City of Black Diamond

Master Development Review Team

Review Comments for: **Villages and Lawson Hills Master Planned Developments (MPD)** ***2011-2014 Stormwater, Baseline, and Groundwater Monitoring Report"***

Permit Number: N/A

1st Comment Date: May 1st 2015

1st Response Date: June 9, 2015

CITY OF BLACK DIAMOND
AUG 18 2015
PLANNING DEPT.

Comment Number	Page Number	Review Comment	Response
1	NA	The report is not stamped and sealed by a Professional Engineer. Either provide a stamped document or provide a basis for the report not being stamped. It appears that the document includes engineering judgement and would, therefore, require approval from an Engineer of Record.	The scientists and engineers that prepared this report used standard methods for analyzing and interpreting water quality data. There was no design element in preparation of report content that requires a Professional Engineer stamp, rather these were analytical exercises routinely used by water quality scientists in preparation of expressions used to compare against regulatory criteria. Content of the report was overseen by a water quality scientist with an advanced research degree (e.g., M.S. or Ph.D.).
2	NA	The Report calculated the predicted phosphorous loading for flow-weighted baseflow and storm flow conditions at three required sites using a reasonable approach based on the separated hydrographs and the filtered water quality data set. The calculation approach, however, is not well described	Since the Technical Memoranda and the final report are related; the Tech Memos as building blocks for the final report, a decision was made to streamline content of the final report to avoid repetition of the same information. Although we

		in the Report (even though it is more fully described in Tetra Tech (2013) and Tetra Tech (2014)). The reader should not have to refer to these memos for a complete understanding of the calculation approach. In addition, neither the Report nor the memos tabulate the summation calculations of phosphorous loading, and a reader must assume that the calculated results presented in the Report are correct. The calculation details from the memos must be brought into the text of the Report, and a tabulation of the calculation must be provided in the Report appendices.	agree all information contained in a single report is convenient for the reader, the length of a report may be daunting if containing all information generated from the previous 3 years of monitoring effort. The raw data provided reviewer(s) are the basis for calculations at each step of the loading analysis. A description for how these calculations are made is included in the methods section of the final report and would be the start point for determining repeatability in calculating a phosphorus load. Inclusion of all steps showing the data used and intermediate results would be useful for an audience not familiar with water quality data analysis. This information is included in the attached revised report.
4	NA	The Report (p.22) concludes that the amount and quality of information are sufficient and no additional sampling are necessary to satisfy the project objectives. This conclusion appears to be based on the qualitative statement that a "great deal of new information" was generated (p. 29). However, there is no statistically-described basis that the data are sufficient to provide for an acceptable error of 0.05. The report must include the basis and the calculations to support the 0.05 accuracy requirement imposed by the Examiner.	Detecting a difference with an acceptable error of p=0.05 means that we assume no difference exists between 2 data sets describing phosphorus concentrations (or loads); pre-construction versus post-construction results. In a simple explanation, we use a statistical routine that compares averages of both sets of data and determine if one of the averages (post-construction data) is within the upper 5% of results collected from between 2011-2014 as pre-construction condition. If the post-construction average is above or beyond the upper 5% of the pre-construction data observations then we conclude the post-

			construction data set is significantly different using a p=0.05 probability (in other words "an acceptable error of 0.05").
5	NA	Page 29 states, "Changes in hydrology at the monitoring sites affected by beaver dams also influenced dynamics of nutrients like TP [total phosphorous] above each of the monitoring sites." There is no further discussion of the nature or effects of these dynamics on water quality in Rock Creek. The water quality data set was filtered to remove sampling results for periods during monitoring when beaver dams affected stream flow; however, there was no description of what the possible effects of beaver dams had on water quality that warranted their removal from the data set. There was no summary of which data were considered relevant and which were not relevant during period when beaver dams influenced flow (p. 21). If data were collected during these periods, a summary statement must be made whether an adverse effect of beaver dams on water quality was apparent in the data, or if additional data could indicate the potential range of effects of beaver dams on water quality. Assuming that beavers will occupy Rock Creek during and after development of the project, some understanding of this potential effect is essential to support upcoming implementation and compliance of the stormwater treatment program to meet the "no net phosphorus" requirement.	There was no discussion about water quality conditions during periods of the monitoring year when beaver dams were present as flow had ceased at the monitoring sites. These barriers stopped water flow both above and below culverts at each of the Rock Creek monitoring sites so samples made at the location represented lentic (standing water) conditions. The decision was made to characterize periods of the year when water was flowing at all sites in Rock Creek that would deliver phosphorus to Lake Sawyer as this is the location with target phosphorus concentration limits and is affected predominantly by Rock Creek and Ravensdale Creek. The attached report has been revised to include how flow records were predicted and daily TP loads calculated when beaver dams were present. Flow records were standardized assuming continuous flow at each site so that future comparisons would remove the effects of beaver dam presence, number of dams appearing in a year, and variation in annual rainfall when dams were present. This analysis reflects a standardized estimate for annual TP load delivery to each of the sites on Rock Creek that will be comparable to future data sets

			generated when construction of the MPDs is underway.
6	NA	Jones Lake is described as a feature within the Rock Creek watershed that serves as a "large nutrient sink". Future changes in lake function due to development or climate changes could seasonally or irreversibly change the phosphorous budget for the watershed if the nutrients are released from Jones Lake. The influence of Jones Lake on Rock Creek water quality and total phosphorous concentrations must be considered in order to implement a successful implementation and compliance program. Likewise, wetlands in Rock Creek are described as a "source and sink of nutrients." Some discussion of the sensitivity of water quality on current and future wetland function is warranted, so that any observed changes in Rock Creek water quality, as development proceeds, can be accurately tied to project impacts or off-site (and unregulated) impacts.	Nutrient conditions in Rock Creek as mediated by Jones Lake are described by results from the Rock Creek at Abrams Avenue monitoring site. This site serves as the primary check point for changes in contribution of phosphorus from Jones Lake and Ginder Creek that joins Rock Creek upstream of this check point. Any changes that occur in Jones Lake or Ginder Creek will be detected at the Abrams Avenue site and identified as sources other than those from the development occurring below this point in the watershed. Should changes occur in the future to the sequestering capacity of phosphorus (timing of release or quantity of phosphorus retention), monitoring activity at the Abrams Avenue site will detect those changes. Factors that may change how the wetland or Jones Lake influence internal phosphorus dynamics include: water level and how long individual periods are sustained (e.g., high water level during winter or low water during summer). Since water volume of Jones Lake and in the Rock Creek wetlands is a primary factor that is related to phosphorus dynamics (e.g., settling from the water column or mobilization and transfer from the basin), changes to the timing and level of water outside of the background range would be an effective indicator.

			This discussion has been included in the report.
7	NA	The groundwater sampling summary in both the Report and Tetra Tech (2014) contained no information on the methods or materials of well installation, development of the wells, the soil or shallow groundwater system into which the wells were installed, or groundwater levels measured during the monitoring period which could indicate response to storm events or potential groundwater flow directions or gradient. The absence of this information renders the groundwater sampling results useless for implementation; there is no way to associate the observed groundwater quality at the monitoring well locations with any observed stream water conditions. We recognize that the groundwater data may be useful as a baseline for comparison to future developed conditions, but without background information and a conceptual understanding of the groundwater system and its interaction with surface water, there is no basis for regulating how any observed changes to groundwater quality could be influenced by or are associated with future conditions. This section should either be removed from the Report or the analysis should be supplemented with enough information to make implementation and compliance possible in future utility permits.	This section has been removed from the Final Report.

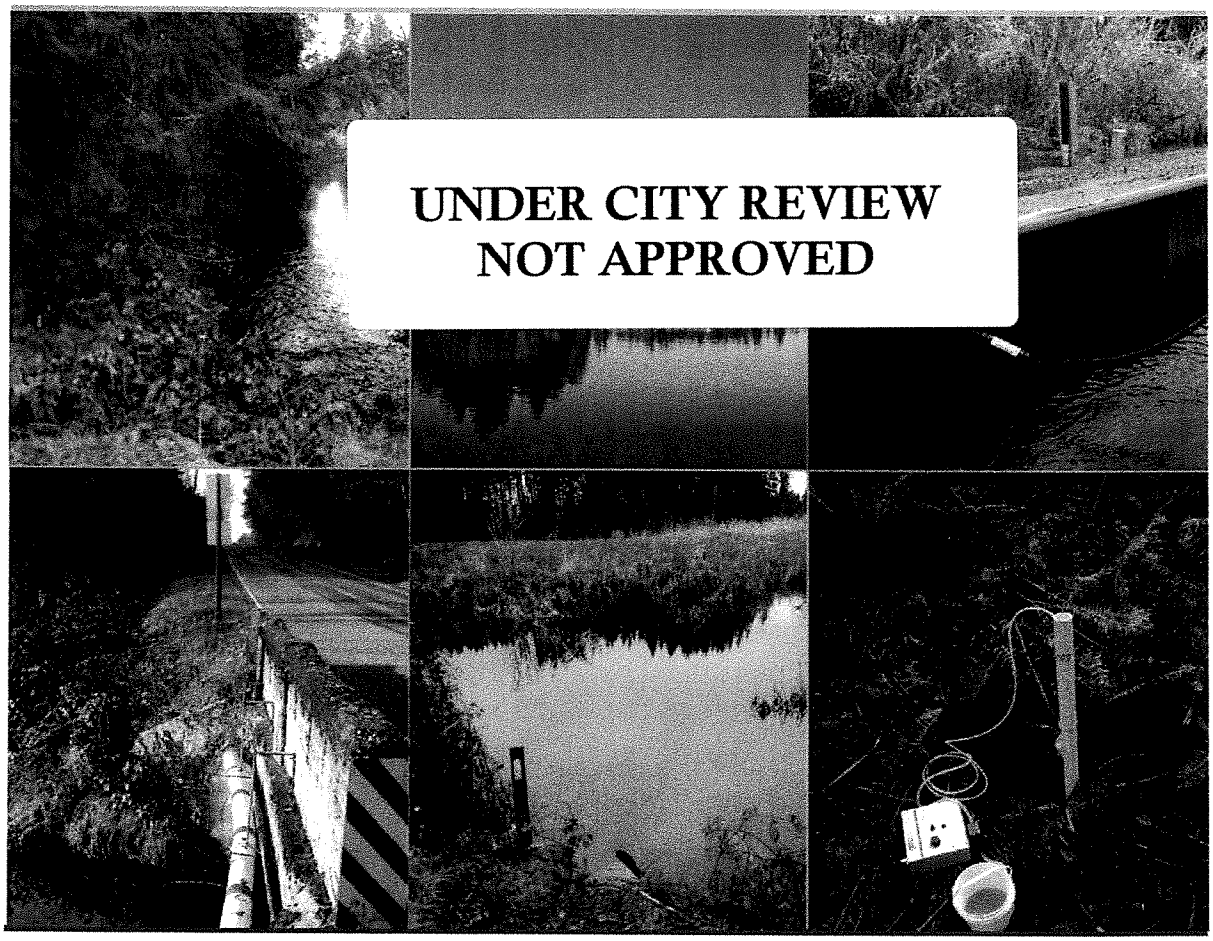
Yarrow Bay

FINAL

YARROWBAY

The Villages and Lawson Hills Master Planned Developments

2011-2014 Stormwater and Baseline Monitoring



June 15, 2015

TETRA TECH

The Villages and Lawson Hills Master Planned Developments

2011-2014 Stormwater and Baseline Monitoring
June 2015

PREPARED FOR

Yarrow Bay

YARROWBAY

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EXECUTIVE SUMMARY

Objectives for this project were the water quality sampling requirements set forth in the No Net Phosphorus Implementation Plan section of Exhibit "O" to The Villages and Lawson Hills Master Planned Development (MPD) Development Agreements (DAs), which requirements were enhanced by the City of Black Diamond Hearing Examiner in The Villages MPD Preliminary Plat 1A decision, and to report a total phosphorus baseline. Those objectives are the focus for products developed from three years of baseline monitoring, storm event monitoring, and groundwater monitoring. Specifically, the objectives for this project were the following:

- To perform analysis of water quality sampling and flow data;
- To determine hydrograph separation (baseflow versus stormflow);
- To describe the relationship between stream flow and nutrient concentration in the water (correlation analysis or sometimes referred to as "smearing");
- To determine phosphorus loading from baseflows at three sites on Rock Creek; and
- To identify any additional sampling deemed necessary to provide for an acceptable error of 0.05.

Water quality sampling was initiated in 2011 and continued through beginning of 2014, generating a substantial increase in water quality observations during a variety of storm events and representing different stages of the hydrograph (water level fluctuation) including base flow at Rock Creek sites. Water quality conditions were coupled with a substantial number of flow observations to develop flow rating curves (tools used to predict flow by using automated, continuous water level monitoring devices). Development of flow-rating curves was completed using a data set generated during a water year when rain events were more numerous and intense (Water year 2013/2014) and rating curves validated by comparing against previous monitoring years (2011/2012 and 2012/2013). The appearance of beaver dams that obstructed flows was previously not included in calculating flow over the calendar year because it might affect estimates for total annual nutrient loads by underestimating potential for maximum loads in years when beaver dams are absent.

Hydrograph separation was completed using a web-based application called WHAT (Web-based Hydrologic Analysis Tool, described more fully in Section 2.2 below. A hydrograph separating base flow from runoff flow (or storm flow) was defined for all three Rock Creek monitoring sites. Results show consistently that storm flow conditions represent approximately one-third the total annual TP load among all sites. Base flow conditions are relatively constant at a site with similar hydrologic patterns between years, so are a standard expression that can be compared between years for determining advent of drought.

Flow measurements and TP samples were collected simultaneously at several points throughout the calendar year for each of the Rock Creek sites. The flow record had several points at which Total Phosphorus (TP) was correlated and a regression model developed. The predictive model had a strong correlation between flow and TP ($R = 0.83$) and was used to calculate average daily loads and then summed to determine total annual load for TP at each Rock Creek site.

Total annual TP load estimates in this study reflect current background conditions at each of the three Rock Creek sites. Any differences from previous studies (Carroll and Pelletier. 1991) describing background conditions reflect changes in the drainage and human activity that influence the Rock Creek drainage area. TP loading increases from the uppermost Abrams Avenue site to the lowermost SE 312th Street site (406.76 kg/year) on Rock Creek as a function of inputs to each of the wetlands directly above the site and the assimilation capacity for nutrients by the wetlands. Approximately one-third of the Total Phosphorus load at the lowermost location on Rock Creek is contributed by stormwater and the same ratio for contribution of TP from stormwater exists at the remaining two sites on this creek. Jones Lake serves as a large nutrient sink for drainage areas above this location and is exemplified in the lower nutrient load passing by the Abrams Avenue site. Input of nutrient below this location increases as assimilation capacity, or capacity of retention, of nutrients is lower in the wetland above ABDR and SE 312th Street sites on Rock Creek. Total annual TP load from Lawson Hills (Plat 2B) is 2.12 kilograms/year and from The Villages (Plat 2C) is 1.86 kilograms/year.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ABDR	Auburn-Black Diamond Road
DA	Development Agreement
HYSEP	Hydrologic Separation Tool developed by USGS
kg/yr	Kilograms per year
MPD	Master Planned Development
MWV-29	Monitoring Well in Area V29 (part of Plat 2C)
NO3+NO2-N	Nitrate+Nitrite-Nitrogen
QAPP	Quality Assurance Project Plan
SRP	Soluble Reactive Phosphorus
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WHAT	Web-based Hydrologic Analysis Tool

1.0 INTRODUCTION

Water quality conditions in lakes and streams are a reflection of the geochemical watershed/basin characteristics and surrounding landscape. The landscape, in turn, is directly impacted by human activity that changes hydrology and destabilizes surrounding soils and vegetation patterns. These features of a drainage area influence the quantity of nutrients transferred from terrestrial to aquatic environments, the length of time transfer occurs, and locations in a stream or lake where nutrient introduction is detectable. Historic disturbance in a drainage area affects nutrient dynamics in the aquatic ecosystem and are reflected in current water quality conditions.

Some areas of The Villages and Lawson Hills MPDs are in the Rock Creek drainage that supplies water to Lake Sawyer and is part of a Lake Sawyer TMDL. The combined input of total phosphorus (TP) from several sources like the larger Ravensdale Creek drainage, Rock Creek drainage, non-point sources (e.g., on-site septic systems surrounding the lake), and air deposition should not produce in-lake steady state TP concentrations higher than 16 µg/L (Carroll and Pelletier,1991). Rock Creek is characterized by three large wetlands over its length between Jones Lake and Lake Sawyer. The upper end of this Rock Creek reach receives water from the smaller Ginder Creek drainage. The downstream wetlands function differently from stream ecosystems by sequestering and releasing nutrients. Timing for sequestration and release as well as the mechanism for this process in wetlands differs from that in flowing water. The unique properties of these three wetlands are taken into account as reflected in objectives of this study and how data are interpreted. This more intensive water quality monitoring program provides greater detail on how Rock Creek can influence Lake Sawyer TP concentration under stormflow conditions and baseflow conditions, representing a greater effort to characterize storm events beyond previous Washington Department of Ecology studies.

1.1 OBJECTIVES

Objectives for the three-year monitoring effort were to summarize results from routine baseline monitoring and storm event monitoring at select sites on Rock Creek in the Lake Sawyer drainage from 2011-2014. The following are products expected to be developed resulting from the monitoring effort:

- Analysis of water quality sampling and flow data;
- Define hydrograph separation (baseflow versus stormflow);
- To describe the relationship between stream flow and nutrient concentration in the water (correlation analysis or sometimes referred to as "smearing");
- To determine phosphorus loading from baseflows at three sites on Rock Creek; and
- To identify any additional sampling deemed necessary to provide for an acceptable error of 0.05.

The objectives listed above are a result of several directives outlined by the Black Diamond Hearing Examiner and Black Diamond City Council for The Villages and Lawson Hills MPDs. Exhibit "O" of The Villages and Lawson Hills MPD DAs, contains the following requirement:

- Monitoring: Prior to construction of the first MPD Implementing Project, the Master Developer shall cause to occur three water quality samples in three separate months during the wet season at three locations within Rock Creek to be mutually agreed to by the City and Master Developer. This sampling data shall be provided to the City and be used to establish an interim baseline phosphorous load that will then be further refined by the Baseline Monitoring section below.

Note: During the 2011-2012 water year, three water quality samples were collected in three separate months (December 2011, January 2012, and March 2012) during the wet season at three locations within Rock Creek to characterize pre-development conditions and establish an interim baseline phosphorus load that would then be further refined by the 2012-2013 Baseline Monitoring Program (set forth below). *See* Tetra Tech's Technical Memorandum titled "The Villages and Lawson Hills MPDs Pre-Construction Stormwater Monitoring in Rock Creek and the Establishment of an Interim Baseline

Phosphorus Load" dated July 23, 2012 for more information. The interim baseline phosphorus load would be established following completion of additional monitoring during 2013-2014 water year.

> Baseline Monitoring: Prior to construction of the first implementing project within the Lake Sawyer drainage basin, the Master Developer, in conjunction with the City of Black Diamond shall review, plan and institute the following:
>
> 1. Monitor pre-development phosphorus levels at pre-determined locations within the project drainage basins. Monitoring is to occur consistently over the course of at least one water year (October to September) in accordance with the procedures and criteria outlined in Chapters 6 through 12 of the QAPP (see Exhibit "O" to the DAs). Use data collected over the water year to establish a baseline phosphorus load from the project. This load should be factored to an average year rainfall volume for future comparisons of phosphorus loads for years where the rainfall is more or less than the average.

Note: This Baseline Monitoring requirement (above) was satisfied by the 2012-2013 Baseline Monitoring Program that was summarized in the 2012-2013 Phosphorus Monitoring Report. However, pursuant to the City of Black Diamond Hearing Examiner's Decision for The Villages MPD Preliminary Plat 1A, dated December 10, 2012, the Baseline Monitoring Program was expanded for the Villages Preliminary Plat 1A beyond this Baseline Monitoring requirement set forth above (and in Exhibit "O" to the Villages and Lawson Hills MPD Development Agreements). Specifically, the Expanded Baseline Monitoring Program for The Villages Preliminary Plat 1A was required to include "a significant increase in the amount of sampling to provide for an acceptable error of 0.05 and the use of hydrograph separation, flow and nutrient correlation, and other techniques to estimate separate loadings for base flows." The Expanded Baseline Monitoring Program that was approved by the City on July 19, 2013 includes the following approach:

- Storm event monitoring at three Rock Creek locations during three separate storm events in the 2013-2014 water year. Three samples collected at each site during each storm event (total of 9 samples for each of the three sites = 27 total samples).
- Flow monitoring data will be generated at the time of sampling and will be used to estimate separate loadings for base flows.
- This expanded baseline monitoring program significantly increases the amount of sampling in Rock Creek and is sufficient to provide for an acceptable error of 0.05.

Note: Detecting a difference with an acceptable error of p=0.05 means that we assume no difference exists between 2 data sets describing phosphorus concentrations (or loads): pre-construction versus post-construction results. In a simple explanation, we use a statistical routine that compares averages of both sets of data and determine if one of the averages (post-construction data) is within the upper 5% of results collected from between 2011-2014 as pre-construction condition. If the post-construction average is above or beyond the upper 5% of the pre-construction data observations then we conclude the post-construction data set is significantly different using a p=0.05 probability (in other words "an acceptable error of 0.05").

Analysis of the water quality sampling and flow data from water years 2011-2012, 2012-2013, and 2013-2014 will include development of hydrograph separation, flow and nutrient correlation, and other techniques to estimate separate phosphorus loadings for base flows

1.2 MONITORING SITES

Several monitoring sites and frequencies of sample collection were used from 2011-2014 in order to characterize the entire extent of the drainage area. Seven sites were the main focus for stormwater monitoring in 2011. These sites were sampled again in 2012-2013 and identified as either stormwater sites or baseflow monitoring sites. In 2014, the focus was narrowed to four sites in drainage areas immediately surrounding the development area and draining into Lake Sawyer. Figure 1 displays these samplings sites and their relative locations to each other and Lake Sawyer, as well as the beaver dams that were observed during the 2013 sampling events.

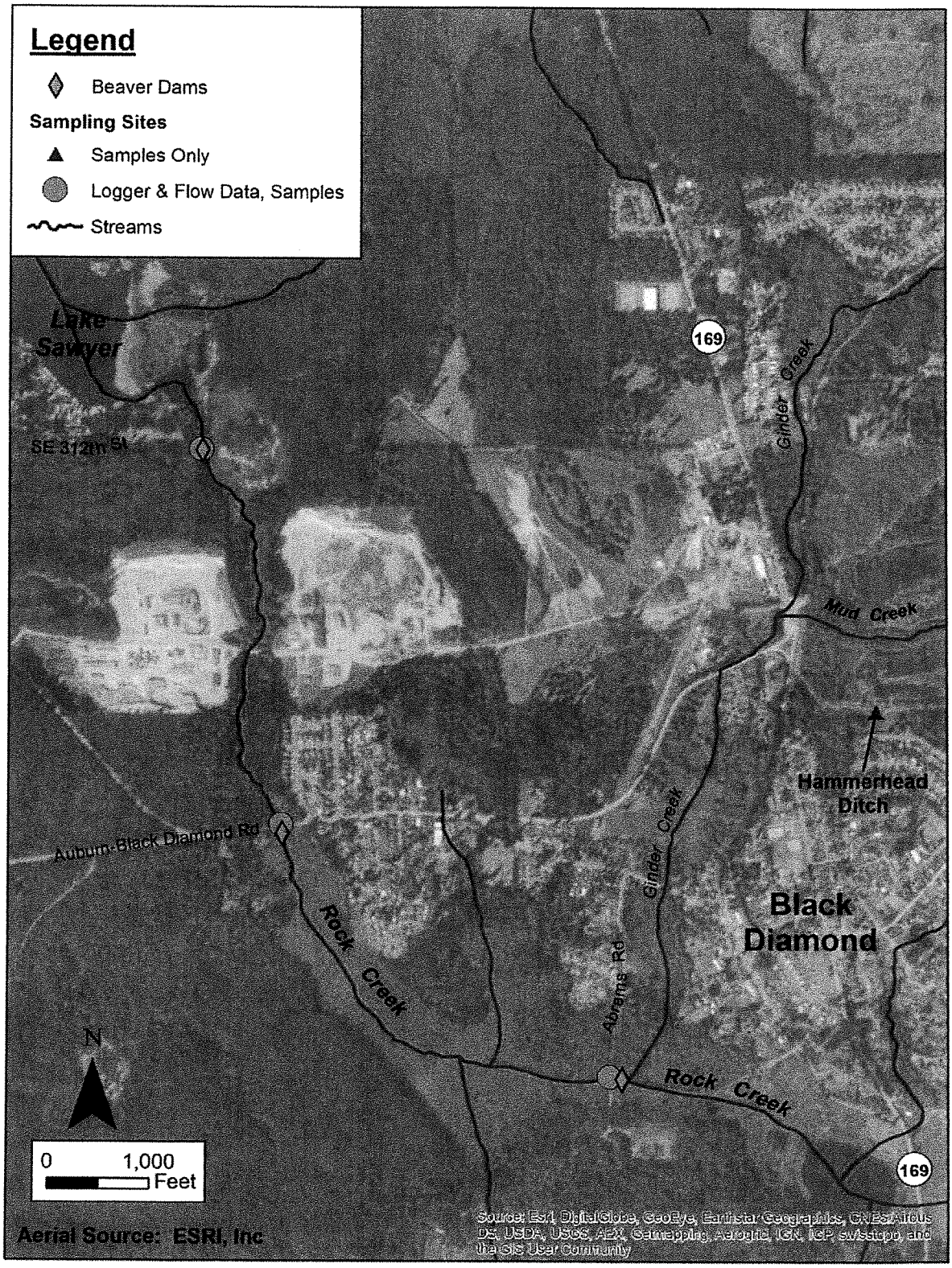

Figure 1. 2014 Sampling Sites in the Rock Creek Drainage Area

1.2.1 Stormwater Monitoring Sites

Four sites were monitored consistently beginning in 2011 and ending in 2014. These sites were the focus for describing baseline and stormflow conditions used to eventually describe total phosphorus (TP) annual loading. Site locations are identified in Figure 2 through Figure 8. Descriptions are provided for each site in order to indicate setting characteristics that were important for interpreting monitoring results.

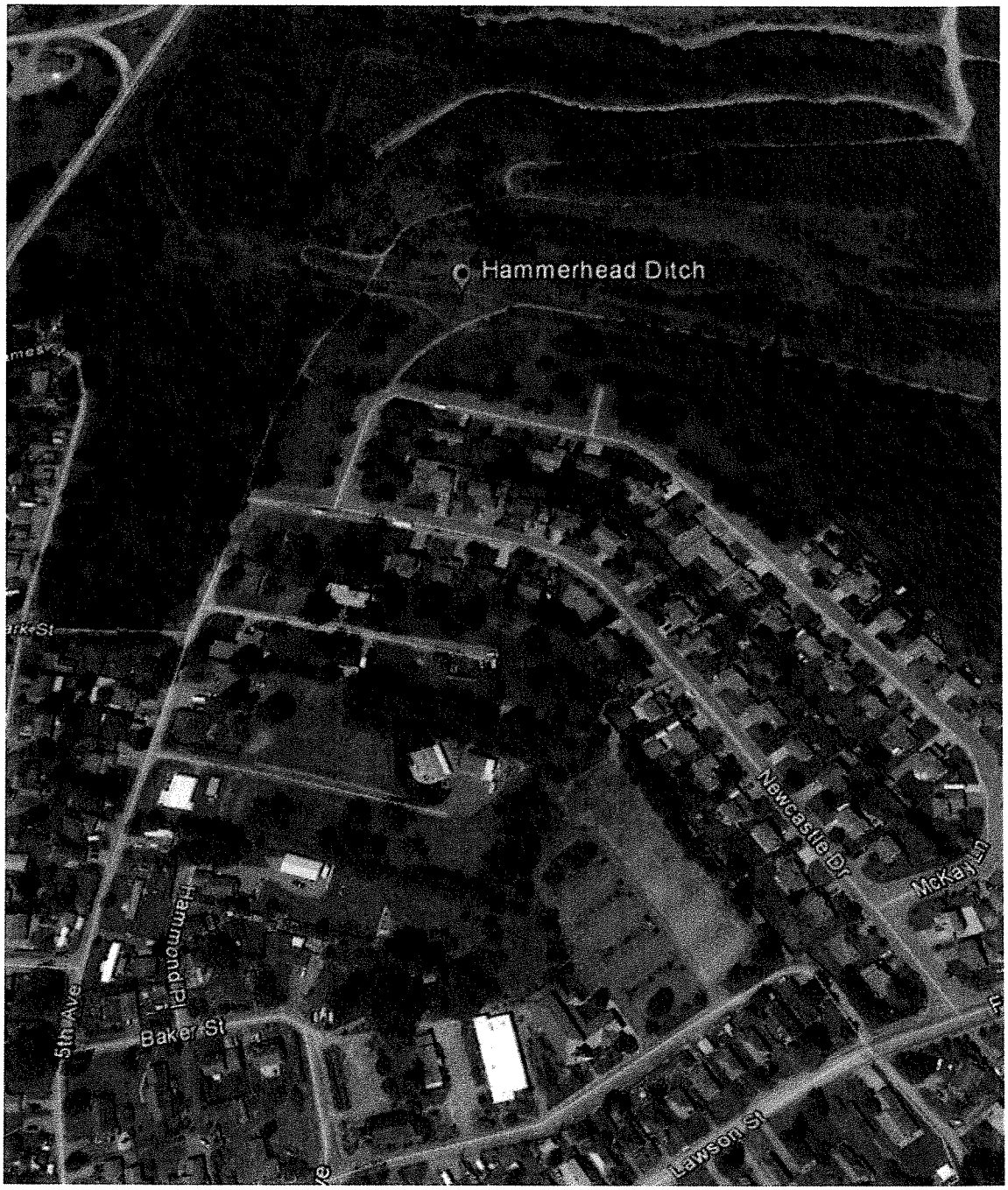

Figure 2. Location of Hammerhead Ditch in the Lake Sawyer drainage.

Figure 3. Location of monitoring sites on lower Rock Creek; SE Auburn-Black Diamond Road (ABDR), and SE 312th Street.

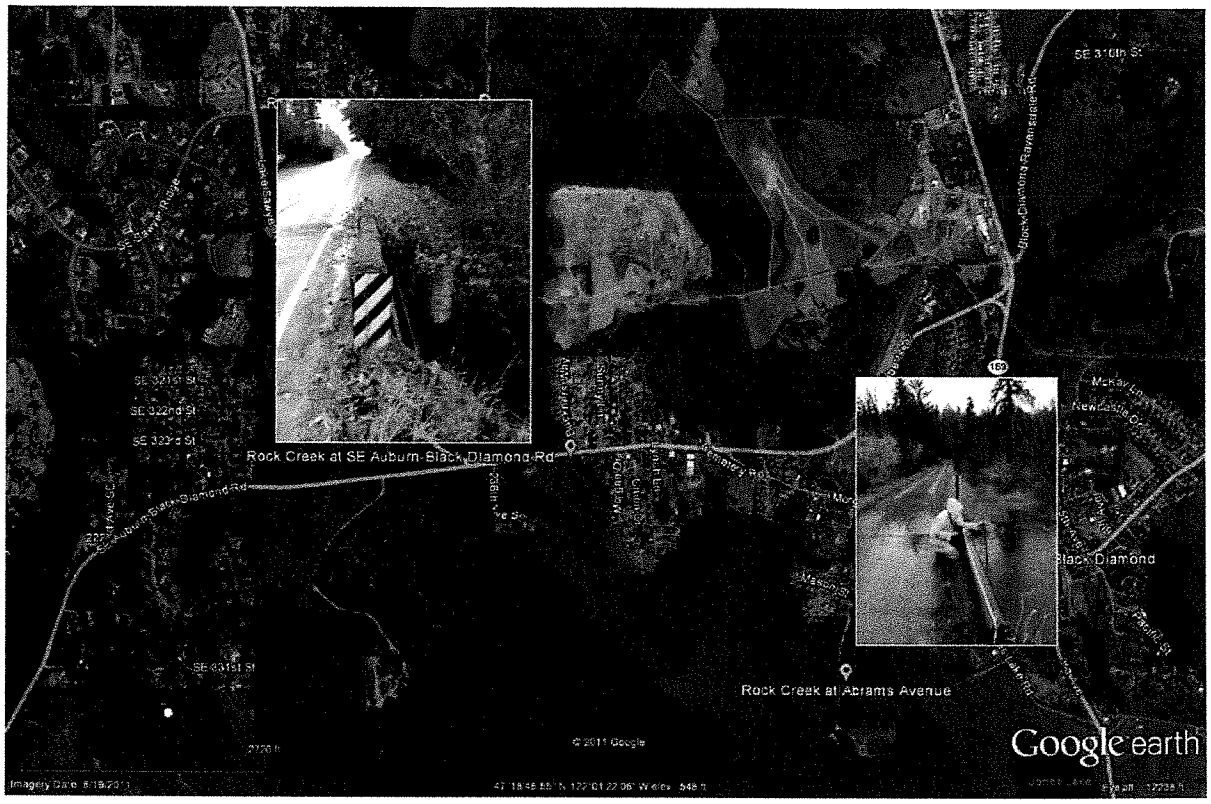

Figure 4. Location of monitoring sites on upper Rock Creek; SE Auburn-Black Diamond Road (ABDR), and Abrams Avenue.

