley**. A continuing project to include a third fertilization treatment and 18 months of post fertilization sampling and 6 months of data analysis and report generation. Scope of work included below.

INCREMENTAL LOCAL PROGRAM PROJECTS

Projects 2-3 and 5- 9: These remaining seven (7) 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 Best

Management Action Practices (BMAP) in the BMAP 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 2014 Program Update. Scopes are included in the Projects below.

TABLE 1. FY14 Grant Funding Request, Project Selection

Project	Type	Title	Lead Agency	Watershed	FY13 319 Funding
1	B	Not approved by EPA Replaced with Project 1a			0
1a	B	Continued Expansion and Sustainability of the FLORIDA-FRIENDLY LANDSCAPING™ Program to Protect Water Quality from Stormwater Runoff and Nonpoint Source Solution	DEP	Statewide	$547,622.67
4	B	Use of Submerged Aquatic Vegetation as Bio-filters in Field Ditches to Reduce Farm P Load	University of Florida	Everglades	$154,647.33
10a	B	Green Swamp Area of Critical State Concern and Area Watersheds	Dept of Health – Polk County	Withlachoochee River	$197,935
11	B	Stormwater, Erosion, and Sedimentation Control Certification Program	DEP	Statewide	$25,000
12	B	C-43 Water Quality Treatment Testing Facility – Phase I	SFWMD	St. Lucie, Caloosahatchee River	$994,446
13	B	Effectiveness of Silviculture Best Management Practices for Forest Fertilization in Pine Straw Production using Polymer Coated Urea Fertilizer on Excessively Drained Soils in the Suwannee Valley	University of Florida – North Florida Research and Education Center	Lower Suwannee	$351,139
				TOTAL BASE	**$2,270,790.00**

Project	Type	Title	Lead Agency	Watershed	FY14 319 Funding
2	I	Fort Pierce Veteran's Memorial Park Stormwater Improvement	City of Fort Pierce Engineering Department	Indian River Lagoon	$345,500
3	I	Bayou Chico Stormwater Retrofit Project	Escambia County Water Quality & Land Management Division	Bayou Chico/Jones River -Pensacola Bay	$755,560
5	I	Draa Field Stormwater Park	City of Titusville, Water Resources Department	North Indian River Lagoon	$388,825
6	I	Demonstration & Technology Transfer of Denitrification Bioreactors to Reduce Nitrogen Loads within the Santa Fe Basin	Board of Regents of the Nevada System of Higher Education on Behalf of the Desert Research Institute	Sante Fe Watershed	$305,914
7	I	All American Ditch Retrofit	Martin County Board of County Commissioners	St. Lucie River/Basin	$1,125,000
8	I	Minutemen Causeway LID SW Treatment Trains – Phase 2	City of Cocoa Beach Stormwater Utility	Indian River Lagoon	$544,540
9	I	Tulip Drive Stormwater Improvement Project	City of Sebastian	Central Indian River Lagoon	$176,840
10	I	Lake Yale – Not approved by EPA – Replaced with Project 10a (In Base)			0
TOTAL INCREMENTAL					**$3,642,179**
TOTAL FY14GRANT REQUEST					**$5,912,969.00**

PROJECT 1
Not Approved by EPA;

PROJECT NAME: **Sanibel Sewer System Grinder Stations Phase 4**

This project is being replaced by Project 1A.

PROJECT 1A

PROJECT NAME: **CONTINUED EXPANSION AND SUSTAINABILITY OF THE FLORIDA-FRIENDLY LANDSCAPING™ PROGRAM TO PROTECT WATER QUALITY FROM STORMWATER RUNOFF AND NONPOINT SOURCE POLLUTION**

PROJECT TYPE (Check One): ☐ Urban ☐ Agricultural ☑ Education Only ☐ OSTDS ☐ Other (describe)

PROJECT FUNDING REQUEST: **$ 547,622.67** MATCH: **$331,512.22**

TOTAL PROJECT COST: **$879,134.89**

LEAD ORGANIZATION: **Florida Cooperative Extension Service**
University of Florida
Institute of Food and Agricultural Sciences

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FEID NUMBER: **59-6002052**

END DATE OF FISCAL YEAR (MM/DD): **06/30**

FINANCIAL COOPERATING PARTNERS: **University of Florida/IFAS**

OTHER COOPERATING PARTNERS:

The Florida-Friendly Landscaping ™ (FFL) Program has grown to become a cooperative effort involving many organizations including the state's water management districts, utilities, city and county governments, the Suwannee River Partnership, DEP Florida Springs Initiative, Florida Nursery, Growers, and Landscape Association (FNGLA) and many other industry and civic groups, along with other UF/IFAS programs (Program for Resource Efficient Communities-PREC, Florida Master Gardener Program, Integrated Pest Management Florida, and the UF Water Institute).

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

FFL is an educational outreach program that covers the entire State of Florida.

Does this project fall within the boundaries of a developing or adopted BMAP or within a Nine Element Watershed Plan approved by EPA. Check one of the following:

NOT APPLICABLE

☐ Adopted BMAP ☐ Developing BMAP ☐ Approved Watershed Plan

If any of the above are checked please complete the following: **NOT APPLICABLE**

BMAP or Watershed Plan Name:

This project contributes to pollutant reductions specified in the BMAP or Watershed Plan.
☐ Yes ☐ No

This project is identified specifically in the BMAP/Plan or in the annual update of the BMAP/Plan.
☐ Yes ☐ No

Cite the section of the BMAP or Watershed Plan if either or both are checked "yes":

LAND USE and STATUS: **NOT APPLICABLE**

PROJECT OVERVIEW: Please provide information for each of the 3 items below; item 4 is optional. Please give thorough descriptions, as the information provided in items 1-3 (and optional 4) will provide the overview needed to evaluate the project.

1. Objective: Provide a description of how the Best Management Practices (BMPs) in this project will reduce nonpoint source pollution. Include how they will benefit the impaired watershed and/or BMAP or how they will protect the unimpaired watershed.

   The goal for this project is to protect Florida's water resources, both surface water and groundwater, by reducing nonpoint source pollution and nutrient leaching from urban landscapes.

   The main objectives for this project are:

   - Educate target audiences who affect urban landscapes on the nine FFL principles.
   - Continue to respond to county and public requests for information and materials.
   - Provide programmatic/technical support to UF/IFAS Extension Service agents statewide who coordinate FFL activities.
   - Educate landscaping professionals on best management practices that protect surface and groundwater quality.

   The primary goal of the FFL program is to educate Floridians about the relationship between their landscaping choices and the environmental impacts of those choices. Through this education effort FFL seeks to change people's behavior so that they adopt landscape practices that protect Florida's water resources, as well as save time and money. This project continues more than twenty years of partnership between EPA, DEP, and UF/IFAS to support local and regional projects that introduce and increase awareness of FFL principles. The success of the program has led to more demand than ever for statewide oversight and guidance to further the implementation of a fully integrated statewide FFL program with regional flexibility.

   The FFL program promotes urban landscape design and landscaping best management practices that reduce contaminant loading to surface and groundwater. The proposed FFL programs will help reinforce the FFL messages throughout the state by complementing current projects throughout Florida. This project will work in conjunction with previously DEP-funded FFL programs and FFL programs funded by other partners (i.e., Tampa Bay Water, utilities and counties).

In 2014, 59 of Florida's 67 counties were active in some aspect of the FFL program, including 48 counties with specifically assigned FFL agents within their UF/IFAS Extension Service offices. FFL efforts by Extension offices are augmented through the Master Gardener program, whose participants advocate for and teach FFL principles during the events that they sponsor or in which they participate. The Master Gardener program is active in 59 of Florida's 67 counties.

Outreach efforts to audiences beyond homeowners, such as builders and developers, retail gardening centers, and landscape professionals, are continuing to gain momentum. This project will enhance the ability of the statewide office to provide technical and administrative support to county FFL programs, improve web and other distance learning opportunities for residents throughout the state, continue to seek additional funding to expand the number of counties offering the program, and provide updated materials for county programs to distribute to all audiences. It will maintain and strengthen the statewide FYN builder/developer component, to enhance outreach efforts to professionals involved in new construction, which is a key part of influencing major changes in landscape design and maintenance behaviors.

2. Description: Provide a description of the project itself and how it will work. Include the steps in the process. Indicate if this project is a phase of a larger project.

The statewide FFL program consists of two program areas 1) a Florida Yards and Neighborhoods (FYN) Program and 2) a Green Industries Best Management Practices (GI-BMP) Program. Each of these program areas is directed by a program coordinator. The FYN Program consists of the Homeowner, Builder and Developer, Homeowner Associations and other components that were previously separately managed. The GI-BMP program also has an education coordinator and two full time program assistants, one of which (i.e., the Creole translator) is scheduled only for the first two quarters of the project. The GI-BMP program previously operated under a separate DEP Agreement No. G0041 that expired in July 2009 at which time the program was fully merged with the other FFL programs.

The two program areas are supported by three (3) additional grant funded positions that are under the direction of the statewide FFL program director: (1) an information specialist, (2) a web and information technolgy coordinator, and (3) a program assistant (classified as part-time OPS). Additional support is provided by cooperating organizations such as the University of Florida Center for Landscape Conservation and Ecology, the UF Program for Resource Efficient Communities (PREC), DEP, several state WMDs, local governments, and industry groups. There will be six (6) full time and one (1) part time positions funded under this Agreement, which will be under the direction of and/or supporting the FFL program director.

The FFL program director (a full time UF/IFAS extension funded position) maintains the integrity and quality of the FFL program statewide. Specific responsibilities are to ensure that all project areas have the educational materials that are necessary to carry out the FFL project, advise and participate in the regional training of coordinators, advisors and volunteers, offer programmatic support wherever and whenever it might be necessary, and help develop regional partnerships with other organizations that have a common interest in the well-being of Florida's environment and water quality that could translate into a possible funding relationship for the FFL project.

The FYN program coordinator serves as a liaison between the FFL statewide office and UF/IFAS county agents, FFL coordinators and program assistants, homeowners, and master gardeners. This position also works with FFL coordinators at Extension offices throughout the state to conduct programs to teach FFL principles to builders, developers, property owner association boards, and related audiences (e.g., landscape architects, planners, engineers, realtors) and to provide information on marketing FFL. The position also assists in recruiting, training and coordinating activities of FFL coordinators working with the above audiences.

The GI-BMP Program state coordinator serves as a liaison between UF/IFAS FFL Green Industries Program and county Extension agents, FDEP program management staff and regional coordinators, FDACS, WMDs and local governments, industry stakeholders and the public.

The GI-BMP education coordinator assists the GI-BMP state coordinator to schedule training sessions statewide and respond to phone and e-mail inquiries regarding GI-BMP training. Communicates regularly with Extension and DEP training coordinators and individual trainers through group and individual emails or other means as necessary to provide reminders of educational opportunities, trainer expiration dates, and training updates and changes. Ensures all trainers have adequate up-to-date materials for scheduled classes. Works with faculty to assure program quality is maintained. Grades tests, records scores in database and disseminates score results as needed, checks data and corrects errors, scans OMR tests and uploads data, prints and mails training certificates, exports/formats data records, maintains instructor certification records in Excel.

The GI-BMP program assistant works at the direction of the GI BMP education coordinator and state coordinator to enter student records and surveys into the project database or online forms, score tests (manually, using answer key), distribute files to training providers, compile quarterly training statistics in Excel, respond to phone and email requests, assist with administrative paperwork and filing, and otherwise assisting the GI-BMP program coordinator and FFL director as needed.

The FFL program assistant assists the FFL coordinators with all fiscal transactions,and assists the county programs in hiring FFL staff, purchasing equipment, and keeping accounting records of operating expenses. The FFL program assistant also acts as a liaison between the fiscal entities of UF/IFAS (i.e., purchasing, payroll, personnel, travel, and accounting offices), the District Extension Directors' Office, and the individual county accounting staff.

The web and information technology coordinator helps to develop and maintain a central FFL web site, create multimedia features for web use, assists in the implementation and training of FFL coordinators and staff in the use of web-based applications and works on developing online modules for the GI-BMP program.

The information specialist assists in the development, distribution, training, marketing and revision of educational materials (exisiting and new) for all program areas under the direction of the FFL program director.

All listed positions work in consultation/cooperation with county FFL coordinators, commercial horticulture agents, UF's PREC and the Center for Landscape Conservation and Ecology to maximize efficiency, minimize redundancy and help create a single voice for UF's multi-faceted FFL programming efforts.

3. Effectiveness: Describe how the success of the project will be evaluated and timeframes associated with that demonstration of success (e.g, monitoring, surveys, etc.).

   Appropriate use of fertilizers, pesticides and irrigation water by program participants will be measured by surveys conducted before FYN programs and six (6) months to one year afterwards. UF/IFAS Extension faculty and the FFL team are working to develop standarized evaluation tools and protocols. Load reductions within the Total Maximum Daily Load (TMDL) Basin Management Action Plan (BMAP) process resulting from FFL education/outreach efforts will also be inventoried and tallied.

4. Additional Information: You may include other relevant information (e.g., the presence of protected species at the site).

   NOT APPLICABLE

PART II – ESTIMATED POLLUTANT LOAD REDUCTIONS

This proposal is for a **structural BMP** project.

☐ Yes ☑ No

If you answered yes then enter the name of the model below and enter the load reductions and event mean concentrations (EMCs) in the Pollutant Load Reduction table. If EMCs are not the primary parameter of the model, describe the source and type of the model information.

Name of the model used for determining the load reductions:

This proposal is for a **non-structural BMP** project, such as educational outreach, demonstrations, or effectiveness evaluations.

☑ Yes ☐ No

If you answered yes but are unable to fill out the Pollutant Load Reduction table please describe below how the project will reduce pollutant loads.

This project is educational in nature and seeks to reduce surface and groundwater contamination by changing the behavior of various stakeholder groups related to their landscape design and maintenance practices. Reductions in fertilizers and pesticides in runoff from residential and other properties is the primary strategy for reducing pollution.

Pollutant Load Reductions

Enter the loads, reductions and percentages and the event mean concentrations (EMCs) used to determine the pre- and post- loads. Unit for loads and reductions must be in lbs/year.

NOT APPLICABLE

PART III – TASKS, DELIVERABLES, BUDGET, and TIMELINE

The information in these fields will provide important project details. Please see Attachment 3 for examples of how to fill out these fields.

TASK INFORMATION

Task 1. FFL/FYN Program Implementation

Description

The purpose of this task is to implement the FYN component of the FFL program for homeowners, builders and developers, homeowner and community associations, youth audiences and more. In order to accomplish this task, the following approved activities will be completed by the FYN Program State Coordinator:

- Act as a liaison between UF/IFAS county agents, FYN coordinators and program assistants, home owners, master gardeners and the FFL statewide office.
- Provide program support for all program areas under the direction of the FFL statewide director
- Train UF/IFAS FYN agents, FYN Coordinators, residential horticultural agents and Master Gardener FYN Yard Advisors, home owners and related audiences on principles and application of FFL practices and offer programmatic support whenever it is necessary. Assist in recruiting, training and coordinating activities of FYN coordinators.
- Work cooperatively with staff of the Master Gardener Program and assist, coordinate activities, and attend Master Gardener Conferences.
- Prepare teaching materials which include web-based, power point and curriculum modules.

- Assist FFL Director to conduct in-service trainings (IST) and implement regional FYN programs.
- Assist with evaluating needs of regional FYN programs for effective implementation.
- Collect annual reports from counties to summarize outcomes/impacts/successes.
- Develop working partnerships with public and private sectors to further the adoption of FFL principles and practices. Identify and pursue sources of long-term funding for the position.
- Participate in strategic planning efforts and focus groups to identify the need for additional outreach materials or revision of existing materials focusing on stormwater runoff, water quality, water conservation, sustainable land management, LID, and other FFL principles.
- Update and continue responding to information requests from the public, distribute materials to county FYN programs as requested and assist FYN program staff in obtaining educational materials to implement their program.
- Research relevant issues including land use and zoning practices, environmental impacts, and regulatory and extension criteria to develop and improve outreach content.
- Summarize key facts of correspondence with and providing prompt and effective communication with the five water management districts, scientists and other specialists, commodity teams, local government, and the DEP.
- Conduct site visits, plan reviews as requested and continue working in the field with FYN staff, teams and others.
- Continue providing advisory support to FYN staff, and others working on FYN homeowners and other documents.
- Attend meetings with extension staff (i.e., Green Teams), state office staff, and stakeholders where appropriate.
- Represent the FYN program (attend, set up exhibits and/or give presentations) at relevant conferences and meetings, as appropriate.
- Prepare and submit FYN component of quarterly reports and draft and final report.
- Ensure that the goals and objectives of the FFL program are met through oversight of the FYN project component.
- Ensure that all outputs and activities regarding the project are done in an efficient manner; and
- Update and continue developing informational materials for the following targeted stakeholder groups:

HOMEOWNERS

- Develop FYN toolkit for new and existing home owners, and update and enhance educational materials
- Phone conversations with homeowners related to this project;
- Preparing flyers for distribution;
- Putting out flyers in neighborhoods announcing the project;
- Providing consultation to homeowners and tenants who are available and are interested in being better informed by answering questions related to FYN
- Providing homeowners and tenants with educational materials on FYN
- Promote use of online FFL Yard Recognition database
- Update FFL Yard Recognition database to include all yards that have already received recognition
- Increase number of FFL recognized yards
- County agents or Master Gardener volunteers will conduct inspections of all properties being considered for FFL yard recognition. These inspections will be performed according to a standard checklist that includes the following office and field duties:
    - researching addresses
    - referring requests to other staff as appropriate
    - GIS mapping of FFL recognized yards
    - issuance of official recognition notice

HOMEOWNER, COMMERCIAL, COMMUNITY AND PROPERTY MANAGER ASSOCIATIONS

- Develop CEU programs for CAMs, and PMs
- Continue public outreach/training regarding implications of SB2080 through workshops with HOAs and property & community association managers

LANDSCAPE ARCHITECTS

- Develop CEU programs for LAs

BUILDERS AND DEVELOPERS

- Collaborate with the St. Johns River Water Management District for cross-promotion of Florida Water Star certification and FFL recognition.
- Continue development of the statewide builder/developer program to facilitate FFL in new construction in collaboration with the five water management districts, the Florida Society of Landscape Architects (FSLA), the Florida Green Building Coalition (FGBC), and UF programs such as the Program for Resource Efficient Communities (PREC).
- Conduct site visits, plan reviews as requested and continue working in the field with FYN B&D staff, building contractors, developer teams and others.
- Provide advisory support to FYN staff, builders and developers and others working on FYN inspection standards, comprehensive planning amendments and other documents.
- Attend meetings with extension staff (i.e., Green Teams), state office staff, and stakeholders where appropriate.
- Represent the FYN B&D program (attend, set up exhibits and/or give presentations) at relevant conferences and meetings, as appropriate.
- At the annual FFL In-Service Training, deliver a UF FYN extension in-service on working with B&D audiences.
- Continue to communicate with FYN staff in counties to determine their needs for working with B&D audiences.
- Participating in and serving on the selection board for the Community of Excellence Award program

YOUTH

- Develop pilot curriculum and teacher training materials for 4H and other youth audiences
- After curriculum coordinator review and approval by the 4H dean, pilot test 4H FFL curriculum in 3 different districts

ENFORCEMENT:

- The FFL/FYN yard recognition program is strictly voluntary. There are no associated enforcement provisions; with the exception of simply revoking, or not renewing an awarded yard recognition should a homeowner change their landscaping/irrigation system to no longer meet the recognition criteria.
- FFL activities may be subject to local government ordinances which typically follow the guidelines recommended in the state model ordinance for FFL practices.
- The state FFL office provides education outreach regarding implications of (s373.185 FS) and local ordinances on FFL/FYN programs

<u>Deliverables</u>

Minimum performance will be verified by submittal each quarter of:

- A spreadsheet indicating properties visited, the results of each visit, and a total number of education packets given out
- In addition to the overall project quarterly reporting, the Grantee will submit records for each project staff detailing the work accomplished each quarter.
- Number and locations of new yard recognitions
- Number of Extension agents using database
- Number of workshops that deliver FFL educational materials to the public and Extension communities
- Number of HOAs, CAMs, PMs, LAs trained
- Number and types of CEUs issued
- Copies of publications developed
- Database statistics
- Evaluations from pilot test classes

Budget Table – Task 1

Task No.	Category	Grant Funding	Match Funding	Total Funding	Match Source
1	Salaries	$40,000.00	$0	$40.000.00	
	Fringe Benefits	$13,239.48	$0	$13,239.48	
	Travel	$0	$0	$0	
	Equipment Purchases	$0	$0	$0	
	Supplies/Other Expenses	$0	$0	$0	
	SUBTOTAL	$53,239.48	$0	$53,239.48	
	Indirect	$5,323.95	$0	$5,323.95	
	Unrecovered Indirect	$0	$0	$0	
	TOTAL FOR TASK	$58,563.43	$0	$58,563.43	

Task 2. GI-BMP Program Implementation

Description

The purpose of this task is to implement the GI-BMP component of the FFL program. In order to accomplish this task the following approved activities will be completed:

The GI-BMP Program State Coordinator will:

- Act as a liaison between UF/IFAS FFL Green Industries Program and county extension agents, DEP program management staff and regional coordinators, FDACS, WMDs and local governments, industry stakeholders and the public.
- Provide program support for all program areas under the direction of the FFL statewide director
- Work with FDACS, FNGLA, and others to ensure UF/IFAS taught courses qualify for appropriate Continuing Education Units (CEU).
- Train UF/IFAS extension agents, Master Gardener Green Industry Yard Advisors, and other academically based Green Industry trainers and related audiences on Principles and Application of GI-BMP and offer programmatic support whenever it is necessary. Assist in recruiting, training and coordinating activities of Green Industry trainers.
- Ensure proficiency of county faculty and other public school, college or university trainers.
- Coordinate with DEP and others to prepare teaching materials which include web-based, power point and curriculum modules.
- Coordinate training programs with extension agents and DEP NERR regional coordinators.
- Assist FFL Director to conduct In-Service Trainings and implement regional GI-BMP programs.
- At the annual Extension and FFL In-Service Training, deliver a UF/FFL extension in-service on working with GI-BMP and general FFL audiences.
- Respond to information requests from the public, distribute materials to county GI-BMP programs as requested and assist regional program staff in obtaining educational materials to implement their program
- Assist to evaluate needs of regional GI-BMP programs for effective implementation.
- Develop, update and enhance educational materials.
- Launch updated GI-BMP English online training
- Launch new GI-BMP Spanish online and DVD training
- Develop Haitian Creole language GI-BMP training program
- Work with local governments, DEP project manager and regional coordinators, and with county extension staff to promote the program.

- Evaluate and document impacts of Green Industries program activities, including effectiveness of outreach to various stakeholder groups.
- Implement updated GI-BMP class evaluation survey (create new processing/reporting tools)
- Collect annual reports from counties to summarize outcomes/impacts/successes of the program.
- Develop working partnerships with public and private sectors to further the adoption of FFL principles and practices. Identify and pursue sources of long-term funding for the position.
- Participate in strategic planning efforts and focus groups to identify the need for additional outreach projects materials or revision of existing materials focusing on stormwater runoff, water quality, water conservation, sustainable land management, and LID, and other FFL principles.
- Research relevant issues including land use and zoning practices, environmental impacts, and regulatory and extension criteria to develop and improve outreach content.
- Summarize key facts of correspondence with and providing prompt and effective communication with the five water management districts, scientists and other specialists, commodity teams, local government, and the DEP.
- Establish project timelines and practice extreme flexibility in adapting to changing priorities.
- Speak and represent the GI-BMP program at conferences, meetings, and public events.
- Meet strict deadlines.
- Prepare and submit Green Industries Program materials for inclusion in statewide coordinator's quarterly reports and draft and final report.
- Oversee GI-BMP Education Coordinator and Program Assistant

The GI-BMP Education Coordinator will:

- Ensure timely public notice of upcoming classes and ensure all training needs are met and program integrity and accountability is maintained.
- Provide program support for all program areas under the direction of the FFL statewide director
- Ensure all trainers have adequate up-to-date materials for scheduled classes.
- Communicate regularly with Extension and DEP training coordinators and individual trainers through group and individual emails or other means as necessary to provide reminders of educational opportunities, trainer expiration dates, and training updates and changes.
- Mail training materials to distance learning applicants.
- Grade exams returned by trainers.
- Issue training certificates of completion.
- Maintain trainee database: enter and update records for all trainees and trainers, including distance learning students.
- Update data content of GI-BMP program on the website including a master calendar of all, including IFAS, DEP, public, and private (such as in-house corporate training), upcoming classes.
- Coordinate with web manager to ensure remote database queries from public or local governments are user-friendly and up-to-date.
- Assist GI-BMP Program Coordinator and Web Coordinator with collecting customized report data as needed.
- Suggest improvements to improve the program and make the system more responsive, efficient, and accountable.
- Improve SCANTRON data handling and procedures
- Implement revised GI-BMP test bank and test versions – online and SCANTRON
- Complete update of GI-BMP trainee database and related tools
- Prepare data for Program Coordinator for quarterly reports and draft and final report.

The GI-BMP Program Assistant will assist the GI-BMP Education Coordinator to:

- Enter student records and surveys into Access database or online forms
- Check data and correct errors
- Score tests (manually, using answer key)
- Scan OMR tests and upload data
- Print and mail training certificates

- Export/format data records and distribute files to training providers
- Compile quarterly training statistics in Excel
- Maintain instructor certification records in Excel
- Respond to phone and email requests

- Conduct Administrative paperwork and filing
- Assist GI-BMP Statewide Program Coordinator and FFL Director as needed

ENFORCEMENT:

- Chapter 482.1562 Florida Statutes (F.S.) requires every commercial fertilizer applicator to have the Florida Department of Agriculture and Consumer Services (FDACS) Limited Commercial Fertilizer Applicator Certificate (LCFAC). The Protection of Urban and Residential Environments and Water Act (Chapter 403.9335-9338, F.S.) requires FDEP and UF/IFAS to provide GI-BMP training for all persons who need a FDACS LCFAC. This certificate is required for any person making a fertilizer application "for hire". In addition, the training is required for all Institutional applicators covered by a local ordinance per Chapter 403.9337F.S.)
- The Florida Department of Environmental Protection and the University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) are required to provide the necessary GI-BMP training. FDACS is responsible for enforcement of Chapter 482. Accordingly, FDACS has initiated a compliance program that provides 76 trained inspectors statewide to conduct field checks among landscaping crews to confirm they have received the appropriate GI-BMP training and are carrying current LCFAC documentation. FDACS responsibilities are outside the scope of this agreement.

Deliverables

Minimum performance will be verified by submittal each quarter of:

- A spreadsheet indicating the number of training classes conducted, the number of persons trained, and the number of persons passing the certification examination.
- In addition to the overall project quarterly reporting, the Grantee will submit records for each project staff detailing the work accomplished each quarter.
- Report training/certification numbers for trainers
- Report training/certification numbers for trainees
- Provide copies of new test questions
- Provide copy of survey and analysis of results
- Copies of curriculums developed (active links to online training programs and copy of DVDs)
- Database statistics
- Copies of any new educational materials that have been developed for the GI-BMP program.

Budget Table – Task 2

Task No.	Category	Grant Funding	Match Funding	Total Funding	Match Source
2	Salaries	$101,620.00	$0	$101,620	
	Fringe Benefits	$24,718.52	$0	$24,718.52	
	Travel	$0	$0	$0	
	Equipment Purchases	$0	$0	$0	
	Supplies/Other Expenses	$0	$0	$0	
	SUBTOTAL	$126,338.52	$0	$126,338.52	
	Indirect	$12,633.85	$0	$12,633.85	
	Unrecovered Indirect	$0	$0	$0	
	Total for Task	$138,972.37	$0	$138,972.37	

Task 3. Project Administration/Oversight/Leadership/Support

Description
The purpose of this task is to provide administration, oversight, leadership and support of this project. The FFL Program Director and members of the FFL team implement this task.

Director and FFL team will provide administration of the project through the following approved activities:

- Preparation and submittal of quarterly progress reports and payment requests (invoices)
- Preparation and submittal of a draft project report, and a comprehensive final report following review by DEP staff and addressing any feedback on the draft report. The report shall be in Word or Adobe format. Three (3) paper copies and an electronic version of the report are to be submitted to DEP by the Agreement expiration date. The report will include, but not be limited to:
    - Progress and problems encountered implementing the program;
    - An assessment of the usefulness of the project to accomplish the goals and objectives of UF, EPA and the DEP;
    - Results of each activity;
    - Project cost accounting (grant and match amounts by category at a minimum) related to the grant for the overall project; and
    - Any recommendations for enhancements or expansions to the project that the Grantee or any other government or health department might be able to use to upgrade the overall project for future implementation.

Director will provide oversight of the project through the following approved activities:

- Direct supervision of the FYN Program Coordinator, GI-BMP Program Coordinator, GI-BMP Education Coordinator, Information Specialist, Web Coordinator, and two Program Assistants specifically related to this grant project.
- Participating in bi-weekly project staff meetings; and
- Participating in DEP or UF/IFAS initiated meetings.

Director and FFL team will provide leadership for the project through the following approved activities:

- Finalizing Communication Plan.
- Conducting an inventory of TMDL BMAP education outreach credits.
- Developing new partnerships with other state agencies and organizations.
- Collaborating with faculty advisors to produce science-based research for publications

Director and FFL team will provide support for the project through:

- Launching FFL plants mobile web application
- Maintaining and improving the FFL website: launch new site design, update content as necessary,
- Continuing to use social media to interact with stakeholders on a consistent basis (Maintain Facebook/Twitter posts; monitor activity; increase number of social media fans)
- Increasing program visibility by continued involvement with the Straughn FFL Demonstration Gardens
- Developing and conducting surveys of people's perceptions of FFL demonstration gardens
- Conducting in-service training (IST) of statewide Extension staff
- Promoting FFL with the Master Gardener Program including:
    - Attend MG conference and give FFL presentation
    - Educate MGs and involve volunteers in environmental landscape management and water monitoring programs.

The FFL Program Director (Match Funded Position) will:

- Continue to support previously implemented regional programs and communicate with county and regional FYN staff.
- Continue to communicate with and collaborate with external partners (especially Florida's five water management districts) and internal partners (e.g., the Center for Landscape Conservation and Ecology, and the Program for Resource Efficient Communities).
- Evaluate state educational materials for needs for technical updates.
- Assist county/regional associated project personnel in implementing FFL programs.
- Provide in-service training to Florida Yard Advisors and other Master Gardeners at the annual Master Gardener conference.
- Continue to modify and update the state FFL website and develop additional computerized training materials.
- Attend regional horticulture extension (Green Team) and relevant stakeholder meetings.
- Evaluate effects of FYN programming by compiling pre-and post-test data from county offices.
- Prepare and submit quarterly progress report and draft and final report..
- Attend the Florida Nursery Growers and Landscape Association (FNGLA) Landscape Show and staff a booth to provide public education regarding FFL.
- Prepare and submit annually the DEP Section 319 grant proposal for the FFL program.
- Fine tune 319 proposal scopes and budgets as applicable based upon grant awards and format as necessary for initiating or amending a contract agreement.
- Continue to seek out and facilitate funding of FFL programs at the state and county levels.
- Provide support and coordination for maintaining the Straughn FFL demonstation gardens on the University of Florida campus.

The FFL Program Assistant will:

- Assist the FFL Director to fulfill the activities outlined in this Agreement.
- Prepare and document all fiscal transactions with regard to any and all grant monies.
- Assist the county programs in hiring FFL staff, purchasing equipment, and keeping accounting records of operating expenses.
- Assist the statewide coordinator to write, prepare and submit proposals for grant funding from other institutions and organizations and identify potential funding sources.
- Act as a liaison between the fiscal entities of UF/IFAS (i.e., purchasing, payroll, personnel, travel, and accounting offices), the District Extension Directors' Office, and the individual county accounting staff.
- Act as the fiscal liaison between the funding agency and the grantee (the FFL program).

The Information Specialist will:

- Assist the FFL director to fulfill the activities outlined in this agreement.
- Assist in the development, distribution, training, marketing and revision of educational materials (exisiting and new).
- Assist the state coordinator in providing technical and programmatic support to county FFL staff.
- Assist in updating and enhancing the state FFL website and updating materials for county FFL programs that cover all audiences targeted by county FFL programs.
- Assist the statewide coordinator to write, prepare and submit proposals for grant funding from other institutions and organizations and identify potential funding sources.
- Represent FFL at conferences and in meetings with stakeholders and county FFL staff/horticulture extension agents.
- Continue providing prompt, effective, & extensive communication with the five water management districts, scientists & other specialists, commodity teams, local government & the DEP.
- Continue participating in strategic planning efforts & focus groups to identify the need for additional outreach materials or revision of existing materials focusing on storm water runoff, water quality, water conservation, sustainable land management, low-impact development (LID), and other FFL principles.

The Web and Information Technology Coordinator will:

- Assist the FFL program director, FYN program coordinator, GI-BMP program coordinator, and GI-BMP education coordinator to maintain FFL web site
- Produce multimedia features for the web and assist in the implementation and training of FFL coordinators and staff in the use of web-based applications and prepare manuals and handouts
- Improve web site architecture and design as needed and in response to internal and external feedback
- Utilize development software (e.g. Dreamweaver and Flash) to devise courses and programs, prepare manuals and maintain data base systems
- Create and maintain public access and government access web pages to allow verification of training and certification status of Green Industry trainers and trainees. List upcoming training opportunities by date, region, county, etc. and by public vs private such as corporate training access.
- Create pages for trainers and project managers to receive or order materials and schedule classes, download approved training materials, participate in educational updates and revisions, etc.
- Assist NERDC or other master university IT departments to incorporate GI-BMP trainee records into university record system and to maintain and adapt the system as needed.
- Participate in educational updates and revisions.
- Arrange for select DEP staff and select extension staff, including GI-BMP program coordinator and education coordinator, to have write-level access to allow direct entry of trainee records.
- Create and update public pages with links to class registration, training progress reports providing local, regional and statewide effectivness, promoting the practices to both the industry and the public, FAQs, link to the online distance learning program.
- Devise and implement digital design standards and production methods for electronic publishing on the web that are Section 508- and ADA-compliant.
- Redesign or manipulate existing design or publication and graphic images for use on web page.
- Help manage web visitor feedback.
- Prepare manuals and handouts and train FFL staff in the use of the current online course management system.
- Prepare information for inclusion in quarterly reports and draft and final report

<u>Deliverables</u>

Deliverables that are required every quarter and are directly tied to the approval of quarterly invoices:

- Summary of activities for each grant funded position with details about their accomplishments. Text, photos and copies of educational materials they helped to develop locally, regionally, and statewide will be provided as evidence of the work performed. Evidence of work performed may also include brochures; booklets; television appearances; specialized educational items and/or displays; copies of press releases, newspaper and magazine articles, and newsletter notices associated with the program; and additional training modules completed and made available to county extension faculty. The activities must be consistent with the responsibilities described above for each funded position or an explanation should be provided explaining any new topics that are requiring attention.
- Summary of activities for the UF/IFAS extension staff that are counted towards meeting the matching funds requirements of this Agreement.
- Summary of science based initiatives that are underway which have implications regarding the nine principles and benefits of FFL programming
- Summary of legal actions such as fertilizer rule making and challenges, HOA responses to SB 2080, local government model ordinance adoption, etc.
- At least one success story per quarter for each of the program areas (FYN and GI BMP) plus one additional that addresses another aspect of the program such as Information Technology accomplishments, work done by the Center or other cooperating organizations that benefits the overall program, significant legislative actions affecting the program, etc.
- Description of presentations given and meetings attended by state FFL office staff.
- FFL state office websites are updated weekly with current information pertaining to the program. This includes posting and linking to new or updated publications, revised advice and images, newsletters, training classes, and responding to citizen inquiries via Facebook, and Twitter accounts and other interactive elements of the website.

- Provide website-content summary report along with page view statistics update
- Summary of Facebook/Twitter activity
- Documentation of efforts to develop partnerships with agencies and organizations having common goals and to increase awareness and communication within the implementing agency.
- Materials of all state and national conferences attended where the FFL program has been highlighted.
- Announcements of any applicable grant awards to complement this DEP grant.
- Announcements of any awards and/or recognition given to the statewide or regional programs.
- Number of participants in FYN educational programs and activities where UF-developed evaluation methods were used to measure participants' knowledge and use of FYN practices before and after Extension programming (pre-test/post-test format).
- Number of instructors who were certified to teach the GI-BMP training program
- Number of participants who completed the GI-BMP training program.
- Number of new MGs trained in FFL
- Summary report on new partnerships, agreements, MOUs, cross-promotions
- Copies of publications, fact sheets, educational publications, or other materials
- Copies of surveys and analysis of results
- Report class statistics/evaluation results

(SPECIFIC OUTPUTS/DELIVERABLES IDENTIFIED BY THE QUARTER THEY ARE EXPECTED TO BE PROVIDED IN ADDITION TO THE DELIVERABLES IDENTIFIED ABOVE. THESE ARE ALSO DIRECTLY TIED TO THE APPROVAL OF QUARTERLY INVOICES.)

<u>FIRST QUARTER OF EACH CALENDAR YEAR</u>

1. An Annual Report summarizing the activities and future plans for the FFL statewide office (grant funded staff) plus the county agents involved with the program plus our other partner organizations. This report will be more comprehensive than the quarterly progress reports and will provide the basis for DEP to report on the success of the program to the public, EPA and the legislature. This overall report will demonstrate the effectiveness of our outreach efforts with numbers and types of contacts. Success will be measured over time as more and more participants are educated through the FFL program and begin to utilize those practices in their own landscapes. It will include evidence of changes in behavior for targeted and general populations and show how these behavior changes are leading to the following measurable benefits that protect the environment:

- Reduced pollutant loading of surface and ground water
- Reduction in stormwater runoff
- Less potable water use
- Time savings
- Lower operation and maintenance costs
- Broader acceptance of FFL principles
- Fewer challenges and disputes
- Less yard waste requiring offsite disposal (report data from waste management entities and/or landfills on local, regional and statewide basis)
- More diverse urban landscapes populated with the right plants in the right places (report total acreage that is properly landscaped and maintained)
- Improvements in shoreline management

2. Conduct the annual FFL In-Service Training(s) for extension agents to deliver advice on working with homeowners, B&D audiences, the Green Industries and other relevant groups. The program materials and recorded tapes will be provided as deliverables.

<u>FOURTH QUARTER OF EACH CALENDAR YEAR</u>

1. Provide in-service training to Florida Yard Advisors and other Master Gardeners at the annual Master Gardener conference.

2. Work cooperatively with staff of the Master Gardener Program and assist, coordinate activities, attend and present new materials at the annual Master Gardener Conference – provide the conference materials as a deliverable and highlight the FFL programs' participation.

OTHER OUTPUTS/DELIVERABLES THAT ARE EXPECTED TO BE PROVIDED IN ADDITION TO THE DELIVERABLES IDENTIFIED ABOVE BUT ARE NOT EXPECTED EVERY QUARTER OR A SPECIFIC QUARTER. THESE ARE DIRECTLY TIED TO THE APPROVAL OF THE FINAL INVOICE.

1. Summary report of TMDL BMAP education outreach credits inventory (including nitrogen loading data
2. Report official launch date for FFL plants mobile web application; tally downloads; advertisements; survey
3. Copy of final communication plan

Budget Table – Task 3

Task No.	Category	Grant Funding	Match Funding	Total Funding	Match Source
3	Salaries	$90,760.00	$185,674.29	$276,434.29	
	Fringe Benefits	$26,496.22	$51,765.99	$78,262.21	
	Travel	$24,000.00	$0	$24,000.00	
	Equipment Purchases	$16,000.00	$0	$16,000.00	
	Supplies/Other Expenses	$161,004.57	$0	$161,004.57	
	SUBTOTAL	$318,260.79	$237,440.28	$555,701.07	
	Indirect	$31,826.08	$47,488.06	$79,314.14	
	Unrecovered Indirect	$0	$46,583.88	$46,583.88	
	Total for Task	$350,086.87	$331,512.22	$681,599.09	

TOTAL PROJECT BUDGET TABLE (319 and Match Funding)

Category Totals	Grant Funding	Match Funding	Total Funding	Match Source
Salaries Total	$232,380.00	$185,674.29	$418,054.29	
Fringe Benefits Total	$64,454.22	$51,765.99	$116,220.21	
Travel Total	$24,000.00	$0	$24,000.00	
Equipment Purchases Total	$16,000.00	$0	$16,000.00	
Supplies/Other Expenses Total	$161,004.57	$0	$161,004.57	
SUBTOTAL	$497,838.79	$237,440.28	$735,279.07	
Indirect Total	$49.783.88	$47,488.06	$97,271.94	
Unrecovered Indirect Total	$0	$46,583.88	$46,583.88	
Total:	$547,622.67	$331,512.22	$879,134.89	
Total Project Cost:	$879,134.89			
Percentage Match:	62%	38%		

QUARTERLY PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Total Funding	Match Source
1	Salaries	$10,000.00	$0	$10,000.00	
	Fringe Benefits	$3,309.87	$0	$3,309.87	
	Travel	$0	$0	$0	
	Equipment Purchases	$0	$0	$0	
	Supplies/Other Expenses	$0	$0	$0	
	SUBTOTAL	$13,309.87	$0	$13,309.87	
	Indirect	$1,330.99	$0	$1,330.99	
	Unrecovered Indirect	$0	$0	$0	
	TOTAL FOR TASK	$14,640.86	$0	$14,640.86	
2	Salaries	$25,405.00	$0	$25,405.00	
	Fringe Benefits	$6,179.63	$0	$6,179.63	
	Travel	$0	$0	$0	
	Equipment Purchases	$0	$0	$0	
	Supplies/Other Expenses	$0	$0	$0	
	SUBTOTAL	$31,584.63	$0	$31,584.63	
	Indirect	$3,158.46	$0	$3,158.46	
	Unrecovered Indirect	$0	$0	$0	
	Total for Task	$34,743.09	$0	$34,743.09	
3	Salaries	$22,690.00	$46,418.57	$69,108.57	
	Fringe Benefits	$6,624.05	$12,941.50	$19,565.55	
	Travel	$6,000.00	$0	$6,000.00	
	Equipment Purchases	$4,000.00	$0	$4,000.00	
	Supplies/Other Expenses	$40,251.14	$0	$40,251.14	
	SUBTOTAL	$79,565.19	$59,360.07	$138,925.26	
	Indirect	$7,956.52	$11,872.01	$19,828,53	
	Unrecovered Indirect	$0	$11,645.97	$11,645.97	
	Total for Task	$87,521.72	$82,878.06	$170,399.78	
Total:		$136,905.67	$82,878.06	$219,783.73	
Total Project Cost:		$219,783.73			
Percentage Match:		62%	38%		

QUARTERLY PROJECT BUDGET CATEGORY TOTALS:

Category Totals	Grant Funding	Match Funding	Total Funding	Match Source
Salaries Total	$58.095.00	$46,418.57	$104,513.57	
Fringe Benefits Total	$16,113.55	$12,941.50	$29,055.05	
Travel Total	$6,000.00	$0	$6,000.00	
Equipment Purchases Total	$4,000.00	$0	$4,000.00	
Supplies/Other Expenses Total	$40,251.14	$0	$40,251.14	
SUBTOTAL	$124,459.69	$59,360.07	$183,819.76	
Indirect Total	$12,445.97	$11,872.01	$24,317.98	
Unrecovered Indirect Total	$0	$11,645.97	$11,645.97	
Total:	$136,905.67	$82,878.06	$219,783.73	
Total Project Cost:	$219,783.73			
Percentage Match:	62%	38%		

TIMELINE: Projects should be completed before September 30, 2019.

Task	Activity	Start	Complete
1	FYN Program Implementation	July 2016	June 2017
2	GI BMP Program Implementation	July 2016	June 2017
3	Administration/Oversight/Leadership/ Support	July 2016	June 2017

PART IV – 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 ☐ No If no, explain: **NOT APPLICABLE – This is a multi-year project for which we normally request funds each year.**

- Does the project utilize innovative technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as a combination of retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  ☐ Yes ☑ No If yes, explain:
- What are the estimated residence times of any ponds, swales, etc. **NOT APPLICABLE**

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  ☐ Yes ☐ No If yes, **state the monthly fee**: **NOT APPLICABLE**

- Is the project located in or does it benefit any of the following areas (check all that apply): **NOT APPLICABLE**

  ☐ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one? State special designation
  ☐ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.
  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.
  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements.
  ☑ Yes ☐ No ☐ Yes, with exceptions Provide details of exceptions.

- This project is an agricultural BMP ☐ Yes ☑ No
  If yes, check the following that apply.
  ☐ The project is supported by both state and local grower associations.
  ☐ The project complements an existing BMP project or USDA program.

  - Please list the types of BMPs that are utilized in this project (e.g., wet detention pond, grassy swale, education).
    FFL provides training in use of Green Industries Best Management Practices (GI-BMP).

  - Are the activities in this project required under a permit or does it implement permit application requirements (e.g., MS4, federal permit).
    ☐ Yes ☑ No If yes, explain; the project may be ineligible for the 319 grant award.

  - References Cited (if applicable):

Florida-Friendly Landscape Guidance Models for Ordinances, Covenants, and Restriction. 2009. Florida Florida Department of Environmental Protection and the University of Florida/IFAS Extension. 46 pgs.

The Florida-Friendly Landscaping™ Guide to Plant Selection & Landscape Design. 2010. University of Florida/IFAS Extension. 110 pgs.

Florida Friendly Best Management Practices for Protection of Water Resources by the Green Industries. Florida Department of Environmental Protection and the University of Florida/IFAS Extension. 61 pgs.

The Florida Yards and Neighborhoods Handbook. 2009. Florida Department of Environmental Protection and the University of Florida/IFAS Extension. 50 pgs.

PROJECT 2

PROJECT NAME: Fort Pierce Veteran's Memorial Park Stormwater Improvements

PROJECT FUNDING REQUEST: $345,500 **MATCH:** $233,900

LEAD ORGANIZATION: City of Fort Pierce Engineering Department

CONTACT PERSON: Jack Andrews, City Engineer
100 North U.S. 1, P.O. Box 1480
Fort Pierce, FL 34954
Tel: 772-467-3774
Fax: 772-460-6847
Email: jandrews@city-ftpierce.com

FEID NUMBER: 59-6000322
FISCAL YEAR END: SEPT. 30, 2013

FINANCIAL COOPERATING PARTNERS: City of Fort Pierce Engineering Department

OTHER COOPERING PARTNERS: SJRWMD/Indian River Lagoon Program, Fort Pierce Veteran's Association, St. Lucie County Engineering Department, City of Fort Pierce Engineering Department

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: City of Fort Pierce, St. Lucie County
Impacted Watershed Name: Moore's Creek Watershed
Size of Project Impact: 8 acre park = project site
Size of Area Being Treated: 36.1-acre watershed
Latitude: 27N° 45' 31.42"
Longitude: 80E° 19' 23.79"
Hydrologic Unit Code: 03080202-009
WBID: 5003A
Impaired waterbody affected: Indian River Lagoon
Impairment: Nutrients, nitrogen, phosphorus, total suspended solids, copper
TMDL Status: Indian River Lagoon, approved TMDL
BMAP Status: The project lies within the BMAP basin and is located in the Moore's Creek Basin. To be adopted by governor in June 2013.

Land Uses within the area being treated:

Land Use	Acres	%
Residential Low Density (1100)	3.3	7.5
Residential Medium Density (1200)	6.4	14.5
Residential High Density (1300)	0	0
Commercial and Services (1400)	26.4	59.9
Industrial (1500)	0	0
Extractive (1600)	0	0
Institutional (1700)	0	0
Recreational (1800)	8	18.1
Open Land (1900)	0	0
Agriculture (2000)	0	0
Upland Non-Forested (3000)	0	0
Upland Forests (4000)	0	0
Water (5000)	0	0
Wetlands (6000)	0	0
Barren Land (7000)	0	0
Transportation, Communication, and Utilities (8000)	0	0
Land Use Totals (Acreage and %)	**44.1**	**100**

LAND OWNERSHIP STATUS: (check one)

√ Land necessary for the construction of treatment infrastructure has been acquired. Title is held by City of Fort Pierce, Veteran's Memorial Park is a city-owned and maintained park.

☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase). Insert real title holder and who owns option. If not the applicant, explain relationship to the applicant.

☐ Land necessary for the construction of treatment infrastructure is under an easement, which allows for the construction and access. Insert real title holder and easement holder. If not the applicant, explain relationship to the applicant.

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 Master Plan 2010.

PROJECT OVERVIEW: Veteran's Memorial Park is located in Fort Pierce, north of the downtown area adjacent to the Indian River Lagoon and Intracoastal Waterway. The City of Fort Pierce is planning a two-phase project with a treatment train in each phase. Both phases will treat both the 8-acre park and the 36.1 acre drainage basin currently discharging directly in the Indian River Lagoon (IRL).

Phase 1 relates to work with existing permits and developed plans for the construction of a wet detention pond and several Low-Impact Design (LID) best management practices (BMPs), while Phase 2 relates to a conceptual site plan prepared by the City's consulting engineer for the installation of LID elements**.** Task 3 describes the portions set forth in this application. The total 44.1-acre basin currently has no water quality treatment prior to discharging into the Indian River Lagoon. The project's stormwater system improvements include the installation of pervious paver systems for sidewalks, parking and roadway along with two groups of Floc-logs (a new award-winning technology developed in 2010), 4 bio-swales complete with applicable stabilization, and a deep cell 0.5-acre settlement pond. It is the applicant's intent to have both Phase 1 and Phase 2 construction occur simultaneously.

Phase 1includes the treatment of run-off from both on-site and off-site drainage flows with initial treatment of the on-site stormwater run-off treated first by the pervious paver system and then the bio-swales (constructed as part of the Phase 2 work) and then draining to the 0.50-acre lake. In Phase 2, the 4 bio-swales will be constructed within the Veterans Park site to help treat onsite and offsite stormwater. In addition, Floc-logs will be installed to provide treatment of the offsite flows and the area around the Bio-Swales will have pervious sidewalks and driveways for the first phase of the treatment train. The pervious pavers will absorb driveway and parking lot stormwater run-off prior to

discharging into the Bio-Swales. All these items reflect a treatment train of pervious pavement to bio-swales for onsite treatment of stormwater from the parking areas.

The project will also include water quality monitoring and public education including coverage with an educational kiosk at the Park and information pamphlets inside the Veteran's Memorial Park building on site. The City will provide a large display board of the project near the entrance to the City Commission chambers and the Engineering Department entrance for the public to view prior to entering either location. It will be featured in the City of Fort Pierce monthly newsletters and as news items in local sections of newspapers. Finally, an exhibit of the City's stormwater projects will be displayed at Riverfest, a music festival on the South Causeway Park in early June to educate the public about the stormwater story. This Phase 2 project is estimated to reduce TSS by 4,344.17 lb/yr or 98.4%, TN by 113.88 lb/yr or 74.2% and TP by 23.07 lb/yr or 96.3%. The Phase 1 & 2 treatment train projects together are estimated to reduce TSS by 5,221.51 lb/yr or 98.6%, TN by 131.29 lb/yr 76.5% and TP by 25.76 lb/yr or 96.4% This proposed 319 program request is $345,500 or 59.5% of the costs to be used for a $579,400 project. Funds will be utilized for construction in late 2014-15.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: (check one)

√ This proposal is for a structural BMP project. In the below estimated pollutant load reduction, the applicant used the following model: Spreadsheet Tool for Estimating Pollutant Load (STEPL, 2007)

☐ This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and: (check one)

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

☐ 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:

BMPs Installed		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Polyacrylamide (PAM)								
Pollutant Loads	Pre-Project	4,415.88	23.96	153.45		687.64	0.24	9.70
	Post-Project	1,280.61	13.42	153.45		687.64	0.24	9.70
	Load Reduction	3,135.28	10.54	00.00		0.00	0.0	0.0
	% Reduction	71.0%	44.0%	0.00%		0.0%	0.0%	0.0%
Bio-Swales		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project	1,280.61	13.42	153.45		687.64	0.24	9.70
	Post-Project	179.28	4.23	69.05		192.54	0.14	7.76
	Load Reduction	1,101.32	9.19	84.40		495.10	0.10	1.94
	% Reduction	86.0%	68.5%	55.0%		72.0%	40.0%	20.0%

Wet Pond		TSS lbs/yr	TP lbs/yr	TN lbs/yr	Sediment lbs/yr	BOD lbs/yr	Other lbs/yr	Other lbs/yr
Pollutant Loads	Pre-Project	179.28	4.23	69.05		192.54	0.14	7.76
	Post-Project	71.71	0.89	39.57		192.54	0.04	3.10
	Load Reduction	107.57	3.34	29.49		0.00	0.11	4.66
	% Reduction	60%	79%	42.7%		0.0%	75.0%	60.0%
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project	4,415.88	23.96	153.45		687.64	0.24	9.70
	Post-Project	71.71	0.89	39.57		192.54	0.04	3.10
	Load Reduction	4,344.17	23.07	113.88		495.10	.020	6.60
	% Reduction	98.4%	96.3%	74.2%		72,0%	85.0%	68%

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 Event Mean Concentrations (EMCs) listed in Attachment 1 were used in the model to estimate pre-project pollutant loads. Stormwater loading rates were calculated using the Spreadsheet Tool for Estimating Pollutant Load (STEPL, 2007) and have been attached in our Attachments Section. The pollutant removal rates are based on the combinations of the selected BMPs.

