Legislative ID# 160474

Fiscal Year 2017 REDI Community & Innovative Projects Cost-Share Application

INSTRUCTIONS FOR USE OF THIS FORM:
This form is designed to assist in submitting a complete application for consideration by the St. Johns River Water Management District (SJRWMD) for the REDI Community & Innovative Projects Cost-Share Program. Detailed guidance on completing this application can be found in the Funding Guidance Document. All sections of the form must be completed to be considered a complete application. If additional space is needed to fully complete a section, please attach separately.

PROJECT CATEGORY (select only one):	☐ REDI	☒ Innovative
A. BASIC INFORMATION		
A-1	**PROJECT NAME:** Suburban Heights - Beville Creek Restoration	
A-2	**Applicant**	
	Name/title: Elizabeth Waite, P.E./ City of Gainesville Public Works Department Project Manager	
	Email address: waiteed@cityofgainesville.org	
	Mailing address: 405 NW 39th Avenue, Gainesville, FL 32609	
	Office Phone: (352) 393-8405	Mobile Phone: (802) 282-3490
A-3	**Contact (if other than applicant)**	
	Name/title:	
	Email address:	
	Mailing address:	
	Office Phone: ( )	Mobile Phone: ( )
A-4	**What County is this project located?**	
	☒ Alachua ☐ Baker ☐ Bradford ☐ Brevard ☐ Clay ☐ Duval	
	☐ Flagler ☐ Indian River ☐ Lake ☐ Marion ☐ Nassau ☐ Orange	
	☐ Osceola ☐ Putnam ☐ Seminole ☐ St. Johns ☐ Okeechobee ☐ Volusia	
A-5	**What Water Supply Planning Region is this project located** (*Refer to map at http://www.sjrwmd.com/watersupply/planning.html*)	
	☒ North Florida (North Florida Regional Water Supply Partnership/North Florida Water Initiative)	
	☐ Central Springs and East Coast	
	☐ Central Florida (Central Florida Water Initiative)	
A-6	**Is the Applicant a Rural Economic Development Initiative (REDI) Community?** ☐ Yes ☒ No	
	If yes, please attach a signed Waiver of Matching Funds Letter on your letterhead. See format at sjrwmd.com/funding/REDI.html	

B. PROJECT INFORMATION

B-1 PROJECT TYPE

Check only one and provide evidence in Section B-3.

☐ **Water Supply** ☐ **Water Conservation** ☐ **Water Quality**
☐ **Flood Protection** ■ **Natural Systems**

B-2 PROJECT DESCRIPTION *(Scoring Criterion #1)*

a. Short Description

Succinctly (four sentences or less) describe the project, e.g. what is being constructed or what is the program to be implemented?

A 1000' long creek restoration project that utilizes Regenerative Stormwater Conveyances (RSC) principals in conjunction with Biosorption Activated Media (BAM) to reduce erosive conditions, improve water quality, promote groundwater recharge, and enhance the ecological and biodiversity within Beville Creek. This natural systems improvement will also maintain a wildlife corridor between Cofrin Nature Park to Kingswood Lake while simultaneously providing erosion protection and an aesthetically pleasing creek system to benefit both the local residents and the environment. Removal of invasive species and installing native plantings will serve to both stabilize creek banks and lessen the maintenance burden on the city's operations and maintenance department, promoting the sustainability goals of the City. The RSC step pools create micro waterfall structures which isolate erosive forces within an armored riprap and boulder section that stabilizes the creek and helps to prevent sediment from moving downstream.

b. Innovative Potential *(N/A for REDI Projects)*

Describe why this project is innovative. Refer to the guidance document for further instruction. Attach separate pages if necessary.

Project Innovative Components:

1. Use of RSC, a new low impact design (LID) that uses a natural systems approach to stormwater management and includes a series of shallow aquatic step pools, riffle grade controls and native vegetation to stabilize and enhance open surface water systems. RSC systems mitigate the damage of excessive stormwater discharge by transitioning surface water flow to groundwater seepage and exfiltration into parent soils.
2. The proposed system maintains the open, natural state of the creek instead of enclosing the system in a conventional piped, conduit flow system that would reduce both groundwater recharge as well as any water quality and ecological benefits of an open and natural system.
3. Maintains and enhances the natural ecosystem and biodiversity of Beville Creek by incorporating native plantings and by removing exotic species.
4. Proposed to include Bold and Gold ™ BAM developed by UCF, to enhance water quality of the system. RSC systems have been demonstrated to reduce TSS, TP, and TN in surface flow by 72%, 28%, and 30%, respectively without the use of BAM (see references in section B-3). Incorporating BAM into the RSC step pool system will further remove TN and TP from the groundwater seepage that will occur as a result of seepage through the step pools. This type of RSC application with BAM would be, to our knowledge, the first of its kind in the State.

c. Measures of Success

Describe how will you measure the effectiveness of your project?

Success will be measured by a variety of system metrics, including the following:

1. **Long-term erosion protection**. The primary function of the system is to prevent ongoing erosion of Beville Creek, that is currently discharging high amounts of sediment loading into Cofrin Nature Park, immediately downstream of the project, as well as threatening several homeowner's properties from erosion-related damage. The long-term stability of the Creek will be monitored by City staff.
2. **Ecological benefits**. Native plantings and groundcover will provide habitat for Florida species. The survival rate of various native plantings will be monitored by City staff and replaced as necessary to promote a well-established vegetated Creek system.
3. **Maintenance reduction**. Routine maintenance of the Creek system by City staff will be documented over the years to determine if the Creek system requires a reduced maintenance effort from the existing system.
4. **Water Quality**. Periodic water quality monitoring of Beville Creek (downstream of project site) has been performed by Alachua County EPD, including sampling for Fecal Coliform, E.Coli, Dissolved Oxygen, Alkalinity, Chloride, Sulfate, Organic Carbon, Metals, Ammonia Nitrogen, NOx, Total Nitrogen, TKN, ortho phosphorus, soluble reactive phosphate, Total Phosphorus, Color, turbidity, specific conductance, pH, TDS, TSS and temperature. Post-construction water quality samples will be measured against historical information to determine if any water quality improvements are evident as a result of the project.

d. Is this project multi-phased or part of a larger overall effort? If so, describe the larger project.

No, this project is not multi-phased. If this project proves successful the design principles incorporated in this project will be used in subsequent creek restorations in Gainesville but no specific projects have been identified at this time.

e. Describe the location, include a map. The map should identify any potentially affected MFL, TMDL, BMAP, or impaired water bodies, or affected wetlands or springs.

The Suburban Heights – Beville Creek Restoration project (Project) area is within the Suburban Heights subdivision within the City of Gainesville within Section 34 of Township 09 South, Range 19 East. The study area is located within the jurisdiction of the St. Johns River Water Management District (SJRWMD), and within the Beville Creek Basin (part of the Orange Creek Watershed) of Alachua County. Please see the attached Exhibit A – Project Maps for maps depicting the project vicinity and site infrastructure.

B-3 **BENEFITS TO DISTRICT MISSIONS *(Scoring Criterion #2)***

Describe the benefit to one (or more) of the District's main missions (Water Supply/Conservation, Water Quality, Flood Protection and/or Natural Systems). Indicate which is the primary mission benefit. Attach separate pages if necessary.

Natural Systems Mission (Primary):

The primary mission of this project is to restore a 1000 linear feet segment of Beville Creek as an open, natural system. The Creek was modified around the 1950's to accommodate the residential development around it and now serves primarily as a stormwater drainage conveyance system. The existing Creek has experienced significant erosion due to large volumes of stormwater traveling at high velocities during storm events, which is typical of a channelized creek system within a developed environment. This channelization and urbanization has caused a reduced natural system function to Beville Creek, as well as to release excess sediment and pollutants into sensitive ecosystems downstream, including Cofrin Nature Park.

