Eastern Washington
Stormwater Effectiveness Studies

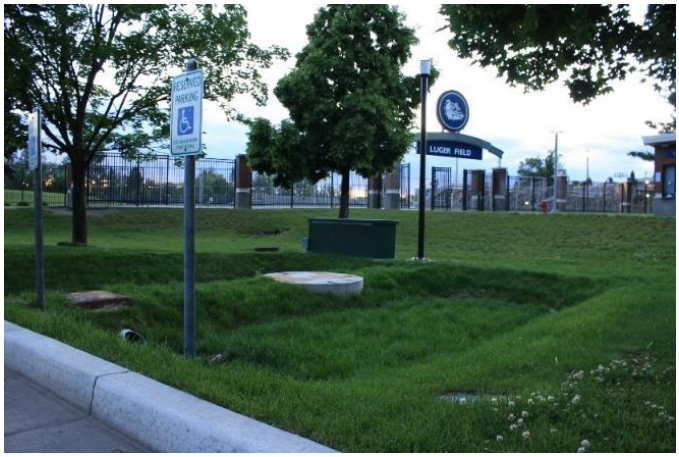
Technical Evaluation Report

Bioretention Soil Media Thickness Study

Study Classification: Structural BMP

Study Objective(s):

☑ Evaluate Effectiveness
☑ Develop Modified BMP
☑ Compare Effectiveness



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QAPP and TER Publication Information

The project Quality Assurance Project Plan (QAPP) and Technical Evaluation Report are stored and accessible to the public on the Spokane County's website at the following link: https://www.spokanecounty.org/918/Stormwater-Utility. For questions regarding either document, please contact Matt Zarecor by email MZarecor@spokanecounty.org or phone (509) 477-7255.

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Document History

The study was conducted following the QAPP which can be accessed at the link on the previous page. The study started in September 2018 and the last data was collected in January 2021. Sample collection continued through the spring 2021 however due to an unusually dry spring, there were no qualifying events. The draft Technical Evaluation Report (TER) was presented and submitted to the Technical Advisory Group (TAG) in October 2021 for review and comment. Appendix E of the TER contains a summary of the TAG's comments along with a summary of responses to the comments including how they were addressed in the document. The final TER was completed in December 2021.

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1.0 Table of Contents

2.0 Executive Summary

The focus of this study is to evaluate the effectiveness of bioretention cells containing an 18-inch bioretention soil media (BSM) layer in comparison to a 12-inch BSM layer. Bioretention cells are shallow landscaped depressions which are designed to capture and treat stormwater runoff from small contributing areas. The cells utilize an engineered BSM containing compost (40%) and sand (60%) to remove total suspended solids (TSS), dissolved metals, and oils from stormwater as runoff infiltrates through the media. Research studying BSM has suggested that removal of these pollutants primarily occurs in the top 6 inches of the media layer. Further research has shown that BSM containing compost leaches nutrients and that higher content of compost in the bioretention cell is associated with higher concentrations of nutrients being leached from the media. This study will compare the treatment performance of 18-inch media depth required by the Department of Ecology Eastern Washington (EWA) Stormwater Management Manual (SWMMEW) to a 12-inch media depth. The goal for this study is to justify a modified bioretention BMP which uses the existing BSM to a depth of 12-inches (rather than the current required 18-inch depth) for providing treatment of TSS and dissolved copper and zinc.

The goal for this study was achieved by conducting field testing of two bioretention cells each containing BSM depths of 18-inches and 12-inches. The field testing was conducted at a site located on Gonzaga University's campus in Spokane, Washington. The test site was constructed in 2014, automated monitoring equipment was installed in the fall of 2017, and field testing was conducted from Fall 2018 to Spring 2021. Automated monitoring equipment installed at the test site was used to collect composite influent and effluent water quality samples, flow rate, temperature, and precipitation data. The water quality parameters tested included the required and screening parameters defined in the 2011 Technology Assessment Protocol Ecology (TAPE) for basic, dissolved metals, and oil treatment. The physiochemical properties of the BSM were also analyzed. The media infiltration rate and saturated hydraulic conducting were measured using the effluent flow rate data and a modified falling head test.

Samples were collected from a total of 29 storm events. For each of these events, a storm report was created, and the data was evaluated to determine whether the storm met the TAPE qualifying storm criteria and sample collection criteria. These criteria define the minimum storm depth and duration, storm antecedent and post storm dry period, minimum number of aliquots, sample event coverage, and minimum number of samples. The evaluation results determined that 9 storm events met the TAPE criteria for qualifying conditions, 8 storm events met all except for one to two of the TAPE criteria for qualifying conditions (potentially qualifying), and 12 storms did not meet three or more of the TAPE criteria (non-qualifying).

The collected data was analyzed for qualifying and potentially qualifying events to determine the effectiveness of the 12-inch BSM depth compared to the 18-inch BSM depth. The specific objectives completed to meet the study goals are summarized below along with a summary of the results.

Objective 1: Determine the pollutant removal efficiency of the BSM mix at a depth of 18-inches compared to 12-inches.

No statistically significant difference was noted between the treatment performance of the 18-inch BSM depth compared to the 12-inch depth for TSS, dissolved copper, or dissolved zinc. A statistically significant difference was measured for leaching of TP; the 18-inch BSM depth leached more TP (-381%) on average than the 12-inch depth (-198%). TSS was removed at a rate of 74.5% for the 12-inch cell and 71.1% for the 18-inch cell. Dissolved zinc was removed at a rate of 39.5% for the 12-inch cell and 34.9% for the 18-inch cell. Like TP, dissolved copper was observed to be leaching from the 12-inch (-50.3%) and 18-inch (-93.4%) cells. The physiochemical properties of the BSM were measured when the cells were constructed and approximately five years after installation. A comparison of the data indicates that copper was not being retained in the BSM, while zinc was retained. The measurements of copper and zinc retained in the BSM support the findings that dissolved copper is leaching from the BSM while dissolved zinc is removed by the BSM.

Objective 2: Determine whether the treatment performance goals were achieved for basic (TSS) and dissolved metals (copper and zinc) by comparing study results to TAPE treatment goals.

Whether TAPE treatment performance goals were met by the 12-inch cell and 18-inch cell was assessed using the bootstrap statistical method. The 12-inch cell and 18-inch cell met TAPE treatment performance goals for TSS but did not meet treatment performance goals for dissolved copper and zinc. The treatment performance goal for oils was not assessed due to the number of non-detect results received during the study.

Objective 3: Determine change in infiltration rate and saturated hydraulic conductivity of each cell over the duration of the study.

Changes in the infiltration rate and saturated hydraulic conductivity of each cell was measured by examining effluent flow rates and performing modified falling head tests, respectively. Saturated hydraulic conductivity decreased for both cells (60% for the 12-inch cell and 78% for the 18-inch cell) from 2014 to 2019. Results from the infiltration testing indicate that the rate appeared to slightly increase from 2018 to 2020. These results may be due to the freeze thaw cycle which has been reported to increase infiltration rates over time. However, infiltration rate data was only collected following the installation of the monitoring equipment in 2017, missing the initial years after the BSM was installed and when infiltration rates are reportedly highest. It is possible that if a similar number of storm events were collected prior to the installation of the equipment as were collected after installation, the trend in infiltration rate would show a decline over the lifespan of the bioretention cells.

Objective 4: Summarize the study results into a final report and submit the report to Ecology for approval of the modified BMP.

This final report will be submitted to Ecology for the approval of the modified BSM depth BMP.

The results of this study will be used to justify the modification of BSM depth from 18-inches, as required in the EWA Stormwater Management Manual, to 12-inches. This effectiveness study will also fulfill the Phase II Municipal Stormwater Permit S8. Monitoring and Assessment

requirements for EWA. The requirements fulfilled include stormwater management program effectiveness studies and reporting. Results will also be used to provide guidance for future studies and research in order to continue improving bioretention BMP performance to effectively meet treatment goals.

Recommendations for future research are also included and focus on:

- Collecting outfall data from other eastern Washington sites to establish lower influent limits that represent the Spokane area. Additionally, determining how land use impacts influent concentrations for pollutants to allow for region-specific lower and upper influent concentration limits.
- The impact of cold weather conditions and maintenance practices like sand and deicer on treatment performance and infiltration.
- Developing BSMs that reduce the leaching of nutrients by BSM to prevent an increase in pollutant concentrations.
- Comparing the performance of vegetated and non-vegetated bioretention to determine if vegetation can be removed to reduce maintenance and watering practices.
- Re-evaluating qualifying storm event guidelines conditions and consider if the time between events could be extended to accommodate these EWA rainfall patterns which would increase the number of rainfall events that are considered qualifying based on TAPE.
- Conducting research to assess if there are other standard testing methods that could be used to analyze PSD in stormwater samples so more labs are able to run the analysis.

3.0 Introduction

3.1 Introduction to the Structural BMP

The focus of this study was to evaluate the effectiveness of a bioretention cell that contains a 12-inch depth of the bioretention soil media (BSM) compared to a cell that contains 18-inches of BSM. Bioretention cells are a common structural stormwater best management practice (BMP) in Spokane County (Figure 3.1). These BMPs are characterized as shallow landscaped depressions which are designed to capture stormwater runoff from small basin areas and provide treatment as stormwater infiltrates through engineered soils referred to as BSM (Figure 3.2). Treated stormwater then infiltrates into the existing soils beneath the bioretention cell or is collected in an underdrain and conveyed to a storm drain network.

Figure 3-1 Example of a bioretention area in the City of Spokane

The BSM specified in the Eastern Washington (EWA) LID Manual is composed of 60% sand and 40% compost by volume. This BSM is approved by Ecology to provide runoff treatment for TSS and dissolved metals (copper and zinc), and oils, to the level specified in the EWA Phase II NPDES MS4 Permit (Ecology, 2014). The primary treatment mechanisms responsible for reducing pollutants include sedimentation, as particles settle on the surface of the BMP; filtration, as runoff infiltrates into the BSM mix and particulates become physically trapped in the media pore spaces; and sorption, of dissolved metals onto the surface of organic materials amended into the BSM mix.

The test-site for the proposed effectiveness study is located on the campus of Gonzaga University. The site was constructed in 2014 for the purpose of conducting BSM stormwater effectiveness studies. At the test site, flow from the parking lot is collected in a catch basin inlet located on the curb and south of the bioretention cells. Runoff is conveyed to a second catch basin and is then distributed equally between the two bioretention cells. Runoff infiltrates through the bioretention media, is captured by an impermeable liner, and collects in an undrain pipe where it is conveyed to a manhole located between the two cells. Runoff collected in the manhole is pumped to a nearby drywell via two sump pumps in the base of the manhole. Section 4.2 of this report provides a more detailed description of the monitoring equipment at the site and the sample collection process.

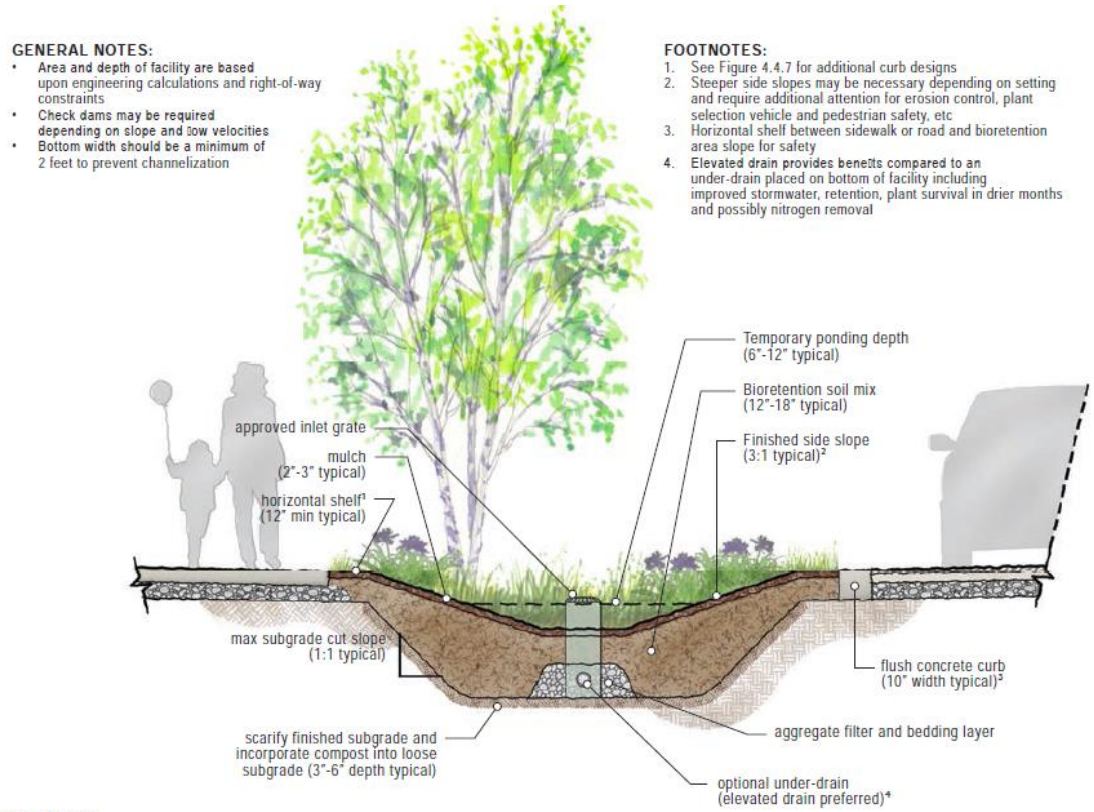

FIGURE **4.4.1**
Bioretention with primary design elements (Under-drain is optional)
Source: AHBL, Inc. courtesy of Low Impact Development Technical Guidance Manual for Puget Sound (2012)

Figure 3-2 Typical bioretention cell design (AHBL & HDR, 2013)

3.2 Problem Description

The Department of Ecology 2019 Stormwater Management Manual for EWA design requirements for bioretention cells specify an 18-inch media depth for the removal of pollutants, specifically TSS, dissolved metals, and oils (Ecology, 2019). Bioretention research has found that the removal of TSS and dissolved metals typically occurs in the first 6 inches of the bioretention soil media mix (Hatt, 2008; Hunt & Lord, 2006; Davis, Shokouhian, Sharma, & Minami, 2001). These results suggest that a media depth of 12 inches would be sufficient when the target pollutants are TSS and dissolved metals. A thinner media depth would also help reduce costs of implementing bioretention cells for municipalities and developers.

Bioretention cells contain an engineered soil mix that utilizes compost to remove metals from stormwater. Research conducted on the 60:40 BSM in western Washington indicates that the media is leaching nutrients (Ecology, 2013). Research has also demonstrated a relationship between the quantity of organic matter (e.g., compost) and nutrient leaching. Specifically, the higher the compost content the higher the concentration of nutrients leaching from the media (Erickson, Gulliver, & Weiss, 2007); (Minnesota Pollution Control Agency, 2014). Therefore, reducing the depth of the BSM from the Ecology required 18-inch depth to the modified 12-inch depth is expected to reduce the quantity of nutrients leaching from the media.

3.3 Project Goals and Objectives

The goal of this study is to develop a modified bioretention BMP that uses the existing 60:40 bioretention mix at a depth of 12 inches (rather than the current required 18-inch depth) for providing treatment of TSS, dissolved copper and zinc, and oils. The data collected in this study will be used to justify approval for a new 12-inch minimum media depth where treatment of pollutants regulated under Ecology's treatment performance criteria (i.e., basic, dissolved metals, and oils) is required per the NPDES Municipal Stormwater Permit. The goals for this study were achieved by meeting the following objectives:

1. Determine the pollutant removal efficiency of the 60:40 BSM mix at a depth of 18-inches compared to 12-inches.
2. Determine whether the treatment performance goals were achieved for basic, dissolved metals, oils by comparing study results to the TAPE treatment goals.
3. Determine the change in the infiltration rate and saturated hydraulic conductivity of each cell over the duration of the study.
4. Summarize the study results into a final report and submit the report to Ecology for the approval of the modified BMP.

3.4 Project Overview

The focus of this report is the field testing. The test site was constructed in 2014 and automated monitoring equipment was installed at the site in the fall of 2017. Flow monitoring and sample collection for this study began in the fall of 2018 and continued through spring 2021. BSM samples were taken in 2014 during construction and during data collection for the study. The same installation of BSM media was in place for from the fall of 2014 through the duration of the study.

Flow-weighted composite samples were collected from rainfall events that were predicted to be qualifying per the TAPE guidelines (Ecology, 2011). Of the 29 storm events monitored, 9 events met the TAPE criteria for qualifying events and 8 were classified as potentially qualifying because they met all the qualifying conditions except for one or two criteria. Samples were tested for the required parameters and screening parameters as defined in TAPE for basic, dissolved metals, and oils treatment (Table 6.4). Media samples were collected in 2014 and 2019, to verify that the material properties of the BSM installed matched Ecology specifications and to assess the changes in the physiochemical properties over time. Data in Appendix A.2 verifies that the material properties matched the Ecology specifications at installation. Changes to the BSM properties are discussed in Section 6.1.3 as they related to the changes in pollutant removal efficiency. The infiltration performance of the bioretention cells was evaluated during the study using data collected from falling head tests and the effluent flow rate measured by autosamplers. The data was evaluated to determine whether pollutant reduction met Ecology's treatment performance criteria as defined in TAPE (Section 6.2).

3.5 Study Location

The project site is located on the Gonzaga University campus in Spokane, Washington, south of the Kermit M. Rudolf Fitness Center, east of Luger Soccer Field and north of the School of Law.

An aerial image of the test site is shown in Figure 3-3. The cells are located immediately adjacent to each other in a grassy area north of the parking lot next to Luger Field. Each cell contains the same type and configuration of BSM, except one cell contains a 12-inch thick BSM layer and the other contains an 18-inch BSM layer. The contributing area consists of 0.53 acres of a paved parking lot and 0.08 acres from sidewalks and the access road to the parking lot. The basin area is delineated in Figure 3-4.

Figure 3-3 Aerial view of test site location

Figure 3-4 Contributing Basin Area

4.0 Sampling Procedures

This section provides an overview of the data collected and sampling procedures followed during the study. Additional detail regarding sampling procedures can be found in Sections 7.0 and 8.0 of the study QAPP.

4.1 Types of Data Collected

Sampling began in the fall of 2018 and ended in spring 2021 because greater than 12 qualifying or potentially qualifying storm events (see Section 5.2.1) had been sampled, and data analysis indicated that sufficient data had been collected to establish trends at the site. Table 4.1 provides a summary of the types of data collected including the equipment used, collection frequency, and total number of samples. Table 4.2 provides a timeline of sample collection. Appendices A and B of this report contain data collected from each rainfall event during the study.

Table 4.1 Summary of the Types of Data Collected

Data Type	How Data Was Collected	Frequency	Total # of Samples
BSM physiochemical properties	Samples of BSM	Prior to installation of bioretention cell	2[b]
Precipitation	Rain gauge connected to data logger at the test site	Measured continuously[a]	NA
Flow Depth, Temperature (influent, 12-inch effluent, 18-inch effluent)	Pressure transducer upstream of weir in pipes (influent, 12-inch effluent, 18-inch effluent). Converted depth to flow w/ weir equation	Measured continuously[a]	NA
Composite Water Quality Samples	Autosamplers collected composite samples & were triggered by the data logger during rainfall conditions	See Table 4.3	29[c]
pH Measurement	Measured composite sample pH	Min. 3 storm events; Each storm event monitored	7[c]
Sediment PSD	Collected from composite flow-weighted samples	Min. 3 storm events	4[c]
Infiltration Rate	Modified falling head test; effluent flow rates	Immediately after media installation; continuously measured[1]	NA

[a] Recorded every 15 minutes or 5 minutes if 0.04 in. or greater precipitation fell in the previous 6 hours.
[b] Samples of BSM media were taken prior to installation of the BSM in 2014 and again in 2019. Results from media samples can be found in Appendix A.2.
[c] Additional information is provided in Table 4.2.