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.: Estimated residence time is estimated at 180 days.

TASKS and DELIVERABLES:

TASK NUMBER: #1
TASK NAME: Engineering Design and Permits
TASK DESCRIPTION (detailed): Complete engineering design plans for all BMPs, including pervious pavement/sidewalks, bio-swales, wet pond and Floc Logs.
DELIVERABLE: A complete set of permitted engineering drawings, and construction specifications along with the required 10-2 SFWMD, as discussed with SFWMD staff.

TASK NUMBER: #2
TASK NAME: Prepare Bid with Federal Procurement Procedures
TASK DESCRIPTION (detailed): Prepare, solicit bids, receive, evaluate and award construction bid.
DELIVERABLE: A construction contract with a notice to proceed given to the responsible, most qualified and/or low bidder.

TASK NUMBER: #3
TASK NAME: Construct stormwater treatment train facilities
TASK DESCRIPTION (detailed): The City of Ft. Pierce will utilize a contractor to build 4 bio-swales within the Veterans Park site to help treat onsite and offsite stormwater run-off. In addition, the contractor will install two (2) Floc-log systems to provide treatment of the offsite flows, construct pervious pavement and sidewalks to provide the initial treatment of any pavement run-off prior to discharging into the bio-swales and ultimately into the deep cell 0.5-acre wet pond (Phase 1 construction). All these items reflect a treatment train of pervious pavement to bio-swales to for the onsite treatment of storm water run-off from the parking areas. The two (2) offsite stormwater systems will be diverted into two of the bio-swales which

then flow over the Floc-log system. The match portion of this project will fund the construction of the deep cell lake, one (1) bio-swale, and Construction Engineering and Inspection services.
DELIVERABLE: Completed project after construction and acceptance of final design.

TASK NUMBER: #4
TASK NAME: Monitoring
TASK DESCRIPTION (detailed) Complete and submit to the Department for approval a Quality Assurance Project Plan for monitoring prior to commencement of the project's monitoring phase. The monitoring plan will specify the sampling locations, sampling instruments, and parameters to be sampled. The parameters shall include, but are not limited to: TN (lbs/yr), TP (lbs/yr), TSS (lbs/yr), Cd, Cr, Cu, Zn, NO2/NO3, TKN, NH3, Orthophosphate, oil/grease, Fecal coliform, rainfall and flow. Monitored events shall include 7 – 10 discrete rain events, generally greater than 0.20 inches and less than 1.5 inches. Monitoring is to be performed at inflow and outflow locations of the treatment BMP train installed and in accordance with the approved QAPP. Sampling locations shall be recorded and verified using a GPS device. Project-specific details must be added during QAPP development.
DELIVERABLE: Draft QAPP; Approved QAPP; monitoring results

TASK NUMBER: #5
TASK NAME: Implement planned educational component
TASK DESCRIPTION (detailed): An on-site kiosk with display of the stormwater project, attendance to at least one City festival to show project progress and educate the public, display at the entrance to the City Commission Chambers and engineering department. Articles on the City's website, city newsletter and in local newspapers
DELIVERABLE: Educational kiosk, attendance to festival, display at City Commission Chambers and engineering department entrances, articles on website and newspapers.

TASK NUMBER: #6
TASK NAME: Grant Admin and Final Report
TASK DESCRIPTION (detailed): Complete and submit to the Department a Final Report. This Final Report is intended to capture the outcome and results of the selected project, including all tasks included in this project. This shall include, where applicable, why a BMP did not obtain or exceeded the expected removal efficiency; any problems encountered and how those problems were overcome; an explanation of any project delays; a brief summary of any additional phases yet to be completed; and more. The Final Report template, available from the Department's contract manager, should be followed as much as possible. Quarterly information regarding the status of the project conveyed to the public. Slides will be taken throughout the design and construction
DELIVERABLE: Draft final report; approved final report

TIMELINE:

Task No.	**Task Title** *(should match identically above)*	Start	Complete
1	Architecture Engineering/Design	Month 1	Month 5
2	Bidding	Month 6	Month 9
3	BMP Construction	Month 10	Month 18
4	Water Quality Monitoring	Month 19	Month 30
5	Education	Month 10	Month 30
6	Grant Admin/Final Report	Month 18	Month 30

PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$66,900	FP SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$66,900	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
2	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$5,000	FP SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$5,000	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
3	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$245,500	$112,000	FP SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$245,500	$112,000	

Task No.	Category	Grant Funding	Match Funding	Match Source
4	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$100,000	$0	
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$100,000	$0	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
5	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$25,000	FP SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$25,000	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
6	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$25,000	FP SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$25,000	
	Total:	$345,500	$233,900	
	Total Project Cost:	$579,400		
	Percentage Match:	59.5%	40.5%	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	$0	$0	
Fringe Benefits Total	$0	$0	
Travel Total	$0	$0	
Contractual Total	$345,500	$233,900	FP SW Utility
Equipment Purchases Total	$0	$0	
Supplies/Other Expenses Total	$0	$0	
Land Total	$0	$0	
Indirect Total	$0	$0	
Total:	$345,500	$233,900	
Total Project Cost:	$597,400		
Percentage Match:	59.5%	40.5%	

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: √ No:

- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.

Yes: √ No: ☐ If yes, explain: **New state-of-the-art Floc-logs, pervious pavement treatment system, bio-swales, and wet pond.**

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

Yes: √ No: ☐ If yes, state the monthly fee: **$4.50/month/ERU**

- Is the project located in or does it benefit any of the following areas:

  √ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one? Moore's Creek Drainage area is within a Front Porch Community.

  √ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements.
  Yes: √ No: ☐ Yes, with exceptions: ☐ Provide details of exceptions.

REFERENCES CITED:

March 2010 Draft, Florida Department of Environmental Protection (FDEP) Environmental Resource Permit "STORMWATER QUALITY APPLICANT'S HANDBOOK".

The following are included as attachments to this application:

√ Monitoring Plan: Attachment 1

√ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)). Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- √ 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, probable engineers cost sheet, pollutant loading calculations, Attachment 5-8.

Fort Pierce Veteran's Park Stormwater Improvements

ATTACHMENTS

Attachment 1, SW Sampling Protocol Plan for Veteran's Park Attachment 2,

Veteran's Park Locator Map

Attachment 3, Treatment Area Map for Veteran's Park Attachment4,

Detailed Conceptual Site Plan for Veteran's Park

Attachment 5, New Technology Schematics for Floc Log and Bio-Swale BMPs

Attachment 1
SW Sampling Protocol Plan for Veteran's Park in Fort Pierce

MONITORING PLAN
MONITORING TO DETERMINE TREATMENT EFFECTIVENESS

For approved stormwater projects, the applicant will be required to monitor the effectiveness of the BMP. BMP effectiveness data is required by EPA to demonstrate the environmental benefits of a project. The general monitoring requirements are set forth below. Please note that the final scope of work in the contract may include more specifics on particular monitoring requirements.

The monitoring plan will specify the sampling locations, sampling instruments, and parameters to be sampled. The monitoring will include sampling of from seven to ten (10) storm events as described below. Monitored events will be discrete rainfall events of generally greater than 0.20 inches and less than 1.5 inches. However, the storm event rainfall may be modified depending on the type of BMP, the contributing drainage area, the amount of impervious area, and the time of concentration.

Monitoring will be conducted at two locations: inflow and outflow of BMPs installed.

Monitoring will include the following parameters:

- Daily rainfall (to nearest 0.01 inch) measured at the sampling location with verification from the local weather station. Rainfall data should be provided for at least the week preceding monitoring and for day(s) of monitoring.

- Flow using approved flow activated flow meters.

- Parameters as specified below:

Parameter	Detection Limit	Method
Total Cadmium	1 ug/l	Composite*
Total Chromium	5 ug/l	Composite*
Total Copper	5 ug/l	Composite*
Total Zinc	10 ug/l	Composite*
NO2+NO3	0.1 mg/l	Composite*
TKN	0.3 mg/l	Composite*
Total Ammonia	0.05 mg/l	Composite*
Total N		Composite*
Total Phosphorus	0.05 mg/l	Composite*
Ortho Phosphate	0.05 mg/l	Composite*
TSS	1 mg/l	Composite*
Oil/Grease	1 mg/l	Composite*
Fecal coliform	N/A	Grab** if possible

* Flow weighted composite samples will be taken over the storm hydrograph. Typically, the samples will be composited over the inflow hydrograph at the inflow and for up to a 36 hour period at an outflow station. Rainfall that does not result in at least a six-hour discharge from the stormwater BMP shall not be considered a completed monitoring event. Each composite will include at least six evenly distributed sub-samples.

* Grab samples to be collected within the drainage area time of concentration at influent and effluent stations described above.

The applicant should estimate the pollutant removal efficiency of a stormwater BMP by calculating the percent reduction in the event mean concentration (EMC) for the period of record [1-(Average Inflow EMC/Average Outflow EMC)]. For BMPs with multiple inflow (and/or outflow) points, the pollutant contributions for each inflow should be flow weighted. See the National Stormwater Best Management Practice database at: http://www.bmpdatabase.org/ and *Development of Performance Measures, Determining Urban Stormwater Best Management Practice Removal Efficiencies*, 1999, by URS Greiner Woodward Clyde, ASCE and EPA at: http://www.bmpdatabase.org/task3_1.pdf

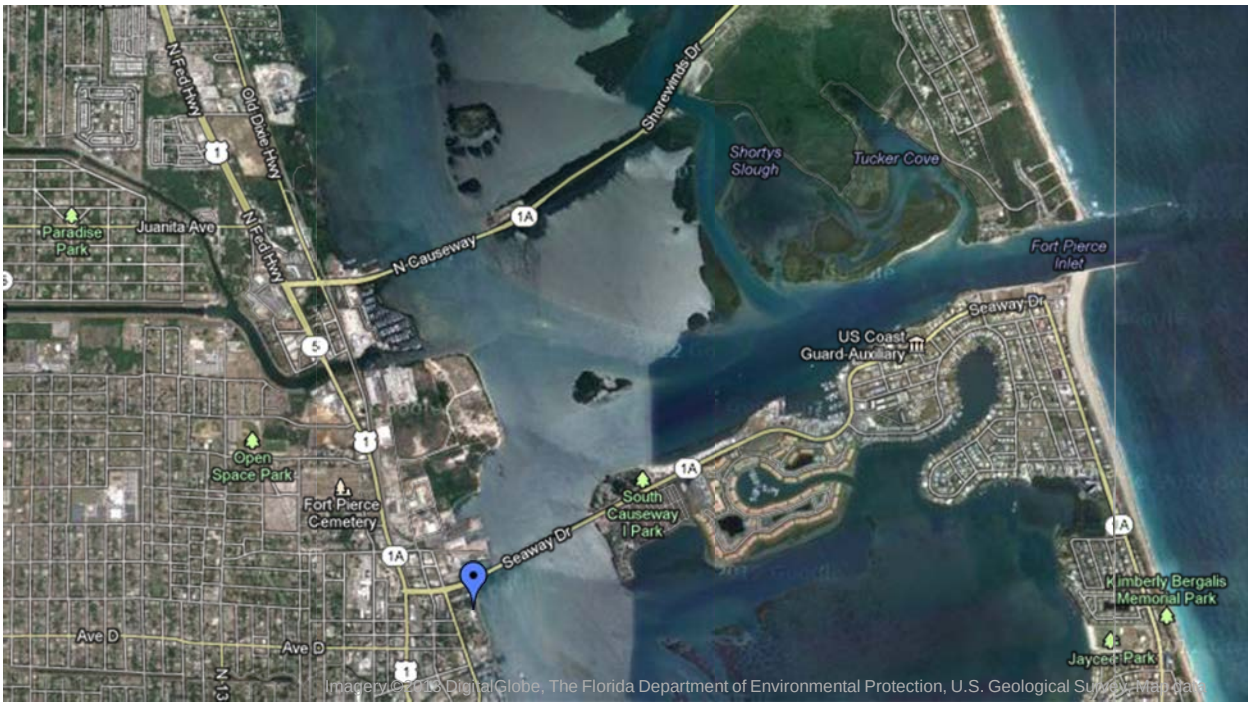
In addition, nutrients removed by vegetated mats shall be monitored and quantified. The total mass of vegetation removed will be weighed. Representative samples of vegetation will be analyzed by a laboratory for the above listed parameters using mass concentrations. Total masses of nutrients removed by the vegetation will be calculated and compared to EMC measurements and removals.

Water quality effectiveness of the constructed BMPs should be summarized in the final report in terms of annual load reduction for each pollutant reported (i.e. kg/yr).

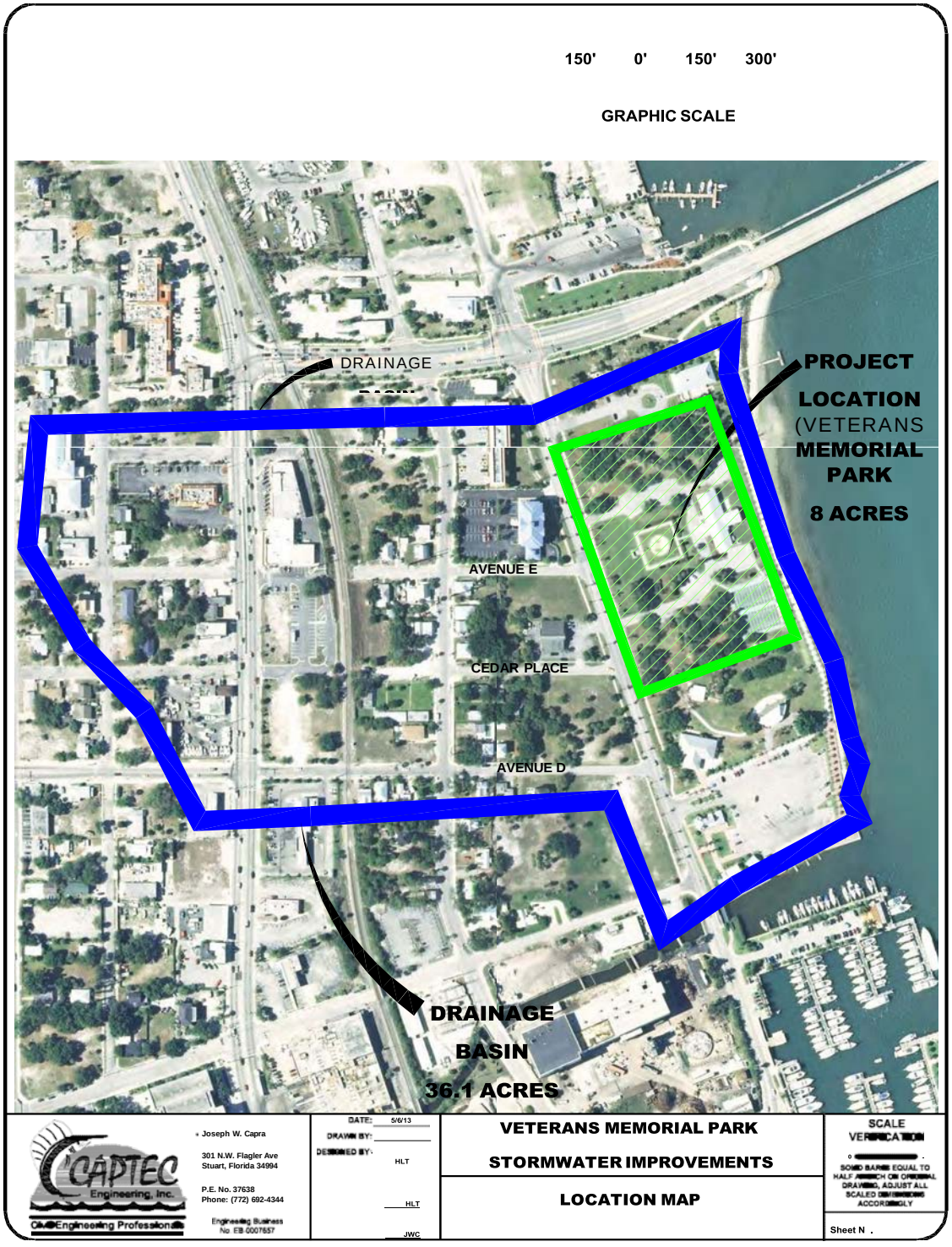
Attachment 2 A, Veteran's Park Location and Vicinity Maps

Location Map: This project is located on Florida's east central coast in the City of Fort Pierce on the Indian River Lagoon.

Attachment 2 B, Veteran's Park Vicinity Map: The project site is located on the eastern boundary of the City of Fort Pierce south of Seaway Drive. It is located adjacent to Fort Pierce Inlet on Florida's east central coast.



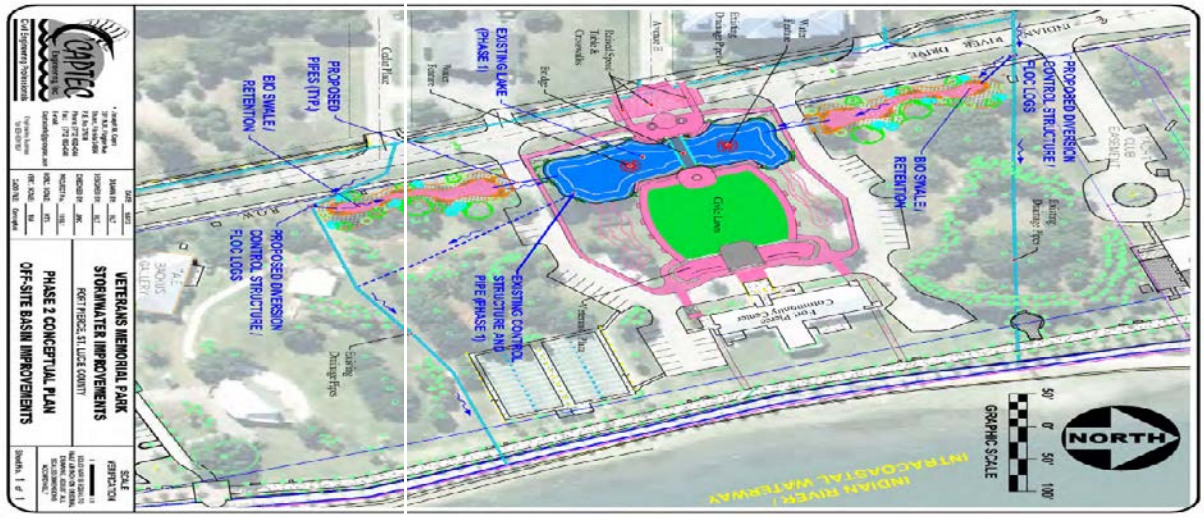
Attachment 3, Drainage Basin/Treatment Area Map
(includes drainage sub-basins)



CHECKED BY:

PROJECT No.:

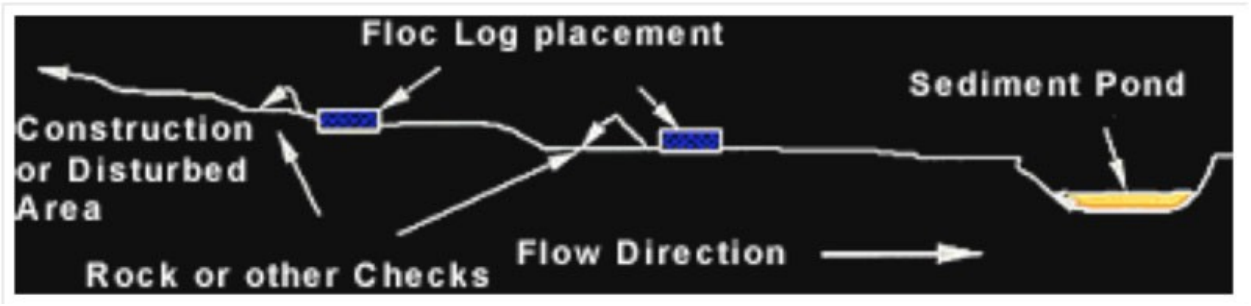
Attachment 4, Detailed Conceptual Site Plan for Veteran's Park


VETERANS MEMORIAL PARK
STORMWATER IMPROVEMENTS
FORT PIERCE, ST. LUCIE COUNTY
PHASE 2 CONCEPTUAL PLAN
OFF-SITE BASIN IMPROVEMENTS
PROPOSED PIPES (TYP.)
BIO SWALE / RETENTION
PROPOSED DIVERSION CONTROL STRUCTURE / FLOC LOGS
EXISTING LAKE (PHASE 1)
EXISTING CONTROL STRUCTURE AND PIPE (PHASE 1)
Civic Lawn
Fort Pierce Community Center
INDIAN RIVER DRIVE
NORTH
GRAPHIC SCALE
50' 0' 50' 100'
INDIAN RIVER / INTRACOASTAL WATERWAY

Attachment 5, New Technology Schematics for Floc Log and Bio-Swale BMPs

The project will also use Floc Log technology placing the logs at the upstream of in the stormwater in-flow point to the wet detention pond.
A Floc Log is a semi-hydrated gel polyacrylamide block that when placed within stormwater or construction site drainages will remove fine particles and reduce NTU values. Each Floc Log is formulated for the soil and water chemistry of the geographical area where placement and usage are intended. Soil and water samples are required for geographical areas not previously tested. Placement of the Floc Log should be as close to the source of particle suspension or NTU origination as possible. Finer particles and colloidal suspensions will require greater mixing times, usually never greater than 75 seconds. This mixing time equates to the time required for water to flow through a ditch system or a pipe. Typical reaction times in most geographical areas are 10-30 seconds. Ideal performance of the Floc Log results when used in conjunction with Best Management Practices in place. Rock checks, drop inlets, storm drains, retrofits and slope drains all greatly enhance the effectiveness of the Floc Log (*Applied Polymer Systems, Inc. (APS) 2012*). In 2006, companies representing the floc log technology received the Product Innovation and Excellence Award from the Stormwater Management Academy and the University of Central Florida for Floc Logs at the recent 2nd Annual Stormwater Management Research Symposium. The product innovation and excellence award is given to the company who has achieved inter-national recognition for a product that substantially improves stormwater quality.

The Floc Log is designed for a base flow rate of 60 GPM, as shown in the following diagram:



Floc Logs Treating Stormwater in an open ditch treatment train.

In 2006, APS received the Product Innovation and Excellence Award from the Stormwater Management Academy and the University of Central Florida for Floc Logs at the 2nd Annual Stormwater Management Research Symposium. The product innovation and excellence award was given to the company for its achievement in gaining international recognition for a product that substantially improves stormwater quality.

It is anticipated that the Floc Logs will reduce TP by 80% or greater as documented by Eddie Snell in 2005 with his Reedy Creek work on a 2.4 acre stormwater wet detention pond.

Bio-Swales

PROJECT 3

PROJECT NAME: BAYOU CHICO STORMWATER RETROFIT PROJECTS

PROJECT FUNDING REQUEST: $ 755,560 **MATCH:** $ 1,900,000

LEAD ORGANIZATION: Escambia County Water Quality & Land Management Division

CONTACT PERSON: TAYLOR "CHIPS" KIRSCHENFELD, DIVISION MANAGER
Escambia County Water Quality & Land Management Division
3363 West Park Place,
Pensacola, FL 32505
Tel: (850) 595-3449
Fax: (850) 595-3634
Email: jtkirsche@myescambia.com

FEID NUMBER: 59-6000598

FISCAL YEAR END: SEPTEMBER 30, 2013

FINANCIAL COOPERATING PARTNERS: Escambia County, FL; Emerald Coast Utilities Authority (ECUA);

OTHER COOPERING PARTNERS: N/A

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Pensacola / Escambia County
Impacted Watershed Name: Bayou Chico / Jones Creek
Size of Project Impact: 5.48 acres
Size of Area Being Treated: 210.48 acres
Latitude: 30.39306
Longitude: 87.29583
Hydrologic Unit Code: 031401050403
WBID: 846, 846DA, 846CB, 846C, (Bayou Chico) / 846A (Jones Creek)
Impaired waterbody affected: Bayou Chico, Jones Creek
Impairment: Fecal Coliforms, Nutrients (Chlorophyll-a), Dissolved Oxygen, Mercury (in fish tissue)
TMDL Status: Florida Department of Environmental Protection (FDEP) Adopted / U.S. Environmental Protection Agency (EPA) Approved (Fecal Colifoms), Draft (Nutrients, Dissolved Oxygen, Mercury)
BMAP Status: Bayou Chico Fecal Coliform Basin Management Action Plan (BMAP) Established 2011

LAND AND USES WITHIN AREA TREATED:

Land Use	Acres	%
Residential Low Density (1100)	0	0
Residential Medium Density (1200)	150.98	71.73
Residential High Density (1300)	0	0
Commercial and Services (1400)	1.02	0.49
Industrial (1500)	0	0
Extractive (1600)	0	0
Institutional (1700)	2.53	1.20
Recreational (1800)	0	0
Open Land (1900)	5.34	2.54
Agriculture (2000)	0	0
Upland Non-Forested (3000)	0	0
Upland Forests (4000)	35.96	17.08
Water (5000)	0	0
Wetlands (6000)	11.27	5.35
Barren Land (7000)	0	0
Transportation, Communication, and Utilities (8000)	3.38	1.61
Land Use Totals (Acreage and %)	**210.48**	**100**

LAND OWNERSHIP STATUS:

- ☑ Land necessary for the construction of treatment infrastructure has been acquired. Title is held by Escambia County (property and right-of-way).
- ☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase).
- ☐ Land necessary for the construction of treatment infrastructure is under an easement which allows for the construction and access.

WATERSHED MANAGEMENT PLAN:

Nonpoint source pollution, stormwater runoff, and failing septic tanks have been identified as the major water quality issues in Jones Creek and Bayou Chico in the Northwest Florida Water Management District (NWFWMD) *Pensacola Bay SWIM Plan,* the Florida Department of Environmental Protection (FDEP) *Pensacola Bay Watershed Ecosystem Management Plan,* and the *Bayou Chico Basin Management Action Plan (BMAP).*

PROJECT OVERVIEW:

These water quality improvement projects will reduce nonpoint source pollution in Jones Creek and Bayou Chico, both of which are 303(d) listed impaired waterbodies with a Total Maximum Daily Load (TMDL) and BMAP. Jones Creek (WBID 846A) is impaired for fecal coliform and total coliform. Bayou Chico (WBIDs 846CB and 846) is impaired for nutrients (chlorophyll-a), fecal coliform, and total coliform. These proposed water quality improvement projects will accomplish the goal of improving water quality in the Jones Creek / Bayou Chico Watershed by providing new treatment for nonpoint source stormwater, restoring degraded wetlands, creating new wetland floodplain, and providing public education and outreach with an educational trail and boardwalk with appropriate educational signage along Jones Creek.

Jones Creek Stormwater Retrofit Project: Untreated stormwater from an older residential area on the south side of Jones Creek flows northward directly into the creek, which flows into the southwest arm of Bayou Chico. This proposed stormwater retrofit project will provide new stormwater treatment to remove pollutants from the stormwater flow and reduce pollutant loading to Jones Creek and Bayou Chico.

Jones Creek Educational Boardwalk: Escambia County has constructed over three miles of educational trails and boardwalks along Jones Creek, including the Glynn Key Stormwater Educational Boardwalk and a section of the Jones Creek Educational Boardwalk, which were previously funded by FDEP. This proposed project will continue the construction of the Jones Creek Educational Boardwalk westward to Fairfield Drive to provide a continuous four-mile educational trail and boardwalk for stormwater, wetland, and stream restoration education. Pensacola State College (PSC) has been an active partner in the previous Jones Creek projects, and the college is planning to incorporate this proposed educational boardwalk as part of the fitness trail for their health and wellness program.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:

☑ This proposal is for a structural BMP project. Pollutant load reductions calculated with Spreadsheet Tool for Estimating Pollutant Load (STEPL 2007)

☐ This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and: (check one)

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

☐ 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:

BMP #1 Pond #1 & Sewer		TSS lbs/yr	TP lbs/yr	TN lbs/yr	Sediment lbs/yr	BOD lbs/yr	Other	Other
Pollutant Loads	Pre-Project	765.8	120.0	25.4	2185	460.6		
	Post-Project	191.4	61.3	5.8	920	88.0		
	Load Reduction	574.3	58.7	19.6	1265	372.6		
	% Reduction	75.00%	48.92%	77.26%	57.88%	80.90%		
BMP #2 Pond #2 & Sewer		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other**	**Other**
Pollutant Loads	Pre-Project	2416.9	267.1	52.9	6521	1069.4		
	Post-Project	604.2	148.5	14.3	2529	225.1		
	Load Reduction	1812.6	118.6	38.6	3992	844.3		
	% Reduction	75.00%	44.42%	73.01%	61.21%	78.95%		
BMP #3 Pond #3 & Sewer		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other**	**Other**
Pollutant Loads	Pre-Project	1565.5	220.8	44.2	4679	829.1		
	Post-Project	391.4	120.1	11.8	2093	171.0		
	Load Reduction	1174.1	100.7	32.5	2586	658.1		
	% Reduction	75.00%	45.61%	73.38%	55.28%	79.37%		
BMP #4 Pond # 4 & Sewer		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other**	**Other**
Pollutant Loads	Pre-Project	2095.8	320.5	66.4	5546	1231.5		
	Post-Project	523.9	165.9	15.0	2083	236.3		
	Load Reduction	1571.8	154.6	51.4	3463	995.2		
	% Reduction	75.00%	48.24%	77.45%	62.44%	80.81%		
BMP #5 Pond #5 & Sewer		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other**	**Other**
Pollutant Loads	Pre-Project	2176.0	336.7	70.2	5228	1300.0		
	Post-Project	544.0	169.2	14.1	1633	238.1		
	Load Reduction	1632.0	167.5	56.1	3595	1061.9		
	% Reduction	75.00%	49.76%	79.90%	68.77%	81.68%		

TOTAL		TSS lbs/yr	TP lbs/yr	TN lbs/yr	Sediment lbs/yr	BOD lbs/yr	Other	Other
Pollutant Loads	Pre-Project	9019.9	1265.1	259.1	24159	4890.6		
	Post-Project	2255.0	664.9	60.9	9259	958.5		
	Load Reduction	6764.9	600.2	198.2	14900	3932.1		
	% Reduction	75.00%	47.44%	76.49%	61.68%	80.40%		

EMCS USED IN MODEL:

Estimated event mean concentrations (EMCs) used to quantify pre-project pollutant loads were based on the mean runoff characteristics summarized in table 4-17 of the FDEP report *Evaluation of Current Stormwater Design Criteria within the State of Florida* (Harper and Baker 2007). Estimated performance efficiencies of stormwater management systems were based on mean pollutant removal efficiencies summarized in table 5-2 of the same report.

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.: 14 days

TASKS and DELIVERABLES:

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Water Quality Scientist	*2080*	*$15.00*	*30%*	*2080 X $15 X .30 = $9,360*	*$31,200 + $9,360 = $40,560*
TOTAL					*$40,560*

TASK NUMBER: 1
TASK NAME: Project Design and Permitting
TASK DESCRIPTION: Escambia County will design and permit the proposed projects. Project design will maximize the water quality benefits to be achieved.
DELIVERABLE: Copies of project design and permits

TASK NUMBER: 2
TASK NAME: BMP Construction and Education
TASK DESCRIPTION: The BMP Projects will be constructed according to design and permits. This project will provide new stormwater treatment for over 200 acres of an older, mainly residential area that currently has no stormwater treatment. Untreated stormwater currently flows into Jones Creek and Bayou Chico, which are both 303(d) listed waterbodies with TMDLs and a BMAP. Five wet stormwater ponds will be constructed in a treatment train so that untreated stormwater flows into the westernmost pond and then progresses through the remaining four ponds until it exits from the easternmost pond. The littoral shelf of each wet pond will be vegetated with native vegetation appropriate for the hydroperiod zone. The educational component of this project includes the construction of an addition to the existing Jones Creek Educational Boardwalk. This proposed project will continue construction of the existing boardwalk (pile supported wooden structure) westward to Fairfield Drive to provide a continuous four-mile educational trail and boardwalk for stormwater, wetland, and stream restoration education. Appropriate educational signage will be placed along the boardwalk. Pensacola State College has been an active partner in the previous Jones Creek projects, and the college is planning to incorporate this proposed educational boardwalk as part of the fitness trail for their health and wellness program.
DELIVERABLE: Photographs of stages of construction

TASK NUMBER: 3
TASK NAME: Monitoring
TASK DESCRIPTION: Escambia County will complete and submit to the Department a Quality Assurance Project Plan (QAPP) for monitoring prior to commencement of any monitoring. The monitoring plan will specify the sampling locations, sampling instruments, and parameters to be sampled. The parameters shall include: Total Nitrogen (lbs/yr), Total Phosphorus (lbs/yr), Total Suspended Solids (lbs/yr), Cadmium, Chromium, Copper, Zinc, Nitrate/Nitrite, Total Kjeldahl Nitrogen, Orthophosphate, oil/grease, Fecal coliform, rainfall and flow. Monitored events shall include 7 – 10 discrete rain events, generally greater than 0.20 inches and less than 1.5 inches. Monitoring is to be performed at inflow and outflow locations of each BMP installed and in accordance with the approved QAPP. Sampling locations shall be recorded and verified using a GPS device. Project-specific details must be added during QAPP development.
DELIVERABLE: Draft QAPP; Approved QAPP; Monitoring results

TASK NUMBER: 4
TASK NAME: Final Report
TASK DESCRIPTION: Escambia County will complete and submit to the Department a Final Report. The Final

Report is intended to capture the outcome and results of the selected project, including all tasks included in this project. This shall include why a BMP did not obtain *or* exceeded the expected removal efficiency; any problems encountered and how those problems were overcome; an explanation of any project delays; a brief summary of any additional phases yet to be completed; and more. The Final Report template, available from the Department's contract manager, will be followed as much as possible.
DELIVERABLE: Draft final report; approved final report

TIMELINE:

Task No.	Task Title	Start	Complete
1	Project Design and Permitting	Month 1	Month 6
2	BMP Construction	Month 7	Month 19
3	Monitoring	Month 20	Month 29
4	Final Report	Month 30	Month 33

PROJECT BUDGET BY CATEGORY AND TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1	Salaries	$5,000	--	--
	Fringe Benefits	$1,500	--	--
	Travel	--	--	--
	Contractual	--	--	--
	Equipment Purchases	--	--	--
	Supplies/Other Expenses	--	--	--
	Land	--	--	--
	Indirect	--	--	--
	TOTAL FOR TASK	$6,500	--	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
2	Salaries	--	--	--
	Fringe Benefits	--	--	--
	Travel	--	--	--
	Contractual	$715,000	$1,900,000	ECUA, LOST
	Equipment Purchases	--	--	--
	Supplies/Other Expenses	--	--	--
	Land	--	--	--
	Indirect	--	--	--
	TOTAL FOR TASK	$715,000	$1,900,000	

Task No.	Category	Grant Funding	Match Funding	Match Source
3	Salaries	$21,200	--	--
	Fringe Benefits	$6,360	--	--
	Travel	--	--	--
	Contractual	--	--	--
	Equipment Purchases	--	--	--
	Supplies/Other Expenses	--	--	--
	Land	--	--	--
	Indirect	--	--	--
	TOTAL FOR TASK	$27,560		
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
4	Salaries	$5,000	--	--
	Fringe Benefits	$1,500	--	--
	Travel	--	--	--
	Contractual	--	--	--
	Equipment Purchases	--	--	--
	Supplies/Other Expenses	--	--	--
	Land	--	--	--
	Indirect	--	--	--
	TOTAL FOR TASK	$6,500	$	
Total:		$755,560	$1,900,000	
Total Project Cost:		$2,655,560		
Percentage Match:		28.5%	71.5%	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	$31,200	--	--
Fringe Benefits Total	$9,360	--	--
Travel Total	--	--	--
Contractual Total	$715,000	$1,900,000	ECUA, LOST
Equipment Purchases Total	--	--	--
Supplies/Other Expenses Total	--	--	--
Land Total	--	--	--
Indirect Total	--	--	--
Total:	$755,560	$1,900,000	
Total Project Cost:	$2,655,560		
Percentage Match:	28.5%	71.5%	

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: ☑ No: ☐ If no, explain:

- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  Yes: ☑ No: ☐ If yes, explain: Project design will incorporate treatment train concept by routing stormwater through additional BMPs to provide discharge into proposed stormwater ponds. Design will also evaluate potential to move stormwater through multiple ponds prior to discharge.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  Yes: ☑ No: ☐ If yes, state the monthly fee: Escambia County Local Option Sales Tax (L.O.S.T.) generates approximately 30 million dollars per year.

- Is the project located in or does it benefit any of the following areas:

  ☑ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one? Escambia County Enterprise Zone, Community Redevelopment Area

  ☑ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.
  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.
  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements.
  Yes: ☑ No: ☐ Yes, with exceptions: ☐

REFERENCES CITED:

Harper, Harvey H., Ph.D., P.E. and David M. Baker, P.E. (2007). "Evaluation of Current Stormwater Design Criteria within the Sate of Florida." Final Report.

The following are included as attachments to this application:

☑ Monitoring Plan

☑ Site Maps

  ☑ Regional site locator map showing the project site relative to the surrounding area
  ☑ 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
  ☑ A detailed site map showing the conceptual elements of your proposed project

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

Attachment 1 – Stormwater Treatment Effectiveness Monitoring Plan

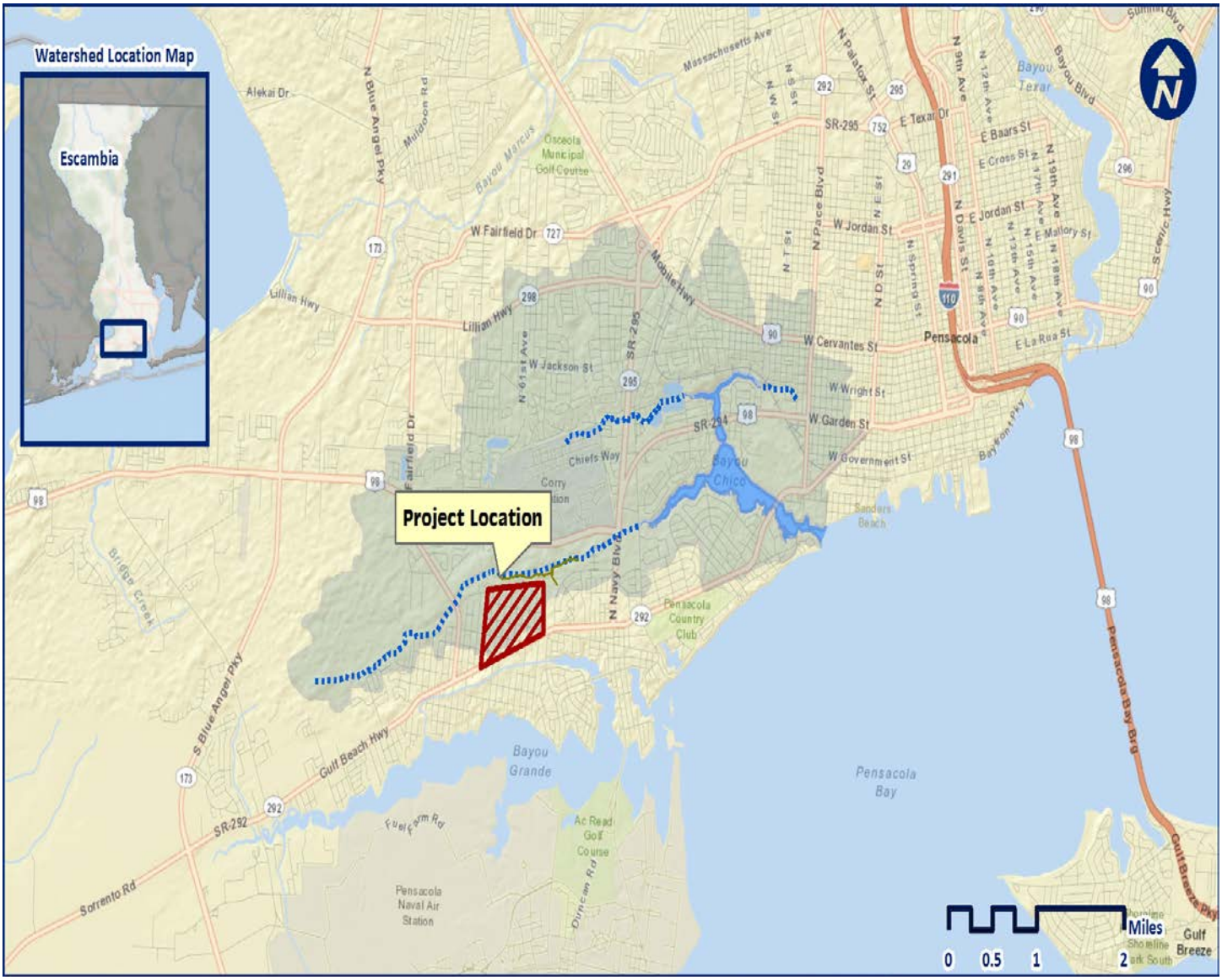
This Project Monitoring Plan is designed to evaluate the stormwater treatment effectiveness of the constructed BMP. Stormwater samples from seven qualifying rainfall events will be collected at the inflow and outflow monitoring stations. Qualifying rainfall events will be generally greater than 0.20 inches and less than 1.5 inches. Sampling frequency is directly related to the frequency of qualifying rainfall events, but will be separated by a minimum of 24 hours. The water quality and flow rates at the inflow and outflow locations of the BMP will be monitored. Removal efficiencies will be calculated based on the comparison of water quality data collected from the inflow and outflow locations.

Parameters to be monitored:

Parameter	**Detection Limits**	**Collection Method**
Total Cadmium	1 ug/L	Flow Weighted Composite
Total Chromium	5 ug/L	Flow Weighted Composite
Total Copper	5 ug/L	Flow Weighted Composite
Total Zinc	10 ug/ L	Flow Weighted Composite
NOx	100 ug/L	Flow Weighted Composite
TKN	300 ug/L	Flow Weighted Composite
Total Nitrogen	50 ug/L	Flow Weighted Composite
Total Phosphorus	50 ug/L	Flow Weighted Composite
Ortho-Phosphate	50 ug/L	Grab
Total Suspended Solids	1000 ug/L	Flow Weighted Composite
Oil/Grease	1000 ug/L	Flow Weighted Composite
Fecal Coliform	1 CFU/ 100 mL	Grab

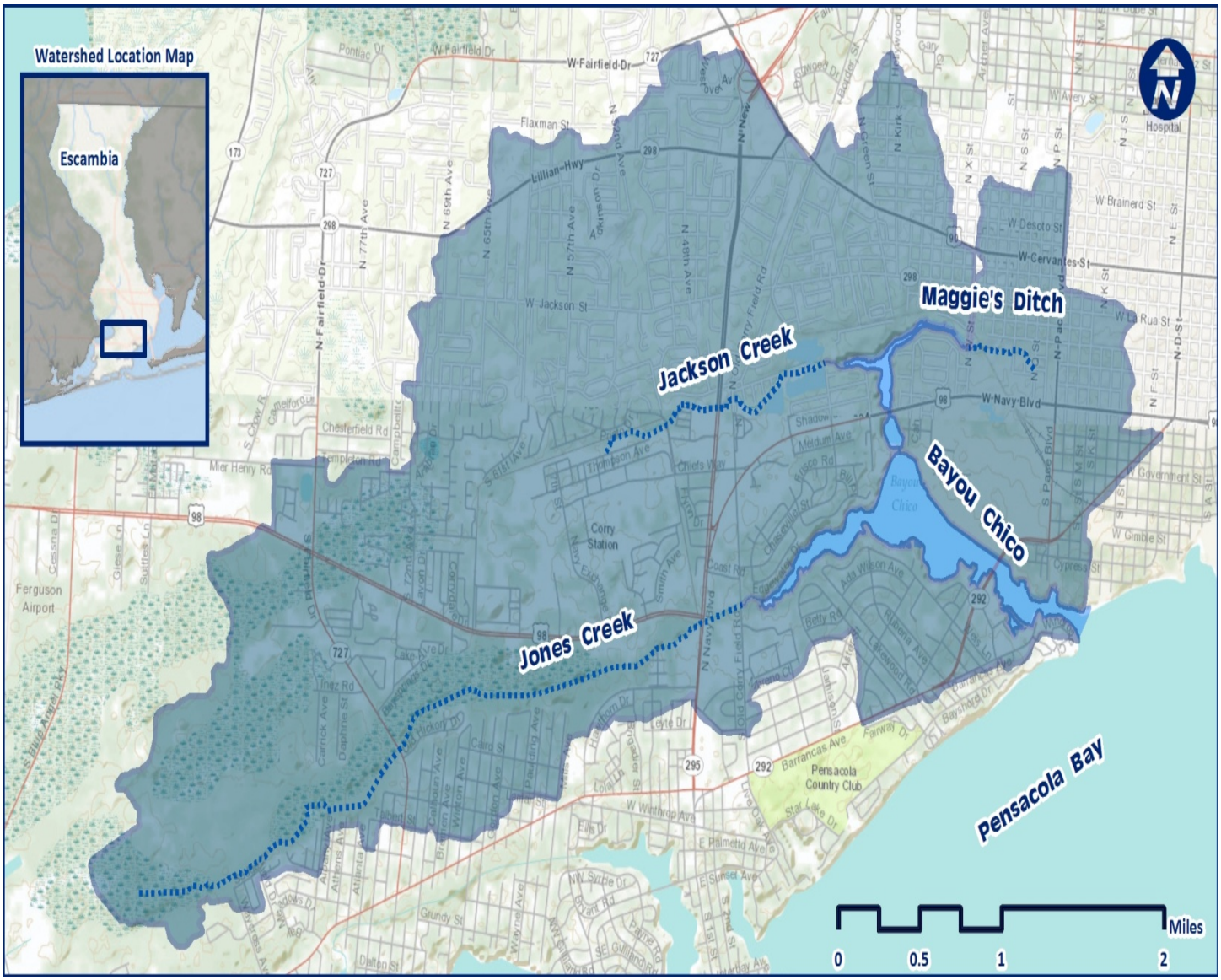
Project will also monitor rainfall and flow in addition to laboratory parameters listed above.

Attachment 2 – Site Maps



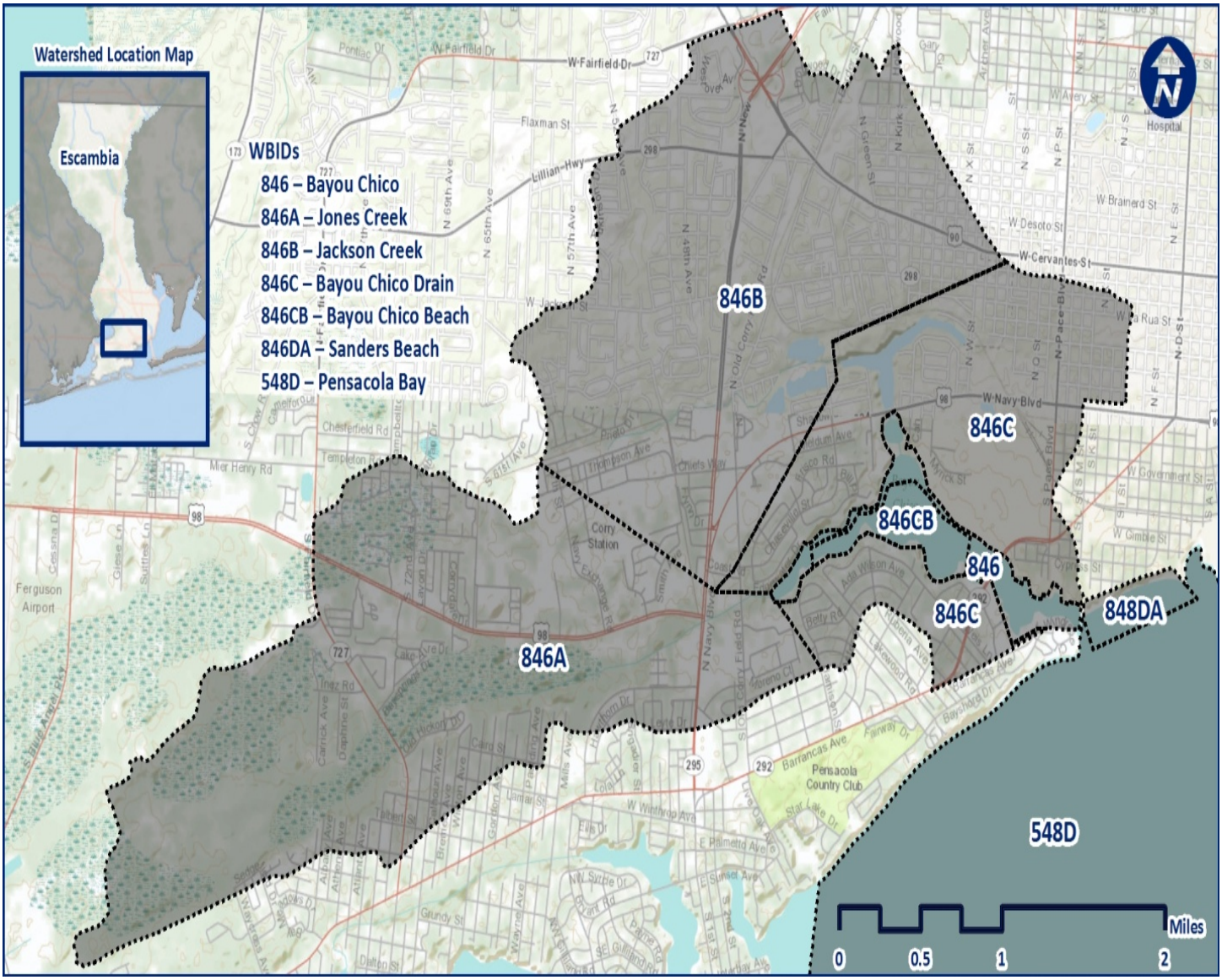
Regional Site Locator Map

Attachment 2 – Site Maps



Bayou Chico Watershed with Tributaries

Attachment 2 – Site Maps

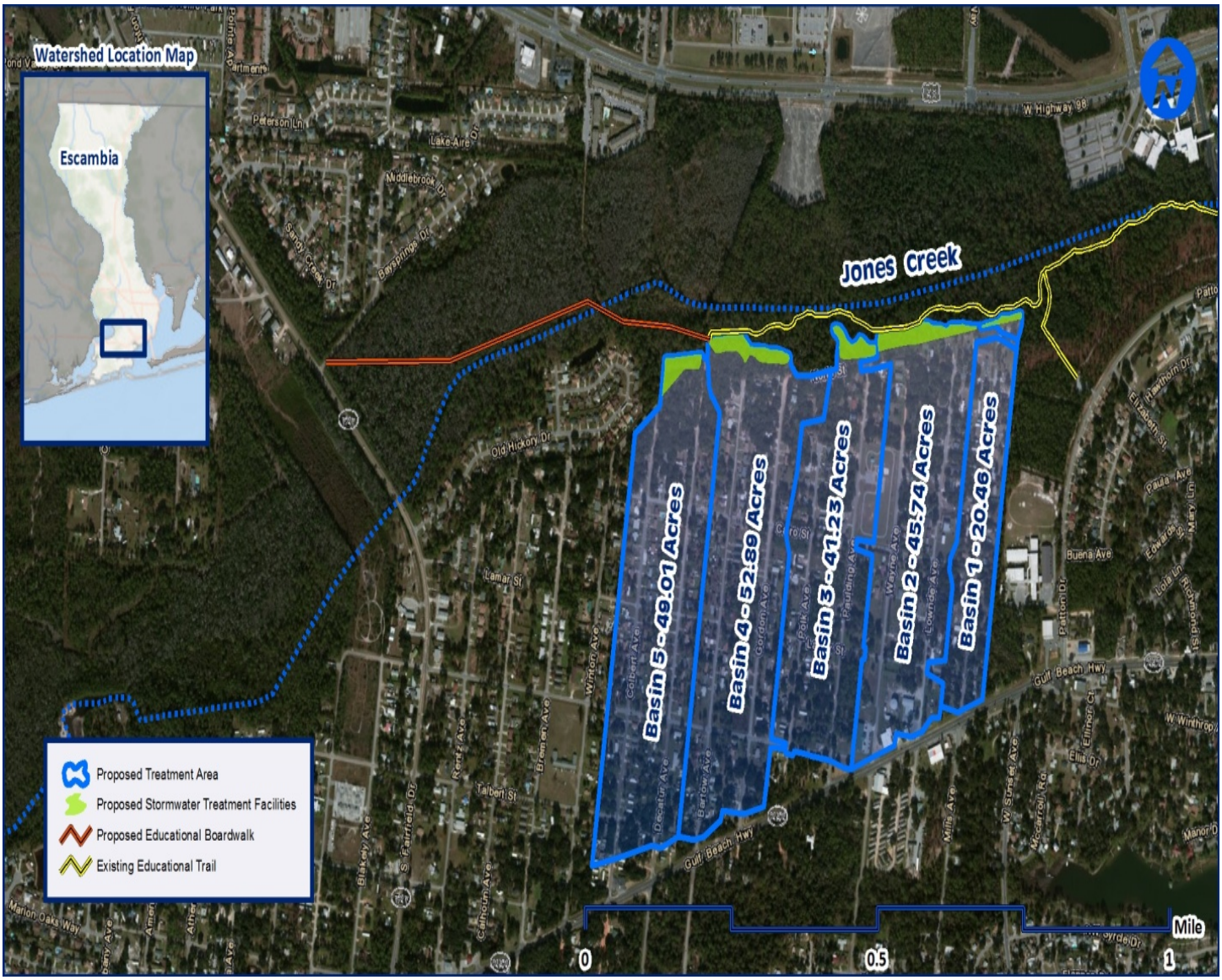


Bayou Chico, Tributaries, and Receiving Waters
By Water Body Identification Numbers (WBIDs)

Attachment 2 – Site Maps

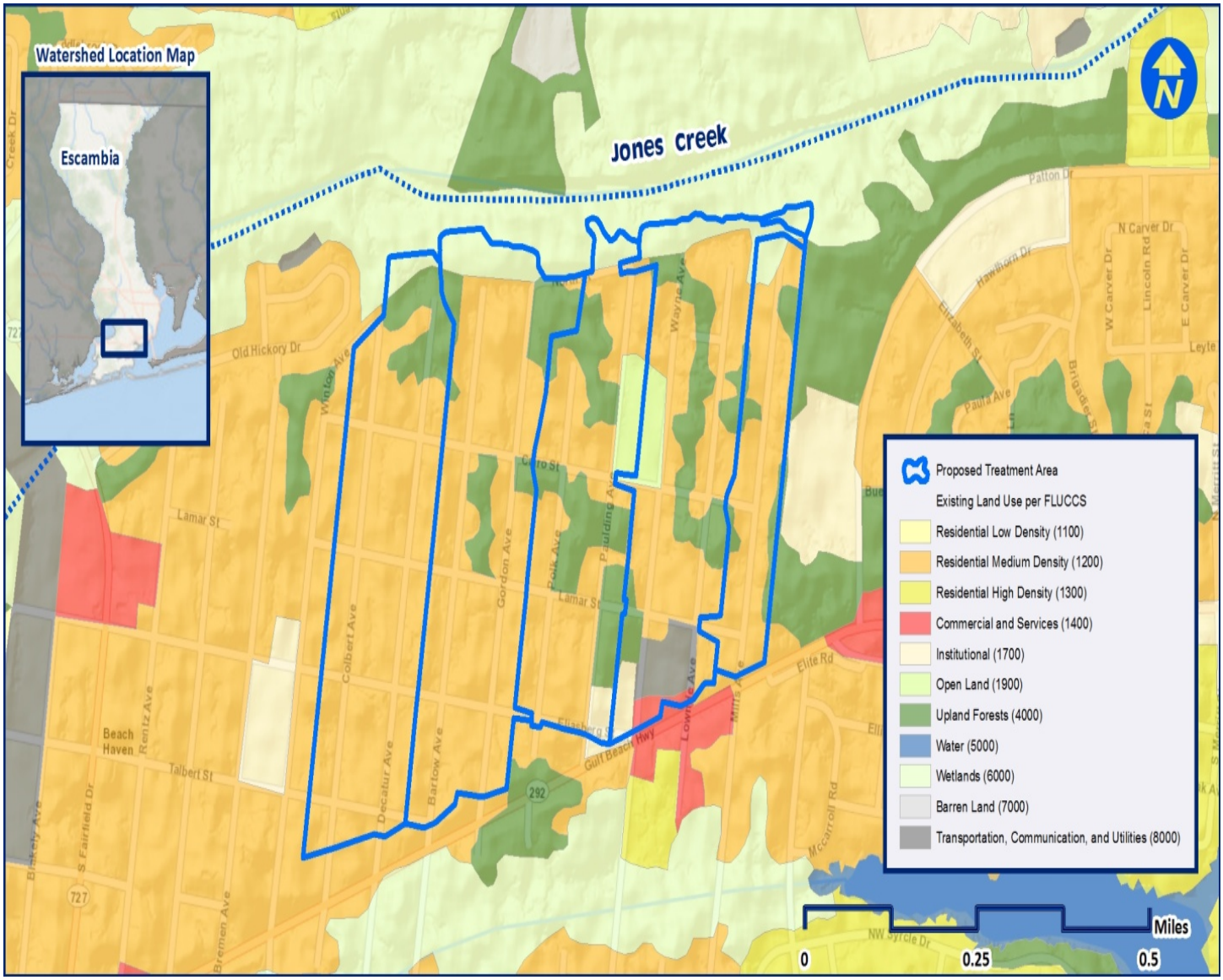
Project Stormwater Treatment Area

Attachment 2 – Site Maps



Detailed Site Map

Attachment 2 – Site Maps



Land Use Category per Florida Land Use and Forms Classification System (FLUCCS)

PROJECT 4

PROJECT NAME: Use of Submerged Aquatic Vegetation as Bio-filters in Field Ditches to Reduce Farm P Load

PROJECT FUNDING REQUEST: $154,647.33 **MATCH:** $111,852.31

LEAD ORGANIZATION: University of Florida – Everglades Research and Education Center.

