NPDES Phase II:
Annual Stormwater Monitoring Summary

Prepared for
Ada County Highway District
Boise, Idaho

January 3, 2020

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Acronyms

°C	degrees Celsius
µS/cm	microSiemens per centimeter
ACHD	Ada County Highway District
DO	dissolved oxygen
DOP	dissolved orthophosphate
EPA	United States Environmental Protection Agency
lbs.	pounds
mg/L	milligrams per liter
Monitoring Plan	*Storm Water Monitoring Plan NPDES Phase II Permit Meridian and Eagle, Idaho*
MPN/100 mL	most probable number per 100 milliliters
MS4	Municipal Separate Storm Sewer System
N	nitrogen
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
Permit	Phase II Stormwater Permit
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
S.U.	Standard Units
TKN	total Kjeldahl nitrogen
TP	total phosphorus
TSS	total suspended solids
WQL	Boise City Water Quality Laboratory
WY	water year

Executive Summary

Ada County Highway District (ACHD) was issued a National Pollutant Discharge Elimination System municipal separate storm sewer system (MS4) permit (Permit) for stormwater discharge from the MS4 in the areas of Meridian and Eagle, Idaho. The United States Environmental Protection Agency issued the Permit to ACHD (Permit number IDS-028185) on September 4, 2009, effective October 15, 2009. ACHD began conducting stormwater monitoring activities as defined in the Permit on October 15, 2010. Data from these monitoring activities are used to characterize local stormwater discharges, pollutant loads, and trends for water quality and quantity.

Water Year (WY) 2019 is the ninth year of stormwater quality monitoring under the Permit, which has been administratively extended since its expiration in 2014. This report presents monitoring data collected for WY 2019 and summarizes data collected from WYs 2011 through 2019 in the context of general statistics and pollutant loading estimates.

The Permit requires collecting stormwater quality data from four storm events each year during Permit-defined monitoring periods. The Permit-defined monitoring periods are listed below:

- March–April
- May–June
- July–August
- September–October

In situations where a stormwater sample cannot be collected and analyzed during the monitoring period, a supplemental sample is to be collected during the November (2018) through February timeframe, outside of one of the predefined monitoring periods.

Monitoring is conducted at two monitoring sites selected to represent the area covered by the Permit. These sites, Edgewood and Chrisfield, represent stormwater runoff from the MS4 in the Eagle and Meridian areas, respectively. Table 1 is a program summary of monitoring efforts for the duration of the Permit. Dry weather grab sample collection and instream sample collection upstream of the Chrisfield outfall were discontinued at the end of WY 2016.

In September 2018, both Edgewood and Chrisfield monitoring stations were equipped with ISCO 6712 portable samplers. Starting at the beginning of WY 2019, stormwater sampling was modified to include composite sample collection. Composite samples include permit-defined analyses (except *E.coli)*, and additional common stormwater constituents described in Section 3.1. *E.coli* is still collected as a grab sample. The monitoring station flowmeters trigger the associated autosamplers to collect flow-proportional composite stormwater runoff samples during storm events. This is the first year composite sampling has been attempted under this Permit.

Stormwater samples were collected during a total of six storm events during WY 2019. All samples were submitted to the Boise City Water Quality Laboratory in Boise, Idaho, for analysis of selected constituents. Additionally, ACHD collected field parameter measurements accompanying all analytical grab samples. Due to equipment and sampling errors stormwater quality sampling data requirements were not met during WY 2019, despite also collecting discrete grab samples for all analytes for the last two monitoring periods in case of equipment failure. Laboratory analytical and field parameter results for grab samples are discussed in Section 3.2 and summarized in Tables 2 and 3. Summary statistics for each constituent over the duration of the monitoring program are presented in Tables 4 through 6. Results are also presented graphically in Figures 1 through 8.

Continuous flow data measurement was conducted at both sites for the duration of WY 2019, with some data gaps due to connection issues, firmware issues, and damage to the monitoring equipment. Discharge data from the monitored outfalls is summarized in Tables 7 and 8 and Figures 9 and 10. Rain data is collected at site-specific rain gauges maintained by ACHD near the monitoring stations. This data is presented in Table 9 and Figures 11 and 12. All data collected for WY 2019 and a summary of data collected during WYs 2011 through 2019 are included in this annual report. Section 4 includes a description of flow and rain data.

Pollutant loading estimates were calculated annually and by monitoring period for both monitored drainages and the Eagle and Meridian MS4s. Pollutant loading estimates are presented in Tables 10 through 13 and discussed in Section 5.

Section 6 presents conclusions and recommendations based on the multi-year analysis.

Section 1

Introduction

On September 4, 2009, the United States Environmental Protection Agency (EPA) issued a signed Municipal Separate Storm Sewer System (MS4) Phase II Stormwater Permit (permit number IDS–028185) (Permit) to Ada County Highway District (ACHD) effective October 15, 2009. The Permit requires developing and implementing a stormwater quality monitoring program throughout the 5-year term of the Permit. This report entitled *National Pollutant Discharge Elimination System [NPDES] Phase II: Annual Stormwater Monitoring Summary for Water Year 2018* serves as the Storm Water Discharge Monitoring Report required by the Permit to be included in the *ACHD Phase II NPDES MS4 Annual Report*.

ACHD is required to determine whether stormwater discharges are contributing pollutants of concern, either directly or indirectly, to the Boise River or any associated tributaries. This report also summarizes the monitoring data collected as defined in the *Storm Water Monitoring Plan NPDES Phase II Permit Meridian and Eagle, Idaho* (Monitoring Plan) (MSE, 2012).

ACHD has selected two stormwater monitoring sites to meet Permit requirements: Edgewood and Chrisfield. The contributing area to the Edgewood site changed due to construction activities during Water Year (WY) 2015 and is now 55.9 acres (formerly 25.2 acres) and discharges to Eagle Drain, a tributary to the lower Boise River. The site was selected to represent the MS4 in the Eagle area. The Chrisfield site was selected to represent the MS4 in the Meridian area. In September of 2018 the 12-acre Chrisfield subwatershed was rerouted to discharge to a stormwater detention pond that overflows to Fivemile Creek. The two stormwater monitoring sites are described in detail in the Monitoring Plan. Site maps and Phase II area maps are included in Appendix A.

The Permit requires that one storm event be monitored during each of four monitoring periods throughout the water year. The Permit-defined monitoring periods are listed below:

- March–April
- May–June
- July–August
- September–October

In order to document and track stormwater monitoring progress, ACHD completes a stormwater monitoring period summary for each monitoring period during the water year. The results of these reports are compiled in this annual stormwater monitoring report for WY 2019. Monitoring period summaries, including monthly hydrographs for WY 2019, are included for reference in Appendix B.

For WY 2019, this annual report includes a summary of the individual stormwater monitoring periods and the data collected in the supplemental period (November 2018–February 2019). As required by the Permit, this annual report contains the following information:

- Dates of sample collection and analysis
- Results of analytical samples collected
- Sampling locations
- Estimated monthly pollutant loads for each pollutant at each sample location

- An annual cumulative estimate of pollutant loading for each parameter at each sample location and an overall estimate of the contribution of pollutants from all stormwater discharging from the MS4

This annual report also summarizes data collected over the course of the monitoring program (WYs 2011 through 2019). Stormwater quality results, runoff volumes, precipitation data, and pollutant loading estimates are included for WYs 2011 through 2019. Summary statistics for stormwater quality data are presented in Tables 4 through 6. Comparative summaries of flow and rain data are shown in Tables 7, 8, and 9.

The Permit defines a storm event using the following criteria:

- The depth of precipitation must be greater than 0.10 inch of accumulation.
- The storm must be preceded by at least 72 hours of dry weather.

In addition to these criteria, the Permit requires that the grab samples be collected within the first 120 minutes of the initiation of measured flow to capture the "first flush."

Variability in weather patterns in the Phase II MS4 area has necessitated that ACHD establish additional storm targeting criteria including a targeted minimum probability of precipitation, expected precipitation depth or quantitative precipitation forecast, and antecedent dry period. The additional storm targeting criteria justification is included in the *Storm Water Monitoring Plan NPDES Phase II Permit Meridian and Eagle, Idah*o (ACHD Appendix D, 2014).

Starting at the beginning of WY 2019, the stormwater sampling program was modified to facilitate collection of composite samples for event mean concentration results. Composite samples include permit-defined analyses (except *E.coli)*, and additional common stormwater constituents described in Section 3.1. *E.coli* is still collected as a grab sample. Edgewood and Chrisfield monitoring stations were equipped with ISCO 6712 portable samplers. Each autosampler is equipped with, and programmed to fill, one 15-liter low-density polyethylene carboy for flow-weighted composite sample collection. The submerged area velocity sensors and sample intakes are mounted on the inverts of existing stormwater pipes. The new composite sampling methods, along with various issues with equipment firmware and equipment failures, prevented full composite sample collection several times. Seven events were targeted for composite samples throughout WY 2019; only one composite sample at Edgewood and two at Chrisfield were successful. Because of the difficulty obtaining successful composite samples, discrete grab samples for permit-defined analytes were collected concurrently with composite samples for the last two monitoring periods.

If samples cannot be collected in the specified monitoring periods, the Permit states that samples may be collected during other months as necessary to meet the minimum of four samples per year. These additional samples and corresponding data are referred to in this program as supplemental samples. Supplemental samples are used frequently throughout WY 2019 at both monitoring stations due to equipment and sampling errors.

The Permit requires that samples collected from each site be analyzed for selected constituents listed in Permit Table IV.A. The Permit-required analytical data presented in this report includes grab samples collected within the first 2 hours of storm flow.

Field and laboratory activities were conducted according to the *Quality Assurance Program Plan for NPDES Phase II Stormwater Permit Monitoring, Meridian and Eagle, Idaho* (QAPP) (ACHD Appendix E, 2014). Field quality assurance/quality control (QA/QC) samples were collected and analyzed to help identify potential sources of introduced error in the stormwater sampling process. Laboratory analyses were performed by the Boise City Water Quality Laboratory (WQL) and are included as Appendix C.

Data quality objectives are outlined in the QAPP. All data collection, handling, results management, and interpretation follow the established data quality objectives defined for this program. The data collected as part of the sampling program include rainfall data, runoff volumes, field analytical data, laboratory analytical data, and QA/QC results. All data collected as part of this monitoring program is stored in ACHD's stormwater database, DataSight.

Section 2

WY 2019 Monitored Storms

During WY 2019, ACHD targeted seven storm events for Phase II monitoring. Successful E.coli grab samples were collected in all monitoring periods except July – August at both Edgewood and Chrisfield. Samples submitted for permit-defined analyses were successfully collected during the November–February and the September–October monitoring periods at Edgewood. At Chrisfield, samples submitted for permit-defined analyses were successfully collected during the May–June and September–October monitoring periods. Sample collection methods and approaches are described in further detail in Section 3. There was no rain event that met the program target criteria for the July–August period.

Occurrence of equipment errors and firmware issues with new composite samplers prevented successful composite samples in several monitoring periods. Seven events were targeted for composite samples throughout WY 2019; only one composite sample at Edgewood and two at Chrisfield were successful. From the May-June monitoring period through the end of the water year, grab samples for the permit-defined analyses were collected concurrently with targeted composite samples. This supplement provided another full sample for both sites. Before this change, grab samples were only collected for *E. coli* analysis since composite samples are not analyzed for *E. coli*.

Some of the monitoring period summaries included in Appendix B do not present pollutant loads due to no available storm event data. For this report, we use supplemental data from later in the year to calculate these loads. The list below describes how supplemental events were applied to monitoring periods during WY 2019.

- November–February monitoring period
  - Edgewood: 11/27/2018 event
  - Chrisfield: 10/19/2019 event
- March–April monitoring period
  - Edgewood: 11/27/2018 event
  - Chrisfield: 5/16/2019 event
- May–June monitoring period
  - Edgewood: 11/27/2018 event
  - Chrisfield: 5/16/2019 event
- July–August monitoring period
  - Edgewood: 9/6/2019 event
  - Chrisfield: 9/6/2019 event
- September–October monitoring period
  - Edgewood: 9/6/2019 event
  - Chrisfield: 10/19/2019 event

Targeted storms are summarized by monitoring period below. Detailed site and equipment background information can be found in the Monitoring Plan. Complete monitoring period

summaries including monthly hydrographs for WY 2019 are included for reference in Appendix B. Laboratory analytical reports are included as Appendix C.

2.1 March–April 2019 Monitoring Period

National Weather Service Summary March–April

The National Weather Service (NWS) prepares a summary of precipitation observations each month for inclusion in an overall monthly climate summary. The NWS monthly climate summary is made available through the local Boise Weather Forecast Office on the NWS website. The following precipitation summaries from the NWS are included for each monitoring period.

> The average temperature for March 2019 was only slightly below normal. Total precipitation was very close to normal, at 1.31 inches. No records were equaled or exceeded. On the 23rd a low-pressure trough approaching from the coast brought light showers, the first measurable precipitation since the 12th. On the 24th the trough was over our area, and more than half an inch of rain was measured at the airport. While not a record, it was the first significant precipitation since late February. On the 26th moist unstable air associated with an offshore low-pressure trough contributed to late afternoon thunderstorms which developed along a cold front. One of these storms was accompanied by brief heavy showers, and even small hail in some parts of Boise. As it moved inland, the trough brought more showers from the 27th through the 30th. A high-pressure ridge over the coast provided dry sunny weather on the 31st.
>
> April 2019 was wetter and slightly warmer than normal, with a total precipitation of 1.99 inches. Measurable precipitation fell on 14 days. An upper-level high pressure ridge kept temperatures above normal through the 5th. Disturbances moving through the ridge brought nearly daily showers. After the ridge shifted east, relatively mild temperatures were maintained by southwest flow aloft ahead of an approaching upper-level low pressure trough. Daily showers continued. Heavier showers on the 8th dropped nearly half an inch of rain at the airport. Another system resulted in rainfall totaling over half an inch on the 14th and 15th. On the 20th a strong cold front in advance of an upper-level trough triggered thunderstorms. One such storm dumped nearly a quarter inch of rain in 20 minutes at the airport.

Stormwater Monitoring Summary

Flow and rain data were collected continuously during the March–April period from the Edgewood and Chrisfield monitoring stations. One storm was targeted during the March–April monitoring period on April 13, 2019, resulting in successful grab samples (*E.coli* only) at both monitoring stations. Composite samples were attempted but were unsuccessful. A narrative for the April 13 event is included below. Pollutant loading estimates for the Edgewood and Chrisfield monitoring stations for the March–April monitoring period were calculated using the November 27, 2018, storm event for Edgewood and the May 16, 2019, storm event for Chrisfield. Field parameters and *E. coli* analytical results are included in Tables 2 and 3.

April 13, 2019

On Friday afternoon, April 12, the NWS issued a forecast for rain showers in the Boise area from Saturday evening to Sunday morning. The chance of precipitation was 65–75 percent; a total precipitation of 0.14 inch was forecasted. Setup was conducted Friday afternoon. Precipitation

started around 2200 on Saturday evening, April 13, 2019, and light showers continued through Sunday morning around 0900. Precipitation totals were 0.48 inch at both Edgewood and Chrisfield.

2.2 May–June 2019 Monitoring Period

NWS Summary May–June

The NWS monthly climate summaries for May and June follow.

> May 2019 was the wettest May since 2005, and the 6th wettest on record, with a total of 3.98 inches. In addition, the period from January 1 through May 31 is the wettest on record at the Boise airport, at 12.07 inches. It ranks in second place for the entire period of record in the Boise area (behind 1896 at 14.27 inches), and even exceeds Boise's average annual precipitation of 11.73 inches. No rain fell during the first two weeks of the month. During the rest of the month most days had measurable rain. The moist and unstable air provided favorable conditions for daily rounds of showers and thunderstorms, some of which produced locally heavy showers.
>
> June 2019 was the second driest June at the Boise airport, with only 0.04 inch of precipitation. Measurable rain fell on only two days. The average temperature for the month was very close to normal. June began with above normal temperatures, with highs in the 80s. On the 26th an upper level trough had arrived off the Washington-Oregon coast. As the trough edged farther east that day, thunderstorms developed in northeast Oregon along a weak cold front, but they never got as far as Boise, and that night the front produced no precipitation.

Stormwater Monitoring Summary

Flow and rain data were collected continuously during the May–June period from the Edgewood and Chrisfield monitoring stations. One storm was targeted during the May–June monitoring period. Grab samples (*E. coli* only) were collected at both sites on May 16, 2019. Grab samples are qualified for holding time. The time between collection time and analysis time was 37 hours. A successful composite sample was collected at Chrisfield, but the composite sample at Edgewood was unsuccessful due to equipment failure. A narrative for this event is included below.

May 16, 2019

On Wednesday afternoon, May 15, the NWS issued a forecast for rain showers in the Boise area from mid-day Thursday continuing through Friday afternoon. The chance of precipitation was 80–85 percent, with a total of 0.64 inch of precipitation forecasted. Setup was conducted Wednesday afternoon. An expected precipitation depth of 0.19 inch was used to set trigger volumes at Edgewood and Chrisfield. Precipitation started around 1500 on Thursday afternoon, May 16, 2019, and continued steadily through the afternoon until around 1900. Precipitation totals were 0.15 at Chrisfield and 0.21 at Edgewood.

2.3 July–August 2019 Monitoring Period

NWS Summary July–August

The NWS summary for the July–August monitoring period follows.

> July and August are normally the driest months of the year, and this year was no different. Only 0.01 inch of rain fell in July. As is common this time of year, upper

> level troughs from the north Pacific weakened as they encountered the strong summer high pressure ridge over the western United States. The ridge diverted these systems too far north to bring measurable rain to the Boise area.
>
> August 2019 resulted in three days of measurable precipitation, totaling 0.09 inch. Precipitation for June, July, and August only totaled 0.14 inch at the airport, making this the second driest summer on record. Southerly flow aloft brought enough moisture for light showers on the 2nd and again on the 8th. On the 9th and 10th, a low pressure trough moved inland, which triggered thunderstorms that produced light but measurable precipitation and gusty outflow winds.

Stormwater Monitoring

No samples were collected during the July–August monitoring period. Both months were hot and dry with no rain events that met sampling criteria. For this monitoring period, pollutant loads were calculated using water quality results from a storm on September 6, 2019.

2.4 September–October 2019 Monitoring Period

NWS Summary September–October

The NWS summary for the September–October monitoring period follows.

> September brought a total precipitation of 0.84 inch to the Boise area, a quarter inch above normal. Airflow from the southwest brought enough monsoon moisture for isolated thunderstorms on the 5th and 6th. A Pacific cold front generated more precipitation on the 8th. Unseasonable cool weather at the end of the month compensated for hot weather at the beginning and middle of September, making the average temperature a normal 64.9.
>
> October 2019 was unseasonably cool, with an average temperature of 46.1 degrees. Overall, October was a dry month, with measurable precipitation falling on only five days. On the 19th, a broad jet stream over the north Pacific pushed a fast-moving upper level trough inland across Idaho. There was enough moisture and energy with this system to produce a thunderstorm and nearly a quarter inch of rain. Winter weather arrived very early during the final week of the month.

Stormwater Monitoring

Two events were targeted during the September–October monitoring period on September 6 and October 19. Grab samples (permit-defined analyses) were collected at both sites on September 6. Composite samplers were set up at both sites for both events, but due to equipment errors, only one composite sample was successful at Chrisfield on October 19. Grab samples collected at Edgewood on October 19 were rejected due to a sampling location error.

September 6, 2019

On Thursday morning, September 5, the NWS issued a forecast for isolated showers and thunderstorms in the Boise area from Thursday evening continuing through Friday. The chance of precipitation was 80 percent, with as much as 0.25 inch of precipitation forecasted. Setup was conducted Thursday afternoon. An expected precipitation depth of 0.11 inch was used to set trigger volumes at Edgewood and Chrisfield. Precipitation started around 1000 on Friday morning, September 6, 2019, and continued heavily in isolated areas for a few hours. Precipitation data was lost at both sites due to equipment errors.

October 19, 2019

The morning of Friday, October 18, the NWS issued a forecast for isolated rain showers and thunderstorms in the Boise area from Friday evening through Saturday afternoon. The chance of precipitation was 95 percent, with as much as 0.35 inch of precipitation forecasted in localized areas. An expected precipitation depth of 0.11 inch was used to set trigger volumes at Edgewood and Chrisfield. Precipitation started around 0730 on Saturday morning October 19, 2019. Two intense and localized waves of precipitation came at 0900 and 1200, producing two clear flow peaks.

2.5 Supplemental Monitoring (November–February)

NWS Summary November 2018–February 2019

The NWS summary for the November–February monitoring period follows.

> The average temperature for November 2018 was near normal. Precipitation totaled 0.80 inch, 60 percent of normal, most falling during the last nine days of the month. There was no measurable precipitation from the 5th through the 21st. But despite the wet weather at the end of the month, it still ranks among the driest 25 percent of Novembers at the airport. The first snow of the season fell at the airport in the early morning hours of the 24th. Weak winds at all levels kept warm air from mixing down to the surface, so temperatures in the valley averaged a few degrees below normal. The change to a progressive flow pattern which began on the 21st broke the inversion, allowing temperatures to warm to near or above normal for the rest of the month.
>
> The average temperature for December 2018 was slightly warmer than normal, although the month started out cold, with the temperature staying below freezing from the 5th through the 8th. The rest of the month was relatively mild, with daily averages near or above normal. Precipitation was near normal, totaling 1.4 inches, but total snowfall was slightly below normal at 4.9 inches. Half of the total precipitation fell on the first two days of the month, when a deep upper level trough from the north Pacific crossed the area. On the 17th and the 18th two closely spaced Pacific weather systems brought nearly a third of an inch of rain.
>
> January 2019 ranked 14th warmest in the 80 years of airport records. Precipitation was a third of an inch below normal, totaling 1.08 inches. Most of it fell in one day on the 19th, when three quarters of an inch fell at the airport. On the 23rd a high-pressure ridge was building near the coast. A weak disturbance rounding the north portion of the ridge crossed the Boise area, bringing another light snowfall. The rest of the month stayed mild and dry as the ridge gradually shifted inland.
>
> After a relatively mild and nearly snow-free January, February 2019 brought a return to winter. February, with an average temperature only a couple of degrees below normal, was colder than January. The low of 10 degrees on the 22nd was the coldest temperature of the winter. Brief periods of southwest flow aloft enabled temperatures to reach or exceed normal values for a few days at the beginning, middle, and end of the month. The warm spells were accompanied by the wettest weather of the month, due to disturbances embedded in the flow picking up moisture from off the California coast. Measurable precipitation was recorded on all but four days, for a February total precipitation of 3.71 inches. It was the wettest February since precipitation records began in 1878. It was the 9th snowiest February on

record, with 11.6 inches falling during the month. The greatest depth of snow for the month and the winter was 5 inches on the 21st.

Stormwater Monitoring

Three storms were targeted during the November–February monitoring period. Grab samples (*E. coli* only) were collected at Chrisfield on November 23, 2018, and at both sites on November 27, 2018. A composite sample was collected at Edgewood on November 27, 2018. Both sites were targeted for composite samples on February 2, 2019, but both were unsuccessful. A successful composite sample was not collected at Chrisfield during the November–February monitoring period. Narratives for each event are included below. More information on flow and rain data collection is included in Section 4.

November 23, 2018

On Wednesday morning, November 21, the NWS issued a forecast for rain showers in the Boise area from late morning Friday into the afternoon and evening. Setup was accomplished Wednesday afternoon to collect composite samples at both Chrisfield and Edgewood. An expected precipitation depth of 0.22 inch was used to set trigger volumes at both monitoring sites. Precipitation started around 1545 Friday afternoon and continued lightly throughout the evening. Precipitation totaled 0.30 inch at Chrisfield, and Edgewood's rain gauge data was not available for this storm event.

November 27, 2018

On Monday morning, November 26, the NWS issued a forecast for rain showers in the Boise area from late morning Tuesday into the afternoon and evening. The chance of precipitation was 100 percent for Tuesday evening; a total precipitation of 0.20 inch was predicted. Setup was accomplished Monday afternoon to collect composite samples at both Chrisfield and Edgewood. An expected precipitation depth of 0.11 inch was used to set trigger volumes at both monitoring sites. Precipitation started around 1700 on Tuesday evening, and small amounts continued until around 2200. Precipitation totals were 0.11 inch at Chrisfield and 0.14 inch at Edgewood.

Section 3

Stormwater Quality Monitoring Summary

WY 2019 was the ninth year of data collection for NPDES Phase II stormwater monitoring. Samples collected during WYs 2011 through 2019 include grab samples collected from both the Edgewood and Chrisfield sample locations, as well as composite samples collected in WY 2019. Table 1 presents a summary of analytical sample and field parameter collection by monitoring period.

3.1 Permit-Defined Analyses and Field Parameters

The permit requires that the following stormwater parameters be collected during the monitoring periods identified in Section 2:

- Flow (cubic feet per second)
- Total suspended solids (TSS) (milligrams per liter [mg/L])
- Total phosphorus, as P (TP) (mg/L)
- Total nitrogen, as N (N) (mg/L)
- *E. coli* (most probable number per 100 milliliters [MPN/100 mL])

Total nitrogen is reported in this document as the sum of total Kjeldahl nitrogen (TKN) and nitrate + nitrite as N. This is described in further detail in the Monitoring Plan. Composite samples are analyzed for additional common stormwater constituents including: biological oxygen demand, chemical oxygen demand, total dissolved solids, total arsenic, total cadmium, total lead, total mercury, dissolved cadmium, dissolved copper, dissolved lead, dissolved zinc, turbidity, and hardness. Reported results for these additional analytes are included in Appendix C only.

In addition to the Permit-defined analyses, the following parameters were collected during all targeted events:

- Temperature (°C)
- Conductivity (microSiemens per centimeter [µS/cm])
- Dissolved oxygen (DO) (mg/L)
- pH (standard units [S.U.])
- Dissolved orthophosphate, as P (DOP) (mg/L)
- Rain (inches)

Section 3.2 presents the permit-defined sample analytical results for WY 2019, and summary statistics for results from WY 2011 through WY 2019 are included in Section 3.3.

3.2 WY 2019 Analytical Results

Field and analytical parameters for WY 2019 have been added to the comprehensive list of results from WYs 2011 through 2019 in Tables 2 and 3 for Edgewood samples and Chrisfield samples, respectively. Samples were analyzed (for the parameters noted in Section 3.1) by the WQL. Results for all WY 2019 samples are summarized in sections 3.2.1 and 3.2.2 below.

3.2.1 WY 2019 Analytical Results

Stormwater samples were collected at both monitoring stations during WY 2019. This section summarizes the ranges for each of the monitored field parameters (pH, DO, conductivity, and temperature) and laboratory analytical constituents (nitrate + nitrite, TKN, TSS, TP, DOP, and *E. coli*) as reported in Table 2 for Edgewood and Table 3 for Chrisfield.

Field Parameters

DO concentrations ranged from 7.33 to 9.89 mg/L in samples collected at Edgewood and from 7.50 to 12.63 mg/L at Chrisfield.

Temperature values were recorded at the time of measurement of each field parameter. Temperature values recorded at Edgewood ranged from 10.1 to 23.01°C and from 5.3 to 24.07°C at Chrisfield.

pH measurements in samples from the Edgewood location ranged from 7.40 to 7.94 S.U, and concentrations from the Chrisfield monitoring location ranged from 7.01 to 9.01 S.U.

Conductivity measurements in samples from the Edgewood location ranged from 59.7 to 167.9 µS/cm, and concentrations from the Chrisfield monitoring location ranged from 0.3 to 205.0 µS/cm.

Laboratory Results

Nitrate + nitrite was detected in all Edgewood and Chrisfield samples. Concentrations in samples from the Edgewood location ranged from 1.21 to 1.26 mg/L, and concentrations from the Chrisfield station ranged from 0.298 to 0.695 mg/L.

TKN was detected in all Edgewood and Chrisfield samples. TKN concentrations ranged from 0.862 mg/L to 2.05 mg/L at Edgewood and 4.23 to 6.71 mg/L at Chrisfield.

TSS was detected in all Edgewood and Chrisfield samples. TSS concentrations in samples from Edgewood ranged from 26.2 to 64.9 mg/L. Concentrations at Chrisfield ranged from 75 to 165 mg/L.

TP was detected in all Edgewood and Chrisfield samples. TP concentrations in samples from the Edgewood location ranged from 0.227 to 0.369 mg/L, while TP concentrations from the Chrisfield station ranged from 0.501 to 0.789 mg/L.

DOP was detected in all Edgewood and Chrisfield samples. DOP concentrations at Edgewood ranged from 0.132 to 0.218 mg/L, while concentrations at Chrisfield ranged from 0.249 to 0.356 mg/L.

E. coli was detected in all Edgewood and Chrisfield samples. *E. coli* concentrations in samples from Edgewood ranged from 105.0 to 2,419.6 MPN/100 mL. *E. coli* concentrations reported at Chrisfield ranged from 307.6 to 6440 MPN/100 mL.

QA/QC samples collected during WY 2019 included two field blank samples (*E.coli* only) and two field duplicate samples. There were no *E. coli* detections in the field blank samples.

A field duplicate sample for *E. coli* was collected at the Chrisfield monitoring station during the November 23, 2018, storm event. The calculated relative percent difference between the field duplicate and the parent sample met the program data quality target of less than 20 percent for *E. coli*.

A field duplicate sample for all permit-defined analyses was collected at the Edgewood monitoring station during the September 6, 2019, storm event. The calculated relative percent difference between the field duplicate and the parent sample met the program data quality target of less than 20 percent for all constituents except *E. coli* (49.5 percent). The *E. coli* result reported for the September 6, 2019, sample collected from Edgewood is considered an estimate.

3.3 Monitoring Program Statistics

Summary statistics for all samples collected for the duration of the Permit are included in Tables 4, 5, and 6. Each table includes statistical summaries of results for each monitoring period, including the minimum, maximum, mean (geometric mean for *E. coli*), and median concentrations; range of concentrations reported; and standard deviation of each dataset. Table 4 summarizes samples from Edgewood and Table 5 the samples from Chrisfield. Table 6 provides summary statistics for all reported values for each site during the monitoring program. Analytical results are presented by monitoring location for WYs 2011 through 2019 in Figures 1 through 8. The scatter plots present recorded monthly concentrations and include a mean line that indicates the mean concentration over the duration of the monitoring program.

3.3.1 Summary Statistics

Summary statistics were calculated for both Chrisfield and Edgewood for all monitoring periods; the July–August monitoring period was not included for Edgewood since only one sample has been collected. Summary statistics are included in Tables 4, 5, and 6, and a list of monitoring period and overall mean and median concentrations is included below.

Edgewood

- Nitrate + nitrite
  - Highest mean value: 1.02 mg/L in November–February
  - Lowest mean value: 0.91 mg/L in March–April
  - Program mean: 1.00 mg/L
- TKN
  - Highest mean value: 1.89 mg/L in March–April
  - Lowest mean value: 1.35 mg/L in May–June
  - Program mean: 1.56 mg/L
- TSS
  - Highest mean value: 57.92 mg/L in March–April
  - Lowest mean value: 17.01 mg/L in September–October
  - Program mean: 38.13 mg/L
- TP
  - Highest mean value: 0.31 mg/L in November–February
  - Lowest mean value: 0.21 mg/L in May–June
  - Program mean: 0.26 mg/L
- *E. coli*
  - Highest geomean value: 716.51 MPN/100 mL in September–October
  - Lowest geomean value: 35.06 MPN/100 mL in November–February
  - Program geomean: 130.75 MPN/100 mL

Chrisfield

- Nitrate + nitrite
  - Highest mean value: 0.87 mg/L in September–October

  - Lowest mean value: 0.29 mg/L in November–February
  - Program mean: 0.55 mg/L
- TKN
  - Highest mean value: 7.35 mg/L in July–August
  - Lowest mean value: 2.64 mg/L in November–February
  - Program mean: 4.61 mg/L
- TSS
  - Highest mean value: 161.00 mg/L in July–August.
  - Lowest mean value: 42.59 mg/L in November–February
  - Program mean: 66.0 mg/L
- TP
  - Highest mean value: 0.73 mg/L in September–October
  - Lowest mean value: 0.32 mg/L in March–April
  - Program mean: 0.54 mg/L
- *E. coli*
  - Highest geomean value: 3,068.01 MPN/100 mL in July–August.
  - Lowest geomean value: 27.44 MPN/100 mL in March–April
  - Program geomean: 203.29 MPN/100 mL

Section 4

Flow and Rain Gauge Data

Flow and rainfall data were collected continuously throughout the year at both the Edgewood and Chrisfield sampling locations. ISCO 2150 flow modules were used for flow monitoring in WY 2019. Rainfall data was collected using a Global Water Rain Gauge at both monitoring stations. Rain information was recorded continuously using ISCO 2105 Interface Modules. During WY 2019, the DataSight stormwater database was used to store flow and rain data for the Phase II monitoring program. Annual hydrographs for each monitoring station are included at the beginning of Appendix B.

Estimated Flow and Rain Measurements during WY 2019

Throughout WY 2019, there were instances in which precipitation and/or flow data was only available at one site. During these dates, precipitation data from the available site was used to supplement the site lacking data. This data was then used to estimate runoff volumes used in pollutant loading calculations as described in Section 5.1.

During dates where both sites were lacking rain data, data from the Boise, Idaho, AgriMet Weather Station rain gauge maintained by the U.S. Bureau of Reclamation was used for precipitation data for calculated flow estimates. The AgriMet Weather Station rain gauge is located at the Boise Fairgrounds, which is approximately 4 miles southeast of the Edgewood monitoring station and 6 miles northeast of the Chrisfield monitoring station.

Measured Flow and Rain

Measured flow and rainfall data are processed in spreadsheets that contain calculations that relate measured flow recorded at the monitoring stations with measured rain to help differentiate between stormwater runoff (rain induced discharge) and background flow (groundwater flow or irrigation runoff). The calculation is based on the average of the previous 25 flow measurements. If the data point exceeds the average, the equation then references the values in the rain amount column for that period. If there is rain in the column associated with the flow measurement, the value above the mean is identified as stormwater runoff. This process allows for consistent differentiation between background flow measurement and the influence of rain in the conveyance system.

Reported runoff totals represent a combination of all flow measured at flowmeters and flow values estimated using rain gauge data to fill in gaps. Additionally, site-specific hydrographs that include flow measurements, 24-hour rain totals, and sample dates are included for each month of WY 2019 in Appendix B, along with an annual hydrograph for each site.

4.1 Flow Summary

All flow data recorded at Edgewood and Chrisfield are summarized in Tables 7 and 8, respectively. These tables present stormwater runoff volumes, non-stormwater background flow volumes, and total discharge volumes for each monitoring period by water year. Flow data for all years at each monitoring station is also represented graphically in Figures 9 and 10.

4.1.1 Edgewood

Background flow was present throughout WY 2019, with the highest background flows observed in the summer months. Dry weather, non-stormwater flows at Edgewood were mostly attributed to groundwater. Groundwater is thought to enter the Edgewood storm drain through drains from a detention pond near the intersection of Hill Road and Edgewood Lane and from infiltration through cracks and joints in the concrete storm drain pipe. An analysis of dry weather flows conducted in WY 2017 found that some dry weather flows may also be the result of irrigation overflows, and field surveys by ACHD staff confirmed the connection of one distribution ditch flowing into the Edgewood storm drain.

Background dry weather flow accounts for the majority of discharge from the Edgewood outfall, which is typical for this site. Data also shows that stormwater runoff totals are generally highest November through February while background flow is usually lowest during this period. May through June brought more precipitation than normal, so stormwater flows were also high during this period.

4.1.2 Chrisfield

Flow and rain measurements collected at Chrisfield over the course of the monitoring program indicate that stormwater runoff constitutes the majority of total annual discharge at the Chrisfield outfall, typically around 94 percent or more. The most common source of background flow in the Chrisfield drainage area may be irrigation runoff from overwatering and/or overspray, though substantial background flow has been recorded outside of the typical lawn and garden irrigation season. May through June had the highest amount of background flow, indicating irrigation was the source of the majority of background flow.

4.2 Precipitation Summary

Measured rainfall amounts are recorded at site-specific rain gauges for this program. A summary of annual precipitation recorded at each rain gauge for WYs 2011 through 2019 is included in Table 9. Table 9 also includes precipitation records from the NWS rain gauge located at the Boise airport. Figure 11 shows precipitation totals by monitoring period as measured at the Edgewood rain gauge, and Figure 12 provides the same analysis for data from the Chrisfield rain gauge.

Figures 11 and 12 show fluctuations in precipitation distribution throughout each year of monitoring. Rainfall was below normal during the winter and summer months of WY 2019. The wettest monitoring period was March–April (excluding the supplemental November to February period), and the driest monitoring period was July–August, with only trace amounts of rainfall recorded.

Section 5

Pollutant Loading Estimates

Pollutant loading estimates were calculated for stormwater flows for the contributing drainage area at each monitoring station. Pollutant loading estimates are based on analytical monitoring results for samples collected during each monitoring period and supplemental samples where no sample was collected during a monitoring period. Pollutant loading estimates (as pounds) were calculated for nitrate + nitrite as N, TSS, TKN, and TP. The analytical results for *E. coli* are provided as most probable numbers; therefore, a pollutant loading mass is not included.

Monitored concentrations and measured/estimated flow at each site are used to calculate site-specific pollutant loading estimates. In the event the analytical result is below the detection limit for the laboratory, the value of half the detection limit is used. In calculating pollutant loads, contaminant concentrations are converted from mg/L to pounds per cubic foot. The measured flow is combined with the converted concentration and results in an estimate of pounds of pollutants discharged from the monitored drainage area.

5.1 Loading Estimate Calculations

Pollutant loading estimates were calculated based on measured runoff at each monitoring station and reported concentrations representative of each monitoring period. As the estimated pollutant load is extrapolated for larger parcels of land, the estimate becomes less accurate. Section 5.2 presents pollutant loading estimates for each monitoring period and for the water year as a whole.

The loading estimate represents the stormwater runoff discharged at the outfall and does not identify reductions from stormwater management measures installed in the system. For example, a common management practice in the Phase II permit area is the use of infiltration best management practices, which would remove a significant amount of stormwater runoff volume and associated pollutant load from the surface water system.

In situations where flow is estimated, the pollutant loading calculation loses resolution. In these instances, the EPA Simple Method is used to estimate the pollutant load using the formulas below for runoff calculation and loading extrapolation. The Simple Method has been approved by the EPA for simple pollutant loading estimations for urban stormwater.

Simple Method

$$L = 0.226 * R * C * A$$

Where:

L = event load

R = event runoff (inches)

C = pollutant concentration (mg/L)

A = area (acres)

0.226 = unit conversion factor

Annual Runoff Calculation

$$R = P * Pj * Rv$$

Where:

R = runoff (inches)

P = rainfall (inches)

Pj = fraction of annual rainfall events that produce runoff (0.9)

Rv = runoff coefficient

Initially, runoff coefficients were calculated for each monitoring station drainage area based on the percentage of impervious land cover in each area. This result was then multiplied by the fraction of rainfall events that produce runoff (assumed 0.90) and the depth of rainfall. This calculation did not take into account effective impervious area or all of the effects of storage or canopy interception and evapotranspiration in the subwatersheds. Runoff coefficients were revised in WY 2018 using monitoring data (specifically the relationship between measured rainfall and measured runoff) to develop empirically derived runoff coefficients that more accurately predict runoff volumes, thereby improving pollutant loading estimates. The revised runoff coefficients for the Edgewood and Chrisfield drainage areas are 0.206 and 0.119, respectively. WY 2019 pollutant load estimates were calculated using these updated coefficients.

Annual pollutant loading values represented in this report are rough estimates based on a sum of monthly loads as calculated each water year. The extrapolation of inputs from monitoring data to represent the MS4 in the Eagle and Meridian areas as a whole assumes that the runoff from the sites is representative of the MS4 in its entirety. Pollutant loading estimates lose resolution as they are extrapolated to reflect the MS4 in each municipal area instead of the defined monitoring location drainage area.

5.2 WY 2019 Loading Estimates

Monthly and annual pollutant loading estimates for both monitored drainage areas are included in Tables 10 and 11, and extrapolated loading estimates for the MS4 in the areas of Eagle and Meridian are provided in Tables 12 and 13, respectively. Pollutant loading estimates are presented as a result of the measured or estimated runoff and measured concentration for site-specific loading.

Nitrate + nitrite loading estimates from the monitoring locations were estimated to be 33.85 pounds (lbs.) at the Edgewood site and 3.60 lbs. at the Chrisfield site for WY 2019. The largest pollutant loading estimate was reported for the month of February at Edgewood and May at Chrisfield. Nitrate + nitrite loading estimates for the year emanating from the MS4 in the Eagle and Meridian areas were estimated to be 13,794 and 7,012 lbs. for WY 2019, respectively.

TSS loading estimates from the monitoring locations were estimated to be 794.93 lbs. at the Edgewood site and 972.91 lbs. at the Chrisfield site. The largest pollutant loading estimate was reported for the month of February at both sites. TSS loading estimates for the year from the MS4 in the Eagle and Meridian areas were estimated to be 323,966 and 2,035,819 lbs. for WY 2019, respectively.

Annual TKN loading estimates from the monitoring locations were estimated to be 25.96 lbs. at the Edgewood site and 45.62 lbs. at the Chrisfield site for WY 2019. The largest pollutant loading estimate was reported for the month of February for Edgewood and the month of May for Chrisfield. Annual TKN loading estimates for the year emanating from the MS4 in the Eagle and Meridian areas were estimated to be 10,579 and 89,993 lbs., respectively.

TP loading estimates from the monitoring locations were estimated to be 6.44 lbs. at the Edgewood site and 5.69 lbs. at the Chrisfield site. The largest pollutant loading estimate was reported for the month of February for Edgewood and the month of May for Chrisfield. TP loading estimates for WY 2019 emanating from the MS4 in the Eagle and Meridian areas were estimated to be 2,627 and 11,311 lbs., respectively.

DOP loading estimates from the monitoring locations were estimated to be 3.74 lbs. at the Edgewood site and 2.66 lbs. at the Chrisfield site. The largest pollutant loading estimate was reported for the month of February at Edgewood and Chrisfield. DOP loading estimates for WY 2019 emanating from the MS4 in the Eagle and Meridian areas were estimated to be 1,530 and 5,468 lbs., respectively.

Pollutant loading estimates were not estimated for *E. coli* because the *E. coli* value produced by the lab is a most probable number and not a mass equivalent.

Section 6

Discussion and Conclusions

Storm event monitoring efforts in WY 2019 were hampered by equipment and sampling errors that resulted in collection of fewer than the four required samples at either monitoring station. Specific issues are described in detail in Section 5 of the individual monitoring period summary reports included in Appendix B. For redundancy during WY 2020, grab sample collection will include all permit-defined analytical parameters to avoid incomplete sampling events until ACHD is confident in the reliability of composite sample collection.

Reported concentrations for the pollutants of concern, when analyzed by monitoring period, do not immediately indicate higher concentrations associated with any one monitoring period. Overall, the number of data points per monitoring period is fairly small, with no more than ten data points available in any one monitoring period, resulting in high variability within each dataset. However, some trends are noticeable.

E. coli concentrations at both sites appear to be higher during summer and fall months and may be attributable to more biotic activity associated with seasonally warm temperatures. Nitrogen levels at Chrisfield are elevated in the summer and fall months. During the summer and beginning of fall, rain events are more infrequent; built up fertilizers and pet waste from the summer may be a source of higher nitrogen concentrations in stormwater runoff. TSS results for Edgewood are typically lower in samples collected from May through October. One likely explanation is that dry weather flows are highest during these months, so background flow makes up a larger percentage of grab samples collected. Additionally, TSS, TP, and TKN results for Chrisfield are typically higher from May through October.

Dry weather flows observed at the Edgewood monitoring station are typical of background flows discharging from the MS4 in this region. Agricultural return flows, irrigation overflows, and groundwater interact with the conveyances of the MS4 and influence the quality and quantity of the MS4 discharges during wet and dry weather conditions.

Volumes of stormwater runoff (estimated and measured) and dry weather discharges can vary by orders of magnitude from year to year for the same monitoring period. While there is some bias throughout the dataset due to gaps and estimated volumes, weather patterns and variations in background flow appear to influence the dataset the most.

Pollutant loading estimates in this report reflect a rough estimate of pollutant loads, particularly when applied to the entire MS4. Annual estimates presented in this report are based on the sum of monthly loads, rather than an annual cumulative estimate based on the geometric mean of pollutant concentrations.

Section 7

References

Ada County Highway District. *Phase II Stormwater Management Plan, 2014.*

Ada County Highway District and Millennium Science and Engineering, Inc. *Stormwater Monitoring Plan NPDES Phase II Permit Meridian and Eagle, Idaho,* Version 1.1. Ada County Highway District, Revised by Brown and Caldwell, 2012.

Ada County Highway District and Millennium Science and Engineering, Inc. *Quality Assurance Program Plan for NPDES Phase II Stormwater Permit Monitoring Meridian and Eagle, Idaho, Version 1.1. Ada County Highway District, Revised by Brown and Caldwell, 2012*.

MSE. *Storm Water Monitoring Plan NPDES Phase II Permit Meridian and Eagle, Idaho, 2012.*

National Weather Service (2017). National Weather Service Forecast Office Boise, Idaho. Retrieved from http://www.nws.noaa.gov/climate/index.php?wfo=boi.

National Weather Service Boise Forecast Office. (2018). Monthly Weather Summary. Retrieved November 29, 2018, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

U.S. Environmental Protection Agency. *Ada County Highway District Permit No. IDS-028185.* U.S. Environmental Protection Agency. 2009.

U.S. Environmental Protection Agency. 1992. *NPDES Stormwater Sampling Guidance Document,* Office of Water, Washington, D.C. EPA 833-B-92-001.

Tables

Table 1. Monitoring Program Sample Count (WY 2011 - WY 2019)										
Monitoring Period	March–April		May–June		July–August		September–October		November–February	
Station	Edgewood	Chrisfield	Edgewood	Chrisfield	Edgewood	Chrisfield	Edgewood	Chrisfield	Edgewood	Chrisfield
Bacteria and field parameters [1]	10	11	8	8	1	2	9	10	9	9
Permit-defined analytes [2]	9	10	7	7	1	2	9	9	8	7
Composite sample constiuents [3]	0	0	0	1	0	0	0	1	1	0
QA/QC	4	5	3	2	0	2	1	3	6	2

Notes:

[1] Includes: E. coli, conductivity, dissolved oxygen, pH, and temperature

[2] Includes: TSS, TP, DOP, TKN, and nitrate + nitrite as N

[3] Includes: permit-defined analytes plus biological oxygen demand, chemical oxygen demand, total dissolved solids, total arsenic, total cadmium, total lead, total mercury, dissolved cadmium, dissolved copper, dissolved lead, dissolved zinc, turbidity, and hardness

Table 2. Wet Weather Field and Analytical Data
Edgewood Data

Storm Event	Water Year	Field Parameters						Analytical Parameters					
		Dissolved Oxygen	Temperature (DO)	pH	Temperature (pH)	Conductivity	Temperature (Cond.)	Nitrate+Nitrite as N	TSS	TKN	DOP	TP	E. coli
		mg/L	C	S.U.	C	uS/cm	C	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100 mL
March 10, 2011[1]	2011	8.44	8.9	6.57	8.6	100.6	8.9	0.71	68.2	1.29	–	0.192	10.9
April 5, 2011		8.16	9.7	6.29	10.1	41.3	9.7	0.33	25.7	1.04	–	0.1034	45.9
May 8, 2011		8.58	9.6	6.65	10.3	100.4	14.6	0.47	13.7	0.55	–	0.0774	95.9
October 5, 2011		6.83	16	6.86	16.4	124.3	16	0.53	4.6	<0.25	–	0.0743	410.6
December 28, 2011	2012	6.78	9.7	7.5	10	848	9.6	1.4	30.8	5.2	–	0.379	3.1
March 25, 2012		8.6	10.3	7.4	10.5	163.3	10.3	1.85	18.3	2.1	–	0.2293	9.7
May 3, 2012[1]		7.54	12.7	5.82	13.7	163.3	12.7	1.02	12.2	1	–	0.158	461.1
May 25, 2012[1]		9.04	11.4	5.88	11.8	86.8	11.4	0.45	128	2.5	–	0.345	2,590
October 16, 2012		5.48	18.8	7.56	17.3	120.5	18.8	1.034	24.2	1.9	–	0.333	347.6
February 22, 2013	2013	8.45	7.5	7.86	7.7	1178	7.7	0.642	765[2J]	3	–	0.898	4.1
March 20, 2013[1]		7.88	9.7	8.02	9.9	254.1	9.8	0.817	82.7	3.5	–	0.482	8.4
June 24, 2013[1]		7.5	16.3	7.55	17.2	109.5	16.3	0.41	10.3	0.3	–	0.104	579.4
September 3, 2013		5.72	20.1	7.35	20.2	102.3	20.1	0.4	12.3	1	–	0.142	1,986.30
November 16, 2013	2014	9.27	9.6	7.57	9.1	79.8	9.6	0.481	75.2	1.7	–	0.329	58.8
March 9, 2014[1]		8.38	10.4	8.27	10.5	76.0	10.3	0.265	18.5	1.1	–	0.154	101
April 22, 2014		8.4	11.5	7.53	11.4	96.6	11.5	0.945	52.4	1.3	–	0.209	816.4
May 8, 2014		8.93	13.9	7.32	13.8	85.8	13.9	0.603	156	2.8	–	0.477	3,230
October 21, 2014		5.42	14	6.2	13	115	–	0.517	7.6	1.5	0.242	0.299	1,880
December 19, 2014	2015	8.99	8.8	7.83	8.9	61.3	8.8	0.348	58.1	0.5	0.0984	0.188	90.6
March 24, 2015		9.79	9.2	7.39	9	80.5	9.2	0.683	73.1	1.4	0.1538	0.241	1
September 15, 2015		5.62	17.5	7.17	17.3	166.2	17.5	0.987	8.15	1.43	0.199	0.228	131.4
October 28, 2015		4.55	15	7.38	14.6	158.2	14.9	1.02	4.17	0.659	0.133	0.161	167
November 19, 2015	2016	7.16	12	8.47	11.3	145.2	11.8	1.09	4.07	0.495	0.178	0.138	11
January 28, 2016		8.77	8.7	7.91	8.3	137.1	8.7	1.41	30.2	0.604	0.104	0.162	40.8[3J]
April 23,2016		7.75	12.5	7.83	12.9	201.8	12.9	1.26	32.8	3.95	0.181	0.825	387
July 10, 2016		5.44	16.8	7.03	16.4	187.3	16.8	1.89	8	0.714	0.168	0.177	139.6
March 3, 2017	2017	7.75	8.8	8.14	8.7	273.5	8.8	1.79	139	1.26	0.128	0.164	4.1
May 16, 2017		5.88	13.2	6.72	13.2	195.8	13.3	2.32	6.93	0.742	0.102	0.142	365.4
October 20, 2017		4.45	13.3	7.17	12.5	209.6	13.3	1.55	8.17	0.897	0.139	0.19	727
November 3, 2017	2018	6.75	11.6	7.74	11.2	153.4	11.5	1.25	10.3	1.19	0.217	0.313	1,299.7
January 18, 2018		10.02	8.3	7.20	8.1	136.2	8.3	1.31	22.9	0.418	0.0884	0.136	19.3
March 21, 2018		9.01	11.6	7.51	11.6	137.7	11.9	0.493	68.5	1.98	0.181	0.233	547.5
June 17, 2018		5.84	15.8	7.31	15.4	202.1	15.7	1.43	9.43	1.55	0.165	0.194	64.4
October 4, 2018		5.22	15.8	8.00	15.7	195.9	15.9	1.67	19.0	3.49	0.273[4J]	0.376	2,419.6
November 27, 2018[5]	2019	9.89	10.1	7.94	10.1	167.9	10.1	1.26	26.2	0.862	0.132	0.227	105.0
April 13, 2019		8.11	12.0	7.75	12.3	59.7	12.0	–	–	–	–	–	248.1
May 16, 2019		7.33	15.57	7.40	15.57	123.2	15.57	–	–	–	–	–	6,090.0[3J]
September 6, 2019		7.47	23.01	7.45	23.01	113.96	23.01	1.21	64.9	2.05	0.218	0.369	2,419.6

Notes:

– = no sample.

J Analytical value qualified as estimated.

[1] Results are associated with a targeted event that did not meet the precipitation criteria (greater than 0.10 inch) at the local rain gauge.

[2J] Qualified value left out of statistical analysis.

[3J] Samples was analyzed outside of regulatory holding time. Results not used in statistical summary.

[4J] Relative percent difference between field duplicate sample and parent sample is outside acceptable range. Value is considered an estimate.

[5] Results are from composite samples and therefore represent event mean concentrations.

Table 3. Wet Weather Field and Analytical Data
Chrisfield Data

Storm Event	Water Year	Field Parameters						Analytical Parameters					
		Dissolved Oxygen	Temperature (DO)	pH	Temperature (pH)	Conductivity	Temperature (Cond.)	Nitrate+Nitrite as N	TSS	TKN	DOP	TP	E. coli
		mg/L	C	S.U.	C	uS/cm	C	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100 mL
March 10, 2011[1]	2011	10.62	7.2	6.27	6.8	24.3	7.2	< 0.05	23.2	1.02	–	0.1286	5.1
April 5, 2011		8.7	9.3	6.84	10	90.4	9.3	1.61	28.3	4.04	–	0.336	117.8
May 8, 2011[1]		7.67	12.1	6.68	12.4	47.4	12.1	0.31	46	2	–	0.263	> 2,419.6[2]
October 4, 2011		7.07	17	6.85	16.9	194.2	17	1.42	17.2	6.2	–	0.783	816.4
December 28, 2011	2012	11.11	4	7.97	4.8	85.9	4	0.56	25.3	4.5	–	0.455	8.6
March 25, 2012		8.27	13	7.67	12.8	56	12.9	0.65	17.2	2.4	–	0.153	6.2
May 3, 2012[1]		6.12	14.8	5	15.5	130.7	14.8	0.47	28.2	4.4	–	0.706	1,229.70
May 25, 2012		9.25	12.9	5.41	13.5	38.1	12.9	0.28	16.8	2	–	0.281	866.4
October 16, 2012		7.16	18.5	7.47	17	66.7	18.5	0.375	23	2.5	–	0.422	151.5
February 22, 2013	2013	9.67	5.9	8.14	6.1	114.1	6	0.19	75.5	1.6	–	0.224	42.4
March 20, 2013		7.35	9.4	8.07	9.4	144.3	9.5	0.574	133	4.5	–	0.448	178.5
June 19, 2013		8.16	17	8.11	16.9	35.7	16.9	0.248	227	3.3	–	0.446	1,119.90
September 3, 2013[1]		6.4	21.2	6.85	21.1	240.9	21.2	2.16	97	17	–	1.205	980
November 16, 2013	2014	3.52	9.5	7.1	9.2	7.6	9.5	0.173	18.4	3.3	–	0.553	1,100
April 22, 2014		2.57	12.9	7.09	12.6	194.5	12.9	0.355	14	5.2	–	0.748	313
May 8, 2014		5.1	16	7.21	16	163.6	16	0.572	22.1	6.8	–	0.867	633.1
October 21, 2014		7.93	12.9	5.84	12.8	61.5	12.9	0.282	33	4.3	0.335	0.472	22.1
December 19, 2014	2015	10.86	6.4	8.25	6.6	25.7	6.4	0.133	30	1	0.0883	0.14	547.5
March 24, 2015		10.59	8	7.71	7.8	68.1	8	0.490	43.2	3.6	0.2922	0.413	8.6
July 11, 2015		5.99	27.7	7.6	27.2	63.9	27.7	0.550	178	3.7	0.2	0.374	4,730.00
September 15, 2015		9.3	16	7.32	16	150.1	16	1.440	142	9.88	0.635	0.931	435.2
November 19, 2015[1]	2016	7.1	8.4	8.74	5.9	75.5	8.4	0.25	17.5	2.25	0.307	0.477	22.3 [3J]
March 21, 2016		6.17	17.6	8.63	17.1	31	17.5	0.201 [4J]	61.8	1.92 [4J]	0.0842	0.166	4.1 [3J]
July 10, 2016		7.96	15.9	6.94	15.8	109.6	15.9	0.746	144	11	0.555	0.914	1,990
March 24, 2017	2017	9.6	11.2	7.63	11	128.7	11.2	0.556	82.5	5.31	0.267	0.473	45.7
April 14, 2017		12.4	8.4	8.71	8.5	36.4	8.4	0.198	23.7	0.857	0.0827	0.132	64.5
May 16, 2017		6.72	14.4	6.54	14.1	221.1	13.9	0.74	48.7	4.04	0.29	0.493	7,540
October 13, 2017		9.61	12.7	7.5	12.3	60.7	12.7	0.3	51.2	2.41	0.223	0.359	57.8
October 20, 2017		7.31	11.3	7.62	11	179.8	10.9	0.437	23.8	3.34	0.371	0.542	307.6
November 3, 2017	2018	9.85	9.5	7.52	9.4	97.7	9.5	0.382	27.4	4.26	0.856	1.17	3.0
January 18, 2018		9.94	7.4	7.75	7.4	59.8	7.5	0.332	104	1.60	0.0689	0.212	70.0
March 21, 2018		8.98	14.1	7.87	14.0	71.9	14.1	0.276	114	2.51	0.0887	0.231	1.0
June 17, 2018		2.99	18.3	7.55	17.8	329.0	18.3	0.752	11.6	4.81	0.449	0.633	387.3
October 4, 2018		8.97	13.8	8.04	13.2	160.7	13.8	1.27	86.8	12.0	1.01	1.50	2560.0
November 23, 2018	2019	7.50	10.55	8.22	10.55	205	10.55	–	–	–	–	–	235.9
November 27, 2018		12.63	5.3	8.49	5.4	8.49	5.3	–	–	–	–	–	1580.0
April 13, 2019		8.33	14.4	8.05	14.2	0.3	14.4	–	–	–	–	–	307.6
May 16, 2019 [5]		8.38	17.18	9.01	17.18	71.7	17.18	0.57	75.0	6.71	0.249	0.789	3410.0 [3J]
September 6, 2019		7.52	24.07	7.74	24.07	114.6	24.07	0.695	165.0	5.57	0.267	0.501	6440.0
October 19, 2019 [5]		8.8	7.0	7.01	7.0	–	7.0	0.298	143	4.23	0.356	0.567	344.8

Notes:

– = no sample.

[1] Results are associated with a targeted event that did not meet the precipitation criteria (greater than 0.10 inch) at the local rain gauge.

[2] Outlier value left out of statistical analysis.

[3J] Samples was analyzed outside of regulatory holding time. Results not used in statistical summary.

[4J] Samples were not preserved to pH less than 2 within 15 minutes of collection, as required by the approved EPA test method.

[5] Results are from composite samples and therefore represent event mean concentrations.

Table 4. Wet Weather Statistical Summary by Monitoring Period for WY 2011 through WY 2019
Edgewood Data

Monitoring Period[1]	Summary Statistics	Field Parameters				Analytical Parameters					
		Dissolved Oxygen	Temperature[2]	pH	Conductivity	Nitrate+Nitrite as N	TSS	TKN	DOP	TP	E. coli[3]
		mg/L	C	S.U.	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100 mL
November–February	Minimum	6.75	7.50	7.20	61.30	0.35	4.07	0.42	0.09	0.14	3.10
	Maximum	10.02	12.00	8.47	1178.00	1.41	75.20	5.20	0.22	0.90	1299.70
	Mean	8.45	9.59	7.78	322.99	1.02	32.22	1.55	0.14	0.31	35.06
	Median	8.77	9.60	7.83	145.20	1.25	28.20	0.86	0.12	0.23	40.80
	Range	3.27	4.50	1.27	1116.70	1.06	71.13	4.78	0.13	0.76	1296.60
	Standard Deviation	1.27	1.48	0.35	401.27	0.42	23.66	1.60	0.05	0.24	421.01
March–April	Minimum	7.75	8.80	6.29	41.30	0.27	18.30	1.04	0.13	0.10	1.00
	Maximum	9.79	12.50	8.27	273.50	1.85	139.00	3.95	0.18	0.83	816.40
	Mean	8.39	10.42	7.52	135.01	0.91	57.92	1.89	0.16	0.28	42.04
	Median	8.38	10.30	7.53	100.60	0.76	60.30	1.35	0.17	0.22	45.90
	Range	2.04	3.70	1.98	232.20	1.59	120.70	2.91	0.05	0.72	815.40
	Standard Deviation	0.60	1.30	0.62	78.86	0.56	37.21	1.03	0.03	0.22	275.37
May–June	Minimum	5.84	9.60	5.82	85.80	0.41	6.93	0.30	0.10	0.08	64.40
	Maximum	9.04	16.30	7.55	202.10	2.32	156.00	2.80	0.17	0.48	3230.00
	Mean	7.58	13.56	6.83	133.36	0.96	48.08	1.35	0.13	0.21	469.70
	Median	7.52	13.55	7.02	116.35	0.60	12.20	1.00	0.13	0.16	461.10
	Range	3.20	6.70	1.73	116.30	1.91	149.07	2.50	0.06	0.40	3165.60
	Standard Deviation	1.25	2.33	0.68	47.37	0.71	64.70	0.97	0.04	0.14	1293.73
July–August	Minimum	5.44	16.80	7.03	187.30	1.89	8.00	0.71	0.17	0.18	139.60
	Maximum	5.44	16.80	7.03	187.30	1.89	8.00	0.71	0.17	0.18	139.60
	Mean	5.44	16.80	7.03	187.30	1.89	8.00	0.71	0.17	0.18	139.60
	Median	5.44	16.80	7.03	187.30	1.89	8.00	0.71	0.17	0.18	139.60
	Range	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Standard Deviation	–	–	–	–	–	–	–	–	–	–
September–October	Minimum	4.45	13.30	6.20	102.30	0.40	4.17	0.13	0.13	0.07	131.40
	Maximum	7.47	23.01	8.00	209.60	1.67	64.90	3.49	0.27	0.38	2419.60
	Mean	5.64	17.06	7.24	145.11	0.99	17.01	1.45	0.20	0.24	716.51
	Median	5.48	16.00	7.35	124.30	1.02	8.17	1.43	0.21	0.23	727.00
	Range	3.02	9.71	1.80	107.30	1.27	60.73	3.37	0.14	0.30	2288.20
	Standard Deviation	0.98	3.13	0.50	38.90	0.45	19.16	0.98	0.06	0.11	989.14

Notes:

[1] For nondetect results, a value of half the method detection limit is used in this analysis.

[2] Temperature value recorded during DO measurement is used for summary statistics because this is the first temperature measurement recorded for each sample.

[3] Mean values for E. coli are represented as the geometric mean of the dataset.

Table 5. Wet Weather Statistical Summary by Monitoring Period WY 2011 through WY 2019
Chrisfield Data

Monitoring Period[1]	Summary Statistics	Field Parameters				Analytical Parameters					
		Dissolved Oxygen	Temperature[2]	pH	Conductivity	Nitrate+Nitrite as N	TSS	TKN	DOP	TP	E. coli[3]
		mg/L	C	S.U.	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100 mL
November–February	Minimum	3.52	4.00	7.10	7.60	0.13	17.50	1.00	0.07	0.14	3.00
	Maximum	12.63	10.55	8.74	205.00	0.56	104.00	4.50	0.86	1.17	1580.00
	Mean	9.13	7.44	8.02	75.53	0.29	42.59	2.64	0.33	0.46	89.89
	Median	9.85	7.40	8.14	75.50	0.25	27.40	2.25	0.20	0.46	70.00
	Range	9.11	6.55	1.64	197.40	0.43	86.50	3.50	0.79	1.03	1577.00
	Standard Deviation	2.71	2.21	0.50	61.94	0.15	33.56	1.39	0.37	0.35	572.42
March–April	Minimum	2.57	7.20	6.27	0.30	0.03	14.00	0.86	0.08	0.13	1.00
	Maximum	12.40	17.60	8.71	194.50	1.61	133.00	5.31	0.29	0.75	313.00
	Mean	8.51	11.41	7.69	76.90	0.49	54.09	3.14	0.16	0.32	27.44
	Median	8.70	11.20	7.71	68.10	0.42	35.75	3.06	0.09	0.28	45.70
	Range	9.83	10.40	2.44	194.20	1.59	119.00	4.45	0.21	0.62	312.00
	Standard Deviation	2.60	3.26	0.73	58.45	0.44	42.57	1.63	0.11	0.20	120.04
May–June	Minimum	2.99	12.10	5.00	35.70	0.25	11.60	2.00	0.25	0.26	387.30
	Maximum	9.25	18.30	9.01	329.00	0.75	227.00	6.80	0.45	0.87	7540.00
	Mean	6.80	15.34	6.94	129.66	0.49	59.43	4.26	0.33	0.56	1270.25
	Median	7.20	15.40	6.95	101.20	0.52	37.10	4.22	0.29	0.56	1119.90
	Range	6.26	6.20	4.01	293.30	0.50	215.40	4.80	NA	0.60	7152.70
	Standard Deviation	2.03	2.17	1.33	104.60	0.20	70.80	1.85	0.11	0.23	2516.08
July–August	Minimum	5.99	15.90	6.94	63.90	0.55	144.00	3.70	0.20	0.37	1990.00
	Maximum	7.96	27.70	7.60	109.60	0.75	178.00	11.00	0.56	0.91	4730.00
	Mean	6.98	21.80	7.27	86.75	0.65	161.00	7.35	0.38	0.64	3068.01
	Median	6.98	21.80	7.27	86.75	0.65	161.00	7.35	0.38	0.64	3360.00
	Range	1.97	11.80	0.66	45.70	0.20	34.00	7.30	0.36	0.54	2740.00
	Standard Deviation	1.39	8.34	0.47	32.31	0.14	24.04	5.16	0.25	0.38	1937.47
September–October	Minimum	6.40	7.00	5.84	60.70	0.28	17.20	2.41	0.22	0.36	22.10
	Maximum	9.61	24.07	8.04	240.90	2.16	165.00	17.00	1.01	1.50	6440.00
	Mean	8.01	15.45	7.22	136.58	0.87	72.51	6.78	0.45	0.73	404.69
	Median	7.73	14.90	7.40	150.10	0.57	68.65	5.11	0.34	0.56	390.00
	Range	3.21	17.07	2.20	180.20	1.88	147.80	14.59	0.79	1.14	6417.90
	Standard Deviation	1.09	5.00	0.62	64.80	0.66	51.93	4.75	0.28	0.38	1983.42

Notes:

[1] For nondetect results, a value of half the method detection limit is used in this analysis.

[2] Temperature value recorded during DO measurement is used for summary statistics because this is the first temperature measurement recorded for each sample.

[3] Mean values for E. coli are represented as the geometric mean of the dataset.