1.2.1.1 Hammerhead Ditch

The Hammerhead Ditch site is located on the proposed Lawson Hills development site. Water is only present in the ditch during times of high storm flows. Resulting flow remains a trickle or forms a small pool of water following adequate water recharge. The ditch originates from a former coal mining site with runoff comprising flow in Hammerhead Ditch following adequate rainfall. Sampling the Hammerhead Ditch site is shown below in Figure 5 to illustrate how the small pool of sampleable water forms.

Figure 5. The Hammerhead Ditch stormwater sampling site.

1.2.1.2 Abrams Road

The Abrams Road site is the uppermost location on Rock Creek where baseline monitoring and stormwater monitoring was completed. The site hydrology is influenced by wetland pools created by beaver dams (*Castor canadensis*). Challenges for measuring stream flow at this site included passage of water beneath Abrams Road through a culvert during low flows. High flow conditions are measured by water flowing through the culvert and water flowing over Abrams Road. Figure 6 below shows flow measured through the culvert beneath Abrams Road. The site visit during this date was during a moderate storm event where water was not flowing over the road and dividers on the road margin.

Figure 6. Measuring flow at the Abrams Road site on Rock Creek.

1.2.1.3 Auburn-Black Diamond Road (ABDR)

The Auburn-Black Diamond Road site is located downstream of the Abrams Road site and is in the middle of the Rock Creek reach sampled for TP loading estimates. This site drains a large wetland complex adjacent to the Villages MPD. The upper area of this portion of Rock Creek is an extensive wetland with water level that appears to partially be regulated upstream of the Auburn-Black Diamond Road by a sil (upstream of the road). The ABDR site upstream of the road is shown in Figure 7 below.

Figure 7. Monitoring location at the Auburn-Black Diamond Road.

1.2.1.4 SE 312th Street

The SE 312th Street stormwater monitoring site is the most downstream site, and captures flow from the surrounding drainage area before it is discharge into Lake Sawyer. At times of high flow, the culvert is inaccessible and flow measurement collection is impossible due to extremely high flows. A photo of this site is shown below in Figure 8.

Figure 8. The 312th Street stormwater monitoring site.

1.2.2 Baseflow Monitoring Sites

Baseflow monitoring was conducted at 7 sites in the Lake Sawyer drainage from 2012-2013. These sites included 3 of the stormwater monitoring sites mentioned above (Abrams Road, Auburn Black Diamond Road, and 312th Street), and four sites on the upstream side of the drainage area. The four sites included Mud Creek, Ginder Creek, the stormwater detention basin along SR 169, and Ginder Creek along Roberts Drive. All four of these sampling sites are shown below in Figures 9 through 12. Level loggers were established at each of these sites to document fluctuations in water level during storm events and during dry periods. Results from the water level fluctuation monitoring at each of the sites indicated hydrology patterns during both wet weather and dry weather conditions.

Table 1. Locations for Rock Creek and Ginder Creek monitoring during storm events and dry periods.

Site Name	Latitude	Longitude
Rock Creek at SE 312th Street	47°19'44.76"N	122°01'21.31"W
Rock Creek at SE Auburn-Black Diamond Road	47°18'43.32"N	122°01'30.76"W
Rock Creek at Abrams Avenue	47°18'17.31"N	122°00'44.12"W
Ginder Creek at Robert's Drive	47°18'58.12"N	122°00'27.38"W
Storm Drain along SR 169	47°19'04.87"N	122°00'17.52"W
Mud Creek above SR 169	47°19'03.82"N	122°00'15.97"W
Ginder Creek above SR 169	47°19'05.59"N	122°00'16.76"W

Figure 9. Ginder Creek above SR 169 monitoring location.

Figure 10. Mud Creek above SR 169 monitoring location.

Figure 11. Storm drain along SR 169 monitoring location.

Figure 12. Ginder Creek below Robert's Drive monitoring location.

2.0 METHODS

Several technical products were developed from 3 years of monitoring data to address the objectives of this study. Technical products were developed from field measurements and laboratory sample analysis in order to achieve several goals. The sequence for development of technical products is found in Figure 13.

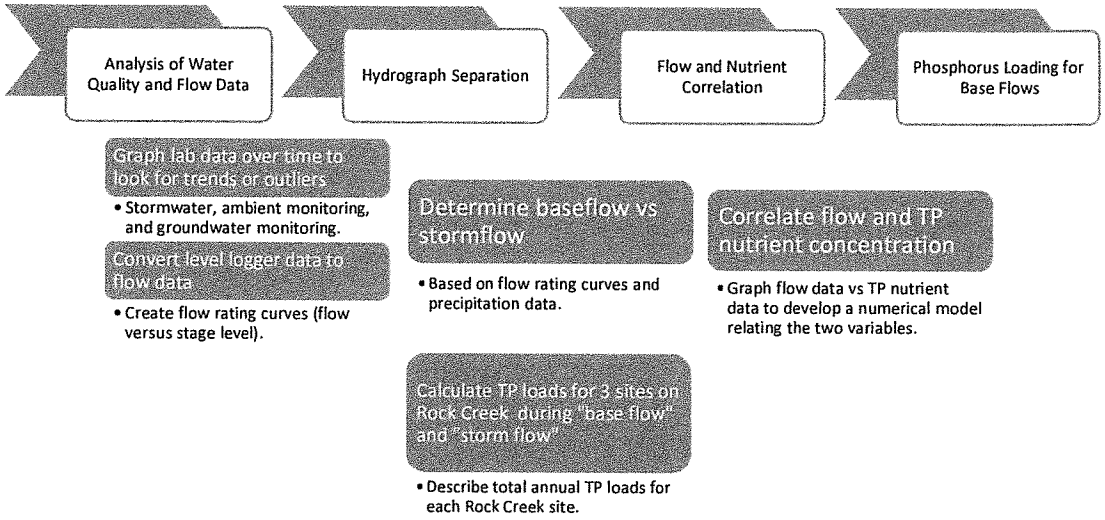

Figure 13. Sequence of technical product development addressing objectives for the monitoring program.

2.1 WATER QUALITY SAMPLING AND FLOW MEASUREMENT

Water quality monitoring began November of 2011 through March 2014 resulting in a total of 26 separate visits to each of the Rock Creek locations. The separate visits were categorized as baseline monitoring (monthly visits for one calendar year) or storm event sampling (3 storm events in 2011-2012; 6 storm event in 2012-2013; and 3 storm events in 2013-2014). Baseline monitoring included 14 separate visits to characterize water quality conditions with a single grab sample (14 baseline monitoring visits in total) and 12 storm event monitoring visits were made during this time period (3 grab samples were made at a site for each of the separate storm event visits). All samples collected during these events were analyzed for TP, soluble reactive phosphorus (SRP), ammonia-nitrogen, nitrate and nitrite (NO3 + NO2)-nitrogen, total nitrogen (TN), total suspended solids (TSS), and turbidity. Sample integrity was maintained using standard protocols for handling containers by rinsing twice with the sample water prior to sample collection (unless jars contained preservative) and all samples were collected from the main line of flow in the channel (known as the thalweg). Field parameters (e.g., temperature, pH, conductivity, and dissolved oxygen) were measured during each sampling event using a multi-parameter probe; the OTT Hydrolab® MS5 instrument.

Flow measurements were made at the same locations that surface water samples were collected during baseline monitoring and storm event sampling. All flow measurements were determined using a Marsh McBirney Flo-Mate® 2000 flow meter and a top-set wading rod. Standard Operating Procedure, EAP024 (WDOE 2012) was followed for measurement of in-stream flows during each sampling event.

2.2 HYDROGRAPH SEPARATION

To evaluate the contributions of baseflow versus stormflow from the Rock Creek watershed to Lake Sawyer, hydrograph separation analysis was completed and total phosphorus loading was determined under each of the flow conditions. The initial step in this analysis included defining total flow and baseflow resulting in determination of the stormflow component at each of the Rock Creek locations. Several methods were examined for separating the baseflow from stormflow components from total flow. These methods used for this determination involved mathematical modeling to determine the base flow/storm flow relationship. The U.S. Geological Survey developed a widely-used application called HYSEP that can use three different methods for determining hydrograph separation: 1) fixed interval, 2) sliding interval, and 3) local minimum methods. The fixed interval and sliding interval methods use the lowest discharge over a user-defined period (fixed or sliding, respectively) and qualify flow above lowest discharge as surface runoff. The Local Minimum method uses values of the surrounding intervals to determine the lowest discharge, and then connects the adjacent lowest discharges to define base flow.

In 2005 The University of Purdue created a tool called WHAT (Web-based Hydrograph Analysis Tool) that also allows for the use of three hydrograph separation methods: the Local Minimum Method mentioned above, the BFLOW digital filter method, and the Eckhardt digital filter method. The WHAT tool facilitates a quick and efficient way to perform hydrograph separation analyses blending flow data generated by the U.S. Geological Survey and data collected from local efforts like those from this project. Evaluation of the Local Minimum method indicates a tendency to overestimate base flow, but the BFLOW and Eckhardt methods provide an increased accuracy when estimating hydrograph separation in contrast to the methods offered by the earlier HYSEP program. A comparison of differences in determining hydrograph separation is demonstrated in Figure 14 through Figure 16 from the SE 312th Street level logger data using WHAT output from three methods previously described.

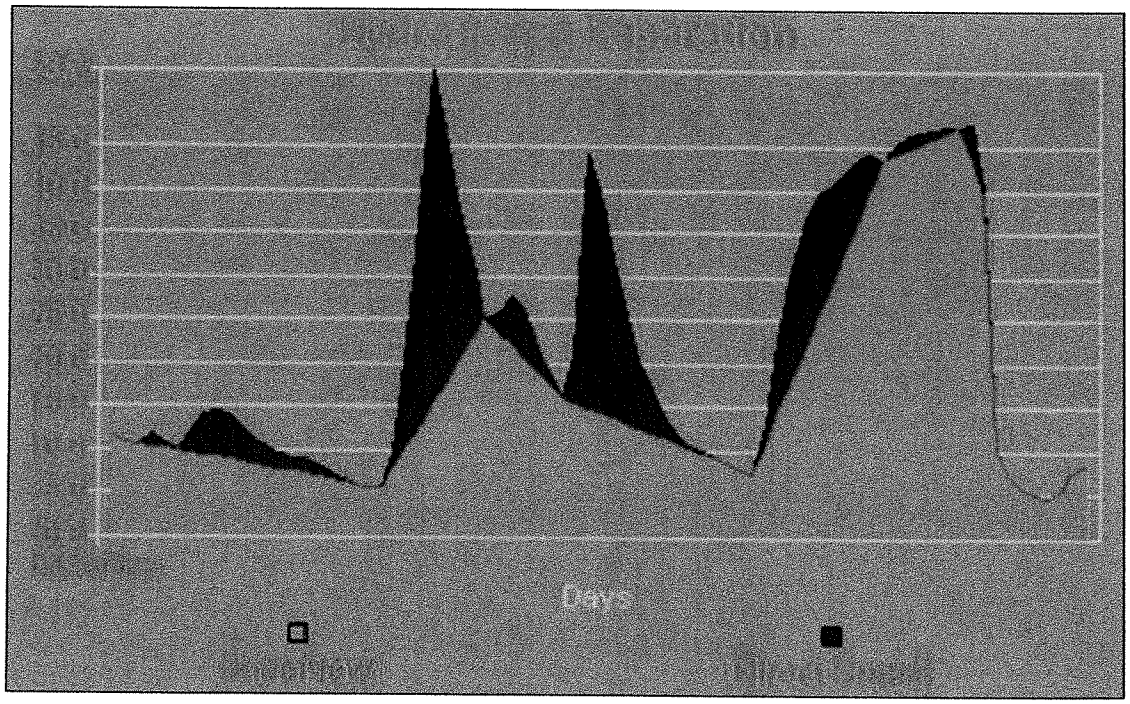

Figure 14. WHAT output using the Local Minimum method for hydrograph separation for a portion of the results collected from SE 312th Street Rock Creek location.

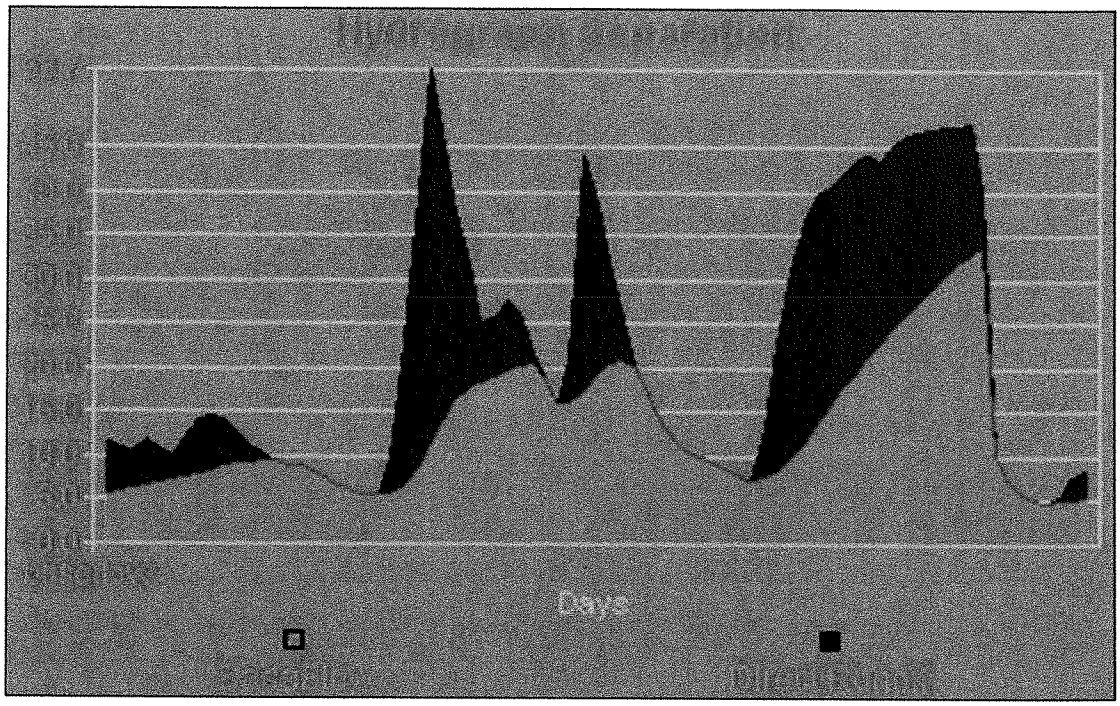

Figure 15. WHAT output using the BFLOW method for hydrograph separation for a portion of the results collected from the SE 312th Street Rock Creek location.

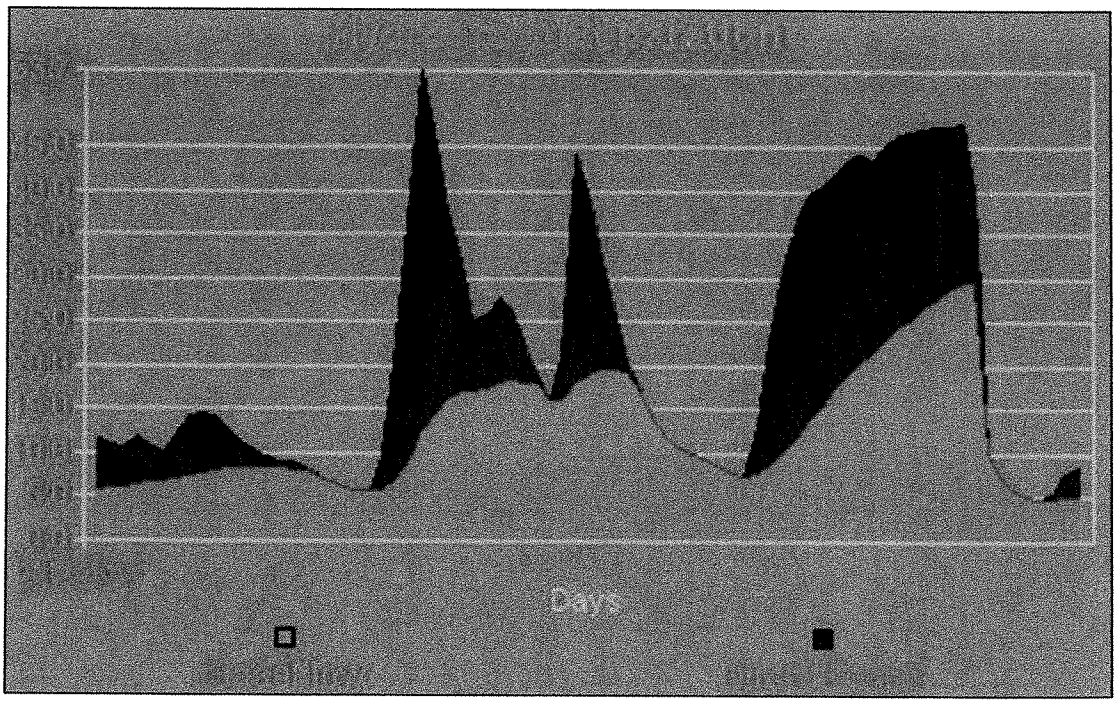

Figure 16. WHAT output using the Eckhardt method for hydrograph separation for a portion of the results collected from the SE 312th Street Rock Creek location.

The WHAT output generates base flow and direct runoff (storm flow) from the daily average total flow. The data file output contains a separated hydrograph differentiating the daily average baseflow and daily average storm flow.

2.3 COMPLETING THE FLOW RECORD

As a result of beaver (*Castor Canadensis*) dams on Rock Creek that affected the data obtained from level loggers at Auburn Black Diamond Road and SE 312th Street, the complete stage level data set generated at the Abrams Avenue location was used to make a flow rating curve based on field flow measurements and corresponding water level data that was continued recorded on 15 minute intervals with on-site level logger instruments. The relationship between flow and water level was used to calculate daily average flows at the Abrams Avenue site. These daily average flows were the source of the input data for the WHAT model described in Section 2.4.

The SE Auburn Black Diamond Road site only had useable flow rating curve data from January 2014 through March 2014 with influence of the beaver dams on the flow-stage relationship, backing up water levels and altering the relationship following March 2014. A similar occurrence with flow-stage alteration was described during development of the rating curve at the SE 312th Street location. Complete flow-stage relationships were described for this lowest location on Rock Creek from between March 2013 through May 2013 and from January 2014 through March 2014; however, due to the presence of beaver dams outside these time periods, water level was backed up and altered the flow-rating relationship. The presence of beaver dams at these sites slowed flow to a trickle, retaining water for an extended period of time acting like hydraulic control structures. Flow was completely stopped during the dry period in summer 2013 through the culvert at SE 312th Street and into Lake Sawyer with the presence of a beaver dam inside the culvert.

Altered flow records from presence of beaver dams occurred at two locations on Rock Creek and were corrected by determining a relationship for both the SE Auburn Black Diamond Road (ABDR) site and the SE 312th Street site with flow records from the same time period as from the Abrams Avenue site. Abrams Avenue is the most upstream site and the majority of the flow passing through this site would also pass through SE Auburn Black Diamond Road and SE 312th Street sites. In an attempt to account for the inflows to Rock Creek that are downstream of the Abrams Avenue site but upstream of either the Auburn Black Diamond Road and/or the SE 312th St, a comparison was made between the flows at the Abrams Avenue site and flows during time periods at those sites where there was no beaver dam influence. This comparison was used to develop a correlative relationship between average daily flows from Abrams Avenue. The missing flow records from ABDR and the SE 312th Street were reconstructed using the correlative relationships in order to develop complete annual records for each site. It is important to note that these calculations are based on the absence of beaver dams and the intensity of flow at Abrams Avenue on any given day.

2.4 CALCULATING PHOSPHORUS LOADING FOR BASEFLOW AND STORMFLOW

This monitoring program has been focused on Rock Creek and tributary sites, but is designed to describe contributions of phosphorus from discrete land areas throughout the drainage. Any new development may change the phosphorus contribution from portions of the drainage and this monitoring program will be used to detect any change from background. Ultimately, the reason for managing phosphorus contribution to streams in the Lake Sawyer drainage is to protect the integrity of Lake Sawyer, the receiving water. Phosphorus concentration in lakes is the key determinant of algal production and biomass or chlorophyll concentration, which in turn defines lake quality. Inflow (stream) concentration of total phosphorus (TP), weighted for flow volume, determines the in-lake TP concentration, averaged over time, according to:

$$TP_{lake} = \frac{TP_{inflow}}{1 + \rho^{0.5}}$$

Where rho, ρ, is water residence time (years) in the lake. The flow-volume-weighted stream concentration is the best estimate of inflow TP. While groundwater and precipitation can also contribute to inflow TP, stream surface water inflows are usually the major source in undeveloped watersheds.

Therefore, establishing volume-weighted inflow TP concentration is appropriate for a base-line, pre-development condition. In addition to higher potential TP concentration, the volume and intensity of stormwater runoff can be increased with land-use changes. The higher runoff TP concentrations plus increased runoff volume, and their potential lake effect, is best represented by flow volume-weighting the measured TP concentrations. Volume weighting accounts for the large masses of TP that enter the lake during major storms unaccounted for by straight averaging TP concentrations. However, pre-development mean and median TP concentrations upstream and downstream of the development can be compared with respective post-development concentrations.

TP loading and volume-weighted TP entering Lake Sawyer was calculated by using the expressions in Table 2. Producing dependable load estimates is more dependent on flow than concentration. Thus, having continuous flow has been shown to be more important than continuous concentration, but both are actually necessary for computing actual total load. Nevertheless, continuous flow and grab samples for concentrations during storms and non-storms, loading can be calculated for storm flow and base flow conditions. In order to obtain the best estimate of TP concentration for a given storm flow, concentration should be regressed on flow. For each daily flow during a storm, a concentration from that relationship can be used to calculate daily and, hence, storm period load. However, the pattern of Rock Creek data do not show particularly higher TP concentrations during storms than during non-storms (base flow), so a useable concentration - flow relation may not exist. Low-flow TPs were also higher than those during high flow in 1989-1990, which resulted in a slightly inverse relation between flow and concentration (Carroll and Pelletier, 1991). Without a TP-flow relation, TP concentrations during each storm event at each of the three sampling sites will be used to calculate a storm period load in kg/day. For other storm-flow periods during the year, a mean TP from all six events will be used to calculate loads for those periods. The procedure for estimating TP loads from baseflow periods and storm flow (Runoff) periods is explained in Table 2.

Table 2. Expressions for calculating loads at three mainstem Rock Creek sites.

Identifier	Storm/Baseflow Calculation	Description
(a)	Daily Average Discharge (CFS)	Level logger data (15-minute logging intervals) is converted to flow estimates; a daily average flow is calculated for each site from approximately 96 observations per day.
(b)	Daily Total Discharge (ft^3)	Average daily discharge is multiplied by total number of seconds in a day.
(c)	Daily Total Liters (L)	Total daily discharge (ft^3) is expressed as a metric volume; liters.
(d)	Daily Total TP	TP concentration is determined by using value for (a) in the regression model equation (Figure 19). TP daily mass (mg) is determined by multiplying (c) with predicted TP concentration from equation in Figure 19. Daily total TP expression is converted to "kg".
(e)	Runoff %	Daily average storm flow "runoff" percentage is determined from daily average total flow for each day (03/14/2013 – 03/12/2014) by using the WHAT separation model.
(f)	Baseflow %	Daily average "baseflow" percentage is determined from daily average total flow for each day (03/14/2013 – 03/12/2014) by using the WHAT separation model.
(g)	Daily Total Load, Runoff (kg)	(d) Daily Total TP x (e) Runoff %
(h)	Daily Total Load, Baseflow (kg)	(d) Daily Total TP x (f) Baseflow %

Total phosphorus concentrations from all relevant 2013-2014 grab samples that were collected during periods when beaver dams did not influence flow and TP concentrations were used to develop a regression model between TP and flow at Rock Creek sites (Appendix Table A6.1). Figure 17 describes the relationship between TP concentrations and flow from all sites on Rock Creek. The regression model developed from this relationship is used to predict concentrations based on average daily flows over the calendar year at each of the Rock Creek sites.

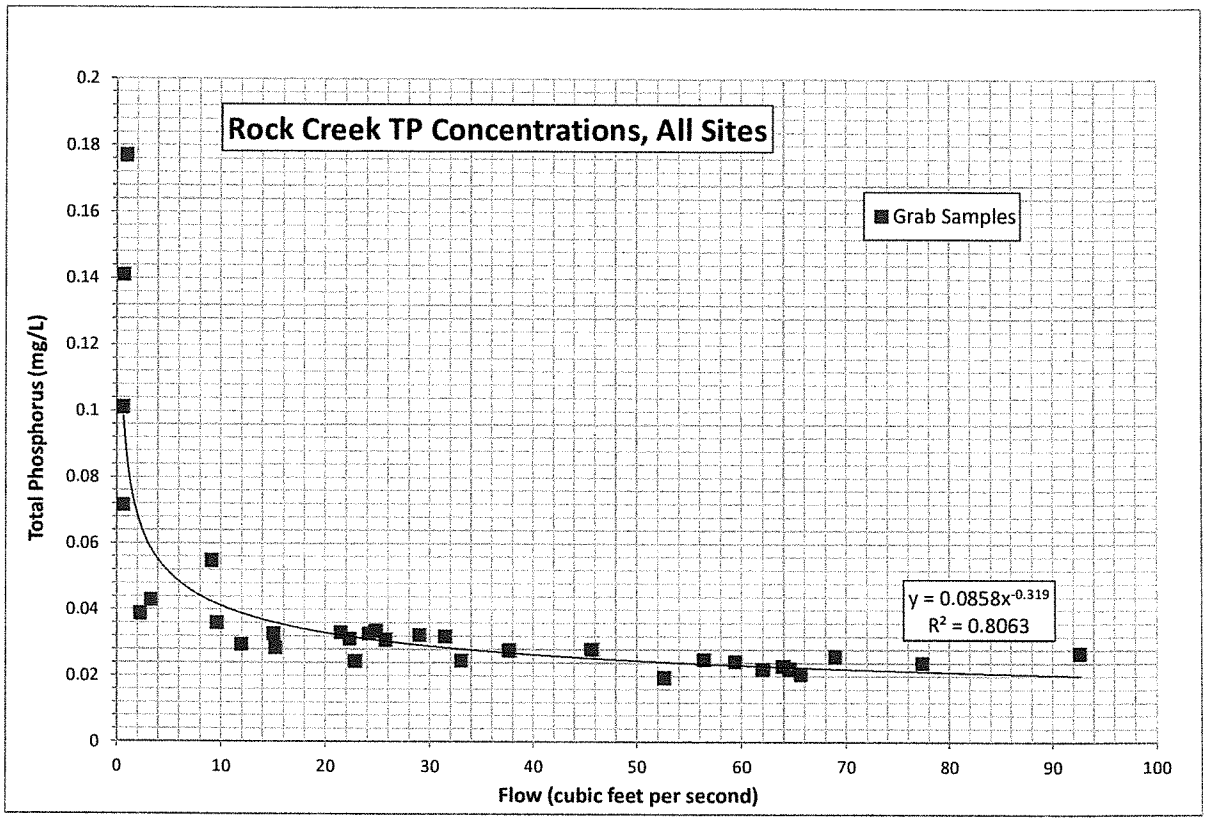

Figure 17. Total Phosphorus as a function of flow based on 34 different grab samples from 2013-2014.

The regression model for the exponential trend line shown in Figure 18 was used to predict TP concentrations based on daily average flows. Validation of the model used to predict TP from flow observations was completed by comparing against a site that was not affected by beaver dam construction at any time during the calendar year. TP loads were calculated using the regression model from the Abrams Avenue data set (validation data set) and compared against the TP Loads calculated by using data from all three Rock Creek sites. Use of data from the combination of all three Rock Creek sites was restricted to those time periods unaffected by beaver dam construction. Validity of the regression model using data from all three Rock Creek sites was determined by plotting TP loads from the combined sites against TP loads from upstream Abrams Avenue site. A relationship of 1:1 between the two sets of data, or very nearly so, is shown in Figure 20. This means that TP loads calculated by the combined Rock Creek data (all three sites) generates the same result for predicted TP from flow data and that the same regression model can be used for predicting TP concentration from flow at any of the Rock Creek sites.

Using total daily phosphorus and the separation between storm and baseflows from the WHAT model output, annual loads of TP for each site were calculated for both storm and baseflows at the Abrams Avenue, Auburn Black Diamond Road, and SE 312th Street sites.

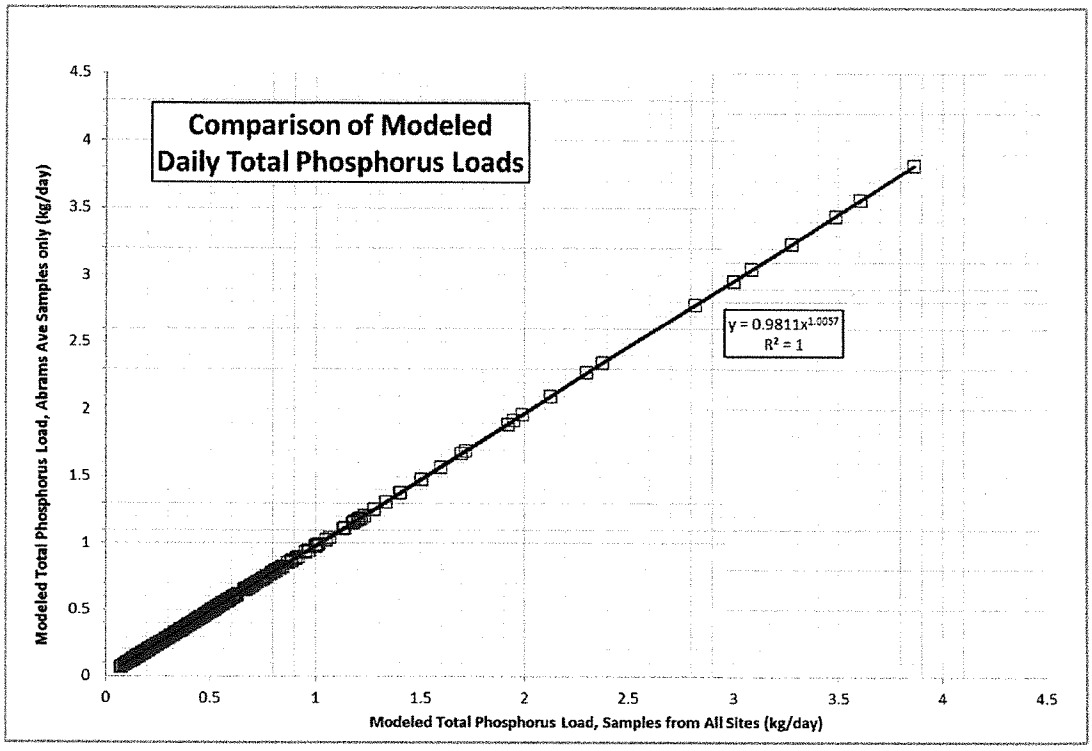

Figure 18. Comparison of predicted Total Phosphorus loads in kg/day using the same input flow value in two regression models (Abrams Avenue model versus the combined data set from all three Rock Creek sites).