Table 4.2 Summary of Water Quality Samples Collected

Type	Parameter	Event Number																												
			1	2	3		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
	Date of Event	Fall 2014	11/22/2018	12/16/2018	1/17/2019	Spring 2019	7/24/2019	9/28/2019	11/19/2019	12/7/2019	12/19/2019	1/28/2020	1/30/2020	2/23/2020	5/6/2020	5/20/2020	5/31/2020	9/25/2020	10/10/2020	10/11/2020	10/13/2020	11/5/2020	11/13/2020	11/16/2020	11/18/2020	12/19/2020	12/21/2020	12/22/2020	1/2/2021	1/4/2021	1/6/2021	1/12/2021
	Qualifying Event (Y/M/N)[1]	N	N	Y	N		M	M	N	N	Y	Y	N	M	Y	M	M	M	Y	N	N	Y	N	N	N	N	N	M	Y	M	M	Y
Water Quality Stormwater	Ortho-phosphate (OP)						X	X	X	X	X	X	X	X	X										X	X		X		X		X
	Total Phosphorus (TP)			X			X	X	X	X	X	X	X	X	X			X	X	X		X	X	X	X	X		X		X		X
	Particle Size Distribution (PSD)																															
	Total Suspended Solids (TSS)		X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
	pH														X																	
	Dissolved Copper (Cu)		X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X		X		
	Dissolved Zinc (Zn)		X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X		X		
	Total Copper (Cu)		X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X		X	X	X
	Total Zinc (Zn)		X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X		X	X	X
	Hardness as CaCO3		X	X			X	X	X	X	X	X	X	X	X		X	X	X	X		X	X		X	X	X	X		X		X
	NWTPH-Dx (TPH)			X			X	X	X	X	X	X	X	X	X		X		X	X		X	X	X	X	X	X	X		X	X	X
	Sediment PSD														X	X					X								X			
BSM	Cation Exchange Capacity (CEC)	X				X																										
	Organic Matter	X				X																										
	Calcium	X				X																										
	Magnesium	X				X																										
	Zinc & Copper	X				X																										

4.2 Sample Collection Process

Data for the study was collected following the standard operating procedures (SOPs) defined in the study's QAPP. The procedures are summarized in this section along with information about the audit and monitoring equipment. More detailed information regarding each SOP can be found in Section 8.0 of the study QAPP.

4.2.1 SOP Overview

- Storm Selection and Tracking – Procedures outline how to decide whether to monitor and collect samples during a storm event. This SOP was conducted daily.
- Storm Monitoring Equipment Maintenance - Procedures describe how to perform maintenance on the monitoring equipment and test site. This SOP was conducted monthly.
- Preparing Stormwater Monitoring Equipment for Storm Sampling - Procedures detail how to prepare monitoring equipment and the test site for a storm to collect data that meet Quality Assurance and Quality Control (QA/QC) requirements. This SOP was conducted before each storm selected for monitoring.
- Stormwater Sample Collection and Processing - Procedures detail how to collect and process samples for transportation to the analytical laboratory following a storm event. This SOP was conducted following each storm in which samples were collected.
- Monitoring Equipment Data Download - Procedures detail how to download data following a storm event. This SOP was typically done at the same time as collection of samples following the event (covered under Stormwater Sample Collection and Processing SOP).
- Falling Head Test - Procedures describe how to perform a falling head test at the test site to estimate infiltration rates through the BSM. This SOP was performed in 2014 and 2019. Infiltration rates were also estimated using pressure transducer readings recorded by the data logger (see Section 6.3).

4.2.2 Audit Overview

An audit was conducted by a participating entity as part of the data quality assessment to verify whether staff followed the SOPs during the study. Any deviations in the SOPs from those in the study QAPP are summarized in the audit findings (Appendix C.4) and detailed in the summary of deviations from the QAPP (Appendix C.5). Deviations primarily included SOPs that were not used because an alternative method was more appropriate.

4.2.3 Monitoring Equipment Overview

Figure 4-1 shows the process diagram of the test site on the Gonzaga Campus. Figure 4-2 includes photos of the test site monitoring equipment. The monitoring equipment at the site is located in the monitoring equipment vault, manhole between the two bioretention cells, and in two sumps between the inlet and the manhole. A rain gauge for the site was also located at the test site and adjacent to the monitoring equipment vault.

Runoff entered the site through a sumped catch basin inlet. A large wire grate was placed over the opening of the pipe leaving the inlet pipe to prevent the passing of large debris and wildlife from damaging the monitoring equipment. Stormwater flowed through the pipe to a second catch basin, where the influent pressure transducer was located. Flow left the second catch basin through a pipe and flowed over a v-notch control weir inside the pipe. Influent flow and temperature were measured by the pressure transducer and v-notch control weir. The appropriate weir equation was used to convert the depth recorded by the pressure transducer into flow. After flowing over the weir, stormwater entered a sump located between the two bioretention cells where influent water quality samples were collected by an automated sampler. From the sump, flow was distributed to each bioretention cell for treatment.

After infiltrating through the BSM, runoff was captured by an impermeable liner and collected in an underdrain. The underdrain for each cell conveyed flow to the effluent sampling manhole. Flow entered the effluent sampling manhole via pipe, in which monitoring and sampling equipment were located. Effluent flow and temperature for each cell were monitored through the same pressure transducer and control weir configuration described for the influent. Effluent water quality samples were also collected by automated samplers immediately downstream of the control weir. The effluent pipes discharged flow into the base of the manhole, which was pumped to a nearby drywell using two sump pumps in series. The data collected by the monitoring system was saved in the data logger located in the monitoring equipment vault. A process diagram of the monitoring equipment and connections is shown in Figure 7.3 and Table 7.1 of the QAPP.

Figure 4-2 Influent sampling sump (left), manhole effluent sampling (middle), and weir (right)

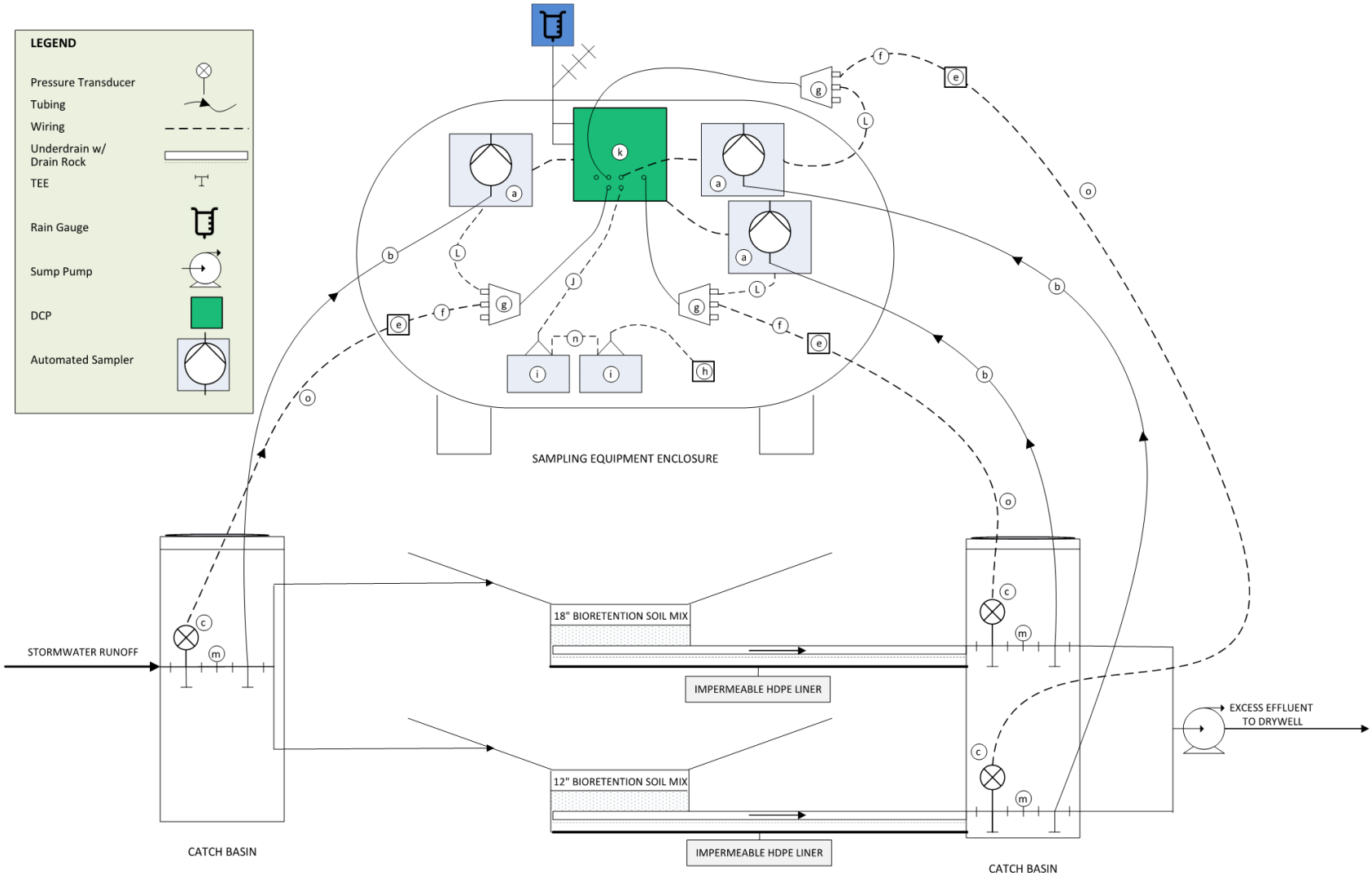

Figure 4-1 Process Diagram of Monitoring System

Table 4.3 Summary of Monitoring Equipment and Instrumentation

Symbol	Equipment Description	Equipment Function	Quantity
a	ISCO 6712 autosampler	Collects and stores influent and effluent samples	3
b	3/8 inch ID x 25 ft. long vinyl suction line with standard weighted polypropylene strainer. Includes tubing coupler.	Suction tubing conveys sample to the samplers	3
c	OTT PLS PRESSURE TRANSDUCER - aa PLS, PRESSURE LEVEL SDI12, 0-4M OTT PLS level sensor with 0-4 meter (13.1 ft) range and SDI-12 communication	Measures the depth of water in the pipe which is used along with the thelmar weir to calculate the influent and effluent flow rates	3
d	ISCO 674 Rain Gauge, Tipping bucket, 50 ft Armored Cable	Records rainfall data	1
e	Junction Box - Humidity Absorber Connection Box FAD 5 Humidity absorber connection enclosure use w/ OTT PLS level sensor	Houses the dessicant cartridges	2
	DESSICANT CARTRIDGE, REPLACEMENT OTT Replacement desiccant cartridge for use with OTT FAD 4/5humidity enclosures	Absorbs moisture that could damage the equipment	3
f	Cable, Terminal Strip to SDI Port, 1.5 ft	Extension cable which provides signal to Data Logger. Between junction box and data logger.	2
g	Cable, SDI Connectors to SDI Port, 2 ft	Connects PT to the humidity box and Samplers	2
h	Trickle Battery Charger (AC to DC Charger)	Continually charges batteries	1
i	Battery, GNB Sunlyte, 100AH, Starved Electrolyte	Battery powers samplers and data logger	2
j	Battery Cable, Dual 10A Fuse, F6 & H2, 8.5ft	Connects data logger and samplers to battery	1
k	Axiom data logger package (H2)	Records data over time via connected external instruments and sensors	1
l	SDI Interface,4.5ft Cable Logger to Isco 6712 Samp	Connects PT to humidity box and samplers	2
m	Volumetric Weir 6"	Used to measure influent and effluent flow rates	3
n	Cable, Two Batteries in Parallel	Connects two batteries together in parallel.	1
o	PLS PROBE CABLE, METERS - Integrated vented cable for use with OTT PLS level sensor; Each PLS to have 15 meter cable.	Patch cable that provides the signal from the presssure transducer to the datalogger. This cable terminates at the junction box (humidity absorber).	2

5.0 Data Quality Assessment

A data quality assessment was performed to determine whether data collected during the study met Data Quality Indicators (DQIs) and Measurement Performance Criteria (MPCs) that were defined in the study QAPP (Osborn Consulting, Inc., 2020). DQIs are qualitative and quantitative measures that characterize the aspects of quality data. MPCs are the acceptance criteria for DQIs which specify the standard for data to meet the data quality objectives for the project. The assessment of whether MPCs were met for each DQI is summarized in Appendix C.1. As part of the data quality assessment, a data verification and data usability assessment were performed. The data verification is summarized in Section 5.1 and supporting materials are included in Appendix C.2. The data usability assessment is summarized in Section 5.2 and supporting materials are included in Appendix C.1-C.6.

5.1 Data Verification

Data verification involves a review of data provided by the analytical laboratory. The review of data is performed for events where samples were collected and is summarized in the Quality Assurance (QA) Worksheets in Appendix C.2. The worksheets were completed for each storm event which was sampled and contain calculations for QA/QC tests (reference QAPP Section 6.0 for detailed description) to determine whether laboratory and field water quality data are acceptable. The information summarized in the QA worksheets includes:

- Parameter
- Method
- Chain of Custody Issues
- Holding Times
- Temperature of Samples Received at Lab
- Laboratory Method Blank Results
- Laboratory Control Sample Recovery Percent
- Laboratory Matrix Spike Recovery Percent
- Laboratory Duplicates Relative Percent Difference
- Field Duplicates Relative Percent Difference
- Laboratory QA/QC Flags and Associated Action (if needed)

The data verification evaluation process resulted in a total of seven samples being rejected, as shown in Table 5.1. The process included evaluating information in the QA worksheets. Specifically, water quality data was rejected if samples arrived beyond holding times, if multiple laboratory QA/QC tests did not meet laboratory limits, or if field duplicates exceeded the relative percent difference limit. Water quality data was potentially accepted if one laboratory QA/QC test did not meet laboratory limits but the sample met other QA/QC tests. Whether QA/QC tests were met for each sample event and parameter are included in Appendix C.2 Quality Assurance Worksheets. Water quality data were also accepted if temperatures were above 6 degrees Celsius

when they were received by the laboratory from the field crew, as there did not appear to be a relationship between analytical results and temperature (see Appendix C.6 for discussion).

Table 5.1. Data Rejected Following Data Verification

Date of Sample	Parameter	Location of Sample	Reason for Rejection
11/13/2020	TSS	12-inch Effluent	Field duplicate exceeded relative percent difference limit of 25%
11/13/2020	Total Zinc	18-inch Effluent	Field duplicate exceeded relative percent difference limit of 20%
11/13/2020	Total Phosphorus	Influent and 12-inch Effluent	Field duplicate exceeded relative percent difference limit of 20%
11/18/2020	TSS	18-inch Effluent	Field duplicate exceeded relative percent difference limit of 25%
11/18/2020	Total Phosphorus	Influent	Field duplicate exceeded relative percent difference limit of 20%
12/21/2020	Dissolved Copper	Influent	Field duplicate exceeded relative percent difference limit of 20%
12/21/2020	Dissolved Zinc	Influent and 12-inch Effluent	Field duplicate exceeded relative percent difference limit of 20%

Additionally, there were a total of seven storm events during late 2018 and 2019 for which QA/QC data was not originally reported by the laboratory. The seven storm events are listed in Table 5.2. Laboratory QA/QC data for 15 dates in 2019 was obtained at the end of the project. The dates of the QA/QC data were compared against the dates for the seven storm events to determine if the miscellaneous laboratory QA/QC data could be used for the QA worksheets for the seven storm events. Laboratory QA/QC data with a matching or similar (less than 14 days apart) date was found for one of the seven storm events. The remaining miscellaneous QA/QC data did not exceed lab control limits. This data will be included in Appendix C.2 with the QA worksheets.

Table 5.2 Data Rejected Following Data Verification

Date of Sample	QA Laboratory Data Recovered? (Y/N)	Date(s) of Recovered QA Data
11/22/2018	N	-
12/16/2018	N	-
1/17/2019	N	-
7/24/2019	Y	7/25/2019, 7/29/2019, 7/30/2019, 8/2/2019, 8/5/2019
9/28/2019	Y	9/20/2019, 9/24/2019, 9/26/2019
11/19/2019	N	-
12/7/2019	N	-

5.2 Data Usability Assessment

The data usability assessment consists of a review of QA/QC materials for the study to determine whether each MPC for the study is met. The materials are reviewed in terms of precision, bias, representativeness, completeness, and comparability. The usability assessment also includes a discussion of limitations on use of measurement data, whether the quality assurance objectives were met, and the resulting impact on decision-making. The materials reviewed include:

- Results of field and lab data verification (Section 5.1 and Appendix C.2)
- Copies of field forms used to document SOPs being followed (Appendix C.3)
- Results of technical system audits (Appendix C.4)
- Changes and deviations from QAPP (Appendix C.5)
- Identification of significant quality assurance problems and recommended solutions (Appendix C.6)

As discussed in Section 5.1, following review of the field and lab data verification nine samples were rejected due to QA issues summarized in Table 5.1. The review of field forms and technical system audits suggested the SOPs were followed for the duration of the study; where modifications were made, they were noted in the audit form (Appendix C.4) and summary of deviations from the QAPP (Appendix C.5). Reasons for modifications included: adding procedures that provided a data quality benefit (i.e. tightening of weir wheels to limit any leaking of flow around the weir seal); revision of steps following installation of equipment or guidance provided by manufacturers, analytical laboratories, or others (i.e. addition of sample blank for dissolved metals); and removal of items that were not necessary to ensure data quality (i.e. disconnect power supply to battery in order to test voltage of battery). In Appendix C.6, quality assurance problems identified during the study along with corrective action taken and justification for not rejecting sample results are provided.

Following review of the data, an assessment was performed to determine whether each quality objective for the study was met. The materials discussed in the previous paragraph were used to support whether the MPCs were fulfilled for each DQI associated with precision, bias, representativeness, completeness, comparability, and sensitivity. The assessment showed that quality objectives were met for the study; a detailed assessment for each DQI is included in Appendix C.1.

From the review of the data and data quality objectives, the main limitation of the data is related to the intended use of the BSM. The study data are expected to be sufficient for the purposes of this effectiveness study. However, data analysis showed that the BSM studied does not appear to be meeting dissolved metals treatment for the 18-inch or 12-inch media depth, which may suggest the BSM is not suitable for general use. That said, some of the influent metals concentrations at the test site did not fall in the influent concentration range for which treatment goals are specified by TAPE. Research has reported that with lower influent concentrations, have lower reductions in pollutant concentrations (Navickis-Brasch, et al., 2021). The low influent concentrations therefore may be skewing the pollutant removal to lower percentages. These results are discussed further in Section 6.2.

5.2.1 TAPE Qualifying Event and Pollutant Concentration Criteria

The TAPE Technical Guidance Manual (Ecology, 2011) specifies storm event guidelines and sample collection requirements for automated, flow-proportional composite sampling. The storm event guidelines help determine whether a storm event is acceptable for sampling and the sample collection requirements help ensure composite samples are representative of the storm event mean concentration. Table 5.2 and Table 5.3 display the storm event guidelines and sample collection requirements.

Table 5.2 Ecology Storm Event Guidelines

Parameter	Definition	Guideline
Minimum Storm Depth	Total rainfall amount during an event	0.15 inches[1]
Storm Antecedent Dry Period	Defines the beginning of the storm event as designated by minimum time interval without significant rainfall	6 hours minimum with less than 0.04 inches of rain
Post-Storm Dry Period	Defines the end of the storm event as designated by minimum time interval without significant rainfall	6 hours minimum with less than 0.04 inches of rain
Minimum Storm Duration	Shortest acceptable rainfall duration	1 hour
Average Storm Intensity	Total rainfall amount divided by total rainfall duration	Range of rainfall intensities

[1] Rainfall events of 0.08 inches or greater were collected during the study to expand the storm conditions monitored and increase the likelihood of obtaining samples.

5.3 Ecology Sample Collection Requirements

Parameter	Definition	Requirement
Minimum Aliquot Number	Number of equal-volume samples collected during a storm event that are combined to create a composite sample	10 aliquots[1]
Storm Event Coverage	The percentage of the total storm volume that the collected aliquots represent	Samples shall be collected for at least 75% of the storm event hydrograph (by volume).
Maximum sampling duration	Time in hours between the collection of the first and last aliquots	36 hours
Minimum number of sample pairs	Number of storm events with successfully collected flow-proportional composite samples that meet influent concentration ranges and the storm event guidelines	12 samples

[1] As few as 7 aliquots may be accepted by Ecology (Ecology, 2018).

The water quality data included in this report was obtained from 29 storm events (Table 4.2) of which nine events met all of the TAPE storm event guidelines and sample collection

requirements (qualifying criteria). The events which met all the qualifying criteria were referred to herein as "qualifying events". Another eight events met all the qualifying criteria except for one to two of the criteria. These storms were referred to as "potentially or maybe qualifying" events. Two common criteria that were not met were minimum precipitation depth and minimum storm event coverage. During the study, the target minimum precipitation depth guideline was lowered to 0.08-0.10 inches to expand the storm conditions monitored and increase the likelihood of obtaining samples. This approach was approved through verbal discussions with the Ecology TAPE contact.

Influent storm event coverage was occasionally not met when high intensity rainfall caused ponding in the influent pipe. For this condition, the monitoring system cannot distinguish between flow and ponding, and an artificially high influent volume was recorded by the data logger. It is anticipated that 75% event coverage of the influent volume was achieved for those events. Six of the eight potentially qualifying events reflected these conditions. One of those six events, plus an another potentially qualifying event which met 75% coverage of influent, did not meet effluent storm event coverage targets. This is likely due to the actual rainfall exceeding the forecasted rainfall, as a high number of aliquots were collected during those events. These events were classified as potentially qualifying because the peak of the effluent hydrograph was reflected in the storm event coverage obtained. It was therefore expected that the storm coverage below 75% would not significantly affect water quality data and would produce slightly conservative water quality data results.

