Upper Lake Lafayette Nutrient Reduction Facility

Quality Assurance Project Plan

Florida Department of Environmental Protection
Grant Agreement No.: S0614

April 2015

Introduction

Project Overview

The City of Tallahassee (City) has designed, is the finishing stages of construction, and will soon operate and maintain the Upper Lake Lafayette Nutrient Reduction Facility (ULL-NURF). The ULL-NURF is located within Section 27 of Township 01 North and Range 01 East, in Leon County, Florida as shown in **Figure 1**.

Facility construction is ongoing and scheduled to be completed in December 2014. Funding for the project was provided by the City of Tallahassee and the Florida Department of Environmental Protection (FDEP) Total Maximum Daily Load (TMDL) Non-Point Source Management Program grant fund. The ULL-NURF is an aluminum sulfate (alum) treatment facility that provides water quality treatment for approximately 10,175 acres of contributing drainage area. This drainage area encompasses the entire northeast drainage ditch and its contributing basins. The intent of the ULL-NURF is to provide water quality treatment to reduce bacteria and nutrient concentrations prior to discharge to Upper Lake Lafayette. **Figure 2** depicts the ULL-NURF contributing drainage area.

Scope and Purpose

This document describes the monitoring procedures that will be executed for Water Quality Monitoring of the ULL-NURF located in the City of Tallahassee. The Best Management Practice (BMP) being evaluated under this water quality monitoring is the ULL-NURF, an alum treatment facility located south of Mahan Drive and North of Easterwood Drive between Capital Circle Northeast and Weems Road. Stormwater runoff generated in the contributing basin is conveyed via the Northeast Drainage Ditch to the main inflow, located at the northwest corner of the facility. The facility discharges at the southeast corner into a stream approximately ¾ of a mile upstream of Upper Lake Lafayette.

The objective of this monitoring is to collect rainfall, flow and stormwater quality data from the ULL-NURF and evaluate the effectiveness of the facility in reducing pollutant loading to Upper Lake Lafayette.

Project Team

The project team consists of staff from the FDEP, City of Tallahassee and selected consultants. The role and contact information of the team members are listed in **Table 1**.

Table 1 – Project Team

Name	Organization	Role	Contact Information
Mark Heidecker	City	City Project Manager, Consultant Management and Reporting to DEP	850-891-6825 Mark.Heidecker@talgov.com
Joni Synatschk	City	Lab Manager, Lab QA/QC	850-891-1235 Joni.Synatschk@talgov.com
Jason Dickey	Cardno, Inc.	BMP Monitoring, Sample Collection, Equipment QA/QC	850-508-4554 jason.dickey@cardno.com
Michael Scheinkman	FDEP	FDEP Project Manager	850-745-7511 Michael.Scheinkman@dep.state.fl.us

Stormwater Treatment Effectiveness Monitoring

Monitoring Summary

The project duration is estimated between six and twelve months. It will be determined, after discussion with the City selected consultant; whether flow or time weighted composite runoff samples will be utilized for this project (this determination will be provided to DEP prior to the commencement of monitoring). Ten qualifying storms (flow or time weighted composite samples) will be collected at both the influent to and effluent from the ULL-NURF as located in **Figure 3** and described in **Table 2**. Sample collection will adhere to the following criteria designed to obtain quality, representative samples of the ULL-NURF's effectiveness:

- For five of the storm events, rainfall amounts will be between 0.20 and 1.50 inches as measured onsite or by a local rain gauge. Five additional sample events will be completed under a variety of rainfall conditions; these events may be less than 0.20 or exceed 1.50 inches of rainfall. Events may include base flow conditions.
- A qualifying storm event shall be preceded by a 24 hour dry period. A dry period is defined as any day without rain or where 0.1 inch or less occurs as measured onsite or by a representative rain gauge.
- A flow or time based composite sample will be collected throughout the storms duration or during the first twelve hours of a storm, whichever occurs first. The composite sample shall consist of a number of aliquots collected over the hydrograph rise and fall.
- The samples will be properly preserved and transported to the City of Tallahassee's Water Quality Laboratory for analysis of selected parameters.