2.5 IDENTIFYING ADDITIONAL SAMPLING NEEDS

At the current time, there are no additional sampling needs that would be used to satisfy product development as part of the objectives for this project. Additional water quality monitoring needs are discussed further in Section 3.5 of this report.

3.0 RESULTS

3.1 WATER QUALITY SAMPLING AND FLOW

3.1.1 Surface Water Sampling

Surface water samples and flow measurements were collected during storm events and as base flow monitoring during three separate water years (2011-2012, 2012-2013, and 2013-2014). Data were used to develop flow rating curves, relationship between flow and TP concentrations, and TP annual loading at three Rock Creek sites. Data serving as the basis for development of products in this report are found in the following Technical Memorandums:

- The Villages and Lawson Hills Master Planned Developments: Pre-Construction Stormwater Monitoring in Rock Creek and the Establishment of an Interim Baseline Phosphorus Load. Technical Memorandum. Black Diamond, WA. July 23, 2012. Prepared for Yarrow Bay. Tetra Tech, Inc., Seattle, WA. 16p.
- The Villages and Lawson Hills MPDs: 2012-2013 Pre-Construction Stormwater Monitoring in Rock Creek to Establish the Baseline Phosphorus Load. Technical Memorandum. Black Diamond, WA. November 2013. Prepared for Yarrow Bay. Tetra Tech, Inc., Seattle, WA. 50p. + Appendixes.
- The Villages and Lawson Hills MPDs: 2013-2014 Pre-Construction Stormwater Monitoring in Rock Creek to Establish the Baseline Phosphorus Load. Technical Memorandum. Black Diamond, WA. November 2014. Prepared for Yarrow Bay. Tetra Tech, Inc., Seattle, WA. 34p. + Appendixes.

3.2 HYDROGRAPH SEPARATION

A diagram displaying annual output of flow (base flow versus storm flow) from the WHAT model is displayed for each of the three Rock Creek sites (Figure 19 through Figure 21). The WHAT model output used daily average flows for both direct runoff (storm flow) and baseflow conditions defined by using data from March 2013 through 2014. The WHAT data output for each site was used to determine total annual phosphorus (TP) loads for each of the three Rock Creek sites. The daily average flows are used in conjunction with predicted TP concentrations from daily average flows to calculate loads on a daily basis (Table 2).

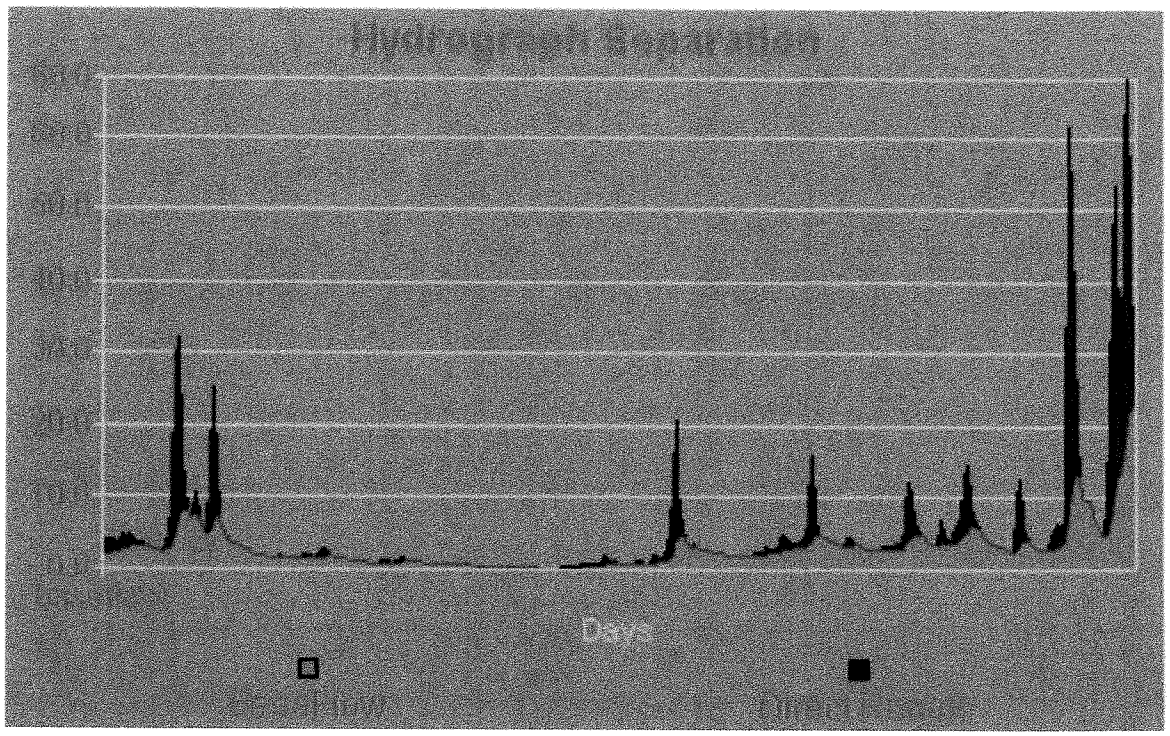

Figure 19. WHAT output of Eckhardt method for hydrograph separation of Rock Creek flows at Abrams Avenue (March 13, 2014 – March 12, 2014).

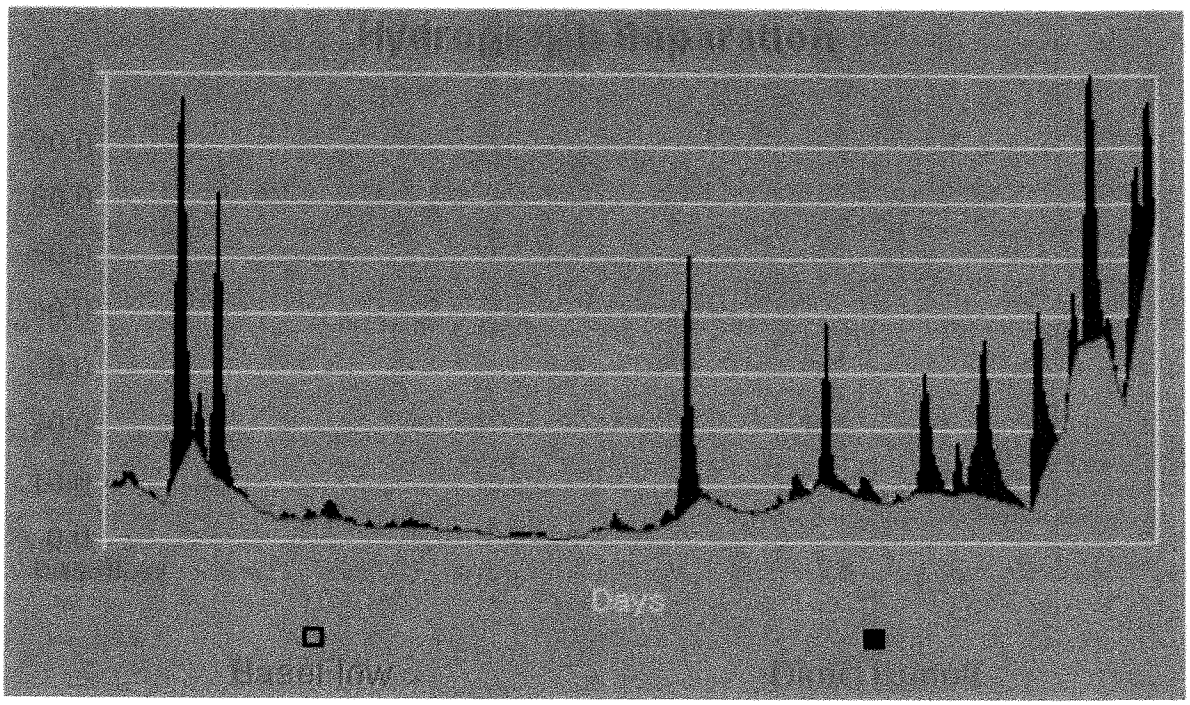

Figure 20. WHAT output of Eckhardt method for hydrograph separation of Rock Creek flows at SE Auburn-Black Diamond Road (ABDR) (March 13, 2014 – March 12, 2014).

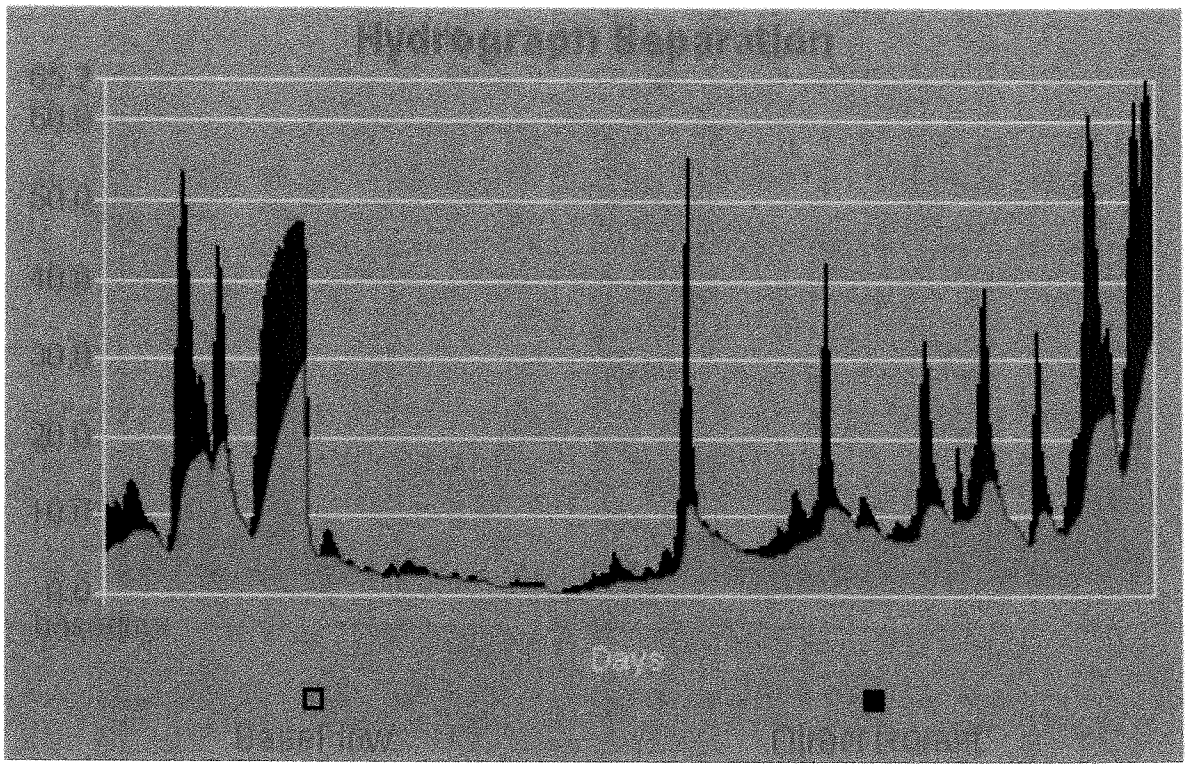

Figure 21. WHAT output of Eckhardt method for hydrograph separation of Rock Creek flows at SE 312th Street (March 13, 2014 – March 12, 2014).

3.3 FLOW AND STAGE RELATIONSHIPS

Figure 22 through Figure 24 describe relationships between flow and water level (or stage) measurements based on continuous data logging devices used to monitor conditions on 15-minute intervals. The relationships between these two variables were described by a regression model and then used to predict flow for each 15-minute interval recorded by the water level devices. The water level measurements collected by data loggers and the flow measurements collected in the field during sampling events from March 2013 through March 2014 (Appendix Table B6.1 through Table B6.3). Each of the regression models describing the relationship between water level (stage) and flow showed strong correlations (average R^2 = 0.93). These models were used to translate all recorded water level data into predicted flow results.

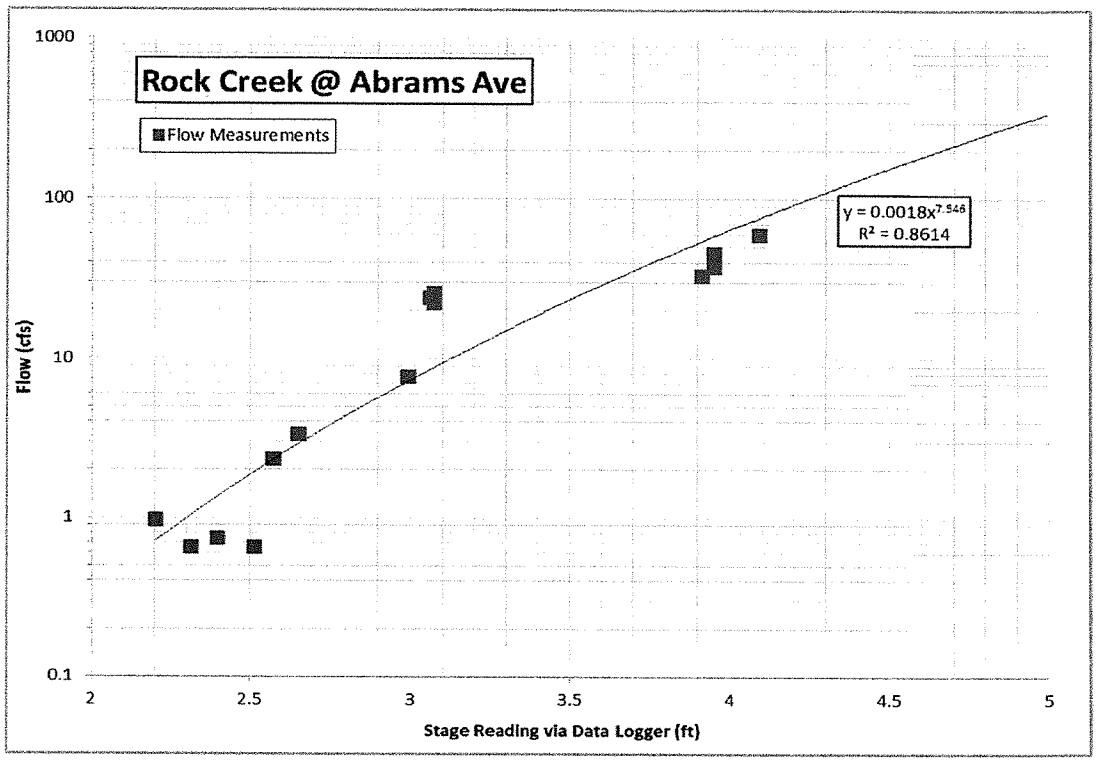

Figure 22. The relationship between flow and water level (stage) measurements collected at Abrams Avenue site on Rock Creek.

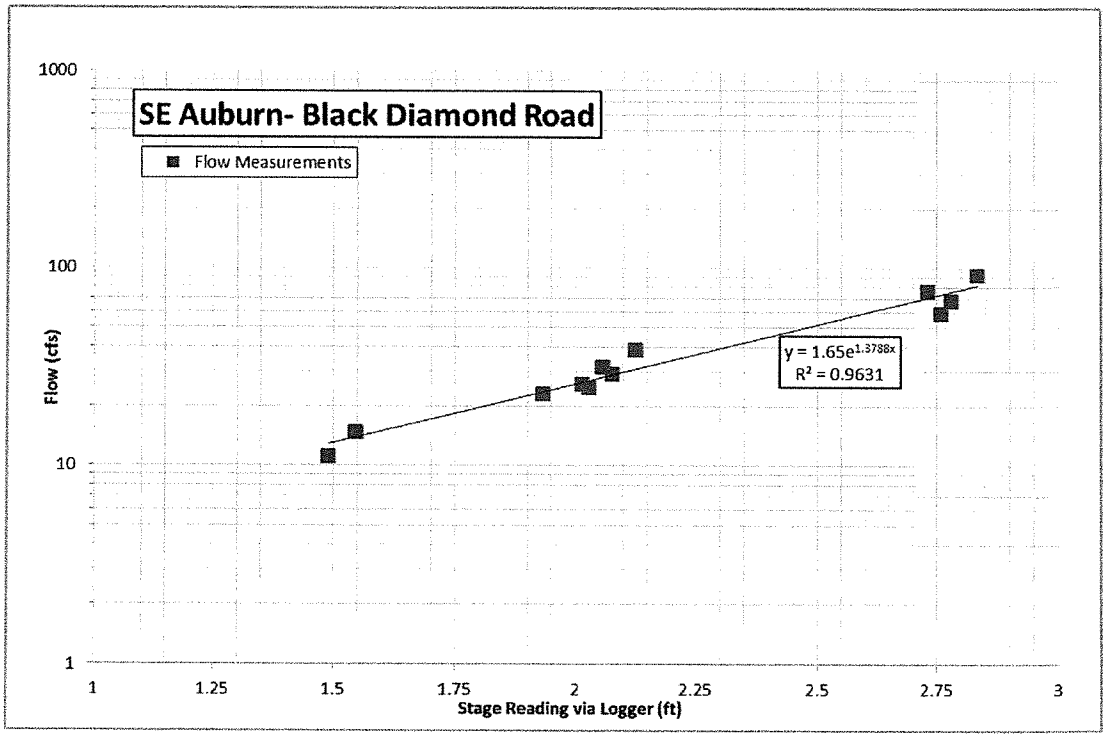

Figure 23. The relationship between flow and water level (stage) measurements collected at SE Auburn Black Diamond Road (ABDR) site on Rock Creek.

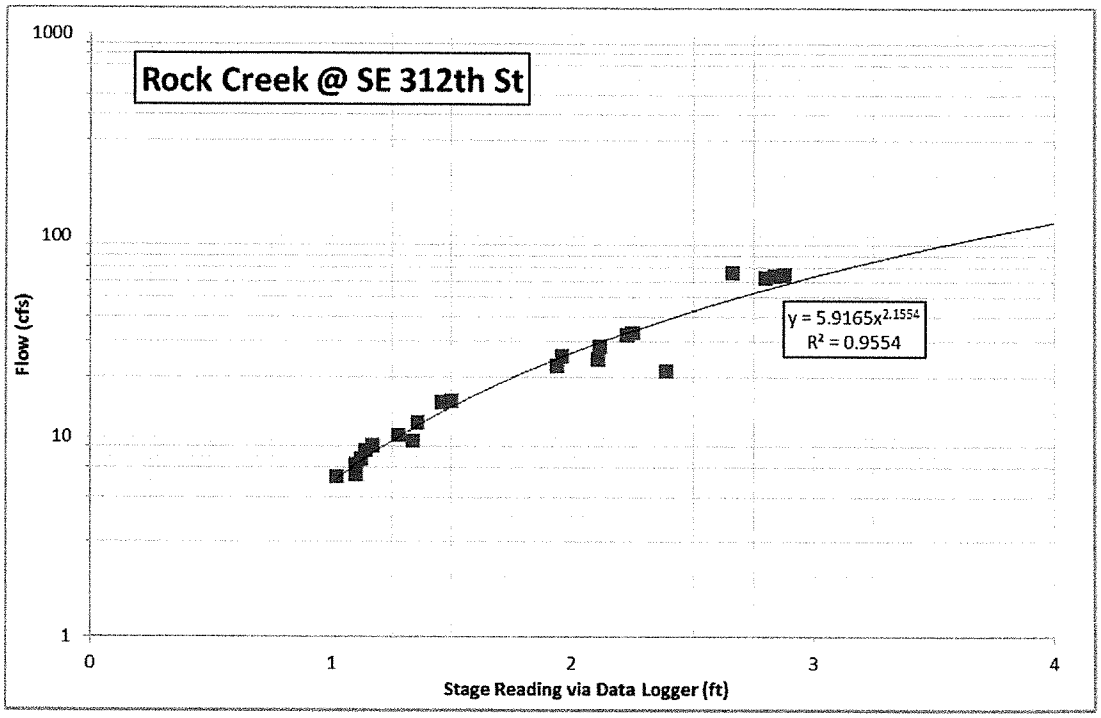

Figure 24. The relationship between flow and water level (stage) measurements collected at the SE 312th Street site on Rock Creek.

3.4 PHOSPHORUS LOADING FOR BASEFLOW AND STORMFLOW

A relationship between TP and flow is described by Figure 25 (Appendix Table A6.1). Strength of the correlation for this model for prediction of TP concentration using flow was R=0.81. This regression model was used to predict TP concentrations using daily average flows and then to calculate total annual TP load at a site by summing the daily average TP load ("average daily flow" x "predicted TP concentration") for all calendar days of the year.

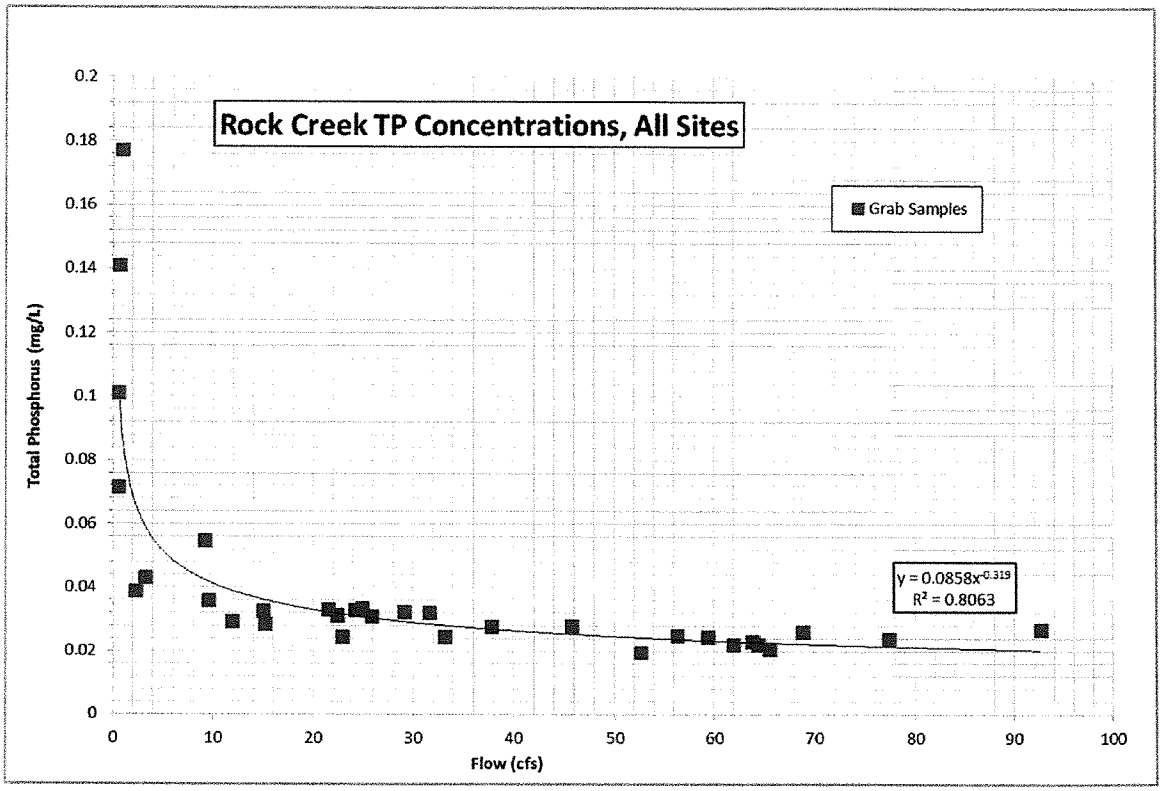

Figure 25. Relationship between total phosphorus (TP) and flow based on data from all Rock Creek sites.

The separation of TP load for baseflow and storm flow was calculated by determining percentage of total annual flow contributed by base flow and by storm flow as generated by the WHAT model (Appendix Table C6.1 through Table E6.1). Table 3 shows total annual loads calculated for each Rock Creek site. Annual TP load at the SE 312th Street site (lower-most site before Lake Sawyer) was about 407 kg/yr with the majority of the TP load contributed by baseflow conditions.

Table 3. TP loading estimates at each Rock Creek site

Site	Total TP Load (kg/yr)	Base Flow Load (kg/yr)	Storm Flow Load (kg/yr)
Rock Creek at Abrams Ave	201.69	136.99	64.70
Rock Creek at Auburn-Black Diamond Rd (ABDR)	376.88	263.39	113.49
Rock Creek at SE 312th Street	406.76	272.80	133.96

4.0 DISCUSSION

Several steps for quantifying physical traits like flow and relationship to chemical traits like TP (total phosphorus) were necessary in order to address each of the objectives listed in Section 1.1. Unexpected conditions like the presence of beaver dams impounding Rock Creek at two of the three monitoring locations combined with presence of impounded water behind each of the Rock Creek monitoring sites presented some complexity for developing tools like flow-rating curves that represent free-flowing stream conditions. Changes in hydrology at the monitoring sites affected by beaver dams also influenced dynamics of nutrients like TP above each of the monitoring sites. Portions of the monitoring record were identified and conditions re-described using predicted values for flow when a Rock Creek site affected by beaver dams no longer represented a free-flowing stream like other portions of the year. The presence of beaver dams was unpredictable between years, as was noted by visits to the same sites in previous monitoring years (2011-2012 and 2012-2013). Consequently, a conservative approach was used to estimate annual TP load by assuming the potential for free-flowing water throughout the calendar year and without the presence of beaver dams (as the lentic conditions caused by beaver dams allow more phosphorus to fall out of suspension when compared to free-flowing conditions, thereby decreasing the TP load).

Regression model development predicting TP concentrations from flow restricted use of data to those collected during free-flowing conditions and then used to estimate total annual TP load at each of the Rock Creek sites. The unaffected Abrams Avenue level logger data was used to fill in flow gaps during portions of the year when obstructions (beaver dams) occurred at the two lowermost Rock Creek sites (i.e., Auburn Black Diamond Road and SE 312th Street). These gaps were re-described using a relationship between the Abrams Avenue flow pattern and the lower Rock Creek drainage sites. Flow record that was affected by presence of beaver dams at the Auburn-Black Diamond Road (ABDR) was from March 14, 2013 through January 28, 2014 (Appendix Table D6.1). Estimates for flow and daily total mass of TP are highlighted in the results matrix for the ABDR site. Flow record affected by presence of beaver dams at the SE 312th Street site was from May 30, 2015 through January 28, 2015 (Appendix Table E6.1). Estimates for flow and daily total mass of TP are highlighted in the results matrix for the SE 312th Street site. Beaver dams impounded water behind the culverts at ABDR and SE 312th Street maintaining a level pool elevation behind each location. Even though periodic rain events occurred, level loggers at the two sites showed no change in pool elevation. Results describing phosphorus concentrations during the presence of beaver dams were not the same conditions as when the stream was free-flowing so were determined to be incompatible. The timing of appearance of beaver dams, number of times the dams were removed, and differences in number of annual rainfall events effect annual TP load estimates to Lake Sawyer. Any one of the factors previously mentioned could account for variation in annual TP load estimates and delivery to Lake Sawyer. The effect of these factors was removed by converting to free-flowing conditions with daily TP load estimates and will be compared against future data sets subject to the same conversions where beaver dams were present in the flow record.

Despite the influence of the beaver dams, the addition of level loggers to the Abrams Avenue and SE 312th Street sites in March 2013 provided a critical dataset in determining a current estimate of total annual TP load entering Lake Sawyer from Rock Creek at SE 312th Street and the quantity of TP contributed by portions of the drainage upstream of this site. The annual TP load pattern at each of the Rock Creek sites shows how assimilative capacity of upstream wetlands and lakes can differ and the role in nutrient retention. From the total annual TP loading estimates at each Rock Creek site, direct runoff flow (storm flow) contributes approximately one-third of the annual TP load and base flow contributes the remaining two-thirds of the annual TP load.

Taken as a whole, the data collected between November 2011 and March 2014 represents a great deal of new information about the Rock Creek drainage area that did not previously available. The entire system is characterized by relatively small inflows that empty into large wetlands that serve as individual settling basins, with road crossings and beaver dams acting as hydraulic controls that impound the flow at various locations. The tools developed during in this project will be useful for future studies in this drainage. In particular, during free-flowing conditions the flow rating curve for the SE 312th St site (where Rock Creek enters Lake Sawyer) can now be used in combination with the staff gage located at the site to obtain an estimate of total flow at that point.

Total annual TP load estimates in this study reflect current background conditions at each of the three Rock Creek sites. Any differences from previous studies (Carroll and Pelletier 1991) describing background conditions reflect changes in the landscape and activities that influence the Rock Creek drainage area. TP loading increases from the uppermost Abrams Avenue site to the lowermost SE 312th Street site on Rock Creek as a function of inputs to each of the wetlands directly above the site and the assimilation capacity for nutrients by the wetlands. Jones Lake serves as a large nutrient sink for drainage areas above this location and is exemplified in the lower nutrient load passing by the Abrams Avenue site. Input of nutrient below this location increases as assimilation capacity, or capacity of retention, of nutrients is lower in the wetland above Auburn Black Diamond Road and SE 312th Street sites on Rock Creek.

Nutrient conditions in Rock Creek as mediated by Jones Lake are described by results from the Rock Creek at Abrams Avenue monitoring site. This site serves as the primary check point for changes in contribution of phosphorus from Jones Lake and Ginder Creek that joins Rock Creek upstream of this check point. Any changes that occur in Jones Lake or Ginder Creek will be detected at the Abrams Avenue site and identified as sources other than those from the development occurring below this point in the watershed. Should changes occur in the future to the sequestering capacity of phosphorus (timing of release or quantity of phosphorus retention), monitoring activity at the Abrams Avenue site will detect those changes. Factors that may change how the wetland or Jones Lake influence internal phosphorus dynamics include: water level and how long individual periods are sustained (e.g., high water level during winter or low water during summer). Future monitoring for these large-scale changes (climate change or development) could begin with measurement of lake and wetland water levels. Since water volume of Jones Lake and in the Rock Creek wetlands is a primary factor that is related to phosphorus dynamics (e.g., settling from the water column or mobilization and transfer from the basin), changes to the timing and level of water outside of the background range would be an effective indicator.

Monitoring results generated from the 2013-2014 data set represented the most complete record including both flow and TP observations. Flow monitoring was initiated at the remaining two Rock Creek sites (i.e., SE 312th Street and Abrams Avenue) in March 2013 and recorded continuous water level (stage) height with storm event monitoring occurring during the same period. This monitoring year also had more intense rainfall events with higher 24-hour accumulations and hydrographs at each Rock Creek site that had higher discharges than in previous years. For these reasons, this year was selected as a calibration data set for the regression models. The regression models developed that represent flow-rating curves and TP predictive models using flow as input data showed strong relationships with the calibration data set so additional data would not necessarily improve the predictive capacity of the models. The earlier data collection effort served as an independent data set for validating regression models. The current flow-rating curves have greater utility for estimating flow from staff gage readings and TP concentrations from all Rock Creek sites using flow estimates as input data. Periodic calibration of the regression models should occur as flow patterns are permanently altered from natural or human-induced factors.

4.1 TOTAL PHOSPHORUS LOADING FROM THE VILLAGES (PLAT 2C) AND LAWSON HILLS (PLAT 2B)

Pre-development condition, annual TP runoff volume, loads, and TP concentrations were calculated for The Villages (Plat 2C; V29) and Lawson Hills (Plat 2B; Hammerhead Ditch), as required by Exhibit "O" to The Villages and Lawson Hills DAs. See Paragraph 1 on Page 2 of 3 of No Net Phosphorus Implementation Plan. These TP runoff loads and concentrations will be used as a baseline in order to design the type and size of BMP(s) necessary following completion of construction so that annual loading to Rock Creek does not exceed the TP load reported in Table 4. These TP runoff estimates are compared with TP runoff rates from forested watersheds in the literature.

