



# Sarasota County **Alligator Creek** **FDEP 319h Water Quality** **Monitoring Program**



**Final Report**  
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**WATERMARK**  
ENGINEERING GROUP, INC.

*Integrated Engineering Solutions for Florida's Water Environments*

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## Appendix A- Data, Results and Records of Measured Pollutants



## BRIARWOOD STORMWATER TREATMENT FACILITY (BSTF)



### Key Project Features

- The BSTF is an innovative stormwater retrofit project that uses upflow media filtration.
- The project land area makes use of abandoned county land and facilities that were otherwise unused.
- The BSTF treats approximately 2.33 times the amount of stormwater that is generated annually to remove large quantities of pollutant mass.

### Documented First Year Success

| Reporting Parameter                                   | Mass Removed (lbs.) |
|---|---------------------|
| TSS Mass Removal Goal (Adjusted for Reporting Period) | 48,670              |
| TSS Mass Removed over Report Period                   | 53,834              |
| TN Mass Removal Goal (Adjusted for Reporting Period)  | 2,004               |
| TN Mass Removed over Report Period                    | 2,053               |
| TP Mass Removal Goal (Adjusted for Reporting Period)  | 554                 |
| TP Mass Removed over Report Period                    | 91                  |

# Stormwater Project Fact Sheet

## History

- Sarasota County constructed the Briarwood Stormwater Treatment Facility (BSTF) under an FDEP 319(h) grant, completing the project construction in 2012 for about \$1.8 million.
- Monitoring of the BSTF began in September of 2013 and continued through March of 2015. The results of monitoring will be used to continue to improve the effectiveness of the BSTF.

## Goal of Treatment

- The BSTF provides treatment of polluted stormwater to reduce annual nutrient and solids pollutant mass discharge to Alligator Creek and Lemon Bay. The goal of treatment has been set based on mass of pollutants reduced-more than 40,000 lb of total suspended solids and 1,600 lb of total nitrogen.

## Treatment Methods

- The BSTF utilizes an “inter-event” treatment strategy that does not depend on rainfall. The BSTF provides continuous treatment of stored stormwater to remove the mass of pollutants that would otherwise be discharged as untreated runoff during the storm.
- Treatment within the BSTF involves a “treatment train” that consists of stormwater harvesting, engineered wetland systems, and biologically active upflow media filters.

## Advantages/Benefits of Treatment

- The BSTF is capable of an annual mass removal of 40,744 lb of Total Suspended Solids and 1,678 lb of Total Nitrogen.
- Total phosphorus has been shown to be reduced to a lesser degree from the BSTF.
- The BSTF has been shown to be capable of slight improvements of background water quality conditions in the Briarwood Lakes Stormwater System.

## Limitations of the BSTF

- The existing nutrients and suspended solids present in the Briarwood Lakes Stormwater System poses tough treatment challenges.
- The BSTF has a limited success for large mass removal of total phosphorus.
- Maintenance of the BSTF requires regular harvesting of aquatic vegetation and annual solids removal to successfully operate.

## EXECUTIVE SUMMARY

**Background:** In early 2009, Sarasota County developed a conceptual plan for an innovative, “inter-event” (non-rainfall dependent) stormwater treatment system that was proposed to reduce overall long-term nutrient mass pollution to Alligator Creek and Lemon Bay. The Alligator Creek stormwater facilities are the result of a formal agreement between Sarasota County and the Florida Department of Environmental Protection (FDEP) that was established December 9, 2008, under the United States Environmental Protection Agency (USEPA) Clean Water Act (CWA) 319(h) grant program. The grant covered both construction and monitoring of the Alligator Creek Stormwater



**Figure ES.1 Briarwoods Stormwater Treatment Facility (BSTF) in operation in 2014 (Google Maps, 2014).**

Improvements program that includes implementation several best management practices (BMPs) for stormwater treatment within the Alligator Creek drainage basin. The Briarwoods Stormwater Treatment Facility (BSTF) is one of the BMPs within the Alligator Creek watershed that was evaluated and later implemented, operated, and monitored within the provisions and requirements of FDEP Agreement #G0260.

**Strategic Goals for BSTF Treatment:** The Lemon Bay Watershed spans a total of 74.5 square miles, 71% of which lies within Sarasota County. Alligator Creek is one of several urbanized watersheds and coastal streams that discharge to Lemon Bay and was the target of study of the 319(h) grant. The BSTF is a key component of the overall Alligator creek nutrient reduction program. The BSTF has a flexible operational capability to divert as much as 665 million gallons per year (MGY) of attenuated stormwater runoff from approximately 65 acres of the Briarwood Lakes stormwater system (BLSS). This flow capacity represents 233% of the predicted annual runoff volume within the basin and BLSS (See Table ES.1 for various operational comparisons).

## **BSTF Treatment**

**Implementation:** The BSTF was constructed on a limited 5-acre utility site (former site of Venice Gardens Wastewater Treatment Facility) and is shown operational in Figure ES.1. The BSTF utilizes an engineered upflow media filter technology coupled with physical and biological treatment to achieve

pollutant mass removal through a “steady-state” treatment train. Construction of the BSTF began in December of 2011 with substantial completion in early 2012. Formal operation of the BSTF began in 2013 and today the BSTF represents one of the most innovative high-rate stormwater treatment systems in Florida that treats up to 2.0 million gallons per day (MGD) of continuous stormwater flow. The BSTF uses no chemicals, requires no on-site staff, and operates with Programmable Logic Control (PLC) and Supervisory Control and Data Acquisition (SCADA) systems. These controls provide for automatic daily flow diversion and daily backwash functions for four (4) upflow filter units. Even though the BSTF has continuous automated operation features, the treatment system requires routine scheduled checking, cleaning, annual biomass harvesting, and programmed solids removal. Throughout the operations of the BSTF, Sarasota County has implemented an effective operations management program to monitor and maintain the operations and vegetative systems of the BSTF.

**BSTF Water Quality Monitoring Program:** The 319(h) grant required water quality monitoring to evaluate the performance of the BSTF treatment system. This is a final comprehensive report that provides a detailed accounting of three (3) monitoring objectives that include the following areas of evaluation that are referenced throughout the report:

*Schedule A- Background Stormwater Characterization and Treatability Analysis*  
*Schedule B- Performance Optimization*  
*Schedule C- Long-term Bimonthly Water Quality Sampling*

*Schedule A- Background Stormwater Characterization and Treatability Analysis:* The initial stormwater characterization (Schedule A) of the 65-acre BLSS lakes and canals provided important background water quality data for design of the system and included limited treatability studies. The water quality throughout the BLSS was representative of an urbanized eutrophic stormwater system with high organic solids and a significant deposition of organic bottom flocculent material. The initial characterization of the stormwater source challenged the process design and operations for development of an effective treatment train. The

**Table ES.1 Briarwoods Stormwater Treatment Facility (BSTF)  
Treatment Capacity in Relation to Stormwater Runoff Volume**

| BSTF Influent Pumping Rate (GPM) | Adjusted BSTF Daily Treatment Capacity (MGD) | Estimated BSTF Annual Treated Flow Capacity (MGY) | Percentage of Treatment Available for Annual Stormwater Runoff |
|----------------------------------|--|---|--|
| 750                              | 0.878  | 285   | 100%   |
| 1000                             | 1.170  | 380   | 133%   |
| 1250                             | 1.463  | 475   | 166%   |
| 1500                             | 1.755  | 570   | 199%   |
| 1750                             | 2.048  | 665   | 233%   |



Schedule A monitoring included informal treatability studies (at no cost to the grant) that evaluated mechanical filtration systems, the addition of settling agents, and media-based filtration systems.

*Schedule B- Performance Optimization:* Following construction of the BSTF, an operations and performance monitoring program was implemented to evaluate the capabilities and operational flexibility of the BSTF unit treatment processes. During the Schedule B monitoring, the facility was subjected to varying operational protocols, including high-flow (HF) treatment (with variable filter backwash times), low-flow (LF) treatment, and batch-flow (BF) treatment. Recommendations for facility operations and maintenance were developed from the findings of the Schedule B monitoring program to optimize the flow of stormwater through the BSTF and achieve the optimum removal of pollutant mass (Table ES.1 describes range of operational flow capability).

*Schedule C- Long-term Bimonthly Water Quality Sampling:* The FDEP 319(h) grant required monitoring over a minimum of eight (8) sample events, beginning in September 2013 with completion in March 2015. The results of Schedule C monitoring were used to assess the performance and benefits of the BSTF relative to the initial established project treatment goals.

### Schedule C BSTF Results – Reported

**Treatment Efficiency:** The concept of effective treatment within the BSTF treatment train revolves around maintaining a high ratio of diverted stormwater flow to annual runoff and acceptance of reasonably consistent reductions in pollutant concentrations through the BSFT treatment train.

The realized benefit of pollutant mass removal requires a minimum flow diversion equivalent to 2-2.5 times the annual stormwater runoff volume to the BLSS annual runoff volume to be effective. Treatment efficiencies shown in Tables ES.2 and ES.3 represent basic calculations of pollutant removal efficiencies in the first year and overall Schedule C monitoring period, respectively. The BSTF effectively reduced pollutant concentrations of Total Suspended Solids (TSS) and Total Nitrogen (TN) (averaged over the reporting period) during the first year of operations (09/2013 through 07/2014). Table ES.3 shows results of the BSTF over the entire monitoring period. The overall treatment results are reduced over the longer term was shown to be reduced from the first year.

**Table ES.2 BSTF Treatment Efficiency (09/2013-07/2014)**

| BSTF Water Quality Parameter<br>(Schedule C Key Parameters) | Averaged Reported Percent Reduction in Pollutant Concentration<br>(09/13-07/14) |
|---|---|
| Turbidity [NTU]   | 36.17%  |
| Total Nitrogen [mg/L]                                       | 18.89%  |
| Total Phosphorus [mg/L]                                     | 2.76%   |
| Chlorophyll A, Corrected [mg/m <sup>3</sup> ]               | 21.46%  |
| Total Suspended Solids (TSS) [mg/L]                         | 44.40%  |
| BOD5  | 32.81%  |
| Total Organic Carbon [mg/L]                                 | 2.15%   |

**Table ES.3 BSTF Treatment Efficiency (09/2013-03/2015)**

| BSTF Water Quality Parameter<br>(Schedule C Key Parameters) | Averaged Reported Percent Reduction in Pollutant Concentration<br>(09/13-03/15) |
|---|---|
| Turbidity [NTU]   | 31.27%  |
| Total Nitrogen [mg/L]                                       | 12.52%  |
| Total Phosphorus [mg/L]                                     | 3.47%   |
| Chlorophyll A, Corrected [mg/m <sup>3</sup> ]               | 19.72%  |
| Total Suspended Solids (TSS) [mg/L]                         | 23.69%  |
| BOD   | 32.18%  |
| Total Organic Carbon [mg/L]                                 | 2.58%   |

**BSTF Mass Removal Results-A Reduction in Pollutant Mass Loading Meets 319(h) Goals in Year 1:** The effectiveness of pollutant mass removal relies on the capability of the BSTF in handling high volume flows over long extended periods. Although the BSTF pumping rated operational capacity is 1,800 GPM, variable frequency drive systems allow for adjusted flows that range between 900 and 1,500 GPM. The average rate of BSTF flow over the monitoring period was determined to be 1,000 GPM. All pollutant mass load reduction calculations were normalized to the 1,000 GPM condition based on recorded influent pump run times (between sample events) and this pumping rate over the monitoring period.

The 319(h) Schedule C monitoring program required a minimum of eight (8) consecutive bi-monthly sample events (the sample events were intended to be completed through wet and dry seasons with a prescribed 60 day period of operation). The monitoring period referenced in Table ES.2 considered five (5) of nine (9) independent sample events. Over the first year of operation, the performance of the BSTF met or exceeded the 319(h) treatment goals for TSS and TN mass removals. TP was shown to be reduced but the BSTF did not meet the performance goal for TP.

When considering the overall 319(h) monitoring from September 2013 to March 2015, the BSTF achieved less favorable results for TSS and TN removals. Although TP mass removal occurred, the BSTF did not meet the goals for mass removal (Table ES.3). The observation of reduced BSTF performance was correlated with a loss of solids from the BSTF over the last three monitoring events (November 2014-January 2015). During these last events, an estimated 12,634 lb. of TSS and 164 lb. of TN were exported. The significant loss of solids drastically reduced system treatment performance.

**The BSTF Operations provided Positive Result in Background BLSS Lake Water Quality:** The BSTF inter-event treatment process recycles stormwater within the last canal system of the BLSS prior to discharging to Alligator Creek.

**Table ES.4 Calculated Mass Removals  
(9/2014-7/2014)**

| <b>BSTF Year 1 Pollutant Removal Estimates<br/>(Reporting Period: 9/2013-9/2014)</b> |                                |
|--|--------------------------------|
| <b>Reporting Parameter</b>   | <b>Mass Removed<br/>(lbs.)</b> |
| TSS Mass Removal Goal<br>(Adjusted for Reporting Period)                             | 48,670                         |
| <b>TSS Mass Removed over<br/>Report Period</b>                                       | <b>53,834</b>                  |
| TN Mass Removal Goal (Adjusted<br>for Reporting Period)                              | 2,004                          |
| <b>TN Mass Removed over Report<br/>Period</b>  | <b>2,053</b>                   |
| TP Mass Removal Goal (Adjusted<br>for Reporting Period)                              | 554                            |
| <b>TP Mass Removed over Report<br/>Period</b>  | <b>91</b>                      |

**Table ES.5 Calculated Mass Removals  
(9/2014-3/2015)**

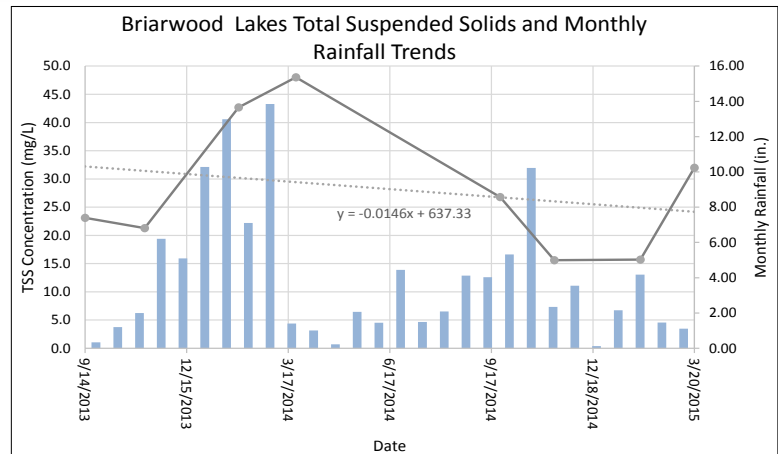
| <b>BSTF Overall Pollutant Removal<br/>Estimates<br/>(Reporting Period: 9/2013-3/2015)</b> |                                |
|---|--------------------------------|
| <b>Reporting Parameter</b>  | <b>Mass Removed<br/>(lbs.)</b> |
| TSS Mass Removal Goal<br>(Adjusted for Reporting Period)                                  | 68,316                         |
| <b>TSS Mass Removed over<br/>Report Period</b>  | <b>48,313</b>                  |
| TN Mass Removal Goal (Adjusted<br>for Reporting Period)                                   | 2,814                          |
| <b>TN Mass Removed over Report<br/>Period</b>   | <b>2,662</b>                   |
| TP Mass Removal Goal (Adjusted<br>for Reporting Period)                                   | 778                            |
| <b>TP Mass Removed over Report<br/>Period</b>   | <b>129</b>                     |

Under normal BSTF dry weather operations, it is estimated that stored water within the BLSS canal may circulate more than two (2.33) times through the BSTF prior to discharge to Alligator Creek. The 319(h) water quality monitoring program did not require monitoring for receiving water trends. However, the long-term results of receiving water quality were demonstrated through the observed trends in the BLSS water source (the BLSS discharge canal).

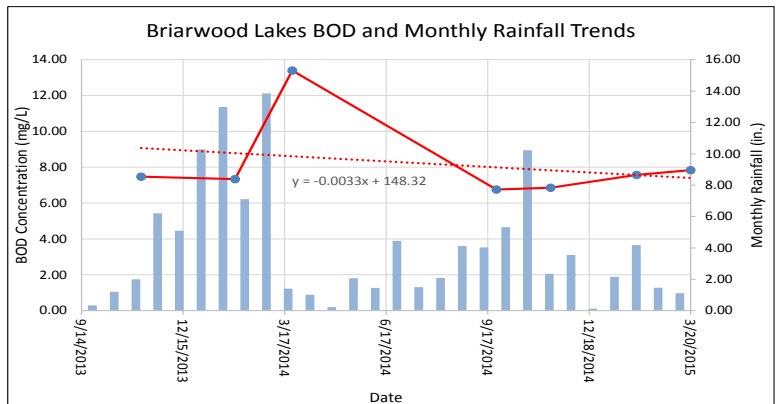
From September 2013 through March 2015, water quality of the BLSS source exhibited background changes that reflect subtle improvements in the BLSS background water quality. Note that Figure ES.2 illustrates a slight general downward trend in TSS concentrations that occurred as a result of the operations of the BSTF. Figures ES.3 and ES.4 provide additional evidence of a reduction in BOD5 and Total Nitrogen within the BLSS. These figures show downward trends that demonstrate the long-term benefits of the BSTF operations.

### Conclusions and Recommendations:

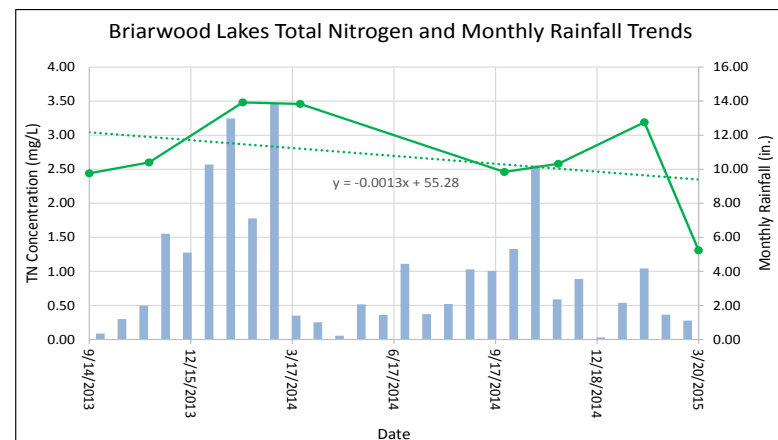
The BSTF is effective in the long-term reduction of TSS, BOD and TN mass pollutants in a continuous inter-event high-flow (HF) mode of treatment (the BSTF treats nearly 2.33 times the annual runoff generated from the basin). Despite any conventional BMP strategies, the continuous inter-event concept has more long-term potential to reduce mass loadings to Alligator Creek and Lemon Bay. Long-term Total Phosphorus (TP) Mass Removal has been documented from the Schedule C monitoring program, yet the effectiveness of TP removal is less predictable. Inter-event treatment has proven to be reasonably consistent, yet the BSTF has a limited capacity to



**Figure ES.2 Briarwoods BLSS TSS Background Trends from 9/2013 through 3/2015 Monitoring Period**



**Figure ES.3 Briarwoods BLSS BOD Background Trends from 9/2013 through 3/2015 Monitoring Period**



**Figure ES.4 Briarwoods BLSS Background TN Trends from 9/2013 through 3/2015 Monitoring Period**



accumulate and store colloidal organic solids. Following long-term operations (estimated 12 continuous months) internal processes within the BSTF release more dissolved and colloidal pollutants (dissolved nitrogen and orthophosphate) than available treatment capacity of the BSTF.

**Recommendations:** Sarasota County has invested a significant amount of research, time and funding for the construction and evaluation of the BSTF inter-event treatment system. Although there are challenges for continued cost effective treatment of nutrients within the Alligator Creek/Lemon Bay watershed, there is potential for improved treatment effectiveness through continued research and process refinements of the inter-event concept for stormwater treatment.

The following are final recommendations to consider for future operations of the BSTF:

**Improve Performance with Scheduled Solids Maintenance:** A BSTF maintenance program should consider monitoring of changes in TSS and dissolved organic nitrogen. When increases in TSS and dissolved organic nitrogen occur, the BSTF should be considered for maintenance. Maintenance should include dewatering of the system, desiccation (drying of organic solids) and removal of at least 20-50% of accumulated mass.

**Improve Vegetative Coverage:** It is possible to improve system BSTF performance by expanded surface vegetation coverage in Zone 2 (fermentation zone) and possibly in Zone 3 (aerobic zone). Alternative floating plants may include white water lily and/or water lettuce. Floating vegetation can be more readily controlled and harvested.

**Improve Performance with Scheduled Vegetation Harvesting:** A BSTF maintenance program should consider routine harvesting of littoral and floating vegetation. It is important to avoid herbicide in harvesting. Harvesting should physically remove vegetation from the process and be considered seasonally. Harvested vegetation may provide planting benefits for other Sarasota County stormwater facilities.

**Add Controlled Intermediate Polymer Addition:** Consider the broadcast application of polymer (Polyacrylamide) or Chitosan prior to scheduled solids removal. Initial treatability studies of Schedule A monitoring (background studies) produced favorable results of polymer addition to promote flocculent settling in BLSS water samples.

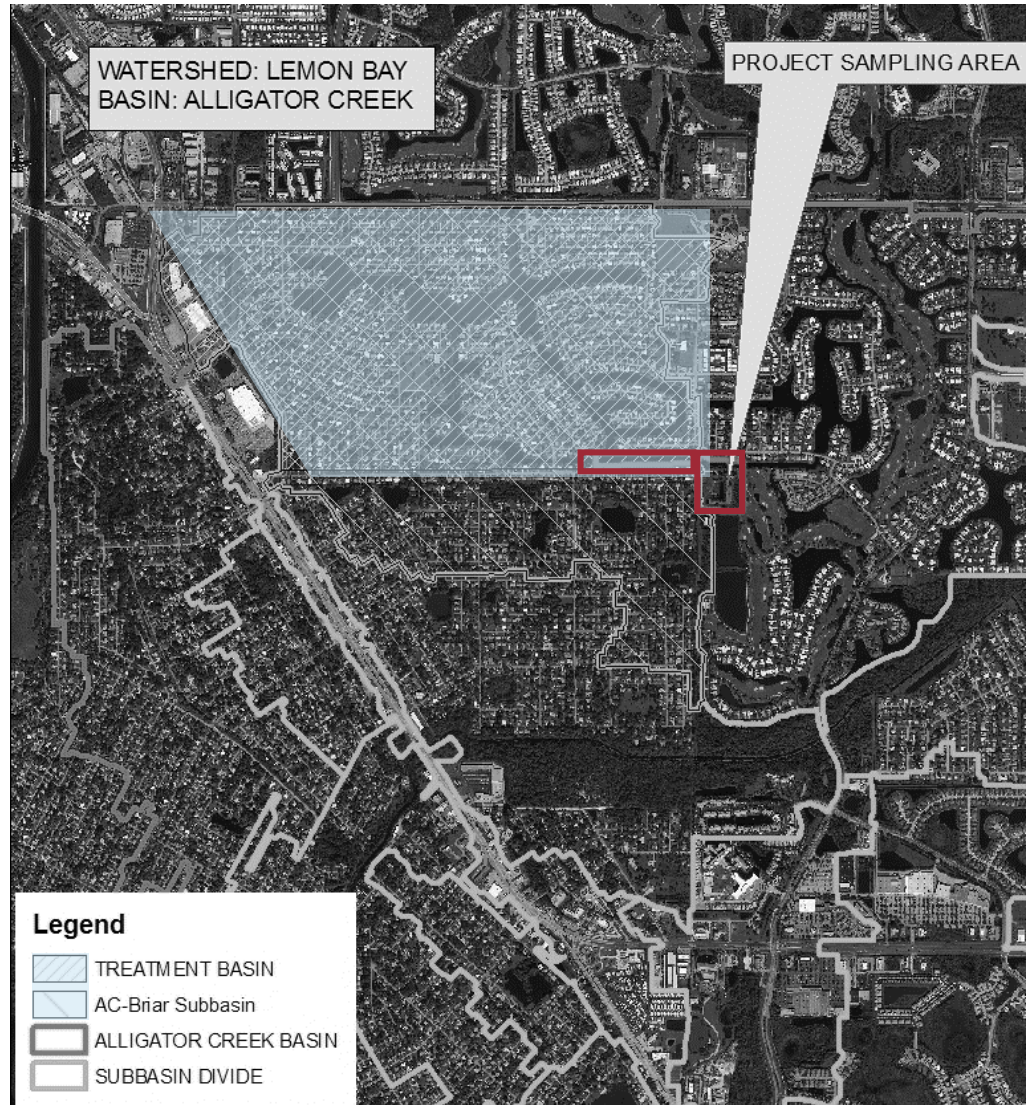
**Improve Performance with Fine Bubble Aeration:** This option considers an improved method to aerate the BSTF with fine bubbles at Pump Station A. Fine or microbubble aeration has the potential for colloidal solids growth (without chemicals) and may complement the aeration function for ammonification and nitrification.

**Create a Stormwater Research Center at the BSTF site:** The pioneering successes and challenges of the BSTF are important factors in the progress of environmental nutrient management in Sarasota County and in Florida. The BSTF may bring opportunities for more research funding that benefits the stormwater profession. As a designated stormwater research center, the BSTF may open doors to professionals, regulators and the public to better understand the benefits of inter-event and media based treatment, and low-impact development practices.

## 1.0 PROJECT OVERVIEW

### 1.1 HISTORY

Alligator Creek is one of many urban drainage basins within Sarasota County's 74.5-square-mile Lemon Bay watershed. Alligator Creek and other urbanized drainage systems within the Lemon Bay watershed convey nutrient-laden runoff to the Lemon Bay Estuary. Sarasota County has established pollutant reduction goals for Lemon Bay that are described within the Lemon Bay Watershed Plan. Venice Gardens is an established residential subdivision of Sarasota County (circa 1950s) within the Alligator Creek basin that is known for its 65 +/- acres of linear canals and inter-connected



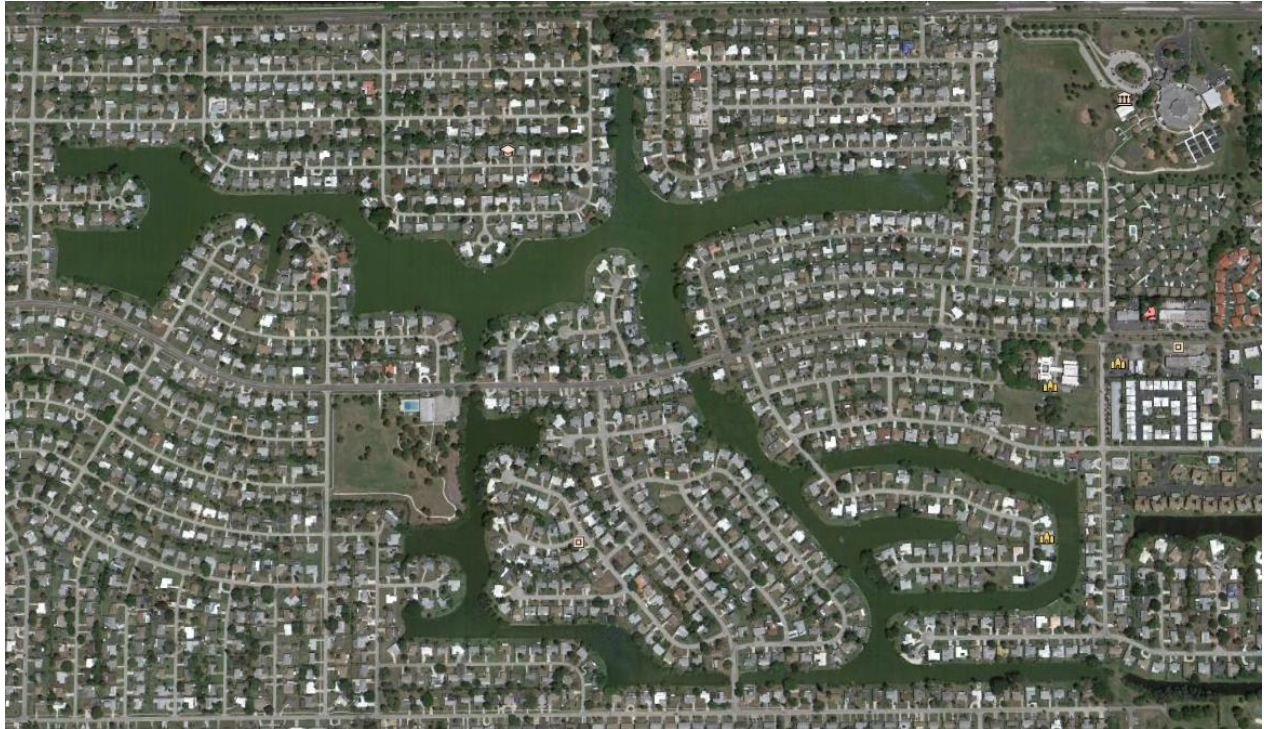
**Figure 1.1 Lemon Bay Watershed with Alligator Creek-Briar Subbasin**

lakes located throughout the subdivision [This system is referenced in this document as the Briarwood Lakes Stormwater System (BLSS)]. Although the practical function of the BLSS is for stormwater management, the canal features are considered recreational benefits to the community. The primary source of water to the BLSS system (Venice Gardens Lakes) is from residential runoff that originates from the 605-acre urban watershed designated by Sarasota County as "AC-Briar Subbasin" (Figure 1.1).

Hydrologic modeling data suggests that the hydraulic residence time within the Venice Gardens lakes system ranges from 270 days to over a year. The BLSS lakes and canals have a documented history of legacy pollution that has accumulated from more than 50 years of stormwater runoff and reports of illicit



wastewater discharges. Today, water quality within the BLSS lakes and canals is characterized by high levels of organic nitrogen and phosphorus and unusually high background chlorophyll levels above 40 mg/m<sup>3</sup>. At times, chlorophyll levels may routinely exceed 100 mg/m<sup>3</sup>, which creates severe water quality conditions that limits recreational values of the lakes. The green water color visible in aerial photos of the lakes and canals is evidence of the severity of the water quality degradation (Figure 1.2).



**Figure 1.2 Briarwood Lakes and Canal System Serve as 65-acre Stormwater Management to Venice Gardens Referenced as the BLSS in this Report**

Sarasota County and the Florida Department of Environmental Protection (FDEP) have entered into an agreement under the United States Environmental Protection Agency (USEPA) 319(h) Grant Program for Alligator Creek Stormwater Improvements within the Lemon Bay Watershed (FDEP Agreement #G0260). The primary goal of treatment within the context of the Alligator Creek 319(h) program is to provide for a reduction in nitrogen loads to Lemon Bay through reduction in mass pollution within the BLSS will effectively reduce the pollutant discharge to achieve this goal.

Sarasota County has estimated annual mass pollutant loading from the AC-Briar Subbasin that served as the basis of need for the FDEP 319(h) grant. The estimated annual pollutant loads are 45,271 lb/yr. for total suspended solids (TSS); 2,468 lb/yr. of total nitrogen (TN); and 644 lb/yr. of total phosphorus (TP).

## **1.2 TREATMENT OPPORTUNITIES AND CHALLENGES**

Alligator Creek stormwater treatment improvements included the design and implementation of nutrient separating baffle boxes, expanded stormwater ponds, and the construction of an innovative treatment system that reduce mass nutrient discharges from BLSS lakes and canals. The strategy for the nutrient reduction program addressed in this report relies on a total mass reduction of nitrogen within the lakes



through diversion and treatment of large volume flows at the Briarwood Stormwater Treatment Facility (BSTF).

Goals for the Alligator Creek treatment goals were recommended early in project development and were based on limited information from nutrient loading models and prescribed treatment performance capabilities of traditional stormwater best management practices. Following further evaluation of water quality parameters, the 319(h) goals were refined based on a targeted mass removal versus treatment efficiency.

The BSTF treatment system was established following a thorough evaluation of available treatment system alternative best management practices (BMPs) and published literature. The various BMP treatment alternatives included mechanical disc filtration and solids concentration, engineered wetland treatment systems, media treatment, and chemical addition. The alternatives were assessed based on the following objectives: an overall life-cycle cost evaluation, consideration of maintenance requirements, and capability of meeting the goals of the FDEP 319(h) grant. The BSTF was selected as a more cost effective, semi-passive solution to reduce pollutant mass loadings with reduced long-term maintenance requirements.

The performance goals for treatment are challenging because of limited land area within urbanized Sarasota County and stringent Sarasota County-imposed operational criteria that specifies no chemical addition for treatment. The BSTF was conceived by Sarasota County as a semi-passive alternative treatment train best management practice (BMP) that was later constructed for \$1.8M over 180 days within a 5 +/- acre utility site that is owned by Sarasota County. The BSTF is now a secured and routinely maintained facility that is situated on the former site of the Venice Gardens Wastewater Treatment Plant (WWTP). The use of land for BSTF treatment is limited to approximately 3 acres because of existing active pipelines and wastewater utilities but advantageous in that existing infiltration ponds and on-site power reduced construction costs. The project represents true innovation in sustainable land use of Sarasota County land and the shared operations of multiple public works and treatment operations (both stormwater and wastewater utilities are integrated on the site). The design of the BSTF also features the functional application of recycled materials [recycled tires, reclaimed concrete products, recycled plastic materials (pipes), and reuse of site physical features] throughout the treatment train processes that further complement Sarasota County's commitment to environmental sustainability and reuse.

Since September of 2013, the BSTF has been operational as an innovative treatment system to meet the primary strategic goal of long-term nitrogen mass reduction. Today, the operations of the BSTF utilize a series of sequential treatment zones to encourage settling and an accumulation (and physical removal) of solids. The effectiveness of the system also depends on achieving effective catabolic reactions (algal senescence and the release of ammonia), followed by treatment zones that enhance nitrification, denitrification, and physical sorption.

### 1.3 OVERVIEW OF OPERATIONS

As the system vegetation matured (Figure 1.3), a treatment optimization and performance evaluation was conducted to “fine-tune” operational parameters and establish high-flow, low-flow, and batch-flow conditional operation protocols. It should be noted that Sarasota County installed a floating wetland system and two small aerators during operations and performance monitoring.

The design of the system allows for several flexible operation modes with programmed automated system backwash capability. The system still requires occasional operations monitoring, annual control of vegetative growth (removal of

biomass), facilities cleaning, and routine filter maintenance. An operations & maintenance manual and nine (9)-session training program was developed for orientation of the Sarasota County staff. The general concept of the BSTF “treatment train” operations relies on a semi-passive (no on-site operator required) continual, uninterrupted diversion of stored stormwater from the BLSS (or programmed batch flow of stormwater from the BLSS) to the treatment system. Because flow is continuous and not dependent on rainfall, the effective mass pollutant removal does not rely on high-efficiency treatment to achieve effective treatment results.

The BSTF system has the capability to treat up to 2.0 MGD or approximately 665 million gallons (MG) annually (with scheduled maintenance and routine shutdowns). Prior to treatment in the BSTF treatment system, a portion of stormwater flow is harvested and reused within the property limits of the BSTF site. This practice reduces flow requirements to achieve the overall goals of treatment.

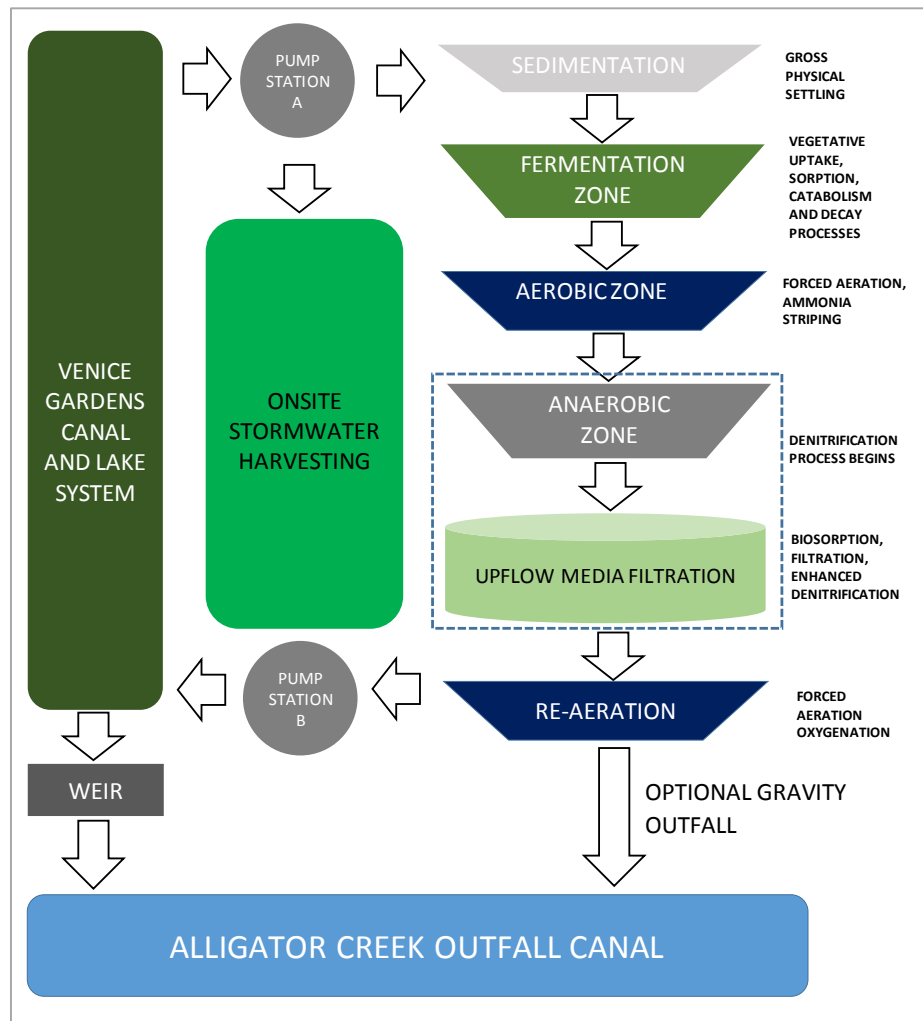
### 1.4 TREATMENT TRAIN PROCESS DESCRIPTION

Sarasota County has established a hydrologic model that predicted an estimated 286 MG/year of runoff generated within the Briarwood Lakes (AC-Briar) subbasin. The BSTF encompasses several sequential treatment processes (Figure 1.4) that work together as a treatment train to treat more than two (2) times the



**Figure 1.3 Aerial Photograph of the BSTF Treatment Site (Google Earth, 2014)**

annual runoff volume within the basin. Pollutant reduction within the BSTF occurs largely as a result of stormwater harvesting and irrigation reuse within the limits of the BSTF property. The remaining continuous diversion of stormwater through the BSTF system allows for the physical capture of algal and colloidal solids (gross solids settling and sorption of algal biomass), biological decay and catabolism processes in the fermentation zone (these processes convert organic solids to produce dissolved organic nutrients), and nitrification and denitrification in the aerobic and anoxic zones. Treatment processes within the BSTF treatment train are low energy and of reduced efficiency. Effective pollutant removal relies on maintaining high-flow, steady-state conditions. Biological nitrogen removal processes are also an important part of the treatment that are concentrated within the anoxic zone and upflow filters.

