The Ozarks Environmental and Water Resources Institute (OEWRI)

FINAL REPORT FOR:

WATER QUALITY MONITORING AND LOAD REDUCTION EVALUATION FROM DETENTION BASIN RETROFITS IN SPRINGFIELD, MISSOURI

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SCOPE AND OBJECTIVES

The James River Basin of southwest Missouri is listed on the state's 303(d) list as being impaired by nutrients from multiple point and nonpoint sources (MDNR, 2001). In 2001, a Total Maximum Daily Load (TMDL) was developed for the James River that set nutrient limits and targets for both wastewater treatment facilities and urban nonpoint land use (MDNR, 2001). The TMDL set in-stream eutrophication threshold target concentrations for total phosphorus (TP) at 0.075 mg/L and total nitrogen (TN) at 1.5 mg/L. Efforts to control point sources through improved tertiary treatment have reduced nutrient concentrations in the Lower James River between 60%-70% (MDNR, 2004). However, nutrient concentrations still remain high in streams draining urban areas particularly during storm flows (Petersen et al. 1998; Richards and Johnson 2002; Miller 2006; MEC 2007; Hutchinson 2010). To date, few studies have addressed urban nonpoint source pollution concerns in the James River Basin and knowledge of local urban storm water quality and the effectiveness of pollution reduction efforts in this area are incomplete. Water quality monitoring is therefore needed to better understand the role of these types of developments as nonpoint sources of nutrients in the James River Basin and to test the effectiveness of urban storm water controls at reducing pollution from these areas.

The Watershed Committee of the Ozarks in cooperation with the James River Basin Partnership and the City of Springfield, Missouri implemented a Section 319 Grant from the Missouri Department of Natural Resources and the Environmental Protection Agency Region VII designed to reduce nonpoint source pollution in Jordan Creek and Fassnight Creek watersheds located in Springfield, Missouri. This project involved the implementation of detention basin retrofits designed to improve infiltration capacity and increase residence time to ultimately reduce nutrient and sediment pollution within the existing storm water infrastructure. This project supports efforts to meet TMDL requirements and the future Wilson Creek TMDL by finding effective techniques to meet these water quality standards.

The Ozarks Environmental and Water Resources Institute (OEWRI) at Missouri State University was contracted to perform the water quality monitoring component of this project. The purpose of this study is to document nutrient, suspended solids, and chloride loads from two small urban catchments that drain to existing detention basins and test the effectiveness of retrofits to those basins designed to improve infiltration, increase residence time, and trap pollutants all which will improve water quality. The specific objectives of this project are: 1) collect hydrology and water quality before and after detention basin retrofits using automated samplers; 2) analyze water quality indicators including; nutrients (total phosphorus and total nitrogen), total suspended solids (TSS), chloride, specific conductivity, and pH for individual samples collected throughout a storm event; and 3) comparing annual loads to assess the effectiveness of the retrofit design. This report contains the results of water quality and load assessment for both sites.

STUDY AREA

Water quality monitoring sites were located at two publically owned detention basins in the City of Springfield that represent typical institutional or commercial style urban development prevalent in the area. One site is located on the campus of Missouri State University at the Greenwood Laboratory School and the other is on Springfield Public School property but drains from the adjacent Drury University campus. The Drury basin is located within the Jordan Creek watershed and the Greenwood basin is located within the Fassnight Creek watershed (Figure 1).

Jordan Creek (35.9 km^2) and Fassnight Creek (14.3 km^2) are headwater tributaries of Wilsons Creek within the 12-digit Hydrologic Unit Code (HUC) 110100020303 (Headwaters Wilsons Creek) located in southern Greene County in southwest Missouri and is a tributary of the James River. The headwaters of Jordan Creek begin near U.S. Highway 65 along the eastside of the city and flows westward. The headwaters of Fassnight Creek begin east of Glenstone Avenue and flow west where it flows into Jordan Creek where the two streams form Wilsons Creek just east of Scenic Avenue. The area is located on the Springfield Plateau, a subdivision of the Ozarks Plateaus physiographic province underlain by Mississippian age cherty limestone (Fenneman, 1938; Bretz, 1965). Dissolution of limestone along fractures and bedding planes creates a karst landscape where springs, sinkholes and losing streams are common (Petersen et al., 1998). Upland soils typically have a thin layer of loess over highly weathered cherty subsoil (Hughes 1982). The Jordan and Fassnight Creek watersheds are highly urbanized watersheds with very little grassland and forest land use present (Figure 2).

Site Descriptions

Drury Basin

The Drury basin is located between Summit Avenue and Clay Avenue to the north of Harrison Stadium on Springfield Public School land adjacent to the campus of Drury University. The basin drains into the underground drainage system that eventually flows to Jordan Creek. The monitoring station on the inlet is located at a curb inlet box on the north side of the basin that drains an apartment complex and parking lot with a drainage area of 1.9 ha (Figure 3, Table 1). The monitoring station on the outlet is located at the southeast side of the basin at the outlet structure with a drainage area of 2.2 ha. The existing basin included a 1.1 m wide concrete trickle channel that connected the inlet pipe to the outlet structure. The retrofit design removed that trickle channel and replaced it with a 1.8 m wide infiltration trench filled with large stones. Additionally, native plants were installed 3 m on either side of the trench.

Greenwood Basin

The Greenwood basin is located between Harrison Avenue and Bear Boulevard on the west side of the Greenwood Laboratory School on the campus of Missouri State University and drains into the underground drainage system that eventually flows to Fassnight Creek. The monitoring station on the inlet is located on the south side of the basin that drains Bear Boulevard with a drainage area of 0.9 ha (Figure 4, Table 1). The monitoring station on the outlet is located at the north side of the basin at the outlet structure with a drainage area of 2.3 ha. The existing basin included a 1.1 m wide concrete trickle channel that connected the inlet pipe to the outlet structure. The retrofit design removed that trickle channel and replaced it with a 3 m wide infiltration trench filled with large stones. Additionally, native plants were installed 3 m on either side of the trench.

METHODS

This section describes the equipment and methods used for discharge measurements, water quality sampling, laboratory analysis, and load calculation procedures used for this project.

Hydrology and Sample Collection

Water samples, level and rainfall were collected at each basin with Teledyne ISCO 6712 Portable Samplers equipped with 720 Submerged Probe Modules and 675 Rain Gauges. The following describes the methods used to collect rainfall data, runoff data, and water samples.

Automated Sampling

The Teledyne ISCO 6712 Portable Sampler is equipped with 24 one-liter bottles that allows for discrete water sampling at specific intervals during the storm event (OEWRI 2006a, OEWRI 2007a, OEWRI 2010a). The sampler pumps water up to an internal distributer arm in clear 0.95 cm PVC tubing connected to a stainless steel strainer anchored next the submerged probe. For this project, the samplers located on the inlet to begin collecting 1-liter samples when the level at the submerged probe was 3 cm and then every 15 minutes for the duration of the storm event. At the outlets, samplers were programmed to collect when the submerged probe was 0.2 ft and then every 30 minutes for the duration of the storm event. For the pre-implementation period a minimum of 4 samples at both the inlet and outlet were required before the samples were kept. Due to the difficulty of sampling during the post-implementation period and the short timeframe before the end of the project, events were analyzed with as few as one sample in the inlet and outlet. Samples were retrieved from the samplers within 24-hours of the storm event for analysis.

Runoff

The 720 Submerged Probe Module uses a pressure transducer style probe that measures liquid level as low as 3 cm with an accuracy of +/- 0.3 cm (OEWRI, 2010a). The module is programmed to record and store level data every 5 minutes. The level reading is used to estimate discharge at each station using a rating curve specifically developed for each site.

Drury – The inlet level was measured inside a 76 cm diameter reinforced concrete pipe (RCP) leading from the last curb inlet box in the system to the detention basin. The outlet level was measured at face of a 38 cm RCP leading from the detention basin to the outlet structure. Flow rates for both the inlet and the outlet were calculated using the culvert flow function in Intelisovle's Hydroflow Express software and a Q rating curve was developed from these data (Appendix A) (Intelisolve, 2006).

Greenwood – The inlet level was measured inside a 73 cm x 114 cm elliptical reinforced concrete pipe (RCP) leading from the last curb inlet box in the system to the detention basin. Flow rates for the inlet were calculated using the culvert flow function in Intelisovle's Hydroflow Express software and a Q rating curve was developed from these data (Intelisolve, 2006). The outlet level was measured at face of the outlet structure of the detention basin where a metal plate was attached to the 38 cm low flow outlet that approximates a 20 cm orifice. Flow rates for the outlet were estimated using the orifice equation (Ward and Trimble, 2004).

Rainfall

The 675 Rain Gauge is a tipping bucket style rain gauge that records rainfall in 0.025 cm increments. For this study, rainfall is recorded as total rainfall over 5 minute intervals.

Laboratory Analysis

Sample processing and analysis was performed at OEWRI's Water Quality Laboratory located on the campus of Missouri State University. OEWRI has developed EPA and MDNR approved Standard Operating Procedures (SOP) for the analyses used for this project and can be found at OEWRI's website (http://www.oewri.missouristate.edu).

Sample Processing

The 1-liter samples were brought back to the laboratory and were split into two 500 ml samples. One sample was preserved by adding 2 ml of concentrated sulfuric acid (H_2SO_4) to lower the pH below 2 standard units (OEWRI 2006b, OEWRI 2007a). This bottle was labeled and stored in the refrigerator for nutrient analysis. Specific conductivity and pH were measured in the remaining 500 ml bottle using a Horiba U-22XD Multi-Parameter Water Quality Monitoring System before being labeled and stored in the refrigerator for total suspended solids analysis (OEWRI, 2007b).

Nutrient, TSS, and Chloride Analysis

Samples were analyzed for total nitrogen (TN) and total phosphorus (TP) using a Genesys 10S UV-Vis Spectrophotometer using EPA standard method 365.2 and methods outlined by Crumpton et al., 1992 (OEWRI 2010b, OEWRI 2010c). Total suspended solids (TSS) were determined by filtering samples through a 1.5 µm filter (OEWRI 2007c). Chloride (Cl) was measured in the lab using an Accumet Excel XL25 Dual Channel pH/Ion Meter (OEWRI 2009).

Acceptable detection limits for these procedures are ≤0.1 mg/L TN, ≤0.005 mg/L TP, 0.5 mg/L TSS and 0.1 mg/L Cl with all accuracy and precision checks within the range of + or – 20%.

Load Reduction

Runoff volume (L) was calculated by multiplying the mean discharge (m^3/s) of the runoff event by the duration (s) of the runoff event. Mean event discharge was the average of all discharge values collected at 5 minute intervals throughout the storm event. Runoff duration started when the recorded stage was >3 cm and ended when stage was <3 cm for the individual event. Flow weighted event mean concentrations (EMC) were calculated in two steps. First, each individual sample concentration for each event was multiplied by the sample runoff volume representing the timeframe the discrete sample was collected to get an individual sample load. The second step is to calculate the EMC by taking the sum of each individual sample load and dividing that total by the total runoff volume to get the EMC of each event (McLeod et al, 2006). The site mean concentration (SMC) is the average EMC for the entire sample period. The site mean yield (SMY) is the average load from all paired storm events divided by the upstream drainage area. Load reduction was calculated by subtracting the SMY from the pre-implementation monitoring period from SMY of the post-implementation and dividing it by the pre-implementation SMY to get percent difference.

RESULTS

Sample Collection

A total of 847 individual samples were collected over the monitoring period with about twice as many storm events sampled for the pre-implementation monitoring period compared to the post-implementation period (Table 2). The pre-implementation monitoring period lasted 22 months at the Drury basin and 26 months at the Greenwood basin. The post-implementation monitoring period lasted 7 months at both the Drury and Greenwood basins. The number of samples from each basin collected pre- and post-implementation of the retrofits are detailed below.

<u>Drury Samples</u>

A total of 190 pre-implementation samples were collected at the Drury inlet and 143 collected at the outlet. The first sample at Drury during the pre-implementation monitoring period was collected on 8-31-2012 and the last sample collected 5-8-2014. During the post-implementation period, 63 samples were collected at the inlet and only 23 at the outlet. The first sample at Drury during the post-implementation monitoring period was collected on 10-9-2014 and the last sample collected 4-22-2015.

<u>Greenwood Samples</u>

For the pre-implementation monitoring period at Greenwood 134 samples were collected at the inlet and 160 were collected at the outlet. The first pre-implementation sample was collected on

5-31-2012 and the last one was collected on 6-5-2014. A total of 78 post-implementation samples were collected at the Greenwood inlet and 56 samples were collected at the outlet. During the post-implementation monitoring period at Greenwood the first sample was collected on 10-9-2014 and the last one sampled on 4-22-2014.

Storm Event Hydrology

Rainfall variability of storm events sampled in the pre-implementation period was far greater than in the post-implementation period for this project, which had a much narrower range. Rainfall amounts in the pre-implementation period ranged from 0.58-5.18 cm at Drury (15 events) and 0.97-5.26 cm at Greenwood (14 events) (Table 3). During the post implementation period, rainfall ranged from 2.03-2.69 cm at Drury (6 events) and 1.24-2.51 cm at Greenwood (7 events). The mean rainfall at Drury in the pre-implementation period and the post-implementation period was 2.44 cm. However, at Greenwood the mean rainfall of the pre-implementation period was 2.62 cm and 1.73 cm for the post-implementation period. The rainfall differences between the two periods are very different at Greenwood where the maximum post-implementation rainfall total is lower than the mean of the pre-implementation period. Variability in rainfall duration was also greater in the pre-implementation period compared to the post-implementation period, with fairly similar averages. This suggests rainfall amounts of storms sampled needs to be considered in comparing loads from the two monitoring periods at both sites. While the higher rainfall amounts were not sampled in the post-implementation period, they do represent 90% of expected rainfall events for a given year (Greene County 1999).

Rainfall-runoff characteristics were also variable during the both the pre- and post-implementation monitoring periods suggesting hydrologic variability in these catchment areas, but could also be a function of how the drainage system manipulates flows. Hydrologic variability can be influenced by vegetation, soil moisture conditions and rainfall intensity (Ward and Trimble 2004). Additionally, hydrology can be affected by limitation of equipment where errors can be relatively high at very low or high velocity flow conditions (Teledyne 2006). This especially important to note in the inlets at each basin where the pipes leading to the basin are fairly steep and relatively large creating shallow, fast and turbulent flows. Furthermore, backwater effects from the drainage system downstream or by debris jams from leaves, sediment and trash could also influence stage-discharge relationships causing artificially high runoff calculations. Due to the variability in rainfall for both periods, selected storms from the pre-implementation period with a similar range to the post-implementation period will be compared for runoff analysis.

Rainfall-runoff conditions have changed between the pre- and post-implementation period at Drury suggesting the basin retrofit has changed the hydrologic conditions. Post-implementation runoff yield for Drury IN was similar to the selected events from the pre-implementation period ranging from 20,000-100,000 L/ha for a 2-3 cm rainfall (Figure 5). Drury OUT post-implementation period runoff yields appear to be slightly lower than the selected pre-implementation runoff yields, but the variability in data makes this difficult to prove but generally had similar runoff yields to the inlet ranging from 20,000-100,000 L/ha for a 2-3 cm rainfall event (Figure 6). However, the basins hydrology did change between the pre- and post-implementation periods because there was no water to sample in the outlet at rainfall events lower than 2 cm. This suggests the infiltration trench had a fairly dramatic effect on the ability of the basin to infiltrate water. As suggested earlier, the sampling protocol had to be changed just to sample at the outlet of the Drury basin.

There also appears to be a change in the rainfall-runoff characteristics at the Greenwood basin between the pre- and post-implementation monitoring period, but it is not as dramatic as at Drury. Runoff is highly variable at the Greenwood inlet, but the post-implementation runoff is similar to the pre-implementation monitoring period with runoff yield ranging from 30,000-150,000 L/ha for a 1-3 cm rainfall (Figure 7). In contrast to the other sites, the rainfall-runoff relationships at Greenwood OUT had less variability over both monitoring periods with runoff yields ranging from 40,000-200,000 L/ha for a 1-3 cm rain event (Figure 8). Again, similar to Drury, less water was making it to the outlet during smaller events at Greenwood in the post-implementation period but not as dramatic. No water made it to the outlet at rainfall events <1.2 cm suggesting storage and infiltration of the basin, but not as much as Drury. Again, the sampling protocol was changed to be able to sample water at the outlet.

Physical Water Parameters

Average SC values fluctuated between the inlet and the outlet and between the pre- and post-implementation periods at both sites suggesting first-flush samples are being stored in the infiltration trench in post-implementation monitoring period. Mean SC increased between the inlet and outlet in the pre-implementation period at Drury from 47.6 μS/cm to 51.5 μS/cm (+8%) (Table 4). However, mean SC decreased between the Drury inlet and outlet in the post-implementation period from 87.9 µS/cm to 72.4 μS/cm (-18%). Similarly, Greenwood mean SC in the pre-implementation period increased between the inlet and outlet from 70.8 µS/cm to 75.6 µS/cm (+7%) and decreased between the inlet and outlet in the post-implementation period from 98.8 µS/cm to 91.6 µS/cm (7%). This may suggest that first-flush runoff with higher dissolved load is likely being stored in and removed by the infiltration trenches. Water arriving at the basin later in the event with low dissolved solids concentrations is diluted before it leaves the basin during the post-implementation period. Average pH is very similar between the inlet and outlet during both periods. Overall, SC increased between the inlet and outlet of both basins in the pre-implementation period and decreased during the post-implementation period suggesting the infiltration trenches are trapping the higher dissolved load in the first-flush of the event.

Nutrients, Suspended Solids, and Chloride

Drury Water Quality Data

Total Phosphorus – Average concentrations of TP at Drury are similar for both the pre- and post-implementation period, but the range of concentrations is much lower at the outlet for the post-implementation period. During the pre-implementation period the Drury inlet had an average TP concentration of 0.120 mg/L with a range of 0.036-1.311 mg/L (Table 5). The average pre-implementation TP concentration at the outlet was actually higher at 0.129 mg/L (+7.5%) with a range of 0.020-0.949 mg/L. The post-implementation average TP concentration at the inlet was similar to pre-implementation concentrations at 0.120 mg/L with a range of 0.049-0.968 mg/L. This shows TP concentrations of water entering the basin did not change between monitoring periods. Average post-implementation period concentrations of TP at the outlet were also similar to the pre-implementation period at 0.120 mg/L (0%), but the range was lower between 0.050-0.265 mg/L suggesting perhaps the retrofit design is storing first-flush runoff with high TP concentration where they were passing through the basin before. Average concentrations of TP of individual samples were similar at the inlet between the pre- and post-implementation period, but were slightly lower at the outlet in the post-implementation monitoring period.

Total Nitrogen - Average concentrations of TN at Drury are similar between the inlet and outlet for the pre-implementation period, but increase between the inlet and outlet during the post-implementation period. During the pre-implementation period the Drury inlet had an average TN concentration of 0.75 mg/L with a range of 0.02-4.54 mg/L (Table 5). The average pre-implementation TN concentration at the outlet was similar at 0.76 mg/L (+1.3%) with a range of 0.04-4.17 mg/L. The post-implementation average TN concentration at the inlet was similar to pre-implementation concentrations at 0.73 mg/L with a range of 0.03-3.02 mg/L. This shows TN concentrations of water entering the basin did not change very much between monitoring periods. Average post-implementation period concentrations of TN at the outlet was slightly higher than the pre-implementation period at 0.84 mg/L (+15%), but the range was lower between 0.27-1.98 mg/L. This is likely the result of only having a few storm events with similar rainfall totals. In summary, mean concentrations of TN were similar at the inlet between the pre- and post-implementation monitoring period, but average TN concentrations were slightly higher during the post-implementation monitoring period compared to the pre-implementation period probably.

Total Suspended Solids - Average concentrations of TSS at Drury is higher in the post-implementation period for both the inlet and outlet compared to the pre-implementation period suggesting that post-construction soil disturbance and erosion prior to vegetation reestablishment influenced results. During the pre-implementation period the Drury inlet had an average TSS concentration of 35.4 mg/L with a range of 0.1-364.3 mg/L (Table 5). The average pre-implementation TSS concentration at the outlet was a little higher at 40.0 mg/L (+13%) with a range of 0.1-418.0 mg/L. The post-implementation average TSS concentration at the inlet was higher than the pre-implementation concentrations at 52.8 mg/L with a range of 2.0-331.5 mg/L. Average post-implementation period concentrations of TSS at the outlet were also similar to the inlet at 53.8 mg/L (+2%), with a range between 4.0-413.0 mg/L. The post-implementation increase in TSS at both the inlet and outlet is likely caused by post-construction soil disturbance and erosion that probably occurred prior to reestablishment of vegetation. Overall, average concentrations of TSS increased at both the inlet and outlet during the post-implementation period suggesting post-construction erosion.

Chloride - Average concentrations of Cl increased between the inlet and outlet at Drury during the pre-implementation period and decreased during the post-implementation period. During the pre-implementation period the Drury inlet had an average Cl concentration of 3.0 mg/L with a range of 0.1-35.6 mg/L (Table 5). The average pre-implementation Cl concentration at the outlet was higher at 8.8 mg/L (+193%) with a range of 0.1-130.8 mg/L. The post-implementation average Cl concentration at the inlet was higher than the pre-implementation concentrations at 7.7 mg/L but had a similar range between 0.4-33.5 mg/L. Average post-implementation period concentrations of Cl at the outlet were lower than the inlet at 4.6 mg/L (-40%) and a lower range between 0.6-17.1 mg/L. The average Cl concentrations increased between the inlet and outlet during the pre-implementation period and decreased during the post-implementation period suggesting the new design may be effective in removing Cl from storm water. More post-implementation samples over all seasons would be needed to verify this trend.

Greenwood Water Quality Data

Total Phosphorus – Post-implementation average concentrations of TP at the Greenwood outlet were much lower compared to the pre-implementation period suggesting the retrofit design has been successful in reducing TP. During the pre-implementation period the Greenwood inlet had an average TP concentration of 0.274 mg/L with a range of 0.030-2.89 mg/L (Table 6). The average pre-implementation TP concentration at the outlet was actually higher at 0.283 mg/L (+3.3%)with a similar range between 0.048-2.83 mg/L. The post-implementation average TP concentration at the inlet was lower at 0.214 mg/L than the average pre-implementation concentrations with a range of 0.048-1.84 mg/L. Average post-implementation period concentrations of TP at the outlet was much lower at 0.121 mg/L (-43%) than the average pre-implementation period, and variability of the range was lower between 0.061-0.496 mg/L. This suggests the retrofit design is storing first-flush runoff with high TP concentration where they were passing through the basin before. These trends show mean TP concentrations were lower at the outlet during both the pre- and post-implementation period, but that average TP was much lower during the post-implementation period due to the new basin design.

Total Nitrogen - Average concentrations of TN at Greenwood were similar between the inlet and outlet for the pre-implementation period, but decrease between the inlet and outlet during the post-implementation period. During the pre-implementation period the Greenwood inlet had an average TN concentration of 1.15 mg/L with a range of 0.04-12.52 mg/L (Table 6). The average pre-implementation TN concentration at the outlet was similar at 1.13 mg/L (-1.7%) with a range of 0.1-9.61 mg/L. The post-implementation average TN concentration at the inlet was higher at 1.39 mg/L than the average pre-implementation concentration, but with a lower range of 0.28-5.1 mg/L. Average post-implementation period concentrations of TN at the outlet were lower than the inlet and similar to the pre-implementation period at 1.09 mg/L (-22%), and the range was also lower between 0.12-3.29 mg/L. In summary, mean TN concentrations were similar at the inlet and outlet during the pre-implementation period and average TN concentrations decreased slightly between the inlet and outlet during the post-implementation period suggesting the new design has the ability to remove some nitrogen from storm water in this basin.

Total Suspended Solids – Average concentrations of TSS coming to the inlet at Greenwood are very high and post-implementation period concentrations at the outlet are much lower compared to the pre-implementation period concentrations showing the new design is more efficient at trapping sediment than it was before. During the pre-implementation period the Greenwood inlet had an average TSS concentration of 200.4 mg/L with a range of 1.0-2,845 mg/L (Table 6). The average pre-implementation TSS concentration at the outlet was lower at 134.6 mg/L (-33%) with a range of 0.7-3,128 mg/L. This decrease is due to the restriction plate across the low flow opening of the outlet structure. The post-implementation average TSS concentration at the inlet was similar to the average pre-implementation concentrations at 178.5 mg/L with a range of 3.5-2,626 mg/L. Average post-implementation period concentrations of TSS at the outlet were much lower compared to the inlet at 46.3 mg/L (-74%), with a range between 6.0-672.0 mg/L. While the concentrations of TSS coming to the basin were similar in both monitoring periods, the post-implementation period concentrations at the outlet were dramatically lower suggesting the increased trapping of sediment in the basin is effective over just the restriction plate that was there before. Overall, show mean TSS concentrations were lower at the outlet during both the pre- and post-implementation period, but that average TSS was much lower during the post-implementation period indicating the new basin design is more efficient at sediment removal than it was before.

Chloride - Average concentrations of Cl were higher in the post-implementation period compared to the pre-implementation period, but the average concentration at the outlet decreased at the outlet in the post-implementation period. Over the pre-implementation period the Greenwood inlet had an average Cl concentration of 5.1 mg/L with a range of 0.2-69.9 mg/L (Table 6). The average pre-implementation Cl concentration at the outlet was similar at 4.8 mg/L (-6%) with a range of 0.2-65.6 mg/L. The post-implementation average Cl concentration at the inlet was higher than the average pre-implementation concentrations at 11.9 mg/L but had a lower range between 1.6-38.1 mg/L. Average post-implementation period concentrations of Cl at the outlet were lower than the inlet at 6.7 mg/L (-44%) and had a slightly lower range between

2.8-27.0 mg/L. Mean Cl concentrations were similar at the inlet and outlet over the pre-implementation period, but were lower at the outlet during the post-implementation period suggesting the new design can trap Cl in this basin.

Seasonal Variability in Water Quality Samples

Discharge

Median sample discharge varied seasonally at Drury, had similar trends between the pre- and post-implementation periods at the inlets and was much higher in the post-implementation period at the outlet due to changing hydrologic conditions after retrofit construction. Over the pre-implementation period at the inlet the winter period had the lowest median sample discharge at 0.004 m^3/s and the spring the highest at 0.011 m^3/s (Figure 9). At the outlet, the median sample discharge over the winter was about 0.006 m^3/s, 0.009 m^3/s during the summer and 0.005 during the fall and spring. During the post-implementation period at the inlet the winter was the lowest at 0.005 m^3/s and the fall and spring were similar at 0.008 m^3/s and is similar to the pre-implementation period even with a lower number of samples. The median sample discharge at the outlet for the post-implementation period was much higher ranging from 0.016-0.018 m^3/s in the fall, winter and spring. The median sample discharge for the post-implementation period is higher in part due to lower samples size, but also the smaller storms cannot be sampled due to infiltration of available runoff in the basin. No post-implementation samples have been collected in the summer at Drury.

At Greenwood, median sample discharge was also highly varied by season suggesting the need for more post-imp mentation samples to help verify trends. Over the pre-implementation period at the inlet the median sample discharge ranged from 0.009-0.010 m^3/s over all seasons (Figure 10). At the outlet, the median sample discharge over the fall was relatively high 0.017 m^3/s, with the lowest median sample discharge during the summer at 0.005 m^3/s. During the post-implementation period at the inlet the spring median sample discharge was high at 0.017 m^3/s and low during the fall at 0.009 m^3/s and is similar to the pre-implementation period even with a lower number of samples. The median sample discharge for the post-implementation period at the outlet was 0.013 during the fall and spring. It appears that the new design of the Greenwood basin can increase residence time of water flowing into the basin and it is delivered to the outlet slower over the storm period. No post-implementation samples have been collected in the summer or the winter at Greenwood.

Total Phosphorus

Sample results show seasonal variability of TP in the Drury is relatively low. Median sample TP concentrations for the pre-implementation period at the inlet were similar in the fall, winter and spring ranging from about 0.070-0.090 mg/L with the highest median sample concentration of 0.130 mg/L in the summer (Figure 11). At the outlet, the median sample concentrations for the pre-implementation period were similar for all seasons ranging from about 0.070-0.090 mg/L.

Post-implementation period median sample concentrations of TP were also similar by season only ranging from 0.080-0.110 mg/L at the inlet. The seasonal variability of the median TP concentrations at the outlet was highest during the post-implementation period ranging from 0.080 mg/L in the fall to 0.160 mg/L in the spring.

Greenwood seasonal TP concentrations were highly variable at the inlet and similar at outlet for both the pre- and post-implementation periods. Median sample TP concentrations for the pre-implementation period at the inlet ranged from 0.110 mg/L in the summer to about 0.190 mg/L during the winter (Figure 12). At the outlet, the median sample concentrations for the pre-implementation period were varied even more ranging from about 0.100 mg/L in the winter to about 0.250 mg/L in the summer. Post-implementation period median sample concentrations of TP were also similar by season only ranging from 0.120-0.140 mg/L at the inlet and 0.100-0.110 mg/L at the outlet for the fall and spring.

Total Nitrogen

Concentrations of TN vary seasonally at Drury, but are similar between the pre- and post-implementation period. Median sample TN concentrations for the pre-implementation period at the inlet ranged from about 0.45 mg/L in the fall and summer to about 0.9 mg/L during the spring (Figure 13). At the outlet, the median sample concentrations of TN for the pre-implementation period was similar ranging from about 0.45 mg/L in the fall to about 0.8 mg/L in the winter. Post-implementation period median sample concentrations of TN at the inlet ranged from 0.4 mg/L in the winter to 0.75 mg/L in the fall. The seasonal variability of the median TN concentrations at the outlet was highest during the post-implementation period ranging from 0.5 mg/L in the winter to 1.1 mg/L in the spring.

There is relatively high variability in seasonal TN concentrations at Greenwood, but seasonal TN concentrations varied the least at the outlet during the post-implementation period. Median sample TN concentrations for the pre-implementation period at the inlet ranged from 0.4 mg/L in the summer to about 1.1 mg/L during the winter (Figure 14). At the outlet, the median sample concentrations for the pre-implementation period were similar to the inlet ranging from about 0.6 mg/L in the fall to about 1.1 mg/L in the spring. Post-implementation period median sample concentrations of TN at the inlet varied greatly between the fall and spring ranging from 0.7-1.5 mg/L. However, median TN concentrations at the outlet ranged from 0.8-1.1 mg/L for fall and spring during the post-implementation period.

Total Suspended Solids

Median TSS sample concentrations did vary by season, but inlet and outlet TSS concentrations were fairly similar between the pre- and post-implementation periods. Median sample TSS concentrations for the pre-implementation period at the inlet ranged from 5.0 mg/L in the summer to about 28 mg/L during the winter (Figure 15). At the outlet, the median sample concentrations for the pre-implementation period was similar ranging from about 8.0 mg/L in the summer to about 19 mg/L in the spring. The post-implementation period median sample concentrations of TSS were also similar by season ranging from 10 mg/L in the summer to 39 mg/L in the winter at the inlet and 8 mg/L in the fall 36 mg/L at the outlet in the spring.