The Flow-Weighted TP upstream (Abrams Ave.) was slightly higher at 0.044 mg/L than at the two lower sites (Auburn-Black Diamond Rd and SE 312th St. (Table 4). The section of Rock Creek to which runoff from The Villages (Plat 2C) will enter is between Abrams Ave and Auburn-Black Diamond Rd. The Villages MPD (Plat 2C) is till forest land, which is known to yield low rates of TP in runoff as compared with other types of land cover (e.g., residential or urban). TP runoff rates from forest have been reported by several authors (Reckhow and Chapra 1983). Based on export rates reported by these authors, TP in

runoff would be expected to be about 0.030 mg/L or higher in forested land cover. The relatively low TP concentrations measured in the 2012 to 2014 stormwater monitoring program in Rock Creek is consistent with the low impervious surface (3%) and high fraction of the watershed that was forested in the mid-1990s (80%) (May and Horner 2000; May et al. 1997).

The annual flow-weighted average was calculated for each of the Rock Creek sites in order to determine annual TP load (Table 4). The annual TP load calculated for the Auburn-Black Diamond Rd site (from stormwater monitoring results from Rock Creek, 2012-2014) represents the location where surface water runoff from The Villages MPD (Plat 2C) enters Rock Creek. The annual TP flow-weighted average concentration is assumed to be influenced by runoff from existing conditions and was used to calculate annual TP load from The Villages MPD (Plat 2C).

Table 4. Annual Flow-weighted TP estimates at each Rock Creek site

Rock Creek Site Names	Total Annual TP Load (kg/yr)	Base Flow Load (kg/yr)	Storm Flow Load (kg/yr)	Total Annual Flow (L)	Total FW Concentration (mg/L)
Abrams Ave	201.69	136.99	64.70	4,538,108,082.36	0.044
Auburn-Black Diamond Rd	376.88	263.39	113.49	10,972,111,680.40	0.034
SE 312th St	406.76	272.80	133.96	11,987,129,048.84	0.034

The total annual runoff from The Villages (Plat 2C) as a fraction of the total annual flow from Auburn-Black Diamond Rd is 0.05% and the annual TP load is assumed to contribute the same fraction of the TP load at this location (Table 5).

Table 5. Annual Flow-weighted TP loading estimates at the Rock Creek site below Plat 2C

TP Annual Load Comparison	Total Annual Flow/Runoff (Acre-Feet)	Total Annual Flow/Runoff (Liters)	Annual Flow-Weighted Concentration (mg/L)	Total Annual TP Load (kg)
Auburn-Black Diamond Rd	8 895.2357	10,972,111,680.40	0.034	376.88
The Villages (Plat 2C)	43.9	54,149,852.70	0.034	1.86

In order to determine the annual TP runoff load, an annual total phosphorus concentration of 0.034 mg/L was used to represent The Villages (Plat 2C) land use characteristics and runoff concentration. This total phosphorus concentration reflects runoff from till forest under existing conditions. Annual water runoff volume from The Villages (Plat 2C) was estimated at 43.90 acre-feet (Triad Associates, 2015). The annual TP load was calculated by multiplying annual total phosphorus concentration by the annual water runoff volume from The Villages (Plat 2C). The Villages (Plat 2C) contributes 1.86 kg/year of total phosphorus as runoff toward the Rock Creek drainage. The annual TP load from runoff is reported in Table 5 and Table 6. Similarly, annual TP load is calculated for the Lawson Hills (Plat 2B) site (represented by the Hammerhead Ditch monitoring results). Results from monitoring effort showed much higher concentrations than was the case for The Villages (Plat 2C). Since flow records were not generated from this site as water presence was intermittent and did not flow in quantities that could be reliably measured, the concentration used to calculate total annual phosphorus load makes several assumptions. The geometric mean was used to calculate the annual phosphorus concentration in order to best represent a limited data set that benefits by using a normalized concentration value.

Table 6. Estimates annual total phosphorus runoff from each development area

MPD Area	Annual Phosphorus Concentration (mg/L)	Annual Runoff (ac-ft)	Estimated Total Annual Phosphorus Runoff (kg)
Basin 5 (The Villages)	0.034[1]	43.90	1.86
Hammerhead Ditch (Lawson Hills)	0.073[2]	23.52	2.12

Note: [1] indicates a flow-weighted concentration.
[2] indicates a geometric mean concentration.

Flowing water was not present at the Hammerhead Ditch site during each visit and when flowing was during extreme high precipitation events. Since surface water was not continuously flowing, but concentrations for TP were occasionally high, an annualized expression using the geometric mean was selected for estimating annual TP runoff load. The normalized annual total phosphorus concentration of 0.073 mg/L was used to estimate load from Plat 2B as land use in this area was represented by predominantly till forest (13.17 acres), some till grass (1.5 acres), and a small impervious surface area (0.25 acres). The annual water runoff volume from Lawson Hills MPD (Plat 2B) was calculated as 23.52 acre-feet (Triad Associates, 2015) and used to determine the TP load. The annual TP load was calculated by multiplying the normalized annual total phosphorus concentration by the annual water runoff volume from Lawson Hills MPD (Plat 2B). Lawson Hills MPD (Plat 2B) contributes 2.12 kg/year of phosphorus as runoff to the Rock Creek drainage. The annual TP load from Lawson Hills MPD (Plat 2B) runoff is reported in Table 6 above.

5.0 REFERENCES

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6.0 APPENDIX

Table A6.1. Flow measurements and TP concentrations used to develop the predictive regression model for determining concentration from flow.

Date	Locations	Flow (cfs)	TP (mg/L)
5.29.13	Abrams Avenue	3.358541667	0.043
6.10.13	Abrams Avenue	0.746	0.141
7.10.13	Abrams Avenue	0.65275	0.101
8.6.13	Abrams Avenue	0.964125	0.177
9.23.13	Abrams Avenue	0.6565	0.072
10.21.13	Abrams Avenue	2.334	0.039
1.29.14 1H	Abrams Avenue	22.3665	0.031
1.29.14 2H	Abrams Avenue	24.225	0.033
1.29.14 3H	Abrams Avenue	25.8175	0.031
3.5.14 1H	Abrams Avenue	45.802875	0.028
3.5.14 2H	Abrams Avenue	37.759825	0.028
3.5.14 3H	Abrams Avenue	33.123675	0.025
1.29.14 1H	ABKD	24.8740625	0.034
1.29.14 2H	ABKD	29.072625	0.032
1.29.14 3H	ABKD	31.5560625	0.032
2.17.14 1H	ABKD	92.690125	0.027
3.5.14 1H	ABKD	59.5120625	0.024
3.5.14 2H	ABKD	69.016375	0.026
3.5.14 3H	ABKD	77.3978125	0.024
3.14.13	SE 312th Street	9.63	0.036
4.10.13	SE 312th Street	21.52	0.033
4.23.13	SE 312th Street	22.91	0.024
5.29.13	SE 312th Street	9.12	0.055
1.29.14 1H	SE 312th Street	11.95	0.030
1.29.14 2H	SE 312th Street	15.03	0.033
1.29.14 3H	SE 312th Street	15.19	0.029
2.17.14 1H	SE 312th Street	65.7	0.021
2.17.14 2H	SE 312th Street	52.77	0.020
2.17.14 3H	SE 312th Street	56.47	0.025
3.5.14 1H	SE 312th Street	62.1	0.022
3.5.14 2H	SE 312th Street	63.99	0.023
3.5.14 3H	SE 312th Street	64.62	0.022

Table B6.1. Rock Creek at Abrams Avenue flow and logger water level data

Tab Name	Date	Logger Depth	Discharge
4.23.13	4/23/13	2.99	7.71
5.29.13	5/29/13	2.65	3.36
6.10.13	6/10/13	2.40	0.75
7.10.13	7/10/13	2.31	0.65
8.6.13	8/6/13	2.20	0.96
9.23.13	9/23/13	2.52	0.66
10.21.13	10/21/13	2.57	2.33
1.29.14 1H	1/29/14 1H	3.07	22.37
1.29.14 2H	1/29/14 2H	3.06	24.23
1.29.14 3H	1/29/14 3H	3.07	25.82
2.17.14 1H	2/17/14 1H	4.09	59.76
3.5.14 1H	3/5/14 1H	3.95	45.80
3.5.14 2H	3/5/14 2H	3.95	37.76
3.5.14 3H	3/5/14 3H	3.91	33.12

Table B6.2. Rock Creek at SE Auburn-Black Diamond Road (ABDR) flow and logger water level data

Tab Name	Date	Logger Depth	Discharge
12.28.11	12/28/2011	1.93	23.08
1.11.12	1/11/2012	1.49	11.12
1.24.12	1/24/2012	2.02	26.08
2.8.12	2/8/2012	1.55	14.81
2.21.12	2/21/2012	2.13	38.80
1.29.14 1H	1/29/14 1H	2.03	24.87
1.29.14 2H	1/29/14 2H	2.08	29.07
1.29.14 3H	1/29/14 3H	2.06	31.56
2.17.14 1H	2/17/14 1H	2.834	92.69
3.5.14 1H	3/5/14 1H	2.76	59.51
3.5.14 2H	3/5/14 2H	2.78	69.02
3.5.14 3H	3/5/14 3H	2.73	77.40

Note:

1H = 1st round of samples collected during a storm event.
2H = 2nd round of samples collected during a storm event.
3H = 3rd round of samples collected during a storm event.

Table B6.3. SE 312th Street Rock Creek flow and logger water level data

Tab Name	Date	Logger Depth	Discharge
3.14.13	3/14/13	1.34	9.63
4.10.13	4/10/13	2.39	21.52
4.23.13	4/23/13	1.94	22.91
5.29.13	5/29/13	1.17	9.12
1.29.14 1H	1/29/14 1H	1.36	11.95
1.29.14 2H	1/29/14 2H	1.46	15.03
1.29.14 3H	1/29/14 3H	1.50	15.19
2.17.14 1H	2/17/14 1H	2.66	65.70
3.5.14 1H	3/5/14 1H	2.80	62.10
3.5.14 2H	3/5/14 2H	2.84	63.99
3.5.14 3H	3/5/14 3H	2.88	64.62

Note:

1H = 1st round of samples collected during a storm event.
2H = 2nd round of samples collected during a storm event.
3H = 3rd round of samples collected during a storm event.

Table C6.1. Variables used to calculate annual TP load for the Rock Creek Site at Abrams Avenue.

Date	Abrams Avenue daily AVG discharge (CFS)	Abrams Avenue daily Total Discharge (ft3)	Abrams daily Total Liters (L)	Abrams Avenue daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
3/14/2013	4.133851336	357164.7554	10113762.95	0.551801478	0.501210654	0.501210654	0.27656878	0.27656878	0.07
3/15/2013	4.0873691	353148.6902	10000040.83	0.547568518	0.466992665	0.533007335	0.255710481	0.291858036	0.05
3/16/2013	4.267893859	368746.0294	10441707.57	0.563924122	0.463700234	0.536299766	0.261491748	0.302432375	0.27
3/17/2013	4.314313696	372756.7034	10555277.02	0.568093846	0.443155452	0.556844548	0.251753885	0.316339961	0.04
3/18/2013	4.006719879	346180.5975	9802726.744	0.540187462	0.381546135	0.6159601	0.206106438	0.332733923	0.02
3/19/2013	3.945414576	340883.8193	9652738.935	0.534545028	0.356962025	0.643037975	0.190812276	0.343732752	0.25
3/20/2013	4.977986702	430098.0511	12179000.49	0.626237104	0.463855422	0.536144578	0.290483476	0.335753628	0.41
3/21/2013	4.521054462	390619.1055	11061083.09	0.586493855	0.389380531	0.610619469	0.228369288	0.358124566	0.02
3/22/2013	4.944866521	427236.4674	12097969.6	0.623396655	0.421052632	0.58097166	0.262482802	0.36217579	0.48
3/23/2013	4.57254786	395068.1351	11187065.37	0.591034699	0.356673961	0.643326039	0.210806687	0.380228012	0
3/24/2013	4.248532554	367073.2127	10394338.75	0.562180696	0.296470588	0.703529412	0.166670042	0.395510654	0
3/25/2013	4.028483972	348061.0152	9855974.155	0.542183954	0.253101737	0.746898263	0.137227701	0.404956254	0
3/26/2013	3.843976588	332119.5772	9404563.644	0.525146994	0.216145833	0.783854167	0.113508335	0.411638659	0
3/27/2013	3.69249073	319031.1991	9033942.658	0.510963319	0.184281843	0.815718157	0.094161262	0.416802057	0.02
3/28/2013	3.647855789	315174.7402	8924740.082	0.506748942	0.178082192	0.821917808	0.090242962	0.41650598	0.1
3/29/2013	3.581525924	309443.8399	8762459.324	0.50045563	0.164804469	0.835195531	0.082477324	0.417978305	0
3/30/2013	3.249107885	280722.9213	7949174.817	0.46833496	0.092307692	0.907692308	0.043230919	0.42510404	0
3/31/2013	3.08809023	266810.9959	7555233.608	0.452401547	0.058252427	0.941747573	0.026353488	0.426048059	0
4/1/2013	2.905077202	250998.6702	7107479.145	0.433965878	0.017182131	0.979381443	0.007456458	0.425018127	0
4/2/2013	2.821631672	243788.9765	6903323.689	0.425437652	0.007092199	0.992907801	0.003017288	0.422420363	0.02
4/3/2013	3.065234633	264836.2723	7499315.754	0.450118642	0.09771987	0.90228013	0.043985535	0.406133107	0
4/4/2013	3.399246705	293694.9154	8316500.179	0.482966283	0.188235294	0.811764706	0.0909113	0.392054982	0.37
4/5/2013	5.660050648	489028.376	13847718.72	0.683464308	0.48409894	0.51590106	0.330864347	0.352599961	1.03

Date	Abrams Avenue daily AVG discharge (CFS)	Abrams Avenue daily Total Discharge (ft3)	Abrams daily Total Liters (L)	Abrams Avenue daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
4/6/2013	9.332977379	806369.2456	22833796.65	0.960791094	0.642015005	0.359056806	0.6168423	0.344978582	0.84
4/7/2013	28.96251648	2502361.424	70858867.98	2.077570261	0.821132597	0.178867403	1.705960663	0.371609598	1.31
4/8/2013	32.46740942	2805184.174	79433839.21	2.245644702	0.781028642	0.218971358	1.753912832	0.49173187	0.16
4/9/2013	15.94313638	1377486.983	39006023.4	1.3835598	0.521329987	0.478670013	0.721291213	0.662268587	0
4/10/2013	11.74684534	1014927.438	28739497.27	1.123728966	0.336170213	0.662978723	0.377764206	0.745008395	0.26
4/11/2013	8.702761049	751918.5546	21291927.33	0.916118516	0.113793103	0.887356322	0.104247969	0.812923557	0.04
4/12/2013	7.567599165	653840.5679	18514672.59	0.832943769	0.001321004	0.998678996	0.001100322	0.831843447	0.46
4/13/2013	8.295995771	716774.0346	20296746.98	0.886736667	0.098795181	0.901204819	0.087605309	0.799131358	0.39
4/14/2013	10.76160973	929803.0804	26329047.87	1.058652928	0.295539033	0.704460967	0.312873263	0.745779665	0.19
4/15/2013	7.297016419	630462.2186	17852672.55	0.812544526	0	1	0	0.812544526	0.12
4/16/2013	6.55122091	566025.4866	16028030.5	0.755023818	0	1	0	0.755023818	0.02
4/17/2013	5.527374036	477565.1167	13523115.9	0.672512783	0	1	0	0.672512783	0
4/18/2013	4.991958074	431305.1776	12213182.45	0.627433505	0	1	0	0.627433505	0.33
4/19/2013	13.95386402	1205613.851	34139126.3	1.263520082	0.601433692	0.398566308	0.759923548	0.503596535	1.44
4/20/2013	25.60150385	2211969.933	62635910.19	1.91017868	0.72890625	0.27109375	1.392341178	0.517837502	0.01
4/21/2013	12.55092754	1084400.14	30706741.87	1.175556315	0.423904382	0.576095618	0.498323474	0.677232841	0.19
4/22/2013	9.205399256	795346.4957	22521667.65	0.95182747	0.212812161	0.786102063	0.20256046	0.748233538	0
4/23/2013	7.037174487	608011.8757	17216950.68	0.792726651	0	1	0	0.792726651	0
4/24/2013	5.823090241	503114.9968	14246606.74	0.696810604	0	1	0	0.696810604	0
4/25/2013	4.965118719	428986.2573	12147518.05	0.62513424	0	1	0	0.62513424	0
4/26/2013	4.228964968	365382.5732	10346465.25	0.560416118	0	1	0	0.560416118	0
4/27/2013	3.829796788	330894.4425	9369871.748	0.523826996	0	1	0	0.523826996	0.15
4/28/2013	3.708730345	320434.3018	9073674.036	0.512492606	0	1	0	0.512492606	0.07
4/29/2013	3.70414695	320038.2965	9062460.434	0.512061204	0.016216216	0.983783784	0.008303695	0.503757509	0.04
4/30/2013	3.539244911	305790.7603	8659015.802	0.496424644	0	1	0	0.496424644	0.02

Date	Abrams Avenue daily AVG discharge (CFS)	Abrams Avenue daily Total Discharge (ft3)	Abrams daily Total Liters (L)	Abrams Avenue daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
5/1/2013	3.281056276	283483.2623	8027338.842	0.471466153	0	1	0	0.471466153	0
5/2/2013	3.017577793	260718.7213	7382719.889	0.445340944	0	1	0	0.445340944	0
5/3/2013	2.859745741	247082.032	6996572.484	0.429342794	0	1	0	0.429342794	0
5/4/2013	2.569923839	222041.4197	6287502.474	0.399209526	0	1	0	0.399209526	0
5/5/2013	2.316771385	200169.0477	5668146.89	0.371989473	0	1	0	0.371989473	0
5/6/2013	2.218622929	191689.0211	5428019.672	0.361183636	0	1	0	0.361183636	0
5/7/2013	2.213021462	191205.0543	5414315.283	0.360562383	0.018099548	0.986425339	0.006526016	0.355667871	0
5/8/2013	2.196521562	189779.463	5373947.097	0.358729473	0.027272727	0.972727273	0.009783531	0.348945942	0
5/9/2013	2.13263225	184259.4264	5217637.325	0.351590378	0.014084507	0.985915493	0.004951977	0.346638401	0.01
5/10/2013	1.982010158	171245.6776	4849129.604	0.334483197	0	1	0	0.334483197	0
5/11/2013	1.781739251	153942.2713	4359152.507	0.311078552	0	1	0	0.311078552	0
5/12/2013	1.740292532	150361.2748	4257750.146	0.306132163	0	1	0	0.306132163	0.17
5/13/2013	1.948468287	168347.66	4767067.019	0.330617905	0.112820513	0.882051282	0.037300482	0.291621947	0.38
5/14/2013	2.127471349	183813.5246	5205010.813	0.351010734	0.192488263	0.807511737	0.067565446	0.283445287	0.01
5/15/2013	2.005937093	173312.9648	4907668.563	0.337227739	0.149253731	0.850746269	0.050332498	0.286895241	0.06
5/16/2013	1.864964997	161132.9758	4562770.248	0.320901643	0.091397849	0.908602151	0.02932972	0.291571923	0.05
5/17/2013	1.872921882	161820.4506	4582237.335	0.321833386	0.106951872	0.893048128	0.034420683	0.287412703	0.23
5/18/2013	1.820124874	157258.7891	4453065.68	0.315626973	0.093406593	0.906593407	0.02948164	0.286145333	0.04
5/19/2013	1.731458639	149598.0264	4236137.395	0.30507306	0.057803468	0.942196532	0.017634281	0.287438779	0.04
5/20/2013	1.637079845	141443.6986	4005232.925	0.293647819	0.024390244	0.975609756	0.007162142	0.286485677	0
5/21/2013	1.783347405	154081.2158	4363086.971	0.31126973	0.112359551	0.887640449	0.034974127	0.276295603	0.35
5/22/2013	2.275055941	196564.8333	5566087.072	0.367414939	0.293859649	0.701754386	0.107968425	0.257835045	0.49
5/23/2013	2.125664666	183657.4271	5200590.632	0.350807711	0.23943662	0.755868545	0.083996212	0.265164514	0.19
5/24/2013	2.065770662	178482.5852	5054055.668	0.344045687	0.217391304	0.782608696	0.074792541	0.269253146	0.14
5/25/2013	2.04274097	176492.8198	4997711.879	0.341429043	0.205882353	0.794117647	0.070294215	0.271134828	0.06

Date	Abrams Avenue daily AVG discharge (CFS)	Abrams Avenue daily Total Discharge (ft3)	Abrams daily Total Liters (L)	Abrams Avenue daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
5/26/2013	1.934987871	167182.9521	4734086.217	0.329058482	0.165803109	0.834196891	0.054558919	0.274499563	0.23
5/27/2013	2.321675423	200592.7566	5680144.969	0.372525519	0.297413793	0.702586207	0.110794228	0.261731291	0.52
5/28/2013	2.703811107	233609.2796	6615067.25	0.413257835	0.377777778	0.622222222	0.156119627	0.257138209	0.13
5/29/2013	2.942014121	254190.02	7197847.959	0.437715857	0.408163265	0.595238095	0.178659534	0.260545153	0.43
5/30/2013	2.879282658	248770.0217	7044370.949	0.431338092	0.375	0.625	0.161751785	0.269586308	0.14
5/31/2013	2.483620781	214584.8355	6076355.87	0.390030242	0.27016129	0.72983871	0.105371074	0.284659169	0.01
6/1/2013	2.089820968	180560.5317	5112896.463	0.346768379	0.138755981	0.861244019	0.048116187	0.298652193	0
6/2/2013	1.890250202	163317.6175	4624632.311	0.323858159	0.063492063	0.936507937	0.020562423	0.303295736	0.01
6/3/2013	1.788981009	154567.9591	4376869.986	0.311939022	0.027932961	0.972067039	0.00871338	0.303225641	0
6/4/2013	1.649947624	142555.4747	4036714.866	0.295217693	0	1	0	0.295217693	0
6/5/2013	1.752684251	151431.9193	4288067.372	0.307614932	0.074285714	0.931428571	0.022851395	0.286521337	0
6/6/2013	1.719828792	148593.2076	4207684.142	0.303676115	0.069767442	0.930232558	0.021186706	0.28248941	0
6/7/2013	1.657203746	143182.4036	4054467.487	0.296101219	0.048192771	0.951807229	0.014269938	0.281831281	0
6/8/2013	1.504806835	130015.3105	3681617.545	0.277274287	0	1	0	0.277274287	0
6/9/2013	1.382476171	119445.9411	3382326.826	0.261717683	0	1	0	0.261717683	0
6/10/2013	1.302191989	112509.3879	3185905.834	0.251268989	0	1	0	0.251268989	0
6/11/2013	1.304258419	112687.9274	3190961.502	0.251540459	0.023076923	0.984615385	0.00580478	0.247670605	0.07
6/12/2013	1.406639481	121533.6511	3441444.093	0.264824214	0.09929078	0.893617021	0.026294603	0.236651426	0.22
6/13/2013	1.459721836	126119.9667	3571313.872	0.271589606	0.136986301	0.863013699	0.037204056	0.23438555	0.06
6/14/2013	1.301528582	112452.0695	3184282.762	0.251181807	0.053846154	0.953846154	0.013525174	0.2395888	0.03
6/15/2013	1.197264433	103443.647	2929193.063	0.237297219	0	1	0	0.237297219	0
6/16/2013	1.098118785	94877.46306	2686626.146	0.223731632	0	1	0	0.223731632	0.01
6/17/2013	1.036776227	89577.466	2536547.189	0.215142747	0	1	0	0.215142747	0.08
6/18/2013	1.092784753	94416.6027	2673576.055	0.222990974	0.064220183	0.935779817	0.014320521	0.208670453	0.12
6/19/2013	1.24280796	107378.6077	3040618.56	0.243407718	0.177419355	0.822580645	0.04318524	0.200222478	0.09

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6/20/2013	1.354073318	116991.9346	3312837.215	0.258043859	0.244444444	0.762962963	0.063077388	0.196877907	0.36
6/21/2013	1.49657115	129303.7474	3661468.354	0.276239966	0.306666667	0.693333333	0.08471359	0.191526377	0.04
6/22/2013	1.291054069	111547.0716	3158656.116	0.249803409	0.19379845	0.80620155	0.048411513	0.201391896	0
6/23/2013	1.169167864	101016.1035	2860452.799	0.233490574	0.11965812	0.88034188	0.027939043	0.205551531	0.11
6/24/2013	1.383754296	119556.3712	3385453.851	0.261882435	0.253623188	0.753623188	0.066419458	0.197360676	0.41
6/25/2013	1.539845583	133042.6584	3767342.349	0.2816548	0.311688312	0.688311688	0.087788509	0.193866291	0.34
6/26/2013	1.628879675	140735.2039	3985170.622	0.292645342	0.337423313	0.662576687	0.098745361	0.193899981	0.16
6/27/2013	1.655933067	143072.617	4051358.682	0.295946587	0.331325301	0.662650602	0.098054592	0.196109184	0.1
6/28/2013	1.579208363	136443.6025	3863646.204	0.286538154	0.291139241	0.708860759	0.083422501	0.203115654	0
6/29/2013	1.465042827	126579.7003	3584332.056	0.272263405	0.231292517	0.761904762	0.062972488	0.207438785	0
6/30/2013	1.418742814	122579.3791	3471055.762	0.266373861	0.211267606	0.788732394	0.056276168	0.210097693	0
7/1/2013	1.38563316	119718.7051	3390050.627	0.262124536	0.18705036	0.805755396	0.049030489	0.211208259	0
7/2/2013	1.385183745	119679.8756	3388951.101	0.262066636	0.18705036	0.805755396	0.049019659	0.211161606	0
7/3/2013	1.282159921	110778.6171	3136895.946	0.248630177	0.1328125	0.8671875	0.033021195	0.215608982	0
7/4/2013	1.097287106	94805.60595	2684591.382	0.223616225	0.009090909	0.990909091	0.002032875	0.22158335	0
7/5/2013	1.050664159	90777.38336	2570525.009	0.217101154	0	1	0	0.217101154	0
7/6/2013	1.04501743	90289.50596	2556709.882	0.216305883	0.00952381	0.980952381	0.002060056	0.212185771	0
7/7/2013	1.017700992	87929.36572	2489878.263	0.212439152	0.009803922	0.990196078	0.002082737	0.210356415	0
7/8/2013	0.992628244	85763.08032	2428535.993	0.208860781	0	1	0	0.208860781	0
7/9/2013	0.994672638	85939.71592	2433537.748	0.209153627	0.02020202	0.97979798	0.004225326	0.204928301	0
7/10/2013	0.995335278	85996.96802	2435158.944	0.209248505	0.04	0.96	0.00836994	0.200878565	0
7/11/2013	0.996339648	86083.74562	2437616.208	0.209392273	0.05	0.94	0.010469614	0.196828737	0
7/12/2013	1.037524533	89642.11969	2538377.975	0.215248482	0.105769231	0.894230769	0.022766666	0.192481816	0
7/13/2013	1.119012852	96682.71041	2737744.974	0.226621907	0.169642857	0.830357143	0.038444788	0.188177119	0
7/14/2013	1.059121596	91508.10588	2591216.732	0.218289733	0.132075472	0.867924528	0.028830719	0.189459014	0

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7/15/2013	0.986732341	85253.67429	2414111.244	0.208015152	0.080808081	0.919191919	0.016809305	0.191205847	0
7/16/2013	0.882977258	76289.23508	2160267.012	0.19285763	0	1	0	0.19285763	0.02
7/17/2013	0.829775437	71692.59774	2030104.952	0.184866132	0	1	0	0.184866132	0.08
7/18/2013	0.923687761	79806.62257	2259868.17	0.198869352	0.108695652	0.891304348	0.021616234	0.177253118	0
7/19/2013	0.898000599	77587.25172	2197022.69	0.195086217	0.1	0.9	0.019508622	0.175577595	0
7/20/2013	0.899284251	77698.15927	2200163.236	0.195276082	0.111111111	0.888888889	0.021697342	0.173578739	0
7/21/2013	0.847738922	73244.64288	2074053.904	0.187582237	0.070588235	0.929411765	0.013241099	0.174341138	0
7/22/2013	0.813460029	70282.94652	1990188.14	0.182382922	0.037037037	0.962962963	0.006754923	0.175627998	0.03
7/23/2013	0.781725824	67541.11116	1912548.137	0.177506921	0.025641026	0.974358974	0.00455146	0.172955461	0
7/24/2013	0.749519386	64758.47496	1833752.784	0.172493343	0	1	0	0.172493343	0
7/25/2013	0.705756372	60977.35056	1726683.44	0.165569039	0	1	0	0.165569039	0
7/26/2013	0.643990295	55640.76153	1575568.316	0.155557882	0	1	0	0.155557882	0
7/27/2013	0.585565591	50592.86704	1432628.097	0.145802225	0	1	0	0.145802225	0
7/28/2013	0.543381241	46948.13923	1329421.069	0.138564336	0	1	0	0.138564336	0
7/29/2013	0.552496398	47735.6888	1351721.952	0.140143048	0.036363636	0.963636364	0.005096111	0.135046938	0
7/30/2013	0.547743747	47325.05977	1340094.253	0.139320952	0.036363636	0.963636364	0.005066216	0.134254735	0
7/31/2013	0.57470215	49654.26574	1406049.912	0.143954672	0.105263158	0.912280702	0.015153123	0.131327069	0.09
8/1/2013	0.655173392	56606.98109	1602928.562	0.157392419	0.212121212	0.787878788	0.033386271	0.124006149	0.01
8/2/2013	0.710572156	61393.43426	1738465.599	0.16633758	0.267605634	0.732394366	0.044512873	0.121824706	0.04
8/3/2013	0.740417947	63972.11063	1811485.462	0.171064148	0.283783784	0.716216216	0.048545231	0.122518917	0
8/4/2013	0.736667012	63648.02984	1802308.531	0.170473511	0.27027027	0.72972973	0.046073922	0.124399589	0
8/5/2013	0.714016136	61690.99414	1746891.543	0.166886178	0.23943662	0.76056338	0.039958662	0.126927516	0
8/6/2013	0.69352975	59920.97043	1696770.135	0.16361026	0.217391304	0.782608696	0.035567448	0.128042812	0
8/7/2013	0.676702889	58467.12959	1655602.015	0.160896376	0.205882353	0.794117647	0.033125724	0.127770652	0
8/8/2013	0.657067716	56770.65066	1607563.16	0.157702182	0.181818182	0.818181818	0.028673124	0.129029058	0