CONTACT PERSON: DR. TIMOTHY A. LANG (P.I.)
3200. E. Palm Beach Road,
Belle Glade, FL-33430.
Tel: 561-261-2354
Fax: 561-993-1582
Email: talang@ufl.edu

DR. JEHANGIR H. BHADHA (Co-P.I.)
DR. SAMIRA H. DAROUB (Co-P.I.)

FEID NUMBER: 59-6002052
FISCAL YEAR END: JUNE 30, 2013

FINANCIAL COOPERATING PARTNERS:
University of Florida - Everglades Research and Education Center
Sugar Cane Growers Cooperative of Florida
TRU-FLO Pumps, Inc.
Wedgworth Farms, Inc.

OTHER COOPERING PARTNERS:

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Belle Glade, Palm Beach County
Impacted Watershed Name: Everglades
Size of Project Impact: 700,000 acres
Size of Area Being Treated: 1280 acres
Latitude: 26.7686
Longitude: -80.5062
Hydrologic Unit Code: 032023101033
WBID: 3238
Impaired waterbodies affected: 3252, 3265, and 3268 (Water Conservation Area 1, Water Conservation Area 2, and the Everglades)
Impairment: High phosphorus loads and concentrations.
TMDL Status: TMDL under development.
BMAP Status: No BMAP for the area.

Land Uses within the area being treated:

Land Use *(Do not alter – All must be filled out; Do not add categories; place a 0 for no acres)*	**Acres**	**%**
Residential Low Density (1100)	0	0
Residential Medium Density (1200)	100,000	2
Residential High Density (1300)	0	0
Commercial and Services (1400)	0	0
Industrial (1500)	0	0
Extractive (1600)	0	0
Institutional (1700)	0	0
Recreational (1800)	0	0
Open Land (1900)	0	0
Agriculture (2000)	450,000	74
Upland Non-Forested (3000)	0	0
Upland Forests (4000)	0	0
Water (5000)	0	0
Wetlands (6000)	150,000	24
Barren Land (7000)	0	0
Transportation, Communication, and Utilities (8000)	0	0
Land Use Totals (Acreage and %)	**700,000**	**100**

LAND OWNERSHIP STATUS: (check one)

- ☑ Land necessary for the construction of treatment infrastructure has been acquired. Title is held by Wedgworth Farms Inc.
- ☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase).
- ☐ Land necessary for the construction of treatment infrastructure is under an easement which allows for the construction and access.

WATERSHED MANAGEMENT PLAN: Everglades Surface Water Improvement and Management Plan (Everglades SWIM Plan), Everglades Comprehensive Everglades Restoration Plan (Everglades CERP).

PROJECT OVERVIEW: The Florida Everglades is the largest subtropical wetland in the United States, covering nearly two million acres. Over the past five decades the ecological integrity of the Everglades has been affected by hydrologic and nutrient imbalances due to urban and agricultural development. Reducing the P load from the EAA (Everglades Agricultural Area) basin is crucial for restoring the Everglades ecosystem.

The EAA has highly productive agricultural land comprised of rich organic soils. Sugarcane, vegetables, sod, and rice are grown in the EAA and annually provide south Florida with jobs and over one billion dollars to Florida's economy (FDACS, 2004). Waters from Lake Okeechobee to the north are released into the EAA basin for irrigation. Lake Okeechobee waters are also conveyed through the EAA basin to supply water to the Everglades Protection Area (WCAs and Everglades National Park). Discharges from the EAA have been identified as contributors to the P enrichment of the Everglades (Sievers et al., 2003).

Concerns regarding the impact of elevated P concentration waters on the fauna and the flora of the Everglades Protection Area prompted the state of Florida to enact the EFA (Everglades Forever Act) in 1994. The EFA mandated that the South Florida Water Management District (SFWMD) create and administer the Everglades Regulatory Program. This regulatory program enables the SFWMD to promulgate Chapter 40E-63, F.A.C., which details the scope of the Everglades Regulatory Program for the EAA basin. In this rule the SFWMD describes the procedures for the BMP program which include: i) enforcing implementation of BMPs, ii) conducting a water quality monitoring program, iii) tracking area-wide P loads, and iv) developing a mandatory BMP research program for P and other water quality parameters of concern.

The EAA basin as a whole is required by the EFA to achieve P load reductions of 25% or greater relative to a baseline P load average (derived from 1979 to 1988 monitoring data). Since January 1, 1995, BMP implementation has been mandatory for all farms that discharge drainage water into SFWMD conveyance canals. The SFWMD monitors EAA basin P loads via a network of monitoring stations, i.e. pump stations and structures that border the EAA. During the seventeen years since BMP program initiation, the EAA basin's annual P load reduction has averaged 54%. Implementing BMPs in the EAA demands additional costs which are born by the growers. The costs are derived from more intensive water management, sediment control practices, farm drainage water monitoring, specialized nutrient application equipment, training of personnel, possible reductions in yields, etc. The on-farm BMP costs are recovered partially by a reduction in Agricultural Privilege taxes that result from exceeding the 25% basin-wide, P load reductions. Agricultural tax credits have accumulated from EAA basin P load reductions, allowing for the minimum tax rate to be collected until the year 2016, unless the credits are utilized as a result of non-compliance (SFWMD, 2007).

Despite the success of the BMP program in the EAA, high P concentrations and loads still exit many farms. This occurs despite the fact that every grower in the EAA implements similar sets of BMPs. Further reductions in farm P loads are achievable by targeting particulate P generation and transport in the farm canals to reduce P in farm drainage water. Particulate P comprises 40-60% of the P loads exiting EAA farms (Stuck, 1996, Daroub et al., 2011). Related studies have concluded that the major portion of the particulate P in EAA farm canals originates from in-canal biological growth rather than from soil erosion (Stuck, 1996; Izuno and Rice, 1999, and Daroub et al., 2005). Particulate P that contributes significantly to farm P export has been determined to be, for the most part, recently deposited biological material such as settled plankton, algae, and macrophyte detritus. The canal system of the EAA, which supplies farms with irrigation water from Lake Okeechobee and conveys farm runoff southward to the WCAs (Water Conservation Area), contains an abundance of both floating and submerged aquatic vegetation (FAV and SAV). The role of SAV in the removal of P from agricultural runoff has been investigated in the past, and proven to be successful in the STAs (Gu et al., 2001; Dierberg et al., 2002; Knight et al., 2003). There are over twelve sediment control practices in the SFWMD's approved EAA BMP table from which EAA farmers can choose to implement on their farms (SFWMD, 2008). One of the sediment control practices is the control of FAV growth in farm canals. However this practice is seldom claimed on BMP permits because of the inadequate scientific knowledge regarding its efficacy and implementation methods.

A promising innovative treatment technology that has not yet been evaluated within the EAA is the treatment train approach that utilizes SAV in conjunction with the Ca-saturated surface waters to remove P from the water column. The removal of P is accomplished by plant uptake as well as by adsorption to (or co-precipitation with) calcium carbonate, which precipitates from the water column during high pH fluctuations. As part of this demonstration study, *Chara* along with *filamentous algae* will be introduced in farm ditches, and the flow of water through the ditches will be controlled using solar-powered, battery operated pumps. *Chara* is a genus of algae in the family Characeae. They are found in fresh water, particularly in limestone areas, where they grow submerged, attached to the muddy bottom. They are native to Florida and are most suited to shallow, hard water, typical of farm canal waters in the EAA.

The goal of this project is to demonstrate that EAA on-farm P load reduction can be achieved through the use of solar-powered water pumps that circulate farm canal water through SAV-seeded field ditches at optimum flows that provide sufficient residence time for P removal. In addition to uptake by aquatic vegetation, P removal from farm canal waters will occur via P co-precipitation with calcium carbonate. The presence of limestone caprock beneath the EAA fields and canals provides Ca-saturated surface waters that can co-precipitate P from the water column with calcium carbonate during photosynthesis-induced pH elevations. We also anticipate a drop in dissolved organic carbon (DOC) concentration as part of the treatment demonstration. This is due to the fact that the SAV will fix a portion of the DOC as it establishes its growth; in addition to high photolytic activity associated with shallow ditch water (Gu et al., 2001).

Monitoring plan to determine BMP effectiveness

The monitoring plan for this study will be divided into three main components: water, vegetation, and sediment. The water quality monitoring plan will entail both, grab water and composite drainage water samples. Grab water samples will be collected from inflow and outflow locations within the monitored ditches every month after the start date of

the study, while composite drainage water will be collected using auto-samplers during selected drainage events. A minimum of 30 inter-event field ditch water samples and 20 farm drainage events will be sampled over the entire course of this demonstration. The water samples will be tested for nine parameters, including pH, total suspended solids (TSS), total P (TP), particulate P (PP), total dissolved P (TDP), soluble reactive P (SRP), dissolved organic P (DOP), DOC, and Ca concentration. In addition to water quality, water quantity will be measured by monitoring water levels in the field ditches and calculating the flows from weirs placed at the outflow of each monitored field ditch. To ensure proper growth of the SAV in the ditches, FAV will be chemically controlled by spot spraying using approved labeled herbicides. SAV coverage will be recorded every month, while SAV plant samples will be collected every six months for TP biomass estimates. The sediment monitoring plan will include collecting sediment cores from the six monitored field ditches every six-months after the start date of the study. Three sediment cores will be collected from each field ditch, and will be tested for at least five parameters, including moisture content, wet bulk density, dry bulk density, TP, loss on ignition (LOI) and ash content.

This demonstration project contains an advanced monitoring program that will quantify changes in sediment P and organic matter accretion, canal water P concentration and speciation, SAV removal of P from farm ditch waters and farm P load. In addition to reducing farm P loads, this technology also has the potential to entrain TSS by the SAV. Results from this study will be valuable to further reduce the export of TSS and P loads off-farm. The reduction in TP, PP, DOC concentrations and TSS in farm drainage waters will be key indicators of project success.

Assessment of SAV-seeded field ditches

The assessment of six field ditches (four treatment and two control) will be evaluated based on the monitoring data that will be collected throughout the duration of this project. For example, over time the TP and organic matter content of the sediments collected from the treatment ditches should be relatively higher than the control ditches. This would suggest that P from the canal water is being captured by the SAV in the treatment ditches. Once the SAV are properly established in the ditches we anticipate the TSS concentration in the treatment canals to be lower than that of the controls. There are two key components that will be of utmost importance in demonstrating the success of this study. One of the keys to success will be optimization of the hydraulic retention time (HRT) of water in contact with the plant and the limerock. For example, Gu et al. (2002) showed that increasing the HRT form 1.5 days to 3.5 days markedly improved the P removal performance, yet doubling the HRT from 3.5 to 7 days had little additional effect on the mesocosm study consisting *Ceratophyllum demersum* and *Najas guadalupensis*. In addition to HRT, water depth also plays a critical role in achieving P load reductions. Gu et al., (2002) suggests that the 0.4 m depth mesocosms performed better than 0.8 and 1.2 m systems. They concluded that submerged aquatic vegetation will provide effective P removal over the depth range of 0.4 to 1.2 m. Our goal will be to retain the water in the ditches for up to 4 days, at a depth between 1.2 and 0.4 m.

Grower involvement and education program

The University of Florida's Institute of Food and Agricultural Science Everglades Research and Education Center (UF/IFAS/EREC) in Belle Glade has a long history in providing essential extension and outreach activities on BMPs to growers in the EAA. Our BMP seminars and workshops are conducted twice annually and have a goal of serving both as a refresher course for growers in the EAA and for educating growers on new techniques and research advances. These workshops are well attended with over 120 participants in each workshop. An example of recent BMP workshop and training seminars can be viewed at http://erec.ifas.ufl.edu/research/index_soil_and_water.shtml. The BMP trainers are experts on the South Florida ecosystem, and have included personnel from UF/IFAS extension, USDA, SFWMD and growers. In addition to BMP workshops, EREC personnel with the water quality group consult individually with interested growers and assist them in specific on-farm issues dealing with water quality and BMPs. We have an excellent rapport with all growers in the EAA including the major companies as well as individual growers (part of the sugarcane cooperative). We are situated in the heart of the EAA and we have an open door policy with all growers in the area.

An undertaking of this magnitude would not be possible without the support and commitment from local growers. We have secured support for this demonstration project from the Sugar Cane Growers Cooperative (SCGC) of Florida, Wedgworth Farms Inc., and TRU-FLO Pumps Inc. Wedgworth Farms has committed to providing land for the demonstration in addition to matching funds to conduct the study.

One of our objectives is to provide education to the growers by presenting the demonstration results to local growers via regularly scheduled biannual BMP workshops. Based on the last five years' of BMP workshop experience, we anticipate over 200 attendees per year for the workshops. Training surveys will be provided to attendees to evaluate the effectiveness of the training materials and provide suggestions to improve future workshops. In addition to the workshops, we will also provide a hands-on field day demonstration to growers, so they can apply a similar treatment technology on their farms.

Demonstration project rationale

Currently within the EAA, there is a BMP program in place that is funded by the growers. In WY2012, the TP load reduction was 71% corresponding to a flow weighted mean TP concentration of 93 ppb exiting the EAA (SFER, 2013) which testifies to the program's success. However, while P load reductions have exceeded the 25% load reduction target, additional P load reductions at the farm level will greatly assist the STAs (Stormwater Treatment Areas) in meeting the 10 ppb P outflow threshold limit. As part of an ongoing BMP research program in the EAA, eight farms within the S-5A and S6 sub-basins are currently being monitored to evaluate the effect of FAV within their main farm canals on farm P load. The proposed demonstration project follows this research effort that targets the development of a BMP for main farm canal management (FAV research project). The proposed demonstration project is the logical progression in the on-farm treatment train, which begins by managing farm main canals to reduce farm P load by controlling FAV and particulate P generation and transport, and continues by circulating farm canal waters through SAV-seeded field ditches to provide additional P load reduction.

Demonstration project objectives

The specific objectives of this project are to:

1. Demonstrate that SAV-seeded field ditches can successfully remove and capture P from farm canal using solar-powered pumps and flow control structures.
2. Assess the potential farm P load, dissolved organic carbon, and TSS reductions achievable by implementing the SAV-seeded field ditch technology on-farm, i.e., circulation of farm canal waters through field ditches containing one or more SAV species as bio-filters.
3. Provide EAA growers with an additional BMP based on SAV-seeded field ditch technology that can be added to the list of existing BMPs for the EAA.
4. Educate EAA growers, extension personnel, and water managers on the demonstration results via field days, workshops, extension publications, and online web pages.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: (check one)

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

☑ This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and: (check one)

☐ Estimated Pollutant Load Reductions were able to be estimated by using the following methodology:
☑ 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 demonstration project will circulate farm canal waters through four SAV-seeded field ditches that will be maintained at or near optimum water depths for P removal by SAV and P co-precipitation with calcium carbonate. The flow rate through the field ditches will be adjusted to maximize P removal rates (g P m^{-2} $week^{-1}$). The adjustment to flow rate will be made after analyzing multiple daily inflow and outflow P concentrations and correlating TP capture to flow rate (retention time). Using P removal rates from SAV lysimeter studies (Dierburg et al., 2002; Gu et al., 2002) we estimate that between 2-6 g P m^{-2} $year^{-1}$ may be

sequestered in field ditch treatment train. The water surface area of one field ditch is 1962 m^2; this area is able to remove between 8 and 34 lbs of P per year, depending on flow and P removal rates. If six field ditches are seeded with SAV under treatment flow the total P removal for the six field ditches could range between 50 to 200 lbs of P per year. We will measure annually the total amount of P captured/stored in the SAV and sediments in the treatment field ditches and determine the P load reduction from the P captured in the field ditch treatment trains.

The cooperator farm site for this demonstration project since 2006 has averaged an annual P load of approximately 800 lbs of P per year. If six treatment field ditches operate at maximum removal efficiency then a P load reduction of 25% would be achieved; at the minimal P removal efficiency a 6% P load reduction would be observed.

Reduction in TSS will be estimated as a percent reduction between the inflow water into the ditch versus the outflow water. Based on observed data collected as part of our ongoing research we estimate TSS concentration flowing in the ditches to be between 1.8-4.0 mg L^{-1}. The volume of water contained in a field ditch is estimated to be 1.2 million L. The volume of water flowing through the ditches will depend on the residence time. An average of TSS reduction for all four treatment ditches will be used to estimate a farm-wide TSS reduction.

BMPs Installed		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
BMP #1								
Pollutant Loads	Pre-Project	20,000	800	-	-	-		
	Post-Project	12,000	600	-	-	-		
	Load Reduction	8,000	200	-	-	-		
	% Reduction	40	25	-	-	-		
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project	20,000	800	-	-	-		
	Post-Project	12,000	600	-	-	-		
	Load Reduction	8,000	200	-	-	-		
	% Reduction	40	25	-	-	-		

EMCS USED IN MODEL: Pre-project pollutant P load is calculated from farm drainage water monitoring data submitted by the cooperator farm to the SFWMD for the previous six years (2006-2011). Pre-project the average farm drainage water TP concentration was 0.150 mg P L^{-1}, which corresponds to an average farm P load of 800 lbs of P per year. Post-project average annual farm drainage water TP concentration is estimated to be 0.113 mg P L^{-1}, which corresponds to an annual farm P load of 600 lbs per year (25% reduction in P load).

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.:
We will be assessing optimum residence time for field ditch flows using inflow and outflow TP concentrations as indicators of optimum residence time. Currently a residence time of four days has been utilized in the calculations for P removal. We will assess residence times of shorter duration (3, 2, and 1 days retention) to observe if similar P load reductions will occur at shorter retention times, thus increasing total P load capture per field ditch.

TASKS and DELIVERABLES

TASK NUMBER: 1
TASK NAME: Site preparation
TASK DESCRIPTION:
A step-by-step protocol will be followed to ensure proper site preparation. The first step will be the removal of aquatic vegetation and sediment from the four treatment and the two control field ditches. This is to ensure that any accretion of new sediment, and plant biomass is a function of the experimental treatment. The cleaning of field ditches will be provided by Wedgworth Farms as part of the cost-sharing contract. Next, we will install solar powered water pump stations at the inflows of the four treatment field ditches. Installation of solar panels at each station will ensure that the batteries get charged daily to generate sufficient power to run the pumps. A proto-type of this setup has been successfully tested in the field. This will be followed by installing water level control structures and level monitoring equipment in each of the four treatment field ditches. Sugarcane Growers Cooperative of Florida will provide equipment enclosures and gates for flow control in field ditches. TRU-FLO engineers will be assisting with the design of the electric water pumps and that will be used to push water through the field ditches. The purpose of the water control structures is to ensure that the water in the treatment ditches is maintained within the optimum range of water depths.

Finally, we will establish submerged aquatic vegetation in the four treatment ditches. *Chara* will be introduced in two ditches using seed plants obtained from an STA and/or from nearby farm canals, while *Lyngbya wollei* (filamentous algae species) from nearby farm canals will be introduced in the other two field ditches. *Filamentous algae* is the predominant SAV that is found in the farm ditches and canals presently. Removal of P in field ditches by both SAV species will provide a good comparison for the two most probable and successful SAV species in the area. The two control ditches will operate under the present conditions without any flow control or introduction of SAV. The steps listed above will be conducted jointly by a field technician, excavator operator, professional engineer, an agronomist and a soil scientist.

DELIVERABLES:

1. Two treatment field ditches that have been cleaned of sediment and aquatic vegetation and seeded with the SAV species, *Chara.* Two treatment field ditches that have been cleaned of sediment and aquatic vegetation and seeded with *Lyngbya wollei*. Two control field ditches that have been cleaned of sediment and aquatic vegetation.
2. Four treatment field ditches equipped with solar water pumps and water level controls to provide optimum flows and water levels that will allow the maximization of P removal via SAV uptake and P co-precipitation with $CaCO_3$.

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Agronomist, PhD	160	38.3	0.263	$1,611.66	$7,739.66
Wetlands Biogeochemist, PhD	160	35	0.263	$1,472.80	$7,072.80
Field Technician	320	15	0.046	$220.80	$5,020.80
Soil Scientist, PhD	40	55	0.263	$578.60	$2,778.60
Engineer, PE	40	50	0.263	$526.00	$2,526.00
TOTAL				$4,409.86	$25,137.86

Travel: We anticipate traveling a total of 1600 miles using three vehicles at a rate of $0.44 per mile.
Contractual: Wedgworth Farms Inc., will provide field ditch cleaning services and pump installation excavations.
Equipment: DC electric water pumps, solar panels, 12 V batteries, PVC pipes, data loggers, water level transducers, relays, radio telemetry system.
Supplies/Other Expenses: equipment enclosures, lumber, hardware, plastic containers for SAV transport.
Indirect Cost: $5436.24. This is 10% of the direct cost as required by University of Florida.

TASK NUMBER: 2
TASK NAME: Water quality monitoring
TASK DESCRIPTION:
A completed quality assurance project plan (QAPP) will be drafted and submitted to FDEP to monitoring commencement. The plan will specify all sampling locations, sampling instruments, methodologies and parameters to be sampled. Sampling locations will be recorded and verified using a GPS device. Project specific details will be added during QAPP development. Following approval of the QAPP, P speciation of water from treatment and control field ditches will be analyzed from samples collected biweekly using grab samples taken from control field ditches and from inflow and outflow transects of treatment ditches. The water quality parameters to be analyzed are pH, TSS, TP, TDP, PP, SRP, DOP, DOC, and Ca.

Analytical Methodology: All water samples will be analyzed using standard EPA methods at the University of Florida's Everglades Research and Education Center's Water Quality Laboratory, a National Environmental Laboratory Accreditation Conference certified laboratory (ID # E76463) for TP, TDP, SRP, and conductivity. For TP and TDP analysis water samples will be digested in the presence of concentrated sulfuric acid, ammonium persulfate using method 365.1 (USEPA, 2003). All SRP samples will be analyzed using ascorbic acid method (Murphy and Riley, 1962), using an automated air segmented continuous flow analyzer, Auto Analyzer 3 (AA3) manufactured by Seal. Samples will be analyzed in a range between 0.00 and 0.50 ppm. Samples with a concentration greater than 0.50 ppm will be diluted to fall in the applicable range. Detailed analytical procedures are contained in the Standard Methods for the Examination of Water and Wastewater (APHA, 1998), and EREC Quality Manual Ver. 7.1. (Josan et al. 2010). For the TSS analysis, a well-mixed water sample (minimum 500 ml, equilibrated to controlled room temperature) will be filtered through a pre-weighted standard glass fiber filter and the residue retained on the filter was dried to a constant weight at 105°C. The increase in weight of the filter was recorded and TSS concentrations were calculated on per liter basis. The practical range of the determination is 1 ppm to 20,000 ppm. The outlined procure is based on method 160.2 (USEPA, 2004) and details of the method are available in EREC Quality Manual Ver. 7.1 (SOP 13 Rev. 3). The total suspended solid will be calculated using the following equation:

$$TSS(mg/L) = \frac{(weightofdryfilter + residue + dish - weightofdryfilter + dish) \times 1000000}{Samplevolume}$$

The pH of the water samples will be determined using a combination glass electrode. The C concentrations will be analyzed using an atomic absorption spectrophotometer. All sample-prep, digestion and analyses will be conducted by chemists, under the supervision of a QA/QC officer.

DELIVERABLES:
1. Draft QAPP
2. Approved QAPP
3. Water quality monitoring results

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Agronomist, PhD	52	38.3	0.263	$523.79	$2,515.39
Wetlands Biogeochemist, PhD	52	35	0.263	$478.66	$2,298.66
Field Technician	416	15	0.046	$287.04	$6,527.04
QAQC officer	52	55	0.263	$752.18	$3,612.18
Senior Chemist	832	24.2	0.333	$6,704.76	$26,839.16
Chemist	416	20	0.333	$2,770.56	$11,090.56
TOTAL				$11,516.99	$52,882.99

Travel: We anticipate 2080 miles of travel to complete Task 2, at a rate of $0.44 per mile.
Equipment: Two grab samplers; six auto-samplers for water collection.
Supplies/Other Expenses: Chemicals/reagents; bottles, vials, and jars.
Indirect Cost: $3755.60. This is 10% of the direct cost as required by University of Florida.

TASK NUMBER: 3
TASK NAME: Assessment of P removal
TASK DESCRIPTION:
An assessment of P removal will be conducted by focusing on the ditch sediments and submerged aquatic vegetation growing in the ditches. Sediment samples will be collected once every six months to evaluate the change in the physico-chemical properties from the four treatment and two control ditches. Intact sediment cores (up to 5 cm depth) will be collected from three locations A, B, C (shown in Attachment 1, A - furthest to the pump, B - middle, and C - furthest away from pump). The sediments will be collected using a piston type, in-house constructed, sediment sampling device. The sediment sampler used polycarbonate tubes of 7.0 cm diameter and 50 cm length. Sample cores will be transported to the laboratory on the same day of collection, sectioned up to 5 cm core lengths, and stored at 4^0C. Sediment sampling locations will be recorded using a hand held GPS device. Sediment properties that will be analyzed are moisture content, ash content, organic matter, TP, wet bulk density and dry bulk density. An overall assessment of FAV will be conducted every two months with the intention of identifying the species composition, coverage within the ditches, and the TP content of the plant biomass. Two representative samples will be collected from each ditch for analysis. Sampling locations within the ditches will be based on spatial coverage. Coverage of aquatic vegetation will be visually logged biweekly.

DELIVERABLES:
1. Assessment of *Chara* and *Filamentous algae* as SAV species for P removal in field ditches; calculate estimates for annual P load capture by field ditch SAV biomass.
2. Assessment of field ditch sediment physico-chemical characteristics; calculate estimates for annual P load capture by field ditch sediments.

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Agronomist, PhD	64	38.3	0.263	$644.67	$3,095.87
Wetlands Biogeochemist, PhD	64	35	0.263	$589.12	$2,829.12
Field Technician	128	15	0.046	$88.32	$2,008.32
QAQC officer	64	55	0.263	$925.76	$4,445.76
Senior Chemist	160	24.2	0.333	$1,289.38	$5,161.38
Chemist	320	20	0.333	$2,131.20	$8,531.20
TOTAL				$5,668.44	$26,071.64

Travel: We anticipate 640 miles of travel at a rate of $0.44 per mile.
Equipment: Sediment core tubes, vegetation sampling containers.
Supplies/Other Expenses: Laboratory chemicals and supplies.
Indirect Cost: $1349.10. This is 10% of the direct cost as required by University of Florida.

TASK NUMBER: 4
TASK NAME: Demonstration results education and outreach
TASK DESCRIPTION:
We are proposing various extension and outreach measures to extend the knowledge achieved from this demonstration project. We anticipate a lot of interest in this potential new BMP as it will be a low cost, farm specific and allows for reduction in P concentrations that are not achievable using other BMPs. We will target sugarcane as well as vegetable growers in the whole EAA basin with specific emphasis on the S5A and S6 basins. The proposed extension and outreach tasks include:

1) Produce a fact sheet to explain the proposed BMP, rationale, results of the demonstration trial illustrating potential P concentration and load reduction. The fact sheet will also demonstrate how to implement this BMP on growers' farm with technical details on use and maintenance of solar pumps and maintenance of the SAV. The fact sheet will be published online on the UF/IFAS extension website http://edis.ifas.ufl.edu/
2) Conduct two field days at the demonstration farm for growers, water managers and agricultural extension personnel to explain the design, implementation of this BMP, potential P reduction and cost involved.
3) Expand the biannual BMP workshop training to include information and monitoring data illustrating potential reductions in P concentration in drainage water before it is moved off farm. The workshops will include detailed presentations on how to implement the BMP with expert speakers on pumps (TRU-FLO engineer) as well as UF IFAS specialist on aquatic weeds.
4) Develop a website page on the EREC website describing in detail the demonstration trial methods, results and how to implement. We will include the presentations from the BMP training on this page.

In addition to the various extension and outreach activities, it will be important to evaluate the impact of this demonstration project. In the second year of the project, we will have a survey distributed during the BMP training to assess the interest of growers in implementing this BMP and obstacles for implementation (for example cost and personnel). The impact will be assessed during the 30 months of the project duration as well as after the project has ended. During the life of the project, the impact will be measured by number of attendees in both field days and BMP workshops. After the project has ended, we will follow up with growers who have implemented the new BMP. We envision analyzing data from all or a subset of farms that have implemented this BMP and analyze the on farm data to validate P load reductions.

DELIVERABLES:

1. Two field days for growers, water managers, and agricultural extension personnel held at the demonstration farm site: one field day held in year 1 and one field day held in year 2.
2. Four BMP workshops to demonstrate the methodology and results. Workshops will be held in April and September of each of the first two years of the project. Workshops will be held in conjunction with regular BMP workshops conducted by UF/IFAS personnel.
3. One electronic fact sheet describing the demonstration methodology, rationale, and results published online.
4. One website page on the EREC website describing in detail the demonstration and its results.

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Agronomist, PhD	64	38.3	0.263	$644.67	$3,095.87
Wetlands Biogeochemist, PhD	64	35	0.263	$589.12	$2,829.12
Soil Scientist, PhD	64	55	0.263	$925.76	$4,445.76
Engineer, PE	32	50	0.263	$420.80	$2,020.80
TOTAL				$2,580.35	$12,391.55

Travel: We anticipate 320 miles of travel at a rate of $0.44 per mile.
Supplies/Other Expenses: Printed handouts, posters, pens, paper, etc.
Indirect Cost: $713.28. This is 10% of the direct cost as required by University of Florida.

TASK NUMBER: 5
TASK NAME: Final report
TASK DESCRIPTION:
The final report will include a detailed description of the demonstration along with the outcomes and results. All tasks and deliverables will be clearly outlined in this final report. A discussion section will be included which will elaborate on the demonstrations successes and or limitations. The report will also include recommendations for future undertakings. The report structure will follow that proposed by the FDEP contract manager.

DELIVERABLES:
1. Draft final report
2. Approved final report

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Agronomist, PhD	80	38.3	0.263	$805.83	$3,869.83
Biogeochemist, PhD	80	35	0.263	$736.40	$3,536.40
Soil Scientist, PhD	40	55	0.263	$578.60	$2,778.60
Engineer, PE	16	50	0.263	$210.40	$1,010.40
TOTAL				$2,331.23	$11,195.23

Travel: We anticipate $50.00 in travel expense.
Supplies/Other Expenses: Printing costs.
Indirect Cost: $761.76. This is 10% of the direct cost as required by University of Florida.

TIMELINE:

Task No.	**Task Title** *(should match identically above)*	**Start**	**Complete**
1	Site preparation	Month 1	Month 3
2	Water quality monitoring	Month 4	Month 28
3	Assessment of P removal	Month 10	Month 28
4	Demonstration results education and outreach	Month 10	Month 28
5	Final Report	Month 26	Month 30

PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1	Salaries	$16,528.00	$4,200.00	TRU-FLO, UF/IFAS
	Fringe Benefits	$3,305.26	$1,104.60	TRU-FLO, UF/IFAS
	Travel	$2,112.00	$0.00	
	Contractual	$0.00	$6,000.00	Wedgworth
	Equipment Purchases	$29,400.00	$6,000.00	SCGC
	Supplies/Other Expenses	$3,200.00	$0.00	
	Land	$0.00	$0.00	
	Indirect	$5,454.53	$530.46	Compiled
	Unrecovered Indirect	$0.00	$652.97	UF/IFAS
	TOTAL FOR TASK	$59,999.79	$18,488.03	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
2	Salaries	$10,051.60	$31,314.40	UF/IFAS
	Fringe Benefits	$1,289.49	$10,227.50	UF/IFAS
	Travel	$915.20	$0.00	
	Contractual	$0.00	$0.00	
	Equipment Purchases	$8,500.00	$0.00	
	Supplies/Other Expenses	$32,200.00	$0.00	
	Land	$0.00	$0.00	
	Indirect	$5,295.63	$4,154.19	Compiled
	Unrecovered Indirect	$0.00	$9,762.35	UF/IFAS
	TOTAL FOR TASK	$58,251.92	$55,458.43	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
3	Salaries	$6,611.20	$13,792.00	UF/IFAS
	Fringe Benefits	$1,322.11	$4,346.34	UF/IFAS
	Travel	$281.60	$0.00	
	Contractual	$0.00	$0.00	
	Equipment Purchases	$2,500.00	$0.00	
	Supplies/Other Expenses	$4,800.00	$0.00	
	Land	$0.00	$0.00	
	Indirect	$1,551.49	$1,813.83	Compiled
	Unrecovered Indirect	$0.00	$4,262.51	UF/IFAS
	TOTAL FOR TASK	$17,066.40	$24,214.68	

Task No.	Category	Grant Funding	Match Funding	Match Source
4	Salaries	$4,691.20	$5,120.00	TRU-FLO, UF/IFAS
	Fringe Benefits	$1,233.79	$1,346.56	TRU-FLO, UF/IFAS
	Travel	$140.80	$0.00	
	Contractual	$0.00	$0.00	
	Equipment Purchases	$0.00	$0.00	
	Supplies/Other Expenses	$2,000.00	$0.00	
	Land	$0.00	$0.00	
	Indirect	$806.58	$646.66	Compiled
	Unrecovered Indirect	$0.00	$1,519.64	
	TOTAL FOR TASK	$8,872.36	$8,632.86	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
5	Salaries	$5,864.00	$3,000.00	TRU-FLO, UF/IFAS
	Fringe Benefits	$1,542.23	$789.00	TRU-FLO, UF/IFAS
	Travel	$100.00	$0.00	
	Contractual	$0.00	$0.00	
	Equipment Purchases	$0.00	$0.00	
	Supplies/Other Expenses	$2,000.00	$0.00	
	Land	$0.00	$0.00	
	Indirect	$950.62	$378.90	Compiled
	Unrecovered Indirect	$0.00	$890.42	
	TOTAL FOR TASK	$10,456.86	$5,058.32	
	Total:	$154,647.33	$111,852.31	
	Total Project Cost:		$266,499.64	
	Percentage Match:	58.03%	41.97%	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	$43,746.00	$57,426.40	UF/IFAS, TRU-FLO
Fringe Benefits Total	$8,692.88	$17,813.99	UF/IFAS, TRU-FLO
Travel Total	$3,549.60	$0.00	
Contractual Total	$0.00	$6,000.00	Wedgworth Farms, Inc.
Equipment Purchases Total	$40,400.00	$6,000.00	SCGC
Supplies/Other Expenses Total	$44,200.00	$0.00	
Land Total	$0.00	$0.00	
Indirect Total	$14,058.85	$7,524.04	UF/IFAS
Unrecovered Indirect Total	$0.00	$17,087.88	UF/IFAS
Total:	$154,647.33	$111,852.31	
Total Project Cost:	$266,499.64		
Percentage Match:	58.03%	41.97%	

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: X No: ☐ If no, explain:

- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  Yes: X No: ☐ If yes, explain:
  This project will utilize innovative technology as it progressively builds on developing a BMP to reduce P loads from farms canals within the EAA. The project is designed to follow a treatment train of events that will include recirculating of farm canal water through the ditches. The ditches will act like STA cells that will contain Chara and Filamentous algae which will behave as bio-filters, helping to progressively reduce phosphorus, carbon and suspended solids as water flows through it. Water, sediment and vegetation will be periodically monitored to track the overall reduction.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  Yes: X No: ☐ If yes, state the monthly fee:
  $25/Acre Privilege Tax; $5/Acre EAA-EPD Fee.

- Is the project located in or does it benefit any of the following areas:

  ☐ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one?
  ☐ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.
  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.

- ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- ◈ The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements. Yes: X No: ☐ Yes, with exceptions: ☐

REFERENCES CITED:

Daroub, S.H., T.A. Lang, M.S. Josan, and J.H. Bhadha. 2011. Implementation and Verification of BMPs for Reducing P Loading from the Everglades Agricultural Area: Floating Aquatic Vegetation Impact on Farm Phosphorus Load. Annual Report submitted to the Everglades Agricultural Area Environmental Protection District and the South Florida Water Management District.

Daroub, S.H., T.A. Lang, O.A. Diaz, M. Chen, and J.D. Stuck. 2005. Everglades Agricultural Area BMPs for reducing particulate phosphorus transport. Final Project Report submitted to the Everglades Agricultural Area Environmental Protection District and The Florida Department of Environmental Protection. Everglades Research and Education Center, Institute of Food and Agricultural Sciences, University of Florida. June 2005.

Dierberg, F.E., T.A. DeBusk, S.D. Jackson, M.J. Chimney, and K.C. Pietro. 2002. Submerged aquatic vegetation-based treatment wetlands for removing phosphorus from agricultural runoff: response to hydraulic and nutrient loading. Water Research. 36: 1409-1422.

Florida Department of Agriculture and Consumer Services. 2004. Florida Agriculture Statistical Directory. State of Florida, Tallahassee.

Gu, B., T.A. DeBusk, F.E. Dierberg, M.J. Chimney, K.C. Pietro, and T. Aziz. 2001. Phosphorus removal from the Everglades agricultural area runoff by submerged aquatic vegetation/limerock treatment technology: an overview of research. Water Science and Technology. 44: 101-108.

Izuno, F.T. and R.W. Rice. 1999. Implementation and verification of BMPs for reducing P loading in the EAA. Final Project Report submitted to the Florida Department of Environmental Protection and the Everglades Agricultural Area Environmental Protection District, Tallahassee, FL.

Josan M.S., S. Daroub., T.A. Lang, and M. Chen. 2010. Quality Manual Ver. 7.1. Soil and Water Quality Laboratory, Everglades Research and Education Center, University of Florida.

Knight, R.L., B. Gu, R.A. Clarke, J.M. Newman. 2003. Long-term phosphorus removal in Florida aquatic systems dominated by submerged aquatic vegetation. Ecological Engineering. 20: 45-63.

Sievers, P., D. Pescatore, S. Daroub, J.D. Stuck, J. Vega, P. McGinnes, and S. Van Horn. 2003. Chapter 3. Performance and optimization of agricultural best management practices. In: 2003 Everglades Consolidated Report, Water Year 2002, South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2007. South Florida Environmental Report. South Florida Water Management District, West Palm Beach, FL.

Stuck, J.D. 1996. Particulate phosphorus transport in the water conveyance systems of the Everglades Agricultural Area. Ph.D. dissertation submitted to the University of Florida Department of Agricultural and Biological Engineering, Gainesville, Fla.

Stuck, J.D., F.T. Izuno, K.L. Campbell, A.B. Bottcher, and R.W. Rice. 2001. Farm-level studies of particulate phosphorus transport in the Everglades Agricultural Area. Transactions of the ASAE. 44: 1105-1116.

South Florida Environmental Report (Draft). 2013. Chapter 4. Nutrient Source Control Programs. Edited by William Baker, Jonathan Madden and Pamela Wade.

The following are included as attachments to this application:

☐ Monitoring Plan: Attachment

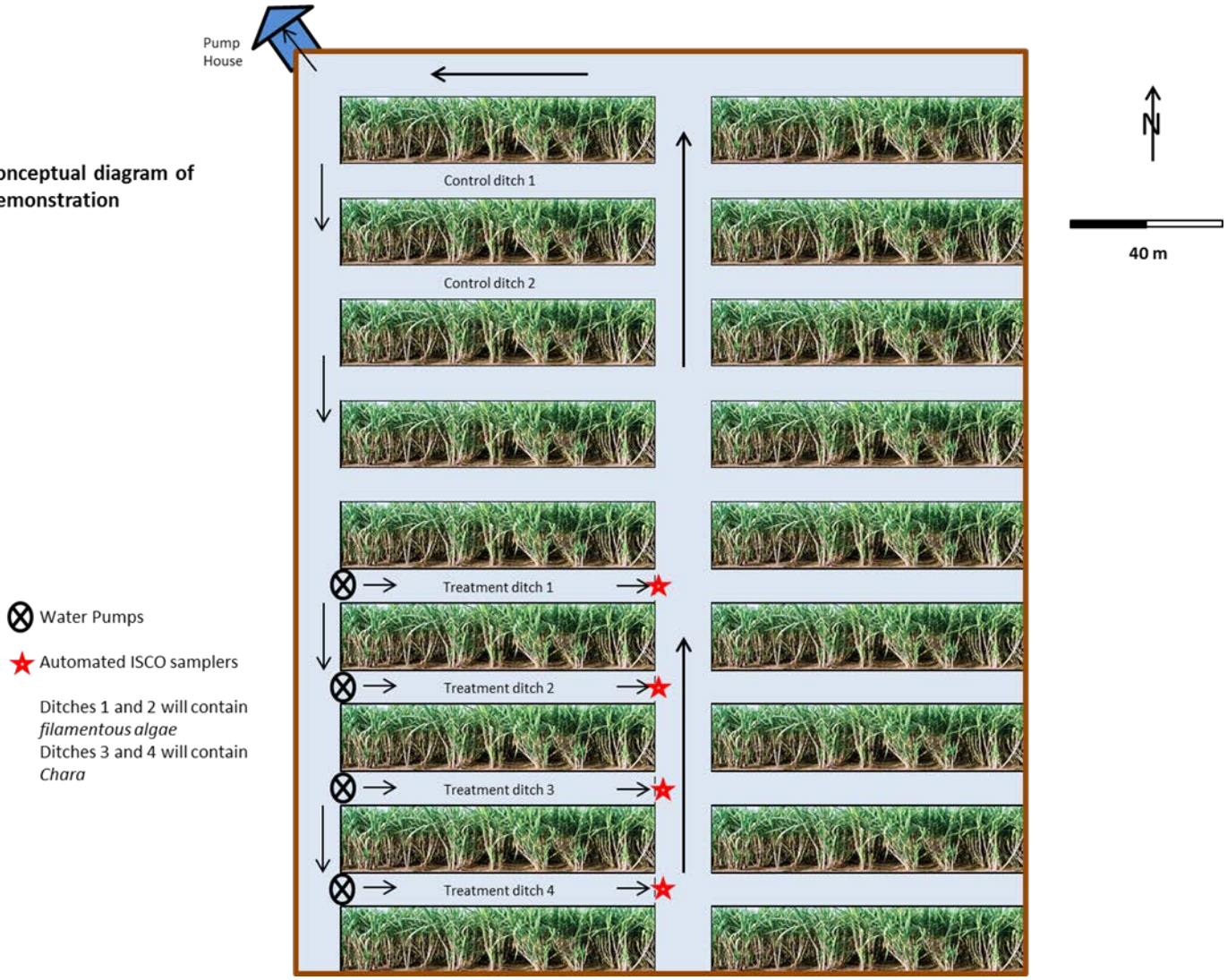
☐ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)). Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- ☐ Regional site locator map showing the project site relative to the surrounding area: Attachment
- ☐ 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
- ☑ A detailed site map showing the conceptual elements of your proposed project: Attachment 1

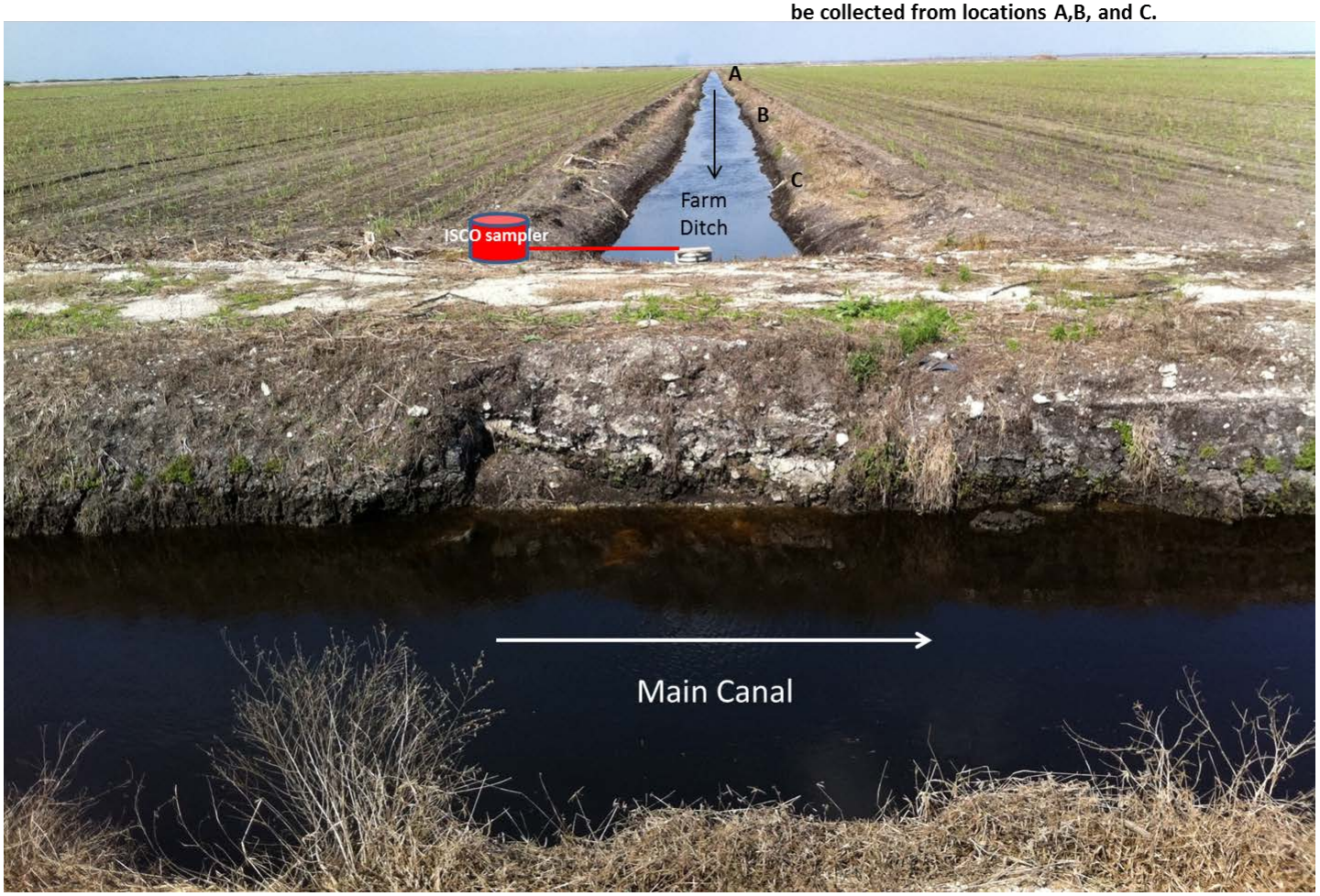
☐ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.: Attachment 2

Attachment1

Conceptual diagram of demonstration



Sediment cores and grab water samples will be collected from locations A,B, and C.



Attachment 2

BETTER PUMPS, BETTER SERVICE, BEST VALUE

TRU-FLO CORPORATION
924 NW 13TH STREET
PO BOX 248
BELLE GLADE, FLORIDA 33430
TELS (561) 996-5850 (561) 996-3082
FAX (561) 996-0782

May 14, 2013

Lee Marchman, P.E., Administrator
Florida Department of Environmental Protection
Bob Martinez Center
2600 Blairstone Road
Tallahassee, FL 32399-2400

Reference: Proposal titled "Use of submerged aquatic vegetation as bio-filters in field ditches to reduce farm P load" submitted by Dr. Timothy Lang, University of Florida, Everglades Research and Education Center, submitted to the FDEP 319 Grant program for FY14.

Dear Sir,
This is to acknowledge that TRU-FLO CORPORATION agrees to commit to cost sharing of the above referenced proposal. The cost sharing is to be provided through technical consulting services necessary to complete Tasks 1, 4, and 5 of the project proposal. The projected cost share is $6,115. TRU-FLO CORPORATION is committed to collaborating fully and effectively on this project.

Sincerely,

Julio Sanchez
President
PH 561-996-5850
Fax 561-996-0782
jsanchez@truflopumps.com

GLADES SUGAR HOUSE

Sugar Cane Growers Cooperative of Florida

POST OFFICE BOX 666 BELLE GLADE, FLORIDA

33430-0666

May 15, 2013

Lee Marchman, P.E., Administrator
Florida Department of Environmental Protection
Bob Martinez Center
2600 Blairstone Road
Tallahassee, FL 32399-2400

Reference: FDEP 319 Grant program for FY14 proposal titled "Use of submerged aquatic vegetation as bio-filters in field ditches to reduce farm P load" submitted by Dr. Timothy Lang, University of Florida, Everglades Research and Education Center.