Of the 29 storm events monitored, 12 were determined to be "non-qualifying" events. These events did not meet three or more of the qualifying criteria in TAPE. The most common criteria not met were number of aliquots, minimum precipitation depth, storm event coverage, and storm event duration. A summary of all the events monitored and the qualifying criteria met for those storm events can be found in Appendix B as well as Appendix D.2.

The TAPE Guidance Manual defines the influent concentration ranges for each pollutant as shown in Table 5.4. The upper influent limit defines the maximum value that can be used to calculate the removal efficiency. If values measured are larger than the upper limit, the upper limit must be used in the analysis. TAPE specifies that all data above the limit are either rejected or included, however, values cannot be "cherry picked". The lower influent limit defines the minimum value of influent samples which may be included in the data set. Dissolved copper, dissolved zinc, and total phosphorus concentrations below the lower influent limit may be included, provided reasoning is given for a new, lower threshold for the study (Ecology, 2011). Moreover, the threshold must be applied across the entire dataset (no "cherry-picking"). TAPE typically requires that influent TSS and TPH concentrations below the lower limit are not included in the dataset.

Table 5.4 Pollutant Influent Range Limits

Pollutant	Upper Influent Limit	Lower Influent Limit
TSS	200 mg/L	20 mg/L
Dissolved Copper	0.02 mg/L	0.005 mg/L
Dissolved Zinc	0.3 mg/L	0.02 mg/L
TP	0.5 mg/L	0.02 mg/L
TPH	None	10 mg/L

For this study, all TSS, dissolved metals, and phosphorus values below the lower influent limit were included in the analysis. The site was selected to be representative of a typical location where bioretention would be installed. As such, concentrations below the lower range were all included in the data analysis to show realistic pollutant removal rates for the BMP. TPH values below the lower limit were not included in the analysis as the majority of TPH values were non-detects. The parameters that were below the lower range are noted below along with the frequency of which this occurred:

- TSS concentrations were below the lower influent limit 6 of 16 times (38%).
- Dissolved zinc influent concentrations were below the lower influent limit 6 of 14 times (43%).
- Dissolved copper influent concentrations were below the lower influent limit 11 of 14 times (79%).
- TPH influent concentrations were below the lower influent limit 14 of 14 times (100%).
- TP influent concentrations were below the lower influent limit 3 of 13 times (0%)

Because of the frequency at which the influent concentrations of dissolved metals were below the lower limit, influent concentrations of dissolved metals at other sites within in the City of Spokane or urban areas of Spokane County were reviewed and compare to the Gonzaga University study site to assess if the influent values were similar to other sites and as such could be considered typical. The other sites included:

- The sand filter located in Spokane County near the intersection of Hawthorne Road and U.S. 2 as a part of the Sand Filter Sidewalk Vault BMP EWA Stormwater Effectiveness Study (Sand Filter) which included runoff from 0.41 acres of arterial roadway, sidewalk, and some lawn surrounded by residential and commercial land use.
- The pervious pavement (concrete and HMA) within Sharp Avenue from Pearl Street to Hamilton Street as a part of the Sharp Avenue Stormwater Improvements (Sharp) which includes runoff from roadway surrounded by residential and commercial land use.
- The monitoring station for the Cochran/Downriver Stormwater Management Facilities (Cochran) which includes runoff from 5300 acres of mostly residential and some commercial land use.

The Gonzaga University, Sand Filter, and Sharp sites receive runoff predominantly from pollutant generating impervious surface. The Sand Filter and Sharp sites receive runoff from roads with ADT over 8,000, while the Gonzaga University site is made up of a parking lot with greater than 100 daily trip end counts. The Cochran site, which samples stormwater from one of the largest basins in the City of Spokane, is primarily residential with some commercial areas, with approximately. All four of the sites would be considered "moderate use" sites as defined by the SWMMEW, due to the ADT (>7,500) and expected trip end count (>100 trip ends) within the basin. Moderate use sites for new or redevelopment require dissolved metals treatment (Ecology, 2019), and bioretention cells are approved for general use to provide this level of treatment. As described in the following paragraph, the four sites receive influent dissolved metals concentrations that are not consistently within the TAPE influent concentration range for dissolved metals. This suggests that the lower concentrations received at the four sites are representative of what is expected to enter an installation of bioretention in EWA.

At the Cochran and Sharp sites, 40% - 44% of samples had dissolved zinc influent concentrations below the lower limit, which is consistent with the Gonzaga University site (43%). The Sand Filter site had only 12% of samples with dissolved zinc influent concentrations less than the lower limit – a lower percentage than the other three sites. Copper influent concentrations at the Cochran, Sharp, and Sand Filter sites were less than the lower influent limit for 11% - 90% of samples, with the highest percentage at the Sharp site. The Gonzaga University site, with 79% of copper influent samples below the lower limit, falls in between this range, with a percentage of samples most similar to the Sharp site. By comparing influent concentrations for dissolved metals at each of the mentioned sites, the percent of samples with concentrations below the lower influent limits at the Gonzaga University site does not appear to be abnormal. While concentrations at the Gonzaga University site do appear to be lower on average of the four sites, this is expected to be due to changes in trip end counts during the year. Specifically, the Gonzaga University site has higher trip end counts (>100) during the fall and spring semesters and may have fewer than 100 trip end counts from June through August and mid-December through mid-January. The other three sites are expected to have more consistent trip end counts and ADT during the calendar year. Figure 5.1 and 5.2 show a comparison of the influent concentrations for dissolved zinc and copper.

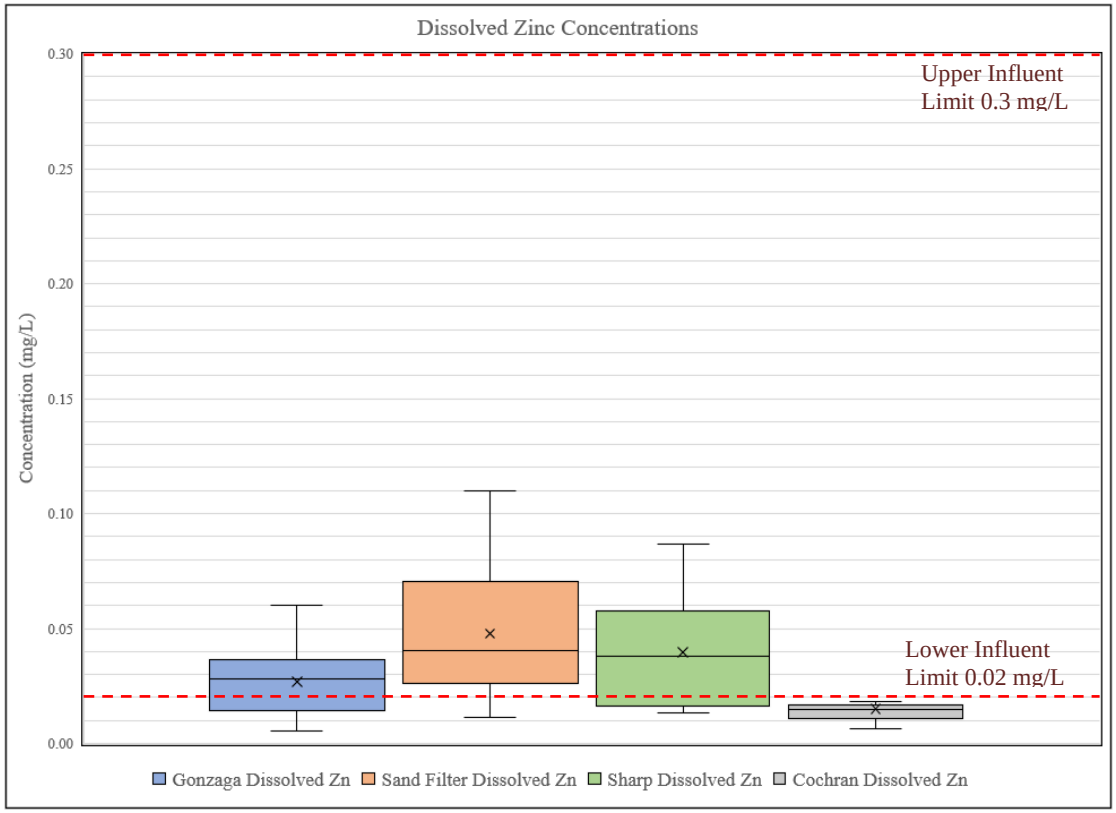

Figure 5-1 Comparison of dissolved zinc influent concentrations

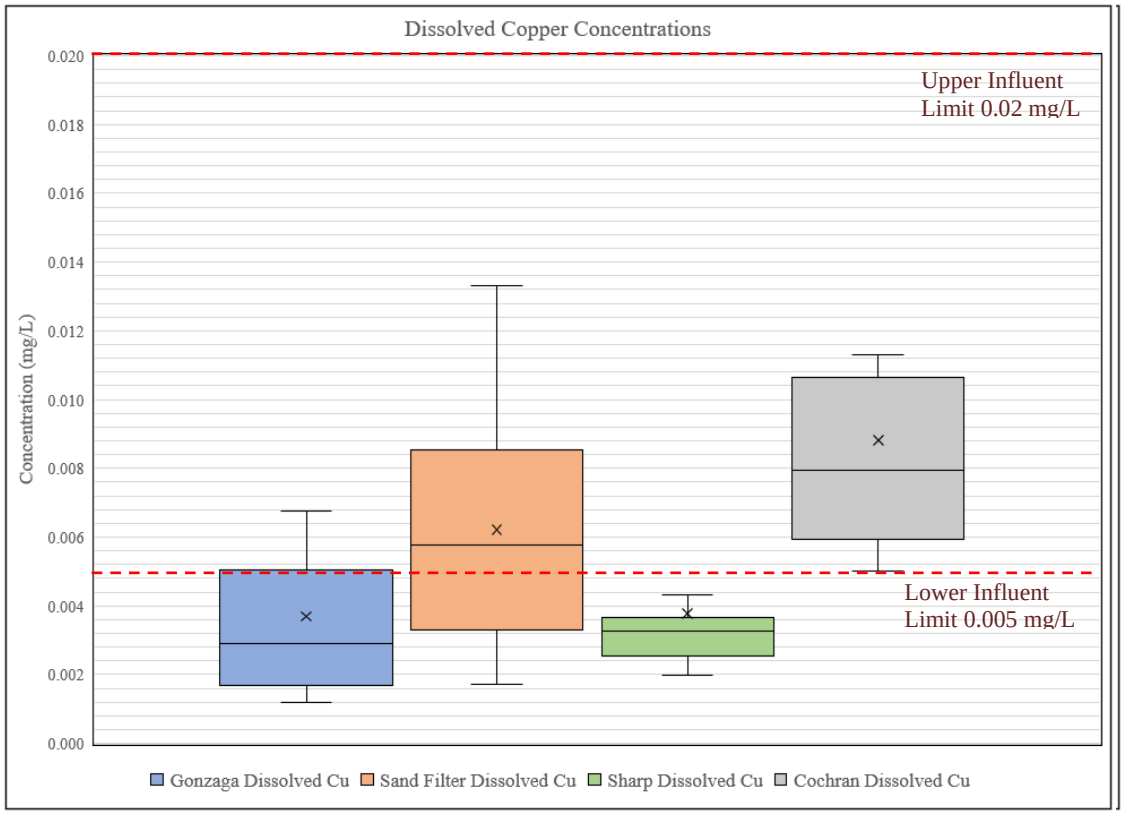

Figure 5-2 Comparison of dissolved copper influent concentrations

6.0 Results and Discussion

The goals of this study were achieved by completing the objectives outlined in Section 3.3. Each objective is noted in the subsequent section along with a summary of how the objective was achieved, the results, and discussion about the results. Table 9.1 in the QAPP for the study defines the Standard Testing Methods for parameters tested and a detailed summary of the analysis can be found in Section 14.0 of the QAPP for the study.

6.1 Water Quality Data Analysis

Objective 1: Determine the pollutant removal efficiency of the BSM mix at a depth of 18-inches compared to 12-inches.

Succinct Objective Summary: No statistically significant difference was noted between the treatment performance of the 18-inch BSM depth compared to the 12-inch depth for TSS, dissolved copper, or dissolved zinc. A statistically significant difference was measured for leaching of TP; the 18-inch BSM depth leached more TP (-381%) on average than the 12-inch depth (-198%). TSS was removed at a rate of 74.5% for the 12-inch cell and 71.1% for the 18-inch cell. Dissolved zinc was removed at a rate of 39.5% for the 12-inch cell and 34.9% for the 18-inch cell. Like TP, dissolved copper was observed to be leaching from the 12-inch (-50.3%) and 18-inch (-93.4%) cells. The physiochemical properties of the BSM were measured when the cells were constructed and approximately five years after installation. A comparison of the data indicates that copper was not being retained in the BSM, while zinc was retained. The measurements of copper and zinc retained in the BSM support the findings that dissolved copper is leaching from the BSM while dissolved zinc is removed by the BSM.

The following section describes the analysis conducted which included developing the storm reports, comparing the influent and effluent pollutant concentrations, and calculating the pollutant removal efficiency. Raw data and calculations for this section can be found in Appendix A, Appendix B, and Appendix D.

6.1.1 Storm Reports

For each storm event where samples were collected, a storm report was created to determine whether the storm met qualifying storm criteria (described in Section 5.0, Tables 5.2 and 5.3), defined flow characteristics through the BSM for a variety of influent conditions, and estimate pollutant removal. Storm reports were developed using data downloaded from the data logger at the test site, which included precipitation, influent and effluent flow rate as well as temperature, and sample quantity for each time step (every 15 minutes or every 5 minutes if greater than or equal to 0.04 inches of precipitation had fallen in the previous 6 hours). An analysis of the data was performed for each storm which is summarized in Table 6.1. Copies of the storm reports for each storm event in which samples were collected can be found in Appendix B. Results for TSS, dissolved copper, dissolved zinc, TPH, and the screening parameters for the study are summarized in each storm report. The TSS, TPH, dissolved copper, and dissolved zinc water quality data included in the storm reports was used to perform the analyses described in this section of the report. Specifically, the analytical results for the parameters and associated pollutant removal efficiencies were used to conduct the statistical comparison of influent and

effluent concentrations (Section 6.1.1), calculate removal efficiencies (Section 6.1.2), and compare results to TAPE treatment performance goals (Section 6.1.3).

Table 6.1 Storm Report Data Summary

Data	Definition
Storm date	The date when the storm began; used to identify the individual storm event.
Total storm precipitation depth	The cumulative precipitation following the initial antecedent dry period (6 hours with 0.04 inches or more of precipitation).
Storm duration	The length of time between storm start (6 hours minimum with greater than or equal to 0.04 inches of precipitation) and end (6 hours with less than 0.04 inches of precipitation).
Storm average precipitation intensity	Equal to the total rainfall amount divided by the total rainfall duration.
Storm peak precipitation intensity	Obtained from the time interval with the maximum precipitation depth per time.
Total flow volume: influent, 12-inch effluent, & 18-inch effluent	The total volume of influent, 12-inch effluent, and 18-inch effluent from storm start to end.
Peak flow rates: influent, 12-inch effluent, & 18-inch effluent	The peak influent, 12-inch effluent, and 18-inch effluent flow rate for a time interval during the storm event.
Average flow rates: influent, 12-inch effluent, & 18-inch effluent	The average influent, 12-inch effluent, and 18-inch effluent flow rate during the storm event.
Total number of aliquots: influent, 12-inch effluent, & 18-incheffluent	The total number of aliquots (individual samples which create a composite sample) collected during the storm event.
Sample duration: influent, 12-inch effluent, & 18-inch effluent	Equal to the time in hours between the collection of the first and last aliquots for the influent and effluent autosamplers.
Storm volume sampled: influent, 12-inch effluent, & 18-inch effluent	Equal to the product of total number of aliquots and the threshold volume, divided by the total storm volume. The threshold is an estimated volume of stormwater that must pass through the influent or effluent before an aliquot is collected.
Water quality parameters monitored: influent, 12-inch effluent, & 18-inch effluent	Summarizes analytical results for parameters which were sampled during the storm event
Pollutant removal efficiency	Equal to the difference between the influent and effluent parameter concentrations, divided by the influent parameter concentration.
Analytical laboratory detection limits and flags	The limits at which parameters can be detected by the analytical method and any quality control or quality assurance flags that the laboratory includes in the analytical report.

6.1.2 Statistical Analysis

A statistical analysis was performed using water quality data obtained during the study to assess whether there was a statistically significant difference in the analytical results of 12-inch effluent and 18-inch effluent pollutant concentrations for TSS, dissolved copper, dissolved zinc and TP. Other screening parameters were not included in the statistical analysis as only assessments of TSS, dissolved copper, dissolved zinc, and TP effluent concentrations were needed to meet the study objectives. TPH was not included in the statistical analysis due to the number of non-detect results, as described in Section 5.2.

The statistical analysis consisted of first determining whether the data was normally distributed. The data was then compared to determine whether 12-inch effluent and 18-inch effluent pollutant concentrations for a certain parameter were significantly different. The following paragraphs include a more detailed description of the analysis as well as the results of the analysis. Output from the statistical analysis can be found in Appendix D.1.

Effluent concentrations for TSS, dissolved copper, dissolved zinc, and TP were evaluated using the Ryan-Joiner test to determine whether each dataset was normally distributed. Normality was assumed if the test produced a p-value greater than 0.05. From the Ryan-Joiner test it was found that dissolved copper 12-inch effluent and 18-inch effluent concentrations were normally distributed, as were TSS 12-inch concentrations, dissolved zinc 18-inch concentrations, and TP 12-inch concentrations. The remaining datasets were non-normally distributed. The normality of each dataset determined which statistical analysis method to use to determine whether 12-inch effluent concentrations were significantly different from 18-inch effluent concentrations.

The two-sample t-test was used for normal data while the Mann-Whitney test was used for non-normal data. These tests were used to determine whether influent and effluent datasets were statistically significantly different. Both tests use a 95% confidence interval to decide whether the null hypothesis is void, or that there is a statistically significant difference between the two datasets (12-inch effluent and 18-inch effluent concentrations). The specific null hypothesis (H_o) and alternative hypothesis (H_a) evaluated were:

- H_o: Effluent pollutant concentrations from the 12-inch cell are equal to the effluent concentrations from the 18-inch cell
- H_a: Effluent concentrations from the 12-inch cell are less or greater than effluent concentrations from the 18-inch cell

The two-sample t-test was used to test the difference between dissolved copper effluent concentrations. The Mann-Whitney test was used for the TSS, dissolved zinc, and TP effluent concentrations. Although the 18-inch effluent dissolved zinc and 12-inch effluent TP effluent concentration datasets were normally distributed, the 12-inch dissolved zinc and 18-inch TP effluent concentration datasets were not; since one data set is not normally distributed, the Mann-Whitney test was used for the analysis. Results from the statistical analysis indicate a statistically significant difference existed between effluent concentrations for TP, which indicates that the 18-inch cell leaches higher concentrations of nutrients than the 12-inch cell. However, the effluent concentrations are statistically insignificant for dissolved copper, dissolved zinc and TSS. The results of the statistical analysis are summarized in Table 6.2.

Table 6.2 Summary of Influent and Effluent Concentrations Statistical Comparison

Pollutant	Normally Distributed?		Statistical Method	Statistically Significant Difference?	P Value (>0.05 No Difference)
	12-inch	18-inch			
TSS	No	No	Mann-Whitney Test	No	0.663
Dissolved Copper	Yes	Yes	Two Sample T-Test	No	0.985
Dissolved Zinc	No	Yes	Mann-Whitney Test	No	0.645
TP	Yes	No	Mann-Whitney Test	Yes	0.007

6.1.3 Pollutant Removal Efficiency

The bioretention cell pollutant removal efficiency was calculated for TSS, dissolved copper, dissolved zinc, and TP for each storm event in which the parameter was tested using Equation 1. The concentrations of parameters tested represent a flow-weighted average concentration from the composite samples collected during the storm event (see Table 4.1). If any non-detect results were reported from analytical testing of the effluent concentration, the reporting limit for the respective pollutant was used in the calculation. The pollutant removal efficiencies calculated are summarized in the storm report for each storm sampled (Appendix B) as well as in Appendix D.2 for comparison to TAPE treatment performance goals. Table 6.3 provides the average pollutant removal efficiencies for each storm event. *Additional discussion of the results for TSS, dissolved copper, dissolved zinc and TP is included Section 6.2.*

$$\text{Average Removal Efficiency} = 100 \times \frac{C_{in} - C_{eff}}{C_{in}} \qquad \text{Equation 1}$$

Where:

C_{in} = flow-weighted average influent concentration (mg/L)
C_{eff} = flow-weighted average effluent concentration (mg/L)

Using Equation 1, approximately equivalent removal of TSS and dissolved zinc was observed for the 12-inch and 18-inch bioretention cells, despite the difference in depth of BSM. An increase in dissolved copper and TP effluent concentrations were observed for the 12-inch and 18-inch bioretention cells. The increase in TP and dissolved copper in the effluents supports existing research that suggests the BSM is leaching nutrients and forms of dissolved copper with a low toxicity which do not affect salmon survival (Ecology, 2013; Ecology, 2016). Additionally, copper concentrations measured in the BSM approximately 5 years after installation in the cells (see Appendix A.2) indicate that the BSM is not retaining copper. The BSM is retaining zinc, which is consistent with the water quality results of the study. The percent removal efficiencies observed during this study suggest that an 18-inch depth of BSM leaches higher amounts of nutrients as well as dissolved copper compared to a 12-inch depth of BSM.