Concentrations of TSS were relatively high at the inlet for both the pre- and post-implementation period and much lower at the outlet for both periods suggesting the basin has the ability to trap sediment. Median sample TSS concentrations for the pre-implementation period at the inlet ranged from 20 mg/L in the summer to a high of around 150 mg/L during the winter (Figure 16). At the outlet, the median sample concentrations for the pre-implementation period varied much less ranging from about 8 mg/L in the summer to about 19 mg/L in the spring. Post-implementation period median sample concentrations of TSS were similar by season only ranging from 50-60 mg/L at the inlet and dropped to 18-19 mg/L at the outlet for the fall and spring.

Chloride

Chloride concentrations were relatively low in the fall, spring and summer and relatively high in the winter at the Drury basin suggesting chloride is entering the drainage system by road salt applications. Median sample Cl concentrations for the pre-implementation period at the inlet ranged from 1.0 mg/L in the fall, spring and summer to about 23.0 mg/L during the winter (Figure 17). At the outlet, the median sample concentrations for the pre-implementation period were varied even more ranging from about 1.0 mg/L in the fall, spring and summer to about 33.0 mg/L in the winter. Post-implementation period median sample concentrations of Cl were also similar by season only ranging from 2.0-4.0 mg/L in the spring and summer to 21.0 mg/L in the winter at the inlet. Outlet median Cl concentrations were also similar ranging from 2.0-4.0 mg/L in the spring and summer to 13.0 mg/L in the winter.

Similar to Drury, median Cl concentrations spike in the winter likely the result of road salt application. Greenwood Median sample Cl concentrations for the pre-implementation period at the inlet ranged from 1.0-5.0 mg/L in the fall, spring and summer to about 24 mg/L during the winter (Figure 18). At the outlet, the median sample concentrations for the pre-implementation period ranged from about 1.0-4.0 mg/L in the fall, spring and summer to about 15 mg/L during the winter. Post-implementation period median sample concentrations of Cl were similar by the two seasons that were sampled ranging from 5.0-11.0 at the inlet and 5.0-7.0 mg/L at the outlet for the fall and spring. Again, no winter samples were collected at Greenwood, but the higher concentrations in the spring could be left over from late winter-early spring snow storms where salt was applied.

In summary, median concentrations of TP, TN, TSS, and Cl varied by season for both the pre- and the post-implementation periods but there doesn't seem to be a specific seasonal pattern for any of the pollutants except for Cl in the winter. High concentrations of TP, TN and TSS varied among the seasons for both Drury and Greenwood suggesting other hydrological processes are likely more important in controlling these pollutants. However, Cl concentrations in the winter were consistently high at both basins indicating the importance of road salt applications as the most important source of Cl for these basins. Again, the number of post-implementation sample events did not cover all seasons and continuing monitoring over the summer, fall and winter seasons would be beneficial in completing the dataset.

Event Mean Concentrations

To evaluate how the basin retrofit design is reducing pollution, individual EMCs of each storm event sampled at the inlet is compared to the outlet for both the pre- and post-implementation monitoring periods for both basins.

Drury

The retrofit design at the Drury basin is reducing EMC of TP, TN, and TSS leaving the basin, particularly when high concentrations are entering the basin. Pre-implementation TP EMCs ranged from around 0.030-0.480 mg/L leaving the basin and 0.060-0.250 mg/L coming into the basin suggesting some internal loading before the retrofit (Figure 19). Post-implementation TP EMCs at the outlet were 0.050-0.200 mg/L and generally lower than the EMCs at the inlet ranging 0.080-0.300 mg/L. The EMCs of TN in the pre-implementation period were about 0.2-1.6 mg/L at the inlet and around 0.2-2.6 mg/L at the outlet, and the EMCs of TN at the inlet were about 0.4-2.2 mg/L during the post-implementation period and 0.4-1.6 mg/L at the outlet for the post-implementation period. The biggest difference in the pre- and post-implementation period EMCs is in TSS where the pre-implementation inlet ranged from 10-200 mg/L and the outlet ranged from 10-220 mg/L. The post-implementation period EMCs at the inlet were similar to the pre-implementation period EMCs ranging from 20-160 mg/L, but the outlet was much lower, ranging from 10-80 mg/L. The EMCs of Cl in the pre-implementation period ranged from about 0.1-28 mg/L at the inlet and 0.1-93 mg/L at the outlet, and the EMCs of CL at the inlet were 1.0-20 mg/L during the post-implementation period and 1.0-13 mg/L at the outlet.

Greenwood

At Greenwood, the retrofit design also appears to be reducing TP and TSS, but TN EMCs appear to be lower at the outlet only when higher concentrations are entering the basin. Pre-implementation TP EMCs were about 0.150-0.470 mg/L leaving the basin and 0.080-0.470 mg/L coming into the basin (Figure 20). Post-implementation TP EMCs at the outlet were 0.090-0.190 mg/L generally much lower than the EMCs at the inlet ranging 0.100-0.420 mg/L. The EMCs of TN in the pre-implementation period were from about 0.2-1.8 mg/L at the inlet and 0.4-1.8 mg/L at the outlet, and the EMCs of TN at the inlet were 0.6-2.5 mg/L during the post-implementation period and 0.8-1.4 mg/L at the outlet. The TSS EMCs during the pre-implementation period at the inlet ranged from around 10-1,000 mg/L and the outlet ranged from about 10-400mg/L. During the post-implementation period the inlet ranged from 50-780 mg/L, but the EMCs at the outlet dropped considerable, ranging from 10-100 mg/L. The EMCs of Cl in the pre-implementation period ranged from about 0.1-20 mg/L at the inlet and 0.1-20 mg/L at the outlet, and the EMCs of CL at the inlet were 2.0-18 mg/L during the post-implementation period and 2.0-10 mg/L at the outlet.

Load Reduction

Load reduction is calculated by taking the percent difference of pre- and post-implementation site mean load (SML) from all events analyzed. The SML is divided by the drainage area and displayed a site mean yield (SMY).

Total Phosphorus

Comparing the SMYs from the pre- and post-implementation period for the inlet and outlet at both basins suggests the new design reduces TP loads by 66-75%. The SMYs at the Drury inlet during the post-implementation period were 54% lower for TP compared to similar rainfall events selected from the pre-implementation period, but were more similar to the SMYs from all pre-implementation period events (Figure 21). The SMYs at the Greenwood inlet during the post-implementation period were within 20% of the selected events from the pre-implementation period for TP. The post-implementation SMYs at the outlet were 66% lower at Greenwood and 75% lower at Drury. The hydrology data suggest there is some infiltration in this basin, however, load reduction is likely due to the increase in residence time after the retrofit causing sedimentation in the basin.

Total Nitrogen

Results show that the new basin designs can reduce TN loads by 28-50%. The SMYs for TN at the inlet were similar for both basins in the pre- and post-implementation period were within 2-13% of the selected events from the pre-implementation period at both basins (Figure 22). Post-implementation SMYs at both outlets were lower, with a 25% reduction at Greenwood and a 50% reduction at Drury.

Total Suspended Solids

The SMYs from the pre- and post-implementation period for the inlet and outlet of both basins suggests the new design reduces the TSS loads by 70-78%. The SMYs at the Drury inlet during the post-implementation period were 43% lower for TSS compared to similar rainfall events selected from the pre-implementation period, but were similar to the SMYs from all pre-implementation period events (Figure 23). The post-implementation SMYs at Drury show a 70% reduction in TSS. The SMYs at the Greenwood inlet during the post-implementation period were 8% higher than the selected events from the pre-implementation period for TSS. However, the post-implementation SMYs at the outlet were much lower for TSS with a 78% reduction.

Chloride

Comparing the SMYs from the pre- and post-implementation periods at both basins shows the new design reduces the pollution loads by 24-64%. The SMY of Cl was 85% higher at the Drury inlet during the post-implementation period when compared to the pre-implementation period suggesting samples were collected soon after road salt was applied after a snow storm (Figure 24). However, the post-implementation SMYs at the outlet showed 64% reduction in Cl compared to selected events from the pre-implementation period at Drury. The SMY for Cl was 24% higher at the inlet during the post-implementation period at Greenwood compared to the pre-implementation period. The post-implementation SMYs for Cl at the Greenwood outlet was 24% lower than the selected pre-implementation events.

Overall, this study suggests that the new basin designs implemented for this project at Drury and Greenwood have been effective in reducing pollution from the urban area. Results of this study show detention basin retrofits have the ability to reduce TP loads from 66-75%, TN loads from 28-50%, TSS loads from 70-78% and Cl loads from 24-64%. While this is promising, this study has limitations particularly with the amount of post-implementation events sampled and the range of rainfall events were not equal to the number events sampled or over the range of rainfall events of pre-implementation monitoring period. Due to the lack of post-implementation sample events, only 33% of the pre-implementation events at Drury and only 43% of the pre-implementation events at Greenwood could be compared. Sampling higher rainfall events could increase the overall mean site yield and may reduce the overall reduction numbers stated above. Furthermore, as these basins age, pollutants and sediment can accumulate in the bottom and become a contamination source if they are not maintained periodically over time. This study also produced ranges of mean event yields for TP, TN, TSS and Cl that can be used in water quality models by giving a range of before and after implementation yields for detention basin retrofit designs over a larger watershed area to model the impact on stream nutrient, sediment and chloride loads (Tables 7 and 8).

CONCLUSIONS

There are 10 main conclusions for this project:

1. **A monitoring network was established at two detention basins in the City of Springfield to test a detention basin retrofit designed to improve water quality in a highly urbanized catchment.** Monitoring stations were installed near Drury University and at the Greenwood Laboratory School on the campus of Missouri State University where rainfall, runoff, and water quality were monitored using automated samplers before and after construction of a retrofit design of existing detention basins. The retrofit was designed to improve infiltration, increase residence time and reduce pollution loads. Catchment drainage areas for the outlets are 2.2 ha for Drury and 2.3 ha at Greenwood.

2. **A total of 847 individual samples were collected and analyzed between May 2012 and April 2015 for this project.** Over the 3 year monitoring period, a total of 847 individual samples collected using automated samplers with about twice as many storm events sampled for the pre-implementation monitoring period compared to the post-implementation period. Samples were processed and analyzed for nutrients, sediment, chloride and physical water parameters at OEWRI Water Quality Laboratory at Missouri State University following the Quality Assurance Project Plan (QAPP) and Quality Assurance/Quality Control following EPA and MDNR approved Standard Operating Procedures (SOP).

3. **Rainfall variability of storm events sampled in the pre-implementation period was far greater than in the post-implementation period for this project, which had a much narrower range.** Rainfall amounts in the pre-implementation period ranged from 0.58-5.18 cm at Drury (15 events) and 0.97-5.26 cm at Greenwood (14 events). During the post implementation period, rainfall ranged from 2.03-2.69 cm at Drury (6 events) and 1.24-2.51 cm at Greenwood (7 events). The difference in the amount of rainfall sampled and the number of events sampled in the post-implementation monitoring period is due to the shorter timeframe to sample and the lack of seasonal variability. Therefore, results of the post-implementation period are only compared to similar events in the pre-implementation period with the same range of rainfall totals for load reduction analysis. However, the range of post-implementation rainfall events represents about 90% of expected events in the area.

4. **Rainfall-runoff conditions shifted between the pre- and post-implementation period at both basins suggesting the basin retrofit has changed the hydrologic conditions by trapping the first-flush runoff in the infiltration trenches.** It is difficult to quantify volume reduction in the post-implementation period due to the variability in the rainfall-runoff relationships for the events sampled for this study. However, lower rainfall events that generated runoff during the pre-implementation period did not produce runoff over the post-implementation period. A total rainfall amount of 2 cm was required to get runoff at the outlet for Drury and 1.2 cm for Greenwood where samples were collected at lower rainfall totals in the pre-implementation period.

5. **Average TP concentrations of individual samples were slightly lower at Drury between the pre- and post-implementation monitoring period and substantially lower at Greenwood during the post-implementation period.** The mean concentration of TP at Drury outlet over the pre-implementation period was 0.129 mg/L and 0.121 mg/L during the post-implementation period. Pre-implementation average concentration of TP at the Greenwood outlet was 0.283 mg/L and 0.121 mg/L over the post-implementation period. This suggests the retrofit design has been successful in reducing

TP in storm water leaving the newly retrofit basin. However, these data do not account for the differences in rainfall and event sampling between the two monitoring periods.

6. **Mean TN concentrations of individual samples increased at Drury between the pre- and post-implementation monitoring period and were slightly lower at Greenwood during the post-implementation period.** The average concentration of TN at the Drury outlet was 0.76 mg/L for the pre-implementation period and increased to 0.84 mg/L during the post-implementation period. At Greenwood, the mean TN concentration over the pre-implementation period was 1.13 mg/L and 1.09 mg/L during the post-implementation period. This suggests the new designs are not reducing TN concentrations for the events sampled for this project.

7. **At Drury, average TSS concentrations of individual samples increased between the pre- and post-implementation monitoring period and decreased at Greenwood during the post-implementation period.** The mean TSS concentration at the Drury outlet during the pre-implementation period was 40.0 mg/L and 53.8 mg/L during the post-implementation period. This is likely due to construction disturbance and erosion before vegetation could be established in the bottom of the basin. The average concentration of TSS at the Greenwood outlet was 134.6 mg/L for the pre-implementation period and decreased to 46.3 mg/L during the post-implementation period. Similar to TP, this suggests the retrofit design has been successful in reducing TSS in storm water leaving the newly retrofit basin without taking into account the difference in rainfall of events sampled in the post-implementation period.

8. **Chloride concentrations decreased from the pre-implementation period to the post-implementation period at Drury and increased at Greenwood over the post-implementation monitoring period**. The average concentration of Cl at the Drury outlet was 8.8 mg/L for the pre-implementation period and decreased to 4.6 mg/L during the post-implementation period. At Greenwood, the mean Cl concentration over the pre-implementation period was 4.8 mg/L and 6.7 mg/L during the post-implementation period. Seasonal analysis shows CL concentrations were relatively low in the fall, spring and summer and relatively high in the winter suggesting chloride is entering the drainage system by road salt applications. Therefore, it might not be feasible to assess the ability of the retrofit design to remove Cl due to the seasonal variability of the major source during the winter.

9. **This study shows that the new retrofit basin designs at Drury and Greenwood have been effective at reducing pollution loads of TP, TN, TSS, and Cl in both basins.** Results of this study suggests detention basin retrofits have the ability to reduce TP loads from 66-75%, TN loads from 28-50%, TSS loads from 70-78% and Cl loads from 24-64% within the selected events compared for the load reduction analysis.

10. **While the project is promising, this study has limitations particularly with the amount of post-implementation events sampled and the range of rainfall events were not equal to the number events sampled or over the range of rainfall events of pre-implementation monitoring period.** Rainfall amounts in the pre-implementation period ranged from 0.58-5.18 cm at Drury (15 events) and 0.97-5.26 cm at Greenwood (14 events). During the post-implementation period, rainfall ranged from 2.03-2.69 cm at Drury (6 events) and 1.24-2.51 cm at Greenwood (7 events). Therefore, the number of events analyzed for the load reduction was limited and further post-implementation monitoring would be necessary to gather the data required to complete the comparison. Additionally, the events sampled post-implementation monitoring period lacked seasonally variability so a continuation of post-implementation monitoring should be considered.

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TABLES

Table 1. Autosampler Water Quality Monitoring Sites in Springfield

Site	Northing UTM Zone 15N (m)	Easting UTM Zone 15N (m)	Drainage Area (ha)
Drury-IN	4,119,248.816	474,906.746	1.9
Drury-OUT	4,119,219.758	474,918.563	2.2
Greenwood-IN	4,117,260.701	475,115.849	0.9
Greenwood-OUT	4,117,344.295	475,120.698	2.3

Table 2. Summary of Sample Events

Site		Events Sampled	# of Samples Collected
Drury-IN	Pre	15	190
	Post	6	63
Drury-OUT	Pre	15	143
	Post	6	23
Greenwood-IN	Pre	14	134
	Post	7	78
Greenwood-OUT	Pre	14	160
	Post	7	56
		Total	**847**

Table 3. Range of Rainfall Totals and Storm Duration for Storm Events Sampled

	Drury Pre		Drury Post		Greenwood Pre		Greenwood Post	
	Rainfall (cm)	Duration (hr)	Rainfall (cm)	Duration (hr)	Rainfall (cm)	Duration (hr)	Rainfall (cm)	Duration (hr)
n	15		6		14		7	
Min	0.58	2.3	2.03	2.4	0.97	1.4	1.24	2.1
Mean	2.44	7.5	2.44	6.6	2.62	5.7	1.73	5.3
Max	5.18	16.7	2.69	9.9	5.26	16.6	2.51	8.6

Table 4. Physical Water Parameter Summary Data

	SC (uS/cm)								pH (std units)							
	Grnwd-IN		Grnwd-OUT		Drury-IN		Drury-OUT		Grnwd-IN		Grnwd-OUT		Drury-IN		Drury-OUT	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Min	6.0	42.2	25.9	49.3	3.3	28.5	3.4	44.3	6.4	6.1	6.3	6.2	6.4	6.2	6.7	6.4
Mean	70.8	98.8	75.6	91.6	47.6	87.9	51.5	72.4	7.4	7.6	7.2	7.3	8.1	7.9	8.1	7.8
Med.	60.9	86.5	59.5	80.8	39.1	83.7	46.1	67.2	7.3	7.5	7.1	7.4	7.9	8.0	8.1	7.6
Max	316	239	410	229	552	187	165	124	10.0	8.4	8.2	7.8	11.0	9.0	10.3	8.7
sd	50.1	45.1	51.2	38.3	47.6	36.5	33.4	22.9	0.5	0.5	0.4	0.3	1.0	0.7	0.8	0.6
cv%	70.8	45.6	67.6	41.9	100	41.5	64.9	31.7	6.1	6.5	5.7	4.3	12.8	8.3	10.1	8.1

Table 5. Nutrient, Total Suspended Solids and Chloride Summary Data for Drury

	TP (mg/L)				TN (mg/L)				TSS (mg/L)				Cl (mg/L)			
	Drury-IN		Drury-OUT		Drury-IN		Drury-OUT		Drury-IN		Drury-OUT		Drury-IN		Drury-OUT	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Min	0.036	0.049	0.020	0.050	0.02	0.03	0.04	0.27	0.1	2.0	0.1	4.0	0.0	0.4	0.0	0.6
Mean	0.120	0.120	0.129	0.121	0.75	0.73	0.76	0.84	35.4	52.8	40.0	53.8	3.0	7.7	8.8	4.6
Med.	0.081	0.078	0.089	0.107	0.61	0.57	0.58	0.67	9.3	20.5	12.7	19.3	1.1	2.6	1.5	1.7
Max	1.311	0.968	0.949	0.265	4.54	3.02	4.17	1.98	364.3	331.5	418.0	413.0	35.6	33.5	130.8	17.1
sd	0.139	0.129	0.143	0.062	0.61	0.56	0.60	0.50	63.2	76.5	70.1	89.7	6.4	8.8	21.3	5.2
cv%	115.7	107.3	110.5	51.5	80.9	76.3	79.0	59.0	178.7	144.9	175.3	166.9	214.5	113.6	242.1	113.2

Table 6. Nutrient, Total Suspended Solids and Chloride Summary Data for Greenwood

	TP (mg/L				TN (mg/L)				TSS (mg/L)				Cl (mg/L)			
	Grnwd-IN		Grnwd-OUT		Grnwd-IN		Grnwd-OUT		Grnwd-IN		Grnwd-OUT		Grnwd-IN		Grnwd-OUT	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Min	0.030	0.048	0.048	0.061	0.04	0.28	0.10	0.12	1.0	3.5	0.7	6.0	0.2	1.6	0.2	2.8
Mean	0.274	0.214	0.283	0.121	1.15	1.39	1.13	1.09	200.4	178.5	134.6	46.3	5.1	11.9	4.8	6.7
Med.	0.147	0.129	0.177	0.108	0.83	1.39	0.88	0.95	74.3	57.0	10.3	17.3	1.8	9.6	2.6	5.1
Max	2.886	1.838	2.830	0.496	12.52	5.10	9.61	3.29	2,845	2,626	3,128	672.0	69.9	38.1	65.6	27.0
sd	0.406	0.258	0.391	0.065	1.34	0.80	1.12	0.60	391.9	407.4	483.8	106.4	8.7	7.6	7.5	4.3
cv%	148.4	120.2	138.4	53.9	117.3	57.8	99.3	55.4	195.5	228.3	359.5	229.8	170.8	63.6	157.1	63.9

Table 7. Range of Pre- and Post-Implementation Event Yields at Drury (2.2 ha)

Site	Range	Yield (kg/ha)			
		TP	TN	TSS	Cl
Drury Out Pre	Min	0.004	0.01	0.6	0.004
	Median	0.013	0.08	3.8	0.11
	Max	0.089	0.16	17.0	3.98
Drury Out Post	Min	0.002	0.01	0.3	0.03
	Median	0.006	0.04	2.1	0.23
	Max	0.018	0.11	8.7	0.89

Table 8. Range of Pre- and Post-Implementation Event Yields at Greenwood (2.3 ha)

Site	Range	Yield (kg/ha)			
		TP	TN	TSS	Cl
Green Out Pre	Min	0.012	0.08	0.6	0.07
	Median	0.032	0.15	6.8	0.44
	Max	0.052	0.18	43.4	2.44
Green Out Post	Min	0.004	0.04	0.5	0.17
	Median	0.008	0.10	3.2	0.45
	Max	0.017	0.13	9.9	1.12

FIGURES

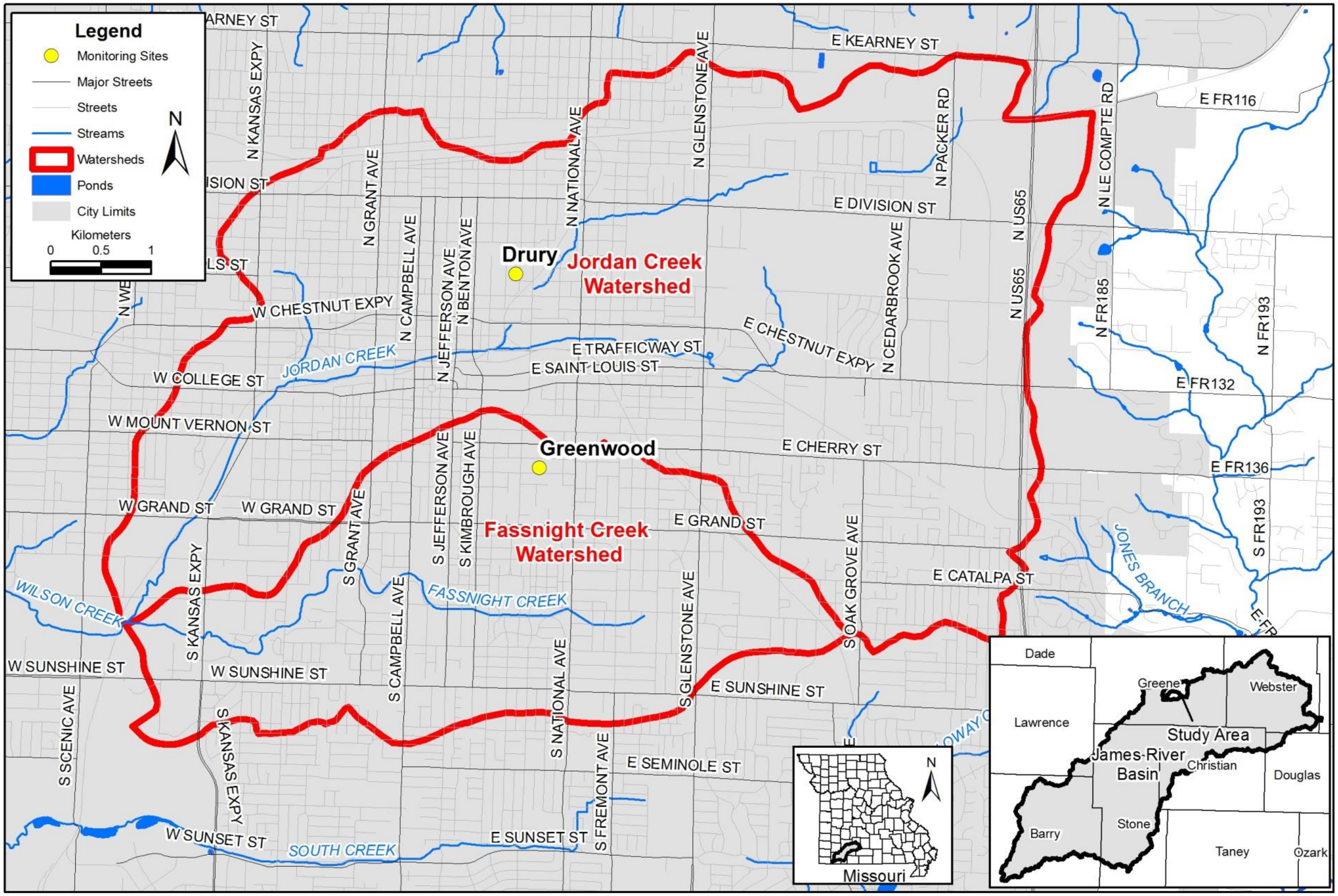

Figure 1. Location of Jordan Creek and Fassnight Creek Watersheds in the James River Basin.

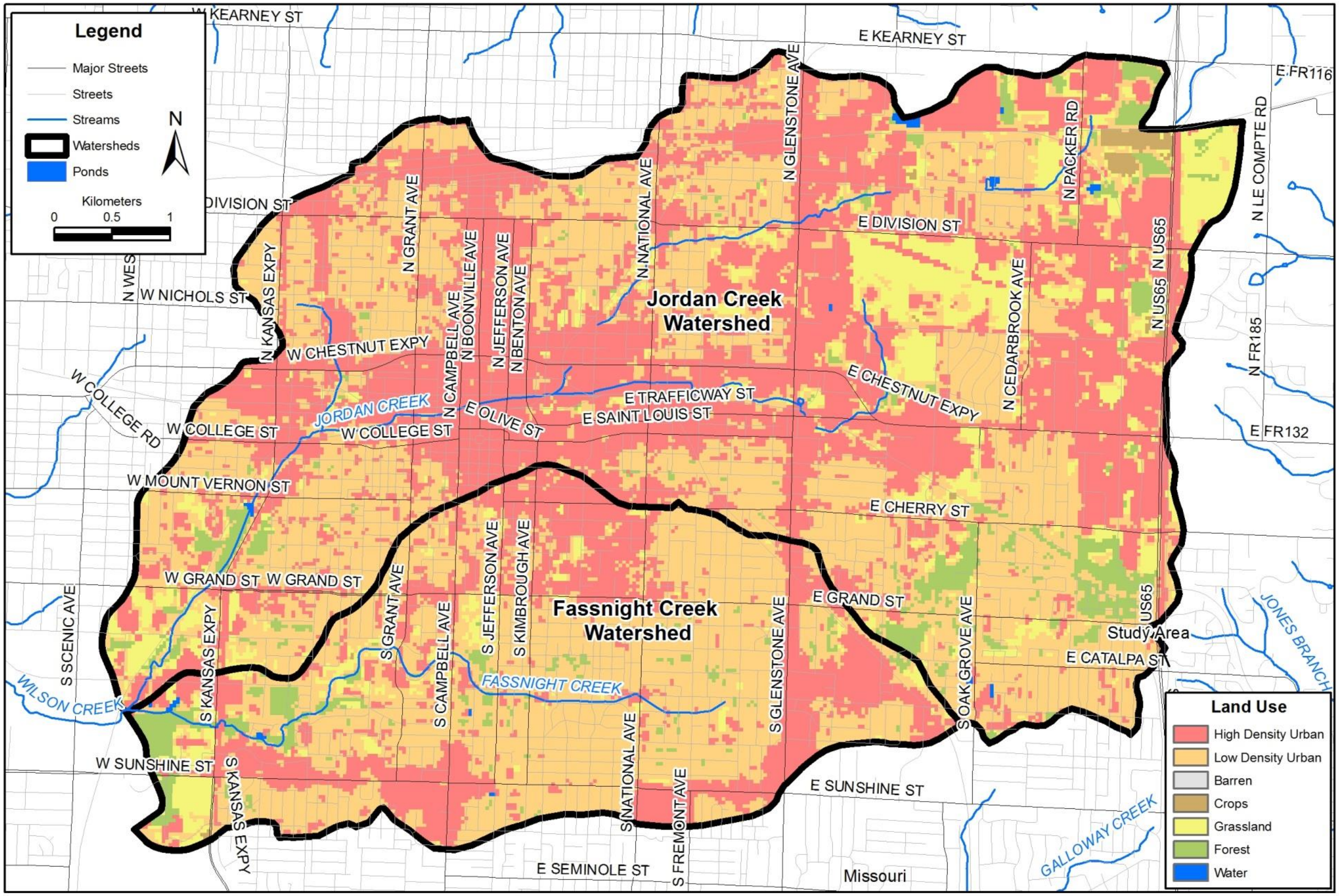

Figure 2. Land use (MoRAP 2005) within the Jordan and Fassnight Creek Watersheds.