This Project aims to construct an open 'natural system' Creek restoration improvement that addresses the ongoing erosion issues of Beville Creek. The removal of invasive species and the planting of native Florida and Florida friendly aquatic and groundcover plants will enhance the Creek ecosystem and biodiversity, while preserving a wildlife corridor that exists between Cofrin Nature Park to the South and Kingswood Lake to the northwest.

Water Quality Mission (Secondary):

Beville Creek lies within a TMDL of Hogtown Creek, which is impaired for excess fecal coliforms. Because the improvements incorporate Regenerative Stormwater Conveyance (RSC) systems which promote increased groundwater seepage and reduced surface flow, a reduction of fecal coliforms discharges is expected as a result of this project.

Additional water quality treatment via the incorporation of BAM will help to remove nutrient loading from the groundwater seepage that the RSC system will generate. Note in the construction cost sheet included with this submittal, that the incorporation of BAM into the RSC step pools is a minor cost to the project overall, yet provides a significant amount of the nutrient reduction credit that this project will produce. This demonstrates the benefit of incorporating BAM wherever infiltration-based best management practices (BMPs) are proposed as a low-cost water quality enhancement.

Water Conservation (Secondary):

Water conservation of approximately 2.51 acre-feet per year will be generated for this project by the construction of the RSC step pool system. The step pools act as small retention devices that promote infiltration of surface water flow into groundwater seepage.

Reference:

1) Cizek, Adrienne Rose (2014). "Quantifying the Stormwater Mitigation Performance and Ecosystem Service Provision in Regenerative Stormwater Conveyance (RSC)." Dissertation, North Carolina State University. Department of Biological and Agricultural Engineering. 3690244.

B-4 **If the Project is for Water Resource Development or Alternative Water Supply Development identify the source water** *(check all that apply)***:**

☐ **Fresh Groundwater**

☐ **Brackish Groundwater**

☐ **Stormwater**

☐ **Reclaimed Water**

☐ **Surface Water: Identify surface water body:** _____

☐ **Brackish Surface Water: Identify surface water body:** _____

☐ **Other: Identify Source:** _____

B-5 **District Permit Information:**
If the applicant has an SJRWMD-issued Consumptive Use Permit and or an Environmental Resource Permit for the project site, provide the following:

Permit Type:	**Permit #**	**Expiration date/Compliant (yes / no)**
ERP General	147568-1	Yes, approved on 10/4/16

B-6 **Project likelihood of successful completion:**
a. Project Readiness *(Scoring Criterion #3)*: *Check all that apply and supply requested dates (month/day/year) and attach a detailed project construction schedule.*

		Current % Complete					
	Planning	100	%	Start Date:	10/1/2014	Completion Date:	12/20/2014
	Design	100	%	Start Date:	12/20/2014	Completion Date:	10/4/2016
	Permitting	100	%	Start Date:	9/22/2016	Completion Date:	10/4/2016
	Bidding	0	%	Start Date:	11/1/2016	Completion Date:	12/6/2016
	Construction			Start Date:	2/10/2017	Completion Date:	7/10/2017
	Future Phases			Start Date:		Completion Date:	
	Other			Start Date:		Completion Date:	

Include documentation that demonstrates that the construction start date is realistic (e.g. critical milestones, commission approval dates, procurement timeline, etc.).

Please see attached Exhibit B; Project Schedule and Gantt Chart

b. Local Government / Public Support: *Describe the public support for your project (meetings attended, community workshops, presentations to councils, notification in newsletters, etc.). If your project requires participation from certain communities or homeowners, provide a description of methods used to ensure participation in your project. Provide the rate of participation that can be documented at the time of the application.*

Public involvement has been very high on this project. Two public meetings have been held so far, one at 15% plans with 10 attendees and one at 90% plans with nearly 20 citizens from the neighborhood in attendance. Multiple on site meetings with residents along the drainage corridor have taken place throughout the design phase. Meetings between the Public Works Director and citizens who live along the corridor have also taken place. These meetings have helped to create a design that accommodates all resident's needs. Public meeting were advertised through physical mailings to residents along the corridor, Facebook announcements, announcements in the Gainesville Sun, the Neighbored HOA email distribution list as well as outreach through both the City of Gainesville's Website and the Public Works' Website. I have met with the Suburban Heights Neighborhood Association on two occasions to provide updates between public meetings. Updates are posted periodically on the City of Gainesville's Public Works project webpage which can be viewed at: http://www.gainesvillepublicworks.org/projects-2/suburban-heights-stormwater-improvements/.

Citizens in this neighborhood tend to be very active in the community and public outreach across multiple platforms has proven successful. I have personally met with over half of the residents who live along the creek segment that will be restored as part of this project. I have spoken on the phone with many of the others residents along the creek. All residents directly impacted by this project have received project information, with about 75% directly participating via phone calls, email, on site meetings, public meetings or HOA meetings.

The City of Gainesville Public Works Department has also worked in collaboration with the Parks Recreation and Cultural Affairs department as well as the City's Environmentalist to help create a design that supports the ecological and biodiversity of Beville Creek.

c. Past Performance *(Scoring Criterion #4)*: *Identify cost-share projects your organization completed with the District, or projects still underway (explain status) funded in part with District support. Please note: applicants will not be penalized if they have not had previous cost-share projects with the District.*

Please see below for the City of Gainesville's previous SJRWMD Cost Share Agreements:

St Johns River Water Management District Cost Share Agreements

Contract Number	Title	Contract Date	City Share	District Share	Last Invoice
SI438AA	Depot Park Stormwater Treatment	4/13/2005	$ 60,000	$ 350,000	6/8/2009
SH437AA	Depot Park-Phase I: West Ponds and Discharge Project	4/16/2004	$ 715,500	$ 715,500	6/5/2006
SK915AA	Paynes Prairie Treatment Wetland	7/1/2007	$ 425,000	$ 850,000	9/29/2010

C. PROJECT COST INFORMATION

C-1

a. Breakdown of project cost *(provide details in separate attachment)*

Attach a table or spreadsheet with detailed project costs for each task or segment of the project. The District will contribute only to the construction costs of the project. Indicate at the conclusion of the table/spreadsheet, a cost effectiveness evaluation as described below.

Please see attached Exhibit C; Construction Cost Estimate

b. Cost-share request funding table

The District's share (C) cannot exceed 50% of the total construction cost (B) except for REDI communities that have submitted a waiver, up to 100% of total construction cost can be reimbursed.

A. Total estimated project cost: (includes capital, construction, land acquisition, planning, permitting & design costs)	$ 794,339	
B. Construction costs:	Year 1 (FY2017) $ 599,509.00	Year 2 (FY2018) $
C. Cost-share amount requested:	$ 299,754.50	
D. Estimated Applicant's Annual Operation & Maintenance Costs:	$ 1000	
E. Estimated Service life of components:	50 years	

	c. Funding Sources: *Identify any other outside sources of funding including State or Federal appropriations or grant monies, municipal bonds. Identify source and status of applicant funding.* N/A – all funding is from the City's SMU fund	
	d. Project partners: *Check one below and if multi-jurisdictional include the percent of funding to be contributed by each partner.* ■ Single entity ☐ Multi-jurisdictional (attach copy of partnership agreement or memorandum of understanding, if available, and includes status of agreement). Identify other partners:	
C-2	**Quantification of Project Benefits** **For Water Quality Projects:** 29.24 Lbs/year TN removed/reduced annually 4.88 Lbs/year TP removed/reduced annually **For Water Supply/Conservation Projects:** 2.51 acre-feet/year of water conserved by groundwater seepage (0.00224 MGD)	**For Flood Protection projects:** _____ Acres protected from flooding Annual Exceedance probability - As is: _____/_____years After implementation: _____/_____years **For Natural Systems projects:** N/A Acres Wetlands Restored/Enhanced 1 Acres Uplands Restored/Enhanced **(1,000 linear feet of Creek restoration)**
C-3	**Cost Effectiveness *(Scoring Criterion #5)*** *(complete for all that apply)* *For Water Supply and Water Conservation projects, and for Water Quality projects, please attach the Cost Effectiveness Calculator (as provided at http://www.sjrwmd.com/funding/REDI.html) and appropriate supporting documentation. (Failure to use the cost effectiveness calculator may result in a zero score for cost effectiveness.) For Water Quality, Flood Protection, and Natural Systems projects, please provide methodology used and additional supporting documentation, including, for Water Supply and Water Quality projects, the cost effectiveness calculator.* Water Supply: N/A cost per 1000 gallons made available Water Conservation: $39.87 cost per 1000 gallons conserved Water Quality (TP or TN): $1,115.22 cost per lb TN $6,682.19 cost per lb TP Flood Protection: N/A Benefit/Cost ratio Natural Systems: $32.61 cost per linear feet shoreline	
Provide the required attachments: project map, construction schedule/timeline, project cost table or spreadsheet, and cost effectiveness calculator; plus, additional information required for your specific project type in accordance with the District's 2017 REDI Community& Innovative Projects Cost-Share (RCIPCS) Funding Program Guidance.		