Table 2 – Monitoring Locations

Station Name	Station Description	GPS Coordinates
ULL-NURF INFLOW	NE Drainage Ditch Discharge into ULL-NURF. Sampling location is at the inflow to the facility.	-84.226775 30.457241
ULL-NURF OUTFLOW	Outflow of the ULL-NURF terminating into Upper Lake Lafayette. The sampling location is at the weir structure prior to discharge under Weems Road.	-84.222617, 30.455358

All procedures associated with monitoring preparation, sampling and post-event activities, as well as Quality Control/Quality Assurance (QC/QA), data management procedures will be in compliance with Florida Department of Environmental Protection (FDEP) Standard Operating Procedures.

Monitoring Locations

Monitoring of the ULL-NURF will be conducted at two automated monitoring stations located at the inflow and outflow of the facility as listed in **Table 2** and shown in **Figure 3**. Flow entering and exiting the ULL-NURF will be calculated by utilizing a rating table derived from Manning's Equation or an acceptable alternative method.

Monitoring Equipment

The monitoring locations will be outfitted with ISCO automatic sampling equipment consisting of an automated sampler, flow meter and factory calibrated rain gauge. The equipment will be programmed by entering rating table data into each ISCO sampler for stage to flow conversion. Sample aliquots will then be initially triggered based on an increase in water level or set time interval at each monitoring

location. The combination of these aliquots will result in a composite sample. In order to properly preserve samples, ice will be added to the ISCO automated sampler prior to a sample event being initialized. Samples will be collected within six hours of sample event completion.

Maintenance is essential to ensure that the monitoring equipment will function properly, prevent sample contamination and properly measure flow. Therefore, the sampling equipment will be assessed and maintenance and calibration procedures performed in accordance with the manufacturer's specifications and operation manuals prior to each sample event.

Quality Assurance & Control

Data Quality Objectives

The objective is to provide data that can be used to quantify pollutant reductions as a result of the ULL-NURF. Expected concentrations are provided in **table 3**. In order to obtain quality data this study will follow QA/QC procedures for all sampling procedures and analytical work. Sample analysis, with the exception of Total Phosphorus, will be performed by the City of Tallahassee Water Quality Laboratory. Total Phosphorus will be analyzed by TestAmerica Tallahassee. Both the City of Tallahassee and TestAmerica Tallahassee labs are NELAP certified. **Tables 3 & 4** list the parameters to be analyzed, the analytical method, preservation, holding times, expected concentrations and lab detection limits.

All data will be reviewed by the City Project Manager to ensure data of a quality that is acceptable to the FDEP. If questionable data results are found; the City Project Manager will initiate a review of processes to determine the potential cause and what corrective action(s) should be taken.

Table 3 – Approximate Expected Pollutant Concentrations - Inflow & Outflow & Lab Detection Limits

Constituent	Inflow	Outflow	Lab MDL	Lab PQL
TKN (mg/L)	0.5	0.35	0.12	0.2
NO3/NO2 (mg/L)	0.2	0.15	0.01	0.05
NH3 (mg/L)	0.03	0.02	0.004	0.02
TN (mg/L) Calculated	0.7	0.5	Calculated Value - TN will be calculated as the sum of TKN + NO3/NO2	
TP (mg/L)	0.30	0.10	0.002	0.0012
OrthoPhosphate (mg/L)	No Data - Unknown	Unknown	0.003	0.01
TSS (mg/L)	50	5	2	5
Total Cadmium (ug/L)	0.2	0.1	0.09	0.2
Total Chromium (ug/L)	4.0	2.0	0.56	10
Total Copper (ug/L)	3.0	1.5	0.34	10
Total Zinc (ug/L)	15	7.5	1.44	10
Oil/Grease (mg/L)	No Data – Unknown	Unknown	1.2	5
Fecal Coliform (CFU/100ml)	10,000	200	<1	<1