Figure 3. The Drury Basin (photo is 2014 NAIP from USDA, downloaded from MSDIS)

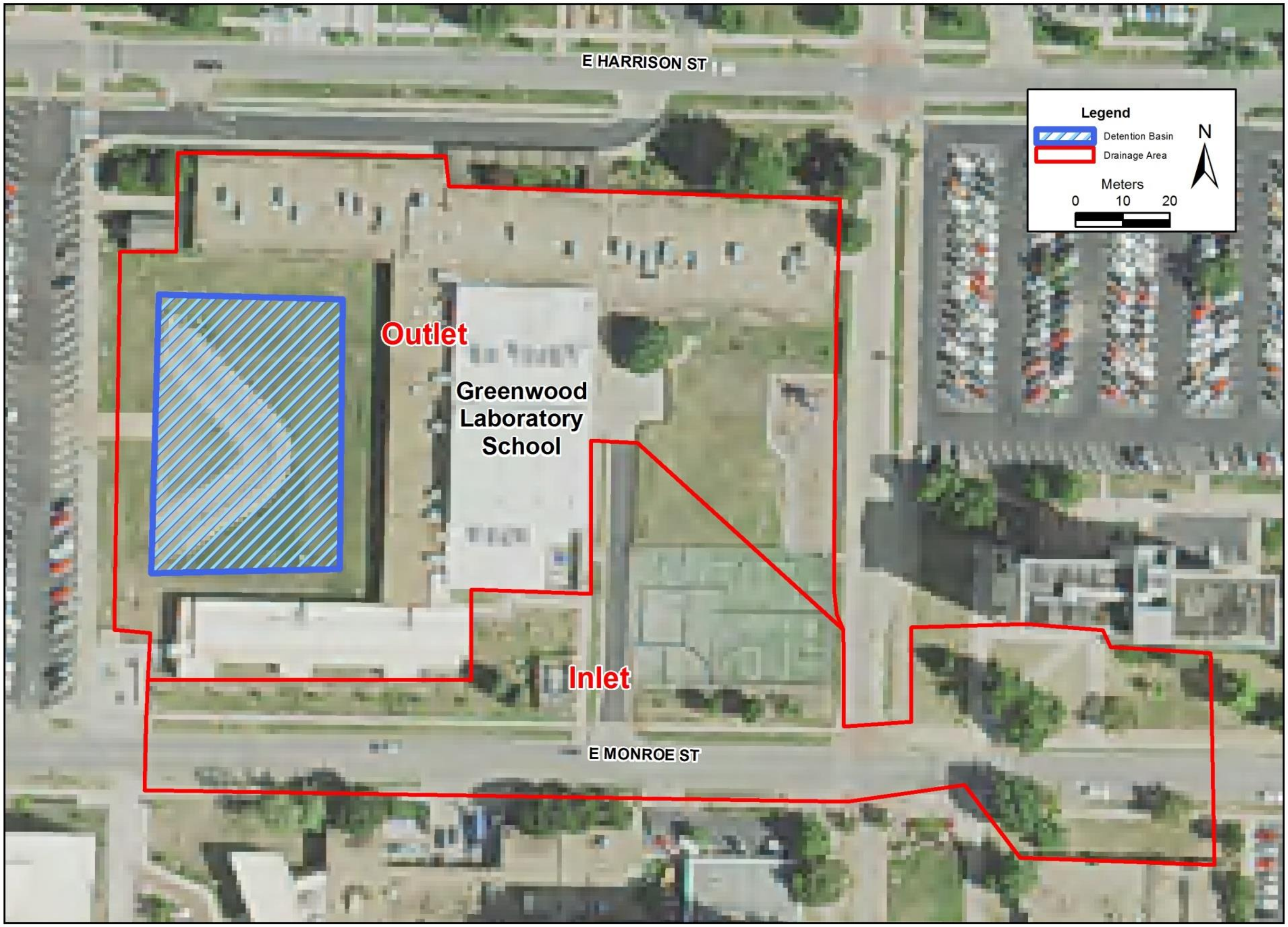

Figure 4. Greenwood Basin (photo is 2014 NAIP from USDA, downloaded from MSDIS)