I certify that all information on this form and the attached document(s), if applicable, is true and correct.
Signature of the person with authority to enter into a contractual agreement.

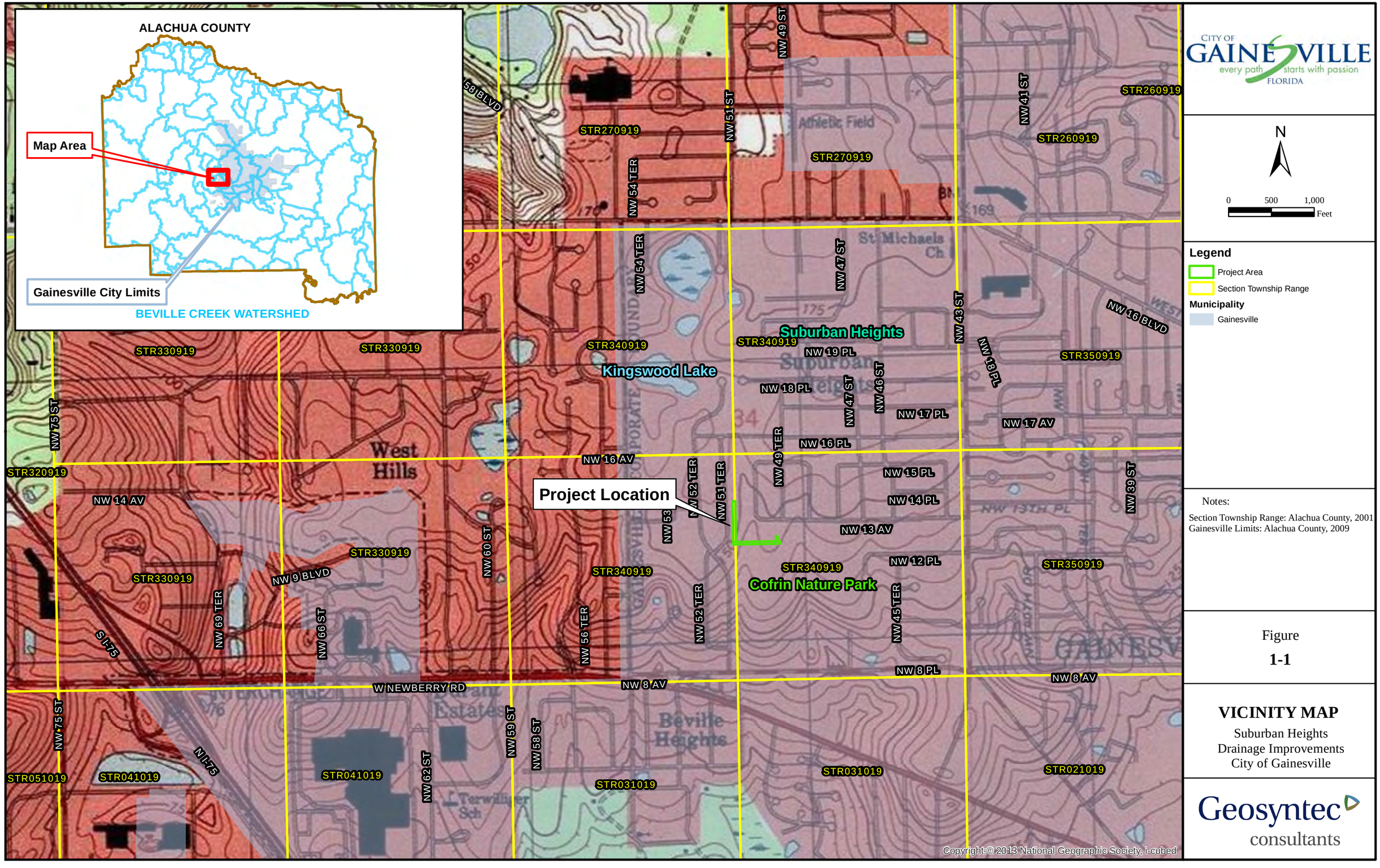
Name (print): Anthony Lyons

Signature: _____

Title: City Manager, Gainesville, Florida

Date: 10/13/2016

Exhibit A_Project Maps



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N

0 500 1,000
Feet

Legend

- Project Area
- Section Township Range

Municipality

- Gainesville

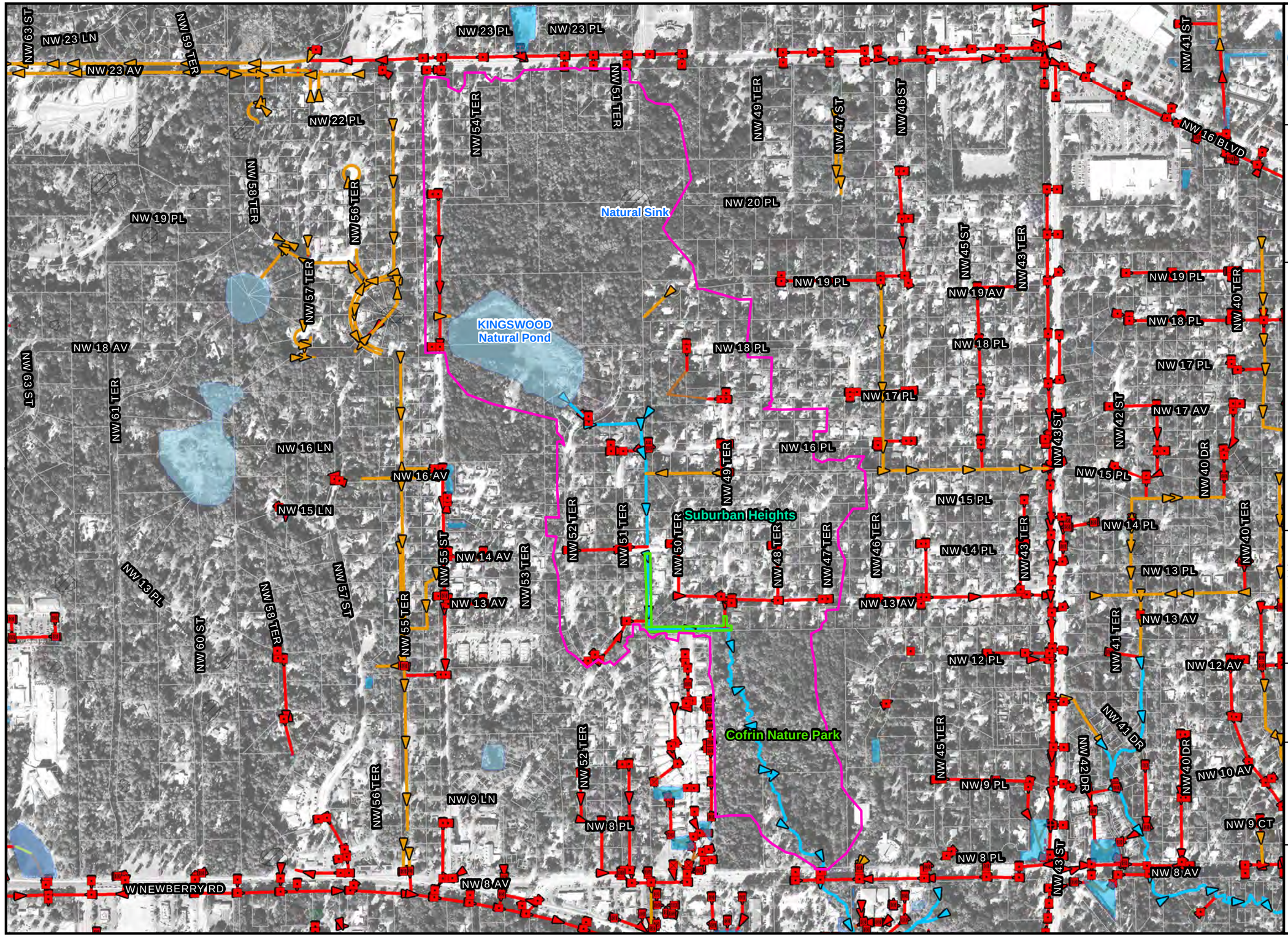
Notes:

Section Township Range: Alachua County, 2001
Gainesville Limits: Alachua County, 2009

Figure
1-1

VICINITY MAP
Suburban Heights
Drainage Improvements
City of Gainesville

Geosyntec consultants



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N

0 300 600
Feet

Legend

- Drainage Area
- Project Area
- Parcel
- Dry Detention
- Natural Pond
- Natural Sink
- Depression
- Retention Pond
- Wet Detention
- DiversionStructure
- OutletControlStructure
- Curb Inlet
- Ditch Bottom Inlet
- Ditch
- Open Channel
- Spillway
- Collector
- Culvert
- Outfall
- Underdrain

Notes:

Aerial: Alachua County Property Appraiser, 2010
Parcels: Alachua County, 2009
Stormwater Infrastructure: Gainesville, 2008

Figure

2-1

SITE AND INFRASTRUCTURE MAP

Suburban Heights
Drainage Improvements
City of Gainesville

Geosyntec consultants

Suburban Heights Stormwater Improvements

NW Corner of Cofrin Park to NW 14th Avenue

Project Manager: Betsy Waite

Today	10/11/2016
% Complete	93.89%
Months to Completion	9.04
Months to Construction	4.04

Task	Actual Start Dates	Actual Duration	Actual End Date	Completed	Remaining	% Complete	Task Delay	Comments
Planning	10/1/2014	30	10/31/2014	30	0	100%	0	
Scope & Fee	10/31/2014	20	11/20/2014	20	0	100%	0	
Design Contract & Legal Review	11/20/2014	30	12/20/2014	30	0	100%	0	
Survey / Soil Borings / Data Gathering	12/20/2014	25	1/14/2015	25	0	100%	0	
Preliminary Submittal - 15% Design	1/14/2015	54	3/9/2015	54	0	100%	0	
Preliminary Review	3/9/2015	14	3/23/2015	14	0	100%	0	
SJRWMD Coordination - pre permitting discussion	2/12/15	70	4/23/2015	70	0	100%	0	*Concerns from John Hendrix and Barbara Hatchett - meetings to discuss
15% Design Submission	4/23/2015	14	5/7/2015	14	0	100%	0	
City Environmentalist Concerns	5/7/2015	28	6/4/2015	28	0	100%	0	*As per meeting on 5/6/15 - Teresa does not support piping the ditch
Brainstorming Session	6/4/2015	14	6/18/2015	14	0	100%	0	*Brainstorming session and follow up with designer and City Environmentalist
Proposal for Alternative Design	6/18/2015	14	7/2/2015	14	0	100%	0	
PO for 100% design services	7/2/2015	25	7/27/2015	25	0	100%	0	
Design Alternatives/ Phase I - 15% Design	7/27/2015	91	10/26/2015	91	0	100%	41	*It took longer than planned for the geo analysis and QA/QC
City Review and Decision on Design	10/26/2015	24	11/19/2015	24	0	100%	4	*Teresa's ultimate decision of how to best move the project forward
90% Design	11/19/2015	194	5/31/2016	194	0	100%	110	*Stakeholder concerns addressed/change in project constraints
90% Review + Coordination meeting	5/31/2016	28	6/28/2016	28	0	100%	14	*Collaboration meeting to discuss conflicting comments w/ design team
Utility Coordination	5/31/2016	150	10/28/2016	133	17	89%	90	
SJRMWD Permitting	9/22/2016	12	10/4/2016	12	0	100%	0	
100% Design	6/28/2016	77	9/13/2016	77	0	100%	34	*Added scope during collaboration meeting
100% PlanReview	9/13/2016	14	9/27/2016	14	0	100%	0	
100% Tech Spec Review/ Final Plans	9/27/2016	35	11/1/2016	14	21	40%	35	
Bidding Process	11/1/2016	35	12/6/2016	0	35	0%	0	
City Commission Approval	12/6/2016	45	1/20/2017	0	45	0%	0	* Low Bid, CC approval on 1/19/17
Pre Construction Meeting/MOT Permit/MOB	1/20/2017	21	2/10/2017	0	21	0%	0	
Construction	2/10/2017	120	6/10/2017	0	120	0%	0	
Final Acceptance	6/10/2017	30	7/10/2017	0	30	0%	0	
				741	**289**			

