CDM

Memorandum

To: *Migdalia Hernandez*

From: *Danielle M. Honour, P.E.*

Date: *September 23, 2008*

Subject: *City of Sanford Site 10 Facility – TMDL Assistance*

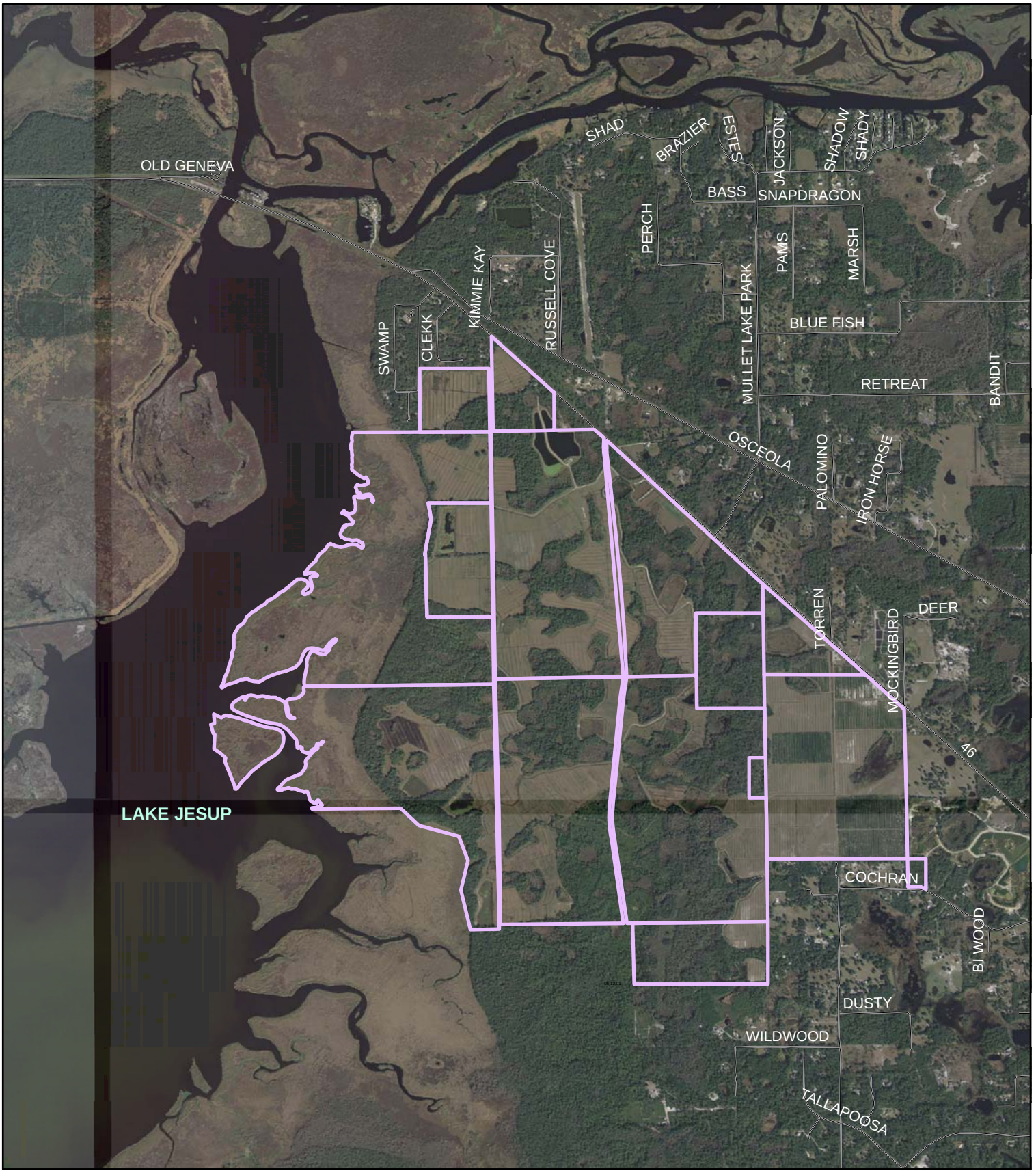
The Florida Department of Environmental Protection (FDEP) adopted a Total Maximum Daily Load (TMDL) for Lake Jesup in 2006 which requires reduction of nutrient loading sources for total phosphorous (TP) and total nitrogen (TN) by 34 and 50 percent, respectively, to meet water quality standards within the Lake Jesup Basin.

In 2006, the City of Sanford (the City) requested CDM's assistance in responding to a data request from the Florida Department of Environmental Protection (FDEP) for preparation of the Lake Jesup, Crane Strand and Long Branch Basin Management Action Plan (BMAP). At the time, FDEP had requested additional data from the City regarding the Sanford Reuse Land Application Facility (Site 10), as shown in **Figure 1.** Site 10 is located on the northeastern shore of Lake Jesup. FDEP specifically requested information on the facility itself (i.e., description and operations), on-site nutrient loading due to reclaimed water operations and residuals applications and nutrient transport to the lake via groundwater and surface runoff. CDM prepared a technical memorandum to the City dated February, 2007 summarizing the results of these findings.

