Sunshine Lake/Sunrise Waterway Monitoring Program Year 2 and Flow

Project Objective: Implement water quality and benthic monitoring program in the Sunshine Lake/ Sunrise Waterway

Project Description:

The Sunshine Lake/Sunrise Waterway system, located in Greater Port Charlotte, experienced extensive and persistent algal blooms. Based on aerial photography and public recollection, it appears that in the course of a few years, the Sunshine Lake/Sunrise Waterway went from being a relatively healthy lake with good water clarity and a mostly sandy bottom to an algae-clogged lake, with noxious odors and deep mucky sediments.

In response to these conditions, and as recommended in an assessment of the lake's problems (Atkins 2012) an extensive dredging operation was completed to remove the algal material from the Sunshine Lake/Sunrise Waterway system. Additionally, a watershed-wide investigation of water chemistry to determine the source of increased nutrients causing the persistent algae bloom was recently completed (Atkins and ESA 2015). The recently completed management plan (Atkins and ESA 2014) concluded that that elevated levels of phosphorus in the surficial aquifer and in stormwater runoff reflected phosphorus-rich surface geology in the surrounding watershed, and that there was no "management action" that could take place in the watershed itself that would reduce the phosphorus-rich runoff from entering the lake. Due to the phosphorus-rich surface geology in the watershed, there is a potential that an algal bloom of some type may reoccur in the lake and waterway. Subsequently, a monitoring program which included quantitative criteria was recommended as part of the water quality management plan. This monitoring program was initiated in October of 2015, with samples to be collected on a quarterly basis. The Scope of Work (SOW) outlined below provides detailed information on the activities and costs associated with the continuation of the water quality and benthic monitoring plan for Sunshine Lake and the Sunrise Waterway, as wells continuing the mechanism through which Atkins and ESA can provide ongoing technical guidance related to the ongoing restoration of Sunshine Lake and the Sunrise Waterway.