Table 6. Program Statistical Summary for WY 2011 through WY 2019											
Monitoring Period	Summary Statistics[1]	Field Parameters				Analytical Parameters					
		Dissolved Oxygen	Temperature	pH	Conductivity	Nitrate+Nitrite as N	TSS	TKN	DOP	TP	E. coli[2]
		mg/L	C	S.U.	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	MPN/100 mL
Edgewood	Minimum	4.45	7.50	5.82	41.30	0.27	4.07	0.13	0.088	0.07	1.00
	Maximum	10.02	23.01	8.47	1,178.0	2.32	156.00	5.20	0.273	0.90	3,230.0
	Mean	7.51	12.62	7.36	182.95	1.00	38.13	1.56	0.163	0.26	130.75
	Median	7.75	11.80	7.43	136.65	1.00	22.90	1.28	0.165	0.20	139.60
	Range	5.57	15.51	2.65	1,136.7	2.06	151.93	5.08	0.185	0.82	3,229.0
	Standard Deviation	1.54	3.63	0.62	208.76	0.53	39.94	1.14	0.051	0.18	880.90
Chrisfield	Minimum	2.57	4.00	5.00	0.30	0.03	11.60	0.86	0.069	0.13	1.00
	Maximum	12.63	27.70	9.01	329.0	2.16	227.00	17.00	1.010	1.50	7,540.0
	Mean	8.02	13.07	7.52	104.08	0.55	66.00	4.61	0.335	0.54	203.29
	Median	8.22	12.90	7.61	75.50	0.44	43.20	4.04	0.290	0.47	307.60
	Range	10.06	23.70	4.01	328.70	2.14	215.40	16.14	0.941	1.37	7,539.0
	Standard Deviation	2.24	5.15	0.87	73.74	0.46	54.50	3.34	0.250	0.32	1,709.67

Notes:

[1] For nondetect results a value of half the method detection limit is used in this analysis.

[2] Mean values for E. coli are represented as the geometric mean of the dataset.

Table 7. Edgewood Discharge Data Summary							
Monitoring Period		November–February	March–April	May–June	July–August	September–October	Annual
WY 11	Stormwater runoff (cf)	9,205 [1]	121,514	251,948	14,886	183,262	580,814
	Background discharge (cf)	347,546	1,165,790	1,821,362	4,048,513	2,325,691	9,708,902
	Total discharge (cf)	356,751	1,287,303	2,073,310	4,063,399	2,508,953	10,289,716
	Storm flow percent	2.6%	9.4%	12%	0.37%	7.3%	5.6%
WY 12	Stormwater runoff (cf)	279,961 [1]	88,727	24,273	0	18,991	411,952
	Background discharge (cf)	576,641	320,649	1,564,717	3,806,335	2,346,960	8,615,302
	Total discharge (cf)	856,602	409,376	1,588,990	3,806,335	2,365,951	9,027,254
	Storm flow percent	32.68%	22%	1.52%	0%	0.80%	4.56%
WY 13	Stormwater runoff (cf)	72,705	20,052	37,001	6,799	48,641	185,198
	Background discharge (cf)	376,871	454,111	2,697,952	2,686,876	1,508,852	7,724,662
	Total discharge (cf)	449,576	474,163	2,734,953	2,693,675	1,557,493	7,909,860
	Storm flow percent	16%	4.2%	1.4%	0.25%	3.1%	2.3%
WY 14	Stormwater runoff (cf)	81,419	83,563 [1]	25,747	9,738	17,605	218,072
	Background discharge (cf)	523,273	–	1,728,602	2,445,304	956,170	–
	Total discharge (cf)	604,692	–	1,754,349	2,455,042	973,775	–
	Storm flow percent	13%	–	1.5%	0.40%	1.8%	–
WY 15	Stormwater runoff (cf)	98,595	12,829	29,540	41,651	20,238	190,024
	Background discharge (cf)	407,906	189,196	2,021,221	3,629,899	1,765,556	8,013,778
	Total discharge (cf)	506,502	202,025	2,050,762	3,671,550	1,785,794	8,216,633
	Storm flow percent	19%	6%	1.0%	1.0%	1.0%	2.3%
WY 16	Stormwater runoff (cf)	108,616 [1]	96,960 [1]	12,700	9,405	71,354 [1]	299,034 [1]
	Background discharge (cf)	–	–	793,628	1,626,475	–	–
	Total discharge (cf)	–	–	806,328	1,635,880	–	–
	Storm flow percent	–	–	1.6%	0.57%	–	–
WY 17	Stormwater runoff (cf)	507,536 [1]	108,907	51,073	0	8,514	676,030
	Background discharge (cf)	–	641,189	1,409,951	1,425,708	901,134	–
	Total discharge (cf)	–	750,096	1,461,024	1,425,708	909,648	–
	Storm flow percent	–	15%	3%	0%	1.00%	–
WY 18	Stormwater runoff (cf)	54,713	65,344	26,280 [1]	0	6,516	156,558
	Background discharge (cf)	739,447	105,296	889,200 [2]	1,683,000	1,041,120	4,481,067
	Total discharge (cf)	794,160	170,640 [1,2]	915,480 [1,2]	1,683,000	1,047,636 [1,2]	4,637,625
	Storm flow percent	6.9%	38%	3%	0%	1%	3.4%
WY 19	Stormwater runoff (cf)	229,023 [1]	99,994	46,080 [1]	1,213	36,188 [1]	413,179
	Background discharge (cf)	1,304,721 [2]	598,010	831,993 [2]	1,286,327	1,371,416 [2]	5,392,467
	Total discharge (cf)	1,533,744 [1,2]	698,004	878,756 [1,2]	1,287,540	1,407,604 [1,2]	5,805,646
	Storm flow percent	15%	14%	15%	0%	3%	7.1%

Notes:

– = not calculated or recorded due to data gaps.

[1] Stormwater runoff volumes estimated using the EPA Simple Method are used to complete flow summaries for periods without a complete measured flow history.

[2] Volume does not include dates with missing data.

Table 8. Chrisfield Discharge Data Summary							
Monitoring Period		November–February	March–April	May–June	July–August	September–October	Annual
WY 11	Stormwater runoff (cf)	5,198 [1]	33,800	16,942	626	17,348	73,914
	Background discharge (cf)	0	2,520	0	194	792	3,506
	Total discharge (cf)	5,198	36,320	16,942	820	18,140	77,420
	Storm flow percent	–	93.1%	100.0%	76.3%	95.6%	95.5%
WY 12	Stormwater runoff (cf)	44,292	32,853	7,856	1,269	4,286	90,556
	Background discharge (cf)	9,158	1,105	940	842	842	12,887
	Total discharge (cf)	53,450	33,958	8,796	2,111	5,128	103,443
	Storm flow percent	82.9%	96.7%	89.3%	60.1%	83.6%	87.5%
WY 13	Stormwater runoff (cf)	19,487	5,004	14,432	50	27,801 [1]	66,774
	Background discharge (cf)	35,402	8,212	2,333	230	173	46,350
	Total discharge (cf)	54,889	13,216	16,765	280	27,974	113,124
	Storm flow percent	35.5%	37.9%	86.1%	17.6%	99.0%	59.0%
WY 14	Stormwater runoff (cf)	74,343 [1]	60,703 [1]	8,928	6,041	10,768	160,782
	Background discharge (cf)	–	–	630	2,887	3,125	–
	Total discharge (cf)	–	–	9,558	8,928	13,892	–
	Storm flow percent	–	–	93.4%	67.7%	77.5%	–
WY 15	Stormwater runoff (cf)	47,776	6,408	10,541	7,853	10,015	76,185
	Background discharge (cf)	2,876	1,904	4,331	8,437	8,932	26,480
	Total discharge (cf)	50,652	8,312	14,872	16,290	18,947	109,073
	Storm flow percent	94%	77%	71%	48%	53%	69.8%
WY 16	Stormwater runoff (cf)	86,000 [1]	35,154 [1]	18,442 [1]	11,142 [1]	11,288 [1]	162,026 [1]
	Background discharge (cf)	–	–	–	–	–	–
	Total discharge (cf)	–	–	–	–	–	–
	Storm flow percent	–	–	–	–	–	–
WY 17	Stormwater runoff (cf)	184,224 [1]	25,020	15,588	720	4,320	229,872
	Background discharge (cf)	–	1,116	180	72	2,052	–
	Total discharge (cf)	–	26,136	15,768	792	6,372	–
	Storm flow percent	–	96%	99%	91%	68%	–
WY 18	Stormwater runoff (cf)	22,248	17,476 [1]	13,716	0	8,238 [1]	61,135
	Background discharge (cf)	7,164	2,448 [2]	36	–	684 [2]	10,800
	Total discharge (cf)	29,412	19,924	13,752	–	9,390	71,935
	Storm flow percent	79%	88%	100%	0%	88%	85%
WY 19	Stormwater runoff (cf)	64,026 [1]	27,872 [1]	32,076 [1]	648	12,780	137,402
	Background discharge (cf)	1,602 [2]	0	4,752 [2]	216	1,548	8,118
	Total discharge (cf)	65,628 [1,2]	27,872 [1]	36,828 [1,2]	864	14,328	145,520
	Storm flow percent	98%	100%	87%	75%	89%	94%

Notes:

– = not calculated or recorded due to data gaps.

[1] Stormwater runoff volumes estimated using the EPA Simple Method are used to complete flow summaries for periods without a complete measured flow history.

[2] Background discharge volume does not include dates with missing data.

Table 9. Precipitation Summary																		
Monitoring Period	November–February			March–April			May–June			July–August			September–October			Annual Total		
Rain Gauge	Edgewood	Chrisfield	NWS	Edgewood	Chrisfield	NWS	Edgewood	Chrisfield	NWS	Edgewood	Chrisfield	NWS	Edgewood	Chrisfield	NWS	Edgewood	Chrisfield	NWS
WY 2011 precipitation (in)	4.59	4.14	6.67	4.59	4.14	3.78	2.95	2.56	2.27	0.04	0.12	0.02	2.11	1.94	1.88	14.28	12.9	14.62
WY 2012 precipitation (in)	3.68	3.47	4.08	4.59	4.45	4.17	0.94	1.09	1.09	0.01	0.09	0.07	0.96	0.82	1.03	10.18	9.92	10.44
WY 2013 precipitation (in)	2.99	2.66 [2]	3.51	0.96	0.74 [2]	1.31	1.29	1.53	1.18	0.08	0.02	0.58	2.20	2.68	2.51	7.52	7.63	9.09
WY 2014 precipitation (in)	4.44	3.87 [2]	5.18	3.5	3.16 [2]	4.49	0.78	0.87	0.87	0.44	0.41	0.24	1.17	1.29	1.32	10.33	9.60	12.10
WY 2015 precipitation (in)	7.48	6.93	7.79	0.94	0.91	1.10	1.96	1.05	1.67	1.46	0.77	1.15	1.14	1.12	1.43	12.98	10.78	13.14
WY 2016 precipitation (in)	5.47	4.77	4.92	2.28	1.83	2.15	0.84	0.96	1.05	0.58	0.58	0.27	1.44	0.99	1.49	10.61	9.13	9.88
WY 2017 precipitation (in)	5.47	5.04 [3]	6.4	4.83	4.98	4.87	2.26	1.84	2.14	0	0.09	0.23	0.84	0.81	1.16	12.97	12.76	14.8
WY 2018 precipitation (in)	4.34	3.83	4.71	2.5	2.3	2.90	0.95	1.58	2.13	0	0	0.11	0.29 [2]	1.02	1.41	8.08	8.73	11.26
WY 2019 precipitation (in)	8.04 [3]	6.88 [3]	6.99	3.14	2.62	3.30	2.81 [4]	2.58 [5]	4.02	0.12	0.09	0.1	1.14 [3]	1.21 [3]	1.13	15.25	13.38	15.54

Notes:

[1] Precipitation depths are presented in inches.

[2] Debris on the rain gauge funnel may have interfered with data collection during this period.

[3] Monthly precipitation data contains data from the Boise, Idaho, AgriMet Weather Station rain gauge.

[4] Hourly rainfall data are supplemented with available hourly rainfall data from Chrisfield.

[5] Hourly rainfall data are supplemented with available hourly rainfall data from Edgewood.

Table 10. Wet Weather Pollutant Loading Estimates [1]
Edgewood

		Permit Required Monitoring								Supplemental Monitoring				Annual Cumulative Estimate
Analyte [2]	Water Year	March	April	May	June	July	August	September	October	November	December	January	February	Sum of Monthly Loads
Nitrate+Nitrite as N (lbs)	2011	2.38		2.18		0.00		1.76		5.12				11.44
	2012	4.23	5.37	0.34	0.36	0.11	0.00	0.10	0.09	0.08				10.69
	2013	0.13	0.89	0.41	0.54	0.27	0.00	0.84	0.38	0.89	0.53	0.73	0.77	6.38
	2014	2.84	2.94	0.66	0.31	0.06	0.23	0.34	0.22	0.54	0.08	0.58	1.25	10.06
	2015	0.14	0.43	0.62	0.02	2.64	0.01	0.60	0.65	0.50	1.06	0.18	0.39	7.24
	2016	6.83	0.80	0.61	0.25	1.11	0.00	0.50	8.41	2.10	4.74	0.66	2.06	28.07
	2017	8.51	3.65	2.34	5.06	0.00	0.00	0.41	0.41	1.66	10.64	35.89	8.52	77.10
	2018	3.29	2.05	2.31	0.87	0.00	0.00	0.00	5.63	1.68	0.44	2.18	0.17	18.62
	2019	2.96	4.91	5.18	0.02	0.00	0.09	2.12	0.57	1.94	2.86	2.11	11.09	33.85
TSS (lbs)	2011	185.52		64.16		0.00		15.24		491.60				756.52
	2012	41.85	53.09	96.87	102.93	4.26	0.00	2.44	2.18	1.79				305.41
	2013	13.29	90.22	10.30	13.49	323	1.62	25.70	11.65	1,061.85	626.32	866.98	916.62	3,961.09
	2014	157.75	162.96	169.59	81.12	10.0	35.71	5.06	3.29	83.67	11.77	91.30	195.44	1,007.66
	2015	14.96	46.31	103.94	3.19	10.8	0.05	4.96	5.33	84.99	176.87	30.21	65.50	547.09
	2016	117.70	20.91	2.28	0.94	15.33	0.00	2.11	35.59	45.06	101.42	14.20	44.06	399.60
	2017	661.2	283.7	6.98	15.11	0.00	0.00	2.17	2.17	128.57	826.5	2,787	661.2	5,374.98
	2018	57.50	35.90	15.26	5.76	0.00	0.00	0.00	64.02	29.4	7.76	38	2.9	256.50
	2019	61.52	102.01	107.64	0.38	0.00	4.87	113.49	30.47	40.41	59.51	43.94	230.68	794.93
TKN (lbs)	2011	7.50		2.55		0.00		0.41		9.03				19.49
	2012	4.80	6.09	1.89	2.01	0.24	0.00	0.19	0.17	0.30				15.70
	2013	0.56	3.82	0.30	0.39	1.27	0.01	2.09	0.95	4.16	2.46	3.40	3.59	23.00
	2014	3.91	4.04	3.04	1.46	0.23	0.81	1.00	0.65	1.89	0.27	2.06	4.42	23.78
	2015	0.29	0.89	0.89	0.03	1.71	0.01	0.87	0.94	0.73	1.52	0.26	0.56	8.70
	2016	21.40	2.52	0.28	0.11	1.37	0.00	0.19	3.18	0.90	2.03	0.28	0.88	33.14
	2017	5.99	2.57	0.75	1.62	0.00	0.00	0.24	0.24	1.17	7.49	25.27	5.99	51.33
	2018	1.05	0.66	2.51	0.95	0.00	0.00	0.00	11.76	0.54	0.14	0.70	0.05	18.36
	2019	2.02	3.36	3.54	0.01	0.00	0.15	3.58	0.96	1.33	1.96	1.45	7.59	25.96
TP (lbs)	2011	0.75		0.36		0.00		0.25		1.38				2.74
	2012	0.52	0.67	0.26	0.28	0.03	0.00	0.03	0.03	0.02				1.84
	2013	0.08	0.53	0.10	0.14	0.38	0.00	0.30	0.13	1.25	0.74	1.02	1.08	5.75
	2014	0.63	0.65	0.52	0.25	0.04	0.16	0.20	0.13	0.37	0.05	0.40	0.86	4.25
	2015	0.05	0.15	0.34	0.01	0.42	0.00	0.14	0.15	0.28	0.57	0.10	0.21	2.42
	2016	4.47	0.53	0.08	0.03	0.34	0.00	0.05	0.79	0.24	0.54	0.08	0.24	7.39
	2017	0.78	0.33	0.14	0.31	0.00	0.00	0.05	0.05	0.15	0.98	3.29	0.78	6.86
	2018	0.34	0.21	0.31	0.09	0.00	0.00	0.00	1.27	0.17	0.05	0.23	0.02	2.69
	2019	0.53	0.88	0.93	0.00	0.00	0.03	0.65	0.17	0.35	0.52	0.38	2.00	6.44
DOP (lbs)	2015	0.03	0.10	0.18	0.01	0.35	0.00	0.12	0.13	0.14	0.30	0.05	0.11	1.52
	2016	0.98	0.12	0.10	0.04	0.32	0.00	0.04	0.75	0.16	0.35	0.05	0.15	3.06
	2017	0.61	0.26	0.10	0.22	0.00	0.00	0.04	0.04	0.12	0.76	2.57	0.61	5.32
	2018	0.22	0.14	0.27	0.08	0.00	0.00	0.00	0.92	0.11	0.03	0.15	0.01	1.93
	2019	0.31	0.51	0.54	0.00	0.00	0.02	0.38	0.10	0.20	0.30	0.22	1.16	3.74

Notes:

[1] The EPA Simple Method is used to fill in gaps in flow summaries for periods without a complete measured storm flow history. The resulting values are then used in pollutant loading estimates.

[2] E. coli is not included in pollutant loads. E. coli values are reported in MPN/100 ml. This is a most probable number and not a mass; therefore, a pollutant loading mass is not an appropriate estimate.

Table 11. Wet Weather Pollutant Loading Estimates [1]
Chrisfield

		Permit Required Monitoring								Supplemental Monitoring				Annual Cumulative Estimate
Analyte [2]	Water Year	March	April	May	June	July	August	September	October	November	December	January	February	Sum of Monthly Loads
Nitrate+Nitrite as N (lbs)	2011	4.12		0.59		–		2.06		0.08				6.85
	2012	0.69	0.64	0.12	0.01	0.01	0.00	0.01	0.09	0.2				1.76
	2013	0.02	0.15	0.11	0.11	0.00	0.00	2.40	1.35	0.01	0.13	0.07	0.02	4.37
	2014	0.74	0.60	0.29	0.03	0.00	0.07	0.15	0.04	0.11	0.09	0.07	0.39	2.58
	2015	0.08	0.11	0.08	0.01	0.27	0.00	0.46	0.44	0.11	0.18	0.06	0.05	1.85
	2016	0.29	0.15	0.22	0.06	0.52	0.00	0.06	0.46	0.27	0.67	0.25	0.13	3.08
	2017	0.31	0.56	0.32	0.40	0.00	0.01	0.06	0.06	0.066	0.43	1.44	0.34	4.00
	2018	0.29	0.11	0.51	0.14	0.00	0.00	0.00	1.55	0.192	0.11	0.12	0.03	3.05
	2019	0.44	0.55	1.13	0.01	0.00	0.03	0.18	0.06	0.11	0.25	0.28	0.56	3.60
TSS (lbs)	2011	99.07		88.06		–		24.95		72.54				284.6
	2012	18.22	16.92	7.20	0.65	0.46	0.00	0.54	5.30	12.08				61.36
	2013	5.71	35.83	104.01	100.49	0.17	0.01	107.60	60.73	2.31	53.61	28.43	7.48	506.4
	2014	29.38	23.67	11.14	1.18	0.00	6.94	17.63	4.55	11.30	9.27	7.50	41.04	163.6
	2015	7.47	9.84	17.72	2.02	87.21	0.04	45.83	42.94	25.55	40.00	12.92	11.00	302.54
	2016	90.41	45.20	15.74	4.41	100.15	0.00	12.09	89.37	18.61	47.00	17.42	9.32	449.72
	2017	45.40	83.43	20.90	26.48	0.35	1.96	3.05	3.37	7.96	51.15	172.5	40.92	457.46
	2018	89.84	35.76	7.82	2.11	0.00	0.00	0.00	106.16	60.30	35.29	38.8	10.05	386.13
	2019	57.59	72.9	148.65	1.52	0.00	6.67	86.44	27.64	50.77	117.93	134.64	268.16	972.91
TKN (lbs)	2011	12.34		3.83		–		8.99		3.24				28.40
	2012	2.54	2.36	0.86	0.08	0.07	0.00	0.06	0.58	1.88				8.42
	2013	0.19	1.21	1.51	1.46	0.00	0.00	18.86	10.64	0.05	1.14	0.60	0.16	35.82
	2014	10.91	8.79	3.43	0.36	0.00	1.24	2.30	0.59	2.03	1.66	1.35	7.36	40.02
	2015	0.62	0.82	0.59	0.07	1.81	0.00	3.19	2.99	0.85	1.33	0.43	0.37	13.07
	2016	2.81	1.40	2.02	0.57	7.65	0.00	0.92	6.83	2.39	6.04	2.24	1.20	34.07
	2017	2.92	5.37	1.73	2.20	0.02	0.09	0.43	0.47	0.29	1.85	6.24	1.48	23.08
	2018	1.38	0.55	3.24	0.88	0.00	0.00	0.00	14.68	0.93	0.54	0.60	0.15	22.95
	2019	5.15	6.52	13.3	0.14	0.00	0.23	2.56	0.82	1.50	3.49	3.98	7.93	45.62
TP (lbs)	2011	0.99		0.50		–		1.14		0.36				2.99
	2012	0.16	0.15	0.12	0.01	0.01	0.00	0.01	0.10	0.30				0.86
	2013	0.02	0.12	0.20	0.20	0.00	0.00	1.34	0.75	0.01	0.16	0.08	0.02	2.90
	2014	1.57	1.26	0.44	0.05	0	0.21	0.25	0.07	0.34	0.28	0.23	1.23	5.92
	2015	0.07	0.09	0.08	0.01	0.18	0.00	0.30	0.28	0.12	0.19	0.06	0.05	1.43
	2016	0.24	0.12	0.43	0.12	0.39	0.00	0.08	0.57	0.33	0.82	0.31	0.16	3.57
	2017	0.26	0.48	0.21	0.27	0.00	0.01	0.07	0.08	0.044	0.28	0.96	0.23	2.90
	2018	0.18	0.07	0.43	0.12	0.00	0.00	0.00	1.83	0.123	0.07	0.08	0.02	2.923
	2019	0.61	0.77	1.56	0.02	0.00	0.02	0.34	0.11	0.2	0.47	0.53	1.06	5.69
DOP (lbs)	2015	0.09	0.07	0.05	0.01	0.10	0.00	0.20	0.19	0.08	0.12	0.04	0.03	0.98
	2016	6.24	0.06	0.28	0.08	0.64	0.00	0.05	0.34	0.51	1.28	0.48	0.25	4.085
	2017	0.86	0.27	0.12	0.16	0.00	0.01	0.05	0.05	0.028	0.18	0.60	0.14	2.47
	2018	0.06	0.02	0.3	0.08	0.00	0.00	0.00	1.24	0.04	0.02	0.03	0.01	1.8
	2019	0.19	0.24	0.49	0.01	0.00	0.01	0.22	0.07	0.13	0.29	0.34	0.67	2.66

Notes:

– = no data available.

[1] The EPA Simple Method is used to fill in gaps in flow summaries for periods without a complete measured storm flow history. The resulting values are then used in pollutant loading estimates.

[2] E. coli is not included in pollutant loads. E. coli values are reported in MPN/100 ml. This is a most probable number and not a mass; therefore, a pollutant loading mass is not an appropriate estimate.

Table 12. Wet Weather Pollutant Loading Estimates [1]
Eagle Area

		Permit Required Monitoring								Supplemental Monitoring				Annual Cumulative Estimate
Analyte [2]	Water Year	March	April	May	June	July	August	September	October	November	December	January	February	Sum of Monthly Loads
Nitrate+Nitrite as N (lbs)	2011	2,149		1,967		–		1,587		4,623				10,326
	2012	6,422	5,050	607	106	19	0	70	1,603	543				14,420
	2013	119	805	370	485	245	1	755	342	805	475	657	695	5,755
	2014	2,570	2,655	592	283	58	206	311	202	483	68	528	1,129	9,085
	2015	415	1,253	1,803	55	1,075	5	245	263	654	3,397	580	1,258	11,003
	2016	2,782	327	249	103	452	0	204	3,427	857	1,930	270	838	11,440
	2017	3,470	1,489	952	2,062	0	0	168	168	675	4,338	14,628	3,470	31,420
	2018	1,340	837	943	356	0	0	0	2,293	686	181	889	67	7,592
	2019	1,206	1,999	2,110	8	0	37	862	232	792	1,166	861	4,521	13,794
TSS (lbs)	2011	167,352		57,964		–		13,770		444,102				683,188
	2012	63,525	49,956	172,554	30,197	770	0	1,631	37,517	11,937				368,087
	2013	12,004	81,507	9,302	12,189	291,831	1,460	23,215	10,522	959,245	565,804	783,202	828,051	3,578,331
	2014	142,503	147,211	153,204	73,283	9,036	32,258	4,575	2,970	75,589	10,631	82,480	176,552	910,292
	2015	44,408	134,118	301,040	9,246	4,396	22	2,022	2,174	109,184	567,099	96,864	210,011	1,480,584
	2016	72,420	8,520	931	384	6,247	0	862	14,504	18,365	41,334	5,787	17,958	187,312
	2017	269,471	115,622	2,844	6,159	0	0	884	885	52,398	336,845	1,135,916	269,476	2,190,501
	2018	23,427	14,638	6,221	2,349	0	0	0	26,091	11,992	3,163	15,540	1,179	104,600
	2019	25,074	41,572	43,869	156	0	1,985	46,252	12,416	16,470	24,253	17,907	94,012	323,966
TKN (lbs)	2011	6,772		2,302		–		374		8,400				17,848
	2012	7,290	5,733	3,370	590	43	0	128	2,946	2,015				22,114
	2013	508	3,449	271	355	1,144	6	1,887	855	3,762	2,219	3,071	3,247	20,775
	2014	3,535	3,652	2,750	1,315	204	729	903	586	1,709	240	1,865	3,991	21,479
	2015	851	2,569	2,591	80	695	4	355	382	940	4,880	834	1,807	15,988
	2016	8,721	1,026	113	47	558	0	77	1,295	367	827	116	359	13,506
	2017	2,443	1,048	305	659	0	0	97	97	475	3,053	10,297	2,443	20,917
	2018	428	267	1,023	386	0	0	0	4,793	219	58	284	22	7,480
	2019	825	1,368	1,443	5	0	63	1,461	392	542	798	589	3,093	10,579
TP (lbs)	2011	673		322		–		222		172				1,390
	2012	796	626	465	81	5	0	22	516	147				2,659
	2013	70	475	94	123	343	2	268	121	1,126	664	919	972	5,177
	2014	568	587	468	224	40	141	180	117	331	47	361	772	3,837
	2015	146	442	974	30	170	1	57	61	353	1,835	313	680	5,062
	2016	1,822	214	32	13	131	0	19	321	63	222	31	96	2,964
	2017	318	136	58	126	0	0	21	21	62	397	1,340	318	2,798
	2018	139	87	128	48	0	0	0	375	71	19	92	7	966
	2019	217	360	380	1	0	11	263	71	143	210	155	815	2,627
DOP (lbs)	2015	93	282	510	16	140	1	49	53	185	961	164	356	2,810
	2016	400	47	41	17	138	0	18	305	99	142	20	62	1,289
	2017	248	106	42	91	0	0	15	15	48	310	1,046	248	2,170
	2018	90	57	109	41	0	0	0	516	46	12	60	5	936
	2019	126	209	221	0.8	0	7	155	42	83	122	90	474	1,530

Notes:

– = no sample.

[1] The EPA Simple Method is used to fill in gaps in flow summaries for periods without a complete measured storm flow history. The resulting values are then used in pollutant loading estimates.

[2] E. coli is not included in pollutant loads. E. coli values are reported in MPN/100 ml. This is a most probable number and not a mass; therefore, a pollutant loading mass is not an appropriate estimate.

Table 13. Wet Weather Pollutant Loading Estimates [1]
Meridian Area

		Permit Required Monitoring								Supplemental Monitoring				Annual Cumulative Estimate
Analyte [2]	Water Year	March	April	May	June	July	August	September	October	November	December	January	February	Sum of Monthly Loads
Nitrate+Nitrite as N (lbs)	2011	9,158		1,320		–		4,582		172				15,233
	2012	2,877	2,453	509	94	83	0	44	452	854				7,366
	2013	55	344	253	244	1	0	5,329	3,008	13	300	159	42	9,748
	2014	1,657	1,335	641	68	0	145	335	87	236	194	157	858	5,713
	2015	188	248	175	20	599	0	1,034	968	252	394	127	108	4,113
	2016	654	327	500	140	1,154	0	139	1,030	591	1,494	553	296	6,878
	2017	681	1,251	706	895	4	25	124	138	148	951	3,205	760	8,889
	2018	638	254	1,128	304	0	0	0	13	428	251	275	71	3,362
	2019	973	1,232	2,513	26	0	63	401	128	235	547	624	1,243	7,012
TSS (lbs)	2011	220,352		195,868		–		55,501		161,132				632,853
	2012	76,117	64,903	30,535	5,642	3,930	0	2,726	27,718	51,256				262,828
	2013	12,696	79,702	231,335	223,506	377	151	239,320	135,067	5,132	119,243	63,244	16,641	1,126,415
	2014	65,341	52,646	24,775	2,618	0	15,431	39,205	10,127	25,124	20,611	16,684	91,276	363,838
	2015	16,604	21,894	39,419	4,483	193,970	89	101,930	95,500	56,827	88,960	28,744	24,455	672,875
	2016	201,081	100,540	35,004	9,801	222,747	0	26,883	198,781	41,390	104,546	38,738	20,719	1,000,230
	2017	101,022	185,551	46,490	58,904	768	4,350	6,780	7,494	17,698	113,774	383,671	91,019	1,017,522
	2018	199,830	79,528	17,393	4,696	0	0	0	868	134,107	78,489	86,286	22,351	623,548
	2019	128,085	162,134	330,619	3,374	0	14,844	192,259	61,466	112,925	262,301	299,466	596,431	2,035,819
TKN (lbs)	2011	27,441		8,516		–		20,006		7,196				63,159
	2012	10,621	9,056	3,635	672	562	0	296	3,013	7,997				35,852
	2013	430	2,697	3,363	3,249	8	3	41,943	23,672	109	2,527	1,340	353	79,693
	2014	24,270	19,554	7,623	805	0	2,768	5,109	1,320	4,506	3,696	2,992	16,370	89,013
	2015	1,384	1,825	1,314	149	4,032	2	7,092	6,645	1,849	2,965	958	815	29,030
	2016	6,247	3,124	4,501	1,260	17,105	0	2,054	15,185	5,322	13,442	4,981	2,663	75,883
	2017	6,502	11,943	3,857	4,887	36	205	952	1,052	640	4,114	13,874	3,291	51,352
	2018	3,074	1,224	7,212	1,947	0	0	0	120	2,063	1,208	1,327	344	18,519
	2019	11,459	14,506	29,579	302	0	501	5,687	1,818	3,340	7,759	8,858	17,643	89,993
TP (lbs)	2011	2,210		1,120		–		2,527		792				6,649
	2012	677	577	511	94	72	0	500	5,086	1,283				8,800
	2013	43	268	455	439	1	0	2,973	1,678	15	354	188	49	6,463
	2014	3,491	2,813	972	103	0	464	561	145	755	619	501	2,743	13,166
	2015	159	209	184	21	408	0	668	626	265	415	134	114	3,203
	2016	540	270	954	267	1,414	0	171	1,262	1,128	2,850	1,056	565	10,477
	2017	579	1,064	471	596	5	31	154	171	99	634	2,137	507	6,448
	2018	407	162	673	256	0	0	0	15	273	160	176	46	2,168
	2019	1,348	1,706	3,478	36	0	45	762	244	448	1,040	1,187	2,365	11,311
DOP (lbs)	2015	122	148	116	13	218	0	456	427	167	262	85	72	2,086
	2016	274	137	614	172	859	0	104	766	726	1,834	680	363	6,529
	2017	327	601	277	351	3	19	106	117	62	397	1,339	318	3,916
	2018	132	53	949	182	0	0	0	10	89	52	57	15	1,539
	2019	425	538	1,098	11	0	24	479	153	281	653	746	1,485	5,468

Notes:

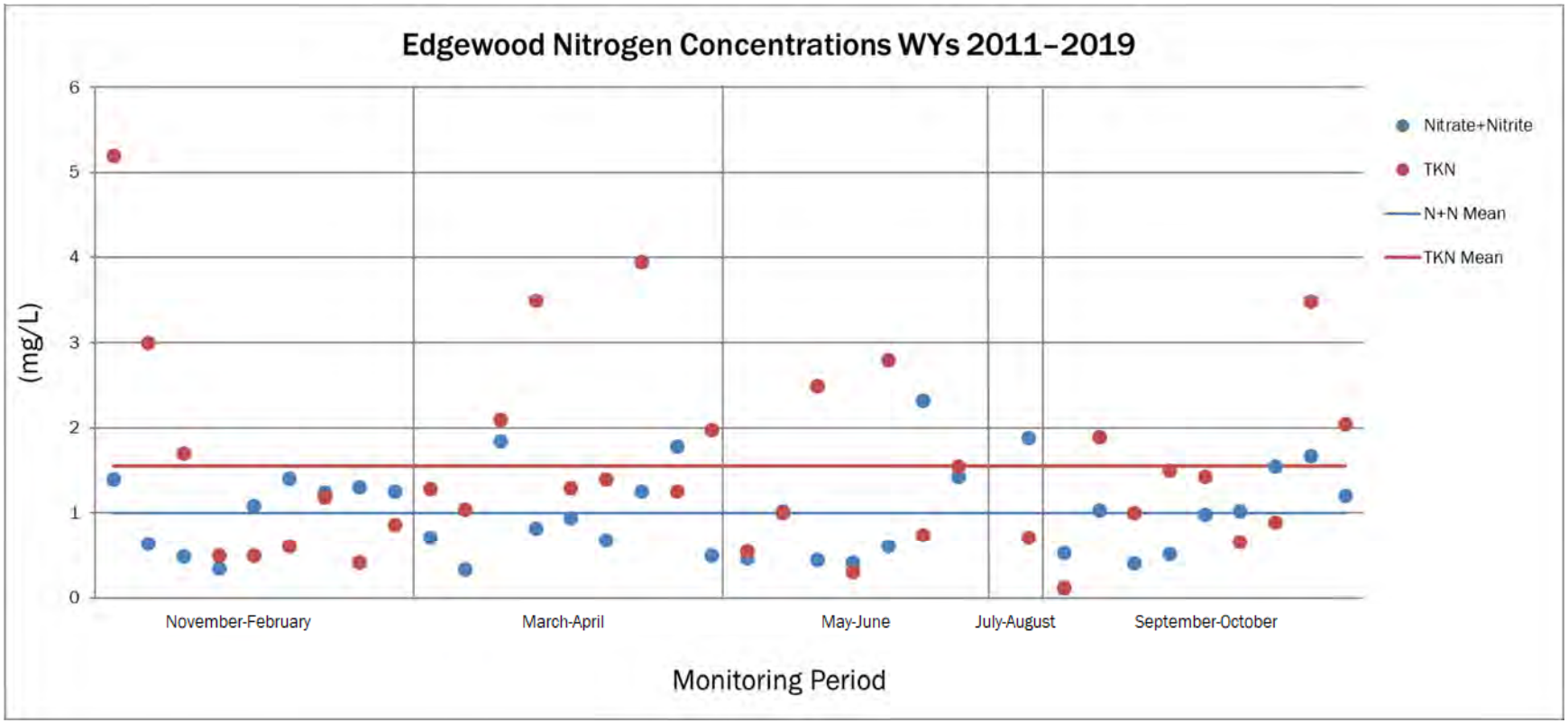
– = no sample.

[1] The EPA Simple Method is used to fill in gaps in flow summaries for periods without a complete measured storm flow history. The resulting values are then used in pollutant loading estimates.

[2] E. coli is not included in pollutant loads. E. coli values are reported in MPN/100 ml. This is a most probable number and not a mass; therefore, a pollutant loading mass is not an appropriate estimate.

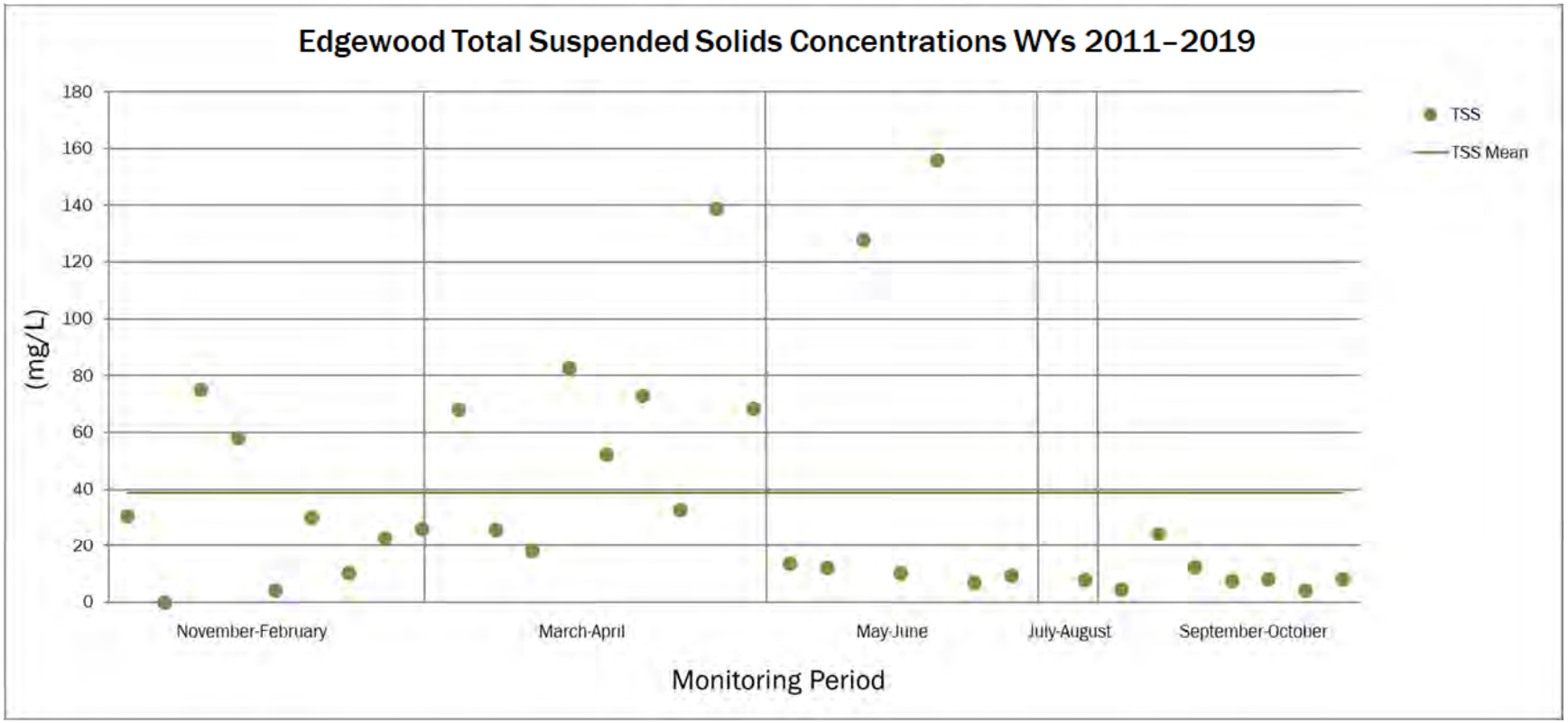
Figures

Figure 1



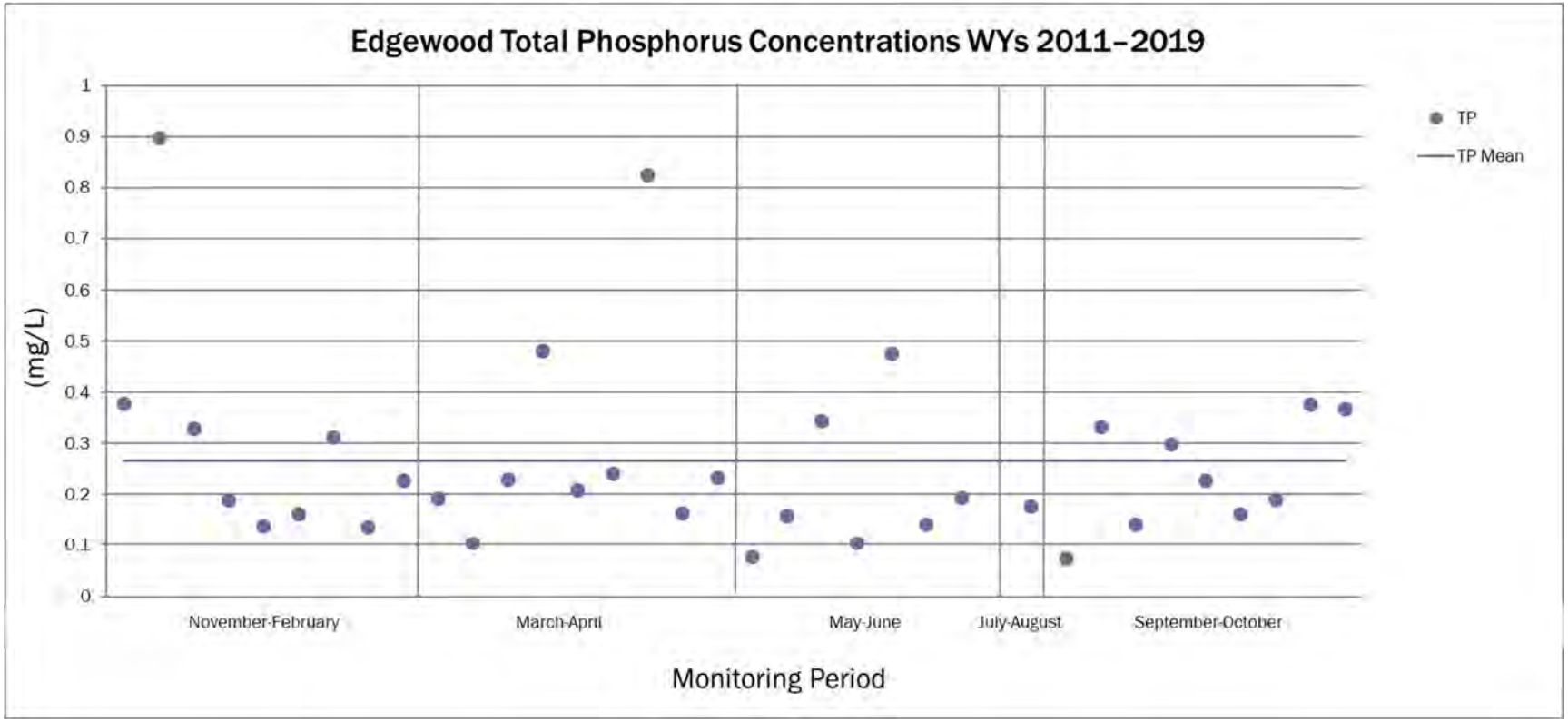
Plotted concentrations represent values in Table 2.

Figure 2



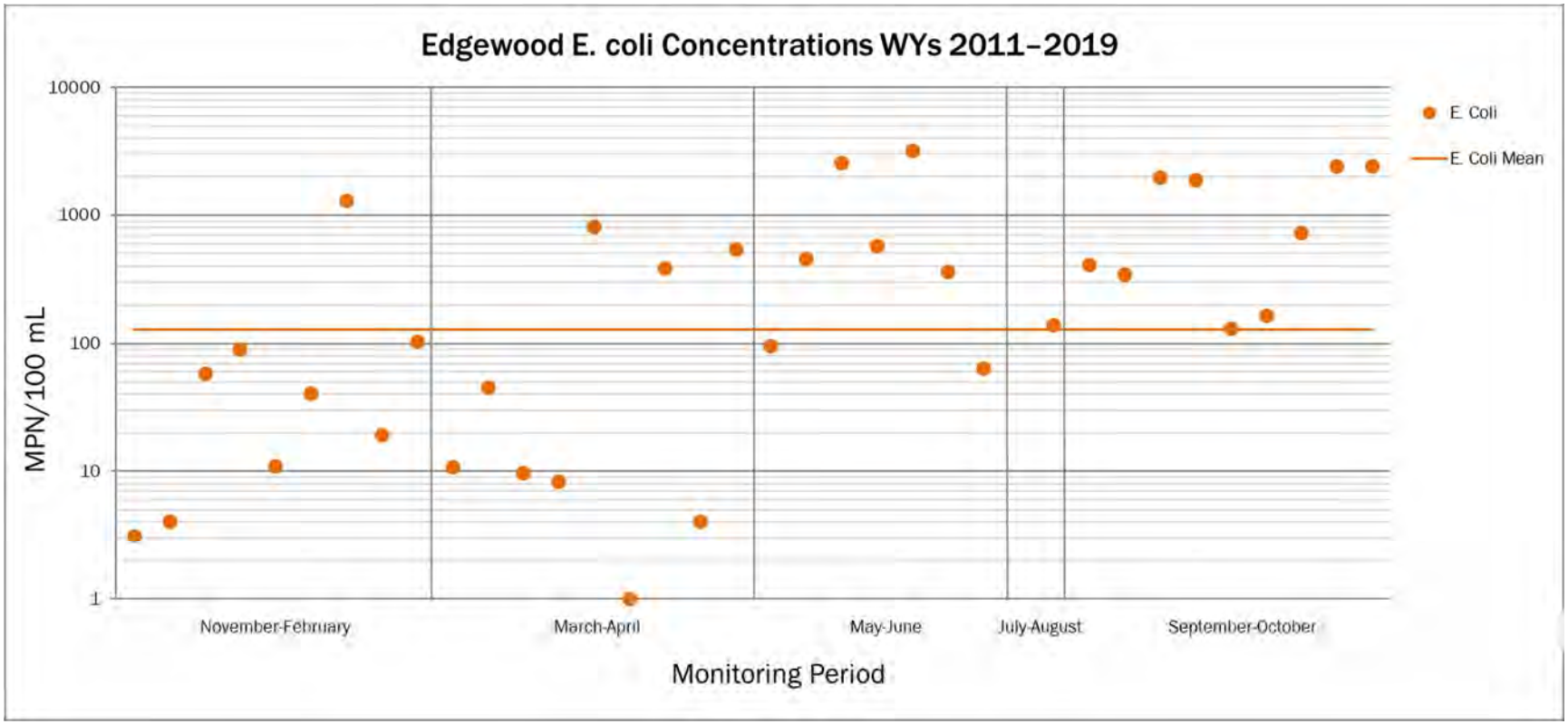
Plotted concentrations represent values in Table 2.

Figure 3



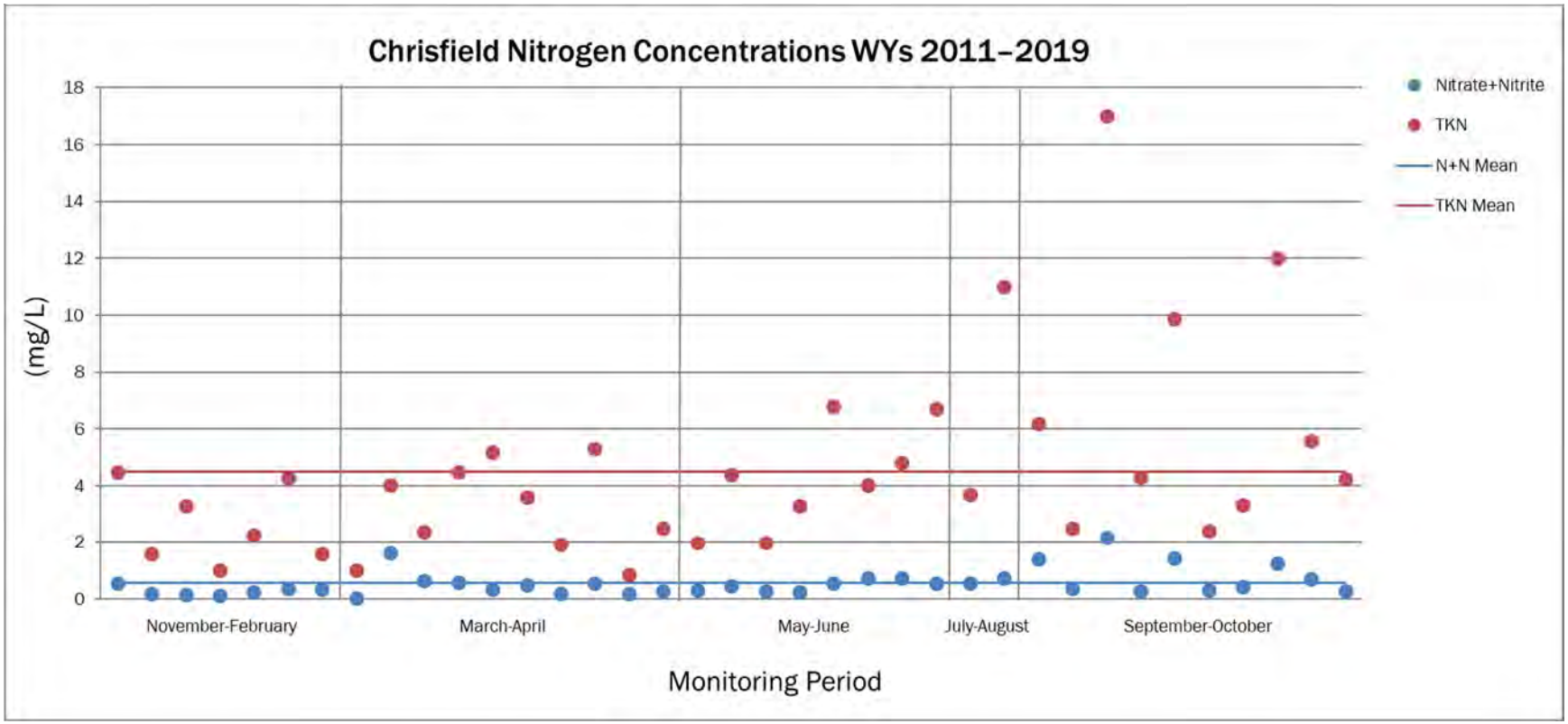
Plotted concentrations represent values in Table 2.

Figure 4



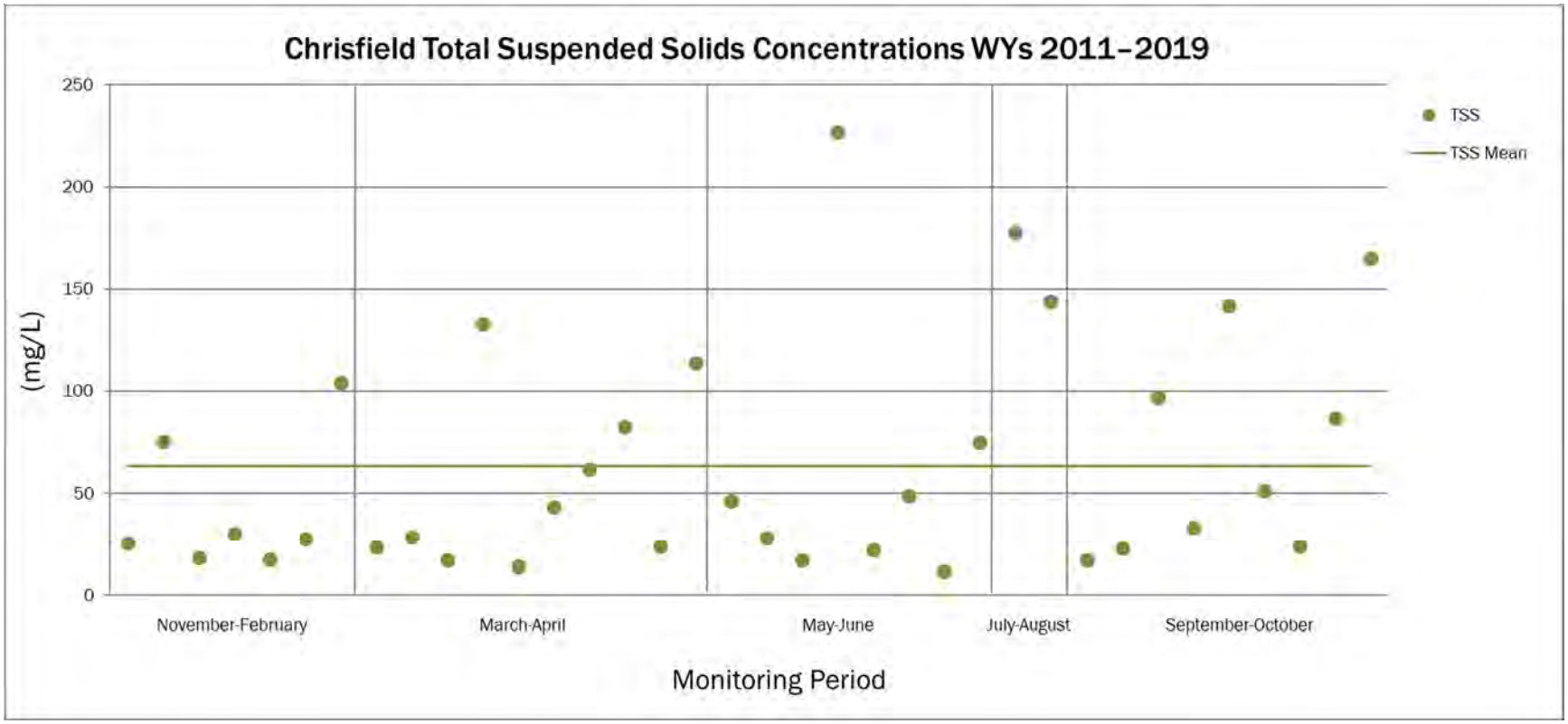
Y-axis is presented as a logarithmic scale.
Plotted concentrations represent values in Table 2.

Figure 5



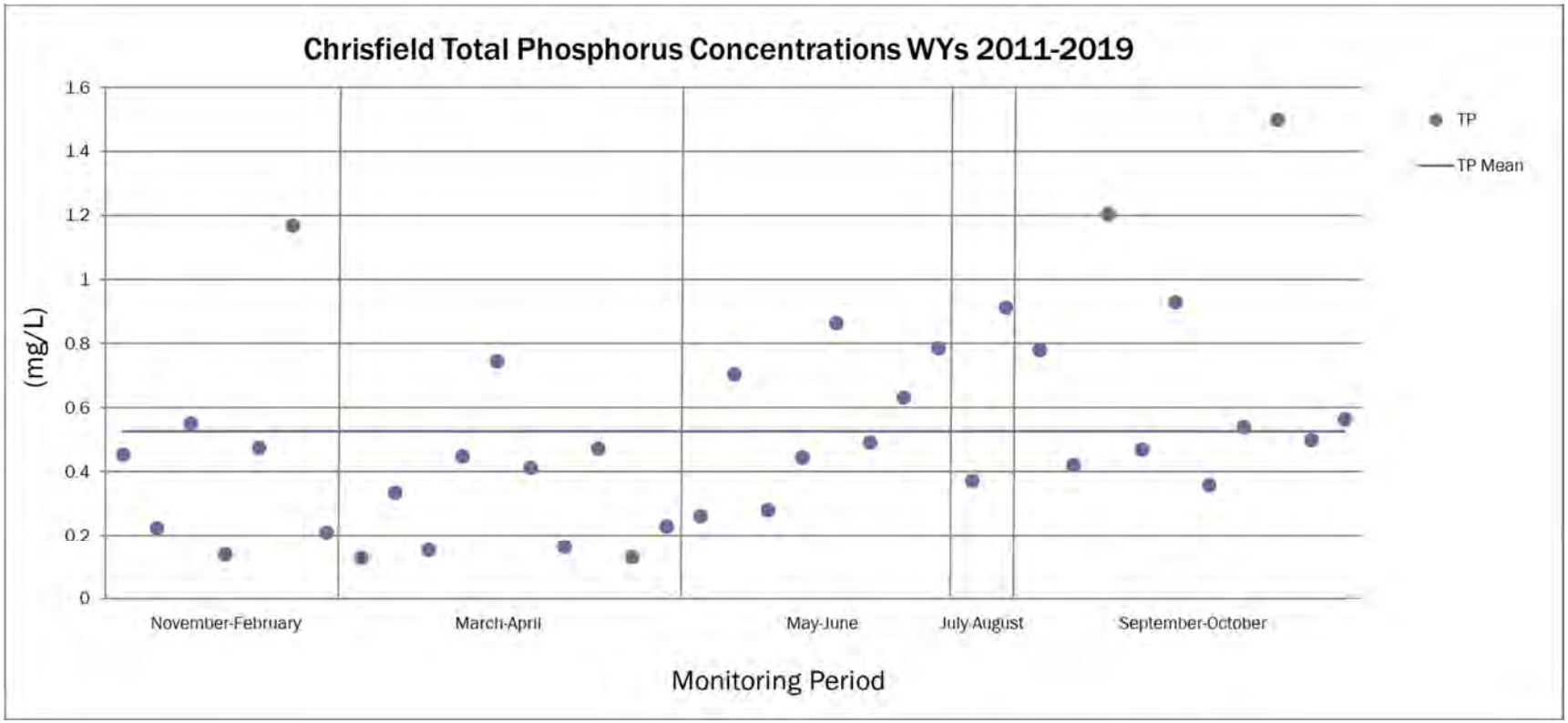
Plotted concentrations represent values in Table 3.

Figure 6



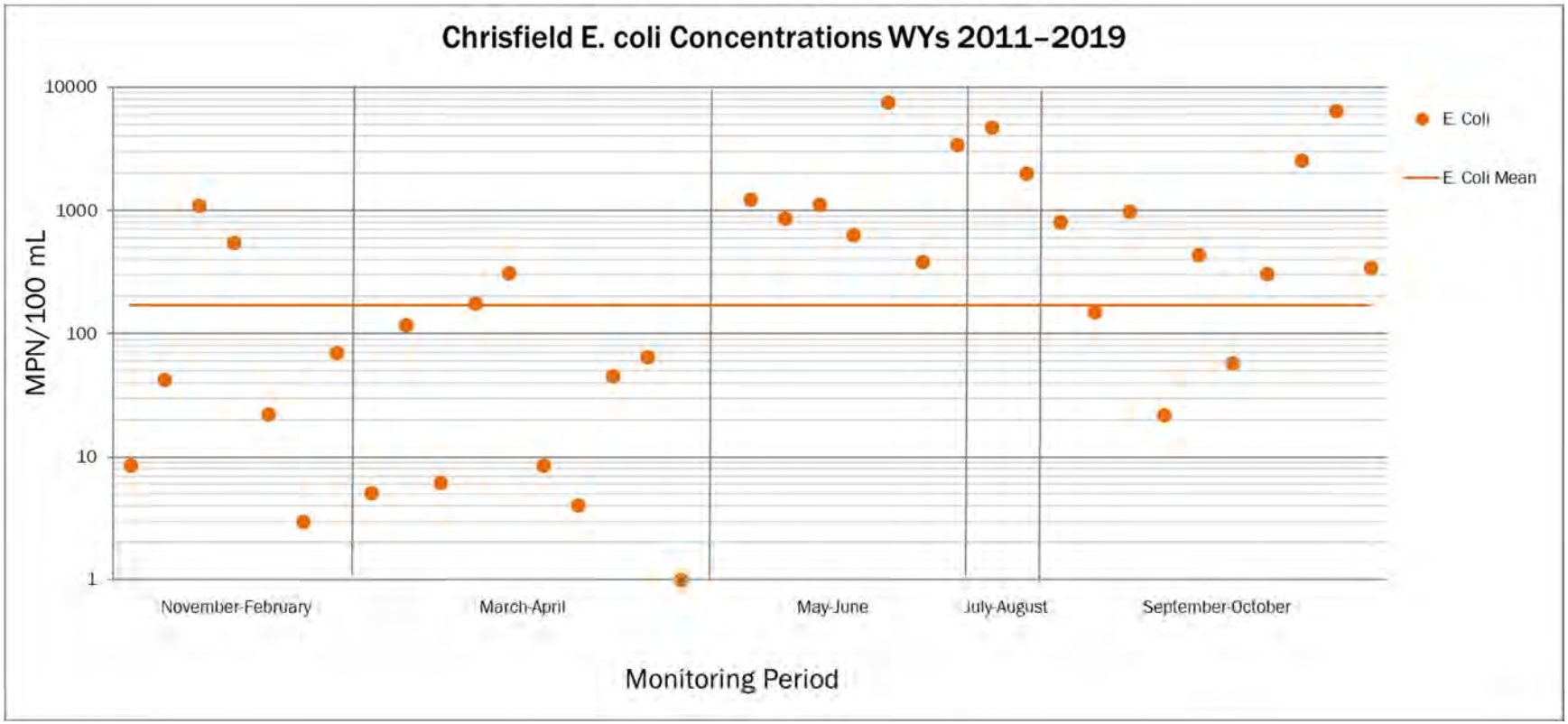
Plotted concentrations represent values in Table 3.

Figure 7



Plotted concentrations represent values in Table 3.

Figure 8



Y-axis is presented as a logarithmic scale.
Plotted concentrations represent values in Table 3.