Dear Mr. Marchman,

I am pleased to submit this Letter of Support on behalf of the Sugar Cane Growers Cooperative (SCGC) of Florida for UF/IFAS at the Everglades Research and Education Center to pursue the FDEP 319(h) Grant proposal titled "Use of submerged aquatic vegetation as bio-filters in field ditches to reduce farm P load". I am aware that the Water Resources team at the Everglades Research and Education Center are proposing to demonstrate the feasibility of reducing farm P loads by using submerged aquatic vegetation as bio-filters in EAA farm field ditches. I believe this study is a worthy undertaking that it will scientifically target some of the water quality and management issues we face in practicing sustainable farming.

SCGC is an agricultural cooperative that harvests and delivers sugarcane to our milling facility to be processed into raw sugar then marketed on behalf of our 47 member/growers. SCGC has agreed to provide technical and logistical assistance for the demonstration in the form of constructing metal enclosures for solar pumps and flow control structures for field ditches. The support is as a cost-share agreement and is estimated to amount to $6000. Please contact me at jmshine@scgc.org or (561) 996-4744 if you have any questions. Thank you for your consideration of their research proposal.

Sincerely,

James M. Shine, Jr.
Vice President – Agriculture Division

elephone 561-996-4744 www.scgc.org Fax No. 561-996-3360

FDEP Section 319 Agricultural Cooperator Letter of Commitment

I, **Stewart Stein**, the undersigned, do hereby agree to cooperate fully with the Florida Department of Environmental Protection (FDEP), the Florida Department of Agriculture and Consumer Services, and other state, local, or federal agencies, including State universities, in the agricultural best management practices (BMPs) demonstration and evaluation project entitled "**Use of submerged aquatic vegetation as bio-filters in field ditches to reduce farm P load**". This project will be funded in part by a Nonpoint Source Management Grant administered by the Florida Department of Environmental Protection in accordance with Section 319(h) of the federal Clean Water Act. I have read the proposed scope of work entitled "**Use of submerged aquatic vegetation as bio-filters in field ditches to reduce farm P load** " (dated May 14, 2013) and commit to undertake a role in this project.

Specifically, I understand and agree to the following:

- The project will occur over several years; it is my intent to continue to conduct my agricultural operations on the farm area covered under this project, in accordance to the above-referenced Scope of Work, throughout this entire project period, which shall last no less than **30 months** from the date of the contract.
- BMPs will be installed on portions of my agricultural land and monitored for their effectiveness in removing pollutants.
- Unless otherwise outlined in the Scope of Work, I will follow the fertilization and irrigation rates and timing recommended by UF-IFAS, which can be found at Everglades Research and Education Center, for my farm area covered under this project.
- I understand that all data collected as part of this project is public record and may be freely disseminated by FDEP or EPA. Persons may request a disclosure exemption in accordance with Chapter 119, Florida Statutes and/or 40 CFR Part 2 for private financial information or Trade Secrets, which may or may not be granted. Request for exemption should be made prior to contract execution. Information required to describe, justify, or explain BMP effectiveness or financial feasibility of the practice shall not be considered for exemption.
- I will fully comply with the above-referenced proposed Scope of Work submitted to the FDEP for the farm area covered under this project.

Owner, Lessee, or other responsible party

Signed this 22nd day of May 2013 in Palm Beach County, Florida.

PROJECT 5

PROJECT NAME: Draa Field Stormwater Park

PROJECT FUNDING REQUEST: $388,825 **MATCH:** $521,547

LEAD ORGANIZATION: City of Titusville, Water Resources Department

CONTACT PERSON: Sean Stauffer, P.E., Water Resources Director
2836 Garden Street
Titusville, FL 32796
Tel: 321-383-5650
Fax: 321-383-5653
Email: Sean.Stauffer@titusville.com

FEID NUMBER: 59-6000440
FISCAL YEAR END: SEPTEMBER 30, 2013

FINANCIAL COOPERATING PARTNERS: City of Titusville, Rails-to-Trails Conservancy

OTHER COOPERING PARTNERS: Rails-to-Trails

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:
Geographic Location: Titusville, Florida.
Impacted Watershed Name: North Indian River Lagoon (IRL)
Size of Project Impact: The project area will consist of a four (4) acre wet detention pond that will treat 89 acres of residential stormwater runoff.
Size of Area Being Treated: The project will treat an 89 acre upstream watershed
Latitude: 28.6187
Longitude: 80.820447
Hydrologic Unit Code: HUC8-0380202
WBID: 2963EA
Impaired waterbody affected: 2963EA
Impairment: The North Indian River Lagoon (IRL) above NASA Causeway is classified as a Class III waterbody, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The North IRL is impaired by nutrients, specifically total nitrogen (TN) and total phosphorus (TP), which have adversely impacted water quality. This has resulted in decreased coverage of seagrass in the IRL, particularly in deeper water areas where seagrass historically grew.
Total Maximum Daily Load (TMDL) Status: Nutrient TMDLs were adopted for the Indian River above NASA causeway in 2009.
Basin Management Action Plan (BMAP) Status: The North Indian River Lagoon BMAP was adopted in February, 2013, and focuses on implementation of the TN and TP TMDLs to achieve the seagrass median depth limit targets.

Land Uses within the area being treated:

Land Use	Acres	%
Residential Low Density (1100)	6.56	6.15
Residential Medium Density (1200)	68.55	64.23
Residential High Density (1300)	0.25	0.23
Commercial and Services (1400)	3.29	3.08
Industrial (1500)	0	0
Extractive (1600)	0	0
Institutional (1700)	0	0
Recreational (1800)	8.97	8.41
Open Land (1900)	0	0
Agriculture (2000)	0.12	0.11
Upland Non-Forested (3000)	0	0
Upland Forests (4000)	2.59	2.43
Water (5000)	0	0
Wetlands (6000)	0	0
Barren Land (7000)	0	0
Transportation, Communication, and Utilities (8000)	16.39	15.36
Land Use Totals (Acreage and %)	**106.72**	**100**

LAND OWNERSHIP STATUS:

☑ Land necessary for the construction of treatment infrastructure has been acquired. Title is held by City of Titusville.

☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase).

☐ Land necessary for the construction of treatment infrastructure is under an easement which allows for the construction and access.

WATERSHED MANAGEMENT PLAN: Three watershed management plans have been developed for this project area: (1) The North Indian River Lagoon BMAP (2013) which addresses the implementation of the nutrient TMDLs for this part of the IRL; (2) The City of Titusville Area 2 Watershed Flooding and Water Quality Improvement Project (Post, Buckley, Schuh & Jernigan, 1998) which evaluated existing stormwater systems within Area 2 and developed conceptual alternatives to minimize flooding and improve quality of stormwater discharges to the Indian River Lagoon; and (3) The Preliminary Engineering Report for the Draa Field Stormwater Park (Environmental Consulting & Technology, 2011) which focuses on the Marina Basin within the Area 2 Watershed in Titusville and the preliminary design of the proposed stormwater treatment system.

PROJECT OVERVIEW:

Over the last several years, the City of Titusville has undertaken a number of stormwater retrofit projects to reduce pollution to the Indian River Lagoon and to reduce flooding in key areas of the City. The City is divided into eight major drainage basins which are prioritized for action to reduce flooding and improve water quality discharges to the Indian River Lagoon. The City is systematically developing watershed management plans for each of the basins and is constructing stormwater retrofit projects within each basin. Areas 1 through 4 drain into the Indian River Lagoon. Construction of the major retrofit projects in Area 1 (in the northernmost area of the City) were completed in 2010 and two of three major projects have been completed in Area 2. Construction of the Draa Field Stormwater Park will complete the implementation of the Area 2 Master Plan. Planning and implementation of Areas 3 and 4 are scheduled to begin in FY 2014.

The IRL is identified in the Surface Water Improvement and Management (SWIM) Act as being in need of restoration and special protection. It has also been verified as an impaired waterbody by the EPA. Total Maximum Daily Loads have been established for nitrogen and phosphorus for the Lagoon, and a Basin Management Action Plan (BMAP) for implementation of the TMDLs was adopted by the Florida Department of Environmental Protection (FDEP) in

February, 2013. The City of Titusville has supported implementation of the BMAP and has assigned the highest priority for retrofit projects that drain to the IRL. The Draa Field Stormwater Park project was granted provisional credit in the North IRL BMAP for compliance toward meeting the City's allocation of nitrogen and phosphorus for the first five-year cycle of the BMAP. Construction of the project is required for the City to comply with the required BMAP reductions.

The Draa Field project will provide a net water quality benefit to the IRL and reduce flooding within the Area 2 basin. The Stormwater system is designed to provide removal efficiencies that help meet TMDL requirements for the IRL. The project includes water quality modeling to ensure that these goals are met. A hydrological and hydraulic study was undertaken to evaluate various pond designs and their effectiveness in meeting the water quality improvement and flood prevention goals.

According to FDEP estimation, the per-acre TN and TP loadings from the area are 9.3 lbs/ac/yr and 2.0 lbs/ac/yr, respectively. Pollutant loading to the IRL in the study area comes from nonpoint sources driven by rainfall. According to FDEP's TMDL, 24% of TN and 45% of TP need to be reduced to achieve the nonpoint sources TMDL target.

The proposed location for the storm water treatment system is the 7.5 acre Draa Field, which historically was an athletic field utilized by the public schools in Titusville. The City of Titusville acquired the property from the Brevard County School Board in 2008.

The Draa Field Stormwater Park will implement numerous best management practices (BMPs) to improve water quality and reduce flooding in the drainage basin. The project consists of two major components. The first is the construction of a four (4) acre wet detention pond which will include innovative best management practices (BMP's) to remove nitrogen and phosphorus from stormwater before it is discharged to the Indian River Lagoon. The pond will have vegetated littoral zones and will discharge through a forested wetland to provide additional biological water treatment. In addition, the park will offer passive recreation with a multiuse trail, environmental education opportunities, and will serve as a trail head for the Rails-to-Trails pathway that is planned directly adjacent to the site.

This project will yield many benefits to the City of Titusville: (1) It will ensure the City's compliance with the Indian River Lagoon Basin Management Action Plan (BMAP) requirement for reduction of nitrogen and phosphorus discharges to the Indian River Lagoon; (2) Flooding within a residential area within the City's Area 2 drainage basin will be eliminated; (3) The project will serve as a trail head for the recently constructed Rails–to-Trails path directly adjacent to the project; (4) Educational kiosks along the boardwalk will provide information to the public about the necessity to reduce nitrogen and phosphorus to the Indian River Lagoon and the project's role in accomplishing that task; (5) The project will dramatically improve the aesthetics to heavily used entry point to the City by converting an empty field into an visually pleasing and environmentally functional stormwater park, and; (6) Most importantly, the project will help improve the health of the Indian River Lagoon by reducing nutrient loading

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 park has received provisional credit by the FDEP toward attainment of TMDL targets. It is estimated that this project will reduce TN, TP and TSS by 39%, 68% and 85%, respectively. The load reduction estimates and treatment efficiency of the system were developed utilizing the methodology outlined in the 2010 FDEP Draft Applicant Handbook. FDEP provides detailed design criteria which references residence time and pond areas. ECT developed a spreadsheet model for TN and TP removal based on the FDEP criteria. Residence time within a wet detention pond was determined by the relationship between the permanent pool volume and the annual runoff inputs. The TN and TP removal efficiencies were then calculated using methodology detailed in Harper and Baker, 2007.

For the wetland treatment BMP (in series with the wet detention pond), the littoral zone removal efficiencies from the Stormwater Applicants Handbook (FDEP, 2010) were used at 10% removal efficiency for both TN and TP. This

should be a conservative estimate because the treatment train incorporates littoral planting, a forested wetland and a filter marsh, which provide more biological treatment than a typical wet detention pond.

☐ 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:

☐ 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:

BMPs Installed		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
BMP #1								
Pollutant Loads	Pre-Project	12384	122	897				
	Post-Project	1858	39	547				
	Load Reduction	10526	83	350				
	% Reduction	85	68	39				
BMP #2		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project		39	547				
	Post-Project		35	492				
	Load Reduction		4	55				
	% Reduction		10	10				
BMP #3		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project							
	Post-Project							
	Load Reduction							
	% Reduction							

TOTAL		TSS lbs/yr	TP lbs/yr	TN lbs/yr	Sediment lbs/yr	BOD lbs/yr	Other lbs/yr	Other lbs/yr
Pollutant Loads	Pre-Project	12384	122	897				
	Post-Project	1858	35	493				
	Load Reduction	10526	87	404				
	% Reduction	85	71	45				

Environmental Modeling Centers (EMC) USED IN MODEL:
EMCs of TN, TP and TSS from Harper, 1994, along with the FDOT FLUCCS codes were used to calculate the pre-project load. Concentrations used for load calculations were weighted averages of the land use type in the basin. Concentrations of 2.21, 0.3 and 30.5 mg/L^{-1} were used for TN, TP and TSS respectively. Post project loads were calculated using methodology detailed in Harper and Baker, 2007. Based on these concentrations the total pre-project loads for TSS, TP and TN are 12384, 122, and 897 lb/yr respectively. The anticipated post-project loads for TSS, TP and TN are 1858, 35, and 493 lb/yr respectively. This equates to reduction efficiencies of 85%, 71% and 45% for TSS, TP and TN respectively

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.:
Residence time within a wet detention pond was determined by the relationship between the permanent pool volume and the annual runoff inputs. Based on this relationship the residence time of the wet detention pond in the wet season was determined to be 33 days.

TASKS and DELIVERABLES:

TASK NUMBER: 1
TASK NAME: Draa Field Stormwater Park Construction
TASK DESCRIPTION
Design and permitting of the Draa Field Stormwater Park is currently contracted to Environmental Consulting and Technology, Inc. (ECT), the Stormwater Utility's continuing services consultant. Task 1 is the construction of the wet detention pond. The BMP's to remove nitrogen and phosphorus that will be built into the pond include a retention time of 45 days, floating wetlands, pond aeration, a vegetated littoral zone around the entire pond, a forested wetland just prior to discharge, and a permeable weir constructed of sorptive material which will consist of a media that promotes both the adsorption of phosphorus and de-nitrification of nitrogen. The construction of a multiuse trail around the pond, pervious parking spaces, landscaping, and educational kiosks are also included in Task 1. Construction will be performed by a qualified and licensed firm selected through the City's competitive bid process.

The educational kiosk will be erected along the walking trail at the site. The kiosk will provide information about the project including the watershed, receiving waters (Indian River Lagoon), nonpoint source pollution associated with stormwater, and pollution prevention measures being implemented by the City and recommended non-structural BMPs for residents to implement. Also, stormwater inlets within the Draa Field watershed will be marked to heighten public awareness regarding discharge of pollutants to the lagoon. The City will also provide a summary of the project and its benefits to the lagoon and community in the City's annual newsletter.

The salaries listed in the table below represent matching funds/resources provided by the City of Titusville for this task.

Position	Estimated Maximum Hours	Hourly Rate	Fringe Benefit (%)	Estimated Max. Total Fringe per position	Estimated Max. Total per position
Stormwater Utility Administrator	160	30.29	0.33	$1,599	$6,445
Project Manager	400	20.44	0.38	$3,107	$11,283
TOTAL	560			$4,706	$17,728

DELIVERABLE: an as-built survey and an as-built certification of the constructed project.

TASK NUMBER: 2
TASK NAME: Efficiency Monitoring
TASK DESCRIPTION (detailed): Storm event monitoring will take place after the treatment system has been constructed to evaluate the treatment efficiency. A Quality Assurance Project Plan (QAPP) will be developed and approved by FDEP before monitoring commences. The QAPP will outline the sampling locations, sampling methodology, flow calculations, proposed equipment, sampling parameters, load calculation methodology and any applicable FDEP standard operating procedures (SOPs0.

Monitoring will be performed at inflow and outflow locations of the wet detention pond and at the discharge structure of the flow-through treatment marsh in accordance with the approved QAPP. The proposed parameters that will be sampled include: TN (lbs/yr), TP (lbs/yr), Total Suspended Solids (TSS) (lbs/yr), Cd, Cr, Cu, Zn, NO2/NO3, TKN, NH3, Orthophosphate, oil/grease, Fecal coliform, rainfall and flow. Monitored events shall include 7 – 10 discrete rain events, generally greater than 0.20 inches and less than 1.5 inches.

The salaries listed in the table below represent matching funds/resources provided by the City of Titusville for this task.

Position	Estimated Maximum Hours	Hourly Rate	Fringe Benefit (%)	Estimated Max. Total Fringe per position	Estimated Max. Total per position
Stormwater Utility Administrator	40	$30.29	0.33	$400	$1,612
Project Manager	120	$20.44	0.38	$932	$3,385
TOTAL	160			$1,332	$4,997

DELIVERABLE: Draft QAPP; Approved QAPP; Monitoring results

TASK NUMBER: 3
TASK NAME: Final Report
TASK DESCRIPTION:
A final report template from the FDEP contract manager will be followed as much as possible. The report will include a summary of the construction tasks completed and analysis of the results from the monitoring tasks. The construction tasks summary will detail any problems encountered during the phase and how those problems were overcome; an explanation of any project delays; a brief summary of any additional phases yet to be completed. The monitoring task report will present sampling data and the BMP/treatment system performance evaluation. The final report will be submitted to FDEP. The City will compile and summarize the individual tasks in a final report.

The salaries listed in the table below represent matching funds/resources provided by the City of Titusville for this task.

Position	Estimated Maximum Hours	Hourly Rate	Fringe Benefit (%)	Estimated Max. Total Fringe per position	Estimated Max. Total per position
Stormwater Utility Administrator	40	$30.29	0.33	$400	$1,612
Project Manager	120	$20.44	0.38	$932	$3,385
TOTAL	160			$1,332	$4,997

DELIVERABLE: Draft final report; approved final report

TIMELINE:

Task No.	Task Title	Start	Complete
1	Wet Detention Pond Construction	March, 2015	October, 2015
2	Efficiency Monitoring	December, 2015	December, 2016
3	Final Reporting	November, 2016	February, 2017

PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1	Salaries	0	$13,022	City of Titusville
	Fringe Benefits	0	$4,706	City of Titusville
	Travel	0	0	
	Contractual	$388,825	$390,825[1]	City of Titusville
	Equipment Purchases	0	0	
	Supplies/Other Expenses	0	$3,000[2]	City of Titusville
	Land	0	0	
	Indirect	0	0	
	TOTAL FOR TASK	$388,825	$411,553	

[1] $2,000 added for kiosk
[2] $3,000 added for markers and newsletter

Task No.	Category	Grant Funding	Match Funding	Match Source
2	Salaries	0	$3,665	City of Titusville
	Fringe Benefits	0	$1,332	City of Titusville
	Travel	0	0	
	Contractual	0	$75,000	City of Titusville
	Equipment Purchases	0	0	
	Supplies/Other Expenses	0	0	
	Land	0	0	
	Indirect	0	0	
	TOTAL FOR TASK	$0	$79,997	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
3	Salaries	0	$3,665	City of Titusville
	Fringe Benefits	0	$1,332	City of Titusville
	Travel	0	0	
	Contractual	0	$25,000	City of Titusville
	Equipment Purchases	0	0	
	Supplies/Other Expenses	0	0	
	Land	0	0	
	Indirect	0	0	
	TOTAL FOR TASK	$0	$29,997	
	Total:	$388,825	$521,547	
	Total Project Cost:	$910,372		
	Percentage Match:	42.71%	57.29%	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	0	$23,199	City of Titusville
Fringe Benefits Total	0	$8,391	City of Titusville
Travel Total	0	0	
Contractual Total	$388,825	$486,957	City of Titusville
Equipment Purchases Total	0	0	
Supplies/Other Expenses Total	0	$3,000	City of Titusville
Land Total	0	0	
Indirect Total	0	0	
Total:	$388,825	$521.547	
Total Project Cost:	$910,372		
Percentage Match:	42.71%	57.29%	

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: ☑ No: ☐ If no, explain:
- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  Yes: ☑ No: ☐ If yes, explain: The preliminary design for the Draa Field Stormwater treatment park utilizes a treatment train consisting of an inflow sediment forebay that provides initial settling of suspended solids before entering the ecologically enhanced wet detention pond. The wet detention pond includes native littoral zones, aeration and a forested flow-through wetland at the discharge point. The wet detention pond discharges to a flow-through marsh with native wetland species for final treatment before discharging back to the original drainage system.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  Yes: ☑ No: ☐ If yes, state the monthly fee: $6.46

- Is the project located in or does it benefit any of the following areas:

  ☐ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one? State special designation

  ☐ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.

  ☑ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking “no” or “yes, except” may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements.

  Yes: ☑ No: ☐ Yes, with exceptions: ☐

REFERENCES CITED:

FDEP, 2010. Draft Environmental Resource Permit Stormwater Quality Applicant’s Handbook. FDEP and Water Management Districts.

Harper, Harvey H., 1994. Stormwater Loading Rate Parameters for Central and South Florida." Revised

Harper, Harvey H. and David M. Baker, 2007. Evaluation of Current Stormwater Design Criteria within the Stat of Florida. Final Report: Florida Department of Environmental Protection.

The following are included as attachments to this application:

☑ Monitoring Plan: Attachment # 1

☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)). Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- ☑ 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

ATTACHMENT # 1

DRAA FIELD STORMWATER TREATMENT SYSTEM:
EFFICIENCY MONITORING PLAN

Quality Assurance Project Plan

Storm event monitoring will take place after the treatment system has been constructed to evaluate the treatment efficiency. A Quality Assurance Project Plan (QAPP) will be developed and approved by FDEP before monitoring commences. The QAPP will outline the sampling locations, sampling methodology, flow calculations, proposed equipment, sampling parameters, load calculation methodology, and any applicable FDEP SOPs.

Sampling Regime

Three sampling stations will be established to evaluate the treatment efficiency of the wet detention pond and the filter marsh (Attachment 4). The first sample station will represent loads flowing into the treatment system. The second monitoring station will determine the reduction efficiency of the wet detention pond and represent the load entering the filter marsh. The third monitoring station will be used to determine the total reduction of the entire system and the reduction of the filter marsh.

Flow-weighted composite samples will be collected at all monitoring stations following a qualifying storm event. Since approximately 90 percent of rainfall events in east-central Florida are less than one inch (Harper and Baker, 2007), storm events between 0.5" and 1.0" of rain in four hours will be sampled. Monitored events shall include 7 – 10 discrete rain events, generally greater than 0.5 inches and less than 1.0 inches.

The inflow sample station (Monitoring Station 1) will be located in the culvert at the north east section of the property where the existing ditch is diverted west into the treatment system. Due to the potential variability of velocities and flow entering the pond, flow will be measured with an area/velocity sensor associated with the autosampler. The aliquot pacing will be determined in the initial phase of monitoring to ensure that enough aliquots are collected to adequately fill sample containers with a representative sample from storm events.

The pond discharge structure will be the site of Monitoring Station 2. The discharge structure will exhibit relatively uniform flow; thus, outflow monitoring will be time paced, collecting equal volume aliquots for at least 12 hours following a storm event. Sampling will be enabled when rainfall is greater than 0.5" and the water level is high enough to discharge from the pond. Discharge flow will be calculated using a rating curve created specifically for the discharge structure. This methodology will also be used at Monitoring Station 3, located at the discharge side of the filter marsh. (Flow at this station will calculated using a custom rating curve similar to the Monitoring Station 2). Monitoring Station 3 will also be time paced for at least 12 hours following at qualifying storm event.

Monitoring will consist of two post-construction sampling phases in order to identify temporal variability between the wet and dry seasons. During each sampling phase (wet and dry seasons) a maximum of two samples per month will be collected up to a total of five samples per phase.

Quality Assurance

Field sampling, instrument calibration and maintenance will be performed in accordance with applicable FDEP SOPs and equipment manufacturer specifications. Applicable FDEP SOPs include:

- DEP-SOP-001/01
    - FS 1000—General Sampling Procedures
    - FS-2000—General Aqueous Sampling
    - FS-2100—Surface Water Sampling
    - FT-1800—Field Measurement of Water Flow and Velocity
    - FQ-1000—Field Quality Control Requirements
    - FC-1000—Cleaning/Decontamination Procedures
    - FD-1000—Documentation Procedures

Laboratory carries NELAC certification through the State of Florida for the parameters being tested.

Sample Parameters

Monitoring will be performed at inflow and outflow locations of the wet detention pond and at the discharge structure of the flow-through treatment marsh in accordance with the approved QAPP. The proposed parameters that will be sampled include: TN, TP, TSS, Cd, Cr, Cu, Zn, NO2/NO3, TKN, NH3, Orthophosphate, oil/grease, Fecal coliform, rainfall and flow. The following table provides details on the respective hold times, preservatives, and detection limits.

The standards criteria outlined in FDEP Rule 62- 302 F.A.C. are the detection limit criteria for this project. **The detection limits reported for this project shall at least meet, or be lower than the stated standards.**

ALL SAMPLING WILL BE DONE IN ACCORDANCE WITH DEP-SOP-001/01; FS 2100 SURFACE WATER SAMPLING.

PARAMETER	**METHOD #**
Flow	Equipment Manufacturer Operation Guide

COMPOSITE SAMPLES WILL BE COLLECTED TO DEMONSTRATE THE EFFICIENCY OF THE SYSTEM FOR 7 TO 10 STORM EVENTS WITH RAINFALL INTENSITY GREATER THAN 0.50 INCHES IN FOUR HOURS. FLOW WEIGHTED COMPOSITE SAMPLES WITH AT LEAST SIX ALIQUOTS WILL BE COLLECTED AT THE INFLOW POINT USING THE FLOW VOLUME PACING INCREMENT METHOD. OUTFLOW MONITORING WILL BE TIME PACED, COLLECTING EQUAL VOLUME ALIQUOTS FOR 24 HOURS FOLLOWING A STORM EVENT. MONITORING WILL CONSIST OF TWO POST-CONSTRUCTION SAMPLING PHASES IN ORDER TO IDENTIFY TEMPORAL VARIABILITY BETWEEN THE WET AND DRY SEASONS. DURING EACH SAMPLING PHASE (WET AND DRY SEASONS) A MAXIMUM OF TWO SAMPLES PER MONTH WILL BE COLLECTED UP TO A TOTAL OF FIVE SAMPLES PER PHASE. ONCE FIVE SAMPLES HAVE BEEN COLLECTED THE SAMPLERS WILL BE SHUT OFF UNTIL THE NEXT PHASE BEGINS.

LABORATORY ANALYSES WILL BE PERFORMED BY: A **NELAC CERTIFIED LABORATORY. ALL LABORATORY ANALYTICAL ACTIVITIES WILL BE CONDUCTED IN ACCORDANCE WITH LABORATORY PROTOCOLS AND SOP'S AS APPROVED BY NELAP.**

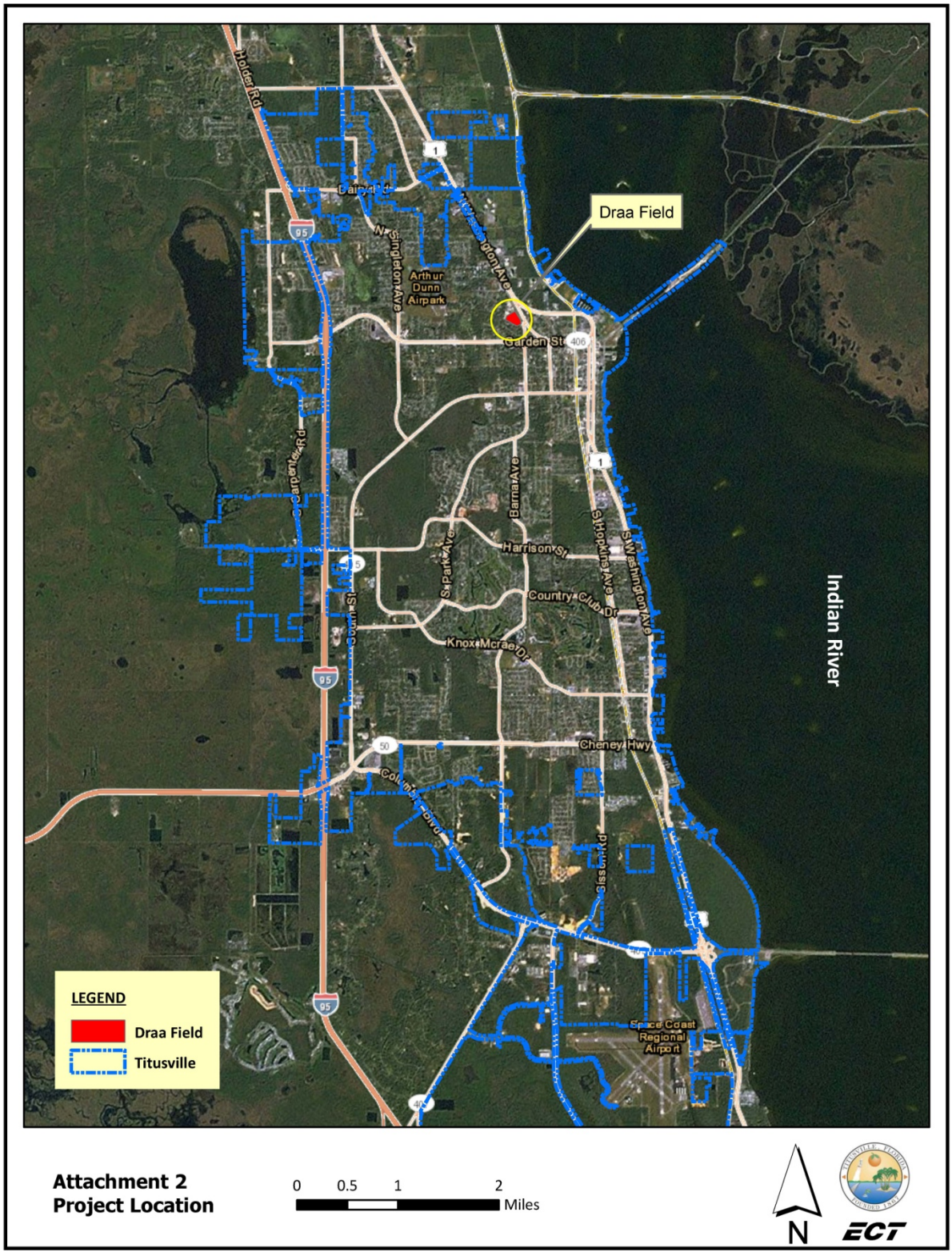
FREQUENCY	SAMPLE MATRIX	SAMPLE SOURCE	SAMPLES	TB, EB, FD	ANALYTICAL METHOD #	COMPONENT	Maximum Holding Time	Preservation	P	MDL	PQL	A(%)
7-10 Storm Events	Water	Stormwater runoff	2	1	EPA 351.2	Total Kjeldahl Nitrogen	28 days	Cool ≤ 6 °C H_2SO_4 to pH <2	20% RPD	0.25 mg/L	0.5 mg/L	90-110
7-10 Storm Events	Water	Stormwater runoff	2	1	EPA 350.1	Ammonia	28 days	Cool ≤ 6 °C H_2SO_4 to pH <2	20% RPD	0.02 mg/L	0.05 mg/L	90-110
7-10 Storm Events	Water	Stormwater runoff	2	1	EPA 353.2	Nitrate/Nitrite, -Nitrogen	28 days	Cool ≤ 6 °C H_2SO_4 to pH <2	20% RPD	0.025 mg/L	0.05 mg/L	90-110
7-10 Storm Events	Water	Stormwater runoff	2	1	EPA 365.3	Total Phosphorus	28 days	Cool ≤ 6 °C H_2SO_4 to pH <2	20% RPD	0.0023 mg/L	0.004 mg/L	90-110
7-10 Storm Events	Water	Stormwater runoff	2	1	E300.0	Ortho-phosphorus*	Filter within 15 minutes; Analyze within 48 hours	Cool ≤ 6 °C	20% RPD	0.0026 mg/L	0.004 mg/L	90-110
7-10 Storm Events	Water	Stormwater runoff	2	1	SM2540D	Total suspended solids	7 days	Cool ≤ 6 °C	20% RPD	5.0 mg/L	5.0 mg/L	90-110
7-10 Storm Events	Water	Stormwater runoff	2	1	SM9222D	Fecal coliform**	6 hours	Cool ≤ 6 °C	20% RPD	1 CFU/100ml	1 CFU/100 ml	NA
					E1664a	Oil/Grease* *	28 days	Cool ≤ 6 °C HCl or H_2SO_4 to pH <2	20% RPD	2.5 mg/L	5.0 mg/L	85-115
					EPA 200.7	Copper	180 days	Cool ≤ 6 °C	20% RPD	0.93 µg/L	1 µg/L	85-115
					EPA 200.7	Zinc	180 days	Cool ≤ 6 °C	20% RPD	10 µg/L	20 µg/L	85-115
					EPA 200.7	Cadmium	180 days	Cool ≤ 6 °C	20% RPD	0.05 µg/L	0.1 µg/L	85-115
					EPA 200.7	Chromium	180 days	Cool ≤ 6 °C	20% RPD	2.5 µg/L	5 µg/L	85-115

B - Trip Blank; EB - Equipment Blank; FD - Field duplicate; P – Precision; A- Accuracy; MDL - Method Detection Limit; PQL – Practical Quantification Limit

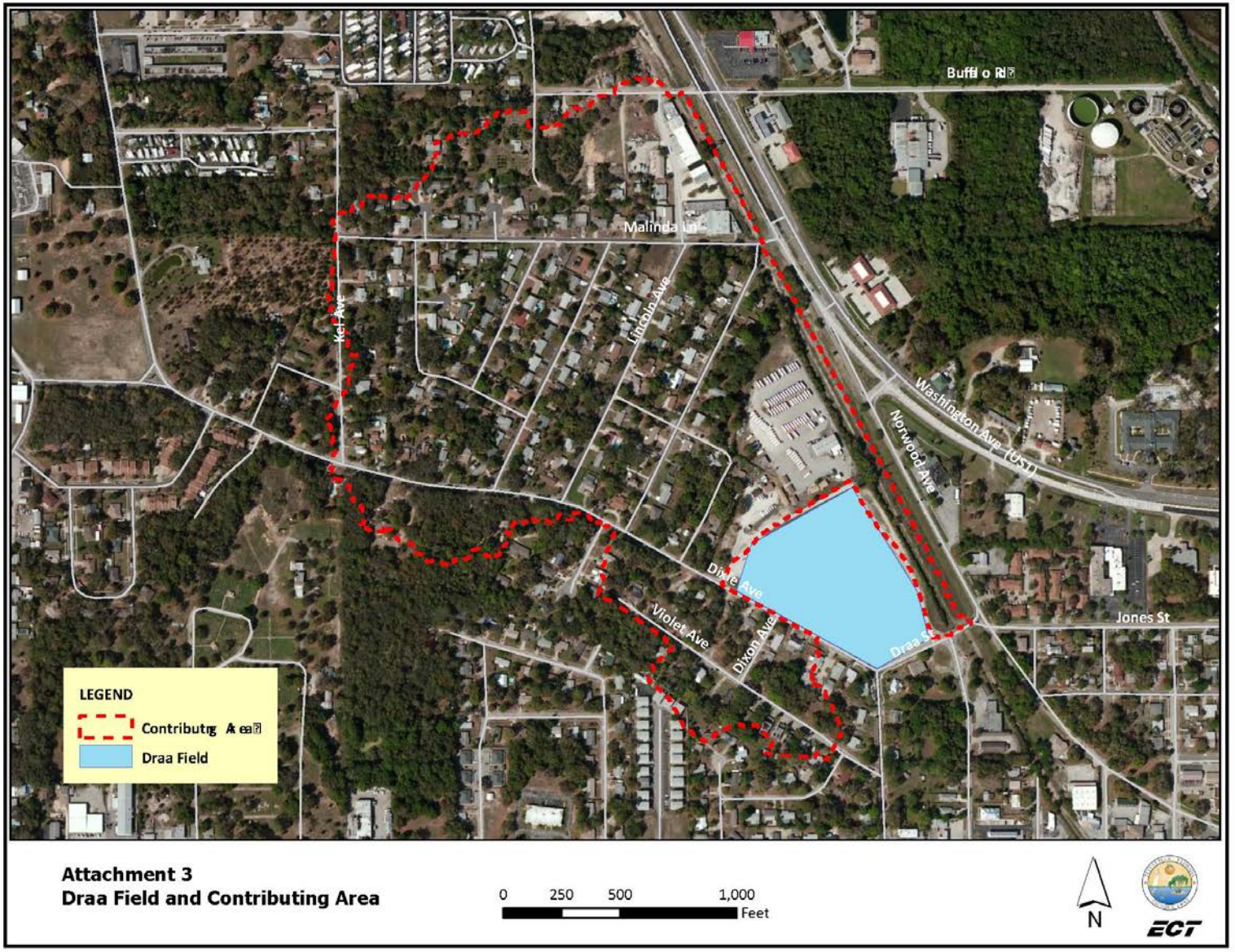
*Orthophosphate will be collected as a composite and filtered when within 15 minutes of collecting the composite. The composite sample will be chilled to 4 °C until collected.

** Grab sampling techniques will be used to collect samples for oil/grease and Fecal coliform analysis.

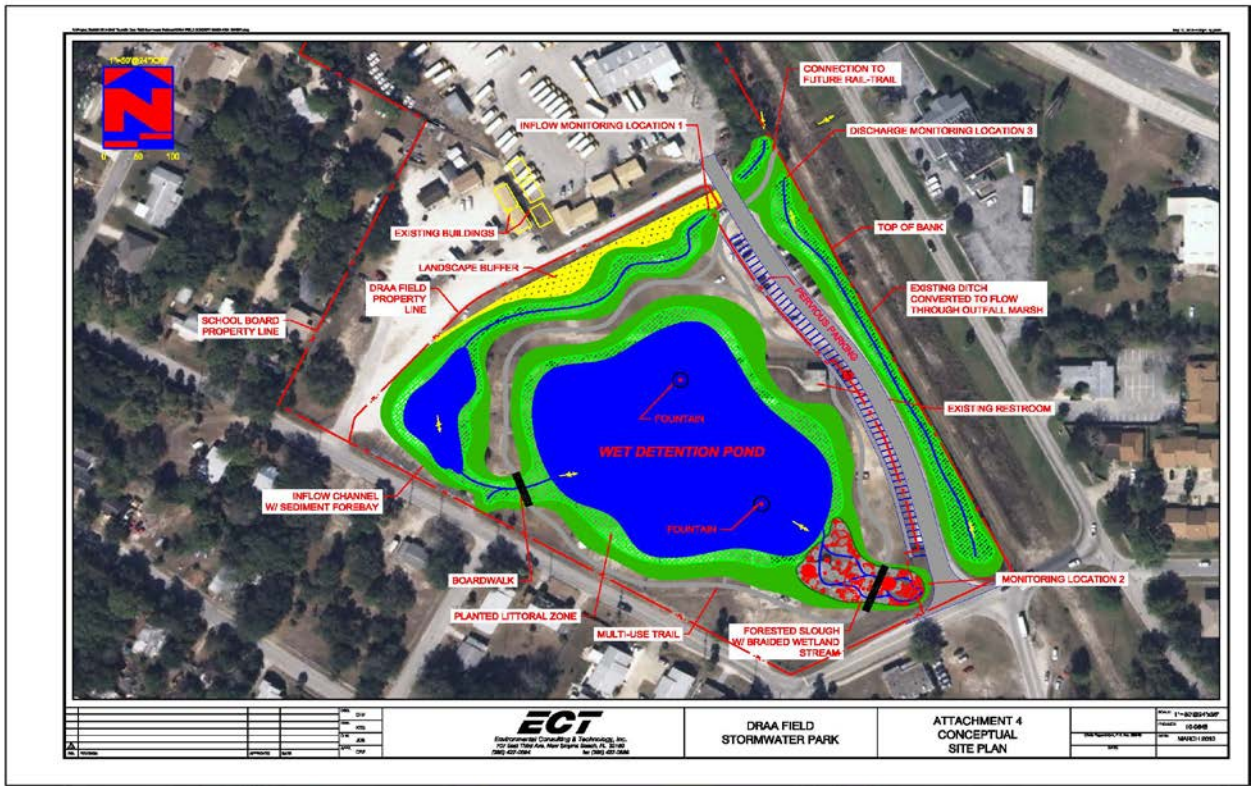
ATTACHMENT # 2 Map of Titusville Florida and the project site.



ATTACHMENT # 3 – Draa Field Stormwater Park Drainage Basin



ATTACHMENT # 4 Conceptual Design of the Draa Field Stormwater Park



PROJECT 6

PROJECT NAME: Demonstration and Technology Transfer of Denitrification Bioreactors to Reduce Nitrogen Loads within the Santa Fe Basin.

PROJECT FUNDING REQUEST: $305,914 MATCH: $209,123

LEAD ORGANIZATION: Board of Regents of the Nevada System of Higher Education, on Behalf of the Desert Research Institute

CONTACT PERSON: CASEY SCHMIDT
2215 Raggio Parkway
Reno, NV 89512-1095
Tel: 775-673-7464
Fax: 775-673-7363
Email: Casey.Schmidt@dri.edu

FEID NUMBER: 88-6000024
FISCAL YEAR END: JUNE 30, 2013

FINANCIAL COOPERATING PARTNERS: Desert Research Institute (DRI)

OTHER COOPERING PARTNERS:
Soil and Water Science Department, University of Florida/Inst. Of Food and Agric. Sci. (IFAS)
The Holly Factory Nursery (Todd Stephens – General Manager), letter attached (Appendix 1)

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

The project is located within the Santa Fe watershed, which is part of the greater Suwannee river basin in North Central Florida (Appendix 2). The Santa Fe Basin is approximately 3,600 square kilometers in area. Due to land clearing and fertilizer application as a result of urbanization and agricultural operations, the Santa Fe watershed is listed as impaired due to nutrient and dissolved oxygen concerns. The watershed has a total maximum daily load (TMDL) for nitrate and a basin management action plan (BMAP) has been adopted. To reduce nitrogen loads, the Santa Fe watershed has been the focus of techniques to develop 'advanced technologies' to 'keep more than 1 million pounds of nitrogen from entering the river and springs' (http://depnewsroom.wordpress.com/springs/northeast-district/). The study area is a 65-ha. container nursery located in Alachua, FL called the Holly Factory (Appendix 3). This nursery sells plants for the landscape market. This project will demonstrate a large-scale advanced treatment technology and through outreach and technology transfer methods, we will expand the use of this technology beyond this site to assist with the BMAP.

The watershed generally consists of well-drained sandy surface soils, often underlain by a clay/loam layer that causes a shallow water table to form. The close connection between agricultural activities and a shallow groundwater table facilitates increasing nitrogen losses to groundwater and the ensuing transport of groundwater to surface waters via seeps and other groundwater discharges. Due to the shallow groundwater table formed beneath many agricultural properties in this region, there is an opportunity to remove and treat the nitrogen before discharging to surface waters.

Geographic Location: Alachua, Alachua County
Impacted Watershed Name: Santa Fe/Suwannee Watershed
Size of Project Impact: Approximately 0.09 acres
Size of Area Being Treated: 65-ha. Nursery
Latitude: 29.918878°
Longitude: -82.504588°
Hydrologic Unit Code: 031102060405

WBID: 3605D
Impaired waterbody affected: Because nitrogen loads are expected to be reduced to all receiving waters, the impaired waterbodies affected by the project include the different reaches of the Santa Fe listed as impaired (i.e. WBID 3605C, B) and any downstream areas within the basin.
Impairment: The cause of impairment in the Santa Fe Watershed is listed as dissolved oxygen, and nutrients with a specific TMDL for nitrate. The goal of the following project is to expand an existing denitrification wall which had previously been shown to effectively reduce nitrate loads within the Santa Fe Basin. It is expected that this project will increase the nitrate reductions of the previous project dramatically and demonstrate the efficacy of utilizing this technique throughout the watershed.
TMDL Status: The Santa Fe River has a TMDL for nitrate.
BMAP Status: A BMAP has been adopted for this watershed.

Land Uses within the area being treated:

Land Use *(Do not alter – All must be filled out; Do not add categories; place a 0 for no acres)*	**Acres**	**%**
Residential Low Density (1100)	0	0
Residential Medium Density (1200)	0	0
Residential High Density (1300)	0	0
Commercial and Services (1400)	0	0
Industrial (1500)	0	0
Extractive (1600)	0	0
Institutional (1700)	0	0
Recreational (1800)	0	0
Open Land (1900)	0	0
Agriculture (2000)	108	55
Upland Non-Forested (3000)	0	0
Upland Forests (4000)	82	42
Water (5000)	5	2
Wetlands (6000)	1.7	1
Barren Land (7000)	0	0
Transportation, Communication, and Utilities (8000)	0	0
Land Use Totals (Acreage and %)	**196.7**	**100**

LAND OWNERSHIP STATUS: (check one)

☑ Land necessary for the construction of treatment infrastructure has been acquired. Title is held by Florida Farms Incorporated and Todd Stephens. Mr. Stephens has collaborated with the investigators in past work on his property, and has pledged significant support to the specific project and construction activities delineated here (see Appendix 1).

WATERSHED MANAGEMENT PLAN: NA

PROJECT OVERVIEW:

Abstract Summary

Reducing nitrogen losses to the Santa Fe River from agricultural operations is a pressing concern. Denitrification bioreactors are an emerging technology due to their demonstrated success at efficiently, and cost-effectively removing N from water using readily available sawdust. Further development and promotion of this technique is necessary to assist with watershed nutrient management. Within the proposed research site, a small denitrification wall receiving non-point groundwater was the first project to demonstrate that this is a feasible approach to help achieve TMDL reductions in surface waters if scaled appropriately. Before this technique can become standard practice within the basin, it is necessary to demonstrate a cost-effective approach to reducing whole-field N losses, tools need to be produced to target suitable installation sites, and the potential detrimental impacts of this technique

need to be managed. Much of the expense of previous denitrification wall installations has been driven by the costly equipment utilized, which generally results in oversized denitrification walls. The authors propose to utilize trenching equipment often already available on agricultural properties to expand the existing denitrification wall over two groundwatersheds and along a drainage ditch to achieve whole-field N reductions. This approach will only be effective in locations with high nitrate and shallow groundwater. Therefore, as part of this projects outreach component, spatial datasets will be utilized to produce a site assessment tool and maps for providing guidelines on transferring this treatment technology to help achieve TMDLs in the greater Santa Fe watershed. A second impediment to denitrification wall implementation is the carbon that leaches from the wood, which can modify stream biota and reduce dissolved oxygen. Therefore, secondary permeable reactive barriers using carbon-binding media will be evaluated and installed in parallel, adjacent to surface waters to remediate these detrimental impacts. Utilizing an array of wells measuring pre and post treatment N and C concentrations, the treatment efficiency and costs of these approaches will be evaluated, and recommendations will be provided through education and outreach to implement these approaches in the many agricultural properties in Florida.

Denitrification Wall Background

Denitrification bioreactors have been proven as a demonstrated approach which can effectively and sustainably provide long term reductions of N loads from agricultural lands (Long et al., 2010, Moorman et al., 2010; Robertson et al., 2008; Schmidt and Clark, 2012a, b). Denitrification is stimulated in these treatment systems by allowing high nitrate waters to contact wood media, which enables denitrifying bacteria to produce gaseous end-products, thus terminating the cascading impact of N on downstream ecosystems. The advantage of denitrification bioreactors as a sustainable and effective non-point source treatment system include; rapid nitrate losses, the use of a locally available and low-cost media (wood products), the decades-long lifespan of the wood media, the limited maintenance required and the passive nature of treatment (i.e. no pumping required). Although bioreactors will not be ideal in all watersheds and require careful consideration before installation, the availability of wood products and the relative ease of installation can facilitate a widespread dissemination of this technology to achieve significant N-load reductions throughout the Santa Fe Basin and beyond. Transferable methods are therefore required for scaling this approach to treat whole-field discharges in a pragmatic and cost-effective manner.

Denitrification walls are permeable reactive barriers (PRBs) generally used to treat non-point N sources by burying sawdust in a long trench which comes in to contact with passively flowing groundwater (Figure 1a, b). Resulting from the unfocused drainage, the volume and field capture-area of denitrification walls is dependent on the linear extent of the wall. Because much

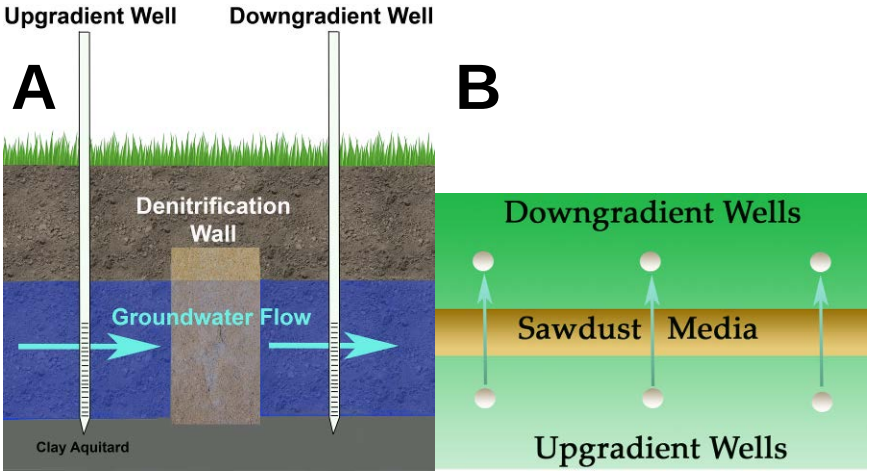


Figure 1. The figure shows a (A) side-view and (B) Birds-eye view of a denitrification wall.

of the N lost to the environment from agricultural properties in the watershed occurs from diffuse sources beneath fields with no controlled drainage, it is important to develop pragmatic methods to increase the capture volume and treat whole-field runoff using denitrification walls. The current limitations to expanding the scale and scope of denitrification walls include developing efficient and cost-effective installation methods, advancing techniques to minimize the short-term detrimental impacts to receiving waters which occur during bioreactor start-up and providing transferable landscape-scale methods for identifying suitable installation locations. By developing a large-scale demonstration site and promoting this emerging technology in the region, this technology will be transferred to the grower community.

Previous denitrification wall project

Expanding the pilot-scale study already completed will demonstrate a holistic approach to denitrification wall treatment. Within the proposed site, a denitrification wall was installed in 2009 utilizing 319 funding. Resulting from this wall alone, nitrate loads were reduced by 77% in groundwater and 65% in a small receiving headwater stream and the wall is estimated to continue functioning maintenance-free for a duration of 24 years (Schmidt and Clark, 2012a, b). This project was the first of its kind to demonstrate that denitrification walls have the potential to produce marked reductions not only in localized groundwater plumes, but in addition they can potentially be an integral part of agricultural best management practices (BMPs) and contribute to TMDL reductions in surface waters. Although, similarly to all other denitrification wall projects, the small project scale (Figure 2) meant that much of the groundwater draining the large nursery was untreated. The N-load reduction created by the wall of 391 kg/yr (862 lbs/yr) was a small fraction of the total load from the agricultural property of 4,429 kg/yr (9764 lbs/yr). This small-scale application demonstrated a proof-of-concept, namely that this technology is effective at treating all nitrate which travels through the wall and is highly cost competitive with other treatment approaches. This project site allows for a rare opportunity to rapidly demonstrate the feasibility of treating whole-field runoff by expanding the existing wall to line the entire edge-of-field area where the majority of N-loading occurs (Figure 2).

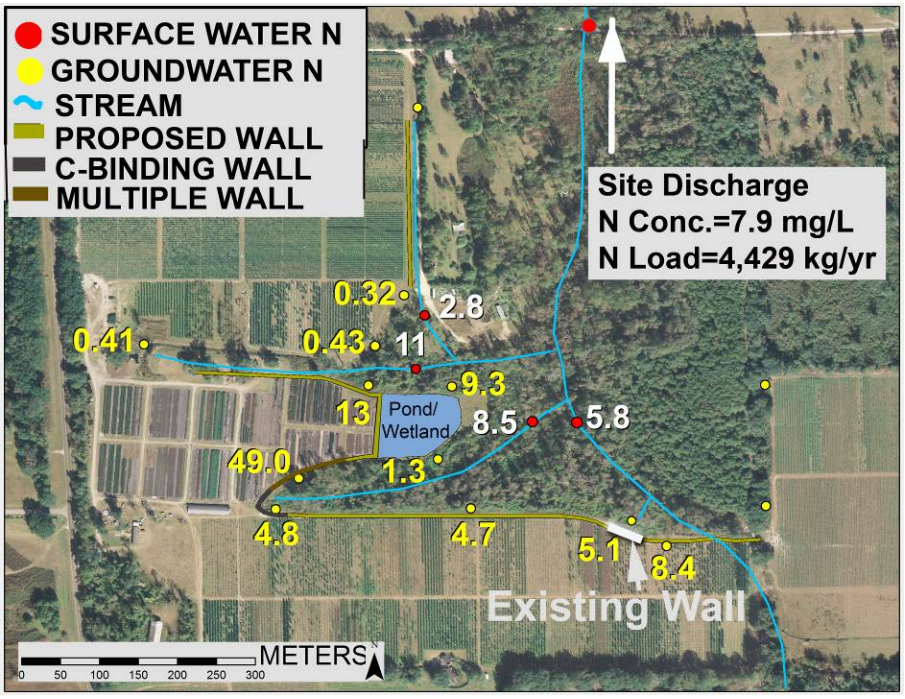


Figure 2. Shown in the figure is a site outline indicating; the small scale of the existing wall, the proposed enhancement by adding a single and multiple walls and locations where dissolved organic carbon binding media can potentially protect receiving waters.