Scope of Work

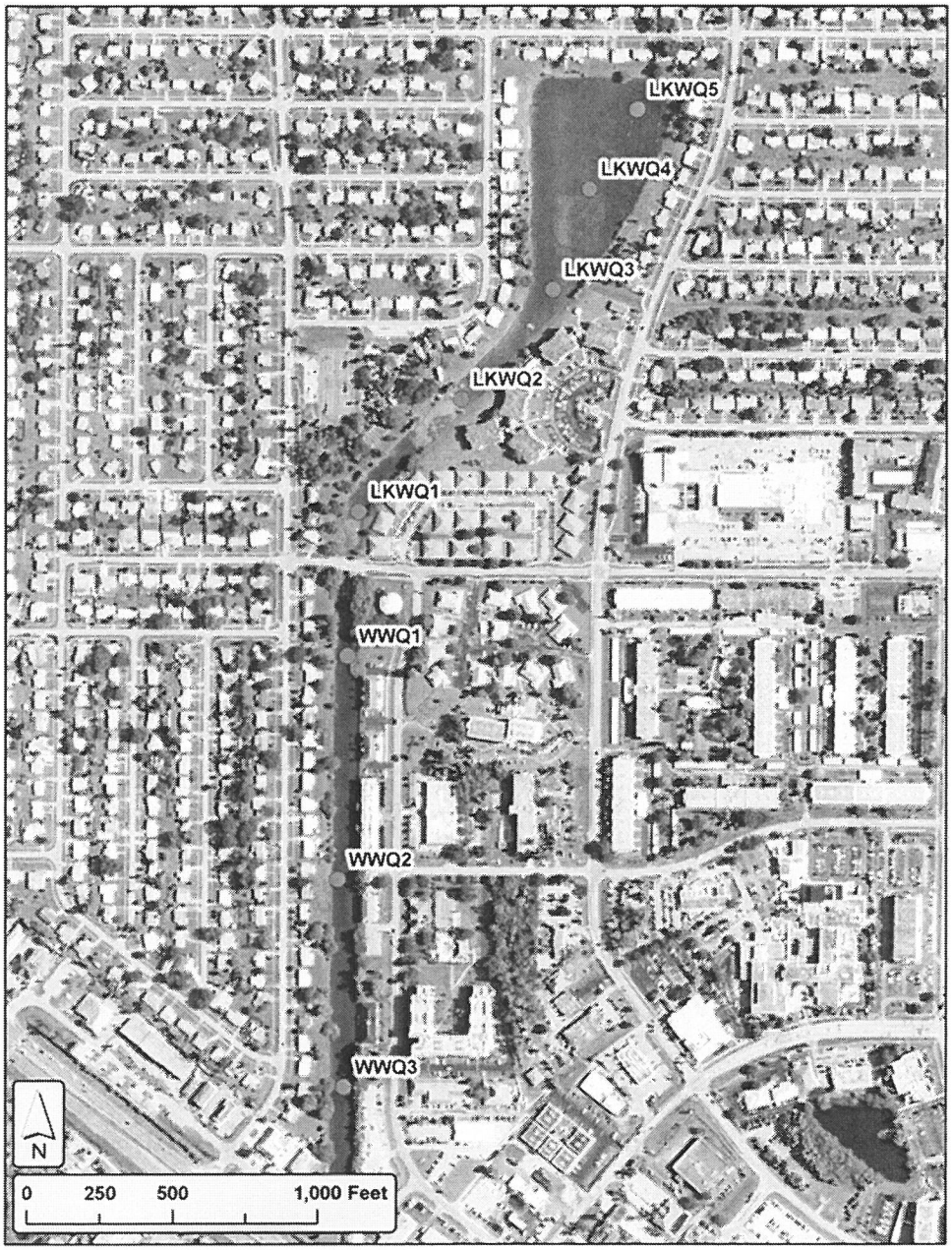
Task 1: Monitoring Program

The monitoring program will continue the ongoing collection of surface water, benthic material and general vegetation assessment for a period of 1 year (4 quarterly events and one annual summary).

- Surface Water Sampling:

  Quarterly monitoring of 8 surface water sites (5 in the lake and 3 within the waterway) will be collected and analyzed for total and dissolved nutrients (nitrogen and phosphorus), chlorophyll-a, and bacteria (Figure 1). One blank and one replicate surface water quality sample will be collected during each quarterly assessment for a total of 10 samples per event. Photo-documentation and identification of emergent and submerged aquatic vegetation will performed quarterly from those same 8 locations

Figure 1. Surface water sampling sites.



- Benthic Sampling:

  On a quarterly basis, the benthic vegetation of the lake and waterway will continue to be quantified at the same 50 randomly selected sites shown in Figure 2.

Figure 2. Benthic vegetation sampling sites.

As was done in the original assessment of Sunshine Lake, lake volume and algal biomass will be conducted by determining the difference between the volume of open water and the volume

occupied by any potential algal bloom. If an algal mat similar in extent to that which previously affected the lake is identified, species identification will be conducted down to the most practical taxonomic unit. At this time, and based on the first two sampling efforts conducted, Atkins/ESA is not anticipating the need for assistance with the taxonomic identification of algal species, but if such a need arises, Atkins/ESA has contacted researchers with Mote Marine Laboratory (Sarasota, Florida) to prepare a cost estimate for this service. The nitrogen and phosphorus concentration of any potential algal mat will be analyzed. Literature is not available on likely values of nutrient content, or if the County decides that such an effort is worth conducting. for quantifying nutrient benefits of the removal of algal biomass. Those two expenses, algal speciation and nutrient assessments, will be developed on an as-needed basis. In the event that these services from Mote are not needed, Atkins/ESA with County's advance consent may utilize the funds from this portion of the task order for other as-needed service as specified by the County.

- In situ Sampling:

  In situ water quality profiles will be performed using a YSI or comparable instrument at each surface water or benthic sampling site. Parameters measured will include water temperature, Dissolved oxygen, salinity and conductivity. Secchi disk depth and total water depth will be also be quantified.

An annual evaluation of the data produced by the monitoring program will be performed and recommendations provided to the County as a technical memorandum. Potential corrective actions, as necessary, will be presented in consideration of the existing water quality management plan developed for the waterbody.