Figure 9

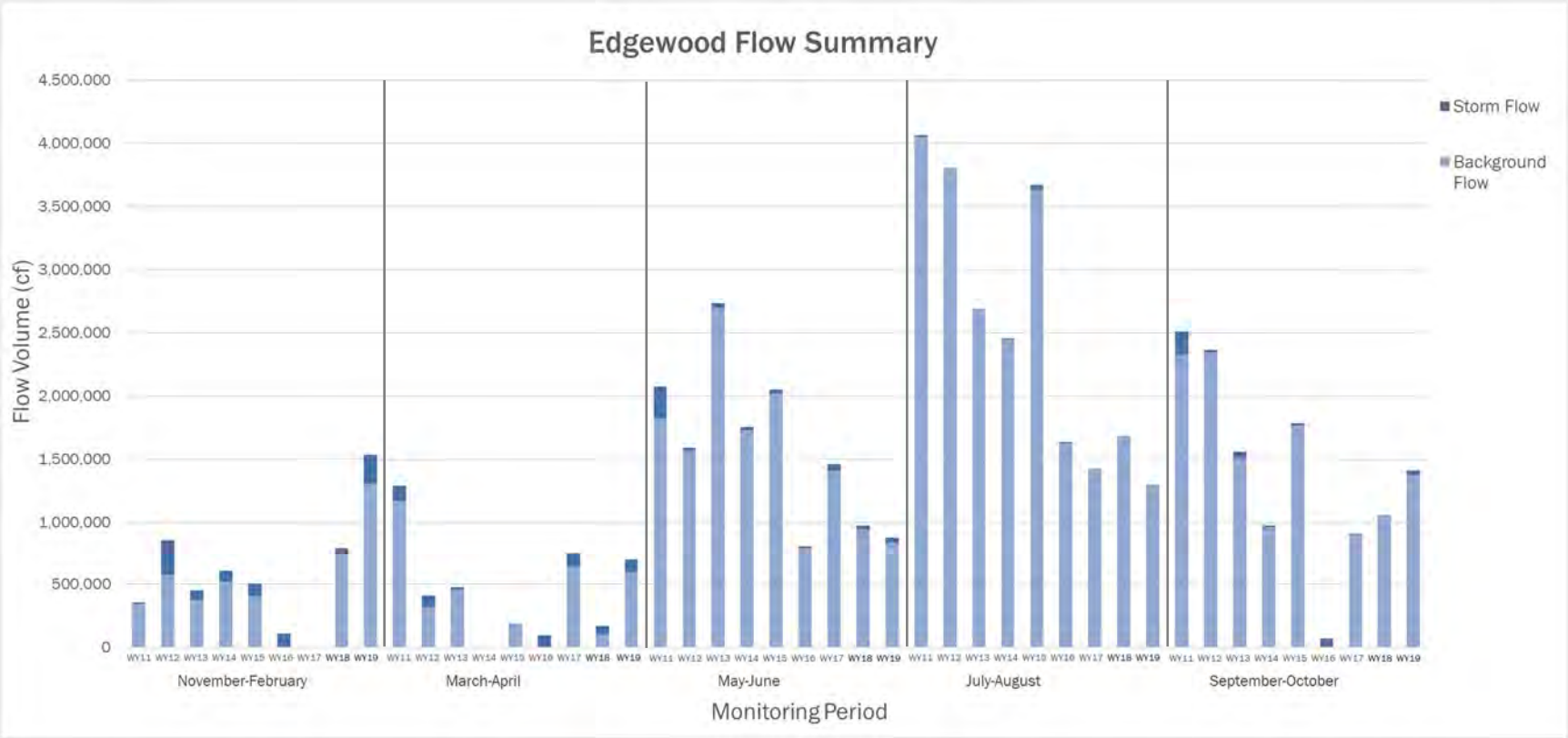

Edgewood Flow Summary
Flow Volume (cf)
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Storm Flow
Background Flow
WY11 WY12 WY13 WY14 WY15 WY16 WY17 WY18 WY19
November-February
March-April
May-June
July-August
September-October
Monitoring Period

Figure 10

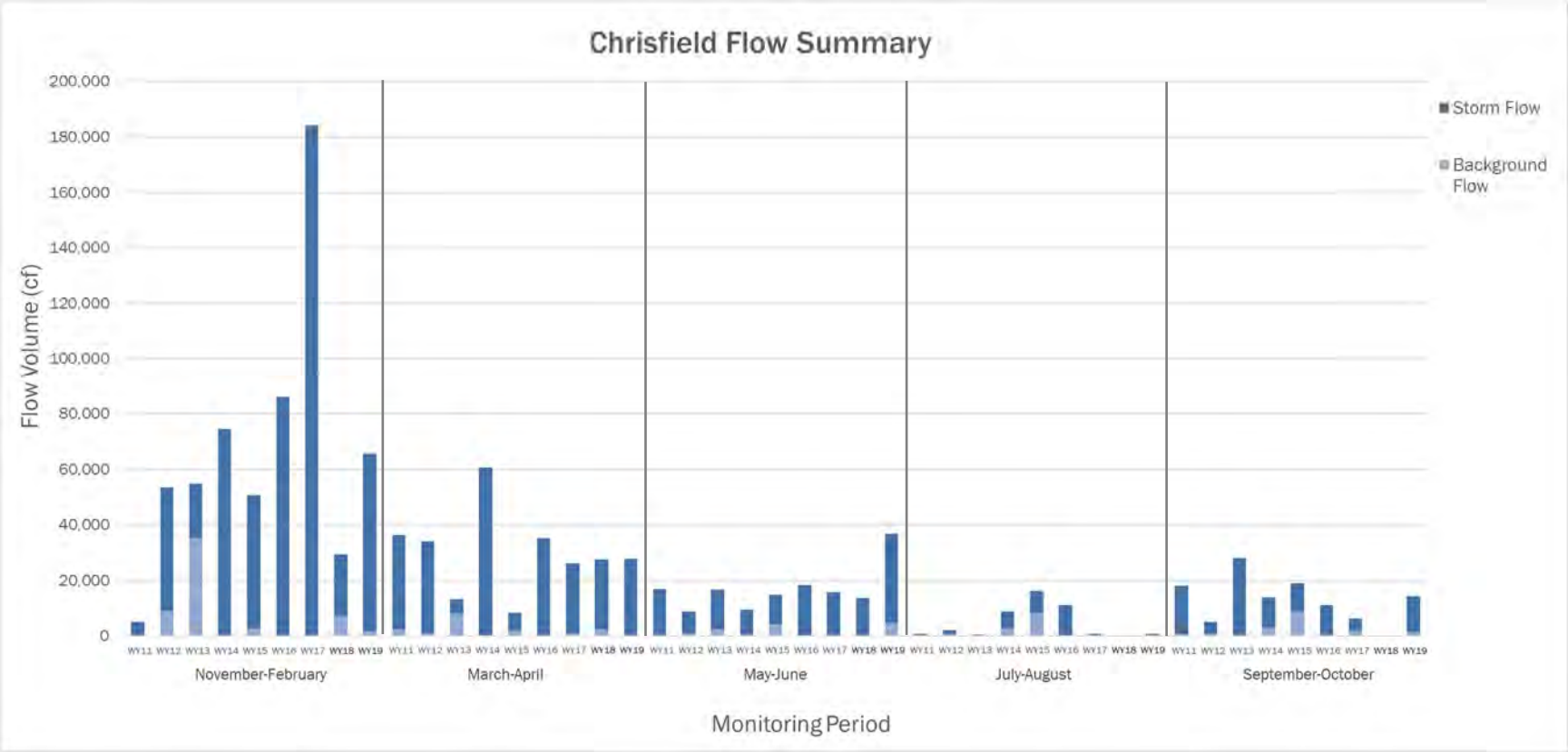

Chrisfield Flow Summary
Flow Volume (cf)
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Storm Flow
Background Flow
November-February
March-April
May-June
July-August
September-October
Monitoring Period

Figure 11

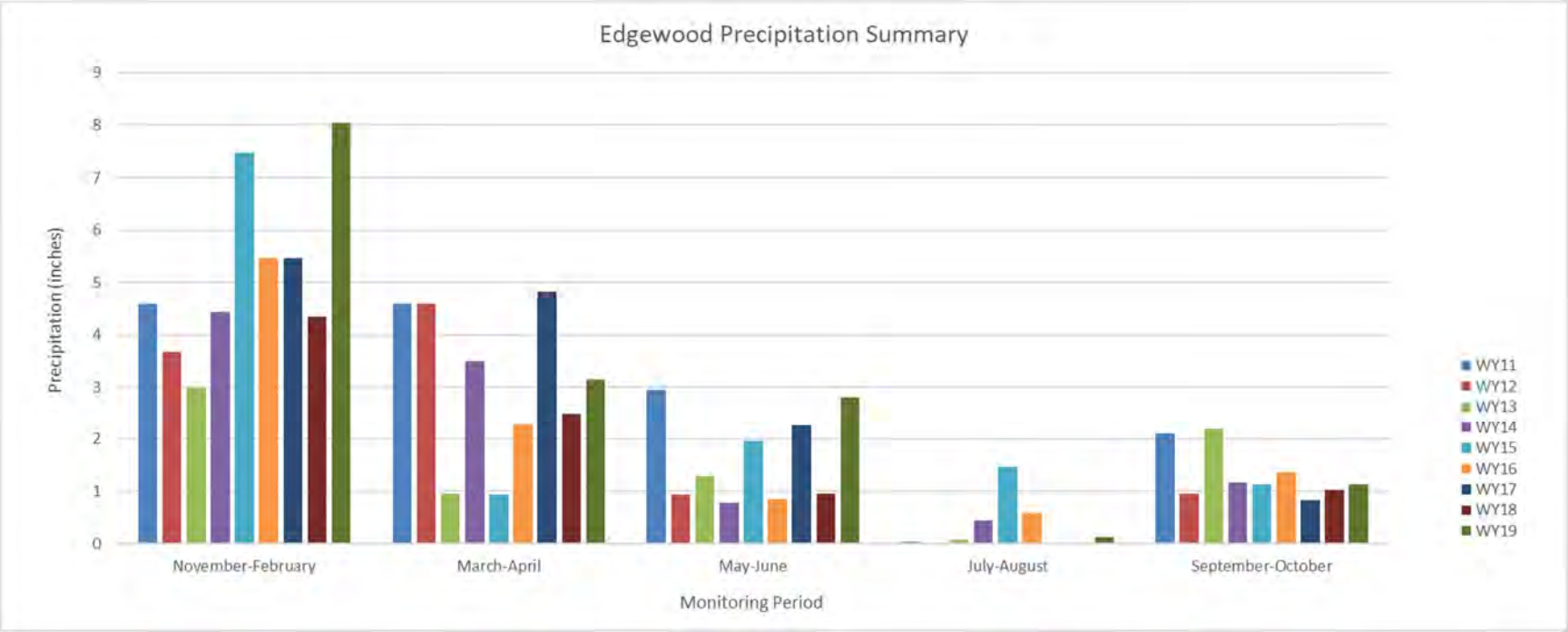
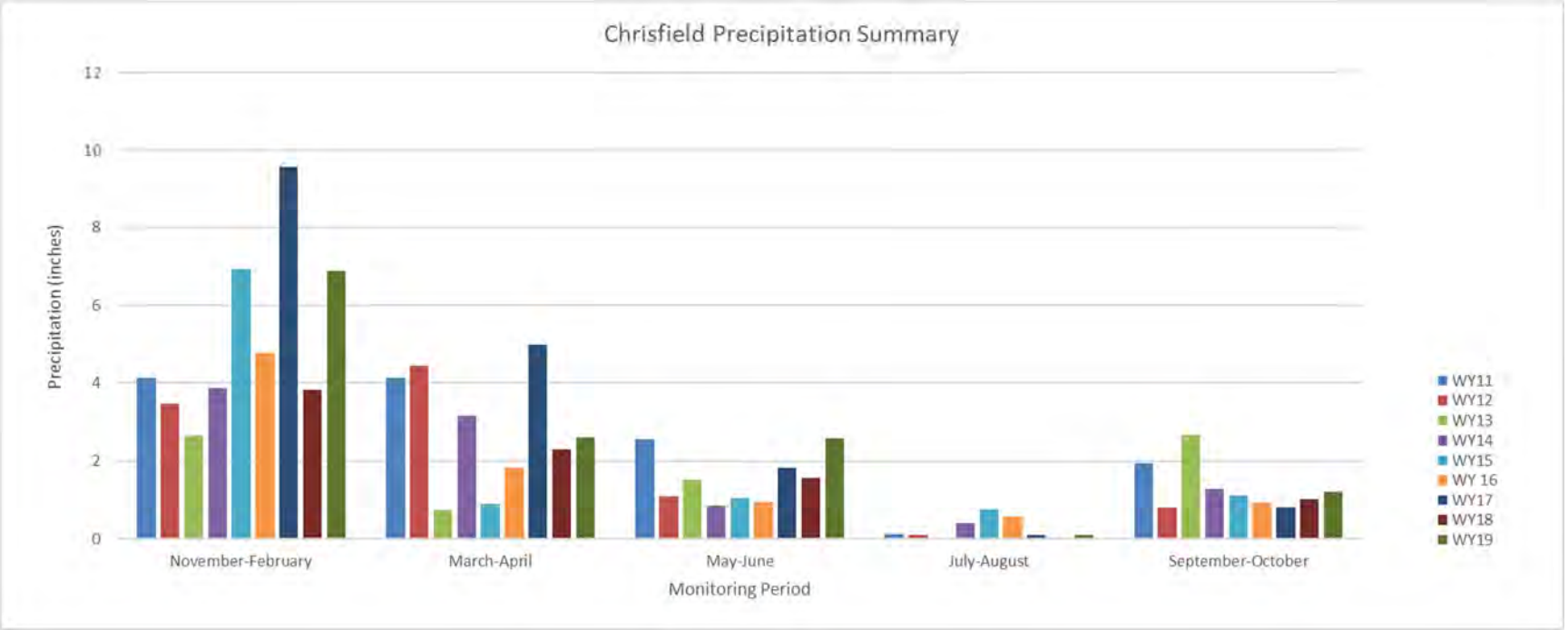

Edgewood Precipitation Summary
Precipitation (inches)
0
1
2
3
4
5
6
7
8
9
November-February
March-April
May-June
July-August
September-October
Monitoring Period
WY11
WY12
WY13
WY14
WY15
WY16
WY17
WY18
WY19

Figure 12


Chrisfield Precipitation Summary
12
10
8
6
4
2
0
Precipitation (inches)
November-February
March-April
May-June
July-August
September-October
Monitoring Period
WY11
WY12
WY13
WY14
WY15
WY 16
WY17
WY18
WY19

Appendix A: Site Maps

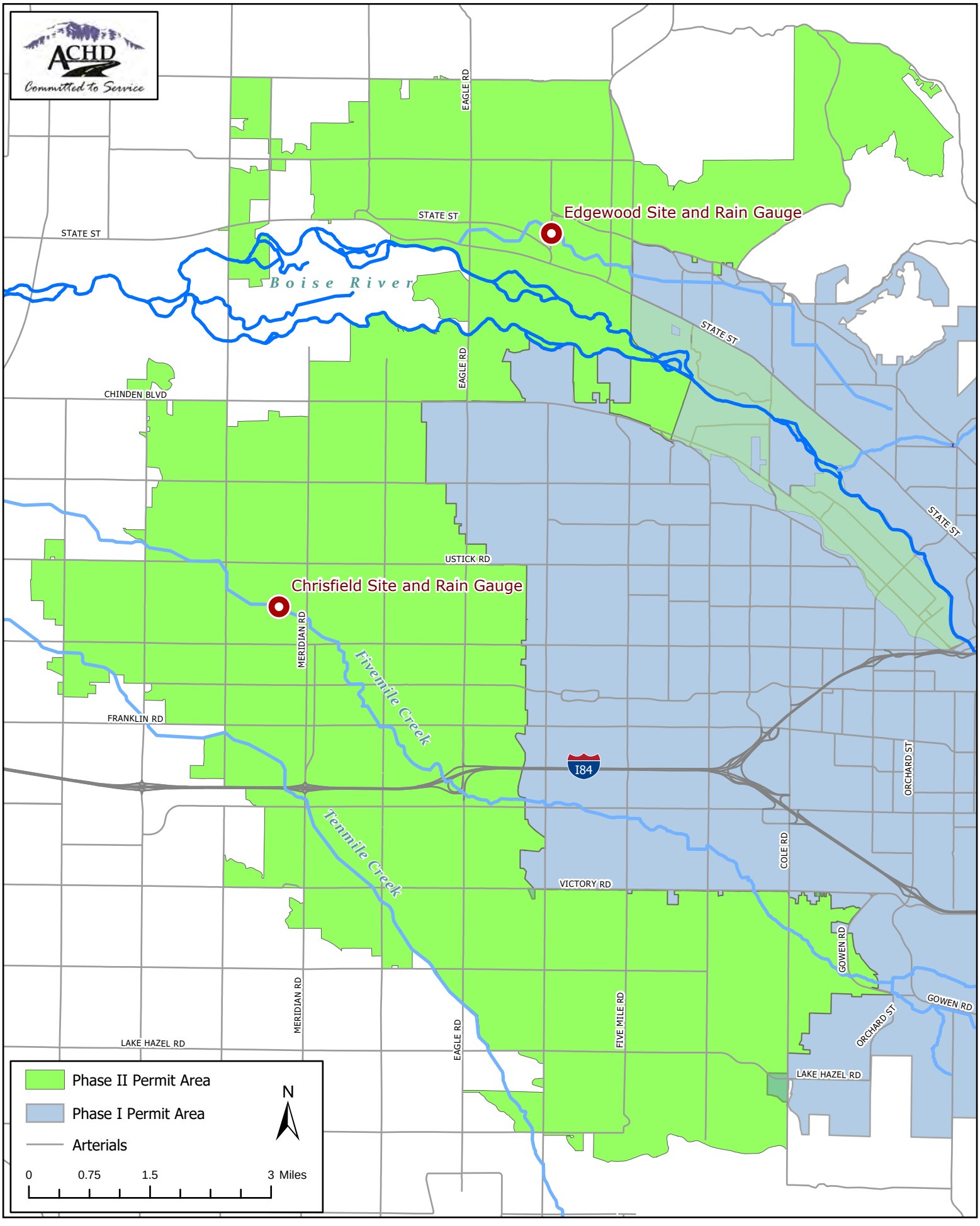
Phase II NPDES Monitoring Locations

Edgewood Monitoring Station Map

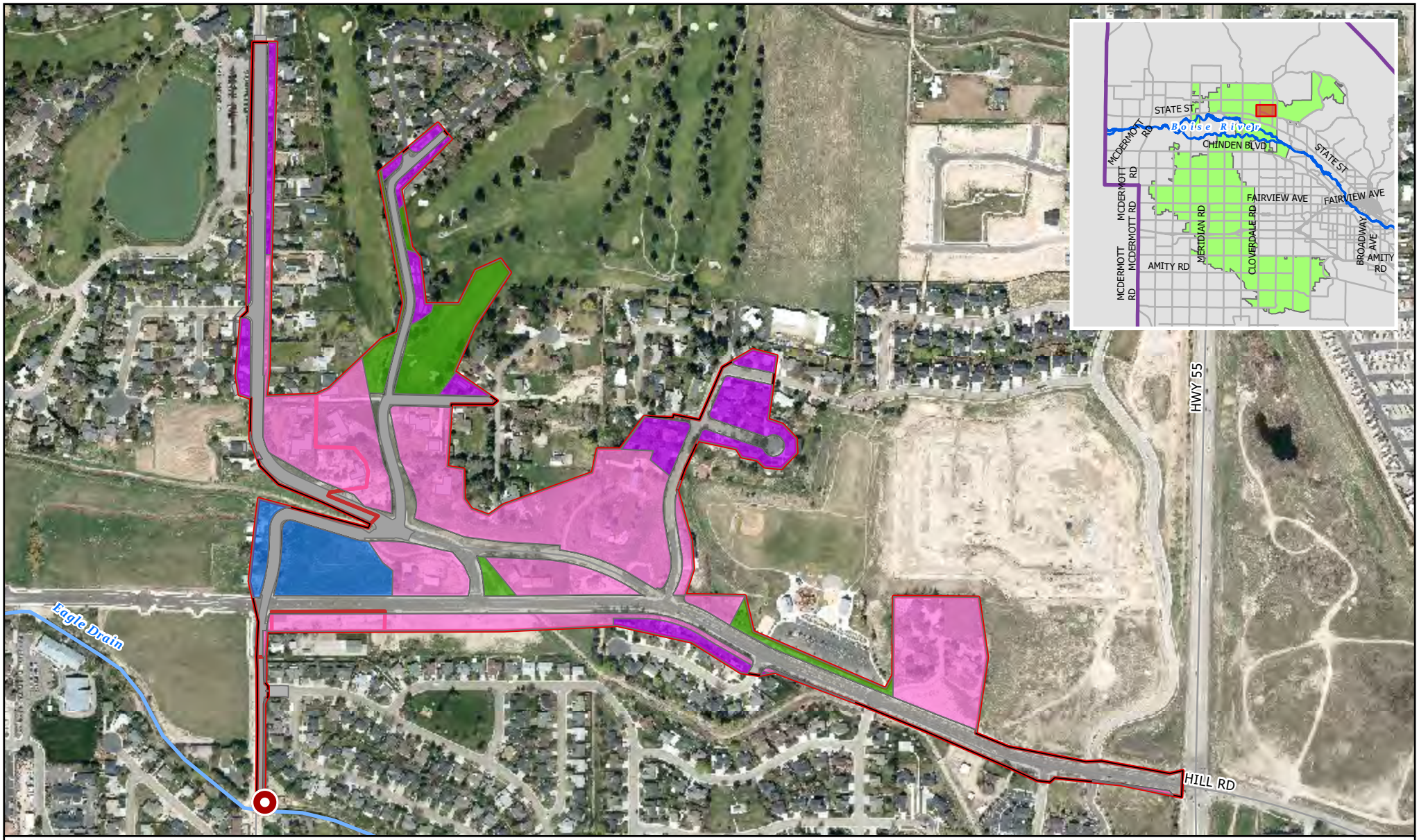
Chrisfield Monitoring Station Map

Phase II City Area of impacts

Phase II NPDES Monitoring Locations



Edgewood Monitoring Station



Land Use Percentages

- Right of Way - 33%
- Open Space - 8%
- Residential Low - 43%
- Residential Medium - 10%
- Agriculture - 6%
- Edgewood Drainage Area
- Waterway
- Arterials
- Edgewood Monitoring Station and Rain Gauge
- Phase II Permit Area
- Ada County Boundary

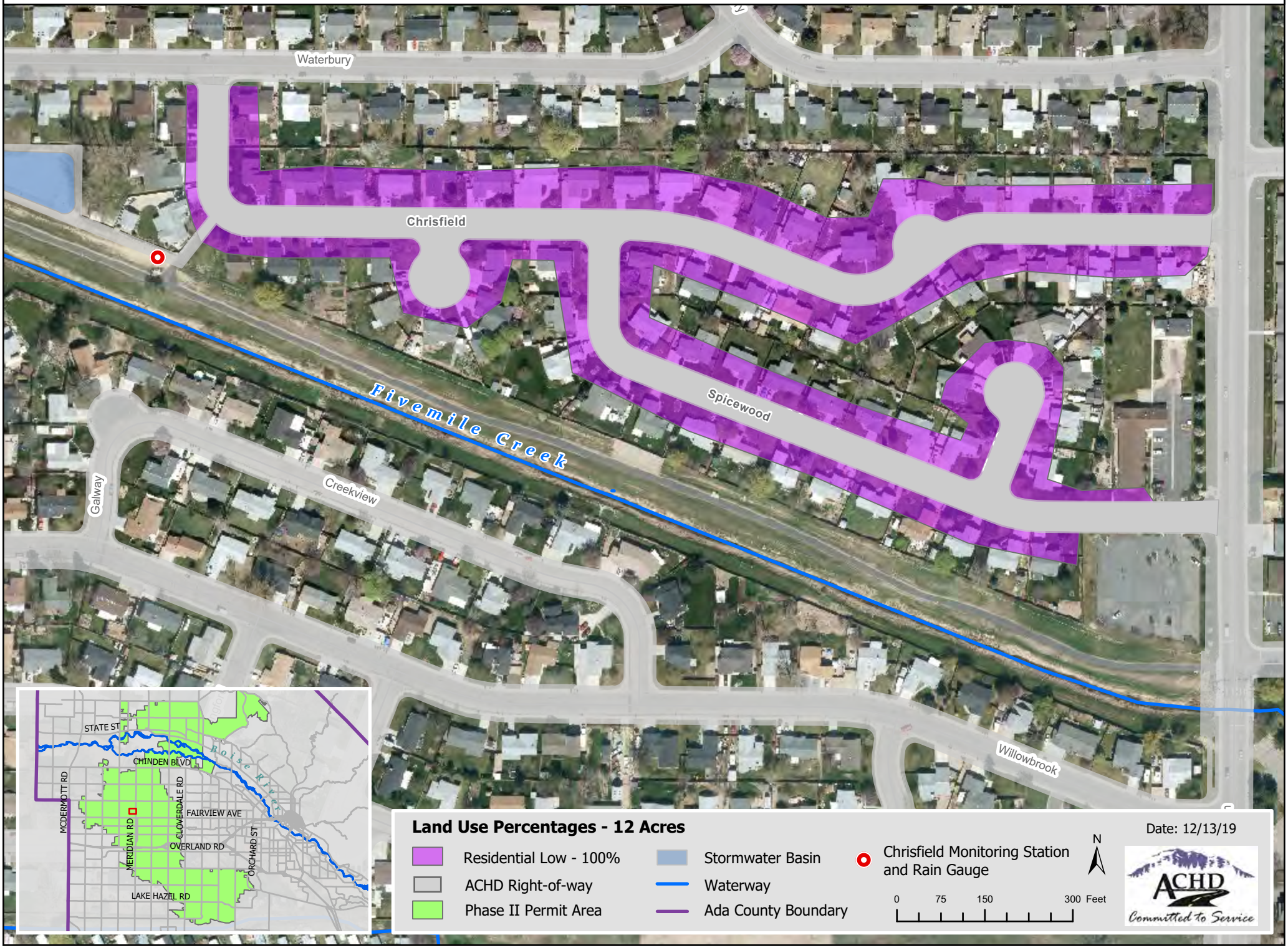
N

0 2.5 5 10 Miles

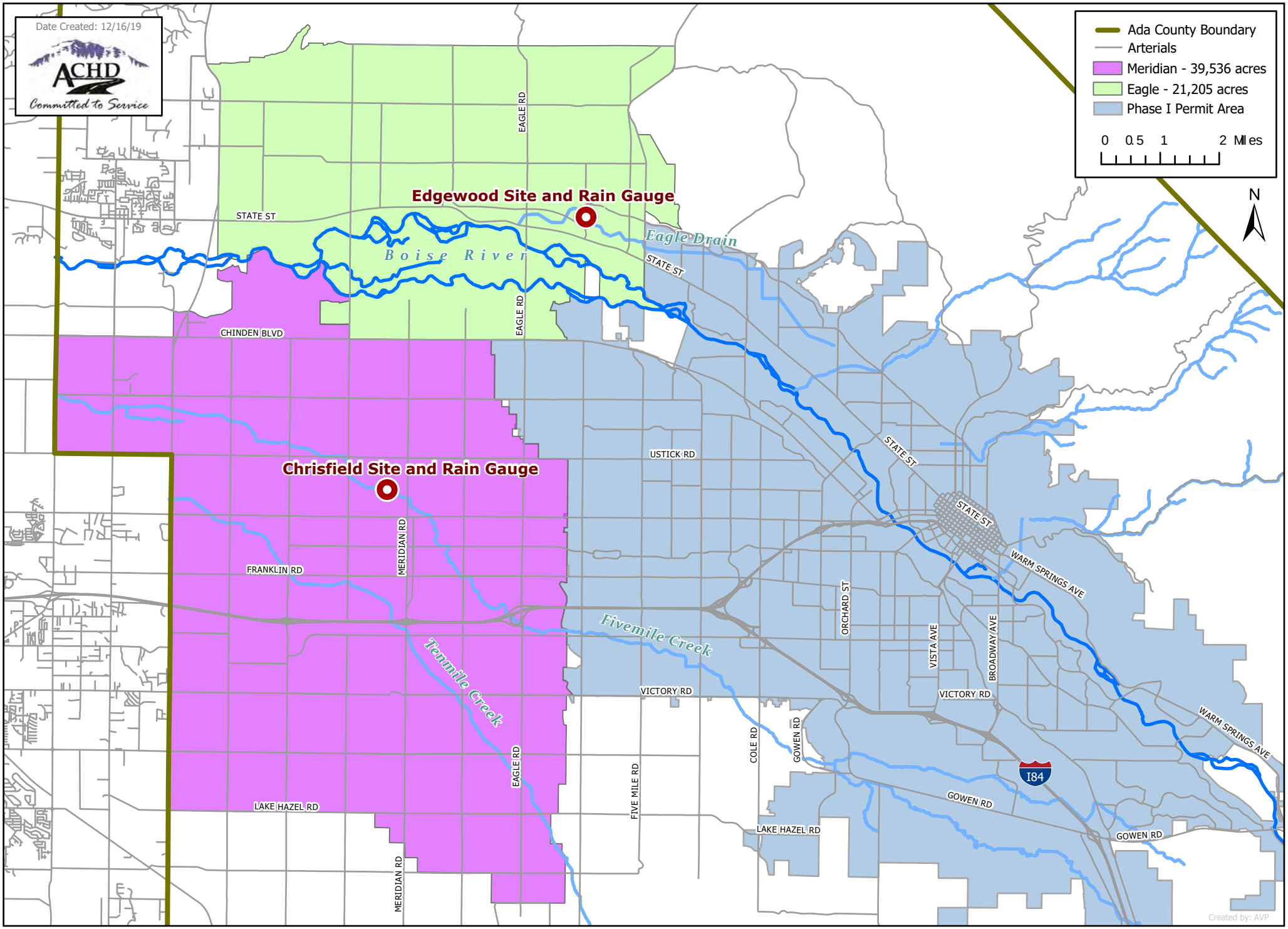
Date Created: 12/18/19

ACHD Committed to Service

Chrisfield Monitoring Station

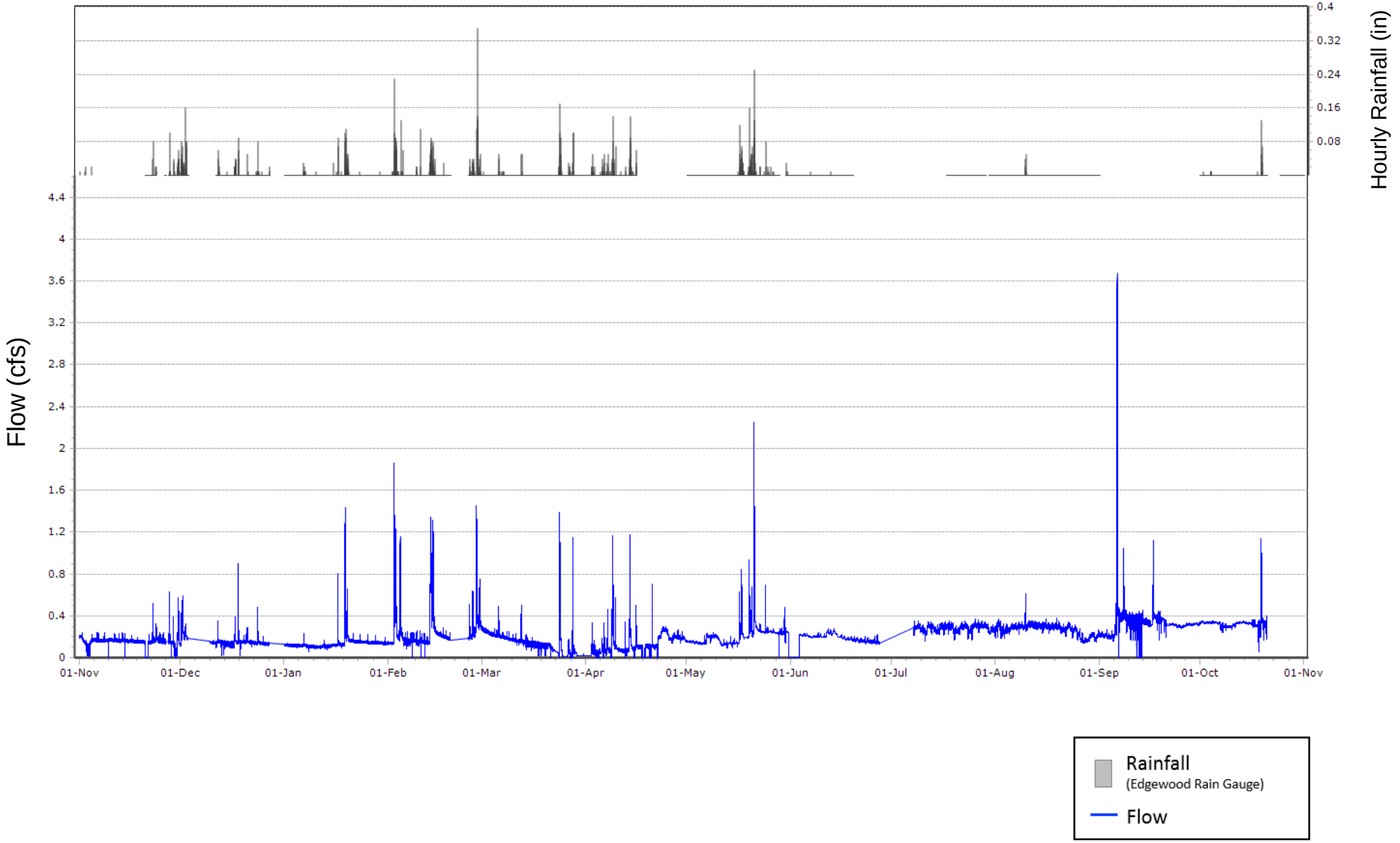


Phase II City Areas of Impact

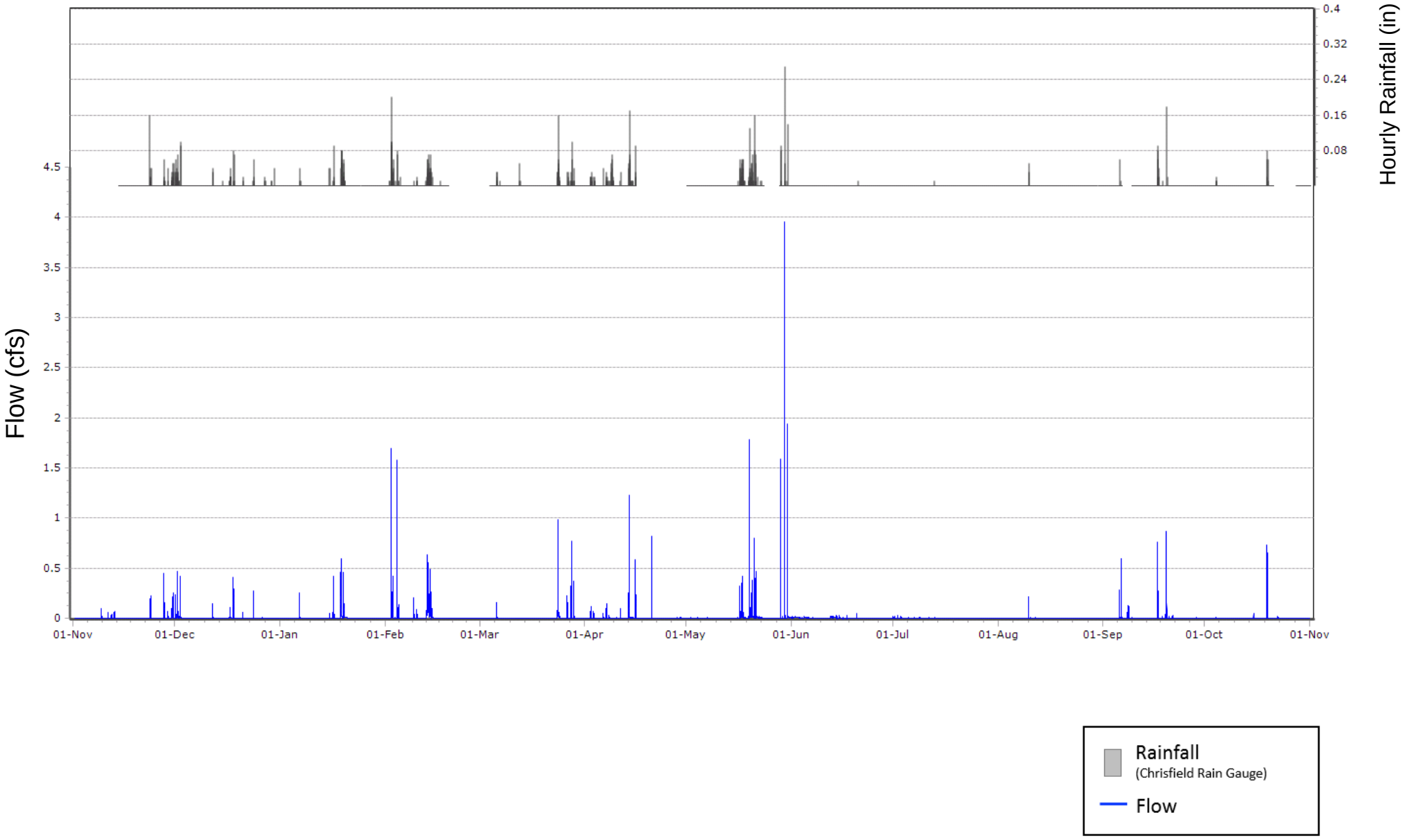


Appendix B: Water Year 2019 Monitoring Period Summaries and Hydrographs

Edgewood Annual Hydrograph - Water Year 2019



Chrisfield Annual Hydrograph - Water Year 2019



Brown AND Caldwell

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Technical Memorandum

Prepared for: Ada County Highway District (ACHD)

Project Title: Phase II Stormwater Outfall Monitoring

Project No.: 152760

Technical Memorandum

Subject: ACHD Phase II Monitoring Period Summary for November 2018 through February 2019

Date: August 23, 2019

To: Monica Lowe
Tammy Lightle

From: Andy Weigel, Project Manager

Prepared by: _____
Andrea Leonard, Project Scientist

Reviewed by: _____
Andy Weigel, Project Manager

Table of Contents

List of Tables

Section 1: Project Summary

Table 1 is a summary of the types of data collected during the supplemental monitoring period for Water Year (WY) 2019 Phase II Stormwater Monitoring.

Table 1. Project Summary

Sample Period	November 2018–February 2019	
Station	Edgewood	Chrisfield
Rain (inches)	8.04 [1]	6.88 [1]
Storm data flow (cubic feet)	229,023	64,026
Wet grab	Yes	Yes
Composite	Yes	No
Field parameters	Yes	Yes
QA/QC	No	Yes

[1]*Rainfall data gaps were supplemented with Agrimet data, maintained by the U.S. Bureau of Reclamation.*

Section 2: Monitoring Period Narrative

This technical memorandum describes the Phase II Stormwater Monitoring completed for Ada County Highway District (ACHD) from November 2018 through February 2019. Flow and rain data were collected during this period from the Edgewood and Chrisfield Phase II monitoring stations. Analytical data was collected during two successful storm events. The first event took place on November 23, 2018 and the second event on November 27, 2018.

National Weather Service Summary

The National Weather Service (NWS) prepares a summary of precipitation observations each month for inclusion in an overall monthly climate summary. The NWS monthly climate summary is made available through the local Boise Weather Forecast Office on the NWS website at http://www.nws.noaa.gov/climate/index.php?wfo=boi. Precipitation summaries from the NWS are included in the text below. Summaries are pared down but are otherwise quoted directly with minor punctuation and grammatical edits for readability.

> The average temperature for November 2018 was near normal. Precipitation totaled 0.80 inch, 60 percent of normal, most falling during the last nine days of the month. There was no measurable precipitation from the 5th through the 21st. But despite the wet weather at the end of the month, it still ranks among the driest 25 percent of Novembers at the airport. The first snow of the season fell at the airport in the early morning hours of the 24th. The longer nights, shorter days, and lower sun angle, combined with warm air aloft, resulted in a temperature inversion. Weak winds at all levels kept warm air from mixing down to the surface, so temperatures in the valley averaged a few degrees below normal. The change to a progressive flow pattern which began on the 21st broke the inversion, allowing temperatures to warm to near or above normal for the rest of the month.
>
> The average temperature for December 2018 was slightly warmer than normal, although the month started out cold, with the temperature staying below freezing from the 5th through the

8th. The rest of the month was relatively mild, with daily averages near or above normal. Precipitation was near normal, totaling 1.4 inches, but total snowfall was slightly below normal at 4.9 inches. Half of the total precipitation fell on the first two days of the month, when a deep upper level trough from the north Pacific crossed the area. On the 17th and the 18th two closely spaced Pacific weather systems brought nearly a third of an inch of rain. Light snow fell on the 23rd and the 29th, but most of it melted in response to afternoon temperatures in the upper 30s and lower 40s.

January ranked 14th warmest in the 80 years of airport records. Precipitation was a third of an inch below normal, totaling 1.08 inches. Most of it fell in one day on the 19th, when three quarters of an inch fell at the airport. While not a record, it was the largest daily amount so far this winter. Light snowfalls left no more than traces on the ground on the 7th, 16th, and 23rd. After each event, the snow was gone by afternoon as temperatures warmed into the 40s. The combination of clear skies and long winter nights allowed the air in the valley to cool, creating a temperature inversion capped by the warm air at high elevations. On the 23rd a high-pressure ridge was building near the coast. A weak disturbance rounding the north portion of the ridge crossed the Boise area, bringing another light snowfall. The rest of the month stayed mild and dry as the ridge gradually shifted inland.

After a relatively mild and nearly snow-free January, February brought a return to winter. February, with an average temperature only a couple of degrees below normal, was colder than January. The low of 10 degrees on the 22nd was the coldest temperature of the winter. Brief periods of southwest flow aloft enabled temperatures to reach or exceed normal values for a few days at the beginning, middle, and end of the month. The warm spells were accompanied by the wettest weather of the month, due to disturbances embedded in the flow picking up moisture from off the California coast. Measurable precipitation was recorded on all but four days, for a February total precipitation of 3.71 inches. It was the wettest February since precipitation records began in 1878. It was the 9th snowiest February on record, with 11.6 inches falling during the month. The greatest depth for the month and the winter was 5 inches on the 21st.

Monitoring Station Summary

Prior to WY 2019, analytical data was derived from grab samples at Edgewood and Chrisfield. For WY 2019, however, composite samplers were installed at both sites to capture flow weighted composite samples during storm events to obtain event mean concentrations rather than discrete data. These samplers will continue to be used going forward with this permit. More equipment details will be outlined in the WY 2019 Annual Report.

A summary of data collected for each monitoring station over the entire monitoring period (Nov–Feb) and for the targeted storms is provided in Table 2. Monthly summaries are presented in Tables 3–6 (Nov–Feb). Monitoring period summary tables are included in Attachment A.

November–February summary hydrographs are presented in Figures 1 (Edgewood) and 2 (Chrisfield). Monthly hydrographs for each monitoring station in this monitoring period are provided in chronological order in Figures 3–10. Included on each hydrograph are recorded hourly precipitation at the local rain gauge (inches), flow (cubic feet per second), and sample collection times, as applicable. Hydrographs are included in Attachment B.

Section 3: Storm Narrative

Three storms were targeted during the November–February monitoring period. Wet grab samples were collected at Chrisfield on November 23, 2018, and at both sites on November 27, 2018. A composite sample was collected at Edgewood on November 27, 2018. Both sites were targeted for composite samples on February 2, 2019, but both were unsuccessful. A successful composite sample was not collected at Chrisfield during the November – February monitoring period. See Section 5 for additional notes about data collected during the monitoring period.

November 23, 2018

On Wednesday morning, November 21, the National Weather Service issued a forecast for rain showers in the Boise area from late morning Friday into the afternoon and evening. Setup was accomplished Wednesday afternoon to collect composite samples at both Chrisfield and Edgewood. An expected precipitation depth of 0.22 inch was used to set trigger volumes at both monitoring sites. Precipitation started around 1545 Friday afternoon and continued lightly throughout the evening. Precipitation totaled 0.30 inch at Chrisfield, and Edgewood's rain gauge data is not available for this storm event.

A two-member team mobilized to collect stormwater runoff grab samples and verify operation of the automatic sampling equipment on the afternoon of November 23, 2019. Wet grab samples were collected at Edgewood and Chrisfield monitoring stations and submitted to the West Boise Water Quality Lab (WQL) at 1711 on November 23. Laboratory analytical reports are included in Attachment C.

November 27, 2018

On Monday morning, November 26, the National Weather Service issued a forecast for rain showers in the Boise area from late morning Tuesday into the afternoon and evening. Chance of precipitation was 100 percent for Tuesday evening; a total precipitation of 0.20 inch was predicted. Setup was accomplished Monday afternoon to collect composite samples at both Chrisfield and Edgewood. An expected precipitation depth of 0.11 inch was used to set trigger volumes at both monitoring sites. Precipitation started around 1700 on Tuesday evening, and small amounts continued until around 2200. Precipitation totals were 0.11 inch at Chrisfield, and 0.14 inch at Edgewood.

A two-member team mobilized to collect stormwater runoff grab samples and verify operation of the automatic sampling equipment on the afternoon of November 27, 2019. Wet grab samples were collected at Edgewood and Chrisfield monitoring stations and submitted to the West Boise Water Quality Lab (WQL) at 2157 on November 27. Laboratory analytical reports are included in Attachment C.

February 2, 2019

On Friday morning of February 1, the National Weather Service (NWS) issued a forecast for rain showers in the Boise area from around midnight throughout the day on Saturday. Rain was expected to continue into late Saturday night and early Sunday. Setup was accomplished Friday afternoon to collect composite samples at both Chrisfield and Edgewood. An expected precipitation depth of 0.11 inch was used to set trigger volumes at both monitoring sites. Precipitation started around 2000 on Saturday evening, and small waves of precipitation continued until 1200 on February 3. Precipitation totals were 0.75 inch at Chrisfield, and 0.98 inch at Edgewood.

No successful samples were collected during this event. See Section 5 for more information.

Section 4: Pollutant Loading

Water quality results and pollutant loading estimates for the Edgewood and Chrisfield monitoring stations for the November–February monitoring period are included in Table 2. Monthly values and estimates are presented for each individual month as well (Tables 3–6). Estimates for wet weather pollutant loads are calculated based on flow and rain data from the monitoring period. Analytical results from samples collected at Edgewood during the November 27, 2018 storm event were used in pollutant loading estimates to represent the Edgewood/Eagle drainage area for the November–February monitoring period.

Section 5: Deviations/Problems

Precipitation and Flow Data

Flow meters were left installed and operating at both stations throughout the monitoring period. Likewise, precipitation data was recorded continuously at site rain gauges. However, there are several data gaps in both flow and precipitation data. On days when precipitation data was not available at either site, the AgriMet Weather Station rain gauge data is used to estimate storm flow. The AgriMet weather station is maintained by the U.S. Bureau of Reclamation and located at the Western Idaho Fairgrounds, which is approximately 4 miles southeast of the Edgewood monitoring station and 6 miles northeast of the Chrisfield monitoring station.

Because the site-specific rain gauges are not equipped to measure snowfall and snow water equivalency, the overall precipitation amounts recorded at the site rain gauges may not be representative of actual total precipitation during times of snow and freezing conditions. Site rain gauge records were compared to measurements from the Boise, Idaho, AgriMet Weather Station rain gauge to validate event timing and totals for the monitoring period. AgriMet gauges are heated and designed to measure snow and avoid ice buildup that would impede accurate measurement collection. Some of the data gaps mentioned above were due to freezing conditions and were replaced with AgriMet data.

Edgewood

During the November 23, 2018 event, the sampler was programmed incorrectly to accommodate remote sampling program initiation.

Edgewood is missing flow data throughout the monitoring period. Since both Edgewood and Chrisfield have the same data gaps, they most likely resulted from error associated with downloading data. Measured background discharge volume does not include these dates.

Chrisfield

Composite samples were targeted at Chrisfield for all three storm events. During the November 23, 2018 event, the sampler was programmed incorrectly to accommodate remote sampling program initiation. The issue was not discovered until too far into the storm event to initiate the sampling program on-site. A tubing connection came loose during the November 27, 2018 event and the sampler could not pull subsamples. A third attempt to collect a composite sample at Chrisfield was conducted on February 2, 2019. A combined sampling team for Phase I and Phase II sites was used for this event due to moderate forecasted precipitation and no need for grab sample collection at the Phase II sites. Rainfall intensity and amount was significantly higher than anticipated at the beginning of this event and sampling teams were not able to change out the full composite sample quickly enough at Chrisfield and the sample was compromised.

Chrisfield is missing flow data throughout the monitoring period. Since both Edgewood and Chrisfield have the same data gaps, they most likely resulted from error associated with downloading data. Measured background discharge volume does not include these dates.

Section 6: References

National Weather Service Boise Forecast Office. (2018). Monthly Weather Summary. Retrieved April 3, 2018, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

National Weather Service Boise Forecast Office. (2018). Preliminary Monthly Climate Data. Retrieved April 3, 2018, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

U.S. Bureau of Reclamation, AgriMet. (2018). Historical Archive (Daily) Data Access. Retrieved april 10, 2018, from AgriMet website: https://www.usbr.gov/pn/agrimet/webarcread.html

Attachment A: Monitoring Period Summary Tables

Table 2

Monitoring Period Summary | November 1 - February 29 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	229,023 [1]	15%	64,026 [1]	98%
Background Discharge Volume (cf)	1,304,721 [1]	85%	1,602 [1]	2%
Total Discharge Volume (cf)	1,533,744 [1]	100%	65,628 [1]	100%
Estimated Runoff for Monitored Area [2]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation [3] (in)	8.04		6.88	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume [4] (cf)	174,604	182,710,296	55,563	183,305,852
Monitored Storm Information	Edgewood (11/27/2018)		Chrisfield (11/23/18)	
Precipitation Amount (in)	0.14		0.30	
Storm Duration (hrs)	5		11	
Antecedent Dry Period (hrs)	98		>217	
Recorded Runoff Volume (cf)	2,349		864.0	
Sample Information				
Sample Date and Time	11/27/2018 21:27		11/23/2018 16:09	
Dissolved Oxygen (mg/L)	9.89		7.50	
pH (S.U.)	7.94		8.22	
Conductivity (uS/cm)	167.9		205.0	
Temperature (°C)	10.1		10.55	
Nitrate + Nitrite as N (mg/L)	1.26		--	
Total Suspended Solids (mg/L)	26.2		--	
Total Kjeldahl Nitrogen (mg/L)	0.862		--	
Dissolved Orthophospate as P (mg/L)	0.132		--	
Total Phosphorus as P (mg/L)	0.227		--	
E.Coli (MPN/100 mL)	105.0		235.9	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.32	18.01	7,340	-	-	-
Total Suspended Solids	6.71	374.55	152,642	-	-	-
Total Kjeldahl Nitrogen	0.22	12.32	5,022	-	-	-
Dissolved Orthophosphate as P	0.03	1.89	769	-	-	-
Total Phosphorus as P	0.06	3.25	1,323	-	-	-

Notes:

[1] Volumes do not include dates with missing data.

[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Missing rain gauge data has been supplemented by Agrimet weather station daily precipitation data. See Section 5.

[4] Estimated stormwater runoff volume is calculated using local precipitation data

Table 3

Monitoring Period Summary | November 1 - November 30 (WY19)						
	Edgewood			Chrisfield		
	cubic feet	percent		cubic feet	percent	
Measured Stormwater Runoff Volume (cf)	24,712 [1]	6%		5,688 [1]	100%	
Background Discharge Volume (cf)	369,812 [1]	94%		0	0%	
Total Discharge Volume (cf)	394,524 [1]	100%		5,688 [1]	100%	
Estimated Runoff for Monitored Area [2]	Edgewood	Eagle		Chrisfield	Meridian	
Monthly Precipitation [3] (in)	0.75			1.05		
Drainage Area (acres)	55.86	22,765		12	26,690	
Estimated Stormwater Runoff Volume [4] (cf)	16,288	17,043,871		8,480	27,975,457	
Monitored Storm Information	Edgewood (11/27/2018)			Chrisfield (11/23/18)		
Precipitation Amount (in)	0.14			0.30		
Storm Duration (hrs)	5			11		
Antecedent Dry Period (hrs)	98			>217		
Recorded Runoff Volume (cf)	2,349			864.0		
Sample Information						
Sample Date and Time	11/27/2018 21:26			11/23/2018 16:04		
Dissolved Oxygen (mg/L)	9.89			7.50		
pH (S.U.)	7.94			8.22		
Conductivity (uS/cm)	167.9			205.0		
Temperature (°C)	10.1			10.55		
Nitrate + Nitrite as N (mg/L)	1.26			--		
Total Suspended Solids (mg/L)	26.2			--		
Total Kjeldahl Nitrogen (mg/L)	0.862			--		
Dissolved Orthophospate as P (mg/L)	0.132			--		
Total Phosphorus as P (mg/L)	0.227			--		
E.Coli (MPN/100 mL)	105.0			235.9		
Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.03	1.94	792	-	-	-
Total Suspended Solids	0.72	40.41	16,470	-	-	-
Total Kjeldahl Nitrogen	0.02	1.33	542	-	-	-
Dissolved Orthophosphate as P	0.00	0.20	83	-	-	-
Total Phosphorus as P	0.01	0.35	143	-	-	-

Notes:

[1] Volumes do not include dates with missing data.

[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Missing rain gauge data has been supplemented by Agrimet weather station daily precipitation data. See Section 5.

[4] Estimated stormwater runoff volume is calculated using local precipitation data

Table 4

Monitoring Period Summary | December 1 - December 31 (WY19)						
	Edgewood			Chrisfield		
	cubic feet	percent		cubic feet	percent	
Measured Stormwater Runoff Volume (cf)	36,389	14%		13,212 [1]	97%	
Background Discharge Volume (cf)	220,867 [1]	86%		396 [1]	3%	
Total Discharge Volume (cf)	257,256 [1]	100%		13,608 [1]	100%	
Estimated Runoff for Monitored Area [2]	Edgewood	Eagle		Chrisfield	Meridian	
Monthly Precipitation [3] (in)	1.8			1.1		
Drainage Area (acres)	55.86	22,765		12	26,690	
Estimated Stormwater Runoff Volume [3] (cf)	39,090	40,905,290		8,884	29,307,622	
Monitored Storm Information	Edgewood (11/27/2018)			Chrisfield (11/23/18)		
Precipitation Amount (in)	0.14			0.30		
Storm Duration (hrs)	5			11		
Antecedent Dry Period (hrs)	98			>217		
Recorded Runoff Volume (cf)	2,349			864.0		
Sample Information						
Sample Date and Time	11/27/2018 21:26			11/23/2018 16:04		
Dissolved Oxygen (mg/L)	9.89			7.50		
pH (S.U.)	7.94			8.22		
Conductivity (uS/cm)	167.9			205.0		
Temperature (°C)	10.1			10.55		
Nitrate + Nitrite as N (mg/L)	1.26			--		
Total Suspended Solids (mg/L)	26.2			--		
Total Kjeldahl Nitrogen (mg/L)	0.862			--		
Dissolved Orthophospate as P (mg/L)	0.132			--		
Total Phosphorus as P (mg/L)	0.227			--		
E.Coli (MPN/100 mL)	105.0			235.9		
Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.05	2.86	1,166	-	-	-
Total Suspended Solids	1.07	59.51	24,253	-	-	-
Total Kjeldahl Nitrogen	0.04	1.96	798	-	-	-
Dissolved Orthophosphate as P	0.01	0.30	122	-	-	-
Total Phosphorus as P	0.01	0.52	210	-	-	-

Notes:

[1] Volumes do not include dates with missing data.

[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Missing rain gauge data has been supplemented by Agrimet weather station daily precipitation data. See Section 5.

[4] Estimated stormwater runoff volume is calculated using local precipitation data

Table 5

Monitoring Period Summary | January 1 - January 31 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	26,867	8%	15,084	97%
Background Discharge Volume (cf)	347,425	92%	468	3%
Total Discharge Volume (cf)	374,292	100%	15,552	100%
Estimated Runoff for Monitored Area[1]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation (in)	0.93		0.93	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume[2] (cf)	20,197	21,134,400	7,511	24,778,262
Monitored Storm Information	Edgewood (11/27/2018)		Chrisfield (11/23/18)	
Precipitation Amount (in)	0.14		0.30	
Storm Duration (hrs)	5		11	
Antecedent Dry Period (hrs)	98		>217	
Recorded Runoff Volume (cf)	2,349		864.0	
Sample Information				
Sample Date and Time	11/27/2018 21:26		11/23/2018 16:04	
Dissolved Oxygen (mg/L)	9.89		7.50	
pH (S.U.)	7.94		8.22	
Conductivity (uS/cm)	167.9		205.0	
Temperature (°C)	10.1		10.55	
Nitrate + Nitrite as N (mg/L)	1.26		--	
Total Suspended Solids (mg/L)	26.2		--	
Total Kjeldahl Nitrogen (mg/L)	0.862		--	
Dissolved Orthophospate as P (mg/L)	0.132		--	
Total Phosphorus as P (mg/L)	0.227		--	
E.Coli (MPN/100 mL)	105.0		235.9	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.04	2.11	861	-	-	-
Total Suspended Solids	0.79	43.94	17,907	-	-	-
Total Kjeldahl Nitrogen	0.03	1.45	589	-	-	-
Dissolved Orthophosphate as P	0.00	0.22	90	-	-	-
Total Phosphorus as P	0.01	0.38	155	-	-	-

Notes:

[1] The "Monitored Area" includes only the area drained by the individual monitoring station.

[2]Estimated stormwater runoff volume is calculated using local precipitation data

Table 6

Monitoring Period Summary | February 1 - February 29 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	141,055 [1]	28%	30,042 [1]	98%
Background Discharge Volume (cf)	366,617 [1]	72%	738 [1]	2%
Total Discharge Volume (cf)	507,672 [1]	100%	30,780 [1]	100%
Estimated Runoff for Monitored Area [2]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation [3] (in)	4.56		3.8	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume [4] (cf)	99,029	103,626,735	30,689	101,244,512
Monitored Storm Information	Edgewood (11/27/2018)		Chrisfield (11/23/18)	
Precipitation Amount (in)	0.14		0.30	
Storm Duration (hrs)	5		11	
Antecedent Dry Period (hrs)	98		>217	
Recorded Runoff Volume (cf)	2,349		864.0	
Sample Information				
Sample Date and Time	11/27/2018 21:26		11/23/2018 16:04	
Dissolved Oxygen (mg/L)	9.89		7.50	
pH (S.U.)	7.94		8.22	
Conductivity (uS/cm)	167.9		205.0	
Temperature (°C)	10.1		10.55	
Nitrate + Nitrite as N (mg/L)	1.26		--	
Total Suspended Solids (mg/L)	26.2		--	
Total Kjeldahl Nitrogen (mg/L)	0.862		--	
Dissolved Orthophospate as P (mg/L)	0.132		--	
Total Phosphorus as P (mg/L)	0.227		--	
E.Coli (MPN/100 mL)	105.0		235.9	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.20	11.09	4,521	-	-	-
Total Suspended Solids	4.13	230.68	94,012	-	-	-
Total Kjeldahl Nitrogen	0.14	7.59	3,093	-	-	-
Dissolved Orthophosphate as P	0.02	1.16	474	-	-	-
Total Phosphorus as P	0.04	2.00	815	-	-	-

Notes:

[1] Volumes do not include dates with missing data.

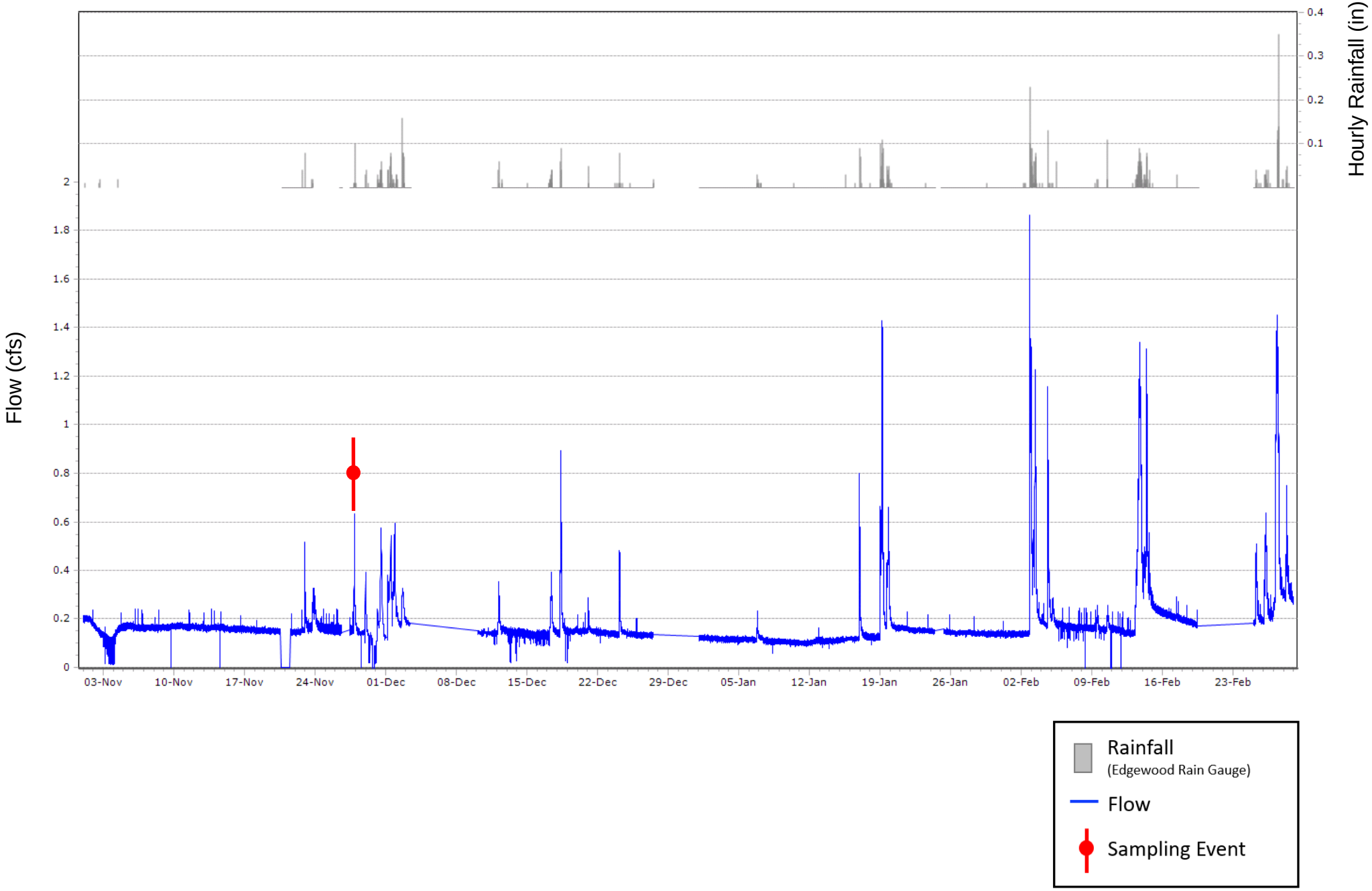
[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Missing rain gauge data has been supplemented by Agrimet weather station daily precipitation data. See Section 5.