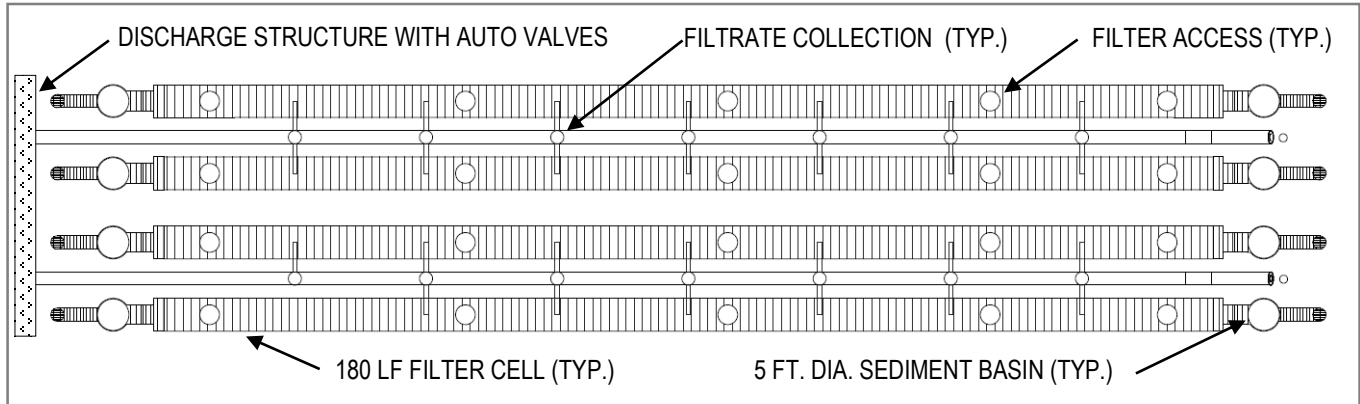


**Figure 1.4 BSTF Unit Treatment Process Schematic Flow Diagram**

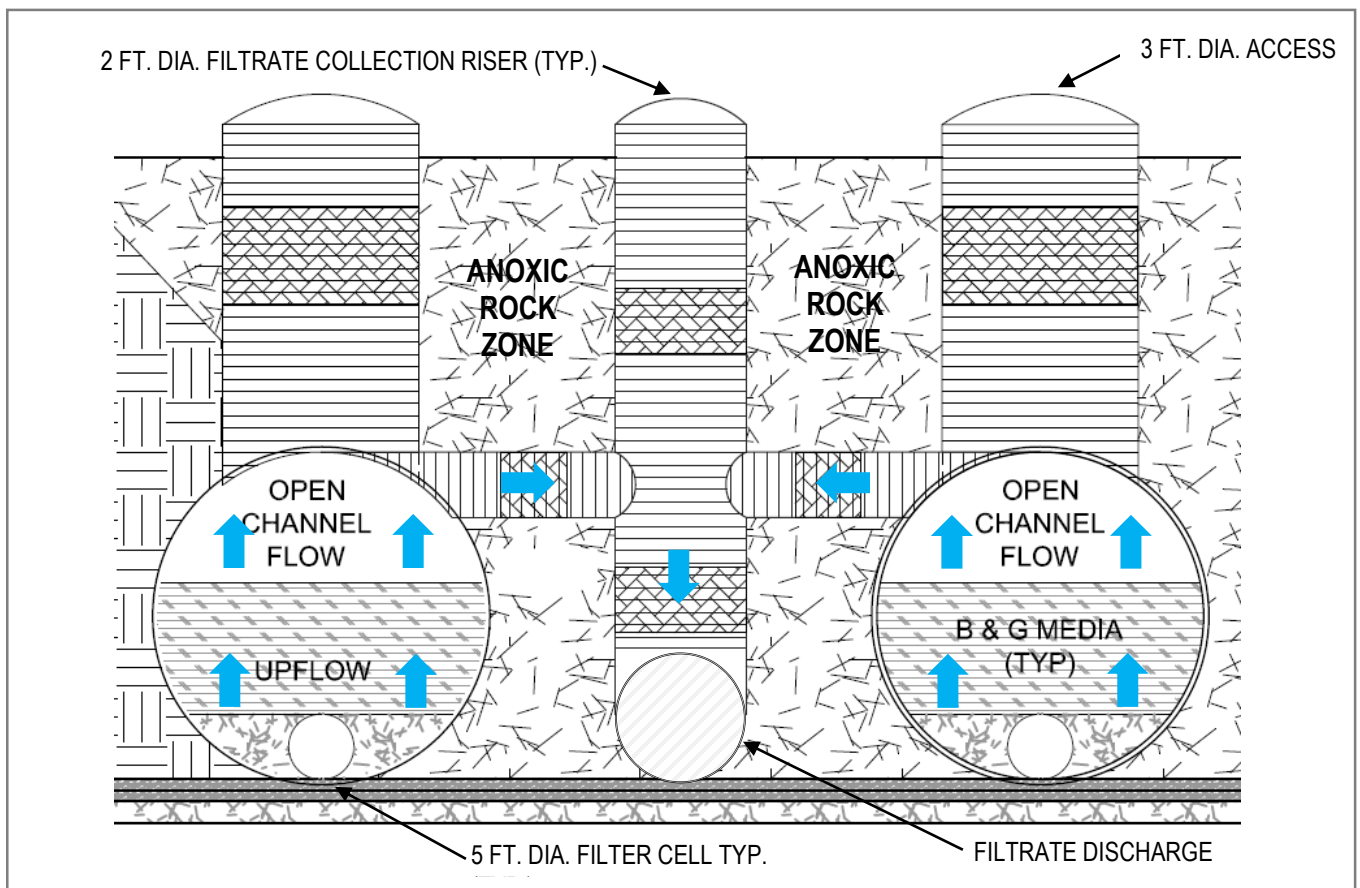
The BSTF upflow filters consist of a 180 ft. by 8 ft. deep anoxic zone (recycled concrete) and four parallel 180 ft. by 5 ft. diameter upflow filters. The upflow filters are constructed with a lower broken rock plenum



area overlain by a 2 ft. media bed [Bold and Gold (B&G) media]. Figures 1.5 and 1.6 provide plan and cross section details of the filter construction.



**Figure 1.5 Upflow Filter Plan View**



**Figure 1.6 Upflow Filter Cross Section View**

## 1.5 MONITORING BACKGROUND

Perhaps the most important factor in the development of any stormwater monitoring plan is establishing methods for the accurate measurement of treated water volume and the control of variables that affect the accuracy of calculations for the total mass removed.

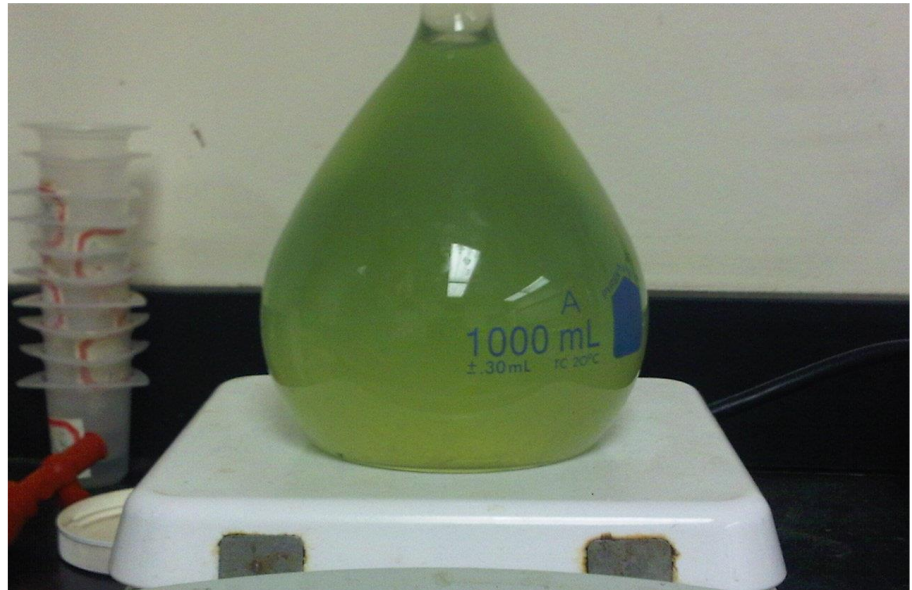
Stormwater is diverted to the BSTF and discharged from the facility through a controlled pumping system that features two (2) state-of-the-art variable frequency drive (variable flow) pump stations. The BSTF basins are isolated from

groundwater influence using an impermeable basin lining and the positive head difference (by pumping) that is maintained in the basin. The treatment basins provide approximately 18 hours of hydraulic residence time (at peak flow) that allows for a true accounting of pollutant mass removals and the accumulation of mass.

The BSTF flow rates (both instantaneous and totalized flows) are monitored by ultrasonic flow measuring devices and verified by records of pump run times (inflow and outflow). During the entire course of monitoring, all water quality monitoring-treated stormwater was directed back to the lake system to maintain water levels in the BLSS. As a supplement to the treatment monitoring program, a flow recorder was installed at the discharge weir. The discharge weir is a broad crested (15-ft wide) structure that has does not allow for accuracy in discharge measurements. The monitoring of discharge from the weir has been recorded by Sarasota County over the course of the long-term monitoring program. Monitoring results from this study have provided evidence that discharges from the BLSS canal (at the discharge weir) primarily occur during significant summer rain events.

## 1.6 MONITORING PROGRAM DESIGN

The BSTF monitoring program was designed to cover various stages of the development and operation of the BSTF treatment train. The program is multi-faceted and includes the collection and analysis of background stormwater quality (the BLSS lakes and canals), performance monitoring and operational adjustments, and long-term monitoring. There are three schedules of monitoring covered in this final report that are covered in sections 2.0-4.0.



**Figure 1.7 Untreated Venice Gardens Briarwoods Lake Stormwater sample in Laboratory (UCF, 2009)**

## 2.0 SCHEDULE A - BACKGROUND STORMWATER CHARACTERIZATION

### 2.1 METHODS OF BACKGROUND STORMWATER CHARACTERIZATION

A single-event background stormwater quality characterization of the Briarwoods Lakes Stormwater System was completed in the early stages of project planning (July 11, 2009) to better understand background water quality parameters and to establish a basis for design of the treatment system.

The background water quality sampling characterization included three surface water sample locations (Figure 2.1). The surface water sampling program was completed in the fall of followed general field protocols of the approved Quality Assurance Project Plan (QAPP) for surface waters. In addition to background water quality, additional sediment core samples were collected and analyzed for volatile organic solids to determine legacy pollution characteristics.



**Figure 2.1 Briarwood Lakes Stormwater System (BLSS) Background Sample Locations**

Following results of the initial water quality characterization, an equipment sponsored field testing program was completed in late July of 2009 that tested the effectiveness of mechanical disc filters (Figure 2.2) in the reduction of algal solids. Mechanical disc filtration works on a pressurized force of water through a series



of tightly compressed, stacked concentric discs to effectively remove small solid particles at relatively high flow rates. This type of filtration system is commonly used in reclaimed water systems and is capable of partially removing algal solids. However, results from the disc filtration field study indicated TSS removal efficiencies of 20 percent or less. For this reason, disc filtration was not considered as a viable option in developing the treatment process.

An informal stormwater treatability analysis was completed at the University of Central Florida (UCF) Stormwater Academy (Figure 2.3) at no cost to the project. The treatability study examined the potential applicability of several proprietary polymers to enhance settling and alternative media treatment options as a treatment strategy for the project. Because of the need to limit chemical addition, the UCF treatability study only evaluated alternative media mixes as feasible treatment strategies. A series of column studies was completed to create a custom Bold and Gold media for this application.

## 2.2 RESULTS OF BACKGROUND STORMWATER CHARACTERIZATION

The design of the BSTF treatment system relied on an understanding of the stormwater quality and trends within the BLSS lakes and canals that was obtained from the initial 2009 water quality results. These results are summarized in Table 2.1.

Water quality within the Briarwoods Stormwater Lake System varies little across the areal extent of the lakes and canals. Nutrients within the lake system water column are nearly entirely organic and are present as reacted particulate (algal biomass) or complex dissolved forms of nitrogen and phosphorus. It was observed that the shallow nature of the system and long



**Figure 2.2 Briarwood Lakes Stormwater System Field Testing of Mechanical Disc Filtration System**



**Figure 2.3 Media Bench Scale Column Testing of BLSS Water Source (UCF, 2009)**

exposure to sunlight exacerbates algal growth and allows for long-term algal senescence, storage, and internal load recycling of nutrients. Within the lake water column, DO concentrations vary spatially and diurnally and are characteristic of the effects of photorespiration within a highly productive system. Sediments collected within the lake system indicate a deep layer (average of 19 inches) of flocculent material suggesting long-term legacy deposits of organics (the flocculent Volatile Organics averaged 26.3% of the total solids).

**Table 2.1 Summary of Background Stormwater and Sediments in BLSS (AET, 2009)**

| Sample Point                            | 1                      | 2                      | 3                    | Average<br>(n = 3) |
|---|------------------------|------------------------|----------------------|--------------------|
| <b>Time of Sampling</b>                 | 9:09 AM -<br>10: 25 AM | 11:20 AM -<br>12:25 PM | 1:40 PM -<br>2:40 PM | -                  |
| <b>Water Column</b>                     |                        |                        |                      |                    |
| Secchi Depth, in.                       | 7                      | 8                      | 12                   | 9                  |
| Water Column Depth, ft.                 | 5.42                   | 5.50                   | 4.67                 | 5.20               |
| Temperature, °C                         | 31.1                   | 31.6                   | 31.2                 | 31.3               |
| Conductivity, µS/cm                     | 399                    | 416                    | 374                  | 396                |
| pH                                      | 8.3                    | 9.0                    | 8.5                  | 8.6                |
| Alkalinity, mg/L as CaCO <sub>3</sub>   | 138                    | 122                    | 116                  | 125                |
| Total Suspended Solids, mg/L            | 48                     | 48                     | 24                   | 40                 |
| Total Nitrogen, mg/L                    | 3.63                   | 3.13                   | 2.23                 | 3.00               |
| Total Kjeldahl Nitrogen, mg/L           | 3.6                    | 3.1                    | 2.2                  | 3.0                |
| Organic Nitrogen, mg/L                  | 3.58                   | 3.08                   | 2.18                 | 2.95               |
| Total Kjeldahl Nitrogen, Filtered, mg/L | 1.15                   | 1.95                   | 1.15                 | 1.42               |
| Organic Nitrogen, Filtered, mg/L        | 1.13                   | 1.93                   | 1.13                 | 1.40               |
| Non-filtrable Organic Nitrogen, mg/L    | 2.45                   | 1.15                   | 1.05                 | 1.55               |
| Ammonia Nitrogen, mg/L                  | 0.02                   | 0.02                   | 0.02                 | 0.02               |
| Total Oxidized Nitrogen, mg/L           | 0.025                  | 0.025                  | 0.025                | 0.025              |
| Total Phosphorus, mg/L                  | 0.27                   | 0.22                   | 0.18                 | 0.22               |
| Total Organic Phosphorus, mg/L          | 0.258                  | 0.208                  | 0.168                | 0.211              |
| Filtered Total Phosphorus, mg/L         | 0.00                   | 0.04                   | 0.02                 | 0.02               |
| Organic Phosphorus, Filtered, mg/L      | 0.00                   | 0.03                   | 0.01                 | 0.01               |
| Non-filtrable Organic Phosphorus, mg/L  | 0.26                   | 0.18                   | 0.16                 | 0.20               |
| Orthophosphorus P, mg/L                 | 0.012                  | 0.012                  | 0.012                | 0.012              |
| Dissolved Organic Carbon, mg/L          | 23                     | 23                     | 28                   | 25                 |
| <b>Sediment</b>                         |                        |                        |                      |                    |
| Flocculent Sediment Layer Depth, in.    | 3                      | 15                     | 24                   | 19.5*              |
| Dissolved Oxygen, mg/L                  | < 0.25                 | 0.02                   | 0.04                 | < 0.1              |
| Oxidation Reduction Potential, mV       | -239                   | -178                   | -274                 | -230               |
| pH                                      | -                      | 6.61                   | 6.59                 | 6.6*               |
| Total Solids Content, %                 | 10                     | 11.1                   | 5.3                  | 8.8                |
| % Volatile (Organic)                    | 20                     | 20                     | 39                   | 26.3               |

\*Average value does not include Sample Point 1.

Source: AET Sampling Event (2009).

## 3.0 SCHEDULE B - PERFORMANCE OPTIMIZATION MONITORING

### 3.1 PERFORMANCE OPTIMIZATION MONITORING METHODS

The BSTF has flexibility in operational protocols to vary the rate of flow, hydraulic residence time, and the daily schedule and rate of backwash times (filter backwash is necessary to reverse flow and dislodge solids that may otherwise block

**Table 3.1 Briarwoods Stormwater Treatment Facility (BSTF) Treatment Capacity**

| BSTF Influent Pumping Rate (GPM) | Adjusted BSTF Daily Treatment Capacity (MGD) | Estimated BSTF Annual Treated Flow Capacity (MGY) | Percentage of Treatment Available for Annual Stormwater Runoff |
|----------------------------------|--|---|--|
| 750                              | 0.878  | 285   | 100%   |
| 1000                             | 1.170  | 380   | 133%   |
| 1250                             | 1.463  | 475   | 166%   |
| 1500                             | 1.755  | 570   | 199%   |
| 1750                             | 2.048  | 665   | 233%   |

the upflow filter treatment system). The performance evaluation examined the treatment train effectiveness of the sedimentation basin, fermentation zone, aerobic zone, and anaerobic upflow filter units. A total of six sample locations were identified for process evaluation throughout the BSTF treatment train. Three independent events were evaluated during low-, high-, and batch-flow scenarios. Water quality trends throughout the treatment train were determined by an analysis of instantaneous grab samples and field measured parameters through the treatment train (Figure 3.1).

### **BSTF PERFORMANCE MONITORING PLAN** **(Schedule B Monitoring)**

- Site 1-BSTF Influent wet well (PS-A);
- Site 2-BSTF Sedimentation pond overflow;
- Site 3-BSTF Catabolic zone outflow;
- Site 4-BSTF Aerobic zone outflow (to submerged rock filter);
- Site 5-BSTF Filter effluent;
- Site 6-BSTF Final treated effluent at wet well (PS-B).

Three basic modes of operation were established in the treatment optimization study to determine which operational scheme may produce an optimum removal of pollutants. These optional treatment schemes (high flow, low flow, and batch flow) are discussed below.





**Figure 3.1 Location of BSFT Performance Monitoring Sites (Schedule B)**

**High-flow Operations:** The high-flow (HF) treatment operational mode conveys a high volume of stormwater through the BSTF with the goal of achieving high mass removals of solids. The HF treatment scheme provides treatment for up to 2.0 MGD of stormwater (approximately 1,000 to 1,500 GPM of pumping). Higher flows through the BSTF may allow for capture of more pollutant mass through the physical removal processes (sedimentation, sorption and filtration). However, the high-flow operations results in a limited hydraulic residence time and thus may be less favorable for biological nitrogen removal. The HF operations requires filter backwash on a daily basis to insure that upflow filters do not clog. During the backwash cycle, the influent pumps are stopped and automatic valves open to drain the upflow filter system. Once water levels have been adjusted in the filter (a timed dewatering event), effluent pumps (PS B) reverse the flow direction in the filters (water enters the top of the filters and solids are forced downward and into the end sediment chambers of each filter cell). The entire backwash cycle is programmed at 4.5 hours. Flow controls for the HF operation are set by water level points in the BSTF to balance water levels and prevent overflows.

**Low-flow Operations:** The BSTF can operate as a low-flow (LF) treatment system that maintains an inter-event stormwater flow at 0.8 MGD (VFD adjusted flow of 750 GPM). As with the HF operation, this mode provides for the upflow filters to be automatically drained with the filter flow reversed on a daily basis. The timed backwash cycle is 4.5 hours. However, the rate of backwash is limited by the flow set point of PS-B (750 GPM). The LF treatment scheme increases residence time in the fermentation zone, anoxic zone, and upflow filters to provide for more sorption, algal senescence and degradation, and settling. The overall residence time (including the lake system) for low flow may range 4-5 days. Like HF operations, flow controls for the LF operation are entirely based on water level set points in the BSTF that balance water levels and prevent overflows.

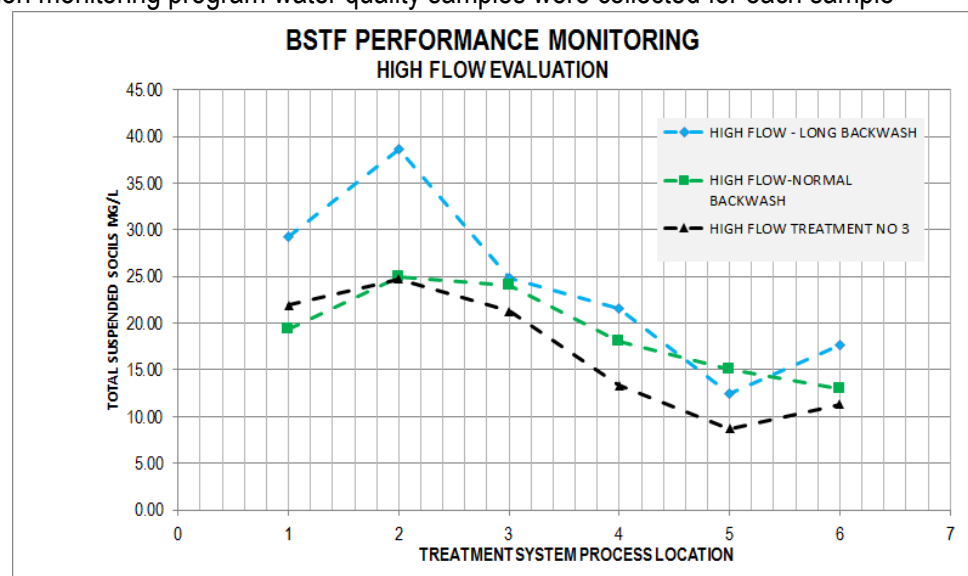
**Batch-flow Operations:** The batch-flow (BF) treatment scheme involves a timed scheduled application of water to the BSTF, a timed basin resting period (extended treatment), and a subsequent return of treated flow to the Briarwoods Lake stormwater system. Typically, the resting period is recommended to range between 1 and 7 days. With the BF operational protocol, upflow filters are drained and flow is reversed through the filters on a timed interval basis (this may be extended beyond a daily backwash frequency period). The residence time of batch flow in the BSTF is variable and can be set to exceed one week in the BSTF to further enhance biological removal systems within the BSTF.

### 3.2 RESULTS OF BSTF PERFORMANCE OPTIMIZATION MONITORING

The performance optimization monitoring program water quality samples were collected for each sample event with a minimum one-week resting period between changes in operational protocols.

#### 3.2.1 High-flow (HF) Performance Monitoring Results

HF monitoring was completed as the initial system performance evaluation for the BSTF. Performance results for TSS, TN, and TP are discussed in this section.

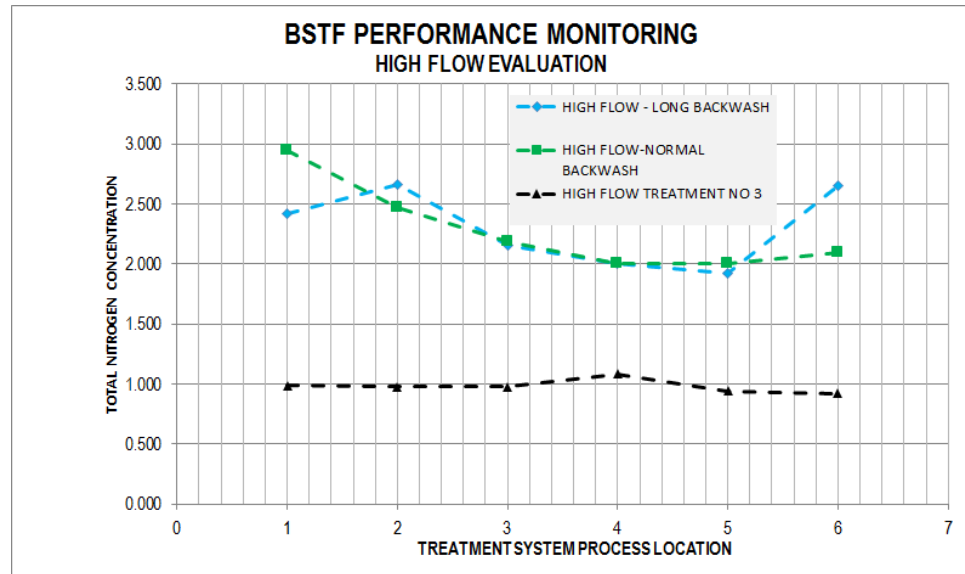


**Figure 3.2 Trends in TSS Reduction through BSTF Treatment Train at High Flow**

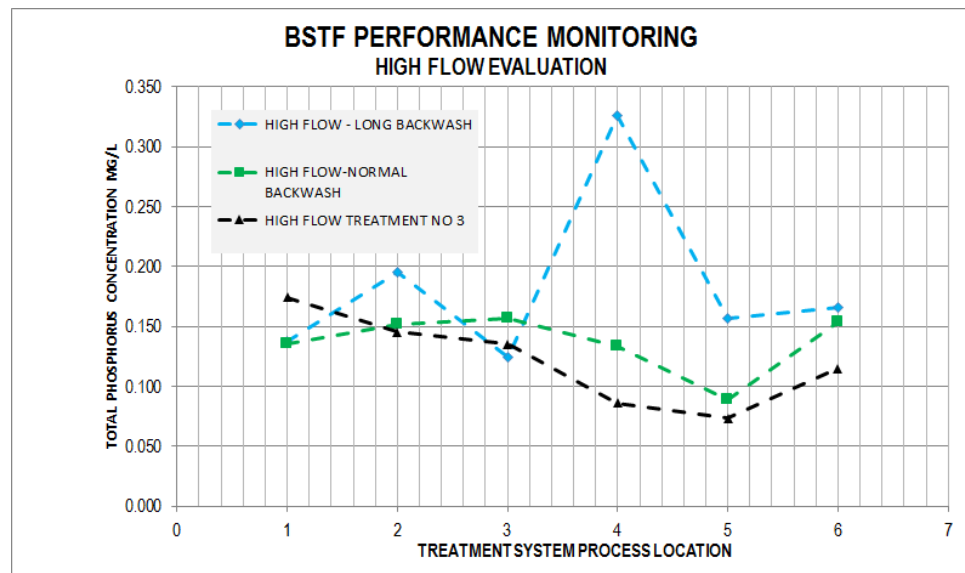
**TSS (HF) Results:** The HF operational protocol option demonstrated effective physical sorption and particulate filtration capacity that produced reproducible TSS results for removal. With three different trials, the results during constant wet conditions are shown in Figure 3.2. Note that extended backwash cycles impacted filter effectiveness.

**TN (HF) Results:** The HF operational protocol demonstrated effective settling and filtration capability for capture of organic solids to consistently reduce TN with high influent background concentrations (above 2 mg/l). From Figure 3.3 it should be noted that lower TN influent concentrations from a significant rainfall resulted in lower treatment effectiveness. It is possible that dilution effects of rainfall changed the dynamics of treatment.

**TP (HF) Results:** Figure 3.4 illustrates the TP reduction potential from the HF operational protocol. The HF did not demonstrate effective pollutant reductions through the aerobic zone, but some removal was still noted through upflow filter processes. Note that the long backwash cycle appeared to negatively impact performance of the aerobic zone.



**Figure 3.3 Trends in TN Reduction through BSTF Treatment Train at High Flow**



**Figure 3.4 Trends in TP Reduction through BSTF Treatment Train at High Flow**



### 3.2.2 Low-flow (LF) Performance Monitoring Results

The LF monitoring event was completed as an independent operational strategy period following the HF performance evaluation. Performance results for TSS, TN, and TP are discussed in this section.

**TSS (LF) Results:** The TSS reduction potential from the LF operational protocol demonstrated similar trends from HF settings when evaluated for the overall settling and filtration capacity. The system provided up to 50% reduction in TSS concentration (Figure 3.5). With three different trials and constant backwash protocols, the results demonstrated very reproducible results during wet weather conditions.

**TN (LF) Results:** TN reduction from the LF operational protocol demonstrated reproducible consistent results considered better than the HF evaluation. With three different trials, the results demonstrated good results for high mass removals during wet weather conditions (Figure 3.6).

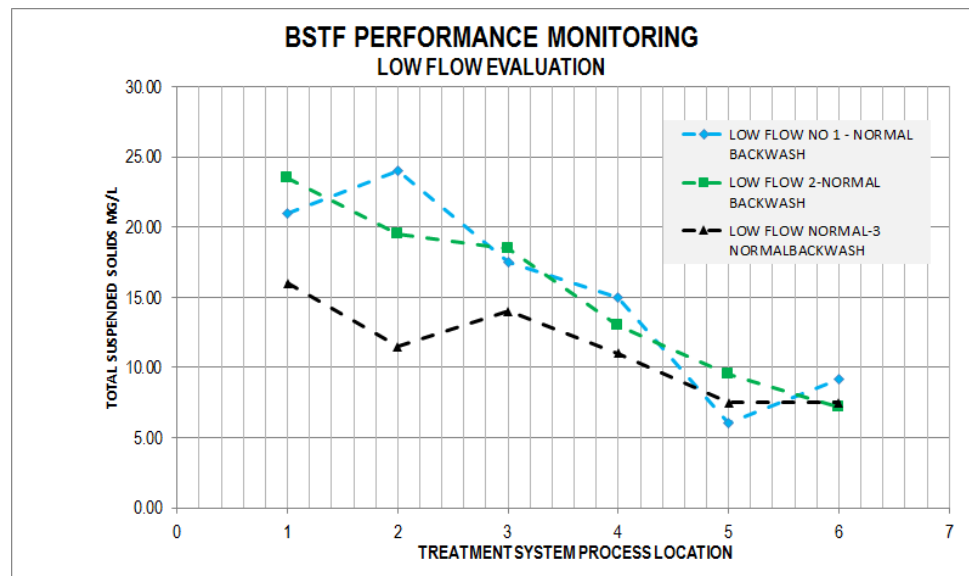


Figure 3.5 Trends in TSS Reduction through BSTF Treatment Train at Low Flow

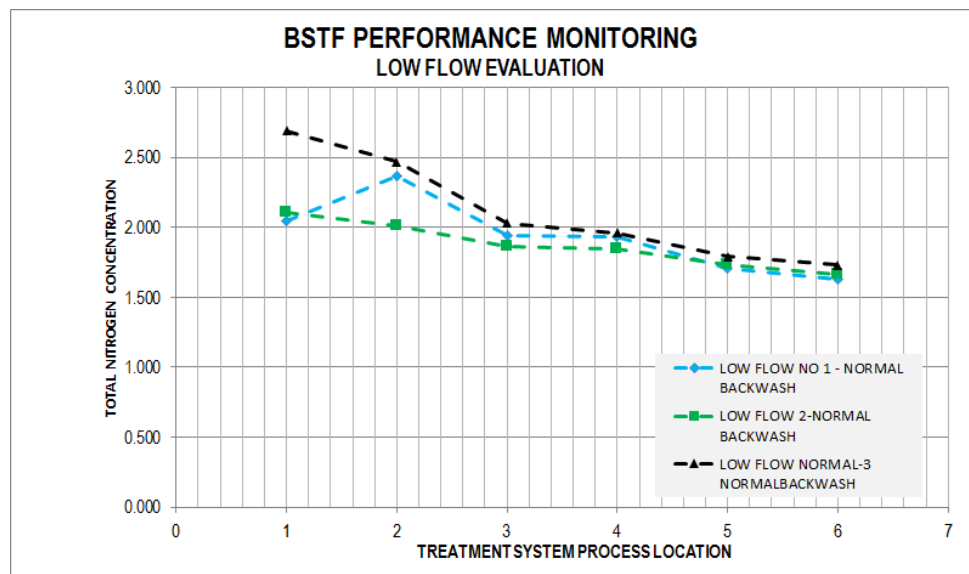


Figure 3.6 Trends in TN Reduction through BSTF Treatment Train at Low Flow

**TP (LF) Results:** TP reduction from the LF operational scheme showed no improvement over the HF operational scheme and in fact showed increase in TP through the upflow filter in one instance. With three duplicate trials, the results do not show good correlation (Figure 3.7).

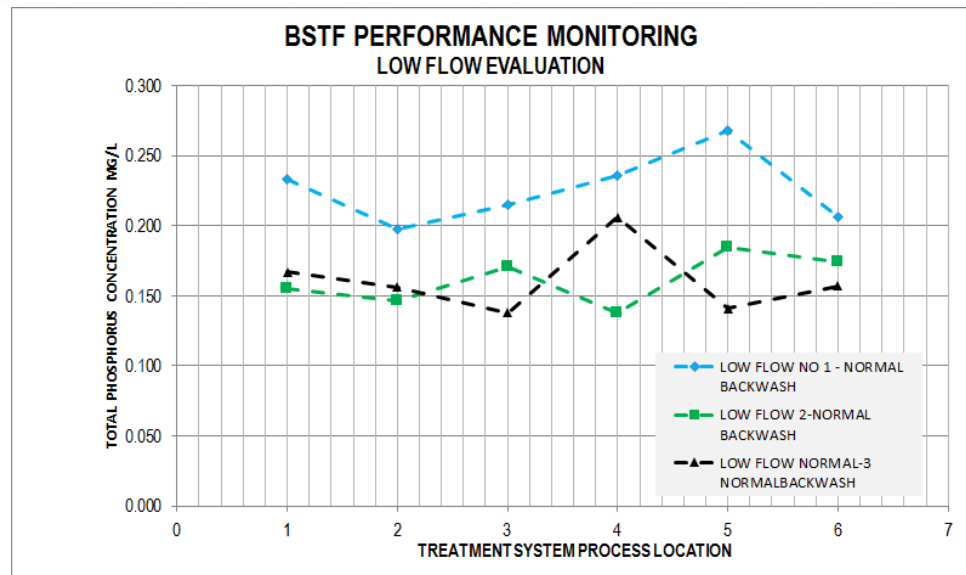
### 3.2.3 Batch-flow (BF) Performance

#### Monitoring Results

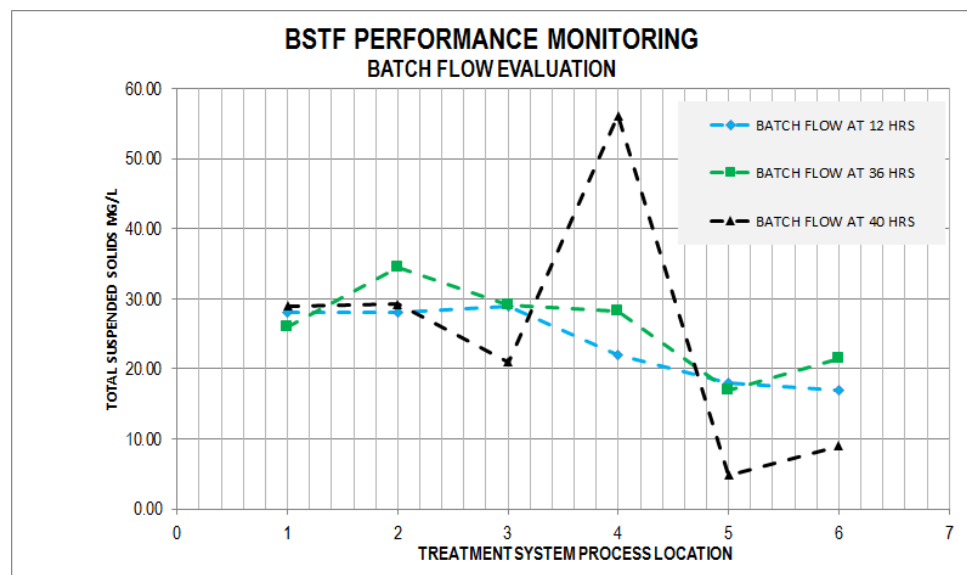
The BF monitoring event was completed for the BSTF at 12, 36, and 40 hours of resting. Performance results for TSS, TN, and TP are discussed in this section.

**TSS (BF) Results:** The BF operational protocol demonstrated some interesting results for settling and filtration capacity (Figure 3.8). In this mode of operation, forced aeration (at two aerobic zone locations in the aerobic zone and reaeration zones was installed at locations 4 and 6 (Figure 3.1). The aerators caused mixing of bottom colloidal solids and increased solids loading to the filters. Despite this observation, there were still documented reductions in TSS through the upflow filter (Process Site 5) prior to reaeration

**TN (BF) Results:** Figure 3.9 illustrates observed TN reduction from the BF operational protocol. This operational strategy offered little or no improvements for sorption and settling in the fermentation area but



**Figure 3.7 Trends in TP Reduction through BSTF Treatment Train at Low Flow**



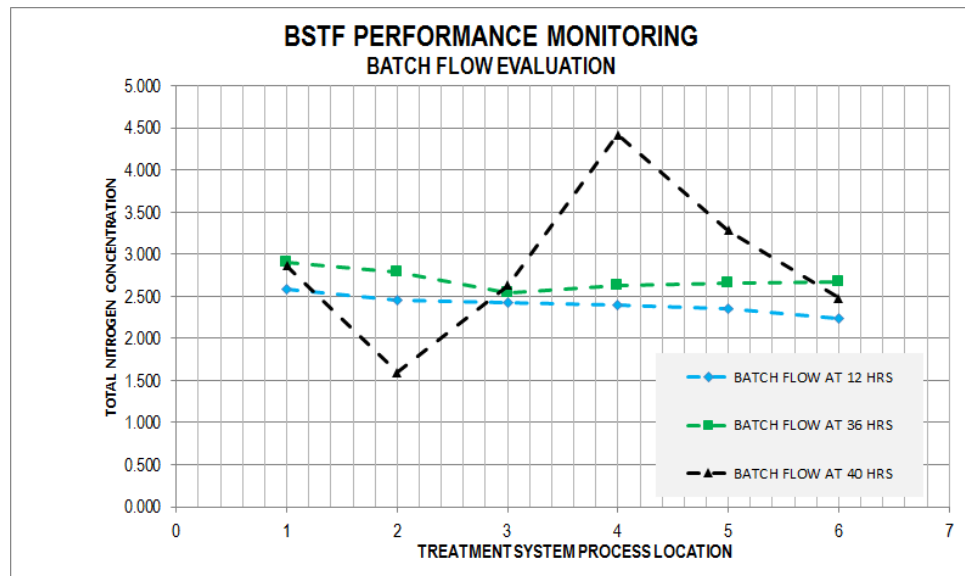
**Figure 3.8 Trends in TSS Reduction through BSTF Treatment Train at Batch Flow**

removal was effective in the upflow filters. Interestingly, flow through the upflow filter at 40 hours of resting did show a strong downward trend suggesting that nitrification and denitrification may be occurring at extended hydraulic residence times.

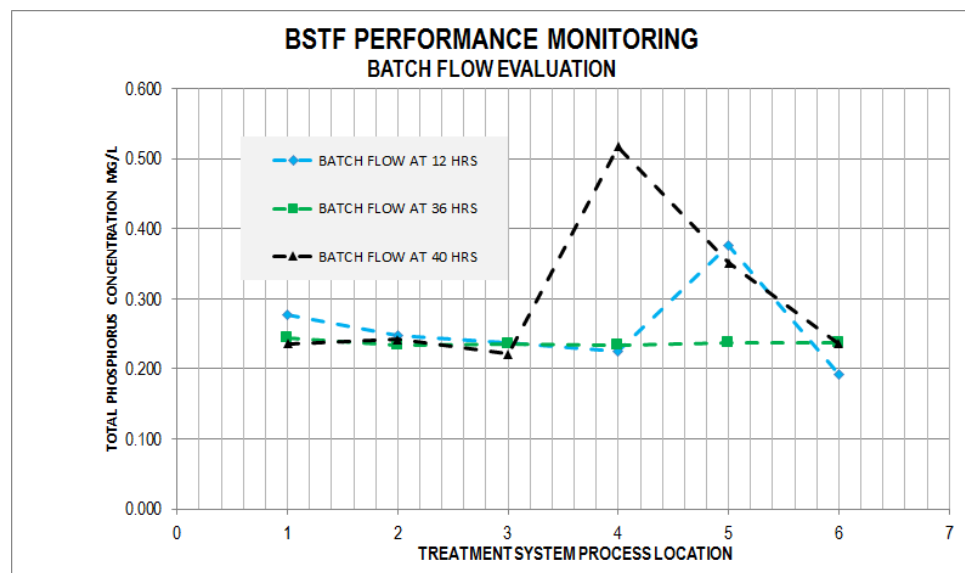
**TP (BF) Results:** The BF operational protocols demonstrated little improvements over HF or LF operations scheme. With three different trials at varied hydraulic retention times, the results continued to demonstrate very little differences, except in the last trial where organics were re-suspended. The upflow filter effectively reduced TP in two of the trials.

### Summary of Schedule B Monitoring Program Findings:

Generally, the operations and performance monitoring program found little variation in system performance between extended batch-flow (BF) high-flow (HF) operations. Based on the findings of Schedule B, it was recommended to operate the BSTF under the HF regime to obtain the benefit of higher annual pollutant mass removals.



**Figure 3.9 Trends in TN Reduction through BSTF Treatment Train at Batch Flow**



**Figure 3.10 Trends in TP Reduction through BSTF Treatment Train at Batch Flow**



## 4.0 SCHEDULE C -BIMONTHLY WATER QUALITY MONITORING

### 4.1 LONG-TERM BIMONTHLY MONITORING METHODS

The long-term bimonthly BSTF monitoring plan addresses trends in water quality (before and after treatment), flow measurements through the BSTF, and potential factors that may influence treatment effectiveness. The fundamental objective of the bimonthly monitoring is to provide meaningful data for comparison of BSTF performance to the goals of the FDEP 319(h) program. This section outlines methods and results for the Schedule C monitoring program.

**Water Stage and Flow Measurements:** Water stage (recorded water levels within treatment zones) and flow measurements of the BLSS were recorded at the BSTF utilizing a permanent ultrasonic stage recorder/flow meter that was installed at the Briarwood discharge weir. Permanent electromagnetic flow meters were also located in the pump station pipe discharges of Pump Stations A and B (flow was measured considering full-flow pipe conditions and treated flow by calculation of pump run times and the rated pump capacity). The BSTF flow meters have the capability to digitally store continuous time-based data from multiple sources.



**Figure 4.1 In Situ Field Sampling at BSTF Site (Summer 2014)**

**Water Quality Analytical Samples:** Bimonthly water quality sampling was completed from September 2013 through March 2015 using time- and flow-based automatic composite samplers (ISCO Model 6712). Because the continual flow of water in and out of the treatment system allows for accurate composited samples of equivalent aliquot volumes, composite sampling was taken at the pump station wet wells. The sample schedule was set for a consistent collection of nine liters of sample over the 24-hour programmed sampling period for each of the sample events. Although there are only eight (8) sample events required by the 319(h) grant, nine (9) events were completed (one added sample event included TSS, BOD, and nutrient speciation). Samples were relinquished to the laboratory where analytical methods followed the QAPP (See analytical methods for laboratory testing referenced in Table 4.1).