The following cost estimates are provided by Benchmark EnviroAnalytical Inc. (Palmetto, Florida). Surface water samples which include TN, TKN, NH4, NOx, TP, o-PO4, and chlorophyll-a are estimated to cost $90 per sample. Recently, FDEP has revised the bacteriological indicator for predominantly freshwater class III waterbodies which is the classification for the Sunshine Lake/Sunrise Waterbody. The bacteriological indicator has transitioned from fecal coliforms to E. coli. As such, E.coli will be added to the suite of parameters analyzed in replacement of fecal coliform bacteria. Bacteria analysis is estimated to cost $18.70 for fecal coliform and/or $22.00 for E. coli per sample.

Parameter	Method	MDL	Cost per Sample
Total Nitrogen	351.2+353.2	calculation	Included in other samples
TKN	351.2	0.05 mg/L	$16.50
Ammonia Nitrogen	350.1	0.012 mg/L	$12.00
NOx	353.2	0.004 mg/L	$12.50
TP	365.3	0.008 mg/L	$14.50
Ortho-P	365.3	0.002 mg/L	$10.50
Ortho-P lab filtration			$1.50
Fecal Coliform	SM 9221D	1CFU/100ml	$18.70
Chlorophyll-a			$22.50

E. Coli	SM92223B	1CFU/100ml	$22.00

Task 2: Annual Report

Atkins and ESA will produce an annual report that summarizes the information developed from the water quality and benthic vegetation monitoring programs. The report will interpret and analyzed water quality in terms of implications to various regulatory programs such as FDEP's Total Maximum Daily Loads efforts, via comparing water quality and benthic vegetation sampling data to guidance included in FDEP's Numeric Nutrient Concentration (NNC) criteria. Atkins and ESA will also provide documentation of progress made in terms of managing the lake, such that the County could modify, enhance or potentially eliminate various lake management actions.

Task 3: Quantification of flows out of Sunshine Lake and the Sunrise Waterway

Atkins staff will deploy 4 Solinst Levelloggers to document water levels and calculate flow rate based on empirical equations at the weir/concrete structure at the South end of the Sunrise Waterway portion of the Lake. Instrumentation will be placed upstream and downstream of the structure for a period of one-year to determine if a statistically significant relationship can be developed between water levels and flows. The 4 Levelloggers will be installed during the final 4th quarter sampling event of Water Year 1 and will be downloaded quarterly in Water Year 2 in conjunction with the quarterly surface water sampling events. Atkins Survey will provide elevations in NAVD88 of the installed Levelloggers and details of the one weir structure at the South end of Sunrise Waterway and provide an XYZ file as a deliverable. Atkins will calculate a maximum discharge velocity based on reading from the Levelloggers only (no 2D velocity measurements are included as part of this task). In the event that an instrument becomes disturbed or vandalized during the 1-year data collection period, Atkins will discuss with the County how to proceed with the study or how to implement a corrective action plan with associated costs. This information during Water Year 2 will be used to quantify the nutrient load to Charlotte Harbor from the Sunshine Lake and Sunrise Waterway system, which could be useful to the County for determining TMDL credits, should the downstream waters of Charlotte Harbor require load reduction efforts be quantified as part of any potential FDEP-led TMDL.

Task 4: Ongoing Technical Guidance

Atkins/ESA scientists will provide ongoing technical guidance for the water quality management of Sunshine Lake/Sunrise Waterway. As requested by the County, staff will be made available to review supplemental data, respond to information requests, and attend meetings for up to 40 hours for David Tomasko, up to 24 hours for Emily Keenan and up to 16 hours for Ed Cronyn.