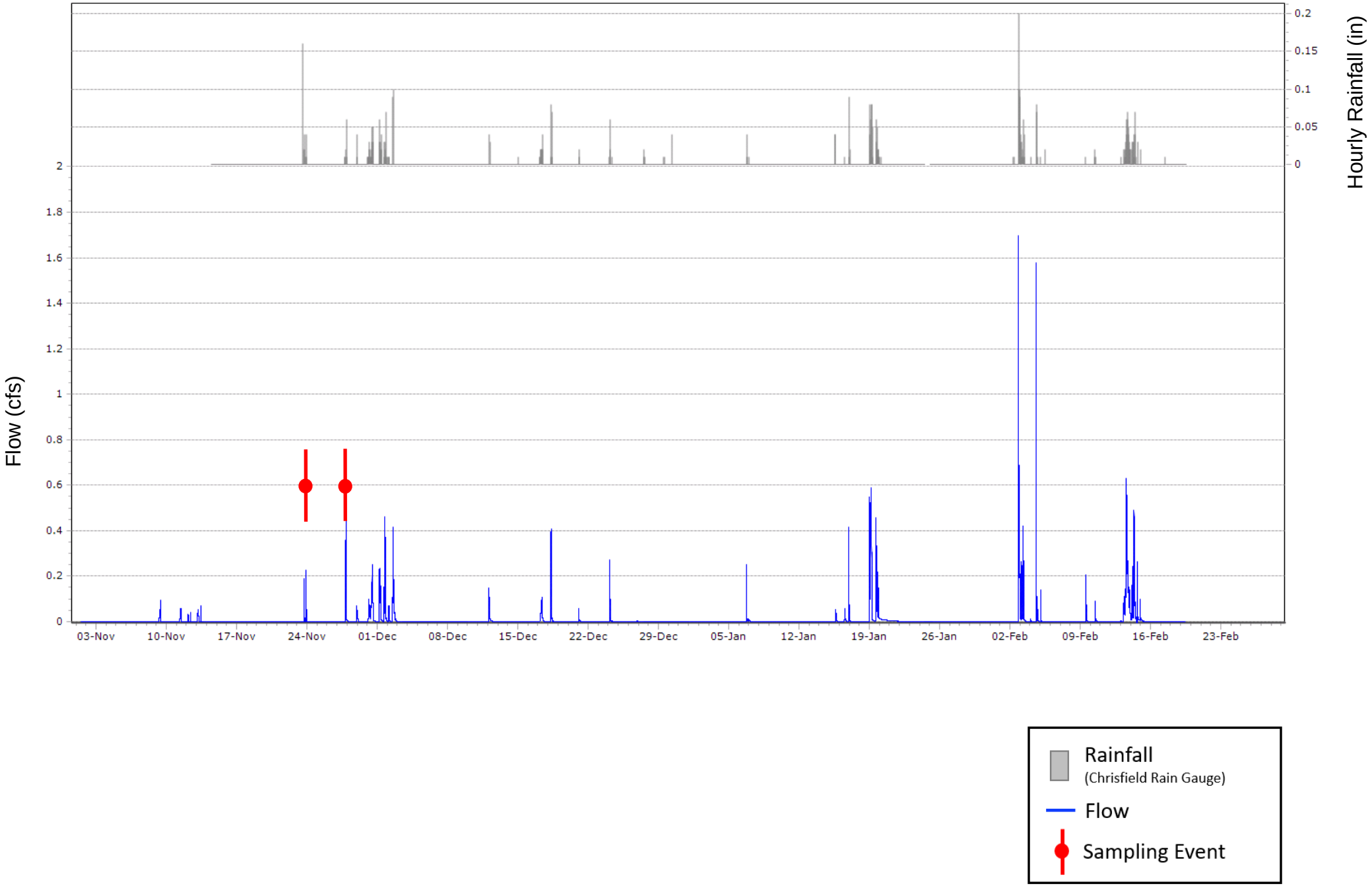
[4] Estimated stormwater runoff volume is calculated using local precipitation data

Attachment B: Monitoring Period Hydrographs

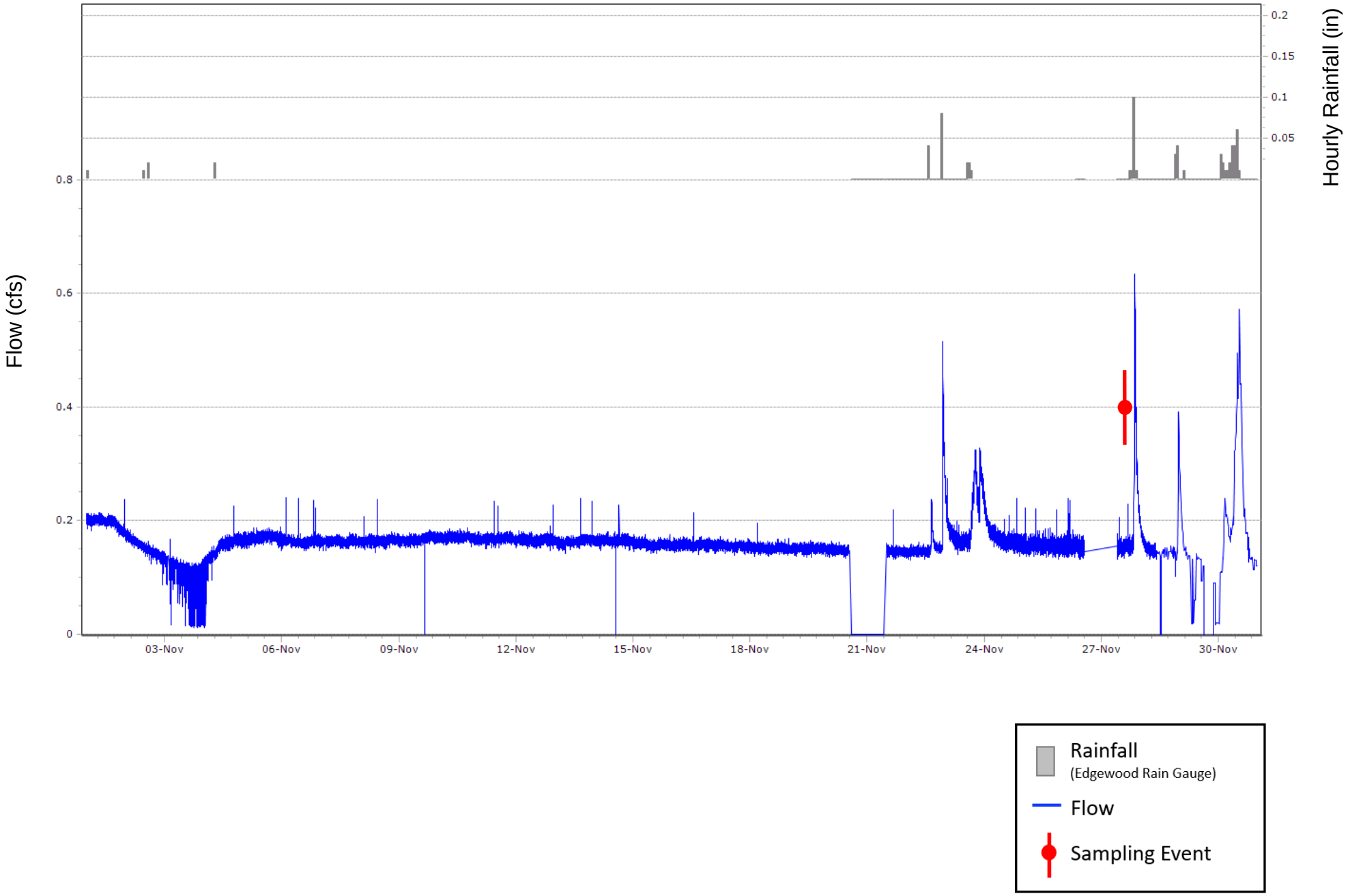
Edgewood - Water Year 2019 - November 2018 through February 2019



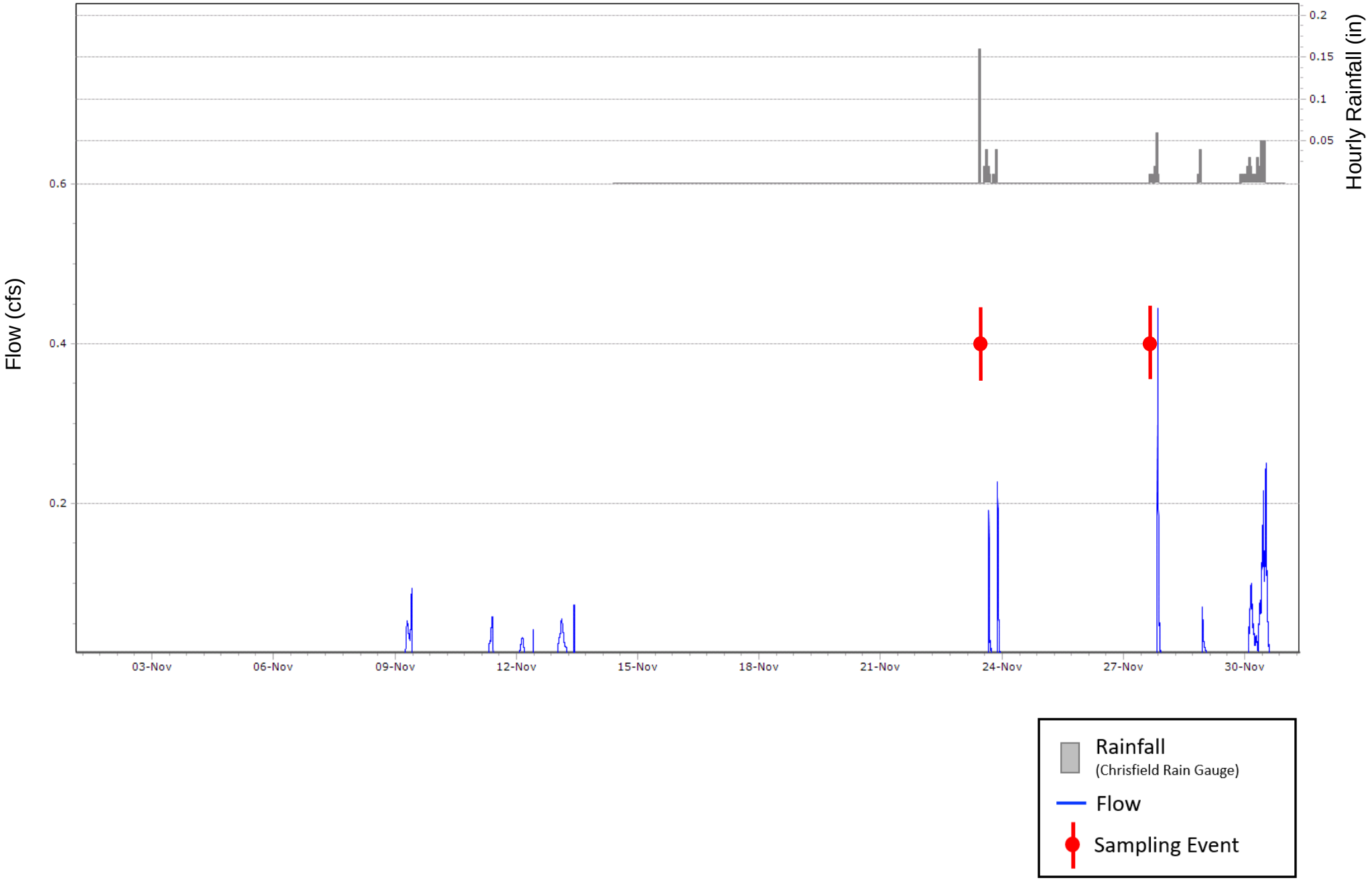
Chrisfield - Water Year 2019 - November 2018 through February 2019



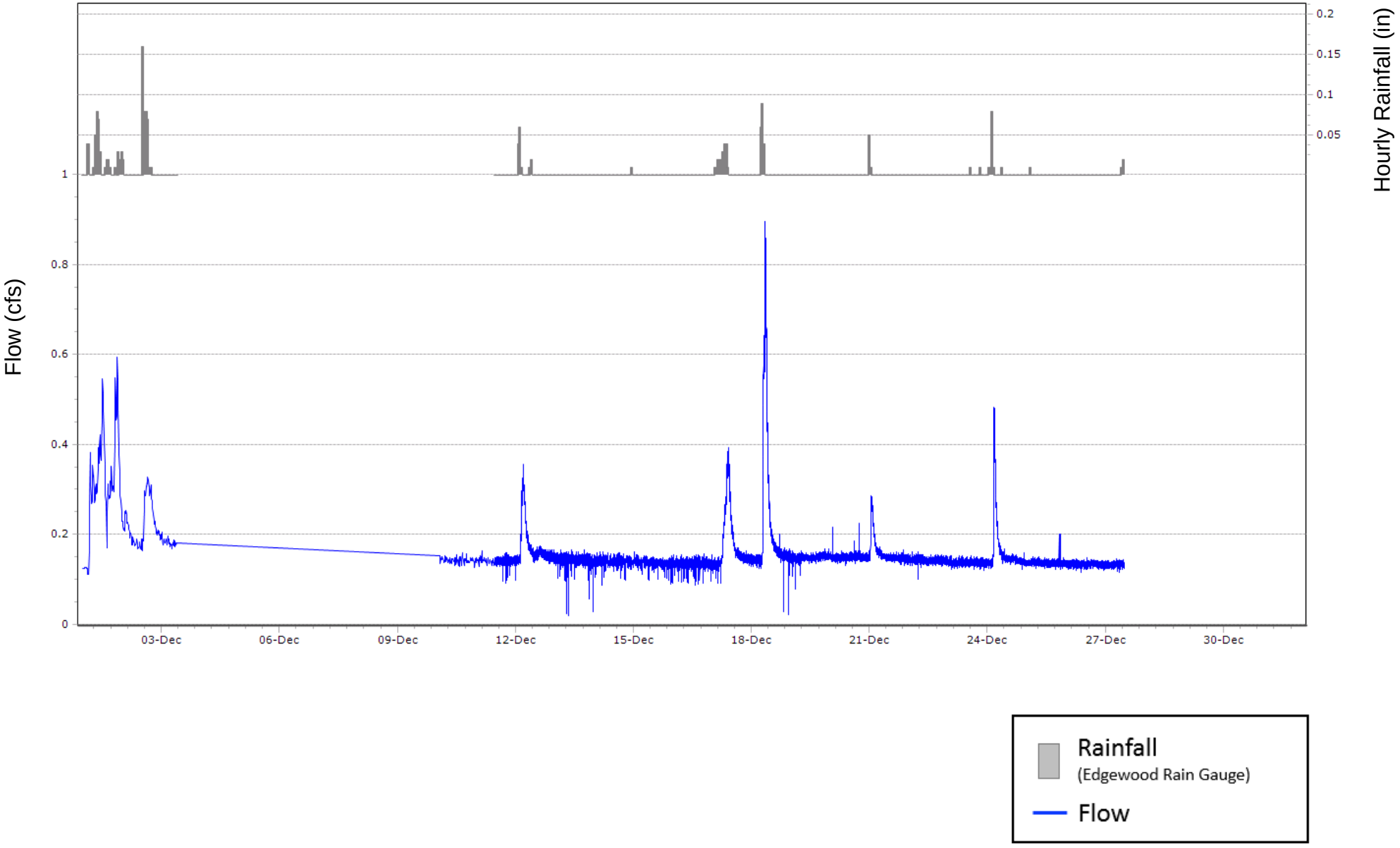
Edgewood - Water Year 2019 - November 2018



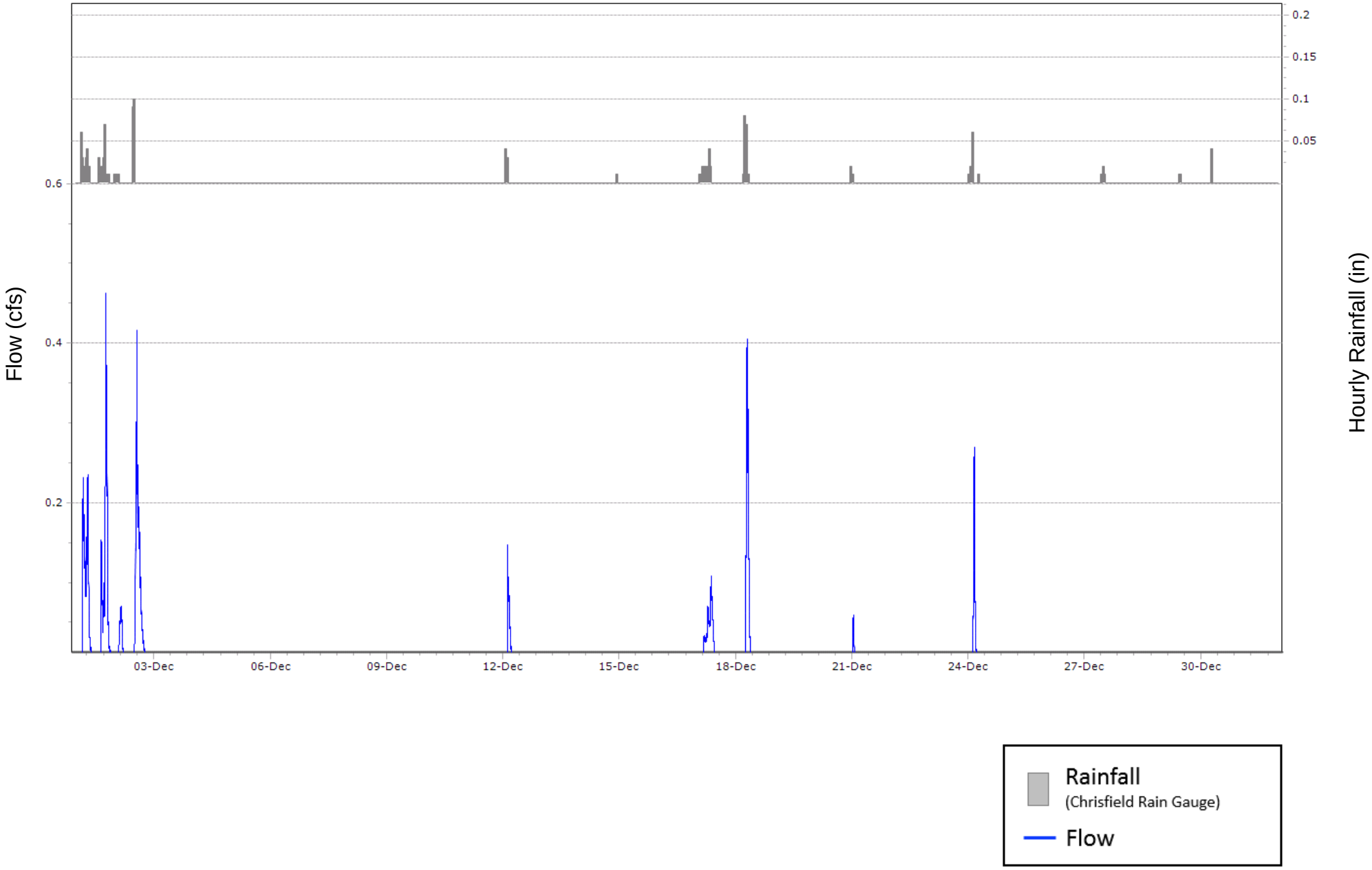
Chrisfield - Water Year 2019 - November 2018



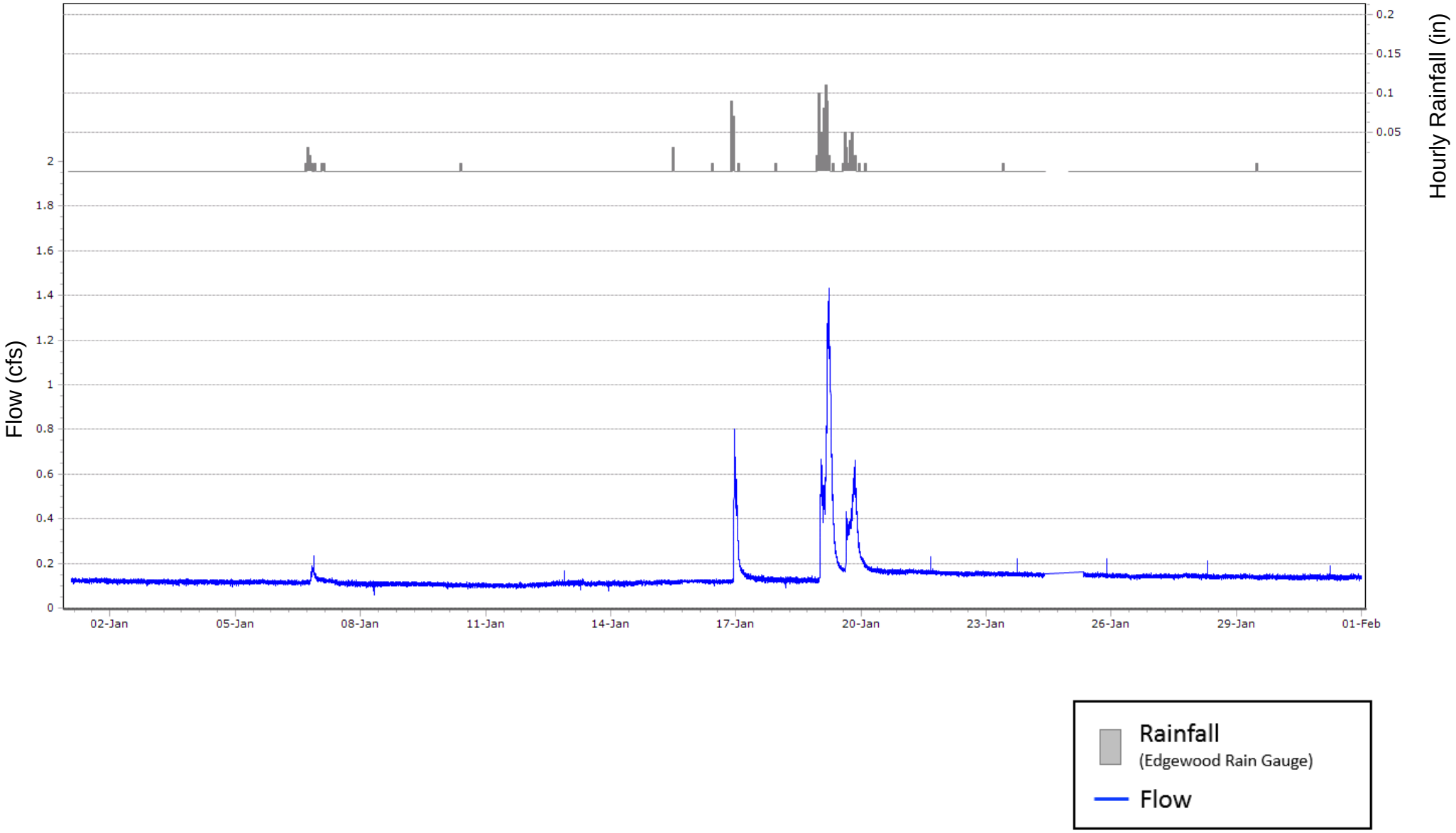
Edgewood - Water Year 2019 - December 2018



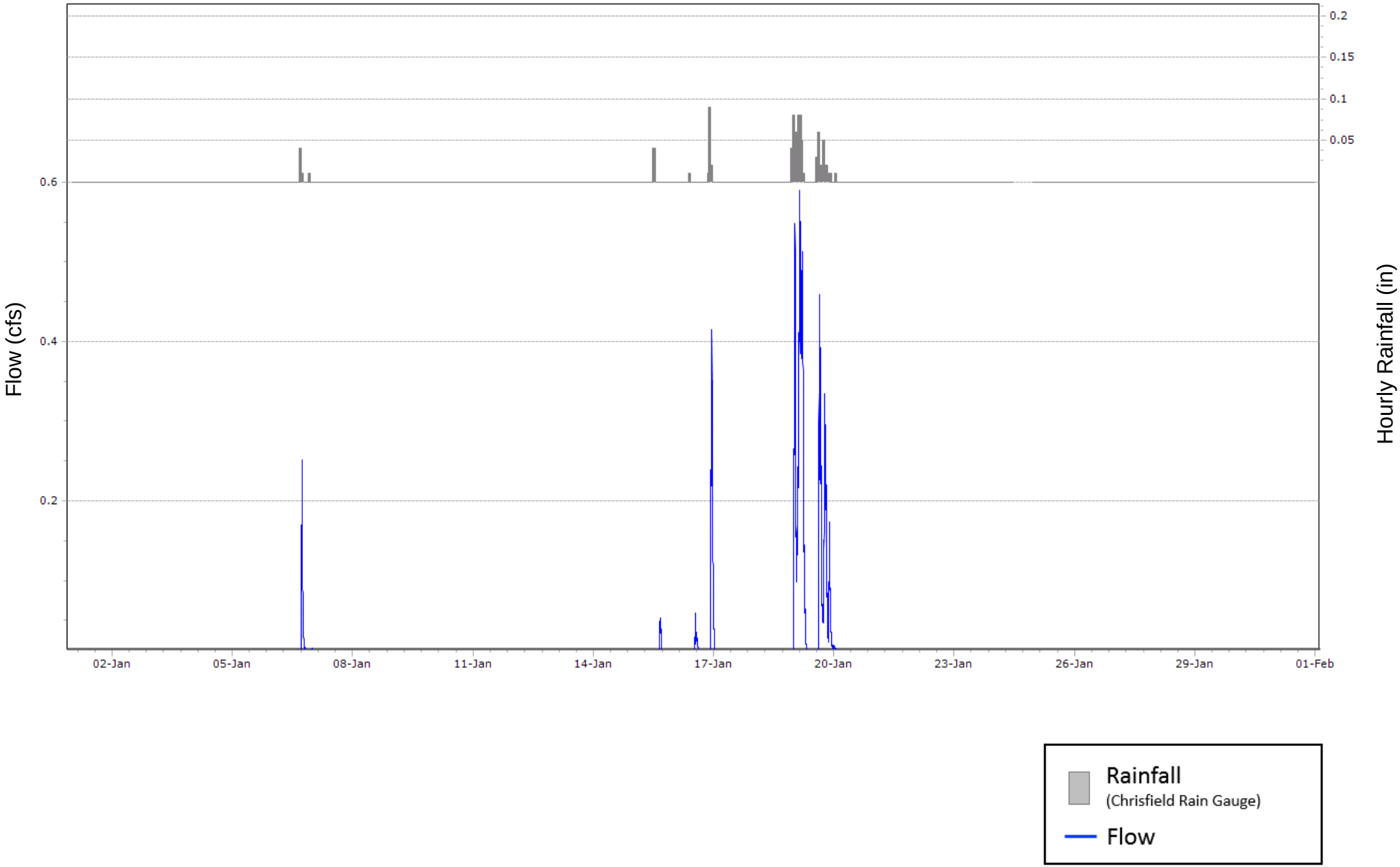
Chrisfield - Water Year 2019 - December 2018



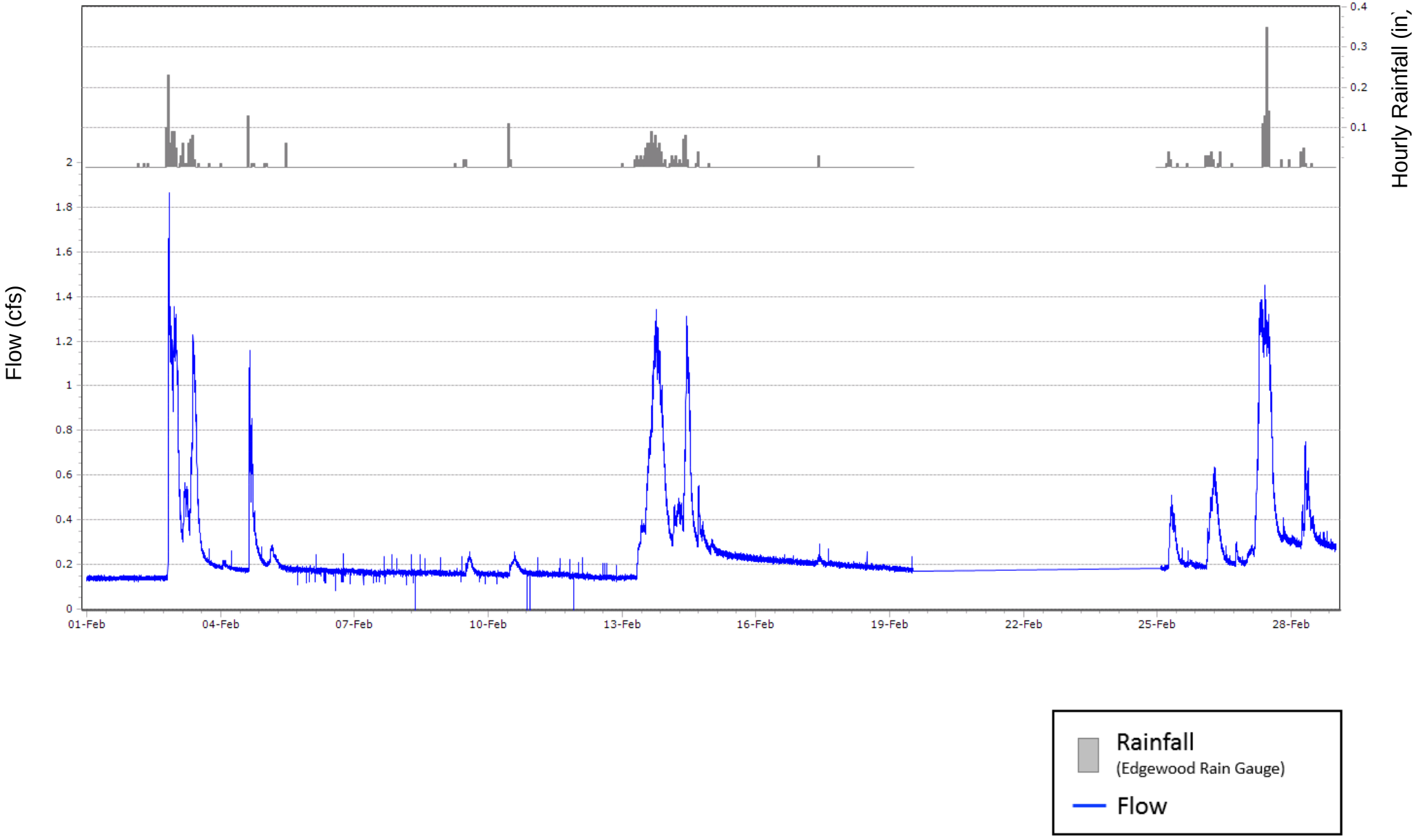
Edgewood - Water Year 2019 - January 2019



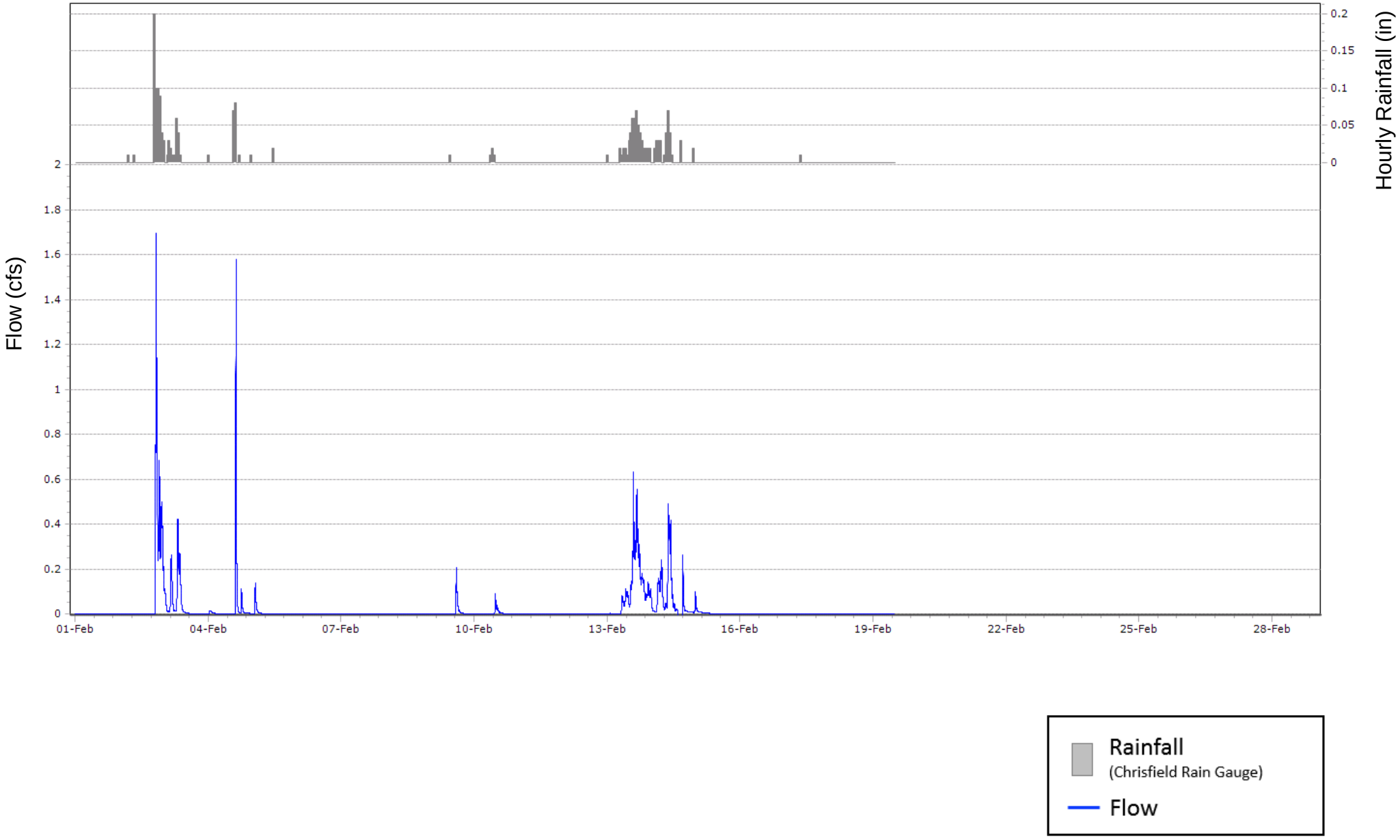
Chrisfield - Water Year 2019 - January 2019



Edgewood - Water Year 2019 - February 2019



Chrisfield - Water Year 2019 - February 2019



Attachment C: Analytical Reports and Field Sheets

Report Date: 11/29/2018 09:33

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
8AC0090-01	ACST2B	181123-09-WG	Water		11/23/2018	11/23/2018
8AC0090-02	ACST2B	181123-09-101	Water		11/23/2018	11/23/2018

Report Date: 11/29/2018 09:33

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	181123-09-WG
Date/Time Collected:	11/23/2018 16:04		
Lab Number:	8AC0090-01	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B8K2301	235.9	MPN/100 mL	1.0	1.0	Colilert	11/23/18 18:25	11/24/18 18:25	ASM	
Wet Chemistry										
Chlorine Screen	B8K2402	Absent				SM 4500-CL G-2000 mod	11/23/18	11/23/18 18:13	ASM	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 11/29/2018 09:33

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	181123-09-101
Date/Time Collected:	11/23/2018 12:00		
Lab Number:	8AC0090-02	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B8K2301	198.9	MPN/100 mL	1.0	1.0	Colilert	11/23/18 18:25	11/24/18 18:25	ASM	
Wet Chemistry										
Chlorine Screen	B8K2402	Absent				SM 4500-CL G-2000 mod	11/23/18	11/23/18 18:13	ASM	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 11/29/2018 09:33

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Microbiology									
Batch: B8K2301									
Blank (B8K2301-BLK1)									
E. Coli	Absent						11/24/2018	ASM	
LCS (B8K2301-BS1)									
E. Coli				Present			11/24/2018	ASM	
Duplicate (B8K2301-DUP1)	Source ID: 8WB0727-06								
E. Coli					Pass	128	11/24/2018	ASM	

Report Date: 11/29/2018 09:33

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Notes and Definitions

Item	Definition

No notes entered.

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Heather Rankin
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Andy Carlson
Andy Weigel

Lab# 8ACC090	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
-01	11/23/18		1604		181123-09-WG	ABV	x	x											x	x					1
-02	11/23/18		1200		181123-09-101	ABV	x	x												x					1

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
	11/23/18 1711	1/23/18	

8ACC090

Form 21A
GRAB SAMPLE DATA FORM – (Phase II)

Station: Chris Field Personnel: NBC AJLW

Date/Time On-site: 11/23/18 1545 MDT/MST (circle one)

FLOW METER CURRENT STATUS:

	Value	Unit		Value	Unit
Level		inch	Velocity		fps
Flow		cfs	Battery		v
Total Flow		cf	Flow Start	~1555	(time)
Rainfall		in. (if applicable)			

GRAB INFORMATION:

Is this a QA/QC Station? Yes X No ____ (if YES, fill out Form 21B on back)

Photographs Taken? Yes ____ No X Swing Sampler Used? Yes X No ____

Storm Event Sample? Yes X No ____

Sample ID: 181123-09-WG Wet / Dry Grab (fill in station name)

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	**Time:**	☐
11/23/18 1604	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
	(1) 250 mL plastic - OP	N/A	**Time:**	☐

FIELD PARAMETERS: Fill (1) 500mL Amber Time: 1609

	Value	Unit		Value	Unit
Diss. O_2 – Field	7.50	Mg/L	Temp – DO Meter	10.55	°C
Conductivity	2050	µS/cm	Temp – Cond. Meter		°C
pH - Field	8.22	S.U.	Temp – pH Meter		°C

COMMENTS: had to fill S+G drop first.

***NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume & Preserved samples should have pH <2**

Updated 3/25/15

Form 21B
QA/QC SAMPLE DATA FORM – (Phase II)

Date/Time - Off-site: _____

Station: Christfield Personnel: _____

Sample ID: 18123 – 09 -101 (fill in appropriate sequential number)
QA Sample? ☑ **QA SAMPLE TYPE: FIELD DUPLICATE**

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
4/23/18 1605	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsample is the "Start Date/Time" and the "End Date/Time", respectively

Comments:

Sample ID: -001 (fill in appropriate sequential number)
QA Sample? ☑ **QA SAMPLE TYPE: FIELD BLANK** (Fill bottles with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsamples is the "Start Date/Time" and "End Date/Time", respectively.

Comments:

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Edgewood Bottle 0 of 0

SET-UP:

Date/Time On-site: 11/21/18 1158 MDT/MST*(circle one) Personnel: BML ABO

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date					
Level					in.
Flow					cfs
Velocity					fps
Voltage					V
Temp					C°

- X Replace batteries if v<11.9
- X Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- X Program sampler per PG 320
  - Trigger condition On
  - Flow Pulse Interval 313
- X Set Modem Access to "Storm Event" -24/7 (Flowlink)
- X Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- X Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- X Perform decon. cycle
- X Verify Sampler date and time are correct
- X Place 15L sample bottle in sampler base & fill with 2 bag ice
- X Remove jar lid and place in a clean re-sealable plastic bag
- X Verify all cable and tubing connections
- N/A Verify Sampler Program is Running
- X Verify latches are secure

Comments: No subsamples taken

Date/Time Off-site: _____

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: _____ Personnel: _____

- ____ Halt Sampler program
- ____ Put lid on sample bottle
- ____ Properly label sample bottle; Record Sample ID on back of sheet
- ____ Record liquid height/sample volume and visual observations on back of sheet
- ____ Record subsample information on back of sheet

If Sampling is Complete:

- ____ Power off Sampler
- ____ Add ice to sample cooler
- ____ Complete COC form;
- ____ Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- ____ Date/Time Restarted: _____
- ____ Verify Running

Comments:

Date/Time Off-site: _____

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ____ Record Flow Meter status (Flowlink)
- ____ Replace battery if v<11.9
- ____ Retrieve Data (Flowlink)
- ____ Change modem access to "Dry Weather" 8-6 M-F
- ____ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ____ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: _____-WC Bottle _____ of _____

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)		mL
Flow Pulse Interval		ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity		Clear, Cloudy, Silty
Color		Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
9			29		
10			30		
11			31		
12			32		
13			33		
14			34		
15			35		
16			36		
17			37		
18			38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: _____-103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

***MST is observed during fall and winter; MDT is observed in spring and summer.**

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station: Chrisfield Bottle 0 of 0

SET-UP:

Date/Time On-site: 11/21/18 1303 MDT/MST*(circle one) Personnel: AML ABW

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date					
Level					in.
Flow					cfs
Velocity					fps
Voltage					V
Temp					C°

- Y Replace batteries if v<11.9
- X Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- X Program sampler per PG 320
  - Trigger condition On
  - Flow Pulse Interval 116
- X Set Modem Access to "Storm Event" -24/7 (Flowlink)
- X Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- X Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- X Perform decon. cycle
- X Verify Sampler date and time are correct
- X Place 15L sample bottle in sampler base & fill with 2 bag ice
- X Remove jar lid and place in a clean re-sealable plastic bag
- X Verify all cable and tubing connections
- NA Verify Sampler Program is Running
- X Verify latches are secure

Comments: No subsamples taken

Date/Time Off-site: _____

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: _____ Personnel: _____

- ____ Halt Sampler program
- ____ Put lid on sample bottle
- ____ Properly label sample bottle; Record Sample ID on back of sheet
- ____ Record liquid height/sample volume and visual observations on back of sheet
- ____ Record subsample information on back of sheet

If Sampling is Complete:

- ____ Power off Sampler
- ____ Add ice to sample cooler
- ____ Complete COC form;
- ____ Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- Date/Time Restarted: _____
- ____ Verify Running

Comments:

Date/Time Off-site: _____

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ____ Record Flow Meter status (Flowlink)
- ____ Replace battery if v<11.9
- ____ Retrieve Data (Flowlink)
- ____ Change modem access to "Dry Weather" 8-6 M-F
- ____ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ____ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: _____-WC Bottle _____ of _____

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)		mL
Flow Pulse Interval		ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity		Clear, Cloudy, Silty
Color		Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
9			29		
10			30		
11			31		
12			32		
13			33		
14			34		
15			35		
16			36		
17			37		
18			38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: _____-103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

***MST is observed during fall and winter; MDT is observed in spring and summer.**

Report Date: 12/04/2018 11:19

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
8AC0092-01	ACST2B	181127-09-WG	Water		11/27/2018	11/27/2018
8AC0092-02	ACST2B	181127-08-WG	Water		11/27/2018	11/27/2018

Report Date: 12/04/2018 11:19

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
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Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	181127-09-WG
Date/Time Collected:	11/27/2018 20:45		
Lab Number:	8AC0092-01	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B8K2704	1580.0	MPN/100 mL	100.0	1.0	Colilert	11/27/18 22:55	11/28/18 23:05	KMR	D
Wet Chemistry										
Chlorine Screen	B8K2811	Absent				SM 4500-CL G-2000 mod	11/27/18	11/27/18 22:03	JJR	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 12/04/2018 11:19

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Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
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Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	181127-08-WG
Date/Time Collected:	11/27/2018 21:26		
Lab Number:	8AC0092-02	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B8K2704	105.0	MPN/100 mL	1.0	1.0	Colilert	11/27/18 22:55	11/28/18 23:05	KMR	
Wet Chemistry										
Chlorine Screen	B8K2811	Absent				SM 4500-CL G-2000 mod	11/27/18	11/27/18 22:03	JJR	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 12/04/2018 11:19

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Boise, Idaho 83714-1076
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Fax (208) 608-7319

Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Microbiology									
Batch: B8K2704									
Blank (B8K2704-BLK1)									
E. Coli	Absent						11/28/2018	JJR	
LCS (B8K2704-BS1)									
E. Coli				Present			11/28/2018	JJR	
Duplicate (B8K2704-DUP1)	Source ID: 8WB0733-06								
E. Coli					Pass	128	11/28/2018	JJR	

Report Date: 12/04/2018 11:19

Boise City Public Works
Water Quality Laboratory
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Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Notes and Definitions

Item	Definition
D	Data reported from a dilution

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Heather Rankin
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Tammy Lightle, Andy Weigel

Lab# 8AC0092	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PALDK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
-01	11/27/18		2045		181127-09-WG	ABW	X	X												X					7
-02	11/27/18		2126		181127-08-WG	ABW	X	X												X					7

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
[signature]	11/27/18 2157	[signature] 11/27/18 2200	

8AC0092

Report Date: 12/13/2018 11:30

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
8AC0094-01	ACST2C	181127-08-WC	Water		11/27/2018	11/28/2018

Report Date: 12/13/2018 11:30

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location: ACST2C
Location Description: 181127-08-WC
Date/Time Collected: 11/27/2018 20:25 - 11/27/2018 22:26
Lab Number: 8AC0094-01
Sample Collector: ABC
Sample Type: Composite
Sample Matrix: Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Wet Chemistry										
Ammonia, as N	B8K3001	271	ug/L	35.0	35.0	SM 4500-NH3 D-1997	11/30/18	11/30/18 11:11	ASM	
BOD5	B8K2901	12.4	mg/L	2.00	2.00	SM 5210 B-2001	11/29/18	12/4/18 7:54	ASM	
COD	B8K2814	67.5	mg/L	7.00	7.00	HH 8000-1979	11/28/18	11/28/18 16:35	KMR	
Nitrate-Nitrite, as N	B8L1002	1.26	mg/L	0.0200	0.0200	EPA 353.2	12/10/18	12/10/18 12:11	SMC	
TKN	B8L1004	0.862	mg/L	0.130	0.130	EPA 351.2	12/10/18	12/11/18 8:46	LRF	
Total Dissolved Solids	B8K2807	111	mg/L	20.0	20.0	SM 2540 C-1997	11/28/18	11/30/18 13:23	CJP	
Total Suspended Solids	B8K2915	26.2	mg/L	0.900	0.900	SM 2540 D-1997	11/29/18	11/29/18 9:35	ALD	
Turbidity	B8K2812	14.2	NTU	0.3	0.3	EPA180.1 R2.0 (1993)	11/28/18	11/28/18 14:08	JAL	
Dissolved Wet Chemistry										
Orthophosphate, as P	B8K2907	0.132	mg/L	2.00E-3	2.00E-3	EPA 365.1	11/29/18	11/29/18 11:22	SMC	
Total Metals										
Mercury	B8K2818	<4.71E-3	ug/L	4.71E-3	4.71E-3	EPA 245.2	11/29/18	11/30/18 9:17	SAS	U
Arsenic	B8K2920	<5.72	ug/L	5.72	5.72	EPA 200.7	11/29/18	11/30/18 16:56	EDM	U
Cadmium	B8L0515	<1.00	ug/L	1.00	1.00	EPA 200.7	12/05/18	12/6/18 17:52	AMO	U
Calcium	B8K2920	15500	ug/L	50.0	50.0	EPA 200.7	11/29/18	11/30/18 16:56	EDM	
Lead	B8K2920	<6.94	ug/L	6.94	6.94	EPA 200.7	11/29/18	11/30/18 16:56	EDM	U
Magnesium	B8K2920	2930	ug/L	50.0	50.0	EPA 200.7	11/29/18	11/30/18 16:56	EDM	
Phosphorus as P	B8K2920	0.227	mg/L	6.00E-3	6.00E-3	EPA 200.7	11/29/18	11/30/18 16:56	EDM	
Hardness	B8K2920	50.6	mg/L	1.00	1.00	EPA 200.7	11/29/18	11/30/18 16:56	EDM	
Dissolved Metals										
Cadmium	B8L0621	<1.00	ug/L	1.00	1.00	EPA 200.7	12/06/18	12/6/18 16:40	AMO	U
Copper	B8L0320	<10.0	ug/L	10.0	10.0	EPA 200.7	12/03/18	12/3/18 18:04	EDM	U
Lead	B8L0320	<6.94	ug/L	6.94	6.94	EPA 200.7	12/03/18	12/3/18 18:04	EDM	U
Zinc	B8L0320	<10.0	ug/L	10.0	10.0	EPA 200.7	12/03/18	12/3/18 18:04	EDM	U

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 12/13/2018 11:30

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
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Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry									
Batch: B8K2807									
Blank (B8K2807-BLK1)									
Total Dissolved Solids	< 20	mg/L					11/30/2018	CJP	U
LCS (B8K2807-BS1)									
Total Dissolved Solids			94.5	90-110			11/30/2018	CJP	
Duplicate (B8K2807-DUP1)	Source ID: 8LS0420-01								
Total Dissolved Solids					6.23	10	11/30/2018	CJP	
Batch: B8K2812									
Blank (B8K2812-BLK1)									
Turbidity	< 0.3	NTU					11/28/2018	JAL	U
LCS (B8K2812-BS1)									
Turbidity			101	90-110			11/28/2018	JAL	
Duplicate (B8K2812-DUP1)	Source ID: 8LS0420-01								
Turbidity					9.72	25	11/28/2018	JAL	
Batch: B8K2814									
Blank (B8K2814-BLK2)									
COD	< 7	mg/L					11/28/2018	KMR	U
LCS (B8K2814-BS1)									
COD			98.7	90-110			11/28/2018	KMR	
Duplicate (B8K2814-DUP1)	Source ID: 8LS0420-01								
COD					8.22	10	11/28/2018	KMR	
Batch: B8K2901									
Blank (B8K2901-BLK1)									
BOD5	< 2	mg/L					12/04/2018	ASM	Seed-01, U
LCS (B8K2901-BS1)									
BOD5			104	84.6-115.4			12/04/2018	ASM	
Duplicate (B8K2901-DUP1)	Source ID: 8AC0094-01								
BOD5					1.99	30	12/04/2018	ASM	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B8K2915									
Blank (B8K2915-BLK1)									
Total Suspended Solids	< 0.9	mg/L					11/29/2018	ALD	U
LCS (B8K2915-BS1)									
Total Suspended Solids			93.2	90-110			11/29/2018	ALD	
Duplicate (B8K2915-DUP1) Source ID: 8BB0755-02									
Total Suspended Solids					4.47	20	11/29/2018	ALD	
Batch: B8K3001									
Blank (B8K3001-BLK1)									
Ammonia, as N	< 35	ug/L					11/30/2018	ASM	U
LCS (B8K3001-BS1)									
Ammonia, as N			101	90-110			11/30/2018	ASM	
Duplicate (B8K3001-DUP1) Source ID: 8WB0727-05									
Ammonia, as N					0.866	10	11/30/2018	ASM	
Duplicate (B8K3001-DUP2) Source ID: 8LS0420-05									
Ammonia, as N					0.789	10	11/30/2018	ASM	
Matrix Spike (B8K3001-MS1) Source ID: 8WB0727-05									
Ammonia, as N			104	80-120			11/30/2018	ASM	
Matrix Spike (B8K3001-MS2) Source ID: 8LS0420-05									
Ammonia, as N			116	80-120			11/30/2018	ASM	
Matrix Spike Dup (B8K3001-MSD1) Source ID: 8WB0727-05									
Ammonia, as N			104	80-120	0.0542	10	11/30/2018	ASM	
Matrix Spike Dup (B8K3001-MSD2) Source ID: 8LS0420-05									
Ammonia, as N			110	80-120	3.88	10	11/30/2018	ASM	
Batch: B8L1002									
Blank (B8L1002-BLK1)									
Nitrate-Nitrite, as N	< 0.02	mg/L					12/10/2018	SMC	U
LCS (B8L1002-BS1)									
Nitrate-Nitrite, as N			96.4	90-110			12/10/2018	SMC	
LCS (B8L1002-BS2)									
Nitrate-Nitrite, as N			103	90-110			12/10/2018	SMC	
Duplicate (B8L1002-DUP1) Source ID: 8AC0093-02									
Nitrate-Nitrite, as N					0.281	10	12/10/2018	SMC	
Duplicate (B8L1002-DUP2) Source ID: 8BB0778-02									
Nitrate-Nitrite, as N					0.0703	10	12/10/2018	SMC	
Matrix Spike (B8L1002-MS2) Source ID: 8BB0778-02									
Nitrate-Nitrite, as N			92.1	90-110			12/10/2018	SMC	
Matrix Spike (B8L1002-MS3) Source ID: 8BB0732-01RE1									
Nitrate-Nitrite, as N			96.4	90-110			12/10/2018	SMC	
Matrix Spike (B8L1002-MS4) Source ID: 8AC0093-02									
Nitrate-Nitrite, as N			99.9	90-110			12/10/2018	SMC	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B8L1002 (Continued)									
Matrix Spike (B8L1002-MS5) Source ID: 8BB0769-02									
Nitrate-Nitrite, as N			104	90-110			12/10/2018	SMC	
Matrix Spike Dup (B8L1002-MSD2) Source ID: 8BB0778-02									
Nitrate-Nitrite, as N			93.4	90-110	0.553	10	12/10/2018	SMC	
Matrix Spike Dup (B8L1002-MSD4) Source ID: 8AC0093-02									
Nitrate-Nitrite, as N			101	90-110	0.456	10	12/10/2018	SMC	
Batch: B8L1004									
Blank (B8L1004-BLK1)									
TKN	< 0.13	mg/L					12/11/2018	LRF	U
LCS (B8L1004-BS1)									
TKN			92.3	80-120			12/11/2018	LRF	
Duplicate (B8L1004-DUP1) Source ID: 8LS0420-01									
TKN					4.52	20	12/11/2018	LRF	D
Duplicate (B8L1004-DUP2) Source ID: 8AC0094-01									
TKN					13.3	20	12/11/2018	LRF	
Matrix Spike (B8L1004-MS1) Source ID: 8LS0420-01									
TKN			95.0	80-120			12/11/2018	LRF	D
Matrix Spike (B8L1004-MS2) Source ID: 8AC0094-01									
TKN			102	80-120			12/11/2018	LRF	
Matrix Spike Dup (B8L1004-MSD1) Source ID: 8LS0420-01									
TKN			96.6	80-120	1.21	20	12/11/2018	LRF	D
Matrix Spike Dup (B8L1004-MSD2) Source ID: 8AC0094-01									
TKN			98.3	80-120	2.48	20	12/11/2018	LRF	
Dissolved Wet Chemistry									
Batch: B8K2907									
Blank (B8K2907-BLK1)									
Orthophosphate, as P	< 0.002	mg/L					11/29/2018	SMC	U
LCS (B8K2907-BS1)									
Orthophosphate, as P			94.3	90-110			11/29/2018	SMC	
Duplicate (B8K2907-DUP1) Source ID: 8AC0093-02									
Orthophosphate, as P					0.0699	10	11/29/2018	SMC	
Matrix Spike (B8K2907-MS1) Source ID: 8AC0093-02									
Orthophosphate, as P			100	90-110			11/29/2018	SMC	
Matrix Spike Dup (B8K2907-MSD1) Source ID: 8AC0093-02									
Orthophosphate, as P			101	90-110	0.262	10	11/29/2018	SMC	

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Total Metals									
Batch: B8K2818									
Blank (B8K2818-BLK1)									
Mercury	< 0.00471	ug/L					11/30/2018	SAS	U
LCS (B8K2818-BS1)									
Mercury			99.8	85-115			11/30/2018	SAS	
Duplicate (B8K2818-DUP1) Source ID: 8BB0732-01									
Mercury					13.6	20	11/30/2018	SAS	D
Matrix Spike (B8K2818-MS1) Source ID: 8BB0732-01									
Mercury			94.9	70-130			11/30/2018	SAS	D
Matrix Spike Dup (B8K2818-MSD1) Source ID: 8BB0732-01									
Mercury			95.6	70-130	0.651	20	11/30/2018	SAS	D
Batch: B8K2920									
Blank (B8K2920-BLK1)									
Arsenic	< 5.72	ug/L					11/30/2018	EDM	U
Calcium	< 50	ug/L					11/30/2018	EDM	U
Lead	< 6.94	ug/L					11/30/2018	EDM	U
Magnesium	< 50	ug/L					11/30/2018	EDM	U
Phosphorus as P	< 0.006	mg/L					11/30/2018	EDM	U
Hardness	< 1	mg/L					11/30/2018	EDM	U
LCS (B8K2920-BS1)									
Arsenic			106	85-115			11/30/2018	EDM	
Calcium			96.5	85-115			11/30/2018	EDM	
Lead			106	85-115			11/30/2018	EDM	
Magnesium			103	85-115			11/30/2018	EDM	
Phosphorus as P			109	85-115			11/30/2018	EDM	
Duplicate (B8K2920-DUP1) Source ID: 8AC0093-02									
Arsenic					NR	20	11/30/2018	EDM	U
Calcium					0.737	20	11/30/2018	EDM	
Lead					4.55	20	11/30/2018	EDM	
Magnesium					0.520	20	11/30/2018	EDM	
Phosphorus as P					0.805	20	11/30/2018	EDM	
Hardness					0.678	200	11/30/2018	EDM	
Matrix Spike (B8K2920-MS1) Source ID: 8AC0093-02									
Arsenic			110	70-130			11/30/2018	EDM	
Calcium			97.2	70-130			11/30/2018	EDM	
Lead			104	70-130			11/30/2018	EDM	
Magnesium			104	70-130			11/30/2018	EDM	
Phosphorus as P			110	70-130			11/30/2018	EDM	
Matrix Spike Dup (B8K2920-MSD1) Source ID: 8AC0093-02									
Arsenic			109	70-130	0.873	20	11/30/2018	EDM	
Calcium			97.9	70-130	0.646	20	11/30/2018	EDM	
Lead			105	70-130	0.660	20	11/30/2018	EDM	
Magnesium			104	70-130	0.128	20	11/30/2018	EDM	
Phosphorus as P			111	70-130	0.524	20	11/30/2018	EDM	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Total Metals (Continued)									
Batch: B8L0515									
Blank (B8L0515-BLK1)									
Cadmium	< 1	ug/L					12/06/2018	AMO	U
LCS (B8L0515-BS1)									
Cadmium			99.6	85-115			12/06/2018	AMO	
Duplicate (B8L0515-DUP1) Source ID: 8BB0769-02									
Cadmium					NR	20	12/06/2018	AMO	U
Matrix Spike (B8L0515-MS1) Source ID: 8BB0769-02									
Cadmium			94.9	70-130			12/06/2018	AMO	
Matrix Spike Dup (B8L0515-MSD1) Source ID: 8BB0769-02									
Cadmium			94.5	70-130	0.358	20	12/06/2018	AMO	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Dissolved Metals									
Batch: B8L0320									
Blank (B8L0320-BLK1)									
Copper	< 10	ug/L					12/03/2018	EDM	U
Lead	< 6.94	ug/L					12/03/2018	EDM	U
Zinc	< 10	ug/L					12/03/2018	EDM	U
LCS (B8L0320-BS1)									
Copper			98.7	85-115			12/03/2018	EDM	
Lead			108	85-115			12/03/2018	EDM	
Zinc			108	85-115			12/03/2018	EDM	
Duplicate (B8L0320-DUP1) Source ID: 8AC0093-03									
Copper					NR	10	12/03/2018	EDM	U
Lead					NR	10	12/03/2018	EDM	U
Zinc					0.269	10	12/03/2018	EDM	
Matrix Spike (B8L0320-MS1) Source ID: 8AC0093-03									
Copper			112	70-130			12/03/2018	EDM	
Lead			102	70-130			12/03/2018	EDM	
Zinc			107	70-130			12/03/2018	EDM	
Matrix Spike Dup (B8L0320-MSD1) Source ID: 8AC0093-03									
Copper			109	70-130	2.86	10	12/03/2018	EDM	
Lead			102	70-130	0.119	10	12/03/2018	EDM	
Zinc			106	70-130	0.215	10	12/03/2018	EDM	
Batch: B8L0621									
Blank (B8L0621-BLK1)									
Cadmium	< 1	ug/L					12/06/2018	AMO	U
LCS (B8L0621-BS1)									
Cadmium			103	85-115			12/06/2018	AMO	
Duplicate (B8L0621-DUP1) Source ID: 8AC0094-01RE1									
Cadmium					NR	10	12/06/2018	AMO	U
Matrix Spike (B8L0621-MS1) Source ID: 8AC0094-01RE1									
Cadmium			90.2	70-130			12/06/2018	AMO	
Matrix Spike Dup (B8L0621-MSD1) Source ID: 8AC0094-01RE1									
Cadmium			91.5	70-130	1.43	10	12/06/2018	AMO	

Report Date: 12/13/2018 11:30

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Notes and Definitions

Item	Definition
D	Data reported from a dilution
Seed-01	The seed depletion is greater than that recommended by the method. The LCS is acceptable showing the seed supports the method.
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

FOR Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Heather Rankin
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Andy Carlson

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
8AC0094																								
-01	11/27/18	11/27/18	2025	2226	181127-08-WC	ARC	X		X	X	X	X	X	X	X	XX	X	X	X		X	X	X	X	1

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
[signature]	11/28/18 1323	[signature] 11-28-18 1324	

8AC0094

Form 21A
Grab Sample Data Form – Phase II

Station: Edgewood Personnel: TLL ABP

Date/Time - On-site: 11/27/18 MDT (MST)* (circle one)

GRAB INFORMATION:

Is this a QA/QC Station? Yes ____ No X (if YES, fill out Form 21B on back)

Photographs Taken? Yes ____ No X Swing Sampler Used? Yes X No ____

Sample ID: 181127-08- -WG (fill in appropriate sequential number)

Date/Time	Container - Test (Subsample Result)	Labeled
11/27/18 2126	(1) 250mL sterile plastic – *E. coli*	☒

FIELD PARAMETERS: Fill (1) 500mL Amber Date/Time: 11/27/18 2127

	Value	Unit		Value	Unit
Diss. O_2—DO Meter	9.89	Mg/L	Temp – DO Meter	10.1	°C
Conductivity –	167.9	µS/cm	Temp - Cond Meter	10.1	°C
pH – pH Meter	7.94	S.U.	Temp – pH Meter	10.1	°C

AUTO SAMPLER CURRENT STATUS:

First Subsample taken: (Yes) / No (circle one) ; if Yes, Date/Time 11/27 2025

Last Subsample taken, Date/Time ____ # of Subsamples taken: 15

COMMENTS:

Date/Time - Off-site: ____

Station: ____ Personnel: ____

Form 21B
QA/QC Grab Sample Data Form – Phase II

FIELD DUPLICATE:

Sample ID: _____-101 (fill in appropriate sequential number)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

FIELD BLANK:

Sample ID: -_____-001 (fill in appropriate sequential number)

(Fill bottle with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

MST is observed during fall and winter; MDT is observed in spring and summer.

Form 21A
GRAB SAMPLE DATA FORM – (Phase II)

Station: Chrisfield Personnel: TLL ABW

Date/Time On-site: 11/27/18 2034 MDT/MST (circle one)

FLOW METER CURRENT STATUS:

	Value	Unit		Value	Unit
Level		inch	Velocity		fps
Flow		cfs	Battery		v
Total Flow		cf	Flow Start		(time)
Rainfall		in. (if applicable)			

GRAB INFORMATION:

Is this a QA/QC Station? Yes ___ No X (if YES, fill out Form 21B on back)

Photographs Taken? Yes ___ No X Swing Sampler Used? Yes X No ___

Storm Event Sample? Yes X No ___

Sample ID: 181127-09-WG Wet / Dry Grab (fill in station name)

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
NA	(4) L plastic – TSS	N/A	N/A	☐
NA	(1) L plastic – TKN	☐	N/A	☐
NA	(1) 500mL plastic - TP	N/A	N/A	☐
NA	(1) 500mL plastic (square) - NOx	☐	**Time:**	☐
11/27/18 2045	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
NA	(1) 250 mL plastic - OP	N/A	**Time:**	☐

FIELD PARAMETERS: Fill (1) 500mL Amber Time: 2045

	Value	Unit		Value	Unit
Diss. O_2 – Field	12.63	Mg/L	Temp – DO Meter	5.3	°C
Conductivity	43.0	µS/cm	Temp – Cond. Meter	5.3	°C
pH - Field	8.49	S.U.	Temp – pH Meter	5.4	°C

COMMENTS: Composites collected, no need for other grabs.

***NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume & Preserved samples should have pH <2**

Updated 3/25/15

Form 21B
QA/QC SAMPLE DATA FORM – (Phase II)

Date/Time - Off-site: _____

Station: _____ Personnel: _____

Sample ID: _____-101 (fill in appropriate sequential number)

QA Sample? ☑ **QA SAMPLE TYPE: FIELD DUPLICATE**

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsample is the "Start Date/Time" and the "End Date/Time", respectively

Comments:

Sample ID: _____-001 (fill in appropriate sequential number)

QA Sample? ☑ **QA SAMPLE TYPE: FIELD BLANK** (Fill bottles with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsamples is the "Start Date/Time" and "End Date/Time", respectively.

Comments:

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Edgewood Bottle _____ of _____

SET-UP:

Date/Time On-site: 11/26/18 1340 MDT/MST*(circle one) Personnel: ABC

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date					
Level					in.
Flow					cfs
Velocity					fps
Voltage					V
Temp					C°

- X Replace batteries if v<11.9
- ___ Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- X Program sampler per PG 320
  - Trigger condition 0.82
  - Flow Pulse Interval 157
- X Set Modem Access to "Storm Event" -24/7 (Flowlink)
- X Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- X Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- NA Perform decon. cycle
- X Verify Sampler date and time are correct
- X Place 15L sample bottle in sampler base & fill with 2 bag ice
- X Remove jar lid and place in a clean re-sealable plastic bag
- X Verify all cable and tubing connections
- X Verify Sampler Program is Running
- X Verify latches are secure

Comments: No samples collected on Friday

Date/Time Off-site: 11/26/18 1355

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: 11/28 1222 Personnel: ABC

- X Halt Sampler program
- X Put lid on sample bottle
- X Properly label sample bottle; Record Sample ID on back of sheet
- X Record liquid height/sample volume and visual observations on back of sheet
- X Record subsample information on back of sheet

If Sampling is Complete:

- X Power off Sampler
- X Add ice to sample cooler
- X Complete COC form; Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ___ Install new 15 L bottle, add ice
- ___ Restart sampling program
- Date/Time Restarted: _____
- ___ Verify Running

Comments: ~~Not submitted for lab~~ Lab done ABC

Date/Time Off-site: 1231

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ___ Record Flow Meter status (Flowlink)
- ___ Replace battery if v<11.9
- ___ Retrieve Data (Flowlink)
- ___ Change modem access to "Dry Weather" 8-6 M-F
- ___ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ___ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: 181127 - 08 -WC Bottle 1 of 1

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)	11000	mL
Flow Pulse Interval	157	ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity	Cloudy	Clear, Cloudy, Silty
Color	Clear	Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1	11/27 2025	Success	21		
2	2027		22		
3	2040		23		
4	2041		24		
5	2042		25		
6	2055		26		
7	2056		27		
8	2057		28		
9	2058		29		
10	2111		30		
11	2111		31		
12	2126		32		
13	2126		33		
14	2127		34		
15	2140		35		
16	2141		36		
17	2156		37		
18	2156		38		
19	2226		39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No X (if YES, fill out information below)

Sample ID: -103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

MST is observed during fall and winter; MDT is observed in spring and summer.

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Crisfield Bottle _____ of _____

SET-UP:

Date/Time On-site: 11/26/18 1300 (MDT)/MST*(circle one) Personnel: ABC

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date					
Level					in.
Flow					cfs
Velocity					fps
Voltage					V
Temp					C°

- X Replace batteries if v<11.9
- X Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- ABC X Program sampler per PG 320
  - Trigger condition On
  - Flow Pulse Interval 58
- ABC X Set Modem Access to "Storm Event" -24/7 (Flowlink)
- ABC X N/A Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- ABC X N/A Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- N/A Perform decon. cycle
- X Verify Sampler date and time are correct
- X Place 15L sample bottle in sampler base & fill with 2 bag ice
- X Remove jar lid and place in a clean re-sealable plastic bag
- X Verify all cable and tubing connections
- X Verify Sampler Program is Running
- X Verify latches are secure

Comments: No samples had been collected. Power failed when it tried to sample

Date/Time Off-site: 11/26/18 1315

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: 11/25/18 1248 Personnel: ABC

- X Halt Sampler program
- X Put lid on sample bottle
- X Properly label sample bottle; Record Sample ID on back of sheet
- X Record liquid height/sample volume and visual observations on back of sheet
- X Record subsample information on back of sheet

If Sampling is Complete:

- X Power off Sampler
- X Add ice to sample cooler
- X Complete COC form; Arrange transport to lab ABC

Comments: Sample discarded as due to insufficient volume.

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- Date/Time Restarted: _____
- ____ Verify Running

Date/Time Off-site: _____

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ____ Record Flow Meter status (Flowlink)
- ____ Replace battery if v<11.9
- ____ Retrieve Data (Flowlink)
- ____ Change modem access to "Dry Weather" 8-6 M-F
- ____ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ____ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: 181127 - 09 -WC Bottle 1 of 1

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)	~ 400	mL
Flow Pulse Interval	58	ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity	Cloudy	Clear, Cloudy, Silty
Color	Clear	Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1	11/27 2016	No Liquid	21		
2	2020	No	22		
3	2023	No	23		
4	2026	No	24		
5	2028	No	25		
6	2031	No	26		
7	2034	No	27		
8	2036	No	28		
9	2039	No	29		
10	2042	No	30		
11	2045	No	31		
12	2050	No	32		
13	2050	No	33		
14	2101	Success	34		
15	2109		35		
16	2123		36		
17	2145		37		
18	2316	No Liquid	38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS: Not submitted, too little volume

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: _____ -103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

MST is observed during fall and winter; MDT is observed in spring and summer.

First 13 sample attempts error: No More Liquid!

Technical Memorandum

950 West Bannock Street, Suite 350
Boise, ID 83702

Phone: 208-389-7700
Fax: 208-389-7750

Prepared for: Ada County Highway District (ACHD)

Project Title: Phase II Stormwater Outfall Monitoring

Project No.: 152760

Technical Memorandum

Subject: ACHD Phase II Monitoring Period Summary for March through April 2019

Date: August 27, 2019

To: Monica Lowe

Cc: Tammy Lightle

From: Andy Weigel, Project Manager

Prepared by: _____
Andrea Leonard, Project Scientist

Reviewed by: _____
Andy Weigel, Project Manager

Table of Contents

List of Tables

Section 1: Project Summary

Table 1 is a summary of the types of data collected during Water Year (WY) 2019 Phase II Stormwater Monitoring.

Table 1. Project Summary

Sample Period	November 2018–February 2019		March–April 2019	
Station	Edgewood	Chrisfield	Edgewood	Chrisfield
Rain (inches)	8.04 [1]	6.88 [1]	3.14	2.62
Storm data flow (cubic feet)	229,023 [1]	64,026 [1]	99,994	27,872 [2]
Wet grab	Yes	Yes	Yes	Yes
Field parameters	Yes	No	No	No
QA/QC	No	Yes	No	Yes

[1] *Rainfall data gaps were supplemented with Agrimet data, maintained by the U.S. Bureau of Reclamation.*

[2] *Estimated runoff volume is used when flow data is not available.*

Section 2: Monitoring Period Narrative

This technical memorandum describes the Phase II Stormwater Monitoring completed for Ada County Highway District (ACHD) from March through April 2019. Flow and rain data were collected during this period from the Edgewood and Chrisfield Phase II monitoring stations. One storm was targeted during the March-April monitoring period on April 13, 2019, resulting in successful grab samples at both monitoring stations. Composite samples were attempted, but were unsuccessful.

National Weather Service Summary

The National Weather Service (NWS) prepares a summary of precipitation observations each month for inclusion in an overall monthly climate summary. The NWS monthly climate summary is made available through the local Boise Weather Forecast Office on the NWS website at https://w2.weather.gov/climate/index.php?wfo=boi. Precipitation summaries from the NWS are included in the text below. Summaries are pared down but are otherwise quoted directly with minor punctuation and grammatical edits for readability.

> The average temperature for March 2019 was only slightly below normal. Total precipitation was very close to normal, at 1.31 inches. No records were equaled or exceeded. On the 23rd a low-pressure trough approaching from the coast brought light showers, the first measurable precipitation since the 12th. On the 24th the trough was over our area, and more than half an inch of rain was measured at the airport. While not a record, it was the first significant precipitation since late February. On the 26th moist unstable air associated with an offshore low-pressure trough contributed to late afternoon thunderstorms which developed along a cold front. One of these storms was accompanied by brief heavy showers, and even small hail in some parts of Boise. As it moved inland, the trough

brought more showers from the 27th through the 30th. A high-pressure ridge over the coast provided dry sunny weather on the 31st.

April 2019 was wetter and slightly warmer than normal, with a total precipitation of 1.99 inches. Measurable precipitation fell on 14 days. An upper-level high pressure ridge kept temperatures above normal through the 5th. Disturbances moving through the ridge brought nearly daily showers. After the ridge shifted east, relatively mild temperatures were maintained by southwest flow aloft ahead of an approaching upper- level low pressure trough. Daily showers continued. Heavier showers on the 8th dropped nearly half an inch of rain at the airport. Another system resulted in rainfall totaling over half an inch on the 14th and 15th. On the 20th a strong cold front in advance of an upper-level trough triggered wet thunderstorms. One such storm dumped nearly a quarter inch of rain in 20 minutes at the airport.

Monitoring Station Summary

A summary of data collected for each monitoring station over the entire monitoring period (Mar-Apr) and for the targeted storm is provided in Table 2. Monthly summaries are presented in Tables 3–4 (Mar-Apr). Monitoring period summary tables are included in Attachment A.

March – April summary hydrographs are presented in Figures 1 (Edgewood) and 2 (Chrisfield). Monthly hydrographs for each monitoring station in this monitoring period are provided in chronological order in Figures 3–6. Included on each hydrograph are recorded hourly precipitation at the local rain gauge (inches), flow (cubic feet per second), and sample collection times, as applicable. Hydrographs are included in Attachment B.

Section 3: Storm Narrative

One storm was targeted during the March – April monitoring period. Wet grab samples were collected at both sites on April 13, 2019. Setup was accomplished for composite samples at Edgewood and Chrisfield, but no successful composite sample was collected. See Section 5 for additional notes about data collected during the monitoring period.

April 12, 2019

On Friday afternoon, April 12, the National Weather Service issued a forecast for rain showers in the Boise area from Saturday evening to Sunday morning. Chance of precipitation was 65-75 percent; a total precipitation of 0.14 inch was forecasted. Setup was conducted Friday afternoon.

April 13, 2019

Precipitation started around 2200 on Saturday evening, April 13, 2019 and light showers continued through Sunday morning around 0900. Precipitation totals were 0.48 at both Edgewood and Chrisfield.

Section 4: Pollutant Loading

Water quality results and pollutant loading estimates for the Edgewood and Chrisfield monitoring stations for the March – April monitoring period were not calculated for this monitoring period since composite samples were not collected. Field parameters and E. Coli analytical results are included in Tables 2-4.

Section 5: Deviations/Problems

Composite Samples

During the April 13, 2019 storm event, trigger volumes for Chrisfield and Edgewood monitoring stations were calculated incorrectly, resulting in programmed trigger volumes that were too high to collect successful composite samples. In future monitoring events both grab and composite samples will be targeted for all analytical parameters, except e. coli, until successful composite samples can be collected consistently.