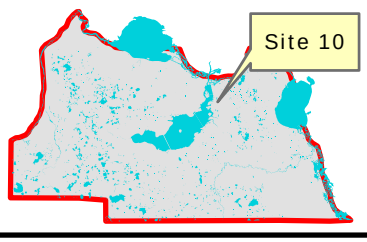
Since that time, FDEP has estimated that Site 10 has the potential to contribute approximately 4,121 lbs/yr of TP to Lake Jesup. As Site 10 loading was not taken into account in the original Lake Jesup TMDL modeling, FDEP will use its original loading estimates and the City will be required to reduce TP loading to the lake by 424 lbs/yr under the current allocation.

FDEP has now requested the City to prepare a surface water monitoring plan as a condition of renewing the City's North Wastewater Treatment Facility Permit No. FL0020141 as well as part of the Lake Jesup (BMAP) which is anticipated to be completed at the end of 2008.

The City owns a number of parcels along the northeast shore of Lake Jesup, which total approximately 2,204 acres. On these parcels resides one of the City's permitted wastewater facilities known as Site 10, which itself is comprised of approximately 1,868 acres. The remaining area is occupied by the marsh fringe associated with Lake Jesup. Site 10 is



LOCATION MAP



LEGEND

Site 10 Boundary

Roads

0 1,400 2,800 Feet

City of Sanford
Wastewater Facility (Site 10) Surface Water Monitoring Plan

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Figure 1
Site 10

generally bounded on the west by Lake Jesup, on the north and the east by SR 46, and on the south by the Lake Jesup Conservation Area owned by the St. Johns River Water Management District (SJRWMD).

In July, 2007 CDM participated in a conference call with FDEP, SJRWMD, Orange and Seminole Counties to discuss the overall long term monitoring strategy for the Lake Jesup BMAP. During this discussion, the agencies and the Counties were asked for their input regarding elements of a stormwater monitoring plan for the Site 10 facility.
The following elements of a surface water monitoring plan at the Site 10 facility were identified during the discussion and include:

- More frequent sampling which includes actual storm event monitoring using an automated storm sampler;
- Routine sampling in the lake near the Site 10 outfall point; and,
- Addition of TP to the parameters already analyzed for in the groundwater monitoring wells that are in close proximity to the lake.

Additionally, the proposed stormwater monitoring plan would need to be designed to meet the following objectives:

- Use the storm event sampling data to better quantify an event mean concentration (EMC) that is representative of the site. These data would be used to refine future iterations of the TMDL modeling for Lake Jesup;
- Use the sampling data to monitor changes, if any, due to the future implementation of improved on-site nutrient management (i.e., discontinue spreading of residuals; improved reclaimed water quality, etc.); and,
- Use the storm event monitoring sampling results to determine if source of nutrient loading is coming from surface runoff, residual loads (i.e., baseflow) or both.

As part of the development for the overall surface water monitoring plan, the City requested that CDM perform the following:

1. Identify existing sampling points near Site 10 and parameters included in the testing.
2. Evaluate possible sampling site for stormwater runoff that are accessible for staff.

Existing Water Quality Sampling Stations Near Site 10

CDM relied on information available from both the Seminole County Watershed Atlas (SCWA) as well as the Florida Storage and Retrieval (STORET) data warehouse website for existing water quality data. Based on these two data sources, CDM identified existing sampling sites within Lake Jesup that are in close vicinity to Site 10. As there were some noted differences in the stations and types of data collected over time, CDM will discuss the water quality data obtained from the SCWA and STORET separately.

Seminole County Watershed Atlas

Using information downloaded from the SCWA, seven (7) sampling sites in Lake Jesup near Site 10 were identified and shown on **Figure 2**. The respective water quality data were downloaded from the SCWA and queried to determine the parameters sampled for as well as the period of record. The stations, period of record and list of sample data available via this query are shown in **Table 1**. As shown in this table, the majority of the water quality sampling for these sites in Lake Jesup has been performed between 1995 and 2008. Historical water quality TP sampling results at these stations is provided in **Figure 3**.

Florida STORET

CDM also downloaded water quality data available from the Florida STORET database. Due to the large number of parameters available in the STORET database and the amount of effort involved in downloading and organizing all these data, CDM elected to only download nutrient data as those are the parameters of concern in Lake Jesup. The nutrient data were queried to determine the parameters sampled for as well as the period of record. The results of this query are shown in **Table 2**. As shown in this table, the majority of the water quality sampling for these sites in Lake Jesup was performed between 1997 and 2008. The location of these stations is shown in **Figure 4**. Historical water quality TP sampling results at these stations is provided in **Figure 5**.

Evaluation of Possible Sampling Site for Stormwater Runoff

In August, 2007 CDM conducted a field visit with City staff to Site 10. The purpose of this visit was to identify potential sites that could be candidates for storm event sampling. Based on feedback from City staff that are familiar with the site, only one location exists where there is continuous flow. This location is at stormwater pond B-2 as shown in **Figure 6**. There are three (3) 48-inch pipes that discharge towards the pond and these pipes collect runoff from fields F-3, F-4, F-6 and F-8. At the time of the inspection, water was flowing through the three 48-inch pipes. **Figure 7** shows the existing monitoring stations in the lake as well as the proposed Site 10 location.