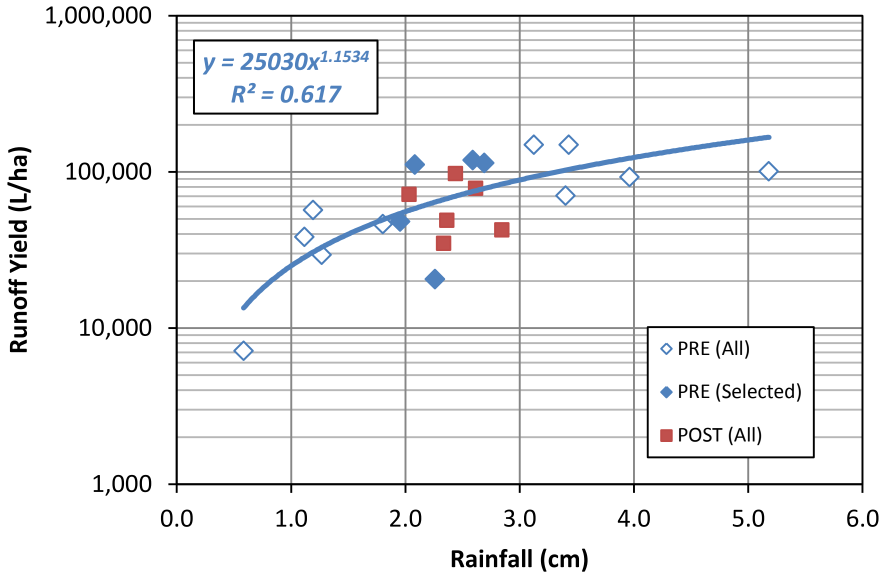

Figure 5. Rainfall-runoff relationship for Drury IN

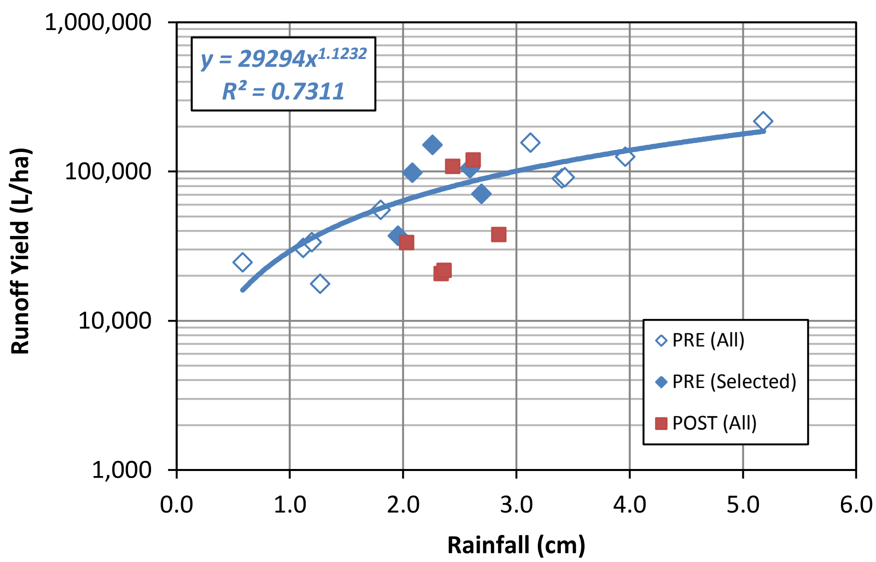

Figure 6. Rainfall-runoff relationship for Drury OUT

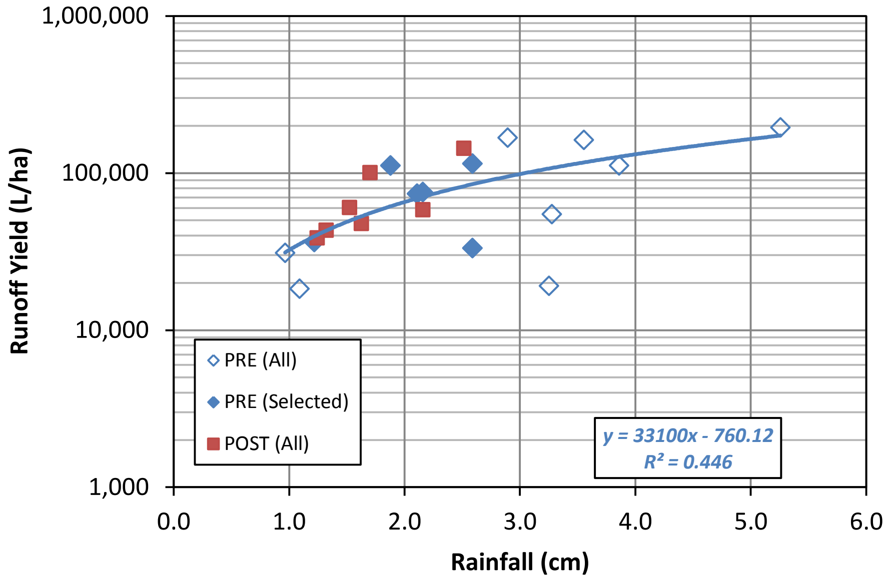

Figure 7. Rainfall-runoff relationship for Greenwood IN

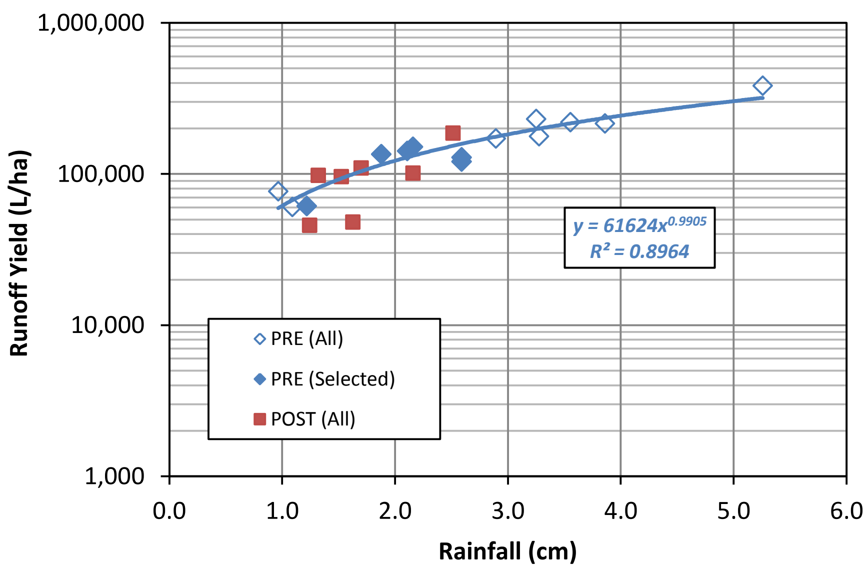

Figure 8. Rainfall-runoff relationship for Greenwood OUT

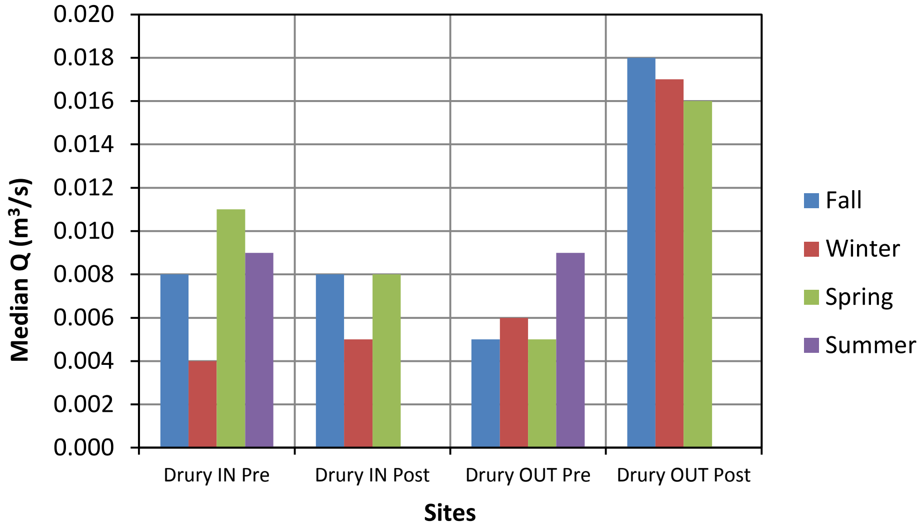

Figure 9. Seasonal variability in discharge at Drury

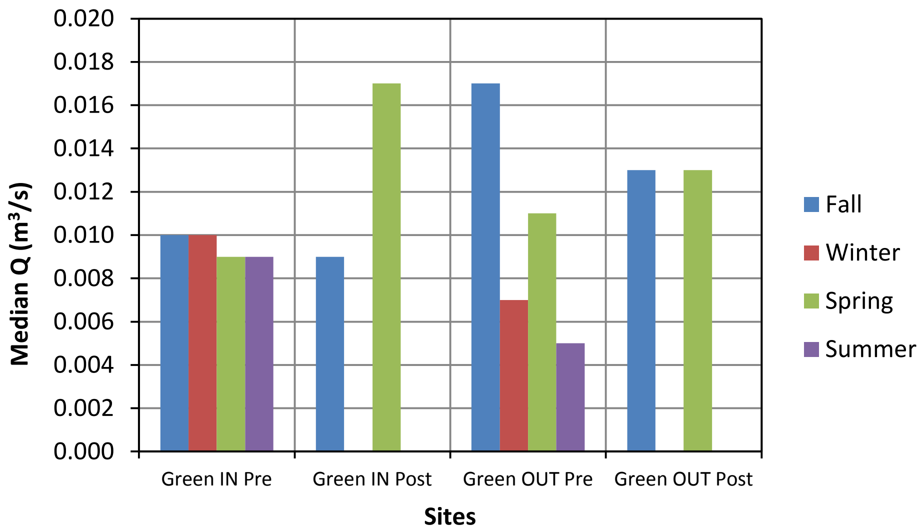

Figure 10. Seasonal variability in discharge at Greenwood

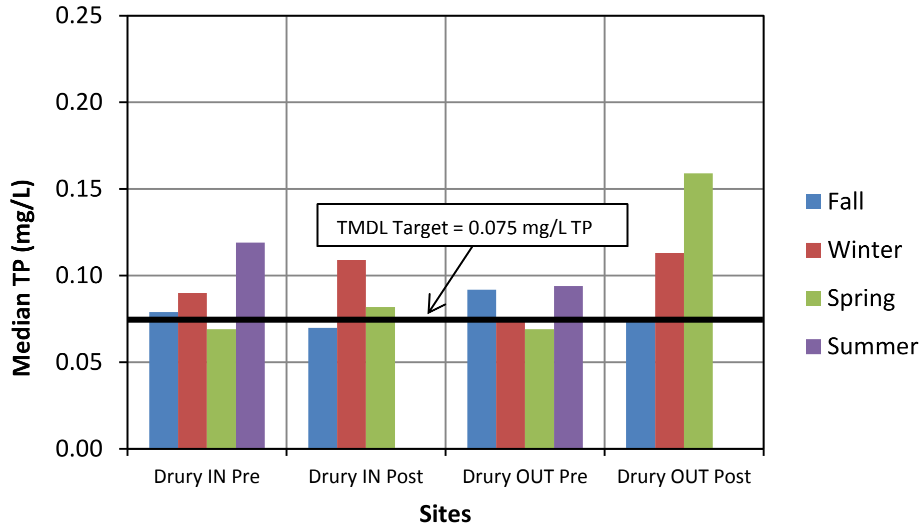

Figure 11. Seasonal variability in TP at Drury

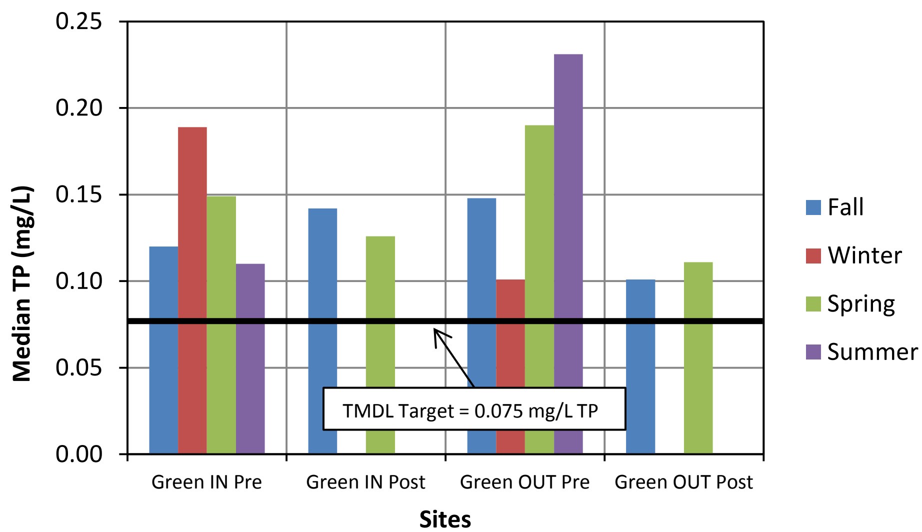

Figure 12. Seasonal variability in TP at Greenwood

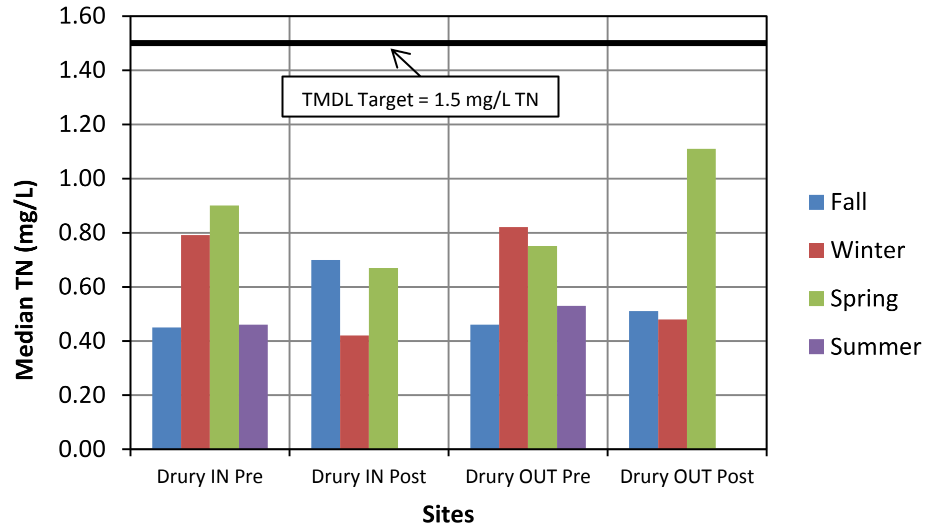

Figure 13. Seasonal variability in TN at Drury

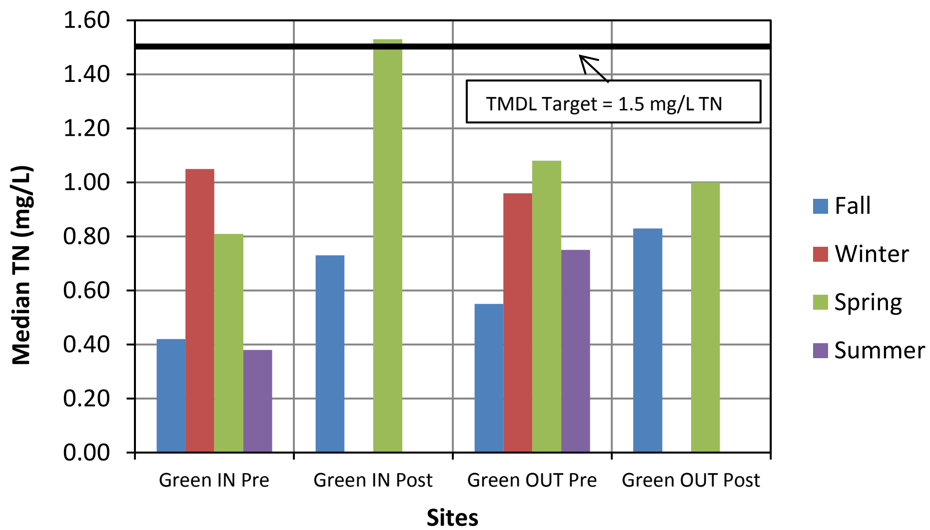

Figure 14. Seasonal variability in TN at Greenwood

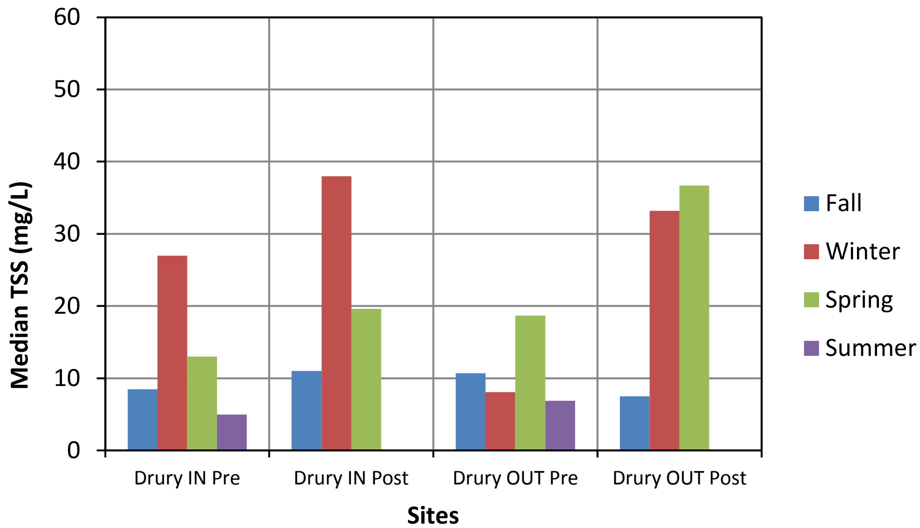

Figure 15. Seasonal variability in TSS at Drury

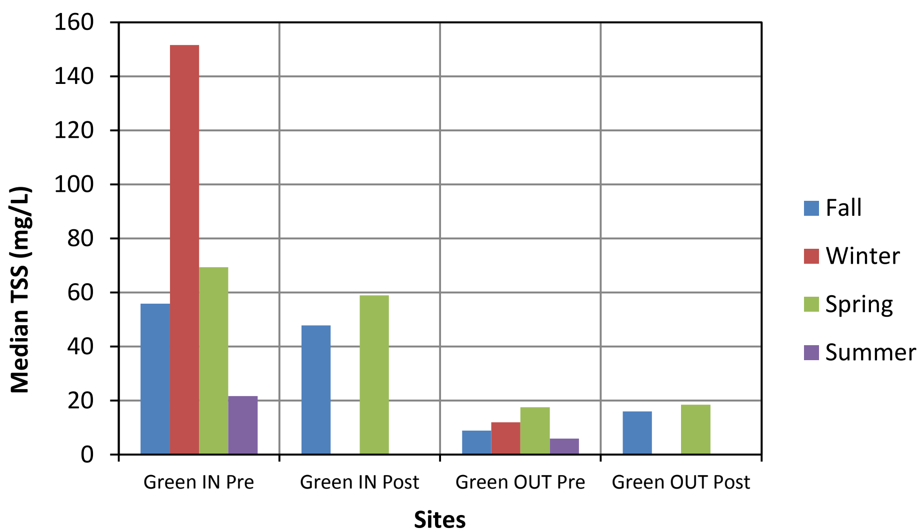

Figure 16. Seasonal variability in TSS at Greenwood

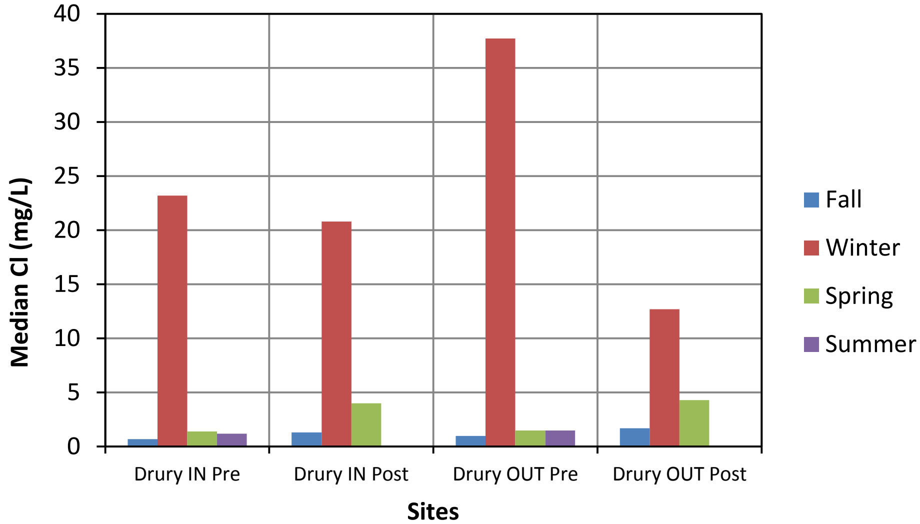

Figure 17. Seasonal variability in Cl at Drury

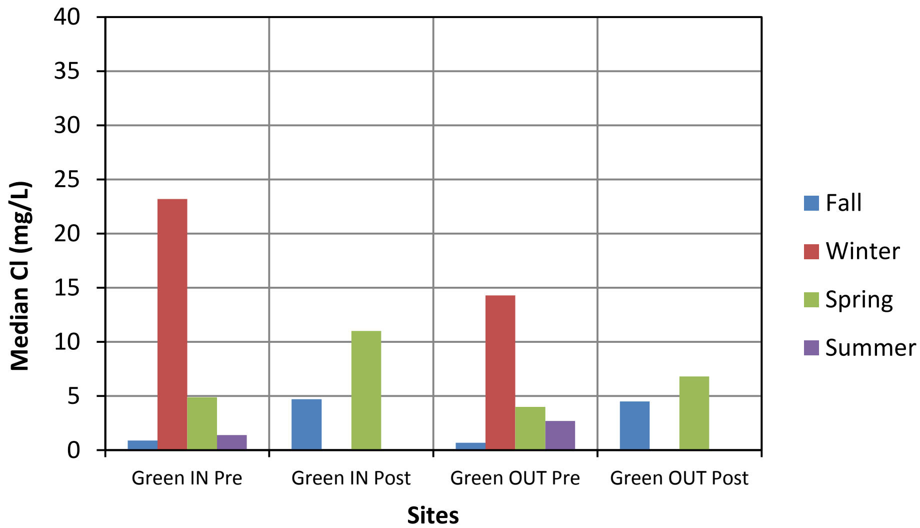

Figure 18. Seasonal variability in Cl at Greenwood

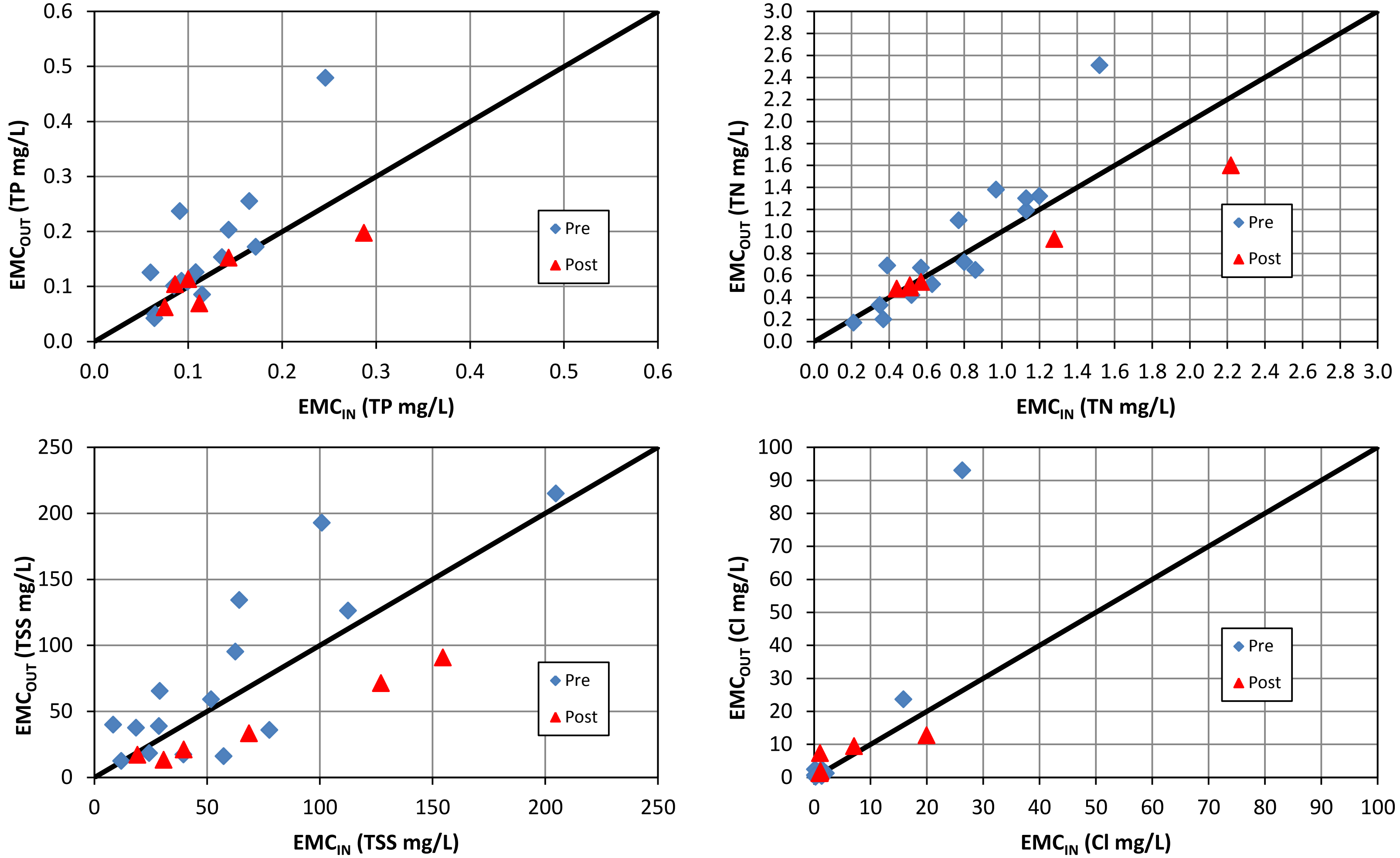

Figure 19. Comparison of IN and OUT EMC at Drury

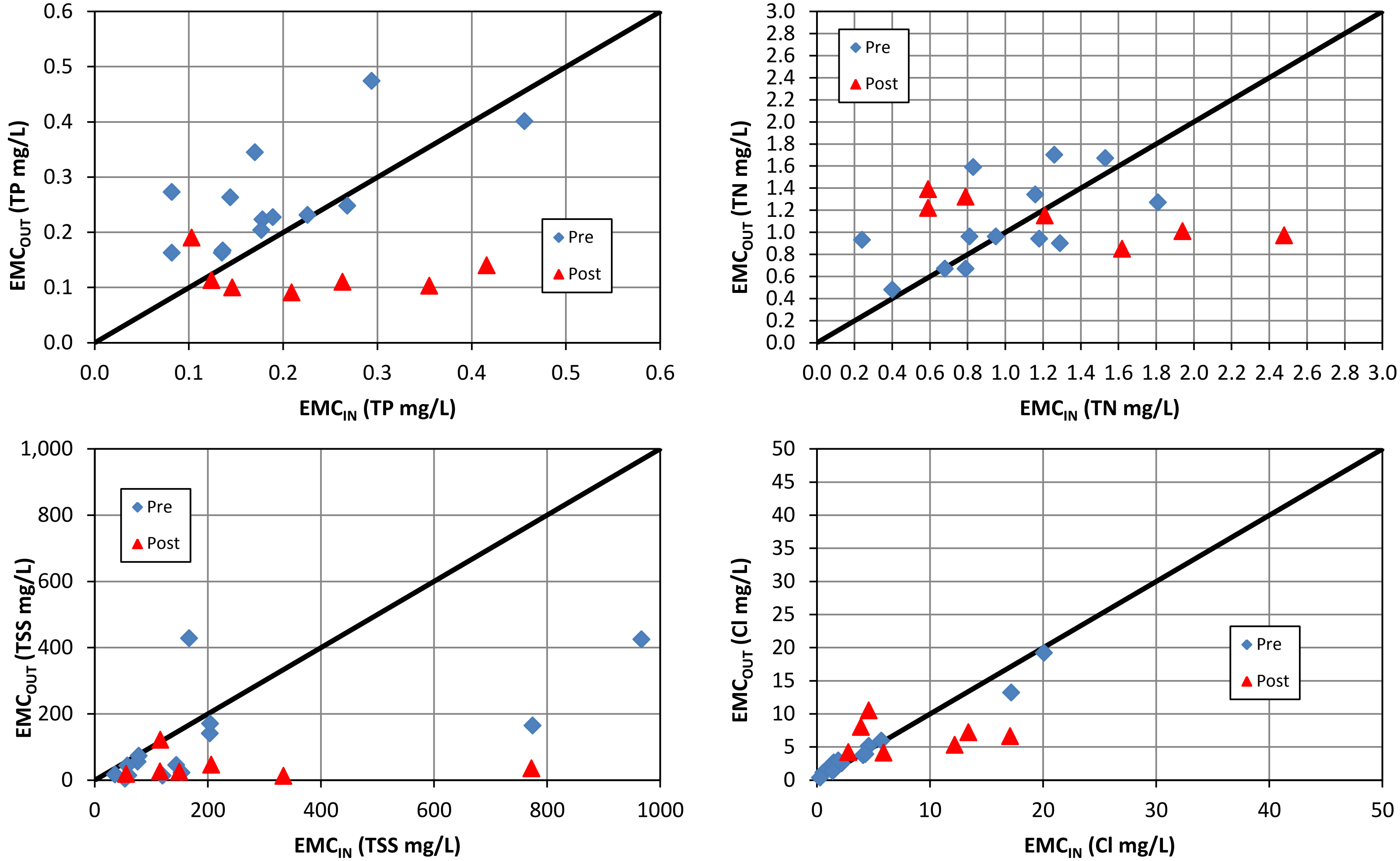

Figure 20. Comparison of IN and OUT EMC at Greenwood

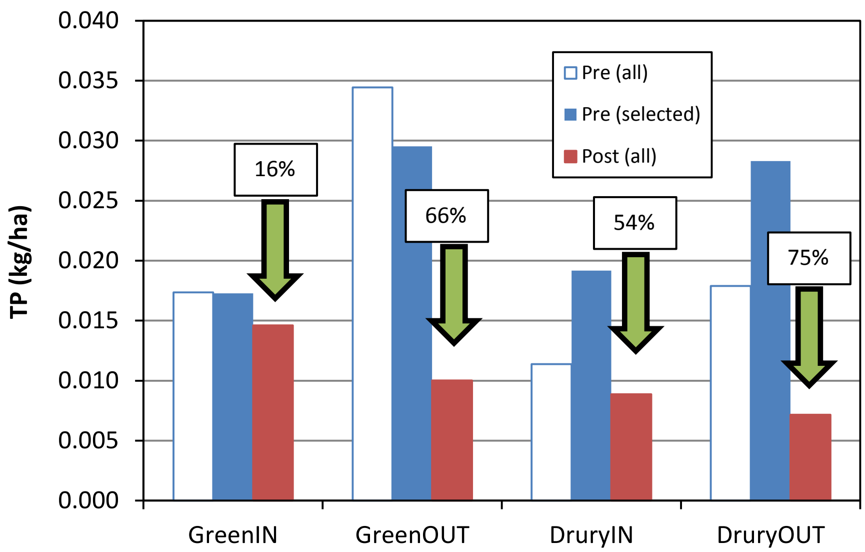

Figure 21. Selected event comparison of TP SMY

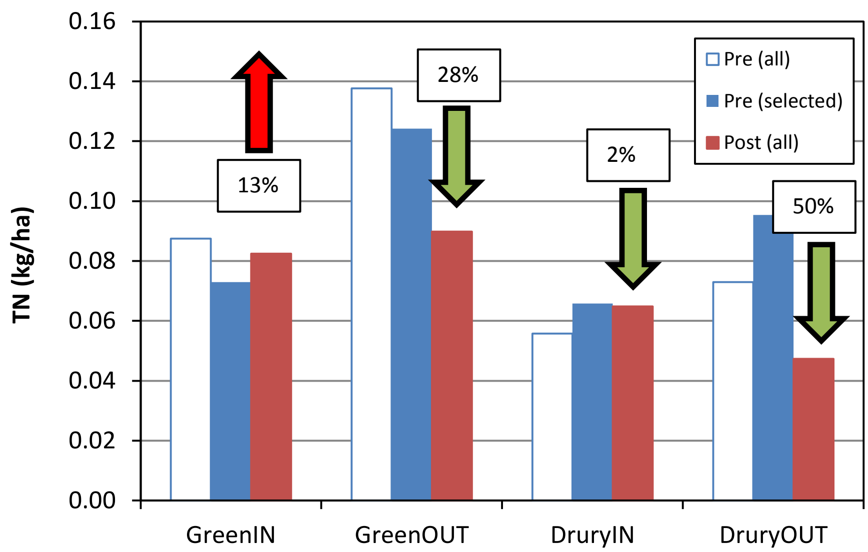

Figure 22. Selected event comparison of TN SMY

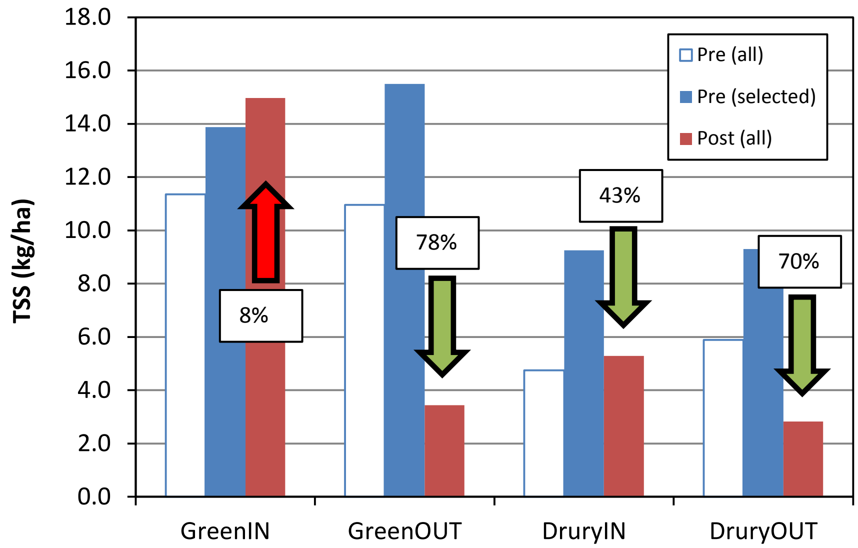

Figure 23. Selected event comparison of TSS SMY

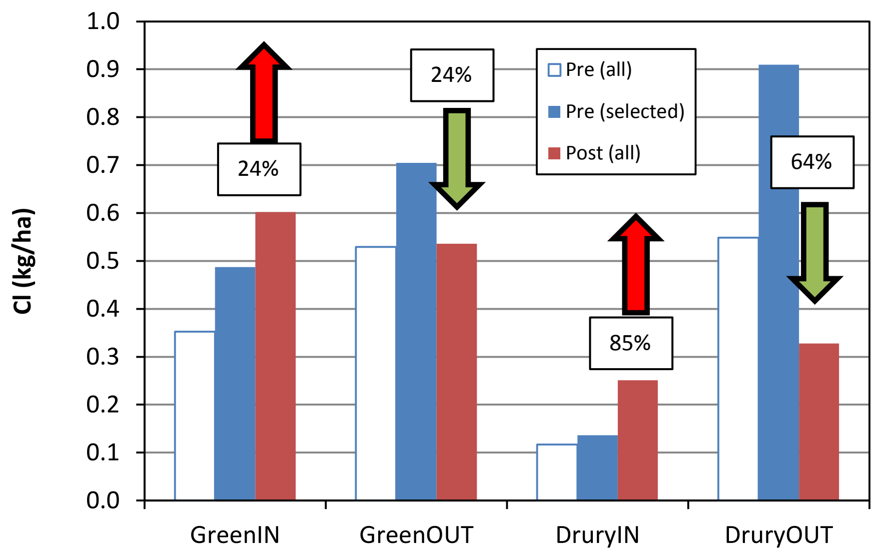

Figure 24. Selected event comparison of Cl SMY

PHOTOS

Photo 1. Excavation and concrete cutting for installation of the monitoring station

Photo 2. Pipe rough in, concrete forms and pad pouring by City of Springfield crews

Photo 3. Concrete pad after the pour with trench to rain gage

Photo 4. Stainless steel box secured to concrete pad with rain gage post installed

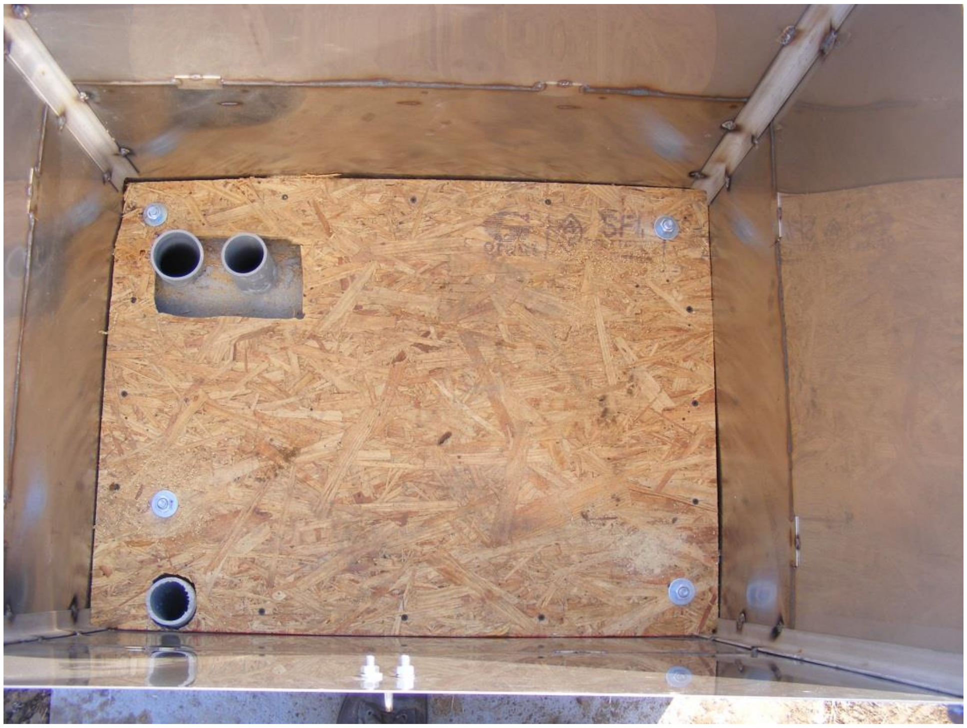

Photo 5. Inside of stainless steel monitoring station box with conduit pipes

Photo 6. Complete installation of monitoring station with pressure transducer, pump tube, rain gage and stainless steel box

Photo 7. Drury basin pre-retrofit

Photo 8. Drury basin post-retrofit

Photo 9. Greenwood basin pre-retrofit

Photo 10. Greenwood basin post-retrofit

APPENDIX A – DISCHARGE RATING CURVES

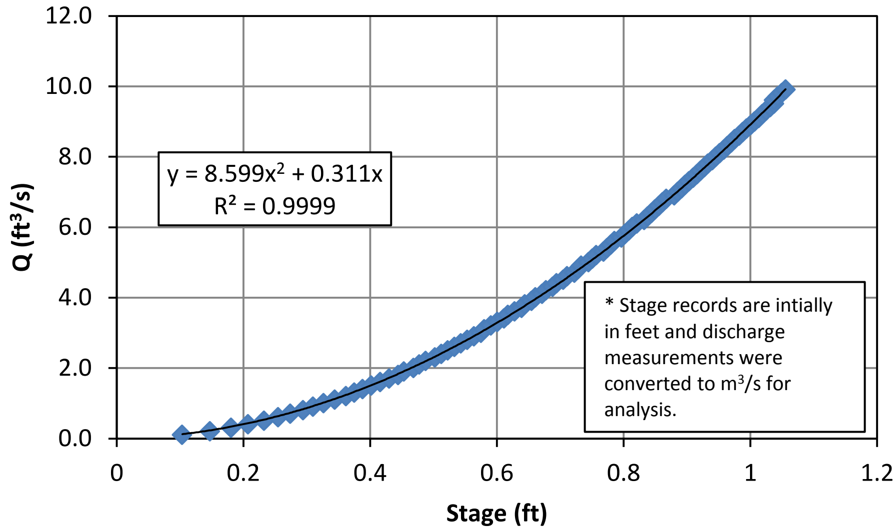

Figure 25. Discharge Rating Curve for the Drury Inlet

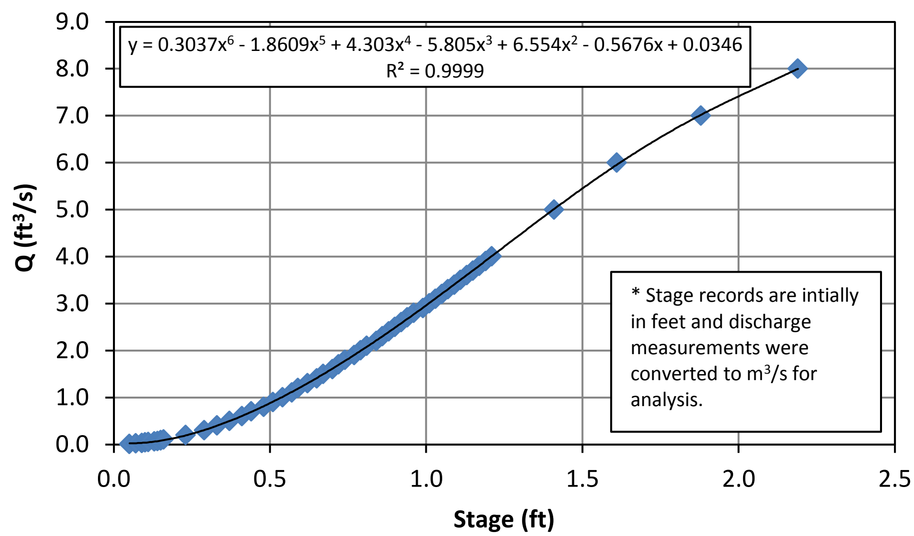

Figure 26. Discharge Rating Curve for the Drury Outlet

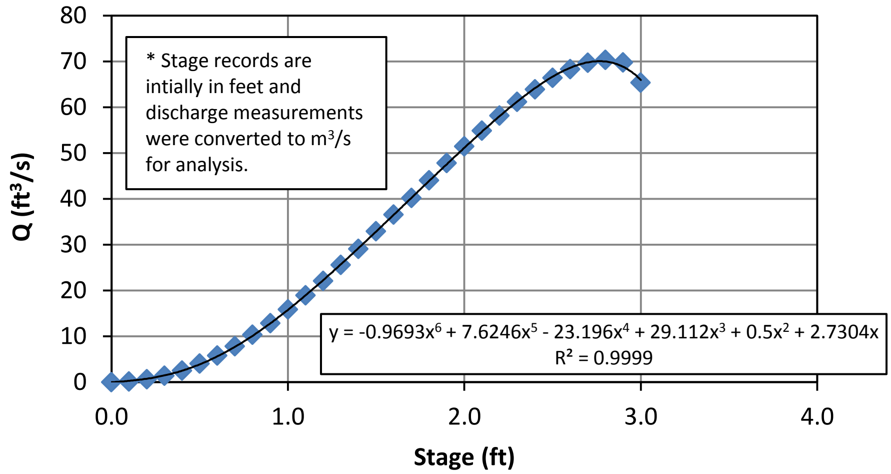

Figure 27. Discharge Rating Curve for the Greenwood Inlet

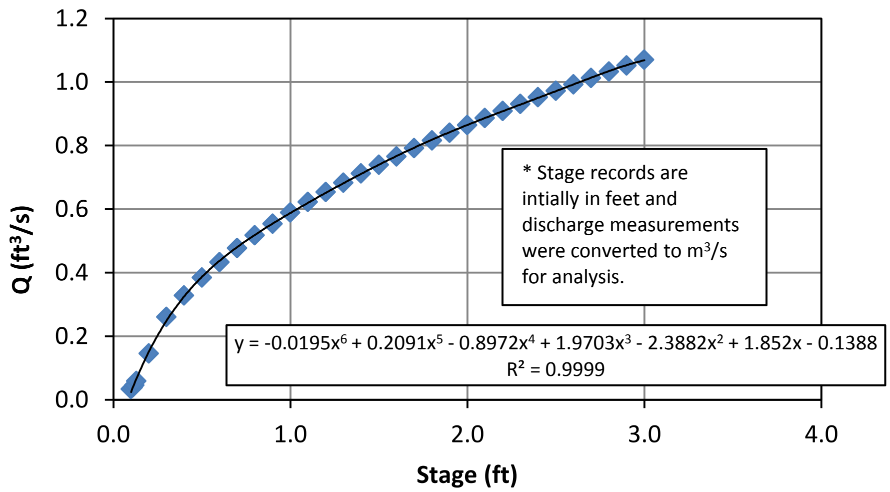

Figure 28. Discharge rating curve for the Greenwood outlet

APPENDIX B – RAINFALL-RUNOFF DATA

Table 9. Drury-OUT Pre-Implementation Event Rainfall-Runoff Data

Date	Rainfall (cm)	Duration (hr)	Intensity (cm/hr)	Rainfall Vol. (m^3)	Runoff (m^3)	Runoff (%)
3/8/2014	0.58	3.75	0.16	128.5	53.1	41.3
11/6/2013	1.12	3.67	0.30	245.9	66.4	27.0
12/4/2012	1.19	3.15	0.38	262.6	72.4	27.6
4/27/2014	1.27	11.25	0.11	279.4	38.2	13.7
11/11/2012	1.80	6.25	0.29	396.7	119.2	30.0
11/21/2013	1.96	2.83	0.69	430.3	79.9	18.6
8/31/2012	2.08	4.42	0.47	458.2	211.3	46.1
3/16/2014	2.26	5.83	0.39	497.3	325.2	65.4
10/12/2012	2.59	2.33	1.11	570.0	226.6	39.8
5/8/2014	2.69	16.67	0.16	592.3	152.8	25.8
9/20/2013	3.12	6.08	0.51	687.3	336.0	48.9
10/5/2013	3.40	10.08	0.34	748.8	194.1	25.9
4/10/2013	3.43	15.75	0.22	754.4	197.6	26.2
4/26/2013	3.96	10.42	0.38	871.7	271.6	31.2
10/29/2013	5.18	10.17	0.51	1,140	469.8	41.2

Table 10. Drury-OUT Post-Implementation Event Rainfall-Runoff Data

Date	Rainfall (cm)	Duration (hr)	Intensity (cm/hr)	Rainfall Vol. (m^3)	Runoff (m^3)	Runoff (%)
4/21/2015	2.03	9.92	2.03	447.0	72.3	16.2
11/4/2014	2.34	5.17	2.34	514.1	44.8	8.7
3/25/2015	2.36	8.50	2.36	519.7	46.9	9.0
4/2/2015	2.44	5.67	2.44	536.4	234.2	43.7
10/9/2014	2.62	2.42	2.62	576.4	258.3	44.8
3/13/2015	2.84	8.08	2.84	625.9	81.6	13.0

Table 11. Greenwood-OUT Pre-Implementation Event Rainfall-Runoff Data

Date	Rainfall (cm)	Duration (hr)	Intensity (cm/hr)	Rainfall Vol. (m^3)	Runoff (m^3)	Runoff (%)
6/11/2012	0.97	1.83	0.53	222.0	148.3	66.8
4/3/2014	1.09	1.42	0.77	251.2	116.8	46.5
6/5/2014	1.22	1.58	0.77	280.4	118.7	42.3
5/12/2014	1.88	4.92	0.38	432.3	261.1	60.4
11/21/2013	2.11	3.33	0.63	484.9	273.5	56.4
3/16/2014	2.16	6.08	0.35	496.6	292.4	58.9
9/7/2012	2.59	2.75	0.94	595.9	248.4	41.7
5/8/2014	2.59	16.58	0.16	595.9	233.0	39.1
4/18/2013	2.90	4.58	0.63	666.0	331.2	49.7
10/5/2013	3.25	10.00	0.33	747.8	447.3	59.8
8/3/2013	3.28	3.33	0.98	753.6	343.2	45.5
5/31/2012	3.56	3.75	0.95	817.9	425.9	52.1
7/26/2013	3.86	8.67	0.45	888.0	417.2	47.0
10/29/2013	5.26	11.42	0.46	1,209	740.1	61.2

Table 12. Greenwood-OUT Post-Implementation Event Rainfall-Runoff Data

Date	Rainfall (cm)	Duration (hr)	Intensity (cm/hr)	Rainfall Vol. (m^3)	Runoff (m^3)	Runoff (%)
4/15/2015	1.24	7.08	0.18	286.3	88.5	30.9
4/1/2015	1.32	2.08	0.63	303.8	189.5	62.4
11/23/2014	1.52	6.33	0.24	350.5	185.5	52.9
4/22/2015	1.63	8.00	0.20	373.9	92.8	24.8
12/14/2014	1.70	2.92	0.58	391.4	211.7	54.1
10/9/2014	2.16	2.17	1.00	496.6	195.7	39.4
3/25/2015	2.51	8.58	0.29	578.4	359.2	62.1

APPENDIX C – WATER QUALITY DATA

Table 13. Drury-IN Pre-Implementation Water Quality Data

Site	Sample #	Date	Time	Level (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC (uS/cm)	pH	Season
Drury_IN	1-1	8/31/2012	3:49	0.03	0.002	0.305	0.02	106.0	0.0	6.3	6.9	Summer
Drury_IN	1-2	8/31/2012	4:04	0.03	0.004	0.203	0.40	36.5	0.0	4.7	7.0	Summer
Drury_IN	1-3	8/31/2012	4:09	0.05	0.008	0.130	0.21	46.0	0.4	4.0	6.9	Summer
Drury_IN	1-4	8/31/2012	4:44	0.02	0.002	0.150	0.29	29.7	0.3	4.3	7.0	Summer
Drury_IN	1-5	8/31/2012	4:52	0.09	0.025	0.122	0.02	150.3	0.1	3.4	6.9	Summer
Drury_IN	1-6	8/31/2012	5:07	0.06	0.011	0.098	0.58	52.0	2.0	9.9	7.0	Summer
Drury_IN	1-7	8/31/2012	5:22	0.03	0.003	0.076	1.21	21.0	6.7	17.3	7.5	Summer
Drury_IN	1-8	8/31/2012	6:26	0.03	0.002	0.080	0.67	38.7	3.9	10.7	7.8	Summer
Drury_IN	1-9	8/31/2012	6:31	0.04	0.007	0.069	0.31	18.7	0.7	5.5	7.7	Summer
Drury_IN	1-10	8/31/2012	6:46	0.05	0.009	0.062	0.29	8.2	0.0	4.0	7.6	Summer
Drury_IN	1-11	8/31/2012	7:01	0.04	0.005	0.078	0.52	7.0	2.5	6.9	7.6	Summer
Drury_IN	1-12	8/31/2012	7:12	0.03	0.004	0.065	1.06	7.2	2.5	8.0	7.8	Summer
Drury_IN	1-13	8/31/2012	7:20	0.04	0.006	0.079	0.81	4.8	5.5	10.8	8.0	Summer
Drury_IN	2-1	10/12/2012	4:43	0.04	0.005	1.311	4.54	269.0	0.1	7.0	6.9	Fall
Drury_IN	2-2	10/12/2012	4:57	0.29	0.233	0.498	0.60	134.0	0.1	3.3	7.1	Fall
Drury_IN	2-3	10/12/2012	5:12	0.07	0.016	0.538	1.51	82.0	1.8	35.2	8.5	Fall
Drury_IN	2-4	10/12/2012	5:52	0.04	0.005	0.302	1.82	31.5	0.1	23.0	8.8	Fall
Drury_IN	2-5	10/12/2012	5:57	0.07	0.016	0.211	0.64	15.5	0.1	14.6	8.8	Fall
Drury_IN	2-6	10/12/2012	6:12	0.04	0.006	0.219	0.87	6.5	0.1	20.9	8.9	Fall
Drury_IN	2-7	10/12/2012	6:27	0.08	0.020	0.174	0.41	14.0	0.1	8.9	8.8	Fall
Drury_IN	2-8	10/12/2012	6:42	0.08	0.020	0.141	0.39	5.7	0.1	8.7	8.7	Fall
Drury_IN	3-1	11/11/2012	11:53	0.10	0.031	0.213	1.71	108.5	1.4	36.1	7.6	Fall
Drury_IN	3-2	11/11/2012	0:07	0.08	0.018	0.124	1.02	34.3	1.0	20.3	7.3	Fall
Drury_IN	3-3	11/11/2012	12:22	0.05	0.007	0.083	0.96	7.7	1.1	25.8	9.0	Fall
Drury_IN	3-4	11/11/2012	12:56	0.03	0.003	0.121	0.55	4.3	1.6	37.2	9.6	Fall
Drury_IN	3-5	11/11/2012	13:04	0.03	0.004	0.089	0.57	0.7	1.0	27.2	8.8	Fall
Drury_IN	3-6	11/11/2012	13:07	0.03	0.004	0.082	0.53	2.3	1.0	25.7	8.8	Fall
Drury_IN	3-7	11/11/2012	13:46	0.03	0.003	0.112	0.67	7.0	2.8	51.2	9.9	Fall
Drury_IN	3-8	11/11/2012	13:56	0.05	0.009	0.079	0.57	4.3	1.0	26.3	8.7	Fall

Drury_IN	3-9	11/11/2012	14:12	0.04	0.004	0.067	0.45	4.0	1.1	31.3	9.1	Fall
Drury_IN	3-10	11/11/2012	14:19	0.04	0.006	0.063	0.41	3.0	1.1	35.4	9.3	Fall
Drury_IN	3-11	11/11/2012	14:28	0.03	0.003	0.063	0.49	2.0	1.2	42.3	9.6	Fall
Drury_IN	3-12	11/11/2012	15:02	0.03	0.003	0.088	0.49	2.3	1.2	35.1	9.3	Fall
Drury_IN	3-13	11/11/2012	15:08	0.04	0.005	0.072	0.41	4.0	1.0	27.1	8.5	Fall
Drury_IN	4-1	12/4/2012	1:07	0.04	0.005	0.341	2.15	214.0	2.0	44.8	6.6	Fall
Drury_IN	4-2	12/4/2012	1:21	0.05	0.008	0.139	0.90	25.3	1.0	36.0	6.7	Fall
Drury_IN	4-3	12/4/2012	2:34	0.03	0.003	0.105	0.65	8.0	1.1	33.7	6.7	Fall
Drury_IN	4-4	12/4/2012	2:36	0.03	0.003	0.101	0.56	6.0	1.0	33.0	6.8	Fall
Drury_IN	4-5	12/4/2012	2:52	0.03	0.003	0.087	0.52	34.7	1.0	24.3	6.8	Fall
Drury_IN	4-6	12/4/2012	3:05	0.09	0.024	0.082	0.38	39.0	0.7	20.1	7.0	Fall
Drury_IN	4-7	12/4/2012	3:20	0.10	0.029	0.055	0.42	19.0	0.8	19.9	6.9	Fall
Drury_IN	4-8	12/4/2012	3:35	0.08	0.021	0.044	0.31	10.0	1.0	33.2	7.1	Fall
Drury_IN	4-9	12/4/2012	3:50	0.04	0.006	0.045	0.35	8.0	2.0	43.1	9.2	Fall
Drury_IN	5-1	4/10/2013	4:32	0.03	0.003	0.555	0.74	279.0	3.0	80.1	6.8	Spring
Drury_IN	5-2	4/10/2013	4:47	0.10	0.112	0.146	1.00	151.3	1.1	38.5	6.9	Spring
Drury_IN	5-3	4/10/2013	5:36	0.03	0.002	0.114	1.47	85.3	1.8	53.7	8.8	Spring
Drury_IN	5-4	4/10/2013	5:42	0.08	0.070	0.087	1.38	40.3	2.0	52.9	7.3	Spring
Drury_IN	5-5	4/10/2013	5:52	0.03	0.004	0.095	1.44	21.7	5.0	103.8	9.9	Spring
Drury_IN	5-6	4/10/2013	17:12	0.08	0.061	0.122	1.11	137.7	1.2	35.1	7.3	Spring
Drury_IN	5-7	4/10/2013	17:17	0.14	0.190	0.073	0.58	48.3	0.8	21.8	7.0	Spring
Drury_IN	5-8	4/10/2013	17:32	0.10	0.108	0.051	0.66	15.0	1.4	30.9	7.5	Spring
Drury_IN	5-9	4/10/2013	17:47	0.07	0.056	0.048	0.60	7.0	3.1	81.7	10.1	Spring
Drury_IN	5-10	4/10/2013	18:02	0.08	0.063	0.041	0.41	4.7	2.9	92.8	10.3	Spring
Drury_IN	5-11	4/10/2013	18:17	0.09	0.090	0.055	0.45	20.7	1.8	71.7	10.1	Spring
Drury_IN	5-12	4/10/2013	18:32	0.08	0.061	0.037	0.45	5.0	2.1	96.3	10.2	Spring
Drury_IN	5-13	4/10/2013	19:04	0.03	0.002	0.043	0.86	4.0	4.4	27.3	11.0	Spring
Drury_IN	5-14	4/10/2013	19:07	0.03	0.006	0.036	1.84	6.3	3.1	20.1	10.7	Spring
Drury_IN	5-15	4/10/2013	19:22	0.04	0.015	0.047	0.68	3.0	2.8	17.8	10.6	Spring
Drury_IN	6-1	4/26/2013	6:23	0.03	0.007	0.191	1.29	26.3	0.9	552.0	6.9	Spring
Drury_IN	6-2	4/26/2013	6:37	0.03	0.007	0.092	1.49	13.0	0.8	49.6	6.9	Spring
Drury_IN	6-3	4/26/2013	6:52	0.04	0.015	0.092	1.00	15.7	0.8	46.3	7.0	Spring
Drury_IN	6-4	4/26/2013	7:07	0.04	0.010	0.081	0.84	5.0	1.0	48.4	7.1	Spring
Drury_IN	6-5	4/26/2013	7:22	0.03	0.005	0.077	0.86	4.0	1.2	50.9	7.2	Spring
Drury_IN	6-6	4/26/2013	7:34	0.03	0.002	0.078	1.06	4.0	1.4	55.2	7.2	Spring

Drury_IN	6-7	4/26/2013	7:47	0.04	0.011	0.067	0.90	4.5	1.0	50.1	7.2	Spring
Drury_IN	6-8	4/26/2013	7:54	0.03	0.003	0.059	1.55	10.0	1.3	53.7	7.2	Spring
Drury_IN	6-9	4/26/2013	8:09	0.04	0.010	0.059	0.94	1.0	1.4	56.0	7.3	Spring
Drury_IN	6-10	4/26/2013	8:56	0.03	0.005	0.058	1.08	8.7	1.9	67.8	7.4	Spring
Drury_IN	6-11	4/26/2013	9:08	0.08	0.061	0.065	1.29	26.7	1.4	50.6	7.2	Spring
Drury_IN	6-12	4/26/2013	9:23	0.07	0.056	0.051	1.22	6.3	2.2	67.9	7.4	Spring
Drury_IN	6-13	4/26/2013	9:38	0.03	0.002	0.055	1.18	5.3	2.8	88.7	8.1	Spring
Drury_IN	6-14	4/26/2013	9:44	0.04	0.010	0.053	1.12	3.3	2.6	80.0	8.0	Spring
Drury_IN	6-15	4/26/2013	10:52	0.03	0.003	0.047	1.10	2.0	2.5	92.8	9.2	Spring
Drury_IN	6-16	4/26/2013	10:59	0.04	0.018	0.049	0.84	5.0	2.0	73.0	8.4	Spring
Drury_IN	6-17	4/26/2013	11:14	0.04	0.013	0.043	0.79	3.7	2.1	78.8	9.2	Spring
Drury_IN	6-18	4/26/2013	11:29	0.08	0.075	0.070	0.65	13.3	1.2	46.7	7.9	Spring
Drury_IN	6-19	4/26/2013	11:44	0.08	0.072	0.042	0.59	8.3	2.0	70.2	9.3	Spring
Drury_IN	6-20	4/26/2013	11:59	0.08	0.063	0.073	0.59	23.0	1.3	54.0	9.5	Spring
Drury_IN	6-21	4/26/2013	12:14	0.09	0.080	0.046	0.53	7.3	2.0	114.4	10.2	Spring
Drury_IN	6-22	4/26/2013	12:29	0.05	0.022	0.046	0.71	5.3	3.2	207.0	10.6	Spring
Drury_IN	6-23	4/26/2013	15:22	0.03	0.002	0.068	0.98	9.3	2.3	113.2	10.2	Spring
Drury_IN	6-24	4/26/2013	15:42	0.03	0.005	0.052	0.90	9.7	1.7	79.1	9.6	Spring
Drury_IN	7-1	9/20/2013	0:12	0.08	0.017	0.192	1.20	60.3	0.9	27.0	7.0	Summer
Drury_IN	7-2	9/20/2013	0:27	0.11	0.035	0.163	0.75	23.0	1.2	38.0	7.3	Summer
Drury_IN	7-3	9/20/2013	0:42	0.08	0.018	0.175	0.59	5.0	1.1	45.7	7.8	Summer
Drury_IN	7-4	9/20/2013	0:57	0.08	0.017	0.167	0.92	7.0	0.9	37.0	7.6	Summer
Drury_IN	7-5	9/20/2013	1:12	0.09	0.024	0.130	0.28	4.3	1.0	40.0	8.6	Summer
Drury_IN	7-6	9/20/2013	1:27	0.08	0.019	0.129	0.37	0.7	1.1	52.7	8.6	Summer
Drury_IN	7-7	9/20/2013	1:42	0.09	0.022	0.125	0.24	1.7	1.2	57.5	8.8	Summer
Drury_IN	7-8	9/20/2013	1:57	0.07	0.014	0.142	0.56	1.0	1.2	75.1	9.0	Summer
Drury_IN	7-9	9/20/2013	2:12	0.08	0.020	0.125	0.20	2.7	1.9	64.5	8.9	Summer
Drury_IN	7-10	9/20/2013	2:27	0.08	0.019	0.117	0.44	3.7	1.0	62.1	8.9	Summer
Drury_IN	7-11	9/20/2013	2:42	0.09	0.025	0.112	0.31	3.0	2.8	66.1	8.7	Summer
Drury_IN	7-12	9/20/2013	2:57	0.05	0.009	0.119	0.61	2.3	1.8	106.9	9.1	Summer
Drury_IN	7-13	9/20/2013	3:12	0.05	0.007	0.119	0.69	0.7	2.2	143.3	9.2	Summer
Drury_IN	7-14	9/20/2013	3:27	0.05	0.007	0.119	0.77	0.1	2.1	142.4	9.4	Summer
Drury_IN	7-15	9/20/2013	3:42	0.05	0.009	0.091	0.57	0.1	1.6	110.4	9.4	Summer
Drury_IN	7-16	9/20/2013	3:57	0.06	0.010	0.116	0.32	0.7	1.6	94.4	9.4	Summer
Drury_IN	7-17	9/20/2013	4:12	0.06	0.010	0.108	0.36	0.7	1.5	90.5	9.3	Summer