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8/9/2013	0.631642796	54573.93754	1545359.275	0.153520483	0.158730159	0.857142857	0.024368331	0.131588985	0
8/10/2013	0.654383336	56538.72025	1600995.634	0.157263144	0.184615385	0.815384615	0.029033196	0.128229948	0.13
8/11/2013	0.656249307	56699.94013	1605560.865	0.157568389	0.181818182	0.803030303	0.028648798	0.126532192	0
8/12/2013	0.735422677	63540.51933	1799264.178	0.170277362	0.27027027	0.72972973	0.046020909	0.124256453	0
8/13/2013	0.559447306	48336.24727	1368727.847	0.141341342	0.053571429	0.946428571	0.007571858	0.133769484	0
8/14/2013	0.353740535	30563.18219	865451.5175	0.103442634	0	1	0	0.103442634	0.02
8/15/2013	0.262727188	22699.62903	642780.8554	0.084474984	0	1	0	0.084474984	0.13
8/16/2013	0.229672351	19843.69113	561909.833	0.077083289	0	1	0	0.077083289	0
8/17/2013	0.228590642	19750.23151	559263.3555	0.076835869	0	1	0	0.076835869	0
8/18/2013	0.241349784	20852.62131	590479.507	0.079731099	0.083333333	0.916666667	0.006644258	0.073086841	0
8/19/2013	0.32517291	28094.93946	795558.7817	0.097677623	0.303030303	0.696969697	0.02959928	0.068078343	0
8/20/2013	0.381184814	32934.36791	932595.9093	0.108842508	0.394736842	0.605263158	0.042964148	0.06587836	0
8/21/2013	0.416156907	35955.9568	1018157.637	0.115547165	0.404761905	0.571428571	0.046769091	0.066026951	0
8/22/2013	0.461168751	39844.98009	1128282.332	0.123917823	0.456521739	0.543478261	0.05657118	0.067346643	0
8/23/2013	0.498572135	43076.63248	1219792.387	0.130676644	0.46	0.54	0.060111256	0.070565388	0
8/24/2013	0.507789492	43873.01208	1242343.308	0.13231705	0.450980392	0.549019608	0.059672395	0.072644655	0.02
8/25/2013	0.520596969	44979.57808	1273677.717	0.134580711	0.442307692	0.557692308	0.059526084	0.075054627	0.01
8/26/2013	0.563229159	48662.99932	1377980.419	0.141991314	0.464285714	0.553571429	0.065924539	0.078602334	0.02
8/27/2013	0.601566756	51975.36772	1471776.093	0.148503774	0.466666667	0.533333333	0.069301761	0.079202013	0.07
8/28/2013	0.676134816	58418.04807	1654212.184	0.160804382	0.485294118	0.5	0.078037421	0.080402191	0.28
8/29/2013	0.885120152	76474.38115	2165509.756	0.193176246	0.573033708	0.426966292	0.1106965	0.082479745	0.98
8/30/2013	1.039223014	89788.86839	2542533.428	0.215488385	0.596153846	0.403846154	0.12846423	0.087024155	0.11
8/31/2013	1.018626326	88009.31458	2492142.159	0.212570673	0.549019608	0.450980392	0.116705468	0.095865206	0
9/1/2013	1.029076854	88912.24021	2517710.124	0.214053416	0.524271845	0.475728155	0.112222179	0.101831237	0
9/2/2013	1.071283859	92558.92544	2620972.58	0.219993683	0.514018692	0.485981308	0.113080865	0.106912818	0

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9/3/2013	1.08339852	93605.63216	2650611.965	0.22168484	0.490740741	0.518518519	0.108789782	0.114947695	0.14
9/4/2013	1.060581487	91634.24047	2594788.46	0.218494594	0.452830189	0.547169811	0.098940948	0.119553646	0
9/5/2013	1.052763237	90958.7437	2575660.554	0.217396435	0.428571429	0.580952381	0.093169901	0.126296976	0.75
9/6/2013	2.129295535	183971.1342	5209473.814	0.351215667	0.666666667	0.333333333	0.234143778	0.117071889	0.8
9/7/2013	1.63730977	141463.5641	4005795.453	0.293675904	0.530487805	0.463414634	0.155791486	0.136093712	0
9/8/2013	1.445439015	124885.9309	3536369.929	0.26977708	0.44137931	0.551724138	0.119074021	0.148842527	0.01
9/9/2013	1.342400899	115983.4376	3284279.807	0.256526955	0.388059701	0.619402985	0.099547773	0.158893561	0
9/10/2013	1.288056239	111288.0591	3151321.711	0.249408253	0.341085271	0.651162791	0.085069482	0.162405374	0
9/11/2013	1.194209856	103179.7316	2921719.824	0.236884763	0.285714286	0.714285714	0.067681361	0.169203402	0
9/12/2013	1.126202754	97303.91793	2755335.583	0.227612494	0.238938053	0.761061947	0.054385286	0.173227208	0
9/13/2013	1.024952328	88555.88111	2507619.174	0.213468796	0.166666667	0.843137255	0.035578133	0.179983495	0.02
9/14/2013	0.953531384	82385.11157	2332882.727	0.203222754	0.115789474	0.894736842	0.023531056	0.181830885	0
9/15/2013	0.916947183	79224.23662	2243376.864	0.197879902	0.086956522	0.913043478	0.017206948	0.180672954	0.21
9/16/2013	1.085131001	93755.31852	2654850.604	0.221926193	0.229357798	0.770642202	0.050900503	0.17102569	0.5
9/17/2013	1.41451563	122214.1504	3460713.654	0.265833116	0.390070922	0.617021277	0.103693769	0.164024689	0.05
9/18/2013	1.361964955	117673.7721	3332144.67	0.259067064	0.345588235	0.654411765	0.08953053	0.169536535	0
9/19/2013	1.293992798	111800.9778	3165845.927	0.250190491	0.302325581	0.697674419	0.075638986	0.174551506	0
9/20/2013	1.166769632	100808.8962	2854585.351	0.233164307	0.222222222	0.769230769	0.05181429	0.179357159	0.09
9/21/2013	1.131461848	97758.30365	2768202.333	0.228335788	0.203539823	0.796460177	0.046475426	0.181860362	0.07
9/22/2013	1.499384088	129546.7852	3668350.408	0.276593447	0.38	0.62	0.10510551	0.171487937	0.75
9/23/2013	2.176886403	188082.9852	5325908.277	0.356542546	0.536697248	0.463302752	0.191355403	0.165187143	0.81
9/24/2013	2.307898392	199402.421	5646438.476	0.371018671	0.528138528	0.467532468	0.195949255	0.173463275	0.07
9/25/2013	2.000493488	172842.6373	4894350.393	0.336604252	0.435	0.565	0.14642285	0.190181402	0.03
9/26/2013	1.867159335	161322.5666	4568138.853	0.321158724	0.374331551	0.625668449	0.120219843	0.200938881	0
9/27/2013	1.846159159	159508.1513	4516760.419	0.318694441	0.351351351	0.643243243	0.111973722	0.204998046	0.1

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9/28/2013	4.039206723	348987.4609	9882208.132	0.543166322	0.658415842	0.341584158	0.357629311	0.185537011	1.72
9/29/2013	5.613050263	484967.5427	13732728.91	0.679594219	0.702317291	0.297682709	0.477290771	0.202303448	0.67
9/30/2013	12.9861255	1122001.243	31771484.79	1.203163943	0.809083911	0.190916089	0.973460588	0.229703355	1.43
10/1/2013	21.00340782	1814694.435	51386339.38	1.669262103	0.819047619	0.180952381	1.367205151	0.302056952	0.82
10/2/2013	11.8316295	1022252.789	28946927.78	1.129245972	0.633981403	0.366018597	0.715920946	0.413325026	0.28
10/3/2013	8.35616292	721972.4763	20443950.22	0.891111199	0.455741627	0.544258373	0.406116468	0.484994732	0
10/4/2013	5.964880778	515365.6992	14593507.43	0.70832082	0.234899329	0.766778523	0.166384085	0.543125193	0.01
10/5/2013	4.272537099	369147.2053	10453067.58	0.564341856	0	1	0	0.564341856	0
10/6/2013	3.708383675	320404.3495	9072825.885	0.512459983	0	1	0	0.512459983	0
10/7/2013	3.473118171	300077.41	8497232.003	0.490089304	0	1	0	0.490089304	0.23
10/8/2013	3.678665407	317836.6911	9000118.015	0.509659695	0.067934783	0.929347826	0.034623621	0.47365113	0.34
10/9/2013	3.423200622	295764.5338	8375105.15	0.485281389	0.01754386	0.98245614	0.008513709	0.47676768	0
10/10/2013	3.099996254	267839.6764	7584362.547	0.45358863	0	1	0	0.45358863	0.14
10/11/2013	3.002847594	259446.0321	7346681.403	0.443859352	0	1	0	0.443859352	0
10/12/2013	3.237416659	279712.7993	7920571.396	0.467186676	0.083333333	0.913580247	0.038932223	0.426812519	0.25
10/13/2013	3.071840482	265407.0176	7515477.437	0.450779016	0.048859935	0.951140065	0.022025033	0.428753982	0
10/14/2013	2.829359424	244456.6543	6922230.188	0.426230785	0	1	0	0.426230785	0
10/15/2013	2.738472453	236604.02	6699868.713	0.416858257	0	1	0	0.416858257	0
10/16/2013	2.754718067	238007.641	6739614.769	0.41854075	0.025454545	0.978181818	0.010653765	0.409408952	0
10/17/2013	2.6438857	228431.7244	6468455.455	0.406998179	0.003787879	1	0.00154166	0.406998179	0
10/18/2013	2.550175725	220335.1827	6239187.301	0.397117885	0	1	0	0.397117885	0.01
10/19/2013	2.352101697	203221.5867	5754585.025	0.375843293	0	1	0	0.375843293	0
10/20/2013	2.280001934	196992.1671	5578187.798	0.367958708	0	1	0	0.367958708	0.01
10/21/2013	2.288172137	197698.0726	5598176.783	0.368856129	0.021834061	0.978165939	0.008053627	0.360802501	0.01
10/22/2013	2.272654842	196357.3783	5560212.611	0.367150822	0.030837004	0.969162996	0.011321832	0.355828991	0

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10/23/2013	2.325376436	200912.5241	5689199.762	0.372929826	0.068669528	0.931330472	0.025608915	0.347320911	0.01
10/24/2013	2.285875948	197499.6819	5592558.992	0.368604017	0.065502183	0.934497817	0.024144368	0.344459649	0
10/25/2013	2.249309179	194340.3131	5503095.777	0.364578185	0.062222222	0.937777778	0.022684865	0.34189332	0.02
10/26/2013	2.339249422	202111.15	5723141.014	0.374443522	0.111111111	0.888888889	0.041604836	0.332838686	0
10/27/2013	2.395025242	206930.1809	5859600.546	0.380500628	0.1375	0.8625	0.052318836	0.328181792	0.12
10/28/2013	2.382663035	205862.0863	5829355.524	0.379162041	0.138655462	0.861344538	0.052572888	0.326589153	0.43
10/29/2013	2.501374907	216118.7919	6119792.608	0.391926798	0.18	0.82	0.070546824	0.321379974	0
10/30/2013	2.630253585	227253.9097	6435103.511	0.405567909	0.220532319	0.779467681	0.089440832	0.316127077	0.02
10/31/2013	2.746435403	237292.0188	6719350.638	0.417683344	0.247272727	0.752727273	0.1032817	0.314401645	0.18
11/1/2013	2.599769854	224620.1154	6360522.884	0.402360995	0.203846154	0.796153846	0.082019741	0.320341253	0
11/2/2013	3.374835615	291585.7972	8256776.702	0.480601631	0.370919881	0.632047478	0.1782647	0.303763049	0.7
11/3/2013	3.048616137	263400.4342	7458657.416	0.448455312	0.291803279	0.708196721	0.13086073	0.317594581	0.23
11/4/2013	3.034079012	262144.4266	7423091.3	0.446997931	0.280528053	0.719471947	0.125395459	0.321602472	0.03
11/5/2013	3.110167544	268718.4758	7609247.336	0.454601602	0.289389068	0.710610932	0.131556734	0.323044868	0.15
11/6/2013	3.157859603	272839.0697	7725929.369	0.459337299	0.291139241	0.708860759	0.133731112	0.325606187	0.06
11/7/2013	4.880872519	421707.3856	11941403.7	0.617891153	0.510245902	0.489754098	0.315276429	0.302614725	0.97
11/8/2013	5.082127254	439095.7947	12433787.8	0.635129395	0.498031496	0.501968504	0.316314443	0.318814952	0
11/9/2013	4.416100032	381551.0428	10804304.57	0.577187206	0.402714932	0.597285068	0.232441907	0.3447453	0.07
11/10/2013	4.199807632	362863.3794	10275129.74	0.557781909	0.354761905	0.645238095	0.197879772	0.359902136	0.01
11/11/2013	4.012570003	346686.0482	9817039.49	0.540724452	0.314214464	0.685785536	0.169903444	0.370821008	0
11/12/2013	3.826862426	330640.9136	9362692.621	0.523553641	0.274151436	0.725848564	0.143532983	0.380020659	0.09
11/13/2013	3.736652037	322846.736	9141986.454	0.515117013	0.251336898	0.748663102	0.129467912	0.3856491	0.03
11/14/2013	3.724078807	321760.4089	9111225.148	0.513936011	0.244623656	0.758064516	0.125720906	0.389596653	0.18
11/15/2013	4.281055497	369883.195	10473908.46	0.565107847	0.329439252	0.670560748	0.186168707	0.37893914	0.53
11/16/2013	4.713783134	407270.8628	11532607.57	0.603406383	0.373673036	0.628450106	0.225476695	0.379210806	0

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11/17/2013	4.415650332	381512.1887	10803204.34	0.577147179	0.319004525	0.680995475	0.184112562	0.393034618	0.44
11/18/2013	8.314716144	718391.4748	20342547.71	0.888098838	0.598074609	0.403128761	0.531149365	0.358018184	0.71
11/19/2013	16.03917853	1385785.025	39240997.39	1.389230241	0.736284289	0.263715711	1.0228684	0.36636184	0.14
11/20/2013	7.706344181	665828.1372	18854122.2	0.84331333	0.428015564	0.570687419	0.360951231	0.481268308	0.01
11/21/2013	5.543341446	478944.7009	13562181.31	0.673835184	0.205776173	0.796028881	0.138659226	0.536392268	0
11/22/2013	4.90909521	424145.8261	12010452.53	0.620322015	0.112016293	0.887983707	0.069486173	0.550835843	0
11/23/2013	4.67706052	404098.0289	11442763.06	0.600201131	0.079059829	0.920940171	0.047451799	0.552749332	0.01
11/24/2013	4.542624558	392482.7618	11113855.87	0.588397969	0.066079295	0.933920705	0.038880923	0.549517046	0
11/25/2013	4.400624939	380213.9947	10766443.64	0.575809041	0.05	0.95	0.028790452	0.547018589	0
11/26/2013	4.143733415	358018.567	10137940.16	0.55269944	0.012077295	0.990338164	0.006675114	0.547359349	0
11/27/2013	3.986493012	344432.9963	9753240.269	0.53832888	0	1	0	0.53832888	0.01
11/28/2013	3.712246543	320738.1013	9082276.667	0.512823446	0	1	0	0.512823446	0
11/29/2013	3.457475112	298725.8497	8458960.139	0.488584995	0	1	0	0.488584995	0.06
11/30/2013	3.393361424	293186.4271	8302101.418	0.482396685	0	1	0	0.482396685	0.27
12/1/2013	4.830646167	417367.8288	11818521.34	0.61355396	0.289855072	0.710144928	0.177841728	0.435712233	0.57
12/2/2013	4.835816569	417814.5516	11831171.09	0.614001102	0.280991736	0.716942149	0.172529235	0.440203269	0
12/3/2013	4.412502457	381240.2123	10795502.84	0.576866955	0.210884354	0.789115646	0.121652215	0.45521474	0.04
12/4/2013	4.05316579	350193.5243	9916359.988	0.544443941	0.148148148	0.854320988	0.080658362	0.465129885	0
12/5/2013	3.733009991	322532.0632	9133075.928	0.514775046	0.085790885	0.914209115	0.044163007	0.47061204	0
12/6/2013	3.525516795	304604.651	8625428.983	0.495112536	0.04815864	0.95184136	0.023843946	0.471268589	0
12/7/2013	3.211269986	277453.7268	7856601.691	0.464613814	0	1	0	0.464613814	0
12/8/2013	3.01301002	260324.0658	7371544.505	0.444881756	0	1	0	0.444881756	0
12/9/2013	2.895607363	250180.4761	7084310.507	0.433002018	0	1	0	0.433002018	0
12/10/2013	3.018152653	260768.3892	7384126.324	0.445398718	0.056291391	0.943708609	0.025072113	0.420326604	0
12/11/2013	3.080066046	266117.7064	7535601.868	0.451600676	0.084415584	0.915584416	0.038122135	0.413478541	0

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12/12/2013	3.231603573	279210.5487	7906349.265	0.466615237	0.13622291	0.86377709	0.063563685	0.403051551	0.23
12/13/2013	3.622454353	312980.0561	8862593.652	0.504343227	0.226519337	0.773480663	0.114243494	0.390099734	0.2
12/14/2013	3.384108991	292387.0168	8279464.678	0.481500564	0.174556213	0.825443787	0.084048915	0.397451649	0
12/15/2013	3.262916683	281916.0014	7982959.028	0.46968953	0.150306748	0.852760736	0.070597506	0.400532789	0.1
12/16/2013	3.344746792	288986.1229	8183162.244	0.477679468	0.173652695	0.829341317	0.082950327	0.396159319	0.03
12/17/2013	3.367934807	290989.5674	8239893.381	0.479932176	0.181008902	0.818991098	0.086871996	0.39306018	0.01
12/18/2013	3.859802659	333486.9497	9443283.257	0.52661841	0.277202073	0.722797927	0.145979715	0.380638695	0.35
12/19/2013	3.9306246	339605.9654	9616554.202	0.533179609	0.282442748	0.717557252	0.150592714	0.382586895	0.01
12/20/2013	3.897801005	336770.0068	9536248.928	0.530143443	0.269230769	0.730769231	0.142730927	0.387412516	0.47
12/21/2013	6.780171348	585806.8045	16588174.12	0.772894291	0.544247788	0.455752212	0.420646008	0.352248283	0.45
12/22/2013	8.547256129	738482.9296	20911473.42	0.904938778	0.597660819	0.402339181	0.540846451	0.364092327	0.45
12/23/2013	12.39926591	1071296.575	30335690.85	1.165863919	0.674193548	0.325806452	0.786017932	0.379845986	0.37
12/24/2013	9.839040984	850093.141	24071917.46	0.995969502	0.553861789	0.446138211	0.55162945	0.444340052	0.01
12/25/2013	7.190393807	621250.0249	17591812.71	0.804440221	0.371349096	0.628650904	0.298728149	0.505712072	0
12/26/2013	5.875659357	507656.9684	14375220.84	0.701088357	0.227891156	0.770408163	0.159771836	0.540124193	0
12/27/2013	5.482920244	473724.3091	13414356.52	0.668824736	0.175182482	0.824817518	0.117166377	0.551658359	0.13
12/28/2013	4.958658293	428428.0766	12131712.16	0.624580199	0.098790323	0.901209677	0.061702479	0.562877719	0
12/29/2013	4.311508958	372514.374	10548415.03	0.567842314	0	1	0	0.567842314	0
12/30/2013	3.999022311	345515.5277	9783894.094	0.539480511	0	1	0	0.539480511	0.03
12/31/2013	3.984251817	344239.357	9747757.024	0.538122759	0.015075377	0.984924623	0.008112403	0.530010356	0.03
1/1/2014	3.707327947	320313.1346	9070242.971	0.512360627	0	1	0	0.512360627	0.01
1/2/2014	3.613122252	312173.7626	8839762.001	0.503458054	0	1	0	0.503458054	0.63
1/3/2014	7.220263351	623830.7535	17664890.68	0.806714425	0.472299169	0.527700831	0.381010553	0.425703873	0.08
1/4/2014	4.917168444	424843.3536	12030204.27	0.621016554	0.221544715	0.776422764	0.137582936	0.48217139	0.01
1/5/2014	4.164800193	359838.7367	10189481.54	0.554611453	0.09375	0.908653846	0.051994824	0.50394983	0

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1/6/2014	3.869377666	334314.2303	9466709.198	0.527507704	0.03875969	0.96124031	0.020446035	0.507061669	0.02
1/7/2014	5.100527333	440685.5616	12478804.91	0.636694462	0.264705882	0.735294118	0.168536769	0.468157693	0.49
1/8/2014	6.40612164	553488.9097	15673034.76	0.743595104	0.394695788	0.605304212	0.293493856	0.450101249	0.45
1/9/2014	7.150944627	617841.6157	17495297.46	0.801432019	0.433566434	0.566433566	0.347474022	0.453957997	0.18
1/10/2014	7.564585657	653580.2008	18507299.83	0.832717875	0.44047619	0.55952381	0.366792397	0.465925478	0.28
1/11/2014	13.25484875	1145218.932	32428935.45	1.220063477	0.636226415	0.363773585	0.776236612	0.443826865	0.88
1/12/2014	14.90358865	1287670.059	36462695.53	1.321466859	0.632214765	0.367785235	0.83545086	0.486015999	0.14
1/13/2014	9.399496642	812116.5099	22996540.79	0.965449216	0.396808511	0.603191489	0.383098466	0.582350751	0.04
1/14/2014	7.532322939	650792.702	18428366.78	0.830297645	0.243027888	0.756972112	0.201785483	0.628512162	0.03
1/15/2014	6.519679648	563300.3215	15950862.55	0.752546403	0.13190184	0.86809816	0.099262256	0.653284148	0
1/16/2014	5.768001507	498355.3302	14111828.21	0.692314579	0.036395147	0.963604853	0.025196891	0.667117688	0.01
1/17/2014	5.102996534	440898.9005	12484845.99	0.63690435	0	1	0	0.63690435	0
1/18/2014	4.502125671	388983.658	11014772.45	0.584820515	0	1	0	0.584820515	0.01
1/19/2014	4.143813274	358025.4669	10138135.54	0.552706694	0	1	0	0.552706694	0
1/20/2014	3.799114935	328243.5304	9294806.402	0.520965472	0	1	0	0.520965472	0.01
1/21/2014	3.713029435	320805.7432	9084192.068	0.512897094	0	1	0	0.512897094	0
1/22/2014	3.611934926	312071.1776	8836857.123	0.503345381	0	1	0	0.503345381	0.02
1/23/2014	3.426070028	296012.4504	8382125.355	0.485558365	0	1	0	0.485558365	0
1/24/2014	3.272167351	282715.2591	8005591.45	0.470595949	0	1	0	0.470595949	0.01
1/25/2014	3.073766462	265573.4223	7520189.485	0.450971467	0	1	0	0.450971467	0
1/26/2014	2.850251805	246261.756	6973344.892	0.428371612	0	1	0	0.428371612	0
1/27/2014	2.630518896	227276.8326	6435752.614	0.405595768	0	1	0	0.405595768	0
1/28/2014	2.613709811	225824.5277	6394627.986	0.40382897	0.011494253	0.988505747	0.004641712	0.399187258	0.18
1/29/2014	9.904141657	855717.8392	24231190.91	1.000452501	0.68989899	0.311111111	0.69021117	0.311251889	1.73
1/30/2014	12.75078549	1101667.866	31195708.63	1.188271989	0.70745098	0.293333333	0.840644183	0.348559783	0.1

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1/31/2014	7.389444468	638448.0021	18078804.39	0.819539391	0.466847091	0.533152909	0.38259958	0.436939811	0.07
2/1/2014	5.94666722	513792.0478	14548946.66	0.706847213	0.324369748	0.67394958	0.229279852	0.476379382	0.02
2/2/2014	4.961878102	428706.268	12139589.65	0.624856356	0.191532258	0.808467742	0.119680149	0.505176207	0.02
2/3/2014	4.332649511	374340.9177	10600136.9	0.569736938	0.085450346	0.914549654	0.048684219	0.521052719	0
2/4/2014	4.033486194	348493.2072	9868212.449	0.542642338	0.034739454	0.965260546	0.018851099	0.523791239	0
2/5/2014	3.621290782	312879.5235	8859746.892	0.5042329	0	1	0	0.5042329	0
2/6/2014	3.222606084	278433.1656	7884336.264	0.465730116	0	1	0	0.465730116	0
2/7/2014	3.173387624	274180.6907	7763919.783	0.460874258	0.003154574	0.996845426	0.001453862	0.459420396	0
2/8/2014	3.062419269	264593.0248	7492427.766	0.449837057	0	1	0	0.449837057	0
2/9/2014	2.858150759	246944.2256	6992670.248	0.429179707	0	1	0	0.429179707	0.09
2/10/2014	3.712805155	320786.3654	9083643.351	0.512875996	0.226415094	0.773584906	0.116122867	0.396753129	0.6
2/11/2014	4.66494828	403051.5314	11413129.6	0.599142182	0.369098712	0.63304721	0.221142608	0.379285287	0.49
2/12/2014	6.05453757	523112.0461	14812859.19	0.715553895	0.484297521	0.515702479	0.346540977	0.369012918	0.31
2/13/2014	6.61345692	571402.6779	16180295.35	0.759901028	0.497730711	0.502269289	0.378226079	0.381674949	0.16
2/14/2014	6.216897417	537139.9368	15210084.16	0.72856599	0.440514469	0.559485531	0.320943861	0.40762213	0.33
2/15/2014	6.645518167	574172.7696	16258735.48	0.762407834	0.45112782	0.54887218	0.343943384	0.41846445	0.41
2/16/2014	7.310330305	631612.5384	17885245.93	0.813553843	0.473324213	0.526675787	0.385074733	0.42847911	0.51
2/17/2014	61.66579	5327924.256	150869765.6	3.47588478	0.869142209	0.130695638	3.021038174	0.454282979	1.67
2/18/2014	49.31379543	4260711.925	120649727.4	2.985085013	0.777529913	0.222470087	2.32099289	0.664092123	0.48
2/19/2014	34.00975436	2938442.777	83207296.41	2.317753171	0.633343134	0.366656866	1.467933058	0.849820113	0.2
2/20/2014	19.23424428	1661838.706	47057954.26	1.572173115	0.3374935	0.6625065	0.530598207	1.041574909	0.2
2/21/2014	12.81109966	1106879.011	31343271.57	1.192096873	0.023419204	0.976580796	0.02791796	1.164178913	0.08
2/22/2014	10.51805096	908759.6032	25733163.93	1.042276925	0	1	0	1.042276925	0.18
2/23/2014	9.93357414	858260.8057	24303199.58	1.002476209	0	1	0	1.002476209	0.32
2/24/2014	10.02867056	866477.1361	24535859.77	1.009001787	0.026919242	0.973080758	0.027161564	0.981840223	0.43

Date	Abrams Avenue daily AVG discharge (CFS)	Abrams Avenue daily Total Discharge (ft3)	Abrams daily Total Liters (L)	Abrams Avenue daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
2/25/2014	9.940199176	858833.2088	24319408.21	1.002931467	0.035211268	0.964788732	0.035314488	0.967616979	0.01
2/26/2014	8.103751234	700164.1066	19826406.97	0.872690882	0	1	0	0.872690882	0
2/27/2014	6.566309765	567329.1637	16064946.46	0.756207629	0	1	0	0.756207629	0
2/28/2014	5.734077663	495424.31	14028831.1	0.689539096	0	1	0	0.689539096	0
3/1/2014	5.005883706	432508.3522	12247252.51	0.628624928	0	1	0	0.628624928	0.01
3/2/2014	4.962449767	428755.6598	12140988.27	0.62490538	0.010080645	0.989919355	0.006299449	0.618605931	0.64
3/3/2014	9.833402119	849605.9431	24058121.57	0.995580751	0.473041709	0.526958291	0.47095122	0.524629531	0.62
3/4/2014	21.37120786	1846472.359	52286188.5	1.689113369	0.705662143	0.294337857	1.19194336	0.497170009	0.89
3/5/2014	43.29458041	3740651.747	105923287.4	2.731847431	0.794178794	0.205821206	2.169575299	0.562272132	1.11
3/6/2014	53.69264427	4639044.465	131362894.3	3.163130994	0.775377165	0.224622835	2.452619543	0.710511451	0.5
3/7/2014	25.10415709	2168999.172	61419115.77	1.884829139	0.490039841	0.510358566	0.923641371	0.961938696	0.03
3/8/2014	17.65170724	1525107.506	43186164.22	1.482883242	0.267422096	0.732577904	0.396555745	1.086327497	1.01
3/9/2014	58.6986118	5071560.06	143610351.9	3.361094756	0.726064736	0.273935264	2.440372377	0.92072238	0.77
3/10/2014	67.96707423	5872355.214	166286308.1	3.713988319	0.711196116	0.28865676	2.641374067	1.072067836	0.98
3/11/2014	47.30906974	4087503.626	115745022.7	2.901899355	0.549566688	0.450433312	1.594787217	1.307112138	0.04
3/12/2014	26.3794714	2279186.329	64539263.45	1.949518722	0.192949204	0.807050796	0.376158085	1.573360636	0.01

Table D6.1. Variables used to calculate annual TP load for the Rock Creek Site at Auburn-Black Diamond Road.