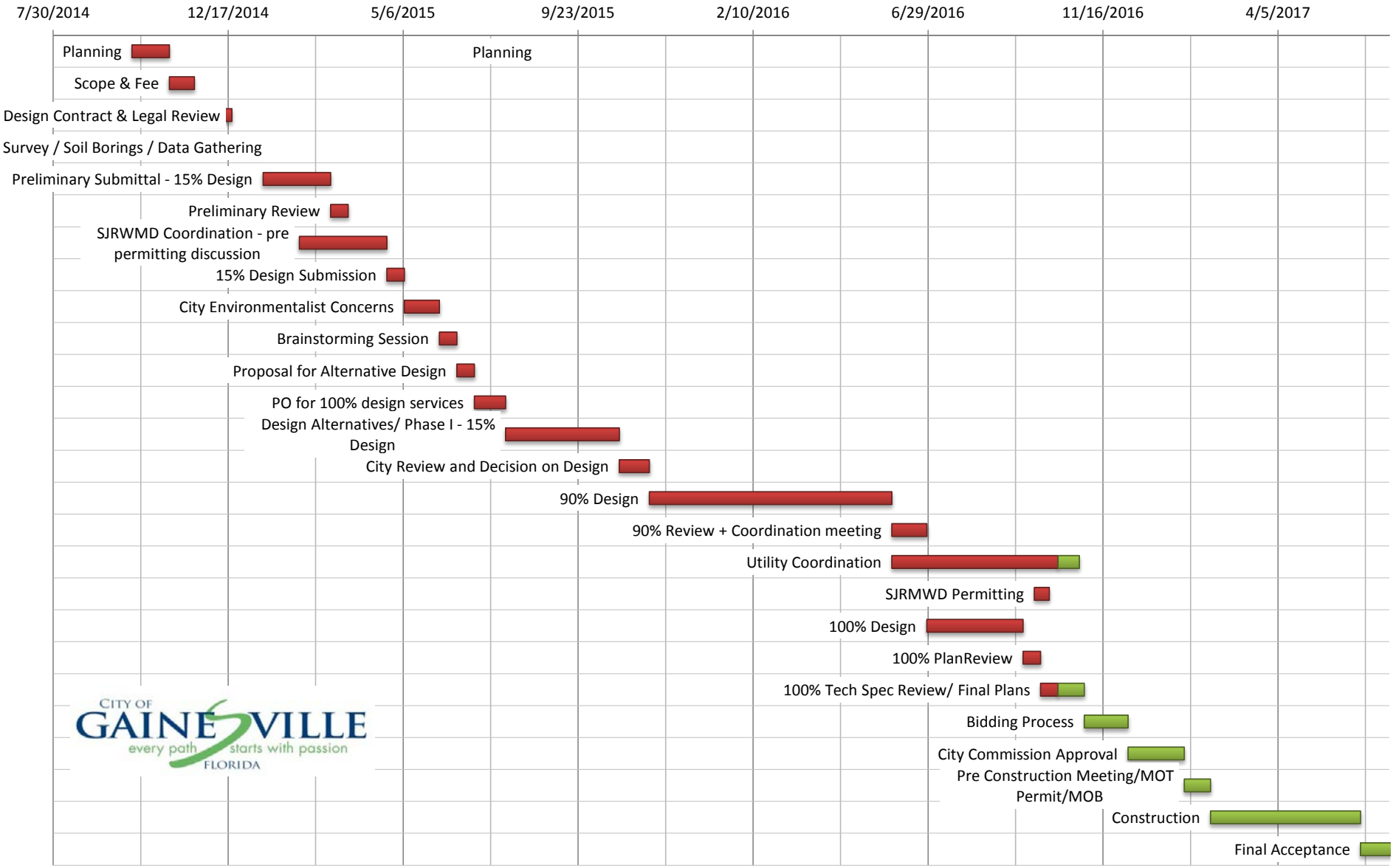
Comments

Last Updated: *10.11.2016*

1. See above

Exhibit B_Schedule

Suburban Heights Stormwater Improvements Schedule



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100% Plans Submittal
Suburban Heights Beville Creek Restoration
Gainesville, Florida
September 2016

Geosyntec consultants

SUBURBAN HEIGHTS BEVILLE CREEK RESTORATION
ESTIMATED CONSTRUCTION COSTS

100% Plans						
Item	FDOT Pay Item No.	Description	Units	Unit Cost	Quantity	Total
1	101-1	Mobilization (15% of Total)	LS	varies	1	$67,172
2	102-1	Maintenance of Traffic (2.5% of Total)	LS	varies	1	$11,195
3	104-1	Prevention, Control and Abatement of Erosion and Water Pollution (5% of Total)	LS	varies	1	$22,391
4	110-1-1	Clearing and Grubbing (5% of Total)	LS	varies	1	$22,391
5	120-1	Regular Excavation	CY	$7.50	1335	$10,013
6	120-6	Embankment	CY	$10.00	500	$5,000
7	530-3-4A	Rip-Rap Type 'A'	TN	$90.00	460	$41,400
8	530-3-4B	Riprap Boulder	TN	$145.00	1490	$216,050
9	530-76-3	Gabion Basket, 36"	CY	$300.00	55	$16,500
10	550-102-2	Fencing, Type B, 6.0' Standard	LF	$15.00	1400	$21,000
11	570-2	Native Seeding	SY	$4.00	3025	$12,100
12	900-1	Flexamat with Soil Anchors	SF	$8.50	2225	$18,913
13	900-2	C125 Erosion Control Blanket	SY	$2.00	3025	$6,050
14	900-3	As-Built Plans	LS	$5,000.00	1	$5,000
15	900-4	Groundwater Dewatering	LS	$15,000.00	1	$15,000
16	900-5	Stormwater Bypass Pumping	LS	$50,000.00	1	$50,000
17	900-6	Export Excess Material Off-site	CY	$22.50	835	$18,788
18	900-7	Biosorption Activated Media (BAM)	CY	$300.00	40	$12,000
					CONSTRUCTION COST:	$570,961
					CONTINGENCY @ 5%	$28,548
					ESTIMATED CONSTRUCTION COST:	**$599,509**

NOTE:
1) This estimate assumes utility relocation costs to be incurred by utility providers

Cost Share Program Cost Effectiveness Calculator

Total Project Costs, (sum of components cost) Fill in total component cost and O&M costs for each component within the project, as applicable. Fill in mgd below for total project.

Q (gpd) = Amount of water conserved or made available by the total project

Interest rate (annual %) = **3.125%** **FY2016 Federal Water Resource Planning Discount Rate**

Project / components	Q(gpd)	Total Estimated Cost*	O&M ($/year)	Service Life	$/kgal
Example Treatment Project	**1,000,000**	**$ 2,000,000**	**$ 2,000**	**20**	0.378
Beville Creek Restoration	**2,241**	**$ 794,339**	**$ 1,000**	**50**	39.870
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
				Total:	**39.870**

* Total Estimated Cost - include capital , total construction, land acquisition, planning, permitting and design costs

Service Life for system components (years)

Component type	Years
Water conveyance structures: (pipelines, collection & transmission systems)	40
Other Structures: (buildings, tankage, site improvements, etc.)	35
Wells	30
Process & Auxilliary Equipment: (treatment equipment, pumps, motors, mechanical equipment, etc.)	20
Reverse Osmosis Membrances	5
Advanced ET Controller	10
Faucet Aerator	10
Cooling Tower	10
Faucets	5
Irrigation system	5
Line looping	30
Major appliances: dishwasher, clothes washer	15
Plant materials	5
Rain sensors	5
Showerheads	5
Soil Moisture Sensor	10
Toilets / Urinals	30
Waterwise Florida Landscape	20

Cost Share Program Cost Effectiveness Calculator

Interest rate (annual %) = **3.125%** **FY2016 Federal Water Resource Planning Discount Rate**

Project / components	lbs TN removed/ year	Total Estimated Cost*	O&M ($/year)	Service Life	$/lbs TN removed
Example Treatment Project	**2,300**	**$ 2,000,000**	**$ 2,000**	**20**	$ 60.00
Bevile Creek Restoration	**29**	**$ 794,339**	**$ 1,000**	**50**	$ 1,115.22
					$ -
					$ -
					$ -
					$ -
					$ -

Project / components	lbs TP removed / year	Total Estimated Cost*	O&M ($/year)	Service Life	$/lbs TP removed
Example Treatment Project	**20,000**	**$ 2,000,000**	**$ 2,000**	**20**	$ 6.90
Beville Creek Restoration	5	$ 794,339	$ 1,000	50	$ 6,682.19
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -

* Total Estimated Cost - include capital , total construction, land acquisition, planning, permitting and design costs

Cost Share Program Cost Effectiveness Calculator

Interest rate (annual %) = **3.125%** **FY2016 Federal Water Resource Planning Discount Rate**

Project / components	Linear Feet of Creek Restoration	Total Estimated Cost*	O&M ($/year)	Service Life	$/LF of Creek Restoration
Beville Creek Restoration	**1,000**	**$ 794,339**	**$ 1,000**	**50**	$ 32.61
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -

* Total Estimated Cost - include capital , total construction, land acquisition, planning, permitting and design costs

GENERAL SITE INFORMATION: V 8.0 | GO TO INTRODUCTION PAGE | 10/17/2016 | Blue Numbers = Input data | Red Numbers = Calculated or Carryover

Select the appropriate Meteorological Zone, input the appropriate Mean Annual Rainfall amount and select the type of analysis

NAME OF PROJECT: Suburban Heights - Beville Creek Restoration

HELP

VIEW ZONE MAP

VIEW MEAN ANNUAL RAINFALL

GO TO WATERSHED

Meteorological Zone (Please use zone map): CLICK ON CELL BELOW TO SELECT — Zone 2

Mean Annual Rainfall (Please use rainfall map): 51.00 Inches

Type of analysis: CLICK ON CELL BELOW TO SELECT — BMP analysis

Treatment efficiency (N, P) (ex 80 70 (no decimal points) use only for specified removal efficiency): % %

Select the STORMWATER TREATMENT ANALYSIS Button below to begin analyzing the effectiveness of Best Management Practices.

Model documentation and example problems.