Table 4 – Analytical Methods, Preservation Requirements and Maximum Allowable Hold Times						
Constituent	**Sample Type**	**Bottle Type**	**Volume (ml)**	**EPA Method**	**Preservation**	**Max Hold Time**
TKN4[4]	Composite	HDPE	250	351.2	4C/H2SO4	28 Days
NO3/NO2[4]	Composite	HDPE	250	353.3	4C/H2SO4	28 Days
NH3[4]	Composite	HDPE	250	353.2	4C/H2SO4	28 Days
TN[4]	Composite	TN will be calculated as the sum of TKN + NO3/NO2				
TP[4]	Composite	HDPE	250	365.1	4C/H2SO4	28 Days
OrthoPhosphate[1]	Composite	HDPE	250	365.1	4C	48 Hours
TSS	Composite	HDPE	500	SM2540D	4C	7 Days
Total Cadmium	Composite	HDPE	250	SM3113B	4C/HNO3	6 Months
Total Chromium	Composite	HDPE	250	200.7	4C/HNO3	6 Months
Total Copper	Composite	HDPE	250	200.7	4C/HNO3	6 Months
Total Zinc	Composite	HDPE	250	200.7	4C/HNO3	6 Months
Oil/Grease[2]	Composite	Glass	1000	1664A	4C/H2SO4	28 Days
Fecal Coliform[3]	Composite	Polypropylene	120	SM9222D	4C	8 Hours

1) Orthophosphate samples are required to be filtered within 15 minutes of collection, due to automated sampling to obtain composite samples this will not be possible. These sample results will be qualified.
2) Oil & Grease sample collection will not meet DEP SOPs due to the use of automated sampling equipment. These sample results will be qualified.
3) Fecal Coliform sample collection will not meet hold times of 8 hours due to the extended time period required for automated sampling. These sample results will be qualified due to the composite collection method.
4) Nutrients, as indicated, are required to be preserved with H2SO4 within 15 minutes of collection. Due to the use of automated sampling to obtain composite samples this will not be possible. These samples results will be qualified.

Standard Operating Procedures

In order to ensure proper sample collection procedures, the project will utilize the following FDEP SOPs:

- FC 1000 – Cleaning & Decontamination Procedures
- FD 1000 – Documentation Procedures
- FS 2000 – General Aqueous Sampling
- FS 1000 – General Sampling Procedures
- FQ 1000 – Field Quality Control Requirements
- FS 2100 – Surface Water Sampling

Data Management & Reporting

Project Documentation

Data will be collected, reported and organized in a manner that allows for easy access and simple analysis or interpretation. Summary reports will be generated and all associated documentation will be provided as appendices to these reports. These reports will include an analysis of the following:

- Inflow vs. Outflow event mean concentrations and percent reductions for all parameters analyzed.

- Inflow vs. Outflow loading and percent reductions for all parameters analyzed.
- For each storm event, the antecedent dry period, rainfall and event hydrograph for each sampling location.
- Site conditions, and if applicable, problems encountered.

Draft & Final Report

Upon completion of the monitoring, a draft final report will be submitted to the FDEP quantifying the effectiveness of the ULL-NURF. A final report will be submitted for project closeout after the draft is reviewed by the FDEP and revisions incorporated. The draft and final report will include, at a minimum, the following:

- A summary of monitoring project, methods and sampling events.
- A summary of monitoring results.
- A summary of anomalies in events or data.
- An analysis and discussion of BMP efficiency.
- The reports generated as part of the above project documentation will be included as appendices to the draft and final report.

Streets
Watercourses
Section
Waterbodies
ULL-NURF
City Boundary

FOREST OAK
CREPE
PANTHER CREEK
RIVERBIRCH
BRADDOCK
ALEXIS
BRIAR
BREWSTER
CHATELAINE
DAYLILY
TANSEY
SILKBAY
MICCOSUKEE
EASTER STANLEY
AUTOMOTIVE
MAHAN
LAGNIAPPE
AUSTIN DAVIS
COTTAGE ROSE
GENEVIEVE PARK
BRUSH HILL
CAPITAL
JAYDELL
ACADIAN
NATHAN
POWELL
EMERSON
TAVISTOCK
ADDISON
NORCROSS
NEWTON ABBOTT
LANDS END
WEEMS
ELIZA
DARTMOUTH
SALTASH
GENTLE WIND
EXMOUTH
FALMOUTH
KAYLEE
BODMIN MOOR
WALDO PALMER
FORT KNOX
VIOLET
INDUSTRIAL PLAZA
POWER MILL
EASTERWOOD
WHETHERBINE
DAWN LAUREN
JOEL BROWN
FCI VILLAGE
TOM BROWN PARK ACCESS
2 2
2 8
2 7
3 3
3 4