Section 6: References

National Weather Service Boise Forecast Office. (2018). Monthly Weather Summary. Retrieved April 3, 2018, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

National Weather Service Boise Forecast Office. (2018). Preliminary Monthly Climate Data. Retrieved April 3, 2018, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

Attachment A: Monitoring Period Summary Tables

Table 2

Monitoring Period Summary | March 1 - April 30 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	99,994	14%	27,872 [1]	100%
Background Discharge Volume (cf)	598,010	86%	0	0%
Total Discharge Volume (cf)	698,004	100%	27,872 [1]	100%
Estimated Runoff for Monitored Area[2]	Edgewood	Eagle	Chrisfield	Meridian
Period Precipitation (in)	3.14		2.62	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume[3] (cf)	68,191	71,357,006	21,159	69,805,426
Monitored Storm Information	Edgewood (4/13/2019)		Chrisfield (4/13/2019)	
Precipitation Amount (in)	0.48		0.48	
Storm Duration (hrs)	12		14	
Antecedent Dry Period (hrs)	108		110	
Recorded Runoff Volume (cf)	14,396		6,300	
Sample Information				
Sample Date and Time	4/14/2019 0:05		4/13/2019 23:30	
Dissolved Oxygen (mg/L)	8.11		8.33	
pH (S.U.)	7.75		8.05	
Conductivity (uS/cm)	59.7		0.3	
Temperature (°C)	12.0		14.4	
Nitrate + Nitrite as N (mg/L)	--		--	
Total Suspended Solids (mg/L)	--		--	
Total Kjeldahl Nitrogen (mg/L)	--		--	
Dissolved Orthophospate as P (mg/L)	--		--	
Total Phosphorus as P (mg/L)	--		--	
E.Coli (MPN/100 mL)	248.1		307.6	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	--	--	--	--	--	--
Total Suspended Solids	--	--	--	--	--	--
Total Kjeldahl Nitrogen	--	--	--	--	--	--
Dissolved Orthophosphate as P	--	--	--	--	--	--
Total Phosphorus as P	--	--	--	--	--	--

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Estimated stormwater runoff volume is calculated using local precipitation data

Table 3

Monitoring Period Summary | March 1 - March 31 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	37,620	10%	12,301 [1]	100%
Background Discharge Volume (cf)	337,464	90%	0	0%
Total Discharge Volume (cf)	375,084	100%	12,301 [1]	100%
Estimated Runoff for Monitored Area[2]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation (in)	1.3		1.07	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume[3] (cf)	28,232	29,542,709	8,641	28,508,322
Monitored Storm Information	Edgewood (4/13/2019)		Chrisfield (4/13/2019)	
Precipitation Amount (in)	0.48		0.48	
Storm Duration (hrs)	12		14	
Antecedent Dry Period (hrs)	108		110	
Recorded Runoff Volume (cf)	14,396		6,300	
Sample Information				
Sample Date and Time	4/14/2019 0:05		4/13/2019 23:30	
Dissolved Oxygen (mg/L)	8.11		8.33	
pH (S.U.)	7.75		8.05	
Conductivity (uS/cm)	59.7		0.3	
Temperature (°C)	12.0		14.4	
Nitrate + Nitrite as N (mg/L)	--		--	
Total Suspended Solids (mg/L)	--		--	
Total Kjeldahl Nitrogen (mg/L)	--		--	
Dissolved Orthophospate as P (mg/L)	--		--	
Total Phosphorus as P (mg/L)	--		--	
E.Coli (MPN/100 mL)	248.1		307.6	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	--	--	--	--	--	--
Total Suspended Solids	--	--	--	--	--	--
Total Kjeldahl Nitrogen	--	--	--	--	--	--
Dissolved Orthophosphate as P	--	--	--	--	--	--
Total Phosphorus as P	--	--	--	--	--	--

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Estimated stormwater runoff volume is calculated using local precipitation data

Table 4

Monitoring Period Summary | April 1 - April 30 (WY 19)						
	Edgewood			Chrisfield		
	cubic feet	percent		cubic feet	percent	
Measured Stormwater Runoff Volume (cf)	62,374	19%		15,571 [1]	100%	
Background Discharge Volume (cf)	260,546	81%		0	0%	
Total Discharge Volume (cf)	322,920	100%		15,571 [1]	100%	
Estimated Runoff for Monitored Area[2]	Edgewood	Eagle		Chrisfield	Meridian	
Monthly Precipitation (in)	1.84			1.55		
Drainage Area (acres)	55.86	22,765		12	26,690	
Estimated Stormwater Runoff Volume[3] (cf)	39,959	41,814,297		12,518	41,297,103	
Monitored Storm Information	Edgewood (4/13/2019)			Chrisfield (4/13/2019)		
Precipitation Amount (in)	0.48			0.48		
Storm Duration (hrs)	12			14		
Antecedent Dry Period (hrs)	108			110		
Recorded Runoff Volume (cf)	14,396			6,300		
Sample Information						
Sample Date and Time	4/14/2019 0:05			4/13/2019 23:30		
Dissolved Oxygen (mg/L)	8.11			8.33		
pH (S.U.)	7.75			8.05		
Conductivity (uS/cm)	59.7			0.3		
Temperature (°C)	12.0			14.4		
Nitrate + Nitrite as N (mg/L)	--			--		
Total Suspended Solids (mg/L)	--			--		
Total Kjeldahl Nitrogen (mg/L)	--			--		
Dissolved Orthophospate as P (mg/L)	--			--		
Total Phosphorus as P (mg/L)	--			--		
E.Coli (MPN/100 mL)	248.1			307.6		
Pollutant Loading Estimates						
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	--	--	--	--	--	--
Total Suspended Solids	--	--	--	--	--	--
Total Kjeldahl Nitrogen	--	--	--	--	--	--
Dissolved Orthophosphate as P	--	--	--	--	--	--
Total Phosphorus as P	--	--	--	--	--	--

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Estimated stormwater runoff volume is calculated using local precipitation data

Attachment B: Monitoring Period Hydrographs

Figure 1

Edgewood - Water Year 2019 - March 2019 through April 2019

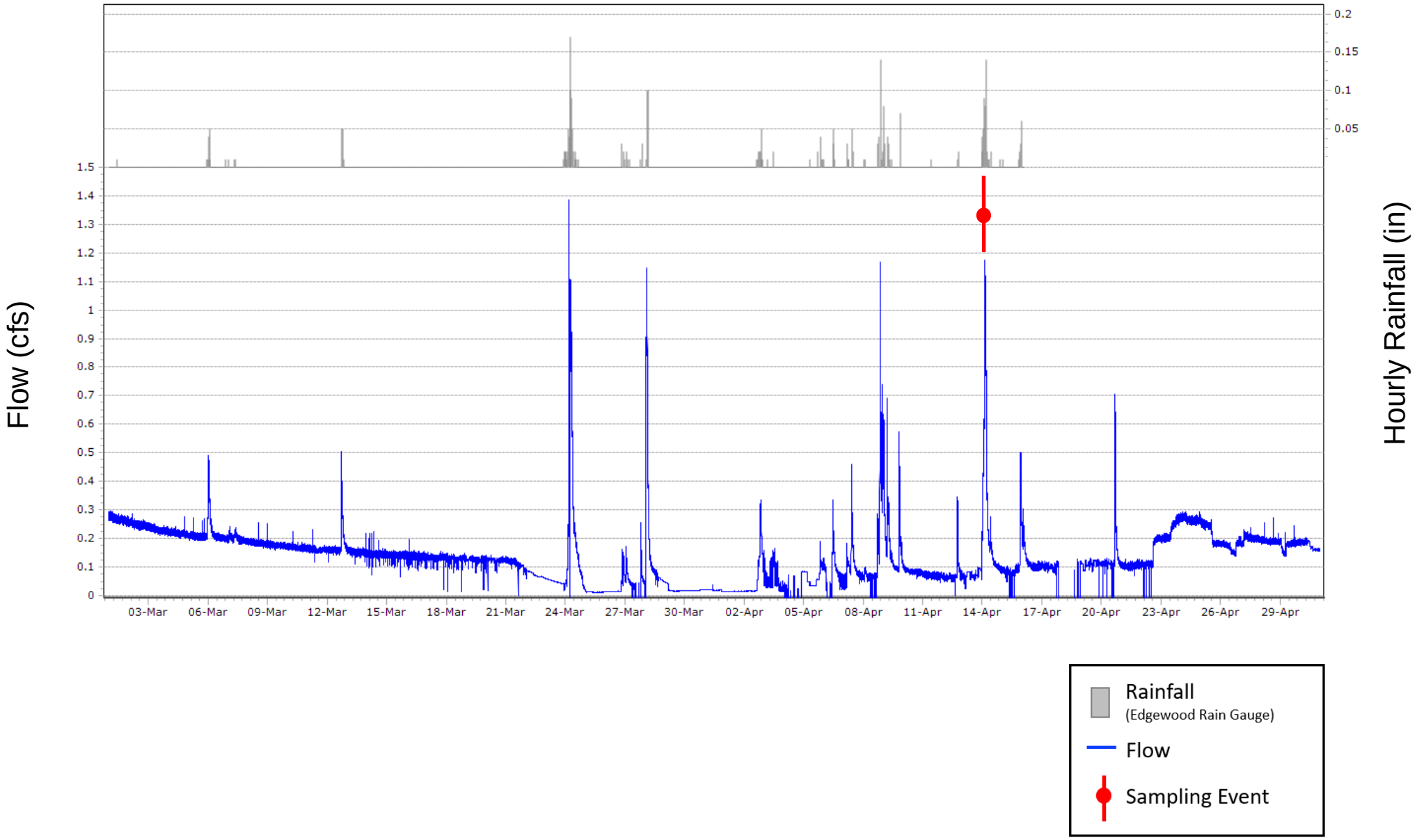


Figure 2

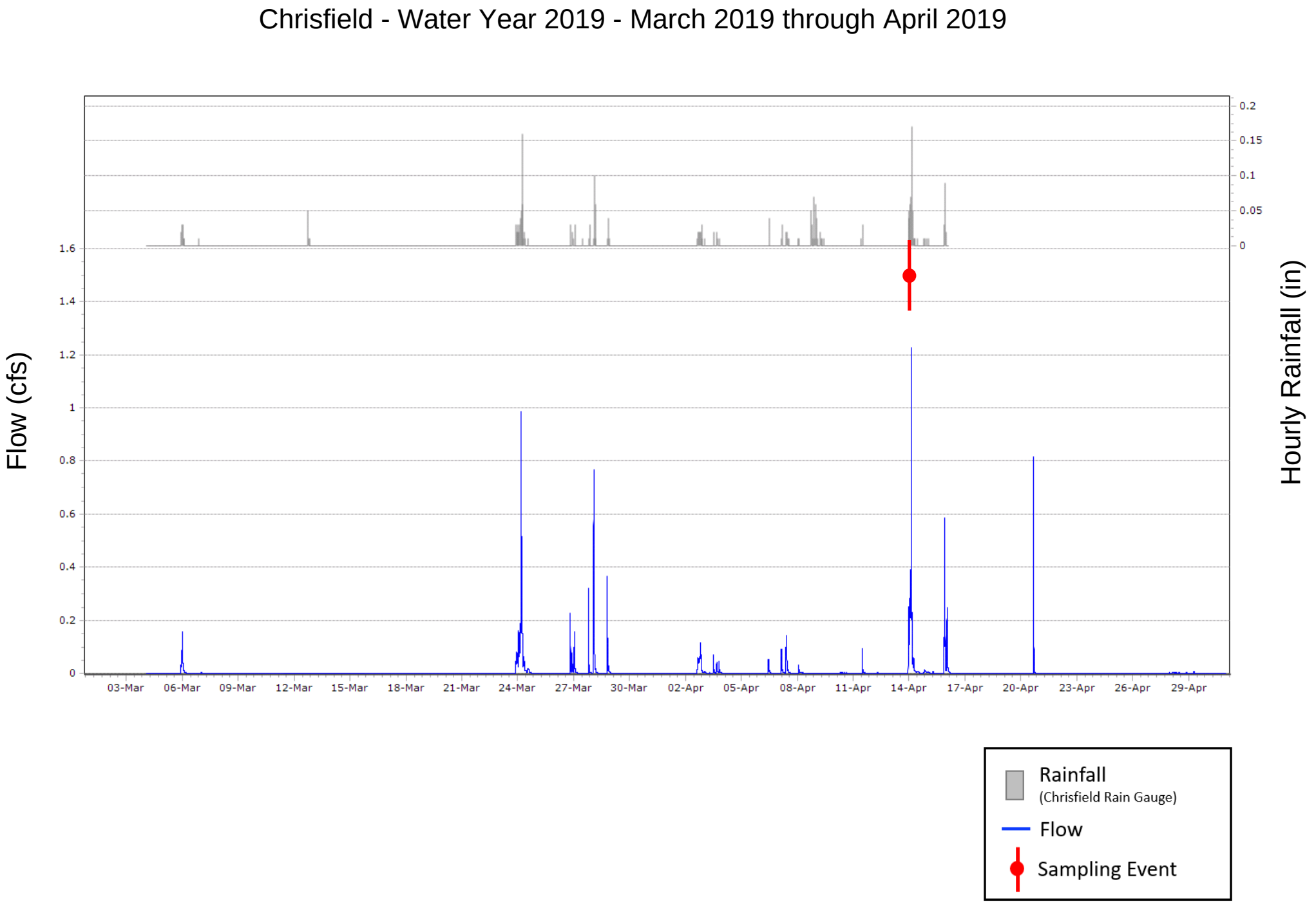

Chrisfield - Water Year 2019 - March 2019 through April 2019
Flow (cfs)
Hourly Rainfall (in)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0
0.05
0.1
0.15
0.2
03-Mar
06-Mar
09-Mar
12-Mar
15-Mar
18-Mar
21-Mar
24-Mar
27-Mar
30-Mar
02-Apr
05-Apr
08-Apr
11-Apr
14-Apr
17-Apr
20-Apr
23-Apr
26-Apr
29-Apr
Rainfall
(Chrisfield Rain Gauge)
Flow
Sampling Event

Figure 3

Edgewood - Water Year 2019 - March 2019

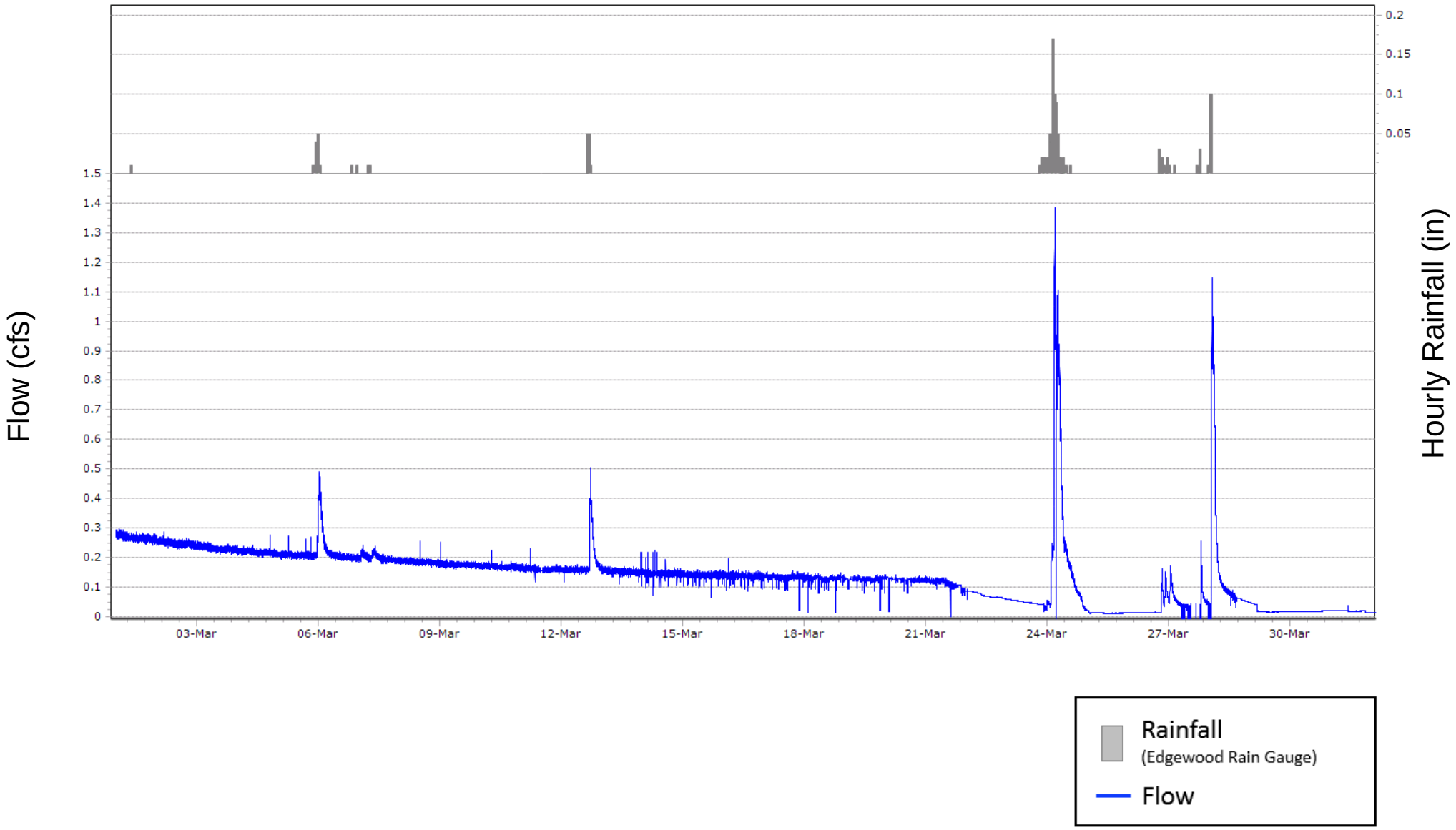


Figure 4

Chrisfield- Water Year 2019 - March 2019

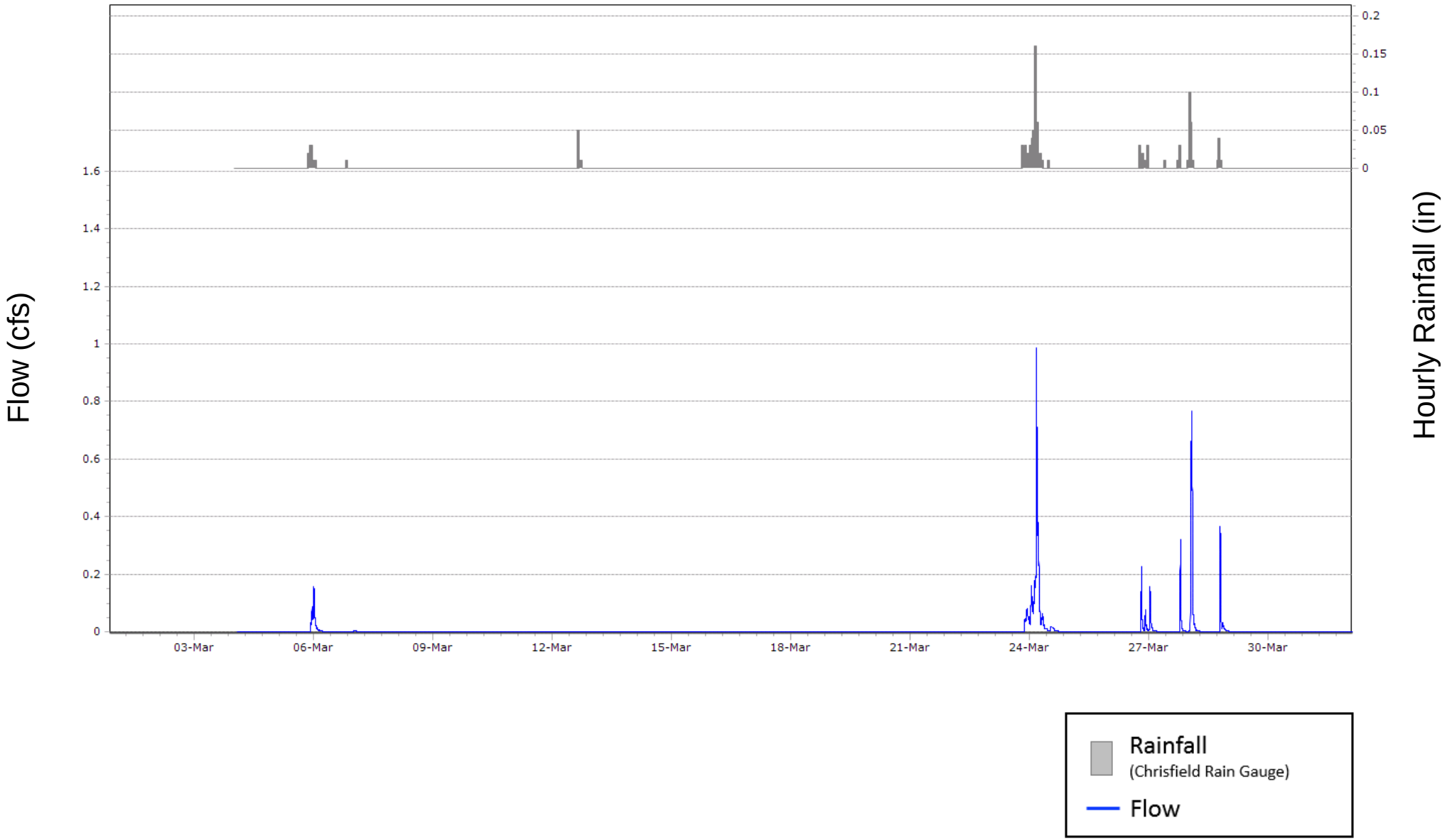


Figure 5

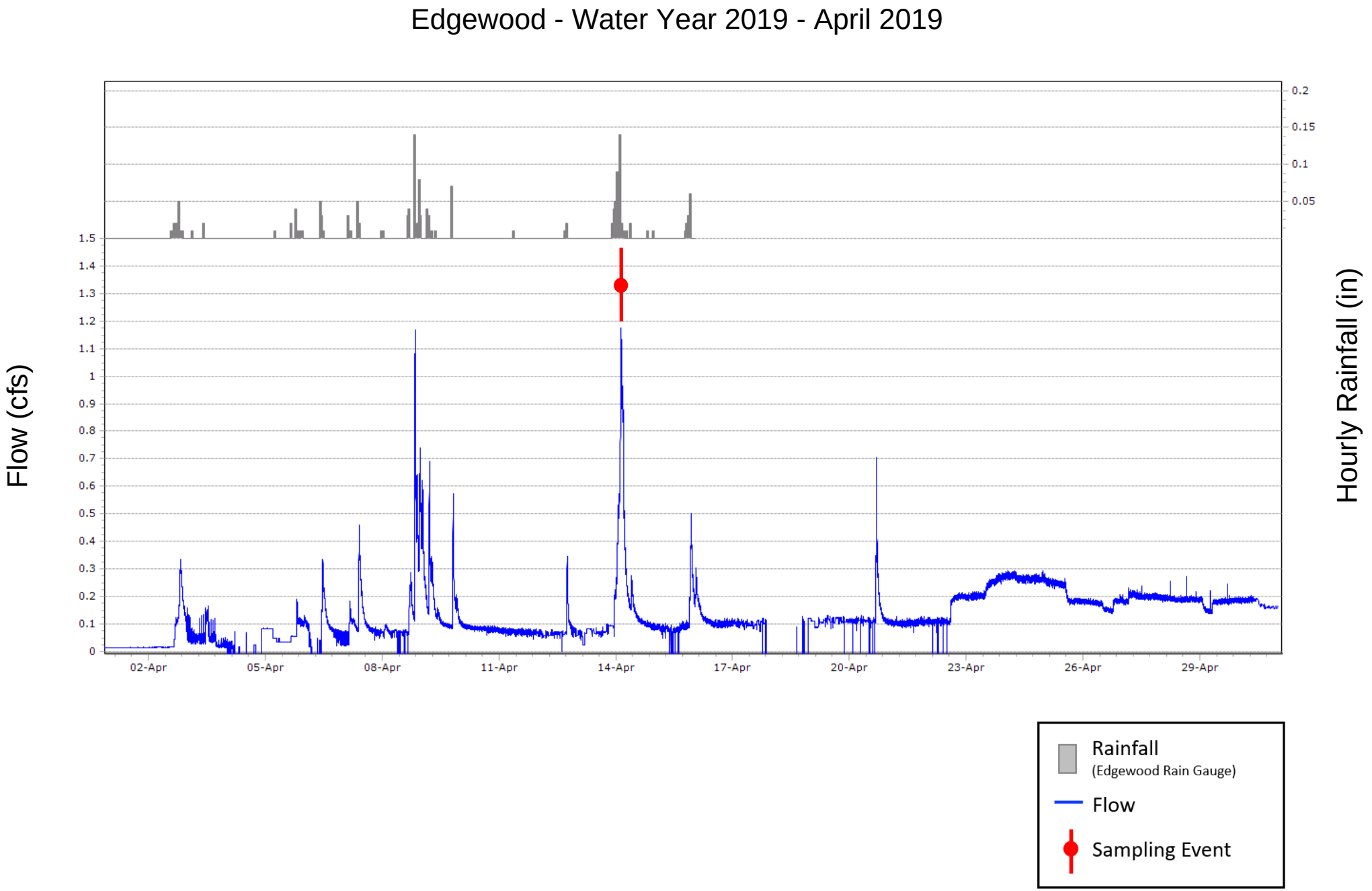
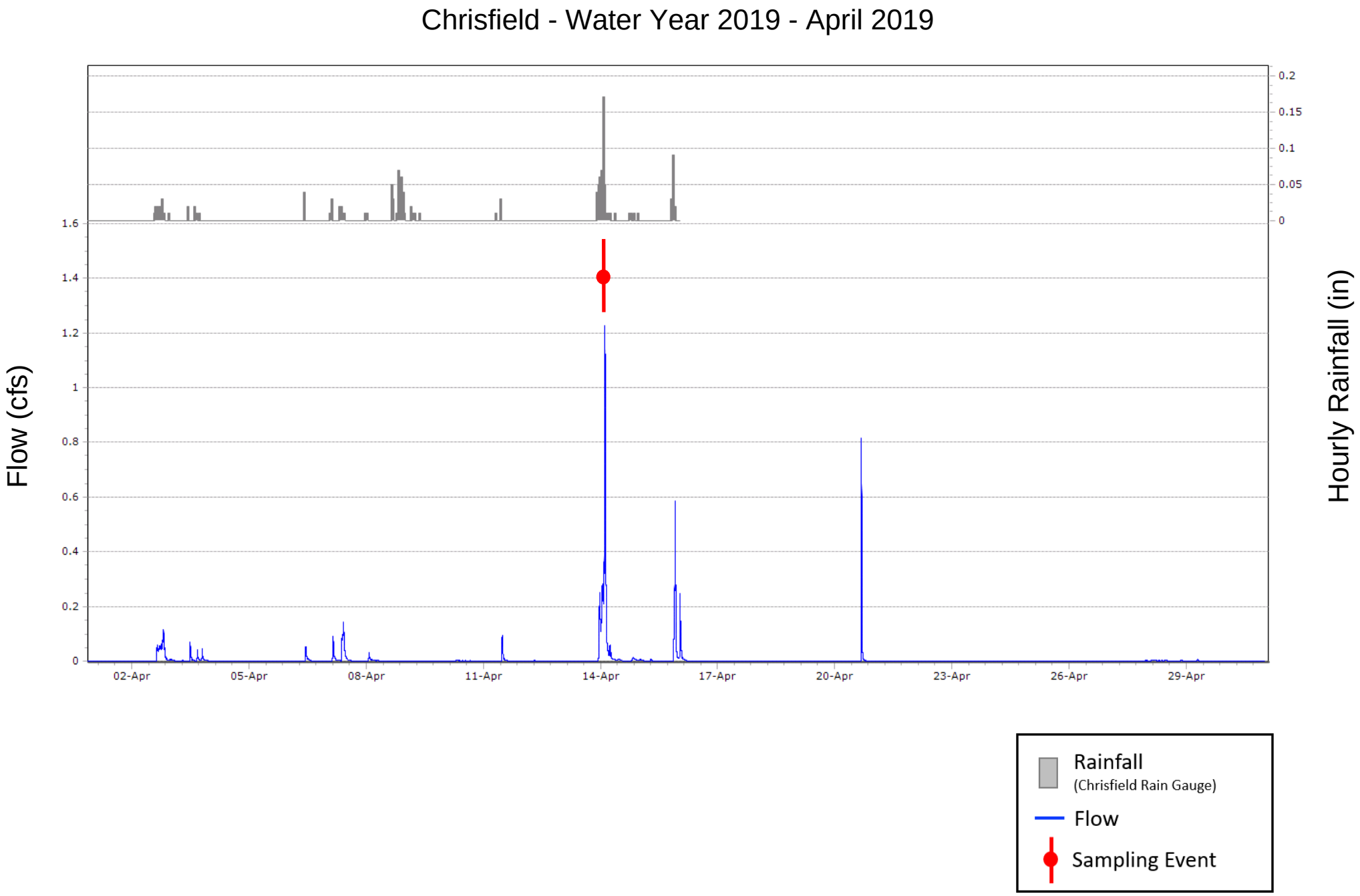

Edgewood - Water Year 2019 - April 2019
Flow (cfs)
Hourly Rainfall (in)
0.2
0.15
0.1
0.05
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
02-Apr
05-Apr
08-Apr
11-Apr
14-Apr
17-Apr
20-Apr
23-Apr
26-Apr
29-Apr
Rainfall
(Edgewood Rain Gauge)
Flow
Sampling Event

Figure 6


Chrisfield - Water Year 2019 - April 2019
Flow (cfs)
Hourly Rainfall (in)
0.2
0.15
0.1
0.05
0
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
02-Apr
05-Apr
08-Apr
11-Apr
14-Apr
17-Apr
20-Apr
23-Apr
26-Apr
29-Apr
Rainfall
(Chrisfield Rain Gauge)
Flow
Sampling Event

Attachment C: Analytical Reports and Field Sheets

Report Date: 04/19/2019 12:37

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
9AC0016-01	ACST2B	190413-09-WG	Water		04/13/2019	04/14/2019
9AC0016-02	ACST2B	190414-08-WG	Water		04/14/2019	04/14/2019
9AC0016-03	ACST2B	190413-09-001	Water		04/13/2019	04/14/2019

Report Date: 04/19/2019 12:37

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	190413-09-WG
Date/Time Collected:	04/13/2019 23:31		
Lab Number:	9AC0016-01	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9D1507	307.6	MPN/100 mL	1.0	1.0	Colilert	04/14/19 07:00	4/15/19 7:15	JJR	
Wet Chemistry										
Chlorine Screen	B9D1514	Absent				SM 4500-CL G-2000 mod	04/14/19	4/14/19 6:18	JJR	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 04/19/2019 12:37

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	190414-08-WG
Date/Time Collected:	04/14/2019 00:05		
Lab Number:	9AC0016-02	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9D1507	248.1	MPN/100 mL	1.0	1.0	Colilert	04/14/19 07:10	4/15/19 7:15	JJR	
Wet Chemistry										
Chlorine Screen	B9D1514	Absent				SM 4500-CL G-2000 mod	04/14/19	4/14/19 6:23	JJR	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 04/19/2019 12:37

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	190413-09-001
Date/Time Collected:	04/13/2019 12:00		
Lab Number:	9AC0016-03	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9D1507	<1.0	MPN/100 mL	1.0	1.0	Colilert	04/14/19 07:00	4/15/19 7:15	JJR	H U
Wet Chemistry										
Chlorine Screen	B9D1514	Absent				SM 4500-CL G-2000 mod	04/14/19	4/14/19 6:18	JJR	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 04/19/2019 12:37

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Microbiology									
Batch: B9D1507									
Blank (B9D1507-BLK1)									
E. Coli	Absent						04/15/2019	JJR	
LCS (B9D1507-BS1)									
E. Coli				Present			04/15/2019	JJR	
Duplicate (B9D1507-DUP1)	Source ID: 9AC0016-01								
E. Coli					Pass	128	04/15/2019	JJR	

Report Date: 04/19/2019 12:37

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Notes and Definitions

Item	Definition
H	Hold time Exceeded.
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

J Finegan-Kelly

Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Azubike Emenari
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Andy Weigel, Zach Dobroth

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO3+NO2 - EPA 353.2	NH3 - SM 4500 NH3 - D	Total Containers
9ACC0016-01	4/13/19		23:31		190413-09-WG	ABW	X	X												X					1
-02	4/14/19		0005		190414-08-WG	ABW	X	X												X					1
-03	4/13/19		1200		190413-09-001	ABW	X	X												X					1

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
	4/14/19 0045	4/14/19 0600	9ACC0016

9ACC0016

Form 21A
Grab Sample Data Form – Phase II

Station: Chrisfield Personnel: ZTD ABW

Date/Time - On-site: 4/13/19 2315 MDT/MST*(circle one)*

GRAB INFORMATION:

Is this a QA/QC Station? Yes X No ____ (if YES, fill out Form 21B on back)

Photographs Taken? Yes ____ No X Swing Sampler Used? Yes X No ____

Sample ID: 190413-09 -WG (fill in appropriate sequential number)

Date/Time	Container - Test (Subsample Result)	Labeled
4/13/19 / 23:30	(1) 250mL sterile plastic – *E. coli*	☒

FIELD PARAMETERS: Fill (1) 500mL Amber Date/Time: 4/13/19 23:31

	Value	Unit		Value	Unit
Diss. O_2–DO Meter	8.33	Mg/L	Temp – DO Meter	14.4	°C
Conductivity –	0.3	µS/cm	Temp - Cond Meter	14.4	°C
pH – pH Meter	8.05	S.U.	Temp – pH Meter	14.2	°C

AUTO SAMPLER CURRENT STATUS:

First Subsample taken: Yes / No (circle one) ; if Yes, Date/Time ____

Last Subsample taken, Date/Time ____ # of Subsamples taken: ____

COMMENTS:

Date/Time - Off-site: 4/13/19 2340

Station: ____ Personnel: ____

Form 21B
QA/QC Grab Sample Data Form – Phase II

FIELD DUPLICATE:

Sample ID: _____-101 (fill in appropriate sequential number)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

FIELD BLANK:

Sample ID: - 190413-09 -001 (fill in appropriate sequential number)

(Fill bottle with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
4/13/19 23:35	(1) 250mL sterile plastic – *E. Coli*	☑

Comments:

MST is observed during fall and winter; MDT is observed in spring and summer.

Form 21A
Grab Sample Data Form – Phase II

Station: Edgewood Personnel: ZTD ; ABW

Date/Time - On-site: 4/14/19 / 12:05 am (MDT)/MST* (circle one)

GRAB INFORMATION:

Is this a QA/QC Station? Yes ___ No X (if YES, fill out Form 21B on back)

Photographs Taken? Yes ___ No X Swing Sampler Used? Yes X No ___

Sample ID: 190414-08 -WG (fill in appropriate sequential number)

Date/Time	Container - Test (Subsample Result)	Labeled
4/14/19, 12:05 am	(1) 250mL sterile plastic – *E. coli*	X

FIELD PARAMETERS: Fill (1) 500mL Amber Date/Time: 4/14/19, 12:07 am

	Value	Unit		Value	Unit
Diss. O_2 – DO Meter	8.11	Mg/L	Temp – DO Meter	12.0	°C
Conductivity –	59.7	µS/cm	Temp - Cond Meter	12.0	°C
pH – pH Meter	7.75	S.U.	Temp – pH Meter	12.3	°C

AUTO SAMPLER CURRENT STATUS:

First Subsample taken: Yes / No (circle one) ; if Yes, Date/Time ___

Last Subsample taken, Date/Time ___ # of Subsamples taken: ___

COMMENTS:

Date/Time - Off-site: 4/14/19 00:35

Station: ___ Personnel: ___

Form 21B
QA/QC Grab Sample Data Form – Phase II

FIELD DUPLICATE:

Sample ID: _____-101 (fill in appropriate sequential number)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

FIELD BLANK:

Sample ID: -_____-001 (fill in appropriate sequential number)

(Fill bottle with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

MST is observed during fall and winter; MDT is observed in spring and summer.

Technical Memorandum

950 West Bannock Street, Suite 350
Boise, ID 83702

Phone: 208-389-7700
Fax: 208-389-7750

Prepared for: Ada County Highway District (ACHD)

Project Title: Phase II Stormwater Outfall Monitoring

Project No.: 152760

Technical Memorandum

Subject: ACHD Phase II Monitoring Period Summary for May through June 2019

Date: August 28, 2019

To: Monica Lowe

Cc: Tammy Lightle

From: Andy Weigel, Project Manager

Prepared by: _____
Andrea Leonard, Project Scientist

Reviewed by: _____
Andy Weigel, Project Manager

Table of Contents

List of Tables

Section 1: Project Summary

Table 1 is a summary of the types of data collected during Water Year (WY) 2019 Phase II Stormwater Monitoring.

Table 1. Project Summary

Sample Period	November 2018–February 2019		March–April 2019		May-June 2019	
Station	Edgewood	Chrisfield	Edgewood	Chrisfield	Edgewood	Chrisfield
Rain (inches)	8.04 [1]	6.88 [1]	3.14	2.62	2.81 [2]	2.58 [3]
Storm data flow (cubic feet)	229,023	64,026 [4]	99,994	27,872 [4]	75,080 [4]	32,076 [4]
Wet grab	Yes	Yes	Yes	Yes	Yes [5]	Yes [5]
Field parameters	Yes	Yes	Yes	Yes	Yes	Yes
Composite Sample	Yes	No	No	No	No	Yes
QA/QC	No	Yes	No	Yes	Yes	No

[1] *Rainfall data gaps were supplemented with Agrimet data, maintained by the U.S. Bureau of Reclamation.*

[2] *Hourly rainfall data are supplemented with available hourly rainfall data from Chrisfield.*

[3] *Hourly rainfall data are supplemented with available hourly rainfall data from Edgewood.*

[4] *Estimated runoff volume is used when flow data is not available.*

[5] *E.Coli results are qualified due to exceeded holding time.*

Section 2: Monitoring Period Narrative

This technical memorandum describes the Phase II Stormwater Monitoring completed for Ada County Highway District (ACHD) from May through June 2019. Flow and rain data were collected during this period from the Edgewood and Chrisfield Phase II monitoring stations. One storm was targeted during the May – June monitoring period on May 16, 2019, resulting in successful grab samples at both monitoring stations, and a successful composite sample at Chrisfield. A composite sample was attempted at Edgewood but was unsuccessful.

National Weather Service Summary

The National Weather Service (NWS) prepares a summary of precipitation observations each month for inclusion in an overall monthly climate summary. The NWS monthly climate summary is made available through the local Boise Weather Forecast Office on the NWS website at http://www.nws.noaa.gov/climate/index.php?wfo=boi. Precipitation summaries from the NWS are included in the text below. Summaries are pared down but are otherwise quoted directly with minor punctuation and grammatical edits for readability.

> May 2019 was the wettest May since 2005, and the 6th wettest on record, with a total of 3.98 inches. In addition, the period from January 1 through May 31 is the wettest on record at the Boise airport, at 12.07 inches. It ranks in second place for the entire period of record in the Boise area (behind 1896 at 14.27 inches), and even exceeds Boise's average annual precipitation of 11.73

inches. No rain fell during the first two weeks of the month. During the rest of the month most days had measurable rain. The moist and unstable air provided favorable conditions for daily rounds of showers and thunderstorms, some of which produced locally heavy showers.

June 2019 was the second driest June at the Boise airport, with only 0.04 inch of precipitation. Measurable rain fell on only two days. The average temperature for the month was very close to normal. June began with above normal temperatures, with highs in the 80s. On the 26th an upper level trough had arrived off the Washington-Oregon coast. As the trough edged further east that day, thunderstorms developed in northeast Oregon along a weak cold front, but they never got as far as Boise, and that night the front produced no precipitation.

Monitoring Station Summary

A summary of data collected for each monitoring station over the entire monitoring period (May-June) and for the targeted storm is provided in Table 2. Monthly summaries are presented in Tables 3 and 4. Monitoring period summary tables are included in Attachment A.

May – June summary hydrographs are presented in Figures 1 (Edgewood) and 2 (Chrisfield). Monthly hydrographs for each monitoring station in this monitoring period are provided in chronological order in Figures 3–6. Included on each hydrograph are recorded hourly precipitation at the local rain gauge (inches), flow (cubic feet per second), and sample collection times, as applicable. Hydrographs are included in Attachment B.

Section 3: Storm Narrative

One storm was targeted during the May – June monitoring period. Wet grab samples were collected at both sites on May 16, 2019. Grab samples are qualified for holding time. The time between collection time and analysis time was 37 hours. A successful composite sample was collected at Chrisfield, but the composite sample at Edgewood was unsuccessful. See Section 5 for additional notes about data collected during the monitoring period.

May 16, 2019

On Wednesday afternoon, May 15, the National Weather Service issued a forecast for rain showers in the Boise area from midday Thursday continuing through Friday afternoon. Chance of precipitation was 80-85 percent, with a total of 0.64 inch of precipitation forecasted. Setup was conducted Wednesday afternoon. An expected precipitation depth of 0.19 inch was used to set trigger volumes at Edgewood and Chrisfield. Precipitation started around 1500 on Thursday afternoon, May 16, 2019 and continued steadily through the afternoon until around 1900. Precipitation totals were 0.15 at Chrisfield and 0.21 at Edgewood.

A two-member team mobilized to collect stormwater runoff grab samples and verify operation of the automatic sampling equipment on the evening of May 16, 2019. Wet grab samples were collected at Edgewood and Chrisfield monitoring stations and submitted to the West Boise Water Quality Lab (WQL) at 1840 on May 16. Laboratory analytical reports are included in Attachment C.

Section 4: Pollutant Loading

Water quality results and pollutant loading estimates for each monitoring station for the May-June monitoring period are included in Table 2. Monthly values and estimates are presented for each individual month as

well (Tables 3–6). Water quality results and pollutant loading estimates for Edgewood were not calculated for this monitoring period since a composite sample was not collected. Field parameters and E. Coli analytical results are included in Tables 2-4.

Section 5: Deviations/Problems

Edgewood

During the May 16, 2019 storm event, the automatic sampler at Edgewood experienced unsuccessful subsamples due to an error in the flow module's firmware. Due to the firmware issue (per conversations with Isco tech support), the sampler bagan collecting double samples sporadically. Eight subsamples were collected successfully at the beginning of the event, but three of these were duplicates. Then from the ninth subsample on, all attempts recorded a 'no more liquid' error. The sampling team was confident that the strainer was submerged and that there were no air gaps in the intake tubing for the duration of the storm. The 'no more liquid' error is attributed to the firmware issue. This composite was taken to the lab, since the error was not realized until after the event. However, these lab results are rejected due to the equipment error.

After this event was completed, firmware was reinstalled and tested for accuracy. Subsamples were taken correctly during this trial run. In future monitoring events both grab and composite samples will be targeted for all analytical parameters, except e. coli (grab sample only), until successful composite samples can be collected consistently.

Section 6: References

National Weather Service Boise Forecast Office. (2018). Monthly Weather Summary. Retrieved July 20, 2019, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

National Weather Service Boise Forecast Office. (2018). Preliminary Monthly Climate Data. Retrieved July 20, 2019, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

Attachment A: Monitoring Period Summary Tables

Table 2

Monitoring Period Summary | May 1 - June 30 (WY19)						
	Edgewood			Chrisfield		
	cubic feet		percent	cubic feet		percent
Measured Stormwater Runoff Volume (cf)	75,080 [1]		15%	32,076 [1]		87%
Background Discharge Volume (cf)	841,689 [2]		85%	4,752 [2]		13%
Total Discharge Volume (cf)	916,769		100%	36,828		100%
Estimated Runoff for Monitored Area [3]	Edgewood		Eagle	Chrisfield		Meridian
Period Precipitation (in)	2.81 [4]			2.58 [5]		
Drainage Area (acres)	55.86		22,765	12		26,690
Estimated Stormwater Runoff Volume [6] (cf)	49,949		52,267,871	20,836		68,739,695
Monitored Storm Information	Edgewood (5/16/2019)			Chrisfield (5/16/2019)		
Precipitation Amount (in)	0.21			0.15		
Storm Duration (hrs)	5			4		
Antecedent Dry Period (hrs)	622			733		
Recorded Runoff Volume (cf)	4,230			1,332		
Sample Information						
Sample Date and Time	5/16/2019 18:11			5/16/2019 17:25		
Dissolved Oxygen (mg/L)	7.33			8.38		
pH (S.U.)	7.40			9.01		
Conductivity (uS/cm)	123.2			71.7		
Temperature (°C)	15.57			17.18		
Nitrate + Nitrite as N (mg/L)	--			0.570		
Total Suspended Solids (mg/L)	--			75.0		
Total Kjeldahl Nitrogen (mg/L)	--			6.71		
Dissolved Orthophospate as P (mg/L)	--			0.249		
Total Phosphorus as P (mg/L)	--			0.789		
E.Coli (MPN/100 mL)	6090.0 [7]			3410.0 [7]		
Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	--	--	--	0.10	1.14	2,538
Total Suspended Solids	--	--	--	12.51	150.17	333,993
Total Kjeldahl Nitrogen	--	--	--	1.12	13.43	29,881
Dissolved Orthophosphate as P	--	--	--	0.04	0.50	1,109
Total Phosphorus as P	--	--	--	0.13	1.58	3,514

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] Background discharge volume does not include dates with missing data.

[3] The "Monitored Area" includes only the area drained by the individual monitoring station.

[4] Hourly rainfall data are supplemented with available hourly rainfall data from Chrisfield.

[5] Hourly rainfall data are supplemented with available hourly rainfall data from Edgewood.

[6] Estimated stormwater runoff volume is calculated using local precipitation data.

[7] E.Coli results are qualified due to exceeded holding time.

Table 3

Monitoring Period Summary | May 1 - May 31 (WY18)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	74,846 [1]	14%	31,752 [1]	97%
Background Discharge Volume (cf)	447,907 [2]	86%	1,044 [2]	3%
Total Discharge Volume (cf)	522,753	100%	32,796	100%
Estimated Runoff for Monitored Area [3]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation (in)	2.78 [4]		2.56 [5]	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume [6] (cf)	49,297	51,586,116	20,675	68,206,829
Monitored Storm Information	Edgewood (5/16/2019)		Chrisfield (5/16/2019)	
Precipitation Amount (in)	0.21		0.15	
Storm Duration (hrs)	5		4	
Antecedent Dry Period (hrs)	622		733	
Recorded Runoff Volume (cf)	4,230		1,332	
Sample Information				
Sample Date and Time	5/16/2019 18:11		5/16/2019 17:25	
Dissolved Oxygen (mg/L)	7.33		8.38	
pH (S.U.)	7.40		9.01	
Conductivity (uS/cm)	123.2		71.7	
Temperature (°C)	15.57		17.18	
Nitrate + Nitrite as N (mg/L)	--		0.570	
Total Suspended Solids (mg/L)	--		75.0	
Total Kjeldahl Nitrogen (mg/L)	--		6.71	
Dissolved Orthophospate as P (mg/L)	--		0.249	
Total Phosphorus as P (mg/L)	--		0.789	
E.Coli (MPN/100 mL)	6090.0 [7]		3410.0 [7]	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	--	--	--	0.09	1.13	2,513
Total Suspended Solids	--	--	--	12.39	148.65	330,619
Total Kjeldahl Nitrogen	--	--	--	1.11	13.30	29,579
Dissolved Orthophosphate as P	--	--	--	0.04	0.49	1,098
Total Phosphorus as P	--	--	--	0.13	1.56	3,478

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] Background discharge volume does not include dates with missing data.

[3] The "Monitored Area" includes only the area drained by the individual monitoring station.

[4] Hourly rainfall data are supplemented with available hourly rainfall data from Chrisfield.

[5] Hourly rainfall data are supplemented with available hourly rainfall data from Edgewood.

[6] Estimated stormwater runoff volume is calculated using local precipitation data.

[7] E.Coli results are qualified due to exceeded holding time.

Table 4

Monitoring Period Summary | June 1 - June 30 (WY18)					
	Edgewood			Chrisfield	
	cubic feet	percent		cubic feet	percent
Measured Stormwater Runoff Volume (cf)	234	0%		324	8%
Background Discharge Volume (cf)	393,814 [1]	100%		3,708	92%
Total Discharge Volume (cf)	394,016	100%		4,032	100%
Estimated Runoff for Monitored Area [2]	Edgewood	Eagle		Chrisfield	Meridian
Monthly Precipitation (in)	0.03 [3]			0.02 [4]	
Drainage Area (acres)	55.86	22,765		12	26,690
Estimated Stormwater Runoff Volume [5] (cf)	652	681,755		162	532,866
Monitored Storm Information	Edgewood (5/16/2019)			Chrisfield (5/16/2019)	
Precipitation Amount (in)	0.21			0.15	
Storm Duration (hrs)	5			4	
Antecedent Dry Period (hrs)	622			733	
Recorded Runoff Volume (cf)	4,230			1,332	
Sample Information					
Sample Date and Time	5/16/2019 18:11			5/16/2019 17:25	
Dissolved Oxygen (mg/L)	7.33			8.38	
pH (S.U.)	7.40			9.01	
Conductivity (uS/cm)	123.2			71.7	
Temperature (°C)	15.57			17.18	
Nitrate + Nitrite as N (mg/L)	--			0.570	
Total Suspended Solids (mg/L)	--			75.0	
Total Kjeldahl Nitrogen (mg/L)	--			6.71	
Dissolved Orthophospate as P (mg/L)	--			0.249	
Total Phosphorus as P (mg/L)	--			0.789	
E.Coli (MPN/100 mL)	6090.0 [6]			3410.0 [6]	
Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	--	--	--	0.00	0.01	26
Total Suspended Solids	--	--	--	0.13	1.52	3,374
Total Kjeldahl Nitrogen	--	--	--	0.01	0.14	302
Dissolved Orthophosphate as P	--	--	--	0.00	0.01	11
Total Phosphorus as P	--	--	--	0.00	0.02	36

Notes:

[1] Background discharge volume does not include dates with missing data.

[2] The "Monitored Area" includes only the area drained by the individual monitoring station.

[3] Hourly rainfall data are supplemented with available hourly rainfall data from Chrisfield.

[4] Hourly rainfall data are supplemented with available hourly rainfall data from Edgewood.

[5] Estimated stormwater runoff volume is calculated using local precipitation data.

[6] E.Coli results are qualified due to exceeded holding time.

Attachment B: Monitoring Period Hydrographs

Figure 1

Edgewood - Water Year 2019 - May 2019 through June 2019

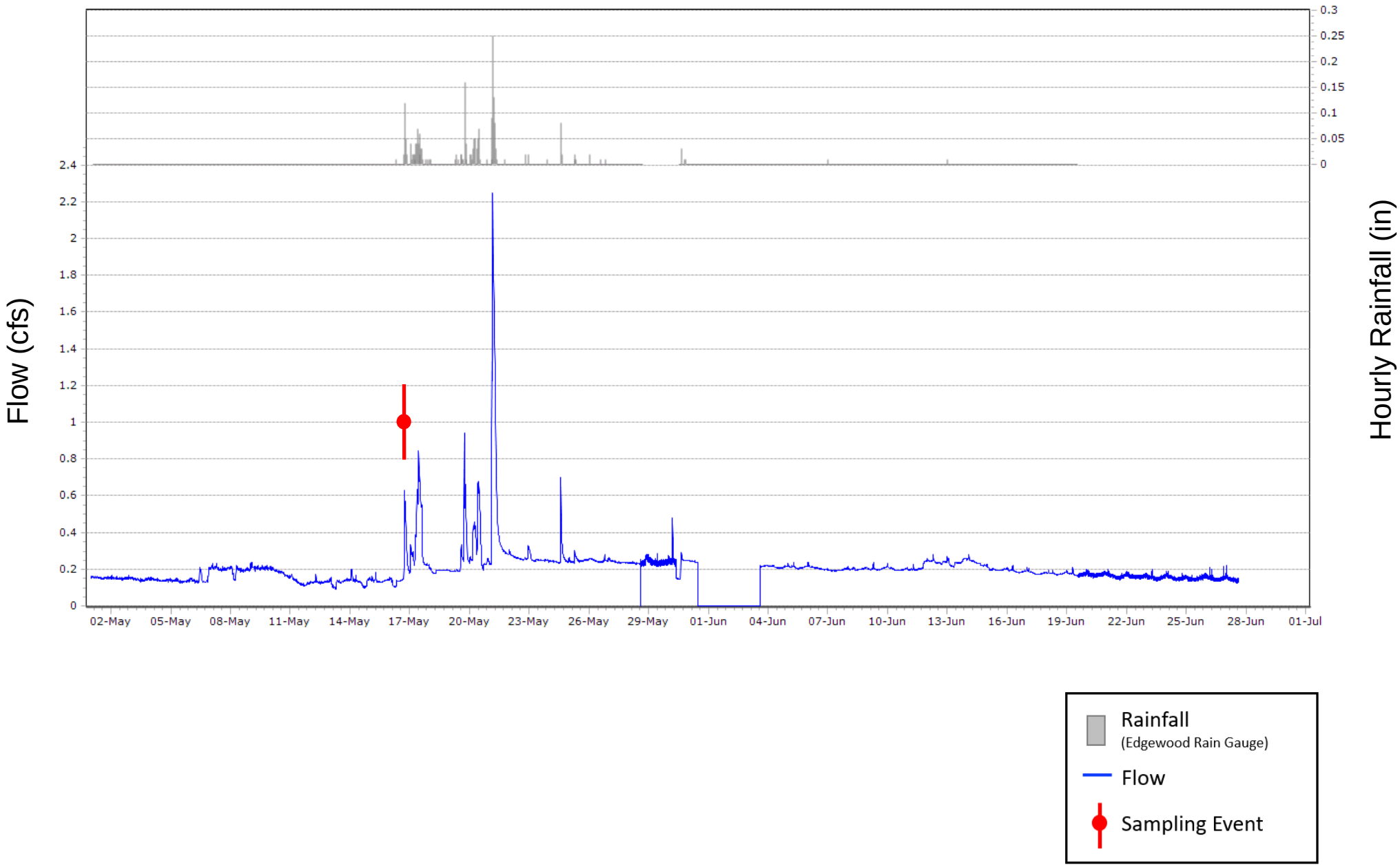


Figure 2

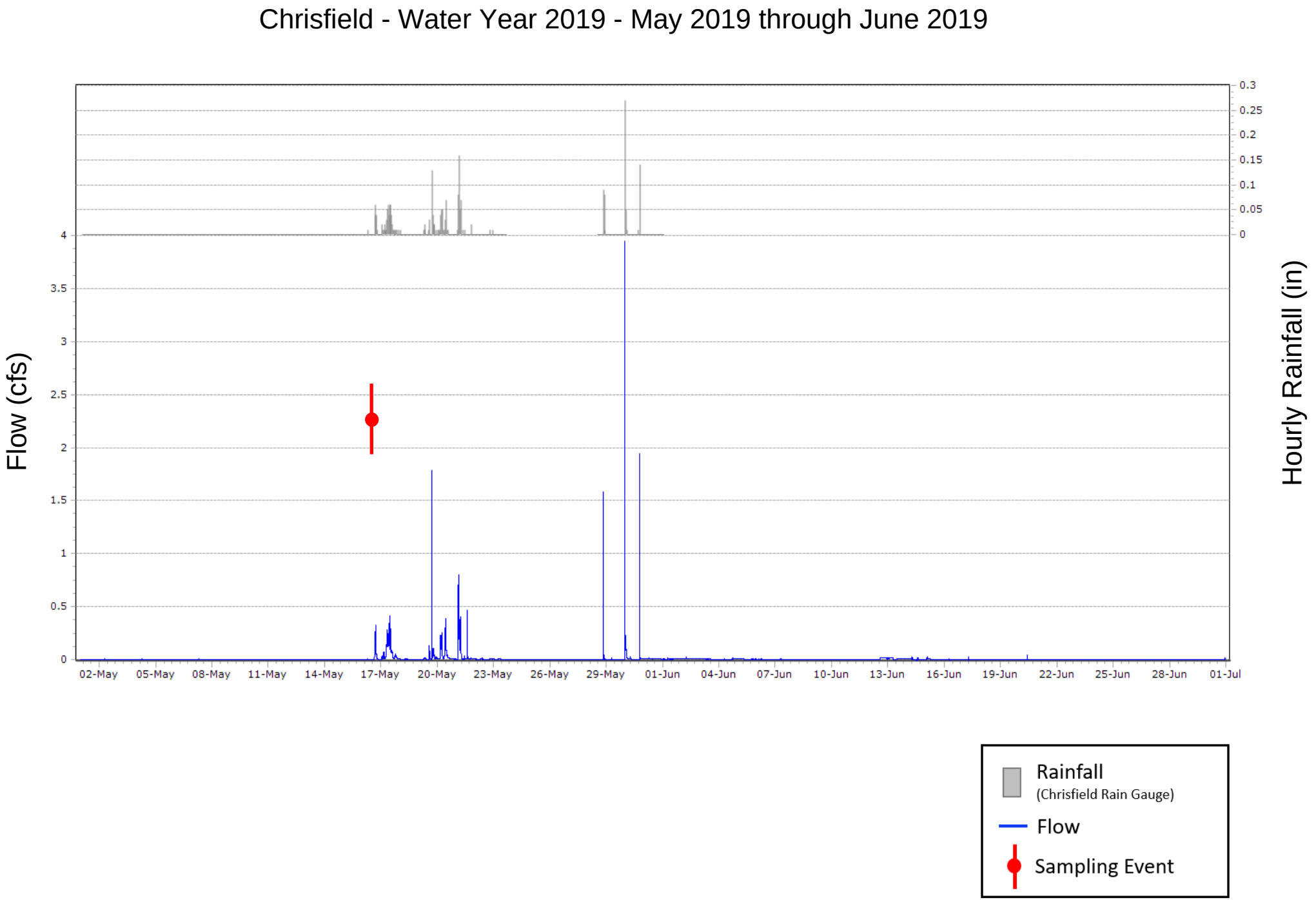

Chrisfield - Water Year 2019 - May 2019 through June 2019
Flow (cfs)
Hourly Rainfall (in)
0
0.5
1
1.5
2
2.5
3
3.5
4
0
0.05
0.1
0.15
0.2
0.25
0.3
02-May
05-May
08-May
11-May
14-May
17-May
20-May
23-May
26-May
29-May
01-Jun
04-Jun
07-Jun
10-Jun
13-Jun
16-Jun
19-Jun
22-Jun
25-Jun
28-Jun
01-Jul
Rainfall
(Chrisfield Rain Gauge)
Flow
Sampling Event

Figure 3

Edgewood - Water Year 2019 - May 2019

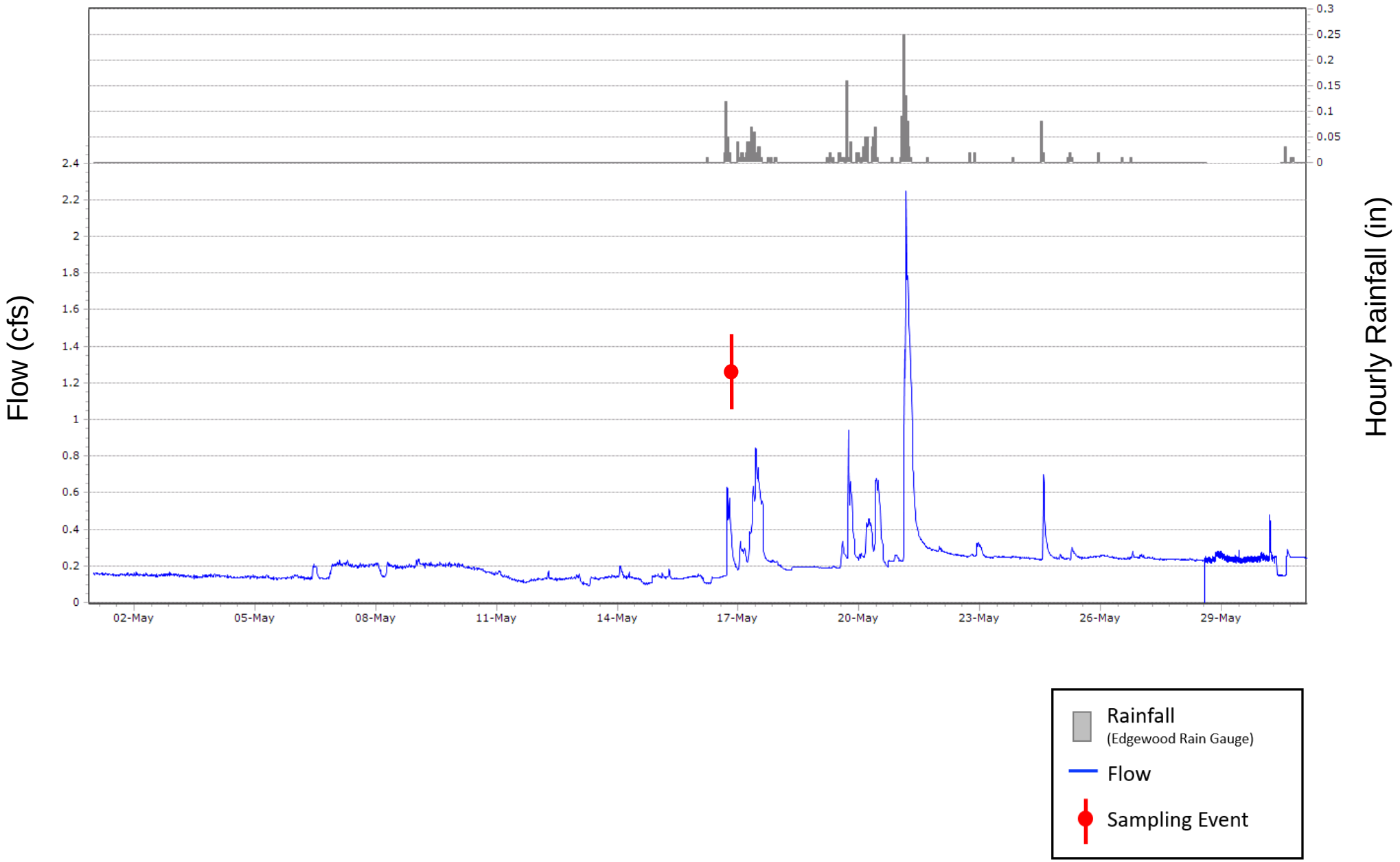


Figure 4

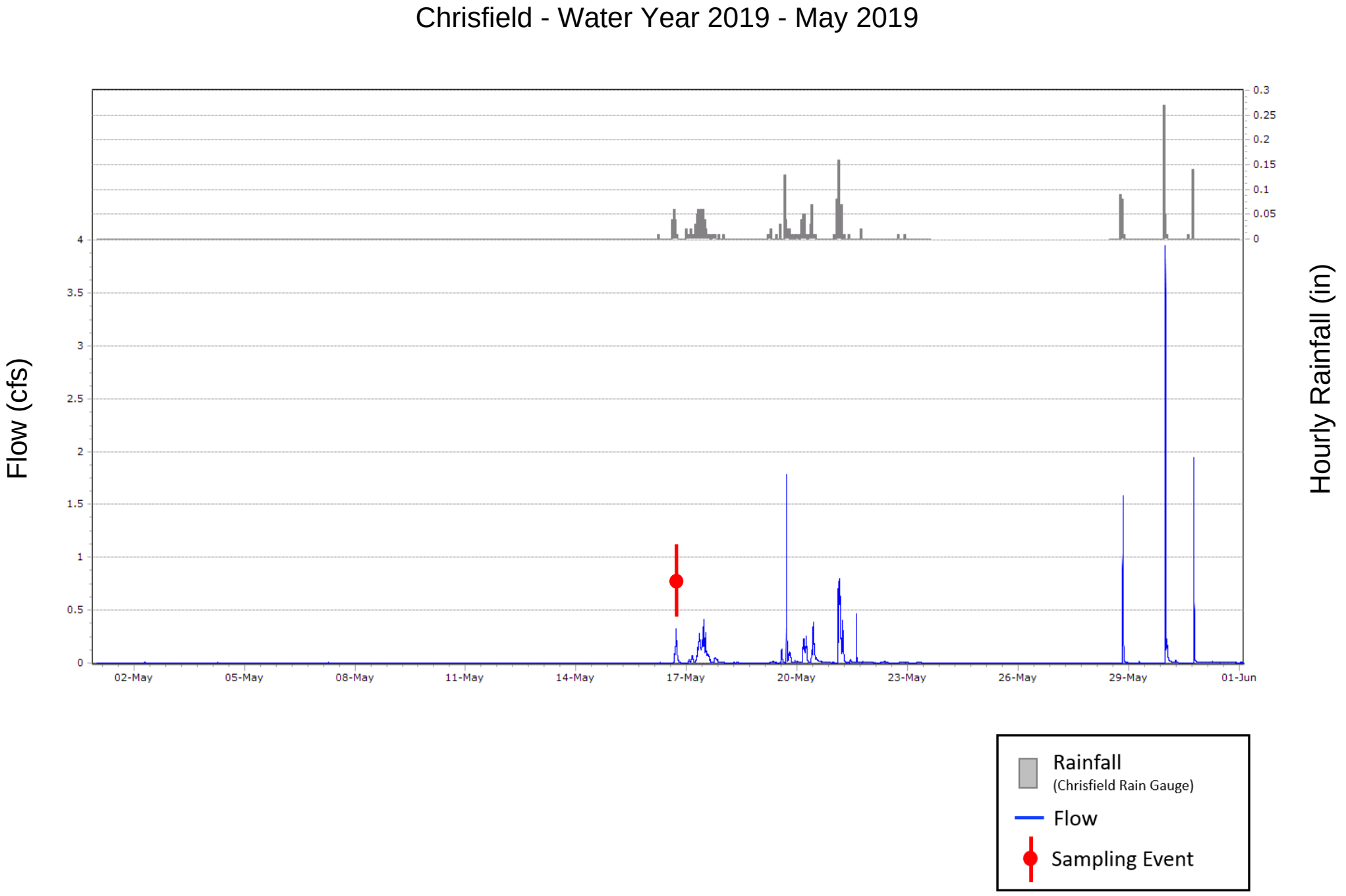

Chrisfield - Water Year 2019 - May 2019
Flow (cfs)
Hourly Rainfall (in)
0.3
0.25
0.2
0.15
0.1
0.05
0
4
3.5
3
2.5
2
1.5
1
0.5
0
02-May
05-May
08-May
11-May
14-May
17-May
20-May
23-May
26-May
29-May
01-Jun
Rainfall
(Chrisfield Rain Gauge)
Flow
Sampling Event