The removal efficiencies for screening parameters (TPH, Orthophosphate, Hardness, pH, and Particle Size Distribution (PSD)) were also analyzed using Equation 1. TAPE requires analytical testing of these parameters (minimum of three samples) to further assess the BMP treatment performance. These parameters were included to determine whether restrictions may be required for locating the BMP (e.g., if phosphorus is being exported, the BMP could not discharge to a nutrient sensitive water body) and to understand the stormwater chemistry (e.g., parameter behavior changes with pH and hardness can influence the toxicity of dissolved metals). PSD is included to determine whether the influent to the treatment system is representative of Pacific Northwest stormwater and to determine the particle size that is reduced in the effluent (Ecology, 2011). PSD samples were taken throughout the study; however, the lab initially selected to analyze PSD for the study was not able to perform the test needed and informed the research team in October 2019 after many samples had been submitted throughout the previous year. A new lab was located in early 2020 after contacting most of the water quality labs in the state. Four samples were collected between 2020 and 2021 and analyzed for PSD. Two of the four samples were qualifying or potentially qualifying sample events. Samples were collected from an additional qualifying event in January 2021 and were lost in the mail and are not included in the analysis. Table 6.4 includes a summary of average screening parameter removal efficiencies and average influent and effluent concentrations. The concentrations for each storm can be found in Appendices A and B.

Increases in concentration of orthophosphate were observed in the 12-inch effluent and 18-inch effluent, -659.8% and -1115.3% respectively. These results support the relationship shown in research that the media is leaching nutrients. There was a slight decrease in pH, where the influent pH was slightly greater than 7.0 and the effluents pH values were between 6.5 and 6.6 on average. The increase in the 12-inch effluent and 18-inch effluent hardness concentrations (-377.6% and -450.4%) suggests the media leaches calcium and/or magnesium. TPH pollutant removal was not calculated as all of the laboratory results except one were non-detect. For PSD, reductions were observed for all particle sizes (>250µm, 250-62.5µm, <62.5µm). This suggests that the bioretention media is effective at trapping larger particle sizes (>62.5µm) as well as fine particles sizes (<62.5µm).

Table 6.3. Pollutant Removal Summary of 12-inch Effluent by Storm Event

Storm Event	TSS Reduction		Dissolved Copper Reduction		Dissolved Zinc Reduction		TP Reduction	
	12-Inch Cell	18-Inch Cell	12-Inch Cell	18-Inch Cell	12-Inch Cell	18-Inch Cell	12-Inch Cell	18-Inch Cell
12/16/2018	44.4%	22.2%	48.4%	54.3%	54.7%	61.1%	-196.6%	-228.8%
7/24/2019	84.6%	56.4%	10.1%	23.8%	75.9%	66.8%	-165.3%	-283.2%
9/28/2019	N/A	26.5%	N/A	-252.6%	N/A	69.8%	N/A	-700.2%
12/19/2019	64.3%	57.1%	53.5%	40.9%	67.4%	69.8%	-115.3%	-161.1%
1/28/2020	68.2%	86.4%	-79.6%	-125.2%	8.3%	0.0%	-391.4%	-800.0%
2/23/2020	97.0%	98.3%	-12.8%	16.8%	-0.5%	29.9%	-86.3%	-149.0%
5/6/2020	88.0%	94.0%	5.6%	NR	45.4%	31.8%	-41.1%	-106.4%
5/20/2020	N/A							
5/31/2020	90.0%	96.7%	-189.1%	-263.0%	-76.5%	49.1%	N/A	N/A
9/25/2020	N/A	N/A	40.1%	73.5%	92.6%	92.7%	9.2%	-57.4%
10/10/2020	63.3%	66.7%	-32.6%	-14.7%	53.3%	30.1%	-64.9%	-148.3%
11/5/2020	77.8%	83.3%	-34.8%	-16.4%	47.1%	45.7%	61.3%	-220.0%
11/18/2020	57.1%	NR	-2.1%	1.2%	67.9%	64.8%	N/A	N/A
12/22/2020	63.2%	50.0%	-241.7%	-416.1%	18.7%	-7.9%	-576.1%	-749.5%
1/2/2021	70.8%	76.9%	N/A	N/A	N/A	N/A	N/A	N/A
1/4/2021	89.2%	93.2%	-218.5%	-337.1%	58.5%	-114.8%	-905.6%	-1441.7%
1/12/2021	84.4%	87.1%	N/A	N/A	N/A	N/A	91.2%	87.8%
Average:	74.5%	71.1%	-50.3%	-93.4%	39.5%	34.9%	-198.4%	-381.4%

N/A: Parameter was not tested for the storm event.
NR: Data not reported as part of pollutant removal summary due to QA or laboratory issue.
Note: No required parameter samples were collected for the 5/20/2020 event.

Table 6.4 Summary of Screening Parameter Pollutant Removal Results

Screening Parameters	Average 12-inch Effluent Removal Efficiency	Average 18-inch Effluent Removal Efficiency	Average Influent Concentration (mg/L)	Average 12-inch Effluent Concentration (mg/L)	Average 18-inch Effluent Concentration (mg/)
PSD, >250 µm[1]	79.3%	78.7%	8.34	1.73	1.78
PSD, 250 - 62.5 µm[1]	90.6%	90.1%	29.88	2.80	2.96
PSD, <62.5 µm[1]	80.5%	86.9%	40.95	8.01	5.36
Orthophosphate	-659.8%	-1115.3%	0.05	0.33	0.53
Hardness	-377.6%	-450.4	35.15	129.11	146.93
pH[2]	6.4%	6.7%	7.07	6.58	6.56

[1] Represents four sample events, including two non-qualifying events.
[2] One non-qualifying event is included in the pH removal efficiency calculation.

6.2 Comparison of Results to TAPE Treatment Performance Goals

Objective 2: Determine whether treatment performance goals were achieved for basic (TSS) and dissolved metals (copper and zinc) by comparing study results to TAPE treatment goals.

Succinct Objective Summary: Whether TAPE treatment performance goals were met by the 12-inch cell and 18-inch cell was assessed using the bootstrap statistical method. The 12-inch cell and 18-inch cell met TAPE treatment performance goals for TSS but did not meet treatment performance goals for dissolved copper and zinc. The treatment performance goal for oils was not assessed due to the number of non-detect results received during the study.

Per TAPE, the pollutant removal efficiencies for dissolved copper and zinc were compared to the Ecology treatment performance goals for Dissolved Metals. The treatment performance goals for Dissolved Metals are a 30% reduction for dissolved copper and a 60% reduction for dissolved zinc. For TSS, effluent concentrations were compared to Ecology treatment performance goals for Basic Treatment, as 15 of the 17 TSS influent samples were below the 100 mg/L concentration range in Table 6.5. The treatment goal for samples below this influent concentration is a TSS effluent concentration less than 20 mg/L. Whether the treatment goals are met is evaluated using the bootstrap method to determine the one-tailed upper 95% confidence interval for mean effluent concentrations (for TSS) and the one-tailed lower 95% confidence interval around the mean pollutant removal efficiency (for dissolved copper and dissolved zinc). Results of the bootstrap method compared to TAPE treatment performance goals are displayed in Table 6.5. The treatment performance goal for oils was not assessed due to the number of non-detect results received during the study.

Table 6.5 Ecology Treatment Performance Goals

Performance Goal	Pollutant	Influent Concentration Range	Treatment Performance Criteria	12-inch Cell Water Quality Results	18-inch Cell Water Quality Results	Treatment Performance Goal Achieved
Basic Treatment	Total Suspended Solids (TSS)	20-100 mg/L	Effluent <20 mg/L	11.01 mg/L	18.82 mg/L	Yes
Dissolved Metals Treatment	Dissolved Copper (Cu)	5.0-20.0 mg/L	30% Reduction	-100.3%	-167.5%	No
	Dissolved Zinc (Zn)	20-300 mg/L	60% Reduction	24.1%[1]	10.6%[1]	No
Oil Treatment	NWTPH-Dx (TPH), visible sheen	Total petroleum hydrocarbons (TPH) > 10 mg/L	1) No ongoing or recurring visible sheen in effluent 2) Daily average effluent conc. < 10 mg/L 3) Max. effluent conc. of 15mg/L for a discrete sample	N/A[2]	N/A[2]	N/A

[1] When the bootstrap analysis was adjusted to exclude statistical outliers from the dataset, the removal efficiencies were 40.0% and 33.6% for the 12-inch and 18-inch cells respectively.

[2] All concentrations except one were not detectable. The value that was detected was an influent concentration of 0.52 mg/L, which is less than minimum influent value, 10 mg/L. As such, oils were not analyzed for the Bootstrap Method.

From the bootstrap analysis, both bioretention cells appear to be removing TSS to required concentrations. However, removal of dissolved copper and zinc for the 12- and 18-inch ponds did not meet the TAPE treatment performance goals. Results of the bootstrap analysis further suggest dissolved copper may be leaching from the bioretention media, as previously discussed in Section 6.1.3. While the leaching was only observed for sample events with influent concentrations below the lower limit, removal of copper was observed for other events with influent concentrations below the lower limit. Moreover, the range of removal efficiencies for sample events with an influent concentration above the lower limit was 5.64% to 100%. The low end of the range suggests that if there were a higher number of sample events with an influent concentration above the lower influent limit, results indicating leaching of dissolved copper may have been observed for those storm events. Further research is needed to better understand why the increase in dissolved copper in the effluent is occurring.

Results of the bootstrap analysis for dissolved zinc indicated that at the lower 95% confidence interval, removal was occurring for both media depths, albeit at a lower removal efficiency than the TAPE treatment performance goal. The dataset reflected in the result in Table 6.5 included two data points which indicated leaching of zinc was occurring for the 12-inch cell during the event on 5/31/2020 and the 18-inch cells during the event on 1/4/2021. These datapoints are not associated with laboratory QA/QC issues or other known issues which would have occurred during the storm event or sampling, aside from influent concentrations being significantly lower than the lower influent limit for dissolved zinc. If the two data points are not included in the bootstrap analysis, the removal efficiencies for the 12-inch and 18-inch cells become 40.0% and 33.6%. Statistical outliers were not observed in the dissolved copper dataset.

Additional graphs of the parameters were created to evaluate the treatment performance including box plots which show the spread and distribution of the data for both the influent, 12-inch effluent and 18-inch effluent (Figures 6-1 through 6-4). The effluent concentration divided by the influent concentration was also graphed to evaluate how the treatment performance changed over time (Figures 6-5 through 6-8). No consistent patterns in treatment performance were observed over time for the parameters observed.

Results from this study were compared to other studies conducted in western Washington (WWA). While the total phosphorus and copper leaching have been documented in WWA studies, the copper leaching continued throughout the entire study (compared to just the months after installation in WWA). In addition, the dissolved zinc concentrations did not achieve the TAPE performance goal which it has been documented to exceed in WWA studies (Ecology, 2016). Since this is the first known bioretention field study in EWA using the 60:40 media, it is not possible to determine if the results from this study are typical for EWA or if they are an anomaly. However, considering the climate conditions differ between the two sides of the state and that cold climate conditions are know to influence the treatment and infiltration performance of BMPs, more field studies are needed to assess if the difference in climate conditions is influencing the results.

The Koppen-Geiger climate classification scheme defines cold climate conditions as temperatures less than or equal to -3° Celsius. Cold climate conditions may also feature characteristics including frozen soils, deep frost lines, repetitive freeze-thaw cycles, short growing seasons, a significant volume of snowmelt, and reduced dissolved oxygen under ice

cover (Kottek, Grieser, Beck, Rudolf, & Rubel). Cold climate conditions are expected to affect treatment performance as plant life is dormant during the winter months and may be less effective at providing treatment mechanisms (Ecology, 2019). TSS influent concentrations are expected to increase during winter months due to the use of sand for road maintenance, but because TSS removal is based on mechanical filtration rather than temperature, removal rates are not expected to be affected by cold climate conditions. However, to what extent cold climate conditions affect dissolved metals is not well understood, particularly when deicer is involved.

One study, which evaluated the impact of a deicer replicate on dissolved metal removal using bioretention cells, found that the salt and aggregate mixture did not affect the soil's ability to remove contaminants or increase heavy metal mobility (Denich, Bradford, & Drake, 2013). However, other studies have indicated that an increase in salt has the potential to affect metal removal in bioretention. A study that focused on sodium loading from application of deicer found that a loss of zinc occurred from the media, which suggests that the media has the potential to release previously trapped pollutants when salt enters the cell (Kakuturu & Clark, 2012). Another study found that salt from winter maintenance can impact soil bacteria which can impact metal mobility (Ledin, 2000). More field research studies, specifically in EWA, are needed to understand how bioretention performs in cold climate conditions.

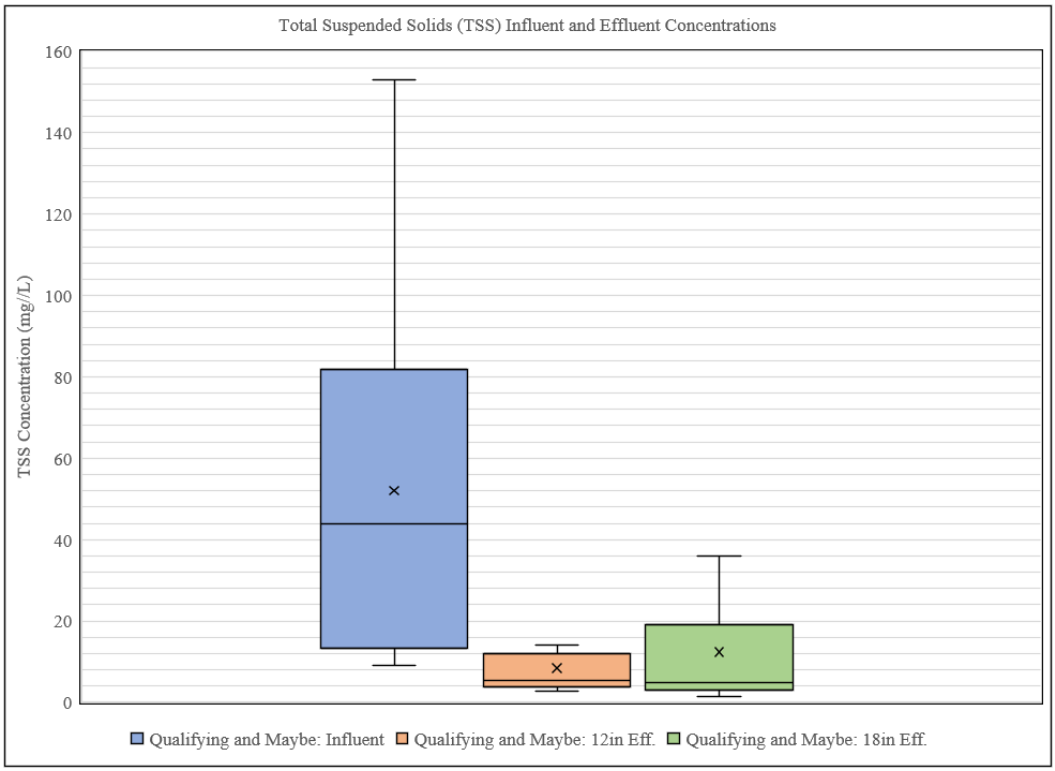

Figure 6-1 TSS box plot for all qualifying and potentially qualifying sample events

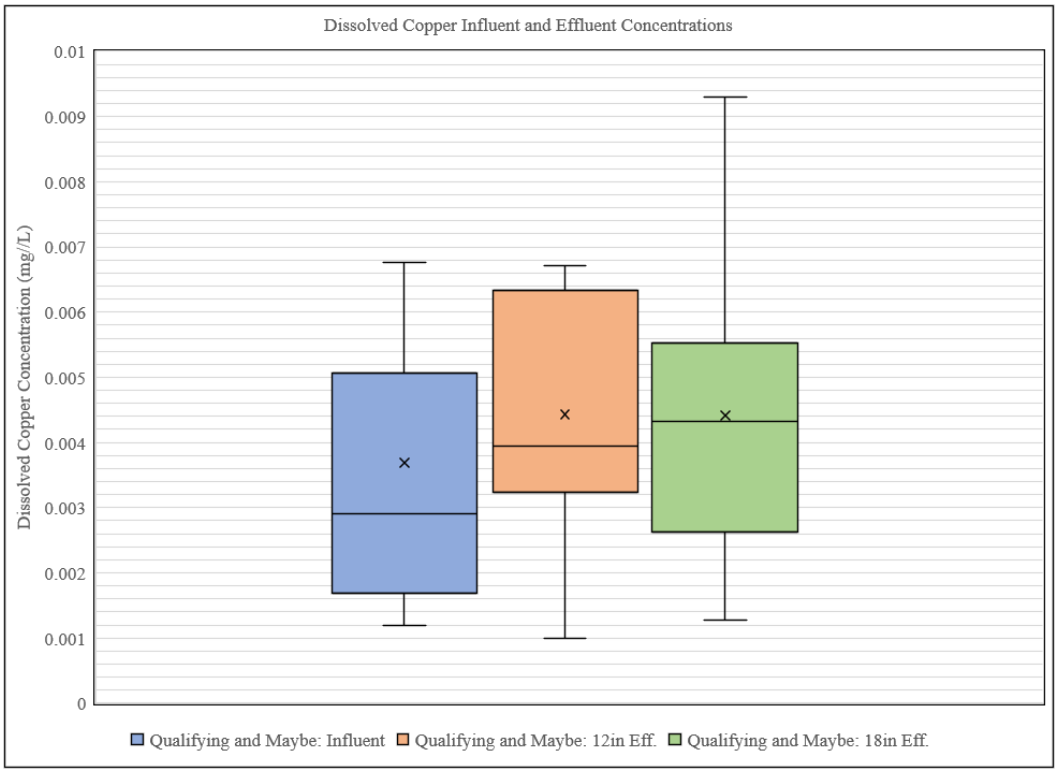

Figure 6-2 Dissolved copper box plot for all qualifying and potentially qualifying sample events

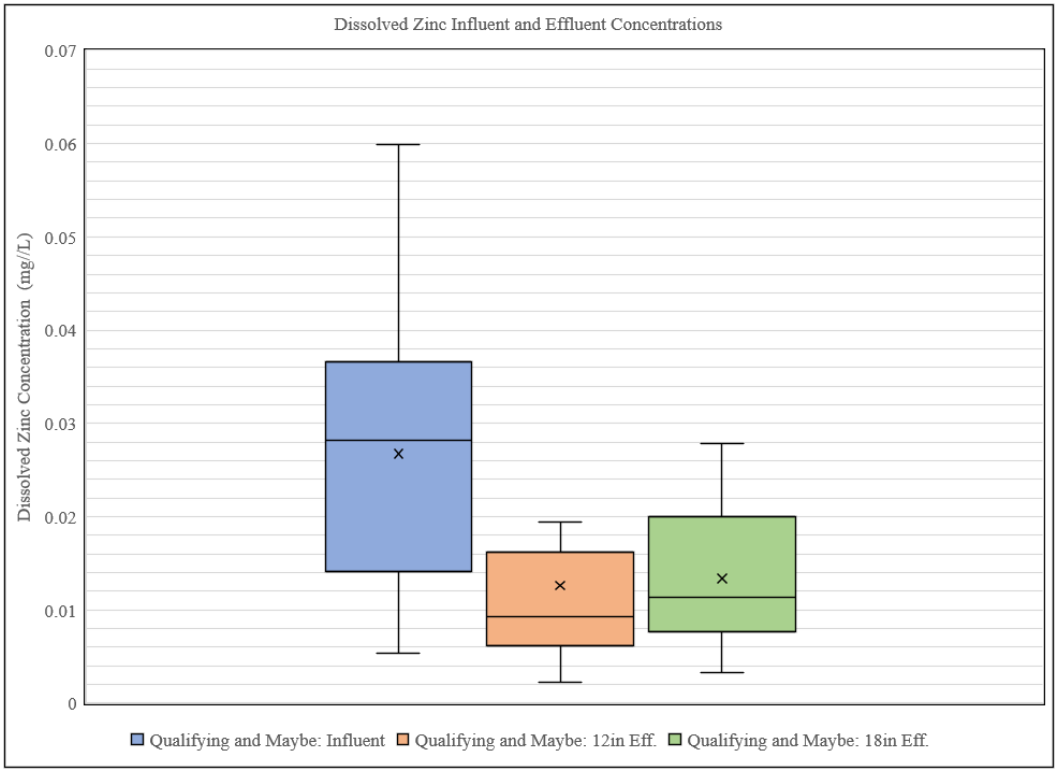

Figure 6-3 Dissolved zinc box plot for all qualifying and potentially qualifying sample events