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THE CITY OF TALLAHASSEE, FLORIDA

Water Resources Engineering Division

Upper Lake Lafayette
Nutrient Reduction Facility

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Figure 1 - ULL-NURF Location

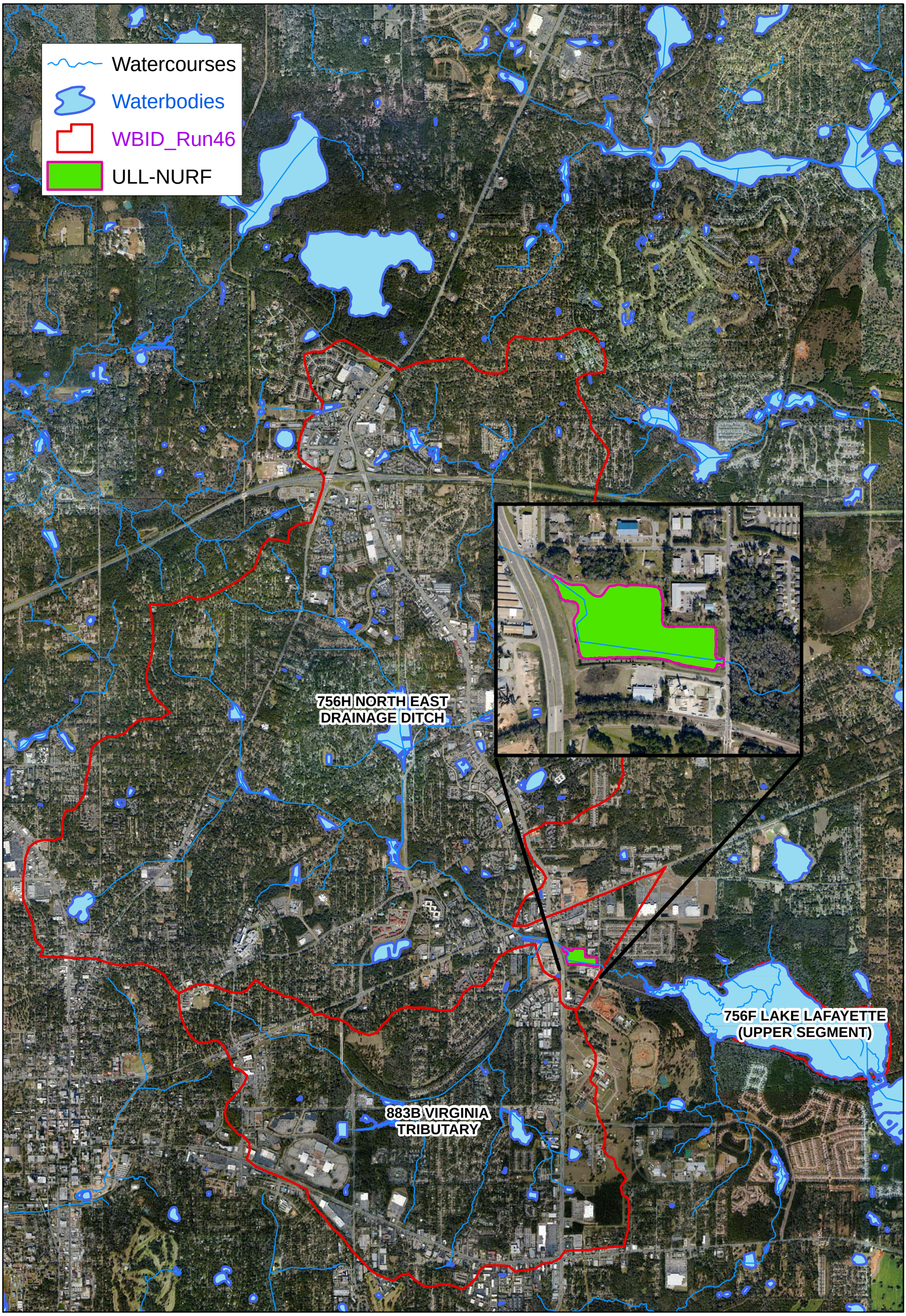

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Figure 2 - Upper Lake Lafayette Drainage Basin

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Figure 3 - Monitoring Locations

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