Treatment scope and cost improvements

Although this treatment technology has better cost-efficiencies ($1.75 per lb-N) than municipal wastewater treatment, wetlands and riparian buffers (CENR, 2000; Hyberg, 2007; Schipper et al., 2010), current installation methods to capture whole-field discharges are still costly and resource-intensive. Therefore alternative approaches will be utilized to increase the capture volume at a lower cost. The wall installed at this site was oversized due to the desire to excavate down to a confining layer to avoid bypass flow under the wall, which required costly excavation equipment with large bucket widths. Due to the wide bucket widths (4-5 ft.) of the excavator and subsequent long detention times, groundwater nitrate was completely removed in a fraction of the wall width and much of the media was wasted. Additionally, as a result of the wall being keyed in to a confining layer there was no groundwater bypass under the wall, although nitrate concentrations increased in downgradient wells because groundwater travelled around the wall (Figure 3).

We propose that significant N reductions can occur by more cost-effectively treating a shallower groundwater profile over a wider capture area using more cost-effective trenching equipment. Trenchers are much less expensive than bucket excavators, they can be used to excavate down to 3 meters (9 ft.) with small excavation widths, and they are often present on agricultural properties, which would facilitate their use by landowners. Although in some circumstances deeper portions of the groundwater profile won't be treated, we present a practical and cost-effective method to achieve significant N reductions across a large spatial extent. There are other advantages to this installation approach that will facilitate the use of denitrification walls in broader settings. Single and multiple parallel thin denitrification walls (Figure 4A) can be blended in to the agricultural landscape between rows, along drainage ditches and the edge of fields which will allow a tiered approach to capture nitrate loads before discharging to deeper groundwater layers. As part of this project we will install a thin denitrification wall along the edge-of-field of two significant groundwatersheds, as well as along a drainage ditch with high N concentrations (Figure 2).

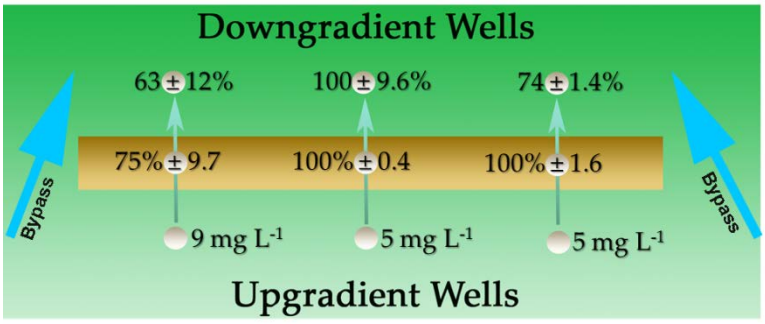


Figure 3. Shown in the figure is a diagram of the average nitrate reductions in a previously installed wall. All nitrate was removed in only a fraction of the wall flow-width, although due to horizontal groundwater bypass, untreated and treated water mixed in wells at the edge of the wall. The overall nitrate reduction from the property can be improved by increasing the capture area of the denitrification wall by installing thinner trenches over a wider area.

Treatment train approach to reduce carbon leaching

The use of thin denitrifying trenches facilitates novel design features including the use of a treatment train approach, whereby different media is used to treat multiple constituents by utilizing secondary trenches. Among other possibilities, one potential use of secondary media is to remove excess carbon which leaches from the wood. During start-up, many denitrification bioreactors have resulted in excess dissolved organic carbon (DOC), which can modify stream biota, and cause declines in dissolved oxygen in receiving streams (Schmidt and Clark, 2012b). It is imperative that methods are developed to minimize these short-term detrimental impacts before this technology

expands throughout the Santa Fe watershed. Secondary permeable reactive barriers that are sinks for organic carbon (e.g. Aluminum water treatment residuals, activated carbon/charcoal) will be evaluated and installed at specific locations adjacent to surface waters (Figure 2, 4). Although the use of DOC-binding media hasn't been demonstrated previously in denitrification wall installations, the media types considered in this project have all been successfully used in permeable reactive barriers to treat other constituents and their ability to bind DOC has been established. In addition to binding dissolved organic carbon, some secondary media may provide the ancillary benefits of P-retention (e.g. Al-Water Treatment Residuals; Al-WTRs) and an increased concentration of beneficial micropores that will create a greater microbial surface area (e.g. charcoal).

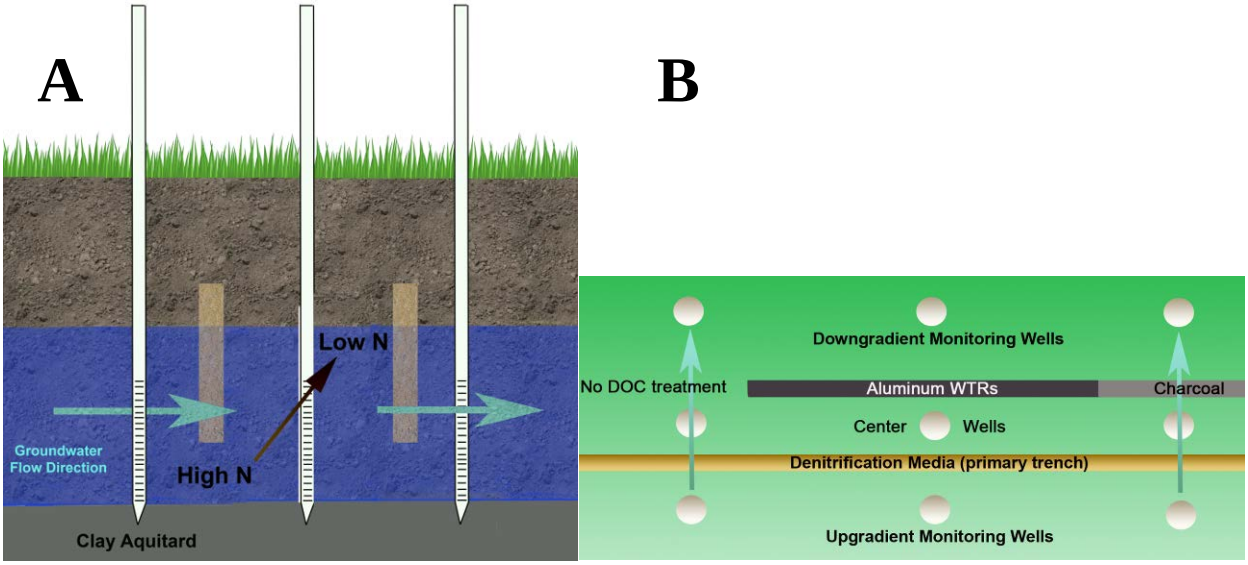


Figure 4: A diagram of the proposed innovative bioreactor implementation methods showing (A) a side-view of multiple walls indicating diffusion of nitrogen, and (B) a birds-eye view showing the use of multiple parallel walls and the use of C-binding media.

Denitrification wall technology transfer

Through extension outreach, workshops, fact sheets and publications we will achieve a broader impact by demonstrating an effective approach to sustainability reduce N loads on agricultural properties. Through past work at this site we have communicated effective nutrient management techniques to hundreds of producers, scientists, educators and the general public. This outreach will continue with this project. In addition to outreach and extension on denitrification walls, it will be important to develop methods to determine appropriate installation locations to expand this technology beyond this site. Due to site geohydrology and the depth of high nitrate concentrations, this technology will not be effective at all locations, and it will be necessary to develop tools and maps for identifying probable installation sites. Some technical constraints on the use of this technology include; a consistently shallow groundwater table, high nitrogen concentrations close to the surface, and a discernible groundwater flow direction. Much of the information required to assess hot spots of nitrogen, perched watertables and groundwater flow direction are available in georectified soil and geological surveys, digital elevation models, potentiometric surfaces datasets and land-use maps. To increase the transferability of this treatment approach, assessment tools will be developed to determine other locations within the Santa Fe watershed which would benefit from denitrification walls and maps will be produced. These maps will be distributed on websites, fact sheets, through presentations and directly to the grower community. The results of this study will determine if denitrification walls can move beyond the pilot-scale to become an effective best management practice for managing non-point N losses in the Santa Fe basin.

Project Objectives

The objectives of this project will be to expand denitrification walls beyond the pilot-scale and facilitate the use of this advanced technology in other settings by demonstrating; a cost-effective approach to reduce whole-field N losses, the use of a treatment train approach to reduce the impacts of wood leaching and suitable locations for targeting walls in the watershed. Specifically, we will determine the N removal efficiencies and cost-effectiveness of utilizing alternative installation methods to expand an existing denitrification wall to increase the capture volume. Trenching equipment will be used to install a thin denitrification wall around an entire field and a drainage ditch as a nitrate-trap. The use of secondary trenches with DOC-binding media and other methods will be assessed as a means to provide further nitrate reductions and to ameliorate the undesirable impacts of bioreactor start-up. To transfer this technology beyond this site, spatial datasets will be utilized to determine site geohydrology and the potential for high nitrate concentrations in groundwater. From these datasets, a geographic information systems (GIS) based assessment tool will be developed to identify other suitable locations for installing large-scale denitrification walls in the Santa Fe Watershed. Through extension outreach, workshops, fact sheets and publications we will achieve a broader impact. The methods developed at this demonstration site will allow for a determination of whether denitrification walls are a feasible approach to reduce widespread N losses from diffuse agricultural sources in the entire watershed. Specific objectives include:

1) Evaluate the technical feasibility of scaling-up an existing denitrification wall over an entire edge-of-field area with significant N loading
2) Determine the nitrate reduction rates and cost removal efficiencies of an alternative installation approach and compare to current methods
3) Evaluate dissolved DOC removal efficiencies of alternative media installed in select locations adjacent to headwater streams
4) Develop a transferable tool for identifying suitable denitrification wall locations.

We consider this project to be an innovative and transferable approach that will help agricultural producers achieve significant nitrogen load reductions in a cost-effective and sustainable manner for the following reasons.

1) Denitrification walls are a demonstrated, pragmatic remediation approach capable of being utilized by producers.
2) Demonstrating that walls can be scaled to the level of the water quality impairment will facilitate the widespread implementation of this technology.
3) We are developing a more cost-effective approach to a remediation technology that is already very cost competitive with other techniques.
4) The landscape-scale assessment tool will allow for a broader impact of this treatment approach.
5) The demonstrated success of this project at a smaller scale verifies the possibility of a successful project outcome.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: (check one)

☑ This proposal is for a structural BMP project.

This project benefits from a previous study where the groundwater nitrogen concentrations and velocities were measured in a series of periphery wells (Figure 2). The nitrogen load reductions of the denitrification wall were carefully quantified both within the local groundwater and the receiving stream (Schmidt and Clark, 2012a, b). As a result of this actual data, the nitrogen load reduction estimates will be based on this previous work.

The previously installed denitrification wall was 180 ft. in length and removed 862 lbs of total nitrogen per year by treating the entire groundwater profile over a small area (Schmidt and Clark, 2012a, b). The existing denitrification wall will be expanded by approximately 3,664 ft. Nitrate reduction rates were in the range of 4.9–5.5

g-N per m^{-3} of denitrification wall media per day (Schmidt and Clark, 2012a), which means that a groundwater concentration of 9.8-11 mg/L would be removed completely in a day, assuming 50% porosity. Based on existing groundwater velocities measured in the periphery wells, this would require a denitrification wall of varying thickness (0.09 – 3 ft) for complete nitrate removal (Table 1). The utility of this existing groundwater velocity and nitrogen concentration data is that the denitrification wall will be designed to remove all nitrate which travels through the wall. The thickness of the wall will therefore vary depending on variations in nitrogen loading rates. The depth of treatment will vary depending on groundwater table depth and site geohydrology. Based on well excavations and surveys, the confining layer is usually present at most 12 ft. below the surface, the top of the water table is on average 3 ft. below the surface and the trenching equipment will only excavate to 9 ft. Therefore based on these conservative estimations, it is assumed that approximately half of the water table will be treated. Because multiple parallel denitrification walls will be used in locations requiring longer detention times, it is possible that the treatment depth will increase. This is because it is likely that high nitrate groundwater from deeper layers which has not passed through the bioreactor will diffuse to low nitrate regions which have undergone denitrification and subsequently undergo treatment in a secondary denitrification wall (Figure 4A). Based on interpolations of the existing periphery well dataset and the assumptions indicated above (Table 1), the total groundwater nitrogen load over the proposed treatment area is 5,697 lbs per year. Assuming complete nitrogen loss over half of the water table depth indicates that an additional 2849 lbs of nitrogen will be removed from groundwater per year. Through outreach and technology transfer we will identify other locations for denitrification wall installation and produce further nitrogen load reductions.

Table 1 – Measured groundwater values and calculated estimates used to determine load reduction.

Well N Conc (mg/m^3)	Groundwater Velocity (m/day)	N-Load ($mg\ m^{-2}\ d^{-1}$)	Wall-length required (m)	Dist. Between wells (m)
8400	0.028	117.6	0.024 (0.079 ft)	143 (469 ft)
4700	0.887	2084.45	0.417 (1.37 ft)	330 (1084 ft)
4800	0.067	160.8	0.032 (0.105 ft)	217 (712 ft)
49000	0.68	16660	0.333 (1.09 ft)	47.2 (155 ft)
1300	0.5175	336.375	0.461 (1.51 ft)	75.9 (249 ft)

BMPs Installed		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
BMP #1								
Pollutant Loads	Pre-Project			9764				
	Post-Project			6915				
	Load Reduction			2849				
	% Reduction			29%				
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project			9764				
	Post-Project			6915				
	Load Reduction			2849				
	% Reduction			29%				

EMCS USED IN MODEL: The concentrations used for these estimations were based on two-year averages of total nitrogen concentrations in a series of periphery wells located where the proposed denitrification wall would be installed. The concentration in these wells ranged from 13-49 mg/L, with an average of 14±20 mg/L.

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.: Based on values reported in the pollutant load reduction estimation above (Table 1), the estimated residence time within the denitrification wall will be approximately 1.5 days on average.

TASKS and DELIVERABLES:
Task Number: 1
Task Name: Media assessment
Task Description: Sawdust bioreactor media will be procured from local sources and the hydraulic conductivity of mixtures of sawdust and site soils will be compared to intact cores using standard methods in the laboratory. It is important to verify the hydraulic conductivity of the bioreactor media and the soils at the site to ensure groundwater bypass doesn't occur. Multiple types of media will be evaluated for their ability to bind DOC by mixing with wood leachate waters and assessing rates and strength of carbon sorption. Based on carbon sorption, potential detrimental impacts and cost, carbon-binding media will be chosen for field installation.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	67	$43.99	44.8%	$1,320	$4,268
Graduate Research Asst.	104	$19.28	21.8%	$437	$2,442
TOTAL	171	varies	varies	$1,757	$6,710

Deliverables: Hydraulic conductivity values of the bioreactor media and soils at the site will be submitted. Dissolved organic carbon sorption isotherms will be tabulated and submitted.

Task Number: 2
Task Name: Project bidding
Task Description: Grantee will utilize an existing dataset of groundwater velocities and nitrogen concentrations on the property to determine the locations of single bioreactor trenches, multiple trenches and where dissolved carbon binding media should be utilized to protect receiving waters. Construction of the denitrification wall (Task 3) and installation of monitoring wells (Task 4) will be advertised and grantee will select the contractor. Any necessary permits will be obtained.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	67	$43.99	44.8%	$1,320	$4,268
Graduate Research Asst.	104	$19.28	21.8%	$437	$2,442
TOTAL	171	varies	varies	$1,757	$6,710

Deliverables: A copy of all the construction quotes will be submitted along with the winning bidder. The final design will be submitted as well as any necessary permits.

Task Number: 3
Task Name: Denitrification wall construction
Task Description: The trench will be installed to complete the existing denitrification wall by lining two entire groundwatersheds along the edge of the field and along a drainage ditch. Based on previously collected data, these two watersheds are the largest sources of nitrogen to receiving waters. Secondary trenches with carbon-binding media will be constructed downgradient from the sawdust wall, adjacent to surface water bodies.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	33	$43.99	44.8%	$650	$2,102
Graduate Research Asst.	52	$19.28	21.8%	$219	$1,221
TOTAL	85	varies	varies	$869	$3,323

Deliverables: A report on the construction will be provided, as well as photographs of the construction and completed project. A signed statement from grantee's grant manager will be submitted that construction has been completed satisfactorily.

Task Number: 4
Task Name: Monitoring Well Installation
Task Description: Monitoring wells will be installed upgradient and downgradient from the denitrification wall. In locations where multiple parallel walls will be installed, a well will be placed between the walls. Monitoring wells will be equipped with calibrated water level sensors for determine groundwater elevation profile.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	33	$43.99	44.8%	$650	$2,102
Graduate Research Asst.	52	$19.28	21.8%	$219	$1,221
TOTAL	85	varies	varies	$869	$3,323

Deliverables: A report on the well installation will be provided as well as photographs. A signed statement from grantee's grant manager will be submitted that construction has been completed satisfactorily.

Task Number: 5
Task Name: Denitrification Wall Monitoring
Task Description: Sampling locations will be recorded with a global positioning system (GPS) device. Grantee will submit a Quality Assurance Project Plan (QAPP) for monitoring prior to commencement of any monitoring. In each of the upgradient and downgradient wells, water levels will be continually monitored and water table elevation gradients will be used to determine groundwater velocities and direction. Water samples will be collected from wells with greater frequency for the first few weeks (biweekly) and then bimonthly for a year total. Samples will be analyzed for nitrate, ammonium, total kjeldahl nitrogen (TKN) and DOC using standard methods.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	293	$43.99	44.8%	$5,774	$18,663
Graduate Research Asst.	458	$19.28	21.8%	$1,925	$10,755
Hourly (Field Tech)	441	$12.00	4.4%	$233	$5,525
TOTAL	1192	varies	varies	$7,932	$34,943

Deliverables: Draft and final QAPP, and reports on the system effectiveness including the hydraulic loading rates, as well as carbon and nitrogen concentrations from the wells.

Task Number: 6
Task Name: Cost and N removal efficiency analysis and comparison
Task Description: Reliable cost and N removal efficiencies will be quantified and transferable models will be developed to estimate the expected outcomes from applying these approaches in other agricultural settings. Additionally, the tradeoffs between treating the entire groundwater profile with traditional bucket excavators will be contrasted with the experimental installation methods utilized in this study. Nitrogen and carbon flux and load

reductions will be quantified based on well measurements and interpolated across the property. From these results, it will be possible to infer the total nitrogen load reductions from entire groundwatersheds. Denitrification wall efficiency will be assessed in terms of nitrate reduction rates (mass loss per year, mass loss rates per volume of reactor media, mass loss rates per linear foot of trench) and cost per mass of nitrogen removal. The metrics in this task will be determined quarterly after denitrification wall construction and final conclusions and comparisons will be compiled and assessed at the end of the study.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	426	$43.99	44.8%	$8,395	$27,135
Graduate Research Asst.	666	$19.28	21.8%	$2,799	$15,640
TOTAL	1092	varies	varies	$11,194	$42,775

Deliverables: Cost and nitrogen removal efficiencies will be submitted, total nitrogen load reduction will be calculated and submitted.

Task Number: 7
Task Name: Geospatial site assessment tool development
Task Description: Existing spatially-based datasets will be utilized to assess locations within the greater watershed where denitrification walls can potentially be targeted. Soil surveys, digital elevation models and geological datasets will inform the assessment of suitable geohydrology which should detail regions where a confining layer occurs close to the surface and a perched water table is present. These and other relevant datasets will be utilized to provide a landscape-scale assessment tool and maps for targeting denitrification walls in the region.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	216	$43.99	44.8%	$4,257	$13,759
Graduate Research Asst.	337	$19.28	21.8%	$1,416	$7,914
TOTAL	553	varies	varies	$5,673	$21,673

Deliverables: The results of this model will be submitted including a map of potential sites for a denitrification wall installation within the Santa Fe watershed.

Task Number: 8
Task Name: Information Transfer
Task Description: The efficacy of the denitrification wall and pragmatic methods for denitrification wall construction will be illustrated to landowners and others during field days, workshops, publications in trade journals and two fact sheets on ‘Denitrification wall installation and design guidelines and expected removal efficiencies’ and the ‘Identification of suitable sites for denitrification wall installation within the Santa Fe watershed’. The University of Florida soil and water science department/IFAS Extension will conduct the outreach effort in collaboration with existing partnerships.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	393	$ 43.99	44.8%	$ 7,745	$ 25,033
Graduate Research Asst.	614	$ 19.28	21.8%	$ 2,581	$ 14,419
TOTAL	1007	varies	varies	$ 10,326	$ 39,452

Deliverables: Publications will be submitted by grantee as well as a head-count and surveys of outreach participants.

Task Number: 9
Task Name: Draft and final report
Task Description: The final report will be conducted by the Desert Research Institute which will detail whether the proposed BMP achieved the desired result, problems encountered and how those problems were overcome, an explanation of delays and overall suggestions for this treatment approach. Draft final report will be submitted to partners for review as well as independent reviewers. The final report will be drafted based on these inputs.

Position	Maximum Hours	Hourly Rate	Fringe Benefit (%)	Maximum Total Fringe per position	Maximum Total per position
Asst. Research Professor	66	$ 43.99	44.8%	$ 1,301	$ 4,204
Graduate Research Asst.	104	$ 19.28	21.8%	$ 437	$ 2,442
TOTAL	170	varies	varies	$ 1,738	$ 6,646

Deliverables: Draft and final report will be submitted.

TIMELINE:

Task No.	Task Title *(should match identically above)*	Start	Complete
1	**Media assessment**	Month 1	Month 2
2	**Project bidding**	Month 1	Month 2
3	**Denitrification wall construction**	Month 3	Month 3
4	**Monitoring Well Installation**	Month 3	Month 3
5	**Denitrification Wall Monitoring**	Month 4	Month 16
6	**Cost and N removal efficiency analysis and comparison**	Month 4	Month 22
7	**Geospatial site assessment tool development**	Month 12	Month 22
8	**Information Transfer**	Month 7	Month 24
9	**Draft and final report**	Month 23	Month 24

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PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1	Salaries	$2,417	$2,535	DRI
	Fringe Benefits	$906	$852	DRI
	Travel	$1,964	$0	
	Supplies/Other Expenses	$650	$0	
	Indirect	$4,097	$2,710	DRI
	Total for Task	$10,034	$6,097	DRI

Travel: **For All travel justification, please see Attachment 1**. One 4-day trip for MS student and Schmidt to collect samples and bring back to DRI including airfare and affiliated expenses.
Supplies/Other Expenses: 50 filters for carbon analysis, purchase of media for lab analysis; Water sample analysis in a lab (50 DOC samples)

Task No.	Category	Grant Funding	Match Funding	Match Source
2	Salaries	$2,417	$2,535	DRI
	Fringe Benefits	$906	$852	DRI
	Travel	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Indirect	$2,293	$2,605	DRI
	Total for Task	$5,616	$5,992	DRI

Task No.	Category	Grant Funding	Match Funding	Match Source
3	Salaries	$1,209	$1,245	DRI
	Fringe Benefits	$453	$416	DRI
	Travel	$2,464	$0	
	Supplies/Other Expenses	$52,957	$0	
	Indirect	$39,387	$3,495	DRI
	Total for Task	$96,470	$5,156	DRI

Travel: **For All travel justification, please see Attachment 1**. One 5-day trip to field site for MS and one 3-day trip for Schmidt including affiliated expenses.
Supplies/Other Expenses: Sawdust ($22,833); DOC binding media ($3,000); trencher rental ($2,100); and mixing/installation ($25,024).

Task No.	Category	Grant Funding	Match Funding	Match Source
4	Salaries	$1,209	$1,245	DRI
	Fringe Benefits	$453	$416	DRI
	Travel	$982	$0	
	Supplies/Other Expenses	$22,040	$30,040	DRI
	Indirect	$17,032	$24,129	DRI
	Total for Task	$41,716	$55,830	DRI

Travel: **For All travel justification, please see Attachment 1**. One 3-day trip to field site for MS including affiliated expenses.
Supplies/Other Expenses: Water level loggers ($800 each x 38); well installation ($13,680) and well supplies ($8,000).

Task No.	Category	Grant Funding	Match Funding	Match Source
5	Salaries	$10,601	$16,408	DRI
	Fringe Benefits	$3,884	$4,048	DRI
	Travel	$4,428	$0	
	Supplies/Other Expenses	$11,866	$0	
	Indirect	$21,238	$16,164	DRI
	Total for Task	$52,017	$36,620	DRI

Travel: **For All travel justification, please see Attachment 1**. Two trips of five days each for MS and two trips of five days each for Schmidt, to field site, including affiliated expenses.
Supplies/Other Expenses: Filters; DOC laboratory analyses; NO3, NH4, TKN analyses.

Task No.	Category	Grant Funding	Match Funding	Match Source
6	Salaries	$15,416	$16,165	DRI
	Fringe Benefits	$5,428	$5,766	DRI
	Travel	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Indirect	$14,382	$16,843	DRI
	Total for Task	$35,226	$38,774	DRI

Task No.	Category	Grant Funding	Match Funding	Match Source
7	Salaries	$7,917	$8,083	DRI
	Fringe Benefits	$2,789	$2,882	DRI
	Travel	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Indirect	$7,387	$8,432	DRI
	Total for Task	$18,094	$19,397	DRI

Task No.	Category	Grant Funding	Match Funding	Match Source
8	Salaries	$14,217	$14,909	DRI
	Fringe Benefits	$5,049	$5,277	DRI
	Travel	$2,768	$0	
	Supplies/Other Expenses	$2,000	$0	
	Indirect	$16,583	$15,697	DRI
	Total for Task	$40,617	$35,883	DRI

Travel: **For All travel justification, please see Attachment 1**. One 5-day trip to field site for Schmidt including affiliated expenses; trip to Soil science Society of America Conference 2015 for MS student and Schmidt (Based on project timeline, the conference in 2015 will be in Minneapolis, MN).
Supplies/Other Expenses: Conference fees

Task No.	Category	Grant Funding	Match Funding	Match Source
9	Salaries	$2,717	$2,191	DRI
	Fringe Benefits	$906	$832	DRI
	Travel	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Indirect	$2,500	$2,352	DRI
	Total for Task	$6,123	$5,375	DRI

Total:	$305,914	$209,123	
Total Project Cost:	$515,037		
Percentage Match:	59.4%	40.60%	

The fringe benefit rates are 44.8% for professional employees, 21.8% for grad students, and 4.4% for hourly. Rates are negotiated and approved annually by the U.S. Department of Health and Human Services.

Indirect cost rates are negotiated and approved by the U.S. Department of Health and Human Services. The current approved rate for Federal projects is 73% effective through 06/30/13; however, DRI has elected to reduce the rate to 69% on this proposal. The indirect cost rate of 69% has been applied to modified total direct costs (MTDC). The indirect cost forgiven is included in the match.

Match: DRI has secured the required match funds in the amount of $209,123.

*NOTE: Budget calculations were prepared by formulas in an excel spreadsheet and may be off by $1, or so, due to rounding.

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: ☑ No: ☐ If no, explain:

- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  Yes: ☑ No: ☐ If yes, explain: This project adapts an innovative BMP (denitrification bioreactor) to remediate groundwater nitrogen on agricultural properties. This technology is not widely utilized. A treatment train will be used by installing parallel permeable reactive barriers to remove nitrogen and a secondary barrier to remediate the excess carbon that occurs from bioreactor installation. It should be noted that the media considered for the secondary barrier will likely retain phosphorus and serve as a biologically active zone for remediating other constituents.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  Yes: ☐ No: ☑ If yes, state the monthly fee:

- Is the project located in or does it benefit any of the following areas:

  ☐ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one?
  ☐ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.
  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.
  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements.
  Yes: ☑ No: ☐ Yes, with exceptions: ☐

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The following are included as attachments to this application:

☑ Monitoring Plan: **Appendix 4**

☑ Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)). Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- ☑ Regional site locator map showing the project site relative to the surrounding area: **Appendix 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: **Appendix 3**
- ☑ A detailed site map showing the conceptual elements of your proposed project: **Figure 2**

☑ Other Relevant Information, including pre-construction photographs, BMP documentation, and letters of commitment from land owners or match contributors, etc.: **Appendix 1 (letter of commitment), Attachment 1 (Schmidt and Clark, 2012a), Attachment 2 (Schmidt and Clark, 2012b) for BMP documentation.**

ATTACHMENT 1
TRAVEL CLARIFICATION by
CASEY SCHMIDT

Clarification on the travel budgeted in **Tasks 3 and 4** on the project entitled, 'Demonstration and Technology Transfer of Denitrification Bioreactors to Reduce Nitrogen Loads within the Santa Fe Basin'. Included in this travel are requests for airfare, lodging and transportation for myself and a graduate student who will be focused on the project as well as travel requests for national conference attendance.

This travel request includes a field technician who will collect regular samples to submit to the UF-IFAS lab for analysis. This field technician has collected over two years of samples from groundwater and surface water wells on a previous 319 grant in collaboration with Dr. Michael Thomas employed by Florida-DEP, and Dr. Mark Clark who is employed by the University of Florida, entitled 'Reducing Nonpoint Source Loss of Nitrate within the Santa Fe Basin: Efficacy of Container Nursery BMPs and Denitrification Wall' and is well versed in the collection protocol**.** I am continuing to collaborate with Dr. Mark Clark who will also provide logistical support and the extension and outreach component of this Demonstration and Technology Transfer project. This is a very novel treatment approach for remediating nitrogen and very few people including my collaborators have the relevant expertise to design, construct and effectively monitor the success of this type of treatment system and to develop methodology for expanding this approach watershed-wide. Therefore, I will periodically visit the field site with a graduate student to provide oversight in addition to my strong involvement using modern telecommunication methods. This travel will predominantly occur during crucial field visits, infrastructure installation and meetings. In my proposal budget I strongly minimized the true extent of travel in order to minimize costs to the EPA.

While working on my Ph.D. and postdoc, I managed the design, oversaw construction and monitoring of the denitrification wall/bioreactor portion of the project, entitled 'Reducing Nonpoint Source Loss of Nitrate within the Santa Fe Basin: Efficacy of Container Nursery BMPs and Denitrification Wall'. From a water quality, logistical and economic standpoint this was an incredibly successful approach to removing nitrogen from surface and groundwater in agricultural areas. Continuing research on the same field site and development of methodology for targeting other focal areas for this treatment approach throughout the Santa Fe/Suwannee watershed has the potential to markedly reduce nitrogen loading and serve as a worldwide model for effective approaches. As a result of the success of this past 319 project, my relationship with the grower is already established, I already have a good understanding of field hydrology conditions and much of the field infrastructure is in place.

Appendix 1 – Signed letter of commitment from grower

THE HOLLY FACTORY

29010 NW County Road 241
Alachua, FL 32615
352-258-6974

To Whom It May Concern:

I am writing this letter on behalf of Casey Schmidt for documentation regarding his current grant proposal.

Florida Farms Inc d/b/a The Holly Factory is an EQIP eligible producer.

We enjoyed working with the UF Team (which included Casey Scmidt) to design, install and monitor the denitrification wall which is currently on our property. We are a willing participant in any further studies regarding the long term effect the wall has on nitrate reduction. We support and grant access to the property and the area needed for further research and study.

The Holly Factory is a mid to large size grower which supports and is active in many state growers associations to include Florida, Texas, North and South Carolina, Maryland and Alabama. I routinely talk with other growers about the research, specifically the denitrification wall, and the affects it has had on nitrate reduction. I talk about its simplicity and low impact. I also reference the water studies and media alternative approaches to reduce the flow through of irrigation water thus reducing nitrate runoff.

I very much enjoyed working with Casey and was very sad to see him leave. He very much took an active roll in understanding the entire growing process and the challenges it entails. He wanted to understand the growers side. The DRI is lucky to have Casey on their team.

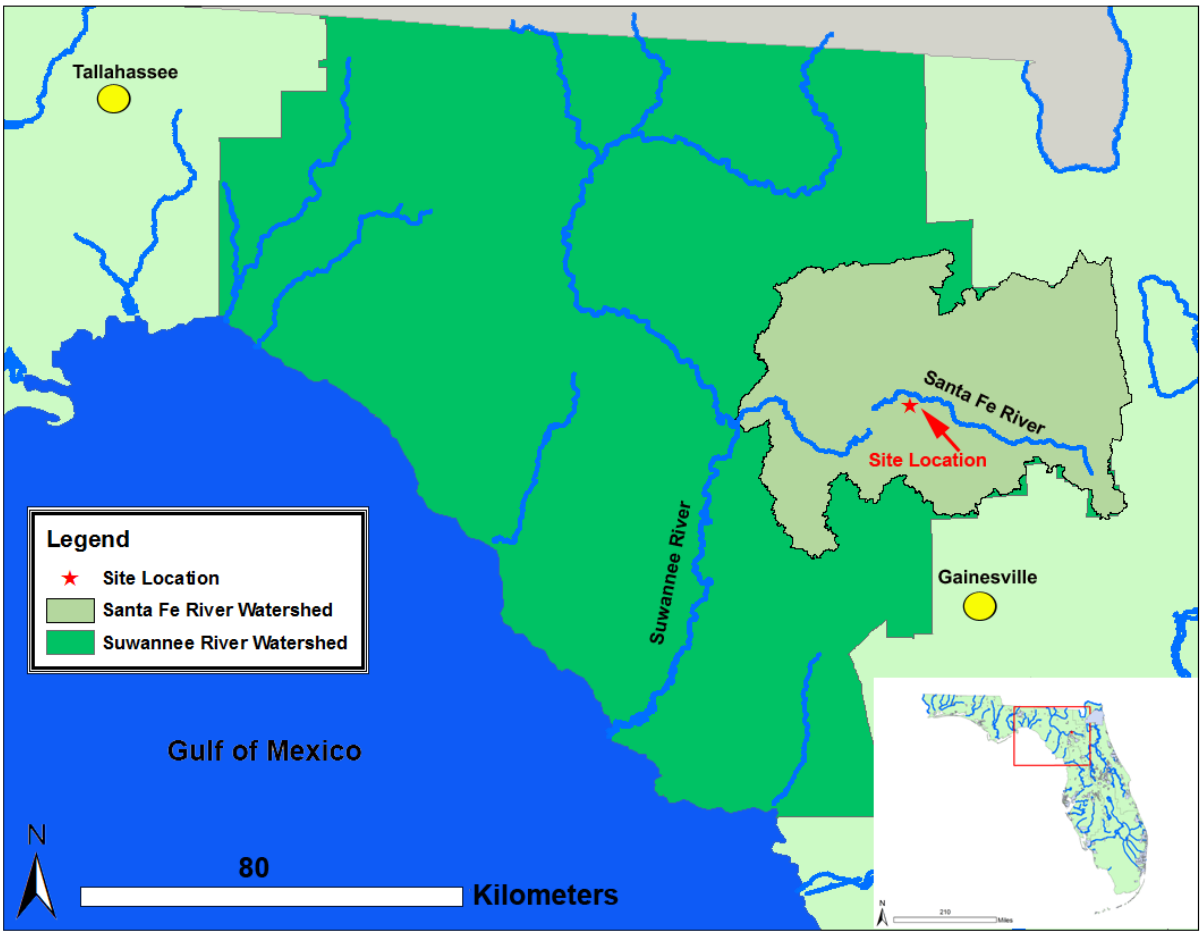
Sincerely,

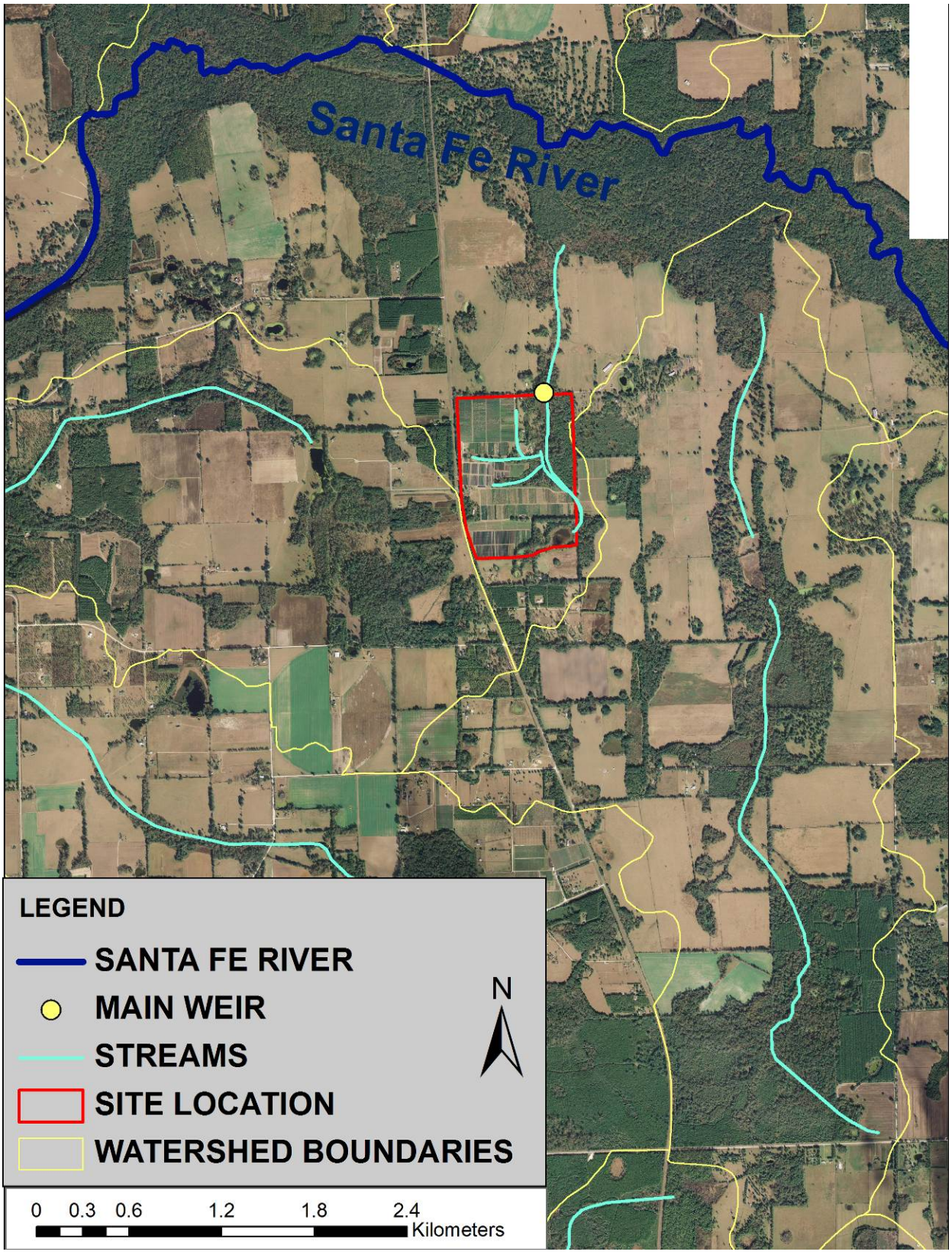
5/8/2013

Todd Stephens
Owner/GM

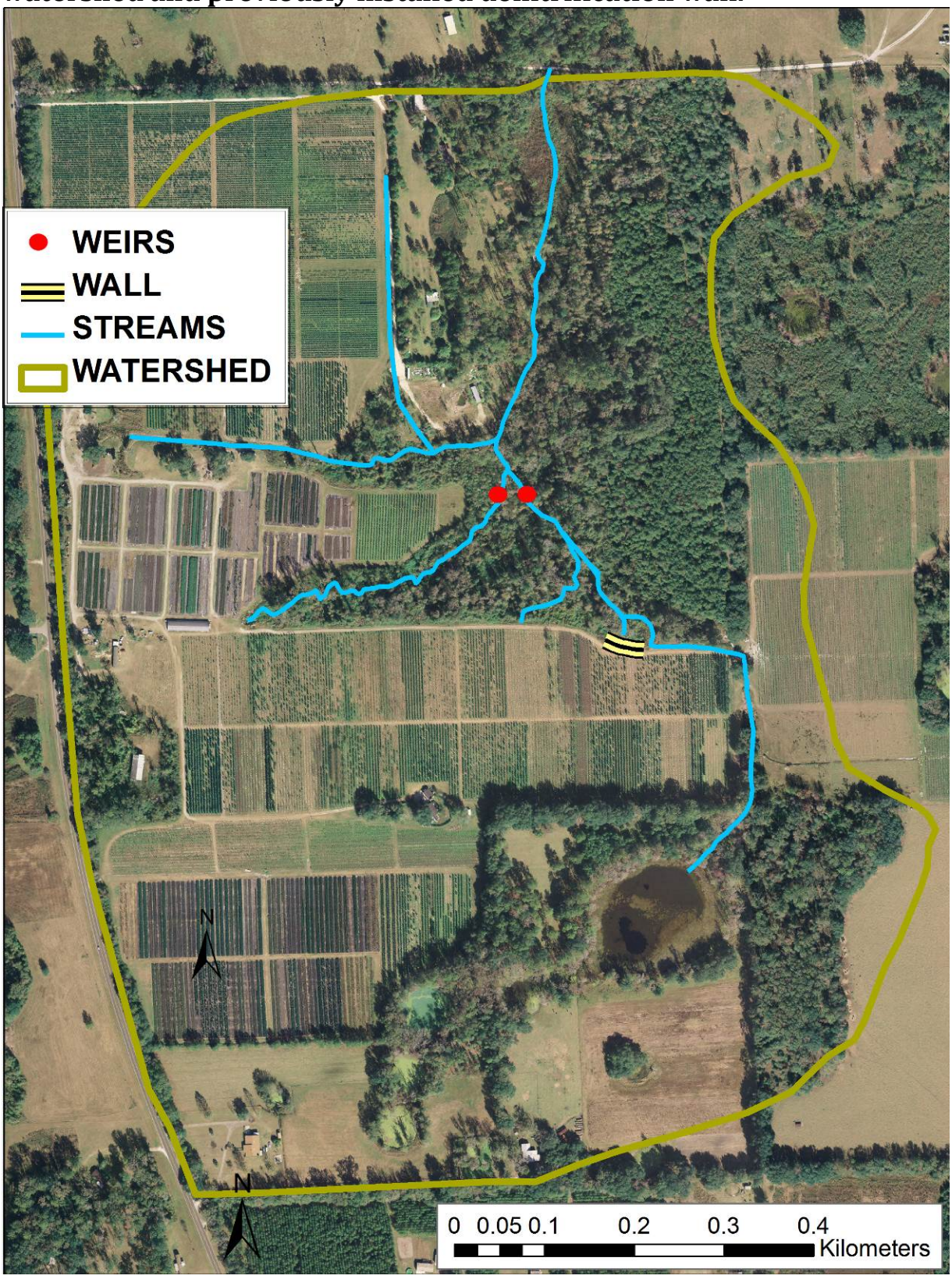
28515 N.W. CR 241 • Alachua, FL 32615 • 904-462-7910 • Fax: 904-462-7911

Appendix 2 – Large scale site location maps




Santa Fe River
LEGEND
SANTA FE RIVER
MAIN WEIR
STREAMS
SITE LOCATION
WATERSHED BOUNDARIES
N
0 0.3 0.6 1.2 1.8 2.4
Kilometers

Appendix 3 – A small scale map delineating the property boundary, watershed and previously installed denitrification wall.



Appendix 4 – A Proposed Monitoring Plan

Monitoring Infrastructure

Approximately every 200 ft along the denitrification wall, groundwater well transects will be by installed down to a confining layer following guidelines found in (USEPA, 2008. Design and Installation of Monitoring Wells. SESDGUID-101-R0. USEPA, Washington, DC). Wells will be installed upgradient and downgradient from the denitrification wall. These wells will be used to determine hydraulic loading rates as well as carbon and nitrogen losses and transformations through the denitrification wall.

Groundwater Hydrology

The groundwater discharge and hydraulic loading rate through the denitrification wall will be determined from groundwater elevation gradients measured with pressure transducers placed in each well. Pressure transducers collect hourly elevation measurements and the data will be downloaded monthly and calibrated quarterly. Hydraulic conductivity will be measured in-situ using slug test methods. Based on groundwater surface topography and hydraulic conductivity, the groundwater direction and velocity will be estimated within each well transect and interpolated across the ground watershed. These calculations will be supplemented by directly measuring groundwater velocity and direction in-situ using a heat-pulse groundwater flowmeter purchased from a previous EPA 319 grant. These methods are described in Schmidt and Clark, 2012a.

Water Sample Collection

Water samples will be collected with greater frequency for the first few weeks (biweekly) and then bimonthly for 12 months. This sampling frequency is based on the rapid rate of change in carbon exports and nitrogen reductions which occurs immediately after denitrification wall installation and the long-term stability after this period. Water samples will be collected within each well after purging two well volumes using a submersible pump. Samples will be collected and either filtered through a 0.45 µm membrane filter, then acidified or unfiltered and acidified directly, stored on ice and transported to the laboratory. Samples will be analyzed for nitrate, ammonium, TKN and DOC within appropriate holding times using standard methods as described in Schmidt and Clark, 2012a, b.

PROJECT 7

PROJECT NAME: ALL AMERICAN DITCH RETROFIT

PROJECT FUNDING REQUEST: $1,125,000 **MATCH:** $805,000

LEAD ORGANIZATION: Martin County Board of County Commissioners

CONTACT PERSON: GREG NOLTE
2401 SE Monterey Road
Stuart, Florida 34996
Tel: (772) 221-2380
Fax: (772) 288-5955
Email: gnolte@martin.fl.us

FEID NUMBER: 59-6000743
FISCAL YEAR END: SEPTEMBER 30, 2013

FINANCIAL COOPERATING PARTNERS:
Martin County Board of County Commissioners – Deborah Drum (ddrum@martin.fl.us)

OTHER COOPERING PARTNERS:
South Florida Water Management District (SFWMD) – Ray Palmer, 561-682-2246
St. Lucie Rivers Issues Team (SLRIT), [future] – Kathy LaMartina, 561-682-6594

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Palm City, Martin County, Florida
Impacted Watershed Name: South Fork of the St. Lucie River, St Lucie Estuary
Size of Project Impact: 36 acres
Size of Area Being Treated: 267.7 acres
Latitude: 27° 9.216' N
Longitude: 80° 15.994' W

Hydrologic Unit Code: 030302060501
Impaired waterbody affected: St Lucie River and Estuary Basin
Impairment: Nutrient (Total Nitrogen, Total Phosphorus) and Dissolved Oxygen
TMDL Status: Approved and adopted Total Maximum Daily Load (TMDL).
BMAP Status: A draft Basin Management Action Plan (BMAP) has been prepared and is in the process of being adopted.

Land Uses within the <u>area being treated:</u> Land uses within the basin are comprised of the following and are depicted in Attachment 2: Basin and Land Use Map.

Land Use *(Do not alter – All must be filled out; Do not add categories; place a 0 for no acres)*	**Acres**	**%**
Residential Low Density (1100)	5.44	2.0
Residential Medium Density (1200)	57.13	21.3
Residential High Density (1300)	53.50	20.0
Commercial and Services (1400)	13.15	4.9
Industrial (1500)	0.00	0.0
Extractive (1600)	0.00	0.0
Institutional (1700)	0.00	0.0
Recreational (1800)	17.58	6.6
Open Land (1900)	0.00	0.0
Agriculture (2000)	0.00	0.0
Upland Non-Forested (3000)	0.00	0.0
Upland Forests (4000)	68.24	25.5
Water (5000)	0.00	0.0
Wetlands (6000)	43.38	16.2
Barren Land (7000)	0.00	0.0
Transportation, Communication, and Utilities (8000)	9.24	3.5
Land Use Totals (Acreage and %)	**267.66**	**100**

LAND OWNERSHIP STATUS: (check one)

- ☐ Land necessary for the construction of treatment infrastructure has been acquired.
- ☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase).
- ☐ Land necessary for the construction of treatment infrastructure is under an easement which allows for the construction and access

Title of property for the proposed project is held by the South Florida Water Management District (SFWMD). Attachment 5 is an e-mail from the SFWMD indicating that Martin County and the SFWMD have always been a great partners in Everglades restoration and coastal watershed projects, and supports the process of obtaining grant funding for water quality improvements which benefit TMDL levels in the St. Lucie River and Estuary as this is a mutual objective of both SFWMD and Martin County. The SFWMD is currently engaged in their "East Coast Lands Assessment Process," in which this Mapp Road parcel is included, that is assessing each parcel of land in their ownership to ensure that the best use of the property is identified. The SFWMD has partnered with Martin County in the past on restoration efforts, and indicated their desire to continue mutually beneficial projects as our partner. However, because of the current timing of their "East Coast Lands Assessment Process," the SFWMD feels it is premature to provide a letter of support for our proposed project. Once they take the results of their Assessment to their leadership and Governing Board, they will be in position to speak more definitively on the use of this Mapp Road parcel for this project purpose. We commit to keeping you apprised as this situation develops, and will provide the requested land ownership status information as we identify the path forward for this property in cooperation with the SFWMD.

WATERSHED MANAGEMENT PLAN:

Martin County utilizes a number of Watershed Management Plans which have identified causes and sources that need to be controlled for pollution reduction to be achieved in the St. Lucie River / Estuary and Indian River Lagoon. These plans include:

- <u>Nutrient and Dissolved Oxygen TMDL for the St. Lucie Basin</u>: The waterbody this project discharges into is the South St. Lucie Estuary which has been identified as a nutrients impaired waterbody in the TMDL process and

is located in the Group 2, St. Lucie – Loxahatchee, (Water Body Identification) WBID 3210 and has an adopted TMDL, approved by the EPA for nutrients. BMAP activities are currently underway.

• The Northern Everglades and Estuary Protection Program (NEEPP): The Florida Legislature passed the Northern Everglades and Estuary Protection Program, Section 373.4595, F.S., in 2007. The primary goal of the legislature is to restore and to protect the state's surface water resources by addressing water quality, quantity, timing, and distribution of water to the natural system. This project supports the intent of the NEEPP to protect and restore surface water resources and achieve and maintain compliance with water quality standards in the downstream receiving waters and the St. Lucie River watershed.

• The St. Lucie River Watershed Protection Plan, 2009 (SLRWPP): The SLRWPP was developed in response to the NEEPP and was required to establish a St. Lucie River Watershed Construction Project, with the purpose of identifying potential water quality and quantity project within the St Lucie River Watershed and Estuary and to identify a preferred Plan that results in the most benefits to the St Lucie Estuary. Chapter 6 describes the tools and processes used to formulate and evaluate alternatives to meet overall project objectives for water quality and quantity. As a result, a Preferred Plan is identified that provides the best overall strategy for improving the hydrology, water quality and aquatic habitats with the SLRWPP study area. A detailed description of the Preferred Plan is included in Chapter 9.0. The All American Boulevard Ditch Retrofit, (SLE 35) project is identified as part of the Watershed Water Quality Projects, Stormwater Management in Section 9.1.2.2 of the Preferred Plan.

• Indian River Lagoon National Estuary Program Update 2008:
(1) Action FSD-4 - Develop and implement Best Management Practices (BMPs) for the management of stormwater, agriculture and freshwater discharges.
(2) Action FSD-11 – Educate residents and property owners about the impacts of freshwater and stormwater discharges on the Indian River Lagoon and what they can do to these impacts.
(3) Action FSD-13 - Upgrade existing urban and agriculture stormwater systems to reduce pollutant loads to the Indian River Lagoon.

In addition to comprehensive watershed plans, Martin County regularly consults with, and utilizes the SFWMD's on-going St. Lucie River Watershed Research and Water Quality Monitoring Program in determining the highest pollutant loaded tributaries to the St. Lucie River and Estuary. The All American Ditch ranks as the highest pollutant tributary to the St. Lucie River for Total Nitrogen and Total Phosphorus, out of more than 40 monitoring locations.

• The Martin County Capital Improvement Program: This project is listed in the Martin County 10-year Capital Improvement Program for design, land acquisition and construction.

• The Martin County Master Stormwater Plan outlines many historical stormwater and drainage problems within the Palm City area, and in particular the All American Ditch watershed area.

PROJECT OVERVIEW:
The All American Ditch Retrofit project is located within Section 20, Township 38 South, Range 41 East, in Palm City, east-central Martin County, Florida. Please refer to Attachment 1: Vicinity Map. The 267.7-acre watershed is generally bounded by SW Martin Highway (36th Street) to the north, All American Boulevard to the south, and the South Fork of the St. Lucie River and Danforth sub-division to the east and west, respectively.