Figure 5

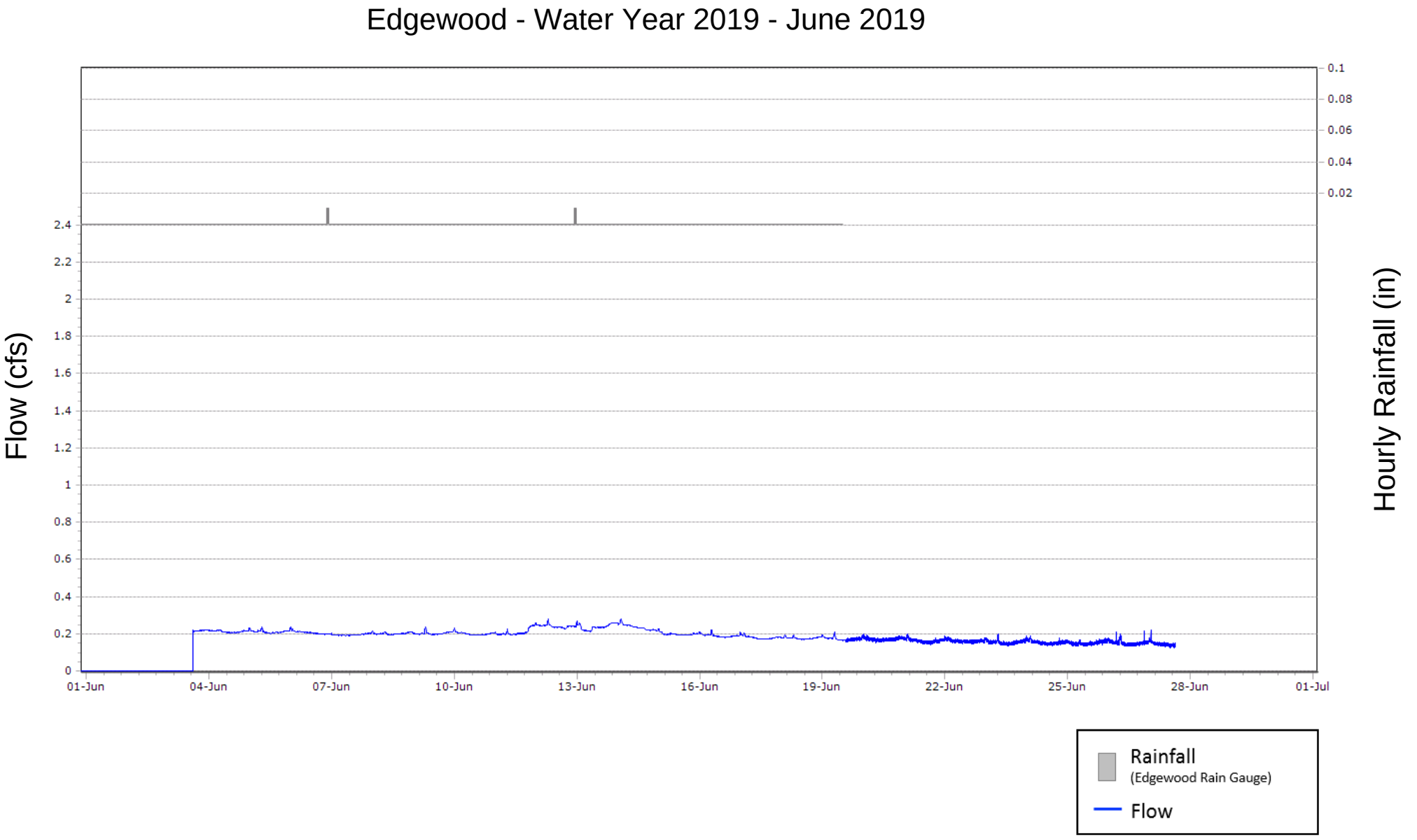
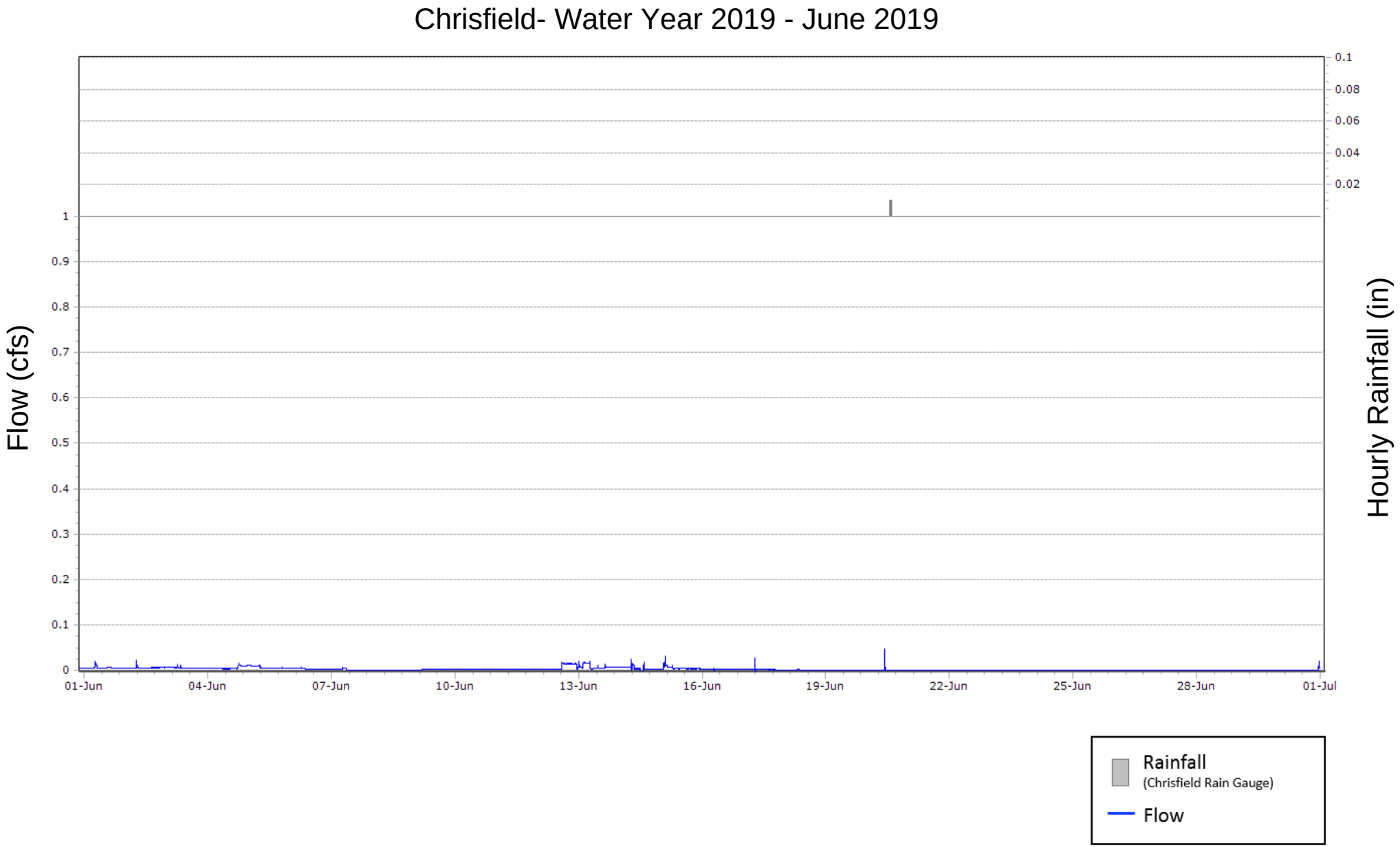

Edgewood - Water Year 2019 - June 2019
Flow (cfs)
Hourly Rainfall (in)
0.1
0.08
0.06
0.04
0.02
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
01-Jun
04-Jun
07-Jun
10-Jun
13-Jun
16-Jun
19-Jun
22-Jun
25-Jun
28-Jun
01-Jul
Rainfall
(Edgewood Rain Gauge)
Flow

Figure 6


Chrisfield- Water Year 2019 - June 2019
Flow (cfs)
Hourly Rainfall (in)
0.1
0.08
0.06
0.04
0.02
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
01-Jun
04-Jun
07-Jun
10-Jun
13-Jun
16-Jun
19-Jun
22-Jun
25-Jun
28-Jun
01-Jul
Rainfall
(Chrisfield Rain Gauge)
Flow

Attachment C: Analytical Reports and Field Sheets

Report Date: 05/24/2019 13:12

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
9AC0022-01	ACST2B	190516-09-WG	Water		05/16/2019	05/17/2019
9AC0022-02	ACST2B	190516-08-WG	Water		05/16/2019	05/17/2019
9AC0022-03	ACST2B	190516-08-001	Water		05/16/2019	05/17/2019

Report Date: 05/24/2019 13:12

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2B	Location Description:	190516-08-WG
Date/Time Collected:	05/16/2019 18:11		
Lab Number:	9AC0022-02	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9E1701	6090.0	MPN/100 mL	100.0	1.0	Colilert	05/17/19 05:39	5/18/19 6:50	LRF	H D
Wet Chemistry										
Chlorine Screen	B9E1708	Absent				SM 4500-CL G-2000 mod	05/17/19	5/17/19 5:33	KMR	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 05/24/2019 13:12

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Analysis Report

Location:	ACST2B	Location Description:	190516-08-001
Date/Time Collected:	05/16/2019 12:00		
Lab Number:	9AC0022-03	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9E1701	<1.0	MPN/100 mL	1.0	1.0	Colilert	05/17/19 05:39	5/18/19 6:50	LRF	H U
Wet Chemistry										
Chlorine Screen	B9E1708	Absent				SM 4500-CL G-2000 mod	05/17/19	5/17/19 5:33	KMR	

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Report Date: 05/24/2019 13:12

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Analysis Report

Location:	ACST2B	Location Description:	190516-09-WG
Date/Time Collected:	05/16/2019 17:25		
Lab Number:	9AC0022-01	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9E1701	3410.0	MPN/100 mL	100.0	1.0	Colilert	05/17/19 05:26	5/18/19 6:50	LRF	H D
Wet Chemistry										
Chlorine Screen	B9E1708	Absent				SM 4500-CL G-2000 mod	05/17/19	5/17/19 5:23	KMR	

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Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Microbiology									
Batch: B9E1701									
Blank (B9E1701-BLK1)									
E. Coli	Absent						05/18/2019	LRF	
LCS (B9E1701-BS1)									
E. Coli				Present			05/18/2019	LRF	
Duplicate (B9E1701-DUP2)	Source ID: 9AC0022-01RE1								
E. Coli					Pass	128	05/18/2019	LRF	

Report Date: 05/24/2019 13:12

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Notes and Definitions

Item	Definition
D	Data reported from a dilution
H	Hold time Exceeded.
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

J Finegan-Kelly

Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Azubike Emenari
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Tammy Lightle, Andy Wagel

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
AC0022-01	5/16/19		1725		190516-09-WG	ABW	X	X												X					1
-02			1811		190516-08-WG	ABW	X	X												X					1
-03			1200		190516-08-001	ABW	X	X												X					1

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
Andy Wagel	5/16/19 1840	[signature] 5-17-19 0511	

9AC0022

Report Date: 06/05/2019 15:06

Boise City Public Works
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Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
9AC0025-01	ACST2C	190516-08-WC	Water		05/16/2019	05/17/2019
Comments:						
	No dissolved parameters. Low sample volume.					
9AC0025-02	ACST2C	190516-09-WC	Water		05/16/2019	05/17/2019

Report Date: 06/05/2019 15:06

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Analysis Report

Location:	ACST2C	Location Description:	190516-08-WC
Date/Time Collected:	05/16/2019 18:20 - 05/16/2019 21:20		
Lab Number:	9AC0025-01	Sample Collector:	ABC
Sample Type:	Composite	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Wet Chemistry										
Ammonia, as N	B9E2905	904	ug/L	35.0	35.0	SM 4500-NH3 D-1997	05/29/19	5/29/19 9:28	ASM	
BOD5	B9E1805	80.9	mg/L	2.00	2.00	SM 5210 B-2001	05/18/19	5/23/19 8:59	ALD	
COD	B9E1801	360	mg/L	7.00	7.00	SM 5220 D-2017	05/18/19	5/18/19 10:45	CJP	
TKN	B9E2901	5.72	mg/L	0.130	0.130	EPA 351.2	05/29/19	5/30/19 10:05	LRF	
Total Dissolved Solids	B9E1634	159	mg/L	20.0	20.0	SM 2540 C-1997	05/17/19	5/18/19 8:30	ASM	
Total Suspended Solids	B9E1707	230	mg/L	0.900	0.900	SM 2540 D-1997	05/17/19	5/17/19 14:24	CPC	
Turbidity	B9E1710	29.7	NTU	0.3	0.3	EPA180.1 R2.0 (1993)	05/17/19	5/17/19 14:00	ALD	
Total Metals										
Mercury	B9E2215	0.0752	ug/L	4.71E-3	4.71E-3	EPA 245.2	05/23/19	5/24/19 8:13	SAS	
Arsenic	B9E2009	<5.72	ug/L	5.72	5.72	EPA 200.7	05/20/19	5/22/19 17:47	EDM	U
Cadmium	B9E2009	<1.00	ug/L	1.00	1.00	EPA 200.7	05/20/19	5/22/19 17:47	EDM	U
Calcium	B9E2009	18000	ug/L	50.0	50.0	EPA 200.7	05/20/19	5/22/19 17:47	EDM	
Lead	B9E2009	7.19	ug/L	6.94	6.94	EPA 200.7	05/20/19	5/22/19 17:47	EDM	
Magnesium	B9E2009	4380	ug/L	50.0	50.0	EPA 200.7	05/20/19	5/22/19 17:47	EDM	
Phosphorus as P	B9E2009	0.978	mg/L	6.00E-3	6.00E-3	EPA 200.7	05/20/19	5/22/19 17:47	EDM	
Hardness	B9E2009	62.9	mg/L	0.125	0.125	EPA 200.7	05/20/19	5/22/19 17:47	EDM	

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Analysis Report

Location:	ACST2C	Location Description:	190516-09-WC
Date/Time Collected:	05/16/2019 16:09 - 05/16/2019 18:29		
Lab Number:	9AC0025-02	Sample Collector:	ABC
Sample Type:	Composite	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Wet Chemistry										
Ammonia, as N	B9E2905	1570	ug/L	35.0	35.0	SM 4500-NH3 D-1997	05/29/19	5/29/19 9:06	ASM	
BOD5	B9E1805	38.1	mg/L	2.00	2.00	SM 5210 B-2001	05/18/19	5/23/19 8:41	ALD	
COD	B9E1801	207	mg/L	7.00	7.00	SM 5220 D-2017	05/18/19	5/18/19 10:45	CJP	
Nitrate-Nitrite, as N	B9E3103	0.570	mg/L	0.0250	0.0250	EPA 353.2	05/31/19	5/31/19 11:10	SMC	
TKN	B9E2901	6.71	mg/L	0.130	0.130	EPA 351.2	05/29/19	5/30/19 10:07	LRF	
Total Dissolved Solids	B9E1634	129	mg/L	20.0	20.0	SM 2540 C-1997	05/17/19	5/18/19 8:30	ASM	
Total Suspended Solids	B9E1707	75.0	mg/L	0.900	0.900	SM 2540 D-1997	05/17/19	5/17/19 14:25	CPC	
Turbidity	B9E1710	36.9	NTU	0.3	0.3	EPA180.1 R2.0 (1993)	05/17/19	5/17/19 13:07	ALD	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9E1709	0.249	mg/L	2.00E-3	2.00E-3	EPA 365.1	05/17/19	5/17/19 12:49	ALN	
Total Metals										
Mercury	B9E2215	0.0175	ug/L	4.71E-3	4.71E-3	EPA 245.2	05/23/19	5/24/19 9:16	SAS	
Arsenic	B9E2009	<5.72	ug/L	5.72	5.72	EPA 200.7	05/20/19	5/22/19 17:52	EDM	U
Cadmium	B9E2009	<1.00	ug/L	1.00	1.00	EPA 200.7	05/20/19	5/22/19 17:52	EDM	U
Calcium	B9E2009	12200	ug/L	50.0	50.0	EPA 200.7	05/20/19	5/22/19 17:52	EDM	
Lead	B9E2009	<6.94	ug/L	6.94	6.94	EPA 200.7	05/20/19	5/22/19 17:52	EDM	U
Magnesium	B9E2009	1900	ug/L	50.0	50.0	EPA 200.7	05/20/19	5/22/19 17:52	EDM	
Phosphorus as P	B9E2009	0.789	mg/L	6.00E-3	6.00E-3	EPA 200.7	05/20/19	5/22/19 17:52	EDM	
Hardness	B9E2009	38.2	mg/L	0.125	0.125	EPA 200.7	05/20/19	5/22/19 17:52	EDM	
Dissolved Metals										
Cadmium	B9F0312	<1.00	ug/L	1.00	1.00	EPA 200.7	06/03/19	6/3/19 15:48	EDM	U
Copper	B9F0312	18.7	ug/L	10.0	10.0	EPA 200.7	06/03/19	6/3/19 15:48	EDM	
Lead	B9F0312	<6.94	ug/L	6.94	6.94	EPA 200.7	06/03/19	6/3/19 15:48	EDM	U
Zinc	B9F0312	56.3	ug/L	10.0	10.0	EPA 200.7	06/03/19	6/3/19 15:48	EDM	

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Report Date: 06/05/2019 15:06

Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry									
Batch: B9E1634									
Blank (B9E1634-BLK1)									
Total Dissolved Solids	< 20	mg/L					05/16/2019	ASM	U
LCS (B9E1634-BS1)									
Total Dissolved Solids			106	90-110			05/16/2019	ASM	
Duplicate (B9E1634-DUP1)	Source ID: 9EN0006-02								
Total Dissolved Solids					1.98	10	05/16/2019	ASM	
Batch: B9E1707									
Blank (B9E1707-BLK1)									
Total Suspended Solids	< 0.9	mg/L					05/17/2019	CPC	U
LCS (B9E1707-BS1)									
Total Suspended Solids			98.0	90-110			05/17/2019	CPC	
Duplicate (B9E1707-DUP1)	Source ID: 9BB0293-01								
Total Suspended Solids					1.03	20	05/17/2019	CPC	
Batch: B9E1710									
Blank (B9E1710-BLK1)									
Turbidity	< 0.3	NTU					05/17/2019	ALD	U
LCS (B9E1710-BS1)									
Turbidity			99.3	90-110			05/17/2019	ALD	
Duplicate (B9E1710-DUP1)	Source ID: 9AC0024-01								
Turbidity					15.8	25	05/17/2019	ALD	
Batch: B9E1801									
Blank (B9E1801-BLK1)									
COD	< 7	mg/L					05/18/2019	CJP	U
LCS (B9E1801-BS1)									
COD			98.3	90-110			05/18/2019	CJP	
Duplicate (B9E1801-DUP1)	Source ID: 9AC0024-01								
COD					1.86	10	05/18/2019	CJP	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9E1805									
Blank (B9E1805-BLK1)									
BOD5	< 2	mg/L					05/23/2019	ALD	U
LCS (B9E1805-BS1)									
BOD5			105	84.6-115.4			05/23/2019	ALD	
LCS (B9E1805-BS2)									
BOD5			108	84.6-115.4			05/23/2019	ALD	
Duplicate (B9E1805-DUP1) Source ID: 9BB0301-01									
BOD5					6.35	30	05/23/2019	ALD	D
Batch: B9E2901									
Blank (B9E2901-BLK1)									
TKN	< 0.13	mg/L					05/30/2019	LRF	U
Blank (B9E2901-BLK2)									
TKN	< 0.13	mg/L					05/30/2019	LRF	U
Blank (B9E2901-BLK3)									
TKN	< 0.13	mg/L					05/30/2019	LRF	U
LCS (B9E2901-BS1)									
TKN			99.1	80-120			05/30/2019	LRF	
LCS (B9E2901-BS2)									
TKN			101	80-120			05/30/2019	LRF	
Duplicate (B9E2901-DUP1) Source ID: 9AC0024-01									
TKN					1.33	20	05/30/2019	LRF	
Duplicate (B9E2901-DUP2) Source ID: 9PK0014-03									
TKN					9.95	20	05/30/2019	LRF	
Duplicate (B9E2901-DUP3) Source ID: 9BB0286-01									
TKN					4.80	20	05/30/2019	LRF	D
Matrix Spike (B9E2901-MS1) Source ID: 9AC0024-01									
TKN			102	80-120			05/30/2019	LRF	
Matrix Spike (B9E2901-MS2) Source ID: 9PK0014-03									
TKN			101	80-120			05/30/2019	LRF	
Matrix Spike (B9E2901-MS4) Source ID: 9WQ0023-01									
TKN			95.9	80-120			05/30/2019	LRF	D
Matrix Spike (B9E2901-MS5) Source ID: 9BB0271-04RE1									
TKN			103	80-120			05/30/2019	LRF	D
[Spk] 50mL->100mL; 5mL->25mL; Spiked 25mL									
Matrix Spike Dup (B9E2901-MSD1) Source ID: 9AC0024-01									
TKN			91.2	80-120	3.44	20	05/30/2019	LRF	
Matrix Spike Dup (B9E2901-MSD2) Source ID: 9PK0014-03									
TKN			101	80-120	8.91E-3	20	05/30/2019	LRF	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9E2905									
Blank (B9E2905-BLK1)									
Ammonia, as N	< 35	ug/L					05/29/2019	ASM	U
Blank (B9E2905-BLK2)									
Ammonia, as N	< 35	ug/L					05/29/2019	ASM	U
LCS (B9E2905-BS1)									
Ammonia, as N			104	90-110			05/29/2019	ASM	
LCS (B9E2905-BS2)									
Ammonia, as N			110	90-110			05/29/2019	ASM	
Duplicate (B9E2905-DUP1) Source ID: 9WQ0023-08									
Ammonia, as N					1.45	10	05/29/2019	ASM	
Duplicate (B9E2905-DUP2) Source ID: 9BB0314-01									
Ammonia, as N					0.443	10	05/29/2019	ASM	
Duplicate (B9E2905-DUP3) Source ID: 9BB0317-01									
Ammonia, as N					0.252	10	05/29/2019	ASM	
Matrix Spike (B9E2905-MS1) Source ID: 9WQ0023-08									
Ammonia, as N			105	80-120			05/29/2019	ASM	
Matrix Spike (B9E2905-MS2) Source ID: 9BB0314-01									
Ammonia, as N			108	80-120			05/29/2019	ASM	
Matrix Spike (B9E2905-MS3) Source ID: 9BB0317-01									
Ammonia, as N			115	80-120			05/29/2019	ASM	
Matrix Spike Dup (B9E2905-MSD1) Source ID: 9WQ0023-08									
Ammonia, as N			101	80-120	2.46	10	05/29/2019	ASM	
Matrix Spike Dup (B9E2905-MSD2) Source ID: 9BB0314-01									
Ammonia, as N			110	80-120	1.48	10	05/29/2019	ASM	
Matrix Spike Dup (B9E2905-MSD3) Source ID: 9BB0317-01									
Ammonia, as N			114	80-120	0.525	10	05/29/2019	ASM	
Batch: B9E3103									
Blank (B9E3103-BLK1)									
Nitrate-Nitrite, as N	< 0.025	mg/L					05/31/2019	SMC	U
Blank (B9E3103-BLK2)									
Nitrate-Nitrite, as N	< 0.025	mg/L					05/31/2019	SMC	U
LCS (B9E3103-BS1)									
Nitrate-Nitrite, as N			96.8	90-110			05/31/2019	SMC	
LCS (B9E3103-BS2)									
Nitrate-Nitrite, as N			95.6	90-110			05/31/2019	SMC	
Duplicate (B9E3103-DUP1) Source ID: 9AC0025-02									
Nitrate-Nitrite, as N					0.648	10	05/31/2019	SMC	
Duplicate (B9E3103-DUP2) Source ID: 9BB0286-01									
Nitrate-Nitrite, as N					2.23	10	05/31/2019	SMC	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9E3103 (Continued)									
Duplicate (B9E3103-DUP3) Source ID: 9PK0014-03									
Nitrate-Nitrite, as N					6.72	10	05/31/2019	SMC	
Matrix Spike (B9E3103-MS1) Source ID: 9AC0025-02									
Nitrate-Nitrite, as N			99.2	90-110			05/31/2019	SMC	
Matrix Spike (B9E3103-MS2) Source ID: 9BB0286-01									
Nitrate-Nitrite, as N			97.7	90-110			05/31/2019	SMC	
Matrix Spike (B9E3103-MS3) Source ID: 9PK0014-03									
Nitrate-Nitrite, as N			97.1	90-110			05/31/2019	SMC	
Matrix Spike (B9E3103-MS4) Source ID: 9AC0030-01									
Nitrate-Nitrite, as N			96.6	90-110			05/31/2019	SMC	
Matrix Spike Dup (B9E3103-MSD1) Source ID: 9AC0025-02									
Nitrate-Nitrite, as N			97.2	90-110	0.834	10	05/31/2019	SMC	
Matrix Spike Dup (B9E3103-MSD2) Source ID: 9BB0286-01									
Nitrate-Nitrite, as N			96.6	90-110	0.912	10	05/31/2019	SMC	
Matrix Spike Dup (B9E3103-MSD3) Source ID: 9PK0014-03									
Nitrate-Nitrite, as N			95.6	90-110	1.34	10	05/31/2019	SMC	
Dissolved Wet Chemistry									
Batch: B9E1709									
Blank (B9E1709-BLK1)									
Orthophosphate, as P	< 0.002	mg/L					05/17/2019	ALN	U
LCS (B9E1709-BS1)									
Orthophosphate, as P			97.1	90-110			05/17/2019	ALN	
Duplicate (B9E1709-DUP1) Source ID: 9BB0294-01									
Orthophosphate, as P					2.56	10	05/17/2019	ALN	D
Duplicate (B9E1709-DUP2) Source ID: 9BB0293-01									
Orthophosphate, as P					0.0278	10	05/17/2019	ALN	D
Matrix Spike (B9E1709-MS1) Source ID: 9BB0294-01									
Orthophosphate, as P			99.7	90-110			05/17/2019	ALN	D
Matrix Spike (B9E1709-MS2) Source ID: 9BB0293-01									
Orthophosphate, as P			103	90-110			05/17/2019	ALN	D
Matrix Spike Dup (B9E1709-MSD1) Source ID: 9BB0294-01									
Orthophosphate, as P			104	90-110	0.837	10	05/17/2019	ALN	D
Matrix Spike Dup (B9E1709-MSD2) Source ID: 9BB0293-01									
Orthophosphate, as P			104	90-110	0.438	10	05/17/2019	ALN	D

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Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Total Metals									
Batch: B9E2009									
Blank (B9E2009-BLK1)									
Arsenic	< 5.72	ug/L					05/22/2019	EDM	U
Cadmium	< 1	ug/L					05/22/2019	EDM	U
Calcium	< 50	ug/L					05/22/2019	EDM	U
Lead	< 6.94	ug/L					05/22/2019	EDM	U
Magnesium	< 50	ug/L					05/22/2019	EDM	U
Phosphorus as P	< 0.006	mg/L					05/22/2019	EDM	U
LCS (B9E2009-BS1)									
Arsenic			105	85-115			05/22/2019	EDM	
Cadmium			102	85-115			05/22/2019	EDM	
Calcium			102	85-115			05/22/2019	EDM	
Lead			102	85-115			05/22/2019	EDM	
Magnesium			104	85-115			05/22/2019	EDM	
Phosphorus as P			106	85-115			05/22/2019	EDM	
Duplicate (B9E2009-DUP1) Source ID: 9AC0024-01									
Arsenic					8.26	20	05/22/2019	EDM	
Cadmium					NR	20	05/22/2019	EDM	U
Calcium					0.264	20	05/22/2019	EDM	
Lead					NR	20	05/22/2019	EDM	U
Magnesium					0.255	20	05/22/2019	EDM	
Phosphorus as P					0.228	20	05/22/2019	EDM	
Matrix Spike (B9E2009-MS1) Source ID: 9AC0024-01									
Arsenic			107	70-130			05/22/2019	EDM	
Cadmium			103	70-130			05/22/2019	EDM	
Calcium			103	70-130			05/22/2019	EDM	
Lead			105	70-130			05/22/2019	EDM	
Magnesium			105	70-130			05/22/2019	EDM	
Phosphorus as P			97.9	70-130			05/22/2019	EDM	
Matrix Spike Dup (B9E2009-MSD1) Source ID: 9AC0024-01									
Arsenic			107	70-130	0.452	20	05/22/2019	EDM	
Cadmium			103	70-130	0.208	20	05/22/2019	EDM	
Calcium			102	70-130	0.319	20	05/22/2019	EDM	
Lead			106	70-130	0.772	20	05/22/2019	EDM	
Magnesium			105	70-130	0.403	20	05/22/2019	EDM	
Phosphorus as P			96.0	70-130	0.357	20	05/22/2019	EDM	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Total Metals (Continued)									
Batch: B9E2215									
Blank (B9E2215-BLK1)									
Mercury	< 0.00471	ug/L					05/24/2019	SAS	U
LCS (B9E2215-BS1)									
Mercury			101	85-115			05/24/2019	SAS	
Duplicate (B9E2215-DUP1) Source ID: 9AC0025-01									
Mercury					10.3	20	05/24/2019	SAS	
Duplicate (B9E2215-DUP2) Source ID: 9BB0287-01									
Mercury					4.08	20	05/24/2019	SAS	D
Matrix Spike (B9E2215-MS1) Source ID: 9AC0025-01									
Mercury			99.8	70-130			05/24/2019	SAS	
Matrix Spike (B9E2215-MS2) Source ID: 9BB0287-01									
Mercury			99.4	70-130			05/24/2019	SAS	D
Matrix Spike Dup (B9E2215-MSD1) Source ID: 9AC0025-01									
Mercury			103	70-130	2.03	20	05/24/2019	SAS	
Matrix Spike Dup (B9E2215-MSD2) Source ID: 9BB0287-01									
Mercury			99.1	70-130	0.281	20	05/24/2019	SAS	D
Dissolved Metals									
Batch: B9F0312									
Blank (B9F0312-BLK1)									
Cadmium	< 1	ug/L					06/03/2019	EDM	U
Copper	< 10	ug/L					06/03/2019	EDM	U
Lead	< 6.94	ug/L					06/03/2019	EDM	U
Zinc	< 10	ug/L					06/03/2019	EDM	U
LCS (B9F0312-BS1)									
Cadmium			101	85-115			06/03/2019	EDM	
Copper			99.8	85-115			06/03/2019	EDM	
Lead			101	85-115			06/03/2019	EDM	
Zinc			98.0	85-115			06/03/2019	EDM	
Duplicate (B9F0312-DUP1) Source ID: 9AC0025-02									
Cadmium					NR	10	06/03/2019	EDM	U
Copper					3.69	10	06/03/2019	EDM	
Lead					NR	10	06/03/2019	EDM	U
Zinc					0.943	10	06/03/2019	EDM	
Matrix Spike (B9F0312-MS1) Source ID: 9AC0025-02									
Cadmium			99.6	70-130			06/03/2019	EDM	
Copper			98.8	70-130			06/03/2019	EDM	
Lead			97.9	70-130			06/03/2019	EDM	
Zinc			94.5	70-130			06/03/2019	EDM	
Matrix Spike Dup (B9F0312-MSD1) Source ID: 9AC0025-02									
Cadmium			99.9	70-130	0.325	10	06/03/2019	EDM	
Copper			91.5	70-130	5.50	10	06/03/2019	EDM	
Lead			99.5	70-130	1.69	10	06/03/2019	EDM	
Zinc			95.6	70-130	0.517	10	06/03/2019	EDM	

Report Date: 06/05/2019 15:06

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
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Notes and Definitions

Item	Definition
D	Data reported from a dilution
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

J Finegan-Kelly

Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Azubike Emenari
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Andy Carlson

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAL-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
AC0025-01	5/16/19	5/16/19	1820	2126	190516-08-WC	ABC	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	1
↓ -02	5/16/19	5/16/19	1609	1829	190516-09-WC	ABC	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	1

Relinquished by (sign)	Date & Time Transferred	Received by (sign)
[signature]	1111 5/17/19	[signature] 05/17/19 1112

Comments/Special Instructions:

If not enough volume for all analytes, please prioritize total parameters over Dissolved.

-ABC

9AC0025-01 → No dissolved parameters; low sample volume. -SMC

9AC0025

Form 21A
Grab Sample Data Form – Phase II

Station: Edgewood Personnel: ABS, TLL

Date/Time - On-site: 5/16/19 1808 (MDT)/MST* (circle one)

GRAB INFORMATION:

Is this a QA/QC Station? Yes X No ____ (if YES, fill out Form 21B on back)

Photographs Taken? Yes ____ No X Swing Sampler Used? Yes X No ____

Sample ID: 190516 – 08 -WG (fill in appropriate sequential number)

Date/Time	Container - Test (Subsample Result)	Labeled
5/16/19 1811	(1) 250mL sterile plastic – *E. coli*	☒

FIELD PARAMETERS: Fill (1) 500mL Amber Date/Time: 5/16/19 1811

	Value	Unit		Value	Unit
Diss. O_2 – DO Meter	7.33	Mg/L	Temp – DO Meter	15.57	°C
Conductivity –	123.2	µS/cm	Temp - Cond Meter	18.57	°C
pH – pH Meter	7.40	S.U.	Temp – pH Meter	15.57	°C

AUTO SAMPLER CURRENT STATUS:

First Subsample taken: Yes / No (circle one) ; if Yes, Date/Time 5/16/19 1705

Last Subsample taken, Date/Time 5/16/19 1805 # of Subsamples taken: 9

COMMENTS:

Date/Time - Off-site: 5/16/19 1818

Station: ____ Personnel: ____

Form 21B
QA/QC Grab Sample Data Form – Phase II

FIELD DUPLICATE:

Sample ID: _____-101 (fill in appropriate sequential number)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

FIELD BLANK:

Sample ID: -190516-08 -001 (fill in appropriate sequential number)

(Fill bottle with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
5/16/19 1816	(1) 250mL sterile plastic – *E. Coli*	☒

Comments:

MST is observed during fall and winter; MDT is observed in spring and summer.

Form 21A
Grab Sample Data Form – Phase II

Station: Christfield Personnel: ABW TLL

Date/Time - On-site: 5/16/19 1722 MDT/MST*(circle one)

GRAB INFORMATION:

Is this a QA/QC Station? Yes ____ No X (if YES, fill out Form 21B on back)

Photographs Taken? Yes ____ No X Swing Sampler Used? Yes X No ____

Sample ID: 190516-09 -WG (fill in appropriate sequential number)

Date/Time	Container - Test (Subsample Result)	Labeled
5/16/19 1725	(1) 250mL sterile plastic – *E. coli*	X

FIELD PARAMETERS: Fill (1) 500mL Amber Date/Time: 5/16/19 1725

	Value	Unit		Value	Unit
Diss. O_2–DO Meter	8.38	Mg/L	Temp – DO Meter	17.18	°C
Conductivity –	71.7	µS/cm	Temp - Cond Meter	17.18 ABC	°C
pH – pH Meter	9.01	S.U.	Temp – pH Meter	17.18 ABC	°C

AUTO SAMPLER CURRENT STATUS:

First Subsample taken: (Yes) / No (circle one) ; if Yes, Date/Time 190516 1609

Last Subsample taken, Date/Time 190516 1734 # of Subsamples taken: 11 ABC 10

COMMENTS:

Date/Time - Off-site: 5/16/19 1734

Station: _____ Personnel: _____

Form 21B
QA/QC Grab Sample Data Form – Phase II

FIELD DUPLICATE:

Sample ID: _____-101 (fill in appropriate sequential number)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

FIELD BLANK:

Sample ID: -_____-001 (fill in appropriate sequential number)

(Fill bottle with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)	Labeled
	(1) 250mL sterile plastic – *E. Coli*	☐

Comments:

MST is observed during fall and winter; MDT is observed in spring and summer.

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Edgewood Bottle 1 of 1

SET-UP:

Date/Time On-site: 5/15/19 1220 MDT/MST*(circle one) Personnel: AML, ABW

Remote Connection Date/Time: 0845 ABC MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date					
Level					in.
Flow					cfs
Velocity	0.61				fps
Voltage					V
Temp					C°

- ✓ Replace batteries if v<11.9
- ✓ Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- ✓ Program sampler per PG 320
  - Trigger condition Vel >0.7
  - Flow Pulse Interval 270 cf
- ✓ Set Modem Access to "Storm Event" -24/7 (Flowlink)
- ✓ Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- ✓ Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- ✓ Perform decon. cycle
- ✓ Verify Sampler date and time are correct
- ✓ Place 15L sample bottle in sampler base & fill with 2 bag ice
- ✓ Remove jar lid and place in a clean re-sealable plastic bag
- ✓ Verify all cable and tubing connections
- ✓ Verify Sampler Program is Running
- ✓ Verify latches are secure

Comments:

Date/Time Off-site: 5/15/19 1248

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: 190517 1000 Personnel: ABC

- ✓ Halt Sampler program
- ✓ Put lid on sample bottle
- ✓ Properly label sample bottle; Record Sample ID on back of sheet
- ✓ Record liquid height/sample volume and visual observations on back of sheet
- ✓ Record subsample information on back of sheet

If Sampling is Complete:

- ✓ Power off Sampler
- ✓ Add ice to sample cooler
- ✓ Complete COC form; Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- ____ Date/Time Restarted: _____
- ____ Verify Running

Comments:

Date/Time Off-site:

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: 190520 MDT/MST Personnel: ABC

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

- NA Record Flow Meter status (Flowlink)
- NA Replace battery if v<11.9
- ✓ Retrieve Data (Flowlink)
- ✓ Change modem access to "Dry Weather" 8-6 M-F
- ✓ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ✓ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Comments:

Date/Time Off-site: 190520 Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: 190516 - 08 -WC Bottle 1 of 1

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)	3500	mL
Flow Pulse Interval	270	ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity	Cloudy	Clear, Cloudy, Silty
Color	Gray	Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1	190516 1716	Success	21	190516 2031	
2	1730		22	2046	
3	1731		23	2116	
4	1745		24	2131	
5	1746		25		
6	1800		26		
7	1801		27		
8	1815		28		
9	1831	No More Liquid	29		
10	1832		30		
11	1846		31		
12	1847		32		
13	1901		33		
14	1902		34		
15	1916		35		
16	1931		36		
17	1932		37		
18	1946		38		
19	2001		39		
20	2016		40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: -103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

MST is observed during fall and winter; MDT is observed in spring and summer.

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Chrisfield Bottle 1 of 1

SET-UP:

Date/Time On-site: 0508 ABC MDT/MST*(circle one) Personnel: AML, ABW

Remote Connection Date/Time: 0900 ABC MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date					
Level					in.
Flow					cfs
Velocity					fps
Voltage					V
Temp					C°

- X Replace batteries if v<11.9
- ___ Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- X Program sampler per PG 320
  - Trigger condition Vel > 0.0
  - Flow Pulse Interval 100 ft
- ✓ Set Modem Access to "Storm Event" -24/7 (Flowlink)
- ✓ Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- ✓ Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- ✓ Perform decon. cycle
- ✓ Verify Sampler date and time are correct
- X Place 15L sample bottle in sampler base & fill with 2 bag ice
- X Remove jar lid and place in a clean re-sealable plastic bag
- X Verify all cable and tubing connections
- X Verify Sampler Program is Running
- X Verify latches are secure

Comments:

Date/Time Off-site:

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: 190517 1645 Personnel: ABC

- X Halt Sampler program
- X Put lid on sample bottle
- X Properly label sample bottle; Record Sample ID on back of sheet
- X Record liquid height/sample volume and visual observations on back of sheet
- X Record subsample information on back of sheet

If Sampling is Complete:

- X Power off Sampler
- X Add ice to sample cooler
- X Complete COC form; Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ___ Install new 15 L bottle, add ice
- ___ Restart sampling program
- ___ Date/Time Restarted: _____
- ___ Verify Running

Comments:

Date/Time Off-site:

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: 190520 MDT/MST Personnel: ABC

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

- NA Record Flow Meter status (Flowlink)
- NA Replace battery if v<11.9
- ✓ Retrieve Data (Flowlink)
- ✓ Change modem access to "Dry Weather" 8-6 M-F
- ✓ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ✓ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Comments:

Date/Time Off-site: 190520 Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: 19576 - 09 -WC Bottle 1 of 1

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)	8000	mL
Flow Pulse Interval	100	ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity	Cloudy	Clear, Cloudy, Silty
Color	Gray	Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1	Mar 11 1609	Success	21		
2	1624		22		
3	1645		23		
4	1655		24		
5	1702		25		
6	1713		26		
7	1713		27		
8	1719		28		
9	1724		29		
10	1734		30		
11	1745		31		
12	1800		32		
13	1821		33		
14	~~7AB2~~		34		
15			35		
16			36		
17			37		
18			38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No X (if YES, fill out information below)

Sample ID: _____-103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

MST is observed during fall and winter; MDT is observed in spring and summer.

Technical Memorandum

950 West Bannock Street, Suite 350
Boise, ID 83702

Phone: 208-389-7700
Fax: 208-389-7750

Prepared for: Ada County Highway District (ACHD)

Project Title: Phase II Stormwater Outfall Monitoring

Project No.: 152760

Technical Memorandum

Subject: ACHD Phase II Monitoring Period Summary for July through August 2019

Date: January 3, 2020

To: Monica Lowe

Cc: Tammy Lightle

From: Andy Weigel, Project Manager

Prepared by: _____
Andrea Leonard, Project Scientist

Reviewed by: _____
Andy Weigel, Project Manager

Table of Contents

List of Tables

Section 1: Project Summary

Table 1 is a summary of the types of data collected during Water Year (WY) 2019 Phase II Stormwater Monitoring. Since the July–August monitoring period uses analytical results from the September 6, 2019 storm event, the September–October monitoring period information is included as well.

Table 1. Project Summary

Sample Period	November 2018–February 2019		March–April 2019		May–June 2019		July–August 2019		September–October 2019	
Station	E	C	E	C	E	C	E	C	E	C
Rain (inches)	8.04 [1]	6.88 [1]	3.14	2.62	2.81 [2]	2.58 [3]	.12	.09	1.14	1.21
Storm data flow (cubic feet)	229,023 [4]	64,026 [4]	99,994	46,761 [4]	46,080 [4]	32,076 [4]	1,213	648	36,188 [4]	12,780
Grab sample	Yes	Yes	Yes	Yes	Yes [5]	Yes [5]	No	No	Yes	Yes
Field parameters	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Composite sample	Yes	No	No	No	No	Yes	No	No	No	Yes
QA/QC	No	Yes	No	Yes	Yes	No	No	No	Yes	No

C = Chrisfield.

E = Edgewood.

[1] Rainfall data gaps were supplemented with Agrimet data, maintained by the U.S. Bureau of Reclamation.

[2] Hourly rainfall data are supplemented with available hourly rainfall data from Chrisfield.

[3] Hourly rainfall data are supplemented with available hourly rainfall data from Edgewood.

[4] Estimated runoff volume is used when flow data is not available.

[5] E.Coli results are qualified due to exceeded holding time.

Section 2: Monitoring Period Narrative

This technical memorandum describes the Phase II Stormwater Monitoring completed for Ada County Highway District (ACHD) from July through August 2019. Flow and rain data were collected during this period from the Edgewood and Chrisfield Phase II monitoring stations. No storms were targeted during this monitoring period. Both months were hot and dry with no rain events that met sampling criteria. A targeted storm from September 6, 2019 is used for pollutant loading for this monitoring period.

National Weather Service Summary

The National Weather Service (NWS) prepares a summary of precipitation observations each month for inclusion in an overall monthly climate summary. The NWS monthly climate summary is made available through the local Boise Weather Forecast Office on the NWS website at http://www.nws.noaa.gov/climate/index.php?wfo=boi. Precipitation summaries from the NWS are included in the text below. Summaries are pared down but are otherwise quoted directly with minor punctuation and grammatical edits for readability.

July and August are normally the driest months of the year, and this year was no different. Only 0.01 inch of rain fell in July. As is common this time of year, upper level troughs from the north Pacific weakened as they encountered the strong summer high pressure ridge over the western United States. The ridge diverted these systems too far north to bring measurable rain to the Boise area.

August 2019 resulted in three days of measurable precipitation, totaling 0.09 inch. Precipitation for June, July, and August only totaled 0.14 inch at the airport, making this the second driest summer on record. Southerly flow aloft brought enough moisture for light showers on the 2nd and again on the 8th. On the 9th and 10th, a low pressure trough moved inland, which triggered thunderstorms that produced light but measurable precipitation and gusty outflow winds.

Monitoring Station Summary

A summary of data collected for each monitoring station over the entire monitoring period (July-August) and for the targeted storm (September 6, 2019) is provided in Table 2. Monthly summaries are presented in Tables 3 and 4. Monitoring period summary tables are included in Attachment A.

July – August summary hydrographs are presented in Figures 1 (Edgewood) and 2 (Chrisfield). Monthly hydrographs for each monitoring station in this monitoring period are provided in chronological order in Figures 3–6. Included on each hydrograph are recorded hourly precipitation at the local rain gauge (inches), flow (cubic feet per second), and sample collection times, as applicable. Hydrographs are included in Attachment B.

Section 3: Storm Narrative

No storms were targeted during the July–August monitoring period. For this monitoring period, pollutant loads are calculated using water quality results from a storm on September 6, 2019. Wet grab samples were collected at both sites on September 6, 2019. Composite samples were unsuccessful at both sites due to equipment issues. See Section 5 for additional notes about data collected during the monitoring period.

September 6, 2019

On Thursday morning, September 5, the National Weather Service issued a forecast for isolated showers and thunderstorms in the Boise area from Thursday evening continuing through Friday. Chance of precipitation was 80 percent, with as much as 0.25 inch of precipitation forecasted. Setup was conducted Thursday afternoon. An expected precipitation depth of 0.11 inch was used to set trigger volumes at Edgewood and Chrisfield. Precipitation started around 1000 on Friday morning, September 6, 2019 and continued heavily in isolated areas for a few hours. Precipitation data was lost at both sites due to equipment errors. Precipitation data is discussed further in Section 5.

A two-member team mobilized to collect stormwater runoff grab samples and verify operation of the automatic sampling equipment on the morning of September 6, 2019. Full suite grab samples were collected at Edgewood and Chrisfield monitoring stations and submitted to the West Boise Water Quality Lab (WQL) at 1258 on September 6. Composite samples were unsuccessful at both monitoring stations and no composite samples were submitted to WQL. Composite sample details are explained further in Section 5. Laboratory analytical reports are included in Attachment C.

Section 4: Pollutant Loading

Water quality results from the September 6, 2019 storm event and pollutant loading estimates for each monitoring station for the July – August monitoring period are included in Table 2. Monthly values and estimates are presented for each individual month as well (Tables 2–4). Field parameters and E. Coli analytical results are included in Tables 2-4.

Section 5: Deviations/Problems

Composite Samples

Both Edgewood and Chrisfield experienced sampling errors associated with ISCO's firmware. Neither site collected any samples. Troubleshooting at both monitoring locations has occurred since this storm event. Equipment errors are being tested and resolved as they are recognized. Equipment testing has been performed outside of storm events at both sites to try to correct errors before another storm event.

Precipitation data

Precipitation data was collected continuously during the July – August monitoring period. However, the storm event used for pollutant loads does not have precipitation data available for the Edgewood or Chrisfield rain gauges. An error with the ISCO firmware caused precipitation data to be deleted at both stations during monitored events. This issue has since been resolved.

For the September 6, 2019 storm event, the AgriMet Weather Station rain gauge data is used. The AgriMet weather station is maintained by the U.S. Bureau of Reclamation and located at the Western Idaho Fairgrounds, which is approximately 4 miles southeast of the Edgewood monitoring station and 6 miles northeast of the Chrisfield monitoring station.

Section 6: References

National Weather Service Boise Forecast Office. (2018). Monthly Weather Summary. Retrieved July 20, 2019, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

National Weather Service Boise Forecast Office. (2018). Preliminary Monthly Climate Data. Retrieved July 20, 2019, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

Attachment A: Monitoring Period Summary Tables

Table 2

Monitoring Period Summary | July 1 - August 31 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	1,213	0%	648	75%
Background Discharge Volume (cf)	1,286,327	100%	216	25%
Total Discharge Volume (cf)	1,287,540	100%	864	100%
Estimated Runoff for Monitored Area[1]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation (in)	0.12		0.09	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume[2] (cf)	2,606	2,727,019	726	2,397,896
Monitored Storm Information	Edgewood (9/6/2019)		Chrisfield (9/6/2019)	
Precipitation Amount[3] (in)	0.30		0.30	
Storm Duration (hrs)	4		4	
Antecedent Dry Period (hrs)	655		2369	
Recorded Runoff Volume (cf)	10,505		1,512	
Sample Information				
Sample Date and Time	9/6/2019 12:17		9/6/2019 11:24	
Dissolved Oxygen (mg/L)	7.47		7.52	
pH (S.U.)	7.45		7.74	
Conductivity (uS/cm)	113.96		114.6	
Temperature (°C)	23.01		24.07	
Nitrate + Nitrite as N (mg/L)	1.21		0.695	
Total Suspended Solids (mg/L)	64.9		165	
Total Kjeldahl Nitrogen (mg/L)	2.05		5.57	
Dissolved Orthophospate as P (mg/L)	0.218		0.267	
Total Phosphorus as P (mg/L)	0.369		0.501	
E.Coli (MPN/100 mL)	2419.6		6440.0	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.00	0.09	37.0	0.00	0.03	62.5
Total Suspended Solids	0.09	4.87	1,985	0.56	6.67	14,844
Total Kjeldahl Nitrogen	0.00	0.15	62.7	0.02	0.23	501.1
Dissolved Orthophosphate as P	0.00	0.02	6.7	0.00	0.01	24.0
Total Phosphorus as P	0.00	0.03	11.3	0.00	0.02	45.1

Notes:

[1] The "Monitored Area" includes only the area drained by the individual monitoring station.

[2] Estimated stormwater runoff volume is calculated using local precipitation data

[3] Missing rain gauge data has been supplemented by Agrimet weather station daily precipitation data. See Section 5.

Table 3

Monitoring Period Summary | July 1 - July 31 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	0	0%	0	0%
Background Discharge Volume (cf)	579,528	100%	180	100%
Total Discharge Volume (cf)	579,528	100%	180	100%
Estimated Runoff for Monitored Area[1]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation (in)	0		0.01	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume[2] (cf)	0	0	81	266,433
Monitored Storm Information	Edgewood (9/6/2019)		Chrisfield (9/6/2019)	
Precipitation Amount[3] (in)	0.30		0.30	
Storm Duration (hrs)	4		4	
Antecedent Dry Period (hrs)	655		2369	
Recorded Runoff Volume (cf)	10,505		1,512	
Sample Information				
Sample Date and Time	9/6/2019 12:17		9/6/2019 11:24	
Dissolved Oxygen (mg/L)	7.47		7.52	
pH (S.U.)	7.45		7.74	
Conductivity (uS/cm)	113.96		114.6	
Temperature (°C)	23.01		24.07	
Nitrate + Nitrite as N (mg/L)	1.21		0.695	
Total Suspended Solids (mg/L)	64.9		165	
Total Kjeldahl Nitrogen (mg/L)	2.05		5.57	
Dissolved Orthophospate as P (mg/L)	0.218		0.267	
Total Phosphorus as P (mg/L)	0.369		0.501	
E.Coli (MPN/100 mL)	2419.6		6440.0	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	--	--	--	--	--	--
Total Suspended Solids	--	--	--	--	--	--
Total Kjeldahl Nitrogen	--	--	--	--	--	--
Dissolved Orthophosphate as P	--	--	--	--	--	--
Total Phosphorus as P	--	--	--	--	--	--

Notes:

[1] The "Monitored Area" includes only the area drained by the individual monitoring station.

[2] Estimated stormwater runoff volume is calculated using local precipitation data

[3] Missing rain gauge data has been supplemented by Agrimet weather station daily precipitation data. See Section 5.

Table 4

Monitoring Period Summary | August 1 - August 31 (WY19)				
	Edgewood		Chrisfield	
	cubic feet	percent	cubic feet	percent
Measured Stormwater Runoff Volume (cf)	1,202	0%	648	95%
Background Discharge Volume (cf)	706,810	100%	36	5%
Total Discharge Volume (cf)	708,012	100%	684	100%
Estimated Runoff for Monitored Area[1]	Edgewood	Eagle	Chrisfield	Meridian
Monthly Precipitation (in)	0.12		0.08	
Drainage Area (acres)	55.86	22,765	12	26,690
Estimated Stormwater Runoff Volume[2] (cf)	2,606	2,727,019	646	2,131,463
Monitored Storm Information	Edgewood (9/6/2019)		Chrisfield (9/6/2019)	
Precipitation Amount[3] (in)	0.30		0.30	
Storm Duration (hrs)	4		4	
Antecedent Dry Period (hrs)	655		2369	
Recorded Runoff Volume (cf)	10,505		1,512	
Sample Information				
Sample Date and Time	9/6/2019 12:17		9/6/2019 11:24	
Dissolved Oxygen (mg/L)	7.47		7.52	
pH (S.U.)	7.45		7.74	
Conductivity (uS/cm)	113.96		114.6	
Temperature (°C)	23.01		24.07	
Nitrate + Nitrite as N (mg/L)	1.21		0.695	
Total Suspended Solids (mg/L)	64.9		165	
Total Kjeldahl Nitrogen (mg/L)	2.05		5.57	
Dissolved Orthophospate as P (mg/L)	0.218		0.267	
Total Phosphorus as P (mg/L)	0.369		0.501	
E.Coli (MPN/100 mL)	2419.6		6440.0	

Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.00	0.09	37.0	0.00	0.03	62.5
Total Suspended Solids	0.09	4.87	1,985	0.56	6.67	14,844
Total Kjeldahl Nitrogen	0.00	0.15	62.7	0.02	0.23	501.1
Dissolved Orthophosphate as P	0.00	0.02	6.7	0.00	0.01	24.0
Total Phosphorus as P	0.00	0.03	11.3	0.00	0.02	45.1

Notes:

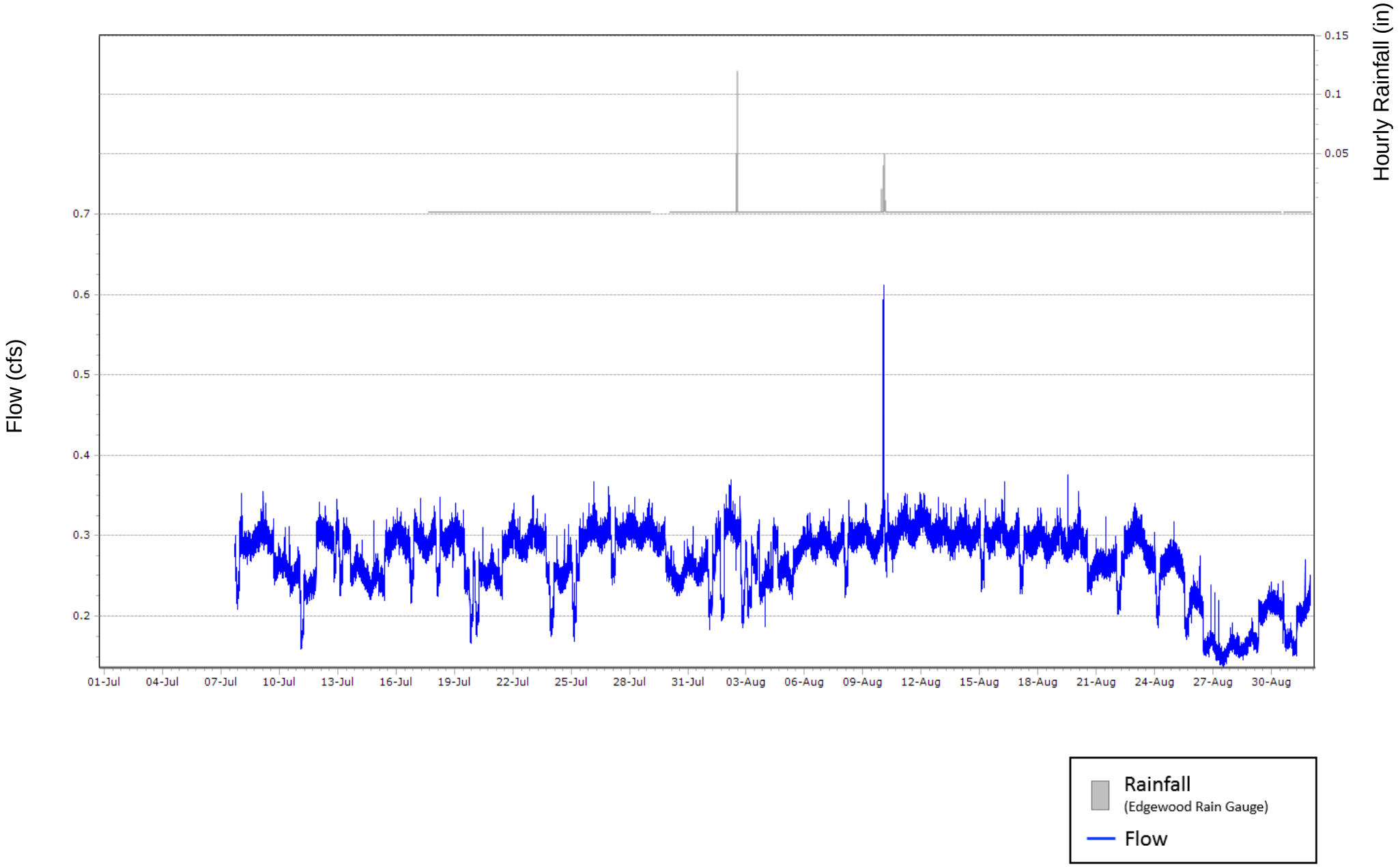
[1] The "Monitored Area" includes only the area drained by the individual monitoring station.

[2] Storm data flow is estimated from rainfall data

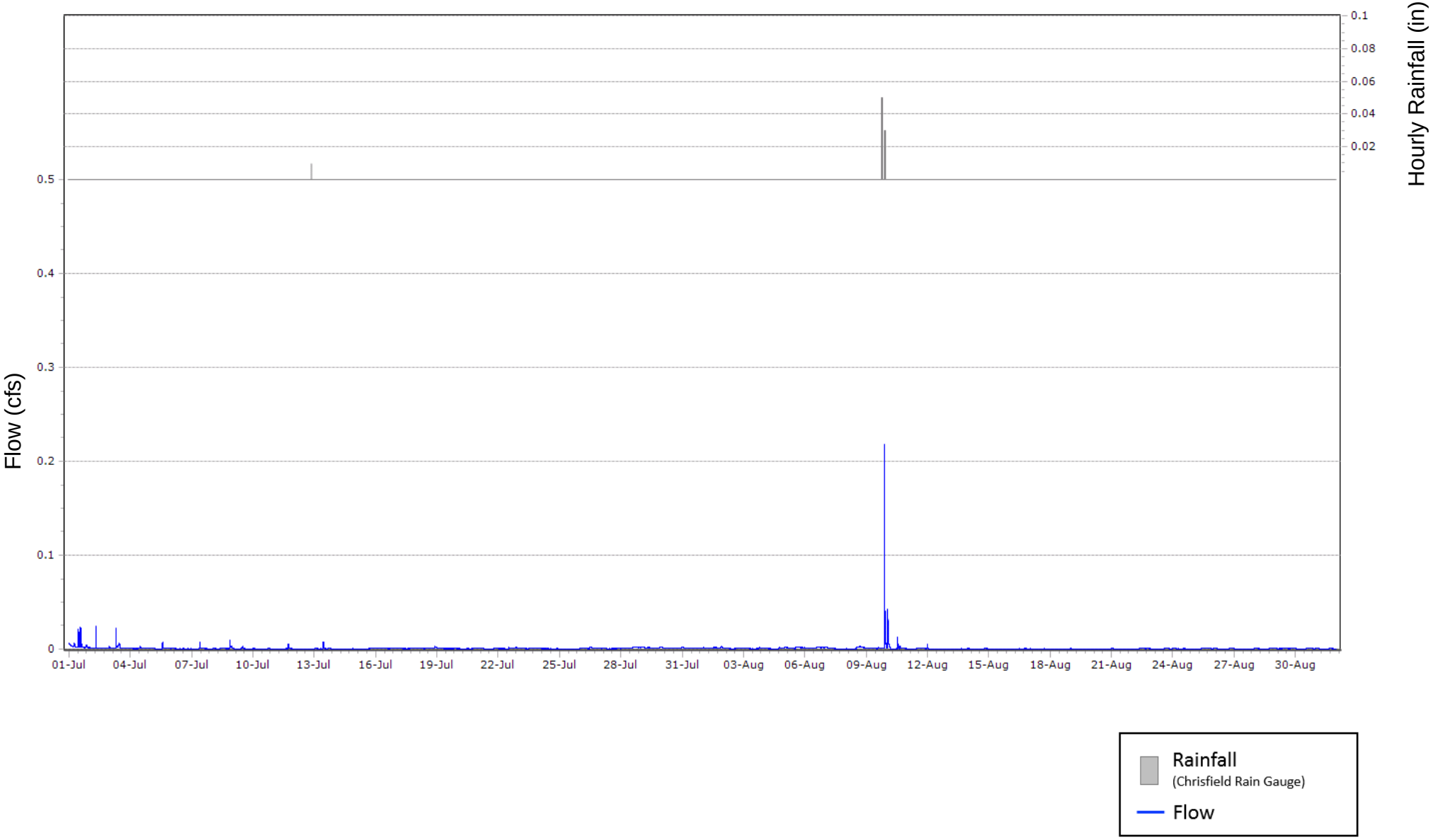
[3] Missing rain gauge data has been supplemented by Agrimet weather station daily precipitation data. See Section 5.