Drury_IN	7-18	9/20/2013	4:27	0.05	0.007	0.100	0.46	1.3	1.8	119.4	9.2	Summer
Drury_IN	8-1	10/5/2013	7:12	0.03	0.004	0.151	1.47	66.7	0.7	47.4	7.2	Fall
Drury_IN	8-2	10/5/2013	7:42	0.06	0.011	0.218	1.20	167.7	0.3	31.8	7.2	Fall
Drury_IN	8-3	10/5/2013	7:45	0.09	0.023	0.090	0.51	39.3	0.3	23.4	7.3	Fall
Drury_IN	8-4	10/5/2013	8:00	0.05	0.007	0.066	0.51	5.7	0.5	39.0	7.4	Fall
Drury_IN	8-5	10/5/2013	8:15	0.04	0.005	0.064	0.53	3.7	0.8	45.2	7.5	Fall
Drury_IN	8-6	10/5/2013	8:30	0.05	0.008	0.056	0.52	6.7	0.5	37.2	7.5	Fall
Drury_IN	8-7	10/5/2013	8:45	0.05	0.009	0.053	0.63	6.3	0.5	35.8	7.6	Fall
Drury_IN	8-8	10/5/2013	9:00	0.06	0.011	0.057	0.39	4.7	0.7	46.5	8.4	Fall
Drury_IN	8-9	10/5/2013	9:15	0.05	0.008	0.056	0.25	4.7	1.0	65.9	8.9	Fall
Drury_IN	8-10	10/5/2013	9:30	0.04	0.006	0.053	0.25	7.0	0.9	65.1	9.1	Fall
Drury_IN	8-11	10/5/2013	9:45	0.06	0.012	0.047	0.22	6.0	0.7	40.5	8.8	Fall
Drury_IN	8-12	10/5/2013	10:00	0.05	0.008	0.052	0.27	3.0	1.0	66.1	9.1	Fall
Drury_IN	8-13	10/5/2013	10:15	0.04	0.006	0.049	0.31	0.7	1.0	82.7	9.2	Fall
Drury_IN	8-14	10/5/2013	11:42	0.04	0.005	0.092	0.63	21.7	1.0	65.0	9.3	Fall
Drury_IN	8-15	10/5/2013	11:48	0.05	0.009	0.062	0.37	20.0	0.6	34.2	8.4	Fall
Drury_IN	8-16	10/5/2013	12:04	0.06	0.013	0.058	0.37	37.7	0.6	32.0	8.6	Fall
Drury_IN	8-17	10/5/2013	12:13	0.04	0.006	0.049	0.22	5.0	0.6	44.7	8.4	Fall
Drury_IN	8-18	10/5/2013	13:44	0.03	0.003	0.058	0.33	2.3	1.4	112.6	10.1	Fall
Drury_IN	8-19	10/5/2013	14:04	0.04	0.005	0.062	0.35	3.3	1.0	66.0	9.3	Fall
Drury_IN	8-20	10/5/2013	14:08	0.04	0.004	0.059	0.22	5.3	0.9	59.5	8.6	Fall
Drury_IN	8-21	10/5/2013	14:14	0.08	0.019	0.069	0.10	43.7	0.4	23.0	8.3	Fall
Drury_IN	8-22	10/5/2013	14:42	0.05	0.008	0.056	0.20	5.7	0.9	49.4	8.9	Fall
Drury_IN	8-23	10/5/2013	14:43	0.05	0.008	0.053	0.20	11.3	0.9	46.9	8.9	Fall
Drury_IN	8-24	10/5/2013	14:58	0.05	0.007	0.060	0.14	1.3	0.9	63.3	9.4	Fall
Drury_IN	9-1	10/29/2013	5:46	0.05	0.008	0.170	0.91	49.0	0.5	42.6	7.9	Fall
Drury_IN	9-2	10/29/2013	6:06	0.06	0.010	0.093	0.57	64.7	0.2	34.6	7.8	Fall
Drury_IN	9-3	10/29/2013	6:13	0.11	0.033	0.070	0.41	63.0	0.1	18.0	7.7	Fall
Drury_IN	9-4	10/29/2013	6:28	0.08	0.017	0.042	0.95	26.3	0.1	19.7	7.6	Fall
Drury_IN	9-5	10/29/2013	6:43	0.09	0.025	0.044	0.29	11.0	0.0	23.8	7.6	Fall
Drury_IN	9-6	10/29/2013	6:58	0.04	0.007	0.057	1.35	18.3	0.1	43.4	7.8	Fall
Drury_IN	9-7	10/29/2013	7:13	0.06	0.013	0.055	0.43	5.7	0.2	45.1	8.3	Fall
Drury_IN	9-8	10/29/2013	7:24	0.05	0.009	0.049	0.57	9.7	0.3	52.8	8.5	Fall
Drury_IN	9-9	10/29/2013	7:30	0.11	0.033	0.036	0.32	8.7	0.0	27.1	8.2	Fall
Drury_IN	9-10	10/29/2013	7:45	0.07	0.013	0.079	0.69	15.3	0.6	55.4	8.2	Fall

Drury_IN	9-11	10/29/2013	8:00	0.03	0.004	0.087	0.78	8.3	0.8	86.4	8.7	Fall
Drury_IN	9-12	10/29/2013	8:14	0.05	0.008	0.065	0.73	10.7	0.7	75.3	8.9	Fall
Drury_IN	9-13	10/29/2013	8:27	0.07	0.015	0.048	0.48	5.0	0.2	44.7	8.4	Fall
Drury_IN	9-14	10/29/2013	11:02	0.07	0.016	0.053	0.57	20.3	0.8	30.2	8.0	Fall
Drury_IN	9-15	10/29/2013	11:12	0.05	0.008	0.055	0.80	7.3	0.9	51.5	7.7	Fall
Drury_IN	10-1	11/6/2013	4:16	0.10	0.028	0.177	0.18	125.0	1.1	24.8	7.6	Fall
Drury_IN	10-2	11/6/2013	4:20	0.10	0.027	0.119	0.09	54.3	0.2	13.9	7.6	Fall
Drury_IN	10-3	11/6/2013	4:35	0.07	0.013	0.092	0.36	6.7	0.5	39.1	7.5	Fall
Drury_IN	10-4	11/6/2013	4:50	0.07	0.016	0.067	0.18	3.7	0.6	32.6	7.5	Fall
Drury_IN	10-5	11/6/2013	5:05	0.04	0.004	0.083	0.27	4.7	1.2	64.2	8.8	Fall
Drury_IN	10-6	11/6/2013	5:18	0.04	0.006	0.071	0.25	5.0	1.4	84.3	9.4	Fall
Drury_IN	10-7	11/6/2013	5:32	0.05	0.007	0.074	0.18	3.7	1.1	68.2	9.4	Fall
Drury_IN	11-1	11/21/2013	9:18	0.03	0.004	0.222	0.50	59.7	0.1	33.3	6.4	Fall
Drury_IN	11-2	11/21/2013	9:33	0.05	0.008	0.143	0.45	35.3	0.2	33.4	6.7	Fall
Drury_IN	11-3	11/21/2013	9:54	0.04	0.006	0.118	0.39	32.3	0.1	30.4	6.8	Fall
Drury_IN	11-4	11/21/2013	10:04	0.07	0.013	0.082	0.32	26.3	0.1	30.9	6.9	Fall
Drury_IN	11-5	11/21/2013	10:19	0.08	0.020	0.083	0.32	14.0	0.2	27.8	6.9	Fall
Drury_IN	11-6	11/21/2013	10:38	0.11	0.034	0.091	0.36	23.7	0.3	31.7	6.9	Fall
Drury_IN	11-7	11/21/2013	10:48	0.04	0.006	0.064	0.34	50.7	0.1	24.7	7.0	Fall
Drury_IN	11-8	11/21/2013	11:03	0.06	0.012	0.081	0.36	15.9	0.7	38.7	7.0	Fall
Drury_IN	11-9	11/21/2013	11:18	0.03	0.004	0.078	0.45	5.7	0.6	49.3	7.2	Fall
Drury_IN	11-10	11/21/2013	11:22	0.03	0.004	0.086	0.37	6.0	0.7	51.0	7.4	Fall
Drury_IN	12-1	3/8/2014	18:24	0.04	0.006	0.309	1.03	189.0	19.4	15.6	8.1	Winter
Drury_IN	12-2	3/8/2014	18:39	0.03	0.004	0.146	1.17	39.0	24.3	15.2	8.0	Winter
Drury_IN	12-3	3/8/2014	19:42	0.03	0.004	0.098	1.28	18.7	32.7	20.0	7.9	Winter
Drury_IN	12-4	3/8/2014	20:58	0.03	0.004	0.102	1.14	40.0	35.6	22.0	7.9	Winter
Drury_IN	12-5	3/8/2014	21:06	0.04	0.005	0.069	1.10	9.3	32.3	20.4	7.9	Winter
Drury_IN	13-1	3/16/2014	3:44	0.06	0.012	0.353	0.74	338.0	16.9	13.5	8.7	Winter
Drury_IN	13-10	3/16/2014	6:55	0.04	0.006	0.082	0.74	4.3	25.4	17.0	8.6	Winter
Drury_IN	13-11	3/16/2014	7:12	0.03	0.003	0.054	0.72	5.7	32.5	21.4	9.2	Winter
Drury_IN	13-2	3/16/2014	3:58	0.03	0.004	0.157	0.83	79.7	6.5	8.0	8.3	Winter
Drury_IN	13-3	3/16/2014	4:01	0.03	0.004	0.120	1.30	35.3	6.7	8.4	8.2	Winter
Drury_IN	13-4	3/16/2014	5:06	0.05	0.007	0.073	0.76	64.7	7.8	8.5	8.1	Winter
Drury_IN	13-5	3/16/2014	5:10	0.07	0.016	0.143	0.81	83.3	6.2	7.5	8.0	Winter
Drury_IN	13-6	3/16/2014	5:25	0.05	0.007	0.073	0.72	16.0	18.0	12.9	7.9	Winter

Drury_IN	13-7	3/16/2014	6:02	0.03	0.004	0.053	0.65	7.0	23.9	15.8	7.9	Winter
Drury_IN	13-8	3/16/2014	6:10	0.04	0.005	0.048	0.62	8.3	22.6	15.4	7.9	Winter
Drury_IN	13-9	3/16/2014	6:42	0.03	0.003	0.053	0.72	5.0	29.7	18.9	8.1	Winter
Drury_IN	14-1	4/27/2014	13:06	0.04	0.006	0.994	4.31	294.0	11.2	90.0	6.5	Spring
Drury_IN	14-2	4/27/2014	13:21	0.05	0.008	0.170	1.07	31.7	1.3	46.4	6.7	Spring
Drury_IN	14-3	4/27/2014	16:52	0.09	0.022	0.240	1.74	162.0	1.2	47.0	6.8	Spring
Drury_IN	14-4	4/27/2014	23:38	0.10	0.027	0.218	1.53	178.0	0.6	40.0	7.0	Spring
Drury_IN	14-5	4/27/2014	23:46	0.07	0.016	0.069	0.95	35.0	0.6	38.5	7.1	Spring
Drury_IN	14-6	4/28/2014	0:01	0.06	0.010	0.099	0.67	8.3	0.5	38.9	7.2	Spring
Drury_IN	14-7	4/28/2014	0:16	0.04	0.006	0.066	0.61	6.0	1.0	51.0	7.3	Spring
Drury_IN	15-1	5/8/2014	15:04	0.03	0.003	0.562	4.14	98.0	2.1	83.8	6.6	Spring
Drury_IN	15-10	5/9/2014	7:12	0.26	0.184	0.173	1.48	364.3	0.4	26.4	7.5	Spring
Drury_IN	15-11	5/9/2014	7:24	0.08	0.018	0.079	0.71	33.0	4.7	66.7	7.1	Spring
Drury_IN	15-2	5/8/2014	15:19	0.08	0.019	0.281	1.82	59.7	1.8	47.6	6.9	Spring
Drury_IN	15-3	5/8/2014	15:34	0.04	0.006	0.130	0.82	23.7	1.2	38.3	7.1	Spring
Drury_IN	15-4	5/8/2014	15:49	0.07	0.016	0.109	0.68	26.3	0.5	36.2	7.2	Spring
Drury_IN	15-5	5/8/2014	16:04	0.06	0.011	0.064	0.62	17.7	1.1	45.1	7.1	Spring
Drury_IN	15-6	5/8/2014	16:19	0.06	0.011	0.066	0.53	5.3	1.4	47.1	7.3	Spring
Drury_IN	15-7	5/8/2014	16:34	0.05	0.007	0.060	0.55	6.0	2.0	52.3	7.3	Spring
Drury_IN	15-8	5/9/2014	1:26	0.16	0.073	0.283	1.28	311.7	0.8	42.1	7.4	Spring
Drury_IN	15-9	5/9/2014	1:33	0.06	0.010	0.128	0.64	36.7	1.2	42.4	7.4	Spring

Table 14. Drury-OUT Pre-Implementation Water Quality Data

Site	Sample ID	Date	Time	Stage (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC (uS/cm)	pH	Season
Drury_OUT	1-1	8/31/2012	3:49	0.09	0.009	0.275	0.92	131.5	0.0	5.6	7.6	Summer
Drury_OUT	1-2	8/31/2012	4:19	0.09	0.008	0.157	0.27	17.7	0.1	4.3	7.6	Summer
Drury_OUT	1-3	8/31/2012	4:49	0.18	0.034	0.145	0.50	187.0	0.4	3.4	7.6	Summer
Drury_OUT	1-4	8/31/2012	5:19	0.12	0.015	0.090	1.06	24.0	4.8	11.2	7.8	Summer
Drury_OUT	1-5	8/31/2012	5:49	0.07	0.005	0.089	1.82	7.5	12.4	16.7	8.4	Summer
Drury_OUT	1-6	8/31/2012	6:06	0.06	0.004	0.075	2.97	12.7	22.1	27.4	8.4	Summer
Drury_OUT	1-7	8/31/2012	6:22	0.07	0.005	0.163	1.19	7.0	10.3	15.5	8.5	Summer
Drury_OUT	1-8	8/31/2012	6:52	0.16	0.027	0.076	0.29	15.3	0.0	3.9	8.6	Summer
Drury_OUT	1-9	8/31/2012	7:22	0.09	0.009	0.086	0.94	3.7	4.9	9.6	8.4	Summer
Drury_OUT	2-1	10/12/2012	4:47	0.08	0.008	0.723	1.97	196.0	1.3	5.3	8.1	Fall
Drury_OUT	2-2	10/12/2012	5:17	0.22	0.050	0.938	1.12	100.5	3.3	10.5	8.4	Fall
Drury_OUT	2-3	10/12/2012	5:51	0.06	0.003	0.379	1.03	158.5	2.9	14.8	8.6	Fall
Drury_OUT	2-4	10/12/2012	6:07	0.06	0.004	0.268	0.83	15.0	3.3	13.8	8.6	Fall
Drury_OUT	2-5	10/12/2012	6:12	0.06	0.004	0.234	0.68	10.7	2.4	11.4	8.5	Fall
Drury_OUT	2-6	10/12/2012	6:20	0.07	0.005	0.213	0.64	16.8	1.7	9.8	8.5	Fall
Drury_OUT	2-7	10/12/2012	6:50	0.07	0.006	0.278	0.76	3.6	2.2	9.6	8.5	Fall
Drury_OUT	3-1	11/12/2012	11:51	0.14	0.021	0.338	2.42	128.8	2.9	45.7	7.1	Fall
Drury_OUT	3-2	11/12/2012	12:21	0.12	0.015	0.143	0.86	36.7	1.0	26.1	7.2	Fall
Drury_OUT	3-3	11/12/2012	14:03	0.06	0.004	0.104	0.57	7.0	NS	32.1	7.5	Fall
Drury_OUT	3-4	11/12/2012	14:25	0.09	0.009	0.094	0.31	3.0	0.8	38.2	8.4	Fall
Drury_OUT	3-5	11/12/2012	14:51	0.06	0.004	0.157	0.82	4.0	1.5	60.4	8.4	Fall
Drury_OUT	3-6	11/12/2012	15:00	0.07	0.005	0.122	0.65	3.0	1.6	58.2	9.1	Fall
Drury_OUT	3-7	11/12/2012	17:56	0.06	0.004	0.087	0.51	2.7	1.0	44.9	8.1	Fall
Drury_OUT	3-8	11/12/2012	18:06	0.06	0.004	0.076	0.37	3.0	1.0	32.1	8.3	Fall
Drury_OUT	4-1	12/4/2012	1:14	0.07	0.005	0.185	1.13	37.7	1.6	41.7	7.4	Fall
Drury_OUT	4-2	12/4/2012	2:56	0.05	0.003	0.139	0.46	33.3	1.0	28.6	7.0	Fall
Drury_OUT	4-3	12/4/2012	3:23	0.09	0.010	0.068	0.35	15.3	1.3	29.2	6.7	Fall
Drury_OUT	4-4	12/4/2012	3:53	0.06	0.005	0.064	0.44	4.7	1.0	44.5	7.8	Fall
Drury_OUT	4-5	12/4/2012	4:09	0.06	0.004	0.100	0.96	3.6	1.8	75.7	9.0	Fall
Drury_OUT	4-6	12/4/2012	4:29	0.06	0.004	0.101	0.81	4.0	2.1	95.1	8.9	Fall
Drury_OUT	5-1	4/10/2013	4:35	0.04	0.001	0.546	2.35	289.5	0.6	81.4	7.3	Spring
Drury_OUT	5-2	4/10/2013	5:37	0.04	0.001	0.168	2.4	153.0	1.9	64.9	7.7	Spring
Drury_OUT	5-3	4/10/2013	5:46	0.12	0.016	0.112	1.23	34.5	1.9	68.2	7.7	Spring

Drury_OUT	5-4	4/10/2013	17:11	0.04	0.002	0.220	0.76	187.0	1.2	46.1	7.4	Spring
Drury_OUT	5-5	4/10/2013	17:40	0.15	0.024	0.090	0.52	27.7	1.4	51.3	8.6	Spring
Drury_OUT	5-6	4/10/2013	18:10	0.10	0.011	0.051	0.47	9.7	1.0	65.9	9.7	Spring
Drury_OUT	5-7	4/10/2013	18:40	0.08	0.007	0.077	0.52	9.0	1.7	100.0	9.8	Spring
Drury_OUT	6-1	4/26/2013	7:43	0.04	0.002	0.105	0.92	19.0	1.2	53.4	7.6	Spring
Drury_OUT	6-2	4/26/2013	7:58	0.06	0.004	0.102	1.47	15.0	1.2	50.4	7.3	Spring
Drury_OUT	6-3	4/26/2013	9:02	0.06	0.004	0.094	1.18	22.3	1.6	63.8	7.2	Spring
Drury_OUT	6-4	4/26/2013	9:23	0.07	0.005	0.071	1.04	8.7	2.0	66.0	7.3	Spring
Drury_OUT	6-5	4/26/2013	10:56	0.06	0.003	0.045	0.79	14.0	2.3	81.5	7.7	Spring
Drury_OUT	6-6	4/26/2013	11:16	0.06	0.005	0.039	0.73	4.0	2.3	78.6	8.0	Spring
Drury_OUT	6-7	4/26/2013	11:37	0.09	0.008	0.039	0.48	11.0	1.4	51.8	7.6	Spring
Drury_OUT	6-8	4/26/2013	12:07	0.10	0.011	0.047	0.50	14.0	1.3	58.2	9.3	Spring
Drury_OUT	6-9	4/26/2013	15:56	0.06	0.003	0.037	0.67	6.7	2.0	70.5	8.6	Spring
Drury_OUT	6-10	4/26/2013	16:11	0.06	0.003	0.032	0.73	3.7	2.3	82.3	9.0	Spring
Drury_OUT	6-11	4/26/2013	17:03	0.05	0.003	0.067	0.88	32.7	2.1	71.1	9.1	Spring
Drury_OUT	6-12	4/26/2013	17:16	0.06	0.003	0.045	0.88	15.0	1.7	75.1	8.8	Spring
Drury_OUT	6-13	4/26/2013	17:21	0.07	0.005	0.031	0.56	12.0	1.8	61.1	8.8	Spring
Drury_OUT	6-14	4/26/2013	18:01	0.07	0.005	0.050	0.67	37.7	1.9	60.5	9.2	Spring
Drury_OUT	6-15	4/26/2013	18:26	0.08	0.007	0.032	0.56	6.0	1.9	83.4	9.5	Spring
Drury_OUT	6-16	4/26/2013	19:36	0.06	0.003	0.022	0.54	5.7	2.6	132.2	10.3	Spring
Drury_OUT	6-17	4/26/2013	20:20	0.08	0.007	0.020	0.50	0.7	2.6	120.9	10.0	Spring
Drury_OUT	6-18	4/26/2013	20:30	0.11	0.014	0.022	0.86	18.3	1.3	48.6	9.5	Spring
Drury_OUT	6-19	4/26/2013	21:00	0.12	0.016	0.040	0.31	6.0	1.8	87.3	9.5	Spring
Drury_OUT	6-20	4/26/2013	21:18	0.06	0.004	0.035	0.52	20.3	2.9	124.9	10.0	Spring
Drury_OUT	6-21	4/26/2013	21:40	0.06	0.005	0.042	0.58	8.7	3.3	163.3	10.1	Spring
Drury_OUT	6-22	4/27/2013	11:43	0.07	0.005	0.031	0.52	13.7	1.5	49.5	8.3	Spring
Drury_OUT	6-23	4/27/2013	11:47	0.06	0.004	0.026	0.52	9.7	1.3	50.2	7.8	Spring
Drury_OUT	7-1	9/20/2013	0:12	0.14	0.021	0.276	0.69	142.0	1.1	36.1	7.0	Summer
Drury_OUT	7-2	9/20/2013	0:42	0.13	0.018	0.166	0.34	14.0	1.8	46.5	7.0	Summer
Drury_OUT	7-3	9/20/2013	1:12	0.14	0.020	0.124	0.34	14.7	1.5	46.2	7.3	Summer
Drury_OUT	7-4	9/20/2013	1:42	0.13	0.019	0.100	0.40	6.7	1.5	54.1	7.8	Summer
Drury_OUT	7-5	9/20/2013	2:12	0.13	0.018	0.109	0.07	4.0	1.3	61.0	8.5	Summer
Drury_OUT	7-6	9/20/2013	2:42	0.14	0.020	0.086	0.22	3.7	1.2	55.3	8.4	Summer
Drury_OUT	7-7	9/20/2013	3:12	0.08	0.008	0.106	0.57	2.3	2.8	133.0	8.8	Summer
Drury_OUT	7-8	9/20/2013	3:42	0.09	0.008	0.080	0.34	1.0	1.9	103.1	9.0	Summer

Drury_OUT	7-9	9/20/2013	4:12	0.09	0.010	0.088	0.26	2.7	1.6	89.2	8.7	Summer
Drury_OUT	7-10	9/20/2013	4:42	0.07	0.006	0.089	0.42	0.1	2.9	145.1	8.6	Summer
Drury_OUT	7-11	9/20/2013	5:12	0.07	0.006	0.092	0.55	2.0	4.0	136.1	9.0	Summer
Drury_OUT	7-12	9/20/2013	5:42	0.07	0.005	0.094	0.55	1.0	3.4	165.2	8.5	Summer
Drury_OUT	7-13	9/20/2013	6:12	0.07	0.005	0.094	0.55	0.1	3.2	140.8	8.5	Summer
Drury_OUT	8-1	10/5/2013	7:21	0.06	0.005	0.087	0.35	52.0	1.0	39.0	7.2	Fall
Drury_OUT	8-2	10/5/2013	7:44	0.10	0.011	0.067	0.16	188.7	0.9	36.6	7.3	Fall
Drury_OUT	8-3	10/5/2013	8:14	0.08	0.007	0.046	0.25	15.7	1.0	43.2	7.4	Fall
Drury_OUT	8-4	10/5/2013	8:44	0.09	0.008	0.039	0.16	10.0	0.9	38.2	7.4	Fall
Drury_OUT	8-5	10/5/2013	9:14	0.09	0.008	0.041	0.16	8.3	0.9	52.7	7.7	Fall
Drury_OUT	8-6	10/5/2013	9:23	0.07	0.005	0.049	0.25	5.0	1.0	70.4	8.3	Fall
Drury_OUT	8-7	10/5/2013	9:26	0.06	0.004	0.049	0.20	6.3	1.1	72.2	8.5	Fall
Drury_OUT	8-8	10/5/2013	9:47	0.11	0.013	0.037	0.18	18.0	0.7	42.2	8.4	Fall
Drury_OUT	8-9	10/5/2013	10:18	0.06	0.004	0.041	0.25	4.0	1.1	72.5	8.6	Fall
Drury_OUT	8-10	10/5/2013	10:21	0.06	0.005	0.048	0.31	9.7	1.0	75.5	8.7	Fall
Drury_OUT	8-11	10/5/2013	11:46	0.07	0.005	0.057	0.27	25.0	1.0	55.9	8.5	Fall
Drury_OUT	8-12	10/5/2013	11:53	0.10	0.010	0.040	0.99	14.0	1.0	49.4	8.1	Fall
Drury_OUT	8-13	10/5/2013	12:06	0.12	0.017	0.054	0.22	47.7	0.7	31.4	8.0	Fall
Drury_OUT	8-14	10/5/2013	14:07	0.06	0.004	0.045	0.25	5.3	1.0	58.6	8.3	Fall
Drury_OUT	8-15	10/5/2013	14:16	0.13	0.019	0.046	0.04	72.7	0.5	23.5	8.2	Fall
Drury_OUT	8-16	10/5/2013	14:26	0.19	0.038	0.065	0.14	19.7	0.6	38.7	7.9	Fall
Drury_OUT	8-17	10/5/2013	14:43	0.06	0.005	0.050	0.04	7.3	1.1	59.6	8.4	Fall
Drury_OUT	9-1	10/29/2013	5:48	0.07	0.006	0.206	0.53	75.0	0.7	37.4	6.8	Fall
Drury_OUT	9-2	10/29/2013	6:07	0.06	0.004	0.111	1.02	17.0	0.6	56.1	7.1	Fall
Drury_OUT	9-3	10/29/2013	6:23	0.28	0.074	0.084	0.05	29.0	0.1	22.9	7.4	Fall
Drury_OUT	9-4	10/29/2013	6:53	0.22	0.047	0.139	0.48	10.3	0.5	37.4	7.4	Fall
Drury_OUT	9-5	10/29/2013	7:23	0.12	0.015	0.135	0.53	12.0	0.8	71.8	8.0	Fall
Drury_OUT	9-6	10/29/2013	7:53	0.24	0.055	0.163	0.77	8.7	0.6	53.8	7.9	Fall
Drury_OUT	9-7	10/29/2013	8:23	0.17	0.030	0.061	0.48	18.0	0.3	38.7	7.9	Fall
Drury_OUT	9-8	10/29/2013	8:53	0.06	0.004	0.113	0.71	5.3	1.1	113.0	8.6	Fall
Drury_OUT	9-9	10/29/2013	11:01	0.12	0.016	0.127	1.16	80.3	1.0	39.8	8.1	Fall
Drury_OUT	9-10	10/29/2013	11:19	0.06	0.004	0.14	0.5	10.0	1.3	103.0	7.8	Fall
Drury_OUT	9-11	10/29/2013	13:04	0.07	0.005	0.049	1.13	6.0	1.2	84.3	8.6	Fall
Drury_OUT	9-12	10/29/2013	13:12	0.06	0.004	0.058	0.50	6.0	1.2	90.3	8.2	Fall
Drury_OUT	9-13	10/29/2013	13:13	0.06	0.004	0.066	0.54	6.7	1.3	93.9	8.1	Fall