A large portion of the eastern half of the watershed basin was first platted and developed in the 1920's before today's standards for water quality treatment. The drainage system consists of ad-hoc driveway and roadway culverts and swales that convey runoff to the All American Ditch, which discharges, uncontrolled and untreated, directly into the South Fork of the St. Lucie River. Please refer to Attachment 3: Pre-Development Drainage Map and Attachment 7: Pre-Project Photos. Through more than 10 years of water quality monitoring, the SFWMD ranks the All American Ditch as the most polluted of the St. Lucie River for Total Nitrogen and Total Phosphorus.

The project proposes to install a deep, wet detention lake and shallow Stormwater Treatment Area (STA). The STA will be configured in a treatment train system, located on a 36-acre parcel, currently owned by SFWMD, and, will be planted with native herbaceous, emergent and submergent plants. A portion of All American Ditch will be filled

and re-graded to direct flow to the STA. Traditional water quality components will be utilized in an innovative manner to maximize attenuation and residence time, reduce velocities in order to achieve the most possible load reductions within the proposed Lake and Stormwater Treatment Area (STA). Please refer to Attachment 4: Post-Development Drainage Map. The traditional water quality components are not included as part of the work in the Construction Task (Task 3) – it is outside the scope of this project work.

The primary objective of this project is to treat runoff and provide water quality benefits by reducing the nutrient loads of Total Phosphorus (TP) by an estimated 32.2%, Total Nitrogen (TN) by 37.7% and sediments, Total Suspended Solids (TSS) by 59% to the South St Lucie Estuary, a nutrient impaired water body with an adopted TMDL.

Other objectives of the project are to:

- ✓ implement an educational program that will tell the stormwater story and highlight the benefits of this project to improve water quality in the St. Lucie River, and educate the public of the TMDL program;
- ✓ construct a deep, wet detention pond with a shallow, Stormwater Treatment Area (STA) planted with native, herbaceous, wetland plants, configured in a meandering treatment train system to treat flows from All American basin;
- ✓ to implement a water quality monitoring program that will provide data analysis on the pollutant removal efficiency of the BMPs.
- ✓ increase the survivability of oysters within the South St. Lucie Estuary by means of reducing fresh water flows;

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 evaluated the pollutant load reduction by use of the Spreadsheet Tool for Estimating Pollutant Load (STEPL, 2007).

☐ This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and: (check one)

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

☐ 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:

BMPs Installed		**TSS tons/yr**	**TP lbs/yr**	**TN lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Wet Pond						Lead	Zinc
Pollutant Loads	Pre-Project	4.47	61.6	438.9	1,473.8	0.8	11.6
	Post-Project	1.79	33.9	285.3	1,473.8	0.2	4.6
	Load Reduction	2.68	27.7	153.6	0.0	0.6	7.0
	% Reduction	60.0%	45.0%	35.0%	0.0%	75.0%	60.0%
BMPs Installed		**TSS tons/yr**	**TP lbs/yr**	**TN lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**	**Other lbs/yr**
Wetland Detention						-	-
Pollutant Loads	Pre-Project	1.79	33.9	285.3	1,473.8	0.20	4.64
	Post-Project	0.40	19.0	228.2	545.3	0.07	3.02
	Load Reduction	1.39	14.9	57.1	928.5	0.13	1.62
	% Reduction	77.6%	44.0%	20.0%	63.0%	65.0%	35.0%

TOTAL		TSS tons/yr	TP lbs/yr	TN lbs/yr	BOD lbs/yr	Other lbs/yr LEAD	Other lbs/yr ZINC
Pollutant Loads	Pre-Project	4.47	61.6	438.9	1,473.8	0.795	11.60
	Post-Project	0.40	19.0	228.2	545.3	0.070	3.02
	Load Reduction	4.07	42.6	210.7	928.5	0.725	8.58
	% Reduction	91.0%	69.2%	48.0%	63.0%	91.25%	74.0%

EMCS USED IN MODEL: The Event Mean Concentrations (EMCs) listed below were used in the STEPL model to estimate the pre-project pollutant loads. These EMCs for TN and TP are consistent with the values used in the Florida Department of Environmental Protection (FDEP) spreadsheet model associated with the TMDL and BMAP process. The pollutant loads calculated and provided herein, are based only on stormwater runoff.

	TN	TP	TSS	BOD
Low Density Residential	0.970	0.125	23.000	4.700
Single-Family Residential	1.240	0.213	37.500	7.900
Multi-Family Residential	1.390	0.339	77.800	11.300
Low Intensity Commercial	0.710	0.117	57.500	7.700
Highway	0.990	0.143	37.300	5.200
Undeveloped / Rangeland / Forest	0.690	0.036	8.400	1.400
Wetlands	0.610	0.033	8.400	1.400

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.: The project proposes the use of a deep cell, 8-acre wet detention pond in series with a shallow water, 19-acre Stormwater Treatment Area (STA), planted with native, herbaceous, emergent and submergent plants. The purpose of this type of treatment train system is to reduce the velocities and provide residence time within the deep cell, wet detention pond, in order for physical settling of the suspended solids, followed by further polishing of the stormwater through the biological uptake of nutrients by the vegetation planted in the STA. The estimated residence time for the project is 122 days, which equates to a 42% removal efficiency of Total Nitrogen (TN) and a 76% removal efficiency of Total Phosphorus (TP), as determined by the formulas and graphs provided in Figures 5-9 and Figures 5-10 for Removal Efficiency of Total Phosphorus and Total Nitrogen in Wet Detention Ponds as a Function of Residence Time, in the Final Report for Evaluation of Current Stormwater Design Criteria within the State of Florida, June 2007.

This project will be designed in similar to the County's Tropical Farms Stormwater Retrofit Project in which residence time was determined in the Performance Efficiency Evaluation of the Tropical Farms Retrofit Project, Final Report to be 38.9 day. The report stated that, "Overall, the Tropical Farms treatment system removed approximately 54% of the total nitrogen, 93% of the total phosphorus, 98% of the TSS, and 70% of the Biological Oxygen Demand (BOD) inputs. These removal efficiencies are substantially greater than removal efficiencies normally associated with wet detention systems, and appear to be related to the unique design of the meandering pond system as well as the presence of the extensive aquatic vegetation."

TASKS and DELIVERABLES:

TASK NUMBER: 1
TASK NAME: Design and Permitting
TASK DESCRIPTION (detailed): County staff and the County's engineering consultant will design, engineer and permit the proposed project. As part of the engineering and permitting the County will have a survey prepared, geotechnical soil boring tests performed and analyzed, and an environmental assessment of the project site performed. This environmental assessment will consist of wetland determination, delineation and evaluation, protected species survey, vegetation and soil surveys, and historical / archeological resource coordination. The engineering consultant will prepare construction plans, technical specifications and bid documents for the use in

bidding and construction of the project. The schedule for this task is estimated to be nine (9) months. The County's Project Manager will develop in coordination with the engineering consultant the project design, and will be reviewed and assisted by the County's Division Manager.
DELIVERABLE: The deliverables will be one (1) copy of the project's Environmental Resource Permit (ERP), and one (1) copy of the construction plans and technical specifications;

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Division Manager	*72*	*$50 / hour*	-	-	*$3,600*
Project Manager	*330*	*$43 / hour*	-	-	*$14,190*
TOTAL	*402*	*varies*	-	-	*$17,790*

TASK NUMBER: 2
TASK NAME: Bidding and Award of Construction
TASK DESCRIPTION (detailed): County staff and the County engineering consultant will prepare, advertise for, address questions and issue addendums, receive and evaluate bids for construction of the proposed improvements. A Notice of Award will be given, contracts signed and executed and a Notice to Proceed issued to the selected responsive and responsible bidder. The County's Project Manager will assist the engineering consultant with preparing the technical specifications and the County's Purchasing Manager in conducting the bid process with the support of the Administrative Specialist and management by the County's Division Manager. The County's Financial Analyst will review the bids for grant compliance. Approximately number of hours for each staff member and the costs for staff time associated with this task is estimated to be $3,010 and the estimated engineering consult's cost is $2,000 for a total Task budget of $5,010.

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Purchasing Manager	*16*	*$45 / hour*	-	-	*$720*
Division Manager	*4*	*$50 / hour*	-	-	*$200*
Financial Analyst	*8*	*$40 / hour*	-	-	*$320*
Project Manager	*30*	*$43 / hour*	-	-	*$1,290*
Administrative Specialist	*20*	*$24 / hour*	-	-	*$480*
TOTAL	*78*	*varies*	-	-	*$3,010*

DELIVERABLE: One (1) copy of the bid tabulation and Notice to Proceed with construction to the selective construction contractor.

TASK NUMBER: 3
TASK NAME: Construction of BMPs
TASK DESCRIPTION (detailed): The County's selected contractor will fill and re-grade a portion of All American Ditch, excavate and grade the proposed deep, wet detention lake and shallow stormwater treatment area (STA). The STA will be planted with native herbaceous, emergent and submergent plants, the upland areas will be landscaped with trees and native grasses. The amenities and other associated improvements, including wooden boardwalks, wooden bridges and educational kiosk will be installed for educational purposes. The estimated construction schedule for this project is twelve (12) months. The Division Manager will assist, advise and review construction on a limited basis of an estimated 2 hours per week; the Project Manager will manage and inspect the construction on an estimated two hours per day and the Administrative Specialist will provide office support and assist the Project Manager on and estimated one hour per day.

DELIVERABLE: One (1) copy of the construction certification and As-Built drawings for the completed facilities as required by the regulatory permits.

Position	*Maximum Hours*	*Hourly Rate*	*Fringe Benefit (%)*	*Maximum Total Fringe per position*	*Maximum Total per position*
Division Manager	*144*	*$50 / hour*	-	-	*$7,200*
Project Manager	*360*	*$43 / hour*	-	-	*$15,480*
Administrative Specialist	*180*	*$24 / hour*	-	-	*$4,320*
TOTAL	*684*	*varies*	-	-	*$27,000*

TASK NUMBER: 4
TASK NAME: Water Quality Monitoring
TASK DESCRIPTION (detailed): The County proposes a water quality monitoring program that will develop a complete hydrologic budget, comprising of rainfall, evaporation, ground water inputs and losses, flow metering, and continuous flow-weighted composite sampling for a minimum of one (1) year. The monitoring program will be developed to evaluate the performance efficiency of the project, similar to the monitoring completed at the County's Tropical Farms Stormwater Retrofit Project. A Quality Assurance Project Plan (QAPP) will be prepared in cooperation with the FDEP and submitted for approval prior to commencement of any monitoring. The QAPP will specify the sampling locations by GPS, sampling instruments, and parameters to be sampled. The parameters may include, but are not limited to: TSS, Cd, Cr, Cu, Zn, NO2/NO3, TKN, NH3, TP, Orthophosphate, oil/grease, Fecal coliform, rainfall and flow. Monitoring is proposed to be a continuous flow-weighted composite sampling for a minimum of one (1) year. Both surface water and ground water monitoring is to be performed at inflow and outflow locations of each BMPs installed and in accordance with the approved QAPP. Project-specific details will be added during QAPP development.
DELIVERABLE: Draft QAPP; Approved QAPP; Monitoring results

TASK NUMBER: 5
TASK NAME: Public Education
TASK DESCRIPTION (detailed): A significant educational component is proposed for this project using educational signage on boardwalks, kiosk, mailing flyers to the surrounding residents and coverage on the Martin County newsletter. Additionally, the County Staff will participate in Water Fest and provide educational information regarding stormwater runoff and a specific display associated to this project. Please see Attachment 6 for an article of County staff's participation in Water Fest this year. County's Project Manager and Administrative Specialist will coordinate printing and mailing of materials, design of educational signage and preparation of exhibits for Water Fest.
DELIVERABLE: One (1) copy, the date, and the number of all distributed flyers and handouts will be provided. Pictures showing the construction of and completion of the boardwalks, kiosk and educational signage will be provided. Copies of articles regarding the project in the Martin County newsletter will be provided.

Position	*Maximum Hours*	*Hourly Rate*	*Fringe Benefit (%)*	*Maximum Total Fringe per position*	*Maximum Total per position*
Project Manager	*72*	*$43 / hour*	-	-	*$3,096*
Administrative Specialist	*21*	*$24 / hour*	-	-	*$504*
TOTAL	*93*	*varies*	-	-	*$3,600*

TASK NUMBER: 6
TASK NAME: Final Report
TASK DESCRIPTION (detailed): The County will complete and submit to the Department a Final Report. The Final Report will capture the outcome and results of the project, including all tasks included in this project. The Final Report will include, where applicable, why a BMP did not obtain *or* exceeded the expected removal efficiency; any problems encountered and how those problems were overcome; an explanation of any project delays;

a brief summary of any additional phases yet to be completed; and more. The Final Report template, available from the Department's contract manager, should be followed as much as possible.
DELIVERABLE: Draft final report; approved final report

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Project Manager	*120*	*$43 / hour*	-	-	*$5,160*
Administrative Specialist	*35*	*$24 / hour*	-	-	*$840*
TOTAL	*155*	*varies*	-	-	*$6,000*

TIMELINE:

Task No.	**Task Title** *(should match identically above)*	**Start**	**Complete**
1	Design and Permitting	Month 1	Month 9
2	Bidding and Award of Construction	Month 10	Month 12
3	Construction of BMP	Month 12	Month 24
4	Water Quality Monitoring	Month 22	Month 34
5	Public Education	Month 1	Month 33
6	Final Report	Month 34	Month 36

PROJECT BUDGET BY CATEGORY and TASK:

Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
1	Salaries	$0	$17,790	MC In-kind
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$188,000	MC MSTU
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$205,790	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
2	Salaries	$0	$3,010	MC In-Kind
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$2,000	MC MSTU
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$5,010	

Task No.	Category	Grant Funding	Match Funding	Match Source
3	Salaries	$0	$27,000	MC In-Kind
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$1,000,000	$550,000	MC MSTU / SLRIT
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$1,000,000	$577,000	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
4	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$100,000	$0	
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$100,000	$0	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
5	Salaries	$0	$3,600	MC In-Kind
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$25,000	$0	
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$7,400	MC MSTU
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$25,000	$11,000	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
6	Salaries	$0	$6,000	MC In-Kind
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$0	MC MSTU
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$200	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$6,200	
	Total:	$1,125,000	$805,000	
	Total Project Cost:	$1,930,000		

Percentage Match:	58.3%	41.7%	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	$0	$57,400	MC MSTU
Fringe Benefits Total	$0	$0	
Travel Total	$0	$0	
Contractual Total	$1,125,000	$740,000	MC MSTU / SLRIT
Equipment Purchases Total	$0	$0	
Supplies/Other Expenses Total	$0	$7,600	MC MSTU
Land Total	$0	$0	
Indirect Total	$0	$0	
Total:	$1,125,000	$805,000	
Total Project Cost:	$1,930,000		
Percentage Match:	58.3%	41.7%	

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: ☐ No: ☑ If no, explain: Due to the length of time (~1 – 1.5 years) to secure the Section 319 grant funds, it is too early to apply for other grants. Martin County will be submitting for a St. Lucie River's Issues Team Grant in the amount of $375,000 in next year's SLRIT grant cycle. In the event the County is unsuccessful in securing the SLRIT grant, Martin County will provide the additional funding through their Stormwater Reserves, Municipal Service Taxing Unit (MSTU).

- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  Yes: ☑ No: ☐ If yes, explain: The project proposes the use of a deep, wet detention lake in conjunction with a shallow, meandering Stormwater Treatment Area, (STA). The deep, wet detention lake will provide physical treatment by reducing velocities, adding residence time and allowing particles time to settle. The STA will be planted with native, herbaceous, emergent and submergent plants to provide biological treatment through nutrient uptake by the plants. Additionally, innovative water quality components will be installed to direct flows to the project, reduce velocities, increase residence time and control discharges to the South Fork of the St. Lucie River. The project proposes the same innovative uses of technology as the County's Tropical Farms Stormwater Retrofit Project.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  Yes: ☑ No: ☐ If yes, state the monthly fee: Martin County does not have a stormwater utility, however, stormwater fees are collected through an MSTU with a millage rate of 0.3575 per $1,000 of the resident's taxable home values. On an average the neighborhood taxable home values are approximately $58,250, which equates to a MSTU stormwater tax of $1.74 per month.

  The St. Lucie River Issues Team (SLRIT) was formed in 1998 by the South Florida Ecosystem Restoration Working Group. The mission of the SLRIT is to restore and protect the environmental and aesthetic values of the St. Lucie River and Estuary. It is a legislatively funded grant program supported by 17 local governments, agencies and stakeholder groups. The goal is to identify issues, prioritize and fund "turn dirt" projects that provide immediate results toward improving water quality or ecosystem functions in the St. Lucie River and Estuary. The team ensures that legislative dollars are leveraged with local dollars to implement the projects.

- Is the project located in or does it benefit any of the following areas:

  ☐ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one?

  ☐ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.

  ☑ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.

  Per the United States Census Bureau web site, the median house hold income for Palm City, Florida is $75,833. The range of median income of 50.1% to 80% is $37,992 to $60,667. At least 51% of the project's benefit is received by an area within this range of median income.

  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements. Yes: ☑ No: ☐ Yes, with exceptions: ☐

REFERENCES CITED:

- ✓ St. Lucie River Watershed Protection Plan, dated January 2009, prepared by South Florida Water Management District, Florida Department of Environmental Protection and the Florida Department of Agricultural and Consumer Goods.
- ✓ Draft Basin Management Action Plan for the Implementation of Total Daily Loads for Nutrients and Dissolved Oxygen Adopted by the Florida Department of Environmental Protection in the St. Lucie River and Estuary Basin, dated March 2013, developed by the St. Lucie River and Estuary Basin Technical Stakeholders.
- ✓ Evaluation of Current Stormwater Design Criteria within the State of Florida, Final Report, dated June 2007, prepared by Environmental Research & Design, Inc.
- ✓ Performance Efficiency Evaluation of the Tropical Farms Stormwater Retrofit Project, Final Report, dated January 2013, prepared by Environmental Research & Design, Inc.

The following are included as attachments to this application:

☐ Monitoring Plan: A monitoring plan is not attached however, the County proposes monitoring for this project in the very same concept and manner as the Tropical Farms Stormwater Retrofit Project. FDEP should have a copy of both the QAPP and the water quality report, referenced above, for this project on file for reference.

☑ Site Maps

- ☑ Vicinity Map: Regional site locator map showing the project site relative to the surrounding area: Attachment 1
- ☑ Basin and Land Use Map with basin boundary and aerial imagery. Attachment 2
- ☑ Pre-Development Drainage Map. Attachment 3
- ☑ Post-Development Drainage Map. Attachment 4

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

Attachment 5: SFWMD E-Mail Correspondence.

Attachment 6: News article referencing Water Fest in Stuart

Attachment 7: Pre-Project photos

PROJECT 8

PROJECT NAME: Minutemen Low Impact Development (LID) Stormwater Treatment Trains

PROJECT FUNDING REQUEST: $544,540 MATCH: $779,591

LEAD ORGANIZATION: City of Cocoa Beach Stormwater Utility

CONTACT PERSON: Joanie Regan, City Stormwater Manager
1600 Minutemen Causeway
Cocoa Beach FL 32931
Tel: 321-868-3292, ext 143
Fax: 321-868-3379
Email: jregan@cityofcocoabeach.com

FEID NUMBER: 59-6000300

FISCAL YEAR END: SEPTEMBER 30, 2013

FINANCIAL COOPERATING PARTNERS: City of Cocoa Beach Stormwater Utility

OTHER COOPERATING PARTNERS: SJRWMD/Indian River Lagoon Program (IRLNEP), Florida Department of Transportation (FDOT) Complete Streets Program

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: City of Cocoa Beach, Brevard County

Impacted Watershed Name: Downtown Minutemen Corridor (sub-basins B-1, B-2, B-3, and B-4).

Size of Project Impact: 6.61-acre project site

Size of Area Being Treated: 20.2-acre watershed

Latitude: 28N° 45' 31.18"

Longitude: 80E° 61' 20"

Hydrologic Unit Code: 03080202-006

WBID: 3057A

Impaired waterbody affected: Banana River Lagoon

Impairment: Nutrients: nitrogen, phosphorus

TMDL Status: Banana River (IRL), approved TMDL

BMAP Status: The full project lies within the Banana River Lagoon BMAP basin and is located in the City's sub-basins B-1 through B-4 basins, which have approved TMDLs and BMAPs by Florida's governor.

Land Uses within the area being treated:

Land Use *(Do not alter – All must be filled out; Do not add categories; place a 0 for no acres)*	**Acres**	**%**
Residential Low Density (1100)	0	0
Residential Medium Density (1200)	0	0
Residential High Density (1300)	0	0
Commercial and Services (1400)	13.6	67%
Industrial (1500)	0	0
Extractive (1600)	0	0
Institutional (1700)	0	0
Recreational (1800)	0	0
Open Land (1900)	0	0
Agriculture (2000)	0	0
Upland Non-Forested (3000)	0	0
Upland Forests (4000)	0	0
Water (5000)	0	0
Wetlands (6000)	0	0
Barren Land (7000)	0	0
Transportation, Communication, and Utilities (8000)	6.61	33%
Land Use Totals (Acreage and %)	**20.2**	**100**

LAND OWNERSHIP STATUS:

√ Land necessary for the construction of treatment infrastructure has been acquired. Title is held by City of Cocoa Beach, City-owned and maintained CRA property and ROWs.

☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase). Insert real titleholder and who owns option. If not the applicant, explain relationship to the applicant.

☐ Land necessary for the construction of treatment infrastructure is under an easement, which allows for the construction and access. Insert real titleholder and easement holder. If not the applicant, explain relationship to the applicant.

WATERSHED MANAGEMENT PLAN: This project supports actions noted in the Indian River Lagoon Comprehensive Conservation & Management Plan, and is listed in the City of Cocoa Beach Stormwater Mater Plan, adopted October 2011.

PROJECT OVERVIEW: Minutemen Causeway is the main street corridor for the City of Cocoa Beach, located in Brevard County on Florida's east central coast. The project corridor runs east to west across a five-block stretch of the Atlantic coastal barrier island. The City of Cocoa Beach is planning the installation of state-of-the-art, new technology LID treatment trains for a 20.2 acre watershed (subbasins B-1 through B-4). Most of the drainage area shares a single stormwater outfall. A small portion discharges to the Banana River Lagoon through separate outfalls. All project basins currently discharge untreated stormwater into the Banana River Lagoon, a waterbody that is part of the Indian River Lagoon (IRL) system, a designated "Estuary of National Significance." The proposed work will occur from the Atlantic dune line west five blocks along Minutemen to Cedar Avenue and uses four major Low-Impact Design (LID) best management practices (BMPs) in its treatments trains – these include native landscape rain gardens, (underground exfiltration) rain tanks, tree filters and pervious pavers. **T**he project will provide treatment for all stormwater flowing from the B-1 through B-4 sub-basins for the entire 20.2-acre drainage basin of urban downtown, densely developed land.

The projects objectives are:

- To build a Best Management Practices (BMP) treatment train that achieves more nitrogen and phosphorus removal from direct discharge to the Lagoon than the target nitrogen and phosphorus pollution removal required by the Banana River Lagoon Basin Management Action Plan.
- To augment part of the treatment train with Biological Adsorption Media also known as Biosorption Activated Media (BAM) to enhance the removal of nitrogen and phosphorus before entering the groundwater.
- To document capture of nitrogen and phosphorus using BAM before discharge of stormwater to the groundwater in the BMPs.
- To document the annual capture effectiveness of runoff from the constructed treatment trains and to compare results to design models, such as the BMPTRAINS model.
- To learn from the results of data collection and share with other local governments so that other areas may benefit from the best design and construction details.

The City will construct a unique treatment train with the intention of measuring annual runoff and annual pollution removal. The City has designed a "BMP TRAIN" for their urban environment where there are many utility conflicts. This train includes placing rain gardens designed as urban planters with raised sides as sitting areas throughout the main street corridor (see attachment Site Schematics/Photos for examples). As needed for pollution reduction, underground exfiltration or rain tanks will be installed coupled with the rain gardens or stand alone, depending on siting. Stand along tree filters promote a shaded walkway with benches and other pedestrian amenities. Pervious pavers will be used along roadway parking and sidewalk areas. These BMPs are easy to maintain and care has been used to develop a plan with visual acceptance and beautification as well as pollution reduction.

A design and analysis spreadsheet now exists for BMP treatment trains, appropriately called the BMPTRAINS model. The model evaluates BMPs in series and parallel configurations. The model has been developed based on the latest science of rainfall and runoff with consideration of the various rainfall patterns in the State (FSA Annual Conference by Dr. Wanielista). The BMPTRAINS model will calculate the average annual pollution controls effectiveness and the total annual load reductions for many BMP configurations used to meet BMAP, TMDL and impaired water removal specifications. This model was used to estimate the pollution removal of the Minutemen LID Stormwater Treatment Trains.

As stated earlier, BAM will be used to further reduce the nitrogen and phosphorus pollution mass before entering the groundwater. This particular sorption media has proven effective i.e. Marion County (FDEP, 2011) for removing phosphorus and nitrogen before the stormwater infiltrates into the groundwater table. BAM is media that removes pollution using chemical sorption as well as biological processes. Bold & Gold is one brand of BAM developed in Florida and made with local materials. Different types of Bold & Gold are used for different applications. Example applications are green roofs, retention basins, septic tank discharges and upstream upflow filters.

BMP Design in the Minutemen LID Project

There are four BMPs to be implemented and monitored in this treatment train – these include native landscape rain gardens, tree filters, underground rain tanks and pervious pavers. As stated earlier, this LID design will also use sorption media to sequester nitrogen and phosphorus prior to runoff infiltration to the groundwater. Depending upon site conditions and nutrient reduction targets – rain tanks may be coupled with rain gardens/tree filters or may be stand-alone where surface conditions preclude rain gardens or trees. Since pervious paver sidewalks infiltrate rain directly, keeping it from becoming polluted runoff, no BAM will be used with the paver sidewalks. BAM will be used with the pervious paver parking, which receives runoff from the roadway. All above LID BMPs will contain a layer of BAM approximately 3-4" thick. In the landscaped rain gardens and tree filters, this layer will be below the native soils and mulch. In the rain tank system, it will be below the rock base material. With the pervious pavers, the BAM will be below the paver support material (sand).

In addition to monitoring the pre and post discharge volumes and associated pollutant loadings, project monitoring will also include pre and post groundwater monitoring to see if a change in groundwater nutrient concentration can be derived from installation of these groundwater protecting LID BMPs. To evaluate actual LID BMP BAM effectiveness, we will compare nutrient removal from each LID type – one containing the BAM and one without this sorption media. There is a great need in Florida to keep surface nutrients from entering the groundwater system, particularly in sandy well-draining soils – this project's monitoring will evaluate the effectiveness of this nutrient-reducing media's performance in accomplishing this task. The particular BAM proposed for this project is a special blend being tested and is tentatively named 2C2B Gold (City of Cocoa Beach Bold & Gold) as it will be making its first real world application in this project!

BAM will be designed into each BMP type (landscape rain garden, tree filter, rain tank, pervious paver) to allow for long-term maintenance i.e. replacement of the media in a few decades without having to tear up the surface infrastructure. These designs will be available to other agencies for consideration since this LID concept is young and maintenance of these urban designs is still being studied.

This project is estimated to reduce TN by 66.9 lb/yr or 74% and TP by 13.9 lb/yr or 74%.

The BMP treatment train will be a method of removing pollutant, an aesthetically pleasing pedestrian corridor and an opportunity to educate the public about the effectiveness of LID. The educational components of the project will be:

- the use of urban landscape as a pollution reduction system and a benefit to the lagoon.
- capturing rain as close to the source as possible to reduce the potential for picking up pollutants, therefore reducing the potential for contamination of groundwater.
- use of pervious paver systems to allow rain to percolate directly, minimizing nutrient concentrations – while providing urban beautification.
- designing pedestrian components into stormwater treatment such as sitting areas around rain garden planters and/or tree filters.
- use of smart technologies such as BAM to capture nutrients and protect the lagoon.

An onsite kiosk with display will be erected at the project site telling the stormwater project story. This project will be featured in the City of Cocoa Beach's newsletter and as a news item in local sections of newspapers. Finally, an exhibit of the City's stormwater projects will be displayed at the Space Coast Art Festival (Cocoa Beach) in November - which is widely attended, to educate the public about the lagoon fragility and the Federal, State and City's efforts to reduce stormwater pollution to the lagoon.

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: Spreadsheet Tool for Estimating Pollutant Load (STEPL, 2007). BMPTRAINS model was used for pollutant load calculation removal rates. The model used was BMPTRAINS ver.5 to estimate the removal (water capture) effectiveness. The pollutant load removal rate was approximately 74% for both nutrients, which is the reduction that the system will be designed for.

8.34 acre section BMPs Installed		TSS lbs/yr	TP lbs/yr	TN lbs/yr	Sediment lbs/yr	BOD lbs/yr	Other lbs/yr
Rain Gardens							
Pollutant Loads	Pre-Project		2.13	10.3			
	Post-Project		0.55	2.66			
	Load Reduction		1.58	7.61			
	% Reduction		74.0%	74.0%			
Rain Tanks/Tree Filters		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project		8.99	43.2			
	Post-Project		2.34	11.2			
	Load Reduction		6.65	32.0			
	% Reduction		74.0%	74.0%			
Pervious Pavers		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project		7.69	36.9			
	Post-Project		2.00	9.60			
	Load Reduction		5.69	27.3			
	% Reduction		74.0%	74.0%			
TOTAL		**TSS lbs/yr**	**TP lbs/yr**	**TN lbs/yr**	**Sediment lbs/yr**	**BOD lbs/yr**	**Other lbs/yr**
Pollutant Loads	Pre-Project		18.8	90.4			
	Post-Project		4.89	23.5			
	Load Reduction		13.9	66.9			
	% Reduction		74.0%	74.0%			

EMCS USED IN MODEL The loading model data (EMCs) were provided in the IRL BMAP. a. Nitrogen (lbs/ac/yr) =10.71 b. Phosphorus (lbs/ac/yr) = 2.23

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.: Residence times in the BMPs were all less than 72 hours.

Pollutant Load Reduction Table was derived from an 8.3-acre section of the 20.2-acre total project area.

TASKS and DELIVERABLES:

TASK NUMBER: #1

TASK NAME: Engineering Design and Permits

TASK DESCRIPTION (detailed): Complete engineering design plans for LID BMPs, including rain gardens, tree filters, rain tanks, pervious pavers and BAM (nutrient biological adsorption media) addition to these systems.

DELIVERABLE: A complete set of design and construction drawings with construction specifications and the required permits for this project.

TASK NUMBER: #2

TASK NAME: Prepare Bid with Federal Procurement Procedures

TASK DESCRIPTION: Prepare, send, receive, evaluate and award construction bid. **DELIVERABLE**: A construction contract with a notice to proceed given to the responsible, most qualified low bidder.

TASK NUMBER: 3

TASK NAME: Construction Phase

TASK DESCRIPTION: The City will construct a unique treatment train of LID BMPs to capture rainfall as close to where it falls as possible. The BMP treatment train will be a method of removing pollutants, an aesthetically pleasing pedestrian corridor and an opportunity to educate the public about the effectiveness of LID.

All storm runoff will be treated by one or more BMPs. This train will include placing landscape rain gardens designed as urban planters with raised sides to double as sitting areas throughout the main street corridor (see attachment Site Schematics/Photos for examples). This treatment train will also include tree filters and underground rain tanks will be installed with the rain gardens/tree filters or stand alone, depending on siting. Pervious pavers will be used for sidewalks and along roadway parking areas. All of these LID BMPs except the sidewalks will contain a layer of BAM approximately 3-4" thick to sequester nitrogen and phosphorus prior to runoff infiltration to the groundwater. In the landscaped rain gardens and tree filters, the BAM will be below the native soils. In the exfiltration system, it will be below the rock base material. With the pervious pavers, the BAM will be below the paver support material (sand). These BMPs are easy to maintain and care has been exercised to develop a plan with visual acceptance and beautification as well as pollution reduction. The BAM is designed for long-term maintenance i.e. replacement of the media in a few decades without having to tear up the surface infrastructure.

DELIVERABLE: Completed LID stormwater treatment system ready to be monitored for nutrient removal capability. Dated photographs depicting construction of the facilities. As-Built Certification from the engineer of record and City of Cocoa Beach Engineering Department acceptance will be provided.

TASK NUMBER: #4

TASK NAME: Monitoring

TASK DESCRIPTION: Complete and submit to the Department a Quality Assurance Project Plan (QAPP) for monitoring prior to commencement of project monitoring. The QAPP will specify the sampling timeframe, sampling locations, sampling instruments, and parameters to be sampled.

Pre and post sampling will include automated flow and sampling for nutrients and other pollutants of concern. There will be ambient canal water monitoring for nutrients and pollutants of concern also – both pre and post project. To get a better idea of nutrient levels within the barrier island groundwater gradient – groundwater monitoring wells will be installed along the project corridor from east to west. These wells will be sampled for nutrients at multiple depths to understand how the nutrient concentration varies by depth. This data will give an indication of the background legacy nutrient levels in the groundwater. If nutrient concentrations are consistent at various depths for two sampling periods, then only one sample at a representative depth will be taken. The groundwater will be sampled this way prior to project start and during the post project monitoring period. Sampling locations shall be recorded and verified using a GPS device.

Post project monitoring will also include sampling to characterize the nutrient load in the runoff going to the BMPs. This will be accomplished by sampling the runoff entering two rain gardens and two rain tanks. It is not possible to sample the runoff sheet flow to the tree filters or pervious pavers but it is assumed that this will be of the same nature as the runoff to the rain gardens and rain tanks. The main stormwater outfall from the system will continue to be sampled (automated flow/sampling) to evaluate the reduction in storm flow due to the LID BMPs and also to evaluate the nutrient concentration reduction to surface water through LID BMP installation.

In order to test the performance of the BAM (sorption media) in the system, one of each type of LID BMP will be constructed without the sorption media while the remainder of the BMPs will be constructed with the sorption media. Shallow monitoring wells will be installed under each BMP type (with and without BAM) for a total of 8 shallow BMP monitoring wells - to evaluate the nutrient concentration infiltrating into the soils and groundwater from each BMP – and to test the effectiveness of the BAM in nutrient removal to the groundwater. The comparison of the nutrient removal of the BMPs with and without the BAM will be calculated. This information will help develop guidelines for future construction within the BMAP and for other applications. Watershed rainfall will be recorded.

DELIVERABLE: Draft QAPP; Approved QAPP, Monitoring results/report

TASK NUMBER: #5

TASK NAME: Implement planned educational component

TASK DESCRIPTION:

The educational components of the project will be:

- use of urban landscape as a pollution reduction system and a benefit to the lagoon.
- capturing rain as close to the source as possible to reduce the potential for picking up pollutants, therefore reducing the potential for contamination of groundwater.

- use of pervious paver systems to allow rain to percolate directly, minimizing nutrient concentrations – while providing urban beautification.
- designing pedestrian components into stormwater treatment such as sitting areas around rain garden planters and/or tree filters.
- use of smart technologies such as BAM to capture nutrients and protect the lagoon.

An onsite kiosk with display of the stormwater project, tabling at City art fest showing project goals/progress and educate public on the lagoon and efforts to protect it, provide articles for the City's website and local newspapers.

DELIVERABLE: Educational kiosk, festival tabling, articles on website and newspapers.

TASK NUMBER: #6

TASK NAME: Grant Admin and Final Report

TASK DESCRIPTION: Complete and submit to the Department a Final Report. This Final Report is intended to capture the outcome and results of the selected project, including all tasks included in this project. This shall include, where applicable, why a BMP did not obtain or exceed the expected removal efficiency; any problems encountered and how those problems were overcome; an explanation of any project delays; a brief summary of any additional phases yet to be completed; and more. The Final Report template, available from the Department's contract manager, should be followed as much as possible. Quarterly information regarding the status of the project conveyed to the public. Slides will be taken throughout design and construction

DELIVERABLE: Draft final report; approved final report

TIMELINE:

Task No.	**Task Title** *(should match identically above)*	**Start**	**Complete**
1	Engineering/Design	Month 1	Month 6
2	Bidding	Month 6	Month 8
3	BMP Construction	Month 9	Month 20
4	Water Quality Monitoring	Month 1	Month 20
5	Education	Month 1	Month 21
6	Grant Admin/Final Report	Month 20	Month 22

PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1 - Engineering/Design	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$118,000	CB SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$118,000	

Task No.	Category	Grant Funding	Match Funding	Match Source
2 - Bidding	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$5,000	CB SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$5,000	

Task No.	Category	Grant Funding	Match Funding	Match Source
3 - BMP Construction	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual*	$544,540	$526,591	CB SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$544,540	$526,591	

- Under this funding, BMP Construction includes installation of rain gardens, rain tanks, tree filters and pervious pavers.

Task No.	Category	Grant Funding	Match Funding	Match Source
4 - Water Quality Monitoring	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$100,000	CB SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$100,000	

Task No.	Category	Grant Funding	Match Funding	Match Source
5 - Education	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$20,000	CB SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$20,000	

Task No.	Category	Grant Funding	Match Funding	Match Source
6 - Grant Admin/Final Report	Salaries	$0	$0	
	Fringe Benefits	$0	$0	
	Travel	$0	$0	
	Contractual	$0	$10,000	CB SW Utility
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$10,000	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	$0	$0	
Fringe Benefits Total	$0	$0	
Travel Total	$0	$0	
Contractual Total	$544,540	$779,591	CB SW Utility
Equipment Purchases Total	$0	$0	
Supplies/Other Expenses Total	$0	$0	
Land Total	$0	$0	
Indirect Total	$0	$0	
Total:	$544,540	$779,591	
Total Project Cost:	$1,324,131		
Percentage Match:	41.1%	58.9%	

Note: Tables for pollutant load and budget show values that include this project funding only, which was originally conceived and submitted as a phased project (based on 8.3 acres of 20.2 acres of total project area). This project is now being built as one project. In addition to the Cocoa Beach Stormwater Utility (CBSU), this project has other funding partners including SJRWMD/IRLNEP and FDOT.

ADDITIONAL REQUIRED INFORMATION:

If this is a multi-year project, have you requested sufficient funds to complete the project
Yes: ☐ No: √ We will apply for a TMDL grant Nov 1, 2013 for additional funding for Phase 1 BMPS, which is part of the full project site.

Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
Yes: √ No: ☐ New state-of-the-art bioswale urban planters, tree filters/silva cells, pervious pavers, with Bold & Gold **Biosorption Activated Media system**.

Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
Yes: √ No: ☐ If yes, state the monthly fee: $6/month.

Is the project located in or does it benefit any of the following areas:
☐ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one? Moore's Creek Drainage area is within a Front Porch Community.
√ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.
☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.
☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations.
Yes: √ No: ☐ Yes, with exceptions: ☐ Provide details of exceptions.

REFERENCES CITED:

FDEP, 2011, "Nitrogen Transport and Transformation Beneath Stormwater Retention Basins in Karst Areas and Effectiveness of Stormwater Best Management Practices for Reducing Nitrate Leaching to Ground Water, Marion County, Florida, Wanielista, et.al., FDEP Report S0316, October, Tallahassee Fl.

The following are included as attachments to this application:

√ 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
√ Other Relevant Information, including pre-construction photographs, BMP documentation, and probable engineers cost sheet, Attachment 5-7

Minutemen Corridor LID Stormwater Treatment Trains

City of Cocoa Beach

ATTACHMENTS

Attachment 1, SW Sampling Protocol Plan for Minutemen Cswy

Attachment 2, Minutemen Cswy Locator Map

Attachment 3, Treatment Area Map for Minutemen Cswy

Attachment 4, New Technology Photos of some of the planned LID BMPs

Attachment 5, Photographs at Minutemen Cswy, Project Site

Attachment 1
SW Sampling Protocol Plan for Minutemen Cswy Treatment Trains in Cocoa Beach

MONITORING PLAN
MONITORING TO DETERMINE TREATMENT EFFECTIVENESS

Complete and submit to the Department a Quality Assurance Project Plan (QAPP) for monitoring prior to commencement of project monitoring. The QAPP will specify the sampling timeframe, sampling locations, sampling instruments, and parameters to be sampled.

Pre and post sampling will include automated flow and sampling for nutrients and other pollutants of concern. There will be ambient canal water monitoring for nutrients and pollutants of concern also – both pre and post project. To get a better idea of nutrient levels within the barrier island groundwater gradient – groundwater monitoring wells will be installed along the project corridor from east to west. These wells will be sampled for nutrients at multiple depths to understand how the nutrient concentration varies by depth. This data will give an indication of the background legacy nutrient levels in the groundwater. If nutrient concentrations are consistent at various depths for two sampling periods, then only one sample at a representative depth will be taken. The groundwater will be sampled this way prior to project start and during the post project monitoring period. Sampling locations shall be recorded and verified using a GPS device.

Post project monitoring will also include sampling to characterize the nutrient load in the runoff going to the BMPs. This will be accomplished by sampling the runoff entering two rain gardens and two rain tanks. It is not possible to sample the runoff sheet flow to the tree filters or pervious pavers but it is assumed that this will be of the same nature as the runoff to the rain gardens and rain tanks. The main stormwater outfall from the system will continue to be sampled (automated flow/sampling) to evaluate the reduction in storm flow due to the LID BMPs and also to evaluate the nutrient concentration reduction to surface water through LID BMP installation.

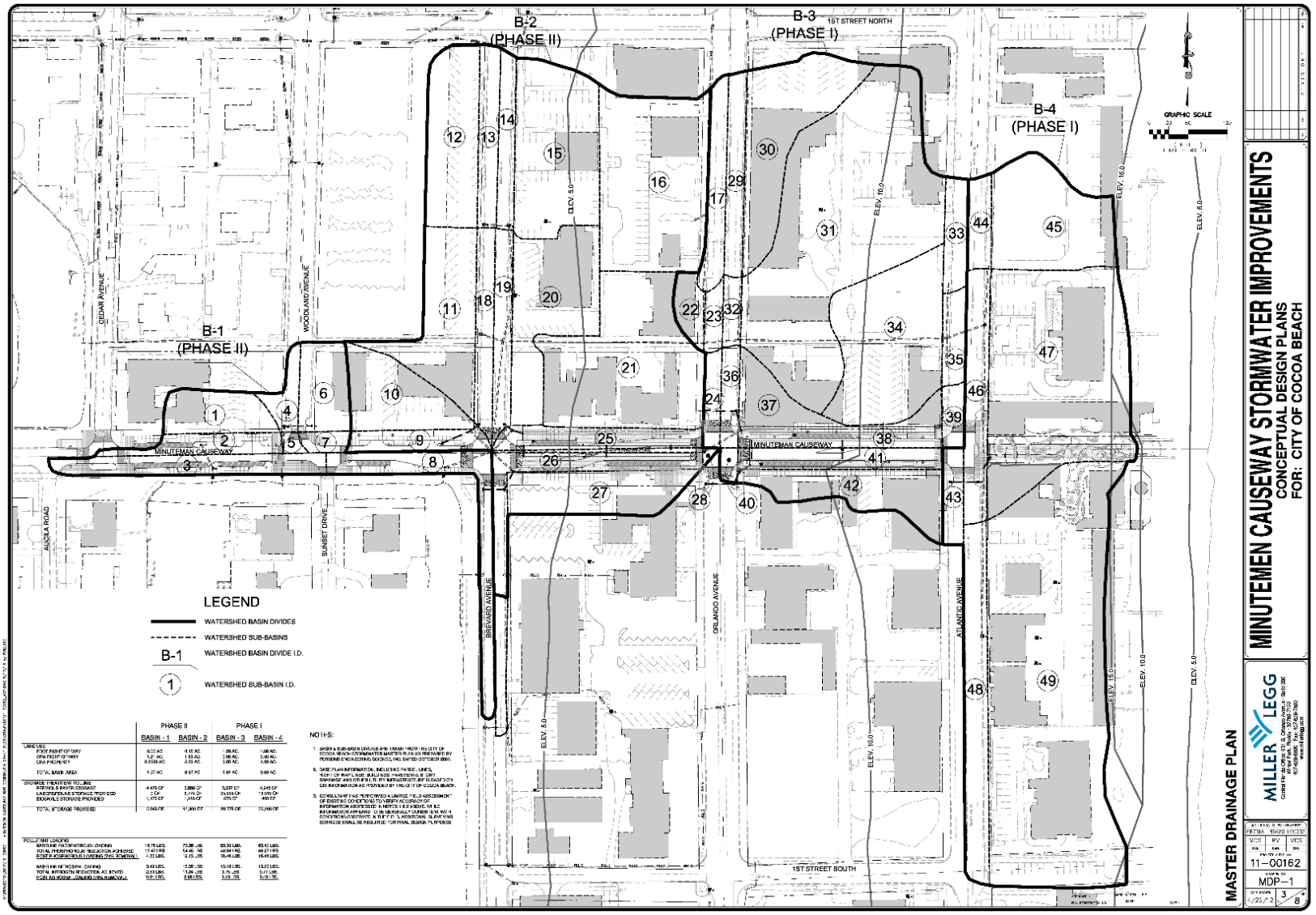
In order to test the performance of the BAM (sorption media) in the system, one of each type of LID BMP will be constructed without the sorption media while the remainder of the BMPs will be constructed with the sorption media. Shallow monitoring wells will be installed under each BMP type (with and without BAM) for a total of 8 shallow BMP monitoring wells - to evaluate the nutrient concentration infiltrating into the soils and groundwater from each BMP – and to test the effectiveness of the BAM in nutrient removal to the groundwater. The comparison of the nutrient removal of the BMPs with and without the BAM will be calculated. This information will help develop guidelines for future construction within the BMAP and for other applications. Watershed rainfall will be recorded.

Attachment 2
Minutemen Cswy Location & Vicinity maps

Location Map: This project is located on Florida's east central coast in the City of Cocoa Beach on the Banana River Lagoon.

Vicinity Map: The project site is located on the eastern boundary of the City of Cocoa Beach near the dune line of the Atlantic Ocean and spans west towards the Banana River Lagoon. It is located adjacent to the south of Cape Canaveral and Port Canaveral on Florida's east central coast.

Attachment 3, Drainage Basin/Treatment Area Map for Minutemen Cswy, (includes drainage sub-basins)



Attachment 4 - New Technology Photos of some of the planned BMPs,

The project will use a number of state-of-the-art technologies including BAM (Biosorption Activated Media), Rain Gardens (urban planters), Tree Filters (silva cells), Rain Tanks (underground exfiltration), and Pervious Pavers. Below are some photographs showing the various BMPs planned for the project.

Bio-Swales, Vegetation Planters, Pervious pavers and tree planters

Rain Gardens will be designed as Urban Planters so as to blend with the urbanized coastal environment of Cocoa Beach. Some of the planters will be designed with raised sides to serve as seating areas throughout the
corridor.

Attachment 5, Photographs at Minutemen Cswy, project site

Looking east along Minutemen along the northern sidewalk.

In front of City Hall near Orlando Avenue at the middle of the project area

Standing on Orlando Avenue on the south sidewalk in front of city hall. This shows how wide the area is along Minutemen Causeway. There is ample of room to install the various BMPs.

PROJECT 9

PROJECT NAME: Tulip Drive Stormwater Improvement Project

PROJECT FUNDING REQUEST: $176,840 **MATCH:** $172,540.00

LEAD ORGANIZATION: City of Sebastian, FL

CONTACT PERSON: Joseph Griffin, Interim City Manager
1225 Main Street
Sebastian, Florida 32958
772-388-8228
jgriffin@cityofsebastian.org
FEID NUMBER: 59-6000427
FISCAL YEAR END: September 30, 2012 to September 29, 2013

FINANCIAL COOPERATING PARTNERS: City of Sebastian

OTHER COOPERING PARTNERS: Neel-Schaffer (Consultant Engineer)

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Sebastian, FL
Impacted Watershed Name: Indian River Lagoon, Saint Sebastian River
Size of Project Impact: 1.25 acres
Size of Area Being Treated: 10.8 acres
Latitude: 27°46'33.13"N
Longitude: 80°29'20.75"W
Hydrologic Unit Code:
WBID: Indian River Lagoon: 5003D Saint Sebastian River: 3129B
Impaired waterbody affected: Indian River Lagoon: 5003D1
Saint Sebastian River South Prong: 3129B

Impairment: This project is part of a Basin Management Action Plan (BMAP), which is a plan that aims to reduce nutrient loadings from stormwater runoff into the Indian River Lagoon, in Sebastian, FL. In addition to reducing nutrient loads into the Indian River Lagoon, it will reduce the amount of nutrient loadings into the Saint Sebastian River watershed. The project area is residential with recreation fields. Runoff from surrounding yards and recreation fields will be held in an on-site wet retention pond, allowing time for nutrients to be filtered out of the runoff water through percolation instead of directly flowing to impaired watersheds.

TMDL (Total Maximum Daily Load) Status:

Indian River Lagoon (WBID: 5003D): IMPAIRED
TMDL TN (total nitrogen) (lbs/yr): 684,715
TMDL TP (total phosphorus) (lbs/yr): 111,594
Saint Sebastian River (WBID: 3129B): IMPAIRED
TMDL TN (total nitrogen) (lbs/yr): 142,855
TMDL TP (total phosphorus) (lbs/yr): 26,899

BMAP Status: The Indian River Lagoon is listed as an impaired water body and has an adopted Basin Management Action Plan (BMAP) as of February 7, 2013.

Land Uses within the area being treated:

Land Use *(Do not alter – All must be filled out; Do not add categories; place a 0 for no acres)*	**Acres**	**%**
Residential Low Density (1100)	0	-
Residential Medium Density (1200)	5.0	46%
Residential High Density (1300)	0	-
Commercial and Services (1400)	0	-
Industrial (1500)	0	-
Extractive (1600)	0	-
Institutional (1700)	0	-
Recreational (1800)	2.9	27%
Open Land (1900)	1.9	18%
Agriculture (2000)	0	-
Upland Non-Forested (3000)	0	-
Upland Forests (4000)	0	-
Water (5000)	0	-
Wetlands (6000)	0	-
Barren Land (7000)	0	-
Transportation, Communication, and Utilities (8000)	1.0	9%
Land Use Totals (Acreage and %)	**10.8**	**100**

LAND OWNERSHIP STATUS: (check one)

X Land necessary for the construction of the retention infrastructure has been acquired. Title is held by The City of Sebastian, FL.

☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase).

☐ Land necessary for the construction of treatment infrastructure is under an easement which allows for the construction and access.

WATERSHED MANAGEMENT PLAN: Central Indian River Lagoon Basin Management Action Plan- January 2013. This BMAP plan can be fully viewed at http://publicfiles.dep.state.fl.us/DEAR/BMAP/IndianRiverLagoon/Archive/. (See citation in the References Cited section.)

BMAP Section 1.3.3, page 9, states the TMDL's and pollutant load allocations adopted by the rule for Central Indian River Lagoon (IRL) sub basin, will provide target nutrient loads within the entire IRL.

BMAP Section 1.4.1, page 15, states the assumptions for obtaining the proper level of total nitrogen and total phosphorous, and use of Best Management Practices (BMP's).

BMAP Section 3.2, page 23, states municipalities regulated by the NPDES Stormwater Program through their Municipal Separate Storm Sewer System program (MS4) shall monitor their storm water conveyance systems and implement TMDL requirements. The MS4 permit number for the City of Sebastian is FLR04E124.

BMAP Section 3.5.2, page 26, states BMP's and other management measures will be used to achieve the maximum extent practicable (MEP) for TMDL or BMAP implementation. Such actions involve reducing the discharge of pollutants to surface waters of the state.

PROJECT OVERVIEW: The City of Sebastian has identified the need for additional stormwater retention in the area of the Sebastian Barber Street Sport Complex field as part of the City's Stormwater Master Plan. In addition to the wet retention pond improvements, the City of Sebastian has also planned to install pervious parking with grassy treatment area along Tulip Drive at the southern end of the Barber Street Sport Complex, which is in between Barber Street and Howe Lane.

This drainage project is identified in the City's Stormwater Master Plan to install a wet retention pond along Tulip Drive to manage and treat stormwater runoff during the 25 year event within the Tulip Drive watershed. Currently,

the street floods and surrounding area has drainage issues during heavy rainfall events. This project will install angle parking (pervious surface) along northside of Tulip Drive adjacent to the city's soccer field to manage the stormwater into the grassy field to help reduce stormwater runoff. A new 2 ft Miami curb is needed between the parking spaces and the existing street pavement edge to handle the runoff from Tulip Drive back into the grass swale system near the intersection of Tulip at Persian Lane. A Miami curb is a 2 ft shallow concrete surface to handle street runoff. The stormwater will continue along the existing swale system along Tulip Drive to Croaque St and then cross Tulip Drive into a new wet retention pond as modeled and identified in the City's Stormwater Master Plan. The modeling was done comparing the existing swale conditions verses the pervious surfacing.