STORMWATER TREATMENT ANALYSIS

Systems available for analysis:
Retention Basin with option for calculating effluent concentration
Wet Detention
Exfiltration Trench
Pervious Pavement
Stormwater Harvesting
Biofiltration
Greenroof
Rainwater Harvesting
Managed Aquatic Plants Detention
Vegetated Natural Buffer
Vegetated Filter Strip
Swale
Rain Garden
Tree Well
Lined reuse pond
User Defined BMP

RESET INPUT FOR STORMWATER TREATMENT

There is a user's manual for the BMPTRAINS model. It can be downloaded from www.stormwater.ucf.edu. The results from the example problems shown in the manual however may not reflect current model results due to ongoing updates of the model.

METHODOLOGY FOR CALCULATING REQUIRED TREATMENT

METHODOLOGY FOR

METHODOLOGY FOR WET

METHODOLOGY FOR

METHODOLOGY FOR WATER

CATCHMENTS AND TREATMENT SUMMARY RESULTS V 8.0

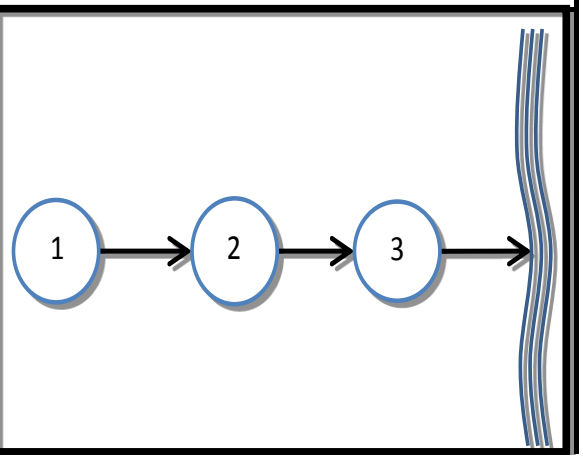
CALCULATION METHODS:

1. The effectiveness of each BMP in a single catchment is converted to an equivalent capture volume.
2. Certain BMP treatment train combinations have not been evaluated and in practice they are at this time not used, an example is a greenroof following a tree well.
3. Wet detention is last when used in a single catchment with other BMPs, except when followed by filtration

PROJECT TITLE	uburban Heights - Beville Creek Restoratio	Optional Identification		
	A	C	B	Catchment 4
BMP Name	Retention Basin	Retention Basin	Retention Basin	
BMP Name				
BMP Name				

Summary Performance of Entire Watershed

Catchment Configuration	D - 3 Catchment-Series	Treatment Objectives or Target	10/17/2016
Nitrogen Pre Load (kg/yr)	226.64		BMPTRAINS MODEL
Phosphorus Pre Load (kg/yr)	32.98		
Nitrogen Post Load (kg/yr)	226.64		
Phosphorus Post Load (kg/yr)	32.98		
Target Load Reduction (N) %			
Target Load Reduction (P) %			
Target Discharge Load, N (kg/yr)			
Target Discharge Load, P (kg/yr)			
Provided Overall Efficiency, N (%):	4		
Provided Overall Efficiency, P (%):	4		
Discharged Load, N (kg/yr & lb/yr):	217.98	480.12	
Discharged Load, P (kg/yr & lb/yr):	31.72	69.87	
Load Removed, N (kg/yr & lb/yr):	8.66	19.08	



Load Removed, P (kg/yr & lb/yr):	**1.26**	**2.78**	

WATERSHED CHARACTERISTICS V 8.0

GO TO STORMWATER TREATMENT ANALYSIS

Blue Numbers = Input data
Red Numbers = Calculated

HELP - LAND USES/EMC

SELECT CATCHMENT CONFIGURATION 10/17/2016

CLICK ON CELL BELOW TO SELECT CONFIGURATION
D - 3 Catchment-Series

VIEW CATCHMENT CONFIGURATION

GO TO GENERAL SITE INFORMATION PAGE

For comingling, the off-site catchment must be upstream. The delay is only for retention BMPs and must be used in hours as measured by the time of concentration at a one inch/hour rain

Delay [hrs]

CATCHMENT NO.1 NAME: A

VIEW AVERAGE ANNUAL RUNOFF "C" Factor

OVERWRITE DEFAULT CONCENTRATIONS USING:

	PRE:		POST:	
EMC(N):		mg/L		mg/L
EMC(P):		mg/L		mg/L

CLICK ON CELL BELOW TO SELECT
Pre-development land use: GIS Import Data
with default EMCs
CLICK ON CELL BELOW TO SELECT
Post-development land use: GIS Import Data
with default EMCs

VIEW EMC & FLUCCS

GO TO GIS LANDUSE DATA

IMPORT GIS CONCENTRATIONS

Total pre-development catchment area:	115.00	AC	From GIS data	Average annual pre runoff volume:	66.662 ac-ft/year
Total post-development catchment or BMP analysis area:	115.00	AC	115.0	Average annual post runoff volume (note no BMP area):	66.662 ac-ft/year
Pre-development Non DCIA CN:	62.40		62.4	Pre-development Annual Mass Loading - **Nitrogen:**	146.200 kg/year
Pre-development DCIA percentage:	13.00	%	13%	Pre-development Annual Mass Loading - **Phosphorus:**	20.187 kg/year
Post-development Non DCIA CN:	62.40		62.4	Post-development Annual Mass Loading - **Nitrogen:**	146.200 kg/year
Post-development DCIA percentage:	13.00	%	13%	Post-development Annual Mass Loading - **Phosphorus:**	20.187 kg/year
Estimated BMPArea (No loading from this area)		AC			

CATCHMENT NO.2 NAME: C

OVERWRITE DEFAULT CONCENTRATIONS:

	PRE:		POST:	
EMC(N):		mg/L		mg/L
EMC(P):		mg/L		mg/L

CLICK ON CELL BELOW TO SELECT
Pre-development land use: GIS Import Data
with default EMCs
CLICK ON CELL BELOW TO SELECT
Post-development land use: GIS Import Data
with default EMCs

IMPORT GIS CONCENTRATIONS

Total pre-development catchment area:	9.20	AC	From GIS data	Average annual pre runoff volume:	9.686 ac-ft/year
Total post-development catchment or BMP analysis area:	9.20	AC	9.2	Average annual post runoff volume (note no BMP area):	9.686 ac-ft/year
Pre-development Non DCIA CN:	76.60		76.6	Pre-development Annual Mass Loading - **Nitrogen:**	24.864 kg/year
Pre-development DCIA percentage:	22.00	%	22%	Pre-development Annual Mass Loading - **Phosphorus:**	4.016 kg/year
Post-development Non DCIA CN:	76.60		76.6	Post-development Annual Mass Loading - **Nitrogen:**	24.864 kg/year
Post-development DCIA percentage:	22.00	%	22%	Post-development Annual Mass Loading - **Phosphorus:**	4.016 kg/year
Estimated BMPArea (No loading from this area)		AC			

CATCHMENT NO.3 NAME:	B			
	CLICK ON CELL BELOW TO SELECT			
Pre-development land use:	GIS Import Data			
with default EMCs	CLICK ON CELL BELOW TO SELECT			
Post-development land use:	GIS Import Data			
with default EMCs				
Total pre-development catchment area:	24.60	AC	From GIS data	
Total post-development catchment or BMP analysis area:	24.60	AC	24.6	
Pre-development Non DCIA CN:	63.70		63.7	
Pre-development DCIA percentage:	22.00	%	22%	
Post-development Non DCIA CN:	63.70		63.7	
Post-development DCIA percentage:	22.00	%	22%	
Estimated BMPArea (no loading from this area)		AC		

OVERWRITE DEFAULT CONCENTRATIONS:

	PRE:		POST:	
EMC(N):		mg/L		mg/L
EMC(P):		mg/L		mg/L

IMPORT GIS CONCENTRATIONS

Average annual pre runoff volume:	21.774	ac-ft/year
Average annual post runoff volume (note no BMP area):	21.774	ac-ft/year
Pre-development Annual Mass Loading - **Nitrogen:**	55.578	kg/year
Pre-development Annual Mass Loading - **Phosphorus:**	8.779	kg/year
Post-development Annual Mass Loading - **Nitrogen:**	55.578	kg/year
Post-development Annual Mass Loading - **Phosphorus:**	8.779	kg/year

CATCHMENT NO.4 NAME:				
	CLICK ON CELL BELOW TO SELECT			
Pre-development land use:				
with default EMCs	CLICK ON CELL BELOW TO SELECT			
Post-development land use:				
with default EMCs				
Total pre-development catchment area:		AC		
Total post-development catchment or BMP analysis area:		AC		
Pre-development Non DCIA CN:				
Pre-development DCIA percentage:		%		
Post-development Non DCIA CN:				
Post-development DCIA percentage:		%		
Estimated BMPArea (no loading from this area)		AC		

OVERWRITE DEFAULT CONCENTRATIONS:

	PRE:		POST:	
EMC(N):		mg/L		mg/L
EMC(P):		mg/L		mg/L

USE DEFAULT CONCENTRATIONS

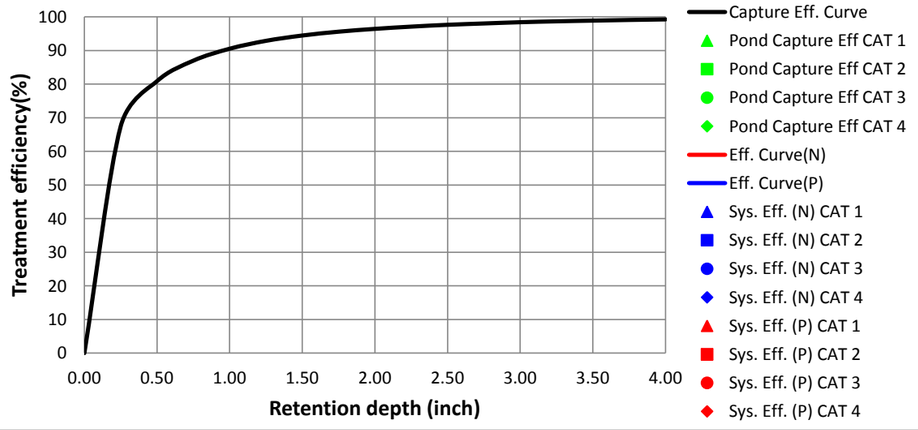
Average annual pre runoff volume:		ac-ft/year
Average annual post runoff volume (note no BMP area):		ac-ft/year
Pre-development Annual Mass Loading - **Nitrogen:**		kg/year
Pre-development Annual Mass Loading - **Phosphorus:**		kg/year
Post-development Annual Mass Loading - **Nitrogen:**		kg/year
Post-development Annual Mass Loading - **Phosphorus:**		kg/year

FILTRATION (Underdrained Dry Basin or Upflow Filter after Wet Detention) 10/17/2016 V 8.0

FILTRATION SERVING EITHER WET POND OR DRY POND: Suburban Heights - Beville Creek Restoration

Notes: No loadings from this BMP area and media must match location.	A	C	B	Catchment 4	
Contributing catchment area:	115.000	9.200	24.600	0.000	ac
Treatment depth (0.0-4.0 inches):					in
Treatment volume provided for treatment depth:	0.000	0.000	0.000	0.000	ac-ft
Provided water capture efficiency:	0.000	0.000	0.000	0.000	%
Required treatment efficiency (**Nitrogen**):					%
Required treatment efficiency (**Phosphorus**):					%
Type of media mixes: View Media Mixes					
Provided treatment efficiency (**Nitrogen**):					%
Provided treatment efficiency (**Phosphorus**):					%
Is this effluent filtration for a wet detention pond?					

ERROR MESSAGE WINDOW FOR FILTRATION INCLUDING BIOFILTRATION:



NOTE FOR TREATMENT EFFICIENCY GRAPH:

The purpose of this graph is to help illustrate the treatment efficiency of the system as the function of retention depth. The graph illustrates that there is a point of diminished return as the retention depth is substantially increased. Therefore, to provide the most economical BMP treatment system, other alternatives such as "treatment trains" and compensatory treatment should be considered.

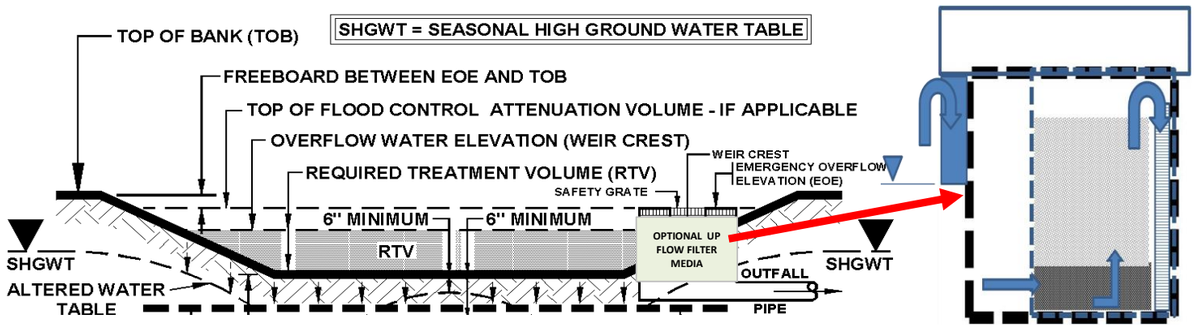
Blue Numbers =	Input data
Red Numbers =	Calculated or Carryover

GO TO STORMWATER TREATMENT ANALYSIS

FOR UNDERDRAINS GO TO LATTERAL SPACING CALCULATOR

REQUIRED REMAINING TREATMENT EFFICIENCIES.

	A	C	B	Catchment 4	
Remaining treatment efficiency needed (**Nitrogen)**:					%
Remaining treatment efficiency needed (**Phosphorus)**:					%



The use of a Biosorption Activated Media may be required.

Source of Graphic: Stormwater Management Academy, University of Central Florida

VEGETATED NATURAL BUFFER (VNB): Used for Type A or A-3 soils > 1' deep — V 8.0

Blue Numbers =	Input data
Red Numbers =	Calculated or Carry

VEGETATED NATURAL BUFFER SERVING : 10/17/2016 — Suburban Heights - Beville Creek Restoration

GO TO STORMWATER TREATMENT ANAL

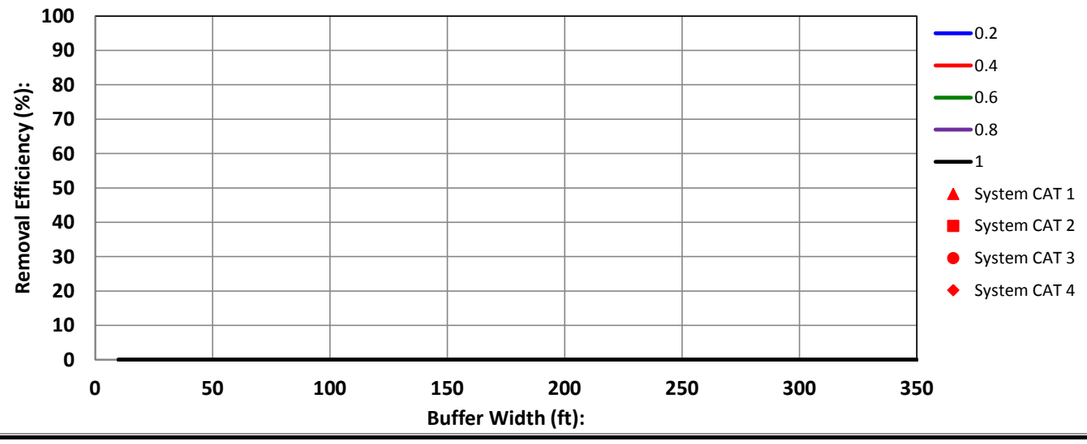
Loadings from BMP area are contained by the BMP, thus no BMP area load.