Attachment B: Monitoring Period Hydrographs

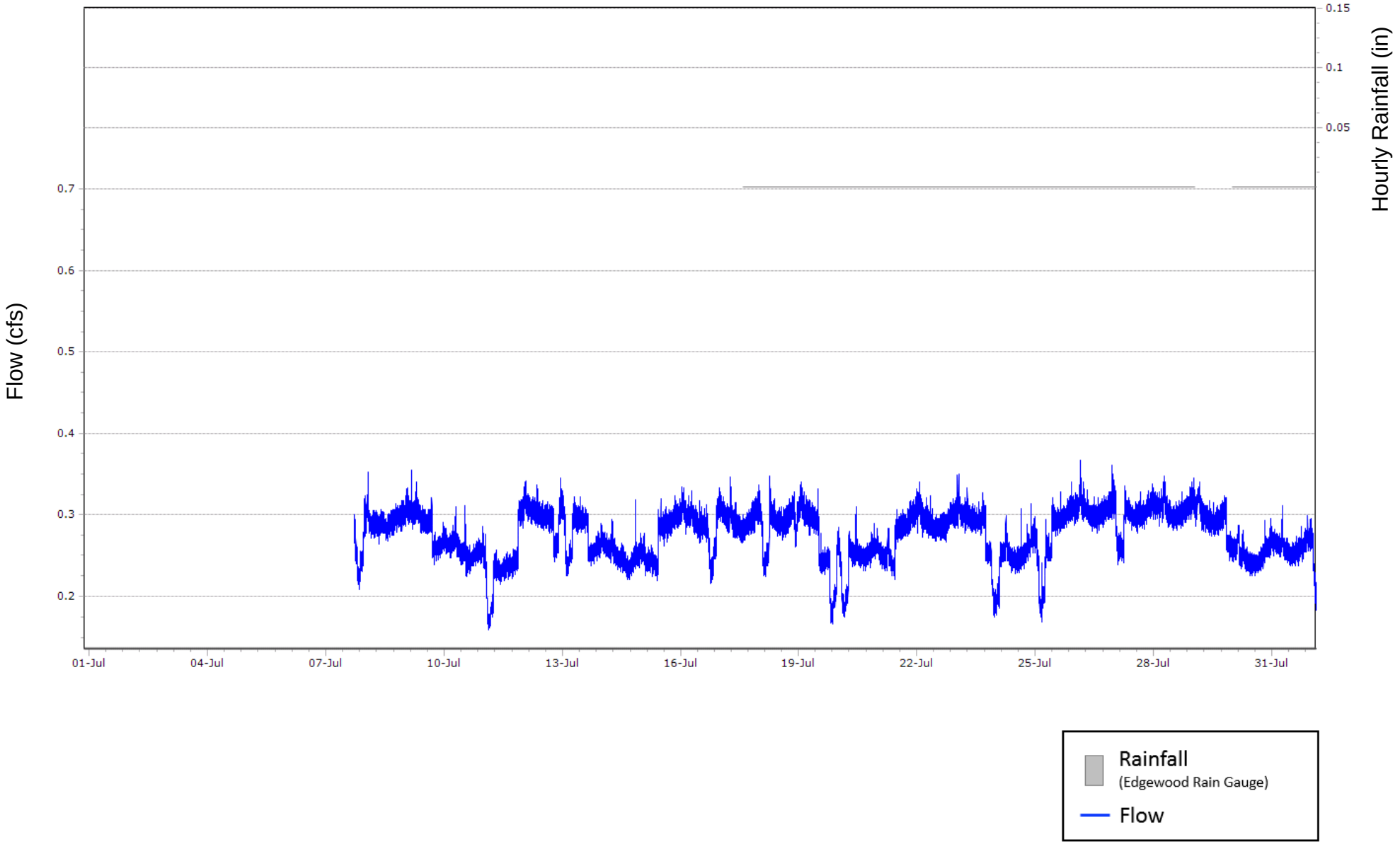
Edgewood - Water Year 2019 - July through August 2019



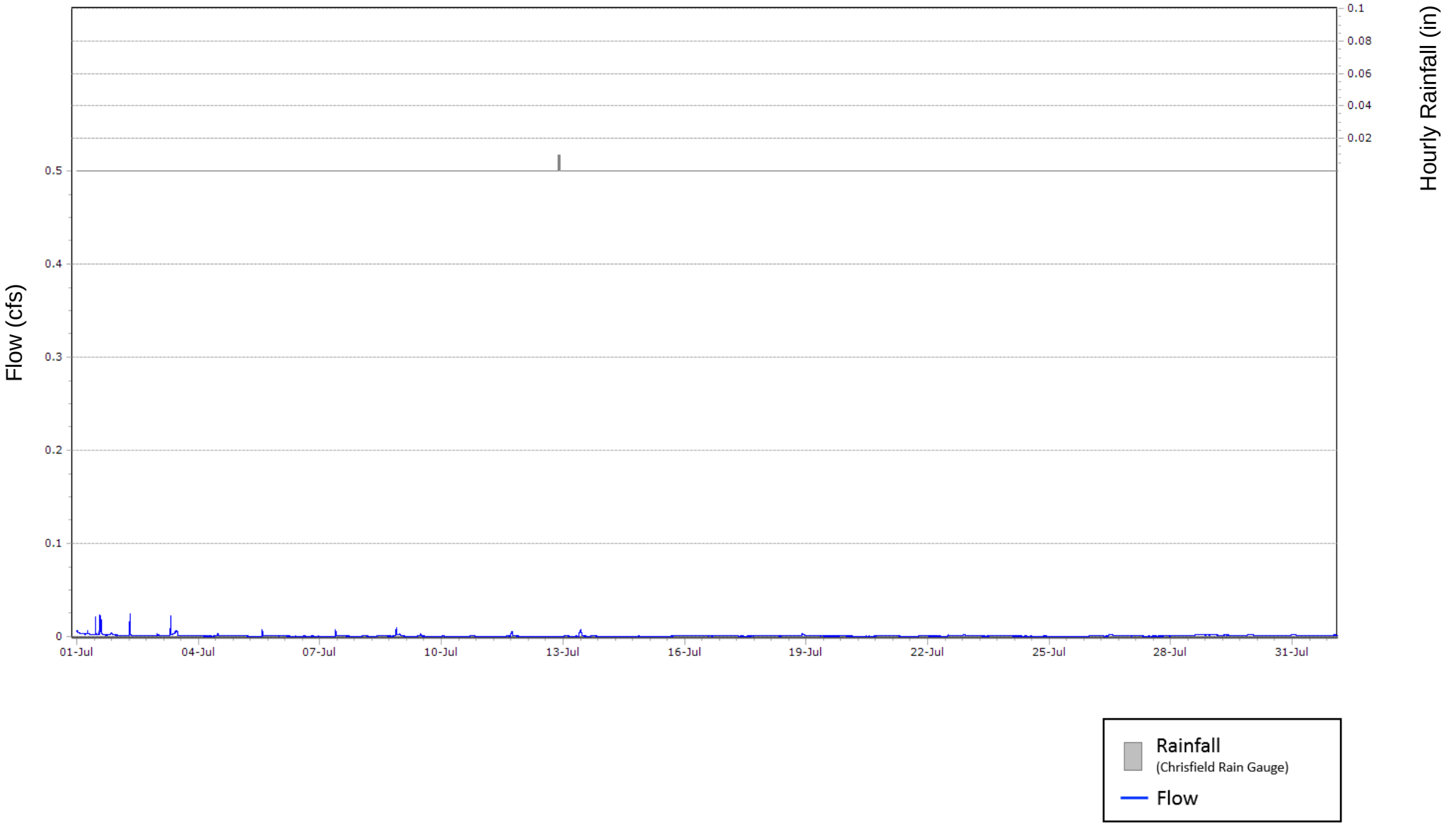
Chrisfield - Water Year 2019 - July through August 2019



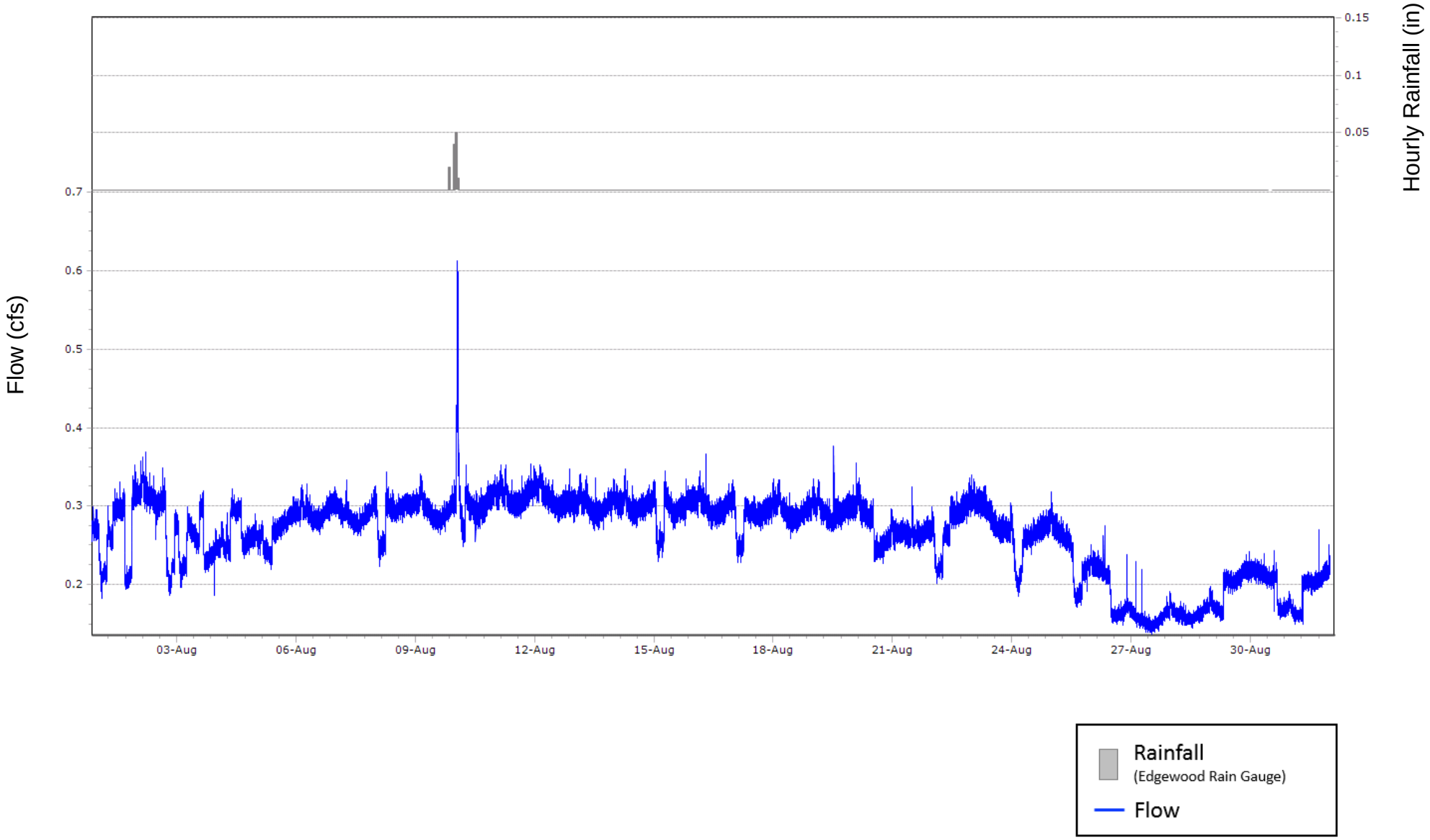
Edgewood - Water Year 2019 - July 2019



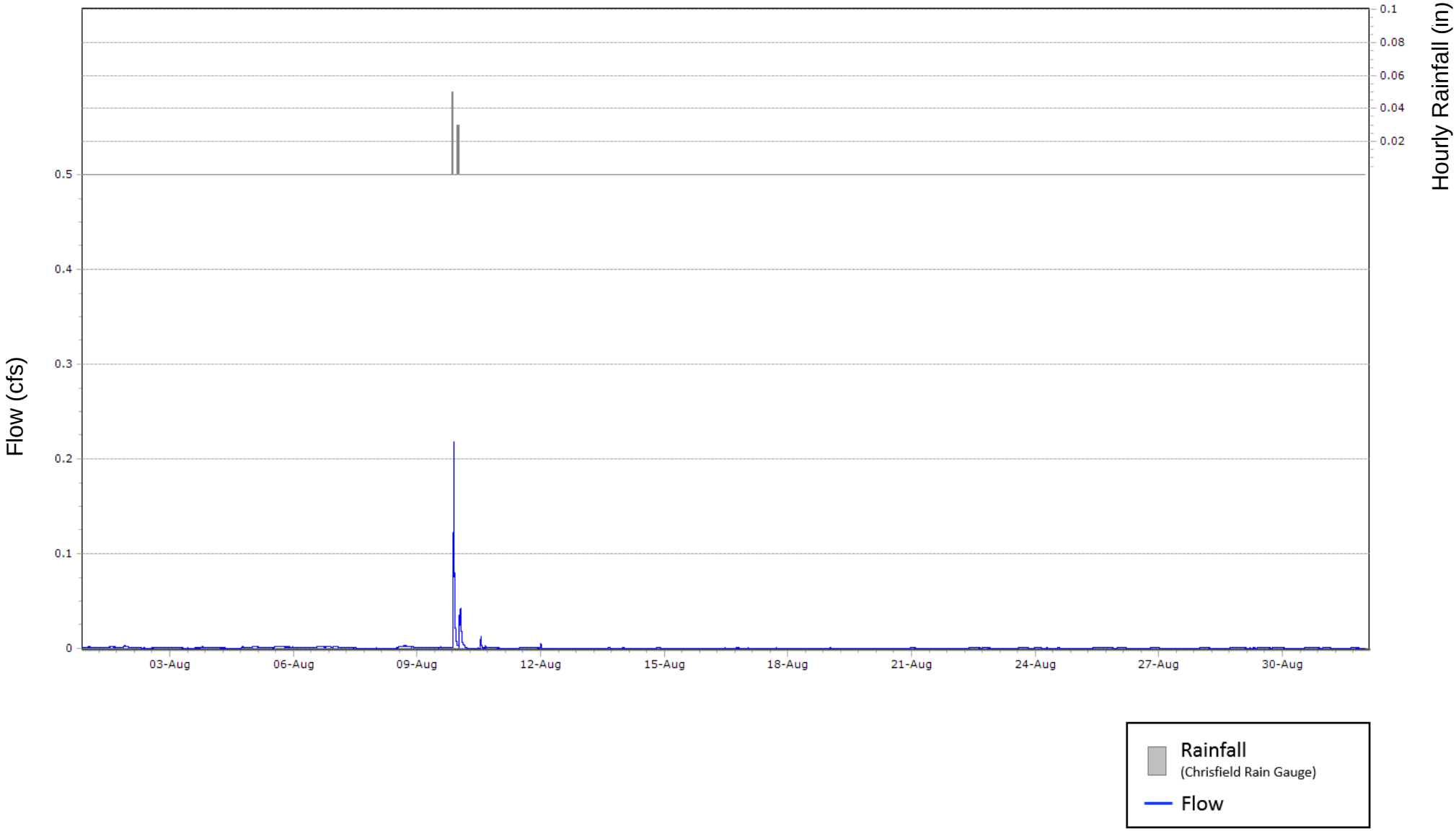
Chrisfield - Water Year 2019 - July 2019



Edgewood - Water Year 2019 - August 2019



Chrisfield - Water Year 2019 - August 2019



Attachment C: Analytical Reports and Field Sheets

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
9AC0064-01	ACST2	190906-09-WG	Water		09/06/2019	09/06/2019
9AC0064-02	ACST2	190906-08-WG	Water		09/06/2019	09/06/2019
9AC0064-03	ACST2	190906-08-101	Water		09/06/2019	09/06/2019

Report Date: 10/01/2019 14:02

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Boise, Idaho 83714-1076
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Analysis Report

Location:	ACST2	Location Description:	190906-09-WG
Date/Time Collected:	09/06/2019 11:24		
Lab Number:	9AC0064-01	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9I0617	6440.0	MPN/100 mL	100.0	1.0	Colilert	09/06/19 13:48	9/7/19 13:48	JAL	D
Wet Chemistry										
Chlorine Screen	B9I0619	Absent				SM 4500-CL G-2000 mod	09/06/19	9/6/19 13:23	LRF	
Nitrate-Nitrite, as N	B9I1205	0.695	mg/L	0.0250	0.0250	EPA 353.2	09/12/19	9/12/19 9:07	JAL	
TKN	B9I3010	5.57	mg/L	0.130	0.130	EPA 351.2	09/30/19	10/1/19 10:06	ALN	
Total Suspended Solids	B9I0703	165	mg/L	0.900	0.900	SM 2540 D-1997	09/07/19	9/7/19 9:58	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9I0701	0.267	mg/L	2.00E-3	2.00E-3	EPA 365.1	09/07/19	9/7/19 9:17	JAL	
Total Metals										
Phosphorus as P	B9I0902	0.501	mg/L	6.00E-3	6.00E-3	EPA 200.7	09/09/19	9/10/19 15:53	AMO	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 10/01/2019 14:02

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Analysis Report

Location:	ACST2	Location Description:	190906-08-WG
Date/Time Collected:	09/06/2019 12:17		
Lab Number:	9AC0064-02	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9I0617	2419.6	MPN/100 mL	1.0	1.0	Colilert	09/06/19 13:48	9/7/19 13:48	JAL	
Wet Chemistry										
Chlorine Screen	B9I0619	Absent				SM 4500-CL G-2000 mod	09/06/19	9/6/19 13:23	LRF	
Nitrate-Nitrite, as N	B9I1205	1.21	mg/L	0.0250	0.0250	EPA 353.2	09/12/19	9/12/19 9:12	JAL	
TKN	B9I3010	2.05	mg/L	0.130	0.130	EPA 351.2	09/30/19	10/1/19 10:07	ALN	
Total Suspended Solids	B9I0703	64.9	mg/L	0.900	0.900	SM 2540 D-1997	09/07/19	9/7/19 9:58	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9I0701	0.218	mg/L	2.00E-3	2.00E-3	EPA 365.1	09/07/19	9/7/19 9:18	JAL	
Total Metals										
Phosphorus as P	B9I0902	0.369	mg/L	6.00E-3	6.00E-3	EPA 200.7	09/09/19	9/10/19 16:07	AMO	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 10/01/2019 14:02

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Water Quality Laboratory
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Telephone (208) 608-7240
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Analysis Report

Location:	ACST2	Location Description:	190906-08-101
Date/Time Collected:	09/06/2019 12:00		
Lab Number:	9AC0064-03	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9I0617	1460.0	MPN/100 mL	100.0	1.0	Colilert	09/06/19 13:48	9/7/19 13:48	JAL	D
Wet Chemistry										
Chlorine Screen	B9I0619	Absent				SM 4500-CL G-2000 mod	09/06/19	9/6/19 13:23	LRF	
Nitrate-Nitrite, as N	B9I1205	1.22	mg/L	0.0250	0.0250	EPA 353.2	09/12/19	9/12/19 9:13	JAL	
TKN	B9I3010	1.95	mg/L	0.130	0.130	EPA 351.2	09/30/19	10/1/19 10:09	ALN	
Total Suspended Solids	B9I0703	67.3	mg/L	0.900	0.900	SM 2540 D-1997	09/07/19	9/7/19 9:59	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9I0701	0.217	mg/L	2.00E-3	2.00E-3	EPA 365.1	09/07/19	9/7/19 9:23	JAL	
Total Metals										
Phosphorus as P	B9I0902	0.368	mg/L	6.00E-3	6.00E-3	EPA 200.7	09/09/19	9/10/19 16:12	AMO	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
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Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Microbiology									
Batch: B9I0617									
Blank (B9I0617-BLK1)									
E. Coli	Absent						09/07/2019	JAL	
LCS (B9I0617-BS1)									
E. Coli				Present			09/07/2019	JAL	
Duplicate (B9I0617-DUP1)	Source ID: 9WB0682-06								
E. Coli					Pass	128	09/07/2019	JAL	
Duplicate (B9I0617-DUP2)	Source ID: 9AC0064-02								
E. Coli					Pass	128	09/07/2019	JAL	
Duplicate (B9I0617-DUP3)	Source ID: 9AC0064-02RE1								
E. Coli					Pass	128	09/07/2019	JAL	
Wet Chemistry									
Batch: B9I0703									
Blank (B9I0703-BLK1)									
Total Suspended Solids	<0.9	mg/L					09/07/2019	F.A	U
LCS (B9I0703-BS1)									
Total Suspended Solids			96.2	90-110			09/07/2019	F.A	
Duplicate (B9I0703-DUP1)	Source ID: 9BB0573-02								
Total Suspended Solids					7.19	20	09/07/2019	F.A	
Batch: B9I1205									
Blank (B9I1205-BLK1)									
Nitrate-Nitrite, as N	<0.025	mg/L					09/12/2019	JAL	U
Blank (B9I1205-BLK2)									
Nitrate-Nitrite, as N	<0.025	mg/L					09/12/2019	JAL	U
LCS (B9I1205-BS1)									
Nitrate-Nitrite, as N			103	90-110			09/12/2019	JAL	
LCS (B9I1205-BS2)									
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Duplicate (B9I1205-DUP1)	Source ID: 9AC0064-01								
Nitrate-Nitrite, as N					0.514	10	09/12/2019	JAL	
Duplicate (B9I1205-DUP2)	Source ID: 9BB0562-02								
Nitrate-Nitrite, as N					NR	10	09/12/2019	JAL	
Duplicate (B9I1205-DUP3)	Source ID: 9WB0677-05								
Nitrate-Nitrite, as N					NR	10	09/12/2019	JAL	
Matrix Spike (B9I1205-MS1)	Source ID: 9AC0064-01								
Nitrate-Nitrite, as N			98.8	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS2)	Source ID: 9BB0562-02								
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS3)	Source ID: 9WB0677-05								
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS4)	Source ID: 9EP0071-01								

Boise City Public Works
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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9I1205 (Continued)									
Matrix Spike (B9I1205-MS4) (Continued) Source ID: 9EP0071-01									
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS5) Source ID: 9EP0071-02									
Nitrate-Nitrite, as N			103	90-110			09/12/2019	JAL	
Matrix Spike Dup (B9I1205-MSD1) Source ID: 9AC0064-01									
Nitrate-Nitrite, as N			93.8	90-110	1.86	10	09/12/2019	JAL	
Matrix Spike Dup (B9I1205-MSD2) Source ID: 9BB0562-02									
Nitrate-Nitrite, as N			104	90-110	0.245	10	09/12/2019	JAL	
Matrix Spike Dup (B9I1205-MSD3) Source ID: 9WB0677-05									
Nitrate-Nitrite, as N			103	90-110	0.582	10	09/12/2019	JAL	
Batch: B9I3010									
Blank (B9I3010-BLK1)									
TKN	<0.13	mg/L					10/01/2019	ALN	U
LCS (B9I3010-BS1)									
TKN			107	80-120			10/01/2019	ALN	
Duplicate (B9I3010-DUP1) Source ID: 9WB0701-05									
TKN					0.196	20	10/01/2019	ALN	D
Duplicate (B9I3010-DUP2) Source ID: 9WB0701-09									
TKN					9.04	20	10/01/2019	ALN	D
Matrix Spike (B9I3010-MS1) Source ID: 9WB0701-05									
TKN			109	80-120			10/01/2019	ALN	D
Matrix Spike (B9I3010-MS2) Source ID: 9WB0701-09									
TKN			99.1	80-120			10/01/2019	ALN	D
Matrix Spike Dup (B9I3010-MSD1) Source ID: 9WB0701-05									
TKN			83.9	80-120	9.19	20	10/01/2019	ALN	D
Matrix Spike Dup (B9I3010-MSD2) Source ID: 9WB0701-09									
TKN			98.3	80-120	0.165	20	10/01/2019	ALN	D

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Dissolved Wet Chemistry									
Batch: B9I0701									
Blank (B9I0701-BLK1)									
Orthophosphate, as P	<0.002	mg/L					09/07/2019	JAL	U
LCS (B9I0701-BS1)									
Orthophosphate, as P			98.3	90-110			09/07/2019	JAL	
Duplicate (B9I0701-DUP1) Source ID: 9AC0064-02									
Orthophosphate, as P					0.173	10	09/07/2019	JAL	
Matrix Spike (B9I0701-MS1) Source ID: 9AC0064-02									
Orthophosphate, as P			106	90-110			09/07/2019	JAL	
Matrix Spike Dup (B9I0701-MSD1) Source ID: 9AC0064-02									
Orthophosphate, as P			108	90-110	0.539	10	09/07/2019	JAL	
Total Metals									
Batch: B9I0902									
Blank (B9I0902-BLK1)									
Phosphorus as P	<0.006	mg/L					09/10/2019	AMO	U
LCS (B9I0902-BS1)									
Phosphorus as P			102	85-115			09/10/2019	AMO	
Duplicate (B9I0902-DUP1) Source ID: 9WB0679-04									
Phosphorus as P					9.27	20	09/10/2019	AMO	D
Matrix Spike (B9I0902-MS1) Source ID: 9WB0679-04									
Phosphorus as P			118	70-130			09/10/2019	AMO	D
Matrix Spike Dup (B9I0902-MSD1) Source ID: 9WB0679-04									
Phosphorus as P			121	70-130	1.14	20	09/10/2019	AMO	D

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Notes and Definitions

Item	Definition
D	Data reported from a dilution
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

AW for Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Azubike Emenari
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Jeannette Ayala
Andy Weigel

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
9AC00604-01	9/6/19		1120	1124	190906-09-WG	ABW	X	X				X		X	X	X				X			X		6
-02	9/6/19		1205	1217	190906-08-WG	ABW	X	X				X		X	X	X				X			X		6
-03	9/6/19		1200		190906-08-101							X		X	X	X				X			X		6

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
[signature]	9-6-19 1358	Kathy Finley	9AC00604

MS ✓

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Chrisfield Bottle 1 of ____

SET-UP:

Date/Time On-site: 9-5-19 13:10 MDT/MST*(circle one) Personnel: AMC ABW

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date	9-5 1340				
Level	.34				in.
Flow	0				cfs
Velocity	.045				fps
Voltage	12.8				V
Temp					C°

- √ Replace batteries if v<11.9
- √ Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- √ Program sampler per PG 320
  - Trigger condition DM .2
  - Flow Pulse Interval 58
- √ Set Modem Access to "Storm Event" -24/7 (Flowlink)
- √ Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- √ Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- √ Perform decon. cycle
- √ Verify Sampler date and time are correct
- √ Place 15L sample bottle in sampler base & fill with 2 bag ice
- √ Remove jar lid and place in a clean re-sealable plastic bag
- √ Verify all cable and tubing connections
- √ Verify Sampler Program is Running
- √ Verify latches are secure

Comments: couldn't connect to Chrisfield in flowlink - connected directly

Date/Time Off-site: 9-5 1350

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: _____ Personnel: _____

- ____ Halt Sampler program
- ____ Put lid on sample bottle
- ____ Properly label sample bottle; Record Sample ID on back of sheet
- ____ Record liquid height/sample volume and visual observations on back of sheet
- ____ Record subsample information on back of sheet

If Sampling is Complete:

- ____ Power off Sampler
- ____ Add ice to sample cooler
- ____ Complete COC form;
- ____ Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- Date/Time Restarted: _____
- ____ Verify Running

Comments:

Date/Time Off-site: _____

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ____ Record Flow Meter status (Flowlink)
- ____ Replace battery if v<11.9
- ____ Retrieve Data (Flowlink)
- ____ Change modem access to "Dry Weather" 8-6 M-F
- ____ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ____ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: _____-WC Bottle _____ of _____

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)		mL
Flow Pulse Interval		ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity		Clear, Cloudy, Silty
Color		Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
9			29		
10			30		
11			31		
12			32		
13			33		
14			34		
15			35		
16			36		
17			37		
18			38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: _____-103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

***MST is observed during fall and winter; MDT is observed in spring and summer.**

Form 21A
GRAB SAMPLE DATA FORM – (Phase II)

Station: Chrisfield Personnel: ABW JA

Date/Time On-site: 9/6/19 1110 MDT/MST (circle one)

FLOW METER CURRENT STATUS:

	Value	Unit		Value	Unit
Level		inch	Velocity		fps
Flow		cfs	Battery		v
Total Flow		cf	Flow Start		(time)
Rainfall		in. (if applicable)			

GRAB INFORMATION:

Is this a QA/QC Station? Yes ___ No X (if YES, fill out Form 21B on back)

Photographs Taken? Yes ___ No X Swing Sampler Used? Yes X No ___

Storm Event Sample? Yes X No ___

Sample ID: 190906-09-AW Wet / Dry Grab (fill in station name)

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
11:23	(4) L plastic – TSS	N/A	N/A	☒
11:21	(1) L plastic – TKN	☒	N/A	☒
11:22	(1) 500mL plastic - TP	N/A	N/A	☒
11:21	(1) 500mL plastic (square) - NOx	☒	Time: 1130	☒
11:20	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
11:24	(1) 250 mL plastic - OP	N/A	Time: 1130	☒

FIELD PARAMETERS: Fill (1) 500mL Amber Time: 11:32

	Value	Unit		Value	Unit
Diss. O_2 – Field	7.52	Mg/L	Temp – DO Meter	24.070	°C
Conductivity	114.60	µS/cm	Temp – Cond. Meter		°C
pH - Field	7.74	S.U.	Temp – pH Meter		°C

COMMENTS:

***NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume & Preserved samples should have pH <2**

Updated 3/25/15

Form 21B
QA/QC SAMPLE DATA FORM – (Phase II)

Date/Time - Off-site: _____

Station: _____ Personnel: _____

Sample ID: _____-101 (fill in appropriate sequential number)

QA Sample? ☑ **QA SAMPLE TYPE: FIELD DUPLICATE**

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsample is the "Start Date/Time" and the "End Date/Time", respectively

Comments:

Sample ID: _____-001 (fill in appropriate sequential number)

QA Sample? ☑ **QA SAMPLE TYPE: FIELD BLANK** (Fill bottles with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsamples is the "Start Date/Time" and "End Date/Time", respectively.

Comments:

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Edgewood Bottle 1 of ____

SET-UP:

Date/Time On-site: 9-5-19 1405 MDT/MST*(circle one) Personnel: AML ABW

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date	1414 9/5/19				
Level	2.585				in.
Flow	0.214				cfs
Velocity	0.815				fps
Voltage	12.8				V
Temp	19.5				C°

- √ Replace batteries if v<11.9
- √ Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- √ Program sampler per PG 320
  - Trigger condition ____
  - Flow Pulse Interval 156
- √ Set Modem Access to "Storm Event" -24/7 (Flowlink)
- √ Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- √ Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- √ Perform decon. cycle
- √ Verify Sampler date and time are correct
- √ Place 15L sample bottle in sampler base & fill with 2 bag ice
- √ Remove jar lid and place in a clean re-sealable plastic bag
- √ Verify all cable and tubing connections
- √ Verify Sampler Program is Running
- √ Verify latches are secure

Comments:

Date/Time Off-site: 9-5 1430

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: _____ Personnel: _____

- ____ Halt Sampler program
- ____ Put lid on sample bottle
- ____ Properly label sample bottle; Record Sample ID on back of sheet
- ____ Record liquid height/sample volume and visual observations on back of sheet
- ____ Record subsample information on back of sheet

If Sampling is Complete:

- ____ Power off Sampler
- ____ Add ice to sample cooler
- ____ Complete COC form;
- Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- Date/Time Restarted: _____
- ____ Verify Running

Comments:

Date/Time Off-site: _____

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ____ Record Flow Meter status (Flowlink)
- ____ Replace battery if v<11.9
- ____ Retrieve Data (Flowlink)
- ____ Change modem access to "Dry Weather" 8-6 M-F
- ____ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ____ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: _____-WC Bottle _____ of _____

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)		mL
Flow Pulse Interval		ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity		Clear, Cloudy, Silty
Color		Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
9			29		
10			30		
11			31		
12			32		
13			33		
14			34		
15			35		
16			36		
17			37		
18			38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: _____-103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

***MST is observed during fall and winter; MDT is observed in spring and summer.**

Form 21A
GRAB SAMPLE DATA FORM – (Phase II)

Station: Edgemont Personnel: ABW JA

Date/Time On-site: 9/6/19 1200 MDT/MST (circle one)

FLOW METER CURRENT STATUS:

	Value	Unit		Value	Unit
Level		inch	Velocity		fps
Flow		cfs	Battery		v
Total Flow		cf	Flow Start		(time)
Rainfall		in. (if applicable)			

GRAB INFORMATION:

Is this a QA/QC Station? Yes X No ____ (if YES, fill out Form 21B on back)

Photographs Taken? Yes ____ No X Swing Sampler Used? Yes X No ____

Storm Event Sample? Yes X No ____

Sample ID: 190906-08 – Wet / Dry Grab (fill in station name)

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
12:13	(4) L plastic – TSS	N/A	N/A	☒
12:09	(1) L plastic – TKN	☒	N/A	☒
12:06	(1) 500mL plastic - TP	N/A	N/A	☒
12:17	(1) 500mL plastic (square) - NOx	☒	Time: 1223	☒
12:05	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
12:17	(1) 250 mL plastic - OP	N/A	Time: 1223	☒

FIELD PARAMETERS: Fill (1) 500mL Amber Time: 12:21

	Value	Unit		Value	Unit
Diss. O_2 – Field	7.47	Mg/L	Temp – DO Meter	23.01	°C
Conductivity	113.9605	µS/cm	Temp – Cond. Meter		°C
pH - Field	7.45	S.U.	Temp – pH Meter		°C

COMMENTS:

***NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume & Preserved samples should have pH <2**

Updated 3/25/15

Form 21B
QA/QC SAMPLE DATA FORM – (Phase II)

Date/Time - Off-site:

Station: Personnel:

Sample ID: 120906 -08 -101 (fill in appropriate sequential number)
QA Sample? ☑ **QA SAMPLE TYPE: FIELD DUPLICATE**

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
12:14	(4) L plastic – TSS	N/A	N/A	☒
12:09	(1) L plastic – TKN	☒	N/A	☒
12.08	(1) 500mL plastic - TP	N/A	N/A	☒
1217	(1) 500mL plastic (square) - NOx	☒	Time: 1223	☒
12:06	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
12:17	(1) 250 mL plastic - OP	N/A	Time: 1223	☒

Notes: The date/time for the first and final subsample is the "Start Date/Time" and the "End Date/Time", respectively

Comments:

Sample ID: -001 (fill in appropriate sequential number)
QA Sample? ☑ **QA SAMPLE TYPE: FIELD BLANK** (Fill bottles with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsamples is the "Start Date/Time" and "End Date/Time", respectively.

Comments:

Ada County ghway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Jeannette Ayala
Andy Weigel

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
	9/6/19		1120	1124	190906-09-WG	ABW	X	X				X		X	X	X				X			X		6
	9/6/19		1205	1217	190906-08-WG	ABW	X	X				X		X	X	X				X			X		6
	9/6/19		1200		190906-08-101							X		X	X	X				X			X		6

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
	9-6-19 1358	Kathy Finley	

Technical Memorandum

950 West Bannock Street, Suite 350
Boise, ID 83702

Phone: 208-389-7700
Fax: 208-389-7750

Prepared for: Ada County Highway District (ACHD)

Project Title: Phase II Stormwater Outfall Monitoring

Project No.: 152760

Technical Memorandum

Subject: ACHD Phase II Monitoring Period Summary for September through October 2019

Date: January 3, 2020

To: Monica Lowe

Cc: Tammy Lightle

From: Andy Weigel, Project Manager

Prepared by: _____
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Andy Weigel, Project Manager

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Section 1: Project Summary

Table 1 is a summary of the types of data collected during Water Year (WY) 2019 Phase II Stormwater Monitoring.

Table 1. Project Summary

Sample Period	November 2018–February 2019		March–April 2019		May–June 2019		July–August 2019		September–October 2019	
Station	E	C	E	C	E	C	E	C	E	C
Rain (inches)	8.04 [1]	6.88 [1]	3.14	2.62	2.81 [2]	2.58 [3]	.12	.09	1.14	1.21
Storm data flow (cubic feet)	229,023 [4]	64,026 [4]	99,994	46,761 [4]	46,080 [4]	32,076 [4]	1,213	648	36,188 [4]	12,780
Grab sample	Yes	Yes	Yes	Yes	Yes [5]	Yes [5]	No	No	Yes	Yes
Field parameters	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Composite sample	Yes	No	No	No	No	Yes	No	No	No	Yes
QA/QC	No	Yes	No	Yes	Yes	No	No	No	Yes	No

C = Chrisfield.

E = Edgewood.

[1] Rainfall data gaps were supplemented with AgriMet data, maintained by the U.S. Bureau of Reclamation.

[2] Hourly rainfall data are supplemented with available hourly rainfall data from Chrisfield.

[3] Hourly rainfall data are supplemented with available hourly rainfall data from Edgewood.

[4] Estimated runoff volume is used when flow data is not available.

[5] E. coli results are qualified due to exceeded holding time.

Section 2: Monitoring Period Narrative

This technical memorandum describes the Phase II Stormwater Monitoring completed for Ada County Highway District (ACHD) from September through October 2019. Flow and rain data were collected during this period from the Edgewood and Chrisfield Phase II monitoring stations. Two storms were targeted during this monitoring period: September 6, 2019, and October 19, 2019. Grab samples were collected at both sites on September 6, 2019, and results were used in September–October pollutant load calculations for Edgewood. A successful composite was collected at Chrisfield on October 19, 2019. The October 19 storm event was used for pollutant loading for Chrisfield for this monitoring period.

National Weather Service Summary

The National Weather Service (NWS) prepares a summary of precipitation observations each month for inclusion in an overall monthly climate summary. The NWS monthly climate summary is made available through the local Boise Weather Forecast Office on the NWS website at http://www.nws.noaa.gov/climate/index.php?wfo=boi. Precipitation summaries from the NWS are included in the text below. Summaries are pared down but are otherwise quoted directly with minor punctuation and grammatical edits for readability.

September brought a total precipitation of 0.84 inch to the Boise area, a quarter inch above normal. Airflow from the southwest brought enough monsoon moisture for isolated thunderstorms on the 5th and 6th. A Pacific cold front generated more precipitation on the 8th. Unseasonable cool weather at the end of the month compensated for hot weather at the beginning and middle of September, making the average temperature a normal 64.9.

October 2019 was unseasonably cool, with an average temperature of 46.1 degrees. Overall, October was a dry month, with measurable precipitation falling on only five days. On the 19th, a broad jet stream over the north Pacific pushed a fast-moving upper level trough inland across Idaho. There was enough moisture and energy with this system to produce a thunderstorm and nearly a quarter inch of rain. Winter weather arrived very early during the final week of the month.

Monitoring Station Summary

A summary of data collected for each monitoring station over the entire monitoring period (September–October) and for the targeted storm is provided in Table 2. Monthly summaries are presented in Tables 3 and 4. Monitoring period summary tables are included in Attachment A.

September–October summary hydrographs are presented in Figures 1 (Edgewood) and 2 (Chrisfield). Monthly hydrographs for each monitoring station in this monitoring period are provided in chronological order in Figures 3–6. Included on each hydrograph are recorded hourly precipitation at the local rain gauge (inches), flow (cubic feet per second), and sample collection times, as applicable. Hydrographs are included in Attachment B.

Section 3: Storm Narrative

Two storms were targeted during the September–October monitoring period. Full suite grab samples were collected at both sites on September 6, 2019. Composite samples were targeted but unsuccessful at both sites due to equipment issues. On October 19, 2019, full suite grab samples were collected at both sites, and a successful composite sample was collected at Chrisfield. Edgewood analytical data was rejected (see Section 5).

For this monitoring period, pollutant loads were calculated using water quality results from the September 6 storm event for Edgewood and the October 19 storm event for Chrisfield. See Section 5 for additional notes about data collected and issues that arose during the monitoring period.

September 6, 2019

On Thursday morning, September 5, the NWS issued a forecast for isolated showers and thunderstorms in the Boise area from Thursday evening continuing through Friday. Chance of precipitation was 80 percent, with as much as 0.25 inch of precipitation forecasted. Setup was conducted Thursday afternoon. An expected precipitation depth of 0.11 inch was used to set trigger volumes at Edgewood and Chrisfield. Precipitation started around 1000 on Friday morning, September 6, 2019, and continued heavily in isolated areas for a few hours. Precipitation data was lost at both sites due to equipment errors. Precipitation data is discussed further in Section 5.

A two-member team mobilized to collect stormwater runoff grab samples and verify operation of the automatic sampling equipment on the morning of September 6, 2019. Grab samples were collected at Edgewood and Chrisfield monitoring stations and submitted to the West Boise Water Quality Lab (WQL) at 1258 on September 6. Laboratory analytical reports are included in Attachment C.

October 19, 2019

The morning of Friday, October 18, the NWS issued a forecast for isolated rain showers and thunderstorms in the Boise area from Friday evening through Saturday afternoon. Chance of precipitation was 95 percent, with as much as 0.35 inch of precipitation forecasted in localized areas. An expected precipitation depth of 0.11 inch was used to set trigger volumes at Edgewood and Chrisfield. Precipitation started around 0730 on Saturday morning October 19, 2019. Two intense and localized waves of precipitation came at 0900 and 1200, producing two clear flow peaks.

A two-member team mobilized to collect stormwater runoff grab samples and verify operation of the automatic sampling equipment on the morning of October 19, 2019. Grab samples were collected at Edgewood and Chrisfield and submitted to the WQL at 1012 on October 19. The composite sample at Chrisfield was collected and submitted to the WQL at 1607 on October 19.

Section 4: Pollutant Loading

Water quality results used in pollutant loading estimates for each monitoring station for the September–October monitoring period are included in Table 2. Monthly values and estimates are presented for each individual month as well (Tables 3–6). Field parameters and *E. coli* analytical results are included in Tables 2–4.

Section 5: Deviations/Problems

Composite Samples

Both Edgewood and Chrisfield experienced sampling errors associated with ISCO's firmware during this monitoring period. Neither site collected any samples on September 6. Equipment errors were tested and resolved as they were recognized. Equipment testing has been performed outside of storm events at both sites to try to correct errors. The composite sampler at Chrisfield has since been corrected and collected a successful composite sample during the October 19 storm event. New firmware is being installed at Edgewood to ensure successful composite samples in the future. Full suite grab samples will continue to be collected during storm events until all issues are resolved.

Precipitation Data

Precipitation data was collected continuously during the September–October monitoring period. However, precipitation data is not available for the Edgewood or Chrisfield rain gauges during the September 6 event. An error with the ISCO firmware caused precipitation data to be deleted at both stations during monitored events. This issue has since been resolved.

For the September 6, 2019, storm event, the AgriMet Weather Station rain gauge data was used. The AgriMet weather station is maintained by the U.S. Bureau of Reclamation and located at the Western Idaho Fairgrounds, which is approximately 4 miles southeast of the Edgewood monitoring station and 6 miles northeast of the Chrisfield monitoring station.

Edgewood Flow Data

Flow data is not available for Edgewood from October 21, 2019, until the end of the monitoring period. Upon inspection of the equipment, it was found that an animal had chewed through the AV sensor cable. A new sensor with a protective lining was installed on November 25, 2019.

October 19, 2019, Edgewood samples

On October 19, grab samples were collected from the wrong inlet pipe in the stormwater vault. This mistake has been documented and appropriate training has taken place to correct this error. The water quality results from Edgewood were rejected.

References

National Weather Service Boise Forecast Office. (2018). Monthly Weather Summary. Retrieved November 20,2019, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

National Weather Service Boise Forecast Office. (2018). Preliminary Monthly Climate Data. Retrieved November 20,2019, from NWS website: http://w2.weather.gov/climate/index.php?wfo=boi

Attachment A: Monitoring Period Summary Tables

Table 2

Monitoring Period Summary | September 1 - October 31 (WY19)						
	Edgewood			Chrisfield		
	cubic feet	percent		cubic feet	percent	
Measured Stormwater Runoff Volume (cf)	36,188 [1]	3%		12,780	89%	
Background Discharge Volume (cf)	1,371,416 [2]	97%		1,548	11%	
Total Discharge Volume (cf)	1,407,604	100%		14,328	100%	
Estimated Runoff for Monitored Area [3]	Edgewood	Eagle		Chrisfield	Meridian	
Monthly Precipitation (in)	1.14			1.21		
Drainage Area (acres)	55.86	22,765		12	26,690	
Estimated Stormwater Runoff Volume [4] (cf)	24,757	25,906,684		9,772	32,238,384	
Monitored Storm Information	Edgewood (9/6/2019)			Chrisfield (10/19/2019)		
Precipitation Amount (in)	0.30			0.23		
Storm Duration (hrs)	4			8		
Antecedent Dry Period (hrs)	655			90		
Recorded Runoff Volume (cf)	10,505			2,844		
Sample Information						
Sample Date and Time	9/6/2019 12:17			10/19/2019 8:19		
Dissolved Oxygen (mg/L)	7.47			8.8		
pH (S.U.)	7.45			7.01		
Conductivity (uS/cm)	113.96			--		
Temperature (°C)	23.01			7.0		
Nitrate + Nitrite as N (mg/L)	1.21			0.298		
Total Suspended Solids (mg/L)	64.9			143		
Total Kjeldahl Nitrogen (mg/L)	2.05			4.23		
Dissolved Orthophospate as P (mg/L)	0.218			0.356		
Total Phosphorus as P (mg/L)	0.369			0.567		
E.Coli (MPN/100 mL)	2419.6			344.8		
Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.05	2.68	1,094	0.02	0.24	529
Total Suspended Solids	2.58	143.96	58,668	9.51	114.08	253,724
Total Kjeldahl Nitrogen	0.08	4.55	1,853	0.28	3.37	7,505
Dissolved Orthophosphate as P	0.01	0.48	197	0.02	0.28	632
Total Phosphorus as P	0.01	0.82	334	0.04	0.45	1,006

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] Background discharge volume does not include dates with missing data.

[3] The "Monitored Area" includes only the area drained by the individual monitoring station.

[4] Estimated stormwater runoff volume is calculated using local precipitation data

Table 3

Monitoring Period Summary | September 1 - September 30 (WY19)						
	Edgewood			Chrisfield		
	cubic feet	percent		cubic feet	percent	
Measured Stormwater Runoff Volume (cf)	28,015	3%		9,684	86%	
Background Discharge Volume (cf)	815,969	97%		1,512	14%	
Total Discharge Volume (cf)	843,984	100%		11,196	100%	
Estimated Runoff for Monitored Area [3]	Edgewood	Eagle		Chrisfield	Meridian	
Monthly Precipitation (in)	0.75			0.92		
Drainage Area (acres)	55.86	22,765		12	26,690	
Estimated Stormwater Runoff Volume [4] (cf)	16,288	17,043,870		7,430	24,511,829	
Monitored Storm Information	Edgewood (9/6/2019)			Chrisfield (10/19/2019)		
Precipitation Amount (in)	0.30			0.23		
Storm Duration (hrs)	4			8		
Antecedent Dry Period (hrs)	655			90		
Recorded Runoff Volume (cf)	10,505			2,844		
Sample Information						
Sample Date and Time	9/6/2019 12:17			10/19/2019 8:19		
Dissolved Oxygen (mg/L)	7.47			8.8		
pH (S.U.)	7.45			7.01		
Conductivity (uS/cm)	113.96			--		
Temperature (°C)	23.01			7.0		
Nitrate + Nitrite as N (mg/L)	1.21			0.298		
Total Suspended Solids (mg/L)	64.9			143		
Total Kjeldahl Nitrogen (mg/L)	2.05			4.23		
Dissolved Orthophospate as P (mg/L)	0.218			0.356		
Total Phosphorus as P (mg/L)	0.369			0.567		
E.Coli (MPN/100 mL)	2419.6			344.8		
Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.04	2.12	862	0.02	0.18	401
Total Suspended Solids	2.03	113.49	46,252	7.20	86.44	192,259
Total Kjeldahl Nitrogen	0.06	3.58	1,461	0.21	2.56	5,687
Dissolved Orthophosphate as P	0.01	0.38	155	0.02	0.22	479
Total Phosphorus as P	0.01	0.65	263	0.03	0.34	762

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] Background discharge volume does not include dates with missing data.

[3] The "Monitored Area" includes only the area drained by the individual monitoring station.

[4] Estimated stormwater runoff volume is calculated using local precipitation data

Table 4

Monitoring Period Summary | October 1 - October 31 (WY19)						
	Edgewood			Chrisfield		
	cubic feet	percent		cubic feet	percent	
Measured Stormwater Runoff Volume (cf)	7,520 [1]	1%		3,096	99%	
Background Discharge Volume (cf)	555,448 [2]	99%		36	1%	
Total Discharge Volume (cf)	562,968	100%		3,132	100%	
Estimated Runoff for Monitored Area [3]	Edgewood	Eagle		Chrisfield	Meridian	
Monthly Precipitation (in)	0.36			0.41		
Drainage Area (acres)	55.86	22,765		12	26,690	
Estimated Stormwater Runoff Volume [4] (cf)	7,818	8,181,058		3,311	10,923,750	
Monitored Storm Information	Edgewood (9/6/2019)			Chrisfield (10/19/2019)		
Precipitation Amount (in)	0.30			0.23		
Storm Duration (hrs)	4			8		
Antecedent Dry Period (hrs)	655			90		
Recorded Runoff Volume (cf)	10,505			2,844		
Sample Information						
Sample Date and Time	9/6/2019 12:17			10/19/2019 8:19		
Dissolved Oxygen (mg/L)	7.47			8.8		
pH (S.U.)	7.45			7.01		
Conductivity (uS/cm)	113.96			--		
Temperature (°C)	23.01			7.0		
Nitrate + Nitrite as N (mg/L)	1.21			0.298		
Total Suspended Solids (mg/L)	64.9			143		
Total Kjeldahl Nitrogen (mg/L)	2.05			4.23		
Dissolved Orthophospate as P (mg/L)	0.218			0.356		
Total Phosphorus as P (mg/L)	0.369			0.567		
E.Coli (MPN/100 mL)	2419.6			344.8		
Pollutant Loading Estimates	Edgewood		Eagle	Chrisfield		Meridian
	(lbs/acre)	(lbs)	(lbs)	(lbs/acre)	(lbs)	(lbs)
Nitrate + Nitrite as N	0.01	0.57	232	0.00	0.06	128
Total Suspended Solids	0.55	30.47	12,416	2.30	27.64	61,466
Total Kjeldahl Nitrogen	0.02	0.96	392	0.07	0.82	1,818
Dissolved Orthophosphate as P	0.00	0.10	42	0.01	0.07	153
Total Phosphorus as P	0.00	0.17	71	0.01	0.11	244

Notes:

[1] Estimated runoff volume is used when flow data is not available.

[2] Background discharge volume does not include dates with missing data.

[3] The "Monitored Area" includes only the area drained by the individual monitoring station.

[4] Estimated stormwater runoff volume is calculated using local precipitation data

Attachment B: Monitoring Period Hydrographs

Figure 1

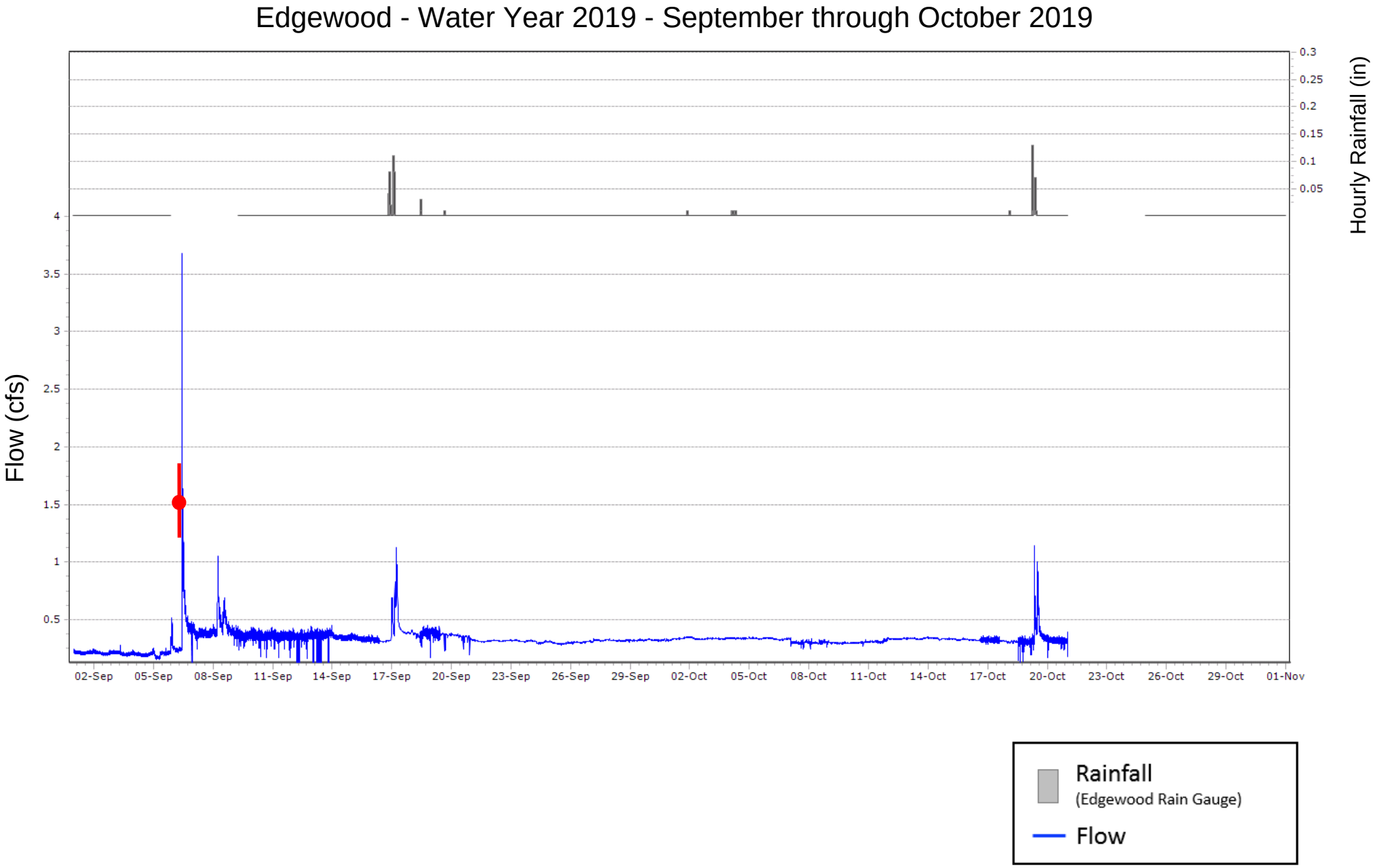

Edgewood - Water Year 2019 - September through October 2019
Flow (cfs)
Hourly Rainfall (in)
0.3
0.25
0.2
0.15
0.1
0.05
4
3.5
3
2.5
2
1.5
1
0.5
02-Sep
05-Sep
08-Sep
11-Sep
14-Sep
17-Sep
20-Sep
23-Sep
26-Sep
29-Sep
02-Oct
05-Oct
08-Oct
11-Oct
14-Oct
17-Oct
20-Oct
23-Oct
26-Oct
29-Oct
01-Nov
Rainfall
(Edgewood Rain Gauge)
Flow

Figure 2

Chrisfield - Water Year 2019 - September through October 2019

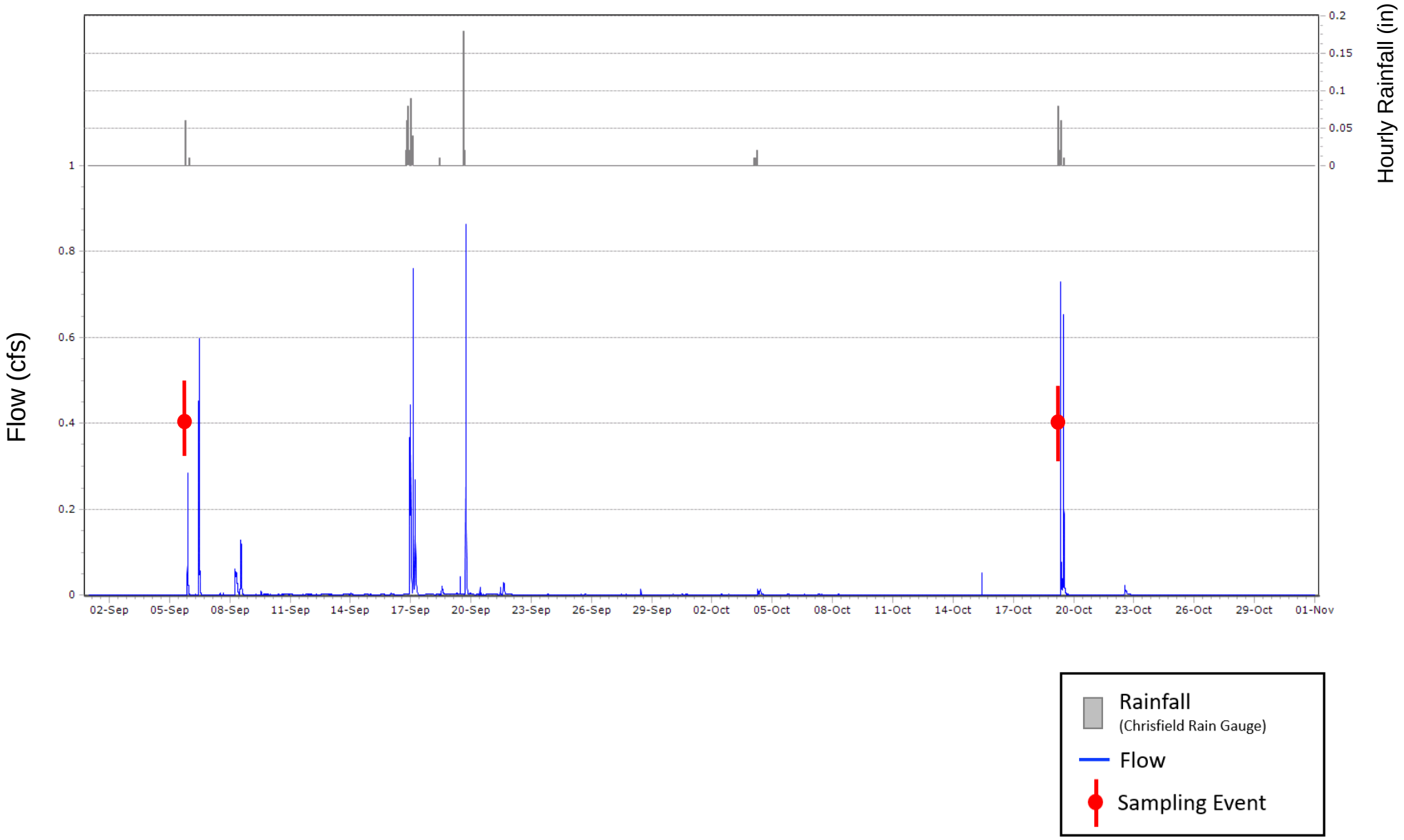


Figure 3

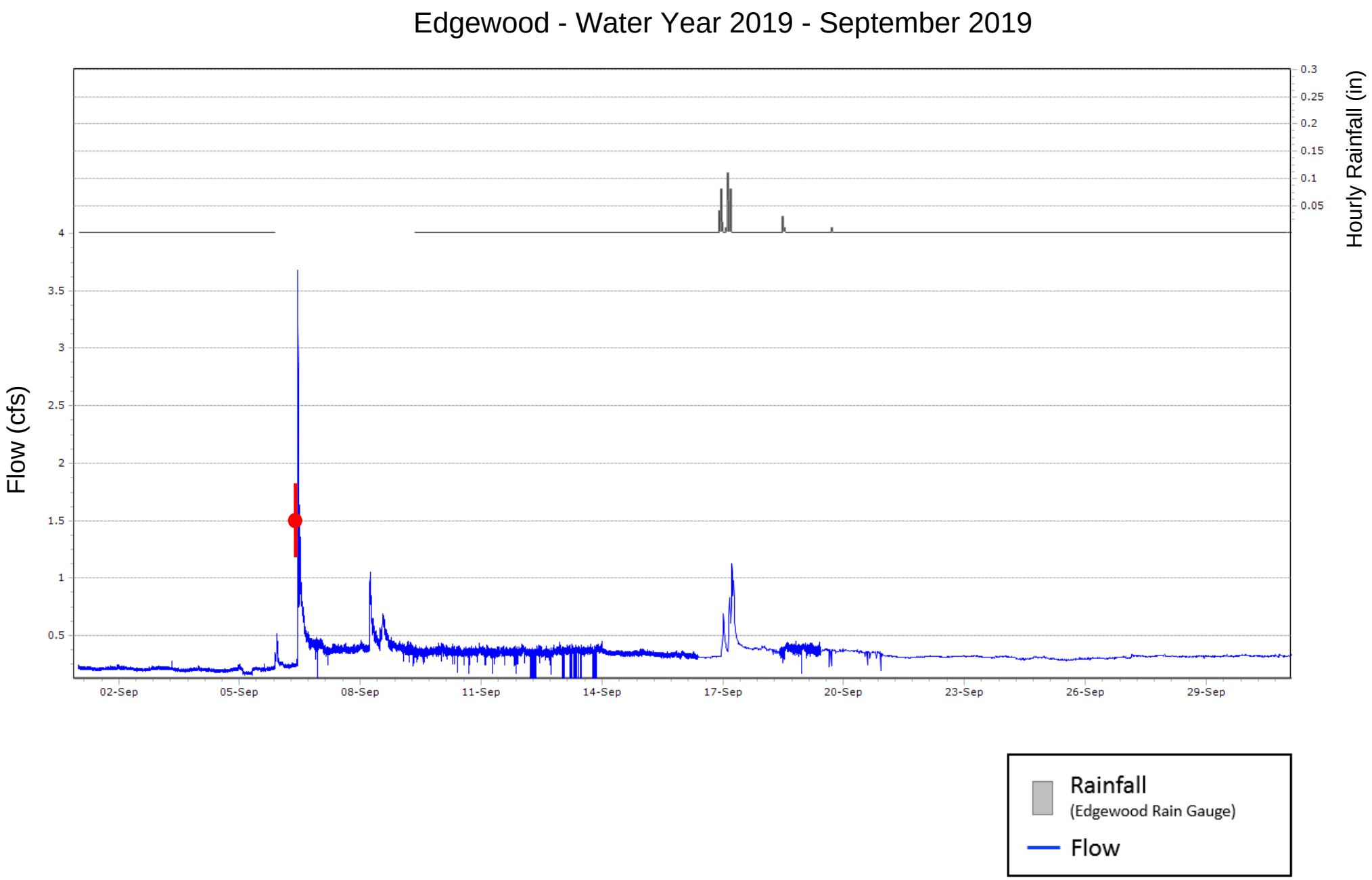

Edgewood - Water Year 2019 - September 2019
Flow (cfs)
Hourly Rainfall (in)
0.3
0.25
0.2
0.15
0.1
0.05
4
3.5
3
2.5
2
1.5
1
0.5
02-Sep
05-Sep
08-Sep
11-Sep
14-Sep
17-Sep
20-Sep
23-Sep
26-Sep
29-Sep
Rainfall
(Edgewood Rain Gauge)
Flow

Figure 4

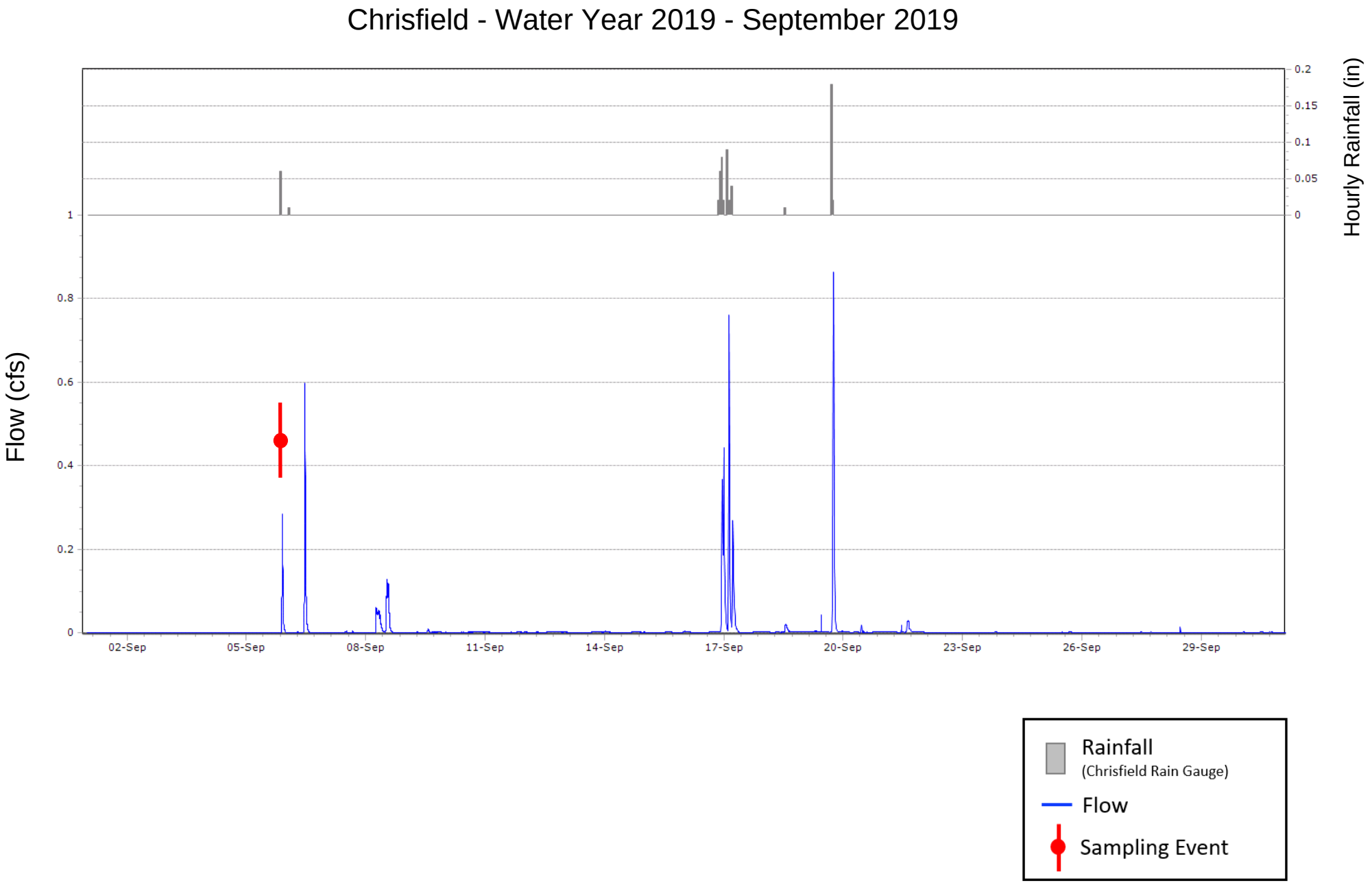

Chrisfield - Water Year 2019 - September 2019
Flow (cfs)
Hourly Rainfall (in)
0
0.2
0.4
0.6
0.8
1
0
0.05
0.1
0.15
0.2
02-Sep
05-Sep
08-Sep
11-Sep
14-Sep
17-Sep
20-Sep
23-Sep
26-Sep
29-Sep
Rainfall
(Chrisfield Rain Gauge)
Flow
Sampling Event

Figure 5

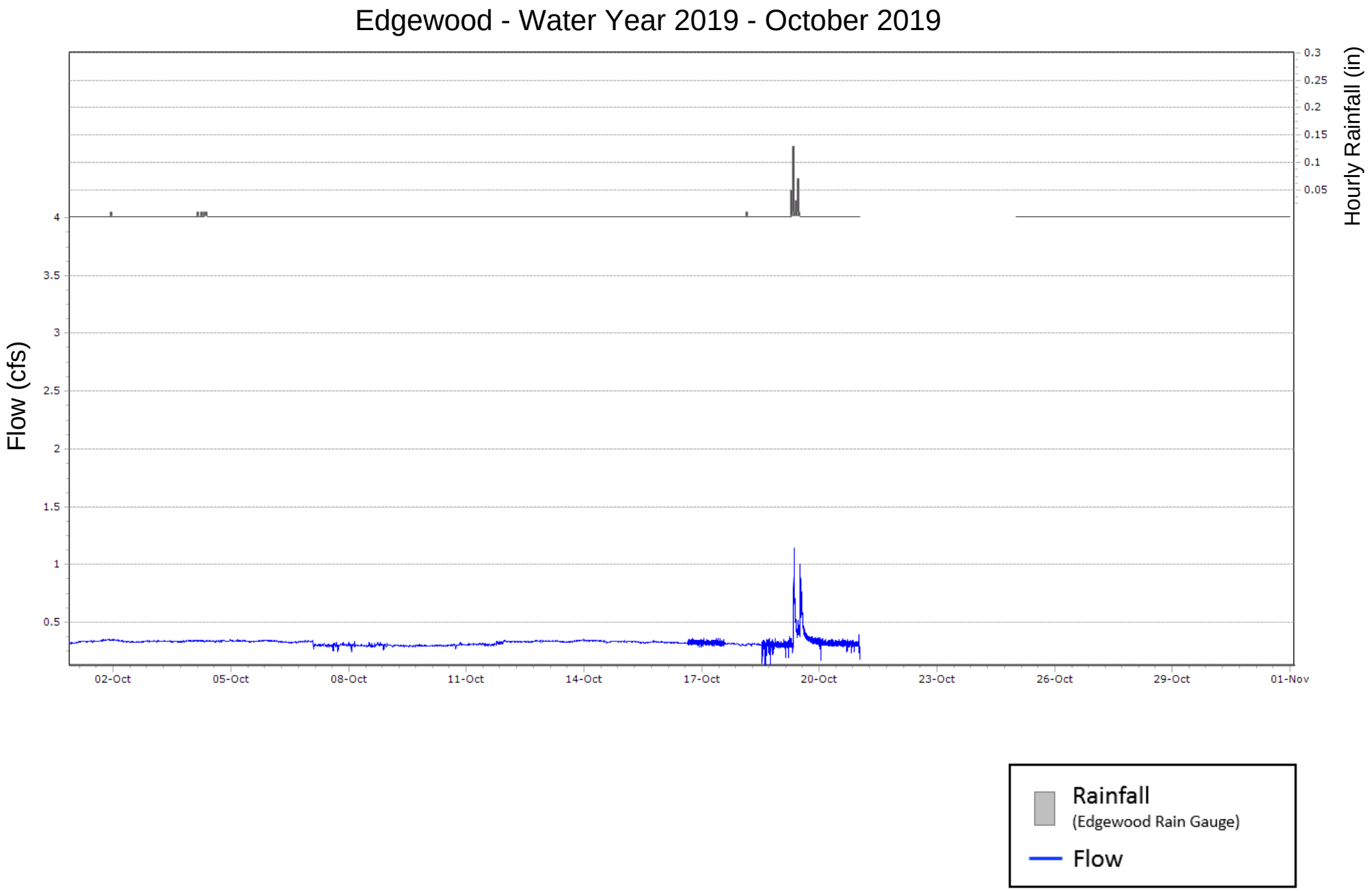
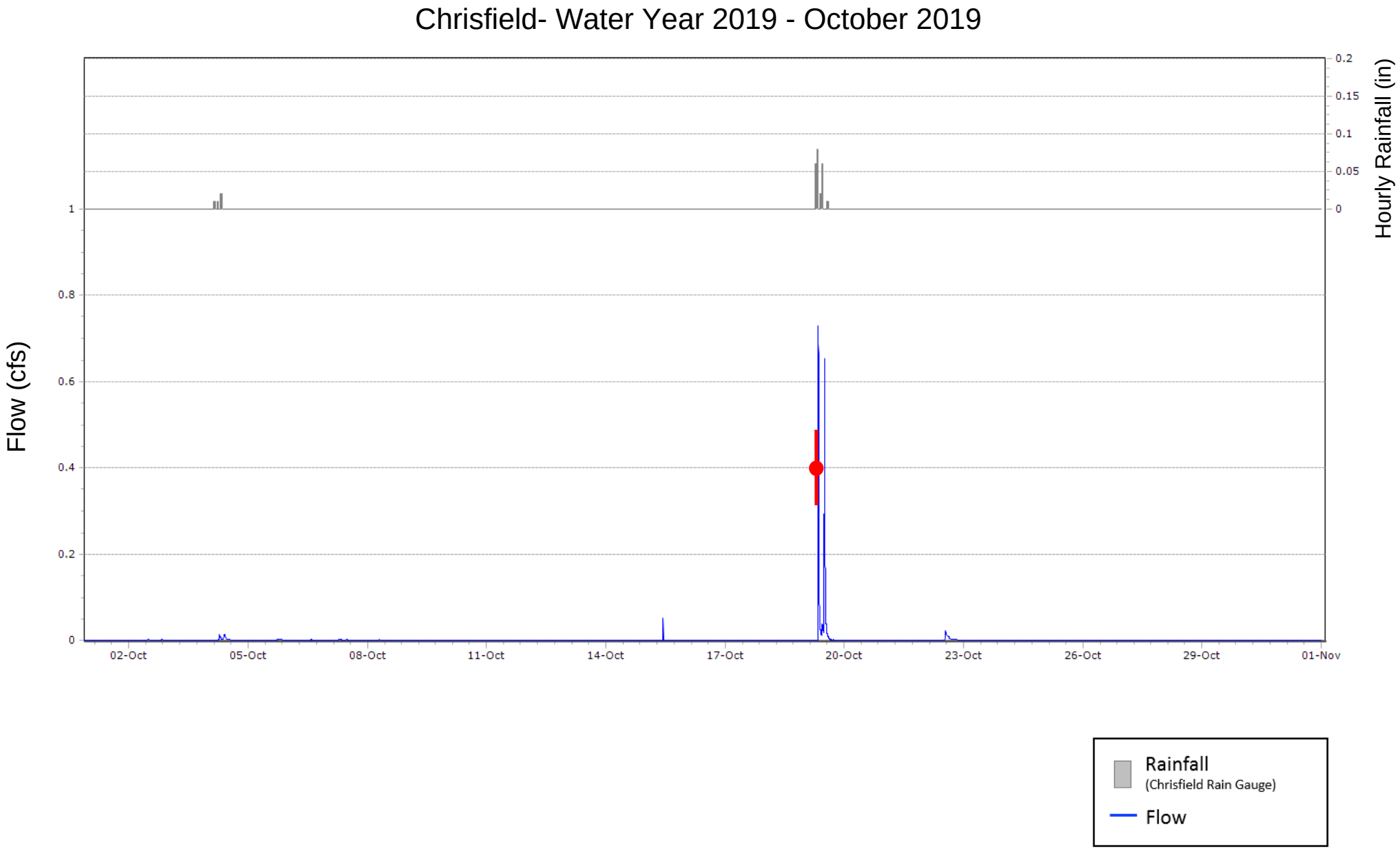