Drury_OUT	10-1	11/6/2013	4:19	0.14	0.021	0.139	0.14	119.3	1.2	22.2	6.9	Fall
Drury_OUT	10-2	11/6/2013	4:49	0.10	0.010	0.071	0.18	10.7	0.8	34.7	7.0	Fall
Drury_OUT	10-3	11/6/2013	5:23	0.07	0.005	0.075	0.25	4.3	1.7	60.4	8.8	Fall
Drury_OUT	10-4	11/6/2013	5:38	0.07	0.005	0.106	0.20	5.3	1.5	70.0	8.8	Fall
Drury_OUT	11-1	11/21/2013	9:59	0.13	0.019	0.153	0.29	105.5	0.1	29.2	7.5	Fall
Drury_OUT	11-2	11/21/2013	10:39	0.08	0.007	0.092	0.36	45.0	0.1	31.1	7.4	Fall
Drury_OUT	11-3	11/21/2013	10:41	0.08	0.007	0.094	0.36	26.5	0.1	28.7	7.3	Fall
Drury_OUT	11-4	11/21/2013	11:11	0.11	0.014	0.078	0.32	6.5	0.2	35.2	7.2	Fall
Drury_OUT	12-1	3/8/2014	18:31	0.08	0.007	0.352	0.49	103.0	38.7	20.0	6.7	Winter
Drury_OUT	12-2	3/8/2014	19:46	0.07	0.005	0.168	1.44	33.7	60.9	30.9	7.1	Winter
Drury_OUT	12-3	3/8/2014	19:56	0.07	0.006	0.126	1.37	14.3	77.8	37.2	7.4	Winter
Drury_OUT	12-4	3/8/2014	20:38	0.06	0.004	0.129	1.57	17.7	126.4	54.4	7.4	Winter
Drury_OUT	12-5	3/8/2014	21:01	0.07	0.005	0.104	1.46	11.7	130.8	57.1	7.5	Winter
Drury_OUT	12-6	3/8/2014	21:31	0.07	0.005	0.092	1.33	7.7	114.6	52.6	7.6	Winter
Drury_OUT	13-1	3/16/2014	3:48	0.08	0.007	0.478	0.31	134.0	11.8	12.9	7.5	Winter
Drury_OUT	13-10	3/16/2014	8:30	0.10	0.012	0.048	0.98	6.7	33.3	24.3	9.2	Winter
Drury_OUT	13-11	3/16/2014	9:00	0.07	0.006	0.063	0.84	7.0	39.2	28.0	9.1	Winter
Drury_OUT	13-12	3/16/2014	9:30	0.07	0.006	0.061	0.76	4.0	38.1	27.1	9.1	Winter
Drury_OUT	13-13	3/16/2014	10:00	0.07	0.005	0.067	0.92	3.0	39.1	27.1	9.0	Winter
Drury_OUT	13-14	3/16/2014	10:30	0.08	0.006	0.056	0.68	5.3	35.2	24.4	9.0	Winter
Drury_OUT	13-15	3/16/2014	11:00	0.07	0.005	0.080	0.70	4.0	38.2	26.5	9.0	Winter
Drury_OUT	13-16	3/16/2014	11:30	0.07	0.005	0.075	0.62	5.0	37.2	26.3	9.0	Winter
Drury_OUT	13-2	3/16/2014	4:18	0.08	0.008	0.193	1.12	23.5	7.4	8.3	7.5	Winter
Drury_OUT	13-3	3/16/2014	5:06	0.07	0.005	0.104	0.96	18.0	23.2	16.4	7.4	Winter
Drury_OUT	13-4	3/16/2014	5:30	0.15	0.025	0.075	0.80	19.0	18.0	12.9	7.5	Winter
Drury_OUT	13-5	3/16/2014	6:00	0.11	0.015	0.060	0.72	28.0	32.4	19.7	7.4	Winter
Drury_OUT	13-6	3/16/2014	6:30	0.12	0.015	0.055	0.74	6.5	35.7	22.1	7.5	Winter
Drury_OUT	13-7	3/16/2014	7:00	0.14	0.021	0.048	0.32	8.5	26.0	17.4	7.6	Winter
Drury_OUT	13-8	3/16/2014	7:30	0.13	0.017	0.049	0.68	7.5	33.8	21.5	8.3	Winter
Drury_OUT	13-9	3/16/2014	8:00	0.09	0.010	0.070	0.88	6.0	40.7	26.7	9.0	Winter
Drury_OUT	14-1	4/27/2014	13:09	0.06	0.005	0.949	4.17	314.0	1.7	70.9	7.0	Spring
Drury_OUT	14-2	4/27/2014	16:54	0.13	0.017	0.311	1.79	193.3	1.5	49.5	6.9	Spring
Drury_OUT	14-3	4/27/2014	23:41	0.14	0.021	0.171	1.76	143.7	0.7	42.7	7.1	Spring
Drury_OUT	14-4	4/27/2014	23:54	0.08	0.007	0.093	0.72	28.0	0.7	36.3	7.1	Spring
Drury_OUT	15-1	5/8/2014	15:16	0.04	0.002	0.430	2.41	77.0	0.3	59.9	6.8	Spring

Drury_OUT	15-2	5/8/2014	15:46	0.10	0.011	0.140	0.86	31.0	0.2	39.5	7.2	Spring
Drury_OUT	15-3	5/8/2014	16:16	0.14	0.022	0.079	0.49	32.7	0.7	42.2	7.2	Spring
Drury_OUT	15-4	5/8/2014	1:27	0.21	0.045	0.336	1.24	418.0	1.1	49.5	7.2	Spring
Drury_OUT	15-5	5/8/2014	1:32	0.22	0.047	0.174	1.01	131.7	0.4	37.9	7.2	Spring
Drury_OUT	15-6	5/8/2014	7:14	0.28	0.073	0.322	1.59	356.0	0.0	29.3	7.1	Spring

Table 15. Drury-IN Post-Implementation Water Quality Data

Site	Sample ID	Date	Time	Level (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC uS/cm)	pH	Season
Drury_IN	16-1	10/9/2014	15:04	0.11	0.033	0.128	0.87	200	1.0	54.5	6.2	Fall
Drury_IN	16-2	10/9/2014	15:19	0.16	0.075	0.069	0.47	35.0	0.8	43.3	6.6	Fall
Drury_IN	16-3	10/9/2014	15:34	0.09	0.025	0.074	0.47	16.0	1.0	70.5	6.7	Fall
Drury_IN	16-4	10/9/2014	15:49	0.04	0.006	0.101	0.57	24.0	1.9	115.7	6.9	Fall
Drury_IN	16-5	10/9/2014	16:04	0.05	0.008	0.065	0.57	11.0	2.2	107.9	7.2	Fall
Drury_IN	16-6	10/9/2014	16:19	0.05	0.007	0.052	0.51	7.0	2.4	113.0	7.3	Fall
Drury_IN	16-7	10/9/2014	16:34	0.03	0.003	0.066	0.55	4.0	2.3	142.3	7.6	Fall
Drury_IN	16-8	10/9/2014	16:49	0.06	0.010	0.049	0.35	11.0	1.3	84.7	7.8	Fall
Drury_IN	16-9	10/9/2014	17:04	0.05	0.007	0.066	0.35	13.0	1.6	116.0	7.8	Fall
Drury_IN	17-1	11/4/2014	2:36	0.10	0.028	0.153	1.06	55.33	1.1	39.0	6.4	Fall
Drury_IN	17-2	11/4/2014	2:51	0.07	0.016	0.074	0.43	26.0	0.8	32.8	6.9	Fall
Drury_IN	17-3	11/4/2014	3:06	0.05	0.007	0.066	0.41	6.7	1.0	42.4	7.3	Fall
Drury_IN	17-4	11/4/2014	3:21	0.05	0.008	0.078	0.35	8.0	1.2	59.8	7.6	Fall
Drury_IN	17-5	11/4/2014	3:28	0.04	0.004	0.083	0.39	22.7	1.2	47.8	7.8	Fall
Drury_IN	17-6	11/4/2014	3:40	0.05	0.008	0.062	0.37	6.0	1.1	52.1	8.0	Fall
Drury_IN	17-7	11/4/2014	3:55	0.05	0.008	0.07	0.43	4.7	1.6	67.3	8.1	Fall
Drury_IN	17-8	11/4/2014	4:10	0.05	0.008	0.069	0.37	3.3	1.5	61.3	8.1	Fall
Drury_IN	17-9	11/4/2014	4:25	0.04	0.006	0.072	0.45	2.7	1.6	76.7	8.2	Fall
Drury_IN	17-10	11/4/2014	4:34	0.03	0.004	0.072	0.39	2.0	1.7	75.1	8.4	Fall
Drury_IN	18-1	3/13/2015	19:24	0.03	0.004	0.223	1.14	236	18.4	123.0	8.0	Winter
Drury_IN	18-2	3/13/2015	19:39	0.03	0.004	0.138	0.03	38.0	33.52	187.2	8.0	Winter
Drury_IN	18-3	3/13/2015	19:54	0.03	0.004	0.114	0.66	60.0	24.64	136.6	8.1	Winter
Drury_IN	18-4	3/13/2015	20:02	0.03	0.003	0.281	1.01	332	18.25	116.3	8.2	Winter
Drury_IN	18-5	3/13/2015	20:10	0.03	0.003	0.163	0.70	51.5	25.05	154.1	8.2	Winter
Drury_IN	18-6	3/13/2015	20:16	0.03	0.004	0.125	0.62	29.0	24.52	101.9	8.2	Winter
Drury_IN	18-7	3/13/2015	20:27	0.06	0.012	0.182	0.70	93.5	16.1	106.8	8.4	Winter
Drury_IN	18-8	3/13/2015	20:42	0.07	0.014	0.092	0.42	36.5	19.9	128.6	8.4	Winter
Drury_IN	18-9	3/13/2015	20:57	0.05	0.007	0.109	0.64	190	19.64	123.1	8.5	Winter
Drury_IN	18-10	3/13/2015	21:12	0.07	0.015	0.091	0.03	67.0	13.49	92.4	8.9	Winter
Drury_IN	18-11	3/13/2015	21:27	0.05	0.007	0.072	0.40	21.5	20.78	136.4	9.0	Winter
Drury_IN	18-12	3/13/2015	21:42	0.05	0.007	0.058	0.36	15.0	22.53	145.1	9.0	Winter
Drury_IN	18-13	3/13/2015	21:57	0.04	0.006	0.060	0.34	10.0	32.63	143.6	8.9	Winter
Drury_IN	18-14	3/13/2015	22:12	0.04	0.005	0.078	0.38	32.4	15.49	50.7	8.5	Winter

Drury_IN	18-15	3/13/2015	22:27	0.04	0.005	0.062	0.38	12.0	20.91	138.4	8.0	Winter
Drury_IN	19-1	3/25/2015	19:24	0.05	0.008	0.968	1.73	306	2.2	55.0	7.6	Spring
Drury_IN	19-2	3/25/2015	19:39	0.05	0.007	0.152	0.72	53	4.0	82.0	7.2	Spring
Drury_IN	19-3	3/25/2015	19:54	0.04	0.006	0.104	0.62	20.5	4.0	83.7	7.6	Spring
Drury_IN	19-4	3/25/2015	20:09	0.04	0.004	0.085	0.55	13	5.7	92.2	7.7	Spring
Drury_IN	19-5	3/25/2015	20:24	0.03	0.004	0.078	0.62	12.5	8.3	111.5	7.8	Spring
Drury_IN	19-6	3/25/2015	20:39	0.03	0.003	0.112	0.64	13	11.4	141.3	7.8	Spring
Drury_IN	19-7	3/25/2015	20:54	0.04	0.005	0.082	0.60	13.2	9.4	121.3	7.9	Spring
Drury_IN	19-8	3/25/2015	21:09	0.05	0.007	0.082	0.51	19.6	7.4	96.4	8.1	Spring
Drury_IN	19-9	3/25/2015	21:24	0.04	0.004	0.07	0.47	12.8	6.9	95.1	8.2	Spring
Drury_IN	19-10	3/25/2015	21:39	0.04	0.005	0.064	0.51	12.4	8.3	102.7	8.3	Spring
Drury_IN	19-11	3/25/2015	21:54	0.04	0.004	0.061	0.57	14.4	9.9	105.7	8.7	Spring
Drury_IN	19-12	3/25/2015	22:09	0.06	0.011	0.077	0.44	48.4	5.6	68.0	8.7	Spring
Drury_IN	19-13	3/25/2015	22:24	0.06	0.011	0.069	0.42	16	5.8	73.4	8.7	Spring
Drury_IN	19-14	3/25/2015	22:39	0.04	0.004	0.061	0.44	8	9.3	107.7	8.8	Spring
Drury_IN	19-15	3/25/2015	22:54	0.03	0.003	0.103	0.85	72.4	9.5	103.3	8.7	Spring
Drury_IN	19-16	3/25/2015	23:09	0.04	0.004	0.063	0.47	7.2	9.2	107.0	9.0	Spring
Drury_IN	21-1	4/2/2015	22:52	0.26	0.183	0.196	1.87	238.7	0.4	31.5	8.1	Spring
Drury_IN	21-2	4/2/2015	23:07	0.09	0.023	0.107	0.81	57.3	1.3	51.8	8.2	Spring
Drury_IN	21-3	4/2/2015	23:22	0.08	0.017	0.079	0.67	15.2	2.6	65.2	8.3	Spring
Drury_IN	21-4	4/3/2015	4:08	0.10	0.031	0.189	2.10	87	1.3	48.1	8.2	Spring
Drury_IN	21-5	4/3/2015	4:13	0.11	0.036	0.127	1.12	76.8	0.4	28.5	8.1	Spring
Drury_IN	21-6	4/3/2015	4:28	0.06	0.011	0.092	0.61	29.6	2.3	74.7	8.1	Spring
Drury_IN	22-1	4/22/2015	19:02	0.22	0.139	0.438	3.02	252	0.8	51.0	7.2	Spring
Drury_IN	22-2	4/22/2015	1:52	0.04	0.005	0.330	2.53	125.5	0.8	47.0	7.2	Spring
Drury_IN	22-3	4/22/2015	1:57	0.06	0.010	0.217	2.08	51.5	0.6	46.4	7.3	Spring
Drury_IN	22-4	4/22/2015	2:12	0.10	0.028	0.076	1.21	29.5	0.5	38.4	7.3	Spring
Drury_IN	22-5	4/22/2015	2:27	0.06	0.013	0.066	1.03	13.3	1.1	64.2	7.2	Spring
Drury_IN	22-6	4/22/2015	2:42	0.06	0.010	0.060	0.91	12.5	2.6	76.4	7.3	Spring
Drury_IN	22-7	4/22/2015	2:57	0.06	0.012	0.055	0.81	11.5	2.9	81.4	7.4	Spring

Table 16. Drury-OUT Post-Implementation Water Quality Data

Site	Sample ID	Date	Time	Level (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC uS/cm)	pH	Season
Drury_OUT	16-2	10/9/2014	15:36	0.32	0.027	0.079	0.69	71.0	1.8	62.0	7.2	Fall
Drury_OUT	16-3	10/9/2014	16:06	0.33	0.029	0.061	0.57	18.0	1.7	85.1	7.4	Fall
Drury_OUT	16-4	10/9/2014	16:36	0.32	0.028	0.066	0.51	6.0	1.9	99.0	7.6	Fall
Drury_OUT	16-5	10/9/2014	17:06	0.30	0.025	0.058	0.43	17.0	2.0	97.6	7.6	Fall
Drury_OUT	16-6	10/9/2014	17:36	0.29	0.023	0.055	0.39	7.0	1.7	96.6	7.6	Fall
Drury_OUT	16-7	10/9/2014	18:06	0.22	0.014	0.050	0.27	8.0	2.0	107.3	7.7	Fall
Drury_OUT	17-1	11/4/2014	2:57	0.07	0.006	0.133	0.67	76.0	1.5	45.7	8.6	Fall
Drury_OUT	17-2	11/4/2014	3:27	0.08	0.006	0.102	0.52	4.7	1.2	51.7	8.5	Fall
Drury_OUT	17-3	11/4/2014	3:36	0.07	0.005	0.113	0.50	4.0	1.5	54.7	8.5	Fall
Drury_OUT	17-4	11/4/2014	4:02	0.07	0.005	0.087	0.45	4.7	1.2	58.4	8.2	Fall
Drury_OUT	18-1	3/13/2015	21:08	0.12	0.017	0.113	0.48	33.2	12.7	124.4	6.4	Winter
Drury_OUT	19-1	3/25/2015	22:14	0.09	0.010	0.065	0.57	11.7	9.0	80.7	6.8	Spring
Drury_OUT	19-2	3/25/2015	22:29	0.10	0.010	0.072	0.51	14.3	9.8	95.2	7.24	Spring
Drury_OUT	21-1	4/3/2015	22:54	0.22	0.048	0.262	1.98	413.0	0.6	44.3	8.7	Spring
Drury_OUT	21-2	4/3/2015	23:09	0.22	0.048	0.155	0.96	52.7	1.1	48.3	8.7	Spring
Drury_OUT	21-3	4/3/2015	23:24	0.12	0.015	0.159	0.83	41.3	15.0	67.2	8.5	Spring
Drury_OUT	21-4	4/3/2015	4:14	0.13	0.018	0.159	1.26	152	17.1	88.7	8.2	Spring
Drury_OUT	21-5	4/3/2015	4:22	0.27	0.069	0.086	0.71	30.5	7.3	45.3	8.3	Spring
Drury_OUT	21-6	4/3/2015	4:37	0.11	0.013	0.187	0.81	44.7	11.6	74.8	8.1	Spring
Drury_OUT	22-1	4/22/2015	19:06	0.20	0.042	0.265	1.82	167.3	1.0	50.3	7.4	Spring
Drury_OUT	22-2	4/22/2015	2:12	0.11	0.012	0.186	1.69	32	1.4	67.2	7.4	Spring
Drury_OUT	22-3	4/22/2015	2:15	0.13	0.017	0.164	1.53	19.3	1.1	57.3	7.4	Spring
Drury_OUT	22-4	4/22/2015	2:30	0.10	0.010	0.107	1.28	8.5	1.4	64.1	7.4	Spring

Table 17. Greenwood-IN Pre-Implementation Water Quality Data

Sample	Sample ID	Date	Time	Level (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC (uS/cm)	pH	Season
Green_IN	1-1	5/31/2012	1:06	0.03	0.009	0.498	3.29	494.0	8.2	265.0	7.7	Spring
Green_IN	1-2	5/31/2012	1:21	0.03	0.010	0.293	3.89	120.0	5.9	196.0	7.5	Spring
Green_IN	1-3	5/31/2012	1:42	0.03	0.008	0.379	2.58	556.0	4.3	172.0	7.5	Spring
Green_IN	1-4	5/31/2012	1:57	0.05	0.016	0.209	1.18	182.5	1.7	63.0	7.6	Spring
Green_IN	1-5	5/31/2012	2:07	0.03	0.007	0.122	1.58	31.5	1.8	80.0	7.3	Spring
Green_IN	1-6	5/31/2012	2:21	0.03	0.009	0.185	1.20	237.0	1.3	80.0	7.3	Spring
Green_IN	1-7	5/31/2012	2:36	0.05	0.017	0.253	1.08	NS	1.3	6.0	7.2	Spring
Green_IN	1-8	5/31/2012	2:51	0.05	0.015	0.249	0.54	214.5	1.4	58.0	7.3	Spring
Green_IN	1-9	5/31/2012	3:06	0.06	0.021	0.248	0.56	76.5	1.3	48.0	7.3	Spring
Green_IN	1-10	5/31/2012	3:21	0.05	0.016	0.163	0.77	14.3	1.2	55.0	7.2	Spring
Green_IN	1-11	5/31/2012	3:31	0.03	0.010	0.147	0.81	37.0	1.3	62.0	7.1	Spring
Green_IN	1-12	5/31/2012	3:46	0.05	0.017	0.135	0.52	10.7	1.4	56.0	7.1	Spring
Green_IN	1-13	5/31/2012	3:57	0.03	0.009	0.141	0.48	33.3	1.6	60.0	7.2	Spring
Green_IN	1-14	5/31/2012	4:09	0.04	0.013	0.128	0.46	9.3	1.6	54.0	7.1	Spring
Green_IN	1-15	5/31/2012	4:22	0.03	0.008	0.118	0.60	5.7	1.9	64.0	7.1	Spring
Green_IN	2-1	6/11/2012	8:47	0.03	0.009	0.258	1.26	244.0	1.3	65.0	7.1	Spring
Green_IN	2-2	6/11/2012	9:02	0.04	0.013	0.145	1.13	55.0	1.2	58.0	7.4	Spring
Green_IN	2-3	6/11/2012	9:08	0.03	0.009	0.126	1.36	26.0	1.2	65.0	7.4	Spring
Green_IN	2-4	6/11/2012	9:29	0.03	0.008	0.120	0.99	31.0	1.2	66.0	7.4	Spring
Green_IN	2-5	6/11/2012	9:34	0.03	0.008	0.092	1.15	10.3	1.3	68.0	7.4	Spring
Green_IN	2-6	6/11/2012	10:01	0.03	0.007	0.189	1.11	168.0	1.2	87.0	7.3	Spring
Green_IN	2-7	6/11/2012	10:11	0.03	0.008	0.080	0.84	32.7	1.5	70.0	7.3	Spring
Green_IN	2-8	6/11/2012	10:16	0.03	0.009	0.102	1.22	24.0	1.8	77.0	7.3	Spring
Green_IN	3-1	9/7/2012	15:56	0.03	0.009	1.344	2.72	2,844.5	5.8	85.0	6.4	Summer
Green_IN	3-2	9/7/2012	15:59	0.03	0.009	0.467	2.23	1,133.5	1.1	64.0	6.5	Summer
Green_IN	3-3	9/7/2012	16:08	0.03	0.009	0.463	1.72	386.5	1.8	52.0	6.7	Summer
Green_IN	3-4	9/7/2012	17:54	0.03	0.009	0.329	0.95	818.0	0.9	56.0	6.7	Summer
Green_IN	4-1	4/18/2013	3:34	0.03	0.009	0.855	5.65	776.5	9.2	170.9	7.2	Spring
Green_IN	4-2	4/18/2013	3:49	0.05	0.017	0.329	1.84	313.0	4.2	82.3	7.1	Spring
Green_IN	4-3	4/18/2013	4:04	0.05	0.016	0.240	1.27	72.0	4.7	62.7	6.9	Spring
Green_IN	4-4	4/18/2013	4:19	0.03	0.010	0.163	1.03	21.7	4.5	52.4	6.7	Spring
Green_IN	4-5	4/18/2013	6:08	0.03	0.009	0.096	1.99	24.0	4.2	58.3	7.1	Spring
Green_IN	4-6	4/18/2013	7:58	0.03	0.009	0.275	2.35	74.3	3.9	81.2	6.9	Spring

Green_IN	4-7	4/18/2013	8:06	0.03	0.009	0.113	1.93	17.3	3.3	61.7	7.2	Spring
Green_IN	4-8	4/18/2013	8:22	0.03	0.009	0.092	1.54	6.7	4.3	63.0	7.1	Spring
Green_IN	5-1	7/26/2013	9:43	0.03	0.010	0.161	0.60	321.3	5.8	100.5	7.6	Summer
Green_IN	5-2	7/26/2013	9:57	0.04	0.011	0.073	0.35	52.0	1.8	43.8	7.1	Summer
Green_IN	5-3	7/26/2013	10:28	0.03	0.009	0.030	0.33	30.5	1.6	49.9	7.0	Summer
Green_IN	5-4	7/26/2013	10:32	0.03	0.009	0.034	0.45	10.0	1.5	41.7	6.9	Summer
Green_IN	5-5	7/26/2013	13:52	0.02	0.006	0.052	0.04	55.7	1.5	52.2	7.4	Summer
Green_IN	5-6	7/26/2013	14:26	0.02	0.004	0.073	0.04	16.7	1.4	44.0	7.2	Summer
Green_IN	5-7	7/26/2013	14:36	0.02	0.007	0.071	0.19	10.7	1.4	49.0	7.0	Summer
Green_IN	5-8	7/26/2013	14:39	0.03	0.010	0.089	0.04	13.0	1.4	40.5	7.4	Summer
Green_IN	5-9	7/26/2013	14:54	0.03	0.008	0.081	0.13	7.7	1.3	40.1	7.3	Summer
Green_IN	5-10	7/26/2013	15:12	0.03	0.007	0.076	0.04	18.7	1.5	34.3	7.3	Summer
Green_IN	5-11	7/26/2013	15:27	0.03	0.009	0.091	0.09	32.0	1.4	38.5	7.4	Summer
Green_IN	5-12	7/26/2013	15:38	0.02	0.006	0.107	0.38	9.0	1.5	34.6	7.1	Summer
Green_IN	6-1	8/3/2013	4:26	0.03	0.009	0.225	2.29	194.3	2.9	83.3	7.5	Summer
Green_IN	6-2	8/3/2013	4:42	0.04	0.010	0.175	0.96	121.7	1.4	35.9	7.1	Summer
Green_IN	6-3	8/3/2013	4:58	0.03	0.008	0.215	0.88	21.0	1.4	32.8	6.8	Summer
Green_IN	6-4	8/3/2013	4:59	0.03	0.008	0.252	0.60	21.7	1.5	33.2	6.8	Summer
Green_IN	6-5	8/3/2013	5:12	0.03	0.009	0.161	0.43	11.7	1.2	30.6	10.0	Summer
Green_IN	6-6	8/3/2013	5:28	0.03	0.008	0.126	0.32	8.0	1.0	28.2	6.9	Summer
Green_IN	6-7	8/3/2013	5:30	0.03	0.008	0.110	0.33	8.7	1.3	33.9	7.0	Summer
Green_IN	7-1	10/5/2013	8:48	0.03	0.009	0.115	3.49	95.0	0.5	33.2	7.3	Fall
Green_IN	7-2	10/5/2013	11:01	0.03	0.009	0.117	0.91	199.7	0.4	41.4	7.4	Fall
Green_IN	7-3	10/5/2013	11:03	0.03	0.009	0.139	0.75	355.7	0.2	31.4	7.3	Fall
Green_IN	7-4	10/5/2013	11:11	0.03	0.009	0.148	0.46	56.7	0.2	27.1	7.2	Fall
Green_IN	8-1	10/29/2013	5:32	0.03	0.010	0.106	0.34	97.0	1.8	28.5	7.6	Fall
Green_IN	8-2	10/29/2013	5:36	0.03	0.009	0.119	0.41	55.0	1.2	29.0	7.5	Fall
Green_IN	8-3	10/29/2013	5:47	0.03	0.009	0.115	0.43	43.7	0.7	25.8	7.5	Fall
Green_IN	8-4	10/29/2013	5:51	0.04	0.010	0.133	0.32	22.0	1.0	28.0	7.4	Fall
Green_IN	8-5	10/29/2013	6:01	0.03	0.009	0.154	0.34	109.7	1.1	31.9	7.4	Fall
Green_IN	8-6	10/29/2013	6:03	0.04	0.013	0.114	0.34	189.7	1.0	25.1	7.5	Fall
Green_IN	8-7	10/29/2013	6:11	0.03	0.009	0.121	0.32	77.3	1.0	27.0	7.4	Fall
Green_IN	8-8	10/29/2013	6:13	0.03	0.009	0.146	0.19	39.7	1.0	29.3	7.4	Fall
Green_IN	8-9	10/29/2013	6:15	0.03	0.009	0.135	0.39	26.7	0.9	30.4	7.4	Fall
Green_IN	8-10	10/29/2013	6:26	0.03	0.010	0.122	0.28	35.3	1.1	36.6	7.4	Fall

Green_IN	8-11	10/29/2013	6:29	0.04	0.011	0.101	0.39	121.7	0.6	27.1	7.5	Fall
Green_IN	8-12	10/29/2013	6:41	0.06	0.019	0.147	0.41	98.7	0.4	26.5	7.4	Fall
Green_IN	8-13	10/29/2013	6:46	0.03	0.009	0.159	0.37	44.0	0.6	30.6	7.3	Fall
Green_IN	8-14	10/29/2013	6:51	0.03	0.010	0.124	0.50	37.3	0.9	30.0	7.3	Fall
Green_IN	8-15	10/29/2013	7:05	0.06	0.019	0.072	0.45	11.7	1.4	32.3	7.3	Fall
Green_IN	8-16	10/29/2013	7:20	0.04	0.014	0.085	0.52	48.3	1.5	32.1	7.4	Fall
Green_IN	8-17	10/29/2013	7:35	0.07	0.025	0.068	0.37	9.0	1.2	30.9	7.4	Fall
Green_IN	8-18	10/29/2013	7:50	0.06	0.023	0.048	0.37	16.3	1.0	33.9	7.3	Fall
Green_IN	8-19	10/29/2013	8:05	0.05	0.018	0.047	0.43	7.7	2.1	38.3	7.3	Fall
Green_IN	8-20	10/29/2013	8:20	0.04	0.013	0.042	0.37	1.0	2.4	43.4	7.3	Fall
Green_IN	8-21	10/29/2013	12:12	0.03	0.009	0.087	0.23	44.7	2.1	31.6	7.5	Fall
Green_IN	9-1	11/21/2013	8:16	0.03	0.010	0.242	1.26	253.3	0.8	58.8	6.7	Fall
Green_IN	9-2	11/21/2013	8:22	0.03	0.009	0.201	0.89	173.0	0.6	46.0	7.1	Fall
Green_IN	9-3	11/21/2013	8:36	0.03	0.009	0.114	0.65	45.0	0.6	38.9	7.1	Fall
Green_IN	9-4	11/21/2013	8:57	0.04	0.012	0.105	0.56	111.0	0.6	40.7	7.2	Fall
Green_IN	9-5	11/21/2013	9:52	0.04	0.010	0.197	0.69	164.0	0.8	34.5	7.2	Fall
Green_IN	9-6	11/21/2013	9:57	0.03	0.010	0.205	0.60	101.0	0.5	35.2	7.2	Fall
Green_IN	9-7	11/21/2013	10:06	0.03	0.009	0.217	0.56	94.7	0.4	34.1	7.2	Fall
Green_IN	10-1	3/16/2014	2:26	0.04	0.013	2.364	1.22	1,857.0	69.9	316.0	6.7	Winter
Green_IN	10-2	3/16/2014	2:33	0.03	0.009	0.267	0.80	310.3	30.3	181.2	7.3	Winter
Green_IN	10-3	3/16/2014	2:36	0.03	0.009	0.273	1.46	190.0	27.7	161.2	7.7	Winter
Green_IN	10-4	3/16/2014	2:43	0.03	0.009	0.191	1.04	109.7	27.4	161.4	7.9	Winter
Green_IN	10-5	3/16/2014	2:45	0.03	0.010	0.187	1.08	179.0	26.3	159.7	8.0	Winter
Green_IN	10-6	3/16/2014	2:53	0.04	0.011	0.115	1.37	90.3	17.8	123.1	8.1	Winter
Green_IN	10-7	3/16/2014	4:08	0.03	0.010	0.121	0.88	124.0	20.2	139.2	8.0	Winter
Green_IN	10-8	3/16/2014	4:13	0.04	0.011	0.227	1.06	234.0	14.0	106.5	8.2	Winter
Green_IN	10-9	3/16/2014	4:17	0.04	0.011	0.153	0.70	110.7	11.7	94.0	8.3	Winter
Green_IN	10-10	3/16/2014	4:21	0.03	0.009	0.124	0.70	60.0	12.1	94.1	8.1	Winter
Green_IN	11-1	4/3/2014	18:08	0.03	0.009	2.886	12.52	2,170.0	42.5	206.0	7.3	Spring
Green_IN	11-2	4/3/2014	18:16	0.03	0.009	1.749	4.49	1,311.3	20.4	133.3	7.4	Spring
Green_IN	11-3	4/3/2014	18:27	0.03	0.009	1.488	1.39	592.0	11.1	95.9	7.8	Spring
Green_IN	11-4	4/3/2014	18:36	0.03	0.009	1.002	0.73	430.3	7.9	82.2	8.0	Spring
Green_IN	12-1	5/8/2014	15:08	0.03	0.009	1.374	3.80	252.0	8.7	181.4	7.1	Spring
Green_IN	12-2	5/8/2014	15:16	0.03	0.009	1.259	2.58	146.0	6.4	133.5	7.1	Spring
Green_IN	12-3	5/8/2014	15:23	0.03	0.009	0.440	1.88	245.6	4.9	103.1	7.2	Spring