Date	ABDR daily AVG discharge (CFS)	ABDR daily Total Discharge (ft3)	ABDR daily Total Liters (L)	ABDR daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
3/14/2013	9.994710946	863543.0258	24452775.15	1.006673732	0.500500501	0.500500501	0.503840707	0.503840707	0.07
3/15/2013	9.882327487	853833.0949	24177820.98	0.998951371	0.467611336	0.53340081	0.467120985	0.53284147	0.05
3/16/2013	10.31879524	891543.9084	25245670.55	1.028789561	0.463178295	0.536821705	0.476512994	0.552276567	0.27
3/17/2013	10.43102783	901240.8045	25520255.61	1.036396557	0.443911793	0.556088207	0.460068654	0.576327903	0.04
3/18/2013	9.687336041	836985.8339	23700760.46	0.985485813	0.381836945	0.617131063	0.376294892	0.608173907	0.02
3/19/2013	9.539113781	824179.4307	23338124.1	0.975192093	0.35639413	0.64360587	0.347552738	0.627639356	0.25
3/20/2013	12.03563799	1039879.122	29446049.13	1.142469651	0.46345515	0.53654485	0.529483443	0.612986208	0.41
3/21/2013	10.93087991	944428.0243	26743179.48	1.069964436	0.389752973	0.610247027	0.41702182	0.652942615	0.02
3/22/2013	11.95556094	1032960.465	29250134.89	1.137287707	0.419732441	0.580267559	0.477356546	0.659931161	0.48
3/23/2013	11.05537922	955184.7645	27047775.94	1.078248482	0.356238698	0.643761302	0.384113835	0.694134647	0
3/24/2013	10.27198401	887499.4185	25131143.53	1.025608958	0.2969815	0.7030185	0.304586886	0.721022072	0
3/25/2013	9.739956661	841532.2555	23829500.57	0.989128094	0.253593429	0.746406571	0.250836385	0.738291709	0
3/26/2013	9.293859832	802989.4895	22738092.78	0.958046879	0.216361679	0.784714747	0.207284631	0.751793514	0
3/27/2013	8.927601532	771344.7724	21842015.65	0.932171029	0.185890258	0.814109742	0.173281513	0.758889516	0.02
3/28/2013	8.819684411	762020.7331	21577988.69	0.92448257	0.178004535	0.821995465	0.16456209	0.75992048	0.1
3/29/2013	8.659313907	748164.7215	21185630.79	0.913001426	0.166281755	0.833718245	0.15181548	0.761185947	0
3/30/2013	7.855602804	678724.0823	19219294.09	0.85440239	0.091603053	0.908396947	0.078265868	0.776136522	0
3/31/2013	7.466298789	645088.2154	18266833.98	0.825334421	0.058902276	0.941097724	0.048614076	0.776720345	0
4/1/2013	7.023814973	606857.6136	17184265.67	0.791701485	0.018518519	0.982905983	0.014661139	0.778168126	0
4/2/2013	6.822062689	589426.2164	16690664.28	0.776143097	0.008797654	0.991202346	0.006828238	0.769314859	0.02
4/3/2013	7.411039161	640313.7835	18131637.35	0.821169625	0.097165992	0.902834008	0.079789761	0.741379864	0
4/4/2013	8.218604274	710087.4093	20107403.15	0.881094904	0.187347932	0.812652068	0.165071308	0.716023596	0.37
4/5/2013	13.68471325	1182359.225	33480629.71	1.246871553	0.483187135	0.516812865	0.602472293	0.64439926	1.03
4/6/2013	22.56501349	1949617.166	55206919.36	1.752810014	0.641559592	0.358440408	1.124532078	0.628277936	0.84

Date	ABDR daily AVG discharge (CFS)	ABDR daily Total Discharge (ft3)	ABDR daily Total Liters (L)	ABDR daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
4/7/2013	70.02476795	6050139.951	171320603	3.790195369	0.821193945	0.178948872	3.112485486	0.678251185	1.31
4/8/2013	78.49880074	6782296.384	192052930.2	4.096820365	0.781146497	0.218853503	3.200216876	0.896603489	0.16
4/9/2013	38.54687233	3330449.769	94307680.02	2.524084046	0.521400778	0.478599222	1.316059386	1.20802466	0
4/10/2013	28.40119642	2453863.37	69485558.29	2.050064156	0.336619718	0.663380282	0.690092019	1.359972137	0.26
4/11/2013	21.04129395	1817967.798	51479030.53	1.671312025	0.113593156	0.886882129	0.189849607	1.482256767	0.04
4/12/2013	18.29673108	1580837.565	44764261.17	1.519572973	0.000546448	0.998907104	0.000830368	1.517912238	0.46
4/13/2013	20.05782816	1732996.353	49072911.14	1.61770953	0.098703888	0.901296112	0.159674221	1.458035309	0.39
4/14/2013	26.01912111	2248052.064	63657640.67	1.931343311	0.295541891	0.704458109	0.570792854	1.360550457	0.19
4/15/2013	17.64252363	1524314.042	43163695.86	1.48235781	0	1	0	1.48235781	0.12
4/16/2013	15.83935996	1368520.701	38752126.98	1.377420458	0	1	0	1.377420458	0.02
4/17/2013	13.36393143	1154643.675	32695814.03	1.226892242	0	1	0	1.226892242	0
4/18/2013	12.06941759	1042797.679	29528693.33	1.144652295	0	1	0	1.144652295	0.33
4/19/2013	33.73726487	2914899.685	82540631.39	2.305090738	0.601363367	0.398636633	1.386197127	0.918893611	1.44
4/20/2013	61.89860496	5348039.468	151439364	3.484816146	0.728756058	0.271243942	2.539580878	0.945235268	0.01
4/21/2013	30.34528402	2621832.54	74241907.66	2.144614883	0.423723229	0.575947282	0.908723143	1.235185112	0.19
4/22/2013	22.25655865	1922966.667	54452262.53	1.736457311	0.212938005	0.786612758	0.369757756	1.365919475	0
4/23/2013	17.01428503	1470034.226	41626665.18	1.44620326	0	1	0	1.44620326	0
4/24/2013	14.07890585	1216417.466	34445050.1	1.271219739	0	1	0	1.271219739	0
4/25/2013	12.00452614	1037191.058	29369931.76	1.140457652	0	1	0	1.140457652	0
4/26/2013	10.22467404	883411.8375	25015396.32	1.022389767	0	1	0	1.022389767	0
4/27/2013	9.259576305	800027.3927	22654215.67	0.955638753	0	1	0	0.955638753	0.15
4/28/2013	8.966865221	774737.1551	21938077.07	0.934960969	0	1	0	0.934960969	0.07
4/29/2013	8.955783617	773779.7045	21910965.14	0.934173944	0.017857143	0.982142857	0.016681678	0.917492267	0.04
4/30/2013	8.557088048	739332.4073	20935527.91	0.905647537	0	1	0	0.905647537	0.02
5/1/2013	7.932846737	685397.9581	19408276.9	0.860114752	0	1	0	0.860114752	0

Date	ABDR daily AVG discharge (CFS)	ABDR daily Total Discharge (ft3)	ABDR daily Total Liters (L)	ABDR daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
5/2/2013	7.295815779	630358.4833	17849735.1	0.812453478	0	1	0	0.812453478	0
5/3/2013	6.914213826	597388.0746	16916118.63	0.783267406	0	1	0	0.783267406	0
5/4/2013	6.213490482	536845.5776	15201748.85	0.728294068	0	1	0	0.728294068	0
5/5/2013	5.60142551	483963.164	13704288.12	0.678635425	0	1	0	0.678635425	0
5/6/2013	5.364124898	463460.3912	13123715.2	0.6589219	0	1	0	0.6589219	0
5/7/2013	5.350581827	462290.2699	13090581.11	0.657788523	0.01682243	0.98317757	0.011065601	0.646722922	0
5/8/2013	5.310688827	458843.5147	12992980.04	0.654444672	0.026365348	0.973634652	0.017254662	0.63719001	0
5/9/2013	5.156219022	445497.3235	12615058.61	0.641420532	0.015503876	0.98255814	0.009944504	0.630232965	0.01
5/10/2013	4.792049111	414033.0432	11724090.88	0.61021121	0	1	0	0.61021121	0
5/11/2013	4.307839675	372197.3479	10539437.86	0.567513171	0	1	0	0.567513171	0
5/12/2013	4.207630949	363539.314	10294270.05	0.558489275	0	1	0	0.558489275	0.17
5/13/2013	4.710952508	407026.2967	11525682.24	0.603159602	0.114649682	0.885350318	0.069152056	0.534007546	0.38
5/14/2013	5.14374114	444419.2345	12584530.58	0.640363064	0.190661479	0.809338521	0.122092569	0.518270495	0.01
5/15/2013	4.849898991	419031.2728	11865624.75	0.615218191	0.146391753	0.853608247	0.090062869	0.525155321	0.06
5/16/2013	4.509060573	389582.8335	11031739.18	0.585433833	0.093126386	0.906873614	0.054519337	0.530914496	0.05
5/17/2013	4.528298507	391244.991	11078806.16	0.58713365	0.105960265	0.89183223	0.062212837	0.523624712	0.23
5/18/2013	4.400647369	380215.9326	10766498.52	0.57581104	0.093181818	0.909090909	0.05365512	0.523464582	0.04
5/19/2013	4.186272609	361693.9534	10242015.34	0.55655711	0.059665871	0.940334129	0.033207465	0.523349645	0.04
5/20/2013	3.958086181	341978.6461	9683740.925	0.535713581	0.022727273	0.974747475	0.012175309	0.52218546	0
5/21/2013	4.311727825	372533.2841	10548950.5	0.567861945	0.113689095	0.88863109	0.064559711	0.504619779	0.35
5/22/2013	5.500567068	475248.9946	13457530.73	0.670289918	0.294545455	0.705454545	0.197430849	0.472859069	0.49
5/23/2013	5.139372991	444041.8264	12573843.59	0.639992681	0.241245136	0.758754864	0.154395122	0.48559756	0.19
5/24/2013	4.994562931	431530.2372	12219555.42	0.627656447	0.218436874	0.783567134	0.137103312	0.491810964	0.14
5/25/2013	4.938882381	426719.4377	12083328.97	0.622882798	0.208502024	0.791497976	0.129872324	0.493010474	0.06
5/26/2013	4.678359933	404210.2982	11445942.17	0.600314684	0.166666667	0.833333333	0.100052447	0.500262237	0.23

Date	ABDR daily AVG discharge (CFS)	ABDR daily Total Discharge (ft3)	ABDR daily Total Liters (L)	ABDR daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
5/27/2013	5.613282357	484987.5956	13733296.75	0.679613355	0.295900178	0.704099822	0.201097713	0.478515642	0.52
5/28/2013	6.537199399	564814.0281	15993725.87	0.753922967	0.377675841	0.622324159	0.28473849	0.469184476	0.13
5/29/2013	7.11312003	614573.5705	17402756.88	0.798542724	0.406469761	0.593530239	0.32458347	0.473959254	0.43
5/30/2013	6.961449642	601469.249	17031684.43	0.786907509	0.376436782	0.625	0.29622093	0.491817193	0.14
5/31/2013	6.004829345	518817.2554	14691244.46	0.71154793	0.27	0.731666667	0.192117941	0.520615902	0.01
6/1/2013	5.052711095	436554.2386	12361819.06	0.632623566	0.138613861	0.863366337	0.087690395	0.54618589	0
6/2/2013	4.57019444	394864.7996	11181307.56	0.590827524	0.061269147	0.938730853	0.036199498	0.554628026	0.01
6/3/2013	4.325348596	373710.1187	10582274.69	0.569082961	0.025404157	0.972286374	0.014457073	0.553311609	0
6/4/2013	3.989197539	344666.6674	9759857.087	0.538577565	0	1	0	0.538577565	0
6/5/2013	4.237591303	366127.8886	10367570.2	0.561194349	0.070754717	0.926886792	0.039707147	0.52016363	0
6/6/2013	4.158154287	359264.5304	10173221.86	0.554008607	0.067307692	0.932692308	0.037289041	0.516719566	0
6/7/2013	4.006741189	346182.4387	9802778.881	0.540189418	0.047381546	0.952618454	0.02559501	0.514594408	0
6/8/2013	3.63828017	314347.4067	8901312.646	0.505842686	0	1	0	0.505842686	0
6/9/2013	3.342512489	288793.079	8177695.86	0.477462143	0	1	0	0.477462143	0
6/10/2013	3.148403624	272022.0732	7702794.641	0.458400169	0	1	0	0.458400169	0
6/11/2013	3.15339978	272453.741	7715018.093	0.458895422	0.019047619	0.980952381	0.008740865	0.450154557	0.07
6/12/2013	3.400933869	293840.6863	8320627.945	0.483129514	0.1	0.9	0.048312951	0.434816563	0.22
6/13/2013	3.529274914	304929.3526	8634623.491	0.495471892	0.138810198	0.858356941	0.068776552	0.425291737	0.06
6/14/2013	3.146799657	271883.4904	7698870.421	0.458241119	0.050793651	0.949206349	0.023275739	0.43496538	0.03
6/15/2013	2.894712693	250103.1767	7082121.633	0.432910905	0	1	0	0.432910905	0
6/16/2013	2.6550011	229392.0951	6495650.078	0.408162657	0	1	0	0.408162657	0.01
6/17/2013	2.506688766	216577.9094	6132793.344	0.392493606	0	1	0	0.392493606	0.08
6/18/2013	2.642104626	228277.8397	6464097.931	0.406811444	0.064393939	0.935606061	0.026196191	0.380615253	0.12
6/19/2013	3.004826568	259617.0155	7351523.104	0.444058536	0.18	0.82	0.079930536	0.364127999	0.09
6/20/2013	3.273840859	282859.8502	8009685.807	0.470759839	0.244648318	0.758409786	0.115170603	0.357028868	0.36

Date	ABDR daily AVG discharge (CFS)	ABDR daily Total Discharge (ft3)	ABDR daily Total Liters (L)	ABDR daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
6/21/2013	3.618368162	312627.0092	8852596.494	0.503955731	0.303867403	0.696132597	0.15313572	0.350820012	0.04
6/22/2013	3.12147467	269695.4115	7636911.029	0.455726453	0.195512821	0.807692308	0.089100364	0.36808675	0
6/23/2013	2.82678159	244233.9294	6915923.332	0.425966288	0.120141343	0.879858657	0.051176162	0.374790126	0.11
6/24/2013	3.345602705	289060.0737	8185256.294	0.477762708	0.250746269	0.749253731	0.119797216	0.357965491	0.41
6/25/2013	3.722995883	321666.8443	9108575.697	0.513834233	0.314516129	0.685483871	0.161609154	0.352225079	0.34
6/26/2013	3.938260037	340265.6672	9635234.845	0.533884721	0.337563452	0.662436548	0.180219969	0.353664752	0.16
6/27/2013	4.003668979	345916.9998	9795262.499	0.539907316	0.335	0.665	0.180868951	0.359038365	0.1
6/28/2013	3.818166118	329889.5526	9341416.484	0.522743132	0.293193717	0.706806283	0.153265002	0.36947813	0
6/29/2013	3.542139857	306040.8837	8666098.495	0.496701131	0.234463277	0.765536723	0.116458175	0.380242956	0
6/30/2013	3.430196971	296369.0183	8392222.216	0.485956598	0.209912536	0.790087464	0.102008382	0.383948216	0
7/1/2013	3.350145371	289452.56	8196370.252	0.478204382	0.191044776	0.808955224	0.091358449	0.386845933	0
7/2/2013	3.349058787	289358.6792	8193711.847	0.478098753	0.191044776	0.808955224	0.091338269	0.386760484	0
7/3/2013	3.099970645	267837.4638	7584299.894	0.453586078	0.132258065	0.867741935	0.059990417	0.393595662	0
7/4/2013	2.652990289	229218.3609	6490730.483	0.407952114	0.00754717	0.99245283	0.003078884	0.40487323	0
7/5/2013	2.540266623	219479.0362	6214943.973	0.396066407	0	1	0	0.396066407	0
7/6/2013	2.526614118	218299.4598	6181542.144	0.394615561	0.011857708	0.984189723	0.004679236	0.38837658	0
7/7/2013	2.460569193	212593.1783	6019958.511	0.387561328	0.008130081	0.991869919	0.003150905	0.384410423	0
7/8/2013	2.399949	207355.5936	5871646.873	0.381033162	0	1	0	0.381033162	0
7/9/2013	2.404891878	207782.6583	5883739.978	0.381567413	0.020833333	0.979166667	0.007949321	0.373618092	0
7/10/2013	2.406493991	207921.0808	5887659.661	0.381740502	0.037344398	0.958506224	0.014255869	0.365900647	0
7/11/2013	2.40892233	208130.8893	5893600.766	0.382002785	0.053941909	0.946058091	0.020605959	0.361396825	0
7/12/2013	2.508498001	216734.2273	6137219.767	0.392686502	0.103585657	0.896414343	0.040676689	0.352009813	0
7/13/2013	2.705518194	233756.772	6619243.761	0.413435501	0.169741697	0.826568266	0.070177244	0.341732665	0
7/14/2013	2.560714778	221245.7568	6264971.847	0.39823478	0.1328125	0.87109375	0.052890557	0.346899828	0
7/15/2013	2.385694049	206123.9659	5836771.117	0.379490446	0.079497908	0.920502092	0.030168697	0.349321749	0

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7/16/2013	2.13483789	184449.9937	5223033.582	0.351837967	0	1	0	0.351837967	0.02
7/17/2013	2.006208005	173336.3716	4908331.368	0.337258754	0	1	0	0.337258754	0.08
7/18/2013	2.233266615	192954.2355	5463846.496	0.362805393	0.112107623	0.892376682	0.04067325	0.323759073	0
7/19/2013	2.171160906	187588.3023	5311900.439	0.355903667	0.096774194	0.903225806	0.03444229	0.321461377	0
7/20/2013	2.174264485	187856.4515	5319493.566	0.356250046	0.105990783	0.894009217	0.037759221	0.318490825	0
7/21/2013	2.049639621	177088.8633	5014589.923	0.342213853	0.068292683	0.931707317	0.023370702	0.318843151	0
7/22/2013	1.966761066	169928.1561	4811821.61	0.332728533	0.040609137	0.954314721	0.013511819	0.317527737	0.03
7/23/2013	1.890034985	163299.0227	4624105.766	0.323833048	0.021164021	0.978835979	0.006853609	0.316979438	0
7/24/2013	1.812167155	156571.2422	4433596.55	0.314686575	0	1	0	0.314686575	0
7/25/2013	1.706358155	147429.3446	4174727.265	0.302054288	0	1	0	0.302054288	0
7/26/2013	1.55702185	134526.6879	3809365.315	0.28379053	0	1	0	0.28379053	0
7/27/2013	1.415764222	122322.0288	3463768.424	0.265992891	0	1	0	0.265992891	0
7/28/2013	1.313772073	113509.9071	3214237.337	0.252788517	0	1	0	0.252788517	0
7/29/2013	1.335810446	115414.0226	3268155.794	0.255668626	0.029850746	0.962686567	0.007631899	0.246128751	0
7/30/2013	1.324319619	114421.2151	3240042.664	0.254168842	0.037878788	0.962121212	0.009627608	0.244541234	0
7/31/2013	1.389498896	120052.7046	3399508.426	0.262622325	0.09352518	0.899280576	0.0245618	0.236171156	0.09
8/1/2013	1.584060031	136862.7867	3875516.158	0.28713735	0.208860759	0.797468354	0.059971725	0.22898295	0.01
8/2/2013	1.718001623	148435.3402	4203213.842	0.303456367	0.261627907	0.738372093	0.079392654	0.224063713	0.04
8/3/2013	1.790161948	154669.9923	4379759.238	0.312079236	0.284916201	0.715083799	0.08891643	0.223162806	0
8/4/2013	1.781093042	153886.4388	4357571.51	0.311001714	0.275280899	0.730337079	0.085612831	0.227136084	0
8/5/2013	1.726328382	149154.7722	4223585.854	0.304457198	0.242774566	0.751445087	0.073914464	0.228782866	0
8/6/2013	1.676796968	144875.2581	4102403.707	0.298480807	0.220238095	0.779761905	0.065736844	0.232743963	0
8/7/2013	1.63611345	141360.2021	4002868.57	0.29352976	0.201219512	0.798780488	0.059063915	0.234465845	0
8/8/2013	1.588640074	137258.5024	3886721.561	0.287702462	0.176100629	0.817610063	0.050664585	0.235228428	0
8/9/2013	1.527168408	131947.3505	3736326.733	0.28007362	0.150326797	0.849673203	0.04210257	0.237971049	0

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8/10/2013	1.582149856	136697.7475	3870842.777	0.286901507	0.183544304	0.816455696	0.052659137	0.23424237	0.13
8/11/2013	1.586661348	137087.5405	3881880.466	0.287458379	0.188679245	0.811320755	0.05423743	0.233220949	0
8/12/2013	1.778084524	153626.5029	4350210.956	0.310643871	0.264044944	0.730337079	0.082023943	0.226874737	0
8/13/2013	1.352616159	116866.0362	3309272.173	0.257854721	0.051851852	0.948148148	0.013370245	0.244484476	0
8/14/2013	0.85526404	73894.81305	2092464.642	0.188714577	0	1	0	0.188714577	0.02
8/15/2013	0.635214498	54882.53262	1554097.7	0.154111127	0	1	0	0.154111127	0.13
8/16/2013	0.555295431	47977.52528	1358569.988	0.140626159	0	1	0	0.140626159	0
8/17/2013	0.552680106	47751.56119	1352171.408	0.14017478	0.018181818	0.981818182	0.002548632	0.137626148	0
8/18/2013	0.583528804	50416.88863	1427644.952	0.145456666	0.086206897	0.931034483	0.012539368	0.135425172	0
8/19/2013	0.786194031	67927.16432	1923479.927	0.178197234	0.303797468	0.696202532	0.054135869	0.124061365	0
8/20/2013	0.921618056	79627.80002	2254804.488	0.198565785	0.391304348	0.608695652	0.077699655	0.12086613	0
8/21/2013	1.006172612	86933.3137	2461673.258	0.210797362	0.415841584	0.584158416	0.087658309	0.123139053	0
8/22/2013	1.115000998	96336.0862	2727929.686	0.226068292	0.446428571	0.544642857	0.100923345	0.12312648	0
8/23/2013	1.205433861	104149.4856	2949180.154	0.238398682	0.462809917	0.537190083	0.110333274	0.128065408	0
8/24/2013	1.22771933	106074.9501	3003703.146	0.24139134	0.447154472	0.552845528	0.107939217	0.133452123	0.02
8/25/2013	1.258684891	108750.3746	3079462.608	0.245521028	0.436507937	0.563492063	0.107171877	0.138349151	0.01
8/26/2013	1.361759817	117656.0482	3331642.786	0.259040491	0.455882353	0.544117647	0.118091988	0.140948502	0.02
8/27/2013	1.454451395	125664.6005	3558419.36	0.270921435	0.462068966	0.537931034	0.125184387	0.145737048	0.07
8/28/2013	1.634739978	141241.5341	3999508.273	0.293361932	0.490797546	0.509202454	0.143981316	0.149380616	0.28
8/29/2013	2.140018921	184897.6347	5235709.343	0.35241923	0.574766355	0.425233645	0.202558716	0.149860514	0.98
8/30/2013	2.512604539	217089.0322	6147266.707	0.393124168	0.597609562	0.402390438	0.234934761	0.158189406	0.11
8/31/2013	2.46280644	212786.4764	6025432.096	0.387801268	0.552845528	0.447154472	0.214394197	0.173407071	0
9/1/2013	2.488073437	214969.5449	6087249.61	0.390506295	0.522088353	0.477911647	0.203878789	0.186627507	0
9/2/2013	2.590120361	223786.3992	6336914.709	0.401343364	0.50965251	0.49034749	0.204545653	0.196797711	0
9/3/2013	2.619410852	226317.0976	6408575.991	0.40442861	0.488549618	0.511450382	0.197583443	0.206845167	0.14

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9/4/2013	2.564244462	221550.7216	6273607.472	0.398608516	0.44921875	0.55078125	0.179062419	0.219546097	0
9/5/2013	2.545341716	219917.5242	6227360.55	0.3966051	0.423529412	0.576470588	0.167973925	0.228631175	0.75
9/6/2013	5.148151606	444800.2988	12595321.1	0.640736933	0.667961165	0.332038835	0.427987388	0.212749545	0.8
9/7/2013	3.958642088	342026.6764	9685100.989	0.535764818	0.532828283	0.467171717	0.285470648	0.25029417	0
9/8/2013	3.494742306	301945.7352	8550136.995	0.492165227	0.446991404	0.555873926	0.219993626	0.273581817	0.01
9/9/2013	3.245619609	280421.5342	7940640.5	0.467992488	0.384615385	0.615384615	0.179997111	0.287995377	0
9/10/2013	3.1142266	269069.1783	7619178.107	0.455005553	0.344051447	0.655948553	0.156545319	0.298460234	0
9/11/2013	2.887327423	249465.0894	7064053.042	0.432158445	0.283737024	0.716262976	0.122619351	0.309539094	0
9/12/2013	2.722901739	235258.7103	6661773.847	0.41524267	0.238970588	0.764705882	0.099230785	0.317538512	0
9/13/2013	2.478101271	214107.9498	6062851.993	0.389439749	0.165322581	0.834677419	0.064383184	0.325056565	0.02
9/14/2013	2.305421697	199188.4346	5640379.065	0.370747482	0.112554113	0.887445887	0.041729154	0.329018328	0
9/15/2013	2.216969432	191546.1589	5423974.273	0.3610003	0.085585586	0.90990991	0.030896422	0.32847775	0.21
9/16/2013	2.623599597	226679.0052	6418824.054	0.40486892	0.22519084	0.77480916	0.091172772	0.313696148	0.5
9/17/2013	3.419976603	295485.9785	8367217.356	0.484970094	0.388888889	0.611111111	0.188599481	0.296370613	0.05
9/18/2013	3.292921041	284508.3779	8056366.837	0.472626513	0.349544073	0.650455927	0.165203796	0.307422717	0
9/19/2013	3.128579848	270309.2989	7654294.354	0.456432622	0.303514377	0.696485623	0.138533863	0.317898759	0
9/20/2013	2.820983209	243732.9493	6901737.179	0.425371066	0.226950355	0.776595745	0.096538114	0.330341359	0.09
9/21/2013	2.73561703	236357.3114	6692882.716	0.416562204	0.200729927	0.799270073	0.083616501	0.332945703	0.07
9/22/2013	3.625169205	313214.6193	8869235.732	0.504600601	0.377410468	0.619834711	0.190441549	0.312768968	0.75
9/23/2013	5.263215485	454741.8179	12876833.11	0.650454972	0.538022814	0.461977186	0.349959614	0.300495358	0.81
9/24/2013	5.579972632	482109.6354	13651802.12	0.676864353	0.53046595	0.46953405	0.359053492	0.317810861	0.07
9/25/2013	4.836737593	417894.128	11833424.44	0.614080737	0.433884298	0.566115702	0.266439989	0.347640748	0.03
9/26/2013	4.514365983	390041.2209	11044719.24	0.585902836	0.376940133	0.625277162	0.220850293	0.366351663	0
9/27/2013	4.463592339	385654.3781	10920497.89	0.581407145	0.35426009	0.647982063	0.205969347	0.376741401	0.1
9/28/2013	9.76588183	843772.1901	23892928.35	0.990920268	0.657113613	0.341862845	0.651147197	0.338758822	1.72

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9/29/2013	13.57107703	1172541.055	33202610.56	1.239811192	0.702284451	0.297715549	0.870700123	0.36911107	0.67
9/30/2013	31.39749355	2712743.442	76816213.51	2.194980594	0.809235669	0.190764331	1.776256589	0.418724005	1.43
10/1/2013	50.78145607	4387517.804	124240464.2	3.0453023	0.81882631	0.18117369	2.493573644	0.551728656	0.82
10/2/2013	28.6061852	2471574.401	69987078.01	2.060129054	0.634044041	0.365955959	1.306212549	0.753916505	0.28
10/3/2013	20.20329862	1745565.001	49428815.03	1.625690166	0.455940594	0.544059406	0.74121814	0.884472026	0
10/4/2013	14.42172308	1246036.874	35283776.95	1.292218292	0.234396671	0.765603329	0.302891666	0.989326626	0.01
10/5/2013	10.33002153	892513.8604	25273136.48	1.029551651	0	1	0	1.029551651	0
10/6/2013	8.966027054	774664.7374	21936026.44	0.934901452	0	1	0	0.934901452	0
10/7/2013	8.397208652	725518.8276	20544371.54	0.894089719	0	1	0	0.894089719	0.23
10/8/2013	8.894175049	768456.7242	21760235.37	0.929792774	0.069741282	0.931383577	0.06484494	0.86599372	0.34
10/9/2013	8.276519389	715091.2752	20249096.62	0.885318445	0.018115942	0.981884058	0.016038378	0.869280067	0
10/10/2013	7.495084844	647575.3305	18337261.12	0.827500065	0	1	0	0.827500065	0.14
10/11/2013	7.260201512	627281.4106	17762602.25	0.80975055	0	1	0	0.80975055	0
10/12/2013	7.827336082	676281.8375	19150137.53	0.85230753	0.084291188	0.915708812	0.071842014	0.780465516	0.25
10/13/2013	7.4270106	641693.7158	18170712.61	0.822374372	0.049798116	0.948855989	0.040952694	0.780314848	0
10/14/2013	6.840746634	591040.5092	16736375.89	0.777590043	0	1	0	0.777590043	0
10/15/2013	6.62100264	572054.6281	16198756.49	0.760491361	0	1	0	0.760491361	0
10/16/2013	6.660280833	575448.264	16294853.4	0.763560801	0.024024024	0.975975976	0.018343803	0.745216998	0
10/17/2013	6.392313413	552295.8789	15639251.94	0.742503222	0.00312989	0.99687011	0.002323954	0.740179269	0
10/18/2013	6.16574404	532720.2851	15084933.77	0.724478203	0	1	0	0.724478203	0.01
10/19/2013	5.686846157	491343.508	13913275.85	0.685666105	0	1	0	0.685666105	0
10/20/2013	5.512525352	476282.1904	13486787.53	0.671281938	0	1	0	0.671281938	0.01
10/21/2013	5.532279041	477988.9092	13535116.34	0.672919139	0.021699819	0.978300181	0.014602224	0.658316915	0.01
10/22/2013	5.494761756	474747.4157	13443327.62	0.66980808	0.032786885	0.969034608	0.021960921	0.64906721	0
10/23/2013	5.622230562	485760.7206	13755189.17	0.68035095	0.067615658	0.932384342	0.046002377	0.634348573	0.01

Date	ABDR daily AVG discharge (CFS)	ABDR daily Total Discharge (ft3)	ABDR daily Total Liters (L)	ABDR daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
10/24/2013	5.526727379	477509.2455	13521533.8	0.672459202	0.065099458	0.934900542	0.043776729	0.628682472	0
10/25/2013	5.438317261	469870.6113	13305232.13	0.665114714	0.064338235	0.935661765	0.042792307	0.622322407	0.02
10/26/2013	5.655772282	488658.7251	13837251.39	0.683112446	0.109540636	0.890459364	0.074828572	0.608283874	0
10/27/2013	5.79062551	500310.0441	14167179.46	0.69416267	0.136442142	0.863557858	0.094713041	0.599449629	0.12
10/28/2013	5.760736511	497727.6346	14094053.88	0.691720632	0.138888889	0.861111111	0.09607231	0.595648322	0.43
10/29/2013	6.047754777	522526.0127	14796264.6	0.715007892	0.181818182	0.818181818	0.130001435	0.585006457	0
10/30/2013	6.359354065	549448.1912	15558614.54	0.739893923	0.218553459	0.781446541	0.161706376	0.578187547	0.02
10/31/2013	6.640255238	573718.0526	16245859.35	0.761996601	0.246987952	0.753012048	0.18820398	0.573792621	0.18
11/1/2013	6.285651348	543080.2765	15378295.57	0.73404342	0.20508744	0.79491256	0.150543086	0.583500334	0
11/2/2013	8.159583819	704988.0419	19963005.39	0.876780974	0.370098039	0.629901961	0.324494919	0.552286055	0.7
11/3/2013	7.370859424	636842.2542	18033334.74	0.818135145	0.293080054	0.706919946	0.239779093	0.578356052	0.23
11/4/2013	7.335711966	633805.5139	17947343.98	0.815476387	0.280653951	0.717983651	0.22886667	0.585498714	0.03
11/5/2013	7.519676707	649700.0675	18397426.87	0.82934807	0.289893617	0.710106383	0.240422712	0.588925358	0.15
11/6/2013	7.634985242	659662.7249	18679537.45	0.837987594	0.29095675	0.70904325	0.243818147	0.594169448	0.06
11/7/2013	11.80083802	1019592.405	28871594.2	1.127243796	0.510169492	0.490677966	0.575085394	0.553113693	0.97
11/8/2013	12.28742612	1061633.617	30062066.81	1.158692218	0.498779496	0.501220504	0.57793192	0.580760298	0
11/9/2013	10.677124	922503.514	26122347.51	1.052985942	0.402621723	0.597378277	0.423955014	0.629030928	0.07
11/10/2013	10.15417825	877321.0007	24842923.31	1.017584073	0.355665025	0.644334975	0.361919064	0.655665009	0.01
11/11/2013	9.701480307	838207.8986	23735365.42	0.986465466	0.31443299	0.68556701	0.310177286	0.67628818	0
11/12/2013	9.252481686	799414.4176	22636858.18	0.955140062	0.273513514	0.726486486	0.261243714	0.693896348	0.09
11/13/2013	9.034373514	780569.8716	22103240.94	0.939748779	0.250276855	0.749723145	0.235197369	0.70455141	0.03
11/14/2013	9.003974308	777943.3802	22028867.11	0.93759423	0.243333333	0.756666667	0.228147929	0.709446301	0.18
11/15/2013	10.35061708	894293.3157	25323524.96	1.030949078	0.328502415	0.671497585	0.338669262	0.692279816	0.53
11/16/2013	11.39685394	984688.1805	27883218.27	1.100818645	0.372807018	0.627192982	0.410392916	0.690425729	0
11/17/2013	10.67603673	922409.5737	26119687.42	1.052912918	0.31835206	0.68164794	0.335196997	0.717715922	0.44

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11/18/2013	20.10308976	1736906.955	49183646.87	1.620194593	0.597512438	0.402487562	0.968086421	0.652108172	0.71
11/19/2013	38.77908037	3350512.544	94875793.61	2.534428859	0.736462094	0.263537906	1.866510784	0.667918075	0.14
11/20/2013	18.63218492	1609820.777	45584972.99	1.538490582	0.428341385	0.571658615	0.658999186	0.879491395	0.01
11/21/2013	13.40253699	1157979.196	32790265.29	1.229304752	0.205223881	0.795522388	0.252282692	0.977939452	0
11/22/2013	11.86907405	1025487.998	29038538.55	1.131678517	0.111204718	0.888795282	0.12584799	1.005830526	0
11/23/2013	11.30806702	977016.9909	27665994.73	1.094971175	0.079575597	0.920424403	0.087132985	1.00783819	0.01
11/24/2013	10.98303149	948933.9207	26870772.04	1.073438188	0.06557377	0.93442623	0.070389389	1.003048799	0
11/25/2013	10.63970875	919270.8363	26030808.42	1.050471699	0.05075188	0.94924812	0.053313413	0.997158286	0
11/26/2013	10.01860356	865607.3478	24511230.15	1.00831192	0.010978044	0.988023952	0.011069293	0.996236328	0
11/27/2013	9.638432085	832760.5321	23581113.44	0.982095128	0	1	0	0.982095128	0.01
11/28/2013	8.975366587	775471.6732	21958876.27	0.935564532	0	1	0	0.935564532	0
11/29/2013	8.359387297	722251.0625	20451838.89	0.891345348	0	1	0	0.891345348	0.06
11/30/2013	8.204375005	708858.0004	20072590.23	0.880055763	0.001219512	0.998780488	0.001073239	0.878982524	0.27
12/1/2013	11.67940214	1009100.345	28574492.64	1.11933128	0.289383562	0.710616438	0.323916073	0.795415208	0.57
12/2/2013	11.69190299	1010180.419	28605076.87	1.120147018	0.281437126	0.718562874	0.315250957	0.804896061	0
12/3/2013	10.66842589	921751.9966	26101066.94	1.052401694	0.21180881	0.78819119	0.22290795	0.829493744	0.04
12/4/2013	9.799631675	846688.1767	23975499.76	0.993251079	0.146938776	0.853061224	0.145947097	0.847303981	0
12/5/2013	9.025567876	779809.0645	22081697.32	0.939124916	0.085271318	0.913621262	0.080080419	0.858004492	0
12/6/2013	8.523896588	736464.6652	20854322.63	0.903253804	0.046948357	0.953051643	0.042406282	0.860847522	0
12/7/2013	7.764119382	670819.9146	18995473.36	0.847613754	0	1	0	0.847613754	0
12/8/2013	7.284771944	629404.296	17822715.57	0.811615762	0	1	0	0.811615762	0
12/9/2013	7.000919059	604879.4067	17128249.18	0.789943077	0	1	0	0.789943077	0
12/10/2013	7.297205659	630478.5689	17853135.54	0.812558877	0.054794521	0.943835616	0.044523774	0.766922008	0
12/11/2013	7.446898141	643411.9994	18219368.9	0.82387336	0.08590604	0.91409396	0.070775698	0.753097662	0
12/12/2013	7.813281364	675067.5098	19115751.66	0.85126503	0.135723431	0.865556978	0.115536611	0.736818387	0.23