### In Situ Water Quality

**Measurements:** In situ water quality parameters (temperature, pH, conductivity, dissolved oxygen, and turbidity) were collected concurrently with automatic sampler collection using a multi-probe YSI sonde in accordance with the QAPP. The sonde measurement was conducted approximately midstream of the undisturbed surface water column. In situ water quality measurements were consistently completed following the collection of each wet sample collection.

### Weather Conditions and Rainfall

**measurements:** Meteorological conditions were recorded during each sample event, including measurement of the local rain gauge that is located at the BSTF PS-A site. Accurate rainfall measurements are continuously recorded at the Sarasota County ROMP TR 4-2 South Venice site. Because of the close proximity to the project area, an alternate rainfall gauge (Sarasota County AL-1 Jacaranda Bridge Rainfall Gauge) provided more useful data for this study. This rainfall station was used in tracking rainfall versus the ROMP TR-4-2 gauge that was originally recommended.

**Treatment System Parameters:** Pump run times, system conditions, treatment basin stage levels, and conditions of the site vegetation were logged by Sarasota County during weekly site visits. Other operational parameters were recorded at the time of water quality sampling.

**Table 4.1 Analytical Water Quality Testing Methods**

| SAMPLE PARAMETER        | REFERENCE ANALYSIS METHOD |
|-------------------------|---------------------------|
| pH                      | Method 150.1              |
| Temperature             | Method 170.1              |
| Specific Conductance    | Method 120.1              |
| Dissolved Oxygen        | Method 360.1              |
| Chlorophyll a           | SM 10200 H (modified)     |
| Total Organic Carbon    | SM 5310 B                 |
| BOD                     | SM5210B                   |
| Dissolved Org. N        | Method 351.2 (filtered)   |
| Nitrate + Nitrite       | Method 353.2              |
| Ammonia                 | Method SM4500NH3C         |
| Total Kjeldahl Nitrogen | Method 351.2              |
| Total Nitrogen          | Methods 351.1 plus 353.2  |
| Total Phosphorus        | Method 365.1/365.4        |
| Ortho Phosphorus        | Method 365.3              |
| Alkalinity              | SM 2320 B                 |
| Copper                  | USEPA 200.7               |
| Zinc                    | USEPA 200.7               |
| Turbidity (Lab)         | Method 180.1              |
| Total Suspended Solids  | SM 2540 D                 |

## 4.2 RESULTS OF FDEP SCHEDULE C BIMONTHLY WATER QUALITY SAMPLING PROGRAM

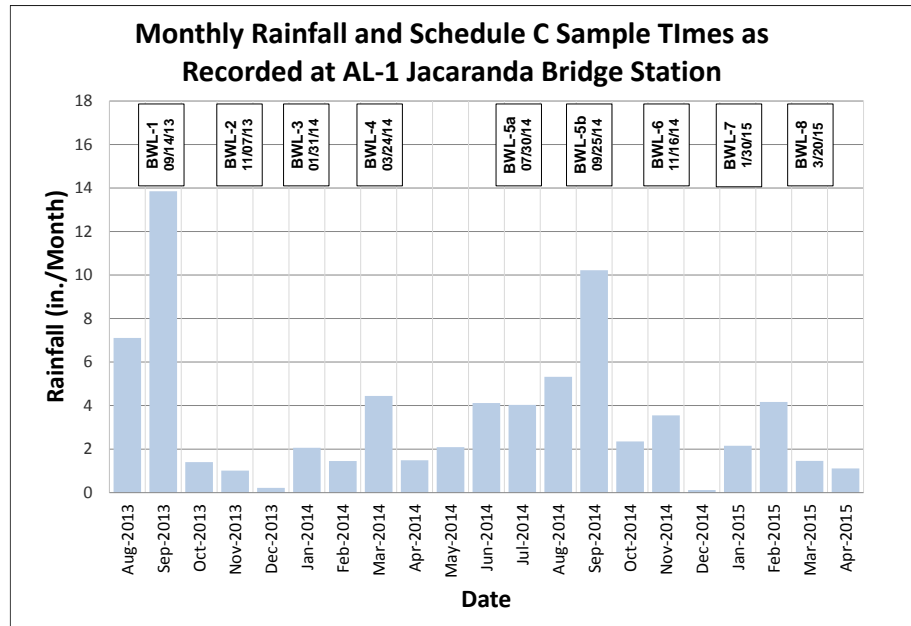
The Schedule C monitoring program was completed over the period beginning September 2013 through March 2015 with the BSTF operating under the HF regime. The objectives of the sampling program were to: 1) Complete a representative number of sampling events during wet and dry seasons; 2) Consider a potential diversion of BSTF treated water through a gravity outfall to Alligator Creek (when storm events would allow); and 3) Document the long-term performance of the BSTF for the pollutant mass removal of organic pollution, particularly TSS, nitrogen, and phosphorus.

**Rainfall and Seasonal Influences:** Figure 4.2 summarizes monthly rainfall for the entire Schedule C study period. From this figure, it is apparent that the number of sample events during wet weather months reasonably balanced with sample events during dry months.

The monthly rainfall trends are reported with each of the 319(h) sample events and reported with each water quality parameter measured in the Schedule C monitoring program. These results are presented in Appendix A.

In the early stages of monitoring, it was postulated that rainfall influenced water quality in the BLSS through dilution (this observation is supported by data during the August-September 2013 period). However, at least four (4) other sample events coincided with high rainfall months where BLSS nutrients and TSS were shown to increase. Because of the linear configuration of BLSS canals and long residence times, significant rainfall events are believed to cause a migration of stagnate stormwater flow from the upper reaches of the BLSS to the BSTF intake structure that outweighs the influence of rainfall dilution. However, it is possible that high-intensity storms may temporarily influence water quality during and shortly following intense rainfall events. It should be noted that most rainfalls observed over the monitoring period did not produce a significant measurable discharge at the BLSS weir. And because of the need to maintain stage levels within the BLSS it was not possible to divert BSTF discharges to the Alligator Creek ditch outfall for long extended periods.

**HF Treatment Mode Influences:** The Schedule B monitoring results indicated that the HF operational mode had the highest potential for mass reduction of pollutants and was thus recommended for operations for the long-term monitoring program. The HF settings were adjusted to balance flow through the BSTF during Schedule C monitoring and ranged from 1,000 GPM to 1475 GPM. The BSTF Monitoring events are designated as “BWL” followed by a numeric site indicator. The sample results are defined by the designation of influent (PS-A) and effluent (PS-B) sites (See Figure 3.1 for PS-A and PS-B locations). A concise overall summary of BSTF influent and effluent water quality results is presented in Tables 4.2 and 4.3 and provide an accounting of all water quality parameters required by the FDEP 319(h) grant. Results of the overall bimonthly sampling program can be examined in-depth based on the level of reduction of nutrient concentrations (i.e. raw treatment performance), consideration of improved treatment effectiveness with stormwater harvesting, and most importantly, the potential gross mass removal of nutrients within the system.



**Figure 4.2 Rainfall Records over Course of Schedule C Sampling**



**Table 4.2 Summary of BSTF Influent Water Quality Data Monitoring**

| <b>Summary of BSTF Influent Monitoring Results (Schedule C)</b> |                             |                             |                             |                             |                              |                              |                             |                             |                             |
|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| <b>Sample Number</b>  | <b>BWL-<br/>Bimonthly-1</b> | <b>BWL-<br/>Bimonthly-2</b> | <b>BWL-<br/>Bimonthly-3</b> | <b>BWL-<br/>Bimonthly-4</b> | <b>BWL-<br/>Bimonthly-5A</b> | <b>BWL-<br/>Bimonthly-5B</b> | <b>BWL-<br/>Bimonthly-6</b> | <b>BWL-<br/>Bimonthly-7</b> | <b>BWL-<br/>Bimonthly-8</b> |
| <b>Sample Date</b>  | 9/14/2013                   | 11/7/2013                   | 1/31/2014                   | 3/24/2014                   | 7/30/2014                    | 9/25/2014                    | 11/13/2014                  | 1/30/2015                   | 3/20/2015                   |
| pH  | 8.38                        | 8.78                        | 8.21                        | 8.66                        | 9.30                         | 8.61                         | 8.93                        | 8.98                        | 6.80                        |
| Turbidity (NTU)   | 10.60                       | 8.60                        | 21.50                       | 29.30                       | 12.50                        | 12.40                        | 12.50                       | 11.90                       | 11.20                       |
| DO (mg/L)   | 8.72                        | 16.53                       | 9.53                        | 7.18                        | 11.10                        | 9.42                         | 14.90                       | 13.25                       | 4.04                        |
| Specific Conductivity (µS/cm)                                   | 0.372                       | 0.375                       | 0.327                       | 0.325                       | 0.399                        | 0.340                        | 0.400                       | 0.423                       | 0.424                       |
| Temp (°C)   | 30.89                       | 23.51                       | 15.78                       | 24.76                       | 34.21                        | 27.80                        | 23.66                       | 20.53                       | 24.82                       |
| ORP   | 72.0                        | 309.5                       | 155.1                       | 128.8                       | 148.4                        | 120.1                        | 176.9                       | 188.4                       | 80.0                        |
| Time  | 0.53                        | 0.52                        | 0.50                        | 0.54                        | 0.75                         | 0.56                         | 0.71                        | 0.68                        | 0.60                        |
| Turbidity [NTU]   | 10.0                        | 15.0                        | 27.0                        | 30.0                        | NA                           | 18.0                         | 17.0                        | 22.0                        | 26.0                        |
| Copper [µG/L]   | 4.40                        | 5.30                        | 7.40                        | 4.00                        | NA                           | 1.20                         | 4.00                        | 4.00                        | 4.00                        |
| Zinc [µG/L]   | 13.40                       | 9.10                        | 15.70                       | 10.00                       | NA                           | 5.70                         | 6.00                        | 10.30                       | 8.41                        |
| Ammonia Nitrogen [mg/L]   | 0.012                       | 0.008                       | 0.031                       | 0.008                       | 0.035                        | 0.034                        | 0.054                       | 0.036                       | 0.021                       |
| Ammonia Nitrogen Dissolved [mg/L]                               | 0.008                       | 0.013                       | 0.008                       | 0.008                       | NA                           | 0.027                        | 0.048                       | 0.015                       | 0.008                       |
| Organic Nitrogen Dissolved [mg/L]                               | 1.04                        | 1.01                        | 1.09                        | 1.28                        | NA                           | 0.97                         | 1.06                        | 1.32                        | 1.29                        |
| TKN [mg/L]  | 2.43                        | 2.59                        | 3.48                        | 3.46                        | 3.00                         | 2.46                         | 2.57                        | 3.18                        | 3.13                        |
| TKN Dissolved [mg/L]  | 1.040                       | 1.020                       | 1.090                       | 1.280                       | NA                           | 1.000                        | 1.110                       | 1.330                       | 1.290                       |
| Total Nitrogen [mg/L]   | 2.44                        | 2.60                        | 3.48                        | 3.46                        | 3.00                         | 2.46                         | 2.58                        | 3.19                        | 1.31                        |
| Nitrate + Nitrite as N [mg/L]                                   | 0.007                       | 0.009                       | 0.004                       | 0.004                       | 0.005                        | 0.004                        | 0.011                       | 0.011                       | 0.016                       |
| Orthophosphate [mg/L]   | 0.016                       | 0.011                       | 0.005                       | 0.002                       | 0.017                        | 0.005                        | 0.002                       | 0.002                       | 0.003                       |
| Total Phosphorus [mg/L]   | 0.083                       | 0.241                       | 0.272                       | 0.311                       | 0.109                        | 0.254                        | 0.229                       | 0.244                       | 0.221                       |
| Chlorophyll A, Corrected [mg/m3]                                | 93.10                       | 112.10                      | 129.00                      | 64.10                       | NA                           | 117.00                       | 37.60                       | 99.40                       | 117.00                      |
| Total Alkalinity [mg/L as CaCO3]                                | 164                         | 128                         | 100                         | 90                          | NA                           | 90                           | 123                         | 125                         | 106                         |
| Total Suspended Solids (TSS) [mg/L]                             | 23.1                        | 21.3                        | 42.7                        | 48.0                        | 36.0                         | 26.8                         | 15.6                        | 15.7                        | 32.0                        |
| BOD5  | NA                          | 7.47                        | 7.34                        | 13.40                       | 4.12                         | 6.76                         | 6.85                        | 7.57                        | 7.84                        |
| Total Organic Carbon [mg/L]                                     | 12.8                        | 13.8                        | 14.2                        | 17.3                        | NA                           | 13.1                         | 15.6                        | 16.3                        | 17.2                        |

**Table 4.3 Summary of BSTF Effluent Water Quality Data Monitoring**

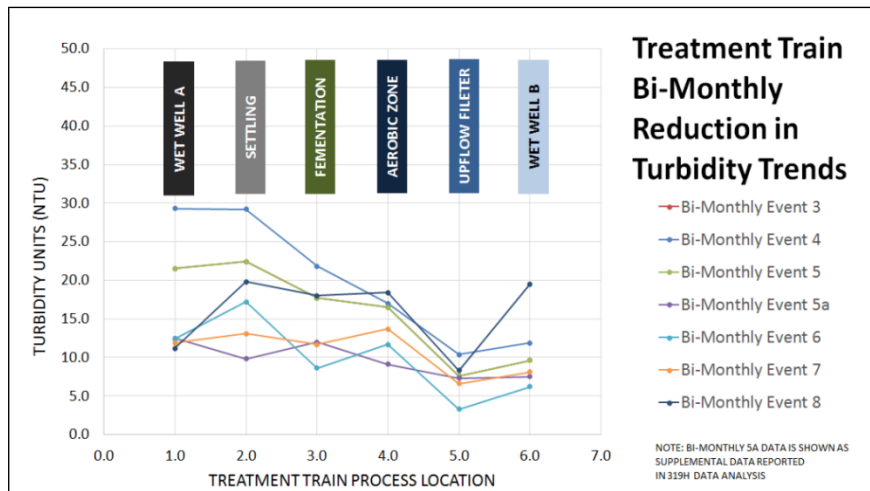
| <b>Summary of BSTF Effluent Monitoring Results (Schedule C)</b> |                             |                             |                             |                             |                              |                              |                             |                             |                             |
|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| <b>Sample Number</b>  | <b>BWL-<br/>Bimonthly-1</b> | <b>BWL-<br/>Bimonthly-2</b> | <b>BWL-<br/>Bimonthly-3</b> | <b>BWL-<br/>Bimonthly-4</b> | <b>BWL-<br/>Bimonthly-5A</b> | <b>BWL-<br/>Bimonthly-5B</b> | <b>BWL-<br/>Bimonthly-6</b> | <b>BWL-<br/>Bimonthly-7</b> | <b>BWL-<br/>Bimonthly-8</b> |
| <b>Sample Date</b>  | 9/14/2013                   | 11/7/2013                   | 1/31/2014                   | 3/24/2014                   | 7/30/2014                    | 9/25/2014                    | 11/13/2014                  | 1/30/2015                   | 3/20/2015                   |
| pH  | 7.98                        | 7.65                        | 7.69                        | 7.89                        | 8.00                         | 7.54                         | 8.16                        | 8.29                        | 8.41                        |
| Turbidity (NTU)   | 6.90                        | 5.60                        | 9.60                        | 11.90                       | 7.50                         | 6.20                         | 11.80                       | 8.10                        | 19.50                       |
| DO (mg/L)   | 4.15                        | 12.52                       | 3.79                        | 1.75                        | 4.79                         | 4.50                         | 7.47                        | 7.34                        | 13.90                       |
| Specific Conductivity (µS/cm)                                   | 0.381                       | 0.393                       | 0.345                       | 0.341                       | 0.429                        | 0.186                        | 0.408                       | 0.436                       | 0.393                       |
| Temp (°C)   | 31.10                       | 22.98                       | 15.75                       | 24.70                       | 33.03                        | 28.39                        | 22.37                       | 18.89                       | 26.03                       |
| ORP   | 32.6                        | 343.0                       | 155.9                       | 68.1                        | 195.8                        | 124.6                        | 184.5                       | 176.0                       | 73.8                        |
| Time  | 0.53                        | 0.52                        | 0.50                        | 0.54                        | 0.76                         | 0.56                         | 0.71                        | 0.67                        | 0.60                        |
| Turbidity [NTU]   | 7.1                         | 12.0                        | 16.0                        | 18.0                        | NA                           | 8.8                          | 13.0                        | 17.0                        | 20.0                        |
| Copper [µG/L]   | 4.00                        | 5.30                        | 5.90                        | 4.00                        | NA                           | 1.83                         | 4.00                        | 4.40                        | 4.00                        |
| Zinc [µG/L]   | 9.30                        | 9.90                        | 30.70                       | 7.00                        | NA                           | 13.20                        | 8.10                        | 10.20                       | 8.80                        |
| Ammonia Nitrogen [mg/L]   | 0.124                       | 0.039                       | 0.145                       | 0.010                       | 0.116                        | 0.023                        | 0.027                       | 0.037                       | 0.140                       |
| Ammonia Nitrogen Dissolved [mg/L]                               | 0.008                       | 0.011                       | 0.096                       | 0.008                       | NA                           | 0.011                        | 0.016                       | 0.010                       | 0.102                       |
| Organic Nitrogen Dissolved [mg/L]                               | 1.02                        | 0.97                        | 1.04                        | 1.21                        | NA                           | 0.95                         | 1.04                        | 1.31                        | 1.49                        |
| TKN [mg/L]  | 2.03                        | 1.93                        | 2.44                        | 3.07                        | 2.15                         | 1.66                         | 2.00                        | 2.67                        | 2.68                        |
| TKN Dissolved [mg/L]  | 1.020                       | 0.976                       | 1.140                       | 1.210                       | NA                           | 0.961                        | 1.060                       | 1.320                       | 1.590                       |
| Total Nitrogen [mg/L]   | 2.06                        | 2.09                        | 2.69                        | 3.18                        | 2.18                         | 1.76                         | 2.09                        | 2.81                        | 1.64                        |
| Nitrate + Nitrite as N [mg/L]                                   | 0.033                       | 0.160                       | 0.254                       | 0.107                       | 0.030                        | 0.100                        | 0.090                       | 0.136                       | 0.115                       |
| Orthophosphate [mg/L]   | 0.019                       | 0.028                       | 0.008                       | 0.006                       | 0.067                        | 0.024                        | 0.002                       | 0.002                       | 0.032                       |
| Total Phosphorus [mg/L]   | 0.114                       | 0.168                       | 0.210                       | 0.269                       | 0.167                        | 0.151                        | 0.209                       | 0.214                       | 0.235                       |
| Chlorophyll A, Corrected [mg/m3]                                | 58.50                       | 88.40                       | 82.00                       | 98.50                       | NA                           | 39.50                        | 50.40                       | 66.80                       | 56.50                       |
| Total Alkalinity [mg/L as CaCO3]                                | 104                         | 131                         | 103                         | 90                          | NA                           | 91                           | 121                         | 126                         | 106                         |
| Total Suspended Solids (TSS) [mg/L]                             | 8.2                         | 25.0                        | 24.2                        | 24.0                        | 10.0                         | 12.4                         | 19.2                        | 27.3                        | 18.0                        |
| BOD5  | NA                          | 4.40                        | 5.44                        | 6.00                        | 4.53                         | 3.26                         | 3.71                        | 5.41                        | 6.35                        |
| Total Organic Carbon [mg/L]                                     | 11.9                        | 12.8                        | 14.4                        | 17.8                        | NA                           | 13.0                         | 15.1                        | 15.4                        | 17.0                        |

### BLSS Water Quality Variations:

BLSS lakes and canals provide stormwater attenuation and treatment function for Venice Gardens. The BLSS is considered a Class III (limited) surface water under Florida Administrative Code (F.A.C.) 62-302.400. This surface water classification limits recreational use and fish consumption and provides for propagation and maintenance of limited fish and wildlife. Despite the classification of the surface water, the BLSS lakes and canals are utilized as recreational benefits of the public.

The BSTF influent water quality reported during each sample event were representative of background water quality conditions within the BLSS lakes and canals at the time of sampling. The BLSS water quality was consistently typical of a highly eutrophic aquatic system that exhibited little temporal or seasonal variation. The BLSS total suspended solids (TSS) routinely exceeded 20 mg/l and Chlorophyll a consistently exceeded 90 mg/m<sup>3</sup>. The major fraction of nutrients occurs as organic, colloidal solids (mostly algal biomass). Background Copper concentrations within the BLSS often were often above Class III standards (Class III standard is 3.7 µg/l).

**Pollutant Removal Efficiency:** The unit process treatment efficiency is defined by the direct observed change in pollutant concentration (IN-OUT) divided by the inflow concentration. Uncorrected efficiency does not account for mass removal efficiency. The BSTF was generally effective in the low efficiency reduction of turbidity, TSS, BOD5, and TN through the monitoring period (Figure 4.3). It is interesting to note that the BSTF performance over the first year of monitoring (Table 4.4) provided significantly better removal efficiencies. The overall performance of the BSTF was reduced from a loss of solids that occurred in the winter of 2014 through 2015 (Figure 4.5).



**Figure 4.3 Observed Turbidity Reductions through Processes**

**Table 4.4 BSTF Treatment performance (09/2014 through 07/2014)**

| BSTF Water Quality Parameter<br>(Schedule C Key Parameters) | Averaged Reported Percent Reduction in Pollutant Concentration<br>(09/13-07/14) |
|---|---|
| Turbidity [NTU]   | 36.17%  |
| Total Nitrogen [mg/L]                                       | 18.89%  |
| Total Phosphorus [mg/L]                                     | 2.76%   |
| Chlorophyll A, Corrected [mg/m <sup>3</sup> ]               | 21.46%  |
| Total Suspended Solids (TSS) [mg/L]                         | 44.40%  |
| BOD5  | 32.81%  |
| Total Organic Carbon [mg/L]                                 | 2.15%   |

**Table 4.5 BSTF Treatment performance (09/2014 through 03/2015)**

| BSTF Water Quality Parameter<br>(Schedule C Key Parameters) | Averaged Reported Percent Reduction in Pollutant Concentration<br>(09/13-03/15) |
|---|---|
| Turbidity [NTU]   | 31.27%  |
| Total Nitrogen [mg/L]                                       | 12.52%  |
| Total Phosphorus [mg/L]                                     | 3.47%   |
| Chlorophyll A, Corrected [mg/m <sup>3</sup> ]               | 19.72%  |
| Total Suspended Solids (TSS) [mg/L]                         | 23.69%  |
| BOD   | 32.18%  |
| Total Organic Carbon [mg/L]                                 | 2.58%   |

### 4.3 EVALUATION OF EFFECTIVENESS OF BSTF POLLUTANT MASS REDUCTION

True treatment system efficiency is determined from a ratio of the mass of pollutants removed versus mass of pollutants present before treatment. The treatment strategy of the BSTF considers a ratio of annual treatment volume to annual runoff of 2.0 or greater in order to achieve an efficient removal of mass. Over the course of the Schedule C bimonthly reporting period, the BSTF system was evaluated for effective performance of pollutant mass reduction. Total pollutant mass removals were calculated and compared to goals of the 319(h) grant projections to measure the degree of success of the treatment system.

The effective mass pollutant reductions for the BSTF were determined for each monitoring period as follows:

#### Equation 4.1 Calculation of BSTF Pollutant Removal

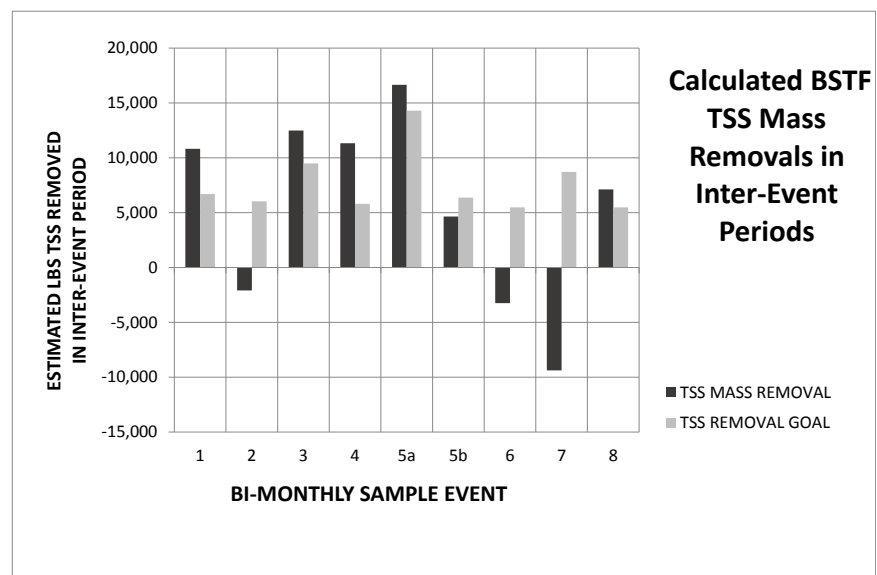
$$(\text{Pollutant X}) \text{ lb Mass} = (X_{\text{IN}} (\text{mg/l}) - X_{\text{OUT}} (\text{mg/l})) \times Q_{\text{IN}} (\text{GPM}) \times T_{\text{Hours}} \times 60 (\text{min.}) \times 10^{-6} \times 8.345$$

Where:

Pollutant X = Pollutant of Concern (lb removed)  
Q = Rate of Flow (GPM)  
T = Time lapsed (Hours)  
8.345 = conversion from (mg/l) - (MG) to lb

The pollutant mass loading and stormwater runoff that enters the BLSS is effectively equalized by storage as the flow travels through the canals and lakes to the outfall. The estimates of pollutant loading goals were normalized by an equal standard of measure for each sample event.

**TSS Mass Reduction:** The BSTF has demonstrated a consistent reduction in TSS over the long-term monitoring period (with the exception of a loss of solids in the winter of 2014-2015). Figure 4.4 provides calculated mass reductions in TSS concentrations from the BSTF as they compare to anticipated removal goals for TSS. From these results, 5 out of 9 events were found to exceed treatment goals. The removal of TSS from the system was estimated based on only 1,000 GPM of flow.



**Figure 4.4 Calculated TSS Mass Reduction as compared to BSTF Treatment Goals**

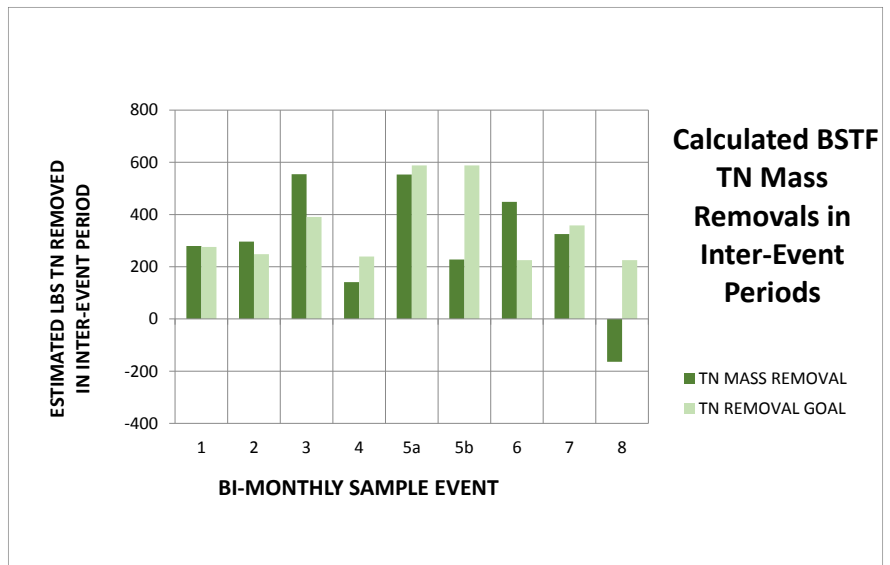


**TN Mass Reduction:** TN reductions in the BSTF treatment process occur as a result of the entrapment of colloidal solids and transformation of organic nitrogen forms through the treatment train. The calculated mass reductions in TN compared to the BSTF goals for removal are presented in Figure 4.5. It should be noted that analytical results for TN reported both dissolved and non-filtered forms. The change in nitrogen species in the treatment process suggest that nitrification and denitrification occur. However, the primary means of nitrogen removal are believed to be physical entrapment and sorption. Biological processes occur as attached growth on plants and media.

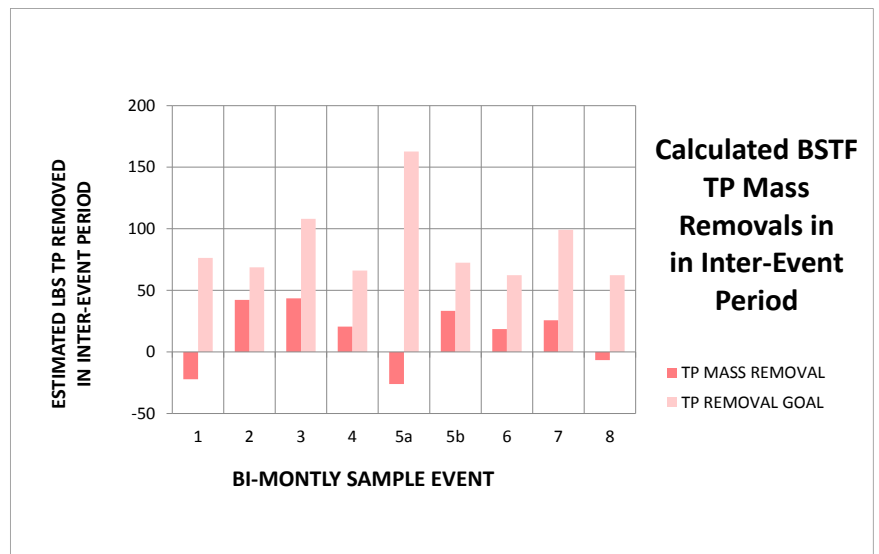
**TP Mass Reduction:** Results for TP mass reductions over the course of the Schedule C monitoring period never met the BSTF treatment goals. At times, the BSTF indicated a transport of TP out of the BSTF. However the overall monitoring results show a net annual removal of TP. Figure 4.6 illustrates the calculated TP removal versus the initial treatment goals.

#### 4.4 EVALUATION OF STORMWATER HARVESTING IN BSTF TREATMENT SCHEME

Stormwater harvesting is a critical element in the BSTF treatment train that is required to meet the goal of nutrient mass reduction. Stormwater harvesting and high rate turf irrigation (1 inch per week or 13,500 gallons per week) are especially effective at this site, because the site grades at the BSTF are elevated 2-3 ft. above natural ground. Groundwater elevations are generally 3-5 ft. below grade and this allows for a large effective storage volume in unsaturated soils that can provide high levels of treatment. Stormwater is irrigated at the BSTF through a programmed automatic dosing of 9 irrigation zones (Figure 4.7).



**Figure 4.5 Calculated TN Mass Reduction as Compared to BSTF Treatment Goals**



**Figure 4.6 Calculated TP Mass Reduction as Compared to BSTF Treatment Goals**

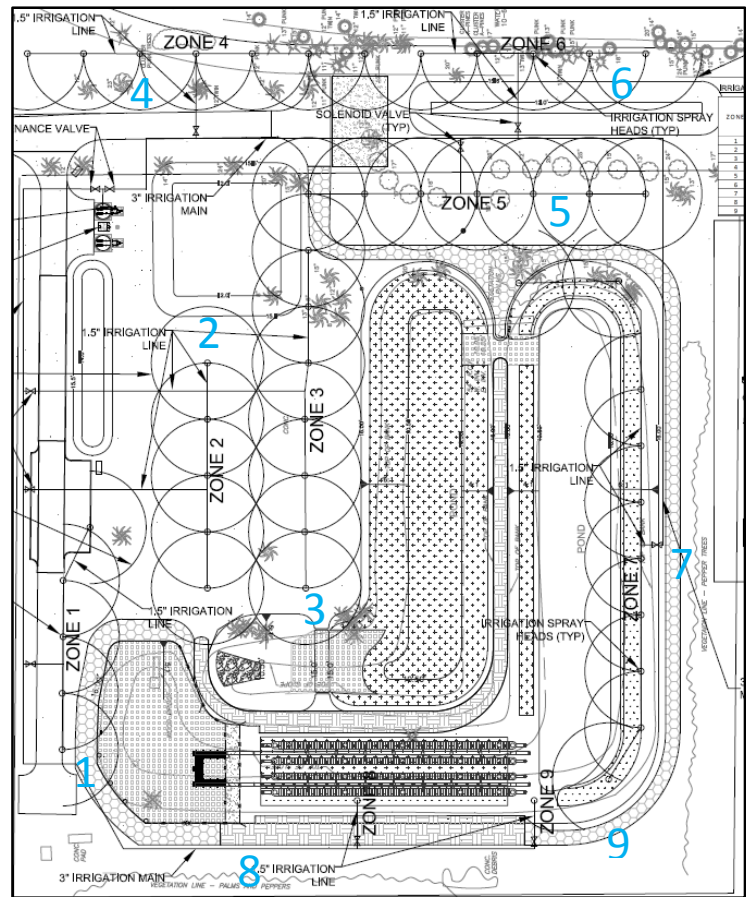
Stormwater irrigation combined with turf grass management is presumed to remove between 80 and 95 percent of organic and nutrient pollutants. The strategy of harvested stormwater irrigation is to saturate turf on a regular daily basis (with no surface accumulation) to optimize evapotranspiration. Infiltration through unsaturated soils allows for natural assimilation and pollutant removal through immobilization of the pollutant (this occurs by chemical means or through adsorption). At the BSTF site, the base flow of groundwater eventually results in a lateral groundwater discharge to the Alligator Creek ditch outfall. It is not practical in the context of this project to quantify the migration of nutrients through soils and discharge volume that may eventually enter Alligator Creek through groundwater base flow.

#### **Harvested Stormwater TSS Removal:**

TSS is removed from irrigated flow by the physical blockage and entrapment of solid particles at the soil surface. It is estimated that 95% (by a reduction in concentration) of colloidal solids may be trapped in the first few inches of the soil. Organic solids undergo desiccation and decay.

**Harvested Stormwater TN Removal:** Nitrogen may be removed through a number of physical and biological pathways. When irrigation is applied, ammonia nitrogen is lost to the atmosphere. The remaining infiltrated stormwater will result in physical sorption and blockage of organic solids (including organic nitrogen) that may be bound in the organic solids. Nitrification and denitrification occurs in unsaturated groundwater flow. It is estimated that 85% of nitrogen (by a reduction in concentration) can be removed by harvesting.

**Harvested Stormwater TP Removal:** Phosphorous removal from irrigated stormwater is less effective and relies largely on plant uptake and immobilization in the soil stratum. For the purpose of this study, an effective reduction of 80% was used to estimate TP reduction in the stormwater treatment system.



**Figure 4.7 BSTF Areas (9) of Stormwater Harvesting by Spray Irrigation**

## 5.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

### 5.1 BSTF TREATMENT SYSTEM OBSERVATIONS

In order to better assess the physical and biological systems within the BSTF, related water quality data were examined for statistical correlations and data trends. These observations are presented in this section.

#### Turbidity vs. TSS:

In surface water systems, turbidity is usually linearly related to suspended solids. A non-linear relationship can occur where higher concentrations of algae may interfere with light absorption. A definite observed linear relationship is apparent between turbidity and TSS as shown in Figure 5.1.

**BOD vs. TOC:** The organic matter in surface waters creates a biochemical oxygen demand impact aquatic viability. The interpretive relationship of BOD and TOC can prove useful in determining the possibility of natural degradation of

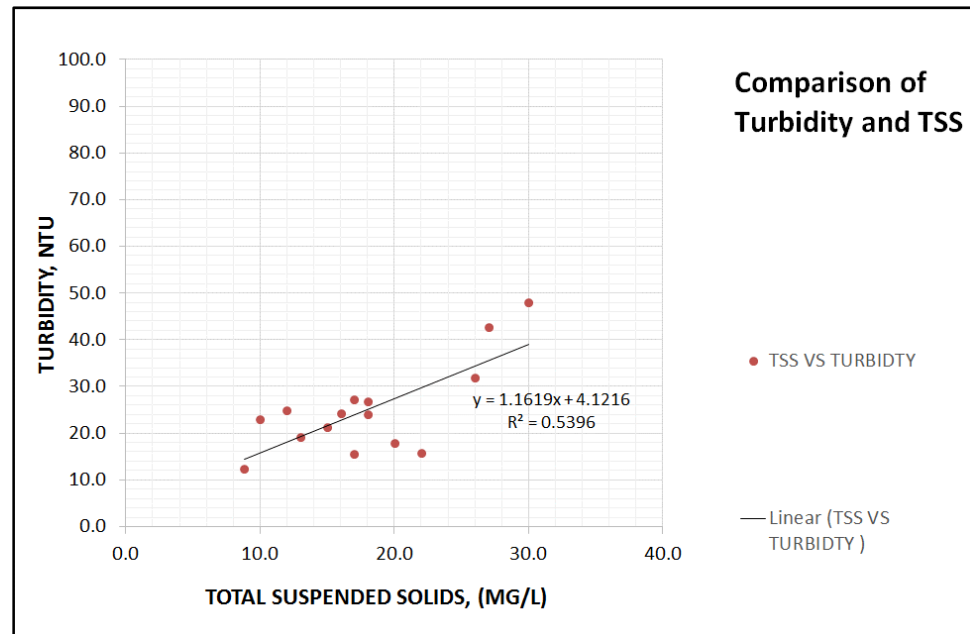


Figure 5.1 Relationship between Turbidity and TSS

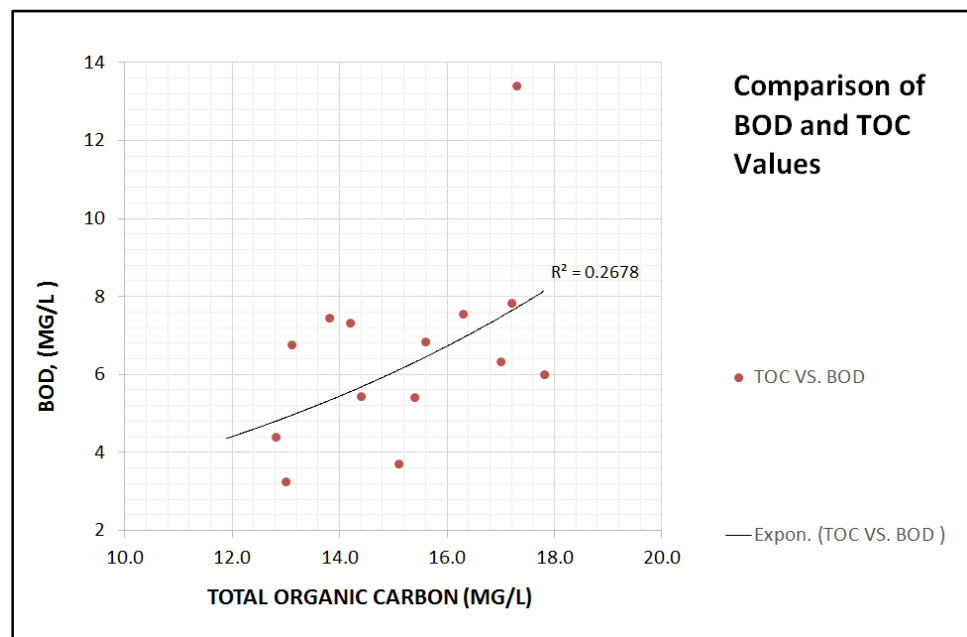


Figure 5.2 Relationship between BOD and TOC



organic matter. A lower TOC:BOD ratio is indicative of an equivalent fraction of inert dissolved and particulate organic matter that may be oxidized (through respiration processes) while higher ratios suggest that a higher fraction of the organics are not available for oxidation. In the evaluation of the BSTF process, a lower TOC:BOD suggests there is potential for bioavailable organic material (for respiration). The observed relationship of TOC to BOD for the Schedule C monitoring period is illustrated in Figure 5.2.

### Chlorophyll vs. TSS:

The high levels of chlorophyll observed within the BLSS do not show a strong statistical relationship with total suspended solids. The data presented in Figure 5.3 includes all data collected at both influent and effluent sample points.