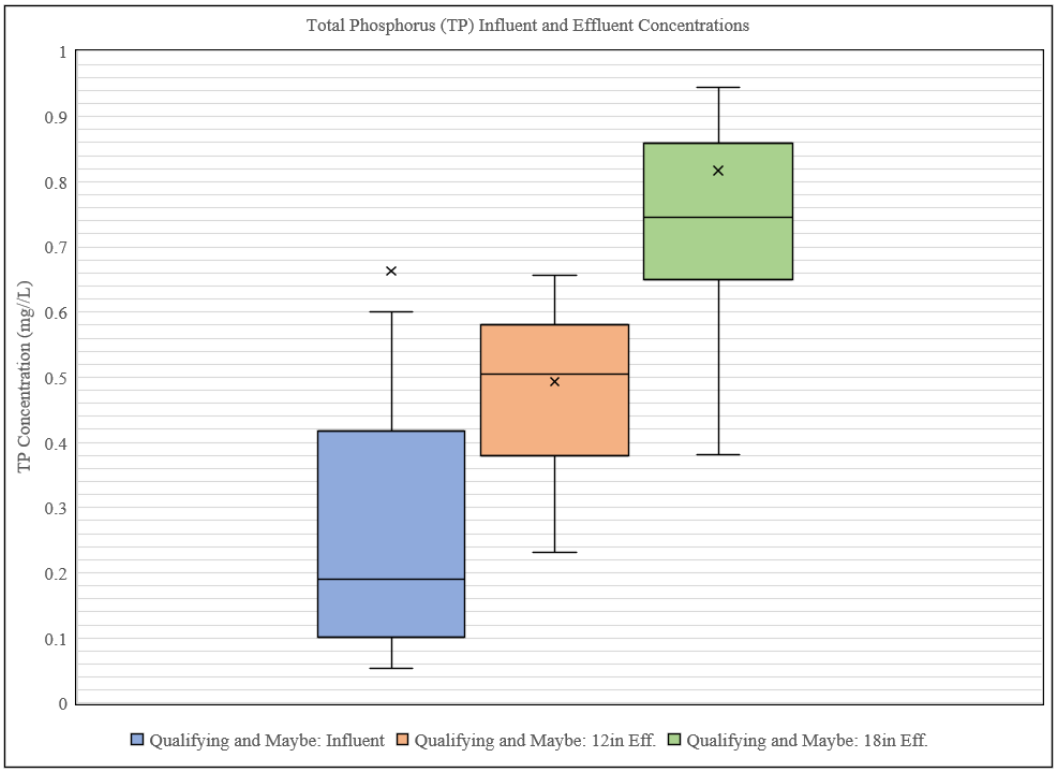

Figure 6-4 Total phosphorus box plot for all qualifying and potentially qualifying sample events

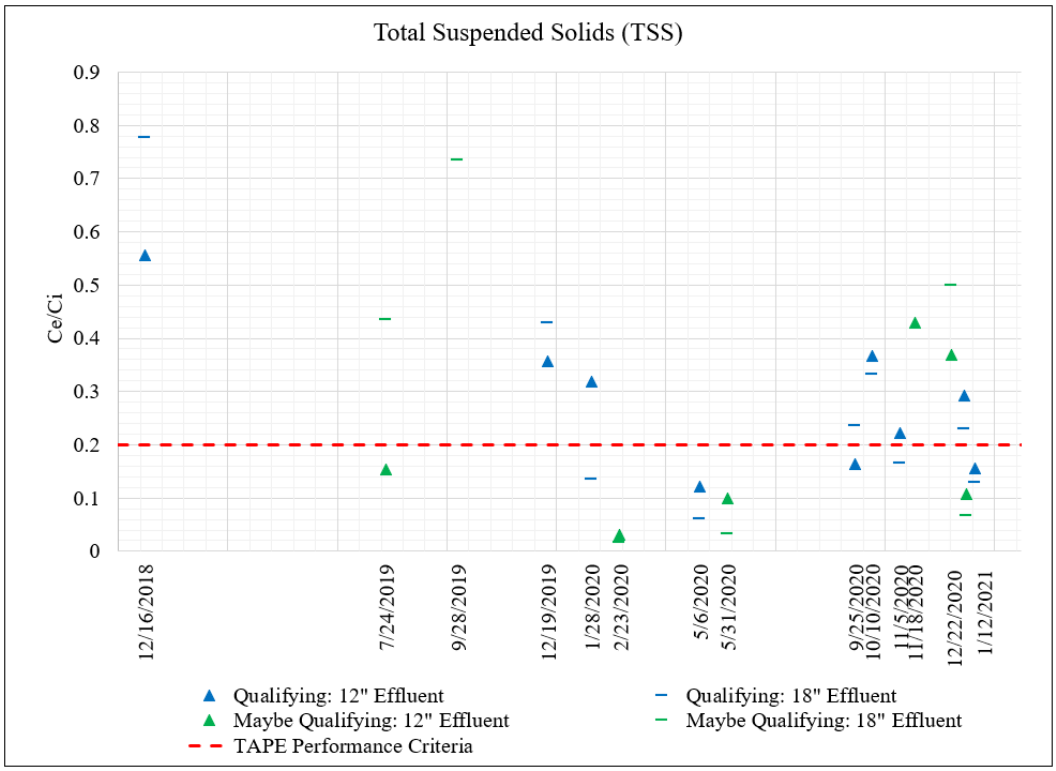

Figure 6-5 TSS effluent/influent concentrations over testing period

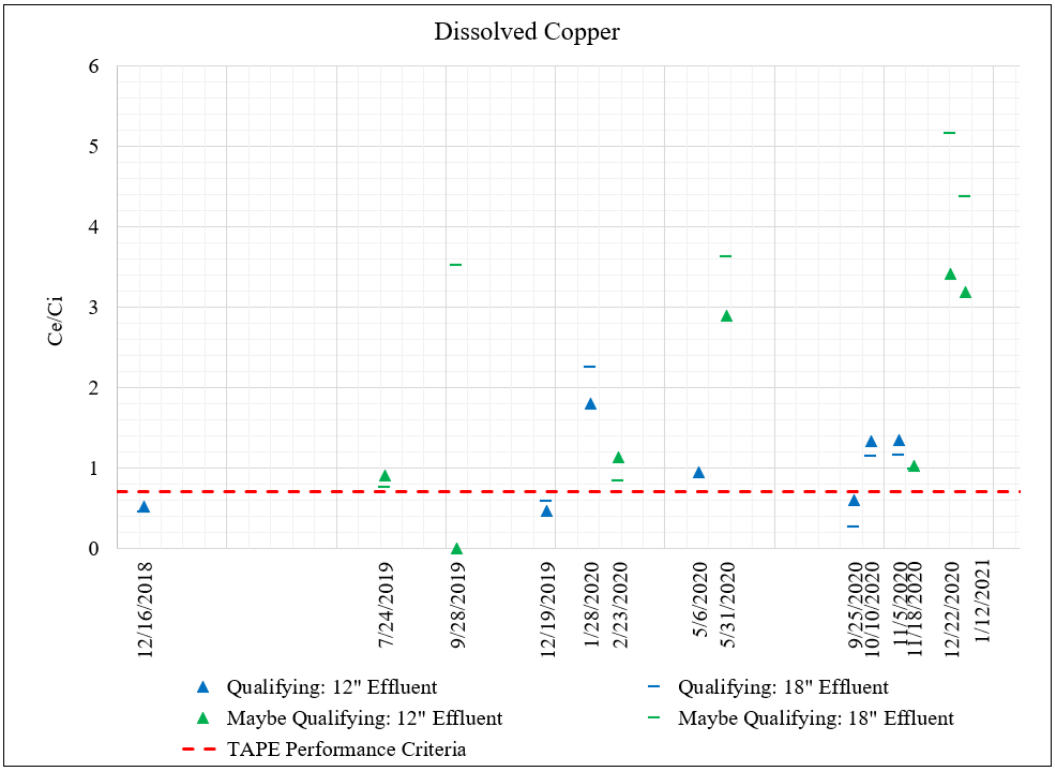

Figure 6-6 Dissolved copper effluent/influent concentrations over testing period

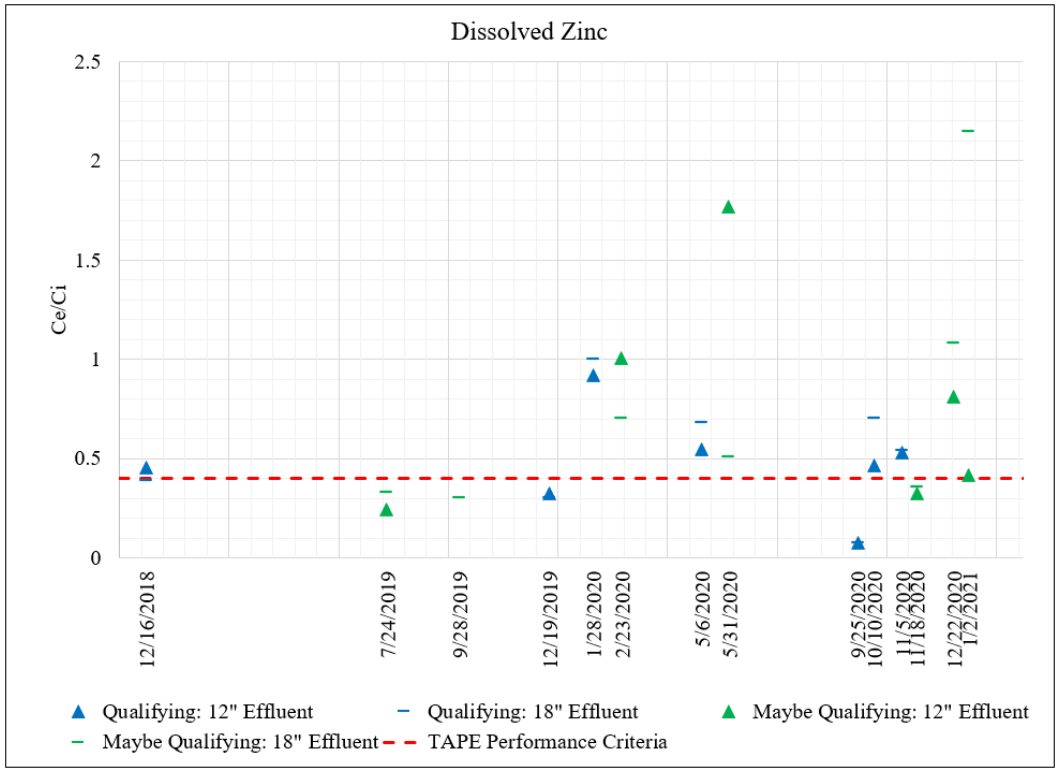

Figure 6-7 Dissolved zinc effluent/influent concentrations over testing period

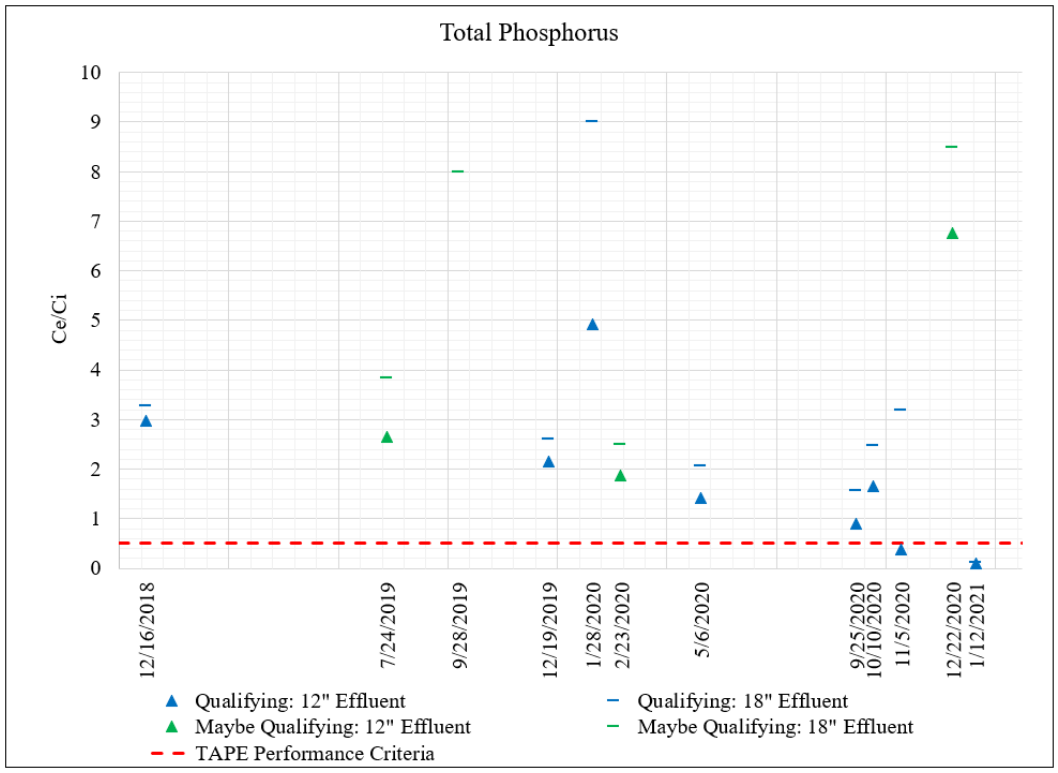

Figure 6-8 Total phosphorus effluent/influent concentrations over testing period

6.3 Infiltration Performance

Objective 3: Determine the change in the infiltration rate and saturated hydraulic conductivity of each cell over the duration of the study.

Succinct Objective Summary: Changes in the infiltration rate and saturated hydraulic conductivity of each cell was measured by examining effluent flow rates and performing modified falling head tests, respectively. Saturated hydraulic conductivity decreased for both cells (60% for the 12-inch cell and 78% for the 18-inch cell) from 2014 to 2019. Results from the infiltration testing indicate that the rate appeared to slightly increase from 2018 to 2020. These results may be due to the freeze thaw cycle which has been reported to increase infiltration rates over time. However, infiltration rate data was only collected following the installation of the monitoring equipment in 2017, missing the initial years after the BSM was installed and when infiltration rates are reportedly highest. It is possible that if a similar number of storm events were collected prior to the installation of the equipment as were collected after installation, the trend in infiltration rate would show a decline over the lifespan of the bioretention cells.

Infiltration and saturated hydraulic conductivity (Ksat) performance of the two bioretention cells was assessed by examining the effluent flow rates and running falling head tests, respectively, over the duration of this study as described in Section 14 of the study QAPP. The effluent flow rates examined were calculated from data logger information recorded during qualifying or potentially qualifying storm events. The falling head test method involved measuring the change in ponded depth above the top of the cell, compared to the time interval that the change occurs. The following paragraphs describe the methods used in detail as well as the results of the analysis.

Falling head tests were conducted in fall of 2014, shortly after the media was installed, and again in the fall of 2019 by senior design students at Gonzaga University. Falling head tests were conducted by directing flow from a fire hydrant to the two cells to pond for an amount of time to allow the media to become saturated. Once the media was saturated, water was added as needed to reach 6 inches of ponded depth, and rate of fall was measured for each cell in intervals until the rate of fall stabilized (less than a 5% difference between three-time intervals). Saturated hydraulic conductivity was measured using the following equation:

$$K_{sat} = \frac{A_1}{A_2} \times \frac{L}{\Delta Time} ln \frac{H_1}{H_2}$$

Where:

H_1 = initial ponded water depth above the top of the cell (inches)
H_2 = final ponded water depth above the top of the cell for time interval (inches)
ΔTime = time interval for water to fall from H_2 to H_1 (seconds)
L = depth of BSM (inches)
A_1 = cell surface area at H1 (sqft)
A_2 = cell surface area at H2 (sqft)

The saturated hydraulic conductivity calculated for the falling head tests are reported in Table 6-6 and shown in Figure 6-9. As shown in Figure 6-9, the Ksat declined in both cells from the approximate time of installation (in 2014) to fall 2019, during the study. This decline is expected

as sediment in runoff enters the bioretention cells and increases the amount of finer material near the surface of the BSM that clog the pore spaces of the media reducing the permeability of the media.

Table 6.-6 Summary of Saturated Hydraulic Conductivity at Site

Year	2014	2019	Percent Difference
12-inch Cell	14.1	5.7	60%
18-inch Cell	28.5	6.3	78%

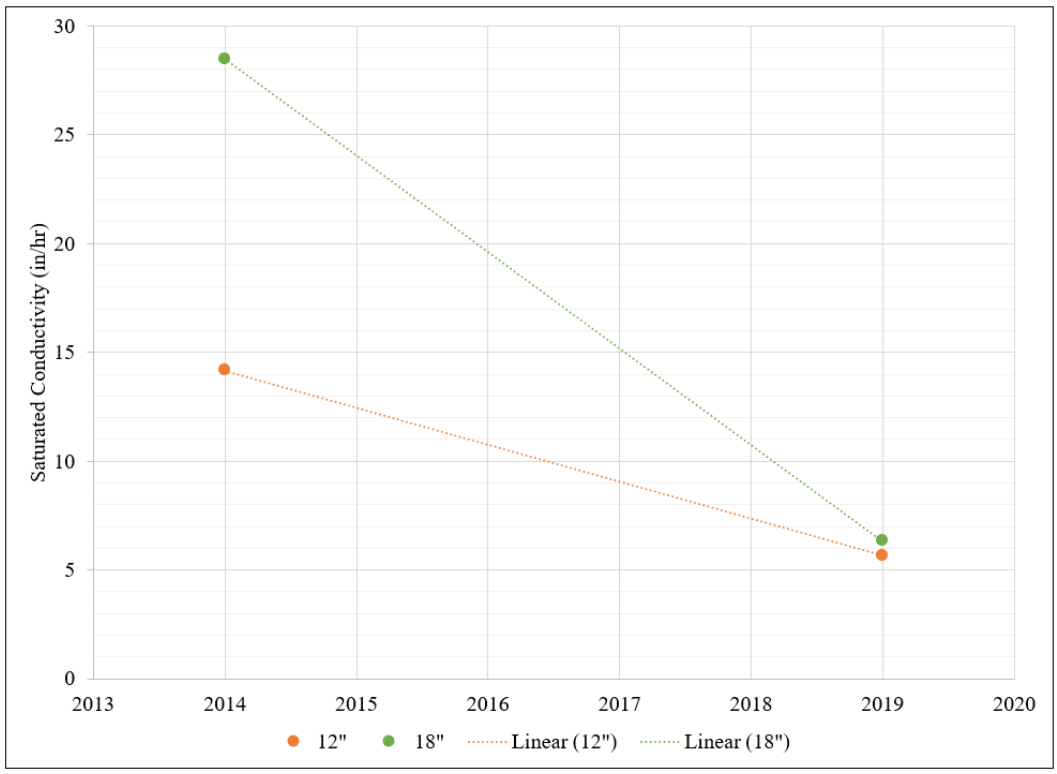

Figure 6-9 Saturated Hydraulic Conductivity at Site

Effluent flow rates were used to calculate infiltration following larger precipitation depth events for qualifying or potentially qualifying storm events. Specifically, storms above 0.15 inches of precipitation were selected for the calculation because they are more likely to have saturated soils. For each storm, the effluent flow rate was calculated for each 5-minute time interval and compared to the adjacent time intervals. Effluent flow rates were filtered until only flow rates with less than a 5% difference between three-time intervals remained. Infiltration was then calculated using the following formula:

$$Infiltration = \frac{Q_{out}}{A_{average}}$$

Where:

Q_{out} = average effluent flow rate recorded by the data logger over the duration of the test: from initial ponded depth to when water has completely infiltrated into the BSM or 0-inches of ponded water (cft/hr)

$A_{average}$= bioretention cell average surface area: average of surface area at initial ponded depth and surface area at 0-inches of ponded water (sqft)

The infiltration calculated for the storm events are reported in Table 6-7 and Figure 6-10. As shown in Figure 6-10, there appeared to be a slight increase in infiltration rate over the duration of the study. It was hypothesized that the increase may be due to freeze thaw cycles impacting the infiltration rate. However, research studies have found mixed results on the effect of freeze thaw cycles on infiltration, with some studies indicating freeze thaw cycles increase infiltration (Ding, Rezanezhad, Gharedaghloo, Van Cappellen, & Passeport, 2018) while other studies indicate freeze thaw cycles decrease infiltration (Baratta, 2013; Zaqout & Andradóttir, 2021). If the increase measured at the site is not real, it is potentially due to the timing of the data collected. The bioretention cells were installed in 2014 and automated equipment used to measure the infiltration rate was not installed until 2017 as such no infiltration testing (using the effluent flow rate) was conducted until four years after the BSM was installed at the site potentially missing the higher infiltration rates that are reported by other researchers in the initial years after BSM is installed. It is possible that if a similar number of storm events were collected prior to the installation of the equipment as were collected after the equipment installation, the trend in infiltration rate would show a decline over the lifespan of the bioretention cells.