Edgewood - Water Year 2019 - October 2019
Flow (cfs)
Hourly Rainfall (in)
4
3.5
3
2.5
2
1.5
1
0.5
0.3
0.25
0.2
0.15
0.1
0.05
02-Oct
05-Oct
08-Oct
11-Oct
14-Oct
17-Oct
20-Oct
23-Oct
26-Oct
29-Oct
01-Nov
Rainfall
(Edgewood Rain Gauge)
Flow

Figure 6


Chrisfield- Water Year 2019 - October 2019
Flow (cfs)
Hourly Rainfall (in)
0
0.2
0.4
0.6
0.8
1
0
0.05
0.1
0.15
0.2
02-Oct
05-Oct
08-Oct
11-Oct
14-Oct
17-Oct
20-Oct
23-Oct
26-Oct
29-Oct
01-Nov
Rainfall
(Chrisfield Rain Gauge)
Flow

Attachment C: Analytical Reports and Field Sheets

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
9AC0064-01	ACST2	190906-09-WG	Water		09/06/2019	09/06/2019
9AC0064-02	ACST2	190906-08-WG	Water		09/06/2019	09/06/2019
9AC0064-03	ACST2	190906-08-101	Water		09/06/2019	09/06/2019

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2	Location Description:	190906-09-WG
Date/Time Collected:	09/06/2019 11:24		
Lab Number:	9AC0064-01	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9I0617	6440.0	MPN/100 mL	100.0	1.0	Colilert	09/06/19 13:48	9/7/19 13:48	JAL	D
Wet Chemistry										
Chlorine Screen	B9I0619	Absent				SM 4500-CL G-2000 mod	09/06/19	9/6/19 13:23	LRF	
Nitrate-Nitrite, as N	B9I1205	0.695	mg/L	0.0250	0.0250	EPA 353.2	09/12/19	9/12/19 9:07	JAL	
TKN	B9I3010	5.57	mg/L	0.130	0.130	EPA 351.2	09/30/19	10/1/19 10:06	ALN	
Total Suspended Solids	B9I0703	165	mg/L	0.900	0.900	SM 2540 D-1997	09/07/19	9/7/19 9:58	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9I0701	0.267	mg/L	2.00E-3	2.00E-3	EPA 365.1	09/07/19	9/7/19 9:17	JAL	
Total Metals										
Phosphorus as P	B9I0902	0.501	mg/L	6.00E-3	6.00E-3	EPA 200.7	09/09/19	9/10/19 15:53	AMO	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2	Location Description:	190906-08-WG
Date/Time Collected:	09/06/2019 12:17		
Lab Number:	9AC0064-02	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9I0617	2419.6	MPN/100 mL	1.0	1.0	Colilert	09/06/19 13:48	9/7/19 13:48	JAL	
Wet Chemistry										
Chlorine Screen	B9I0619	Absent				SM 4500-CL G-2000 mod	09/06/19	9/6/19 13:23	LRF	
Nitrate-Nitrite, as N	B9I1205	1.21	mg/L	0.0250	0.0250	EPA 353.2	09/12/19	9/12/19 9:12	JAL	
TKN	B9I3010	2.05	mg/L	0.130	0.130	EPA 351.2	09/30/19	10/1/19 10:07	ALN	
Total Suspended Solids	B9I0703	64.9	mg/L	0.900	0.900	SM 2540 D-1997	09/07/19	9/7/19 9:58	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9I0701	0.218	mg/L	2.00E-3	2.00E-3	EPA 365.1	09/07/19	9/7/19 9:18	JAL	
Total Metals										
Phosphorus as P	B9I0902	0.369	mg/L	6.00E-3	6.00E-3	EPA 200.7	09/09/19	9/10/19 16:07	AMO	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Analysis Report

Location:	ACST2	Location Description:	190906-08-101
Date/Time Collected:	09/06/2019 12:00		
Lab Number:	9AC0064-03	Sample Collector:	ABW
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9I0617	1460.0	MPN/100 mL	100.0	1.0	Colilert	09/06/19 13:48	9/7/19 13:48	JAL	D
Wet Chemistry										
Chlorine Screen	B9I0619	Absent				SM 4500-CL G-2000 mod	09/06/19	9/6/19 13:23	LRF	
Nitrate-Nitrite, as N	B9I1205	1.22	mg/L	0.0250	0.0250	EPA 353.2	09/12/19	9/12/19 9:13	JAL	
TKN	B9I3010	1.95	mg/L	0.130	0.130	EPA 351.2	09/30/19	10/1/19 10:09	ALN	
Total Suspended Solids	B9I0703	67.3	mg/L	0.900	0.900	SM 2540 D-1997	09/07/19	9/7/19 9:59	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9I0701	0.217	mg/L	2.00E-3	2.00E-3	EPA 365.1	09/07/19	9/7/19 9:23	JAL	
Total Metals										
Phosphorus as P	B9I0902	0.368	mg/L	6.00E-3	6.00E-3	EPA 200.7	09/09/19	9/10/19 16:12	AMO	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 10/01/2019 14:02

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Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Microbiology									
Batch: B9I0617									
Blank (B9I0617-BLK1)									
E. Coli	Absent						09/07/2019	JAL	
LCS (B9I0617-BS1)									
E. Coli				Present			09/07/2019	JAL	
Duplicate (B9I0617-DUP1)	Source ID: 9WB0682-06								
E. Coli					Pass	128	09/07/2019	JAL	
Duplicate (B9I0617-DUP2)	Source ID: 9AC0064-02								
E. Coli					Pass	128	09/07/2019	JAL	
Duplicate (B9I0617-DUP3)	Source ID: 9AC0064-02RE1								
E. Coli					Pass	128	09/07/2019	JAL	
Wet Chemistry									
Batch: B9I0703									
Blank (B9I0703-BLK1)									
Total Suspended Solids	<0.9	mg/L					09/07/2019	F.A	U
LCS (B9I0703-BS1)									
Total Suspended Solids			96.2	90-110			09/07/2019	F.A	
Duplicate (B9I0703-DUP1)	Source ID: 9BB0573-02								
Total Suspended Solids					7.19	20	09/07/2019	F.A	
Batch: B9I1205									
Blank (B9I1205-BLK1)									
Nitrate-Nitrite, as N	<0.025	mg/L					09/12/2019	JAL	U
Blank (B9I1205-BLK2)									
Nitrate-Nitrite, as N	<0.025	mg/L					09/12/2019	JAL	U
LCS (B9I1205-BS1)									
Nitrate-Nitrite, as N			103	90-110			09/12/2019	JAL	
LCS (B9I1205-BS2)									
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Duplicate (B9I1205-DUP1)	Source ID: 9AC0064-01								
Nitrate-Nitrite, as N					0.514	10	09/12/2019	JAL	
Duplicate (B9I1205-DUP2)	Source ID: 9BB0562-02								
Nitrate-Nitrite, as N					NR	10	09/12/2019	JAL	
Duplicate (B9I1205-DUP3)	Source ID: 9WB0677-05								
Nitrate-Nitrite, as N					NR	10	09/12/2019	JAL	
Matrix Spike (B9I1205-MS1)	Source ID: 9AC0064-01								
Nitrate-Nitrite, as N			98.8	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS2)	Source ID: 9BB0562-02								
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS3)	Source ID: 9WB0677-05								
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS4)	Source ID: 9EP0071-01								

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9I1205 (Continued)									
Matrix Spike (B9I1205-MS4) (Continued) Source ID: 9EP0071-01									
Nitrate-Nitrite, as N			104	90-110			09/12/2019	JAL	
Matrix Spike (B9I1205-MS5) Source ID: 9EP0071-02									
Nitrate-Nitrite, as N			103	90-110			09/12/2019	JAL	
Matrix Spike Dup (B9I1205-MSD1) Source ID: 9AC0064-01									
Nitrate-Nitrite, as N			93.8	90-110	1.86	10	09/12/2019	JAL	
Matrix Spike Dup (B9I1205-MSD2) Source ID: 9BB0562-02									
Nitrate-Nitrite, as N			104	90-110	0.245	10	09/12/2019	JAL	
Matrix Spike Dup (B9I1205-MSD3) Source ID: 9WB0677-05									
Nitrate-Nitrite, as N			103	90-110	0.582	10	09/12/2019	JAL	
Batch: B9I3010									
Blank (B9I3010-BLK1)									
TKN	<0.13	mg/L					10/01/2019	ALN	U
LCS (B9I3010-BS1)									
TKN			107	80-120			10/01/2019	ALN	
Duplicate (B9I3010-DUP1) Source ID: 9WB0701-05									
TKN					0.196	20	10/01/2019	ALN	D
Duplicate (B9I3010-DUP2) Source ID: 9WB0701-09									
TKN					9.04	20	10/01/2019	ALN	D
Matrix Spike (B9I3010-MS1) Source ID: 9WB0701-05									
TKN			109	80-120			10/01/2019	ALN	D
Matrix Spike (B9I3010-MS2) Source ID: 9WB0701-09									
TKN			99.1	80-120			10/01/2019	ALN	D
Matrix Spike Dup (B9I3010-MSD1) Source ID: 9WB0701-05									
TKN			83.9	80-120	9.19	20	10/01/2019	ALN	D
Matrix Spike Dup (B9I3010-MSD2) Source ID: 9WB0701-09									
TKN			98.3	80-120	0.165	20	10/01/2019	ALN	D

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Dissolved Wet Chemistry									
Batch: B9I0701									
Blank (B9I0701-BLK1)									
Orthophosphate, as P	<0.002	mg/L					09/07/2019	JAL	U
LCS (B9I0701-BS1)									
Orthophosphate, as P			98.3	90-110			09/07/2019	JAL	
Duplicate (B9I0701-DUP1) Source ID: 9AC0064-02									
Orthophosphate, as P					0.173	10	09/07/2019	JAL	
Matrix Spike (B9I0701-MS1) Source ID: 9AC0064-02									
Orthophosphate, as P			106	90-110			09/07/2019	JAL	
Matrix Spike Dup (B9I0701-MSD1) Source ID: 9AC0064-02									
Orthophosphate, as P			108	90-110	0.539	10	09/07/2019	JAL	
Total Metals									
Batch: B9I0902									
Blank (B9I0902-BLK1)									
Phosphorus as P	<0.006	mg/L					09/10/2019	AMO	U
LCS (B9I0902-BS1)									
Phosphorus as P			102	85-115			09/10/2019	AMO	
Duplicate (B9I0902-DUP1) Source ID: 9WB0679-04									
Phosphorus as P					9.27	20	09/10/2019	AMO	D
Matrix Spike (B9I0902-MS1) Source ID: 9WB0679-04									
Phosphorus as P			118	70-130			09/10/2019	AMO	D
Matrix Spike Dup (B9I0902-MSD1) Source ID: 9WB0679-04									
Phosphorus as P			121	70-130	1.14	20	09/10/2019	AMO	D

Report Date: 10/01/2019 14:02

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
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Telephone (208) 608-7240
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Notes and Definitions

Item	Definition
D	Data reported from a dilution
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

AW for Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Azubike Emenari
QA/QC Coordinator

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63046446
Project: Stormwater-PII
Sampler(s): Jeannette Ayala
Andy Weigel

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
9AC00604-01	9/6/19		1120	1124	190906-09-WG	ABW	X	X				X		X	X	X				X			X		6
-02	9/6/19		1205	1217	190906-08-WG	ABW	X	X				X		X	X	X				X			X		6
-03	9/6/19		1200		190906-08-101							X		X	X	X				X			X		6

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
[signature]	9-6-19 1358	Kathy Finley	9AC00604

MS ✓

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Chrisfield Bottle 1 of ____

SET-UP:

Date/Time On-site: 9-5-19 13:10 MDT/MST*(circle one) Personnel: AMC ABW

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date	9-5 1340				
Level	.34				in.
Flow	0				cfs
Velocity	.045				fps
Voltage	12.8				V
Temp					C°

- √ Replace batteries if v<11.9
- √ Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- √ Program sampler per PG 320
  - Trigger condition DM .2
  - Flow Pulse Interval 58
- √ Set Modem Access to "Storm Event" -24/7 (Flowlink)
- √ Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- √ Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- √ Perform decon. cycle
- √ Verify Sampler date and time are correct
- √ Place 15L sample bottle in sampler base & fill with 2 bag ice
- √ Remove jar lid and place in a clean re-sealable plastic bag
- √ Verify all cable and tubing connections
- √ Verify Sampler Program is Running
- √ Verify latches are secure

Comments: couldn't connect to Chrisfield in flowlink - connected directly

Date/Time Off-site: 9-5 1350

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: _____ Personnel: _____

- ____ Halt Sampler program
- ____ Put lid on sample bottle
- ____ Properly label sample bottle; Record Sample ID on back of sheet
- ____ Record liquid height/sample volume and visual observations on back of sheet
- ____ Record subsample information on back of sheet

If Sampling is Complete:

- ____ Power off Sampler
- ____ Add ice to sample cooler
- ____ Complete COC form;
- ____ Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- Date/Time Restarted: _____
- ____ Verify Running

Comments:

Date/Time Off-site: _____

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ____ Record Flow Meter status (Flowlink)
- ____ Replace battery if v<11.9
- ____ Retrieve Data (Flowlink)
- ____ Change modem access to "Dry Weather" 8-6 M-F
- ____ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ____ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: _____-WC Bottle _____ of _____

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)		mL
Flow Pulse Interval		ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity		Clear, Cloudy, Silty
Color		Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
9			29		
10			30		
11			31		
12			32		
13			33		
14			34		
15			35		
16			36		
17			37		
18			38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: _____-103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

***MST is observed during fall and winter; MDT is observed in spring and summer.**

Form 21A
GRAB SAMPLE DATA FORM – (Phase II)

Station: Chrisfield Personnel: ABW JA

Date/Time On-site: 9/6/19 1110 MDT/MST (circle one)

FLOW METER CURRENT STATUS:

	Value	Unit		Value	Unit
Level		inch	Velocity		fps
Flow		cfs	Battery		v
Total Flow		cf	Flow Start		(time)
Rainfall		in. (if applicable)			

GRAB INFORMATION:

Is this a QA/QC Station? Yes ___ No X (if YES, fill out Form 21B on back)

Photographs Taken? Yes ___ No X Swing Sampler Used? Yes X No ___

Storm Event Sample? Yes X No ___

Sample ID: 190906-09-AW Wet / Dry Grab (fill in station name)

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
11:23	(4) L plastic – TSS	N/A	N/A	☒
11:21	(1) L plastic – TKN	☒	N/A	☒
11:22	(1) 500mL plastic - TP	N/A	N/A	☒
11:21	(1) 500mL plastic (square) - NOx	☒	Time: 1130	☒
11:20	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
11:24	(1) 250 mL plastic - OP	N/A	Time: 1130	☒

FIELD PARAMETERS: Fill (1) 500mL Amber Time: 11:32

	Value	Unit		Value	Unit
Diss. O_2 – Field	7.52	Mg/L	Temp – DO Meter	24.070	°C
Conductivity	114.60	µS/cm	Temp – Cond. Meter		°C
pH - Field	7.74	S.U.	Temp – pH Meter		°C

COMMENTS:

***NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume & Preserved samples should have pH <2**

Updated 3/25/15

Form 21B
QA/QC SAMPLE DATA FORM – (Phase II)

Date/Time - Off-site: _____

Station: _____ Personnel: _____

Sample ID: _____-101 (fill in appropriate sequential number)

QA Sample? ☑ **QA SAMPLE TYPE: FIELD DUPLICATE**

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsample is the "Start Date/Time" and the "End Date/Time", respectively

Comments:

Sample ID: _____-001 (fill in appropriate sequential number)

QA Sample? ☑ **QA SAMPLE TYPE: FIELD BLANK** (Fill bottles with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsamples is the "Start Date/Time" and "End Date/Time", respectively.

Comments:

Form 22
SET-UP/SHUT DOWN CHECKLIST – Phase II

Station : Edgewood Bottle 1 of ____

SET-UP:

Date/Time On-site: 9-5-19 1405 MDT/MST*(circle one) Personnel: AML ABW

Remote Connection Date/Time: _____ MDT/MST*(circle one)

Flow Meter Status & Velocity Cut-off Chart					
Time/Date	1414 9/5/19				
Level	2.585				in.
Flow	0.214				cfs
Velocity	0.815				fps
Voltage	12.8				V
Temp	19.5				C°

- √ Replace batteries if v<11.9
- √ Verify Flow Meter operation (Flowlink) & Check to determine if flow present
- √ Program sampler per PG 320
  - Trigger condition ____
  - Flow Pulse Interval 156
- √ Set Modem Access to "Storm Event" -24/7 (Flowlink)
- √ Change Data Storage Rates to 1 minute for Level, Velocity and Flow (Flowlink)
- √ Change Data Storage Rates to 15 minutes for temperature, velocity spectrum, velocity spectrum ratio, and velocity signal to 15 minute (Flowlink)
- √ Perform decon. cycle
- √ Verify Sampler date and time are correct
- √ Place 15L sample bottle in sampler base & fill with 2 bag ice
- √ Remove jar lid and place in a clean re-sealable plastic bag
- √ Verify all cable and tubing connections
- √ Verify Sampler Program is Running
- √ Verify latches are secure

Comments:

Date/Time Off-site: 9-5 1430

COMPOSITE SAMPLE COLLECTION

Date/Time On-site: _____ Personnel: _____

- ____ Halt Sampler program
- ____ Put lid on sample bottle
- ____ Properly label sample bottle; Record Sample ID on back of sheet
- ____ Record liquid height/sample volume and visual observations on back of sheet
- ____ Record subsample information on back of sheet

If Sampling is Complete:

- ____ Power off Sampler
- ____ Add ice to sample cooler
- ____ Complete COC form;
- Arrange transport to lab

If Continuing Sampling (sample bottle change out):

- ____ Install new 15 L bottle, add ice
- ____ Restart sampling program
- Date/Time Restarted: _____
- ____ Verify Running

Comments:

Date/Time Off-site: _____

SHUT-DOWN:

Date/Time On-site: _____ MDT/MST

Remote Date/Time: _____ MDT/MST Personnel: _____

- ____ Record Flow Meter status (Flowlink)
- ____ Replace battery if v<11.9
- ____ Retrieve Data (Flowlink)
- ____ Change modem access to "Dry Weather" 8-6 M-F
- ____ Change data storage rates for level, velocity and flow rate to 15 min (Flowlink)
- ____ Change data storage rates for temp, vel. Spectrum, Velocity ratio, and velocity signal to 30 minutes.

Flow Meter Status		
Level		in.
Flow		cfs
Velocity		fps
Voltage		V

Comments:

Date/Time Off-site: _____ Remote/On-site (circle one)

Form 22
COMPOSITE INFORMATION– Phase II

Station/Sample ID: _____-WC Bottle _____ of _____

Sample Quantitative Results

Component	Value	Unit
Composite Sample Volume (Approx.)		mL
Flow Pulse Interval		ft^3

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Sample Qualitative Results

Component	Description	Examples
Clarity		Clear, Cloudy, Silty
Color		Clear, Gray, Tan, Brown, Black

Subsample Information:

Trigger #	Date/Time	Sampler Message / Subsample Result	Trigger #	Date/Time	Sampler Message / Subsample Result
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
9			29		
10			30		
11			31		
12			32		
13			33		
14			34		
15			35		
16			36		
17			37		
18			38		
19			39		
20			40		

Notes: The date/time for the first trigger is the "Start Date/Time"; The date/time for the final trigger is the "End Date/Time"

COMMENTS:

Is this a QA/QC Station? Yes _____ No _____ (if YES, fill out information below)

Sample ID: _____-103 (fill in appropriate sequential number) QA Sample Type: Laboratory Split

SUBSAMPLE INFORMATION:

Date/Time	Container - Test (Subsample Result)
12:00	COC Sample Date & Time

Notes: Use the "Start Date/Time" and "End Date/Time" for the parent sample.

***MST is observed during fall and winter; MDT is observed in spring and summer.**

Form 21A
GRAB SAMPLE DATA FORM – (Phase II)

Station: Edgemont Personnel: ABW JA

Date/Time On-site: 9/6/19 1200 MDT/MST (circle one)

FLOW METER CURRENT STATUS:

	Value	Unit		Value	Unit
Level		inch	Velocity		fps
Flow		cfs	Battery		v
Total Flow		cf	Flow Start		(time)
Rainfall		in. (if applicable)			

GRAB INFORMATION:

Is this a QA/QC Station? Yes X No ____ (if YES, fill out Form 21B on back)

Photographs Taken? Yes ____ No X Swing Sampler Used? Yes X No ____

Storm Event Sample? Yes X No ____

Sample ID: 190906-08 – Wet / Dry Grab (fill in station name)

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
12:13	(4) L plastic – TSS	N/A	N/A	☒
12:09	(1) L plastic – TKN	☒	N/A	☒
12:06	(1) 500mL plastic - TP	N/A	N/A	☒
12:17	(1) 500mL plastic (square) - NOx	☒	Time: 1223	☒
12:05	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
12:17	(1) 250 mL plastic - OP	N/A	Time: 1223	☒

FIELD PARAMETERS: Fill (1) 500mL Amber Time: 12:21

	Value	Unit		Value	Unit
Diss. O_2 – Field	7.47	Mg/L	Temp – DO Meter	23.01	°C
Conductivity	113.9605	µS/cm	Temp – Cond. Meter		°C
pH - Field	7.45	S.U.	Temp – pH Meter		°C

COMMENTS:

***NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume & Preserved samples should have pH <2**

Updated 3/25/15

Form 21B
QA/QC SAMPLE DATA FORM – (Phase II)

Date/Time - Off-site:

Station: Personnel:

Sample ID: 120906 -08 -101 (fill in appropriate sequential number)
QA Sample? ☑ **QA SAMPLE TYPE: FIELD DUPLICATE**

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
12:14	(4) L plastic – TSS	N/A	N/A	☒
12:09	(1) L plastic – TKN	☒	N/A	☒
12.08	(1) 500mL plastic - TP	N/A	N/A	☒
1217	(1) 500mL plastic (square) - NOx	☒	Time: 1223	☒
12:06	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☒
12:17	(1) 250 mL plastic - OP	N/A	Time: 1223	☒

Notes: The date/time for the first and final subsample is the "Start Date/Time" and the "End Date/Time", respectively

Comments:

Sample ID: -001 (fill in appropriate sequential number)
QA Sample? ☑ **QA SAMPLE TYPE: FIELD BLANK** (Fill bottles with Ultra-pure water supplied by WQL)

SUBSAMPLE INFORMATION:

SUBSAMPLE INFORMATION:

Collection Time	Container - Analyte	Preserved* (H_2SO_4)	Filtered	Labeled
	(4) L plastic – TSS	N/A	N/A	☐
	(1) L plastic – TKN	☐	N/A	☐
	(1) 500mL plastic - TP	N/A	N/A	☐
	(1) 500mL plastic (square) - NOx	☐	Time:	☐
	(1) 500mL sterile plastic – *E. coli*	N/A	N/A	☐
	(1) 250 mL plastic - OP	N/A	Time:	☐

Notes: The date/time for the first and final subsamples is the "Start Date/Time" and "End Date/Time", respectively.

Comments:

Report Date: 11/15/2019 11:46

Revised Report

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
9AC0086-01	ACST2	191019-09-WG	Water		10/19/2019	10/19/2019
9AC0086-02	ACST2	191019-08-WG	Water		10/19/2019	10/19/2019

Work Order Comments:

9AC0086 Revised report by request from ACHD due to incorrect 9AC0086-01 sample name on COC. Sample name changed from 191019-10-WG to 191019-09-WG.

Report Date: 11/15/2019 11:46

Revised Report

Boise City Public Works
Water Quality Laboratory
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Analysis Report

Location:	ACST2	Location Description:	191019-09-WG
Date/Time Collected:	10/19/2019 08:19		
Lab Number:	9AC0086-01	Sample Collector:	J.A
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9J1907	344.8	MPN/100 mL	1.0	1.0	Colilert	10/19/19 12:10	10/20/19 12:10	JAL	
Wet Chemistry										
Chlorine Screen	B9J1908	Absent				SM 4500-CL G-2000 mod	10/19/19	10/19/19 10:44	KMR	
Nitrate-Nitrite, as N	B9K0101	0.324	mg/L	0.0250	0.0250	EPA 353.2	11/01/19	11/1/19 9:51	LRF	
TKN	B9J2803	4.64	mg/L	0.0500	0.0500	EPA 351.2	10/28/19	10/29/19 10:10	JAL	
Total Suspended Solids	B9J1906	86.1	mg/L	0.900	0.900	SM 2540 D-1997	10/19/19	10/19/19 12:11	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9J2001	0.324	mg/L	2.00E-3	2.00E-3	EPA 365.1	10/20/19	10/20/19 11:32	JAL	
Total Metals										
Phosphorus as P	B9J2604	0.580	mg/L	7.30E-3	7.30E-3	EPA 200.7	11/04/19	11/6/19 12:11	EDM	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 11/15/2019 11:46

Revised Report

Boise City Public Works
Water Quality Laboratory
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Analysis Report

Location:	ACST2	Location Description:	191019-08-WG
Date/Time Collected:	10/19/2019 09:38		
Lab Number:	9AC0086-02	Sample Collector:	J.A
Sample Type:	Grab	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Microbiology										
E. Coli	B9J1907	95.9	MPN/100 mL	1.0	1.0	Colilert	10/19/19 12:10	10/20/19 12:10	JAL	
Wet Chemistry										
Chlorine Screen	B9J1908	Absent				SM 4500-CL G-2000 mod	10/19/19	10/19/19 10:44	KMR	
Nitrate-Nitrite, as N	B9K0101	0.439	mg/L	0.0250	0.0250	EPA 353.2	11/01/19	11/1/19 9:52	LRF	
TKN	B9J2803	1.37	mg/L	0.0500	0.0500	EPA 351.2	10/28/19	10/29/19 10:15	JAL	
Total Suspended Solids	B9J1906	16.0	mg/L	0.900	0.900	SM 2540 D-1997	10/19/19	10/19/19 12:12	F.A	
Dissolved Wet Chemistry										
Orthophosphate, as P	B9J2001	0.247	mg/L	2.00E-3	2.00E-3	EPA 365.1	10/20/19	10/20/19 11:36	JAL	
Total Metals										
Phosphorus as P	B9J2604	0.328	mg/L	7.30E-3	7.30E-3	EPA 200.7	11/04/19	11/6/19 12:05	EDM	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 11/15/2019 11:46

Revised Report

Boise City Public Works
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Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Microbiology									
Batch: B9J1907									
Blank (B9J1907-BLK1)									
E. Coli	Absent						10/20/2019	JAL	
LCS (B9J1907-BS1)									
E. Coli				Present			10/20/2019	JAL	
Duplicate (B9J1907-DUP1) Source ID: 9AC0085-01									
E. Coli					Pass	128	10/20/2019	JAL	
Wet Chemistry									
Batch: B9J1906									
Blank (B9J1906-BLK1)									
Total Suspended Solids	< 0.9	mg/L					10/19/2019	F.A	U
LCS (B9J1906-BS1)									
Total Suspended Solids			95.8	90-110			10/19/2019	F.A	
Duplicate (B9J1906-DUP1) Source ID: 9BB0676-01									
Total Suspended Solids					3.30	20	10/19/2019	F.A	
Batch: B9J2803									
Blank (B9J2803-BLK1)									
TKN	< 0.05	mg/L					10/29/2019	JAL	U
Blank (B9J2803-BLK2)									
TKN	< 0.05	mg/L					10/29/2019	JAL	U
LCS (B9J2803-BS1)									
TKN			100	80-120			10/29/2019	JAL	
LCS (B9J2803-BS2)									
TKN			103	80-120			10/29/2019	JAL	
Duplicate (B9J2803-DUP1) Source ID: 9AC0086-01									
TKN					5.04	20	10/29/2019	JAL	
Matrix Spike (B9J2803-MS1) Source ID: 9AC0086-01									
TKN			82.3	80-120			10/29/2019	JAL	
Matrix Spike Dup (B9J2803-MSD1) Source ID: 9AC0086-01									
TKN			103	80-120	11.4	20	10/29/2019	JAL	

Report Date: 11/15/2019 11:46

Revised Report

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9K0101									
Blank (B9K0101-BLK1)									
Nitrate-Nitrite, as N	< 0.025	mg/L					11/01/2019	LRF	U
Blank (B9K0101-BLK2)									
Nitrate-Nitrite, as N	< 0.025	mg/L					11/01/2019	LRF	U
Blank (B9K0101-BLK3)									
Nitrate-Nitrite, as N	< 0.025	mg/L					11/01/2019	LRF	U
LCS (B9K0101-BS1)									
Nitrate-Nitrite, as N			96.4	90-110			11/01/2019	LRF	
LCS (B9K0101-BS2)									
Nitrate-Nitrite, as N			102	90-110			11/01/2019	LRF	
LCS (B9K0101-BS3)									
Nitrate-Nitrite, as N			97.0	90-110			11/01/2019	LRF	
Duplicate (B9K0101-DUP1) Source ID: 9BB0642-01									
Nitrate-Nitrite, as N					1.14	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP2) Source ID: 9BB0664-01									
Nitrate-Nitrite, as N					0.272	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP3) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N					1.77	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP4) Source ID: 9TM0068-03									
Nitrate-Nitrite, as N					0.886	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP5) Source ID: 9WB0770-05									
Nitrate-Nitrite, as N					1.90	10	11/01/2019	LRF	
Matrix Spike (B9K0101-MS1) Source ID: 9BB0642-01									
Nitrate-Nitrite, as N			93.5	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS2) Source ID: 9BB0664-01									
Nitrate-Nitrite, as N			94.6	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS3) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			94.6	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS4) Source ID: 9TM0068-03									
Nitrate-Nitrite, as N			94.9	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS5) Source ID: 9WB0770-05									
Nitrate-Nitrite, as N			90.9	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS6) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			93.0	90-110			11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD1) Source ID: 9BB0642-01									
Nitrate-Nitrite, as N			95.2	90-110	1.15	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD2) Source ID: 9BB0664-01									
Nitrate-Nitrite, as N			98.2	90-110	0.751	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD3) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			92.9	90-110	1.68	10	11/01/2019	LRF	

Revised Report

Boise City Public Works
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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9K0101 (Continued)									
Matrix Spike Dup (B9K0101-MSD4) Source ID: 9TM0068-03									
Nitrate-Nitrite, as N			103	90-110	0.646	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD5) Source ID: 9WB0770-05									
Nitrate-Nitrite, as N			90.5	90-110	0.443	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD6) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			90.8	90-110	1.15	10	11/01/2019	LRF	
Dissolved Wet Chemistry									
Batch: B9J2001									
Blank (B9J2001-BLK1)									
Orthophosphate, as P	< 0.002	mg/L					10/20/2019	JAL	U
LCS (B9J2001-BS1)									
Orthophosphate, as P			95.8	90-110			10/20/2019	JAL	
Duplicate (B9J2001-DUP1) Source ID: 9AC0086-01									
Orthophosphate, as P					0.332	10	10/20/2019	JAL	
Matrix Spike (B9J2001-MS1) Source ID: 9AC0086-01									
Orthophosphate, as P			105	90-110			10/20/2019	JAL	
Matrix Spike Dup (B9J2001-MSD1) Source ID: 9AC0086-01									
Orthophosphate, as P			105	90-110	0.0375	10	10/20/2019	JAL	
Total Metals									
Batch: B9J2604									
Blank (B9J2604-BLK1)									
Phosphorus as P	< 0.0073	mg/L					11/06/2019	EDM	U
LCS (B9J2604-BS1)									
Phosphorus as P			103	85-115			11/06/2019	EDM	
Duplicate (B9J2604-DUP1) Source ID: 9BB0694-01									
Phosphorus as P					18.2	20	11/06/2019	EDM	D
Matrix Spike (B9J2604-MS1) Source ID: 9BB0694-01									
Phosphorus as P			112	70-130			11/06/2019	EDM	D
Matrix Spike Dup (B9J2604-MSD1) Source ID: 9BB0694-01									
Phosphorus as P			112	70-130	0.121	20	11/06/2019	EDM	D

Report Date: 11/15/2019 11:46

Revised Report

Boise City Public Works
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Notes and Definitions

Item	Definition
D	Data reported from a dilution
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Azubike Emenari
QA/QC Coordinator

Ada County H[illegible]hway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63050897
Project: Stormwater-PII
Sampler(s): Jeanette Ayala
Zach Dobrotka

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification (See note B&L)	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
[illegible]086-01	10-19-19		8:13	8:19	191019-10-WG → 191019-09-WG	JA,ZD	X					X		X	X	X				X					6
-02			9:29	9:38	191019-08-WG	JA,ZD	X					X		X	X	X				X			X		6

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
[signature]	10-19-19 10:12	Kathy Riley 10-19-19 10:15	Please dilute 191019-10-WG (contacted by Tammy Lightle) E-Coli on 11/15/19, first sample on COC was labelled INCORRECTLY - should be 191019-09-WG / not 191019-10-WG JK

coc_wql-p2 10/19

OAN0086

Report Date: 11/12/2019 09:38

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
Telephone (208) 608-7240
Fax (208) 608-7319

Samples in this Report

Lab ID	Sample	Sample Description	Matrix	Qualifiers	Date Sampled	Date Received
9AC0088-01	ACST2C	191019-09-WC	Water		10/19/2019	10/19/2019

Report Date: 11/12/2019 09:38

Boise City Public Works
Water Quality Laboratory
11818 Joplin Road
Boise, Idaho 83714-1076
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Analysis Report

Location:	ACST2C	Location Description:	191019-09-WC
Date/Time Collected:	10/19/2019 08:01 - 10/19/2019 08:39		
Lab Number:	9AC0088-01	Sample Collector:	T.L
Sample Type:	Composite	Sample Matrix:	Water

Analyte Name	Batch	Result	Units	Adjusted MDL *	Method MDL	Analysis Method Reference	Prepared Time	Analysis Time	Analyst Initials	Qual
Wet Chemistry										
Ammonia, as N	B9J2602	2120	ug/L	35.0	35.0	SM 4500-NH3 D-1997	10/26/19	10/26/19 11:17	ALN	
BOD5	B9J2114	34.5	mg/L	2.00	2.00	SM 5210 B-2001	10/21/19	10/26/19 8:05	LRF	
COD	B9J2102	200	mg/L	7.00	7.00	SM 5220 D-2017	10/21/19	10/21/19 9:53	ALN	
Nitrate-Nitrite, as N	B9K0101	0.298	mg/L	0.0250	0.0250	EPA 353.2	11/01/19	11/1/19 10:03	LRF	
TKN	B9J2803	4.23	mg/L	0.0500	0.0500	EPA 351.2	10/28/19	10/29/19 10:23	JAL	
Total Dissolved Solids	B9J2121	114	mg/L	20.0	20.0	SM 2540 C-1997	10/19/19	10/21/19 15:10	ASM	
Total Suspended Solids	B9J2116	143	mg/L	0.900	0.900	SM 2540 D-1997	10/21/19	10/21/19 10:53	F.A	
Turbidity	B9J2101	44.9	NTU	0.6	0.3	EPA180.1 R2.0 (1993)	10/21/19	10/21/19 8:02	LRF	D
Dissolved Wet Chemistry										
Orthophosphate, as P	B9J2001	0.356	mg/L	2.00E-3	2.00E-3	EPA 365.1	10/20/19	10/20/19 11:45	JAL	
Total Metals										
Mercury	B9J2314	0.0113	ug/L	4.71E-3	4.71E-3	EPA 245.2	10/24/19	10/25/19 10:23	SAS	
Arsenic	B9K0110	<5.50	ug/L	5.50	5.50	EPA 200.7	11/01/19	11/5/19 10:06	EDM	U
Cadmium	B9K0110	<0.700	ug/L	0.700	0.700	EPA 200.7	11/01/19	11/5/19 10:06	EDM	U
Calcium	B9K0110	9700	ug/L	25.0	25.0	EPA 200.7	11/01/19	11/5/19 10:06	EDM	
Lead	B9K0110	5.31	ug/L	5.00	5.00	EPA 200.7	11/01/19	11/5/19 10:06	EDM	
Magnesium	B9K0110	1870	ug/L	53.0	53.0	EPA 200.7	11/01/19	11/5/19 10:06	EDM	
Phosphorus as P	B9K0110	0.567	mg/L	7.30E-3	7.30E-3	EPA 200.7	11/01/19	11/5/19 10:06	EDM	
Hardness	B9K0110	31.9	mg/L	0.280	0.280	EPA 200.7	11/01/19	11/5/19 10:06	EDM	
Dissolved Metals										
Cadmium	B9K0613	<0.700	ug/L	0.700	0.700	EPA 200.7	11/06/19	11/6/19 17:30	AMO	U
Copper	B9K0613	<11.5	ug/L	11.5	11.5	EPA 200.7	11/06/19	11/6/19 17:30	AMO	U
Lead	B9K0613	<5.00	ug/L	5.00	5.00	EPA 200.7	11/06/19	11/6/19 17:30	AMO	U
Zinc	B9K0613	41.8	ug/L	7.50	7.50	EPA 200.7	11/06/19	11/6/19 17:30	AMO	

* The reported adjusted "MDL" is sample-specific. The analysis MDL as defined by 40 CFR pt 136 App.B. was corrected for dilution, dry weight, or method-defined ML.

Report Date: 11/12/2019 09:38

Boise City Public Works
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Telephone (208) 608-7240
Fax (208) 608-7319

Quality Control Report

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry									
Batch: B9J2101									
Blank (B9J2101-BLK1)									
Turbidity	<0.3	NTU					10/21/2019	LRF	U
LCS (B9J2101-BS1)									
Turbidity			99.6	90-110			10/21/2019	LRF	
Duplicate (B9J2101-DUP1) Source ID: 9AC0087-01									
Turbidity					1.96	25	10/21/2019	LRF	
Batch: B9J2102									
Blank (B9J2102-BLK1)									
COD	<7	mg/L					10/21/2019	ALN	U
LCS (B9J2102-BS1)									
COD			100	90-110			10/21/2019	ALN	
Duplicate (B9J2102-DUP1) Source ID: 9AC0087-01									
COD					4.82	10	10/21/2019	ALN	
Batch: B9J2114									
Blank (B9J2114-BLK1)									
BOD5	<2	mg/L					10/26/2019	LRF	U
LCS (B9J2114-BS1)									
BOD5			100	84.6-115.4			10/26/2019	LRF	
LCS (B9J2114-BS2)									
BOD5			93.8	84.6-115.4			10/26/2019	LRF	
Duplicate (B9J2114-DUP1) Source ID: 9LS0406-01									
BOD5					2.54	30	10/26/2019	LRF	
Batch: B9J2116									
Blank (B9J2116-BLK1)									
Total Suspended Solids	<0.9	mg/L					10/21/2019	F.A	U
LCS (B9J2116-BS1)									
Total Suspended Solids			98.7	90-110			10/21/2019	F.A	
Duplicate (B9J2116-DUP1) Source ID: 9WB0766-07									
Total Suspended Solids					9.95	20	10/21/2019	F.A	
Duplicate (B9J2116-DUP2) Source ID: 9LS0406-01									
Total Suspended Solids					8.30	20	10/21/2019	F.A	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9J2121									
Blank (B9J2121-BLK1)									
Total Dissolved Solids	<20	mg/L					10/21/2019	ASM	U
LCS (B9J2121-BS1)									
Total Dissolved Solids			105	90-110			10/21/2019	ASM	
Duplicate (B9J2121-DUP1) Source ID: 9AC0087-03									
Total Dissolved Solids					0.669	10	10/21/2019	ASM	
Batch: B9J2602									
Blank (B9J2602-BLK1)									
Ammonia, as N	<35	ug/L					10/26/2019	ALN	U
LCS (B9J2602-BS1)									
Ammonia, as N			98.5	90-110			10/26/2019	ALN	
Duplicate (B9J2602-DUP1) Source ID: 9BB0657-01									
Ammonia, as N					1.89	10	10/26/2019	ALN	
Duplicate (B9J2602-DUP2) Source ID: 9BB0667-01									
Ammonia, as N					1.57	10	10/26/2019	ALN	
Matrix Spike (B9J2602-MS1) Source ID: 9BB0657-01									
Ammonia, as N			98.8	80-120			10/26/2019	ALN	
Matrix Spike (B9J2602-MS2) Source ID: 9BB0667-01									
Ammonia, as N			105	80-120			10/26/2019	ALN	
Matrix Spike Dup (B9J2602-MSD1) Source ID: 9BB0657-01									
Ammonia, as N			99.6	80-120	0.462	10	10/26/2019	ALN	
Matrix Spike Dup (B9J2602-MSD2) Source ID: 9BB0667-01									
Ammonia, as N			104	80-120	0.710	10	10/26/2019	ALN	
Batch: B9J2803									
Blank (B9J2803-BLK1)									
TKN	<0.05	mg/L					10/29/2019	JAL	U
Blank (B9J2803-BLK2)									
TKN	<0.05	mg/L					10/29/2019	JAL	U
LCS (B9J2803-BS1)									
TKN			100	80-120			10/29/2019	JAL	
LCS (B9J2803-BS2)									
TKN			103	80-120			10/29/2019	JAL	
Duplicate (B9J2803-DUP1) Source ID: 9AC0086-01									
TKN					5.04	20	10/29/2019	JAL	
Duplicate (B9J2803-DUP2) Source ID: 9EP0082-01									
TKN					0.151	20	10/29/2019	JAL	D
Matrix Spike (B9J2803-MS1) Source ID: 9AC0086-01									
TKN			82.3	80-120			10/29/2019	JAL	
Matrix Spike Dup (B9J2803-MSD1) Source ID: 9AC0086-01									
TKN			103	80-120	11.4	20	10/29/2019	JAL	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9K0101									
Blank (B9K0101-BLK1)									
Nitrate-Nitrite, as N	<0.025	mg/L					11/01/2019	LRF	U
Blank (B9K0101-BLK2)									
Nitrate-Nitrite, as N	<0.025	mg/L					11/01/2019	LRF	U
Blank (B9K0101-BLK3)									
Nitrate-Nitrite, as N	<0.025	mg/L					11/01/2019	LRF	U
LCS (B9K0101-BS1)									
Nitrate-Nitrite, as N			96.4	90-110			11/01/2019	LRF	
LCS (B9K0101-BS2)									
Nitrate-Nitrite, as N			102	90-110			11/01/2019	LRF	
LCS (B9K0101-BS3)									
Nitrate-Nitrite, as N			97.0	90-110			11/01/2019	LRF	
Duplicate (B9K0101-DUP1) Source ID: 9BB0642-01									
Nitrate-Nitrite, as N					1.14	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP2) Source ID: 9BB0664-01									
Nitrate-Nitrite, as N					0.272	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP3) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N					1.77	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP4) Source ID: 9TM0068-03									
Nitrate-Nitrite, as N					0.886	10	11/01/2019	LRF	
Duplicate (B9K0101-DUP5) Source ID: 9WB0770-05									
Nitrate-Nitrite, as N					1.90	10	11/01/2019	LRF	
Matrix Spike (B9K0101-MS1) Source ID: 9BB0642-01									
Nitrate-Nitrite, as N			93.5	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS2) Source ID: 9BB0664-01									
Nitrate-Nitrite, as N			94.6	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS3) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			94.6	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS4) Source ID: 9TM0068-03									
Nitrate-Nitrite, as N			94.9	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS5) Source ID: 9WB0770-05									
Nitrate-Nitrite, as N			90.9	90-110			11/01/2019	LRF	
Matrix Spike (B9K0101-MS6) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			93.0	90-110			11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD1) Source ID: 9BB0642-01									
Nitrate-Nitrite, as N			95.2	90-110	1.15	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD2) Source ID: 9BB0664-01									
Nitrate-Nitrite, as N			98.2	90-110	0.751	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD3) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			92.9	90-110	1.68	10	11/01/2019	LRF	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Wet Chemistry (Continued)									
Batch: B9K0101 (Continued)									
Matrix Spike Dup (B9K0101-MSD4) Source ID: 9TM0068-03									
Nitrate-Nitrite, as N			103	90-110	0.646	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD5) Source ID: 9WB0770-05									
Nitrate-Nitrite, as N			90.5	90-110	0.443	10	11/01/2019	LRF	
Matrix Spike Dup (B9K0101-MSD6) Source ID: 9AC0087-03									
Nitrate-Nitrite, as N			90.8	90-110	1.15	10	11/01/2019	LRF	
Dissolved Wet Chemistry									
Batch: B9J2001									
Blank (B9J2001-BLK1)									
Orthophosphate, as P	<0.002	mg/L					10/20/2019	JAL	U
LCS (B9J2001-BS1)									
Orthophosphate, as P			95.8	90-110			10/20/2019	JAL	
Duplicate (B9J2001-DUP1) Source ID: 9AC0086-01									
Orthophosphate, as P					0.332	10	10/20/2019	JAL	
Matrix Spike (B9J2001-MS1) Source ID: 9AC0086-01									
Orthophosphate, as P			105	90-110			10/20/2019	JAL	
Matrix Spike Dup (B9J2001-MSD1) Source ID: 9AC0086-01									
Orthophosphate, as P			105	90-110	0.0375	10	10/20/2019	JAL	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Total Metals									
Batch: B9J2314									
Blank (B9J2314-BLK1)									
Mercury	<0.00471	ug/L					10/25/2019	SAS	U
LCS (B9J2314-BS1)									
Mercury			99.0	85-115			10/25/2019	SAS	
Duplicate (B9J2314-DUP1) Source ID: 9AC0087-01									
Mercury					12.6	20	10/25/2019	SAS	
Duplicate (B9J2314-DUP2) Source ID: 9BB0641-01									
Mercury					13.2	20	10/25/2019	SAS	
Matrix Spike (B9J2314-MS1) Source ID: 9AC0087-01									
Mercury			99.9	70-130			10/25/2019	SAS	
Matrix Spike (B9J2314-MS2) Source ID: 9BB0641-01									
Mercury			101	70-130			10/25/2019	SAS	
Matrix Spike Dup (B9J2314-MSD1) Source ID: 9AC0087-01									
Mercury			98.4	70-130	1.51	20	10/25/2019	SAS	
Matrix Spike Dup (B9J2314-MSD2) Source ID: 9BB0641-01									
Mercury			98.2	70-130	2.38	20	10/25/2019	SAS	
Batch: B9K0110									
Blank (B9K0110-BLK1)									
Arsenic	<5.5	ug/L					11/05/2019	EDM	U
Cadmium	<0.7	ug/L					11/05/2019	EDM	U
Calcium	<25	ug/L					11/05/2019	EDM	U
Lead	<5	ug/L					11/05/2019	EDM	U
Magnesium	<53	ug/L					11/05/2019	EDM	U
Phosphorus as P	<0.0073	mg/L					11/05/2019	EDM	U
LCS (B9K0110-BS1)									
Arsenic			103	85-115			11/05/2019	EDM	
Cadmium			96.5	85-115			11/05/2019	EDM	
Calcium			101	85-115			11/05/2019	EDM	
Lead			101	85-115			11/05/2019	EDM	
Magnesium			101	85-115			11/05/2019	EDM	
Phosphorus as P			103	85-115			11/05/2019	EDM	
Duplicate (B9K0110-DUP1) Source ID: 9AC0087-02									
Arsenic					NR	20	11/05/2019	EDM	U
Cadmium					NR	20	11/05/2019	EDM	U
Calcium					0.643	20	11/05/2019	EDM	
Lead					1.14	20	11/05/2019	EDM	
Magnesium					0.618	20	11/05/2019	EDM	
Phosphorus as P					0.759	20	11/05/2019	EDM	

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Total Metals (Continued)									
Batch: B9K0110 (Continued)									
Duplicate (B9K0110-DUP2) Source ID: 9AC0087-03									
Arsenic					NR	20	11/05/2019	EDM	U
Cadmium					NR	20	11/05/2019	EDM	U
Calcium					1.48	20	11/05/2019	EDM	
Lead					1.34	20	11/05/2019	EDM	
Magnesium					2.39	20	11/05/2019	EDM	
Phosphorus as P					4.87	20	11/05/2019	EDM	
Matrix Spike (B9K0110-MS1) Source ID: 9AC0087-02									
Arsenic			105	70-130			11/05/2019	EDM	
Cadmium			95.8	70-130			11/05/2019	EDM	
Calcium			101	70-130			11/05/2019	EDM	
Lead			100	70-130			11/05/2019	EDM	
Magnesium			104	70-130			11/05/2019	EDM	
Phosphorus as P			104	70-130			11/05/2019	EDM	
Matrix Spike (B9K0110-MS2) Source ID: 9AC0087-03									
Arsenic			108	70-130			11/05/2019	EDM	
Cadmium			98.1	70-130			11/05/2019	EDM	
Calcium			103	70-130			11/05/2019	EDM	
Lead			103	70-130			11/05/2019	EDM	
Magnesium			106	70-130			11/05/2019	EDM	
Phosphorus as P			106	70-130			11/05/2019	EDM	
Matrix Spike Dup (B9K0110-MSD1) Source ID: 9AC0087-02									
Arsenic			105	70-130	0.119	20	11/05/2019	EDM	
Cadmium			96.0	70-130	0.180	20	11/05/2019	EDM	
Calcium			102	70-130	0.368	20	11/05/2019	EDM	
Lead			101	70-130	0.470	20	11/05/2019	EDM	
Magnesium			104	70-130	0.0337	20	11/05/2019	EDM	
Phosphorus as P			105	70-130	0.299	20	11/05/2019	EDM	
Matrix Spike Dup (B9K0110-MSD2) Source ID: 9AC0087-03									
Arsenic			107	70-130	1.31	20	11/05/2019	EDM	
Cadmium			97.2	70-130	0.941	20	11/05/2019	EDM	
Calcium			102	70-130	0.639	20	11/05/2019	EDM	
Lead			102	70-130	0.743	20	11/05/2019	EDM	
Magnesium			104	70-130	1.61	20	11/05/2019	EDM	
Phosphorus as P			105	70-130	1.26	20	11/05/2019	EDM	

Report Date: 11/12/2019 09:38

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Notes and Definitions

Item	Definition
D	Data reported from a dilution
U	Analyte included in the analysis, but not detected

Method Reference Acronyms

Colilert	Colilert, IDEXX Laboratories, Inc.
EPA	Manual of Methods for Chemical Analysis of Water and Wastes, USEPA
GS	USGS Techniques of Water-Resources Investigations
HH	Hach Spectrophotometer Procedures Manual
SM	Standard Methods for the Examination of Water and Wastewater
SW	Test methods for Evaluating Solid Waste, SW-846

Janet Finegan-Kelly
Water Quality Laboratory Manager

Stephen Quintero or Azubike Emenari
QA/QC Coordinator

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Quality Control Report
(Continued)

Analyte Name	Method Blank	Units	% Recovery	Recovery Limits	RPD	RPD Limit	Date Analyzed	Analyst Initials	Qualifier
Dissolved Metals									
Batch: B9K0613									
Blank (B9K0613-BLK1)									
Cadmium	<0.7	ug/L					11/06/2019	AMO	U
Copper	<11.5	ug/L					11/06/2019	AMO	U
Lead	<5	ug/L					11/06/2019	AMO	U
Zinc	<7.5	ug/L					11/06/2019	AMO	U
LCS (B9K0613-BS1)									
Cadmium			100	85-115			11/06/2019	AMO	
Copper			98.1	85-115			11/06/2019	AMO	
Lead			100	85-115			11/06/2019	AMO	
Zinc			101	85-115			11/06/2019	AMO	
Duplicate (B9K0613-DUP1) Source ID: 9AC0088-01									
Cadmium					NR	10	11/06/2019	AMO	U
Copper					NR	10	11/06/2019	AMO	U
Lead					NR	10	11/06/2019	AMO	U
Zinc					1.12	10	11/06/2019	AMO	
Matrix Spike (B9K0613-MS1) Source ID: 9AC0088-01									
Cadmium			103	70-130			11/06/2019	AMO	
Copper			105	70-130			11/06/2019	AMO	
Lead			103	70-130			11/06/2019	AMO	
Zinc			101	70-130			11/06/2019	AMO	
Matrix Spike Dup (B9K0613-MSD1) Source ID: 9AC0088-01									
Cadmium			101	70-130	1.61	10	11/06/2019	AMO	
Copper			105	70-130	0.178	10	11/06/2019	AMO	
Lead			101	70-130	1.39	10	11/06/2019	AMO	
Zinc			99.8	70-130	0.534	10	11/06/2019	AMO	

Ada County Highway District

Attn: Monica Lowe
3775 Adams Street
Garden City, Idaho 83714–6418
Tel. (208) 387–6255
Fax (208) 387–6391

Purchase Order: 63050897
Project: Stormwater-PII
Sampler(s): Tammy Lightle, Andrea Leonard

Lab#	Begin Date	End Date	Begin Time	End Time	Sample Identification	Sampler Initials	Matrix: Water	Type: Grab	Type: Composite	BOD_5 - SM 5210 B	COD - Hach 8000	TSS - SM 2540 D	TDS - SM 2540 C	TKN - Perstorp PAI-DK01	TP - EPA 200.7	Orthophosphate - EPA 365.1	Total As, Cd, Pb - EPA 200.7	Diss. Cd, Cu, Pb, Zn - EPA 200.7	Total Hg - EPA 245.2	E. Coli - IDEXX Colilert	Turbidity - EPA 180.1	Hardness - SM2340 B	NO_3+NO_2 - EPA 353.2	NH_3 - SM 4500 NH_3 - D	Total Containers
AC0088-01	10/19	10/19	0801	0839	191019-09-WC	TL	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1

Relinquished by (sign)	Date & Time Transferred	Received by (sign)	Comments/Special Instructions:
Tamara Lightle	10/19/19 1607	Kathy K. Ley 10-19-19 1611	9AC0088

Set Up/ Shut Down Form – Phase II

STATION: Christfield

SET UP

Personnel: AML TLL **Date/Time On-Site:** 10-18-19 1145

Date	Time	Level (in)	Flow (cfs)	Velocity (fps)	Total (cf)	Battery (V)
	1145	0.041	0	0.035		

Downloaded to:	RLO
Trigger Condition:	0.1 (Velocity > 0.1)
Flow Pulse Interval:	58 cf

On-Site

- ☒ Replace battery if v<11.9
- ☒ Perform Decon. Cycle done on 10/16
- ☒ Place 15L sample bottle in cooler, with ice
- ☒ Remove jar lid and put in clean re-sealable plastic bag
- ☒ Set Sampler program parameters (refer Table 103)
- ☒ Verify all cable and tubing connections
- ☒ Verify Sampler Program is running
- ☒ Verify latches are secure

Flowlink (Refer to Flowlink Instructions, if needed)

- ☒ Direct or Remote; Date/time 1200
- ☒ Retrieve data and review recent flow history
- ☒ Change Wireless Power Control to Storm Event
- ☒ Change Data Storage Rates to 1 minute for Level, Velocity, and Flow
- ☒ Enable Sampler: On Trigger, and set velocity equation
- ☒ Set Latch
- ☒ Set Sampler Pacing to Flow Paced, and set trigger volume

Comments:

Date/Time Off-Site: 10-18 1215

SHUT DOWN

Personnel: TL JA **Date/Time On-Site:** 10/21 1055

Date	Time	Level (in)	Flow (cfs)	Velocity (fps)	Total (cf)	Battery (V)
10/21	1101	-0.002	0	0	1779.04	12.334

Downloaded to:	computer

On-Site

- ☐ Replace battery if v<11.9
- ☒ Remove battery from Sampler

Flowlink (Refer to Flowlink Instructions, if needed)

- ☒ Direct or Remote; Date/time 1100
- ☐ Retrieve data
- ☒ Change Wireless Power Control to Dry Weather
- ☒ Change Data Storage Rates to 15 minutes for Level, Velocity, and Flow
- ☒ Enable Sampler: Never

Comments:

Date/Time Off-Site: 10/21

Composite Sample Collection

STATION: C. Christfield
Personnel: JA ; K ZD

Bottle ~~21~~ 1 **of** ~~24~~ 2 TZ
Date/Time On-Site: 10-19-19 8:09

☒ Halt Sampler program	
☒ Put lid on sample bottle; label sample bottle	
Sample ID:	191019-09 -WC
Approx Sample Volume (mL):	10500 mL
Clarity (ex. Clear, Cloudy, Silty):	cloudy, silty
Color (ex. Clear, Gray, Tan, Brown, Black):	Gray-tan
QA/QC Sample ID:	-103 (Time: 1200)

Subsample Information

Trigger #	Date/Time	Sampler Message/ Subsample Result	Trigger #	Date/Time	Sampler Message/ Subsample Result
1	10/19/19 8:01	S	13	8:24	S
2	8:06	S	14	8:25	S
3	8:09	S	15	8:27	S
4	8:11	S	16	8:28	S
5	8:13	S	17	8:30	S
6	8:14	S	18	8:32	S
7	8:16	S	19	8:34	S
8	8:17	S	20	8:37	S
9	8:19	S	21	8:39	S
10	8:20	S	22		
11	8:21	S	23		
12	8:23	S	24		

Comments:

If Sampling is Complete:
- ☒ Power off Samplers
- ☐ Disable Flow Meter pacing
- ☐ Resume Flow Meter program
- ☐ Verify Flow Meter is running
- ☐ Add ice to sample transport cooler
- ☐ Complete COC form; arrange transport to lab
- ☐ Current **Velocity Cutoff (fps):** ____________

If Continuing Sampling (sample bottle change-out):
- ☐ Keep Flow Meter running
- ☐ Install new 15L bottle; add ice
- ☐ Restart program from beginning;

Date/Time Restarted: ________________
- ☐ Verify running

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
1.0"	800 mL	**3.5"**	4250 mL	**6.0"**	8000 mL	**8.5"**	11750 mL	**11.0"**	15500 mL
1.5"	1400 mL	**4.0"**	5000 mL	**6.5"**	8750 mL	**9.0"**	12500 mL	**11.5"**	16250 mL
2.0"	2000 mL	**4.5"**	5750 mL	**7.0"**	9500 mL	**9.5"**	13250 mL	**After 12"**	1" = 1500 mL
2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Composite Sample Collection

STATION: Chrisfield **Bottle** 2 **of** 2

Personnel: AMZ, RL **Date/Time On-Site:** 10/19

☐ Halt Sampler program	
☒ Put lid on sample bottle; label sample bottle	
Sample ID:	191019-09 -WC
Approx Sample Volume (mL):	800mL → see comment
Clarity (ex. Clear, Cloudy, Silty):	
Color (ex. Clear, Gray, Tan, Brown, Black):	
QA/QC Sample ID:	-103 (Time: 1200)

Subsample Information

Trigger #	Date/Time	Sampler Message/ Subsample Result	Trigger #	Date/Time	Sampler Message/ Subsample Result
1	10-19-19 902	success	13	1208	success
2	922	success	14	1210	
3	1011	No more liquid	15	1211	
4	1047	success	16	1213	
5	1121	No more liquid	17	1216	
6	1150	success	18	1218	
7	1154		19	1221	
8	1157		20	1224	
9	1200		21	1230	
10	1202		22	1237	
11	1204		23	1249	
12	1206		24	1311	

Comments:

Tubing from sampler became detached during event and majority of the sample went into the sampler base instead of the bottle. Not submitting this.

If Sampling is Complete:
- ☒ Power off Samplers
- ☐ Disable Flow Meter pacing
- ☐ Resume Flow Meter program
- ☐ Verify Flow Meter is running
- ☐ Add ice to sample transport cooler
- ☐ Complete COC form; arrange transport to lab
- ☐ Current **Velocity Cutoff (fps):** _____

If Continuing Sampling (sample bottle change-out):
- ☐ Keep Flow Meter running
- ☐ Install new 15L bottle; add ice
- ☐ Restart program from beginning;

Date/Time Restarted: _____

- ☐ Verify running

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	3.0"	3500 mL	5.5"	7250 mL	8.0"	11000 mL	10.5"	14750 mL
1.0"	800 mL	3.5"	4250 mL	6.0"	8000 mL	8.5"	11750 mL	11.0"	15500 mL
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2.0"	2000 mL	4.5"	5750 mL	7.0"	9500 mL	9.5"	13250 mL	After 12"	1" = 1500 mL
2.5"	2750 mL	5.0"	6500 mL	7.5"	10250 mL	10.0"	14000 mL	Lab min	8,000 mL

Grab Sample Data Form: Phase II

STATION: Chrisfield

Personnel: TA, ZD **Date/Time On-Site:** 8:09

Grab Sample Times									
	Sample ID	TSS	TKN	TP	NO_x	NO_x Filtered	*E.Coli*	OP	OP Filtered
Site Sample	191019-(09-WG	08 13	8:15	8:16	8:17	8:28	8:19	8:19	8:26
	Preserved? *	N/A	☒	N/A	N/A	☒	N/A	N/A	N/A
	Labeled?	☒	☒	☒	☒	☒	☒	☒	☒

QA/QC Sample Times									
	Sample ID	TSS	TKN	TP	NO_x	NO_x Filtered	*E.Coli*	OP	OP Filtered
Field Duplicate	-101								
	Preserved? *	N/A	☐	N/A	N/A	☐	N/A	N/A	N/A
	Labeled?	☐	☐	☐	☐	☐	☐	☐	☐
Field Blank	-001								
	Preserved? *	N/A	☐	N/A	N/A	☐	N/A	N/A	N/A
	Labeled?	☐	☐	☐	☐	☐	☐	☐	☐

*NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume

Field Parameters						
Meter number	Date	Time	Temp (C)	D.O. (mg/L)	pH (S.U.)	Cond (uS/cm)
MP06	10/19/19	08:12a	7.0	8.8	7.01	0.0

PH 02

Didn't work?

Sampler Current Status	
First Subsample Date/Time	
Last Subsample Date/Time	
# of Subsamples taken	

Comments:

Date/Time Off-Site: 10/19/19 8 52 am

Set Up/ Shut Down Form – Phase II

STATION: Edgewood

UP

Personnel: AML **Date/Time On-Site:** 10-18-19 1240

Date	Time	Level (in)	Flow (cfs)	Velocity (fps)	Total (cf)	Battery (V)
10/18	1300	2.890	0.319	1.051	2931080	12.233

Downloaded to:	R6
Trigger Condition:	Velocity > 1.2 ft/s
Flow Pulse Interval:	15 7 ft

On-Site	**Flowlink** (Refer to Flowlink Instructions, if needed)
☒ Replace battery if v<11.9	☒ Direct or Remote; Date/time 10/18 1245
☒ Perform Decon. Cycle	☒ Retrieve data and review recent flow history
☐ Place 15L sample bottle in cooler, with ice	☒ Change Wireless Power Control to Storm Event
☐ Remove jar lid and put in clean re-sealable plastic bag	☒ Change Data Storage Rates to 1 minute for Level, Velocity, and Flow
☐ Set Sampler program parameters (refer Table 103)	☒ Enable Sampler: On Trigger, and set velocity equation
☐ Verify all cable and tubing connections	☒ Set Latch
☐ Verify Sampler Program is running	☒ Set Sampler Pacing to Flow Paced, and set trigger volume
☐ Verify latches are secure	

Comments:

Date/Time Off-Site:

SHUT DOWN

Personnel: TL, JA **Date/Time On-Site:** 10/21 1000

Date	Time	Level (in)	Flow (cfs)	Velocity (fps)	Total (cf)	Battery (V)
10/21	would not show real time readings					
Downloaded to:	R6					

On-Site	**Flowlink** (Refer to Flowlink Instructions, if needed)
☒ Replace battery if v<11.9	☒ Direct or Remote; Date/time 1008
☒ Remove battery from Sampler	☒ Retrieve data
	☒ Change Wireless Power Control to Dry Weather
	☒ Change Data Storage Rates to 15 minutes for Level, Velocity, and Flow
	☒ Enable Sampler: Never

Comments:

Date/Time Off-Site: 10/21

test Total Flow
vs
Total Flow 2

Composite Sample Collection

STATION: EDGEWOOD
Personnel: TL, JA
Bottle 0 **of** 0
Date/Time On-Site: 10-21-19 10:02

☐ Halt Sampler program	
☐ Put lid on sample bottle; label sample bottle	
Sample ID:	-WC
Approx Sample Volume (mL):	
Clarity (ex. Clear, Cloudy, Silty):	
Color (ex. Clear, Gray, Tan, Brown, Black):	
QA/QC Sample ID:	-103 (Time: 1200)

Subsample Information

Trigger #	Date/Time	Sampler Message/ Subsample Result	Trigger #	Date/Time	Sampler Message/ Subsample Result
1	10-18-19 13:03	Program started	13		
2	10-18-19 13:03	Program Disabled	14		
3	10-19-19 05:54	Program enabled	15		
4	10-19-19 09:48	Manual Pause	16		
5	10-19-19 09:56	Manual resume	17		
6			18		
7			19		
8			20		
9			21		
10			22		
11			23		
12			24		

Comments:

If Sampling is Complete:
- ☐ Power off Samplers
- ☐ Disable Flow Meter pacing
- ☐ Resume Flow Meter program
- ☐ Verify Flow Meter is running
- ☐ Add ice to sample transport cooler
- ☐ Complete COC form; arrange transport to lab
- ☐ Current **Velocity Cutoff (fps):** _____

If Continuing Sampling (sample bottle change-out):
- ☐ Keep Flow Meter running
- ☐ Install new 15L bottle; add ice
- ☐ Restart program from beginning;
  Date/Time Restarted: _____
- ☐ Verify running

Liquid Height vs. Approximate Sample Volume Conversion Chart

Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume	Liquid Height	Sample Volume
0.5"	400 mL	**3.0"**	3500 mL	**5.5"**	7250 mL	**8.0"**	11000 mL	**10.5"**	14750 mL
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2.5"	2750 mL	**5.0"**	6500 mL	**7.5"**	10250 mL	**10.0"**	14000 mL	**Lab min**	8,000 mL

Grab Sample Data Form: Phase II

STATION: Edgewood

Personnel: JA, ZD **Date/Time On-Site:** 10/19/19 9:24 am

Grab Sample Times									
	Sample ID	TSS	TKN	TP	NO_x	NO_x Filtered	*E.Coli*	OP	OP Filtered
Site Sample	191019-08 -WG	9:29	9:35	9:36	9:38	9:42	9:37	9:38	9:41
	Preserved? *	N/A	☒	N/A	N/A	☒	N/A	N/A	N/A
	Labeled?	☒	☒	☒	☒	☐	☒	☒	☒

QA/QC Sample Times									
	Sample ID	TSS	TKN	TP	NO_x	NO_x Filtered	*E.Coli*	OP	OP Filtered
Field Duplicate	-101								
	Preserved? *	N/A	☐	N/A	N/A	☐	N/A	N/A	N/A
	Labeled?	☐	☐	☐	☐	☐	☐	☐	☐
Field Blank	-001								
	Preserved? *	N/A	☐	N/A	N/A	☐	N/A	N/A	N/A
	Labeled?	☐	☐	☐	☐	☐	☐	☐	☐

*NOTE: Use 1 drop of H_2SO_4 per 100 mL of sample volume

Field Parameters						
Meter number	Date	Time	Temp (C)	D.O. (mg/L)	pH (S.U.)	Cond (uS/cm)
MP06	10/19/19	9:27	8.9	10.42	7.26	0.0

PH02

Not working?

Sampler Current Status	
First Subsample Date/Time	
Last Subsample Date/Time	
# of Subsamples taken	

Comments:

Date/Time Off-Site: 10/19/19 9:54 am