Based on CDM's field inspection, the site near pond B-2 would be a suitable location for a storm event autosampler. The autosampler and ancillary equipment could be located on a platform at the top-of-bank adjacent to the overflow structure. The flow monitoring sensors

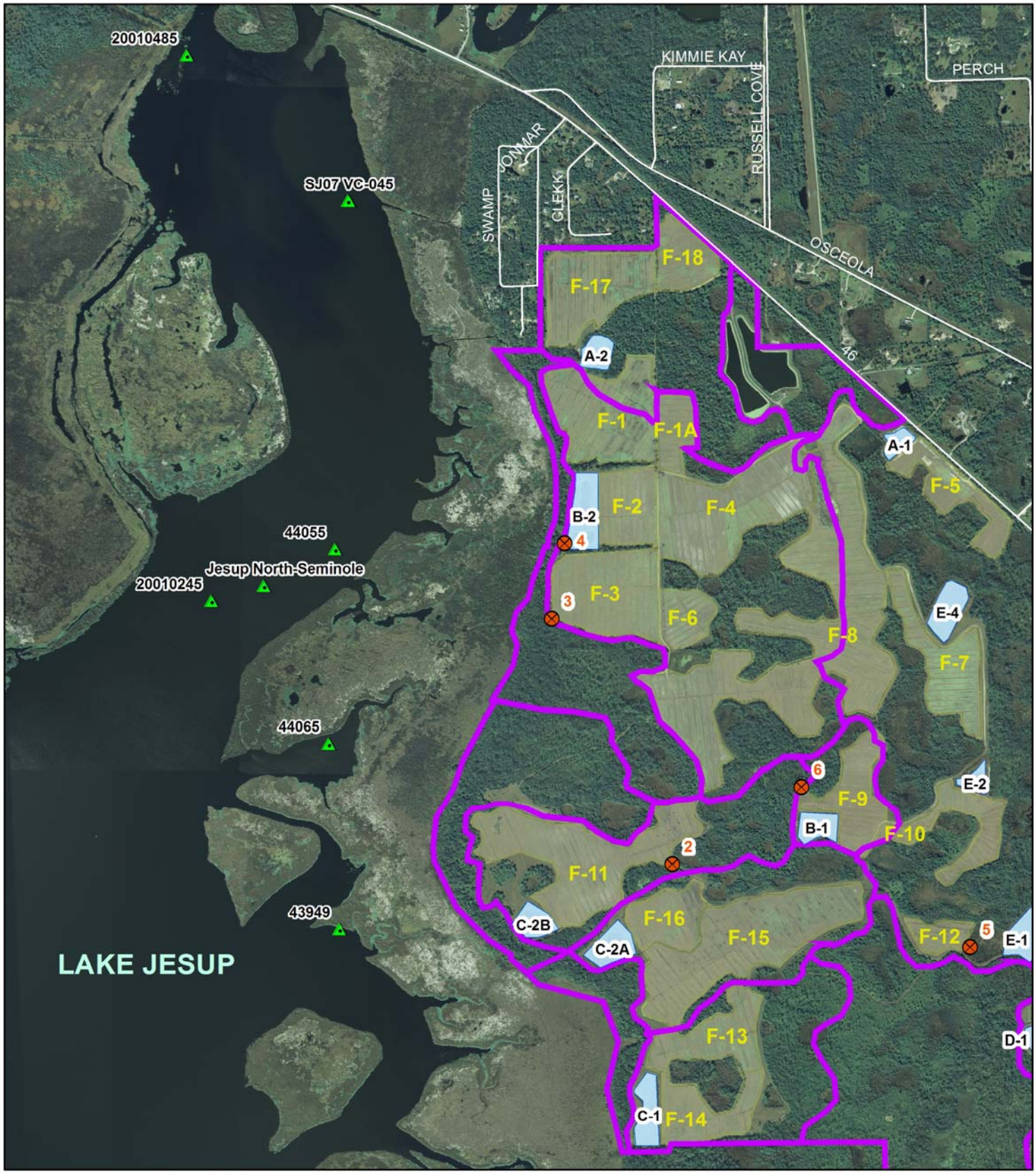

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Figure 2
Seminole County Watershed Atlas Sampling Locations

Table 1
City of Sanford
Site 10 TMDL Assistance
Seminole County Watershed Atlas Monitoring Stations

Station/Period of Record:	20010245	43949	44055 (OW-2)	44065 (T-1)	Jesup North-Seminole	SJ07	VC-045
Parameter	1/16/1973 - 7/13/1976	3/27/1996	2/15/1995 - 3/4/2008	2/14/1995 - 2/15/2000	2/17/2001 - 1/13/2008	1/29/1991 - 12/9/1998	1/27/1999 - 2/8/2006
Ag_ugl			√				
Al_ugl			√				
Alk_CaCO3_diss_mgl			√	√			
Alk_CaCO3_mgl					√		
Alkalinity_mglCaCO3	√						
As_ugl			√				
Ba_ugl			√				
Be_ugl			√				
BOD5_mgl	√						
Ca_diss_mgl			√	√			
Ca_mgl			√	√			
Cd_ugl	√		√				
Chla_ugl			√	√	√	√	√
ChlaC_ugl			√	√		√	√
chlb_ugl			√	√		√	√
chlc_ugl			√	√		√	√
Cl_mgl	√		√	√	√		
Cloud_Cover_Percent						√	
CloudCov_pct							√
Color_pcu	√				√		
Color_true_diss_pcu			√	√			
Cond_umhocm	√	√	√	√	√	√	√
Cr_ugl			√				
Cu_ugl	√		√				
Depth_bott_ft		√	√	√			√
Depth_ft							√
DO_mgl	√	√	√	√		√	√
DO_percent	√					√	
Ecoccus_100ml							√
F_mgl			√				
Fcoli_100ml	√					√	√
Fe_ugl	√		√	√			
FixedSolids_mgl							√
Fstrep_100ml	√						
hardness_mglCaCO3			√	√			
Hg_ugl			√				
K_mgl			√	√			
Light_Attenuation_Coeff						√	
Mg_mgl			√	√			
Mn_ugl			√				