Green_IN	12-4	5/8/2014	15:27	0.03	0.009	0.358	1.64	175.3	5.3	98.7	7.3	Spring
Green_IN	12-5	5/8/2014	15:48	0.03	0.009	0.253	1.01	103.6	3.5	63.5	7.5	Spring
Green_IN	12-6	5/8/2014	16:08	0.03	0.009	0.242	0.99	104.6	2.8	69.9	7.6	Spring
Green_IN	12-7	5/8/2014	16:12	0.03	0.009	0.141	0.54	94.0	2.7	65.3	7.7	Spring
Green_IN	12-8	5/8/2014	16:21	0.03	0.009	0.175	0.80	72.6	2.8	70.5	7.7	Spring
Green_IN	12-9	5/8/2014	16:34	0.03	0.009	0.121	0.80	39.0	2.8	71.1	7.8	Spring
Green_IN	12-10	5/8/2014	16:38	0.03	0.009	0.138	0.66	218.0	2.8	73.5	7.9	Spring
Green_IN	12-11	5/8/2014	2:48	0.03	0.009	0.412	1.01	320.0	5.4	101.9	8.2	Spring
Green_IN	12-12	5/8/2014	2:52	0.03	0.009	0.309	2.18	317.0	4.3	80.0	8.3	Spring
Green_IN	12-13	5/8/2014	2:53	0.03	0.009	0.247	1.71	190.3	4.1	74.9	8.3	Spring
Green_IN	12-14	5/8/2014	2:58	0.03	0.009	0.165	0.96	77.6	3.1	64.6	8.3	Spring
Green_IN	12-15	5/8/2014	3:04	0.03	0.009	0.108	0.87	29.3	5.3	68.3	8.3	Spring
Green_IN	12-16	5/8/2014	7:13	0.03	0.009	0.374	1.62	801.0	1.9	44.0	8.5	Spring
Green_IN	12-17	5/8/2014	7:22	0.07	0.028	0.258	1.52	155.0	2.3	44.1	7.4	Spring
Green_IN	12-18	5/8/2014	7:29	0.03	0.009	0.181	1.22	57.3	9.8	104.6	6.7	Spring
Green_IN	13-1	5/12/2014	17:38	0.03	0.009	0.516	2.96	163.3	17.0	196.4	6.8	Spring
Green_IN	13-10	5/12/2014	20:07	0.04	0.010	0.098	0.66	30.7	5.2	69.6	7.4	Spring
Green_IN	13-11	5/12/2014	22:11	0.03	0.009	0.093	0.88	33.0	5.7	85.3	7.4	Spring
Green_IN	13-12	5/12/2014	22:17	0.03	0.010	0.086	0.71	17.7	6.1	52.3	7.5	Spring
Green_IN	13-2	5/12/2014	17:49	0.03	0.010	0.595	2.34	452.7	11.0	164.6	7.0	Spring
Green_IN	13-3	5/12/2014	18:03	0.06	0.021	0.169	0.73	123.3	5.1	65.5	7.2	Spring
Green_IN	13-4	5/12/2014	18:18	0.04	0.013	0.150	0.75	30.7	5.3	65.2	7.1	Spring
Green_IN	13-5	5/12/2014	18:56	0.03	0.010	0.183	1.30	54.7	7.1	100.0	7.1	Spring
Green_IN	13-6	5/12/2014	19:07	0.05	0.014	0.144	0.88	53.7	5.8	81.5	7.2	Spring
Green_IN	13-7	5/12/2014	19:22	0.04	0.011	0.112	0.84	43.0	6.3	82.1	7.2	Spring
Green_IN	13-8	5/12/2014	19:37	0.03	0.010	0.115	0.86	49.7	6.7	87.1	7.3	Spring
Green_IN	13-9	5/12/2014	19:52	0.04	0.012	0.098	0.57	65.0	3.5	64.3	7.4	Spring
Green_IN	14-1	6/5/2014	22:44	0.04	0.013	0.778	1.54	1,027.7	3.8	81.2	7.3	Spring
Green_IN	14-2	6/5/2014	22:51	0.04	0.012	0.178	1.16	324.7	7.1	10.0	6.9	Spring
Green_IN	14-3	6/5/2014	23:16	0.03	0.010	0.131	0.78	97.7	4.6	11.5	7.0	Spring
Green_IN	14-4	6/5/2014	23:26	0.04	0.013	0.110	0.59	73.7	2.5	25.2	6.7	Spring

Table 18. Greenwood-OUT Pre-Implementation Water Quality Data

Site	Sample ID	Date	Time	Level (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC (uS/cm)	pH	Season
Green_OUT	1-1	5/31/2012	1:52	0.10	0.008	0.428	1.82	647.0	1.3	168.0	7.2	Spring
Green_OUT	1-2	5/31/2012	2:22	0.27	0.016	0.199	1.34	46.3	5.3	75.0	7.2	Spring
Green_OUT	1-3	5/31/2012	2:52	0.38	0.019	0.154	1.04	62.8	3.9	49.0	7.1	Spring
Green_OUT	1-4	5/31/2012	3:22	0.46	0.021	0.171	0.71	59.3	1.5	51.0	7.3	Spring
Green_OUT	1-5	5/31/2012	3:52	0.47	0.021	0.132	0.75	17.7	1.6	53.0	7.2	Spring
Green_OUT	1-6	5/31/2012	4:22	0.47	0.021	0.133	0.71	11.2	1.6	50.0	6.9	Spring
Green_OUT	1-7	5/31/2012	4:52	0.45	0.021	0.155	0.71	7.0	1.6	56.0	6.9	Spring
Green_OUT	1-8	5/31/2012	5:22	0.43	0.020	0.202	0.71	11.0	1.8	65.0	6.6	Spring
Green_OUT	1-9	5/31/2012	5:52	0.40	0.019	0.246	0.96	8.0	2.3	72.0	6.9	Spring
Green_OUT	1-10	5/31/2012	6:22	0.37	0.019	0.268	0.81	8.0	2.6	75.0	7.0	Spring
Green_OUT	1-11	5/31/2012	6:52	0.34	0.018	0.366	0.92	5.7	3.1	82.0	7.0	Spring
Green_OUT	2-1	6/11/2012	8:51	0.31	0.017	0.339	1.71	234.0	2.5	74.0	7.3	Spring
Green_OUT	2-2	6/11/2012	9:21	0.33	0.017	0.172	1.15	30.0	1.5	66.0	7.3	Spring
Green_OUT	2-3	6/11/2012	9:51	0.30	0.016	0.241	1.17	17.3	2.4	77.0	7.1	Spring
Green_OUT	2-4	6/11/2012	10:21	0.24	0.015	0.236	1.22	21.3	1.9	76.0	7.3	Spring
Green_OUT	2-5	6/11/2012	10:51	0.11	0.008	0.323	1.48	15.3	3.0	107.0	7.0	Spring
Green_OUT	4-1	4/18/2013	2:44	0.15	0.011	1.517	5.65	1,799.0	11.0	188.0	6.9	Spring
Green_OUT	4-2	4/18/2013	3:14	0.39	0.019	0.254	1.33	79.6	5.6	58.7	6.8	Spring
Green_OUT	4-3	4/18/2013	3:44	0.40	0.019	0.141	0.97	20.0	4.3	40.2	6.4	Spring
Green_OUT	4-4	4/18/2013	4:14	0.38	0.019	0.137	1.03	12.7	4.6	44.6	6.6	Spring
Green_OUT	4-5	4/18/2013	4:44	0.37	0.009	0.137	1.03	8.3	3.2	50.7	6.6	Spring
Green_OUT	4-6	4/18/2013	5:15	0.37	0.009	0.096	0.91	3.7	2.9	51.5	6.8	Spring
Green_OUT	4-7	4/18/2013	5:44	0.37	0.009	0.149	0.91	8.0	3.0	52.4	6.7	Spring
Green_OUT	4-8	4/18/2013	6:14	0.36	0.009	0.176	1.95	2.7	3.0	62.6	6.8	Spring
Green_OUT	4-9	4/18/2013	6:44	0.36	0.009	0.177	0.99	2.7	2.7	57.5	6.8	Spring
Green_OUT	4-10	4/18/2013	7:14	0.37	0.009	0.156	0.83	6.0	2.5	53.9	6.8	Spring
Green_OUT	4-11	4/18/2013	7:44	0.36	0.009	0.190	0.91	8.7	2.6	62.7	6.9	Spring
Green_OUT	4-12	4/18/2013	8:14	0.32	0.009	0.256	1.07	1.0	2.5	74.9	6.9	Spring
Green_OUT	4-13	4/18/2013	8:44	0.25	0.008	0.291	1.29	2.0	3.2	99.6	7.0	Spring
Green_OUT	4-14	4/18/2013	9:14	0.14	0.005	0.243	1.33	5.3	3.9	120.3	7.2	Spring
Green_OUT	5-1	7/26/2013	10:29	0.36	0.005	0.091	0.75	8.3	2.6	46.4	6.9	Summer
Green_OUT	5-2	7/26/2013	10:59	0.35	0.004	0.093	0.64	4.3	2.8	46.6	6.9	Summer
Green_OUT	5-3	7/26/2013	11:29	0.34	0.004	0.119	0.87	6.0	2.9	49.4	6.8	Summer

Green_OUT	5-4	7/26/2013	11:59	0.34	0.004	0.162	0.71	3.3	3.2	47.8	7.0	Summer
Green_OUT	5-5	7/26/2013	12:29	0.33	0.004	0.207	0.80	5.7	2.9	47.1	6.9	Summer
Green_OUT	5-6	7/26/2013	12:42	0.34	0.004	0.231	0.78	2.3	3.0	49.6	6.4	Summer
Green_OUT	5-7	7/26/2013	13:04	0.34	0.004	0.235	0.66	4.7	3.1	50.6	7.0	Summer
Green_OUT	5-8	7/26/2013	13:34	0.37	0.005	0.207	0.69	4.7	4.4	67.2	7.1	Summer
Green_OUT	5-9	7/26/2013	14:04	0.41	0.005	0.113	1.70	6.7	3.0	50.1	7.2	Summer
Green_OUT	5-10	7/26/2013	14:34	0.44	0.005	0.097	1.74	5.3	2.7	41.2	7.1	Summer
Green_OUT	5-11	7/26/2013	15:04	0.46	0.005	0.114	0.54	7.5	2.6	39.7	7.2	Summer
Green_OUT	5-12	7/26/2013	15:34	0.46	0.005	0.139	0.35	3.3	2.0	30.9	7.0	Summer
Green_OUT	5-13	7/26/2013	16:04	0.46	0.005	0.139	0.31	6.0	2.4	36.1	7.0	Summer
Green_OUT	5-14	7/26/2013	16:34	0.46	0.005	0.180	0.35	3.0	2.4	37.8	6.9	Summer
Green_OUT	5-15	7/26/2013	17:04	0.45	0.005	0.270	0.47	6.3	2.2	36.5	7.0	Summer
Green_OUT	5-16	7/26/2013	17:34	0.45	0.005	0.310	0.66	4.0	2.6	38.9	7.0	Summer
Green_OUT	5-17	7/26/2013	18:04	0.44	0.005	0.315	0.73	1.0	2.7	39.6	6.9	Summer
Green_OUT	5-18	7/26/2013	18:34	0.43	0.005	0.346	1.05	2.3	2.9	44.1	6.9	Summer
Green_OUT	6-1	8/3/2013	4:25	0.09	0.007	1.325	1.53	964.3	5.7	139.5	7.3	Summer
Green_OUT	6-2	8/3/2013	4:55	0.45	0.021	0.191	0.50	58.3	1.8	34.6	7.0	Summer
Green_OUT	6-3	8/3/2013	5:25	0.49	0.022	0.151	0.54	10.7	1.4	30.4	6.8	Summer
Green_OUT	6-4	8/3/2013	5:55	0.49	0.022	0.152	0.46	8.3	1.4	29.4	6.9	Summer
Green_OUT	6-5	8/3/2013	6:25	0.48	0.022	0.159	0.37	5.3	1.6	33.2	6.8	Summer
Green_OUT	6-6	8/3/2013	6:55	0.46	0.021	0.254	0.74	7.0	1.9	37.3	6.8	Summer
Green_OUT	6-7	8/3/2013	7:25	0.44	0.021	0.326	0.75	5.7	2.3	42.1	6.8	Summer
Green_OUT	6-8	8/3/2013	7:55	0.42	0.020	0.372	0.75	4.7	2.6	48.3	6.8	Summer
Green_OUT	6-9	8/3/2013	8:25	0.39	0.019	0.410	0.77	5.0	2.9	54.9	6.8	Summer
Green_OUT	6-10	8/3/2013	8:55	0.36	0.018	0.890	0.93	0.7	3.1	60.0	6.9	Summer
Green_OUT	3-1	9/7/2013	16:06	0.09	0.007	0.868	2.18	1,565.5	2.8	73.0	6.7	Summer
Green_OUT	3-2	9/7/2013	16:36	0.39	0.019	0.348	0.93	69.3	0.6	49.0	6.8	Summer
Green_OUT	3-3	9/7/2013	17:06	0.37	0.018	0.463	1.43	29.0	2.2	59.0	6.8	Summer
Green_OUT	3-4	9/7/2013	17:36	0.32	0.017	0.755	1.93	13.7	5.2	77.0	6.8	Summer
Green_OUT	3-5	9/7/2013	18:06	0.29	0.016	0.328	1.06	78.3	0.2	55.0	6.7	Summer
Green_OUT	3-6	9/7/2013	18:36	0.31	0.017	0.703	1.65	13.0	2.8	74.0	6.8	Summer
Green_OUT	3-7	9/7/2013	19:06	0.18	0.012	0.048	2.14	77.0	3.3	100.0	6.8	Summer
Green_OUT	7-1	10/5/2013	7:12	0.08	0.006	0.410	2.02	383.7	0.4	86.1	7.3	Fall
Green_OUT	7-2	10/5/2013	7:42	0.13	0.010	0.138	2.29	46.7	0.5	58.4	7.4	Fall
Green_OUT	7-3	10/5/2013	8:12	0.17	0.012	0.079	0.82	10.3	0.4	38.2	7.3	Fall

Green_OUT	7-4	10/5/2013	8:42	0.23	0.014	0.111	1.76	8.3	0.2	43.2	7.4	Fall
Green_OUT	7-5	10/5/2013	9:12	0.24	0.014	0.132	0.65	4.3	0.2	45.5	7.4	Fall
Green_OUT	7-6	10/5/2013	9:42	0.23	0.014	0.118	0.44	11.7	0.2	44.3	7.3	Fall
Green_OUT	7-7	10/5/2013	10:12	0.30	0.016	0.095	0.34	5.0	0.2	40.0	7.4	Fall
Green_OUT	7-8	10/5/2013	10:42	0.20	0.013	0.204	0.58	2.7	0.7	59.0	7.2	Fall
Green_OUT	7-9	10/5/2013	12:13	0.37	0.019	0.111	0.38	49.7	0.2	26.3	7.6	Fall
Green_OUT	7-10	10/5/2013	12:43	0.36	0.018	0.090	0.38	18.3	0.2	25.9	7.5	Fall
Green_OUT	7-11	10/5/2013	13:13	0.34	0.018	0.136	2.95	6.7	0.2	36.8	7.4	Fall
Green_OUT	7-12	10/5/2013	13:43	0.31	0.017	0.200	0.74	4.3	0.2	52.8	7.3	Fall
Green_OUT	7-13	10/5/2013	14:13	0.27	0.016	0.313	0.86	8.0	0.4	64.2	7.4	Fall
Green_OUT	7-14	10/5/2013	14:43	0.29	0.016	0.189	0.67	4.3	0.3	51.7	7.4	Fall
Green_OUT	7-15	10/5/2013	15:13	0.28	0.016	0.242	0.72	2.0	0.4	64.2	7.4	Fall
Green_OUT	7-16	10/5/2013	15:43	0.12	0.009	0.249	0.77	0.7	1.0	80.1	7.5	Fall
Green_OUT	8-1	10/29/2013	4:22	0.08	0.006	0.143	0.88	20.3	1.7	58.1	7.5	Fall
Green_OUT	8-2	10/29/2013	4:52	0.08	0.006	0.150	0.74	7.3	1.6	64.9	7.5	Fall
Green_OUT	8-3	10/29/2013	5:46	0.10	0.008	0.102	0.63	26.3	2.1	69.9	7.5	Fall
Green_OUT	8-4	10/29/2013	6:16	0.31	0.017	0.073	0.39	73.3	1.0	32.8	7.9	Fall
Green_OUT	8-5	10/29/2013	6:46	0.41	0.020	0.091	0.41	19.3	0.8	28.2	7.8	Fall
Green_OUT	8-6	10/29/2013	7:16	0.45	0.021	0.095	0.37	25.0	0.4	29.8	7.6	Fall
Green_OUT	8-7	10/29/2013	7:46	0.56	0.023	0.114	0.41	51.0	0.5	29.2	7.5	Fall
Green_OUT	8-8	10/29/2013	8:16	0.57	0.024	0.133	0.41	18.3	0.7	30.6	7.4	Fall
Green_OUT	8-9	10/29/2013	8:46	0.57	0.024	0.216	0.10	9.3	0.5	31.3	7.3	Fall
Green_OUT	8-10	10/29/2013	9:16	0.54	0.023	0.222	0.50	10.0	1.0	34.6	7.2	Fall
Green_OUT	8-11	10/29/2013	9:46	0.51	0.022	0.196	0.48	10.3	0.8	34.8	7.1	Fall
Green_OUT	8-12	10/29/2013	10:16	0.49	0.022	0.177	0.48	8.3	1.1	35.4	7.1	Fall
Green_OUT	8-13	10/29/2013	10:46	0.46	0.021	0.202	0.52	7.7	1.0	37.3	7.1	Fall
Green_OUT	8-14	10/29/2013	11:16	0.45	0.021	0.157	0.59	6.3	0.9	38.1	7.1	Fall
Green_OUT	8-15	10/29/2013	11:46	0.43	0.020	0.141	0.57	9.0	1.6	48.5	7.2	Fall
Green_OUT	8-16	10/29/2013	12:16	0.41	0.020	0.157	0.43	6.3	1.5	49.6	7.2	Fall
Green_OUT	8-17	10/29/2013	12:46	0.39	0.019	0.192	0.65	4.3	2.0	61.0	7.2	Fall
Green_OUT	8-18	10/29/2013	13:16	0.40	0.019	0.085	0.39	33.7	1.4	42.4	7.4	Fall
Green_OUT	8-19	10/29/2013	13:46	0.38	0.019	0.161	0.52	8.7	1.7	59.9	7.4	Fall
Green_OUT	8-20	10/29/2013	14:16	0.36	0.018	0.150	0.41	3.0	2.5	68.3	7.3	Fall
Green_OUT	8-21	10/29/2013	14:46	0.34	0.018	0.231	0.52	8.0	2.0	70.6	7.3	Fall
Green_OUT	8-22	10/29/2013	15:16	0.30	0.016	0.354	0.70	4.7	2.8	96.5	7.3	Fall

Green_OUT	9-1	11/21/2013	9:44	0.17	0.012	0.136	0.80	14.7	0.7	47.3	7.1	Fall
Green_OUT	9-2	11/21/2013	10:14	0.30	0.016	0.101	0.43	20.3	0.4	36.1	7.1	Fall
Green_OUT	9-3	11/21/2013	10:44	0.31	0.017	0.102	0.43	14.7	0.4	37.7	7.2	Fall
Green_OUT	9-4	11/21/2013	11:14	0.39	0.019	0.146	0.37	20.7	0.6	30.7	7.2	Fall
Green_OUT	9-5	11/21/2013	11:44	0.38	0.019	0.144	0.45	7.3	0.5	32.5	7.1	Fall
Green_OUT	9-6	11/21/2013	12:14	0.36	0.018	0.185	0.69	6.7	1.0	47.2	7.1	Fall
Green_OUT	9-7	11/21/2013	12:44	0.33	0.017	0.277	0.86	7.3	1.6	59.9	7.1	Fall
Green_OUT	9-8	11/21/2013	13:14	0.25	0.015	0.393	1.06	11.3	2.5	85.4	7.0	Fall
Green_OUT	10-1	3/16/2014	3:27	0.11	0.009	2.830	1.57	3,128.0	65.6	348.0	8.0	Winter
Green_OUT	10-2	3/16/2014	3:57	0.27	0.016	0.214	1.25	136.0	36.5	187.9	8.2	Winter
Green_OUT	10-3	3/16/2014	4:27	0.26	0.015	0.179	1.43	31.3	22.1	148.7	8.1	Winter
Green_OUT	10-4	3/16/2014	4:57	0.23	0.014	0.128	1.45	16.7	29.9	189.0	7.9	Winter
Green_OUT	10-5	3/16/2014	5:27	0.29	0.007	0.120	1.02	73.0	16.5	115.5	8.1	Winter
Green_OUT	10-6	3/16/2014	5:57	0.31	0.007	0.078	0.96	14.0	12.4	97.6	8.1	Winter
Green_OUT	10-7	3/16/2014	6:27	0.32	0.007	0.070	1.02	10.9	14.6	111.0	7.9	Winter
Green_OUT	10-8	3/16/2014	6:57	0.32	0.007	0.066	1.35	15.0	15.0	123.2	7.8	Winter
Green_OUT	10-9	3/16/2014	7:27	0.32	0.007	0.077	0.90	12.0	14.3	122.6	7.8	Winter
Green_OUT	10-10	3/16/2014	7:57	0.32	0.007	0.077	0.88	6.7	13.7	120.6	7.7	Winter
Green_OUT	10-11	3/16/2014	8:27	0.32	0.007	0.084	0.52	8.3	14.2	126.9	7.7	Winter
Green_OUT	10-12	3/16/2014	8:57	0.31	0.007	0.091	0.86	7.0	10.4	117.4	7.7	Winter
Green_OUT	10-13	3/16/2014	9:27	0.31	0.007	0.132	0.90	6.0	10.8	126.7	7.6	Winter
Green_OUT	10-14	3/16/2014	9:57	0.30	0.007	0.101	0.88	5.3	11.8	123.8	7.6	Winter
Green_OUT	10-15	3/16/2014	10:27	0.28	0.006	0.120	0.50	4.7	10.0	128.9	7.6	Winter
Green_OUT	11-1	4/3/2014	18:14	0.15	0.011	2.485	9.61	2,859.3	32.3	209.0	7.8	Spring
Green_OUT	11-2	4/3/2014	18:44	0.29	0.016	0.662	3.82	297.3	11.4	94.2	7.9	Spring
Green_OUT	11-3	4/3/2014	19:14	0.31	0.017	0.058	1.55	106.7	9.8	89.2	8.0	Spring
Green_OUT	11-4	4/3/2014	19:44	0.28	0.016	0.172	0.59	23.7	11.9	130.2	7.7	Spring
Green_OUT	11-5	4/3/2014	20:14	0.12	0.009	0.206	1.37	29.3	10.3	132.3	7.6	Spring
Green_OUT	12-1	5/8/2014	15:09	0.05	0.003	1.391	1.56	521.0	25.6	410.0	6.7	Spring
Green_OUT	12-2	5/8/2014	15:39	0.14	0.010	0.452	1.45	122.5	12.3	126.2	7.1	Spring
Green_OUT	12-3	5/8/2014	16:09	0.17	0.012	0.270	0.31	34.7	7.7	86.5	7.3	Spring
Green_OUT	12-4	5/8/2014	16:39	0.15	0.011	0.198	0.96	26.0	6.0	78.0	7.5	Spring
Green_OUT	12-5	5/8/2014	17:09	0.10	0.008	0.188	1.34	12.3	5.8	95.6	7.5	Spring
Green_OUT	12-6	5/8/2014	17:39	0.07	0.006	0.179	2.04	4.7	4.8	102.2	7.6	Spring
Green_OUT	12-7	5/9/2014	2:56	0.06	0.004	1.974	8.09	2,265.3	6.1	158.1	7.7	Spring

Green_OUT	12-8	5/9/2014	3:26	0.07	0.005	0.186	1.20	91.0	6.3	81.2	8.0	Spring
Green_OUT	12-9	5/9/2014	7:16	0.08	0.006	1.892	3.77	2,896.7	1.1	67.8	8.1	Spring
Green_OUT	12-10	5/9/2014	7:46	0.36	0.018	0.319	1.48	356.0	1.9	43.4	8.1	Spring
Green_OUT	12-11	5/9/2014	8:16	0.32	0.017	0.169	1.06	40.7	1.6	51.2	7.3	Spring
Green_OUT	12-12	5/9/2014	8:46	0.22	0.014	0.119	0.93	21.3	1.8	66.2	7.0	Spring
Green_OUT	12-13	5/9/2014	9:16	0.07	0.005	0.104	0.97	16.0	1.6	75.2	6.7	Spring
Green_OUT	13-2	5/12/2014	18:20	0.33	0.017	0.169	0.84	34.0	5.6	55.4	6.4	Spring
Green_OUT	13-3	5/12/2014	18:50	0.17	0.012	0.267	1.28	34.0	7.5	101.5	6.7	Spring
Green_OUT	13-4	5/12/2014	19:20	0.17	0.012	0.190	1.08	16.0	6.7	97.4	6.9	Spring
Green_OUT	13-5	5/12/2014	19:50	0.19	0.013	0.173	0.86	20.3	5.8	95.2	7.0	Spring
Green_OUT	13-6	5/12/2014	20:20	0.14	0.010	0.170	1.01	6.0	5.4	105.0	7.1	Spring
Green_OUT	13-7	5/12/2014	20:50	0.12	0.009	0.176	1.01	4.3	6.2	118.7	7.1	Spring
Green_OUT	13-8	5/12/2014	21:20	0.10	0.008	0.181	1.12	5.3	6.2	130.4	7.2	Spring
Green_OUT	13-9	5/12/2014	21:50	0.10	0.007	0.161	1.06	6.7	6.8	132.8	7.3	Spring
Green_OUT	13-10	5/12/2014	22:20	0.14	0.010	0.115	0.88	3.7	5.6	111.9	7.4	Spring
Green_OUT	13-11	5/12/2014	22:50	0.14	0.010	0.117	0.86	3.0	5.3	116.3	7.4	Spring
Green_OUT	14-1	6/4/2014	22:48	0.16	0.011	0.318	2.96	879.3	2.6	130.6	6.6	Spring
Green_OUT	14-2	6/4/2014	23:18	0.19	0.013	0.194	1.87	67.3	4.3	40.3	6.3	Spring
Green_OUT	14-3	6/4/2014	23:48	0.31	0.017	0.115	0.76	22.7	2.6	47.4	6.3	Spring
Green_OUT	14-4	6/5/2014	0:18	0.24	0.015	0.229	1.34	11.7	4.3	141.7	6.5	Spring
Green_OUT	14-5	6/5/2014	0:48	0.10	0.008	0.305	1.50	12.7	4.5	52.4	6.7	Spring
Green_OUT	14-6	6/5/2014	1:18	0.08	0.006	0.326	1.68	6.0	4.1	86.3	6.9	Spring

Table 19. Greenwood-IN Post-Implementation Water Quality Data

Site	Sample ID	Date	Time	Level (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC uS/cm)	pH	Season
Green_IN	15-1	10/9/2014	15:18	0.05	0.014	0.148	0.85	471.0	5.7	76.5	7.2	Fall
Green_IN	15-2	10/9/2014	15:36	0.04	0.013	0.093	0.53	39.0	3.6	48.5	7.4	Fall
Green_IN	16-1	11/23/2014	19:13	0.03	0.009	0.188	1.03	428.0	4.8	59.4	7.5	Fall
Green_IN	16-2	11/23/2014	19:21	0.04	0.011	0.148	0.90	210.0	3.4	48.7	6.5	Fall
Green_IN	16-3	11/23/2014	19:27	0.04	0.011	0.166	0.86	168.0	2.5	42.2	7.2	Fall
Green_IN	16-4	11/23/2014	21:03	0.03	0.009	0.082	1.07	88.7	2.7	54.9	7.0	Fall
Green_IN	16-5	11/23/2014	21:37	0.03	0.009	0.156	0.39	19.5	1.6	47.1	7.4	Fall
Green_IN	16-6	11/23/2014	21:38	0.03	0.009	0.155	0.37	9.7	1.9	46.2	7.4	Fall
Green_IN	17-1	12/14/2014	22:37	0.04	0.013	0.294	2.35	494.0	20.5	120.6	8.1	Fall
Green_IN	17-2	12/14/2014	22:48	0.03	0.009	0.136	1.20	165.3	7.0	58.0	8.4	Fall
Green_IN	17-3	12/14/2014	22:52	0.03	0.009	0.148	0.87	81.3	7.6	60.8	8.3	Fall
Green_IN	17-4	12/14/2014	22:54	0.03	0.009	0.151	0.96	56.7	6.5	54.6	8.2	Fall
Green_IN	17-5	12/14/2014	22:56	0.03	0.009	0.136	0.37	38.7	5.1	50.0	8.1	Fall
Green_IN	17-6	12/14/2014	23:26	0.03	0.009	0.117	0.61	10.7	4.8	50.5	7.9	Fall
Green_IN	17-7	12/14/2014	23:57	0.03	0.010	0.090	0.39	25.3	7.0	65.9	7.8	Fall
Green_IN	17-8	12/15/2014	0:06	0.04	0.011	0.082	0.33	23.3	4.5	52.8	7.9	Fall
Green_IN	17-9	12/15/2014	0:48	0.03	0.009	0.117	0.28	20.0	3.7	49.9	7.8	Fall
Green_IN	17-10	12/15/2014	0:51	0.04	0.011	0.114	0.44	14.0	4.3	51.1	7.7	Fall
Green_IN	18-1	3/25/2015	17:26	0.05	0.016	1.838	3.30	2,218.0	23.5	173.2	7.5	Spring
Green_IN	18-2	3/25/2015	17:41	0.05	0.015	0.433	2.23	333.0	10.3	91.5	7.9	Spring
Green_IN	18-3	3/25/2015	17:56	0.05	0.015	0.200	1.56	66.7	21.2	139.0	7.9	Spring
Green_IN	18-4	3/25/2015	18:11	0.05	0.015	0.205	1.46	156.7	16.1	117.6	7.8	Spring
Green_IN	18-5	3/25/2015	18:26	0.04	0.014	0.114	1.39	45.3	16.3	126.0	7.9	Spring
Green_IN	18-6	3/25/2015	18:41	0.04	0.014	0.124	1.52	26.5	21.1	137.4	7.7	Spring
Green_IN	18-7	3/25/2015	18:56	0.04	0.014	0.128	1.70	36.0	21.5	154.5	7.8	Spring
Green_IN	18-8	3/25/2015	19:11	0.04	0.014	0.100	1.58	29.0	22.7	163.2	7.7	Spring
Green_IN	18-9	3/25/2015	19:26	0.06	0.021	0.616	1.94	733.0	10.9	100.3	7.9	Spring
Green_IN	18-10	3/25/2015	19:41	0.05	0.018	0.048	3.39	141.3	6.7	71.9	8.0	Spring
Green_IN	18-11	3/25/2015	19:56	0.05	0.018	0.326	0.81	108.5	9.0	65.4	8.1	Spring
Green_IN	18-12	3/25/2015	20:11	0.05	0.018	0.129	0.79	94.5	9.5	72.3	8.2	Spring
Green_IN	18-13	3/25/2015	20:26	0.05	0.014	0.108	0.85	60.5	10.2	76.9	8.2	Spring
Green_IN	18-14	3/25/2015	20:41	0.05	0.016	0.110	0.90	141.0	10.7	81.5	8.2	Spring
Green_IN	18-15	3/25/2015	20:56	0.05	0.018	0.112	0.68	109.5	9.4	75.0	8.2	Spring