Budget

See attachment A

ATTACHMENT A - COMPENSATION BREAKDOWN

Work Assignment: Charlotte County Watershed Management Plan

Prepared by: DAT 3-25-2016)
Checked by: **EC (9/7/16)**

LABOR COSTS

Category	Task 1: Monitoring Program	Task 2: Annual Report	Task 3 - Flow estimates for discharges from lake and waterway	Task 4: Ongoing Technical Guidance	Total Labor Fee
Atkins	$22,290.00	$2,300.00	$15,595.00	$ 2,512.00	$ 42,697.00
ESA	$16,800.00	$4,820.00	$1,472.00	$10,384.00	$ 33,476.00
Total Labor Fee	**$39,090.00**	**$7,120.00**	**$17,067.00**	**$12,896.00**	**$ 76,173.00**
					Direct Expenses
Direct Expenses	$ 3,150.00	-	$1,400.00	-	$ 4,550.00
ESA Direct Expenses	-	-		$ 600.00	$ 600.00
Benchmark	**$ 5,000.00**	-		-	$ 5,000.00
MOTE Sediment (or Atkins/ESA as-needed)	**$ 5,000.00**	-		-	$ 5,000.00
Benthic Algae ID		-			
Total Direct Expenses	**$13,150.00**	**$ -**	**$1,400.00**	**$ 600.00**	**$ 15,150.00**
Project Total	**$52,240.00**	**$7,120.00**	**$18,467.00**	**$13,496.00**	**$ 91,323.00**

Tasks 1, 2 and 3will be invoiced on a lump sum basis in proportion to the percentage of services completed, upon completion of deliverables (per sampling event and annual report, plus direct costs); Task 4 will be invoiced monthly based upon hours and rates in contract #2013000416

ATTACHMENT A - COMPENSATION BREAKDOWN p. 2 (BENCHMARK ENVIROANALYTICAL INC)
QUOTATION ATKINS - CHARLOTTE CO. SW,GW, STM. W. SUNSHINE LAKE- 8-31-16

Contact: EMILY KEENAN Company: ESA (Invoice ATKINS)
Address: 4030 W Boy Scout Blvd Ste 700

Date : 8-31-16
Phone No. 813-207-7211 (E. Keenan/ESA)
813-281-8354 (E. Cronyn/Atkins)

PARAMETER	METHOD	MDL	MATRIX	EACH COST	TOTAL COST	QUANTITY
SURFACE WATER SAMPLES						
TOTAL NITROGEN	351.2+353.2	CALC	SW	$0.00	$0.00	40
TOTAL KJELDAHL NITROGEN	351.2	0.05 MG/L	SW	$16.50	$660.00	40
AMMONIA NITROGEN	350.1	0.012 MG/L	SW	$12.00	$480.00	40
NITRATE-NITRITE	353.2	0.004 MG/L	SW	$12.50	$500.00	40
TOTAL PHOSPHORUS	365.3	0.008 MG/L	SW	$14.50	$580.00	40
ortho -PHOSPHORUS	365.3	0.002MG/L	SW	$10.50	$420.00	40
o-P LAB FILTRATION				$1.50	$60.00	40
FECAL COLIFORM	SM 9221D	1CFU/100ML	SW	$18.70	$0.00	0
E COLI	SM9223B Quant	1CFU/100ML	SW	$22.00	$880.00	40
Chlorophyll-a				$22.50	$900.00	40
				$130.70	$4,480.00	

WORK ASSIGNMENT # _____
CHARLOTTE COUNTY PURCHASING DIVISION
CONTRACT NO. _____

THIS WORK ASSIGNMENT

1.	Work Assignment #	
2.	Short Title	
3.	Date Submitted	
4.	Amount	
5.	Scheduled Completion	

In presenting this Work Assignment, Consultant agrees that:

Unless detailed herein, all drawings, data, electronic files and other information required for this Work Assignment has been accepted by Consultant. Specifically, all electronic files have been reviewed and accepted for the purposes of this Work Assignment. Unless specified herein, additional information will not be required.

SUBMITTED AND AGREED TO BY:

BY: Charlotte Maddox Sr. Vice President
Name of Consultant Atkins North America, Inc

Signature

DATE: 9/26/2016

RECOMMENDED AND APPROVED BY:

FISCAL REVIEWED BY: _____

CHARLOTTE COUNTY DEPARTMENT DIRECTOR: _____

CHARLOTTE COUNTY PURCHASING: _____

CHARLOTTE COUNTY ADMINISTRATION: _____