Table 1
City of Sanford
Site 10 TMDL Assistance
Seminole County Watershed Atlas Monitoring Stations

Station/Period of Record:	20010245	43949	44055 (OW-2)	44065 (T-1)	Jesup North-Seminole	SJ07	VC-045
Parameter	1/16/1973 - 7/13/1976	3/27/1996	2/15/1995 - 3/4/2008	2/14/1995 - 2/15/2000	2/17/2001 - 1/13/2008	1/29/1991 - 12/9/1998	1/27/1999 - 2/8/2006
Na_diss_mgl			√	√			
Na_mgl			√	√			
NH3_N_ugl	√						
NH4_ugl		√	√	√			
Ni_ugl			√				
NO2_diss_ugl	√						
NO2_ugl	√						
NO3_diss_ugl	√						
NO3_ugl	√						
Nox_diss_ugl						√	
NOx_ugl	√	√	√	√			√
OP_mgl	√	√	√	√		√	√
Pb_ugl	√		√				
pH	√	√	√	√	√	√	√
Pheo_ugl						√	√
Resid_volatile_susp_mgl	√						
Salinity_ppt						√	√
Sb_ugl			√				
Se_ugl			√				
Secchi_ft			√	√	√	√	√
Si_mgl			√	√			
SO4_mgl	√		√	√			
Tcoli_100ml	√					√	√
TDS_mgl			√	√			
TempA_F		√	√	√		√	√
TempW_C							√
TempW_F	√	√	√	√		√	√
TKN_ugl	√	√	√	√		√	√
Tl_ugl			√				
TN_ugl	√				√		
TOC_mgl	√		√	√			
TP_ugl	√	√	√	√	√	√	√
TSS_mgl	√		√	√		√	√
Turb_ntu			√	√		√	√
WindDir_deg			√	√		√	√
WindSpeed_mph			√	√		√	√
Zn_ugl	√		√				