	A	C	B	Catchment 4	
Contributing catchment area:	115.000	9.200	24.600	0.000	ac
Required treatment efficiency (**Nitrogen**):	TBD	TBD	TBD	TBD	%
Required treatment efficiency (**Phosphorus**):	TBD	TBD	TBD	TBD	%
Vegetated Natural Buffer width (10 to 350 feet):					ft
Vegetated Natural Buffer length (length should be same as buffer):					ft
Vegetated Natural Buffer storage depth not greater than 1 foot:					ft
Width of the area feeding the buffer:					ft
Water storage capacity of the soil:					in/in
What is the slope of Buffer Width with no collector trench or swale (2-6%)?					%
Provided treatment efficiency (**Nitrogen**):	0.000	0.000	0.000	0.000	%
Provided treatment efficiency (**Phosphorus**):	0.000	0.000	0.000	0.000	%
Which efficiency graph do you want to view?					

REQUIRED REMAINING TREATMENT EFFICIENCIES OF TREATMENT SYSTEM IN SERI
OF TREATMENT SYSTEM IN SERIES WITH VNB.

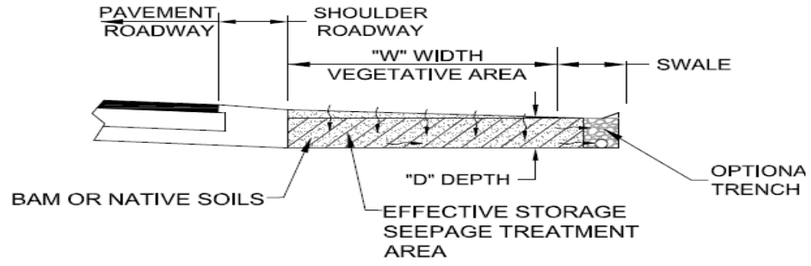
	A	C
Remaining treatment efficiency needed (**Nitrogen**):		
Remaining treatment efficiency needed (**Phosphorus**):		

Removal efficiency of the VNB. Displayed curves are based on the ratio of the VNB width to contributing area width (for example 0.2 curve indicates contributing area width 5 times greater than the VNB width.



NOTE FOR TREATMENT EFFICIENCY GRAPH:

The purpose of the treatment efficiency graphs is to help illustrate the treatment efficiency of the Vegetated Natural Buffer as the function of the Vegetated Natural Buffer width and contributing watershed width. The graph illustrates that there is a point of diminished return as the width of the Vegetated Natural Buffer is substantially increased. Therefore, to provide the most economical BMP treatment system, other alternatives such as "treatment trains" and compensatory treatment should be considered.



VNB OR VFS STORAGE SECTION
NTS

Image Courtesy of Watermark Engineering Group, Ir

WET DETENTION/ MANAGED AQUATIC PLANTS: 10/17/2016 V 8.0

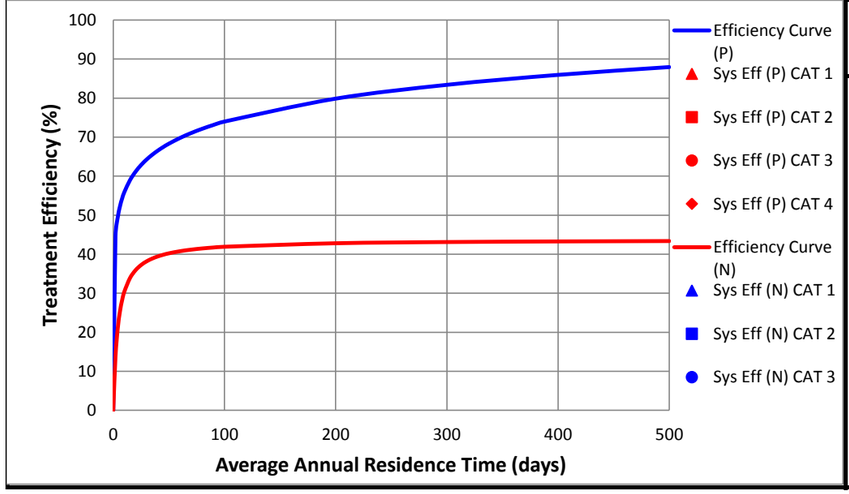
Also called: FLOATING ISLANDS and includes a wet detention pond: urban Heights - Beville Creek Restora

	A	C	B	Catchment 4	
Total pre-development catchment area:	115.000	9.200	24.600	0.000	ac
Total post-development catchment area:	115.000	9.200	24.600	0.000	ac
Average annual residence time (between 1 and 500 days)					days
Littoral Zone or other improvements used?*					
Littoral Zone or other improvement efficiency credit:					%
Floating Wetland or Mats used in the design:					
Floating Wetland or Mats credit:					%
Total **Nitrogen** removal required:	TBD	TBD	TBD	TBD	%
Total **Phosphorus** removal required:	TBD	TBD	TBD	TBD	%
Total **Nitrogen** removal efficiency:	0.000	0.000	0.000	0.000	%
Total **Phosphorous** removal efficiency:	0.000	0.000	0.000	0.000	%
Is the wet detention sufficient:					
Average annual runoff volume:	66.662	9.686	21.774		ac-ft/yr

* pond coverage must follow Regulatory Requirements

Wet Detention Pond Characteristic:

Minimum Pond Permanent Pool Volume:					ac-ft



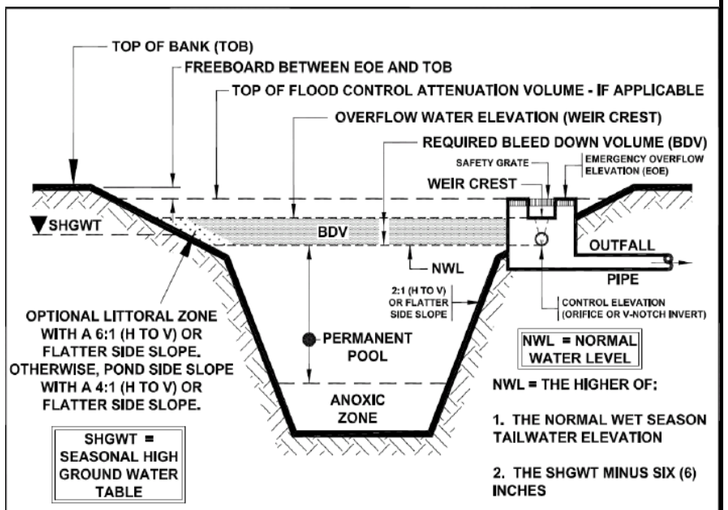
NOTE FOR TREATMENT EFFICIENCY GRAPH:

The purpose of the treatment efficiency graphs is to help illustrate the treatment efficiency of the wet detention system as the function of average annual residence time (and permanent pool volume). The graph illustrates that there is a point of diminished return as the permanent pool volume is substantially increased. Therefore, to provide the most economical BMP treatment system, other alternatives such as "treatment trains" and compensatory treatment should be considered.

Blue Numbers =	Input data
Red Numbers =	Calculated or Carryover

GO TO STORMWATER TREATMENT ANALYSIS

REQUIRED REMAINING TREATMENT EFFICIENCIES OF TREATMENT SYSTEM IN SERIES WITH FLOATING ISLANDS WITH WET DETENTION. USE FOR SIZING OF TREATMENT SYSTEM IN SERIES WITH FLOATING ISLANDS WITH WET DETENTION.



TYPICAL X-SECTION OF A WET DETENTION SYSTEM

Source of Graphic: draft **STORMWATER QUALITY APPLICANT'S HANDBOOK** dated March 2010, by the Department of Environmental Protection, available at: http://www.dep.state.fl.us/water/wetlands/erp/rules/stormwater, March 2010