The current stormwater BMP, a shallow swale system, is insufficient to handle the heavy rains, causing Tulip Drive and surrounding streets to flood. This project will replace the existing grassy swale with a pervious parking and grassy treatment area and a new wet retention pond. In order to prevent untreated stormwater from entering into the Saint Sebastian River South Prong and channels that connect to the Indian River Lagoon, a 0.65 acre wet retention pond will be installed with 4:1 side slopes from top of bank to 2-ft below normal water levels, then a 2:1 to bottom of pond. The wet retention pond will collect and hold water from the recreation fields, surrounding residences, and Tulip Drive. The wet retention pond will allow for nutrient loading removal instead of loading into impaired surface waters and wetlands, such as the Indian River Lagoon and the Saint Sebastian River. The grass swales will be modified to handle the stormwater runoff into the new wet retention pond. The educational components to the project include: (1) a public announcement, through the local television channel, regarding the project and the effects of stormwater pollution; (2) informational brochures; and (3) a display at City Hall illustrating the BMP's of the project.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED:

X This proposal is for a structural BMP project. In the below estimated pollutant load reduction, the applicant used the following model: Spreadsheet Tool for Estimating Pollutant Loading (STEPL). STEPL model is available for download at http://it.tetratech-ffx.com/stepl/.

☐ This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and: (check one)

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

BMPs Installed		TSS lbs/yr	TP lbs/yr	TN lbs/yr	Sediment lbs/yr	BOD lbs/yr	Other lbs/yr	Other lbs/yr
BMP #1								
Pollutant Loads	Pre-Project	5,812.7	19.5	126.7	5,800.0	491.3		
	Post-Project	2,325.1	10.7	82.4	2,400.0	491.3		
	Load Reduction	3,487.6	8.8	44.4	3,400.0	0.0		
	% Reduction	60.0	45.0	35.0	60.0	0.0		

EMCS USED IN MODEL:

1. Urban pollutant concentration in runoff (mg/l)

Landuse	Commerci	Industrial	Institution	Transporta	Multi-Fami	Single-Fa	Urban-Cul	Vacant (de	Open Spa
TN	2	2.5	1.8	3	2.2	2.2	1.9	1.5	1.5
TP	0.2	0.4	0.3	0.5	0.4	0.4	0.3	0.15	0.15
BOD	9.3	9	7.8	9.3	10	10	4	4	4
TSS	75	120	67	150	100	100	150	70	70

1. Average of single-family and undeveloped loading rates

2. Mean of pasture, citrus, and row crop land uses
3. Runoff concentrations assumed equal to industrial values for these parameters
4. Value assumed to be equal to 50% of single-family concentration

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.:

Est. Residence Time (minimum wet season)	14 days*
Size of Pond	0.65 acres (28,314 square feet)
Max. Pond depth	12 feet
Permanent pool depth	3.25 feet**

*Harper, H.H. "Effects of residence time and depth on wet detention systems."
** Gao, X. "TMDL Report: Nutrient and Dissolved Oxygen TMDL's for the Indian River Lagoon and Banana River Lagoon" 2013

TASKS and DELIVERABLES:

TASK NUMBER: 1
TASK NAME: Preliminary Engineering/ Design
TASK DESCRIPTION (detailed): Task 1 includes the preliminary engineering analysis and preparation of the wet retention basin and pervious parking design plans. The preliminary plans were presented to the Sebastian City Council on April 10th, 2013 and were approved for funding and design. The design project will include:

- Drainage and storm water improvements
- BMP measures to improve stormwater quality
- Proposed supplemental pervious parking on Tulip Drive and wet retention pond

DELIVERABLE: Engineering design plans and specifications

TASK NUMBER: 2
TASK NAME: Final design, permitting, bidding & award
TASK DESCRIPTION (detailed): Task 2 will include the preparation of the final 100% engineering design plans and permitting through the St. John's River Water Management District (SJRWMD) for construction of the wet retention basin and the pervious parking and grassy treatment area. The SJRWMD General Stormwater Permit application will be completed by August 2013. The final design plans include:

- Wet retention basin (BMP) installation
- Pervious parking and grassy area

Other design elements will include: bidding, BMP construction, the wet retention pond and pervious parking spaces and shallow grassy area for treatment.
DELIVERABLE: Permitting and final design plans complete, Project advertisement, award for construction.

TASK NUMBER: 3
TASK NAME: Construction
TASK DESCRIPTION (detailed): The Tulip Drive Stormwater Improvement Project consist of constructing a new wet retention pond with pervious parking area and shallow grassy treatment area to handle the runoff system within the existing city right-of-way. The project includes construction of a new wet retention pond, pervious parking area with shallow grassy area and modification to existing system to handle the runoff into the new wet retention pond site. Anticipated soil disturbing activities for this project will include the following:

a) Clearing and grubbing,
b) Rough & final grading,
c) Erosion control and dewatering of pond site
d) Construction of retention pond system and parking
e) Construction of the .65 acre wet retention pond

f) Landscaping around pond

The project area is approximately 1.25 acres of the existing public street right-of-way and the city owned lot. The drainage watershed area is approximately 10.8 acres. The drainage improvements will replace the existing grass swales along the north side of Tulip Drive with a new wet retention pond, pervious parking spaces with shallow grassy treatment area to allow for storm water treatment and modifications to existing system to handle the runoff into the wet retention pond. The new wet retention pond is identified in the City's Stormwater Master Plan to help manage and treat pollutants from the stormwater runoff during a 25 year storm event. The wet pond will be a 0.65 acre retention pond and community park area which will be installed **with 4:1 grassy side slopes from the top of bank to 2-ft below normal water levels, then a 2:1 to** bottom of pond. The wet retention pond will collect and hold water from the recreation fields, surrounding residences and Tulip Drive. The wet retention pond and drainage improvements will allow for treatment and removal of nutrient pollutants from the storm water runoff and to reduce the nutrient loading into the impaired Indian River Lagoon and the Saint Sebastian River. In addition to the construction of the infrastructure components are the educational components to the project which will include an informational display board at the new retention pond site.

Construction will begin in the fall of 2014. Tentative schedule is the following:

- Completion of the 60%, 90% and 100% plans and specifications
- Submittal of the plans and drainage analysis to SJRWMD for permitting
- Plans will be sent to the Environmental Protection Agency (EPA) for determination on September 30, 2013
- EPA funding award announcement to arrive during the spring of 2014.
- Begin construction during the fall of 2014.
- End construction by the end of the year 2014.

DELIVERABLE: Project advertisement, award for construction, begin construction, and end construction.
See Attachment 5 in appendices for Preliminary Construction Cost Estimates.

TASK NUMBER: 4
TASK NAME: Monitoring
TASK DESCRIPTION (detailed): Environmental monitoring of the wet retention pond will be conducted by City of Sebastian trained staff for the purpose of determining the reduction of pollutants within the system. Before commencement of monitoring, the City of Sebastian will complete and submit, to the EPA, a Quality Assurance Project Plan (QAPP). The monitoring plan will specify the sampling locations, sampling instruments, and parameters to be sampled. The parameters shall include, but are not limited to: TN (lbs/yr), TP (lbs/yr), TSS (lbs/yr), cadmium (Cd), chromium (Cr), copper (Cu), zinc (Zn), nitrite/ nitrate (NO2/NO3), Total Kjeldahl Nitrogen rainfall and flow. Monitored events shall include 7 – 10 discrete rain events, generally greater than 0.20 inches and less than 1.5 inches. Monitoring is to be performed at inflow and outflow locations of the retention pond in accordance with the approved QAPP. Sampling locations shall be recorded and verified using a GPS device. Project-specific details must be added during QAPP development.
DELIVERABLE: Draft QAPP; Approved QAPP; Monitoring test results

TASK NUMBER: 5
TASK NAME: Final Report
TASK DESCRIPTION (detailed): The City of Sebastian will complete and submit to the Department of Environmental Protection a Draft and then Final Report. The Draft and Final Report is intended to capture the results of the selected project, including all tasks. The report will include, where applicable: Why a BMP did or did not exceed the expected removal efficiency; were any problems encountered and how those problems were overcome; an explanation of any project delays; a brief summary of any additional phases yet to be completed. The Draft and Final Report template, available from the EPA's contract manager, should be followed.
DELIVERABLE: Draft report; approved final report

TIMELINE:

Task No.	Task Title *(should match identically above)*	Start	Complete
1	Preliminary Engineering	3/2013	6/2013
2	Final design plans and permitting	8/2013	12/2013
3	Construction	6/2014	12/2014
4	Monitoring	12/2014	12/2016
5	Final report	1/2017	3/2017

PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1	Salaries	$0.00	$0.00	City of Sebastian
	Fringe Benefits	$0.00	$0.00	City of Sebastian
	Travel	$0.00	$0.00	City of Sebastian
	Contractual	$0.00	$5,000.00	City of Sebastian
	Equipment Purchases	$0.00	$0.00	City of Sebastian
	Supplies/Other Expenses	$0.00	$0.00	City of Sebastian
	Indirect	$0.00	$0.00	City of Sebastian
	TOTAL FOR TASK	$0.00	$5,000.00	

Task No.	Category	Grant Funding	Match Funding	Match Source
2	Salaries	$0.00	$0.00	City of Sebastian
	Fringe Benefits	$0.00	$0.00	City of Sebastian
	Travel	$0.00	$0.00	City of Sebastian
	Contractual	$0.00	$21,510.00	City of Sebastian
	Permitting	$0.00	$490.00	City of Sebastian
	Supplies/Other Expenses	$0.00	$0.00	City of Sebastian
	Land	$0.00	$0.00	City of Sebastian
	Indirect	$0.00	$0.00	City of Sebastian
	TOTAL FOR TASK	$0.00	$22,000.00	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
3	Salaries	$0.00	$0.00	City of Sebastian
	Fringe Benefits	$0.00	$0.00	City of Sebastian
	Travel	$0.00	$0.00	City of Sebastian
	Contractual	$176,840.00	$134,540.00	City of Sebastian
	Equipment Purchases	$0.00	$0.00	City of Sebastian
	Supplies/Other Expenses	$0.00	$0.00	City of Sebastian
	Indirect	$0.00	$0.00	City of Sebastian
	TOTAL FOR TASK	$176,840.00	$134,540.00	

Task No.	Category	Grant Funding	Match Funding	Match Source
4	Salaries	$0.00	$0.00	City of Sebastian
	Fringe Benefits	$0.00	$0.00	City of Sebastian
	Travel	$0.00	$0.00	City of Sebastian
	Contractual	$0.00	$0.00	City of Sebastian
	Equipment Purchases	$0.00	$0.00	City of Sebastian
	Supplies/Other Expenses	$0.00	$0.00	City of Sebastian
	Monitoring	$0.00	$5,000.00	City of Sebastian
	Education	$0.00	$1,000.00	City of Sebastian
	TOTAL FOR TASK	$0.00	$6,000.00	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
5	Salaries	$0.00	$0.00	City of Sebastian
	Fringe Benefits	$0.00	$0.00	City of Sebastian
	Travel	$0.00	$0.00	City of Sebastian
	Contractual	$0.00	$5,000.00	City of Sebastian
	Supplies/Other Expenses	$0.00	$0.00	City of Sebastian
	TOTAL FOR TASK	$0.00	$5,000.00	
	Total:	$176,840.00	$172,540	
	Total Project Cost:	$349,380.00		
	Percentage Match:	51%	49%	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Contractual Total	$176,840.00	$166,050.00	CITY OF SEBASTIAN
Monitoring	$0.00	$5,000.00	CITY OF SEBASTIAN
Education	$0.00	$1,000.00	CITY OF SEBASTIAN
Permit Total	$0.00	$490.00	CITY OF SEBASTIAN
Total:	$176,840.00	$172,540.00	
Total Project Cost:	$349,380.00		
Percentage Match:	51%	49%	

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: **X** No: ☐ If no, explain:

- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  Yes: **X** No: ☐ If yes, explain: A retention pond will be installed that will be aesthetically pleasing and can be alternatively used as a local park.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  Yes: ☐ No: **X** If yes, state the monthly fee:

- Is the project located in or does it benefit any of the following areas:

  ☐ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one?

  X At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements.
  Yes: **X** No: ☐ Yes, with exceptions: ☐

REFERENCES CITED:

Central Florida River Lagoon Stakeholders. "Basin Management Action Plan: Indian River Lagoon Basin, Central Indian River Lagoon." 26 March 2013. http://publicfiles.dep.state.fl.us/DEAR/BMAP/IndianRiverLagoon/Archive/.

Gao, Xueqing. "TMDL Report: Nutrient and Dissolved Oxygen TMDL's for the Indian River Lagoon and Banana River Lagoon." 18 March 2009. Florida Department of Environmental Protection. http://www.dep.state.fl.us/water/tmdl/docs/tmdls/final/gp5/indian-banana-nutrient-do-tmdl.pdf.

Harper, H.H. "Effects of residence time and depth on wet detention systems." Environmental Research and Design, Inc. Orlando, FL. http://erd.org/ERD%20Publications/EFFECTS%20OF%20RESIDENCE%20TIME%20AND%20DEPTH%20ON%20WET%20DETENTION%20SYSTEM%20PERFORMANCE-2005.pdf

The following are included as attachments to this application:

X Monitoring Plan/ Preliminary QAPP: Attachment 1

X Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)). Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

- **X** Regional site location map showing the project site relative to the surrounding area: Attachment 2
- **X** Treatment area/Project Area: Attachment 3

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

Attachment 4: STEPL Tables for Nutrient Load Reductions
Attachment 5: Preliminary Construction Cost Estimate
Attachment 6: Correspondence for initial permit determination from Saint John's River Water Management District (SJRWMD)
Attachment 7: SJRWMD Fee Schedule
Attachment 8: City of Sebastian Agenda Transmittal and Recommendation

PROJECT 10
Not approved by EPA, Replaced by Project 10a

PROJECT 10a

PROJECT NAME: Green Swamp Area of Critical State Concern and Area Watersheds Onsite Sewage Treatment and Disposal Systems (OSTDS) Scanning and Inventory Project

PROJECT FUNDING REQUEST: $197,935.00 **MATCH:** $131,956.66

LEAD ORGANIZATION: Florida Department of Health, Polk County (FDOH-Polk)

CONTACT PERSON:
Kevin King
2090 East Clower Street
Bartow, Florida 33830
Tel: 863-519-8330
Fax: 863-534-7245
Email: Kevin_King@doh.state.fl.us

FEID NUMBER: F 593 502 843
FISCAL YEAR END: June 30, 2013

FINANCIAL COOPERATING PARTNERS: Florida Department of Health - Polk County

OTHER COOPERING PARTNERS: Not applicable

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location: Polk County
Impacted Watershed Name: Green Swamp Area of Critical State Concern (ACSC), Saddle Creek, and Peace River Watersheds.
Size of Project Impact: 286,054.426
Size of Area Being Treated: 286,054.426
Latitude: 28.2142
Longitude: -81.8562
Hydrologic Unit Code:
03100208010,031002080102,031002080104,031002080201,031002080203,031002080204,031001010101,031001010103,031001010301,031001010306,031001010405
WBID: 1329,1406,1436,1466,1467,1483,1497,1623,1623J,1623K,1623L
Impaired waterbody affected: Withlacoochee River WBID 1329, Big Creek WBID 1406, Horse(Horseshoe)Creek WBID 1436, Lake Agnes WBID 1466, Mud Lake WBID 1467, Bald Eagle Creek WBID 1483, Saddle Creek WBID 1497, Lake Hancock WBID 1623, Peace River Above Bowlegs Creek WBID 1623J, Saddle Creek Below Lake Hancock WBID 1623K, Lake Hancock WBID

Impairment: Onsite Sewage Treatment and Disposal Systems (OSTDS) are a known source of nutrients such as total nitrogen and phosphorus. Other load contaminants include heavy metals and fecal coliforms. The water quality impairments for waterbodies located in the Green Swamp Area of Critical State Concern and the Peace River Watershed which includes Saddle Creek Watershed are as follows; Withlacoochee River (Mercury in fish tissue), Big Creek (Dissolved Oxygen), Horshoe Creek (Fecal Coliform), Lake Agnes(Nutrients), Mud Lake (Nutrients), Bald Eagle Creek (Dissolved Oxygen and Nutrients- Chlorophyll-a), Saddle Creek (Nutrients-Chlorophyll-a, Dissolved Oxygen, and Fecal Coliforms), Lake Hancock (Nutrients and Dissolved Oxygen), Peace River (Dissolved Oxygen-Nutrients and Mercury in Fish Tissue).

TMDL Status: The following waterbodies are EPA established TMDL's with parameters: Peace River Basin, TMDL ID 22666 - Dissolved Oxygen, Nutrient, Turbidity, and TSS. Lake Hancock and Lower Saddle Creek, TMDL ID 22737 – Dissolved Oxygen, Nutrient. Peace River Above Bowlegs Creek, TMDL

ID 22742 – Fecal Coliform. Peace River Above Bowlegs Creek, TMDL ID 32351- Dissolved Oxygen, Nutrients, and BOD.

BMAP Status: The project is within the Peace River Basin for which an active priority Basin Management Plan is in progress. http://www.dep.state.fl.us/water/watersheds/docs/bmap/bmap_activities.pdf

Land Uses within the area being treated:

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Green Swamp Area of Critical State Concern

Land Use	Acres	%
Residential Low Density (1100)	12601.854	6.537
Residential Medium Density (1200)	1258.8	0.653
Residential High Density (1300)	2446.756	1.269
Commercial and Services (1400)	258.006	0.134
Industrial (1500)	688.895	0.357
Extractive (1600)	2006.707	1.041
Institutional (1700)	305.635	0.159
Recreational (1800)	349.099	0.182
Open Land (1900)	1488.02	0.772
Agriculture (2000)	55639.507	28.863
Upland Non-Forested (3000)	10773.315	5.589
Upland Forests (4000)	18957.2	9.834
Water (5000)	4139.394	2.147
Wetlands (6000)	80771.005	41.9
Barren Land (7000)	276.161	0.143
Transportation, Communication, and Utilities (8000)	809.213	0.42
Land Use Totals (Acreage and %)	**192769.566**	**100**

Peace River Basin (Saddle Creek Watershed)

Land Use	Acres	%
Residential Low Density (1100)	4199.193	6.720
Residential Medium Density (1200)	7088.340	11.344
Residential High Density (1300)	3086.451	4.940
Commercial and Services (1400)	2502.560	4.005
Industrial (1500)	1597.269	2.556
Extractive (1600)	10221.991	16.359
Institutional (1700)	1139.368	1.823
Recreational (1800)	918.427	1.470
Open Land (1900)	1162.666	1.861
Agriculture (2000)	7623.460	12.200
Upland Non-Forested (3000)	190.186	0.304
Upland Forests (4000)	2702.199	4.325
Water (5000)	10584.920	16.940
Wetlands (6000)	6869.331	10.993
Barren Land (7000)	31.857	0.051
Transportation, Communication, and Utilities (8000)	2567.553	4.109
Land Use Totals (Acreage and %)	**62485.771**	**100**

Peace River Basin (Lower Peace River Watershed)

Land Use	Acres	%
Residential Low Density (1100)	1181.688	3.837
Residential Medium Density (1200)	2364.294	7.677
Residential High Density (1300)	232.582	0.755
Commercial and Services (1400)	408.914	1.328
Industrial (1500)	146.852	0.477
Extractive (1600)	10468.691	33.990
Institutional (1700)	441.813	1.434
Recreational (1800)	261.849	0.850
Open Land (1900)	294.522	0.956
Agriculture (2000)	5771.403	18.739
Upland Non-Forested (3000)	69.300	0.225
Upland Forests (4000)	844.396	2.742
Water (5000)	1049.966	3.409
Wetlands (6000)	6991.364	22.700
Barren Land (7000)	9.537	0.031
Transportation, Communication, and Utilities (8000)	261.920	0.850
Land Use Totals (Acreage and %)	**30799.091**	**100**

LAND OWNERSHIP STATUS:

x Land necessary for the construction of treatment infrastructure has been acquired. Title is held by No land necessary for this project.

☐ Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase). Insert real title holder and who owns option. If not the applicant, explain relationship to the applicant.

☐ Land necessary for the construction of treatment infrastructure is under an easement which allows for the construction and access. Insert real title holder and easement holder. If not the applicant, explain relationship to the applicant.

WATERSHED MANAGEMENT PLAN: The Watershed Management Plans that the project area is located within are identified as, *A Plan for the Use and Management of the Green Swamp Wilderness Preserve, January 1994, Southwest Florida Water Management District* and the *Peace R iver Comprehensive Watershed Management Plan, 2001, Southwest Florida Water Management District*. The Green Swamp Area of Critical State Concern is recognized as a major ecological and hydrological importance and the headwaters for the Peace River Watershed as well as other major rivers and watersheds. Polk County developed as part of their Comprehensive Plan and Land Development Code, sections addressing development and resource management within the Green Swamp (ACSC), specifically from these sections, management and county rules are outlined for OSTDS. The scanning project would benefit the needs of the WMP's and Polk County's OSTDS wastewater management by providing a specific and enhanced inventory of septic systems that are a known source of nutrients and biologicals.

PROJECT OVERVIEW: This project will digitally inventory all Onsite Sewage Treatment and Disposal System documents located in the Green Swamp Area of Critical State Concern and the Peace River Watershed Basin. These documents consist of septic system application permit packages, site plans, and related forms that will be digitally scanned into a web-based management and tracking program known as Carmody and Septic Search Compliance Software and Solutions. The project will allow Health Department staff, other local and state agencies, clients, and public access to web based OSTDS files on a 24 hour basis. This in turn will streamline department work processes between public clients, other agencies, and enhancing public awareness. The electronic filing will be a cost saving to the State. As noted, the Green Swamp (ACSC) is the headwaters for the Peace River and a recharge for the Floridan Aquifer and both are major sources of the water supply to central Florida. The watersheds also hold diverse populations of protected species of flora and fauna. This project will enhance the OSTDS program to better manage and track septic systems within these watersheds, ultimately reducing known source nutrients and bacteriologicals.

ESTIMATED POLLUTANT LOAD REDUCTION MODEL USED: (check one)

☐ This proposal is for a structural BMP project. In the below estimated pollutant load reduction, the applicant used the following model: Insert model used. Stormwater retrofit and other applicable projects must complete the estimated pollutant load reduction table in this application by providing the estimated average annual pollutant loads to be reduced by the project. Applicants are to use the Spreadsheet Tool for Estimating Pollutant Load (STEPL, 2007), Nonpoint Source Loading Management Model (NPSLMM, 2008), or Watershed Management Model (WMM, 2006). The STEPL model is available for download at http://it.tetratech-ffx.com/stepl/. **All load reduction data must be reported in pounds per year.**

x This proposal is for a non-structural BMP project, such as educational outreach, demonstrations, or effectiveness evaluations, and: (check one)

> ☐ Estimated Pollutant Load Reductions were able to be estimated by using the following methodology: Complete the Estimated Load Reduction table as much as possible, explaining methodology here. **All load reduction data must be reported in pounds per year.**
>
> x 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 digital inventory and scanning project will enable the septic system program, industry regulators, utilities, industry contractors and engineers to better track and identify malfunctioning or abandoned septic systems so they may be repaired or replaced by a sewerage system. The project will improve septic system management and will allow for reductions in nonpoint pollutants over time.

EMCS USED IN MODEL: NA

ESTIMATED RESIDENCE TIME OF ANY PONDS, SWALES, ETC.: NA

TASKS and DELIVERABLES:

TASK NUMBER: 1
TASK NAME: File and Database Preparation
TASK DESCRIPTION (detailed): The FDOH-Polk County will procure Carmody Software, Inc and Septic Search Company through a single source contract to allow for the scanning, digitizing, and indexing for all septic systems files into the Carmody Web-based Management and Tracking Program using the *e-file* software application, which is currently the only compatible software for the Carmody scanning program. Equipment request is for a wide format compatible scanner; model Contex SD 4400, to accommodate larger documents, such as engineered plans, compatibility software requirements, and in-house project sustainability. All septic systems files will be prepared for the scanning, indexing, and digitizing from three Environmental Health Office locations within Polk County. Files from two of the Environmental Health Offices will require some transport by staff for file preparation at the main Environmental Health Office. Files that are located at a storage facility will be ordered and readied for the project. Staff from each of the three offices will be tasked to organize, inventory, prepare, and box the documents for delivery to vendor. Files will be carefully managed and inventoried to establish a file recall system by Environmental staff for future access. This will allow vendor to deliver requested off-site files to the Health department in a timely manner by fax or e-mail. Due to the three separate Environmental Health office locations, preparation and organization will require significant staff time at supervisory and clerical levels.
DELIVERABLE: Provide the Florida Department of Environmental Protection (DEP) Grant Manager project contract documentation; provide DEP Grant Manager purchase documentation for the wide format scanner.

TASK 1: File and Database Preparation

Position	*Maximum Hours*	*Hourly Rate*	*Fringe Benefit (%)*	*Maximum Total Fringe per position*	*Maximum Total per position*
Senior Clerk Lakeland	*180*	*13.63*	*38.16*	*936.22*	*3389.62*
Secretary Specialist Lakeland	*180*	*12.10*	*40.35*	*878.82*	*3056.82*
Senior Clerk Bartow	*90*	*10.98*	*29.19*	*288.46*	*1276.66*
Secretary Specialist Winter Haven	*90*	*11.08*	*29.06*	*289.79*	*1286.99*
Environmental Supervisor Lakeland	*180*	*20.47*	*33.09*	*1219.23*	*4903.83*
Environmental Supervisor Bartow	*90*	*19.66*	*33.76*	*597.35*	*2366.75*
Environmental Supervisor Winter Haven	*120*	*19.66*	*33.76*	*796.47*	*3155.67*
Environmental Specialist II	*40*	*19.05*	*32.33*	*246.35*	*1008.35*
Environmental Administrator	*40*	*31.25*	*28.56*	*357.00*	*1607.00*
TOTAL	*1010*			*5,609.69*	*22,051.69*

TASK NUMBER: 2
TASK NAME: Inventory and scanning
TASK DESCRIPTION (detailed): All septic permitting documents will be scanned and indexed using the *e-file* software program. The scanned files will then be reconciled with current Health Department data and current county property tax data to provide an up-to-date database. The files will then be indexed providing 25 data fields for document search and sorting. Carmody Software Inc will deliver the septic system database available for use to the department, other government agencies, public, and septic industry utilizing the Septic Search program for a more efficient and streamlined access to septic system records. Carmody will provide *e-file* software and database training and technical support to department staff.
DELIVERABLE: A prepared and fully functioning scanned septic system database provided by the Web-based Carmody Septic Search. Septic Search program will be available on the FDOH-Polk website for public and industry access.

TASK 2: Inventory and Scanning

Position	*Maximum Hours*	*Hourly Rate*	*Fringe Benefit (%)*	*Maximum Total Fringe per position*	*Maximum Total per position*
Senior Clerk Lakeland	*1000*	*13.63*	*38.16*	*5201.21*	*18831.21*
Secretary Specialist Lakeland	*1000*	*12.10*	*40.35*	*4882.35*	*16982.35*
Senior Clerk Bartow	*800*	*10.98*	*29.19*	*2564.05*	*11348.05*
Secretary Specialist Winter Haven	*900*	*11.08*	*29.06*	*2897.86*	*12869.86*
Environmental Supervisor Lakeland	*200*	*20.47*	*33.09*	*1354.70*	*5448.70*
Environmental Supervisor Bartow	*80*	*19.66*	*33.76*	*530.98*	*2103.78*
Environmental Supervisor Winter Haven	*100*	*19.66*	*33.76*	*663.72*	*2629.72*
Environmental Specialist II	*150*	*19.05*	*32.33*	*923.83*	*3781.33*
Environmental Administrator	*40*	*31.25*	*28.56*	*357.00*	*1607.00*
TOTAL	*4270*			*19,384.70*	*75,602.00*

TASK NUMBER: 3
TASK NAME: Public Awareness and Education
TASK DESCRIPTION (detailed): The Septic Search database will require public awareness and education on access and use. Training for Health Department staff will be conducted. Environmental Director will coordinate with Environmental Supervisors and Environmental Specialist to develop training presentations, guidelines and educational materials for different groups such as the general public, local governments and officials, state agencies, building and real estate industry. Contractor training and education will be held at the main Environmental Health office, staff training and public awareness at each location. Other training and education will be scheduled at county commission meetings and workshops with county agencies. Printed educational materials will be made available at Environmental offices, BOCC County Administrative offices, and information placed on the department web-site.
DELIVERABLE: Provide copies of advertisements released and educational materials used; copies of meeting and workshop agendas; meeting sign-in documentation.

TASK 3: Public Awareness and Education

Position	*Maximum Hours*	*Hourly Rate*	*Fringe Benefit (%)*	*Maximum Total Fringe per position*	*Maximum Total per position*
Senior Clerk Lakeland	*100*	*13.63*	*38.16*	*520.12*	*1883.12*
Secretary Specialist Lakeland	*100*	*12.10*	*40.35*	*488.24*	*1698.24*
Senior Clerk Bartow	*100*	*10.98*	*29.19*	*320.51*	*1418.51*
Secretary Specialist Winter Haven	*100*	*11.08*	*29.06*	*321.98*	*1429.98*
Environmental Supervisor Lakeland	*200*	*20.47*	*33.09*	*1354.70*	*5448.70*
Environmental Supervisor Bartow	*100*	*19.66*	*33.76*	*663.72*	*2629.72*
Environmental Supervisor Winter Haven	*100*	*19.66*	*33.76*	*663.72*	*2629.72*
Environmental Specialist II	*50*	*19.05*	*32.33*	*307.94*	*1260.44*
Environmental Administrator	*200*	*31.25*	*28.56*	*1785.00*	*8035.00*
TOTAL	*1050*			*6,425.93*	*26,433.43*

TASK NUMBER: 4
TASK NAME: Final Report
TASK DESCRIPTION (detailed): The FDOH-Polk will submit a final report describing and detailing the outcomes of all tasks. The report shall include, but not limited to: the progress and implementation of the program, effectiveness of the inventory program, and recommended enhancements to the program by department staff.
DELIVERABLE: Draft final report; approved final report for the completed scanning and inventory project.

TASK 4: Final Report

Position	***Maximum Hours***	***Hourly Rate***	***Fringe Benefit (%)***	***Maximum Total Fringe per position***	***Maximum Total per position***
Senior Clerk Lakeland	*20*	*13.63*	*38.16*	*104.02*	*376.62*
Secretary Specialist Lakeland	*20*	*12.10*	*40.35*	*97.65*	*339.65*
Senior Clerk Bartow	*10*	*10.98*	*29.19*	*32.05*	*141.85*
Secretary Specialist Winter Haven	*10*	*11.08*	*29.06*	*32.20*	*143.00*
Environmental Supervisor Lakeland	*40*	*20.47*	*33.09*	*270.94*	*1087.74*
Environmental Supervisor Bartow	*10*	*19.66*	*33.76*	*66.37*	*262.97*
Environmental Supervisor Winter Haven	*10*	*19.66*	*33.76*	*66.37*	*262.97*
Environmental Specialist II	*10*	*19.05*	*32.33*	*61.59*	*252.09*
Environmental Administrator	*40*	*31.25*	*28.56*	*357.00*	*1607.00*
TOTAL	*170*			*1,088.19*	*4,473.89*

TIMELINE:

Task No.	**Task Title** *(should match identically above)*	**Start**	**Complete**
1	File and Database Preparation	Month 1	Month 2
2	Inventory and Scanning	Month 2	Month 18
3	Public Awareness and Education	Month 2	Month 18
4	Final Report	Month 17	Month 18

PROJECT BUDGET BY CATEGORY and TASK:

Task No.	Category	Grant Funding	Match Funding	Match Source
1	Salaries	$0	$16,442.00	FDOH-Polk
	Fringe Benefits	$0	$5,609.69	FDOH-Polk
	Travel	$0	$708.00	FDOH-Polk
	Contractual	$0	$0	
	Equipment Purchases	$8,000.00	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$8,000.00	$22,759.69	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
2	Salaries	$0	$56,217.30	FDOH-Polk
	Fringe Benefits	$0	$19,384.70	FDOH-Polk
	Travel	$0	$0	
	Contractual	$189,935.00	$0	
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$189,935.00	$75,602.00	
Task No.	**Category**	**Grant Funding**	**Match Funding**	**Match Source**
3	Salaries	$0	$20,007.50	FDOH-Polk
	Fringe Benefits	$0	$6,425.93	FDOH-Polk
	Travel	$0	$236.70	FDOH-Polk
	Contractual	$0	$0	
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$2,451.25	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$29,121.38	

Task No.	Category	Grant Funding	Match Funding	Match Source
4	Salaries	$0	$3,385.40	FDOH-Polk
	Fringe Benefits	$0	$1,088.19	FDOH-Polk
	Travel	$0	$0	
	Contractual	$0	$0	
	Equipment Purchases	$0	$0	
	Supplies/Other Expenses	$0	$0	
	Land	$0	$0	
	Indirect	$0	$0	
	TOTAL FOR TASK	$0	$4,473.59	
Total:		$197,935.00	$131,956.66	
Total Project Cost:		$329,891.66		
Percentage Match:		60%	40%	

PROJECT BUDGET BY CATEGORY TOTALS:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	$0	$96,052.20	FDOH-Polk
Fringe Benefits Total	$0	$32,508.51	FDOH-Polk
Travel Total	$0	$944.70	FDOH-Polk
Contractual Total	$189,935.00	$0	
Equipment Purchases Total	$8,000.00	$0	
Supplies/Other Expenses Total	$0	$2,451.25	FDOH-Polk
Land Total	$0	$0	
Indirect Total	$0	$0	
Total:	$197,935.00	$131,956.66	
Total Project Cost:	$329,891.66		
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: ☐ No: x If no, explain: Not a multi-year contract

- Does the project utilize innovative uses of technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  Yes: ☐ No: x If yes, explain: Provide explanation if yes.

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  Yes: ☐ No: x If yes, state the monthly fee: Monthly fee.

- Is the project located in or does it benefit any of the following areas:

  x At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one? Area of Critical State Concern

  ☐ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements. Yes: x No: ☐ Yes, with exceptions: ☐ Provide details of exceptions.

REFERENCES CITED:

Florida Department of Environmental Protection Basin Management Action Plans (BMAPs)
http://www.dep.state.fl.us/central/Home/Watershed/BMAP.htm

U.S. Environmental protection Agency Watershed Assessment, Tracking, and Environmental Results
http://iaspub.epa.gov/waters10/attains_waterbody.control?p_list_id=FL-1623L&p_report_type=T&p_cycle=2002#tmdls

The following are included as attachments to this application:

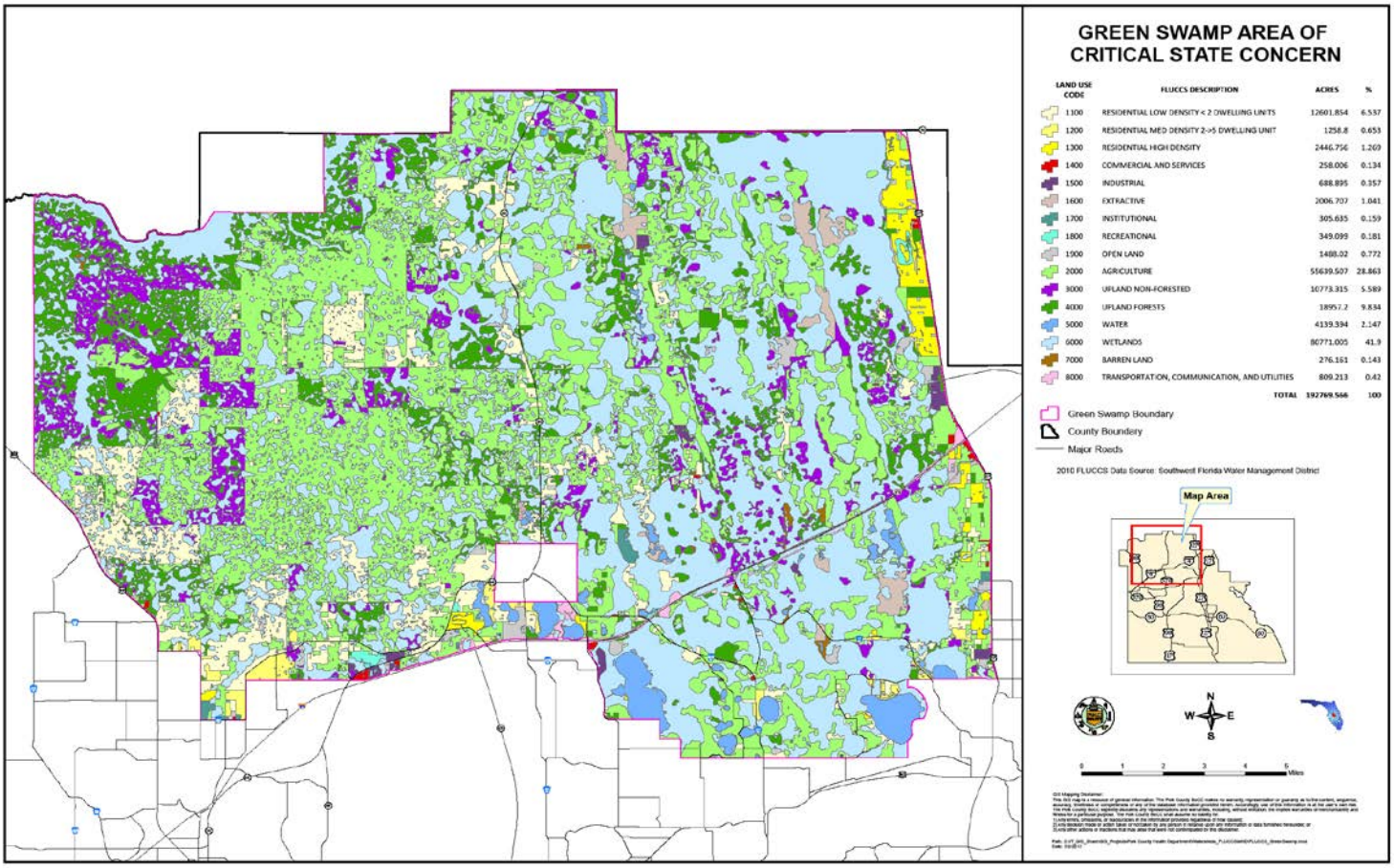
☐ Monitoring Plan: Attachment #

x Site Maps (in graphic file format (i.e. - .doc, .jpg, .tiff)). Each map should have a legend, scale, and north arrow. When pasting maps, use a new page for each of the requested figures.

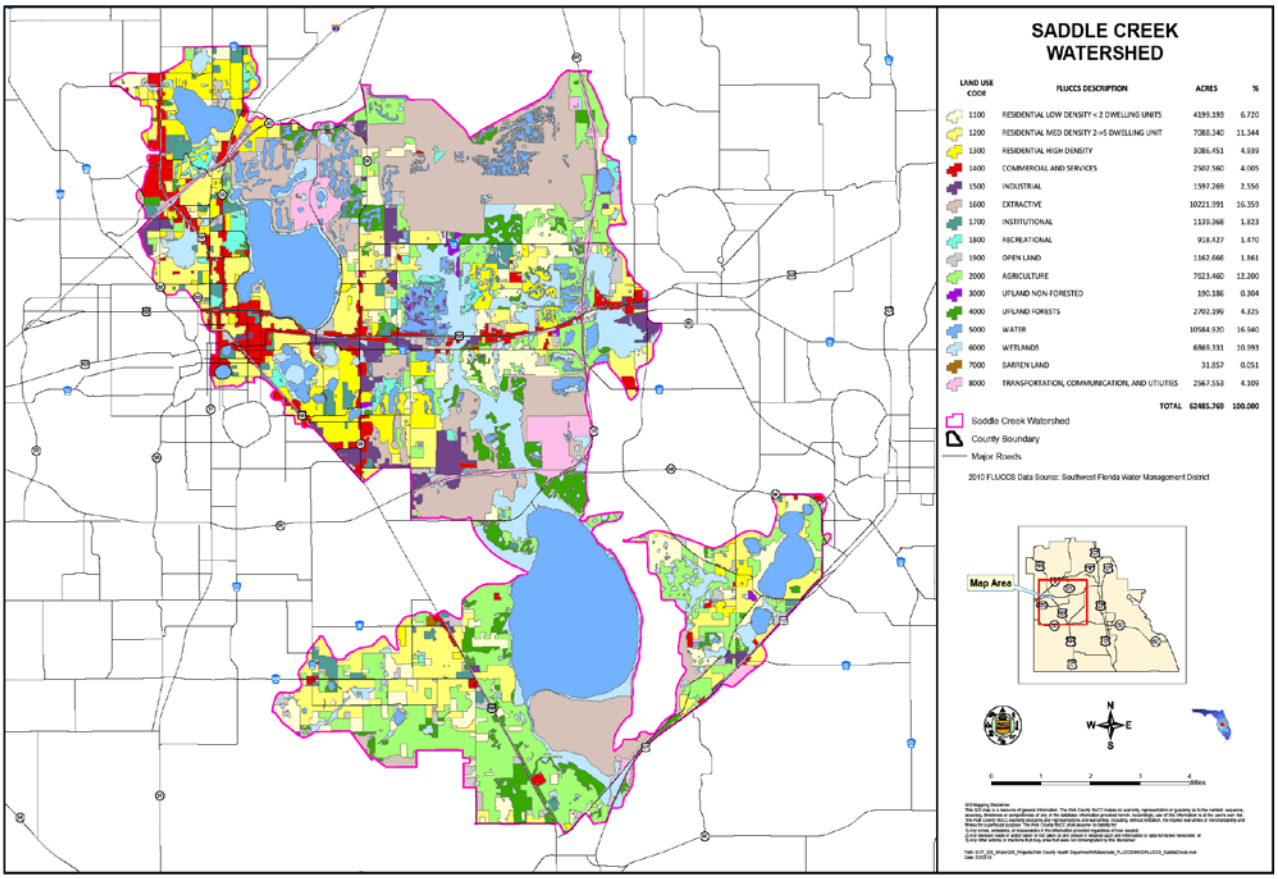
- x Regional site locator map showing the project site relative to the surrounding area: Attachments 1, 2, & 3
- ☐ Treatment area, including the following elements if possible: watersheds, drainage basins, or catchments, relative water features (i.e. – waterbodies and water courses), site boundaries, and aerial imagery if available: Attachment #
- ☐ A detailed site map showing the conceptual elements of your proposed project: Attachment #

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

Attachment 1



Attachment 2



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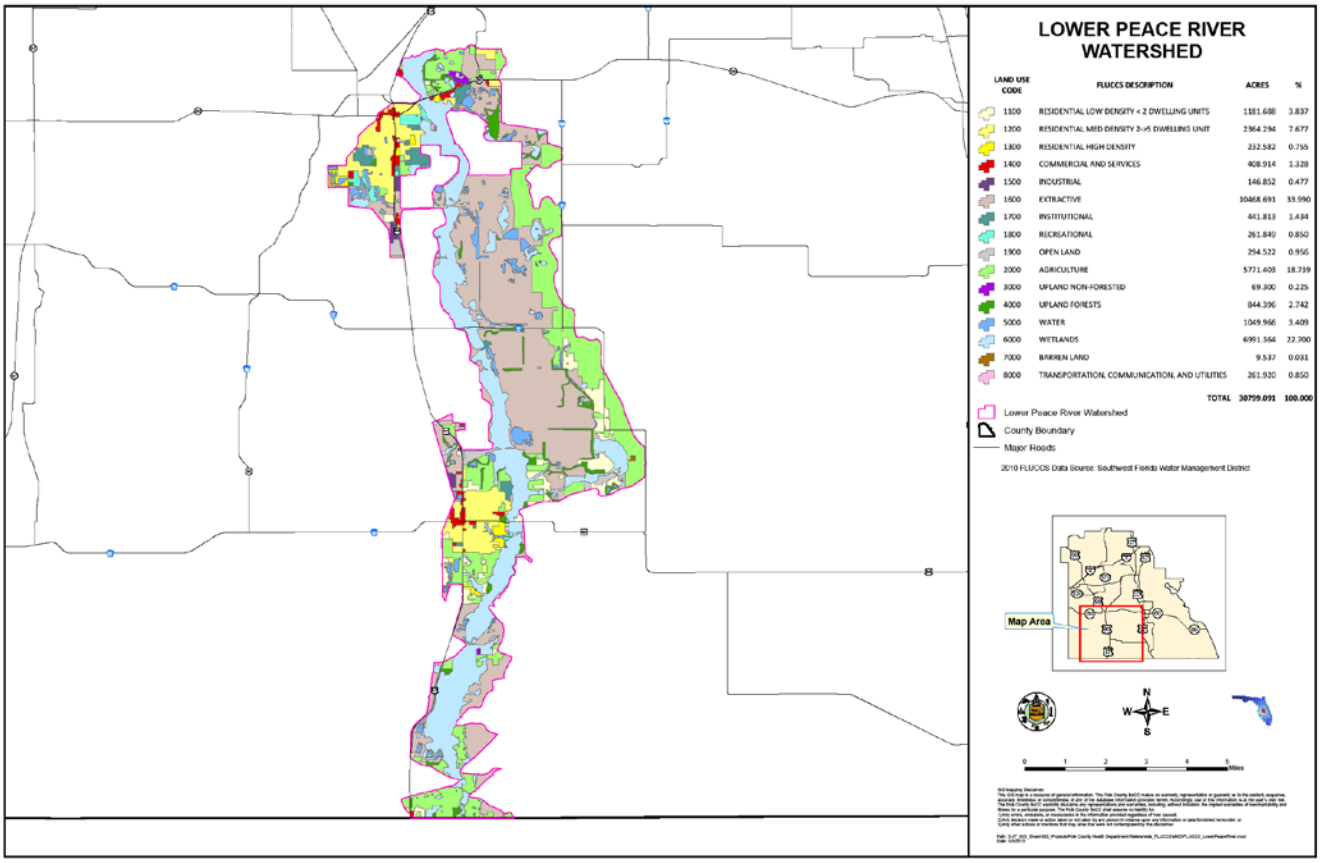

PROJECT 11

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

PROJECT FUNDING: $25,000

LEAD ORGANIZATION: Florida Department of Environmental Protection

FISCAL YEAR: June 30, 2014

PROJECT ABSTRACT: Implementation of the Florida Stormwater, Erosion, and Sedimentation Control *Inspector* Qualification Training program (FSESCI) began in late 1997. Since inception of the program, over 31,000 inspectors have been trained throughout the State of Florida. This training program is a two day class which follows the curriculum provided in the Florida Stormwater, Erosion, and Sedimentation Control *Inspector* Training Program Manual. Upon completion of the class, a proctored examination is administered. In order to obtain the qualification as an inspector, individuals must receive a minimum passing grade of 70 percent on the examination.

An outdoor workshop is also provided which is currently titled "Florida Muddy Water Blues." It is an outdoor portion of the regular FSESCI class, and allows attendees to observe various stormwater erosion and sedimentation control practices and BMPs in use. A variety of volunteer erosion sediment control suppliers are on hand to provide technical specifications of products and demonstration proper installations and applications.

Additionally, the Department offers train-the-trainer (T3) workshops designed to prepare new instructors for implementation of the inspector's training program. In order to attend the train-the-trainer workshop, all participants must be FDEP Qualified Inspectors prior to the scheduled workshop date. Prospective trainers must also achieve a minimum score of 80% on the FSESCI proctored examination. The T3 workshop covers procedures and guidelines that instructors are required to follow in order to teach the FSESCI class. Instructors must provide their resumes which are reviewed for experience levels and each instructor is evaluated on their teaching skills and speaking abilities prior to becoming a qualified instructor.

PROJECT DESCRIPTION: The Stormwater, Erosion, and Sedimentation Control *Inspector* Qualification program has been in place since 1997. The primary program objective is to provide training throughout the State of Florida to both public and private employees in various construction and regulatory related fields. The ideal target audience for the training program is inspectors, contractors, engineers and regulatory personnel. Florida's NPDES Stormwater regulatory program requires the use of appropriate BMPs required to minimize erosion and sedimentation utilizing performance based and layered BMPs. During construction specific BMPs should be used based on inherent erosion potential of an area as determined by soil characteristics, vegetative cover, topography and climate in order to minimize erosion and sedimentation during construction and to treat runoff. Inspections are required every seven days and within 24 hours after a half inch rain fall event.

The goal of the Stormwater, Erosion, and Sedimentation Control *Inspector* Qualification Program is to increase the proper design, construction, usage and maintenance of erosion and sediment controls before, during and after construction, as well as assure the proper long-term operation and maintenance of stormwater systems after final construction has been completed and final stabilization achieved.

DEP believes that advanced training is needed to ensure that construction sites reduce and eliminate erosion and sedimentation that impact Florida waters. Based on these factors, DEP will create the new Construction Erosion and Sedimentation Control *Installer* Qualification Program. The *Installer* course will be designed to include an interactive field day that will highlight proper sediment and erosion control BMP installation, maintenance, and inspections. The *Installer* course will be aimed at construction workers, BMP installers and suppliers, field supervisors and design consultants and will provide hands-on opportunities to learn about erosion and sedimentation control and proper installation of BMPs. At this time, this *Installer* course is currently titled "Florida Muddy Water Blues" and is intended to be implemented in conjunction with the existing training program.

Federal grant funding will be used to continue the program's one staff position. This position coordinates the implementation of training courses at locations throughout the state for all phases of the Stormwater, Erosion, and Sedimentation Control Qualification Program. This one staff person will also research and create a new field manual to be utilized in the new Construction Erosion and Sedimentation Control *Installer* Qualification Program for an Installer's Level (field taught) class.

In addition to these responsibilities, during the next year the Department intends to:

- develop an interactive CD-Rom for the inspector training class;
- complete the revision to the existing program manual;
- create a new field manual relating to the Construction Erosion and Sedimentation Control *Installer* Qualification Program currently titled "Florida Muddy Water Blues";
- host a T3 trainer workshop intended to gather trainers from throughout the state to provide the latest revisions and new guidelines for the program;
- increase trainer participation throughout the state in order to meet the increasing demands for the class and the need for qualified inspectors.

PROJECT MILESTONES:

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

FY12-FY14 Task: Create and publish the new Construction Erosion and Sedimentation Control *Installer* Qualification Program Field Guide for Installer's Level Qualification.

FY13-FY14 Task: Introduce the new Construction Erosion and Sedimentation Control *Installer* Qualification Program for an Installer's Level Qualification (Field Class).

FY14-FY15 Task: Develop on-line training materials in order to move toward an electronic examination program in order to automate the entire training program and increase the number of qualified inspectors statewide.

PROJECT BUDGET:

Project Funding Activity	**319 (h) Amount**
Expense (Supplies, printing)	$ 10,000
Equipment	$ 8,000
Travel	$ 7,000
Total:	**$ 25,000**

PROJECT 12

PROJECT NAME: C-43 Water Quality Treatment Testing Facility Project – Phase I

PROJECT TYPE (Check One): ☐ Urban ☐ Agricultural ☐ Education Only ☐ OSTDS
☑ Other (describe): Water Quality Demonstration Project

PROJECT FUNDING REQUEST: $994,446 **MATCH:** $ 1,073,054

TOTAL PROJECT COST: $ 2,106,531

LEAD ORGANIZATION: South Florida Water Management District (SFWMD)

CONTACT INFORMATION:

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West Palm Beach, FL 33406
Tel: (561)-682-6391
Fax: (561)-682-5831
Email: ergonzal@sfwmd.gov

FEID NUMBER: 59-6015290

END DATE OF FISCAL YEAR (MM/DD): 09/30 (SFWMD)

FINANCIAL COOPERATING PARTNERS: The funds provided by Lee County and the State of Florida discussed below are not considered as matching contributions under the rules of this Section 319 Grant Application.

OTHER COOPERATING PARTNERS

This is a multi-phased project. Phase I, which involves bioassays and mesocosms, is the subject of this 319 grant application. Lee County is a cooperating partner on this application and will be providing technical input and review of deliverables. To allow for all phases of the project, approximately 1,774 acres of land were purchased in 2007 with $27M from the State's Save Our Everglades Trust Fund and a $10M contribution from Lee County.

The Florida Department of Agriculture and Consumer Services (FDACS) and Florida Department of Environmental Protection (FDEP), as Coordinating Agencies for the Northern Everglades and Estuaries Protection Program (NEEP), have provided technical expertise for the review of the project's conceptual design which was completed in 2012 (Attachment IV). FDACS and FDEP, along with Lee County, are also expected to assist SFWMD with the evaluation of the demonstration facility's final design as well as the reports generated during its operation.

Please also see the attached letter of support from Lee County Board of County Commissioners. (Attachment VII).

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

Geographic Location (city and county): Unincorporated area of Glades County. See Attachments I through III

Size of Project Impact: The C-43 Water Quality Treatment and Testing Facility is to be constructed in multiple phases. Phase I, the subject of this application, will be approximately one (1) acre or less in size. All phases of the project, when completed, will take at least 1,335 acres.