Figure 3
Seminole County Watershed Atlas Sampling Stations
Total Phosphorus

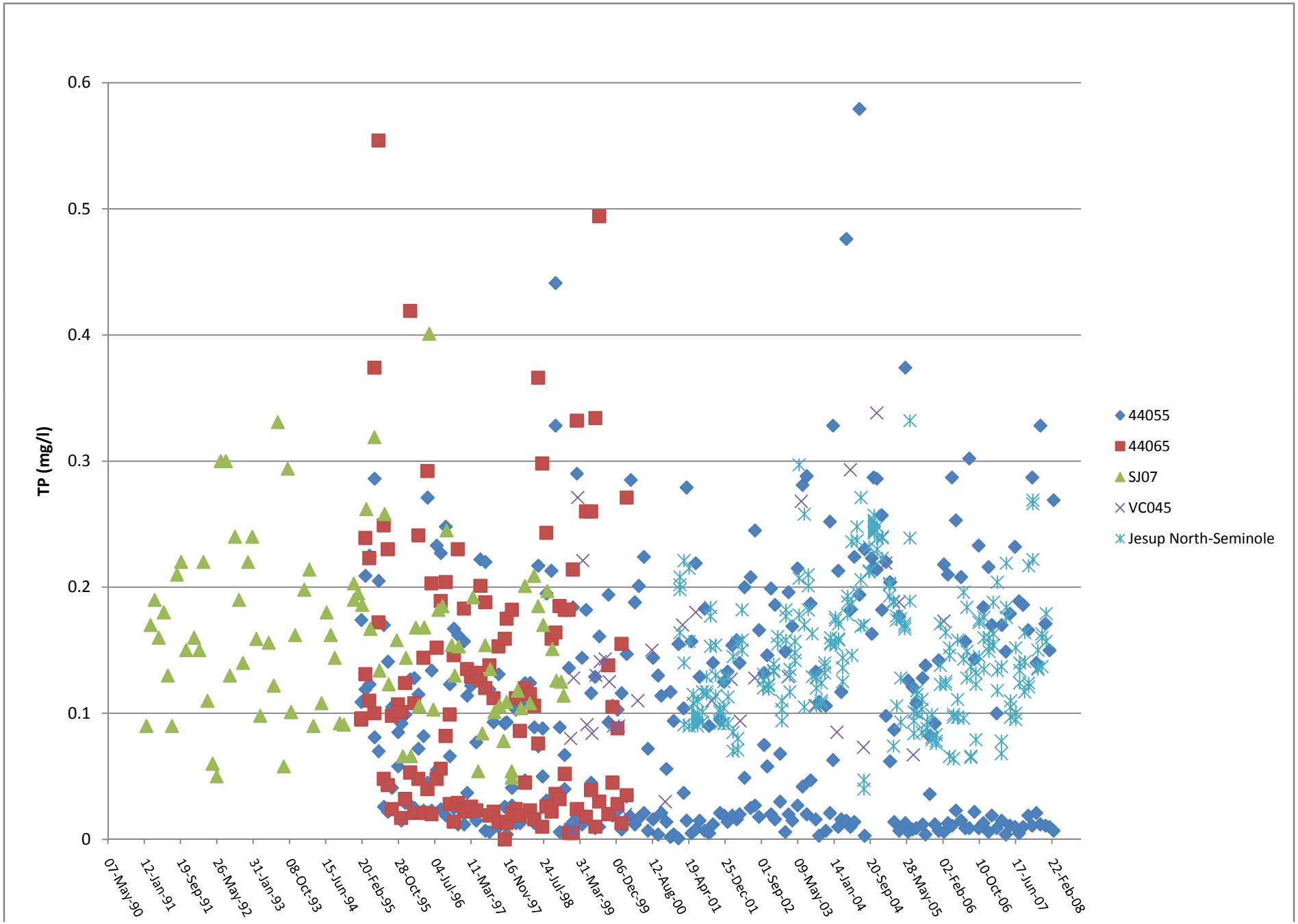
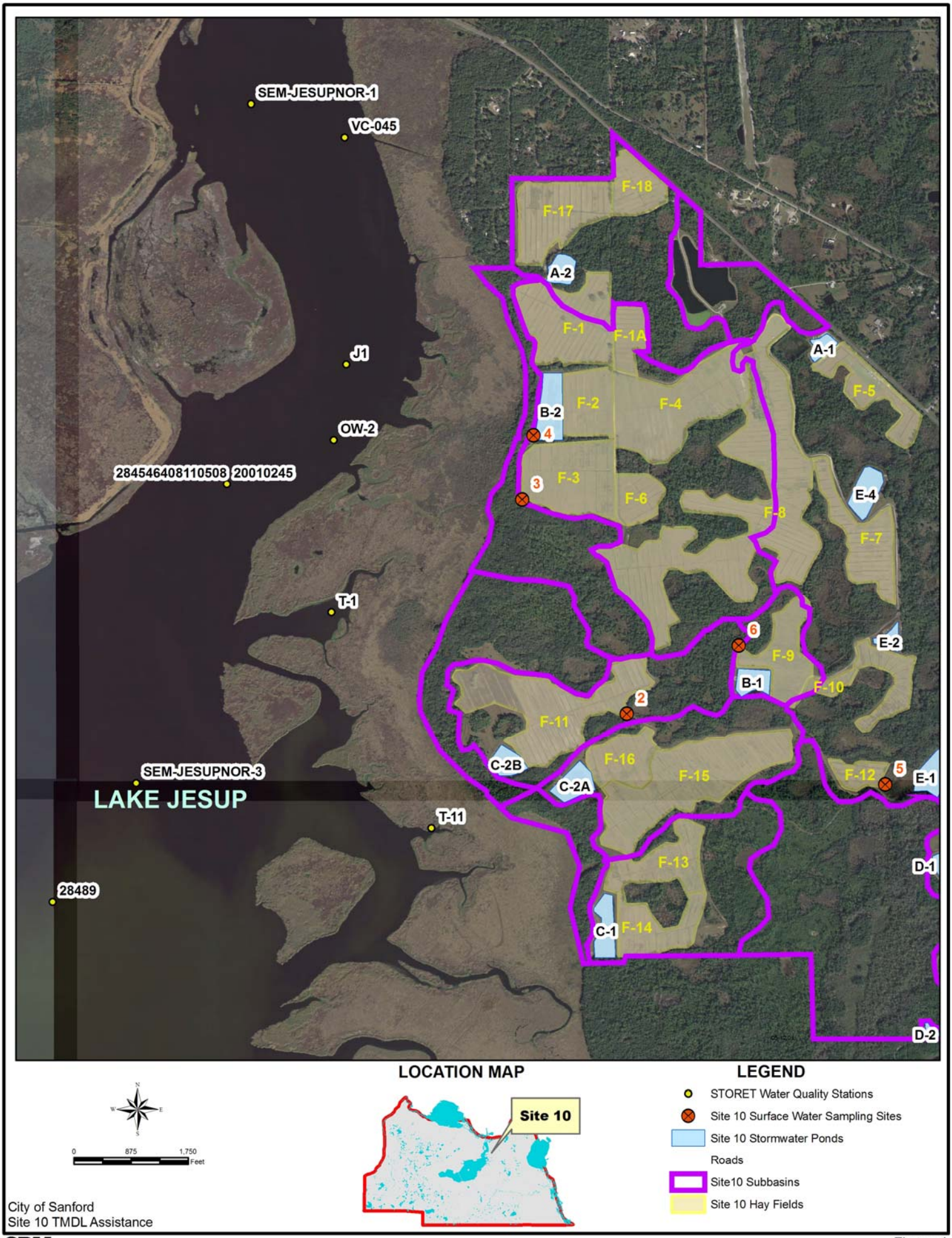


Table 2
City of Sanford
Site 10 TMDL Assistance
STORET Water Quality Monitoring Stations

Station/Period of Record:		OW-2	SEM-JESUPNOR-1	SEM-JESUPNOR-2	SEM-JESUPNOR-3	T-1	T-11	VC-045
Parameter		5/14/1997 - 1/8/2008	2/17/2001 - 2/20/2006	2/17/2001 - 2/20/2006	2/17/2001 - 2/20/2006	5/15/1997 - 2/15/2000	5/15/1997 - 1/11/2000	1/27/1999 - 2/8/2006
Nitrogen, ammonia as N	Dissolved	√				√	√	
Nitrogen, ammonia as N	Total	√				√	√	
Nitrogen, Kjeldahl	Dissolved	√				√	√	
Nitrogen, Kjeldahl	Total	√				√	√	
Nitrogen, mixed forms (NH3)+(NH4)+organic+(NO2)+(NO3) (Total)	Total		√	√	√			
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	Dissolved							
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	Total	√				√	√	
Phosphorus as P			√	√	√			
Phosphorus as P	Dissolved	√				√	√	
Phosphorus as P	Total	√				√	√	
Phosphorus, orthophosphate as P	Dissolved							√
Phosphorus, orthophosphate as P	Total	√				√	√	√
Sulfur, sulfate (SO4) as SO4	Total	√				√	√	√
Total Organic Carbon (TOC)	Dissolved	√				√	√	√
Total Organic Carbon (TOC)	Total	√				√	√	