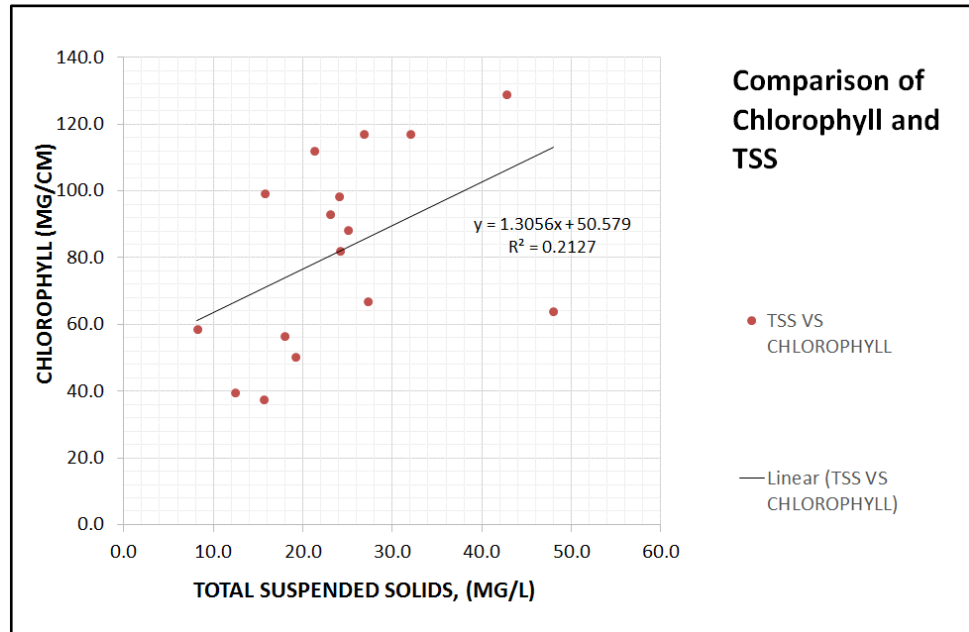


Figure 5.3 Relationship between Chlorophyll and TSS

### Biological Nitrogen

**Removal:** The BSTF removes nitrogen by physical means (ammonia losses to the atmosphere, filtration and sorption) and biological nitrification and denitrification. Internal biological processes of the BSTF occur from catabolism and decay of organic solids (fermentation zone), which produce ammonia and dissolved organic nitrogen. Ammonia can

be lost to the atmosphere, or it may be available for nitrification under favorable environmental conditions. One interesting observation was made from a comparison of Schedule C results of total nitrogen, ammonia,

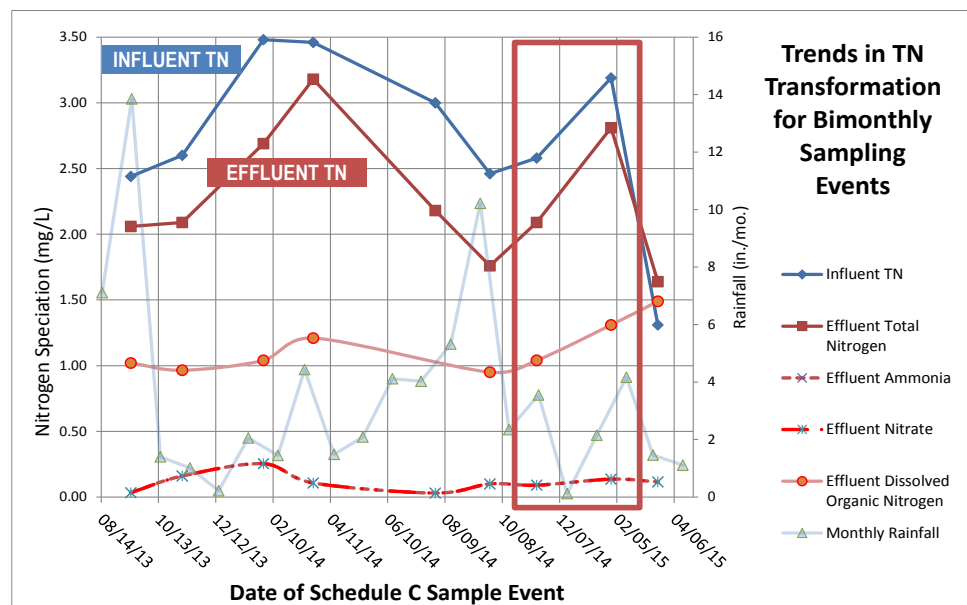


Figure 5.4 Biological Nitrogen Trends in BSTF

and nitrate-nitrogen data (from the fourth sample event and last three events) where dissolved organic nitrogen showed increased trends in concentration after long periods of operation. This observation suggests that the rate of decay may have increased for organically bound nitrogen as excessive levels of solids accumulate within the BSTF treatment zones (especially the fermentation zone). It is believed that the accumulation of colloidal organic solids (and the decay rates) reaches a point that exceeds the BSTF system capacity for nitrification and denitrification.

## 5.2 SUMMARY OF ANNUALIZED ESTIMATES OF POLLUTANT REDUCTION (BASED ON SCHEDULE C MONITORING)

The Schedule C monitoring program provided useful information on the potential for long-term nutrient mass removals from the BSTF. Over the first year of operation, the performance of the BSTF met or exceeded the 319(h) treatment goals for TSS and TN mass removals. This monitoring period included 5 of the Schedule C sample events. The performance goal for phosphorus was not achieved over this period (See Table 5.1).

When considering the overall 319(h) monitoring period, from September 2013 to March 2015, the BSTF achieved less favorable results for TSS and TN removals and did not meet the goals for phosphorus removal (See Table 5.2). The observation of reduced BSTF performance was exacerbated by a loss of solids over the last three monitoring events (November, 2014-January 2015). During these last events, an estimated 12,634 lb of TSS and 164 lb of TN was exported from the BSTF. The significant loss of solids drastically reduced system treatment performance.

**Table 5.1 Calculated Mass Removals  
(9/2014-7/2014)**

| <b>BSTF Year 1 Pollutant Removal Estimates<br/>(Reporting Period: 9/2013-9/2014)</b> |                                |
|--|--------------------------------|
| <b>Reporting Parameter</b>   | <b>Mass Removed<br/>(lbs.)</b> |
| TSS Mass Removal Goal (Adjusted for Reporting Period)                                | 48,670                         |
| <b>TSS Mass Removed over Report Period</b>   | <b>53,834</b>                  |
| TN Mass Removal Goal (Adjusted for Reporting Period)                                 | 2,004                          |
| <b>TN Mass Removed over Report Period</b>  | <b>2,053</b>                   |
| TP Mass Removal Goal (Adjusted for Reporting Period)                                 | 554                            |
| <b>TP Mass Removed over Report Period</b>  | <b>91</b>                      |

**Table 5.2 Calculated Mass Removals  
(9/2014-7/2014)**

| <b>BSTF Overall Pollutant Removal Estimates<br/>(Reporting Period: 9/2013-3/2015)</b> |                                |
|---|--------------------------------|
| <b>Reporting Parameter</b>  | <b>Mass Removed<br/>(lbs.)</b> |
| TSS Mass Removal Goal (Adjusted for Reporting Period)                                 | 68,316                         |
| <b>TSS Mass Removed over Report Period</b>  | <b>48,313</b>                  |
| TN Mass Removal Goal (Adjusted for Reporting Period)                                  | 2,814                          |
| <b>TN Mass Removed over Report Period</b>   | <b>2,662</b>                   |
| TP Mass Removal Goal (Adjusted for Reporting Period)                                  | 778                            |
| <b>TP Mass Removed over Report Period</b>   | <b>129</b>                     |

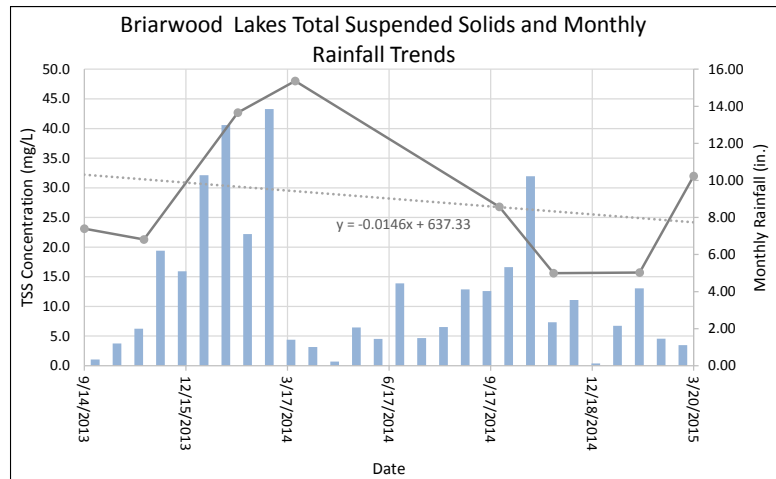
### 5.3 BENEFITS OF THE BSTF CONTINUED OPERATIONS

The effectiveness of traditional stormwater treatment BMPs is generally limited to treatment during storm events. Treatment processes occur during rainfall when rainfall runoff is generated (about 10 to 20 percent of storm events produce runoff) to drive the process. In many instances the volume of runoff is too great to treat the total runoff (BMP processes are often designed with high-flow diversions). The innovation of the BSTF has brought about added interest in the area of inter-event treatment, the application of upflow media filtration, and the combination of BMP treatment train unit processes that couple biologically active systems with physical sorption and filtration processes. The inter-event unit processes within the BSTF allow for higher capture of cumulative storm flows (in excess of the total annual volume of runoff) and do not depend on high-efficiency treatment systems (i.e. chemicals).

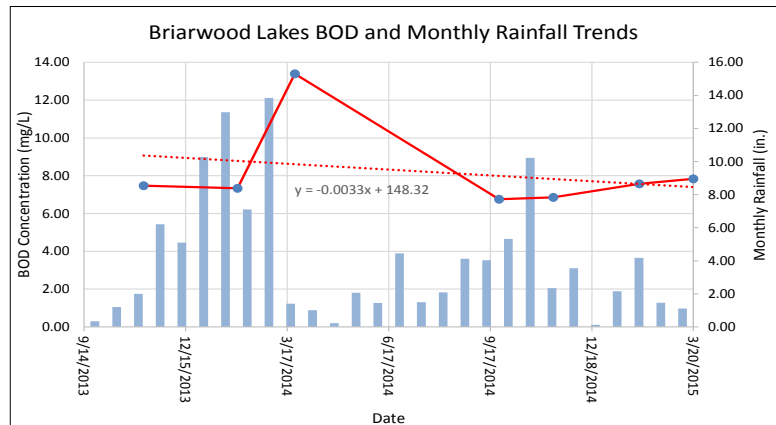
#### Observed Trends in BLSS Lake Water Quality:

The BSTF inter-event treatment process recycles stormwater within the last segment of canal system of the BLSS prior to discharging to Alligator Creek. Under normal BSTF dry weather operations, it is estimated that stored water within the BLSS canal may undergo two and a half (2.5) treatment recycles prior to discharge to Alligator Creek. Although the 319(h) water quality monitoring program did not require monitoring for receiving water trends, the long-term results of receiving water quality was demonstrated through the observed subtle changes in the BLSS source (the BLSS discharge canal).

From September 2015 through March 2015, water quality of the BLSS source exhibited background changes that reflect subtle improvements in the water quality. Figure 5.5 illustrates a slight general downward trend in TSS concentrations that occurred as a result of the operations of the BSTF.



**Figure 5.5 Briarwoods Lake TSS Trends from 9/2013 through 3/2015 Monitoring Period.**

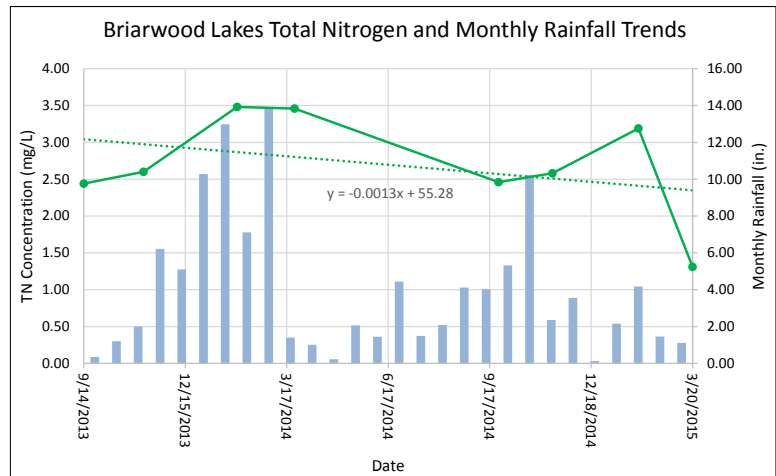


**Figure 5.6 Briarwoods Lake BOD Trends from 9/2013 through 3/2015 Monitoring Period.**



Similarly from Figures 5.6 and 5.7, there is evidence of a reduction in BOD5 and Total Nitrogen within the BLSS. Again, these downward trends document the potential long-term benefits of the BSTF operations in reducing the historic accumulation of organically bound colloidal pollutants in the BLSS System.

Long-term TP Mass Removal has been documented from the Schedule C monitoring program, yet the effectiveness of TP removal is less predictable. Inter-event treatment has proven to be reasonably consistent, yet the BSTF has a limited capacity to accumulate and store colloidal organic solids. Following long-term operations (estimated 12 continuous months) internal processes within the BSTF release more dissolved and colloidal pollutants (dissolved nitrogen and orthophosphate) than available treatment capacity of the BSTF.



**Figure 5.7 Briarwoods Lake TN Trends from 9/2013 through 3/2015 Monitoring Period.**

## 5.4 CONCLUSIONS AND RECOMMENDATIONS

Sarasota County has invested a significant amount of research, time and funding for the construction and evaluation of the BSTF inter-event treatment system. Although there are challenges for continued cost effective treatment of nutrients within the Alligator Creek/Lemon Bay watershed, there is potential for improved treatment effectiveness through continued research and process refinements of the inter-event concept for stormwater treatment. By way of the observed benefits of the BSTF, it can be concluded that the inter-event treatment concept is effective in treating high percentages of drainage basin flows to achieve effective pollutant mass reductions.

The following final recommendations to be considered for future operation of the BSTF:

**5.4.1 Improve Performance with Scheduled Solids Maintenance:** A BSTF maintenance program should consider monitoring of changes in TSS and dissolved organic nitrogen. When increases in TSS and dissolved organic nitrogen occur, the BSTF should be considered for maintenance. Maintenance should include dewatering of the system, desiccation (drying of organic solids) and removal of at least 20-50% of accumulated mass.

**5.4.2 Improve Vegetative Coverage:** It is possible to improve system BSTF performance by with expanded surface vegetation coverage in Zone 2 (fermentation zone) and possibly in Zone 3 (aerobic zone). Alternative floating plants may include white water lily and/or water lettuce. Floating vegetation can be more readily controlled and harvested.

**5.4.3 Improve Performance with Scheduled Vegetation Harvesting:** A BSTF maintenance program should consider routine harvesting of littoral and floating vegetation. It is important to

avoid herbicide in harvesting. Harvesting should physically remove vegetation from the process and be considered seasonally. Harvested vegetation may provide planting benefits for other Sarasota County stormwater facilities.

**5.4.4 Add Controlled Intermediate Polymer Addition:** Consider the broadcast application of polymer (polyacrylamide) or chitosan prior to scheduled solids removal. Initial treatability studies of Schedule A monitoring (background studies) produced favorable results of polymer addition to promote flocculent settling in BLSS water samples.

**5.4.5 Improve Performance with Fine Bubble Aeration:** This option considers an improved method to aerate the BSTF with fine bubbles at Pump Station A. Fine or microbubble aeration has the potential for colloidal solids growth (without chemicals) and may complement the aeration function for ammonification and nitrification.

**5.4.6 Create a Stormwater Research Center at the BSTF site:** The pioneering successes and challenges of the BSTF are important factors in the progress of environmental nutrient management in Sarasota County and in Florida. The BSTF may bring opportunities for more research funding that benefits the stormwater profession. As a designated stormwater research center, the BSTF may open doors to professionals, regulators and the public to better understand the benefits of inter-event and media-based treatment and low-impact development practices.

As Sarasota County continues realizing the benefits of inter-event treatment at the BSTF, it is possible to plan or retrofit other stormwater treatment systems to produce more effective results for large mass pollutant removal that will provide improved natural system conditions of receiving waters.

**APPENDIX A**  
**Data, Results, and Records of Measured Pollutants**





### A.1. Schedule A Summary of Background Water and Sediments (AET, 2009)

| Sample Point                            | 1                      | 2                      | 3                    | Average<br>(n = 3) |
|---|------------------------|------------------------|----------------------|--------------------|
| <b>Time of Sampling</b>                 | 9:09 AM -<br>10: 25 AM | 11:20 AM -<br>12:25 PM | 1:40 PM -<br>2:40 PM | -                  |
| <b>Water Column</b>                     |                        |                        |                      |                    |
| Secchi Depth, in.                       | 7                      | 8                      | 12                   | 9                  |
| Water Column Depth, ft.                 | 5.42                   | 5.50                   | 4.67                 | 5.20               |
| Temperature, °C                         | 31.1                   | 31.6                   | 31.2                 | 31.3               |
| Conductivity, µS/cm                     | 399                    | 416                    | 374                  | 396                |
| pH                                      | 8.3                    | 9.0                    | 8.5                  | 8.6                |
| Alkalinity, mg/L as CaCO <sub>3</sub>   | 138                    | 122                    | 116                  | 125                |
| Total Suspended Solids, mg/L            | 48                     | 48                     | 24                   | 40                 |
| Total Nitrogen, mg/L                    | 3.63                   | 3.13                   | 2.23                 | 3.00               |
| Total Kjeldahl Nitrogen, mg/L           | 3.6                    | 3.1                    | 2.2                  | 3.0                |
| Organic Nitrogen, mg/L                  | 3.58                   | 3.08                   | 2.18                 | 2.95               |
| Total Kjeldahl Nitrogen, Filtered, mg/L | 1.15                   | 1.95                   | 1.15                 | 1.42               |
| Organic Nitrogen, Filtered, mg/L        | 1.13                   | 1.93                   | 1.13                 | 1.40               |
| Non-filtrable Organic Nitrogen, mg/L    | 2.45                   | 1.15                   | 1.05                 | 1.55               |
| Ammonia Nitrogen, mg/L                  | 0.02                   | 0.02                   | 0.02                 | 0.02               |
| Total Oxidized Nitrogen, mg/L           | 0.025                  | 0.025                  | 0.025                | 0.025              |
| Total Phosphorus, mg/L                  | 0.27                   | 0.22                   | 0.18                 | 0.22               |
| Total Organic Phosphorus, mg/L          | 0.258                  | 0.208                  | 0.168                | 0.211              |
| Filtered Total Phosphorus, mg/L         | 0.00                   | 0.04                   | 0.02                 | 0.02               |
| Organic Phosphorus, Filtered, mg/L      | 0.00                   | 0.03                   | 0.01                 | 0.01               |
| Non-filtrable Organic Phosphorus, mg/L  | 0.26                   | 0.18                   | 0.16                 | 0.20               |
| Orthophosphorus P, mg/L                 | 0.012                  | 0.012                  | 0.012                | 0.012              |
| Dissolved Organic Carbon, mg/L          | 23                     | 23                     | 28                   | 25                 |
| <b>Sediment</b>                         |                        |                        |                      |                    |
| Flocculent Sediment Layer Depth, in.    | > 3                    | 15                     | 24                   | 19.5*              |
| Dissolved Oxygen, mg/L                  | < 0.25                 | 0.02                   | 0.04                 | < 0.1              |
| Oxidation Reduction Potential, mV       | -239                   | -178                   | -274                 | -230               |
| pH                                      | -                      | 6.61                   | 6.59                 | 6.6*               |
| Total Solids Content, %                 | 10                     | 11.1                   | 5.3                  | 8.8                |
| % Volatile (Organic)                    | 20                     | 20                     | 39                   | 26.3               |

\*Average value does not include Sample Point 1.

Source: AET Sampling Event (2009).

## A.2. Schedule C Summary Data Table

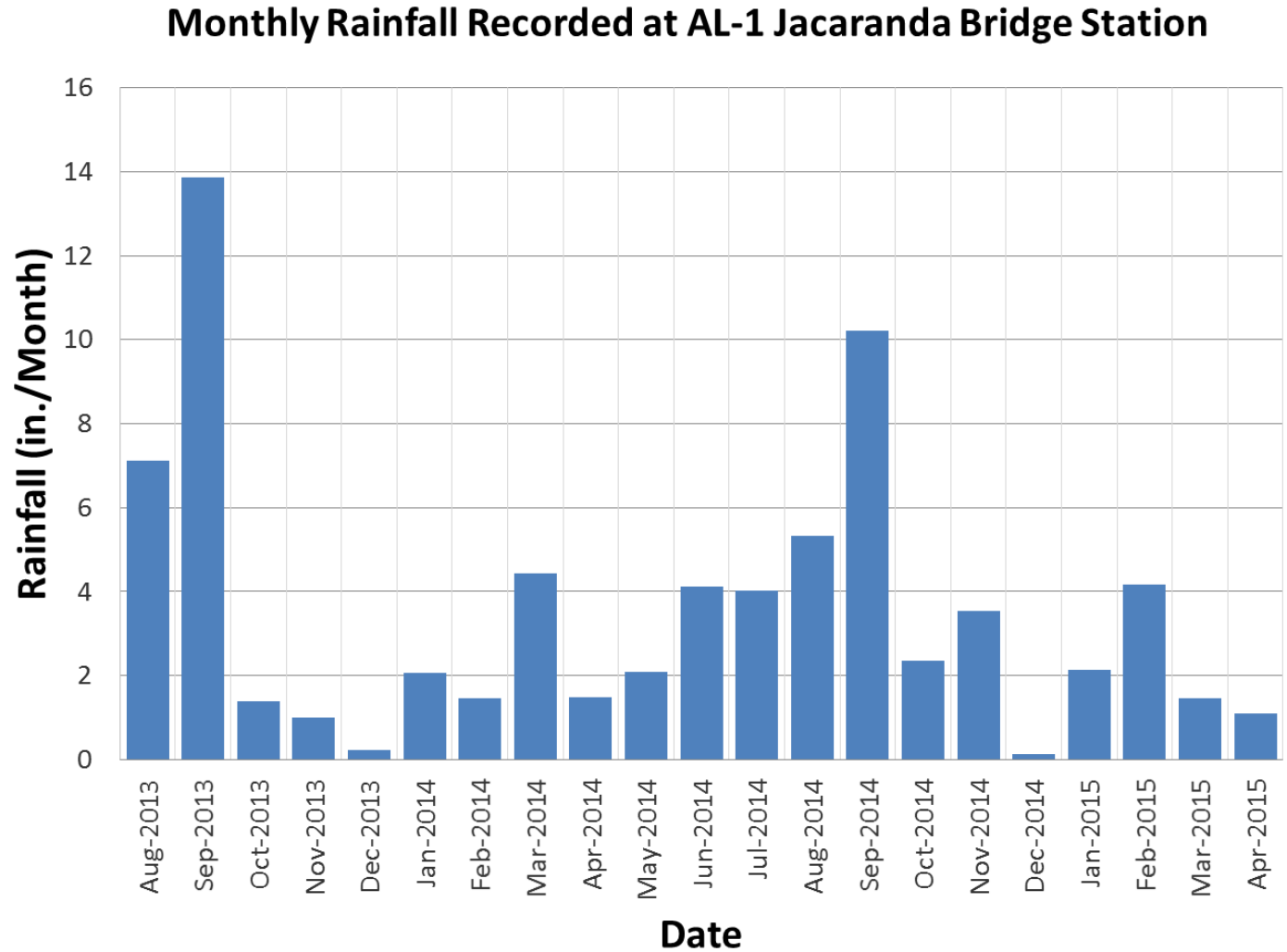
| BTSF Influent Parameters<br>(PS-A)            | BWL Bimonthly Sampling Event ID (Division III) |           |           |           |           |            |           |           |
|---|--|-----------|-----------|-----------|-----------|------------|-----------|-----------|
|   | BWL-1  | BWL-2     | BWL-3     | BWL-4     | BWL-5B*   | BWL-6      | BWL-7     | BWL-8     |
| Sample Date                                   | 9/14/2013                                      | 11/7/2013 | 1/31/2014 | 3/24/2014 | 9/25/2014 | 11/13/2014 | 1/30/2015 | 3/20/2015 |
| pH  | 8.38   | 8.78      | 8.21      | 8.66      | 8.61      | 8.93       | 8.98      | 6.80      |
| Titrant added [mL]                            | 0.00   | 0.00      | 0.00      | 0.00      | 0.00      | 0.00       | 0.00      | 0.00      |
| Alkalinity [mg/L as CaCO <sub>3</sub> ]       | 0.00   | 0.00      | 0.00      | 0.00      | 0.00      | 0.00       | 0.00      | 0.00      |
| Turbidity (NTU)                               | 10.60  | 8.60      | 21.50     | 29.30     | 12.40     | 12.50      | 11.90     | 11.20     |
| DO (mg/L)                                     | 8.72   | 16.53     | 9.53      | 7.18      | 9.42      | 14.90      | 13.25     | 4.04      |
| DO (% Sat)                                    | 117.40   | 194.60    | 96.20     | 86.60     | 69.90     | 111.40     | 160.00    | 48.80     |
| Specific Conductivity (µS/cm)                 | 0.372  | 0.375     | 0.327     | 0.325     | 0.340     | 0.400      | 0.423     | 0.424     |
| Temp (°C)                                     | 30.89  | 23.51     | 15.78     | 24.76     | 27.80     | 23.66      | 20.53     | 24.82     |
| ORP   | 72.0   | 309.5     | 155.1     | 128.8     | 120.1     | 176.9      | 188.4     | 80.0      |
| Time  | 0.53   | 0.52      | 0.50      | 0.54      | 0.56      | 0.71       | 0.68      | 0.60      |
| Turbidity [NTU]                               | 10.0   | 15.0      | 27.0      | 30.0      | 18.0      | 17.0       | 22.0      | 26.0      |
| Copper [µG/L]                                 | 4.40   | 5.30      | 7.40      | 4.00      | 1.20      | 4.00       | 4.00      | 4.00      |
| Zinc [µG/L]                                   | 13.40  | 9.10      | 15.70     | 10.00     | 5.70      | 6.00       | 10.30     | 8.41      |
| Ammonia Nitrogen [mg/L]                       | 0.012  | 0.008     | 0.031     | 0.008     | 0.034     | 0.054      | 0.036     | 0.021     |
| Ammonia Nitrogen Dissolved [mg/L]             | 0.008  | 0.013     | 0.008     | 0.008     | 0.027     | 0.048      | 0.015     | 0.008     |
| Organic Nitrogen Dissolved [mg/L]             | 1.04   | 1.01      | 1.09      | 1.28      | 0.97      | 1.06       | 1.32      | 1.29      |
| TKN [mg/L]                                    | 2.43   | 2.59      | 3.48      | 3.46      | 2.46      | 2.57       | 3.18      | 3.13      |
| TKN Dissolved [mg/L]                          | 1.040  | 1.020     | 1.090     | 1.280     | 1.000     | 1.110      | 1.330     | 1.290     |
| Total Nitrogen [mg/L]                         | 2.44   | 2.60      | 3.48      | 3.46      | 2.46      | 2.58       | 3.19      | 1.31      |
| Nitrate + Nitrite as N [mg/L]                 | 0.007  | 0.009     | 0.004     | 0.004     | 0.004     | 0.011      | 0.011     | 0.016     |
| Orthophosphate [mg/L]                         | 0.016  | 0.011     | 0.005     | 0.002     | 0.005     | 0.002      | 0.002     | 0.003     |
| Total Phosphorus [mg/L]                       | 0.083  | 0.241     | 0.272     | 0.311     | 0.254     | 0.229      | 0.244     | 0.221     |
| Chlorophyll A, Corrected [mg/m <sup>3</sup> ] | 93.10  | 112.10    | 129.00    | 64.10     | 117.00    | 37.60      | 99.40     | 117.00    |
| Total Alkalinity [mg/L as CaCO <sub>3</sub> ] | 164  | 128       | 100       | 90        | 90        | 123        | 125       | 106       |
| Total Suspended Solids (TSS) [mg/L]           | 23.1   | 21.3      | 42.7      | 48.0      | 26.8      | 15.6       | 15.7      | 32.0      |
| BOD   | 0.00   | 7.47      | 7.34      | 13.40     | 6.76      | 6.85       | 7.57      | 7.84      |
| Total Organic Carbon [mg/L]                   | 12.8   | 13.8      | 14.2      | 17.3      | 13.1      | 15.6       | 16.3      | 17.2      |
| BTSF Influent Parameters<br>(PS-A)            | BWL Bimonthly Sampling Event ID (Schedule C)   |           |           |           |           |            |           |           |
|   | BWL-1  | BWL-2     | BWL-3     | BWL-4     | BWL-5B*   | BWL-6      | BWL-7     | BWL-8     |
| Sample Date                                   | 9/14/2013                                      | 11/7/2013 | 1/31/2014 | 3/24/2014 | 9/25/2014 | 11/13/2014 | 1/30/2015 | 3/20/2015 |
| pH  | 7.98   | 7.65      | 7.69      | 7.89      | 7.54      | 8.16       | 8.29      | 8.41      |
| Titrant added [mL]                            | 0.00   | 0.00      | 0.00      | 0.00      | 0.00      | 0.00       | 0.00      | 0.00      |
| Alkalinity [mg/L as CaCO <sub>3</sub> ]       | 0.00   | 0.00      | 0.00      | 0.00      | 0.00      | 0.00       | 0.00      | 0.00      |
| Turbidity (NTU)                               | 6.90   | 5.60      | 9.60      | 11.90     | 6.20      | 11.80      | 8.10      | 19.50     |
| DO (mg/L)                                     | 4.15   | 12.52     | 3.79      | 1.75      | 4.50      | 7.47       | 7.34      | 13.90     |
| DO (% Sat)                                    | 56.10  | 146.20    | 155.90    | 22.70     | 34.20     | 57.30      | 88.40     | 171.30    |
| Specific Conductivity (µS/cm)                 | 0.381  | 0.393     | 0.345     | 0.341     | 0.186     | 0.408      | 0.436     | 0.393     |
| Temp (°C)                                     | 31.10  | 22.98     | 15.75     | 24.70     | 28.39     | 22.37      | 18.89     | 26.03     |
| ORP   | 32.6   | 343.0     | 155.9     | 68.1      | 124.6     | 184.5      | 176.0     | 73.8      |
| Time  | 0.53   | 0.52      | 0.50      | 0.54      | 0.56      | 0.71       | 0.67      | 0.60      |
| Turbidity [NTU]                               | 7.1  | 12.0      | 16.0      | 18.0      | 8.8       | 13.0       | 17.0      | 20.0      |
| Copper [µG/L]                                 | 4.00   | 5.30      | 5.90      | 4.00      | 1.83      | 4.00       | 4.40      | 4.00      |
| Zinc [µG/L]                                   | 9.30   | 9.90      | 30.70     | 7.00      | 13.20     | 8.10       | 10.20     | 8.80      |
| Ammonia Nitrogen [mg/L]                       | 0.124  | 0.039     | 0.145     | 0.010     | 0.023     | 0.027      | 0.037     | 0.140     |
| Ammonia Nitrogen Dissolved [mg/L]             | 0.008  | 0.011     | 0.096     | 0.008     | 0.011     | 0.016      | 0.010     | 0.102     |
| Organic Nitrogen Dissolved [mg/L]             | 1.02   | 0.97      | 1.04      | 1.21      | 0.95      | 1.04       | 1.31      | 1.49      |
| TKN [mg/L]                                    | 2.03   | 1.93      | 2.44      | 3.07      | 1.66      | 2.00       | 2.67      | 2.68      |
| TKN Dissolved [mg/L]                          | 1.020  | 0.976     | 1.140     | 1.210     | 0.961     | 1.060      | 1.320     | 1.590     |
| Total Nitrogen [mg/L]                         | 2.06   | 2.09      | 2.69      | 3.18      | 1.76      | 2.09       | 2.81      | 1.64      |
| Nitrate + Nitrite as N [mg/L]                 | 0.033  | 0.160     | 0.254     | 0.107     | 0.100     | 0.090      | 0.136     | 0.115     |
| Orthophosphate [mg/L]                         | 0.019  | 0.028     | 0.008     | 0.006     | 0.024     | 0.002      | 0.002     | 0.032     |
| Total Phosphorus [mg/L]                       | 0.114  | 0.168     | 0.210     | 0.269     | 0.151     | 0.209      | 0.214     | 0.235     |
| Chlorophyll A Corrected [mg/m <sup>3</sup> ]  | 58.50  | 88.40     | 82.00     | 98.50     | 39.50     | 50.40      | 66.80     | 56.50     |
| Total Alkalinity [mg/L as CaCO <sub>3</sub> ] | 104  | 131       | 103       | 90        | 91        | 121        | 126       | 106       |
| Total Suspended Solids (TSS) [mg/L]           | 8.2  | 25.0      | 24.2      | 24.0      | 12.4      | 19.2       | 27.3      | 18.0      |
| BOD   | 0.00   | 4.40      | 5.44      | 6.00      | 3.26      | 3.71       | 5.41      | 6.35      |
| Total Organic Carbon [mg/L]                   | 11.9   | 12.8      | 14.4      | 17.8      | 13.0      | 15.1       | 15.4      | 17.0      |

\*Note: Sampling Event 5A (performed on 7/30/2014) was not utilized due to incomplete lab samples.

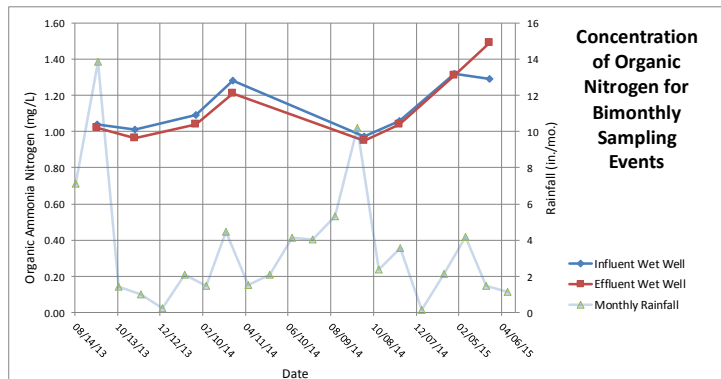
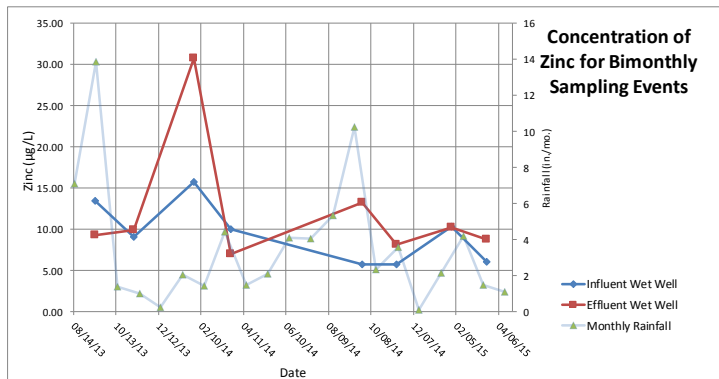
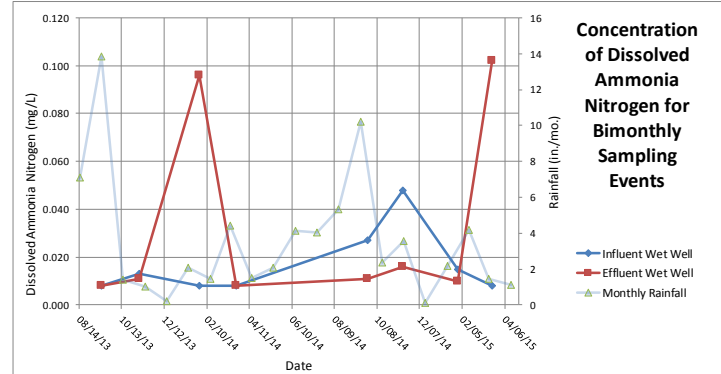
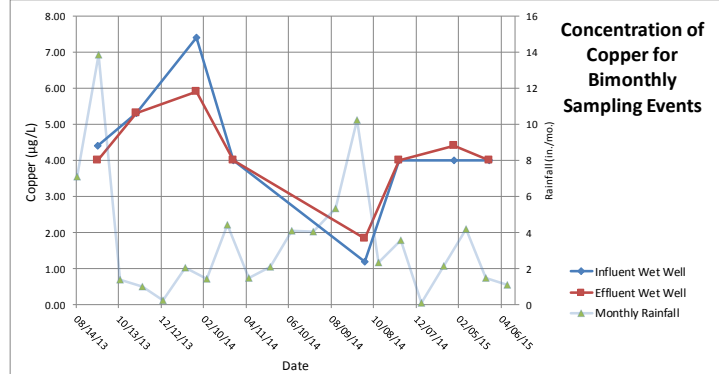
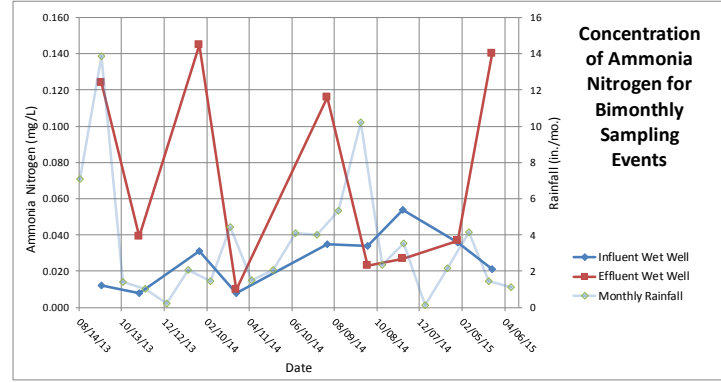
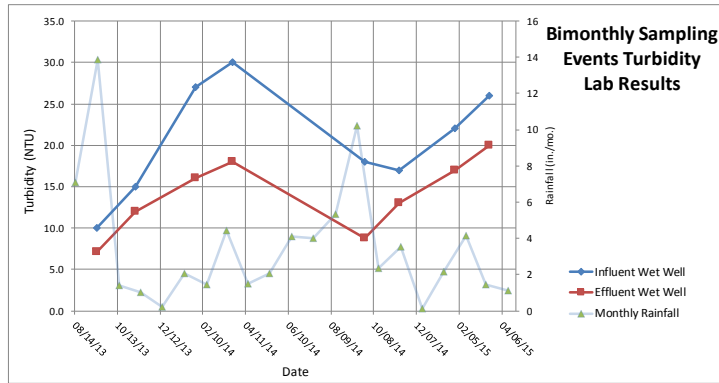