Table 6-7 Summary of Infiltration at Site

Date	12-inch Cell	18-inch Cell
12/16/2018	1.13	0.99
1/17/2019	1.67	1.35
9/28/2019	1.67	2.21
12/19/2019	3.08	-[1]
1/28/2020	5.85	1.30
5/20/2020	3.18	2.94
10/10/2020	5.33	3.44
11/5/2020	3.18	2.78
1/12/2021	3.61	2.35

[1] After filtering the data, there were no time intervals with flow rates with less than a 5% difference between three adjacent time intervals.

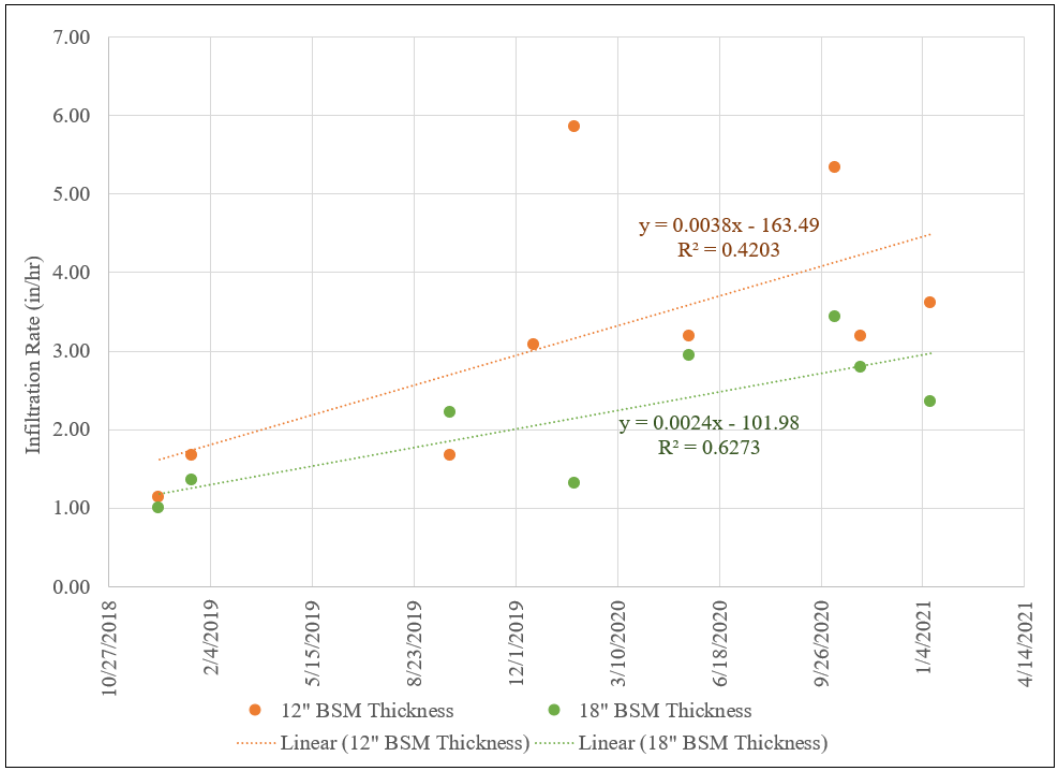

Figure 6-10 Infiltration at Site During Study

7.0 Future Action Recommendations

Based upon the results, the following topics should be studied further to better understand the performance of the bioretention media in EWA:

- Per Section 5.2.1 the influent concentration of some samples for some parameters were below the lower concentration limit as described in the TAPE Guidance Manual. A similar pattern was observed when reviewing concentrations at other sites within the City of Spokane and Spokane County. Additional outfall data should be collected from EWA sites to assess if there is a similar pattern and if so, identify influent concentration ranges for each pollutant that are more representative of the pollutants expected at moderate use site in this area.
- Per Section 6.2, differences in reported treatment performance of the media between WWA and EWA were observed. Research regarding cold climate conditions is recommended to determine how winter conditions and maintenance practices influence infiltration and treatment performance.
- Research into reducing leaching of nutrients by BSM would be beneficial to prevent an increase in pollutant concentrations to receiving waters. Specifically, TP can be found at high concentration levels in the Spokane River as such having a BSM that does not leach nutrients would be beneficial to improving the river water quality.
- The treatment and infiltration performance of non-vegetated bioretention should be evaluated to determine if vegetation can be removed from the BMP and still achieve the TAPE treatment goals. EWA is a semi-arid climate with hot and dry summers which requires irrigation to keep the vegetation alive between storm events. The cost to construct and operate an irrigation system adds to the overall life cycle cost of stormwater BMPs and consumes water that could have a higher beneficial use.
- While not previously mentioned in this report, rainfall patterns in EWA, coupled with the TAPE requirements for qualifying events, reduce the number of potentially qualifying storm events. Specifically, the series of storm events contained in the long duration hyetograph for EWA (Ecology, 2019; WSDOT, 2019) reduced the number of potential qualifying storm events as the portion of rainfall from the antecedent precipitation is not always enough for a qualifying storm event. Additionally, the duration between the antecedent precipitation and remaining storm event is not always long enough to count as a dry period between events, resulting in difficultly predicting whether one or two storms will need to be sampled in a given day or making the entire rainfall event non-qualifying. Ecology should re-evaluate these conditions and consider if the time between events could be extended to accommodate these EWA rainfall patterns which would increase the number of rainfall events that are considered qualifying based on TAPE.
- Because of the challenges with finding laboratories to analyze PSD samples (see Section 6.1.3), it is recommended that research be conducted to assess if there are other standard testing methods that could be used to analyze PSD in stormwater samples so more labs are able to run the analysis.

8.0 Conclusions

The purpose of this study was to develop a modified bioretention BMP which uses a 12-inch depth of BSM instead of the Ecology-required 18-inch depth. Effectiveness was based upon a comparison of treatment performance between an 18-inch bioretention cell and 12-inch bioretention cell. The purpose of this study was achieved by meeting the objectives outlined in the QAPP, the results of which are summarized in the following paragraphs.

Objective 1: Determine the pollutant removal efficiency of the BSM mix at a depth of 18-inches compared to 12-inches.

The TSS pollutant removal efficiency by the 12-inch and 18-inch cells were similar with average reductions of 74.5% and 71.1%, respectively. Average removal efficiency of dissolved zinc was also comparable between the two cells, with the 12-inch cell achieving 39.5% (49.1% if statistical outlier excluded) and the 18-inch cell achieving 34.9% (46.44% if statistical outlier excluded). Dissolved copper appeared to leach from the media for both the 12-inch and 18-inch cell primarily when there were low influent concentrations (below the TAPE lower limit), however leaching was also observed for sample events with influent concentrations within the TAPE influent limits for dissolved copper. The removal efficiency of dissolved copper through the 12-inch and 18-inch cells was -50.3%, and -93.4%, respectively. Moreover, measurements of the BSM approximately five years after installation in both cells indicated that copper was not being retained in the BSM, which supports the removal efficiencies observed during the study (zinc was retained in the BSM, supporting removal efficiencies reported in this study). The leaching of dissolved copper measured during the study is consistent with findings from previous studies that indicate dissolved copper can leach from the BSM however Ecology has reported that toxicity testing of the effluent after infiltrating through the BSM is not negatively affecting salmon survival. Nutrient leaching from the BSM has also been reported in the previous research, which was observed during this study. On average, there was an approximate 200% increase in TP in the 12-inch cell effluent, and a nearly 400% increase in TP in the 18-inch cell effluent. The BSM removal efficiency of oils was not assessed because as only one storm events resulted in a detectable amount of NWTPH-Dx.

A statistical analysis was also conducted to compare the effluent concentrations from the 12-inch and 18-inch cells. TSS, dissolved copper, dissolved zinc, and TP concentrations were compared to determine whether there was a statistically significant difference between the 12-inch and 18-inch effluents. A statistically significant difference was only found for TP concentrations, with higher concentrations in the 18-inch effluent. There was no statistically significant difference between the TSS, dissolved copper, and dissolved zinc effluent concentrations. These results suggest that the treatment performance between the two different BSM depths was insignificant for TSS and dissolved metals.

Objective 2: Determine whether the treatment performance goals were achieved for basic (TSS) and dissolved metals (copper and zinc) by comparing study results to TAPE treatment goals.

Treatment performance of the bioretention cells was assessed using the bootstrap method, as required by TAPE, and comparing the results of the method to the TAPE treatment goals. Both the 12-inch and 18-inch cells met TAPE treatment performance goals for basic (TSS) treatment.

Neither cell met dissolved metals treatment goals, and dissolved copper leached from the BSM during the study. It is possible that the low influent concentrations (below the TAPE lower limit for influent concentrations) may have impacted the removal efficiency results. However, the cells were installed at a moderate use site which triggers metals treatment per the SWMMEW, and concentrations are expected to reflect what is typical for that installation. It is important to note that the 60:40 BSM has been field tested in WWA extensively, however this study was the first known field study in EWA to analyze treatment performance of the 60:40 BSM using TAPE guidelines. While some results from this study are consistent with results from WWA studies, some results are not. More field testing is needed to understand whether the results presented in this study are because of cold climate conditions, or if the results are simply unique to the study location and test site. Oil treatment was not assessed as only one of the storm events resulted in a detectable amount of NWTPH-Dx.

Objective 3: Determine change in infiltration rate and saturated hydraulic conductivity of each cell over the duration of the study.

Changes in the infiltration rate and saturated hydraulic conductivity of each cell was measured by examining effluent flow rates and performing modified falling head tests, respectively. Saturated hydraulic conductivity decreased for both cells (60% for the 12-inch cell and 78% for the 18-inch cell) from 2014 to 2019. Results from the infiltration testing indicate that the rate appeared to slightly increase from 2018 to 2020. These results may be due to the freeze thaw cycle which has been reported to increase infiltration rates over time. However, infiltration rate data was only collected following the installation of the monitoring equipment in 2017, missing the initial years after the BSM was installed and when infiltration rates are reportedly highest. It is possible that if a similar number of storm events were collected prior to the installation of the equipment as were collected after installation, the trend in infiltration rate would show a decline over the lifespan of the bioretention cells.

Objective 4: Summarize the study results into a final report and submit the report to Ecology for approval of the modified BMP.

This report serves as the final report for the Bioretention Soil Media Thickness Study, which will be submitted to Ecology for approval of the modified BMP.

Future action recommendations were included that outlined additional research recommended based on the findings from this study. These included further analysis of influent concentrations in EWA, research of the effects of cold climate conditions on bioretention treatment and infiltration performance, development of bioretention technologies to reduce leaching or support non-vegetated cells, development of revised qualifying storm event guidelines that are better suited for EWA conditions, and research of other acceptable PSD laboratory analysis methods. In addition, while some results from this study were consistent with research conducted in WWA, some results were not. As this study was the first bioretention media in EWA to evaluate the treatment performance of a structural BMP using TAPE guidelines, more field testing is needed to understand whether the differences in the results are because of cold climate conditions, or if the results are simply unique to the study location and test site.

9.0 References

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10.0 Appendices

10.0 Appendices

Appendix A. Laboratory Analytical Reports

Appendix A.1 Water Quality Reports

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HDR, INC - SPOKANE
Address: 1401 E TRENT AVE, STE 101
SPOKANE, WA 99202
Attn: AIMEE NAVICKIS-BRASCH

Batch #: 181126028
Project Name: STORMWATER TREATMENT MONITORING

Analytical Results Report

Sample Number 181126028-001 **Sampling Date** 11/22/2018 **Date/Time Received** 11/26/2018 1:00 PM
Client Sample ID IN11222018 **Sampling Time** 7:00 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00650	mg/L	0.001	11/29/2018 4:03:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00321	mg/L	0.001	11/29/2018 3:50:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0385	mg/L	0.001	11/29/2018 3:50:00 PM	BAG	EPA 200.8	
Hardness	13	mg CaCO3/L	1	11/28/2018 12:00:00 PM	NDE	EPA 130.2	
TSS	74.7	mg/L	1.33	11/29/2018 3:00:00 PM	BAS	SM 2540D	
Zinc	0.0649	mg/L	0.001	11/29/2018 4:03:00 PM	BAG	EPA 200.8	

Sample Number 181126028-002 **Sampling Date** 11/22/2018 **Date/Time Received** 11/26/2018 1:00 PM
Client Sample ID 1211222018 **Sampling Time** 7:00 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00531	mg/L	0.001	11/29/2018 4:07:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00434	mg/L	0.001	11/29/2018 3:53:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0406	mg/L	0.001	11/29/2018 3:53:00 PM	BAG	EPA 200.8	
Hardness	148	mg CaCO3/L	1	11/28/2018 12:00:00 PM	NDE	EPA 130.2	
TSS	31	mg/L	1	11/29/2018 3:00:00 PM	BAS	SM 2540D	
Zinc	0.0201	mg/L	0.001	11/29/2018 4:07:00 PM	BAG	EPA 200.8	

Sample Number 181126028-003 **Sampling Date** 11/22/2018 **Date/Time Received** 11/26/2018 1:00 PM
Client Sample ID 1811222018 **Sampling Time** 7:00 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00400	mg/L	0.001	11/29/2018 4:10:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00416	mg/L	0.001	11/29/2018 3:57:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0279	mg/L	0.001	11/29/2018 3:57:00 PM	BAG	EPA 200.8	
Hardness	183	mg CaCO3/L	1	11/28/2018 12:00:00 PM	NDE	EPA 130.2	
TSS	36	mg/L	1	11/29/2018 3:00:00 PM	BAS	SM 2540D	
Zinc	0.0213	mg/L	0.001	11/29/2018 4:10:00 PM	BAG	EPA 200.8	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	HDR, INC - SPOKANE	**Batch #:**	181126028
Address:	1401 E TRENT AVE, STE 101 SPOKANE, WA 99202	**Project Name:**	STORMWATER TREATMENT MONITORING
Attn:	AIMEE NAVICKIS-BRASCH		

Analytical Results Report

Sample Number	181126028-004	**Sampling Date**	11/22/2018	**Date/Time Received**	11/26/2018 1:00 PM
Client Sample ID	DISSOLVED METALS BLANK	**Sampling Time**		**Extraction Date**	
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Dissolved Copper	ND	mg/L	0.001	11/29/2018 4:00:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0531	mg/L	0.001	11/29/2018 4:00:00 PM	BAG	EPA 200.8	

Authorized Signature

Kathleen A. Sattler, Lab Manager

MCL	EPA's Maximum Contaminant Level
ND	Not Detected
PQL	Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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Login Report

Customer Name: HDR, INC - SPOKANE
1401 E TRENT AVE, STE 101
SPOKANE WA 99202

Order ID: 181126028
Order Date: 11/26/2018

Contact Name: AIMEE NAVICKIS-BRASCH
Comment:

Project Name: STORMWATER TREATMENT MONITORING

Sample #: 181126028-001 **Customer Sample #:** IN11222018

Recv'd: ☑ **Matrix:** Water **Collector:** AIMEE NAVICKIS-BRASC **Date Collected:** 11/22/2018
Quantity: 5 **Date Received:** 11/26/2018 1:00:00 PM **Time Collected:** 7:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/6/2018	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/6/2018	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***

Sample #: 181126028-002 **Customer Sample #:** 1211222018

Recv'd: ☑ **Matrix:** Water **Collector:** AIMEE NAVICKIS-BRASC **Date Collected:** 11/22/2018
Quantity: 5 **Date Received:** 11/26/2018 1:00:00 PM **Time Collected:** 7:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/6/2018	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/6/2018	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***

Customer Name: HDR, INC - SPOKANE
1401 E TRENT AVE, STE 101
SPOKANE WA 99202

Order ID: 181126028
Order Date: 11/26/2018

Contact Name: AIMEE NAVICKIS-BRASCH

Project Name: STORMWATER TREATMENT MONITORING

Comment:

Sample #: 181126028-003 **Customer Sample #:** 1811222018

Recv'd: ☑ **Matrix:** Water **Collector:** AIMEE NAVICKIS-BRASC **Date Collected:** 11/22/2018
Quantity: 5 **Date Received:** 11/26/2018 1:00:00 PM **Time Collected:** 7:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/6/2018	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/6/2018	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***

Sample #: 181126028-004 **Customer Sample #:** DISSOLVED METALS BLANK

Recv'd: ☑ **Matrix:** Water **Collector:** AIMEE NAVICKIS-BRASC **Date Collected:** 11/22/2018
Quantity: 1 **Date Received:** 11/26/2018 1:00:00 PM **Time Collected:**
Comment:

Test	Lab	Method	Due Date	Priority
DISSOLVED COPPER SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/6/2018	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	6.4
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Labels and chain agree?	Yes
Total number of containers?	16

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

31126 028 **HDRS** Last Due **12/6/2018**
1st SAMP 11/22/201 1st RCVD 11/26/2018
STORMWATER TREATMENT MONITORING

Company Name:	HDR, Inc	Project Manager:	Aimee Navicks-Brasch
Address:	1401 E. Trent Ave, Suite 101	Project Name & # :	Stormwater Treatment Monitoring
City: Spokane	State: WA Zip: 99202	Email Address :	amiee-navickis-brasch@hdrinc.com
Phone:		Purchase Order #:	
Fax:		Sampler Name & phone:	Amiee Navickis-Brasch

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

✓ Normal
__ Next Day*
__ 2nd Day*
__ Other*_____

*All rush order requests must be prior approved.