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12/13/2013	8.758269525	756714.4869	21427732.78	0.920093728	0.226027397	0.773972603	0.20796639	0.712127337	0.2
12/14/2013	8.182004728	706925.2085	20017859.74	0.878420934	0.174816626	0.826405868	0.153562584	0.725932215	0
12/15/2013	7.888989331	681608.6782	19300976.62	0.856873587	0.148288973	0.851711027	0.127064905	0.729808682	0.1
12/16/2013	8.086835898	698702.6216	19785022.39	0.871449953	0.171817058	0.826946848	0.149729967	0.720642792	0.03
12/17/2013	8.142899236	703546.494	19922185.36	0.87555966	0.180589681	0.820638821	0.158117039	0.718518247	0.01
12/18/2013	9.332123666	806295.4847	22831707.98	0.960731243	0.276527331	0.723472669	0.265668447	0.695062796	0.35
12/19/2013	9.503354989	821089.871	23250637.66	0.972701103	0.281052632	0.718947368	0.273380205	0.699320898	0.01
12/20/2013	9.423995012	814233.169	23056477.8	0.967162103	0.268577495	0.731422505	0.259757975	0.707404129	0.47
12/21/2013	16.39290997	1416347.422	40106426.67	1.410022284	0.544234289	0.455765711	0.767382476	0.642639809	0.45
12/22/2013	20.66531848	1785483.517	50559179.64	1.650916377	0.59796807	0.40203193	0.987195279	0.663721098	0.45
12/23/2013	29.97860075	2590151.105	73344790.8	2.126932653	0.674449633	0.325550367	1.434508948	0.692423706	0.37
12/24/2013	23.78856002	2055331.586	58200413.45	1.816987404	0.553593947	0.446406053	1.005873229	0.811114175	0.01
12/25/2013	17.38473444	1502041.056	42532996.17	1.467572798	0.3716916	0.6283084	0.545484481	0.922088317	0
12/26/2013	14.206006	1227398.919	34756009.7	1.279023817	0.228008445	0.771287825	0.291628231	0.986495498	0
12/27/2013	13.25645228	1145357.477	32432858.61	1.22016399	0.17571644	0.82428356	0.214402873	1.005761117	0.13
12/28/2013	11.9889063	1035841.504	29331716.71	1.139446892	0.098415346	0.901584654	0.11213906	1.027307832	0
12/29/2013	10.42424661	900654.9073	25503664.88	1.035937678	0	1	0	1.035937678	0
12/30/2013	9.668725075	835377.8465	23655227.4	0.984196093	0	1	0	0.984196093	0.03
12/31/2013	9.633013385	832292.3564	23567856.2	0.981719092	0.015576324	0.985462098	0.015291575	0.967446956	0.03
1/1/2014	8.963474544	774444.2006	21929781.54	0.934720193	0	1	0	0.934720193	0.01
1/2/2014	8.735706631	754765.0529	21372531.05	0.91847887	0	1	0	0.91847887	0.63
1/3/2014	17.45695219	1508280.67	42709682.06	1.471721721	0.471935853	0.528064147	0.694558246	0.777163475	0.08
1/4/2014	11.88859329	1027174.461	29086293.77	1.132945592	0.222035324	0.777964676	0.251553941	0.881391651	0.01
1/5/2014	10.06953823	870008.1033	24635845.46	1.011800083	0.092353525	0.907646475	0.093443305	0.918356779	0
1/6/2014	9.355273853	808295.6609	22888346.57	0.962353618	0.039529915	0.959401709	0.038041756	0.923283707	0.02

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1/7/2014	12.33191332	1065477.311	30170907.92	1.161547433	0.265206813	0.735604217	0.308050293	0.854439191	0.49
1/8/2014	15.48854298	1338210.113	37893828.13	1.356570594	0.395093609	0.604906391	0.535972371	0.820598222	0.45
1/9/2014	17.28935531	1493800.299	42299644.3	1.462084814	0.43377675	0.56622325	0.634218398	0.827866416	0.18
1/10/2014	18.2894451	1580208.057	44746435.51	1.519160866	0.440131219	0.559322034	0.668630124	0.849700145	0.28
1/11/2014	32.04720516	2768878.526	78405779.44	2.225811096	0.636193448	0.363806552	1.416046435	0.809764661	0.88
1/12/2014	36.0334827	3113292.905	88158492.54	2.410805385	0.632250902	0.367749098	1.524233879	0.886571506	0.14
1/13/2014	22.72584192	1963512.742	55600397.61	1.761308014	0.39683238	0.60316762	0.698944051	1.062363963	0.04
1/14/2014	18.2114412	1573468.52	44555593.38	1.514745542	0.242723778	0.757276222	0.367664761	1.147080781	0.03
1/15/2014	15.76310037	1361931.872	38565552.44	1.37290081	0.132614213	0.868020305	0.182066161	1.191705779	0
1/16/2014	13.94571384	1204909.676	34119186.32	1.26301746	0.035842294	0.96344086	0.045269443	1.216842628	0.01
1/17/2014	12.33788329	1065993.116	30185513.87	1.161930339	0	1	0	1.161930339	0
1/18/2014	10.88511441	940473.8846	26631210.9	1.066911694	0	1	0	1.066911694	0.01
1/19/2014	10.01879664	865624.0301	24511702.53	1.008325154	0	1	0	1.008325154	0
1/20/2014	9.185394574	793618.0912	22472724.77	0.950418359	0	1	0	0.950418359	0.01
1/21/2014	8.977259442	775635.2158	21963507.28	0.935698893	0	1	0	0.935698893	0
1/22/2014	8.732835947	754517.0259	21365507.72	0.918273316	0	1	0	0.918273316	0.02
1/23/2014	8.283456958	715690.6811	20266069.88	0.885823744	0	1	0	0.885823744	0
1/24/2014	7.911355341	683541.1014	19355696.66	0.858527203	0	1	0	0.858527203	0.01
1/25/2014	7.431667182	642096.0445	18182105.27	0.822725468	0	1	0	0.822725468	0
1/26/2014	6.891259652	595404.8339	16859959.6	0.781495641	0	1	0	0.781495641	0
1/27/2014	6.359995527	549503.6135	15560183.92	0.739944747	0	1	0	0.739944747	0
1/28/2014	6.319354989	545992.271	15460753.94	0.736721507	0.012658228	0.987341772	0.009325589	0.727395918	0.18
1/29/2014	31.86096002	2752786.946	77950117.39	2.216993837	0.748273697	0.251726303	1.658918176	0.558075661	1.73
1/30/2014	41.01177645	3543417.485	100338244.2	2.632909598	0.748597903	0.25164594	1.970990604	0.662561011	0.1
1/31/2014	32.7438181	2829065.884	80110092.82	2.258646526	0.64019548	0.360109957	1.445975296	0.813361104	0.07

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2/1/2014	28.96060249	2502196.055	70854185.25	2.07747676	0.556629834	0.443370166	1.156385545	0.921091216	0.02
2/2/2014	25.46324225	2200024.13	62297643.29	1.903147438	0.468578162	0.531814611	0.891773328	1.012121615	0.02
2/3/2014	23.48315041	2028944.196	57453207	1.801068725	0.402896082	0.597103918	0.725643532	1.075425192	0
2/4/2014	21.10657663	1823608.221	51638749.26	1.674841543	0.323069635	0.676930365	0.541090447	1.133751097	0
2/5/2014	20.96952776	1811767.199	51303449.41	1.66742794	0.30758226	0.69241774	0.512871255	1.154556685	0
2/6/2014	18.23772359	1575739.318	44619895.12	1.5162339	0.203399123	0.796600877	0.308400645	1.207833254	0
2/7/2014	18.53977974	1601836.97	45358897.11	1.533290399	0.215210356	0.784789644	0.329979973	1.203310426	0
2/8/2014	19.66425719	1698991.821	48110011.59	1.596024715	0.254323499	0.745676501	0.405906591	1.190118124	0
2/9/2014	20.08865036	1735659.391	49148319.85	1.619402	0.263812842	0.736187158	0.427219044	1.192182956	0.09
2/10/2014	22.21732287	1919576.696	54356269.38	1.734372063	0.321782178	0.678217822	0.55809002	1.176282043	0.6
2/11/2014	32.02002813	2766530.43	78339288.89	2.224525496	0.498750781	0.501249219	1.109483828	1.115041668	0.49
2/12/2014	44.29125273	3826764.236	108361717.5	2.774519217	0.597200271	0.402799729	1.656943628	1.117575589	0.31
2/13/2014	37.22407782	3216160.323	91071368.65	2.464769504	0.491133799	0.509134874	1.21053161	1.25490011	0.16
2/14/2014	35.10075717	3032705.419	85876512.82	2.368131038	0.436182336	0.563817664	1.032936929	1.335194109	0.33
2/15/2014	35.99677752	3110121.577	88068690.68	2.40913275	0.426944444	0.573055556	1.028565844	1.380566907	0.41
2/16/2014	36.45498431	3149710.644	89189726.37	2.429974204	0.412620027	0.587654321	1.002656023	1.427984841	0.51
2/17/2014	81.40271625	7033194.684	199157567.2	4.199429478	0.687223587	0.312776413	2.88594699	1.313482488	1.67
2/18/2014	82.91001679	7163425.45	202845285.8	4.252228293	0.647207816	0.352792184	2.752075386	1.500152908	0.48
2/19/2014	67.69188744	5848579.075	165613044	3.703741301	0.533904565	0.466095435	1.977444388	1.726296913	0.2
2/20/2014	51.39988661	4440950.203	125753498.7	3.070509429	0.368871595	0.631128405	1.132623712	1.937885717	0.2
2/21/2014	42.95772131	3711547.121	105099137.5	2.717354415	0.240689013	0.759310987	0.654037352	2.063317063	0.08
2/22/2014	39.90008359	3447367.222	97618408.16	2.584094343	0.184210526	0.815789474	0.476017379	2.108076964	0.18
2/23/2014	37.08184157	3203871.112	90723377.5	2.458351872	0.129449838	0.870819849	0.318233252	2.140781606	0.32
2/24/2014	40.11414865	3465862.443	98142133.63	2.593527488	0.195711793	0.804537522	0.507583914	2.086590178	0.43
2/25/2014	38.58905058	3334093.97	94410872.13	2.525964551	0.167141747	0.832858253	0.422194127	2.103770424	0.01

Date	ABDR daily AVG discharge (CFS)	ABDR daily Total Discharge (ft3)	ABDR daily Total Liters (L)	ABDR daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
2/26/2014	33.53775191	2897661.765	82052508.67	2.295798788	0.056350626	0.943649374	0.129369699	2.166429088	0
2/27/2014	29.5236169	2550840.5	72231640.27	2.104896156	0	1	0	2.104896156	0
2/28/2014	26.86529309	2321161.323	65727860.95	1.973897839	0	1	0	1.973897839	0
3/1/2014	26.44329049	2284700.299	64695401.42	1.952729362	0.004160363	0.996217852	0.008124063	1.94534385	0.01
3/2/2014	24.73015887	2136685.726	60504102.37	1.865660974	0	1	0	1.865660974	0.64
3/3/2014	33.21342228	2869639.685	81259013.02	2.280655999	0.250225836	0.749774164	0.570679053	1.709976946	0.62
3/4/2014	48.03427483	4150161.345	117519288.8	2.932119034	0.455548615	0.544451385	1.335722766	1.596396268	0.89
3/5/2014	63.0079009	5443882.638	154153335.9	3.527225345	0.549277892	0.450722108	1.937426904	1.589798442	1.11
3/6/2014	66.57122318	5751753.682	162871258.7	3.661873482	0.538831305	0.461168695	1.973132068	1.688741413	0.5
3/7/2014	54.11175478	4675255.613	132388278.1	3.179924402	0.411199409	0.5889854	1.307583034	1.872929047	0.03
3/8/2014	43.25181683	3736956.974	105818663.2	2.730009571	0.25734104	0.74265896	0.702543503	2.027466067	1.01
3/9/2014	76.75562306	6631685.832	187788121.4	4.034644283	0.54611777	0.453751954	2.203390937	1.830727728	0.77
3/10/2014	78.23182221	6759229.439	191399748.2	4.087326496	0.521922536	0.478077464	2.133267811	1.954058685	0.98
3/11/2014	66.36207236	5733683.052	162359556.2	3.65403483	0.414556962	0.585443038	1.514805578	2.139229252	0.04
3/12/2014	56.22492253	4857833.307	137558294.2	3.263974531	0.298826041	0.701173959	0.975360586	2.288613946	0.01

Table E6.1. Variables used to calculate annual TP load for the Rock Creek Site at SE 312th Street.

Date	SE 312th Street daily AVG discharge (CFS)	SE 312th Street daily Total Discharge (ft3)	SE 312th Street daily Total Liters (L)	SE 312th Street daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
3/14/2013	11.64731422	1006327.948	28495987.25	1.11723612	0.499570815	0.499570815	0.55813856	0.55813856	0.07
3/15/2013	11.15602347	963880.4281	27294009.31	1.084923505	0.452508961	0.547491039	0.490937608	0.593985897	0.05
3/16/2013	10.72580193	926709.2869	26241441.54	1.056252814	0.409133271	0.590866729	0.432148169	0.624104645	0.27
3/17/2013	12.04238923	1040462.429	29462566.52	1.142906033	0.448504983	0.551495017	0.512599052	0.630306982	0.04
3/18/2013	11.00264048	950628.1374	26918746.84	1.074742957	0.378181818	0.621818182	0.406448246	0.668294711	0.02
3/19/2013	10.14603162	876617.1322	24822992.01	1.017028033	0.313300493	0.685714286	0.318635384	0.697390651	0.25
3/20/2013	11.98114936	1035171.304	29312738.79	1.138944784	0.398998331	0.601001669	0.454437067	0.684507717	0.41
3/21/2013	14.34907276	1239759.887	35106032.76	1.287781665	0.470383275	0.529616725	0.605750957	0.682030707	0.02
3/22/2013	14.46411881	1249699.865	35387501.14	1.29480403	0.449515906	0.551175657	0.582035007	0.713664462	0.48
3/23/2013	14.36732319	1241336.724	35150683.74	1.288896859	0.422407794	0.576896312	0.544440079	0.743559844	0
3/24/2013	12.76012607	1102474.893	31218561.04	1.188864708	0.336206897	0.663793103	0.399704514	0.789160194	0
3/25/2013	11.46925726	990943.8272	28060358.17	1.105576348	0.255448997	0.744551003	0.28241837	0.823157978	0
3/26/2013	10.45655904	903446.7007	25582719.54	1.038123381	0.185468451	0.814531549	0.192539136	0.845584245	0
3/27/2013	9.737092846	841284.8219	23822494.05	0.988930029	0.131416838	0.867556468	0.129962057	0.857952644	0.02
3/28/2013	9.29040577	802691.0586	22729642.17	0.957804389	0.100107643	0.899892357	0.095883539	0.861920849	0.1
3/29/2013	9.016027466	778984.7731	22058356.02	0.938448777	0.084257206	0.914634146	0.079071072	0.858337296	0
3/30/2013	8.381315538	724145.6625	20505487.89	0.892936973	0.03221957	0.96778043	0.028770046	0.864166928	0
3/31/2013	7.482374458	646477.1532	18306164.25	0.82654416	0	1	0	0.82654416	0
4/1/2013	6.896216384	595833.0956	16872086.6	0.781878395	0	1	0	0.781878395	0
4/2/2013	6.426390173	555240.1109	15722623.17	0.745196475	0	1	0	0.745196475	0.02
4/3/2013	5.922783882	511728.5274	14490514.36	0.704912695	0	1	0	0.704912695	0
4/4/2013	5.905004987	510192.4308	14447017.03	0.703471013	0.015228426	0.983079526	0.010712757	0.69156795	0.37
4/5/2013	9.9535657	859988.0764	24352110.36	1.003849692	0.395979899	0.604020101	0.3975043	0.606345392	1.03

Date	SE 312th Street daily AVG discharge (CFS)	SE 312th Street daily Total Discharge (ft3)	SE 312th Street daily Total Liters (L)	SE 312th Street daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
4/6/2013	23.40795865	2022447.627	57269244.97	1.797139441	0.692866296	0.307133704	1.245177349	0.551962092	0.84
4/7/2013	39.90341789	3447655.305	97626565.75	2.584241398	0.762406015	0.237593985	1.970241186	0.614000212	1.31
4/8/2013	53.67779876	4637761.813	131326573.7	3.162535382	0.765648286	0.234351714	2.421389795	0.741145587	0.16
4/9/2013	45.12311821	3898637.413	110396935.9	2.809900835	0.673093972	0.326906028	1.891327313	0.918573522	0
4/10/2013	37.76037715	3262496.586	92383463.32	2.48889709	0.571239407	0.428760593	1.421756097	1.067140993	0.26
4/11/2013	32.04584353	2768760.881	78402448.12	2.225746693	0.467394696	0.532293292	1.040302198	1.184750034	0.04
4/12/2013	25.2453466	2181197.946	61764546.01	1.89204166	0.312475248	0.687128713	0.591216186	1.30007615	0.46
4/13/2013	25.83407736	2232064.284	63204917.91	1.92197886	0.316686024	0.683701123	0.608663843	1.314059105	0.39
4/14/2013	27.75801077	2398292.131	67911958.61	2.018332267	0.34870317	0.65129683	0.70379886	1.314533407	0.19
4/15/2013	26.61519404	2299552.765	65115975.75	1.961365295	0.309541698	0.690458302	0.607124344	1.354240951	0.12
4/16/2013	21.98073248	1899135.287	53777434.08	1.721773087	0.167424932	0.832575068	0.288267742	1.433505346	0.02
4/17/2013	19.11585426	1651609.808	46768304.62	1.565576598	0.057008368	0.942468619	0.089250967	1.475506814	0
4/18/2013	16.1855553	1398431.978	39599118.63	1.39785171	0	1	0	1.39785171	0.33
4/19/2013	20.92525741	1807942.24	51195138.82	1.665029854	0.224080268	0.775919732	0.373100335	1.291929519	1.44
4/20/2013	44.12567945	3812458.704	107956630.6	2.767451707	0.591887605	0.407885792	1.638020362	1.128804231	0.01
4/21/2013	38.7121542	3344730.123	94712053.94	2.531449346	0.504004133	0.495995867	1.275860934	1.255588412	0.19
4/22/2013	32.41019099	2800240.502	79293850.24	2.242948835	0.388151805	0.611848195	0.870604639	1.372344196	0
4/23/2013	25.41724122	2196049.641	62185098.48	1.900805375	0.217938631	0.781667978	0.414258921	1.485798694	0
4/24/2013	20.56459552	1776781.053	50312753.71	1.645432385	0.049124514	0.951361868	0.080831066	1.565401627	0
4/25/2013	17.09029881	1476601.817	41812638.33	1.450600155	0	1	0	1.450600155	0
4/26/2013	14.39829011	1244012.265	35226446.51	1.290788062	0	1	0	1.290788062	0
4/27/2013	12.07508374	1043287.235	29542555.98	1.145018218	0	1	0	1.145018218	0.15
4/28/2013	10.79329047	932540.2964	26406557.06	1.060774291	0	1	0	1.060774291	0.07
4/29/2013	10.0568992	868916.0908	24604923.16	1.010935049	0	1	0	1.010935049	0.04

Date	SE 312th Street daily AVG discharge (CFS)	SE 312th Street daily Total Discharge (ft3)	SE 312th Street daily Total Liters (L)	SE 312th Street daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
4/30/2013	9.45878983	817239.4413	23141605.81	0.969592463	0	1	0	0.969592463	0.02
5/1/2013	8.770981212	757812.7768	21458832.84	0.921002936	0	1	0	0.921002936	0
5/2/2013	7.935105444	685593.1104	19413802.99	0.86028152	0	1	0	0.86028152	0
5/3/2013	7.639131266	660020.9414	18689680.99	0.838297458	0	1	0	0.838297458	0
5/4/2013	13.20933322	1141286.39	32317578.45	1.217208829	0.401211204	0.598788796	0.488357819	0.72885101	0
5/5/2013	23.1336291	1998745.554	56598078.1	1.782769559	0.61565067	0.38434933	1.097563274	0.685206285	0
5/6/2013	31.40440776	2713340.831	76833129.64	2.195309757	0.66910828	0.33089172	1.468899936	0.726409821	0
5/7/2013	36.91147157	3189151.144	90306555.1	2.450654513	0.670549986	0.329720943	1.64328635	0.808032116	0
5/8/2013	39.78827581	3437707.03	97344862.42	2.579160924	0.648404122	0.351595878	1.672338573	0.90682235	0
5/9/2013	40.65617142	3512693.21	99468231.1	2.617341166	0.613625184	0.386128874	1.606066456	1.010630996	0.01
5/10/2013	41.98723732	3627697.304	102724779	2.675396071	0.586568231	0.413431769	1.569302339	1.106093732	0
5/11/2013	43.46460003	3755341.443	106339252.6	2.739148684	0.563506673	0.436493327	1.543528561	1.195620123	0
5/12/2013	44.10379202	3810567.631	107903081.5	2.766516808	0.535600907	0.464399093	1.481748912	1.284767896	0.17
5/13/2013	43.40282037	3750003.68	106188104.2	2.736496699	0.497695853	0.502304147	1.361943058	1.374553642	0.38
5/14/2013	45.22750221	3907656.191	110652318.8	2.814325831	0.488613752	0.511386248	1.375118303	1.439207527	0.01
5/15/2013	46.41987905	4010677.55	113569554.1	2.864643819	0.473718225	0.526281775	1.357033985	1.507609834	0.06
5/16/2013	46.65193919	4030727.546	114137305.8	2.874388522	0.450803859	0.549196141	1.295785437	1.578603086	0.05
5/17/2013	47.14319709	4073172.228	115339203.4	2.894966645	0.4327535	0.5672465	1.252806948	1.642159696	0.23
5/18/2013	47.54941549	4108269.498	116333045.7	2.911930955	0.415562566	0.584437434	1.210089499	1.701841456	0.04
5/19/2013	47.3406319	4090230.596	115822241.7	2.903217628	0.393324884	0.606675116	1.141907736	1.761309892	0.04
5/20/2013	47.59868104	4112526.042	116453577.4	2.913985211	0.378361345	0.621638655	1.102539362	1.811445849	0
5/21/2013	40.32333376	3483936.037	98653919.97	2.60273009	0.260168651	0.740079365	0.677148776	1.926226832	0.35
5/22/2013	10.25512925	886043.1675	25089907.17	1.024462625	0	1	0	1.024462625	0.49
5/23/2013	7.211699051	623090.798	17643937.51	0.806062665	0	1	0	0.806062665	0.19

Date	SE 312th Street daily AVG discharge (CFS)	SE 312th Street daily Total Discharge (ft3)	SE 312th Street daily Total Liters (L)	SE 312th Street daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
5/24/2013	5.971006573	515894.9679	14608494.63	0.708816118	0	1	0	0.708816118	0.14
5/25/2013	5.461352178	471860.8281	13361588.7	0.667031937	0	1	0	0.667031937	0.06
5/26/2013	5.141872672	444257.7989	12579959.24	0.640204646	0	1	0	0.640204646	0.23
5/27/2013	5.574011842	481594.6232	13637218.63	0.676371866	0.089766607	0.912028725	0.060715607	0.616870571	0.52
5/28/2013	7.919987033	684286.8797	19376814.71	0.859164983	0.343434343	0.656565657	0.295066762	0.564098221	0.13
5/29/2013	8.550657283	738776.7893	20919794.59	0.905183988	0.374269006	0.625730994	0.338782311	0.566401677	0.43
5/30/2013	7.605445301	657110.474	18607265.87	0.835778295	0.287779238	0.712220762	0.240519641	0.595258654	0.14
5/31/2013	6.560329167	566812.44	16050314.5	0.755738519	0.176829268	0.823170732	0.133636689	0.62210183	0.01
6/1/2013	5.520131558	476939.3666	13505396.66	0.671912568	0.038043478	0.961956522	0.025561891	0.646350676	0
6/2/2013	4.992977845	431393.2858	12215677.39	0.627520789	0	1	0	0.627520789	0.01
6/3/2013	4.725481594	408281.6098	11561228.69	0.604425783	0	1	0	0.604425783	0
6/4/2013	4.358233592	376551.3824	10662730.18	0.572025852	0	1	0	0.572025852	0
6/5/2013	4.629605976	399997.9563	11326662.13	0.596047249	0.071274298	0.928725702	0.042482849	0.5535644	0
6/6/2013	4.542820334	392499.6768	11114334.85	0.588415238	0.068281938	0.933920705	0.040178133	0.549533174	0
6/7/2013	4.377400185	378207.376	10709622.62	0.57373781	0.047945205	0.952054795	0.027507977	0.546229833	0
6/8/2013	3.974853263	343427.3219	9724762.79	0.537257978	0	1	0	0.537257978	0
6/9/2013	3.651724455	315508.9929	8934205.051	0.507114866	0	1	0	0.507114866	0
6/10/2013	3.439658804	297186.5207	8415371.269	0.48686905	0	1	0	0.48686905	0
6/11/2013	3.445117149	297658.1216	8428725.499	0.487395061	0.020289855	0.979710145	0.009889175	0.477505886	0.07
6/12/2013	3.71555033	321023.5485	9090359.618	0.513134208	0.102150538	0.897849462	0.052416935	0.460717273	0.22
6/13/2013	3.855764057	333138.0145	9433402.529	0.526243107	0.139896373	0.860103627	0.073619502	0.452623605	0.06
6/14/2013	3.437906456	297035.1178	8411084.024	0.486700123	0.049418605	0.947674419	0.024052041	0.461233256	0.03
6/15/2013	3.162499218	273239.9324	7737280.519	0.459796779	0	1	0	0.459796779	0
6/16/2013	2.900612183	250612.8926	7096555.158	0.433511544	0	1	0	0.433511544	0.01

Date	SE 312th Street daily AVG discharge (CFS)	SE 312th Street daily Total Discharge (ft3)	SE 312th Street daily Total Liters (L)	SE 312th Street daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
6/17/2013	2.738579646	236613.2814	6700130.967	0.416869369	0	1	0	0.416869369	0.08
6/18/2013	2.886522671	249395.5588	7062084.158	0.432076414	0.065743945	0.934256055	0.028406408	0.403670006	0.12
6/19/2013	3.282799601	283633.8855	8031604.009	0.471636732	0.179878049	0.820121951	0.084837095	0.386799637	0.09
6/20/2013	3.576700093	309026.888	8750652.582	0.499996315	0.24301676	0.75698324	0.121507484	0.378488831	0.36
6/21/2013	3.953099218	341547.7724	9671539.962	0.535253835	0.303797468	0.696202532	0.16260876	0.372645075	0.04
6/22/2013	3.410238684	294644.6223	8343392.84	0.484029283	0.193548387	0.806451613	0.093683087	0.390346196	0
6/23/2013	3.088283887	266827.7279	7555707.405	0.452420867	0.1197411	0.8802589	0.054173372	0.398247494	0.11
6/24/2013	3.655100543	315800.687	8942464.892	0.507434097	0.24863388	0.74863388	0.126165308	0.379882357	0.41
6/25/2013	4.067405929	351423.8722	9951199.505	0.545745839	0.314496314	0.685503686	0.171635055	0.374110784	0.34
6/26/2013	4.302583921	371743.2507	10526579.28	0.56704156	0.337209302	0.662790698	0.191211689	0.375829871	0.16
6/27/2013	4.374043768	377917.3816	10701410.91	0.573438188	0.33409611	0.66590389	0.191583468	0.38185472	0.1
6/28/2013	4.171380252	360407.2538	10205580.12	0.555208025	0.292565947	0.707434053	0.162434962	0.392773063	0
6/29/2013	3.869819121	334352.3721	9467789.249	0.527548688	0.235142119	0.764857881	0.124048916	0.403499772	0
6/30/2013	3.747520527	323785.7736	9168576.993	0.516136867	0.208	0.792	0.107356468	0.408780399	0
7/1/2013	3.660063446	316229.4818	8954606.989	0.507903201	0.191256831	0.808743169	0.097139956	0.410763244	0
7/2/2013	3.658876344	316126.9161	8951702.659	0.507791012	0.191256831	0.808743169	0.0971185	0.410672512	0
7/3/2013	3.386745347	292614.7979	8285914.71	0.481755981	0.132743363	0.867256637	0.063949909	0.417806072	0
7/4/2013	2.898415353	250423.0865	7091180.457	0.433287926	0.006896552	0.993103448	0.002988193	0.430299733	0
7/5/2013	2.775263752	239782.7882	6789881.256	0.420664058	0	1	0	0.420664058	0
7/6/2013	2.76034827	238494.0905	6753389.462	0.419123108	0.014492754	0.985507246	0.006074248	0.41304886	0
7/7/2013	2.688193605	232259.9275	6576857.915	0.411630772	0.007434944	0.992565056	0.003060452	0.408570321	0
7/8/2013	2.621965508	226537.8199	6414826.138	0.404697175	0.003816794	1	0.001544646	0.404697175	0
7/9/2013	2.627365646	227004.3918	6428037.962	0.405264606	0.022813688	0.977186312	0.00924558	0.396019025	0
7/10/2013	2.629115968	227155.6196	6432320.25	0.405448445	0.038022814	0.961977186	0.015416291	0.390032154	0