Green_IN	18-16	3/25/2015	21:11	0.06	0.019	0.156	0.72	177.3	6.9	62.9	8.3	Spring
Green_IN	18-17	3/25/2015	21:26	0.05	0.018	0.108	0.58	100.5	8.4	67.9	8.3	Spring
Green_IN	18-18	3/25/2015	21:41	0.05	0.017	0.095	0.64	64.5	9.7	73.8	8.2	Spring
Green_IN	18-19	3/25/2015	21:56	0.05	0.017	0.097	0.68	93.5	8.7	73.2	8.2	Spring
Green_IN	18-20	3/25/2015	22:11	0.06	0.019	0.124	0.72	252.7	6.9	62.3	8.3	Spring
Green_IN	18-21	3/25/2015	22:26	0.06	0.019	0.159	1.06	165.3	6.6	62.0	8.3	Spring
Green_IN	18-22	3/25/2015	22:41	0.05	0.015	0.095	0.62	215.5	12.2	82.8	8.1	Spring
Green_IN	18-23	3/25/2015	22:56	0.05	0.015	0.094	1.00	247.3	17.4	110.4	7.9	Spring
Green_IN	18-24	3/25/2015	23:11	0.04	0.014	0.079	0.66	30.0	15.5	102.5	7.9	Spring
Green_IN	19-1	4/1/2015	13:56	0.05	0.017	1.128	5.10	2,626.0	15.7	238.0	7.1	Spring
Green_IN	19-2	4/1/2015	14:26	0.05	0.016	0.110	1.29	46.0	7.3	78.9	7.3	Spring
Green_IN	19-3	4/1/2015	14:41	0.04	0.012	0.087	1.33	14.0	8.5	82.1	7.3	Spring
Green_IN	19-4	4/1/2015	14:56	0.04	0.011	0.071	0.86	11.0	10.4	81.1	7.3	Spring
Green_IN	19-5	4/1/2015	15:11	0.04	0.011	0.079	1.31	4.0	11.5	91.8	7.2	Spring
Green_IN	19-6	4/1/2015	15:26	0.04	0.011	0.078	1.40	3.5	13.3	100.1	7.1	Spring
Green_IN	19-7	4/1/2015	15:41	0.04	0.011	0.110	1.48	22.5	16.5	140.2	7.1	Spring
Green_IN	19-8	4/1/2015	15:56	0.04	0.011	0.184	1.93	30.7	38.1	239.0	7.0	Spring
Green_IN	19-9	4/1/2015	16:11	0.04	0.012	0.175	1.66	118.0	19.5	180.7	7.1	Spring
Green_IN	19-10	4/1/2015	16:26	0.04	0.011	0.107	1.44	16.0	27.4	175.3	7.2	Spring
Green_IN	19-11	4/1/2015	16:41	0.04	0.011	0.087	1.64	10.0	29.2	176.7	7.2	Spring
Green_IN	19-12	4/1/2015	16:56	0.04	0.011	0.213	1.56	10.0	28.4	172.3	7.2	Spring
Green_IN	20-1	4/15/2015	5:53	0.07	0.026	0.612	2.93	243.0	24.6	198.5	6.9	Spring
Green_IN	20-2	4/15/2015	6:08	0.07	0.026	0.427	2.48	62.0	19.0	152.8	7.1	Spring
Green_IN	20-3	4/15/2015	6:23	0.07	0.024	0.317	1.86	22.0	18.9	142.5	7.1	Spring
Green_IN	20-4	4/15/2015	6:38	0.06	0.023	0.322	1.88	16.0	27.6	152.1	7.2	Spring
Green_IN	20-5	4/15/2015	6:53	0.07	0.024	0.299	1.88	26.0	21.2	143.7	7.2	Spring
Green_IN	20-6	4/15/2015	7:08	0.06	0.023	0.252	1.86	15.3	20.0	139.8	7.2	Spring
Green_IN	20-7	4/15/2015	7:23	0.06	0.023	0.262	1.78	18.0	NS	140.9	7.2	Spring
Green_IN	20-8	4/15/2015	8:23	0.07	0.030	0.672	2.35	682.0	16.0	115.6	7.4	Spring
Green_IN	20-9	4/15/2015	8:38	0.08	0.035	0.217	1.55	116.0	9.6	79.3	7.5	Spring
Green_IN	20-10	4/15/2015	8:53	0.07	0.027	0.186	1.39	78.0	10.4	82.9	7.5	Spring
Green_IN	20-11	4/15/2015	9:08	0.07	0.027	0.125	0.78	78.7	7.8	73.9	7.6	Spring
Green_IN	20-12	4/15/2015	9:23	0.06	0.022	0.126	1.04	28.0	9.3	79.6	7.6	Spring
Green_IN	20-13	4/15/2015	9:38	0.05	0.018	0.122	1.45	42.7	11.5	89.7	7.6	Spring
Green_IN	20-14	4/15/2015	9:53	0.05	0.017	0.106	1.47	41.0	11.6	88.9	7.5	Spring

Green_IN	20-15	4/15/2015	10:08	0.05	0.017	0.094	1.70	10.0	11.0	86.8	7.5	Spring
Green_IN	20-16	4/15/2015	10:23	0.05	0.017	0.098	1.70	32.0	11.0	86.4	7.5	Spring
Green_IN	20-17	4/15/2015	10:38	0.05	0.016	0.096	1.76	15.5	9.1	87.2	7.5	Spring
Green_IN	20-18	4/15/2015	10:53	0.06	0.021	0.112	1.96	13.0	8.6	92.3	7.5	Spring
Green_IN	20-19	4/15/2015	11:08	0.06	0.021	0.106	1.90	23.5	8.5	94.5	7.4	Spring
Green_IN	20-20	4/15/2015	11:23	0.06	0.021	0.152	1.53	30.7	6.9	99.2	7.5	Spring
Green_IN	20-21	4/15/2015	11:38	0.07	0.024	0.145	1.09	98.7	7.2	94.4	7.6	Spring
Green_IN	21-1	4/21/2015	19:06	0.05	0.015	0.819	2.48	1,006.0	7.3	102.8	6.1	Spring
Green_IN	21-2	4/21/2015	2:11	0.03	0.010	0.346	2.47	245.3	4.4	86.5	6.5	Spring
Green_IN	21-3	4/21/2015	2:18	0.03	0.010	0.156	1.61	57.3	3.5	60.3	6.7	Spring

Table 20. Greenwood-OUT Post-Implementation Water Quality Data

Site	Sample ID	Date	Time	Level (m)	Q (cms)	TP (mg/L)	TN (mg/L)	TSS (mg/L)	Chl (mg/L)	SC uS/cm)	pH	Season
Green_OUT	15-1	10/9/2014	15:26	0.18	0.012	0.171	1.66	325	11.0	156.7	7.1	Fall
Green_OUT	15-2	10/9/2014	15:56	0.34	0.018	0.061	3.29	50	4.8	53.0	7.4	Fall
Green_OUT	15-3	10/9/2014	16:26	0.33	0.017	0.076	0.59	17.0	4.3	49.3	7.4	Fall
Green_OUT	15-4	10/9/2014	16:56	0.31	0.017	0.086	0.61	16.0	4.9	52.7	7.3	Fall
Green_OUT	15-5	10/9/2014	17:26	0.30	0.016	0.084	0.61	7.0	4.8	51.9	7.2	Fall
Green_OUT	15-6	10/9/2014	17:56	0.24	0.015	0.093	0.61	8.0	5.3	65.7	7.2	Fall
Green_OUT	15-7	10/9/2014	18:26	0.13	0.010	0.101	0.33	6.0	4.1	70.4	7.2	Fall
Green_OUT	15-8	10/9/2014	18:56	0.06	0.005	0.107	1.16	6.0	4.2	81.8	7.2	Fall
Green_OUT	15-10	10/9/2014	22:10	0.20	0.013	0.062	1.02	24.0	4.3	105.7	7.1	Fall
Green_OUT	15-11	10/9/2014	22:40	0.11	0.009	0.063	0.65	19.0	3.7	80.8	7.2	Fall
Green_OUT	15-12	10/9/2014	23:10	0.06	0.004	0.086	0.83	8.0	3.8	85.7	7.2	Fall
Green_OUT	16-1	11/23/2014	19:23	0.08	0.006	0.186	2.25	142	15.4	193.5	7.4	Fall
Green_OUT	16-2	11/23/2014	19:53	0.25	0.015	0.104	1.69	44.0	4.5	62.5	7.7	Fall
Green_OUT	16-3	11/23/2014	20:23	0.15	0.011	0.106	0.78	17.5	3.7	58.0	7.1	Fall
Green_OUT	16-4	11/23/2014	20:53	0.10	0.008	0.108	0.95	16.0	3.3	60.8	6.7	Fall
Green_OUT	16-5	11/23/2014	21:23	0.19	0.013	0.083	0.6	13.0	3.4	68.8	6.3	Fall
Green_OUT	16-6	11/23/2014	21:53	0.27	0.016	0.084	0.12	11.5	3.7	73.0	7.3	Fall
Green_OUT	16-7	11/23/2014	22:23	0.20	0.013	0.092	0.68	9.5	3.3	67.8	6.9	Fall
Green_OUT	16-8	11/23/2014	22:53	0.11	0.009	0.093	2.87	9.0	2.8	61.2	7.1	Fall
Green_OUT	17-1	12/14/2014	22:58	0.11	0.008	0.320	2.21	358.7	27.0	229.0	7.4	Fall
Green_OUT	17-2	12/14/2014	23:28	0.29	0.016	0.155	0.70	22.5	7.8	80.9	7.7	Fall
Green_OUT	17-3	12/14/2014	23:58	0.26	0.015	0.123	1.01	15.3	5.9	65.2	7.6	Fall
Green_OUT	17-4	12/15/2014	0:28	0.29	0.016	0.100	0.48	16.7	4.6	56.3	7.5	Fall
Green_OUT	17-5	12/15/2014	0:58	0.32	0.017	0.117	0.59	20.7	5.3	62.6	7.5	Fall
Green_OUT	17-6	12/15/2014	1:28	0.26	0.015	0.111	1.12	12.7	4.4	57.3	7.4	Fall
Green_OUT	17-7	12/15/2014	1:58	0.17	0.012	0.147	0.85	14.7	5.0	65.8	7.4	Fall
Green_OUT	17-8	12/15/2014	2:28	0.13	0.010	0.153	1.47	10.0	4.8	74.2	7.4	Fall
Green_OUT	18-1	3/25/2015	19:52	0.17	0.012	0.145	1.24	63.5	13.7	125.6	7.2	Spring

Green_OUT	18-2	3/25/2015	20:22	0.18	0.012	0.083	0.93	31	7.5	90.4	7.5	Spring
Green_OUT	18-3	3/25/2015	20:52	0.18	0.012	0.079	0.87	18.5	5.2	80.7	7.6	Spring
Green_OUT	18-4	3/25/2015	21:22	0.25	0.015	0.072	0.77	18	6.3	88.1	7.6	Spring
Green_OUT	18-5	3/25/2015	21:52	0.27	0.016	0.098	0.66	23.5	4.8	80.4	7.7	Spring
Green_OUT	18-6	3/25/2015	22:22	0.31	0.017	0.101	0.56	15	4.0	68.1	7.8	Spring
Green_OUT	18-7	3/25/2015	22:52	0.32	0.017	0.115	0.70	24.5	4.1	70.7	7.8	Spring
Green_OUT	18-8	3/25/2015	23:22	0.30	0.017	0.122	0.79	23	4.0	70.8	7.7	Spring
Green_OUT	18-9	3/25/2015	23:52	0.28	0.016	0.121	0.77	18.5	4.2	71.1	7.7	Spring
Green_OUT	18-10	3/26/2015	0:22	0.23	0.014	0.124	0.79	18.5	5.2	81.6	7.6	Spring
Green_OUT	18-11	3/26/2015	0:52	0.19	0.013	0.116	0.89	14	9.1	103.9	7.6	Spring
Green_OUT	18-12	3/26/2015	1:22	0.14	0.010	0.108	0.95	12	11.4	125.2	7.5	Spring
Green_OUT	19-1	4/1/2015	14:06	0.29	0.016	0.496	2.67	672.0	16.9	196.7	7.3	Spring
Green_OUT	19-2	4/1/2015	14:36	0.35	0.018	0.214	1.28	96.7	7.3	108.4	7.5	Spring
Green_OUT	19-3	4/1/2015	15:06	0.32	0.017	0.148	1.26	50.0	6.6	99.2	7.5	Spring
Green_OUT	19-4	4/1/2015	15:36	0.26	0.015	0.136	1.22	49.3	6.9	99.6	7.5	Spring
Green_OUT	19-5	4/1/2015	16:06	0.19	0.013	0.144	1.18	33.3	6.8	96.4	7.5	Spring
Green_OUT	19-6	4/1/2015	16:36	0.15	0.011	0.127	1.20	30.0	6.9	103.5	7.4	Spring
Green_OUT	20-1	4/15/2015	9:24	0.11	0.008	0.127	1.24	18.5	13.6	169.4	7.2	Spring
Green_OUT	20-2	4/15/2015	9:54	0.08	0.006	0.111	1.15	15.5	9.7	124.5	7.3	Spring
Green_OUT	20-3	4/15/2015	12:01	0.07	0.005	0.093	1.02	8.0	7.2	106.9	7.4	Spring
Green_OUT	20-4	4/15/2015	12:10	0.09	0.007	0.092	1.00	9.5	9.1	118.6	7.4	Spring
Green_OUT	20-5	4/15/2015	12:40	0.12	0.009	0.094	0.86	7.0	10.4	134.8	7.4	Spring
Green_OUT	20-6	4/15/2015	13:10	0.10	0.008	0.089	0.80	7.5	10.0	115.3	7.4	Spring
Green_OUT	21-1	4/22/2015	2:17	0.08	0.006	0.111	1.59	33.0	5.8	116.5	6.2	Spring
Green_OUT	21-2	4/22/2015	2:39	0.25	0.015	0.130	1.51	28.5	5.8	89.3	7.0	Spring
Green_OUT	21-3	4/22/2015	3:09	0.24	0.015	0.110	1.13	14.0	3.3	64.8	7.1	Spring
Green_OUT	21-4	4/22/2015	3:39	0.14	0.011	0.106	1.09	10.0	3.4	67.4	7.1	Spring
Green_OUT	21-5	4/22/2015	4:09	0.08	0.006	0.105	1.00	11.0	3.3	71.5	7.1	Spring

APPENDIX D – MEAN EVENT CONCENTRATIONS AND LOADS

Table 21. Drury-IN Pre-Implementation Water Quality EMC, Load, and Yield

	Rainfall	Runoff	Runoff Yield	EMC (mg/L)				Event Load (kg)				Event Yield (kg/ha)			
Date	(cm)	(L)	(L/ha)	TP	TN	TSS	Cl	TP	TN	TSS	Cl	TP	TN	TSS	Cl
8/31/2012	2.08	211,343	111,233	0.108	0.39	62.6	1.4	0.023	0.08	13.2	0.3	0.012	0.043	6.963	0.156
10/12/2012	2.59	225,764	118,823	0.493	0.97	112.6	0.2	0.111	0.22	25.4	0.0	0.059	0.115	13.379	0.024
11/11/2012	1.80	88,014	46,323	0.143	1.13	51.8	1.2	0.013	0.10	4.6	0.1	0.007	0.052	2.400	0.056
12/4/2012	1.19	108,231	56,964	0.093	0.57	39.6	1.1	0.010	0.06	4.3	0.1	0.005	0.032	2.256	0.063
4/10/2013	3.43	283,731	149,332	0.091	0.77	64.3	1.7	0.026	0.22	18.2	0.5	0.014	0.115	9.602	0.254
4/26/2013	3.96	175,578	92,409	0.064	0.86	12.0	1.6	0.011	0.15	2.1	0.3	0.006	0.079	1.109	0.148
9/20/2013	3.12	283,285	149,097	0.136	0.52	8.4	1.4	0.039	0.15	2.4	0.4	0.020	0.078	1.252	0.209
10/5/2013	3.40	134,058	70,557	0.065	0.37	18.6	0.7	0.009	0.05	2.5	0.1	0.005	0.026	1.312	0.049
10/29/2013	5.18	191,729	100,910	0.060	0.63	24.3	0.2	0.012	0.12	4.7	0.0	0.006	0.064	2.452	0.020
11/6/2013	1.12	72,836	38,335	0.099	0.21	29.0	0.7	0.007	0.02	2.1	0.1	0.004	0.008	1.112	0.027
11/21/2013	1.96	91,473	48,144	0.085	0.35	28.7	0.3	0.008	0.03	2.6	0.0	0.004	0.017	1.382	0.014
3/8/2014	0.58	13,596	7,156	0.172	1.13	77.7	26.3	0.002	0.02	1.1	0.4	0.001	0.008	0.556	0.188
3/16/2014	2.26	39,086	20,572	0.115	0.80	57.4	15.9	0.004	0.03	2.2	0.6	0.002	0.016	1.181	0.327
4/27/2014	1.27	55,749	29,342	0.246	1.52	100.9	2.1	0.014	0.08	5.6	0.1	0.007	0.045	2.961	0.062
5/8/2014	2.69	216,866	114,140	0.165	1.20	204.7	1.4	0.036	0.26	44.4	0.3	0.019	0.137	23.364	0.160

Table 22. Drury-IN Post-Implementation Water Quality EMC, Load, and Yield

	Rainfall	Runoff	Runoff Yield	EMC (mg/L)				Event Load (kg)				Event Yield (kg/ha)			
Date	(cm)	(L)	(L/ha)	TP	TN	TSS	Cl	TP	TN	TSS	Cl	TP	TN	TSS	Cl
10/9/2014	2.62	148,837	78,335	0.075	0.51	39.7	1.2	0.011	0.08	5.9	0.2	0.006	0.040	3.110	0.094
11/4/2014	2.34	66,324	34,907	0.086	0.51	19.1	1.1	0.006	0.03	1.3	0.1	0.003	0.018	0.667	0.038
3/13/2015	2.84	80,680	42,463	0.100	0.44	68.7	20.0	0.008	0.04	5.5	1.6	0.004	0.019	2.917	0.849
3/25/2015	2.36	92,799	48,842	0.112	0.57	30.8	7.1	0.010	0.05	2.9	0.7	0.005	0.028	1.504	0.347
4/2/2015	2.44	185,342	97,548	0.143	1.28	127.2	1.1	0.027	0.24	23.6	0.2	0.014	0.125	12.408	0.107
4/21/2015	2.03	136,599	71,894	0.287	2.22	154.6	1.0	0.039	0.30	21.1	0.1	0.021	0.160	11.115	0.072

Table 23. Drury-OUT Pre-implementation Water Quality EMC, Load, and Yields

	Rainfall	Runoff	Runoff Yield	EMC (mg/L)				Event Load (kg)				Event Yield (kg/ha)			
Date	(cm)	(L)	(L/ha)	TP	TN	TSS	Cl	TP	TN	TSS	Cl	TP	TN	TSS	Cl
8/31/2012	2.08	211,343	96,065	0.126	0.69	95.1	2.4	0.027	0.15	20.1	0.5	0.012	0.066	9.136	0.231
10/12/2012	2.59	226,592	102,996	0.758	1.38	126.2	2.4	0.172	0.31	28.6	0.5	0.078	0.142	12.998	0.247
11/11/2012	1.80	119,155	54,161	0.203	1.30	58.9	1.7	0.024	0.15	7.0	0.2	0.011	0.070	3.190	0.092
12/4/2012	1.19	72,402	32,910	0.110	0.67	17.1	1.5	0.008	0.05	1.2	0.1	0.004	0.022	0.563	0.049
4/10/2013	3.43	197,560	89,800	0.237	1.10	134.1	1.1	0.047	0.22	26.5	0.2	0.021	0.099	12.042	0.099
4/26/2013	3.96	271,550	123,432	0.042	0.65	12.2	2.0	0.011	0.18	3.3	0.5	0.005	0.080	1.506	0.247
9/20/2013	3.12	335,978	152,717	0.153	0.42	39.7	1.6	0.051	0.14	13.3	0.5	0.023	0.064	6.063	0.244
10/5/2013	3.40	194,149	88,250	0.049	0.20	37.5	0.8	0.010	0.04	7.3	0.2	0.004	0.018	3.309	0.071
10/29/2013	5.18	469,788	213,540	0.125	0.52	18.2	0.6	0.059	0.24	8.6	0.3	0.027	0.111	3.886	0.128
11/6/2013	1.12	66,374	30,170	0.108	0.17	65.2	1.2	0.007	0.01	4.3	0.1	0.003	0.005	1.967	0.036
11/21/2013	1.96	79,899	36,318	0.101	0.33	38.6	0.1	0.008	0.03	3.1	0.0	0.004	0.012	1.402	0.004
3/8/2014	0.58	53,050	24,114	0.172	1.19	35.7	93.0	0.009	0.06	1.9	4.9	0.004	0.029	0.861	2.243
3/16/2014	2.26	325,165	147,802	0.085	0.72	15.9	23.6	0.028	0.23	5.2	7.7	0.013	0.106	2.350	3.488
4/27/2014	1.27	38,244	17,384	0.479	2.51	192.7	1.2	0.018	0.10	7.4	0.0	0.008	0.044	3.350	0.021
5/8/2014	2.69	152,812	69,460	0.255	1.32	214.8	0.3	0.039	0.20	32.8	0.0	0.018	0.092	14.920	0.021

Table 24. Drury-OUT Post-Implementation Water Quality EMC, Load, and Yield

	Rainfall	Runoff	Runoff Yield	EMC (mg/L)				Event Load (kg)				Event Yield (kg/ha)			
Date	(cm)	(L)	(L/ha)	TP	TN	TSS	Cl	TP	TN	TSS	Cl	TP	TN	TSS	Cl
10/9/2014	2.62	258,298	119,582	0.062	0.49	20.9	1.8	0.016	0.13	5.4	0.5	0.007	0.058	2.454	0.211
11/4/2014	2.34	44,772	20,728	0.104	0.51	16.8	1.3	0.005	0.02	0.8	0.1	0.002	0.010	0.342	0.026
3/13/2015	2.84	81,580	37,769	0.113	0.48	33.2	12.7	0.009	0.04	2.7	1.0	0.004	0.018	1.231	0.471
3/25/2015	2.36	46,913	21,719	0.069	0.54	13	9.4	0.003	0.03	0.6	0.4	0.001	0.012	0.277	0.200
4/2/2015	2.44	234,160	108,407	0.152	0.93	71.3	7.3	0.036	0.22	16.7	1.7	0.016	0.099	7.589	0.777
4/21/2015	2.03	72,312	33,478	0.197	1.60	90.6	1.2	0.014	0.12	6.6	0.1	0.006	0.053	2.978	0.039

Table 25. Greenwood-IN Pre-Implementation Water Quality EMC, Load, and Yield

Date	Rainfall (cm)	Runoff (L)	Runoff Yield (L/ha)	EMC (mg/L) TP	EMC (mg/L) TN	EMC (mg/L) TSS	EMC (mg/L) Cl	Load (kg) TP	Load (kg) TN	Load (kg) TSS	Load (kg) Cl	Yield (kg/ha) TP	Yield (kg/ha) TN	Yield (kg/ha) TSS	Yield (kg/ha) Cl
5/31/2012	3.56	146,056	162,284	0.226	1.29	144.2	2.2	0.033	0.19	21.1	0.3	0.037	0.209	23.401	0.357
6/11/2012	0.97	27,878	30,976	0.144	1.16	76.0	1.3	0.004	0.03	2.1	0.0	0.004	0.036	2.354	0.040
9/7/2012	2.59	29,851	33,168	0.456	1.53	774.6	1.5	0.014	0.05	23.1	0.0	0.015	0.051	25.692	0.050
4/18/2013	2.90	150,784	167,538	0.189	1.81	78.1	4.3	0.028	0.27	11.8	0.6	0.032	0.303	13.085	0.720
7/26/2013	3.86	100,256	111,396	0.082	0.24	53.7	1.9	0.008	0.02	5.4	0.2	0.009	0.027	5.982	0.212
8/3/2013	3.28	49,203	54,670	0.17	0.79	57.6	1.5	0.008	0.04	2.8	0.1	0.009	0.043	3.149	0.082
10/5/2013	3.25	17,157	19,063	0.136	1.18	153.6	0.3	0.002	0.02	2.6	0.0	0.003	0.022	2.928	0.006
10/29/2013	5.26	175,490	194,989	0.082	0.40	36.0	1.4	0.014	0.07	6.3	0.2	0.016	0.078	7.020	0.273
11/21/2013	2.11	66,315	73,683	0.177	0.68	120.3	0.6	0.012	0.05	8.0	0.0	0.013	0.050	8.864	0.044
3/16/2014	2.16	67,998	75,553	0.268	0.95	204.4	20.1	0.018	0.06	13.9	1.4	0.020	0.072	15.443	1.519
4/3/2014	1.09	16,483	18,314	1.611	3.66	967.0	17.2	0.027	0.06	15.9	0.3	0.030	0.067	17.710	0.315
5/8/2014	2.59	103,319	114,799	0.294	1.26	167.4	4.6	0.030	0.13	17.3	0.5	0.034	0.145	19.217	0.528
5/12/2014	1.88	100,270	111,411	0.135	0.81	59.7	5.7	0.014	0.08	6.0	0.6	0.015	0.090	6.651	0.635
6/5/2014	1.22	32,760	36,400	0.178	0.83	203.7	4.1	0.006	0.03	6.7	0.1	0.006	0.030	7.415	0.149

Table 26. Greenwood-IN Post-Implementation Water Quality EMC, Load, and Yield

Date	Rainfall (cm)	Runoff (L)	Runoff Yield (L/ha)	EMC (mg/L) TP	EMC (mg/L) TN	EMC (mg/L) TSS	EMC (mg/L) Cl	Load (kg) TP	Load (kg) TN	Load (kg) TSS	Load (kg) Cl	Yield (kg/ha) TP	Yield (kg/ha) TN	Yield (kg/ha) TSS	Yield (kg/ha) Cl
10/9/2014	2.16	52,489	58,321	0.103	0.59	116	3.9	0.005	0.03	6.1	0.2	0.006	0.034	6.765	0.227
11/23/2014	1.52	54,270	60,300	0.146	0.79	149.7	2.8	0.008	0.04	8.1	0.2	0.009	0.048	9.027	0.169
12/14/2014	1.70	90,304	100,338	0.124	0.59	56.0	5.9	0.011	0.05	5.1	0.5	0.012	0.059	5.619	0.592
3/25/2015	2.51	129,118	143,464	0.209	1.21	206.4	12.2	0.027	0.16	26.6	1.6	0.030	0.174	29.611	1.750
4/1/2015	1.32	38,927	43,252	0.416	2.48	772.7	17.1	0.016	0.10	30.1	0.7	0.018	0.107	33.421	0.740
4/15/2015	1.24	34,698	38,553	0.263	1.62	115.9	13.4	0.009	0.06	4.0	0.5	0.010	0.062	4.468	0.517
4/22/2015	1.63	42,832	47,591	0.355	1.94	333.9	4.6	0.015	0.08	14.3	0.2	0.017	0.092	15.891	0.219

Table 27. Greenwood-OUT Pre-Implementation Water Quality EMC, Load, and Yield

Date	Rainfall (cm)	Runoff (L)	Runoff Yield (L/ha)	EMC (mg/L) TP	EMC (mg/L) TN	EMC (mg/L) TSS	EMC (mg/L) Cl	Load (kg) TP	Load (kg) TN	Load (kg) TSS	Load (kg) Cl	Yield (kg/ha) TP	Yield (kg/ha) TN	Yield (kg/ha) TSS	Yield (kg/ha) Cl
5/31/2012	3.56	425,867	185,160	0.231	0.90	44.6	2.5	0.098	0.38	19.0	1.1	0.043	0.167	8.258	0.463
6/11/2012	0.97	148,336	64,494	0.263	1.34	55.3	2.3	0.039	0.20	8.2	0.3	0.017	0.086	3.567	0.148
9/7/2012	2.59	248,409	108,004	0.401	1.67	164.1	2.6	0.100	0.41	40.8	0.6	0.043	0.180	17.723	0.281
4/18/2013	2.90	331,152	143,979	0.227	1.27	72.4	3.9	0.075	0.42	24.0	1.3	0.033	0.183	10.424	0.562
7/26/2013	3.86	417,172	181,379	0.273	0.93	3.5	2.9	0.114	0.39	1.5	1.2	0.050	0.169	0.635	0.526
8/3/2013	3.28	343,193	149,214	0.345	0.67	43.0	2.2	0.118	0.23	14.8	0.8	0.051	0.100	6.416	0.328
10/5/2013	3.25	447,251	194,457	0.167	0.94	21.8	0.3	0.075	0.42	9.8	0.2	0.032	0.183	4.239	0.066
10/29/2013	5.26	740,084	321,776	0.163	0.48	16.4	1.3	0.121	0.36	12.1	1.0	0.052	0.154	5.277	0.418
11/21/2013	2.11	273,523	118,923	0.204	0.67	12.6	1.1	0.056	0.18	3.4	0.3	0.024	0.080	1.498	0.131
3/16/2014	2.16	292,420	127,139	0.248	0.96	170.0	19.2	0.073	0.28	49.7	5.6	0.032	0.122	21.614	2.441
4/3/2014	1.09	116,804	50,784	0.522	2.74	424.2	13.2	0.061	0.32	49.5	1.5	0.027	0.139	21.543	0.670
5/8/2014	2.59	233,005	101,307	0.474	1.70	428.0	5.1	0.110	0.40	99.7	1.2	0.048	0.172	43.359	0.517
5/12/2014	1.88	261,145	113,541	0.163	0.96	13.6	5.9	0.043	0.25	3.6	1.5	0.019	0.109	1.544	0.670
6/5/2014	1.22	118,691	51,605	0.223	1.59	140.6	3.7	0.026	0.19	16.7	0.4	0.012	0.082	7.256	0.191

Table 28. Greenwood-OUT Post-Implementation Water Quality EMC, Load, and Yield

Date	Rainfall (cm)	Runoff (L)	Runoff Yield (L/ha)	EMC (mg/L) TP	EMC (mg/L) TN	EMC (mg/L) TSS	EMC (mg/L) Cl	Load (kg) TP	Load (kg) TN	Load (kg) TSS	Load (kg) Cl	Yield (kg/ha) TP	Yield (kg/ha) TN	Yield (kg/ha) TSS	Yield (kg/ha) Cl
10/9/2014	2.16	195,656	85,068	0.091	1.15	45.6	5.3	0.018	0.23	8.9	1.0	0.008	0.098	3.879	0.451
11/23/2014	1.52	185,497	80,651	0.100	1.32	24.3	4.2	0.019	0.24	4.5	0.8	0.008	0.106	1.960	0.339
12/14/2014	1.70	211,692	92,040	0.140	0.97	34.7	6.6	0.030	0.21	7.3	1.4	0.013	0.089	3.194	0.607
3/25/2015	2.51	359,212	156,179	0.110	0.85	25.1	7.2	0.040	0.31	9.0	2.6	0.017	0.133	3.920	1.124
4/1/2015	1.32	189,522	82,401	0.190	1.39	120.5	8.0	0.036	0.26	22.8	1.5	0.016	0.115	9.929	0.659
4/15/2015	1.24	88,476	38,468	0.103	1.01	11.7	10.5	0.009	0.09	1.0	0.9	0.004	0.039	0.450	0.404
4/22/2015	1.63	92,791	40,344	0.113	1.22	17.4	4.1	0.010	0.11	1.6	0.4	0.005	0.049	0.702	0.165