__ Phone
__ Mail
__ Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	Preservative: PSD, Influent	Total Suspended Solids (TSS)	Dissolved Copper (Cu)	Dissolved Zinc (Zn)	Total Copper (Cu)	Total Zinc (Zn)	Hardness as CaCO3	Ortho-Phoshate (OP)	Total Phoshorus (TP)	
	IN11222018	11/22/2018 @ 7:00pm	Water	5			x	x	x	x	x	x			
	1211222018	11/22/2018 @ 7:00pm	Water	5			x	x	x	x	x	x			
	1811222018	11/22/2018 @ 7:00pm	Water	5			x	x	x	x	x	x			
	Diss metal blank							x	x						

Note Special Instructions/Comments

SWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Leland O'Hanlon		HDR	11/27/18	1:00pm
Received by	TRACY Martinez		AnatekLabs	11/28/18	1300
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	Y	N

h/c li

Temperature (°C): 6.4 dig 04
Preservative: HNO3 (NA) <2
pH P18285-3N
Date & Time: 11-26-18 1545
Inspected By: MG

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client: HDR, INC - SPOKANE
Address: 1401 E TRENT AVE, STE 101
SPOKANE, WA 99202
Attn: AIMEE NAVICKIS-BRASCH

Batch #: 181217016
Project Name: SAND FILTER

Analytical Results Report

Sample Number 181217016-001
Client Sample ID IN12172018
Matrix Water
Comments

Sampling Date 12/17/2018
Sampling Time 9:30 AM
Sample Location

Date/Time Received 12/17/20110:00 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00321	mg/L	0.001	1/4/2019 1:49:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00289	mg/L	0.001	1/4/2019 1:46:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0285	mg/L	0.001	1/4/2019 1:46:00 PM	BAG	EPA 200.8	
Hardness	43	mg CaCO3/L	1	2/21/2018 10:30:00 AM	NDE	EPA 130.2	
TSS	9	mg/L	1	12/18/2018 1:30:00 PM	BAS	SM 2540D	
Total P	0.118	mg/L	0.01	1/7/2019 3:34:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	2/19/2018 11:33:00 PM	LMC	NWTPHDX	Q5 Q10
Lube Oil	ND	mg/L	0.5	2/19/2018 11:33:00 PM	LMC	NWTPHDX	Q5 Q10
Zinc	0.0261	mg/L	0.001	1/4/2019 1:49:00 PM	BAG	EPA 200.8	

Surrogate Data

Sample Number 181217016-001

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	89.2	50-150

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: HDR, INC - SPOKANE
Address: 1401 E TRENT AVE, STE 101
SPOKANE, WA 99202
Attn: AIMEE NAVICKIS-BRASCH

Batch #: 181217016
Project Name: SAND FILTER

Analytical Results Report

Sample Number 181217016-002
Client Sample ID 12EF12172018
Matrix Water
Comments

Sampling Date 12/17/2018
Sampling Time 9:30 AM
Sample Location

Date/Time Received 12/17/20110:00 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00155	mg/L	0.001	1/4/2019 1:55:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00149	mg/L	0.001	1/4/2019 1:52:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0129	mg/L	0.001	1/4/2019 1:52:00 PM	BAG	EPA 200.8	
Hardness	222	mg CaCO3/L	1	2/21/2018 10:30:00 AM	NDE	EPA 130.2	
TSS	5	mg/L	1	12/18/2018 1:30:00 PM	BAS	SM 2540D	
Total P	0.350	mg/L	0.1	1/7/2019 4:16:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	2/20/2018 12:28:00 AM	LMC	NWTPHDX	Q5 Q10
Lube Oil	ND	mg/L	0.5	2/20/2018 12:28:00 AM	LMC	NWTPHDX	Q5 Q10
Zinc	0.0111	mg/L	0.001	1/4/2019 1:55:00 PM	BAG	EPA 200.8	

Surrogate Data

Sample Number 181217016-002

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	93.0	50-150

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Client: HDR, INC - SPOKANE
Address: 1401 E TRENT AVE, STE 101
SPOKANE, WA 99202
Attn: AIMEE NAVICKIS-BRASCH

Batch #: 181217016
Project Name: SAND FILTER

Analytical Results Report

Sample Number 181217016-003
Client Sample ID 18EF12172018
Matrix Water
Comments

Sampling Date 12/17/2018
Sampling Time 9:30 AM
Sample Location

Date/Time Received 12/17/20110:00 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00147	mg/L	0.001	1/4/2019 2:38:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00132	mg/L	0.001	1/4/2019 2:34:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0111	mg/L	0.001	1/4/2019 2:34:00 PM	BAG	EPA 200.8	
Hardness	243	mg CaCO3/L	1	2/21/2018 10:30:00 AM	NDE	EPA 130.2	
TSS	7	mg/L	1	12/18/2018 1:30:00 PM	BAS	SM 2540D	
Total P	0.388	mg/L	0.1	1/7/2019 4:18:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	12/20/2018 1:24:00 AM	LMC	NWTPHDX	Q5 Q10
Lube Oil	ND	mg/L	0.5	12/20/2018 1:24:00 AM	LMC	NWTPHDX	Q5 Q10
Zinc	0.00590	mg/L	0.001	1/4/2019 2:38:00 PM	BAG	EPA 200.8	

Surrogate Data

Sample Number 181217016-003

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	69.0	50-150

Authorized Signature

Kathleen A. Sattler

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: HDR, INC - SPOKANE
1401 E TRENT AVE, STE 101
SPOKANE WA 99202

Order ID: 181217016
Order Date: 12/17/2018

Contact Name: AIMEE NAVICKIS-BRASCH

Project Name: SAND FILTER

Comment:

Sample #: 181217016-001 **Customer Sample #:** IN12172018

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/17/2018
Quantity: 1 **Date Received:** 12/17/2018 10:00:00 AM **Time Collected:** 9:30 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/31/2018	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/31/2018	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	12/31/2018	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	12/31/2018	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***

Sample #: 181217016-002 **Customer Sample #:** 12EF12172018

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/17/2018
Quantity: 1 **Date Received:** 12/17/2018 10:00:00 AM **Time Collected:** 9:30 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/31/2018	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/31/2018	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	12/31/2018	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	12/31/2018	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***

Customer Name: HDR, INC - SPOKANE
1401 E TRENT AVE, STE 101
SPOKANE WA 99202

Order ID: 181217016
Order Date: 12/17/2018

Contact Name: AIMEE NAVICKIS-BRASCH

Project Name: SAND FILTER

Comment:

Sample #: 181217016-003 **Customer Sample #:** 18EF12172018

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/17/2018

Quantity: 1 **Date Received:** 12/17/2018 10:00:00 AM **Time Collected:** 9:30 AM

Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/31/2018	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/31/2018	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	12/31/2018	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	12/31/2018	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/31/2018	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	No
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	3.2
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	No
Labels and chain agree?	Yes
Total number of containers?	3

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

31217 016 HDRS Last Due 12/31/2018
1st SAMP 12/17/201 1st RCVD 12/17/2018
SAND FILTER

Company Name:	HDR	Project Manager:	Aimee Navickis-Brasch
Address:	1401 E. Trent Ave	Project Name & # :	Sand Filter
City: Spokane	State: WA Zip: 99202	Email Address :	aimee.navickis-brasch@hdrinc.com
Phone:		Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Around Time & Reporting

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

synthetic stormwater influent and effluent

9:30

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	Preservative	TSS SM 2540D	Cu+Zn EPA 200.8	Total P Persulfate	Hardness SM 2340B	Total Phos SM4500-P E	NWTPH Dx	NWTPH Ecology	
	IN12172018	12/17/2018 8:00 am	water	5			x	x	x	x	x	x		
	12EF12172018	12/17/2018 8:00 am	water	5			x	x	x	x	x	x		
	18EF12172018	12/17/2018 8:00 am	water	1			x	x	x	x	x	x		

TSS SM 2540D Cu+Zn EPA 200.8 Total P Persulfate Hardness SM 2340B Total Phos SM4500-P E NWTPH Dx NWTPH Ecology
200.8 EPA 200.8 Persulfate SM 2340B SM4500 NWTPH Dx

Note Special Instructions/Comments

Please send the invoice for lab testing to Jake Saxon at Spokane County: JSAXON@spokanecounty.org

SWBS

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	~~Y~~	~~N~~

NA / NC / NI

Temperature (°C): 3.2° D16.04
Preservative: labpres H2SO4 R368-3 <2 E
HCl R368-2 <2 pH P18285-3C
Date & Time: 12-17-18 1130
Inspected By: MG

	Printed Name	Signature	Company	Date	Time
Relinquished by	Aimee N. Brasch		HDR	12/17	10:30
Received by	K Scott		Anatek	12/17/18	1000
Relinquished by					
Received by					
Relinquished by					
Received by					

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HDR, INC - SPOKANE
Address: 1401 E TRENT AVE, STE 101
SPOKANE, WA 99202
Attn: AIMEE NAVICKIS-BRASCH

Batch #: 190121014
Project Name: STORMWATER TREATMENT MONITORING

Analytical Results Report

Sample Number 190121014-001 **Sampling Date** 1/18/2019 **Date/Time Received** 1/21/2019 3:00 PM
Client Sample ID IN01182019 **Sampling Time** 6:00 PM **Digested Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00451	mg/L	0.001	1/24/2019 1:12:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00406	mg/L	0.001	1/24/2019 1:09:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0291	mg/L	0.001	1/24/2019 1:09:00 PM	BAG	EPA 200.8	
TSS	8	mg/L	2	1/22/2019 2:45:00 PM	BAS	SM 2540D	
Zinc	0.0338	mg/L	0.001	1/24/2019 1:12:00 PM	BAG	EPA 200.8	

Sample Number 190121014-002 **Sampling Date** 1/18/2019 **Date/Time Received** 1/21/2019 3:00 PM
Client Sample ID 18EFF01182019 **Sampling Time** 6:00 PM **Digested Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00148	mg/L	0.001	1/24/2019 1:19:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00146	mg/L	0.001	1/24/2019 1:16:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0146	mg/L	0.001	1/24/2019 1:16:00 PM	BAG	EPA 200.8	
TSS	5	mg/L	1	1/22/2019 2:45:00 PM	BAS	SM 2540D	
Zinc	0.0125	mg/L	0.001	1/24/2019 1:19:00 PM	BAG	EPA 200.8	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HDR, INC - SPOKANE
Address: 1401 E TRENT AVE, STE 101
SPOKANE, WA 99202
Attn: AIMEE NAVICKIS-BRASCH

Batch #: 190121014
Project Name: STORMWATER TREATMENT MONITORING

Analytical Results Report

Sample Number	190121014-003	**Sampling Date**	1/18/2019	**Date/Time Received**	1/21/2019	3:00 PM
Client Sample ID	12EFF01182019	**Sampling Time**	6:00 PM	**Digested Date**		
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00139	mg/L	0.001	1/24/2019 1:25:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00142	mg/L	0.001	1/24/2019 1:22:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0134	mg/L	0.001	1/24/2019 1:22:00 PM	BAG	EPA 200.8	
TSS	<1	mg/L	1	1/22/2019 2:45:00 PM	BAS	SM 2540D	
Zinc	0.00832	mg/L	0.001	1/24/2019 1:25:00 PM	BAG	EPA 200.8	

Authorized Signature

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Login Report

Customer Name: HDR, INC - SPOKANE
1401 E TRENT AVE, STE 101
SPOKANE WA 99202

Order ID: 190121014
Order Date: 1/21/2019

Contact Name: AIMEE NAVICKIS-BRASCH
Comment:

Project Name: STORMWATER TREATMENT MONITORING

Sample #: 190121014-001 **Customer Sample #:** IN01182019

Recv'd: ☑ **Matrix:** Water **Collector:** ISABELLA BURZYNSKI **Date Collected:** 1/18/2019
Quantity: 4 **Date Received:** 1/21/2019 3:00:00 PM **Time Collected:** 6:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	1/31/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***

Sample #: 190121014-002 **Customer Sample #:** 18EFF01182019

Recv'd: ☑ **Matrix:** Water **Collector:** ISABELLA BURZYNSKI **Date Collected:** 1/18/2019
Quantity: 4 **Date Received:** 1/21/2019 3:00:00 PM **Time Collected:** 6:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	1/31/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***

Customer Name: HDR, INC - SPOKANE
1401 E TRENT AVE, STE 101
SPOKANE WA 99202

Order ID: 190121014
Order Date: 1/21/2019

Contact Name: AIMEE NAVICKIS-BRASCH

Project Name: STORMWATER TREATMENT MONITORING

Comment:

Sample #: 190121014-003 **Customer Sample #:** 12EFF01182019

Recv'd: ☑ **Matrix:** Water **Collector:** ISABELLA BURZYNSKI **Date Collected:** 1/18/2019

Quantity: 4 **Date Received:** 1/21/2019 3:00:00 PM **Time Collected:** 6:00 PM

Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	1/31/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/31/2019	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	6.4
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Labels and chain agree?	Yes
Total number of containers?	12

190121 014 **HDRS** Last Due 1/31/2019
1st SAMP 1/18/2019 1st RCVD 1/21/2019
STORMWATER TREATMENT MONITORING

Anatek Labs, Inc.

Chain of Custody Record

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504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Company Name: HDR Inc	Project Manager: Aimee Navicks - Brasch
Address: 1401 E. Trent Ave, Suit 101	Project Name & #: Stormwater Treatment Monitoring
City: Spokane State: WA Zip: 99202	Email Address: amiee-navickis-brasch@hdrinc…
Phone:	Purchase Order #:
Fax:	Sampler Name & phone: Isabella Burzynski

Turn Around Time & Reporting

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

✓ Normal
__ Next Day*
__ 2nd Day*
__ Other*____

*All rush order requests must be prior approved.

__ Phone
__ Mail
__ Fax
X Email

Provide Sample Description / **List Analyses Requested**

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	Total Suspend Solids (TSS)	Dissolved Copper (Cu)	Dissolved Zinc (Zn)	Total Copper (Cu)	Total Zinc (Zn)
	IN01182019	01/18/2019@6pm	Water	~~3~~ 4		X	X	X	X	X
	~~18[illegible]2019~~	~~01/18/2019@~~	~~Water~~	~~3~~						
	~~12[illegible]182019~~		~~Water~~	~~3~~						
	18EFF01182019	01/18/2019@6pm	Water	~~3~~ 4		X	X	X	X	X
	12EFF01182019	01/18/2019@6pm	Water	~~3~~ 4		X	X	X	X	X

Preservative:

Note Special Instructions/Comments

SWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Nicole Chen	[signature]	HDR	1/21	3PM
Received by	Anne Look	Anne Look	Anatek	1/21/19	1500
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact? (Y) N
Labels & Chains Agree? (Y) N
Containers Sealed? (Y) N
VOC Head Space? ~~Y N~~
hd [illegible] Cooler/Ice
Temperature (°C): 6.4 deg-04
Preservative: HNO3
pH P18285-3C
Date & Time: 1-21-19 1550
Inspected By: [initials]

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Client: OSBORN CONSULTING
Address: P.O. BOX 48026
SPOKANE, WA 99208
Attn: AIMEE NOVICKIS-BRASCH

Batch #: 190725050
Project Name: GU BIOPOND

Analytical Results Report

Sample Number 190725050-001
Client Sample ID IN07232019
Matrix Water
Comments

Sampling Date 7/24/2019
Sampling Time 8:00 AM
Sample Location

Date/Time Received 7/24/201910:38 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00885	mg/L	0.001	8/1/2019 12:07:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00676	mg/L	0.001	8/1/2019 12:04:00 PM	BAG	EPA 200.8	
Dissolved Iron	0.128	mg/L	0.01	8/1/2019 12:04:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0307	mg/L	0.001	8/1/2019 12:04:00 PM	BAG	EPA 200.8	
Hardness	52.0	mg CaCO3/L	1	8/2/2019 9:45:00 AM	NDE	EPA 130.2	
Iron	0.633	mg/L	0.01	8/1/2019 12:07:00 PM	BAG	EPA 200.8	
PO4/P	0.0352	mg/L	0.01	7/25/2019 5:25:00 PM	TLM	SM4500PF	
TSS	78	mg/L	2	7/30/2019 12:35:00 PM	BAS	SM 2540D	
Total P	0.334	mg/L	0.1	7/31/2019 11:36:00 AM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	8/6/2019 9:42:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.5	8/6/2019 9:42:00 AM	LMC	NWTPHDX	
Zinc	0.0565	mg/L	0.001	8/1/2019 12:07:00 PM	BAG	EPA 200.8	

Surrogate Data

Sample Number 190725050-001

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	91.0	50-150

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: OSBORN CONSULTING
Address: P.O. BOX 48026
SPOKANE, WA 99208
Attn: AIMEE NOVICKIS-BRASCH

Batch #: 190725050
Project Name: GU BIOPOND

Analytical Results Report

Sample Number 190725050-002
Client Sample ID 12EF07232019
Matrix Water
Comments

Sampling Date 7/24/2019
Sampling Time 8:00 AM
Sample Location

Date/Time Received 7/24/201910:38 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00640	mg/L	0.001	8/1/2019 12:13:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00608	mg/L	0.001	8/1/2019 12:10:00 PM	BAG	EPA 200.8	
Dissolved Iron	0.0480	mg/L	0.01	8/1/2019 12:10:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.00740	mg/L	0.001	8/1/2019 12:10:00 PM	BAG	EPA 200.8	
Hardness	218	mg CaCO3/L	2	8/2/2019 9:45:00 AM	NDE	EPA 130.2	
Iron	0.169	mg/L	0.01	8/1/2019 12:13:00 PM	BAG	EPA 200.8	
PO4/P	0.719	mg/L	0.01	7/25/2019 5:26:00 PM	TLM	SM4500PF	
TSS	12	mg/L	2	7/30/2019 12:35:00 PM	BAS	SM 2540D	
Total P	0.886	mg/L	0.1	7/31/2019 11:38:00 AM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	8/6/2019 10:38:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.5	8/6/2019 10:38:00 AM	LMC	NWTPHDX	
Zinc	0.0139	mg/L	0.001	8/1/2019 12:13:00 PM	BAG	EPA 200.8	

Surrogate Data

Sample Number 190725050-002

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	87.8	50-150

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Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: OSBORN CONSULTING
Address: P.O. BOX 48026
SPOKANE, WA 99208
Attn: AIMEE NOVICKIS-BRASCH

Batch #: 190725050
Project Name: GU BIOPOND

Analytical Results Report

Sample Number 190725050-003
Client Sample ID 18EF07232019
Matrix Water
Comments

Sampling Date 7/24/2019
Sampling Time 8:00 AM
Sample Location

Date/Time Received 7/24/201910:38 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00533	mg/L	0.001	8/1/2019 12:18:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00515	mg/L	0.001	8/1/2019 12:16:00 PM	BAG	EPA 200.8	
Dissolved Iron	0.0628	mg/L	0.01	8/1/2019 12:16:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0102	mg/L	0.001	8/1/2019 12:16:00 PM	BAG	EPA 200.8	
Hardness	244	mg CaCO3/L	2	8/2/2019 9:45:00 AM	NDE	EPA 130.2	
Iron	0.300	mg/L	0.01	8/1/2019 12:18:00 PM	BAG	EPA 200.8	
PO4/P	1.10	mg/L	0.01	7/25/2019 5:29:00 PM	TLM	SM4500PF	
TSS	34	mg/L	2	7/30/2019 12:35:00 PM	BAS	SM 2540D	
Total P	1.28	mg/L	0.1	7/31/2019 11:41:00 AM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	8/6/2019 11:33:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.5	8/6/2019 11:33:00 AM	LMC	NWTPHDX	
Zinc	0.00852	mg/L	0.001	8/1/2019 12:18:00 PM	BAG	EPA 200.8	

Surrogate Data

Sample Number 190725050-003

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	89.2	50-150

Authorized Signature

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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Login Report

Customer Name: OSBORN CONSULTING
P.O. BOX 48026
SPOKANE WA 99208

Order ID: 190725050
Order Date: 7/25/2019

Contact Name: AIMEE NOVICKIS-BRASCH

Project Name: GU BIOPOND

Comment:

Sample #: 190725050-001 **Customer Sample #:** IN07232019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 7/24/2019
Quantity: 7 **Date Received:** 7/24/2019 10:38:00 AM **Time Collected:** 8:00 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED ZINC	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	8/5/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	8/5/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	8/5/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	8/5/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	8/5/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***

Sample #: 190725050-002 **Customer Sample #:** 12EF07232019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 7/24/2019
Quantity: 5 **Date Received:** 7/24/2019 10:38:00 AM **Time Collected:** 8:00 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED ZINC	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	8/5/2019	***Normal (~10 Days)***

Customer Name: OSBORN CONSULTING
P.O. BOX 48026
SPOKANE WA 99208

Order ID: 190725050
Order Date: 7/25/2019

Contact Name: AIMEE NOVICKIS-BRASCH

Project Name: GU BIOPOND

Comment:

IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	8/5/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	8/5/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	8/5/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	8/5/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***

Sample #: 190725050-003 **Customer Sample #:** 18EF07232019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 7/24/2019

Quantity: 6 **Date Received:** 7/24/2019 10:38:00 AM **Time Collected:** 8:00 AM

Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED ZINC	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	8/5/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	8/5/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	8/5/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	8/5/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	8/5/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***

Customer Name: OSBORN CONSULTING
P.O. BOX 48026
SPOKANE WA 99208

Order ID: 190725050
Order Date: 7/25/2019

Contact Name: AIMEE NOVICKIS-BRASCH

Project Name: GU BIOPOND

Comment:

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	14.4
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Labels and chain agree?	Yes
Total number of containers?	18

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

90725 050 OCON Last Due 8/5/2019
1st SAMP 7/24/2019 1st RCVD 7/24/2019
GU BIOPOND

Company Name:	Osborn Consulting
Address:	429 W. 1st Ave
City:	Spokane State: WA Zip: 99201
Phone:	(509) 867-3654
Fax:	
Project Manager:	Aimee Navickis-Brasch
Project Name & # :	GU BioPond
Email Address :	aimeen@osbornconsulting.com
Purchase Order #:	
Sampler Name & phone:	(509)995-0557

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal __Next Day* __2nd Day* __Other*_____
*All rush order requests must be prior approved.
__Phone __Mail __Fax x Email

Provide Sample Description

synthetic stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative: # of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
	IN07232019	07/24/2019 8:00 am	water	7		x	x	x	x	x	x	x	x		
	12EF07232019	07/24/2019 8:00 am	water	5		x	x	x	x	x	x	x			
	18EF07232019	07/24/2019 8:00 am	water	6		x	x	x	x	x	x	x			

Note Special Instructions/Comments

Please send the invoice for lab testing to Ethan Murnin at Spokane County: emurnin@spokanecounty.org

SWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Taylor Hoffmann-Ballard	Taylor Hoff-Ballard	OCI	7/24/19	10:38a
Received by	Kathy Sattler	Kathy Sattler	Anatek labs	7-24-19	1038
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact? (Y) N
Labels & Chains Agree? (Y) N
Containers Sealed? (Y) N
VOC Head Space? (Y) N

Cooler / Ice / Hand

Temperature (°C): 14.4 DIG-04
Preservative: MHN03 P18009-73<2
H2SO4 R379-2<2 pH P8285-30
Date & Time: 7-25-19 1700
Inspected By: MG

Anatek Labs, Inc.