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7/11/2013	2.63176895	227384.8373	6438810.96	0.405727017	0.053231939	0.946768061	0.021597636	0.384129381	0
7/12/2013	2.740556251	236784.0601	6704966.873	0.417074245	0.102189781	0.897810219	0.042620726	0.374453519	0
7/13/2013	2.955802555	255381.3407	7231582.349	0.439111858	0.168918919	0.827702703	0.0741743	0.363454071	0
7/14/2013	2.797603542	241712.9461	6844537.151	0.422967097	0.132142857	0.867857143	0.055892081	0.367075017	0
7/15/2013	2.606391848	225192.2557	6376724.066	0.403058649	0.08045977	0.91954023	0.032430006	0.370628643	0
7/16/2013	2.332329276	201513.2494	5706210.381	0.373688817	0	1	0	0.373688817	0.02
7/17/2013	2.191799988	189371.519	5362395.429	0.358204164	0	1	0	0.358204164	0.08
7/18/2013	2.439863528	210804.2088	5969300.619	0.385337374	0.110655738	0.889344262	0.042639791	0.342697582	0
7/19/2013	2.372012492	204941.8793	5803298.208	0.378007017	0.097046414	0.902953586	0.036684225	0.341322792	0
7/20/2013	2.375403179	205234.8347	5811593.766	0.378374907	0.105042017	0.890756303	0.039745263	0.337039834	0
7/21/2013	2.239249413	193471.1493	5478483.841	0.363466999	0.066964286	0.933035714	0.024339308	0.339127691	0
7/22/2013	2.148703858	185648.0134	5256957.665	0.353392594	0.041860465	0.958139535	0.014793178	0.338599415	0.03
7/23/2013	2.064879936	178405.6265	5051876.445	0.343944656	0.024271845	0.980582524	0.008348171	0.337266119	0
7/24/2013	1.979808643	171055.4668	4843743.442	0.334230142	0	1	0	0.334230142	0
7/25/2013	1.864211376	161067.8629	4560926.459	0.320813329	0	1	0	0.320813329	0
7/26/2013	1.701060142	146971.5962	4161765.297	0.301415303	0	1	0	0.301415303	0
7/27/2013	1.546734933	133637.8983	3784197.637	0.282512344	0	1	0	0.282512344	0
7/28/2013	1.435307609	124010.5774	3511582.718	0.268487914	0	1	0	0.268487914	0
7/29/2013	1.459384727	126090.8404	3570489.109	0.271546891	0.034246575	0.965753425	0.009299551	0.26224734	0
7/30/2013	1.446830897	125006.1895	3539775.266	0.269953963	0.04137931	0.95862069	0.011170509	0.258783455	0
7/31/2013	1.518039833	131158.6415	3713993.021	0.27893245	0.098684211	0.901315789	0.027526229	0.251406221	0.09
8/1/2013	1.730599594	149523.8049	4234035.678	0.304969977	0.208092486	0.791907514	0.06346196	0.241508016	0.01
8/2/2013	1.876931967	162166.922	4592048.296	0.322302485	0.260638298	0.734042553	0.084004371	0.236583739	0.04
8/3/2013	1.955767761	168978.3345	4784925.703	0.331460876	0.280612245	0.714285714	0.09301198	0.236757768	0

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8/4/2013	1.9458599	168122.2954	4760685.414	0.330316434	0.271794872	0.728205128	0.089778313	0.240538121	0
8/5/2013	1.886029025	162952.9078	4614304.9	0.323365472	0.243386243	0.751322751	0.078702707	0.242951836	0
8/6/2013	1.831915517	158277.5007	4481912.332	0.317017918	0.218579235	0.781420765	0.069293534	0.247724384	0
8/7/2013	1.787468414	154437.271	4373169.314	0.311759386	0.201117318	0.798882682	0.062700212	0.249059175	0
8/8/2013	1.735603331	149956.1278	4246277.68	0.305570185	0.17816092	0.816091954	0.054440665	0.249373369	0
8/9/2013	1.668444992	144153.6473	4081970.001	0.297467554	0.149700599	0.850299401	0.044531071	0.252936483	0
8/10/2013	1.72851271	149343.4981	4228929.968	0.304719487	0.184971098	0.815028902	0.056364298	0.248355189	0.13
8/11/2013	1.733441555	149769.3504	4240988.74	0.305310944	0.184971098	0.815028902	0.056473701	0.248837243	0
8/12/2013	1.942573068	167838.3131	4752643.943	0.329936367	0.268041237	0.731958763	0.088436552	0.241499815	0
8/13/2013	1.477745117	127677.1781	3615409.116	0.273868754	0.054054054	0.945945946	0.014803716	0.259065037	0
8/14/2013	0.934383528	80730.73678	2286036.127	0.200434671	0	1	0	0.200434671	0.02
8/15/2013	0.693977457	59959.65227	1697865.481	0.163682178	0	1	0	0.163682178	0.13
8/16/2013	0.60666517	52415.87069	1484249.727	0.149359728	0	1	0	0.149359728	0
8/17/2013	0.603807904	52169.00292	1477259.222	0.148880316	0.016666667	1	0.002481339	0.148880316	0
8/18/2013	0.637510379	55080.89672	1559714.736	0.154490233	0.078125	0.921875	0.012069549	0.142420683	0
8/19/2013	0.858923933	74211.02777	2101418.831	0.189264149	0.302325581	0.697674419	0.057219394	0.132044755	0
8/20/2013	1.006875877	86994.07575	2463393.844	0.210897687	0.386138614	0.613861386	0.08143574	0.129461946	0
8/21/2013	1.099252478	94975.41407	2689399.805	0.223888903	0.418181818	0.581818182	0.093626269	0.130262635	0
8/22/2013	1.218148451	105248.0262	2980287.308	0.240108233	0.450819672	0.549180328	0.108245515	0.131862718	0
8/23/2013	1.316947154	113784.2341	3222005.401	0.2532044	0.462121212	0.537878788	0.117011124	0.136193276	0
8/24/2013	1.341294226	115887.8211	3281572.252	0.256382917	0.447761194	0.552238806	0.114798321	0.141584596	0.02
8/25/2013	1.375124376	118810.7461	3364340.134	0.260769079	0.434782609	0.557971014	0.11337786	0.145501587	0.01
8/26/2013	1.487734644	128540.2732	3639849.209	0.275128166	0.456375839	0.543624161	0.125561848	0.149566318	0.02
8/27/2013	1.589001012	137289.6875	3887604.622	0.287746975	0.459119497	0.534591195	0.132110246	0.153826999	0.07

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8/28/2013	1.785967884	154307.6252	4369498.161	0.311581136	0.491620112	0.508379888	0.153179553	0.158401583	0.28
8/29/2013	2.337989597	202002.3012	5720058.763	0.374306179	0.572649573	0.427350427	0.214346274	0.159959906	0.98
8/30/2013	2.745042681	237171.6876	6715943.244	0.417539091	0.596363636	0.403636364	0.249005131	0.168533961	0.11
8/31/2013	2.690637817	232471.1074	6582837.854	0.411885614	0.553903346	0.446096654	0.22814482	0.183740794	0
9/1/2013	2.718242234	234856.129	6650374.035	0.414758636	0.522058824	0.474264706	0.216528406	0.196705383	0
9/2/2013	2.829729402	244488.6203	6923135.364	0.42626874	0.512367491	0.487632509	0.218406245	0.207862495	0
9/3/2013	2.861729522	247253.4307	7001425.948	0.429545595	0.486013986	0.513986014	0.208765167	0.220780428	0.14
9/4/2013	2.801459754	242046.1227	6853971.648	0.423364045	0.45	0.55	0.19051382	0.232850225	0
9/5/2013	2.780808336	240261.8402	6803446.477	0.421236207	0.424460432	0.575539568	0.178798102	0.242438105	0.75
9/6/2013	5.62440116	485948.2603	13760499.7	0.680529814	0.667259786	0.332740214	0.454090179	0.226439636	0.8
9/7/2013	4.324851491	373667.1688	10581058.49	0.569038421	0.534722222	0.467592593	0.304277489	0.26607815	0
9/8/2013	3.818036877	329878.3861	9341100.285	0.522731082	0.445026178	0.552356021	0.232629016	0.288733661	0.01
9/9/2013	3.545868127	306363.0062	8675219.974	0.497057099	0.383098592	0.614084507	0.190421874	0.305235064	0
9/10/2013	3.402320103	293960.4569	8324019.467	0.483263612	0.344117647	0.655882353	0.166299537	0.316964075	0
9/11/2013	3.154430745	272542.8164	7717540.424	0.458997587	0.285714286	0.717460317	0.131142168	0.329312555	0
9/12/2013	2.974794231	257022.2216	7278046.844	0.44103126	0.239057239	0.764309764	0.105431715	0.337084499	0
9/13/2013	2.707347555	233914.8287	6623719.422	0.413625853	0.166051661	0.833948339	0.06868326	0.344942593	0.02
9/14/2013	2.518693593	217615.1264	6162164.012	0.393772705	0.111111111	0.888888889	0.043752523	0.350020182	0
9/15/2013	2.422058712	209265.8727	5925739.863	0.383420175	0.08677686	0.91322314	0.033271999	0.350148177	0.21
9/16/2013	2.866305763	247648.8179	7012622.047	0.43001325	0.226480836	0.773519164	0.09738976	0.33262349	0.5
9/17/2013	3.736354685	322821.0448	9141258.962	0.515089097	0.387700535	0.612299465	0.199700318	0.315388779	0.05
9/18/2013	3.59754536	310827.9191	8801652.02	0.501978919	0.347222222	0.65	0.174298236	0.326286298	0
9/19/2013	3.418001153	295315.2997	8362384.277	0.484779309	0.304093567	0.695906433	0.147418269	0.33736104	0
9/20/2013	3.081949105	266280.4027	7540208.907	0.451788679	0.224025974	0.775974026	0.101212399	0.35057628	0.09

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9/21/2013	2.9886858	258222.4531	7312033.56	0.442432744	0.200668896	0.799331104	0.08878249	0.353650253	0.07
9/22/2013	3.960529417	342189.7417	9689718.477	0.535938754	0.378787879	0.621212121	0.203007104	0.33293165	0.75
9/23/2013	5.750109466	496809.4578	14068054.06	0.690851391	0.537391304	0.462608696	0.37125753	0.319593861	0.81
9/24/2013	6.09616945	526709.0405	14914714.56	0.718900923	0.529508197	0.468852459	0.380663931	0.337058466	0.07
9/25/2013	5.284178596	456553.0307	12928120.86	0.652218139	0.433712121	0.566287879	0.282874912	0.369343226	0.03
9/26/2013	4.931984762	426123.4834	12066453.45	0.622290254	0.37525355	0.62474645	0.233516627	0.388773627	0
9/27/2013	4.876514107	421330.8188	11930740.53	0.617515358	0.352459016	0.645491803	0.217648856	0.398601102	0.1
9/28/2013	10.66931227	921828.5801	26103235.54	1.052461239	0.6579194	0.3420806	0.692434667	0.360026572	1.72
9/29/2013	14.82652168	1281011.473	36274145.68	1.316809501	0.701955496	0.297370196	0.924341666	0.391579899	0.67
9/30/2013	34.30203938	2963696.203	83922392.63	2.331299571	0.809329446	0.190962099	1.88678939	0.44518986	1.43
10/1/2013	55.47918987	4793402.005	135733805.9	3.234430392	0.818853641	0.181146359	2.648525103	0.585905289	0.82
10/2/2013	31.25251033	2700216.892	76461501.7	2.188073093	0.63424	0.36576	1.387763479	0.800309615	0.28
10/3/2013	22.07228243	1907045.202	54001417.57	1.726653436	0.455822383	0.544177617	0.787047285	0.939606152	0
10/4/2013	15.75586001	1361306.305	38547838.37	1.372471336	0.234137056	0.765228426	0.321346398	1.050254081	0.01
10/5/2013	11.28563988	975079.2859	27611125.12	1.093491818	0	1	0	1.093491818	0
10/6/2013	9.795463852	846328.0768	23965302.89	0.992963382	0	1	0	0.992963382	0
10/7/2013	9.174024718	792635.7356	22444907.6	0.949617041	0	1	0	0.949617041	0.23
10/8/2013	9.716964902	839545.7675	23773249.59	0.98753743	0.068930041	0.930041152	0.068070996	0.91845045	0.34
10/9/2013	9.04217063	781243.5424	22122317.14	0.940301029	0.01880531	0.982300885	0.017682652	0.923658532	0
10/10/2013	8.188446479	707481.7758	20033619.95	0.878891846	0	1	0	0.878891846	0.14
10/11/2013	7.931834362	685310.4888	19405800.05	0.860039999	0	1	0	0.860039999	0
10/12/2013	8.551433895	738843.8885	20921694.62	0.905239975	0.084210526	0.915789474	0.076230735	0.82900924	0.25
10/13/2013	8.114074765	701056.0597	19851664.23	0.873447822	0.050554871	0.950678175	0.044157042	0.830367781	0
10/14/2013	7.473576198	645716.9835	18284638.68	0.825882169	0	1	0	0.825882169	0

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10/15/2013	7.23350394	624974.7405	17697284.73	0.807721575	0	1	0	0.807721575	0
10/16/2013	7.276415714	628682.3177	17802271.45	0.810981642	0.023351648	0.975274725	0.018937758	0.790929898	0
10/17/2013	6.983658938	603388.1323	17086021.06	0.788616286	0.00286533	0.99713467	0.002259646	0.78635664	0
10/18/2013	6.736129894	582001.6229	16480423.55	0.769471825	0	1	0	0.769471825	0.01
10/19/2013	6.212929721	536797.1279	15200376.91	0.728249307	0	1	0	0.728249307	0
10/20/2013	6.0224827	520342.5053	14734434.65	0.712971814	0	1	0	0.712971814	0.01
10/21/2013	6.04406378	522207.1106	14787234.31	0.714710692	0.021523179	0.978476821	0.015382846	0.699327846	0.01
10/22/2013	6.003075815	518665.7504	14686954.32	0.711406421	0.031666667	0.968333333	0.02252787	0.688878551	0
10/23/2013	6.142336613	530697.8833	15027665.82	0.722604055	0.068403909	0.933224756	0.049428942	0.674351992	0.01
10/24/2013	6.03799854	521683.0739	14772395.27	0.71422219	0.064569536	0.933774834	0.046116996	0.666922708	0
10/25/2013	5.941409704	513337.7985	14536083.77	0.706421574	0.063973064	0.936026936	0.045191953	0.661229622	0.02
10/26/2013	6.178981238	533863.979	15117319.52	0.725537053	0.108414239	0.889967638	0.078658548	0.645704497	0
10/27/2013	6.326309583	546593.1479	15477768.85	0.73727355	0.135860979	0.862559242	0.100166707	0.635942114	0.12
10/28/2013	6.293655587	543771.8427	15397878.51	0.734679849	0.138314785	0.861685215	0.101617086	0.633062764	0.43
10/29/2013	6.60722558	570864.2901	16165049.93	0.759413362	0.181543116	0.818456884	0.137866268	0.621547094	0
10/30/2013	6.947650559	600277.0083	16997923.99	0.785844937	0.218705036	0.779856115	0.171868245	0.612845979	0.02
10/31/2013	7.254537574	626792.0464	17748745.02	0.809320298	0.248275862	0.753103448	0.200934695	0.609501907	0.18
11/1/2013	6.867129688	593320.0051	16800923.92	0.779631088	0.203784571	0.794759825	0.158876787	0.619619467	0
11/2/2013	8.914417486	770205.6708	21809759.94	0.931233339	0.37037037	0.630751964	0.344901237	0.587377258	0.7
11/3/2013	8.052729109	695755.795	19701577.7	0.868945319	0.293167702	0.706832298	0.254746702	0.614198617	0.23
11/4/2013	8.014330201	692438.1293	19607632.02	0.866121439	0.280898876	0.719101124	0.243292539	0.6228289	0.03
11/5/2013	8.215313307	709803.0697	20099351.56	0.880854621	0.289537713	0.710462287	0.255040632	0.625813988	0.15
11/6/2013	8.341288901	720687.3611	20407559.87	0.890030702	0.291366906	0.708633094	0.259325492	0.63070521	0.06
11/7/2013	12.8925199	1113913.719	31542472.01	1.197251122	0.50969744	0.49030256	0.610235832	0.58701529	0.97

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11/8/2013	13.42412171	1159844.116	32843073.86	1.230652643	0.498509687	0.501490313	0.613492264	0.617160379	0
11/9/2013	11.6648524	1007843.248	28538895.68	1.118381493	0.402229846	0.597770154	0.449846415	0.668535078	0.07
11/10/2013	11.09352954	958480.9523	27141113.43	1.080780996	0.356176736	0.644724977	0.384949047	0.696806503	0.01
11/11/2013	10.59895304	915749.5423	25931096.64	1.047729772	0.314150943	0.685849057	0.329145296	0.718584476	0
11/12/2013	10.10841807	873367.3213	24730967.76	1.014458908	0.272997033	0.727002967	0.276944272	0.737514636	0.09
11/13/2013	9.870132964	852779.4881	24147986.21	0.998111752	0.250253293	0.749746707	0.249780752	0.748330999	0.03
11/14/2013	9.836921563	849910.023	24066732.14	0.995823394	0.243902439	0.756097561	0.242883755	0.75293964	0.18
11/15/2013	11.3081407	977023.3566	27666174.98	1.094976033	0.328912467	0.671087533	0.360151268	0.734824765	0.53
11/16/2013	12.45116372	1075780.546	30462662.56	1.16918484	0.372690763	0.627309237	0.43574439	0.73344045	0
11/17/2013	11.66366455	1007740.617	28535989.51	1.118303934	0.318181818	0.681818182	0.355823979	0.762479955	0.44
11/18/2013	21.96280336	1897586.21	53733569.19	1.720816562	0.597449909	0.402550091	1.028101698	0.692714864	0.71
11/19/2013	42.36648827	3660464.587	103652643.6	2.691829225	0.736606089	0.263393911	1.982817798	0.709011427	0.14
11/20/2013	20.35582681	1758743.437	49801986.15	1.634038334	0.428290766	0.571218075	0.69984353	0.933392231	0.01
11/21/2013	14.64239019	1265102.513	35823654.83	1.30565056	0.204918033	0.795081967	0.267551344	1.038099216	0
11/22/2013	12.96706837	1120354.707	31724860.18	1.20196126	0.111025443	0.888203547	0.133448282	1.067586254	0
11/23/2013	12.35416323	1067399.703	30225343.92	1.162974213	0.079352227	0.920647773	0.092284593	1.07068962	0.01
11/24/2013	11.99905904	1036718.701	29356556.11	1.140103923	0.065833333	0.934166667	0.075056842	1.065047082	0
11/25/2013	11.62397591	1004311.519	28438888.41	1.115711104	0.050774527	0.949225473	0.056649703	1.059061401	0
11/26/2013	10.945413	945683.683	26778735.71	1.070932997	0.010958904	0.988127854	0.011736252	1.058218724	0
11/27/2013	10.5300723	909798.2463	25762574.98	1.043088014	0	1	0	1.043088014	0.01
11/28/2013	9.805667375	847209.6612	23990266.54	0.993667642	0	1	0	0.993667642	0
11/29/2013	9.132704553	789065.6734	22343814.86	0.946702231	0	1	0	0.946702231	0.06
11/30/2013	8.963352253	774433.6347	21929482.35	0.934711508	0.001116071	0.998883929	0.001043205	0.933668304	0.27
12/1/2013	12.75985013	1102451.051	31217885.92	1.1888472	0.289184953	0.710815047	0.343796722	0.845050478	0.57

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12/2/2013	12.77350742	1103631.041	31251299.47	1.189713599	0.281910728	0.718089272	0.335393027	0.854320572	0
12/3/2013	11.65534963	1007022.208	28515646.47	1.11776096	0.211835334	0.788164666	0.236781267	0.880979693	0.04
12/4/2013	10.70618427	925014.3213	26193445.53	1.054936804	0.147525677	0.852474323	0.155630266	0.899306538	0
12/5/2013	9.860512728	851948.2997	24124449.61	0.997449144	0.086206897	0.914807302	0.085986995	0.91247376	0
12/6/2013	9.312432409	804594.1601	22783531.91	0.95935026	0.04726101	0.95273899	0.045339862	0.914010398	0
12/7/2013	8.482369091	732876.6895	20752722.64	0.900254692	0	1	0	0.900254692	0
12/8/2013	7.958677776	687629.7598	19471474.38	0.862021051	0	1	0	0.862021051	0
12/9/2013	7.648565989	660836.1014	18712763.72	0.839002386	0	1	0	0.839002386	0
12/10/2013	7.972261719	688803.4125	19504708.47	0.863022737	0.055207026	0.944792974	0.047644919	0.815377818	0
12/11/2013	8.13580208	702933.2997	19904821.66	0.875039905	0.085995086	0.914004914	0.075249132	0.799790773	0
12/12/2013	8.536078991	737517.2248	20884127.75	0.90413273	0.135831382	0.864168618	0.122809598	0.781323132	0.23
12/13/2013	9.568486914	826717.2694	23409987.57	0.977236026	0.225705329	0.774294671	0.220567379	0.756668647	0.2
12/14/2013	8.938912528	772322.0424	21869688.81	0.932975149	0.174496644	0.825503356	0.162801033	0.770174116	0
12/15/2013	8.618790615	744663.5091	21086487.66	0.910089606	0.148491879	0.851508121	0.135140916	0.77494869	0.1
12/16/2013	8.834939739	763338.7934	21615311.95	0.925571236	0.17214043	0.82785957	0.159328231	0.766243005	0.03
12/17/2013	8.896189432	768630.7669	21765163.7	0.929936176	0.179775281	0.819101124	0.167179537	0.761711767	0.01
12/18/2013	10.19542764	880884.948	24943842.9	1.020397328	0.276470588	0.72254902	0.28210985	0.737287089	0.35
12/19/2013	10.38249937	897047.9459	25401527.27	1.033110575	0.281310212	0.718689788	0.290624555	0.74248602	0.01
12/20/2013	10.2957979	889556.9383	25189405.91	1.027227577	0.267961165	0.731067961	0.275257098	0.75097317	0.47
12/21/2013	17.90939913	1547372.084	43816625.84	1.49759153	0.54438861	0.45561139	0.815271771	0.682319759	0.45
12/22/2013	22.5770432	1950656.533	55236350.91	1.753446318	0.597874225	0.402125775	1.048340358	0.705105959	0.45
12/23/2013	32.75188645	2829762.989	80129832.61	2.259025521	0.674503817	0.325496183	1.523721336	0.735304185	0.37
12/24/2013	25.98921221	2245467.935	63584466.43	1.929831164	0.55367449	0.44632551	1.068498286	0.861332878	0.01
12/25/2013	18.99297613	1640993.138	46467674.48	1.55871621	0.371774618	0.628225382	0.579491124	0.979225086	0

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12/26/2013	15.5201872	1340944.174	37971247.98	1.35845742	0.228092784	0.771907216	0.309854334	1.048603086	0
12/27/2013	14.48279136	1251313.174	35433184.87	1.295942112	0.175414365	0.824585635	0.227326862	1.06861525	0.13
12/28/2013	13.09798616	1131666.005	32045159.92	1.210212089	0.098473282	0.901526718	0.119173557	1.091038532	0
12/29/2013	11.38858162	983973.4516	27862979.43	1.100274449	0	1	0	1.100274449	0
12/30/2013	10.56316766	912657.6854	25843545.15	1.04531946	0	1	0	1.04531946	0.03
12/31/2013	10.52415232	909286.7602	25748091.33	1.042688625	0.015209125	0.984790875	0.015858382	1.026830243	0.03
1/1/2014	9.792675213	846087.1384	23958480.28	0.992770866	0	1	0	0.992770866	0.01
1/2/2014	9.543836753	824587.4955	23349679.19	0.975520877	0	1	0	0.975520877	0.63
1/3/2014	19.07187466	1647809.971	46660705.38	1.563122801	0.471945464	0.528054536	0.737708716	0.825414085	0.08
1/4/2014	12.98839332	1122197.183	31777033.18	1.203307026	0.22247883	0.77752117	0.267710339	0.935596687	0.01
1/5/2014	11.00105958	950491.5473	26914879.05	1.074637792	0.092727273	0.907272727	0.099648232	0.974989561	0
1/6/2014	10.22071942	883070.1581	25005721.05	1.022120461	0.040117417	0.959882583	0.041004833	0.981115629	0.02
1/7/2014	13.47272437	1164043.386	32961983.74	1.233685181	0.265033408	0.734966592	0.326967787	0.906717394	0.49
1/8/2014	16.92137018	1462006.384	41399342.37	1.440820229	0.394799054	0.605200946	0.568834464	0.871985765	0.45
1/9/2014	18.88877358	1631990.038	46212735.49	1.552887395	0.434092112	0.565907888	0.67409617	0.878791226	0.18
1/10/2014	19.98138053	1726391.278	48885876.53	1.613508148	0.44044044	0.55955956	0.710654239	0.902853909	0.28
1/11/2014	35.01185507	3025024.278	85659007.47	2.364044797	0.63610397	0.36389603	1.503778281	0.860266516	0.88
1/12/2014	39.36689853	3401300.033	96313932.78	2.560528131	0.632207264	0.367792736	1.618784485	0.941743646	0.14
1/13/2014	24.82818329	2145155.036	60743926.12	1.870693813	0.396697543	0.602899718	0.74209964	1.127840772	0.04
1/14/2014	19.89616057	1719028.274	48677379.82	1.608818611	0.242713568	0.75678392	0.390482105	1.217528054	0.03
1/15/2014	17.22132657	1487922.616	42133207.12	1.458164631	0.132404181	0.867595819	0.193067094	1.265097537	0
1/16/2014	15.23581571	1316374.477	37275512.8	1.34145699	0.036089239	0.963910761	0.048412162	1.293044828	0.01
1/17/2014	13.47924661	1164606.907	32977940.87	1.234091867	0	1	0	1.234091867	0
1/18/2014	11.89208376	1027476.037	29094833.43	1.133172102	0	1	0	1.133172102	0.01

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1/19/2014	10.94562394	945701.9085	26779251.8	1.070947053	0	1	0	1.070947053	0
1/20/2014	10.03512481	867034.7835	24551650.56	1.009443965	0	1	0	1.009443965	0.01
1/21/2014	9.807735336	847388.333	23995325.95	0.993810347	0	1	0	0.993810347	0
1/22/2014	9.540700506	824316.5237	23342006.14	0.975302557	0	1	0	0.975302557	0.02
1/23/2014	9.049749986	781898.3988	22140860.58	0.940837709	0	1	0	0.940837709	0
1/24/2014	8.643225678	746774.6986	21146269.79	0.911845921	0	1	0	0.911845921	0.01
1/25/2014	8.119162122	701495.6073	19864110.81	0.873820723	0	1	0	0.873820723	0
1/26/2014	7.528762117	650485.0469	18419654.98	0.830030323	0	1	0	0.830030323	0
1/27/2014	6.948351361	600337.5576	16999638.55	0.785898917	0	1	0	0.785898917	0
1/28/2014	6.903951214	596501.3849	16891010.42	0.782475497	0.013043478	0.988405797	0.010206202	0.773403318	0.18
1/29/2014	13.14639305	1135848.359	32163590.82	1.213256165	0.455513308	0.544486692	0.552654329	0.660601836	1.73
1/30/2014	33.5683261	2900303.375	82127310.6	2.297223866	0.732499255	0.267500745	1.682714771	0.614509095	0.1
1/31/2014	26.450344	2285309.721	64712658.32	1.953084061	0.617769376	0.382230624	1.206555522	0.746528539	0.07
2/1/2014	20.60083049	1779911.754	50401405.16	1.64740623	0.480582524	0.519417476	0.791714644	0.855691585	0.02
2/2/2014	16.90098113	1460244.769	41349459.09	1.439637727	0.35147929	0.64852071	0.506002846	0.933634881	0.02
2/3/2014	14.2239875	1228952.52	34800002.71	1.280126097	0.226441632	0.773558368	0.289873842	0.990252255	0
2/4/2014	12.22437952	1056186.391	29907818.78	1.154640193	0.109656301	0.891162029	0.126613573	1.028971498	0
2/5/2014	10.58718743	914732.9939	25902311.24	1.04693759	0	1	0	1.04693759	0
2/6/2014	9.045995814	781574.0383	22131675.73	0.940571901	0	1	0	0.940571901	0
2/7/2014	8.517323981	735896.792	20838242.28	0.902779442	0	1	0	0.902779442	0
2/8/2014	8.796065994	759980.1019	21520204.55	0.922795904	0.047727273	0.952272727	0.044042532	0.878753372	0
2/9/2014	8.447466044	729861.0662	20667329.84	0.897730374	0.026035503	0.973964497	0.023372862	0.874357512	0.09
2/10/2014	9.699069447	837999.6002	23729467.08	0.986298518	0.155670103	0.844329897	0.153537192	0.832761326	0.6
2/11/2014	13.91034598	1201853.893	34032656.32	1.260835231	0.391804457	0.608195543	0.494000863	0.766834367	0.49

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2/12/2014	17.81595462	1539298.48	43588007.19	1.492265847	0.494949495	0.505050505	0.738596227	0.753669619	0.31
2/13/2014	20.1713197	1742802.022	49350576.3	1.623937351	0.521070897	0.478929103	0.846186493	0.777750858	0.16
2/14/2014	19.92307318	1721353.523	48743223.44	1.610300266	0.485943775	0.514056225	0.78251539	0.827784876	0.33
2/15/2014	19.54595389	1688770.416	47820574.12	1.589479504	0.450639386	0.549360614	0.716282068	0.873197436	0.41
2/16/2014	22.87540934	1976435.367	55966324.99	1.769193793	0.5	0.5	0.884596897	0.884596897	0.51
2/17/2014	47.46060887	4100596.606	116115774	2.908226214	0.707332491	0.292667509	2.057082891	0.851143323	1.67
2/18/2014	60.98077032	5268738.555	149193815.9	3.449543078	0.719252214	0.280911774	2.481091496	0.969017267	0.48
2/19/2014	55.01324338	4753144.228	134593834.5	3.215906408	0.64351936	0.35648064	2.069498034	1.146408374	0.2
2/20/2014	47.91389808	4139760.794	117224778.4	2.927113	0.554581507	0.445627218	1.623322738	1.304401222	0.2
2/21/2014	40.65067755	3512218.54	99454789.95	2.617100303	0.449446494	0.550553506	1.176246557	1.440853746	0.08
2/22/2014	33.98649808	2936433.434	83150398.28	2.316673732	0.328331862	0.671668138	0.760637801	1.556035931	0.18
2/23/2014	30.67190075	2650052.225	75040998.84	2.160307701	0.250733616	0.749592436	0.541661761	1.619350311	0.32
2/24/2014	32.34099263	2794261.763	79124551.5	2.239686499	0.281076067	0.718923933	0.629522272	1.610164227	0.43
2/25/2014	34.20525894	2955334.373	83685612.37	2.326818225	0.308973984	0.690733704	0.718926297	1.60721177	0.01
2/26/2014	27.81181349	2402940.686	68043590.81	2.020995575	0.154980223	0.84537936	0.313214345	1.708507946	0
2/27/2014	23.31109272	2014078.411	57032255.56	1.792071594	0.011154011	0.989274989	0.019988787	1.772851607	0
2/28/2014	19.77368247	1708446.165	48377728.37	1.60206757	0	1	0	1.60206757	0
3/1/2014	17.14845936	1481626.889	41954932.29	1.453960147	0	1	0	1.453960147	0.01
3/2/2014	15.43877528	1333910.184	37772067.89	1.353600642	0	1	0	1.353600642	0.64
3/3/2014	22.19268732	1917448.184	54295996.75	1.733062167	0.294727355	0.705272645	0.510780828	1.222281339	0.62
3/4/2014	36.52779608	3156001.581	89367865.57	2.433278319	0.5370928	0.4629072	1.306896267	1.126382053	0.89
3/5/2014	54.94451719	4747206.285	134425690.9	3.213169929	0.646705497	0.353294503	2.077974656	1.135195274	1.11
3/6/2014	62.5233676	5402018.961	152967890.5	3.508730824	0.644273832	0.355886116	2.260583455	1.248708586	0.5
3/7/2014	53.45236867	4618284.653	130775042.9	3.153484496	0.548362956	0.451824135	1.72925408	1.424820404	0.03

Date	SE 312th Street daily AVG discharge (CFS)	SE 312th Street daily Total Discharge (ft3)	SE 312th Street daily Total Liters (L)	SE 312th Street daily Total TP (kg)	Runoff %	Baseflow %	Daily Total Load, Runoff (kg)	Daily Total Load, Baseflow (kg)	Daily Precip (inches)
3/8/2014	44.36082466	3832775.251	108531930.2	2.777486386	0.431920649	0.568079351	1.199653723	1.577832663	1.01
3/9/2014	60.18200123	5199724.906	147239570.2	3.418707742	0.546028581	0.453971419	1.866712137	1.551995605	0.77
3/10/2014	65.17732768	5631321.112	159460993.7	3.609482615	0.545566125	0.454433875	1.969211442	1.640271173	0.98
3/11/2014	62.05340892	5361414.531	151818103	3.490748883	0.492828364	0.507171636	1.720340062	1.770408821	0.04
3/12/2014	54.19774039	4682684.77	132598648.1	3.183364637	0.398892989	0.600922509	1.269821835	1.912955466	0.01

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