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Site 10 TMDL Assistance

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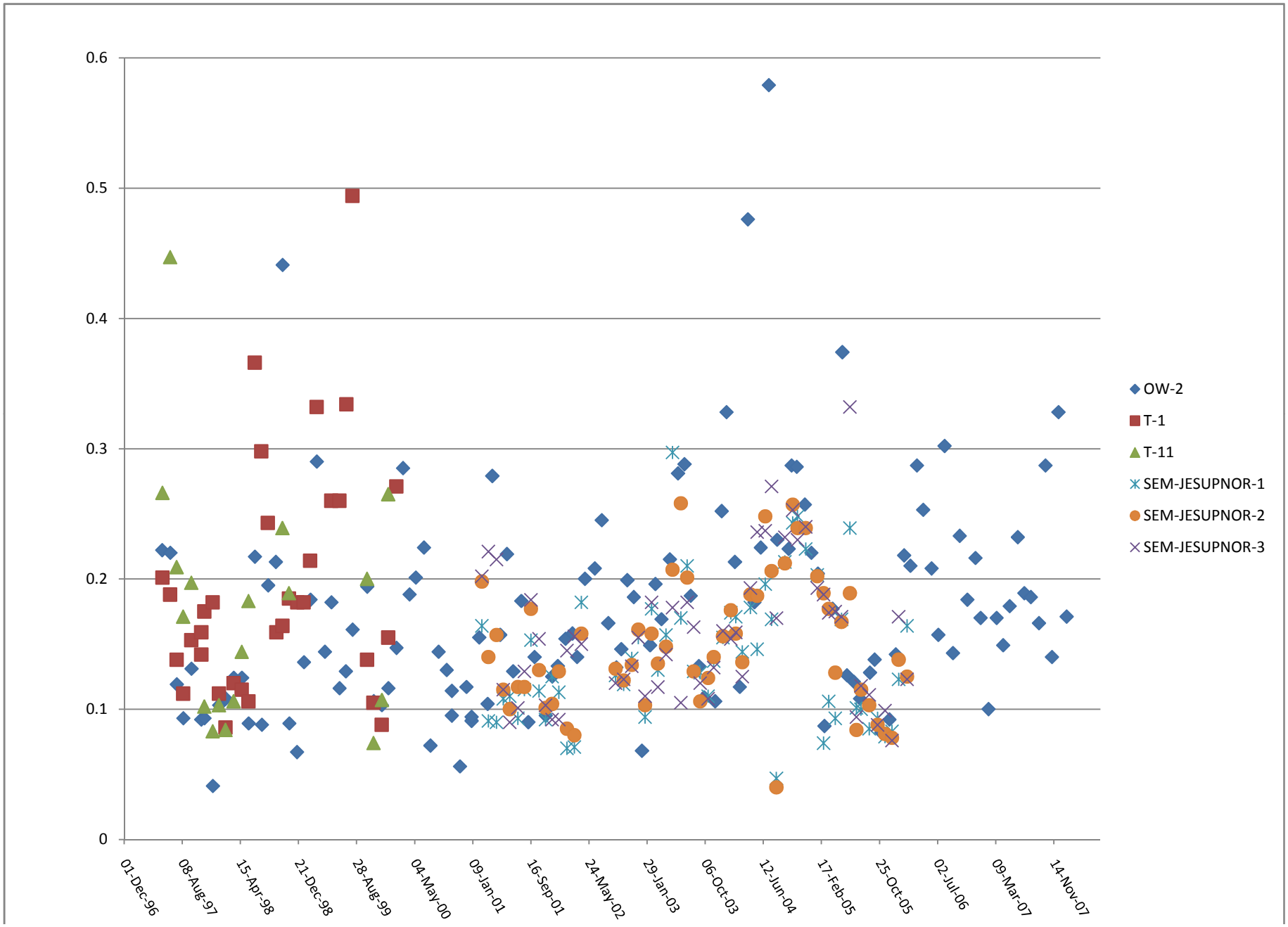
Figure 4
STORET Water Quality Sampling Stations