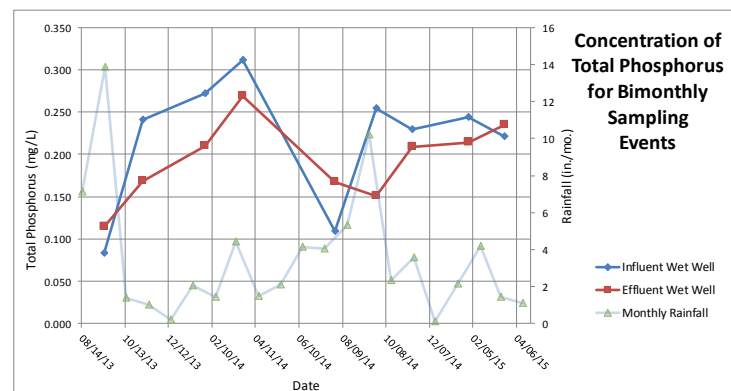
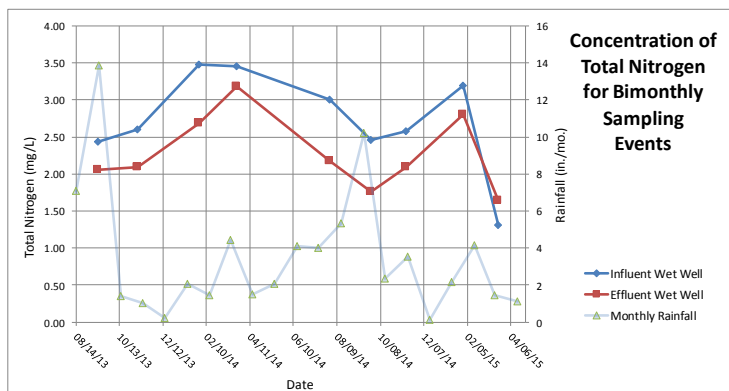
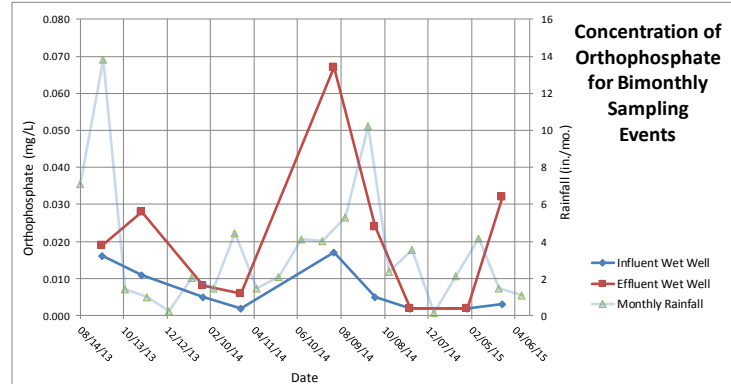
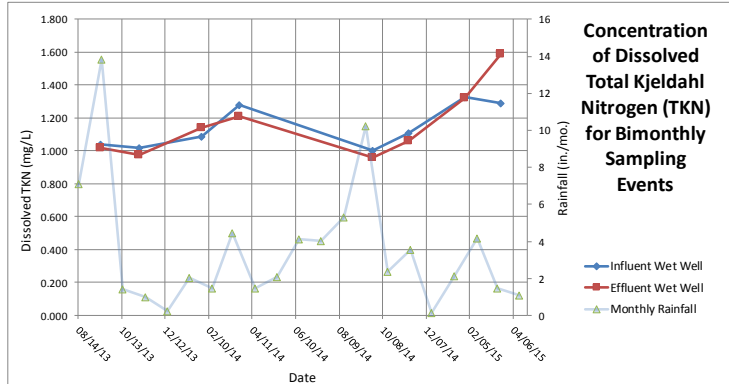
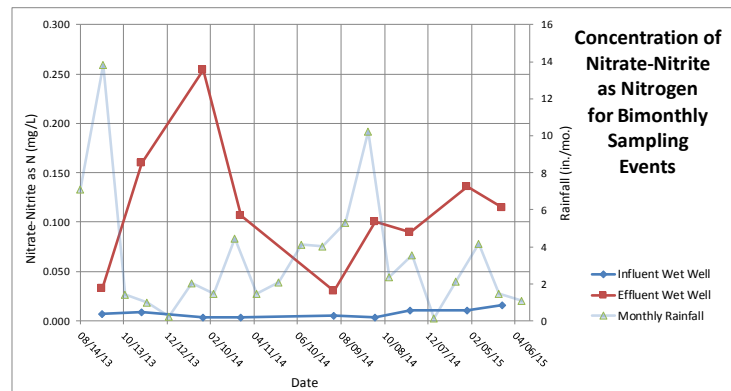
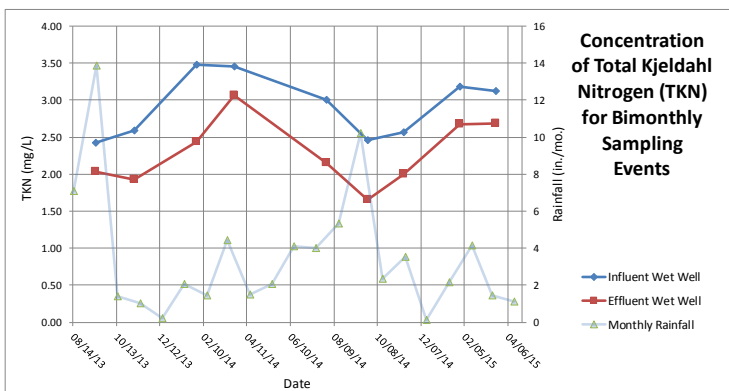
### A.3. Rainfall Data

| Date     | Monthly Rainfall (in.) |
|----------|------------------------|
| Jan-2013 | 0.34                   |
| Feb-2013 | 1.20                   |
| Mar-2013 | 2.00                   |
| Apr-2013 | 6.21                   |
| May-2013 | 5.10                   |
| Jun-2013 | 10.28                  |
| Jul-2013 | 12.98                  |
| Aug-2013 | 7.11                   |
| Sep-2013 | 13.85                  |
| Oct-2013 | 1.40                   |
| Nov-2013 | 1.01                   |
| Dec-2013 | 0.22                   |
| Jan-2014 | 2.06                   |
| Feb-2014 | 1.45                   |
| Mar-2014 | 4.44                   |
| Apr-2014 | 1.49                   |
| May-2014 | 2.09                   |
| Jun-2014 | 4.12                   |
| Jul-2014 | 4.03                   |
| Aug-2014 | 5.32                   |
| Sep-2014 | 10.22                  |
| Oct-2014 | 2.35                   |
| Nov-2014 | 3.55                   |
| Dec-2014 | 0.12                   |
| Jan-2015 | 2.15                   |
| Feb-2015 | 4.17                   |
| Mar-2015 | 1.46                   |
| Apr-2015 | 1.11                   |

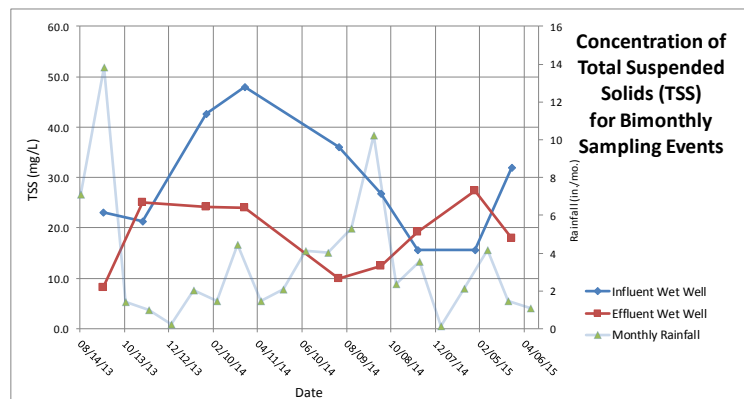
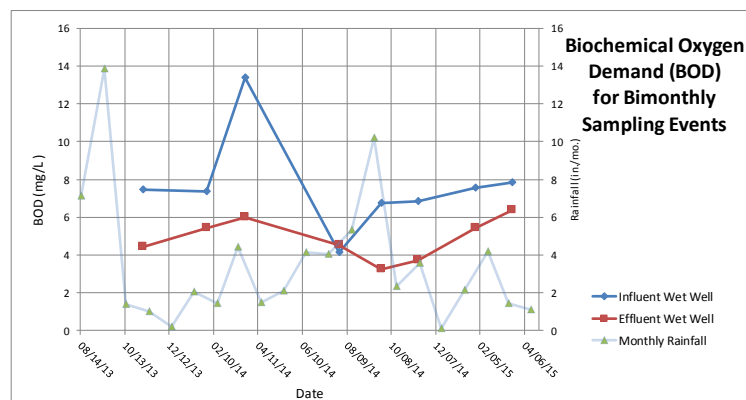
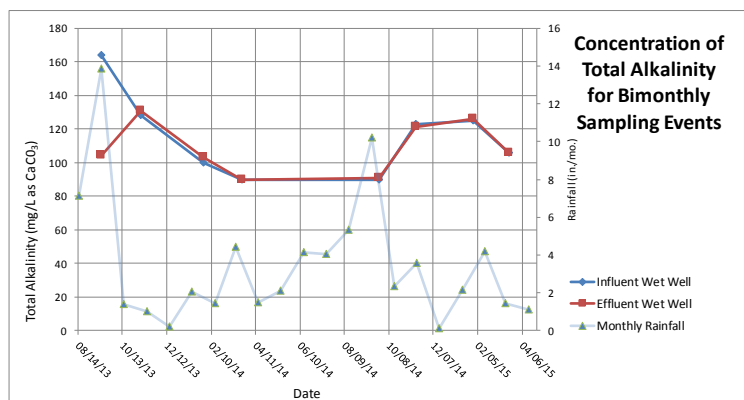
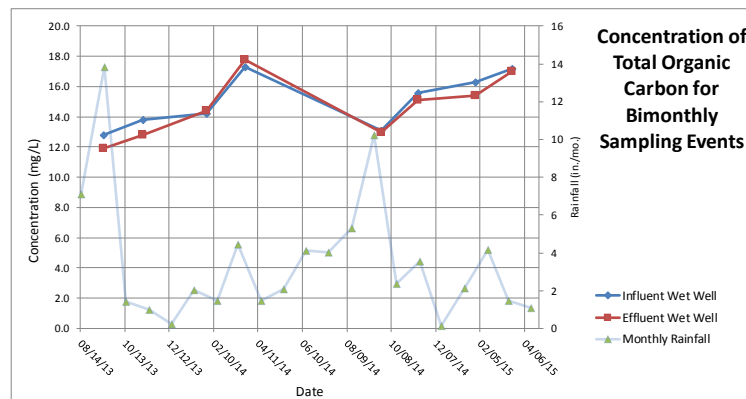
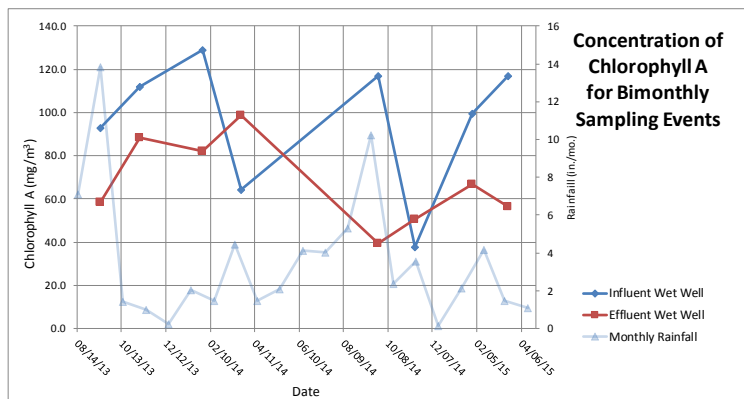


## A.4. Schedule C Summary of Bimonthly Results (319h Criteria)









| <b>BSTF BIMONTHLY EVENT REPORT NO. 1</b>            |  |
|---|--|
| <b>1.0 General Sample Information</b>               |  |
| Date/Time   | 09.14.13 / 12:00 pm                          |
| Interevent Period (days)                            | 60   |
| Ambient Conditions                                  | Hot, cloudy, may have rained the night prior |
| Technician Name(s)                                  | Erik Stuart                                  |
| Site Rain Gauge (in.)                               | 0.75   |
| <b>2.0 Reported Stage Readings (ft.)</b>            |  |
| Fermentation Basin                                  | 14.55  |
| Nitrification Zone                                  | 14.35  |
| Reaeration Zone                                     | 13.70  |
| Lake Discharge Weir                                 | 11.05  |
| <b>3.0 Pump Run Times (Totalized)</b>               |  |
| Pump A1 (hrs)                                       | 2,637.0                                      |
| Pump A2 (hrs)                                       | 2,597.0                                      |
| Pump B1 (hrs)                                       | 2,906.0                                      |
| Pump B2 (hrs)                                       | 1,977.0                                      |
| Total Treated Flow (MG at Influent PSA)             | 86.4   |
| Irrigation Pump (hrs)                               | 512.0  |
| Harvested Flow (MG)                                 | 0.335  |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |  |
| TSS (mg/L at PSA Influent)                          | 23.1   |
| TN (mg/L at PSA Influent)                           | 2.44   |
| TP (mg/L at PSA Influent)                           | 0.083  |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |  |
| TSS (mg/L at PSB Effluent)                          | 8.17   |
| TN (mg/L at PSB Effluent)                           | 2.06   |
| TP (mg/L at PSB Effluent)                           | 0.114  |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |  |
| TSS Mass Removal Goal (lbs)                         | 6,697.6                                      |
| TSS Reduction in Concentration (mg/L)               | 14.9   |
| TSS Mass Removed this Period (lbs)                  | 10,819.5                                     |
| TN Mass Removal Goal (lbs)                          | 275.8  |
| TN Reduction in Concentration (mg/L)                | 0.380  |
| TN Mass Removed this Period (lbs)                   | 279.8  |
| TP Mass Removal Goal (lbs)                          | 76.3   |
| TP Reduction in Concentration (mg/L)                | -0.031                                       |
| TP Mass Removed this Period (lbs)                   | -22.2  |

| <b>BSTF BIMONTHLY EVENT REPORT NO. 2</b>            |                     |
|---|---------------------|
| <b>1.0 General Sample Information</b>               |                     |
| Date/Time   | 11.07.13 / 11:00 am |
| Interevent Period (days)                            | 54                  |
| Ambient Conditions                                  | Hot, overcast       |
| Technician Name(s)                                  | Erik Stuart         |
| Site Rain Gauge (in.)                               | 0                   |
| <b>2.0 Reported Stage Readings (ft.)</b>            |                     |
| Fermentation Basin                                  | 14.45               |
| Nitrification Zone                                  | 13.30               |
| Reaeration Zone                                     | 12.20               |
| Lake Discharge Weir                                 | 11.05               |
| <b>3.0 Pump Run Times (Totalized)</b>               |                     |
| Pump A1 (hrs)                                       | 3,307.2             |
| Pump A2 (hrs)                                       | 3,071.8             |
| Pump B1 (hrs)                                       | 3,351.4             |
| Pump B2 (hrs)                                       | 2,445.0             |
| Total Treated Flow (MG at Influent PSA)             | 68.7                |
| Irrigation Pump (hrs)                               | 568.3               |
| Harvested Flow (MG)                                 | 0.220               |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |                     |
| TSS (mg/L at PSA Influent)                          | 21.3                |
| TN (mg/L at PSA Influent)                           | 2.60                |
| TP (mg/L at PSA Influent)                           | 0.241               |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |                     |
| TSS (mg/L at PSB Effluent)                          | 25.0                |
| TN (mg/L at PSB Effluent)                           | 2.09                |
| TP (mg/L at PSB Effluent)                           | 0.168               |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |                     |
| TSS Mass Removal Goal (lbs)                         | 6,027.9             |
| TSS Reduction in Concentration (mg/L)               | -3.7                |
| TSS Mass Removed this Period (lbs)                  | -2,088.0            |
| TN Mass Removal Goal (lbs)                          | 248.3               |
| TN Reduction in Concentration (mg/L)                | 0.510               |
| TN Mass Removed this Period (lbs)                   | 296.4               |
| TP Mass Removal Goal (lbs)                          | 68.6                |
| TP Reduction in Concentration (mg/L)                | 0.073               |
| TP Mass Removed this Period (lbs)                   | 42.2                |



| <b>BSTF BIMONTHLY EVENT REPORT NO. 3</b>            |                      |
|---|----------------------|
| <b>1.0 General Sample Information</b>               |                      |
| Date/Time   | 01.31.2014 / 9:30 AM |
| Interevent Period (days)                            | 85                   |
| Ambient Conditions                                  | No rain              |
| Technician Name(s)                                  | Erik Stuart          |
| Site Rain Gauge (in.)                               | 2.75                 |
| <b>2.0 Reported Stage Readings (ft.)</b>            |                      |
| Fermentation Basin                                  | 14.45                |
| Nitrification Zone                                  | 13.55                |
| Reaeration Zone                                     | 12.30                |
| Lake Discharge Weir                                 | 10.75                |
| <b>3.0 Pump Run Times (Totalized)</b>               |                      |
| Pump A1 (hrs)                                       | 3,976.9              |
| Pump A2 (hrs)                                       | 3,689.8              |
| Pump B1 (hrs)                                       | 3,678.2              |
| Pump B2 (hrs)                                       | 2,982.5              |
| Total Treated Flow (MG at Influent PSA)             | 77.3                 |
| Irrigation Pump (hrs)                               | 1,036.0              |
| Harvested Flow (MG)                                 | 1.824                |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |                      |
| TSS (mg/L at PSA Influent)                          | 42.7                 |
| TN (mg/L at PSA Influent)                           | 3.48                 |
| TP (mg/L at PSA Influent)                           | 0.272                |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |                      |
| TSS (mg/L at PSB Effluent)                          | 24.2                 |
| TN (mg/L at PSB Effluent)                           | 2.69                 |
| TP (mg/L at PSB Effluent)                           | 0.210                |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |                      |
| TSS Mass Removal Goal (lbs)                         | 9,488.3              |
| TSS Reduction in Concentration (mg/L)               | 18.5                 |
| TSS Mass Removed this Period (lbs)                  | 12,480.4             |
| TN Mass Removal Goal (lbs)                          | 390.8                |
| TN Reduction in Concentration (mg/L)                | 0.790                |
| TN Mass Removed this Period (lbs)                   | 554.4                |
| TP Mass Removal Goal (lbs)                          | 108.1                |
| TP Reduction in Concentration (mg/L)                | 0.062                |
| TP Mass Removed this Period (lbs)                   | 43.5                 |

| <b>BSTF BIMONTHLY EVENT REPORT NO. 4</b>            |                      |
|---|----------------------|
| <b>1.0 General Sample Information</b>               |                      |
| Date/Time   | 03.24.2014 / 1:00 PM |
| Interevent Period (days)                            | 52                   |
| Ambient Conditions                                  | Rain                 |
| Technician Name(s)                                  | Erik Stuart          |
| Site Rain Gauge (in.)                               | No data recorded     |
| <b>2.0 Reported Stage Readings (ft.)</b>            |                      |
| Fermentation Basin                                  | 14.35                |
| Nitrification Zone                                  | 13.30                |
| Reaeration Zone                                     | 12.00                |
| Lake Discharge Weir                                 | 11.07                |
| <b>3.0 Pump Run Times (Totalized)</b>               |                      |
| Pump A1 (hrs)                                       | 4,163.4              |
| Pump A2 (hrs)                                       | 4,433.0              |
| Pump B1 (hrs)                                       | 3,841.0              |
| Pump B2 (hrs)                                       | 3,512.7              |
| Total Treated Flow (MG at Influent PSA)             | 55.8                 |
| Irrigation Pump (hrs)                               | 1,147.1              |
| Harvested Flow (MG)                                 | 0.433                |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |                      |
| TSS (mg/L at PSA Influent)                          | 48.0                 |
| TN (mg/L at PSA Influent)                           | 3.460                |
| TP (mg/L at PSA Influent)                           | 0.311                |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |                      |
| TSS (mg/L at PSB Effluent)                          | 24.0                 |
| TN (mg/L at PSB Effluent)                           | 3.180                |
| TP (mg/L at PSB Effluent)                           | 0.269                |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |                      |
| TSS Mass Removal Goal (lbs)                         | 5,804.6              |
| TSS Reduction in Concentration (mg/L)               | 24.0                 |
| TSS Mass Removed this Period (lbs)                  | 11,319.5             |
| TN Mass Removal Goal (lbs)                          | 239.1                |
| TN Reduction in Concentration (mg/L)                | 0.280                |
| TN Mass Removed this Period (lbs)                   | 141.0                |
| TP Mass Removal Goal (lbs)                          | 66.1                 |
| TP Reduction in Concentration (mg/L)                | 0.042                |
| TP Mass Removed this Period (lbs)                   | 20.5                 |

| <b>BSTF BIMONTHLY EVENT REPORT NO. 5A</b>           |   |
|---|---|
| <b>1.0 General Sample Information</b>               |   |
| Date/Time   | 07.30.2014 / 4:00 PM                              |
| Interevent Period (days)                            | 128   |
| Ambient Conditions                                  | Hot, mostly sunny with intermittent light breezes |
| Technician Name(s)                                  | Phong Nguyen, Hunter Yates                        |
| Site Rain Gauge (in.)                               | 0.25  |
| <b>2.0 Reported Stage Readings (ft.)</b>            |   |
| Fermentation Basin                                  | 14.31   |
| Nitrification Zone                                  | -   |
| Reaeration Zone                                     | 13.38   |
| Lake Discharge Weir                                 | 11.50   |
| <b>3.0 Pump Run Times (Totalized)</b>               |   |
| Pump A1 (hrs)                                       | 4,701.7   |
| Pump A2 (hrs)                                       | 5,160.8   |
| Pump B1 (hrs)                                       | 4,248.1   |
| Pump B2 (hrs)                                       | 3,918.8   |
| Total Treated Flow (MG at Influent PSA)             | 76.0  |
| Irrigation Pump (hrs)                               | 1,318.4   |
| Harvested Flow (MG)                                 | 0.668   |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |   |
| TSS (mg/L at PSA Influent)                          | 36.0  |
| TN (mg/L at PSA Influent)                           | 3.000   |
| TP (mg/L at PSA Influent)                           | 0.109   |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |   |
| TSS (mg/L at PSB Effluent)                          | 10.0  |
| TN (mg/L at PSB Effluent)                           | 2.150   |
| TP (mg/L at PSB Effluent)                           | 0.151   |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |   |
| TSS Mass Removal Goal (lbs)                         | 14,288.3  |
| TSS Reduction in Concentration (mg/L)               | 26.0  |
| TSS Mass Removed this Period (lbs)                  | 16,652.9  |
| TN Mass Removal Goal (lbs)                          | 588.4   |
| TN Reduction in Concentration (mg/L)                | 0.850   |
| TN Mass Removed this Period (lbs)                   | 553.1   |
| TP Mass Removal Goal (lbs)                          | 162.7   |
| TP Reduction in Concentration (mg/L)                | -0.042  |
| TP Mass Removed this Period (lbs)                   | -26.1   |

| <b>BSTF BIMONTHLY EVENT REPORT NO. 5B</b>           |                          |
|---|--------------------------|
| <b>1.0 General Sample Information</b>               |                          |
| Date/Time   | 09.25.2014 / 1:20 PM     |
| Interevent Period (days)                            | 57                       |
| Ambient Conditions                                  | Hot, mostly sunny        |
| Technician Name(s)                                  | Mark Flint, Phong Nguyen |
| Site Rain Gauge (in.)                               | 4.75                     |
| <b>2.0 Reported Stage Readings (ft.)</b>            |                          |
| Fermentation Basin                                  | 14.40                    |
| Nitrification Zone                                  | -                        |
| Reaeration Zone                                     | 13.30                    |
| Lake Discharge Weir                                 | 10.70                    |
| <b>3.0 Pump Run Times (Totalized)</b>               |                          |
| Pump A1 (hrs)                                       | 5,152.1                  |
| Pump A2 (hrs)                                       | 5,349.1                  |
| Pump B1 (hrs)                                       | 4,692.2                  |
| Pump B2 (hrs)                                       | 4,129.0                  |
| Total Treated Flow (MG at Influent PSA)             | 38.3                     |
| Irrigation Pump (hrs)                               | 1,378.9                  |
| Harvested Flow (MG)                                 | 0.236                    |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |                          |
| TSS (mg/L at PSA Influent)                          | 26.8                     |
| TN (mg/L at PSA Influent)                           | 2.460                    |
| TP (mg/L at PSA Influent)                           | 0.254                    |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |                          |
| TSS (mg/L at PSB Effluent)                          | 12.4                     |
| TN (mg/L at PSB Effluent)                           | 1.760                    |
| TP (mg/L at PSB Effluent)                           | 0.151                    |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |                          |
| TSS Mass Removal Goal (lbs)                         | 6,362.8                  |
| TSS Reduction in Concentration (mg/L)               | 14.4                     |
| TSS Mass Removed this Period (lbs)                  | 4,649.9                  |
| TN Mass Removal Goal (lbs)                          | 262.0                    |
| TN Reduction in Concentration (mg/L)                | 0.700                    |
| TN Mass Removed this Period (lbs)                   | 228.0                    |
| TP Mass Removal Goal (lbs)                          | 72.5                     |
| TP Reduction in Concentration (mg/L)                | 0.103                    |
| TP Mass Removed this Period (lbs)                   | 33.4                     |



| <b>BSTF BIMONTHLY EVENT REPORT NO. 6</b>            |                          |
|---|--------------------------|
| <b>1.0 General Sample Information</b>               |                          |
| Date/Time   | 11.13.2014 / 5:00 PM     |
| Interevent Period (days)                            | 49                       |
| Ambient Conditions                                  | Cool, mostly sunny       |
| Technician Name(s)                                  | Mark Flint, Phong Nguyen |
| Site Rain Gauge (in.)                               | 0                        |
| <b>2.0 Reported Stage Readings (ft.)</b>            |                          |
| Fermentation Basin                                  | 14.25                    |
| Nitrification Zone                                  | 13.65                    |
| Reaeration Zone                                     | 11.80                    |
| Lake Discharge Weir                                 | 11.10                    |
| <b>3.0 Pump Run Times (Totalized)</b>               |                          |
| Pump A1 (hrs)                                       | 6,326.9                  |
| Pump A2 (hrs)                                       | 5,350.3                  |
| Pump B1 (hrs)                                       | 5,139.8                  |
| Pump B2 (hrs)                                       | 4,591.7                  |
| Total Treated Flow (MG at Influent PSA)             | 108.9                    |
| Irrigation Pump (hrs)                               | 1,428.7                  |
| Harvested Flow (MG)                                 | 0.194                    |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |                          |
| TSS (mg/L at PSA Influent)                          | 15.6                     |
| TN (mg/L at PSA Influent)                           | 2.580                    |
| TP (mg/L at PSA Influent)                           | 0.229                    |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |                          |
| TSS (mg/L at PSB Effluent)                          | 19.2                     |
| TN (mg/L at PSB Effluent)                           | 2.090                    |
| TP (mg/L at PSB Effluent)                           | 0.209                    |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |                          |
| TSS Mass Removal Goal (lbs)                         | 5,469.7                  |
| TSS Reduction in Concentration (mg/L)               | -3.6                     |
| TSS Mass Removed this Period (lbs)                  | -3,249.5                 |
| TN Mass Removal Goal (lbs)                          | 225.3                    |
| TN Reduction in Concentration (mg/L)                | 0.5                      |
| TN Mass Removed this Period (lbs)                   | 448.8                    |
| TP Mass Removal Goal (lbs)                          | 62.3                     |
| TP Reduction in Concentration (mg/L)                | 0.0                      |
| TP Mass Removed this Period (lbs)                   | 18.5                     |

| <b>BSTF BIMONTHLY EVENT REPORT NO. 7</b>            |                                |
|---|--------------------------------|
| <b>1.0 General Sample Information</b>               |                                |
| Date/Time   | 1.30.2015 / 4:00 PM            |
| Interevent Period (days)                            | 78                             |
| Ambient Conditions                                  | Cool, clear skies              |
| Technician Name(s)                                  | Phong Nguyen, Avedis Serpekian |
| Site Rain Gauge (in.)                               | N/A (rain gauge broken)        |
| <b>2.0 Reported Stage Readings (ft.)</b>            |                                |
| Fermentation Basin                                  | 14.42                          |
| Nitrification Zone                                  | 12.96                          |
| Reaeration Zone                                     | 11.78                          |
| Lake Discharge Weir                                 | -                              |
| <b>3.0 Pump Run Times (Totalized)</b>               |                                |
| Pump A1 (hrs)                                       | 7,537.2                        |
| Pump A2 (hrs)                                       | 5,769.3                        |
| Pump B1 (hrs)                                       | 5,799.5                        |
| Pump B2 (hrs)                                       | 5,196.0                        |
| Total Treated Flow (MG at Influent PSA)             | 97.8                           |
| Irrigation Pump (hrs)                               | 1,599.1                        |
| Harvested Flow (MG)                                 | 0.665                          |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |                                |
| TSS (mg/L at PSA Influent)                          | 15.7                           |
| TN (mg/L at PSA Influent)                           | 3.190                          |
| TP (mg/L at PSA Influent)                           | 0.244                          |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |                                |
| TSS (mg/L at PSB Effluent)                          | 27.3                           |
| TN (mg/L at PSB Effluent)                           | 2.810                          |
| TP (mg/L at PSB Effluent)                           | 0.214                          |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |                                |
| TSS Mass Removal Goal (lbs)                         | 8,706.9                        |
| TSS Reduction in Concentration (mg/L)               | -11.6                          |
| TSS Mass Removed this Period (lbs)                  | -9,389.2                       |
| TN Mass Removal Goal (lbs)                          | 358.6                          |
| TN Reduction in Concentration (mg/L)                | 0.380                          |
| TN Mass Removed this Period (lbs)                   | 325.0                          |
| TP Mass Removal Goal (lbs)                          | 99.2                           |
| TP Reduction in Concentration (mg/L)                | 0.030                          |
| TP Mass Removed this Period (lbs)                   | 25.6                           |

| <b>BSTF BIMONTHLY EVENT REPORT NO. 8</b>            |                               |
|---|-------------------------------|
| <b>1.0 General Sample Information</b>               |                               |
| Date/Time   | 3.20.2015 / 1:30 PM           |
| Interevent Period (days)                            | 49                            |
| Ambient Conditions                                  | Warm, clear skies             |
| Technician Name(s)                                  | Phong Nguyen, Mark Flint      |
| Site Rain Gauge (in.)                               | N/A (rain gauge not replaced) |
| <b>2.0 Reported Stage Readings (ft.)</b>            |                               |
| Fermentation Basin                                  | 14.45                         |
| Nitrification Zone                                  | 12.45                         |
| Reaeration Zone                                     | 11.50                         |
| Lake Discharge Weir                                 | 11.00                         |
| <b>3.0 Pump Run Times (Totalized)</b>               |                               |
| Pump A1 (hrs)                                       | 8,034.2                       |
| Pump A2 (hrs)                                       | 6,279.5                       |
| Pump B1 (hrs)                                       | 6,136.9                       |
| Pump B2 (hrs)                                       | 5,612.2                       |
| Total Treated Flow (MG at Influent PSA)             | 60.4                          |
| Irrigation Pump (hrs)                               | 1,663.3                       |
| Harvested Flow (MG)                                 | 0.250                         |
| <b>4.0 Reported Stormwater Inflow Water Quality</b> |                               |
| TSS (mg/L at PSA Influent)                          | 32.0                          |
| TN (mg/L at PSA Influent)                           | 1.310                         |
| TP (mg/L at PSA Influent)                           | 0.221                         |
| <b>5.0 Treated Stormwater Effluent from BSTF</b>    |                               |
| TSS (mg/L at PSB Effluent)                          | 18.0                          |
| TN (mg/L at PSB Effluent)                           | 1.640                         |
| TP (mg/L at PSB Effluent)                           | 0.235                         |
| <b>6.0 Summary of 319h Grant Key Parameters</b>     |                               |
| TSS Mass Removal Goal (lbs)                         | 5,469.7                       |
| TSS Reduction in Concentration (mg/L)               | 14.0                          |
| TSS Mass Removed this Period (lbs)                  | 7,117.1                       |
| TN Mass Removal Goal (lbs)                          | 225.3                         |
| TN Reduction in Concentration (mg/L)                | -0.330                        |
| TN Mass Removed this Period (lbs)                   | -164.1                        |
| TP Mass Removal Goal (lbs)                          | 62.3                          |
| TP Reduction in Concentration (mg/L)                | -0.014                        |
| TP Mass Removed this Period (lbs)                   | -6.7                          |

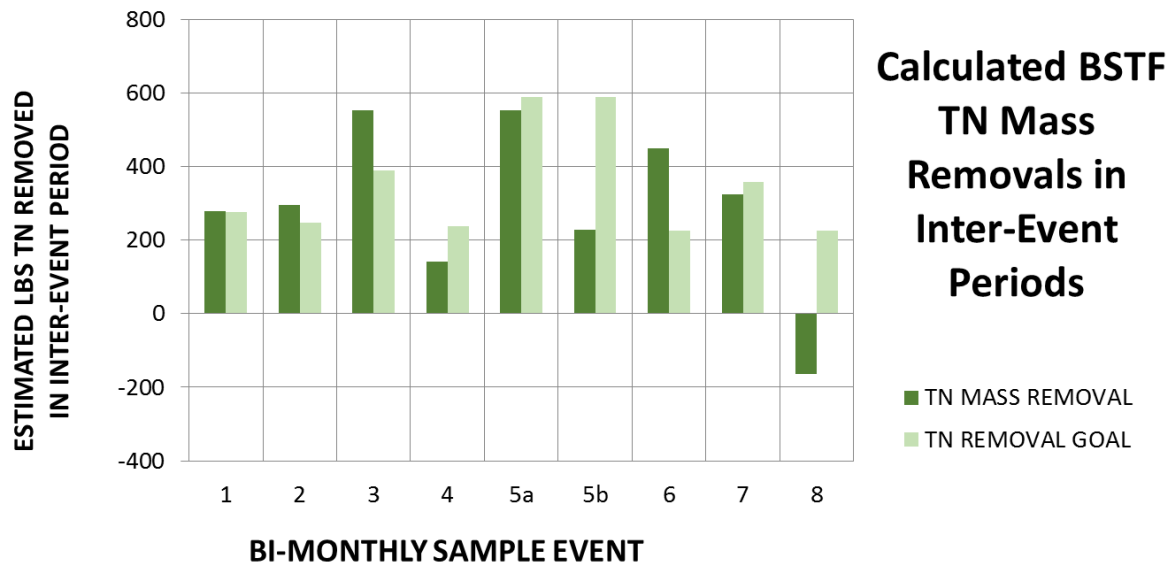
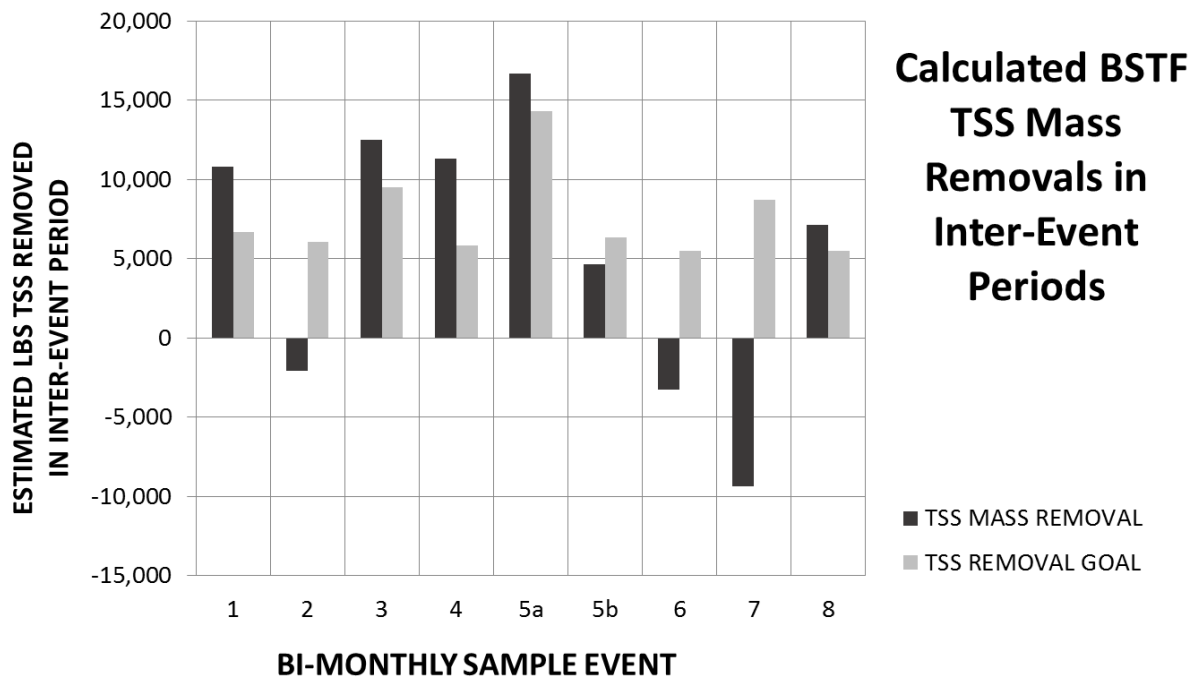
**BSTF Year 1 Pollutant Removal Estimates**  
(Reporting Period: 9/2013-9/2014)

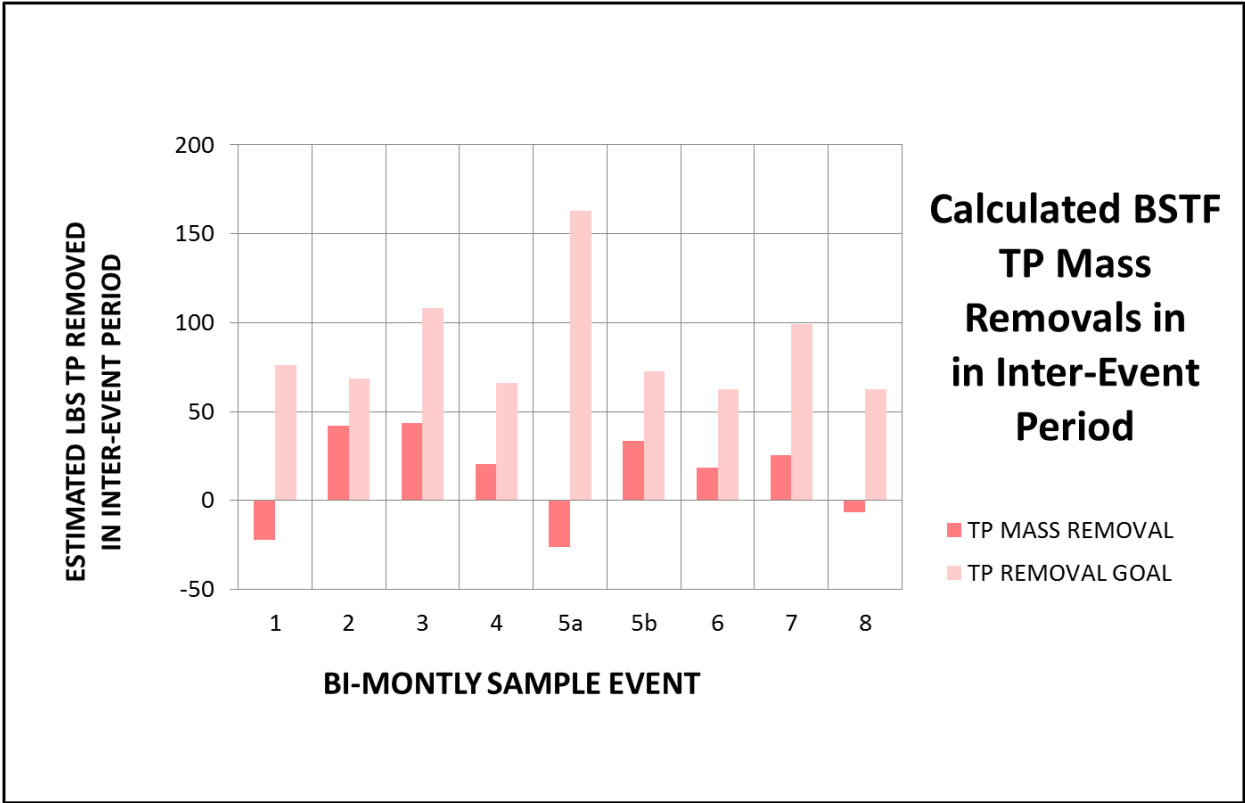
| Reporting Parameter                                   | Mass Removed (lb) |
|---|-------------------|
| TSS Mass Removal Goal (Adjusted for Reporting Period) | 48,670            |
| <b>TSS Mass Removed over Report Period</b>            | <b>53,834</b>     |
| TN Mass Removal Goal (Adjusted for Reporting Period)  | 2,004             |
| <b>TN Mass Removed over Report Period</b>             | <b>2,053</b>      |
| TP Mass Removal Goal (Adjusted for Reporting Period)  | 554               |
| <b>TP Mass Removed over Report Period</b>             | <b>91</b>         |

**BSTF Overall Pollutant Removal Estimates**  
(Reporting Period: 9/2013-3/2015)

| Reporting Parameter                                   | Mass Removed (lb) |
|---|-------------------|
| TSS Mass Removal Goal (Adjusted for Reporting Period) | 68,316            |
| <b>TSS Mass Removed over Report Period</b>            | <b>48,313</b>     |
| TN Mass Removal Goal (Adjusted for Reporting Period)  | 2,814             |
| <b>TN Mass Removed over Report Period</b>             | <b>2,662</b>      |
| TP Mass Removal Goal (Adjusted for Reporting Period)  | 778               |
| <b>TP Mass Removed over Report Period</b>             | <b>129</b>        |



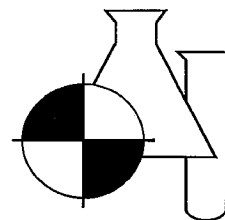




#### **A.5. Schedule C Benchmark Enviroanalytical Raw Data**

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 13090584

Watermark Engineering Group  
1422 Apollo Beach Blvd  
Apollo Beach, FL 33572

Project Name : BRIARWOOD BIMONTHLY  
Date Received : 09/14/2013  
Time Received : 1429

Submission Number 13090584

Sample Number: 001

Sample Description: BWL-Bimonthly-1-1

Sample Date: 09/14/2013

Sample Method: Grab

Sample Time: 1250

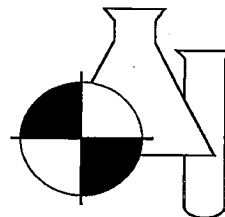
| Parameter                          | Result    | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|-----------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |           |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 10        | NTU   | 0.05  | 0.05  | 180.1     | 09/15/2013 | 13:20 | BG      |
| COPPER                             | 4.40 I    | UG/L  | 4     | 16    | 200.7     | 09/19/2013 | 17:01 | JSM     |
| ZINC                               | 13.4      | UG/L  | 1.4   | 5.6   | 200.7     | 09/19/2013 | 17:01 | JSM     |
| AMMONIA NITROGEN                   | 0.012 I   | MG/L  | 0.008 | 0.032 | 350.1     | 09/19/2013 | 15:15 | DM      |
| AMMONIA NITROGEN, DISSOLVED        | 0.008 U   | MG/L  | 0.008 | 0.032 | 350.1     | 09/19/2013 | 15:13 | DM      |
| ORGANIC NITROGEN, DISSOLVED        | 1.04      | MG/L  | 0.05  | 0.20  | 351-350.1 | 10/02/2013 | 13:01 | JER     |
| TOTAL KJELDAHL NITROGEN            | 2.43      | MG/L  | 0.05  | 0.20  | 351.2     | 10/02/2013 | 13:00 | JER     |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.04      | MG/L  | 0.05  | 0.20  | 351.2     | 10/02/2013 | 13:01 | JER     |
| TOTAL NITROGEN                     | 2.44      | MG/L  | 0.05  | 0.20  | 353+351   | 10/02/2013 | 13:00 | JER/WY  |
| NITRATE+NITRITE AS N               | 0.007 IJ4 | MG/L  | 0.004 | 0.016 | 353.2     | 09/18/2013 | 10:00 | WY      |
| ORTHO PHOSPHORUS AS P              | 0.016     | MG/L  | 0.002 | 0.008 | 365.3     | 09/16/2013 | 09:25 | MR      |
| TOTAL PHOSPHORUS AS P              | 0.083     | MG/L  | 0.008 | 0.032 | 365.3     | 09/17/2013 | 12:50 | MR      |
| CHLOROPHYLL A, CORRECTED           | 93.1      | MG/M3 | 0.25  | 1.00  | 445.0     | 09/20/2013 | 12:25 | BG      |
| TOTAL ALKALINITY (CAC03)           | 164       | MG/L  | 0.594 | 2.376 | SM2320B   | 09/23/2013 | 12:32 | MR      |
| TOTAL SUSPENDED SOLIDS             | 23.1      | MG/L  | 0.570 | 2.280 | SM2540D   | 09/16/2013 | 14:13 | JA      |
| TOTAL ORGANIC CARBON               | 12.8      | MG/L  | 0.271 | 1.084 | SM5310B   | 09/20/2013 | 14:47 | KD      |

1711 12th Street East \* Palmetto, FL 34221 \* Phone (941) 723-9986 \* Fax (941) 723-6061



# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

Submission Number 13090584

Sample Number: 002

Sample Description: BWL-Bimonthly-1-6

Sample Date: 09/14/2013

Sample Method: Grab

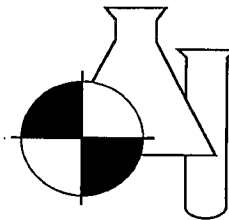
Sample Time: 1255

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 7.1     | NTU   | 0.05  | 0.05  | 180.1     | 09/15/2013 | 13:20 | BG      |
| COPPER                             | 4 U     | UG/L  | 4     | 16    | 200.7     | 09/19/2013 | 17:04 | JSM     |
| ZINC                               | 9.30    | UG/L  | 1.4   | 5.6   | 200.7     | 09/19/2013 | 17:04 | JSM     |
| AMMONIA NITROGEN                   | 0.124   | MG/L  | 0.008 | 0.032 | 350.1     | 09/19/2013 | 15:19 | DM      |
| AMMONIA NITROGEN, DISSOLVED        | 0.008 U | MG/L  | 0.008 | 0.032 | 350.1     | 09/19/2013 | 15:17 | DM      |
| ORGANIC NITROGEN, DISSOLVED        | 1.02    | MG/L  | 0.05  | 0.20  | 351-350.1 | 10/02/2013 | 13:03 | JER     |
| TOTAL KJELDAHL NITROGEN            | 2.03    | MG/L  | 0.05  | 0.20  | 351.2     | 10/02/2013 | 13:02 | JER     |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.02    | MG/L  | 0.05  | 0.20  | 351.2     | 10/02/2013 | 13:03 | JER     |
| TOTAL NITROGEN                     | 2.06    | MG/L  | 0.05  | 0.20  | 353+351   | 10/02/2013 | 13:02 | JER/WY  |
| NITRATE+NITRITE AS N               | 0.033   | MG/L  | 0.004 | 0.016 | 353.2     | 09/18/2013 | 10:00 | WY      |
| ORTHO PHOSPHORUS AS P              | 0.019   | MG/L  | 0.002 | 0.008 | 365.3     | 09/16/2013 | 09:28 | MR      |
| TOTAL PHOSPHORUS AS P              | 0.114   | MG/L  | 0.008 | 0.032 | 365.3     | 09/17/2013 | 12:51 | MR      |
| CHLOROPHYLL A, CORRECTED           | 58.5    | MG/M3 | 0.25  | 1.00  | 445.0     | 09/20/2013 | 12:25 | BG      |
| TOTAL ALKALINITY (CACO3)           | 104     | MG/L  | 0.594 | 2.376 | SM2320B   | 09/23/2013 | 12:32 | MR      |
| TOTAL SUSPENDED SOLIDS             | 81.7    | MG/L  | 0.570 | 2.280 | SM2540D   | 09/16/2013 | 14:14 | JA      |
| TOTAL ORGANIC CARBON               | 11.9    | MG/L  | 0.271 | 1.084 | SM5310B   | 09/20/2013 | 15:02 | KD      |

1711 12th Street East \* Palmetto, FL 34221 \* Phone (941) 723-9986 \* Fax (941) 723-6061

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

10/04/2013

Date

*Tülay Tanrisever*  
Dale D. Dixon / Laboratory Director  
Tülay Tanrisever / QC Officer  
Jennifer Hatfield / QC Officer

## DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

## NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 340.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

! = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES: Chlorophyll A lab filtered on 09/15/13 at 1230.