Size of Area Being Treated: Phase I of the C-43 Water Quality Treatment and Testing Facility Project will pull a modest amount of water (±1 gpm) from the Caloosahatchee River (C-43 Canal) for the demonstrations. The C-43 Canal is one of Lake Okeechobee's main discharge canals which, in addition to carrying direct discharges from the Lake, it also carries runoff originating from approximately 246,240 acres of the East Caloosahatchee Sub-Watershed and the S-4 Basin

Latitude (decimal degrees): 26°46'37" N

Longitude (decimal degrees): 81°17'15" W

12 Digit Hydrologic Unit Code: 030902050206

WBID: 3237B

Impaired Water Body Affected: Phase I of the C-43 Water Quality Treatment and Testing Facility Project, the subject of this application, will yield information necessary for the optimal design and operation of a full testing and treatment facility. Future phases of the project could affect multiple impaired water bodies. The project is located within the Long Hammock Creek Basin, Water Body Identification No. 3237B (i.e. WBID 3237B), which is tributary to the Caloosahatchee River and is listed as impaired for nutrients. In addition, the reach of the Caloosahatchee River adjacent to the west of the site is impaired for nutrients (WBID 3235B). Further to the west along the Caloosahatchee River, there are three WBIDs (WBID 3240 A through C) that are considered as impaired due to nutrients and currently have total nitrogen (TN) Total Maximum Daily Loads (TMDL). Please refer to the water body identification maps along the Caloosahatchee River (Attachments V & VI)

In addition, the Caloosahatchee River is a highly managed system with flows predominantly directed from east to west but occasionally flows are directed from west to east towards Lake Okeechobee. Lake Okeechobee has multiple impaired Water Body Identifications (WBIDs) covered under the FDEP total phosphorus (TP) TMDL and associated Basin Management Action Plan (BMAP) which is under development. Lake Okeechobee is also included in EPA's 1999 consent decree. Lake Hicpochee (WBID 3237 C), which is bisected by the Caloosahatchee River and lies east of the project site, is listed by FDEP as impaired for dissolved oxygen with TN as the causative agent and is on the U.S. Environmental Protection Agency's (EPA) 1999 consent decree impaired waters list for nutrients, dissolved oxygen, and biochemical oxygen demand. In addition, EPA has the East Caloosahatchee Sub-watershed east of the S-78 structure listed as impaired on its 1999 consent decree (WBID 3237A).

TMDL Status and Name: There are multiple TMDLs in the project vicinity. The state of Florida has a finalized TMDL for Lake Okeechobee. FDEP is currently developing TMDLs for the Long Hammock (WBID 3237B) and the Caloosahatchee River freshwater mainstem west of S-78 (WBID 3235B). In addition, these segments collectively will have a downstream TMDL for the estuary (i.e. tidal) segments of the Caloosahatchee River (WBIDs 3240 A-C). EPA has finalized the TMDLs for Lake Hicpochee (WBID 3237C) and the East Caloosahatchee Sub-watershed (WBID 3237A). Please refer to the water body identification maps along the Caloosahatchee River (Attachments V & VI).

TMDL Impairment; indicate the parameters in the TMDL: Primarily nutrients (TN and TP) and dissolved oxygen.

Impairments To Be Addressed by Project: The project primarily addresses TN load reduction through optimizing the removal of TN through wetland-based features. These features will also reduce TP and total suspended solids (TSS) loads. Collectively, these reductions address the Caloosahatchee Estuary TMDL and associated BMAP (WBIDs 3240 A-C), the EPA TMDL for the freshwater Caloosahatchee (3237A), the EPA TMDL for Lake Hicpochee (WBID 3237C), the forthcoming FDEP TMDL/BMAP for the freshwater tributary and mainstem Caloosahatchee (WBID 3235B), and the forthcoming FDEP TMDL/BMAP for Long Hammock Creek (WBID 3237B).

Does this project fall within the boundaries of a developing or adopted BMAP or within a Nine Element Watershed Plan approved by EPA. Check one of the following:

☑ Adopted BMAP ☑ Developing BMAP ☑ Approved Watershed Plan

BMAP or Watershed Plan Name: There are both, a BMAP and a Watershed Plan named as follows:

1. The Caloosahatchee Estuary Basin Management Plan
2. The Caloosahatchee River Watershed Protection Plan
3. The Lake Okeechobee Basin Management Plan
4. The Lake Okeechobee Watershed Protection Plan

This project contributes to pollutant reductions specified in the BMAP or Watershed Plan.
☑ Yes ☐ No

This project is identified specifically in the BMAP/Plan or in the annual update of the BMAP/Plan.
☑ Yes ☐ No

This project is specifically mentioned in the Caloosahatchee River Watershed Protection Plan Update included in Appendix 10-2, Page 20, of the 2012 South Florida Environmental Report.

WATERSHED MANAGEMENT PLAN: The proposed Section 319 Project addresses needs in four (4) watershed management plans:

1) **The Caloosahatchee River and Lake Okeechobee Watershed Protection Plans**: In 2007, NEEPP was authorized under Section 373.4595, Florida Statutes (F.S.), in response to legislative findings that the Lake Okeechobee, Caloosahatchee River, and St. Lucie River watersheds are critical water resources that have been, and continue to be, adversely affected by changes to hydrology and water quality. NEEPP legislation specifically called for the development of the three northern watershed protection plans: Lake Okeechobee, St. Lucie River, and Caloosahatchee River.

   The Caloosahatchee River Watershed Protection Plan (CRWPP) (SFWMD et al., 2009), completed in 2009, aims to minimize undesirable flows and improve the quality of water delivered to the Caloosahatchee Estuary. The Lake Okeechobee Watershed Protection Plan (LOWPP) (SFWMD et al., 2004), completed in 2004 and updated twice since, contains a phased, watershed-based, comprehensive approach to reduce TP loading to the lake. Both plans seek to achieve their goals through implementation of the three major elements specified by NEEPP legislation: Construction Project, Source Control Program, and Research and Water Quality Monitoring Program. Through these three major

programmatic elements, the CRWPP and the LOWPP meet the EPA's Comprehensive Watershed Plan's nine specific planning elements.

Specifically, known pollutants with their current loads are detailed in both watershed protection plans. Additionally, specific projects, with budget estimates are identified to reach restoration goals over specific timeframes. Monitoring towards meeting the water quality goals is also an important aspect of both watershed protection plans. Finally, both watershed protection plans' processes included large stakeholder outreach and input during its initial development and continue to do so with periodic (3 year) updates to the Florida State Legislature.

The 2012 CRWPP update (Volume I, Appendix 10-2, Page 10-2-20) describes the need for the proposed project. The following is a link to this document: http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/crwpp_2012update_sfer_voli_app10_2.pdf

The following is a link to the 2013 LOWPP update (Volume I, Appendix 8): http://my.sfwmd.gov/portal/page/portal/pg_grp_sfwmd_sfer/portlet_prevreport/2014_sfer/v1/chapters/v1_ch8.pdf

2) **The Caloosahatchee Estuary Basin Management Action Plan:** The NEEPP ensures that the CRWPP form the basis of any FDEP BMAP within the Caloosahatchee Watershed. The following link is for the BMAP document (http://www.dep.state.fl.us/water/watersheds/docs/bmap/caloosa-estuary-bmap-final-nov12.pdf). Currently, there is one adopted BMAP for the Caloosahatchee Estuary for TN. The project is located upstream of the S-79 structure and in the freshwater portion of the Caloosahatchee River Watershed therefore outside the current geographical BMAP boundary. The project location however is within the BMAP's watershed boundary and FDEP recognizes the disproportionate contribution of TN that is being discharged into the estuary from that area. In the Final BMAP for the Caloosahatchee Estuary Basin, FDEP states:

"The purpose of this BMAP is to address total nitrogen (TN) load reductions in the portion of the watershed that drains to the Caloosahatchee Estuary below S-79 identified in the previous table as the Estuarine Portion. FDEP recognizes that approximately 85 percent of the total current loading of TN comes from sources upstream of S-79 and that reduction of loads from the watershed below S-79 alone will not result in the restoration of the Estuary. The TN sources above S-79, although important, are not addressed in this BMAP but will be through other efforts. Similarly, the proper control of high and low flows is also important in this basin. The development of this BMAP does not diminish the additional work needed in the basin to restore the Estuary to its designated uses; however, it does take an important step forward by addressing the portion of the TN loading discharged below S-79."

Section 1.3.4 of the Final BMAP states that *"During the course of the BMAP, concerns were presented by various stakeholders with regards to portions of the TMDL modeling and/or allocations. The TMDL models and allocations are scheduled to be refined in the next few years."* In public meetings subsequent to the BMAP publication (e.g., August 29, 2013, N Bailey FDEP presentation), FDEP has indicated that the revised TMDL modeling process for the estuary will also encompass the freshwater reaches of the Caloosahatchee River and its tributaries such as Long Hammock Creek. Thus the specific project location is important to both the current estuary BMAP and future TMDL implementation within the freshwater segments of the Caloosahatchee
River Watershed.

3) **The Lake Okeechobee Basin Management Action Plan:** The FDEP Lake Okeechobee TMDL for TP was adopted in 2001 and work towards its implementation has included components of the Lake Okeechobee Watershed Protection Plan and the Lake Okeechobee Phase 2 Technical Plan. The NEEPP, in 2007, outlined the importance of BMAPs in water quality restoration for the overall Northern Everglades. The FDEP announced the Lake Okeechobee BMAP planning process in December 2012 to build upon the successful accomplishments of the previous watershed plans. Currently, the Lake Okeechobee BMAP is in its developmental stage which FDEP hopes to complete by the end of 2014.

This project will address the needs of the Lake Okeechobee BMAP by continuing to optimize nutrient reduction technologies for both nitrogen and phosphorus from agricultural land uses which comprise a large part of land uses throughout the Northern Everglades. Furthermore, this proposed demonstration project is designed to address both fresh and marine waters and the varied nutrient regimes that can characterize each type of water body including Lake Okeechobee's watershed. While FDEP's Lake Okeechobee TMDL is for TP, FDEP has stated there are expected TN reductions with projects previously designed for TP. This project will contribute to a better understanding of the synergistic treatment of both nutrient types and their associated load reductions.

LAND USE and STATUS:

Land Uses within the <u>Area Being Treated</u>: The C-43 Water Quality Treatment and Testing Facility Project- Phase I will be located at the eastern edge of the East Caloosahatchee Sub-watershed and will be withdrawing a maximum of ±1gpm (0.00223 cfs) from the C-43 Canal (aka Caloosahatchee River). A maximum of 1,700 gpm (3.79 cfs) will be withdrawn when all phases of the project are constructed. These are relatively small flow rates when compared to the C-43 flows which, for the period of record between 1981 and 2011, had a maximum flow of 8,724 cfs at the S-78 structure (WSI 2012). The C-43 Canal also conveys flows from Lake Okeechobee which receives runoff from a 3.45 million ac watershed comprised of nine (9) Sub-watersheds including the East Caloosahatchee Sub-watershed. The following land use information is specific to the East Caloosahatchee Sub-watershed and it is based on SFWMD's 2009 Land Use Map:

Land Use *(Do not alter – All must be filled out; do not add categories; place a 0 for no acres)*	**Acres**	**%**
Residential Low Density (1100)	4,299	1.7%
Residential Medium Density (1200)	1,978	0.8%
Residential High Density (1300)	109	0.0%
Commercial and Services (1400)	684	0.3%
Industrial (1500)	788	0.3%
Extractive (1600)	765	0.3%
Institutional (1700)	490	0.2%
Recreational (1800)	339	0.1%
Open Land (1900)	2,124	0.9%
Agriculture (2000)	168,831	68.6%
Upland Non-Forested (3000)	6,328	2.6%
Upland Forests (4000)	20,812	8.5%
Water (5000)	3,546	1.4%
Wetlands (6000)	30,752	12.5%
Barren Land (7000)	2,498	1.0%
Transportation, Communication, and Utilities (8000)	1,895	0.8%
Land Use Totals (Acreage and %)	**246,238**	**100%**

The Lake Okeechobee Watershed, based on SFWMD's 2009 Land Use Map, is comprised of the following land uses, acreages, and percent of total area: Urban 392,617 (11.4%); Agriculture 1,4745,559 (50.6%), Rangeland 206,061 (6.0%), Upland Forests 251,352 (7.3%), Water Bodies 224,863 (6.5%), Wetlands 608,353 (17.6%) and Barren Lands 21,670 (0.6%).

Land Ownership Status: (check one)

- [x] Land necessary for the construction of treatment infrastructure has been acquired. Title is held by: **SFWMD**
- [ ] Land necessary for the construction of treatment infrastructure is under a legal option to buy (please provide documentation of the option-to-buy and funding to execute the purchase).
- [ ] Land necessary for the construction of treatment infrastructure is under an easement which allows for the construction and access.

PROJECT OVERVIEW:

The objective of the larger C-43 Water Quality Treatment and Testing Facility Project (C-43 WQTA Project) is to demonstrate and implement cost effective wetland-based strategies for reducing load discharges of TN and other constituents including TP and TSS to the Caloosahatchee River and its downstream estuarine ecosystems. Special attention will be given to reducing dissolved organic nitrogen (DON) as it constitutes the most abundant and possibly most recalcitrant form of TN in the Caloosahatchee River. **The specific objectives of the mesocosms are to test the effects of varying parameters on the wetland plants' ability to remove TN and DON to determine what has the most uptake of nutrients.**

Elevated concentrations of TN and TP in the Caloosahatchee River and Estuary are contributing to water quality impairments in this system as evidenced by excessive algae blooms and decreased water clarity and dissolved oxygen content (Knight and Steele 2005). The Florida Department of Environmental Protection (FDEP), in its statewide comprehensive list of impaired waters, has identified TN as a limiting, co-limiting, or causative pollutant for the Caloosahatchee River Watershed and Estuary. The reduction of nonpoint nutrient concentrations and loads to these water bodies was required by NEEPP which was passed by the Florida Legislature and signed into law in 2007, and by the Caloosahatchee River Estuary TMDL published by FDEP. FDEP is currently implementing the Caloosahatchee Estuary Basin Management Action Plan (BMAP) and developing several tributary and freshwater Caloosahatchee River TMDLs.

Through a decade of successful operation of Stormwater Treatment Areas (STAs), the SFWMD has built an extensive expertise in TP removal from non-point runoff using wetland treatment systems. The mechanisms for TN removal via wetland treatment systems however have not been demonstrated or optimized to the same extent. The Caloosahatchee River Estuary TMDL requires a 23% reduction in current loads which may result in the need to achieve TN target concentrations in the Caloosahatchee River that are less than one half of those attained at the most advanced wastewater treatment facilities in Florida (Knight 2012). To date, there have been limited efforts to design treatment wetlands to optimize nitrogen removal especially DON which accounts for at least 80% of the TN present in the Caloosahatchee River and Estuary system (Knight 2012).

DON can be important to aquatic microbes and phytoplankton and should be considered when developing nutrient reduction strategies for coastal ecosystems (Bronk et al. 2007). Despite its significance and pre-dominance in TN pools, the overall reactivity and bioavailability of DON in freshwater and estuarine ecosystems remain largely unknown (Boyer et al. 2004; Eyre et al. 2011). The cycling of TN among the sediments, water, and atmosphere is complicated by the comparatively large fraction of DON, the roles of nitrogen fixation and denitrification, and the rapid exchanges

among inorganic and organic pools through algal uptake and microbial remineralization (Bronk et al. 2007; Wetland Solutions 2012; Eyre et al. 2011). It is therefore important to evaluate and quantify the bioavailability of DON for planktonic biota in the Caloosahatchee River and optimize strategies for removing DON in order to achieve the Caloosahatchee Estuary TN TMDL.

Once strategies for removing TN using wetland systems are identified, it is expected that these systems will be applied at various scales throughout the watershed. The SFWMD also anticipates that the project will generate strategies that can be applied to estuaries impaired by TN throughout south Florida as well. Ultimately, it is envisioned that a full scale treatment facility would be constructed at the site (approximately 1,335 acres).

PROJECT DESCRIPTION:

This project is the first phase of a larger project. As described in the response to item #1 above, the larger project, known as the C-43 Water Quality Treatment and Testing Facility Project, will demonstrate and implement cost effective wetland-based strategies for reducing loadings of TN and other constituents, including TP and TSS.

The conceptual design for the demonstration component of the project (WSI 2012) comprises mesocosms, test cells, and field-scale cells designed to test, optimize, and demonstrate wetland technologies that have the potential to effectively remove background TN loads from the Caloosahatchee River. It will identify the range of hydrological loading rates per unit area, plant communities, and plant substrata combinations necessary to optimize TN removal rates. Please refer to Attachments III and IV for more details.

Phase I, the focus of this application, consists of the final design, installation, and operation of mesocosms which are a component of the conceptual design. Mesocosms are an appropriate scale to test the effects of varying parameters on the wetland plants' ability to remove TN and DON. Mesocosm units are also appropriate for testing multiple design elements more cost effectively than building larger test and field-scale cells. Contingent upon future funding, the test and field-scale cells are to be constructed, operated, and sampled in subsequent phases which are not included in this grant application. Each phase of implementation will build upon the information and "lessons learned" of the previous phase with the goal of having the field-scale cells incorporated into a full-sized facility operating on site. It is anticipated that the knowledge gained from the demonstrations will be used to construct a full treatment facility at the site.

The conceptual design report stated that there is no recognized analytical test to fractionate total organic N from biologically available N (BAN) and suggested the development of a new analytical or biological test (e.g. modified TKN or FDEP's Algal Growth Potential) for rapid estimation of BAN. Once developed, this test would quickly tell what fraction of TN in raw water samples is bioavailable and therefore help in the design of wetland based treatment trains that focus on that fraction of TN. Instead of developing new analytical tests to measure BAN, which is expensive and time consuming, SFWMD wishes to conduct bioassays to determine the bioavailability of DON for microbial utilization in the Caloosahatchee River as part of the project's mesocosm design phase. Bioassays are a commonly used and accepted technique (e.g. Bronk et al 2007) that will provide essential information needed to optimize the design of the mesocosms such as the identification of the DON dominant users (bacteria or phytoplankton); determining the percentage of DON that can be physically degraded by sun light and salinity effects; and establishing the quantity and timescale of dissolved N transfer into particulate form that may then enter the benthic cycle as it settles out of the water column. The results of the bioassays will indicate whether removing bioavailable DON would make a significant contribution towards meeting the TMDL and whether mesocosms need to focus on removing DON, DIN (dissolved inorganic nitrogen) or both. The following discussion provides more detailed information of how the bioassays and mesocosms will be accomplished.

Bioassays: The first step of the project is the performance of bioassays which will evaluate the bioavailability of DON in the Caloosahatchee River through the collection of bi-monthly water

samples. The samples will be collected along the Caloosahatchee River from a location upstream and downstream of the S-77, S-78, and S-79 structures. The sources of microbial inoculum will consist of *in situ* bacteria and phytoplankton as well as a treatment with inoculum from the more estuarine water column community downstream of S-79. Several water quality parameters will be measured during the incubation periods with the results included in a final report. The information gained from the bioassays will tell us if the mesocosms need to focus on removing DON, DIN (dissolved inorganic nitrogen) or both.

Mesocosms: The mesocosms are currently anticipated to be designed, constructed, and operated as envisioned under the conceptual design report but may be modified based on recommendations from the bioassay final report and value engineering efforts during final design. The conceptual mesocosm phase of the project consists of the final design, installation, operation, and testing of eight pre-fabricated fiberglass tanks, 12 m^2 (±129 sf) each, installed on a level pad at a location to be determined within the SFWMD's "Boma Property" (see Attachment II) adjacent to the Caloosahatchee River just upstream of the Ortona Locks (i.e. S-78). The varying parameters to be tested at the mesocosms include antecedent soil chemistry, plant community effects, and plant- and microbial-level biogeochemical processes such as biomass production, nutrient storage, nutrient biotransformation, enzyme production, etc.

A single plastic head tank 700 m^3 (± 3,300 gallons) will be centrally located to provide a constant head inflow to the mesocosms. The head tank will receive water drawn directly from the Caloosahatchee River or the Barron Water Control District's Canal 3 using an electric or gas-powered pump. The eight mesocosm tanks will be plumbed for parallel operation. Four of the mesocosms will have a substrate consisting of 30 cm (12 in) of clean (washed) medium-grain sand. One mesocosm unit will have a substrate consisting of 30 cm (12 in) #57 limestone. Three of the mesocosms will be "controls" with no substrate at all. Each of the mesocosms will have emergent macrophytes, floating aquatic plants, submerged aquatic plants, algae, or planktonic communities. All eight mesocosms will be subjected to six consecutive treatments with varying hydraulic loading rates (HLR) ranging from 0 to 6 cm/day. Plant communities in the mesocosms will be managed by physical removal of unwanted specimens. See the WSI Report included with this application and the associated CD with the report's attachments A through C.

SFWMD is seeking funds at this time for the construction, operation, and sampling of the mesocosms phase of the facility and credit as "in-kind" contribution for the final design of the mesocosms including the bioassay investigation.

PROJECT EFFECTIVENESS:

The project will identify the most effective combination of hydraulic loading rates, substrate, and plant community combinations and treatment sequences for the removal of TN. The bioassays will be conducted over a period of one (1) year and are expected to yield information to be applied during the final design of the mesocosm phase of the project. The design, permitting and construction of the mesocosms will take approximately 10 months. The mesocosm operation and testing will be conducted over approximately 3 years and an excess of 60,000 samples will be collected measuring such things as field conditions (e.g. flow, stage, temperature, pH), water quality (e.g. N series, P series, TSS), rainfall/atmospheric inputs, periphyton or macrophyte cover, and sediments.

Data analysis will proceed concurrently with monitoring of the mesocosms. This will allow an adaptive management approach to determine performance and adjust system management for maximizing information gained and TN removal rates. Monthly status reports, bi-annual progress reports as well as interim presentations and final annual reports will be required to communicate the progress of the project to the team members. The data analyses will be comprised of information such as: data trend plots and analyses, water balances by treatment, pollutant mass balances, calculation of kinetic rate constants, and non-parametric statistical analyses to detect significant treatment differences and temporal trends. All analyses will be compared to data expectations from similar systems in the literature and in the review of existing systems. The data gathered during the

testing of the mesocosms will be used for the final design of the larger test and field cells which are less affected by high surface-to-volume ratios and provide more realistic plant growth conditions in native soils.

ADDITIONAL INFORMATION:

The performance of bioassays for determining the bioavailability of DON and implementation of only the mesocosms portion of the conceptual design are both intended to minimize cost and allow the leverage of information collected at one phase for the benefit of subsequent phase(s) of project execution. Identifying the fraction of DON that is bioavailable in the Caloosahatchee River will help with the selection of the most promising combination of hydraulic loading rates, depth, wetland plant species, and substrate during the mesocosm design phase. In turn the operation and testing of the mesocosms, which are susceptible to stochastic effects, can provide information useful for the final design of larger test and field-scaled cells which are more realistic and can be used to demonstrate the most effective wetland-based treatment trains.

Once strategies for removing TN using wetland systems are identified, it is expected that these systems will be applied at various scales throughout the watershed. The SFWMD also anticipates that the project will generate strategies that can be applied to estuaries impaired by TN throughout south Florida as well.

PART II – ESTIMATED POLLUTANT LOAD REDUCTIONS

This proposal is for a **structural BMP** project.

☐ Yes ☑ No

If you answered yes then enter the name of the model below and enter the load reductions and event mean concentrations (EMCs) in the Pollutant Load Reduction table. If EMCs are not the primary parameter of the model, describe the source and type of the model information.

Name of the model used for determining the load reductions: Not Applicable

This proposal is for a **non-structural BMP** project, such as educational outreach, demonstrations, or effectiveness evaluations.

☑ Yes ☐ No

If you answered yes but are unable to fill out the Pollutant Load Reduction table please describe below how the project will reduce pollutant loads.

The Caloosahatchee River and Estuary TMDL requires a 23% reduction of current TN loads which includes both, DIN and DON forms. The SFWMD has successfully constructed and operated Stormwater Treatment Areas that focus on TP removal but also effectively remove DIN. DON, which accounts for at least 80% of the TN in the Caloosahatchee River, is comprised of hundreds of compounds some of which are bioavailable and others that are not. Algae species responsible for harmful estuarine and coastal blooms can use bioavailable DON while the remaining portion of DON endures in a recalcitrant form on time-scales of years to thousands of years.

Drinking water treatment systems use conventional technologies for the removal of DON but in relatively small scales when compared to the volume discharges from the Caloosahatchee River. As an example, the largest drinking water facility in the State of Florida (Miami-Dade's Alexander Orr) has a capacity of approximately 218 MGD whereas the Caloosahatchee River flows at S-79, for the 1981-2011 period, averaged ±1,700 cfs (app. 915 MGD) with a maximum of ±11,000 cfs (app. 5,900 MGD) (WSI 2012). Wastewater treatment systems in Florida using the most advanced known technologies do not achieve the TN concentrations necessary to meet the Caloosahatchee River Estuary TMDL (Knight 2012). With 85% of the total current TN loading coming from sources upstream of S-79 (FDEP BMAP 2012) and TN concentrations required to meet the TMDL as low as 1.24 mg/l (Knight 2012), it is crucial that a cost-effective and feasible natural treatment system focusing on TN and applicable at various scales be developed.

Treatment wetlands operating in the State of Florida with inflow chemistry similar to the Caloosahatchee River already achieve concentration reduction rates of ±14% for TN, ±37% for TP, and ±26% for TSS. All of these treatment facilities were designed to primarily remove TP and therefore have not been optimized for the removal of TN. SFWMD will seek to exceed the already observed TN removal rates and identify the maximum TN reduction rate using wetland based technologies while maintaining and/or exceeding TP and TSS removal rates already achieved.

After completing the bioassays and determining the bioavailability of DON in the Caloosahatchee River, SFWMD will install and operate mesocosms with up to forty-eight different arrangements of wetland plant communities, substrates, water depths, and flow rates. Each arrangement will remove nitrogen through a transformation and reduction process, including the mineralization of DON, at various rates. After the operation of the mesocosms for a period of approximately 36 months an effectiveness evaluation will be conducted and reported. This effectiveness evaluation will be used for the design of the larger test and field-scale cells under future phases.

Periodic reporting, outreach and field tours during the bioassay investigation and the operational phase of the mesocosms will be coordinated and shared with academia, stakeholders, and other agencies through Interagency Coordinating Meetings FDACS and FDEP, South Florida Environmental Report annual updates, and publications issued by SFWMD's Public Information Unit known as "Splash Sheets". The intent of providing field access and reporting is twofold; to

educate individuals and organizations of the latest findings related to the treatment of TN and to welcome independent reviews of the work in progress. SFWMD will also be communicating the progress and results of the demonstration project to the Northern Everglades Stakeholder Group, which are in excess of 200 individuals, agencies and organizations with interest in the northern everglades and estuaries and that have the opportunity participate in regularly scheduled NEEPP coordination meetings.

In addition to Lee County, FDACS and FDEP, as Coordinating Agencies for the NEEPP, will be cooperating with SFWMD in the implementation of this project.

PART III – TASKS, DELIVERABLES, BUDGET, and TIMELINE

The information in these fields will provide important project details. Please see Attachment 3 for examples of how to fill out these fields.

TASK INFORMATION

The cost and timeline estimates for Task 1 through 5 will be further refined based on the final design for the mesocosms and associated testing plans and the final executed contract with the consultants. The tasks are comprised of activities performed by SFWMD staff, consultants, and/or contractor(s).

Task Number: 1

Task Name: Bioavailability Analysis of Dissolved Organic Nitrogen in the Freshwater Caloosahatchee River

Task Description: The SFWMD will hire an environmental consultant to conduct bioassays that will evaluate the bioavailability of DON in the upper Caloosahatchee River. The specific activities under this task include overall project management and communication, contract procurement and administration, development of a detailed bioassay work plan, sample collection on a bi-monthly basis, laboratory incubations and analyses, and reporting. This task will take place over the span of one (1) year using SFWMD funds and prior to any Grant 319 funds being relied upon.

Deliverables:

1. Kick-off Meeting and Presentation
2. Draft Bioassay Work Plan
3. Bi-monthly laboratory incubation data files
4. Bi-monthly interim reports
5. Draft final report
6. Final project meeting and presentation
7. Final Report

Budget Table – Task 1

Category	Grant Funding	Match Funding	
Salaries	$0	$28,324	SFWMD
Fringe Benefits	$0	$16,687	SFWMD
Travel	$0	$0	-
Contractual	$0	$200,000	SFWMD
Equipment Purchases	$0	$0	-
Supplies/Other Expenses	$0	$0	-
Indirect/Overhead	$0	$22,170	SFWMD
TOTAL FOR TASK	$0	$267,181	

Task Number: 2
Task Name: Mesocosm Demonstration Project - Planning, Design, and Permitting

Task Description: A final design for the mesocosm is to be completed based on the conceptual design prepared by Wetland Solutions, Inc. (October 2012 – see attachment IV) and the findings of Task 1. The final design, which will be completed by a contractor, will include site layout, system configuration, development of specifications, utility service coordination, final plant species selection, operating plan refinement, testing plan refinement, a Quality Assurance Project Plan (QAPP), and development of all details necessary for the construction, operation, and sampling of the mesocosms. All necessary permits are to be procured under this task except those that are obtained by the construction contractor during Task 3.

Deliverables:

1. Draft Mesocosm System Construction, Operation, and Sampling Plans
2. Final Mesocosm System Construction, Operation, and Sampling Plans
3. Permits

Budget Table – Task 2

Category	Grant Funding	Match Funding	
Salaries	$0	$23,340	SFWMD
Fringe Benefits	$0	$13,751	SFWMD
Travel	$0	$0	-
Contractual	$0	$29,235	SFWMD
Equipment Purchases	$0	$0	-
Supplies/Other Expenses	$0	$0	-
Indirect/Overhead	$0	$18,269	SFWMD
	$0	**$84,595**	

Task Number: 3
Task Name: Mesocosm Demonstration Project Construction and Startup
Task Description: A contractor will be selected for the construction and operation of the mesocosm facility. The contractor will be responsible for construction of the mesocosm system and ancillary improvements designed under Task 2 including the procurement of all necessary construction permits. The contractor will conduct the startup phase of the mesocosm operation by selecting and planting the required wetland plant species and, after plant establishment, obtaining approval from SFWMD for the commencement of the "batch" (i.e. water replacement only) phase of the system's operation

Deliverables:

1. Construction Permits
2. Field Office Certificate of Occupancy
3. Engineer's As-Built Certification
4. Mesocosm Startup Phase Completion

Budget Table – Task 3

Category	Grant Funding	Match Funding	Match Source
Salaries	$17,985	$18,720	SFWMD
Fringe Benefits	$10,596	$11,029	SFWMD
Travel	$0	$0	-
Contractual	$383,525	$50,000	SFWMD
Equipment Purchases	$0	$0	-
Supplies/Other Expenses	$0	$0	-
Indirect/Overhead	$14,078	$14,652	SFWMD
TOTAL FOR TASK	**$426,184**	**$94,401**	-

Task Number: 4
Task Name: Mesocosm Demonstration Project – Operation, Sampling, and Reporting
Task Description: Operation, sampling, and reporting of the mesocosms in accordance with the plans developed under Task 2

Deliverables:

1. Monthly Status Reports including a summary of the previous month's sampling results
2. Bi-Annual Reports and Presentations including preliminary findings
3. Draft Final Report and Presentation
4. Final Report

Budget Table – Task 4

Category	Grant Funding	Match Funding	Match Source
Salaries	$52,632	$54,780	SFWMD
Fringe Benefits	$31,008	$32,274	SFWMD
Travel	$0	$0	-
Contractual	$469,420	$488,580	SFWMD
Equipment Purchases	$0	$0	-
Supplies/Other Expenses	$0	$0	-
Indirect/Overhead	$41,197	$42,878	SFWMD
	$594,257	**$618,512**	-

Task Number: 5
Task Name: Mesocosm Decommissioning
Task Description: Upon completion of the sampling period, removal and disposal of all appurtenances associated with the mesocosms and final closure inspection by SFWMD Land Management Personnel.

Deliverables:

1. SFWMD Land Management Site Inspection Clearance

Budget Table – Task 5

Category	Grant Funding	Match Funding	
Salaries	$3,388	$3,527	SFWMD
Fringe Benefits	$1,996	$2,078	SFWMD
Travel	$0	$0	-
Contractual	$5,000	$0	SFWMD
Equipment Purchases	$0	$0	-
Supplies/Other Expenses	$0	$0	-
Indirect/Overhead	$2,652	$2,760	SFWMD
TOTAL FOR TASK	**$13,036**	**$8,365**	

TOTAL PROJECT BUDGET TABLE

Totals for All Tasks	319 Funding	Match Funding	
Salaries Total	$74,005	$128,691	SFWMD
Fringe Benefits Total	$43,600	$75,819	SFWMD
Travel Total	$0	$0	-
Contractual Total	$857,945	$767,815	SFWMD
Equipment Purchases Total	$0	$0	-
Supplies/Other Expenses Total	$0	$0	-
Indirect Total/Overhead	$57,927	$100,729	SFWMD
Total:	**$1,033,477**	**$1,073,054**	
Percentage of Total Cost:	**49%**	**51%**	

TIMELINE: The proposed schedule is based on the assumption that a letter from FDEP acknowledging the intent to recommend Section 319 Grant funding for this project is issued by September 30, 2014 and that Section 319 Grant Agreement is executed with FDEP by January 31, 2016. The final schedule will be adjusted to reflect actual dates.

Task No.	Task Title *(should match identically above)*	Start	Complete
1	Bioavailability Analysis of Dissolved Organic Nitrogen	Oct. 2014	Sep. 2015
2	Mesocosm Demonstration Project – Planning, Design, and Permitting	Oct. 2014	Feb. 2015
3	Mesocosm Demonstration Project – Construction and Startup	Feb. 2015	Aug. 2015
4	Mesocosm Demonstration Project- Operation, Sampling, and Reporting	Aug. 2015	Jul. 2018
5	Mesocosm Decommissioning	Aug. 2018	Sep. 2018

PART IV – 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 ☑ No If no, explain: The conceptual design comprises mesocosms, test cells, and field-scale cells designed to test, optimize, and demonstrate wetland technologies that have the potential to effectively remove background TN loads from the Caloosahatchee River inflows. The conceptual design was based on concurrent operation and sampling of all three components with a total estimated cost of approximately $8.1M, which we believe can be value engineered to be less. SFWMD is approaching the project in phases to base the testing plan on the information and knowledge gained from a previous phase and for budgetary purposes. The first phase consists of design, construction, operation, and sampling of the Mesocosm Demonstration Project. Based on the results of Phase I, the District will seek the appropriate level of funding for future phases.

- Does the project utilize innovative technologies/BMPS? For example, stormwater projects that include an extensive treatment train such as a combination of retention ponds, exfiltration trenches, nutrient separating baffle boxes, swales, etc., will be considered more innovative than projects that install a single BMP.
  ☑ Yes ☐ No If yes, explain:

  The State of Florida has long been a leader in the engineering, operation, and optimization of treatment wetlands. Florida's broad range of wetland-based alternatives include the Cypress Dome Natural Treatment Wetland project in the mid-1970s, a dozen other natural treatment wetlands, the first two large constructed treatment wetlands in 1987 (Lakeland and Orlando), at least a half dozen other municipal constructed treatment wetland systems, the south Florida Stormwater Treatment Areas (STAs), and dozens of large and small-scale urban and agricultural stormwater treatment wetlands. None of these facilities however are optimized for the removal of TN especially DON.

  This is a demonstration project for the use of constructed wetlands to effectively remove TN, including DON, as well as TP and TSS from waters of the Caloosahatchee River (C-43). SFWMD anticipates that the project will generate nutrient reduction strategies that could be adapted as sub-regional and regional facilities, and potentially BMPS on a single farm-based scale. This demonstration project will investigate innovative approaches to wetland treatment of TN and identify the most promising wetland-based TN treatment train that will also treat TP and TSS. When scaled up, these facilities can not only benefit the Caloosahatchee River and Estuary by helping achieve the TMDL and associated BMAP goals but can be applied to other estuaries as well.

- What are the estimated residence times of any ponds, swales, etc.

  Not Applicable

- Does the applicant or partner providing at least 10% match have a dedicated stormwater utility fee or other recurring dedicated fee?
  ☐ Yes ☑ No If yes, **state the monthly fee**: Not Applicable

- Is the project located in or does it benefit any of the following areas (check all that apply):

  ☑ At least 51% of the project's benefit is received by a special designation area including Empowerment Zone, Enterprise Community, Champion Community, Area of Critical State Concern, HUD-designated Renewal Community Rural Area of Critical Economic Concern, Rural Economic Development Initiative (REDI) community, Florida Enterprise Zone, or Front Porch Community. If yes, which one? The project is located within a Rural Economic Development Initiative (REDI) community and a Florida Enterprise Zone

  State special designation

  ☐ At least 51% of the project's benefit is received by an area with median income at 50% or less of the area's median income.

  ☐ At least 51% of the project's benefit is received by an area with median income between 80% and 50.1% of the area's median income.

  ☑ At least 51% of the project's benefit is received by an area with median income at or above 80.1% the area's median income.

- The applicant agrees to comply with all state and federal requirements specified in the guidance package and in the federal grant regulations. Checking "no" or "yes, except" may disqualify a project or cause the project to have a lower ranking than similar projects by lead organizations that agree to the requirements.
  ☑ Yes ☐ No ☐ Yes, with exceptions Provide details of exceptions.

- This project is an agricultural BMP ☐ Yes ☑ No
  If yes, check the following that apply.
  ☐ The project is supported by both state and local grower associations.
  ☐ The project complements an existing BMP project or USDA program.

- Please list the types of BMPs that are utilized in this project (e.g., wet detention pond, grassy swale, education).

  This project will develop wetland based BMP's that effectively remove nutrients (TN and TP), including DON, as well as TSS

- Are the activities in this project required under a permit or does it implement permit application requirements (e.g., MS4, federal permit).
  ☐ Yes ☑ No If yes, explain; the project may be ineligible for the 319 grant award.

- References Cited (if applicable):

Part I

1. Knight, R.L. and J. Steele 2005. Caloosahatchee River/Estuary Nutrient Issues. White Paper. Prepared for the South Florida Water Management District. Prepared by Wetland Solutions, Inc., Gainesville, FL.
2. Knight, R.L. 2012. Conceptual Design of C-43 Water Quality Treatment Area Nutrient Removal/Reduction Test Facility. Pages 1 and 9. Prepared for the South Florida Water Management District. Prepared by Wetland Solutions, Inc., Gainesville, FL.
3. Bronk, D.A., See, J.H., Bradley, P., Killberg, L., 2007. DON as a source of bioavailable nitrogen for phytoplankton. Biogeosciences 4:283-296.
4. Eyre, B., Ferguson, A. J. P., Webb, A., Maher, D., and Oakes, J. M. 2011. Denitrification, N-fixation, and nitrogen and phosphorus fluxes in different benthic habitats and their contribution to the nitrogen and phosphorus budgets of a shallow oligotrophic subtropical coastal system (southern Moreton Bay, Australia), Biogeochemistry 102:111-133.

Part II

1. Miami-Dade Water and Sewer Department's website (http://www.miamidade.gov/water/home.asp)
2. Knight, R.L. 2012. Conceptual Design of C-43 Water Quality Treatment Area Nutrient Removal/Reduction Test Facility. Page 13; Exhibit 3. Prepared for the South Florida Water Management District. Prepared by Wetland Solutions, Inc., Gainesville, FL.

3. Knight, R.L. 2012. Conceptual Design of C-43 Water Quality Treatment Area Nutrient Removal/Reduction Test Facility. Page 9. Prepared for the South Florida Water Management District. Prepared by Wetland Solutions, Inc., Gainesville, FL.

PART V – ATTACHMENTS

List the file names for all attachments that are included with this application (such as maps, design plans, etc.), a description of what the attachment contains, and the total number of attachments submitted, including the application.

1. Application Form
Filename: SFWMD_C-43WQTF_319APP(5-21-14).docx
Description: Completed application form

2. Attachment I – See separate attachment submitted with this FY14 workplan.
Filename: C-43 Water Quality Demonstration Facility Location Map.pdf
Description: Location Map

3. Attachment II - See separate attachment submitted with this FY14 workplan.
Filename: Boma Property Map.pdf
Description: Map of the property were the project is proposed

4. Attachment III - See separate attachment submitted with this FY14 workplan
Filename: C-43 Water Quality Demonstration Facility Conceptual Design.pdf
Description: Site plan showing the proposed demonstration facility

5. Attachment IV - See separate attachment submitted with this FY14 workplan
Filename: C43_WQTA_Task_4_Final_Report.pdf
Description: Report titled "*Conceptual Design of C-43 Water Quality Treatment Area Nutrient Removal/Reduction Test Facility"* including the report's attachments A thru C.

6. Attachment V- See separate attachment submitted with this FY14 workplan
Filename: Freshwater Caloosahatchee River WBID.pdf
Description: Map showing the freshwater Caloosahatchee River WBID's with the project site location

7. Attachment VI - See separate attachment submitted with this FY14 workplan
Filename: Caloosahatchee River Tidal WBID.pdf
Description: Map showing the Caloosahatchee River WBID's

8. Attachment VII - See separate attachment submitted with this FY14 workplan
Filename: C-43 WQTF Lee County Support Letter.pdf
Description: Letter of support from Lee County's Board of County Commissioners

PROJECT 13

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

PROJECT FUNDING REQUEST: $351,139 **MATCH:** $236,031.09

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

CONTACT PERSON: Patrick Minogue, Associate Professor of Silviculture
University of Florida, Institute of Food and Agricultural Sciences, North Florida Research and Education Center
155 Research Road, Quincy, FL 32351-5677
Tel: (850) 875-7142
Fax: (850) 875-7188
Email: pminogue@ufl.edu

COOPERATING ORGANIZATIONS:

Florida Department of Agricultural and Consumer Services, Florida Forest Service
Florida Department of Environmental Protection
Tommye Collins, private forest landowner, Suwannee County, FL

JUSTIFICATION FOR EXTENDED MONITORING

We propose to **extend the existing forest site preparation BMP monitoring project** to include a third sequential annual application of slow release and standard fertilizer treatments and monitoring of the environmental fate of applied nitrogen, phosphorus and potassium fertilizers for an additional two years (18 months monitoring, six months analysis). Specific needs addressed by the extended monitoring period include:

- Pine straw producers may apply nitrogen fertilizers annually to bolster pine straw harvests, potentially doubling yields of a relatively high value crop (Morris et al 1992). In their recent review, Binkley et al. (1999) emphasized the need for further forestry BMP studies examining effects of repeated applications and larger scale studies, as we are conducting.
- We will add ammonia loss measures to show the value of plastic coated urea materials. Although this does not directly affect water resources, it will provide growers with a justification to use more environmentally responsible nitrogen forms, though more costly.
- An additional year of fertilization and the extended monitoring period will allow for assessment of a broader range of temporal changes in precipitation and other environmental conditions.
- The full extent of pine volume response does not occur for two or more years following fertilization and the extended monitoring period will enable this study to better document nitrogen rate response to fertilization, likely supporting the use of lower N fertilization rates with more frequent applications of a slow release form.
- The longer monitoring period is critical to monitoring the environmental fate of applied phosphorus, which is relatively immobile in short term studies, but does move in the form of soluble organic complexes with time.

PROJECT ABSTRACT

This project will monitor the environmental fate of applied nitrogen and phosphorus following two sequential annual applications of PCU controlled release fertilizer to provide 25, 50, and 125 lb N/acre, to be compared to an unfertilized control and conventional treatment using a combination of DAP and urea to provide 50 lb of N per acre and 25 lb per acre P_2O_5 (Table 1). The conventional treatment provides a typical amount of P for forest fertilization and an N rate thought to be just above the threshold to obtain a pine growth response on this site. The 50 lb N rate

of the conventional treatment compares to the middle PCU rate. Phosphorus will be added using triple superphosphate (TSP) to all the PCU treatments to provide the typical 25 lb/acre P_2O_5 rate, so N response comparisons may be made among the PCU treatments and conventional treatment with P held constant. We have located an ideal study location in the Suwannee Valley, a region of special concern to groundwater pollution. 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.

STATEMENT OF THE PROBLEM/BACKGROUND

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 (potentially 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 poorly 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 and use of slow release fertilizers are lacking in the literature.

Potential Concerns with Straw Removal

Pine straw serves many important purposes in the forest 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 two years following annual fertilization through quantification of total phosphorus and plant available P using Mehlich III extraction.

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. 2013). Our study will determine nutrient dynamics and leaching potential in a seven year old slash pine stand on a location representing the extreme high leaching potential in north Florida.

Coated slow release fertilizers, including sulfur coated urea (SCU) and various polymer coated urea (PCU) fertilizers reduce volatile losses, but also provide slow release of N, thus extending the period for plant uptake and reducing potential leaching losses as well. Polymer coated urea has been utilized in forest management, and its cost may be justified by high pine straw product values, which typically range between $100 and $200 per acre. Polymer coated urea is comprised of a soluble urea nitrogen source core, which is coated with one of several polymer materials including linseed oil, polyethylene, polypropylene, or various other organic polymers. Nitrogen is released through the polymer coating by diffusion, and the release rate increases strongly with increasing temperature. The rate of nitrogen release can be manipulated by coating thickness and composition. Polymer coated urea products are a newer technology than sulfur coated urea and generally are more expensive. However,

they contain higher amounts of N (typically 44% vs. 34% N) and provide superior long-term fertilization, significantly reducing the amounts of N needed as compared to conventional mineral fertilizers.

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

PROJECT OBJECTIVES

The scope of this monitoring project includes applied and basic questions regarding: (1) the fate of applied N and P for a wide range of PCU controlled release fertilization rates (plus standard TSP) as compared to conventional DAP plus urea fertilization; (2) forest stand level nutrient budgets; and (4) 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 and P following two sequential annual fertilizations using a wide range of PCU application rates (0, 25, 50, 125 lb N per acre, plus standard 25 lb/acre P_2O_5 from TSP) as compared to a non-fertilized control and conventional DAP + urea treatment (providing 50 lb N/acre and 25 lb/acre P_2O_5) in a study with 3 replications of treatments, 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 other sandy soils of the Coastal Plain.

3. Assess volatile losses of ammonia to compare various rates of the plastic coated urea to conventional urea, to determine and compare nutrient use efficiency.

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

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

TREATMENTS

Table 1. Fertilization treatments with Polymer coated urea (PCU)[1], triple supper phosphate (TSP), and diammonium phosphate (DAP)[2], and potassium chloride (KCl) to be compared to a non-fertilized control in raked and non-raked slash pine stands growing on poorly drained soils in the Suwannee Valley, Florida.

Nutrient Sources	Pounds per acre added			
	56.8 PCU + 55.6 TSP	113.6 PCU + 55.6 TSP	284.1 PCU + 55.6 TSP	54.3 DAP + 87.4 Urea
N elemental	25	50	125	50
P_2O_5	25	25	25	25
P elemental	11	11	11	11
KCl	100	100	100	100
K elemental	50	50	50	50
Ca elemental	8.3	8.3	8.3	-

1. ESN PCU product formulation is 44% N by weight.
2. Urea is 46% N by weight.
3. DAP is 18% N and 46% P_2O_5 by weight.
4. TSP is 45% P_2O_5, 19.8% P, 15% Ca by weight
5. KCl is 50% K, 60% K_2O by weight.

Summary of Estimated Pollutant Load Reductions: This project is providing cornerstone information regarding fate of applied nitrogen and phosphorus 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 DEP 319 project with DAP, and the proposed monitoring of PCU applied at the same nitrogen rates, current Florida Silviculture BMP fertilization guidelines will be evaluated and possibly improved for better protection of groundwater quality. Current BMPs do not address the use of controlled 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 138 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 peer-reviewed journal publications.

Summary of Monitoring: The environmental fate of applied N and P and pine stand responses will be determined following two sequential annual applications of various rates of PCU controlled release fertilizer plus standard P amounts using TSP, as compared to a conventional DAP plus urea treatment and a non-fertilized control, in a seven year old slash pine stand with and without annual pine straw removal (Table 1). Specifically:

- Groundwater NO_x , NH_4, and TP concentrations will be monitored monthly for three months prior to fertilization, then quarterly for one year following each of two sequential March fertilizations. Two monitoring wells will be placed in the treatment area and one at a distant (1000 ft minimum) control location.

- These same three nutrient parameters will be assessed in lysimeter extracts of the soil solution at 20 and 72 inch depths at 3 months, 1 month and 2 weeks prior to fertilization, then at 2 and 4 weeks, and at 2, 3, 6, 9, and 12 months following each fertilization. In addition, four sampling dates are budgeted for significant rain events soon after fertilization.

- Soil matrix nutrient monitoring to 72 inch depth will be done prior to each fertilization event and at one year after each fertilization, and will include a host of plant macronutrients in various forms (NO_x, NH_4, TKN, TP, $P_{Mehlich\ 3}$, K, Ca, Mg). Soil Al and Fe concentration will also be measured at these same assessment dates to facilitate application of the Florida Phosphorus Index to evaluate leaching potential (Hurt et al. 2009).

- 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 removals, and the measures of the soil matrix nutrients listed above.

- Soil organic matter (OM) content and root mass within the upper 12 inches of the soil profile will be evaluated at each soil matrix sampling time to evaluate the effect of straw removals and fertilization on these important indices of sustainability. Soil bulk density will be measured for each treatment prior to study initiation and at study completion. Prior to study initiation, soil texture will be examined through the soil depths sampled on each plot and also determined by the hydrometer method for a composite sample of surface soils within each of the 30 half-acre treatment plots.

- Continuous monitoring of rainfall, tree crown rain through-fall, wind speed, air psychometric parameters, and soil moisture and temperature at various depths will be recorded with solar and battery powered instrumentation on-site to facilitate process modeling of applied N and P environmental fate.

PROJECT LOCATION AND WATERSHED CHARACTERISTICS:

This project utilizes a 9-year-old slash pine plantation on private ownership in Suwannee County, FL (approximately 3 miles S-SE of Live Oak, FL). It is located 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:	N 30° 14.003
Longitude:	W 83° 01.047
Elevation :	105 ft
Hydrologic Unit Code:	031102050102
Land is owned by:	Mr. Tommye Collins

Land Uses within the watershed: N/A

POLLUTION REDUCTION STRATEGY:

Watershed Management Plan: This work will determine the effectiveness of current silviculture fertilization BMPs 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 monitor N and P concentrations of shallow groundwater at the project site.

TASK DESCRIPTION: Tasks are steps taken to complete the proposed project. Examples include completing construction of a BMP, completing required monitoring, or publishing educational materials. Please include a detailed description of what tasks will be completed by this project.

Task Number	
1	Contractor shall perform University-level research in accordance with the Project Objectives listed above to evaluate a proposed revision to the current fertilization BMP for pine straw production, including extension activities and semi-annual activity and data acquisition reports.

DELIVERABLES: Reimbursement may only come upon completion and submittal of a named deliverable. Deliverables must be a tangible and measurable event or item that must be produced to complete a project *or part of a project*; must be directly related to a task identified in the scope of work; must be specific, quantifiable, measurable and verifiable; must be a necessary part of the completion of the project; and must clearly describe what constitutes successful performance. Progress Reports are not considered a deliverable. However, development of the QAPP, collection of data, and periodic sampling activity and data acquisition reports are tangible work products and upon approval do constitute interim deliverables for invoicing expenses incurred within the deliverable budget during that period. This project has 2 interim deliverables consisting of collection of data, and periodic sampling activity and data acquisition reports. Reports will be examined for compliance with data and QA requirements. Final project reports are required for EPA grant funded projects.

ALLOWABLE COSTS: Contracted services for laboratory and statistical analysis, UF farm crew work, on-site pine straw raking services; and salary, fringe, travel and supplies for sampling, preparation and reporting, and up to 10% allowable indirect costs.

Task Number	Task Description	Deliverables	Start	Complete
1	Evaluation of revised fertilization BMP for pine straw production.	A QAPP, all required QA reports, and annual sampling activity and data acquisition reports will be delivered. These reports shall contain summary results of data as they become available. All current data shall be submitted to DEP with semi-annual activity and data reports as they clear QA procedures.	Month 1	Month 60
		At least two Extension publications for growers and two research publications supported by this grant shall be provided with proper acknowledgement of the funding agency.	*	
		The Final Report containing all data and copies of photos, publications and presentations shall be submitted on or before July 11, 2018. A Draft Final Report shall be submitted on or before September. 11, 2018.	*	

*This is a continuation of a previously approved project and the amendment will have dates for these milestones.

TIMELINE FOR COMPLETION:

Proposed Extension: September 12, 2016 to September 11, 2018.

As with all in-field agricultural research projects, timelines can only be estimated. If significant delays or other problems occur, at least thirty (30) days notice is generally required to ensure processing of a change order or amendment to the task. No payment may be made for work or expenditures that occur after the task closing date.

MINIMUM PERFORMANCE STANDARD: The Department Grant Manager will visit the site and review the data deliverables and reports to verify that QA standards are followed and that the study is performed in accordance with the approved Scope of Work. Technical modifications shall be addressed in a written memo from the Department's Contract Manager, a change order, or a contract amendment as appropriate, prior to the change of procedure.

Budget Table – Task 1

Budget Justification:
Supplies and other expenses: Field agricultural tools and supplies, fertilizer, sampling supplies and tool including lysimeters, water pump and control box, field laboratory instruments and supplies including datalogger, thermometers, and electronic balance, and protective safety gear for workers.

Budget Table – Total Tasks 1

Category	Grant Funding	Match Funding	Match Source
Salaries	188,033.87	105,603.80	UF
Fringe Benefits	25,099.32	31,469.93	UF
Travel	30,322.64		
Contractual	61,532.40		
Equipment Purchases	0		
Supplies/Other Expenses	14,229.05		
Indirect/Overhead	31,921.72	98,957.36	UF – unrecovered Indirect
TOTAL FOR TASK	**351,139.00**	**236,031.09**	-

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