Figure 5
STORET Sampling Stations
Total Phosphorus



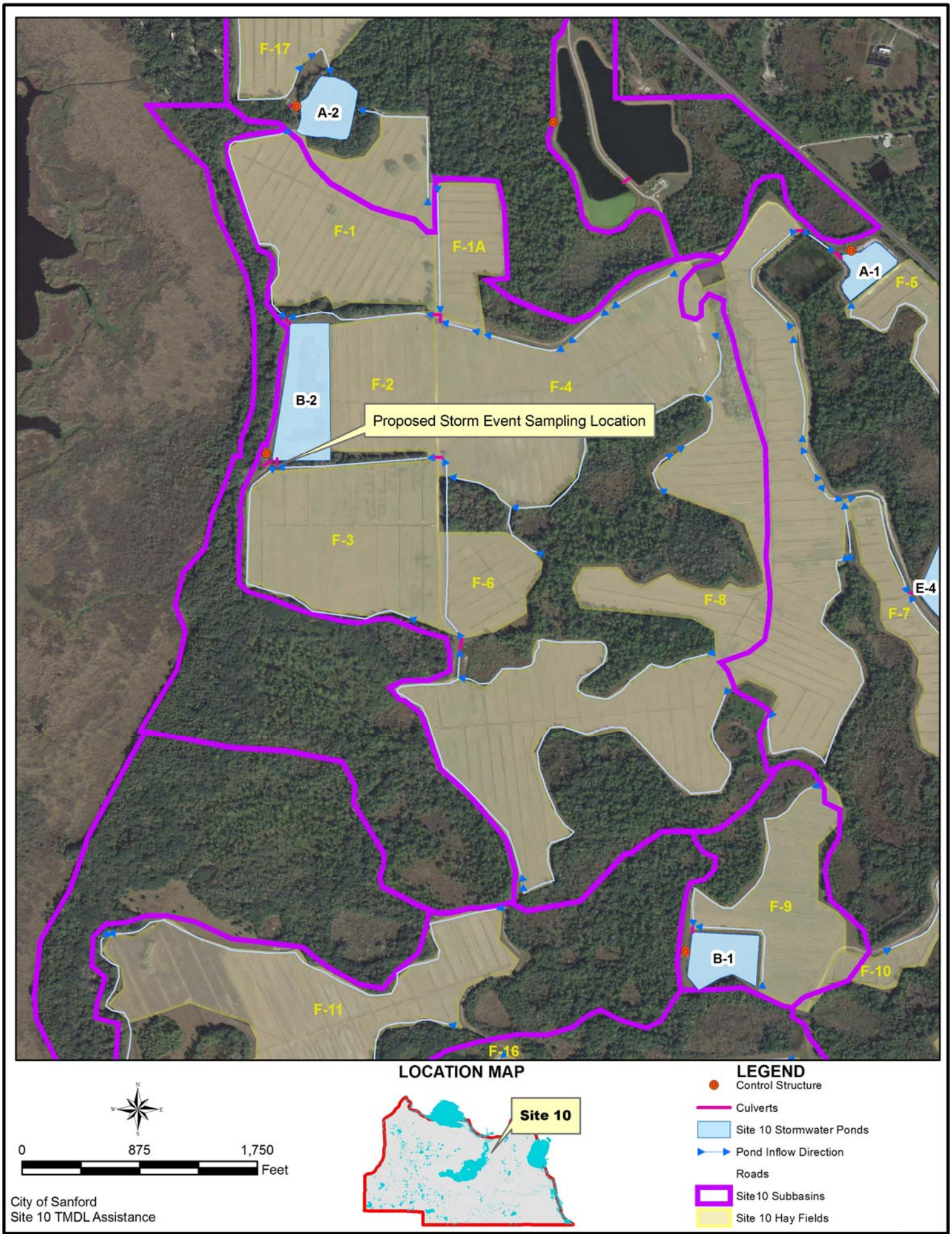
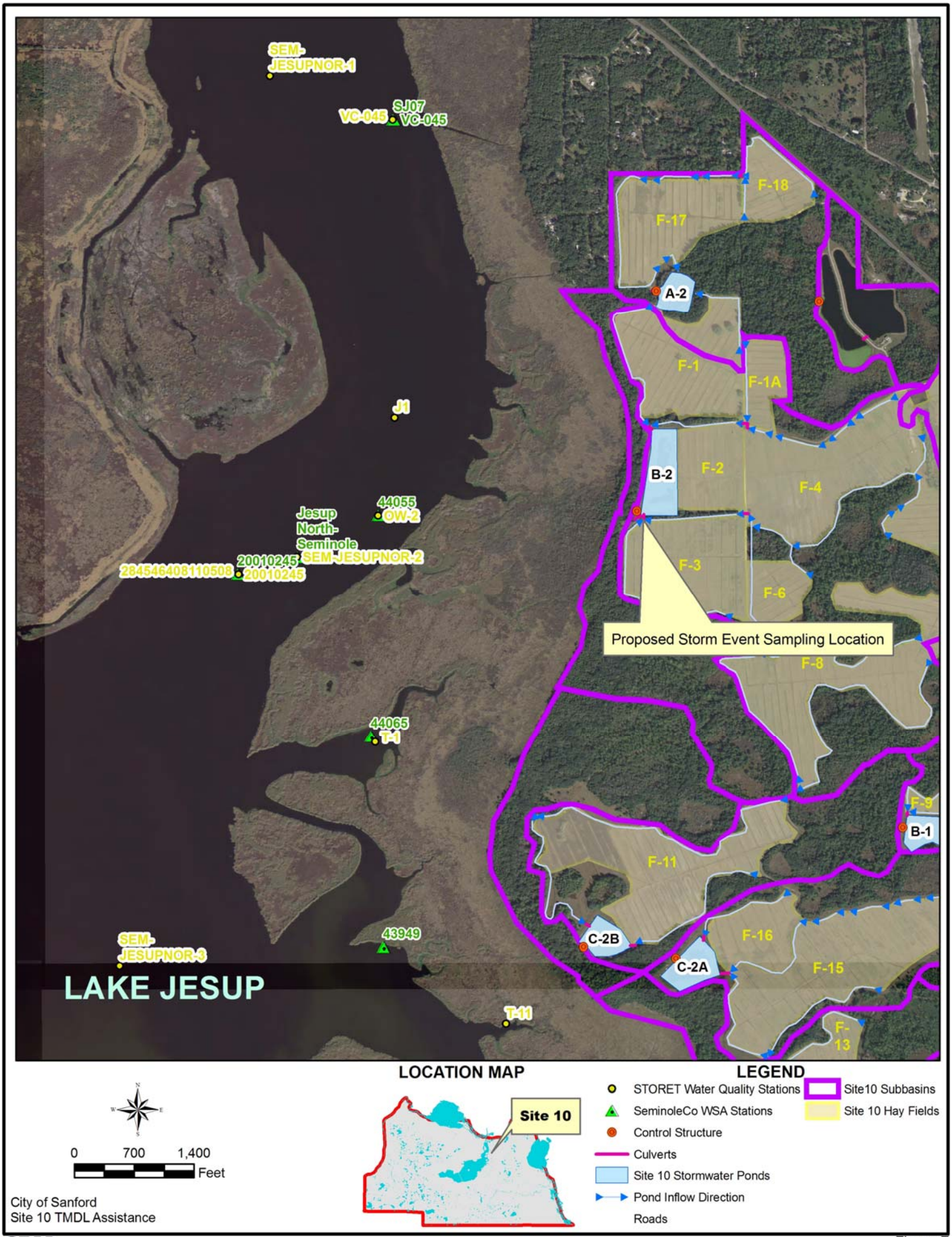