For questions and comments regarding these results, please contact Bettina Beilfuss at (941) 723-9986

*Results relate only to the samples.*

Benchmark EnviroAnalytical, Inc  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
[www.benchmarkea.com](http://www.benchmarkea.com)

Client Information:

**Watermark Engineering Group, Inc.**  
1422 Apollo Beach Blvd.  
Apollo Beach, FL 33572  
813-641-1200  
Fax: 813-641-1204  
Mark Flint — [mflint@watermarkengineering.com](mailto:mflint@watermarkengineering.com)

Bi-monthly

Project Name: Briarwood Stormwater Treatment Facility  
Profile 560

Laboratory Submission #

| Sample Name                                 | Sample Type <sup>1</sup> | Sample Matrix <sup>2</sup>   | Parameters, Preservation <sup>4</sup> , Container Type <sup>3</sup>  | Laboratory Sample #                         |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
|---|--------------------------|--|--|---|--|--|---|--|--|---------------|---|---|---|---|---|---|---|-------|---------|-------|---|-------|-------|---------------------------|--------------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------------|--|--|--|--|--|---|----------------------------|--|--|--|--|--|---|--------------|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--------------------|---|----|--|--|--|--|--|
| Bimonthly 1-1<br>BWL-OPT - - -              | G                        | SW   | <table border="1"> <tr> <td>Corrected Chlorophyll a (445.0)<br/>01/12/20</td><td>TOC (SM5310B)</td><td>Dissolved Organic Nitrogen (Calc.)<br/>NH<sub>3</sub> (350.1)<br/>TKN (351.2)<br/>(Lab Filtered)</td><td>NH<sub>3</sub> (350.1)<br/>TKN (351.2)<br/>NO<sub>3</sub>-NO<sub>2</sub> (353.2)<br/>TP (365.3) TN (Calc.)</td><td>Ortho-Phosphate (Lab Filtered) (365.3)</td><td>TSS (SM2540D)<br/>T-Alkalinity (SM2320B)<br/>Turbidity (180.1)</td><td>Cu Zn (200.7)</td></tr> <tr> <td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td></tr> <tr> <td>Plain</td><td>1:1 HCl</td><td>Plain</td><td>1:4 H<sub>2</sub>SO<sub>4</sub> pH&lt;2</td><td>Plain</td><td>Plain</td><td>1:4 HNO<sub>3</sub> pH&lt;2</td></tr> <tr> <td>1 x 500mL Opaque Plastic</td><td>1 x 40mL Glass Vial</td><td>1 x 1/2 Pint Plastic</td><td>1 x 1/2 Pint Plastic</td><td>1 x 1/2 Pint Plastic</td><td>1 x 1 Quart Plastic</td><td>1 x 1/2 Pint Plastic</td></tr> <tr> <td>Date &amp; Time: 9-14-13 12:50</td><td colspan="5"></td><td>1</td></tr> <tr> <td>Date &amp; Time: 9-14-13 12:55</td><td colspan="5"></td><td>2</td></tr> <tr> <td>Date &amp; Time:</td><td colspan="5"></td><td></td></tr> <tr> <td>Date &amp; Time:</td><td colspan="5"></td><td></td></tr> <tr> <td>Date &amp; Time:</td><td colspan="5"></td><td></td></tr> <tr> <td>Date &amp; Time:</td><td colspan="5"></td><td></td></tr> <tr> <td>Date &amp; Time:</td><td colspan="5"></td><td></td></tr> <tr> <td>Date &amp; Time:</td><td colspan="5"></td><td></td></tr> <tr> <td>BWL-OPT - - - -Dup</td><td>G</td><td>SW</td><td colspan="3"></td><td></td></tr> </table> | Corrected Chlorophyll a (445.0)<br>01/12/20 | TOC (SM5310B)  | Dissolved Organic Nitrogen (Calc.)<br>NH <sub>3</sub> (350.1)<br>TKN (351.2)<br>(Lab Filtered) | NH <sub>3</sub> (350.1)<br>TKN (351.2)<br>NO <sub>3</sub> -NO <sub>2</sub> (353.2)<br>TP (365.3) TN (Calc.) | Ortho-Phosphate (Lab Filtered) (365.3) | TSS (SM2540D)<br>T-Alkalinity (SM2320B)<br>Turbidity (180.1) | Cu Zn (200.7) | A | B | C | D | E | F | G | Plain | 1:1 HCl | Plain | 1:4 H <sub>2</sub> SO <sub>4</sub> pH<2 | Plain | Plain | 1:4 HNO <sub>3</sub> pH<2 | 1 x 500mL Opaque Plastic | 1 x 40mL Glass Vial | 1 x 1/2 Pint Plastic | 1 x 1/2 Pint Plastic | 1 x 1/2 Pint Plastic | 1 x 1 Quart Plastic | 1 x 1/2 Pint Plastic | Date & Time: 9-14-13 12:50 |  |  |  |  |  | 1 | Date & Time: 9-14-13 12:55 |  |  |  |  |  | 2 | Date & Time: |  |  |  |  |  |  | Date & Time: |  |  |  |  |  |  | Date & Time: |  |  |  |  |  |  | Date & Time: |  |  |  |  |  |  | Date & Time: |  |  |  |  |  |  | Date & Time: |  |  |  |  |  |  | BWL-OPT - - - -Dup | G | SW |  |  |  |  |  |
| Corrected Chlorophyll a (445.0)<br>01/12/20 | TOC (SM5310B)            | Dissolved Organic Nitrogen (Calc.)<br>NH <sub>3</sub> (350.1)<br>TKN (351.2)<br>(Lab Filtered) | NH <sub>3</sub> (350.1)<br>TKN (351.2)<br>NO <sub>3</sub> -NO <sub>2</sub> (353.2)<br>TP (365.3) TN (Calc.)  | Ortho-Phosphate (Lab Filtered) (365.3)      | TSS (SM2540D)<br>T-Alkalinity (SM2320B)<br>Turbidity (180.1) | Cu Zn (200.7)  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| A   | B                        | C  | D  | E   | F  | G  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Plain                                       | 1:1 HCl                  | Plain  | 1:4 H <sub>2</sub> SO <sub>4</sub> pH<2  | Plain                                       | Plain  | 1:4 HNO <sub>3</sub> pH<2  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| 1 x 500mL Opaque Plastic                    | 1 x 40mL Glass Vial      | 1 x 1/2 Pint Plastic   | 1 x 1/2 Pint Plastic   | 1 x 1/2 Pint Plastic                        | 1 x 1 Quart Plastic  | 1 x 1/2 Pint Plastic   |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time: 9-14-13 12:50                  |                          |  |  |   |  | 1  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time: 9-14-13 12:55                  |                          |  |  |   |  | 2  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time:                                |                          |  |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time:                                |                          |  |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time:                                |                          |  |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time:                                |                          |  |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time:                                |                          |  |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Date & Time:                                |                          |  |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| BWL-OPT - - - -Dup                          | G                        | SW   |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| Bimonthly 1-6<br>BWL-OPT - - -              | G                        | SW   |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| BWL-OPT - - -                               | G                        | SW   |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| BWL-OPT - - -                               | G                        | SW   |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| BWL-OPT - - -                               | G                        | SW   |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |
| BWL-OPT - - -                               | G                        | SW   |  |   |  |  |   |  |  |               |   |   |   |   |   |   |   |       |         |       |   |       |       |                           |                          |                     |                      |                      |                      |                     |                      |                            |  |  |  |  |  |   |                            |  |  |  |  |  |   |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |              |  |  |  |  |  |  |                    |   |    |  |  |  |  |  |

"Sample Type" is used to indicate whether the sample was a grab (G) or whether it was a composite (C).

Sample Matrix: is used to indicate whether the sample is being discharged to drinking water (DW), surface water (SW), soil, effluent (SP/INT) or sludge (S/DG).

"Container Type" is used to indicate whether the container is plastic (P) or glass (G).

Under "Preservative," list any preservatives that were added to the sample container. Sample must be refrigerated or stored in wet ice after collection. The temperature during storage should be less than or equal to 6°C (42.8°F).

and identifying sample ID, premeasured preservative contained in the bottle, sample type, client ID, and parameters for analysis.

Information should be added to each bottle label after collection with permanent black ink: date and time of collection, sampler's name or initials, and any field number or ID. Information may be added to the label after collection.

4. The client is responsible for documentation of the sampling events. Please note special sampling events on the sample custody form.

| Collected By  | Date       | Time  |
|---|------------|-------|
|  | 10/10/2008 | 10:00 |

| Collected by: | Date | Time | Re |
|---------------|------|------|----|
|               |      |      |    |

|       |          |       |
|-------|----------|-------|
| 14201 | 06/11/13 | 14201 |
|-------|----------|-------|

11/11/2020

222 Street

Laboratory Sample Acceptability: pH < 2: ☒  
BEA Temperature: 0.90C

4 of 4

Brady!

Time 1429

Date 9/24/13

10

Ute

\_\_\_\_\_  
 Approved By:

Time 1429

|      |          |
|------|----------|
| Date | 09/14/11 |
|------|----------|

*Wen*

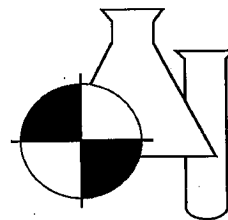
W. L. R.

Collected By:

4

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 13110291

Watermark Engineering Group  
1422 Apollo Beach Blvd  
Apollo Beach, FL 33572

Project Name : BRIARWOOD STORMWATER  
Date Received : 11/07/2013  
Time Received : 1514

Submission Number 13110291

Sample Number: 001

Sample Description: BWL-BiMon-2-1

Sample Date: 11/07/2013

Sample Method: Grab

Sample Time: 1158

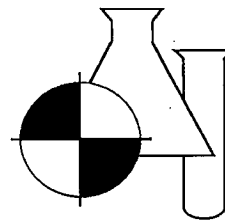
| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst  |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|----------|
|                                    |         |       |       |       |           | Date       | Time  |          |
| TURBIDITY                          | 15      | NTU   | 0.05  | 0.05  | 180.1     | 11/08/2013 | 11:30 | JB       |
| COPPER                             | 5.30 I  | UG/L  | 4     | 16    | 200.7     | 11/13/2013 | 18:56 | JSM      |
| ZINC                               | 9.10    | UG/L  | 1.4   | 5.6   | 200.7     | 11/13/2013 | 18:56 | JSM      |
| AMMONIA NITROGEN                   | 0.008 I | MG/L  | 0.008 | 0.032 | 350.1     | 11/11/2013 | 13:11 | JB       |
| AMMONIA NITROGEN, DISSOLVED        | 0.013 I | MG/L  | 0.008 | 0.032 | 350.1     | 11/12/2013 | 09:42 | JB       |
| ORGANIC NITROGEN, DISSOLVED        | 1.01    | MG/L  | 0.05  | 0.20  | 351-350.1 | 11/14/2013 | 12:40 | JER/JB   |
| TOTAL KJELDAHL NITROGEN            | 2.59    | MG/L  | 0.05  | 0.20  | 351.2     | 11/14/2013 | 12:35 | JER      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.02    | MG/L  | 0.05  | 0.20  | 351.2     | 11/14/2013 | 12:36 | JER      |
| TOTAL NITROGEN                     | 2.60    | MG/L  | 0.05  | 0.20  | 353+351   | 11/14/2013 | 12:35 | JER/TN/W |
| NITRATE+NITRITE AS N               | 0.009 I | MG/L  | 0.004 | 0.016 | 353.2     | 11/08/2013 | 10:25 | TN/WY    |
| ORTHO PHOSPHORUS AS P              | 0.011   | MG/L  | 0.002 | 0.008 | 365.3     | 11/07/2013 | 17:12 | MR       |
| TOTAL PHOSPHORUS AS P              | 0.241   | MG/L  | 0.008 | 0.032 | 365.3     | 11/12/2013 | 12:17 | MR       |
| CHLOROPHYLL A, CORRECTED           | 112.1   | MG/M3 | 0.25  | 1.00  | 445.0     | 11/14/2013 | 15:35 | JMG/BG   |
| TOTAL ALKALINITY (CACO3)           | 128     | MG/L  | 0.594 | 2.376 | SM2320B   | 11/13/2013 | 09:50 | MR       |
| TOTAL SUSPENDED SOLIDS             | 21.3    | MG/L  | 0.570 | 2.280 | SM2540D   | 11/11/2013 | 12:05 | JG/JA    |
| BIOCHEMICAL OXYGEN DEMAND          | 7.47    | MG/L  | 0.5   | 2.0   | SM5210B   | 11/08/2013 | 12:43 | SJ/SJ    |
| TOTAL ORGANIC CARBON               | 13.8    | MG/L  | 0.271 | 1.084 | SM5310B   | 11/19/2013 | 12:42 | KD       |

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# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification # E84167

Submission Number 13110291

Sample Number: 002

Sample Description: BWL-BiMon-2-2

Sample Date: 11/07/2013

Sample Method: Grab

Sample Time: 1200

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst  |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|----------|
|                                    |         |       |       |       |           | Date       | Time  |          |
| TURBIDITY                          | 12      | NTU   | 0.05  | 0.05  | 180.1     | 11/08/2013 | 11:30 | JB       |
| COPPER                             | 5.30 I  | UG/L  | 4     | 16    | 200.7     | 11/13/2013 | 19:07 | JSM      |
| ZINC                               | 9.90    | UG/L  | 1.4   | 5.6   | 200.7     | 11/13/2013 | 19:07 | JSM      |
| AMMONIA NITROGEN                   | 0.039   | MG/L  | 0.008 | 0.032 | 350.1     | 11/11/2013 | 13:15 | JB       |
| AMMONIA NITROGEN, DISSOLVED        | 0.011 I | MG/L  | 0.008 | 0.032 | 350.1     | 11/12/2013 | 09:47 | JB       |
| ORGANIC NITROGEN, DISSOLVED        | 0.965   | MG/L  | 0.05  | 0.20  | 351-350.1 | 11/14/2013 | 12:40 | JER/JB   |
| TOTAL KJELDAHL NITROGEN            | 1.93    | MG/L  | 0.05  | 0.20  | 351.2     | 11/14/2013 | 12:37 | JER      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 0.976   | MG/L  | 0.05  | 0.20  | 351.2     | 11/14/2013 | 12:38 | JER      |
| TOTAL NITROGEN                     | 2.09    | MG/L  | 0.05  | 0.20  | 353+351   | 11/14/2013 | 12:37 | JER/TN/W |
| NITRATE+NITRITE AS N               | 0.160   | MG/L  | 0.004 | 0.016 | 353.2     | 11/08/2013 | 10:25 | TN/WY    |
| ORTHO PHOSPHORUS AS P              | 0.028   | MG/L  | 0.002 | 0.008 | 365.3     | 11/07/2013 | 17:14 | MR       |
| TOTAL PHOSPHORUS AS P              | 0.168   | MG/L  | 0.008 | 0.032 | 365.3     | 11/12/2013 | 12:18 | MR       |
| CHLOROPHYLL A, CORRECTED           | 88.4    | MG/M3 | 0.25  | 1.00  | 445.0     | 11/14/2013 | 15:37 | JMG/BG   |
| TOTAL ALKALINITY (CAC03)           | 131     | MG/L  | 0.594 | 2.376 | SM2320B   | 11/13/2013 | 09:50 | MR       |
| TOTAL SUSPENDED SOLIDS             | 25.0    | MG/L  | 0.570 | 2.280 | SM2540D   | 11/11/2013 | 12:06 | JG/JA    |
| BIOCHEMICAL OXYGEN DEMAND          | 4.4     | MG/L  | 0.5   | 2.0   | SM5210B   | 11/08/2013 | 12:43 | SJ/SJ    |
| TOTAL ORGANIC CARBON               | 12.8    | MG/L  | 0.271 | 1.084 | SM5310B   | 11/19/2013 | 12:57 | KD       |

Submission Number 13110291

Sample Number: 003

Sample Description: BWL-BiMon-2-2-Dup

Sample Date: 11/07/2013

Sample Method: Grab

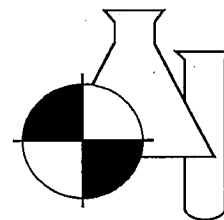
Sample Time: 1200

| Parameter                   | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|-----------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                             |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                   | 13      | NTU   | 0.05  | 0.05  | 180.1     | 11/08/2013 | 11:30 | JB      |
| COPPER                      | 5.70 I  | UG/L  | 4     | 16    | 200.7     | 11/13/2013 | 19:12 | JSM     |
| ZINC                        | 14.5    | UG/L  | 1.4   | 5.6   | 200.7     | 11/13/2013 | 19:12 | JSM     |
| AMMONIA NITROGEN            | 0.027 I | MG/L  | 0.008 | 0.032 | 350.1     | 11/11/2013 | 13:21 | JB      |
| AMMONIA NITROGEN, DISSOLVED | 0.025 I | MG/L  | 0.008 | 0.032 | 350.1     | 11/11/2013 | 13:19 | JB      |
| ORGANIC NITROGEN, DISSOLVED | 1.22    | MG/L  | 0.05  | 0.20  | 351-350.1 | 11/14/2013 | 12:40 | JER/JB  |
| TOTAL KJELDAHL NITROGEN     | 2.33    | MG/L  | 0.05  | 0.20  | 351.2     | 11/14/2013 | 12:39 | JER     |

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## EnviroAnalytical Inc.



NELAC Certification # E84167

|                                    |       |       |       |       |         |            |       |          |
|------------------------------------|-------|-------|-------|-------|---------|------------|-------|----------|
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.24  | MG/L  | 0.05  | 0.20  | 351.2   | 11/14/2013 | 12:40 | JER      |
| TOTAL NITROGEN                     | 2.49  | MG/L  | 0.05  | 0.20  | 353+351 | 11/14/2013 | 12:39 | JER/TN/W |
| NITRATE+NITRITE AS N               | 0.159 | MG/L  | 0.004 | 0.016 | 353.2   | 11/08/2013 | 10:25 | TN/WY    |
| ORTHO PHOSPHORUS AS P              | 0.034 | MG/L  | 0.002 | 0.008 | 365.3   | 11/07/2013 | 17:15 | MR       |
| TOTAL PHOSPHORUS AS P              | 0.218 | MG/L  | 0.008 | 0.032 | 365.3   | 11/12/2013 | 12:19 | MR       |
| CHLOROPHYLL A, CORRECTED           | 91.5  | MG/M3 | 0.25  | 1.00  | 445.0   | 11/14/2013 | 15:38 | JMG/BG   |
| TOTAL ALKALINITY (CACO3)           | 127   | MG/L  | 0.594 | 2.376 | SM2320B | 11/13/2013 | 09:50 | MR       |
| TOTAL SUSPENDED SOLIDS             | 28.0  | MG/L  | 0.570 | 2.280 | SM2540D | 11/11/2013 | 12:07 | JG/JA    |
| BIOCHEMICAL OXYGEN DEMAND          | 5.37  | MG/L  | 0.5   | 2.0   | SM5210B | 11/08/2013 | 12:43 | SJ/SJ    |
| TOTAL ORGANIC CARBON               | 13.9  | MG/L  | 0.271 | 1.084 | SM5310B | 11/19/2013 | 13:12 | KD       |

*Tulay Tanrisever*  
Dale D. Dixon / Laboratory Director

11/21/2013

Date

Tulay Tanrisever/ QC Officer

Jennifer Hatfield / QC Officer

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

### NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 340.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

I = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES: Chlorophyll A lab filtered on 11/07/13 at 1600.

For questions and comments regarding these results, please contact Bettina Beilfuss at (941) 723-9986

Results relate only to the samples.

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standard report

13110291

PAGE 3 OF 4

Benchmark EnviroAnalytical, Inc.  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
www.benchmarkea.com

Client Information:

Watermark Engineering Group, Inc.  
1422 Apollo Beach Blvd.  
Apollo Beach, FL 33572  
813-641-1200  
Fax: 813-641-1204  
Mark Flint - mflint@watermarkengineers.com

Project Name: Briarwood Stormwater Treatment Facility Weekly  
Profile 560

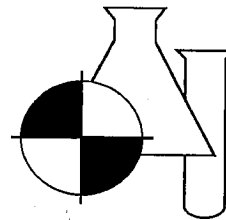
| Sample Name                     |                     | Sample Type <sup>1</sup>  | Sample Matrix <sup>2</sup>               | Parameters, Preservation <sup>3</sup> , Container Type <sup>3</sup>               |                     |                           |  |  |  |  | Laboratory Sample # |
|---------------------------------|---------------------|---|--|---|---------------------|---------------------------|--|--|--|--|---------------------|
| Corrected Chlorophyll a (445.0) | TOC (SM5310B)       | Dissolved Organic Nitrogen (Calc.) NH <sub>3</sub> (350.1) TKN (351.2) NO <sub>3</sub> -NO <sub>2</sub> (353.2) TP (365.3) TN (Calc.) | Ortho-Phosphate (Lab Filtered) (365.3)   | BOD <sub>5</sub> (SM5210B) TSS (SM2540D) T-Alkalinity (SM2320B) Turbidity (180.1) | Cu Zn (200.7)       |                           |  |  |  |  |                     |
| 11/16/11 11:00                  |                     |   |  |   |                     |                           |  |  |  |  |                     |
| A                               | B                   | C   | D  | E   | F                   | G                         |  |  |  |  |                     |
| Plain                           | 1:1 HCl             | Plain   | 1:4 H <sub>2</sub> SO <sub>4</sub> pH<20 | Plain   | Plain               | 1:4 HNO <sub>3</sub> pH<2 |  |  |  |  |                     |
| 1 x 500mL Opaque Plastic        | 1 x 40mL Glass Vial | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic                     | 1 x 1/2 Pint Plastic  | 1 x 2 Quart Plastic | 1 x 1/2 Pint Plastic      |  |  |  |  |                     |
| Date & Time: 11-7-13 @ 11:58    |                     |   |  |   |                     |                           |  |  |  |  |                     |
| Date & Time: 11-7-13 @ 12:00    |                     |   |  |   |                     |                           |  |  |  |  |                     |
| Date & Time:                    |                     |   |  |   |                     |                           |  |  |  |  |                     |
| Date & Time:                    |                     |   |  |   |                     |                           |  |  |  |  |                     |
| Date & Time:                    |                     |   |  |   |                     |                           |  |  |  |  |                     |
| Date & Time:                    |                     |   |  |   |                     |                           |  |  |  |  |                     |
| Date & Time:                    |                     |   |  |   |                     |                           |  |  |  |  |                     |
| Date & Time: 11-7-13 @ 12:00    |                     |   |  |   |                     |                           |  |  |  |  |                     |

Laboratory Sample Acceptability: pH < 2  
BEA Temperature: 2-4°C

|   |                            |               |      |              |               |            |
|---|----------------------------|---------------|------|--------------|---------------|------------|
| 1 | Collected By: Erik Stewart | Date: 11-7-13 | Time | Received By: | Date: 11/7/13 | Time: 1514 |
|---|----------------------------|---------------|------|--------------|---------------|------------|

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 14011166

Watermark Engineering Group  
3868 Sun City Center Blvd  
Sun City Center, FL 33573

Project Name : BRIARWOOD STORMWATER TREATMENT  
Date Received : 01/31/2014  
Time Received : 1350

Mark Flint

Submission Number 14011166

Sample Number: 001  
Sample Date: 01/31/2014  
Sample Time: 1114

Sample Description: BWL BIMONTHLY 3-1  
Sample Method: Grab

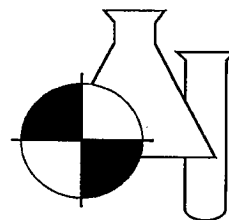
| Parameter                          | Result    | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|-----------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |           |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 27        | NTU   | 0.05  | 0.05  | 180.1     | 01/31/2014 | 16:00 | MV      |
| COPPER                             | 7.40 I    | UG/L  | 4     | 16    | 200.7     | 02/03/2014 | 18:29 | TSA     |
| ZINC                               | 15.7      | UG/L  | 1.4   | 5.6   | 200.7     | 02/03/2014 | 18:29 | TSA     |
| AMMONIA NITROGEN                   | 0.031 I   | MG/L  | 0.008 | 0.032 | 350.1     | 02/04/2014 | 15:05 | MV      |
| AMMONIA NITROGEN, DISSOLVED        | 0.008 UJ4 | MG/L  | 0.008 | 0.032 | 350.1     | 02/04/2014 | 15:04 | MV      |
| ORGANIC NITROGEN, DISSOLVED        | 1.09      | MG/L  | 0.05  | 0.20  | 351-350.1 | 02/04/2014 | 15:11 | JB/MV   |
| TOTAL KJELDAHL NITROGEN            | 3.48      | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2014 | 09:08 | JB      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.09      | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2014 | 09:08 | JB      |
| TOTAL NITROGEN                     | 3.48      | MG/L  | 0.05  | 0.20  | 353+351   | 02/04/2014 | 09:08 | JB/TN   |
| NITRATE+NITRITE AS N               | 0.004 U   | MG/L  | 0.004 | 0.016 | 353.2     | 02/03/2014 | 09:27 | TN      |
| ORTHO PHOSPHORUS AS P              | 0.005 I   | MG/L  | 0.002 | 0.008 | 365.3     | 01/31/2014 | 17:26 | MR      |
| TOTAL PHOSPHORUS AS P              | 0.272     | MG/L  | 0.008 | 0.032 | 365.3     | 02/05/2014 | 13:07 | MR      |
| CHLOROPHYLL A, CORRECTED           | 129       | MG/M3 | 0.25  | 1.00  | 445.0     | 02/03/2014 | 15:38 | TN      |
| TOTAL ALKALINITY (CaCO3)           | 100       | MG/L  | 0.594 | 2.376 | SM2320B   | 02/03/2014 | 11:50 | MV      |
| TOTAL SUSPENDED SOLIDS             | 42.7      | MG/L  | 0.570 | 2.280 | SM2540D   | 02/04/2014 | 09:03 | JG/JA   |
| BIOCHEMICAL OXYGEN DEMAND          | 7.35      | MG/L  | 0.5   | 2.0   | SM5210B   | 01/31/2014 | 14:13 | DN/DN   |
| TOTAL ORGANIC CARBON               | 14.2      | MG/L  | 0.271 | 1.084 | SM5310B   | 02/06/2014 | 14:21 | KD      |

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# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

Submission Number 14011166

Sample Number: 002

Sample Description: BWL BIMONTHLY 3-2

Sample Date: 01/31/2014

Sample Method: Grab

Sample Time: 1127

| Parameter                          | Result | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|--------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |        |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 16     | NTU   | 0.05  | 0.05  | 180.1     | 01/31/2014 | 16:00 | MV      |
| COPPER                             | 5.90 I | UG/L  | 4     | 16    | 200.7     | 02/03/2014 | 18:59 | TSA     |
| ZINC                               | 30.7   | UG/L  | 1.4   | 5.6   | 200.7     | 02/03/2014 | 18:59 | TSA     |
| AMMONIA NITROGEN                   | 0.145  | MG/L  | 0.008 | 0.032 | 350.1     | 02/04/2014 | 15:09 | MV      |
| AMMONIA NITROGEN, DISSOLVED        | 0.096  | MG/L  | 0.008 | 0.032 | 350.1     | 02/04/2014 | 15:07 | MV      |
| ORGANIC NITROGEN, DISSOLVED        | 1.04   | MG/L  | 0.05  | 0.20  | 351-350.1 | 02/04/2014 | 15:11 | JB/MV   |
| TOTAL KJELDAHL NITROGEN            | 2.44   | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2014 | 09:08 | JB      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.14   | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2014 | 09:08 | JB      |
| TOTAL NITROGEN                     | 2.69   | MG/L  | 0.05  | 0.20  | 353+351   | 02/04/2014 | 09:08 | JB/TN   |
| NITRATE+NITRITE AS N               | 0.254  | MG/L  | 0.004 | 0.016 | 353.2     | 02/03/2014 | 09:27 | TN      |
| ORTHO PHOSPHORUS AS P              | 0.008  | MG/L  | 0.002 | 0.008 | 365.3     | 01/31/2014 | 17:27 | MR      |
| TOTAL PHOSPHORUS AS P              | 0.210  | MG/L  | 0.008 | 0.032 | 365.3     | 02/05/2014 | 13:08 | MR      |
| CHLOROPHYLL A, CORRECTED           | 82.0   | MG/M3 | 0.25  | 1.00  | 445.0     | 02/03/2014 | 15:39 | TN      |
| TOTAL ALKALINITY (CACO3)           | 103    | MG/L  | 0.594 | 2.376 | SM2320B   | 02/03/2014 | 11:50 | MV      |
| TOTAL SUSPENDED SOLIDS             | 24.2   | MG/L  | 0.570 | 2.280 | SM2540D   | 02/04/2014 | 09:04 | JG/JA   |
| BIOCHEMICAL OXYGEN DEMAND          | 5.44   | MG/L  | 0.5   | 2.0   | SM5210B   | 01/31/2014 | 14:13 | DN/DN   |
| TOTAL ORGANIC CARBON               | 14.4   | MG/L  | 0.271 | 1.084 | SM5310B   | 02/06/2014 | 14:37 | KD      |

Submission Number 14011166

Sample Number: 003

Sample Description: BWL BIMONTHLY 3-2 DUP

Sample Date: 01/31/2014

Sample Method: Grab

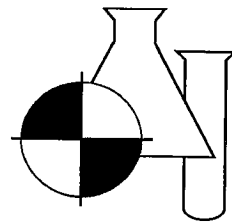
Sample Time: 1129

| Parameter                   | Result | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|-----------------------------|--------|-------|-------|-------|-----------|------------|-------|---------|
|                             |        |       |       |       |           | Date       | Time  |         |
| TURBIDITY                   | 15     | NTU   | 0.05  | 0.05  | 180.1     | 01/31/2014 | 16:00 | MV      |
| COPPER                      | 5.20 I | UG/L  | 4     | 16    | 200.7     | 02/03/2014 | 19:04 | TSA     |
| ZINC                        | 30.5   | UG/L  | 1.4   | 5.6   | 200.7     | 02/03/2014 | 19:04 | TSA     |
| AMMONIA NITROGEN            | 0.110  | MG/L  | 0.008 | 0.032 | 350.1     | 02/04/2014 | 15:13 | MV      |
| AMMONIA NITROGEN, DISSOLVED | 0.104  | MG/L  | 0.008 | 0.032 | 350.1     | 02/04/2014 | 15:11 | MV      |
| ORGANIC NITROGEN, DISSOLVED | 1.07   | MG/L  | 0.05  | 0.20  | 351-350.1 | 02/04/2014 | 15:11 | JB/MV   |
| TOTAL KJELDAHL NITROGEN     | 2.56   | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2014 | 09:08 | JB      |

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## EnviroAnalytical Inc.



NELAC Certification # E84167

|                                    |       |       |       |       |         |            |       |       |
|------------------------------------|-------|-------|-------|-------|---------|------------|-------|-------|
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.17  | MG/L  | 0.05  | 0.20  | 351.2   | 02/04/2014 | 09:08 | JB    |
| TOTAL NITROGEN                     | 2.84  | MG/L  | 0.05  | 0.20  | 353+351 | 02/04/2014 | 09:08 | JB/TN |
| NITRATE+NITRITE AS N               | 0.278 | MG/L  | 0.004 | 0.016 | 353.2   | 02/03/2014 | 09:27 | TN    |
| ORTHO PHOSPHORUS AS P              | 0.008 | MG/L  | 0.002 | 0.008 | 365.3   | 01/31/2014 | 17:29 | MR    |
| TOTAL PHOSPHORUS AS P              | 0.213 | MG/L  | 0.008 | 0.032 | 365.3   | 02/05/2014 | 13:09 | MR    |
| CHLOROPHYLL A, CORRECTED           | 71.2  | MG/M3 | 0.25  | 1.00  | 445.0   | 02/03/2014 | 15:40 | TN    |
| TOTAL ALKALINITY (CACO3)           | 105   | MG/L  | 0.594 | 2.376 | SM2320B | 02/03/2014 | 11:50 | MV    |
| TOTAL SUSPENDED SOLIDS             | 17.9  | MG/L  | 0.570 | 2.280 | SM2540D | 02/04/2014 | 09:05 | JG/JA |
| BIOCHEMICAL OXYGEN DEMAND          | 5.76  | MG/L  | 0.5   | 2.0   | SM5210B | 01/31/2014 | 14:13 | DN/DN |
| TOTAL ORGANIC CARBON               | 14.9  | MG/L  | 0.271 | 1.084 | SM5310B | 02/06/2014 | 14:52 | KD    |

*Tülay Tanrisever*  
Dale D. Dixon / Laboratory Director  
Tülay Tanrisever / QC Officer

02/10/2014

Date

Jessica Sierra Medina / QC Officer

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

### NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 340.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

! = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES: Chlorophyll A lab filtered on 01/31/14 at 1422.

For questions and comments regarding these results, please contact Bettina Beilfuss at (941) 723-9986

Results relate only to the samples.

1711 12th Street East \* Palmetto, FL 34221 \* Phone (941) 723-9986 \* Fax (941) 723-6061

Benchmark EnviroAnalytical, Inc  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
www.benchmarkea.com

Client Information:

Watermark Engineering Group, Inc.  
1422 Apollo Beach Blvd.  
Apollo Beach, FL 33572  
813-641-1200  
Fax: 813-641-1204  
Mark Flint - mflint@watermarkengineers.com

Project Name: Briarwood Stormwater Treatment Facility  
Profile 560

Laboratory Submission #

14-5WL-Bimonthly-3  
14011166

| Sample Name                    | Sample Type <sup>1</sup> | Sample Matrix <sup>2</sup> | Parameters, Preservation <sup>1</sup> , Container Type <sup>3</sup> |                     |   |   |  |   |                           |   | Laboratory Sample # |
|--------------------------------|--------------------------|----------------------------|---|---------------------|---|---|--|---|---------------------------|---|---------------------|
|                                |                          |                            | Corrected Chlorophyll a (445.0)                                     | TOC (SM5310B)       | Dissolved Organic Nitrogen (Calc.) NH <sub>3</sub> (350.1) TKN (351.2) (Lab Filtered) | NH <sub>3</sub> (350.1) TKN (351.2) NO <sub>3</sub> -NO <sub>2</sub> (353.2) TP (365.3) TN (Calc.) (Lab Filtered) | Ortho-Phosphate (Lab Filtered) (365.3) | BOD <sub>5</sub> (SM5210B) TSS (SM2540D) T-Alkalinity (SM2320B) Turbidity (180.1) | Cu Zn (200.7)             |   |                     |
|                                |                          |                            | A   | B                   | C   | D   | E                                      | F   | G                         |   |                     |
|                                |                          |                            | Plain   | 1:1 HCl             | Plain   | 1:4 H <sub>2</sub> SO <sub>4</sub> pH<2   | Plain                                  | Plain   | 1:4 HNO <sub>3</sub> pH<2 |   |                     |
|                                |                          |                            | 1 x 500mL Opaque Plastic  | 1 x 40mL Glass Vial | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic                   | 1 x 2 Quart Plastic   | 1 x 1/2 Pint Plastic      |   |                     |
| BWL-OPT - <u>Bimonthly 3-1</u> | G                        | SW                         | Date & Time: 1-30-14 11:14  |                     |   |   |  |   |                           | 1 |                     |
| BWL-OPT <u>3-2</u>             | G                        | SW                         | Date & Time: 1-31-14 11:27  |                     |   |   |  |   |                           | 2 |                     |
| BWL-OPT <u>3-2 dup</u>         | G                        | SW                         | Date & Time: 1-31-14 11:29  |                     |   |   |  |   |                           | 3 |                     |
| BWL-OPT -                      | G                        | SW                         | Date & Time:  |                     |   |   |  |   |                           |   |                     |
| BWL-OPT -                      | G                        | SW                         | Date & Time:  |                     |   |   |  |   |                           |   |                     |
| BWL-OPT -                      | G                        | SW                         | Date & Time:  |                     |   |   |  |   |                           |   |                     |
| BWL-OPT - Dup                  | G                        | SW                         | Date & Time:  |                     |   |   |  |   |                           |   |                     |

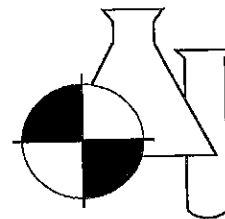
1. Each bottle has a label identifying sample ID, preservation, date, time, and parameters for analysis.  
2. "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), groundwater (GW), surface water (SW), soil, sediment (SM), or sludge (SL).  
3. "Sample Type" is used to indicate whether the sample is a grab (G) or whether it was a composite (C).  
4. "Sample Preservation" is used to indicate whether the sample was preserved with HCl, HNO<sub>3</sub>, or H<sub>2</sub>SO<sub>4</sub>.  
5. "Container Type" is used to indicate whether the sample was collected in a glass bottle, plastic bottle, or plastic bag.  
6. "Date & Time" is used to indicate the date and time of collection. Samples should be collected during storage, should be less than or equal to 60 days (12.89).  
7. "Laboratory Sample Acceptability" is used to indicate whether the sample was accepted for analysis. If not, the reason for rejection should be noted.  
8. "BEA Temperature" is used to indicate the temperature of the sample at the time of collection. Please note field sampling events on the sample analysis form.

Laboratory Sample Acceptability: pH < 12  
BEA Temperature: 2.6 °C

|   |                           |               |             |
|---|---------------------------|---------------|-------------|
| 1 | Collected By: <u>Enk</u>  | Date: 1-31-14 | Time: 13:50 |
|   | Received By: <u>Janet</u> | Date: 1/31/14 | Time: 13:50 |

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 14030919

Watermark Engineering Group  
3868 Sun City Center Blvd  
Sun City Center, FL 33573

Project Name : BRIARWOOD STORMWATER TREATMENT  
Date Received : 03/24/2014  
Time Received : 1534

Mark Flint

Submission Number 14030919

Sample Number: 001  
Sample Date: 03/24/2014  
Sample Time: 1310

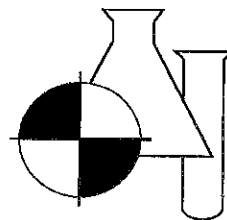
Sample Description: BWL-BiMonthly-4-1  
Sample Method: Grab

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 30      | NTU   | 0.05  | 0.05  | 180.1     | 03/25/2014 | 10:00 | MV      |
| COPPER                             | 4 U     | UG/L  | 4     | 16    | 200.7     | 03/27/2014 | 12:49 | TSA     |
| ZINC                               | 10.0    | UG/L  | 1.4   | 5.6   | 200.7     | 03/27/2014 | 12:49 | TSA     |
| AMMONIA NITROGEN                   | 0.008 U | MG/L  | 0.008 | 0.032 | 350.1     | 03/26/2014 | 10:35 | MR      |
| AMMONIA NITROGEN, DISSOLVED        | 0.008 U | MG/L  | 0.008 | 0.032 | 350.1     | 03/26/2014 | 11:32 | MR      |
| ORGANIC NITROGEN, DISSOLVED        | 1.28    | MG/L  | 0.05  | 0.20  | 351-350.1 | 03/27/2014 | 09:48 | JB/MR   |
| TOTAL KJELDAHL NITROGEN            | 3.46    | MG/L  | 0.05  | 0.20  | 351.2     | 03/27/2014 | 09:48 | JB      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.28    | MG/L  | 0.05  | 0.20  | 351.2     | 03/27/2014 | 09:48 | JB      |
| TOTAL NITROGEN                     | 3.46    | MG/L  | 0.05  | 0.20  | 353+351   | 03/27/2014 | 09:48 | JB/KR   |
| NITRATE+NITRITE AS N               | 0.004 I | MG/L  | 0.004 | 0.016 | 353.2     | 03/25/2014 | 08:54 | KR      |
| ORTHO PHOSPHORUS AS P              | 0.002 U | MG/L  | 0.002 | 0.008 | 365.3     | 03/25/2014 | 17:03 | JP      |
| TOTAL PHOSPHORUS AS P              | 0.311   | MG/L  | 0.008 | 0.032 | 365.3     | 03/25/2014 | 14:46 | JP      |
| CHLOROPHYLL A, CORRECTED           | 64.1    | MG/M3 | 0.25  | 1.00  | 445.0     | 03/25/2014 | 12:57 | KR      |
| TOTAL ALKALINITY (CAO3)            | 90.0    | MG/L  | 0.594 | 2.376 | SM2320B   | 03/25/2014 | 09:30 | MR      |
| TOTAL SUSPENDED SOLIDS             | 48.0    | MG/L  | 0.570 | 2.280 | SM2540D   | 03/31/2014 | 09:03 | MV      |
| BIOCHEMICAL OXYGEN DEMAND          | 13.4    | MG/L  | 0.5   | 2.0   | SM5210B   | 03/25/2014 | 13:45 | BG/DN   |
| TOTAL ORGANIC CARBON               | 17.3    | MG/L  | 0.271 | 1.084 | SM5310B   | 03/27/2014 | 19:48 | JB      |

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# BENCHMARK

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NELAC Certification # E84167

Submission Number 14030919

Sample Number: 002

Sample Description: BWL-BiMonthly-4-1-DUP

Sample Date: 03/24/2014

Sample Method: Grab

Sample Time: 1310

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 32      | NTU   | 0.05  | 0.05  | 180.1     | 03/25/2014 | 10:00 | MV      |
| COPPER                             | 4 U     | UG/L  | 4     | 16    | 200.7     | 03/27/2014 | 12:54 | TSA     |
| ZINC                               | 8.60    | UG/L  | 1.4   | 5.6   | 200.7     | 03/27/2014 | 12:54 | TSA     |
| AMMONIA NITROGEN                   | 0.025 I | MG/L  | 0.008 | 0.032 | 350.1     | 03/26/2014 | 10:38 | MR      |
| AMMONIA NITROGEN, DISSOLVED        | 0.008 U | MG/L  | 0.008 | 0.032 | 350.1     | 03/26/2014 | 11:32 | MR      |
| ORGANIC NITROGEN, DISSOLVED        | 1.19    | MG/L  | 0.05  | 0.20  | 351-350.1 | 03/27/2014 | 09:48 | JB/MR   |
| TOTAL KJELDAHL NITROGEN            | 3.69    | MG/L  | 0.05  | 0.20  | 351.2     | 03/27/2014 | 09:48 | JB      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.19    | MG/L  | 0.05  | 0.20  | 351.2     | 03/27/2014 | 09:48 | JB      |
| TOTAL NITROGEN                     | 3.69    | MG/L  | 0.05  | 0.20  | 353+351   | 03/27/2014 | 09:48 | JB/KR   |
| NITRATE+NITRITE AS N               | 0.004 U | MG/L  | 0.004 | 0.016 | 353.2     | 03/25/2014 | 08:54 | KR      |
| ORTHO PHOSPHORUS AS P              | 0.017   | MG/L  | 0.002 | 0.008 | 365.3     | 03/25/2014 | 17:05 | JP      |
| TOTAL PHOSPHORUS AS P              | 0.317   | MG/L  | 0.008 | 0.032 | 365.3     | 03/25/2014 | 14:47 | JP      |
| CHLOROPHYLL A, CORRECTED           | 174     | MG/M3 | 0.25  | 1.00  | 445.0     | 03/25/2014 | 12:59 | KR      |
| TOTAL ALKALINITY (CACO3)           | 88.5    | MG/L  | 0.594 | 2.376 | SM2320B   | 03/25/2014 | 09:30 | MR      |
| TOTAL SUSPENDED SOLIDS             | 58.0    | MG/L  | 0.570 | 2.280 | SM2540D   | 03/26/2014 | 10:00 | MV      |
| BIOCHEMICAL OXYGEN DEMAND          | 14.2    | MG/L  | 0.5   | 2.0   | SM5210B   | 03/25/2014 | 13:45 | BG/DN   |
| TOTAL ORGANIC CARBON               | 17.6    | MG/L  | 0.271 | 1.084 | SM5310B   | 03/27/2014 | 20:04 | JB      |

Submission Number 14030919

Sample Number: 003

Sample Description: BWL-BiMonthly-4-6

Sample Date: 03/24/2014

Sample Method: Grab

Sample Time: 1315

| Parameter                   | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|-----------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                             |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                   | 18      | NTU   | 0.05  | 0.05  | 180.1     | 03/25/2014 | 10:00 | MV      |
| COPPER                      | 4 U     | UG/L  | 4     | 16    | 200.7     | 03/27/2014 | 13:16 | TSA     |
| ZINC                        | 7.00    | UG/L  | 1.4   | 5.6   | 200.7     | 03/27/2014 | 13:16 | TSA     |
| AMMONIA NITROGEN            | 0.010 I | MG/L  | 0.008 | 0.032 | 350.1     | 03/26/2014 | 10:40 | MR      |
| AMMONIA NITROGEN, DISSOLVED | 0.008 U | MG/L  | 0.008 | 0.032 | 350.1     | 03/26/2014 | 11:34 | MR      |
| ORGANIC NITROGEN, DISSOLVED | 1.21    | MG/L  | 0.05  | 0.20  | 351-350.1 | 03/27/2014 | 09:48 | JB/MR   |
| TOTAL KJELDAHL NITROGEN     | 3.07    | MG/L  | 0.05  | 0.20  | 351.2     | 03/27/2014 | 09:48 | JB      |

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standard report

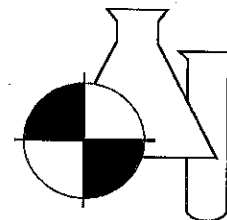
14030919

PAGE 2 OF 4



# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification # E84167

|                                    |         |       |       |       |         |            |       |       |
|------------------------------------|---------|-------|-------|-------|---------|------------|-------|-------|
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.21    | MG/L  | 0.05  | 0.20  | 351.2   | 03/27/2014 | 09:48 | JB    |
| TOTAL NITROGEN                     | 3.18    | MG/L  | 0.05  | 0.20  | 353+351 | 03/27/2014 | 09:48 | JB/KR |
| NITRATE+NITRITE AS N               | 0.107   | MG/L  | 0.004 | 0.016 | 353.2   | 03/25/2014 | 08:54 | KR    |
| ORTHO PHOSPHORUS AS P              | 0.006 I | MG/L  | 0.002 | 0.008 | 365.3   | 03/25/2014 | 17:06 | JP    |
| TOTAL PHOSPHORUS AS P              | 0.269   | MG/L  | 0.008 | 0.032 | 365.3   | 03/25/2014 | 14:48 | JP    |
| CHLOROPHYLL A, CORRECTED           | 98.5    | MG/M3 | 0.25  | 1.00  | 445.0   | 03/25/2014 | 13:00 | KR    |
| TOTAL ALKALINITY (CACO3)           | 90.0    | MG/L  | 0.594 | 2.376 | SM2320B | 03/25/2014 | 09:30 | MR    |
| TOTAL SUSPENDED SOLIDS             | 24.0    | MG/L  | 0.570 | 2.280 | SM2540D | 03/26/2014 | 10:00 | MV    |
| BIOCHEMICAL OXYGEN DEMAND          | 6.00    | MG/L  | 0.5   | 2.0   | SM5210B | 03/25/2014 | 13:45 | DN/BG |
| TOTAL ORGANIC CARBON               | 17.8    | MG/L  | 0.271 | 1.084 | SM5310B | 03/27/2014 | 20:20 | JB    |

*Tulay Diner*  
Dale D. Dixon / Laboratory Director

04/02/2014

Date

Tulay Tanrisever / QC Officer

Jessica Medina Sierra / QC Officer

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

### NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 340.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

I = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES: Chlorophyll A lab filtered on 03/24/14 at 1540.

For questions and comments regarding these results, please contact Bettina Bellfuss at (941) 723-9986

Results relate only to the samples.

1711 12th Street East \* Palmetto, FL 34221 \* Phone (941) 723-9986 \* Fax (941) 723-6061

standard report

14030919

PAGE 3 OF 4

Benchmark EnviroAnalytical, Inc  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
www.benchmarkea.com

Client Information:

Watermark Engineering Group, Inc.  
3868 Sun City Center Blvd  
Sun City Center, FL 33573  
813-641-1200  
Fax: 813-641-1204  
Mark Flint - mflint@watermarkengineers.com

Project Name: Briarwood Stormwater Treatment Facility  
Profile 360

Laboratory Submission #

14030919

| Sample Name              | Sample Type <sup>1</sup> | Sample Matrix <sup>2</sup> | Parameters, Preservation <sup>3</sup> , Container Type <sup>3</sup> |                     |   |  |   |                      | Laboratory Sample # |
|--------------------------|--------------------------|----------------------------|---|---------------------|---|--|---|----------------------|---------------------|
|                          |                          |                            | Corrected Chlorophyll a (445.0)                                     | TOC (SM5310B)       | Dissolved Nitrogen (Calc.) NH <sub>3</sub> (350.1) TKN (351.2) NO <sub>3</sub> -NO <sub>2</sub> (353.2) TP (365.3) TN (Calc.) | Ortho-Phosphate (Lab Filtered) (365.3) | BOD <sub>5</sub> (SM5210B) TSS (SM2540D) T-Alkalinity (SM2320B) Turbidity (180.1) | Cu Zn (200.7)        |                     |
| A                        |                          |                            | 1520  |                     |   |  |   |                      |                     |
| Plain                    |                          |                            |   | 1:1 HCl             | Plain   |  | Plain   | G                    |                     |
| 1 x 500mL Opaque Plastic |                          |                            |   | 1 x 40mL Glass Vial | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic                   | 1 x 2 Quart Plastic   | 1 x 1/2 Pint Plastic |                     |
| Date & Time:             |                          |                            | 3-24-14   |                     |   |  |   |                      |                     |
|                          | G                        | SW                         |   |                     |   |  |   |                      | 1                   |
|                          | G                        | SW                         |   |                     |   |  |   |                      | 2                   |
|                          | G                        | SW                         |   |                     |   |  |   |                      | 3                   |

<sup>1</sup> "Sample Type" is used to indicate whether the sample was a grab (G) or whether it was a composite (C).

<sup>2</sup> "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), groundwater (GW), surface water (SW), soil, sediment (SDMNT), or sludge (SLDG).

<sup>3</sup> "Container Type" is used to indicate whether the container is plastic (P) or glass (G).

<sup>4</sup> Sample must be refrigerated or stored in wet ice after collection. The temperature during storage should be less than or equal to 6°C (42.8°F).

Under "Preservative," list any preservatives that were added to the sample container.

Instructions: 1. Each bottle has a label identifying sample ID, premeasured preservative contained in the bottle, sample type, client ID, and parameters for analysis.

2. The following information should be added to each bottle label after collection with permanent black ink: date and time of collection, sampler's name or initials, and any field number or ID.

3. All bottles not containing preservative may be rinsed with appropriate sample prior to collection.

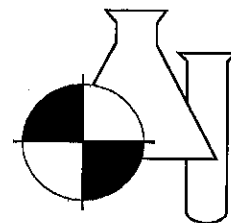
4. The client is responsible for documentation of the sampling event. Please note special sampling events on the sample custody form.

Laboratory Sample Acceptability: pH < 2.0  
BEA Temperature: 24°C

|   |                                 |               |            |                                 |               |            |
|---|---------------------------------|---------------|------------|---------------------------------|---------------|------------|
| 1 | Collected By: <i>C. S. Ford</i> | Date: 3-24-14 | Time: 1534 | Received By: <i>[Signature]</i> | Date: 3/24/14 | Time: 1534 |
|---|---------------------------------|---------------|------------|---------------------------------|---------------|------------|

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 14071224

Watermark Engineering Group  
3868 Sun City Center Blvd  
Sun City Center, FL 33573

Project Name : SARASOTA COUNTY ALLIGATOR CREEK  
Date Received : 07/31/2014  
Time Received : 1017

Haylee La Torre

Submission Number 14071224

Sample Number: 001 Sample Description: BWL-1  
Sample Date: 07/30/2014 Sample Method: Grab  
Sample Time: 1828

| Parameter                 | Result | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|---------------------------|--------|-------|-------|-------|-----------|------------|-------|---------|
|                           |        |       |       |       |           | Date       | Time  |         |
| AMMONIA NITROGEN          | 0.035  | MG/L  | 0.008 | 0.032 | 350.1     | 08/01/2014 | 10:49 | SJ      |
| TOTAL KJELDAHL NITROGEN   | 3.00   | MG/L  | 0.05  | 0.20  | 351.2     | 08/05/2014 | 10:54 | JB      |
| TOTAL NITROGEN            | 3.00   | MG/L  | 0.05  | 0.20  | 353+351   | 08/05/2014 | 10:54 | JB/HL   |
| NITRATE+NITRITE AS N      | 0.005  | MG/L  | 0.004 | 0.016 | 353.2     | 08/04/2014 | 09:29 | HL      |
| ORTHO PHOSPHORUS AS P     | 0.017  | MG/L  | 0.002 | 0.008 | 365.3     | 07/31/2014 | 16:05 | KR      |
| TOTAL PHOSPHORUS AS P     | 0.109  | MG/L  | 0.008 | 0.032 | 365.3     | 08/01/2014 | 09:49 | KR      |
| TOTAL SUSPENDED SOLIDS    | 36.0   | MG/L  | 0.570 | 2.280 | SM2540D   | 08/05/2014 | 16:22 | JA/SW   |
| BIOCHEMICAL OXYGEN DEMAND | 4.12   | MG/L  | 0.5   | 2.0   | SM5210B   | 07/31/2014 | 15:01 | KC/KC   |

Submission Number 14071224

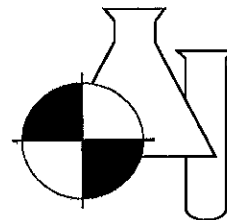
Sample Number: 002 Sample Description: BWL-6  
Sample Date: 07/30/2014 Sample Method: Grab  
Sample Time: 1830

| Parameter               | Result | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|-------------------------|--------|-------|-------|-------|-----------|------------|-------|---------|
|                         |        |       |       |       |           | Date       | Time  |         |
| AMMONIA NITROGEN        | 0.116  | MG/L  | 0.008 | 0.032 | 350.1     | 08/01/2014 | 10:50 | SJ      |
| TOTAL KJELDAHL NITROGEN | 2.15   | MG/L  | 0.05  | 0.20  | 351.2     | 08/05/2014 | 10:54 | JB      |
| TOTAL NITROGEN          | 2.18   | MG/L  | 0.05  | 0.20  | 353+351   | 08/05/2014 | 10:54 | JB/HL   |
| NITRATE+NITRITE AS N    | 0.030  | MG/L  | 0.004 | 0.016 | 353.2     | 08/04/2014 | 09:29 | HL      |
| ORTHO PHOSPHORUS AS P   | 0.067  | MG/L  | 0.002 | 0.008 | 365.3     | 07/31/2014 | 16:07 | KR      |

1711 12th Street East \* Palmetto, FL 34221 \* Phone (941) 723-9986 \* Fax (941) 723-6061

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

|                           |       |      |       |       |         |            |       |       |
|---------------------------|-------|------|-------|-------|---------|------------|-------|-------|
| TOTAL PHOSPHORUS AS P     | 0.167 | MG/L | 0.008 | 0.032 | 365.3   | 08/01/2014 | 09:51 | KR    |
| TOTAL SUSPENDED SOLIDS    | 10.0  | MG/L | 0.570 | 2.280 | SM2540D | 08/05/2014 | 16:23 | JA/SW |
| BIOCHEMICAL OXYGEN DEMAND | 4.53  | MG/L | 0.5   | 2.0   | SM5210B | 07/31/2014 | 15:01 | KC/KC |

Submission Number 14071224

Sample Number: 003

Sample Description: BWL-6-DUP

Sample Date: 07/30/2014

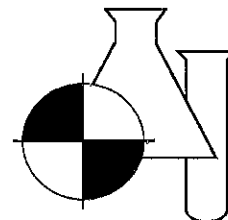
Sample Method: Grab

Sample Time: 1830

| Parameter                 | Result | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|---------------------------|--------|-------|-------|-------|-----------|------------|-------|---------|
|                           |        |       |       |       |           | Date       | Time  |         |
| AMMONIA NITROGEN          | 0.119  | MG/L  | 0.008 | 0.032 | 350.1     | 08/08/2014 | 11:57 | SJ      |
| TOTAL KJELDAHL NITROGEN   | 2.12   | MG/L  | 0.05  | 0.20  | 351.2     | 08/05/2014 | 10:54 | JB      |
| TOTAL NITROGEN            | 2.15   | MG/L  | 0.05  | 0.20  | 353+351   | 08/05/2014 | 10:54 | JB/HL   |
| NITRATE+NITRITE AS N      | 0.030  | MG/L  | 0.004 | 0.016 | 353.2     | 08/04/2014 | 09:29 | HL      |
| ORTHO PHOSPHORUS AS P     | 0.061  | MG/L  | 0.002 | 0.008 | 365.3     | 07/31/2014 | 16:10 | KR      |
| TOTAL PHOSPHORUS AS P     | 0.151  | MG/L  | 0.008 | 0.032 | 365.3     | 08/01/2014 | 09:53 | KR      |
| TOTAL SUSPENDED SOLIDS    | 10.0   | MG/L  | 0.570 | 2.280 | SM2540D   | 08/05/2014 | 16:24 | JA/SW   |
| BIOCHEMICAL OXYGEN DEMAND | 13.8   | MG/L  | 0.5   | 2.0   | SM5210B   | 07/31/2014 | 15:01 | KC/KC   |

# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification # E84167

*Jessica Sierra Medina*

08/14/2014

Dale D. Dixon / Laboratory Director

Date

Tulay Tanrisever / QC Officer

Jessica Sierra Medina / QC Officer

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

### NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 340.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

I = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES:

For questions and comments regarding these results, please contact Bettina Beilfuss at (941) 723-9986

*Results relate only to the samples.*

Benchmark EnviroAnalytical, Inc  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
www.benchmarkea.com

Client Information:

Watermark Engineering Group, Inc.  
3868 Sun City Center Blvd  
Sun City Center, FL 33573  
813-641-1200  
Fax: 813-641-1204  
Haylee La Torre hlatorre@watermarkengineers.com

Project Name: Sarasota County Alligator Creek

|                         |          |
|-------------------------|----------|
| Laboratory Submission # | 14071224 |
|-------------------------|----------|

| Sample Name | Sample Type <sup>1</sup> | Sample Matrix <sup>2</sup> | Parameters, Preservation <sup>4</sup> , Container Type <sup>3</sup> |                                    |   |   |               | Laboratory Sample # |
|-------------|--------------------------|----------------------------|---|------------------------------------|---|---|---------------|---------------------|
|             |                          |                            | NH <sub>3</sub> (350.1)   | TKN (351.2)<br>TP <sub>365.3</sub> | NO <sub>3</sub> -NO <sub>2</sub> (353.2)<br>TN <sub>(Calc.)</sub> | Ortho-Phosphate<br>(Field Filtered) (365.3) | BOD (SM5210B) |                     |
| BWL-1       | C                        | SW                         | A   |                                    | B   | C   | Plain         | 1 x 1 Quart Plastic |
|             |                          |                            | 1:4 H2SO4 pH<2  |                                    |   |   |               |                     |
|             |                          |                            | 1 x 1/2 Pint Plastic  |                                    |   |   |               |                     |
|             |                          |                            | Date & Time:<br>7/30 17:47  | 18:28                              | 7/30 18:28  | 7/30 18:28                                  | 7/30 18:28    | 1                   |
| BWL-6       | C                        | SW                         | Date & Time:<br>7/30 18:00  | 18:30                              | 7/30 18:00  | 7/30 18:00                                  | 7/30 18:00    | 2                   |
| BWL-6-DUP   | C                        | SW                         | Date & Time:<br>7/30 18:00  | 18:30                              | 7/30 18:00  | 7/30 18:00                                  | 7/30 18:00    | 3                   |
|             |                          |                            | Date & Time:  |                                    |   |   |               |                     |
|             |                          |                            | Date & Time:  |                                    |   |   |               |                     |

<sup>1</sup> "Sample Type" is used to indicate whether the sample was a grab (G) or whether it was a composite (C).

<sup>2</sup> "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), groundwater (GW), surface water (SW), soil, sediment (SDMNT), or sludge (SLDG).

<sup>3</sup> "Container Type" is used to indicate whether the container is plastic (P) or glass (G).

<sup>4</sup> Sample must be refrigerated or stored in wet ice after collection. The temperature during storage should be less than or equal to 6°C (42.8°F). Under "Preservative," list any preservatives that were added to the sample container.

Instructions:

1. Each bottle has a label identifying sample ID, premeasured preservative contained in the bottle, sample type, client ID, and parameters for analysis.  
2. The following information should be added to each bottle label after collection with permanent black ink: date and time of collection, sampler's name or initials, and any field number or ID.  
3. All bottles not containing preservative may be rinsed with appropriate sample prior to collection.

4. The client is responsible for documentation of the sampling event. Please note special sampling events on the sample custody form.

5. Each bottle has a label identifying sample ID, premeasured preservative contained in the bottle, sample type, client ID, and parameters for analysis.

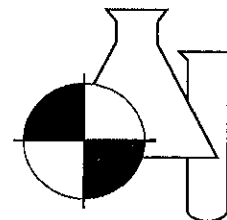
Laboratory Sample Acceptability: pH < 7  
BEA Temperature: 0.8°C

|   |   |               |             |              |       |       |
|---|---|---------------|-------------|--------------|-------|-------|
| 1 | Collected By: Hunter Yates,<br>Phong Nguyen | Date: 7/30/14 | Time: 18:30 | Received By: | Date: | Time: |
| 2 | Relinquished By:                            | Date: 7/31/14 | Time: 10:17 | Received By: | Date: | Time: |
| 3 | Relinquished By:                            | Date:         | Time:       | Received By: | Date: | Time: |



# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 14091061

Watermark Engineering Group  
3868 Sun City Center Blvd  
Sun City Center, FL 33573

Project Name : BRIARWOOD STORMWATER TREATMENT  
Date Received : 09/25/2014  
Time Received : 1532

Mark Flint

Submission Number 14091061

Sample Number: 001

Sample Description: BWL-1

Sample Date: 09/25/2014

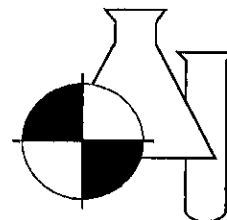
Sample Method: Composite

Sample Time: 1324

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst  |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|----------|
|                                    |         |       |       |       |           | Date       | Time  |          |
| TURBIDITY                          | 18      | NTU   | 0.11  | 0.11  | 180.1     | 09/25/2014 | 15:52 | SJ       |
| ZINC                               | 5.70    | UG/L  | 1.4   | 5.6   | 200.7     | 09/29/2014 | 16:53 | JSM      |
| AMMONIA NITROGEN                   | 0.034   | MG/L  | 0.008 | 0.032 | 350.1     | 09/26/2014 | 10:26 | SJ       |
| AMMONIA NITROGEN, DISSOLVED        | 0.027 I | MG/L  | 0.008 | 0.032 | 350.1     | 09/29/2014 | 10:26 | SJ       |
| ORGANIC NITROGEN, DISSOLVED        | 0.973   | MG/L  | 0.05  | 0.20  | 351-350.1 | 10/01/2014 | 12:06 | KS/SJ    |
| TOTAL KJELDAHL NITROGEN            | 2.46    | MG/L  | 0.05  | 0.20  | 351.2     | 10/01/2014 | 12:06 | KS       |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.00    | MG/L  | 0.05  | 0.20  | 351.2     | 10/01/2014 | 12:06 | KS       |
| TOTAL NITROGEN                     | 2.46    | MG/L  | 0.05  | 0.20  | 353+351   | 10/01/2014 | 10:21 | KS/KC/KR |
| NITRATE+NITRITE AS N               | 0.004 U | MG/L  | 0.004 | 0.016 | 353.2     | 10/01/2014 | 10:21 | KC/KR    |
| ORTHO PHOSPHORUS AS P              | 0.005   | MG/L  | 0.002 | 0.008 | 365.3     | 09/25/2014 | 17:14 | KR       |
| TOTAL PHOSPHORUS AS P              | 0.254   | MG/L  | 0.008 | 0.032 | 365.3     | 09/26/2014 | 10:10 | KR       |
| CHLOROPHYLL A, CORRECTED           | 117     | MG/M3 | 0.25  | 1.00  | 445.0     | 10/06/2014 | 15:42 | BG       |
| TOTAL ALKALINITY (CACO3)           | 89.5    | MG/L  | 0.594 | 2.376 | SM2320B   | 09/30/2014 | 08:30 | SJ       |
| TOTAL SUSPENDED SOLIDS             | 26.8    | MG/L  | 0.570 | 2.280 | SM2540D   | 09/30/2014 | 09:02 | SW       |
| COPPER                             | 1.20 I  | UG/L  | 0.346 | 1.384 | SM3113B   | 09/30/2014 | 15:33 | JSM      |
| BIOCHEMICAL OXYGEN DEMAND          | 6.76    | MG/L  | 0.5   | 2.0   | SM5210B   | 09/26/2014 | 08:30 | PN/PN    |
| TOTAL ORGANIC CARBON               | 13.1    | MG/L  | 0.271 | 1.084 | SM5310B   | 09/26/2014 | 20:53 | KD       |

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

Submission Number 14091061

Sample Number: 002

Sample Description: BWL-6

Sample Date: 09/25/2014

Sample Method: Composite

Sample Time: 1321

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst  |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|----------|
|                                    |         |       |       |       |           | Date       | Time  |          |
| TURBIDITY                          | 8.8     | NTU   | 0.11  | 0.11  | 180.1     | 09/25/2014 | 15:52 | SJ       |
| ZINC                               | 13.2    | UG/L  | 1.4   | 5.6   | 200.7     | 09/29/2014 | 16:57 | JSM      |
| AMMONIA NITROGEN                   | 0.023 I | MG/L  | 0.008 | 0.032 | 350.1     | 09/26/2014 | 10:28 | SJ       |
| AMMONIA NITROGEN, DISSOLVED        | 0.011 I | MG/L  | 0.008 | 0.032 | 350.1     | 09/29/2014 | 10:27 | SJ       |
| ORGANIC NITROGEN, DISSOLVED        | 0.950   | MG/L  | 0.05  | 0.20  | 351-350.1 | 10/01/2014 | 12:06 | KS/SJ    |
| TOTAL KJELDAHL NITROGEN            | 1.66    | MG/L  | 0.05  | 0.20  | 351.2     | 10/01/2014 | 12:06 | KS       |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 0.961   | MG/L  | 0.05  | 0.20  | 351.2     | 10/01/2014 | 12:06 | KS       |
| TOTAL NITROGEN                     | 1.76    | MG/L  | 0.05  | 0.20  | 353+351   | 10/01/2014 | 10:21 | KS/KC/KR |
| NITRATE+NITRITE AS N               | 0.100   | MG/L  | 0.004 | 0.016 | 353.2     | 10/01/2014 | 10:21 | KC/KR    |
| ORTHO PHOSPHORUS AS P              | 0.024   | MG/L  | 0.002 | 0.008 | 365.3     | 09/25/2014 | 17:15 | KR       |
| TOTAL PHOSPHORUS AS P              | 0.151   | MG/L  | 0.008 | 0.032 | 365.3     | 09/26/2014 | 10:11 | KR       |
| CHLOROPHYLL A, CORRECTED           | 39.5    | MG/M3 | 0.25  | 1.00  | 445.0     | 10/06/2014 | 15:43 | BG       |
| TOTAL ALKALINITY (CACO3)           | 91.0    | MG/L  | 0.594 | 2.376 | SM2320B   | 09/30/2014 | 08:30 | SJ       |
| TOTAL SUSPENDED SOLIDS             | 12.4    | MG/L  | 0.570 | 2.280 | SM2540D   | 09/30/2014 | 09:03 | SW       |
| COPPER                             | 1.83 I  | UG/L  | 0.346 | 1.384 | SM3113B   | 09/30/2014 | 15:52 | JSM      |
| BIOCHEMICAL OXYGEN DEMAND          | 3.26    | MG/L  | 0.5   | 2.0   | SM5210B   | 09/26/2014 | 08:30 | PN/PN    |
| TOTAL ORGANIC CARBON               | 13.0    | MG/L  | 0.271 | 1.084 | SM5310B   | 09/26/2014 | 21:08 | KD       |

Submission Number 14091061

Sample Number: 003

Sample Description: BWL-6-DUP

Sample Date: 09/25/2014

Sample Method: Composite

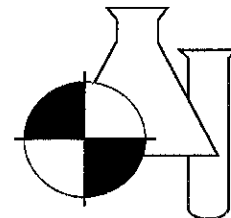
Sample Time: 1321

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 8.5     | NTU   | 0.11  | 0.11  | 180.1     | 09/25/2014 | 15:52 | SJ      |
| ZINC                               | 8.40    | UG/L  | 1.4   | 5.6   | 200.7     | 09/29/2014 | 17:00 | JSM     |
| AMMONIA NITROGEN                   | 0.023 I | MG/L  | 0.008 | 0.032 | 350.1     | 09/26/2014 | 10:29 | SJ      |
| AMMONIA NITROGEN, DISSOLVED        | 0.010   | MG/L  | 0.008 | 0.032 | 350.1     | 09/30/2014 | 14:14 | SJ      |
| ORGANIC NITROGEN, DISSOLVED        | 0.967   | MG/L  | 0.05  | 0.20  | 351-350.1 | 10/09/2014 | 10:21 | KS/SJ   |
| TOTAL KJELDAHL NITROGEN            | 1.68    | MG/L  | 0.05  | 0.20  | 351.2     | 10/01/2014 | 12:06 | KS      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 0.977   | MG/L  | 0.05  | 0.20  | 351.2     | 10/09/2014 | 11:00 | KS      |

1711 12th Street East \* Palmetto, FL 34221 \* Phone (941) 723-9986 \* Fax (941) 723-6061

# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification # E84167

|                           |        |       |       |       |         |            |       |          |
|---------------------------|--------|-------|-------|-------|---------|------------|-------|----------|
| TOTAL NITROGEN            | 1.78   | MG/L  | 0.05  | 0.20  | 353+351 | 10/01/2014 | 10:21 | KS/KC/KR |
| NITRATE+NITRITE AS N      | 0.102  | MG/L  | 0.004 | 0.016 | 353.2   | 10/01/2014 | 10:21 | KC/KR    |
| ORTHO PHOSPHORUS AS P     | 0.023  | MG/L  | 0.002 | 0.008 | 365.3   | 09/25/2014 | 17:16 | KR       |
| TOTAL PHOSPHORUS AS P     | 0.153  | MG/L  | 0.008 | 0.032 | 365.3   | 09/26/2014 | 10:12 | KR       |
| CHLOROPHYLL A, CORRECTED  | 43.7   | MG/M3 | 0.25  | 1.00  | 445.0   | 10/06/2014 | 15:44 | BG       |
| TOTAL ALKALINITY (CaCO3)  | 92.0   | MG/L  | 0.594 | 2.376 | SM2320B | 09/30/2014 | 08:30 | SJ       |
| TOTAL SUSPENDED SOLIDS    | 13.6   | MG/L  | 0.570 | 2.280 | SM2540D | 09/30/2014 | 09:04 | SW       |
| COPPER                    | 1.60 I | UG/L  | 0.346 | 1.384 | SM3113B | 09/30/2014 | 15:59 | JSM      |
| BIOCHEMICAL OXYGEN DEMAND | 3.21   | MG/L  | 0.5   | 2.0   | SM5210B | 09/26/2014 | 08:30 | PN/PN    |
| TOTAL ORGANIC CARBON      | 13.4   | MG/L  | 0.271 | 1.084 | SM5310B | 09/26/2014 | 21:23 | KD       |

*Tulay Tanrisever*  
Dale D. Dixon / Laboratory Director

10/09/2014

Date

Tulay Tanrisever / QC Officer

Jessica Sierra Medina / QC Officer

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

### NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 340.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

! = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES: Chlorophyll A lab filtered on 09/25/14 at 1650.

For questions and comments regarding these results, please contact Bettina Beilfuss at (941) 723-9986  
Results relate only to the samples.

Benchmark EnviroAnalytical, Inc  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
[www.benchmarkea.com](http://www.benchmarkea.com)

Client Information:

Watermark Engineering Group, Inc.  
3868 Sun City Center Blvd  
Sun City Center, FL 33573  
813-641-1200  
Fax: 813-641-1204  
Mark Flint - [mflint@watermarkengineers.com](mailto:mflint@watermarkengineers.com)

Project Name: Briarwood Stormwater Treatment Facility  
Profile 560

Laboratory Submission #

14091061

| Sample Name | Sample Type <sup>1</sup> | Sample Matrix <sup>2</sup> | Parameters, Preservation <sup>3</sup> , Container Type <sup>3</sup>  |                     |  |   |   | Laboratory Sample #       |
|-------------|--------------------------|----------------------------|--|---------------------|--|---|---|---------------------------|
|             |                          |                            | Corrected Chlorophyll a (445.0)                                      | TOC (SM310B)        | Dissolved Organic Nitrogen (Calc.) NH <sub>3</sub> (350.1) TKN (351.2) | Ortho-Phosphate (Lab Filtered) (365.3)  | BOD <sub>5</sub> (SM5210B) TSS (SM2540D) T-Alkalinity (SM2320B) Turbidity (180.1) |                           |
|             |                          |                            | 9/25/14  |                     |  |   |   |                           |
|             |                          |                            | A  | B                   | C  | D                                       | E   | G                         |
|             |                          |                            | Plain  | 1:1 HCl             | Plain  | 1:4 H <sub>2</sub> SO <sub>4</sub> pH<2 | Plain   | 1:4 HNO <sub>3</sub> pH<2 |
|             |                          |                            | 1 x 500mL Opaque Plastic   | 1 x 40mL Glass Vial | 1 x 1/2 Pint Plastic   | 1 x 1/2 Pint Plastic                    | 1 x 2 Quart Plastic   | 1 x 1/2 Pint Plastic      |
| BWL-1       | Comp.                    | SW                         | Start Date & Time: 9/25/14, 13:23<br>End Date & Time: 9/25/14, 13:24 |                     |  |   |   | 1                         |
| BWL-6       | Comp.                    | SW                         | Start Date & Time: 9/25/14, 13:20<br>End Date & Time: 9/25/14, 13:21 |                     |  |   |   | 2                         |
| BWL-6-DUP   | Comp.                    | SW                         | Start Date & Time: 9/25/14, 13:20<br>End Date & Time: 9/25/14, 13:21 |                     |  |   |   | 3                         |
|             | Comp.                    | SW                         | Start Date & Time:<br>End Date & Time:                               |                     |  |   |   |                           |

<sup>1</sup> Sample Type: is used to indicate whether the sample was a grab (G) or whether it was a composite (C).

<sup>2</sup> Sample Matrix: is used to indicate whether the sample is being collected in drinking water (DW), surface water (SW), soil, sediment (S), or sludge (SL/DK).

<sup>3</sup> Sample must be refrigerated or stored in ice for other collection. The temperature during storage should be less than or equal to 4°C (40°F).

<sup>4</sup> Under "Parameters," list any parameters that were added to the sample container.

<sup>5</sup> The following information should be added to each vial label after collection: sample ID, date and time of collection, sample volume, and any field number or ID.

<sup>6</sup> All bottles not containing preservatives must be mixed with appropriate sample prior to collection.

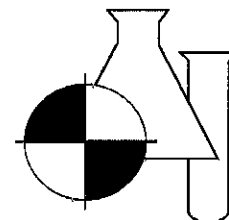
<sup>7</sup> The client is responsible for documentation of the sampling event. Please note special sampling events on the sample analysis form.