Figure 6
Potential Location for Storm Event Sampling



City of Sanford
Site 10 TMDL Assistance

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Figure 7
Existing Monitoring Stations & Proposed Site 10 Sampling Location

and sample collection port would then be placed inside one of the three 48-inch pipes. The proposed installation will allow easy access to the autosampler by City staff for both routine maintenance and sample collection. The autosampler can also be programmed to not sample during periods of negative flow (i.e., if the pond stages up too high and flows into the three 48-inch pipes). For informational purposes, CDM has provided a detailed estimate in **Table 3** for the equipment costs related to purchasing an automatic sampler.

At this point in time, it is anticipated that City staff will operate the autosampler, collect the samples and have the water quality analysis performed by an outside analytical laboratory. Upon request, CDM can provide a proposal for services to assist the City in preparing a quality assurance project plan (QUAPP), equipment procurement, equipment installation and testing as well as training.

As part of the autosampling program, it is recommended that the City sample for the same parameters currently being collected as part of their ongoing surface water monitoring on Site 10, which also address the parameters of concern for the Lake Jesup TMDL. These parameters include:

- pH
- Temperature
- Carbonaceous Biochemical Oxygen Demand (CBOD)
- Total Suspended Solids (TSS)
- Fecal Coliform
- Total Kjeldahl Nitrogen (TKN)
- Nitrates and Nitrites (NO_x)
- Total Phosphorus (TP)
- Total Nitrogen (TN)
- Unionized Ammonia (NH_3)

Table 3
City of Sanford, Florida
Site 10 Monitoring Program Assistance
Equipment Costs

Item No.	Description	Model No.	Quantity	Unit Price [1]	Total Price
ISCO Equipment Purchase					
1	6712 Portable Sampler	68-6710-070	1	$ 3,022.95	$ 3,022.95
2	2.5 Gallon PE Bottle	68-6700-014	2	$ 146.00	$ 292.00
3	3/8" ID Vinyl Suction Line w/SS strainer	60-9004-379	1	$ 91.93	$ 91.93
4	3/8" ID Vinyl Suction Line (100 ft)	68-1680-058	1	$ 70.00	$ 70.00
5	Connect Cable, 12 V DC Source	60-1394-023	1	$ 68.00	$ 68.00
6	SPA Cell Modem	60-5314-489	1	$ 1,880.00	$ 1,880.00
7	Model 750 Low Profile AV Flow Module (75 ft)	68-6700-106	1	$ 3,605.00	$ 3,605.00
8	674 Rain Gage	60-3284-001	1	$ 765.00	$ 765.00
9	Solar Panel	60-5314-347	1	$ 800.00	$ 800.00
10	Solar Panel Wiring	60-1394-023	1	$ 68.00	$ 68.00
11	Flowlink 5 Software	68-2540-200	1	$ 1,995.00	$ 1,995.00
12	Interrogator Cable	60-2544-044	1	$ 75.00	$ 75.00
13	Dessicant 8 Mesh (1 lb can)	09-9001-1003	1	$ 38.64	$ 38.64
				Subtotal	$ 12,771.52
				Estimated Shipping	$ 200.00
				Tax [2]	NA
				Total (ISCO Equipment Purchase)	$ 12,971.52
Additional Equipment (Non-ISCO Suppliers)					
13	Equipment Enclosure (Rubbermaid)	NA	1	$ 300.00	$ 300.00
14	Fence Enclosure	NA	1	$ 750.00	$ 750.00
15	12 V Marine Battery (Sears)	NA	1	$ 69.00	$ 69.00
16	Cellular Phone Monthly Service (Verizon only)	NA	24	$ 69.00	$ 1,656.00
17	Miscellaneous Replacement Parts (Allowance)	NA	1	$ 1,000.00	$ 1,000.00
				Subtotal	$ 3,775.00
				Tax [2]	NA
				Total (Non-ISCO Equipment Purchase)	$ 3,775.00
				Total Equipment Cost	**$16,747**

Notes:

(1) Prices quoted on September 5, 2008

(2) Tax exempt if purchased by the City

(3) Cellular phone service provider must be by Verizon Wireless per autosampler manufacturer