Laboratory Sample Acceptability: pH < 2.0  
BEA Temperature:

|   |  |               |             |              |               |            |
|---|--|---------------|-------------|--------------|---------------|------------|
| 1 | Collected By: Phong T. Nguyen, Mark S. Flint | Date: 9/25/14 | Time: 13:20 | Received By: | Date: 9/25/14 | Time: 1532 |
| 2 | Relinquished By:                             | Date:         | Time:       | Received By: | Date:         | Time:      |

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 14110548

Watermark Engineering Group  
3868 Sun City Center Blvd  
Sun City Center, FL 33573

Project Name : BRIARWOOD STORMWATER  
Date Received : 11/14/2014  
Time Received : 0930

Mark Flint

Submission Number 14110548

Sample Number: 001

Sample Description: BWL-1

Sample Date: 11/13/2014

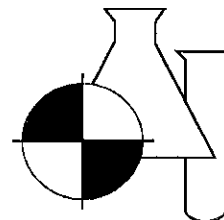
Sample Method: Composite

Sample Time: 1641

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 17      | NTU   | 0.11  | 0.11  | 180.1     | 11/14/2014 | 13:10 | SJ      |
| COPPER                             | 4 U     | UG/L  | 4     | 16    | 200.7     | 11/17/2014 | 16:32 | JSM     |
| ZINC                               | 6.00    | UG/L  | 1.4   | 5.6   | 200.7     | 11/17/2014 | 16:32 | JSM     |
| AMMONIA NITROGEN                   | 0.054   | MG/L  | 0.008 | 0.032 | 350.1     | 11/19/2014 | 12:07 | SJ      |
| AMMONIA NITROGEN, DISSOLVED        | 0.048   | MG/L  | 0.008 | 0.032 | 350.1     | 11/19/2014 | 12:08 | SJ      |
| ORGANIC NITROGEN, DISSOLVED        | 1.06    | MG/L  | 0.05  | 0.20  | 351-350.1 | 11/19/2014 | 12:12 | KS/SJ   |
| TOTAL KJELDAHL NITROGEN            | 2.57    | MG/L  | 0.05  | 0.20  | 351.2     | 11/17/2014 | 10:21 | KS      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.11    | MG/L  | 0.05  | 0.20  | 351.2     | 11/17/2014 | 10:21 | KS      |
| TOTAL NITROGEN                     | 2.58    | MG/L  | 0.05  | 0.20  | 353+351   | 11/17/2014 | 09:28 | KS/KC   |
| NITRATE+NITRITE AS N               | 0.011 I | MG/L  | 0.004 | 0.016 | 353.2     | 11/17/2014 | 09:28 | KC      |
| ORTHO PHOSPHORUS AS P              | 0.002 U | MG/L  | 0.002 | 0.008 | 365.3     | 11/14/2014 | 16:15 | KR      |
| TOTAL PHOSPHORUS AS P              | 0.229   | MG/L  | 0.008 | 0.032 | 365.3     | 11/17/2014 | 09:57 | KR      |
| CHLOROPHYLL A, CORRECTED           | 37.6    | MG/M3 | 0.25  | 1.00  | 445.0     | 11/18/2014 | 11:00 | JA      |
| TOTAL ALKALINITY (CaCO3)           | 123     | MG/L  | 0.594 | 2.376 | SM2320B   | 11/18/2014 | 08:40 | SJ      |
| TOTAL SUSPENDED SOLIDS             | 15.6    | MG/L  | 0.570 | 2.280 | SM2540D   | 11/19/2014 | 12:58 | SW      |
| BIOCHEMICAL OXYGEN DEMAND          | 6.85    | MG/L  | 0.5   | 2.0   | SM5210B   | 11/14/2014 | 10:41 | PN/PN   |
| TOTAL ORGANIC CARBON               | 15.6    | MG/L  | 0.271 | 1.084 | SM5310B   | 11/18/2014 | 15:28 | KD      |

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

Submission Number 14110548

Sample Number: 002

Sample Description: BWL-6

Sample Date: 11/13/2014

Sample Method: Composite

Sample Time: 1625

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|---------|
|                                    |         |       |       |       |           | Date       | Time  |         |
| TURBIDITY                          | 13      | NTU   | 0.11  | 0.11  | 180.1     | 11/14/2014 | 13:10 | SJ      |
| COPPER                             | 4 U     | UG/L  | 4     | 16    | 200.7     | 11/17/2014 | 16:37 | JSM     |
| ZINC                               | 8.10    | UG/L  | 1.4   | 5.6   | 200.7     | 11/17/2014 | 16:37 | JSM     |
| AMMONIA NITROGEN                   | 0.027   | MG/L  | 0.008 | 0.032 | 350.1     | 11/19/2014 | 12:09 | SJ      |
| AMMONIA NITROGEN, DISSOLVED        | 0.016   | MG/L  | 0.008 | 0.032 | 350.1     | 11/19/2014 | 12:10 | SJ      |
| ORGANIC NITROGEN, DISSOLVED        | 1.04    | MG/L  | 0.05  | 0.20  | 351-350.1 | 11/19/2014 | 12:12 | KS/SJ   |
| TOTAL KJELDAHL NITROGEN            | 2.00    | MG/L  | 0.05  | 0.20  | 351.2     | 11/17/2014 | 10:21 | KS      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.06    | MG/L  | 0.05  | 0.20  | 351.2     | 11/17/2014 | 10:21 | KS      |
| TOTAL NITROGEN                     | 2.09    | MG/L  | 0.05  | 0.20  | 353+351   | 11/24/2014 | 14:06 | KS/KC   |
| NITRATE+NITRITE AS N               | 0.090   | MG/L  | 0.004 | 0.016 | 353.2     | 11/24/2014 | 14:06 | KC      |
| ORTHO PHOSPHORUS AS P              | 0.002 U | MG/L  | 0.002 | 0.008 | 365.3     | 11/14/2014 | 16:17 | KR      |
| TOTAL PHOSPHORUS AS P              | 0.209   | MG/L  | 0.008 | 0.032 | 365.3     | 11/17/2014 | 09:58 | KR      |
| CHLOROPHYLL A, CORRECTED           | 50.4    | MG/M3 | 0.25  | 1.00  | 445.0     | 11/18/2014 | 11:00 | JA      |
| TOTAL ALKALINITY (CaCO3)           | 121     | MG/L  | 0.594 | 2.376 | SM2320B   | 11/18/2014 | 08:40 | SJ      |
| TOTAL SUSPENDED SOLIDS             | 19.2    | MG/L  | 0.570 | 2.280 | SM2540D   | 11/19/2014 | 12:59 | SW      |
| BIOCHEMICAL OXYGEN DEMAND          | 3.71    | MG/L  | 0.5   | 2.0   | SM5210B   | 11/14/2014 | 10:41 | PN/PN   |
| TOTAL ORGANIC CARBON               | 15.1    | MG/L  | 0.271 | 1.084 | SM5310B   | 11/18/2014 | 16:16 | KD      |

Submission Number 14110548

Sample Number: 003

Sample Description: BWL-6-DUP

Sample Date: 11/13/2014

Sample Method: Composite

Sample Time: 1625

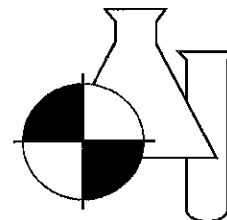
| Parameter                   | Result | Units | MDL   | PQL   | Procedure | Analysis   |       | Analyst |
|-----------------------------|--------|-------|-------|-------|-----------|------------|-------|---------|
|                             |        |       |       |       |           | Date       | Time  |         |
| TURBIDITY                   | 13     | NTU   | 0.11  | 0.11  | 180.1     | 11/14/2014 | 13:10 | SJ      |
| COPPER                      | 4 U    | UG/L  | 4     | 16    | 200.7     | 11/17/2014 | 16:41 | JSM     |
| ZINC                        | 8.00   | UG/L  | 1.4   | 5.6   | 200.7     | 11/17/2014 | 16:41 | JSM     |
| AMMONIA NITROGEN            | 0.025  | MG/L  | 0.008 | 0.032 | 350.1     | 11/19/2014 | 12:11 | SJ      |
| AMMONIA NITROGEN, DISSOLVED | 0.016  | MG/L  | 0.008 | 0.032 | 350.1     | 11/19/2014 | 12:12 | SJ      |
| ORGANIC NITROGEN, DISSOLVED | 1.12   | MG/L  | 0.05  | 0.20  | 351-350.1 | 11/19/2014 | 12:12 | KS/SJ   |
| TOTAL KJELDAHL NITROGEN     | 2.22   | MG/L  | 0.05  | 0.20  | 351.2     | 11/17/2014 | 10:21 | KS      |

1711 12th Street East \* Palmetto, FL 34221 \* Phone (941) 723-9986 \* Fax (941) 723-6061



# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification # E84167

|                                    |         |       |       |       |         |            |       |       |
|------------------------------------|---------|-------|-------|-------|---------|------------|-------|-------|
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.14    | MG/L  | 0.05  | 0.20  | 351.2   | 11/17/2014 | 10:21 | KS    |
| TOTAL NITROGEN                     | 2.31    | MG/L  | 0.05  | 0.20  | 353+351 | 11/24/2014 | 14:06 | KS/KC |
| NITRATE+NITRITE AS N               | 0.091   | MG/L  | 0.004 | 0.016 | 353.2   | 11/24/2014 | 14:06 | KC    |
| ORTHO PHOSPHORUS AS P              | 0.002 U | MG/L  | 0.002 | 0.008 | 365.3   | 11/14/2014 | 16:19 | KR    |
| TOTAL PHOSPHORUS AS P              | 0.200   | MG/L  | 0.008 | 0.032 | 365.3   | 11/17/2014 | 09:59 | KR    |
| CHLOROPHYLL A, CORRECTED           | 54.0    | MG/M3 | 0.25  | 1.00  | 445.0   | 11/18/2014 | 11:00 | JA    |
| TOTAL ALKALINITY (CaCO3)           | 121     | MG/L  | 0.594 | 2.376 | SM2320B | 11/18/2014 | 08:40 | SJ    |
| TOTAL SUSPENDED SOLIDS             | 17.2    | MG/L  | 0.570 | 2.280 | SM2540D | 11/19/2014 | 13:00 | SW    |
| BIOCHEMICAL OXYGEN DEMAND          | 3.96    | MG/L  | 0.5   | 2.0   | SM5210B | 11/14/2014 | 10:41 | PN/PN |
| TOTAL ORGANIC CARBON               | 15.0    | MG/L  | 0.271 | 1.084 | SM5310B | 11/18/2014 | 16:31 | KD    |

*Tülay Tanrisever*

12/01/2014

Dale D. Dixon / Laboratory Director

Date

Tülay Tanrisever / QC Officer

Deborah A. Murphy / Project Manager

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix Interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

### NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 340.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

I = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES: Chlorophyll A lab filtered on 11/14/14 at 1715.

For questions and comments regarding these results, please contact Bettina Beilfuss at (941) 723-9986

Results relate only to the samples.

Benchmark EnviroAnalytical, Inc  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
www.benchmarkea.com

Client Information:

Watermark Engineering Group, Inc.  
3868 Sun City Center Blvd  
Sun City Center, FL 33573  
813-641-1200  
Fax: 813-641-1204  
Mark Flint - mflint@watermarkengineers.com

Project Name: Briarwood Stormwater Treatment Facility  
Profile 560

| Sample Name                                |                     | Sample Type <sup>4</sup>  | Sample Matrix <sup>2</sup>   | Parameters, Preservation <sup>4</sup> , Container Type <sup>3</sup> |   |                           |  |  |  | Laboratory Submission # | Laboratory Sample # |
|--|---------------------|---|--|---|---|---------------------------|--|--|--|-------------------------|---------------------|
| Corrected Chlorophyll a (445.0)            | TOC (SM5310B)       | Dissolved Organic Nitrogen (Calc.) NH <sub>3</sub> (350.1) TKN (351.2) (Lab Filtered) | NH <sub>3</sub> (350.1) TKN (351.2) NO <sub>3</sub> -NO <sub>2</sub> (353.2) TP (365.3) TN (Calc.) | Ortho-Phosphate (Lab Filtered) (365.3)                              | BOD <sub>5</sub> (SM5210B) TSS (SM2540D) T-Alkalinity (SM2320B) Turbidity (180.1) | Cu Zn (200.7)             |  |  |  |                         |                     |
| 11/11/14                                   |                     |   |  |   |   |                           |  |  |  |                         |                     |
| A  | B                   | C   | D  | E   | F   | G                         |  |  |  |                         |                     |
| Plain                                      | 1:1 HCl             | Plain   | 1:4 H <sub>2</sub> SO <sub>4</sub> pH<2  | Plain   | Plain   | 1:4 HNO <sub>3</sub> pH<2 |  |  |  |                         |                     |
| 1 x 300mL Opaque Plastic                   | 1 x 40mL Glass Vial | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic   | 1 x 1/2 Pint Plastic  | 1 x 2 Quart Plastic   | 1 x 1/2 Pint Plastic      |  |  |  |                         |                     |
| Start Date & Time: 11/12/14, 1:05 PM       |                     |   |  |   |   |                           |  |  |  |                         |                     |
| End Date & Time: 11/13/14, 1:08 PM (1641*) |                     |   |  |   |   |                           |  |  |  | 1                       |                     |
| Start Date & Time: 11/12/14, 1:00 PM       |                     |   |  |   |   |                           |  |  |  |                         |                     |
| End Date & Time: 11/13/14, 1:00 PM (1625*) |                     |   |  |   |   |                           |  |  |  | 2                       |                     |
| Start Date & Time: 11/12/14, 1:00 PM       |                     |   |  |   |   |                           |  |  |  |                         |                     |
| End Date & Time: 11/13/14, 1:00 PM (1625*) |                     |   |  |   |   |                           |  |  |  | 3                       |                     |
| Start Date & Time:                         |                     |   |  |   |   |                           |  |  |  |                         |                     |
| End Date & Time:                           |                     |   |  |   |   |                           |  |  |  |                         |                     |

\*Sample Type<sup>3</sup> is used to indicate whether the sample was a grab (G) or whether it was a composite (C).

<sup>2</sup> "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), surface water (SW), soil, sediment (SD), or sludge (SLD).

<sup>3</sup> Container Type: If used to indicate whether the sample is plastic (P) or glass (G), the container type must be indicated on the label. The container type must be indicated on the label. The container type must be indicated on the label.

<sup>4</sup> Under "Preservation" for any preservation that was added to the sample container.

<sup>5</sup> Each bottle has a label identifying sample ID, preservation, preservation date, and parameters for analysis.

<sup>6</sup> All bottles and sampling preservation must be rinsed with appropriate sample prior to collection.

<sup>7</sup> All bottles and sampling preservation must be rinsed with appropriate sample prior to collection.

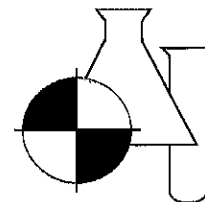
\*Per Sample bottles. @ 11/14/14

Laboratory Sample Acceptability: pH < 7  
BEA Temperature: 4.0°C

| 1 | Collected By: Phong Nguyen (PTN)  | Date     | Time | Received By: | Date     | Time |
|---|-----------------------------------|----------|------|--------------|----------|------|
| 2 | Relinquished By: Mark Flint (MFL) | Date     | Time | Received By: | Date     | Time |
|   |                                   | 11/13/14 |      |              | 11/14/14 | 0930 |

# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification #E84167

### ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 15011177

Watermark Engineering Group  
3868 Sun City Center Blvd  
Sun City Center, FL 33573

Project Name : BRIARWOOD STORMWATER TREATMENT  
Date Received : 01/31/2015  
Time Received : 1310

Mark Flint

Submission Number: 15011177  
Sample Number: 001  
Sample Description: BWL-1

Sample Date: 01/30/2015  
Sample Time: 1345  
Sample Method: Composite

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis Date/Time | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|--------------------|---------|
| TURBIDITY                          | 22      | NTU   | 0.11  | 0.11  | 180.1     | 01/31/2015 14:10   | BG      |
| COPPER                             | 4 U     | UG/L  | 4     | 16    | 200.7     | 02/09/2015 17:51   | JSM     |
| ZINC                               | 10.3    | UG/L  | 1.4   | 5.6   | 200.7     | 02/09/2015 17:51   | JSM     |
| AMMONIA NITROGEN                   | 0.036   | MG/L  | 0.008 | 0.032 | 350.1     | 02/02/2015 10:18   | SJ      |
| AMMONIA NITROGEN, DISSOLVED        | 0.015 I | MG/L  | 0.008 | 0.032 | 350.1     | 02/02/2015 10:20   | SJ      |
| ORGANIC NITROGEN, DISSOLVED        | 1.32    | MG/L  | 0.05  | 0.20  | 351-350.1 | 02/04/2015 09:51   | KS/SJ   |
| TOTAL KJELDAHL NITROGEN            | 3.18    | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2015 09:51   | KS      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.33    | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2015 09:51   | KS      |
| TOTAL NITROGEN                     | 3.19    | MG/L  | 0.05  | 0.20  | 353+351   | 02/04/2015 09:28   | KS/KC   |
| NITRATE+NITRITE AS N               | 0.011 I | MG/L  | 0.004 | 0.016 | 353.2     | 02/04/2015 09:28   | KC      |
| ORTHO PHOSPHORUS AS P              | 0.002 U | MG/L  | 0.002 | 0.008 | 365.3     | 02/01/2015 09:05   | SJ      |
| TOTAL PHOSPHORUS AS P              | 0.244   | MG/L  | 0.008 | 0.032 | 365.3     | 02/02/2015 12:36   | SJ      |
| CHLOROPHYLL A, CORRECTED           | 99.4    | MG/M3 | 0.25  | 1.00  | 445.0     | 02/05/2015 15:00   | BG      |
| TOTAL ALKALINITY (CACO3)           | 125     | MG/L  | 0.594 | 2.376 | SM2320B   | 02/03/2015 09:00   | DW      |
| TOTAL SUSPENDED SOLIDS             | 15.7    | MG/L  | 0.570 | 2.280 | SM2540D   | 02/03/2015 12:05   | SN/SW   |
| BIOCHEMICAL OXYGEN DEMAND          | 7.57    | MG/L  | 0.5   | 2.0   | SM5210B   | 02/01/2015 08:43   | SJ/PN   |
| TOTAL ORGANIC CARBON               | 16.3    | MG/L  | 0.271 | 1.084 | SM5310B   | 02/03/2015 18:48   | KD      |

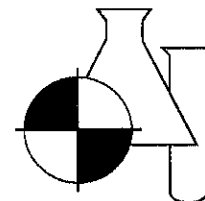
Submission Number: 15011177  
Sample Number: 002  
Sample Description: BWL-6

Sample Date: 01/30/2015  
Sample Time: 1345  
Sample Method: Composite

| Parameter | Result | Units | MDL  | PQL  | Procedure | Analysis Date/Time | Analyst |
|-----------|--------|-------|------|------|-----------|--------------------|---------|
| TURBIDITY | 17     | NTU   | 0.11 | 0.11 | 180.1     | 01/31/2015 14:10   | BG      |
| COPPER    | 4.40 I | UG/L  | 4    | 16   | 200.7     | 02/09/2015 18:01   | JSM     |

# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification #E84167

|                                    |         |       |       |       |           |            |       |       |
|------------------------------------|---------|-------|-------|-------|-----------|------------|-------|-------|
| ZINC                               | 10.2    | UG/L  | 1.4   | 5.6   | 200.7     | 02/09/2015 | 18:01 | JSM   |
| AMMONIA NITROGEN                   | 0.037   | MG/L  | 0.008 | 0.032 | 350.1     | 02/02/2015 | 10:19 | SJ    |
| AMMONIA NITROGEN, DISSOLVED        | 0.010 I | MG/L  | 0.008 | 0.032 | 350.1     | 02/02/2015 | 10:21 | SJ    |
| ORGANIC NITROGEN, DISSOLVED        | 1.31    | MG/L  | 0.05  | 0.20  | 351-350.1 | 02/04/2015 | 09:51 | KS/SJ |
| TOTAL KJELDAHL NITROGEN            | 2.67    | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2015 | 09:51 | KS    |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.32    | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2015 | 09:51 | KS    |
| TOTAL NITROGEN                     | 2.81    | MG/L  | 0.05  | 0.20  | 353+351   | 02/04/2015 | 09:28 | KS/KC |
| NITRATE+NITRITE AS N               | 0.136   | MG/L  | 0.004 | 0.016 | 353.2     | 02/04/2015 | 09:28 | KC    |
| ORTHO PHOSPHORUS AS P              | 0.002 U | MG/L  | 0.002 | 0.008 | 365.3     | 02/01/2015 | 09:08 | SJ    |
| TOTAL PHOSPHORUS AS P              | 0.214   | MG/L  | 0.008 | 0.032 | 365.3     | 02/02/2015 | 12:37 | SJ    |
| CHLOROPHYLL A, CORRECTED           | 66.8    | MG/M3 | 0.25  | 1.00  | 445.0     | 02/05/2015 | 15:00 | BG    |
| TOTAL ALKALINITY (CAC03)           | 126     | MG/L  | 0.594 | 2.376 | SM2320B   | 02/03/2015 | 09:00 | DW    |
| TOTAL SUSPENDED SOLIDS             | 27.3    | MG/L  | 0.570 | 2.280 | SM2540D   | 02/03/2015 | 12:05 | SN/SW |
| BIOCHEMICAL OXYGEN DEMAND          | 5.41    | MG/L  | 0.5   | 2.0   | SM5210B   | 02/01/2015 | 08:43 | SJ/PN |
| TOTAL ORGANIC CARBON               | 15.4    | MG/L  | 0.271 | 1.084 | SM5310B   | 02/03/2015 | 19:03 | KD    |

Submission Number: 15011177

Sample Number: 003

Sample Description: BWL-6-DUP

Sample Date: 01/30/2015

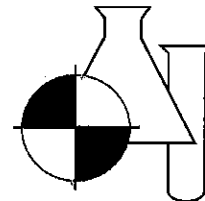
Sample Time: 1345

Sample Method: Composite


| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis Date/Time | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|--------------------|---------|
| TURBIDITY                          | 18      | NTU   | 0.11  | 0.11  | 180.1     | 01/31/2015 14:10   | BG      |
| COPPER                             | 4.60 I  | UG/L  | 4     | 16    | 200.7     | 02/09/2015 18:05   | JSM     |
| ZINC                               | 10.4    | UG/L  | 1.4   | 5.6   | 200.7     | 02/09/2015 18:05   | JSM     |
| AMMONIA NITROGEN                   | 0.039   | MG/L  | 0.008 | 0.032 | 350.1     | 02/02/2015 10:20   | SJ      |
| AMMONIA NITROGEN, DISSOLVED        | 0.010 I | MG/L  | 0.008 | 0.032 | 350.1     | 02/02/2015 10:22   | SJ      |
| ORGANIC NITROGEN, DISSOLVED        | 1.32    | MG/L  | 0.05  | 0.20  | 351-350.1 | 02/04/2015 09:51   | KS/SJ   |
| TOTAL KJELDAHL NITROGEN            | 2.68    | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2015 09:51   | KS      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.33    | MG/L  | 0.05  | 0.20  | 351.2     | 02/04/2015 09:51   | KS      |
| TOTAL NITROGEN                     | 2.82    | MG/L  | 0.05  | 0.20  | 353+351   | 02/04/2015 09:28   | KS/KC   |
| NITRATE+NITRITE AS N               | 0.136   | MG/L  | 0.004 | 0.016 | 353.2     | 02/04/2015 09:28   | KC      |
| ORTHO PHOSPHORUS AS P              | 0.002 U | MG/L  | 0.002 | 0.008 | 365.3     | 02/01/2015 09:11   | SJ      |
| TOTAL PHOSPHORUS AS P              | 0.210   | MG/L  | 0.008 | 0.032 | 365.3     | 02/02/2015 12:38   | SJ      |
| CHLOROPHYLL A, CORRECTED           | 51.2    | MG/M3 | 0.25  | 1.00  | 445.0     | 02/05/2015 15:00   | BG      |
| TOTAL ALKALINITY (CAC03)           | 127     | MG/L  | 0.594 | 2.376 | SM2320B   | 02/03/2015 09:00   | DW      |
| TOTAL SUSPENDED SOLIDS             | 24.7    | MG/L  | 0.570 | 2.280 | SM2540D   | 02/03/2015 12:05   | SN/SW   |
| BIOCHEMICAL OXYGEN DEMAND          | 5.48    | MG/L  | 0.5   | 2.0   | SM5210B   | 02/01/2015 08:43   | SJ/PN   |
| TOTAL ORGANIC CARBON               | 15.1    | MG/L  | 0.271 | 1.084 | SM5310B   | 02/03/2015 19:18   | KD      |

# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification #E84167

  
Dale D. Dixon / Laboratory Director

02/11/2015

Date

Tulay Tanrisever / QC Officer

Deborah Murphy / Project Manager

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.  
B = Results based upon colony counts outside the ideal range.  
H = Value based on field kit determination. Results may not be accurate.  
I = Reported value is between the laboratory MDL and the PQL.  
J1 = Estimated value. Surrogate recovery limits exceeded.  
J2 = Estimated value. No quality control criteria exists for component.  
J3 = Estimated value. Quality control criteria for precision or accuracy not met.  
J4 = Estimated value. Sample matrix interference suspected.  
J5 = Estimated value. Data questionable due to improper lab or field protocols.  
K = Off-scale low. Value is known to be < the value reported.  
L = Off-scale high. Value is known to be > the value reported.  
N = Presumptive evidence of presence of material.  
O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.  
T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.  
U = Analyte analyzed but not detected at the value indicated.  
V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable.  
Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.  
Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.  
! = Data deviate from historically established concentration ranges.  
? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the presence or absence of the analyte cannot be determined from the data.  
\* = Not reported due to interference.

### NOTES:

MBAS calculated as LAS; molecular weight = 340.  
PQL = 4xMDL.  
ND = Not detected at or above the adjusted reporting limit.  
X = Value exceeds MCL.

### COMMENTS:

Chlorophyll A lab filtered on 01/31/15 at 1400.

For questions or comments regarding these results, please contact us at (941) 723-9986.

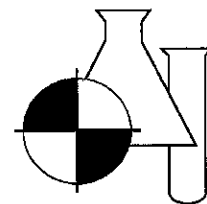
*Results relate only to the samples.*





# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification #E84167

### ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 15030746

Watermark Engineering Group  
3868 Sun City Center Blvd  
Sun City Center, FL 33573

Project Name : BRIARWOOD STORMWATER TREATMENT  
Date Received : 03/20/2015  
Time Received : 1630

Mark Flint

Submission Number: 15030746  
Sample Number: 001  
Sample Description: BWL-1

Sample Date: 03/20/2015  
Sample Time: 1330  
Sample Method: Composite

| Parameter                          | Result  | Units | MDL   | PQL   | Procedure | Analysis Date/Time | Analyst |
|------------------------------------|---------|-------|-------|-------|-----------|--------------------|---------|
| TURBIDITY                          | 26      | NTU   | 0.11  | 0.11  | 180.1     | 03/21/2015 13:20   | BG      |
| COPPER                             | 4 U     | UG/L  | 4     | 16    | 200.7     | 03/30/2015 12:30   | KC/JSM  |
| ZINC                               | 8.41    | UG/L  | 1.4   | 5.6   | 200.7     | 03/30/2015 12:30   | KC/JSM  |
| AMMONIA NITROGEN                   | 0.021 I | MG/L  | 0.008 | 0.032 | 350.1     | 03/23/2015 10:12   | SJ      |
| AMMONIA NITROGEN, DISSOLVED        | 0.008 U | MG/L  | 0.008 | 0.032 | 350.1     | 03/23/2015 10:21   | SJ      |
| ORGANIC NITROGEN, DISSOLVED        | 1.29    | MG/L  | 0.05  | 0.20  | 351-350.1 | 03/24/2015 09:53   | KS/SJ   |
| TOTAL KJELDAHL NITROGEN            | 3.13    | MG/L  | 0.05  | 0.20  | 351.2     | 03/24/2015 12:03   | KS      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.29    | MG/L  | 0.05  | 0.20  | 351.2     | 03/24/2015 12:03   | KS      |
| TOTAL NITROGEN                     | 1.31    | MG/L  | 0.05  | 0.20  | 353+351   | 03/25/2015 09:53   | KS/SW   |
| NITRATE+NITRITE AS N               | 0.016   | MG/L  | 0.004 | 0.016 | 353.2     | 03/25/2015 09:53   | SW      |
| ORTHO PHOSPHORUS AS P              | 0.003 I | MG/L  | 0.002 | 0.008 | 365.3     | 03/21/2015 12:46   | SJ      |
| TOTAL PHOSPHORUS AS P              | 0.221   | MG/L  | 0.008 | 0.032 | 365.3     | 03/23/2015 12:50   | SJ      |
| CHLOROPHYLL A, CORRECTED           | 117     | MG/M3 | 0.25  | 1.00  | 445.0     | 03/27/2015 09:00   | BG      |
| TOTAL ALKALINITY (CACO3)           | 106     | MG/L  | 0.594 | 2.376 | SM2320B   | 03/26/2015 09:00   | DW      |
| TOTAL SUSPENDED SOLIDS             | 32.0    | MG/L  | 0.570 | 2.280 | SM2540D   | 03/24/2015 13:01   | SN/KP   |
| BIOCHEMICAL OXYGEN DEMAND          | 7.84    | MG/L  | 0.5   | 2.0   | SM5210B   | 03/21/2015 12:49   | PN/SJ   |
| TOTAL ORGANIC CARBON               | 17.2    | MG/L  | 0.271 | 1.084 | SM5310B   | 03/24/2015 13:44   | KD      |

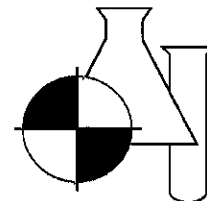
Submission Number: 15030746  
Sample Number: 002  
Sample Description: BWL-2

Sample Date: 03/20/2015  
Sample Time: 1330  
Sample Method: Composite

| Parameter | Result | Units | MDL  | PQL  | Procedure | Analysis Date/Time | Analyst |
|-----------|--------|-------|------|------|-----------|--------------------|---------|
| TURBIDITY | 20     | NTU   | 0.11 | 0.11 | 180.1     | 03/21/2015 13:20   | BG      |
| COPPER    | 4 U    | UG/L  | 4    | 16   | 200.7     | 03/30/2015 12:34   | JSM/KC  |

# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification #E84167

|                                    |       |       |       |       |           |            |       |        |
|------------------------------------|-------|-------|-------|-------|-----------|------------|-------|--------|
| ZINC                               | 8.80  | UG/L  | 1.4   | 5.6   | 200.7     | 03/30/2015 | 12:34 | JSM/KC |
| AMMONIA NITROGEN                   | 0.140 | MG/L  | 0.008 | 0.032 | 350.1     | 03/23/2015 | 10:14 | SJ     |
| AMMONIA NITROGEN, DISSOLVED        | 0.102 | MG/L  | 0.008 | 0.032 | 350.1     | 03/23/2015 | 10:23 | SJ     |
| ORGANIC NITROGEN, DISSOLVED        | 1.49  | MG/L  | 0.05  | 0.20  | 351-350.1 | 03/24/2015 | 09:53 | KS/SJ  |
| TOTAL KJELDAHL NITROGEN            | 2.68  | MG/L  | 0.05  | 0.20  | 351.2     | 03/24/2015 | 12:03 | KS     |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.59  | MG/L  | 0.05  | 0.20  | 351.2     | 03/24/2015 | 12:03 | KS     |
| TOTAL NITROGEN                     | 1.64  | MG/L  | 0.05  | 0.20  | 353+351   | 03/25/2015 | 09:53 | KS/SW  |
| NITRATE+NITRITE AS N               | 0.115 | MG/L  | 0.004 | 0.016 | 353.2     | 03/25/2015 | 09:53 | SW     |
| ORTHO PHOSPHORUS AS P              | 0.032 | MG/L  | 0.002 | 0.008 | 365.3     | 03/21/2015 | 12:49 | SJ     |
| TOTAL PHOSPHORUS AS P              | 0.235 | MG/L  | 0.008 | 0.032 | 365.3     | 03/23/2015 | 12:51 | SJ     |
| CHLOROPHYLL A, CORRECTED           | 56.5  | MG/M3 | 0.25  | 1.00  | 445.0     | 03/27/2015 | 09:00 | BG     |
| TOTAL ALKALINITY (CACO3)           | 106   | MG/L  | 0.594 | 2.376 | SM2320B   | 03/26/2015 | 09:00 | DW     |
| TOTAL SUSPENDED SOLIDS             | 18.0  | MG/L  | 0.570 | 2.280 | SM2540D   | 03/24/2015 | 13:01 | SN/KP  |
| BIOCHEMICAL OXYGEN DEMAND          | 6.35  | MG/L  | 0.5   | 2.0   | SM5210B   | 03/21/2015 | 12:49 | PN/SJ  |
| TOTAL ORGANIC CARBON               | 17.0  | MG/L  | 0.271 | 1.084 | SM5310B   | 03/24/2015 | 13:59 | KD     |

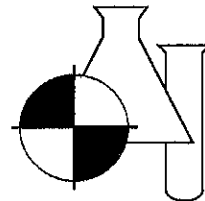
Submission Number: 15030746  
Sample Number: 003  
Sample Description: BWL-2 DUP

Sample Date: 03/20/2015  
Sample Time: 1330  
Sample Method: Composite

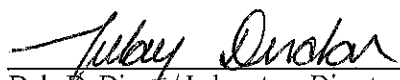
| Parameter                          | Result | Units | MDL   | PQL   | Procedure | Analysis Date/Time | Analyst |
|------------------------------------|--------|-------|-------|-------|-----------|--------------------|---------|
| TURBIDITY                          | 18     | NTU   | 0.11  | 0.11  | 180.1     | 03/21/2015 13:20   | BG      |
| COPPER                             | 41     | UG/L  | 4     | 16    | 200.7     | 03/30/2015 12:38   | KC      |
| ZINC                               | 8.49   | UG/L  | 1.4   | 5.6   | 200.7     | 03/30/2015 12:38   | KC      |
| AMMONIA NITROGEN                   | 0.138  | MG/L  | 0.008 | 0.032 | 350.1     | 03/23/2015 10:18   | SJ      |
| AMMONIA NITROGEN, DISSOLVED        | 0.108  | MG/L  | 0.008 | 0.032 | 350.1     | 03/23/2015 10:24   | SJ      |
| ORGANIC NITROGEN, DISSOLVED        | 1.40   | MG/L  | 0.05  | 0.20  | 351-350.1 | 03/24/2015 09:53   | KS/SJ   |
| TOTAL KJELDAHL NITROGEN            | 2.81   | MG/L  | 0.05  | 0.20  | 351.2     | 03/24/2015 12:03   | KS      |
| TOTAL KJELDAHL NITROGEN, DISSOLVED | 1.51   | MG/L  | 0.05  | 0.20  | 351.2     | 03/24/2015 12:03   | KS      |
| TOTAL NITROGEN                     | 1.63   | MG/L  | 0.05  | 0.20  | 353+351   | 03/25/2015 09:53   | KS/SW   |
| NITRATE+NITRITE AS N               | 0.119  | MG/L  | 0.004 | 0.016 | 353.2     | 03/25/2015 09:53   | SW      |
| ORTHO PHOSPHORUS AS P              | 0.031  | MG/L  | 0.002 | 0.008 | 365.3     | 03/21/2015 12:51   | SJ      |
| TOTAL PHOSPHORUS AS P              | 0.238  | MG/L  | 0.008 | 0.032 | 365.3     | 03/23/2015 12:52   | SJ      |
| CHLOROPHYLL A, CORRECTED           | 59.0   | MG/M3 | 0.25  | 1.00  | 445.0     | 03/27/2015 09:00   | BG      |
| TOTAL ALKALINITY (CACO3)           | 107    | MG/L  | 0.594 | 2.376 | SM2320B   | 03/26/2015 09:00   | DW      |
| TOTAL SUSPENDED SOLIDS             | 18.0   | MG/L  | 0.570 | 2.280 | SM2540D   | 03/24/2015 13:01   | SN/KP   |
| BIOCHEMICAL OXYGEN DEMAND          | 6.32   | MG/L  | 0.5   | 2.0   | SM5210B   | 03/21/2015 12:49   | PN/SJ   |
| TOTAL ORGANIC CARBON               | 17.0   | MG/L  | 0.271 | 1.084 | SM5310B   | 03/24/2015 14:15   | KD      |

# BENCHMARK

## EnviroAnalytical Inc.



NELAC Certification #E84167

  
Dale D. Dixon / Laboratory Director

04/06/2015

Date

Tülay Tanrisever / QC Officer

Deborah A. Murphy / Project Manager

### DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.  
B = Results based upon colony counts outside the ideal range.  
H = Value based on field kit determination. Results may not be accurate.  
I = Reported value is between the laboratory MDL and the PQL.  
J1 = Estimated value. Surrogate recovery limits exceeded.  
J2 = Estimated value. No quality control criteria exists for component.  
J3 = Estimated value. Quality control criteria for precision or accuracy not met.  
J4 = Estimated value. Sample matrix interference suspected.  
J5 = Estimated value. Data questionable due to improper lab or field protocols.  
K = Off-scale low. Value is known to be < the value reported.  
L = Off-scale high. Value is known to be > the value reported.  
N = Presumptive evidence of presence of material.  
O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.  
T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.  
U = Analyte analyzed but not detected at the value indicated.  
V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable.  
Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.  
Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.  
! = Data deviate from historically established concentration ranges.  
? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the presence or absence of the analyte cannot be determined from the data.  
\* = Not reported due to interference.

### NOTES:

MBAS calculated as LAS; molecular weight = 340.  
PQL = 4xMDL.  
ND = Not detected at or above the adjusted reporting limit.  
X = Value exceeds MCL.

### COMMENTS:

Chlorophyll A lab filtered on 03/20/15 at 1655.

For questions or comments regarding these results, please contact us at (941) 723-9986.

Results relate only to the samples.

Benchmark EnviroAnalytical, Inc  
1711 12<sup>th</sup> Street East  
Palmetto, FL 34221  
941-723-9986  
941-723-6061 Fax  
www.benchmarkea.com

Client Information:

Watermark Engineering Group, Inc.  
3868 Sun City Center Blvd  
Sun City Center, FL 33573  
813-641-1200  
Fax: 813-641-1204  
Mark Flint - mflint@watermarkengineers.com

Project Name: Briarwood Stormwater Treatment Facility  
Profile 560

Laboratory Submission #

15030746

| Sample Name | Sample Type <sup>1</sup> | Sample Matrix <sup>2</sup> | Parameters, Preservation <sup>4</sup> , Container Type <sup>3</sup> |                                       |   |  |   |   | Laboratory Sample #  |               |
|-------------|--------------------------|----------------------------|---|---------------------------------------|---|--|---|---|----------------------|---------------|
|             |                          |                            | Corrected Chlorophyll a (445.0)                                     | TOC (SM5310B)                         | Dissolved Organic Nitrogen (Calc.) NH <sub>3</sub> (350.1) TKN (351.2) (Lab Filtered) | NH <sub>3</sub> (350.1) TKN (351.2) NO <sub>3</sub> -NO <sub>2</sub> (353.2) TP (365.3) TN (Calc.) | Ortho-Phosphate (Lab Filtered) (365.3)  | BOD <sub>5</sub> (SM5210B) TSS (SM2540D) T-Alkalinity (SM2320B) Turbidity (180.1) |                      | Cu Zn (200.7) |
| BWL-1       | Comp.                    | SW                         | A   | B                                     | C   | D  | E                                       | F   | G                    | ✓             |
|             |                          |                            | Plain   | 1:1 HCl                               | Plain   | 1:4 H <sub>2</sub> SO <sub>4</sub> pH<2  | Plain                                   | 1 x 1/2 Pint Plastic  | 1 x 2 Quart Plastic  |               |
| BWL-2       | Comp.                    | SW                         | 1 x 500mL Opaque Plastic  | 1 x 40mL Glass Vial                   | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic   | 1 x 1/2 Pint Plastic                    | 1 x 2 Quart Plastic   | 1 x 1/2 Pint Plastic | 1             |
|             |                          |                            | Start Date & Time: 3/20/15 1:00-1:30 PM                             | End Date & Time: 3/20/15 1:00-1:30 PM | Start Date & Time: 3/20/15 1:00-1:30 PM   | End Date & Time: 3/20/15 1:00-1:30 PM  | Start Date & Time: 3/20/15 1:00-1:30 PM | End Date & Time: 3/20/15 1:00-1:30 PM   |                      |               |
| BWL-2-DUP   | Comp.                    | SW                         | 1 x 500mL Opaque Plastic  | 1 x 40mL Glass Vial                   | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic   | 1 x 1/2 Pint Plastic                    | 1 x 2 Quart Plastic   | 1 x 1/2 Pint Plastic | 2             |
|             |                          |                            | Start Date & Time: 3/20/15 1:00-1:30 PM                             | End Date & Time: 3/20/15 1:00-1:30 PM | Start Date & Time: 3/20/15 1:00-1:30 PM   | End Date & Time: 3/20/15 1:00-1:30 PM  | Start Date & Time: 3/20/15 1:00-1:30 PM | End Date & Time: 3/20/15 1:00-1:30 PM   |                      |               |
|             | Comp.                    | SW                         | 1 x 500mL Opaque Plastic  | 1 x 40mL Glass Vial                   | 1 x 1/2 Pint Plastic  | 1 x 1/2 Pint Plastic   | 1 x 1/2 Pint Plastic                    | 1 x 2 Quart Plastic   | 1 x 1/2 Pint Plastic | 3             |
|             |                          |                            | Start Date & Time: 3/20/15 1:00-1:30 PM                             | End Date & Time: 3/20/15 1:00-1:30 PM | Start Date & Time: 3/20/15 1:00-1:30 PM   | End Date & Time: 3/20/15 1:00-1:30 PM  | Start Date & Time: 3/20/15 1:00-1:30 PM | End Date & Time: 3/20/15 1:00-1:30 PM   |                      |               |

<sup>1</sup> Sample Type: 1. For surface water, use "SW". For groundwater, use "GW". For surface water (SW) and groundwater (GW), use "SW" or "GW".

<sup>2</sup> Sample Matrix: 1. For surface water, use "SW". For groundwater, use "GW". For surface water (SW) and groundwater (GW), use "SW" or "GW".

<sup>3</sup> Container Type: 1. For surface water, use "SW". For groundwater, use "GW". For surface water (SW) and groundwater (GW), use "SW" or "GW".

<sup>4</sup> Preservation: 1. For surface water, use "SW". For groundwater, use "GW". For surface water (SW) and groundwater (GW), use "SW" or "GW".

<sup>5</sup> Laboratory Sample Acceptability: pH < 2.7

<sup>6</sup> BEA Temperature: 1.2°C

Received By:

3/20/15 1:30 PM

Time

Date

3/20/15 1630

Time

Date

3/20/15 1630

Time

Date

Received By:

3/20/15 1630

Time

Date

3/20/15 1630

Time

Date

3/20/15 1630

Time

Date

Note: BWL-2 = effluent wet well, BWL-1 = influent wet well, DUP = duplicate