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Client: OSBORN CONSULTING
Address: P.O. BOX 48026
SPOKANE, WA 99208
Attn: AIMEE NOVICKIS-BRASCH

Batch #: 190725047
Project Name: GU BIOPOND

Analytical Results Report

Sample Number 190725047-001
Client Sample ID RNIN07242019
Matrix Water
Comments

Sampling Date 7/24/2019
Sampling Time
Sample Location

Date/Time Received 7/24/20193:25 PM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	ND	mg/L	0.001	8/1/2019 12:01:00 PM	BAG	EPA 200.8	
Dissolved Copper	ND	mg/L	0.001	8/1/2019 11:58:00 AM	BAG	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	8/1/2019 11:58:00 AM	BAG	EPA 200.8	
Dissolved Zinc	0.00470	mg/L	0.001	8/1/2019 11:58:00 AM	BAG	EPA 200.8	
Hardness	<5	mg CaCO3/L	1	8/2/2019 9:45:00 AM	NDE	EPA 130.2	
Iron	0.0172	mg/L	0.01	8/1/2019 12:01:00 PM	BAG	EPA 200.8	
TSS	2	mg/L	1	7/30/2019 12:35:00 PM	BAS	SM 2540D	
Zinc	0.00141	mg/L	0.001	8/1/2019 12:01:00 PM	BAG	EPA 200.8	

Surrogate Data

Authorized Signature

Kathleen A. Sattler

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Login Report

Customer Name: OSBORN CONSULTING
P.O. BOX 48026
SPOKANE WA 99208

Order ID: 190725047
Order Date: 7/25/2019

Contact Name: AIMEE NOVICKIS-BRASCH

Project Name: GU BIOPOND

Comment:

Sample #: 190725047-001 **Customer Sample #:** RNIN07242019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 7/24/2019

Quantity: 3 **Date Received:** 7/24/2019 3:25:00 PM **Time Collected:**

Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
DISSOLVED ZINC	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	8/5/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	8/5/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	8/5/2019	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	19.1
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Labels and chain agree?	Yes
Total number of containers?	3

Anatek Labs, Inc.

Chain of Custody Record

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504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

90725 047 OCON Last Due 8/5/2019
1st SAMP 7/24/2019 1st RCVD 7/24/2019
GU BIOPOND

Company Name:	Osborn Consulting	Project Manager:	Aimee Navickis-Brasch
Address:	429 W. 1st Ave	Project Name & # :	GU BioPond
City: Spokane	State: WA Zip: 99201	Email Address :	aimeen@osbornconsulting.com
Phone:	(509) 867-3654	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Around Time & Reporting

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

synthetic stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative: # of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	ASTM D3977-97		
	RNIN07242019	07/24/2019	water	3		x	x	x	x						

Note Special Instructions/Comments

Please send the invoice for lab testing to Ethan Murnin at Spokane County: emurnin@spokanecounty.org

Dissolved metals were NOT filtered in the field

SWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Taylor Hoffman-Ballard	Taylor Hoffman-Ballard	OCI	7/24/19	
Received by	K Scott	K Scott	Anatek	7/24/19	1525
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
VOC Head Space?	Y	N

hd/Coalatice

Temperature (°C): 19.1° dig-04
Preservative: MHN03 P18009-7B <2
pH P18285-3Q
Date & Time: 7-25-19 1700
Inspected By: MK

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 190930019
Project Name: ~~SAND FILTER~~
Gonzaga

Analytical Results Report

Sample Number	190930019-001	**Sampling Date**	9/28/2019	**Date/Time Received**	9/30/2019	11:10 AM
Client Sample ID	IN-09282019	**Sampling Time**	6:00 PM	**Extraction Date**		
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00330	mg/L	0.001	10/2/2019 5:29:00 PM	TRC	EPA 200.8	
Dissolved Copper	0.00133	mg/L	0.001	10/2/2019 5:40:00 PM	TRC	EPA 200.8	
Dissolved Iron	0.0126	mg/L	0.01	10/2/2019 5:40:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0599	mg/L	0.001	10/2/2019 5:40:00 PM	TRC	EPA 200.8	
Hardness	18.0	mg CaCO3/L	1	10/3/2019 10:00:00 AM	NDE	EPA 130.2	
Iron	0.435	mg/L	0.01	10/2/2019 5:29:00 PM	TRC	EPA 200.8	
PO4/P	0.0501	mg/L	0.01	9/30/2019 4:33:00 PM	TLM	SM4500PF	
TSS	68	mg/L	2	10/4/2019 11:00:00 AM	BAS	SM 2540D	
Total P	0.0991	mg/L	0.01	10/8/2019 5:16:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	10/9/2019 3:08:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	10/9/2019 3:08:00 AM	LMC	NWTPHDX	
Zinc	0.0403	mg/L	0.001	10/2/2019 5:29:00 PM	TRC	EPA 200.8	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 190930019
Project Name: ~~SAND FILTER~~
Gonzaga

Analytical Results Report

Sample Number 190930019-002 **Sampling Date** 9/28/2019 **Date/Time Received** 9/30/2019 11:10 AM
Client Sample ID EF18-09282019 **Sampling Time** 6:00 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00510	mg/L	0.001	10/2/2019 5:37:00 PM	TRC	EPA 200.8	
Dissolved Copper	0.00469	mg/L	0.001	10/2/2019 5:43:00 PM	TRC	EPA 200.8	
Dissolved Iron	0.0513	mg/L	0.01	10/2/2019 5:43:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0940	mg/L	0.001	10/2/2019 5:43:00 PM	TRC	EPA 200.8	
Hardness	145	mg CaCO3/L	1	10/3/2019 10:00:00 AM	NDE	EPA 130.2	
Iron	0.785	mg/L	0.01	10/2/2019 5:37:00 PM	TRC	EPA 200.8	
PO4/P	0.700	mg/L	0.01	9/30/2019 4:34:00 PM	TLM	SM4500PF	
TSS	50	mg/L	2	10/4/2019 11:00:00 AM	BAS	SM 2540D	
Total P	0.793	mg/L	0.1	10/8/2019 5:16:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	10/9/2019 4:02:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	10/9/2019 4:02:00 AM	LMC	NWTPHDX	
Zinc	0.0181	mg/L	0.001	10/2/2019 5:37:00 PM	TRC	EPA 200.8	

Sample Number 190930019-003 **Sampling Date** 9/28/2019 **Date/Time Received** 9/30/2019 11:10 AM
Client Sample ID INDIWATER **Sampling Time** 6:00 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Dissolved Copper	ND	mg/L	0.001	10/2/2019 5:46:00 PM	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	10/2/2019 5:46:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0419	mg/L	0.001	10/2/2019 5:46:00 PM	TRC	EPA 200.8	

Taylor Hoffman-Ballard

From: Kathy Sattler <kathy@anateklabs.com>
Sent: Wednesday, October 16, 2019 8:18 AM
To: 'emurnin@spokanecounty.org'; Aimee S. Navickis-Brasch, PhD, PE; Taylor Hoffman-Ballard, PE
Subject: Sand Filter
Attachments: 190930019_SPKC.pdf; 190930019_SPKC_EDD.xls

Follow Up Flag: Follow up
Flag Status: Completed

Hello,

I have attached the sand filter report. Budinger is unable to run PSD's on water.

Thank you.

Kathy Sattler
Lab Manager/Microbiologist
Anatek Labs, Inc.
504 E. Sprague Ave. Suite D
Spokane, WA 99202
V: 509-838-3999
F: 509-838-4433
C: 509-879-4797
www.anateklabs.com

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191120022
Project Name: SAND FILTER

Analytical Results Report

Sample Number 191120022-001 **Sampling Date** 11/19/2019 **Date/Time Received** 11/20/2019 10:05 AM
Client Sample ID IN-11192019 **Sampling Time** 10:10 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
PO4/P	0.0901	mg/L	0.01	11/27/2019 10:51:00 AM	TLM	SM4500PF	
TSS	22	mg/L	2	11/26/2019 1:15:00 PM	BAS	SM 2540D	

Sample Number 191120022-002 **Sampling Date** 11/19/2019 **Date/Time Received** 11/20/2019 10:05 AM
Client Sample ID EF12-11192019 **Sampling Time** 10:10 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00338	mg/L	0.001	11/27/2019 3:41:00 PM	BAG	EPA 200.8	
Dissolved Copper	0.00324	mg/L	0.001	11/27/2019 3:38:00 PM	BAG	EPA 200.8	
Dissolved Iron	0.0589	mg/L	0.01	11/27/2019 3:38:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0134	mg/L	0.001	11/27/2019 3:38:00 PM	BAG	EPA 200.8	
Hardness	104	mg CaCO3/L	2	11/26/2019 2:30:00 PM	NDE	EPA 130.2	
Iron	0.192	mg/L	0.01	11/27/2019 3:41:00 PM	BAG	EPA 200.8	
NO3/N+NO2/N	15.6	mg/L	2	12/4/2019 4:54:00 PM	TLM	SM 4500 NO3F	
PO4/P	0.349	mg/L	0.01	11/21/2019 2:37:00 PM	TLM	SM4500PF	
TSS	1	mg/L	1	11/26/2019 1:15:00 PM	BAS	SM 2540D	
TKN	0.803	mg/L	0.5	12/5/2019 4:14:00 PM	TLM	SM4500NORGC	
Total Nitrogen	16.4	mg/L		12/9/2019 10:30:00 AM	KAS	Calculation	
Total P	0.416	mg/L	0.05	12/4/2019 2:47:00 PM	TLM	SM4500PF	
Zinc	0.0125	mg/L	0.001	11/27/2019 3:41:00 PM	BAG	EPA 200.8	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191120022
Project Name: SAND FILTER

Analytical Results Report

Sample Number	191120022-004	**Sampling Date**	11/19/2019	**Date/Time Received**	11/20/2019 10:05 AM
Client Sample ID	EF12DI-11192019	**Sampling Time**	10:10 PM	**Extraction Date**	
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Dissolved Copper	0.00200	mg/L	0.001	11/27/2019 3:44:00 PM	BAG	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	11/27/2019 3:44:00 PM	BAG	EPA 200.8	
Dissolved Zinc	0.0131	mg/L	0.001	11/27/2019 3:44:00 PM	BAG	EPA 200.8	

Authorized Signature

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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Login Report

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191120022
Order Date: 11/20/2019

Contact Name: ETHAN MURNIN

Project Name: SAND FILTER

Comment:

Sample #: 191120022-001 **Customer Sample #:** IN-11192019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 11/19/2019
Quantity: 1 **Date Received:** 11/20/2019 10:05:00 AM **Time Collected:** 10:10 PM
Comment:

Test	Lab	Method	Due Date	Priority
PHOSPHATE/P FIA	S	SM4500PF	12/4/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/4/2019	***Normal (~10 Days)***

Sample #: 191120022-002 **Customer Sample #:** EF12-11192019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 11/19/2019
Quantity: 1 **Date Received:** 11/20/2019 10:05:00 AM **Time Collected:** 10:10 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/4/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	12/4/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	12/4/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/4/2019	***Normal (~10 Days)***
TKN-SPO	S	SM4500NORGC	12/4/2019	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	12/4/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	12/4/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***

Sample #: 191120022-004 **Customer Sample #:** EF12DI-11192019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 11/19/2019
Quantity: 1 **Date Received:** 11/20/2019 10:05:00 AM **Time Collected:** 10:10 PM
Comment:

Test	Lab	Method	Due Date	Priority
DISSOLVED COPPER SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191120022
Order Date: 11/20/2019

Contact Name: ETHAN MURNIN

Project Name: SAND FILTER

Comment:

DISSOLVED IRON SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/4/2019	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	2.4
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Labels and chain agree?	Yes
Total number of containers?	7

Chain of Custody Record

Anatek Labs, Inc.

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504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

91120 022 SPKC Last Due 12/4/2019
1st SAMP 11/19/201 1st RCVD 11/20/2019
SAND FILTER

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Sand Filter
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal __Next Day* __2nd Day* __Other*_____ *All rush order requests must be prior approved. __Phone __Mail __Fax x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative:	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
01	IN-11192019	11/19/19 22:10	water		4		x	x	x	x	x	x	x	x	x	x
	~~EF18-11192019~~	~~11/19/19 22:10~~	~~water~~		4		x	x	x	x	x	x	x	x	x	x
02	EF12-11192019	11/19/19 22:10	water		1		x	x	x	x	x	x	x	x	x	x
03	INDI-11192019	11/19/19 22:10	water		1				x							
	~~EF18DI-11192019~~	~~11/19/19 22:10~~	~~water~~						x							
04	EF12DI-11192019	11/19/19 22:10	water						x							

No Dx received
Not received

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	Y	N

Ice/Coolerice

Temperature (°C): 2.4° dig-07

Preservative:

Date & Time:

Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	TUCKER MUNSON		Spokane County	11/19	22:30
Received by	KScott	KScott	Anatek	11/20/19	1005
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Sand Filter
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: 509-477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Around Time & Reporting

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
X Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
Preservative:															
	IN-11122019	11/19/20 @ 22:10	water	1		X									
	EF18-11122019		water	0											
	EF12-11122019	11/19/20 @ 22:10	water	2		X		X							
	INDI-11122019		water	0											
	EF18DI-11122019		water	0											
	EF12DI-11122019	11/19/20 @ 22:10	water	1				X							

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

COC emailed 11/25/19

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	Y	N

Temperature (°C):_____
Preservative:_____
Date & Time:_____
Inspected By:_____

	Printed Name	Signature	Company	Date	Time
Relinquished by					
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by					

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 190930019
Project Name: ~~SAND FILTER~~ Gonzaga

Analytical Results Report

Sample Number	190930019-004	**Sampling Date**	9/28/2019	**Date/Time Received**	9/30/2019	11:10 AM
Client Sample ID	EF18-DIWATER	**Sampling Time**	6:00 PM	**Extraction Date**		
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Dissolved Copper	ND	mg/L	0.001	10/2/2019 5:48:00 PM	TRC	EPA 200.8	
Dissolved Iron	0.0160	mg/L	0.01	10/2/2019 5:48:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.146	mg/L	0.001	10/2/2019 5:48:00 PM	TRC	EPA 200.8	

Authorized Signature

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Login Report

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 190930019
Order Date: 9/30/2019

Contact Name: ETHAN MURNIN
Comment: PSD SUB TO BUDI

Project Name: ~~SAND FILTER~~ Gonzaga

Sample #: 190930019-001 **Customer Sample #:** IN-09282019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 9/28/2019
Quantity: 4 **Date Received:** 9/30/2019 11:10:00 AM **Time Collected:** 6:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	10/10/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	10/10/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	10/10/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	10/10/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	10/10/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***

Sample #: 190930019-002 **Customer Sample #:** EF18-09282019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 9/28/2019
Quantity: 4 **Date Received:** 9/30/2019 11:10:00 AM **Time Collected:** 6:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	10/10/2019	***Normal (~10 Days)***

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 190930019
Order Date: 9/30/2019

Contact Name: ETHAN MURNIN

Project Name: ~~SAND FILTER~~ Gonzaga

Comment: PSD SUB TO BUDI

IRON SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	10/10/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	10/10/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	10/10/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	10/10/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***

Sample #: 190930019-003 **Customer Sample #:** INDIWATER

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 9/28/2019
Quantity: 1 **Date Received:** 9/30/2019 11:10:00 AM **Time Collected:** 6:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
DISSOLVED COPPER SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***

Sample #: 190930019-004 **Customer Sample #:** EF18-DIWATER

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 9/28/2019
Quantity: 1 **Date Received:** 9/30/2019 11:10:00 AM **Time Collected:** 6:00 PM
Comment:

Test	Lab	Method	Due Date	Priority
DISSOLVED COPPER SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	10/10/2019	***Normal (~10 Days)***

Customer Name:	SPOKANE COUNTY			**Order ID:**	190930019
	1026 W BROADWAY			**Order Date:**	9/30/2019
	SPOKANE	WA	99260-0430		
Contact Name:	ETHAN MURNIN			**Project Name:**	~~SAND FILTER~~ Gonzaga
Comment:	PSD SUB TO BUDI				

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	1.5
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Labels and chain agree?	Yes
Total number of containers?	12

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
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90930 019 SPKC Last Due 10/10/2019
1st SAMP 9/28/2019 1st RCVD 9/30/2019
SAND FILTER

Company Name:	Spokane County
Address:	1026 W. Broadway Avenue
City:	Spokane State: WA Zip: 99260
Phone:	(509) 477-7420
Fax:	
Project Manager:	Ethan Murnin
Project Name & # :	~~Sand Filter~~ Gonzaga
Email Address :	EMURNIN@spokanecounty.org
Purchase Order #:	
Sampler Name & phone:	(509)995-0557

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal __Next Day* __2nd Day* __Other*_____
*All rush order requests must be prior approved.
__Phone __Mail __Fax x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
				Preservative:											
	IN-09282019	09/28/19 6:00pm	water	4		x	x	x	x	x	x	x	x		
	EF18-09282019	09/28/19 6:00pm	water	4		x	x	x	x	x	x	x	x		
	INDIWater	09/28/19 6:00pm	water	1				x							
	EF18-DIWater	09/28/19 6:00pm	water	1				x							

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

metals filtered for diss.

SWBS
BUDI - PSD

Inspection Checklist

Received Intact? (Y) N
Labels & Chains Agree? (Y) N
Containers Sealed? (Y) N
VOC Head Space? Y N

hdl Coolant/ice

Temperature (°C): 1.5° digital
Preservative: HCl R385-342 pH P18285-300
H_2SO_4 R386-342 HNO3 P18009-7B <2
Date & Time: 9-30-19 1430
Inspected By: MW

	Printed Name	Signature	Company	Date	Time
Relinquished by	TUCKER MUNSON		GONZAGA U.	9/30	11:10
Received by	KScott		Anatek	9/30/19	1110
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191209036
Project Name: Gonzaga

Analytical Results Report

Sample Number 191209036-001
Client Sample ID IN-12072019
Matrix Water
Comments

Sampling Date 12/7/2019
Sampling Time 1:40 PM
Sample Location

Date/Time Received 12/9/2019 8:09 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00353	mg/L	0.001	12/16/2019 12:57:00 PM	TRC	EPA 200.8	
Dissolved Copper	0.00306	mg/L	0.001	12/16/2019 12:29:00 PM	TRC	EPA 200.8	
Dissolved Iron	0.176	mg/L	0.01	12/16/2019 12:29:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0240	mg/L	0.001	12/16/2019 12:29:00 PM	TRC	EPA 200.8	
Hardness	14.5	mg CaCO3/L	1	12/10/2019 11:30:00 AM	NDE	EPA 130.2	
Iron	0.315	mg/L	0.01	12/16/2019 12:57:00 PM	TRC	EPA 200.8	
NO3/N+NO2/N	0.188	mg/L	0.1	12/17/2019 9:46:00 AM	TLM	SM 4500 NO3F	
PO4/P	0.122	mg/L	0.01	12/9/2019 2:06:00 PM	KAS	SM4500PF	
TSS	16	mg/L	1	12/12/2019 10:15:00 AM	BAS	SM 2540D	
TKN	<0.5	mg/L	0.5	12/12/2019 1:34:00 PM	KAS	SM4500NORGC	
Total Nitrogen	ND	mg/L		12/17/2019 1:51:00 PM	TLM	Calculation	
Diesel	ND	mg/L	0.1	12/17/2019 2:58:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	12/17/2019 2:58:00 AM	LMC	NWTPHDX	
Zinc	0.0246	mg/L	0.001	12/16/2019 12:57:00 PM	TRC	EPA 200.8	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191209036
Project Name: SAND FILTER

Analytical Results Report

Sample Number 191209036-002
Client Sample ID EF18-12072019
Matrix Water
Comments

Sampling Date 12/7/2019
Sampling Time 1:40 PM
Sample Location

Date/Time Received 12/9/2019 8:09 AM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00386	mg/L	0.001	12/16/2019 1:00:00 PM	TRC	EPA 200.8	
Dissolved Copper	0.00361	mg/L	0.001	12/16/2019 12:32:00 PM	TRC	EPA 200.8	
Dissolved Iron	0.00977	mg/L	0.01	12/16/2019 12:32:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0133	mg/L	0.001	12/16/2019 12:32:00 PM	TRC	EPA 200.8	
Hardness	148	mg CaCO3/L	2	12/10/2019 11:30:00 AM	NDE	EPA 130.2	
Iron	0.301	mg/L	0.01	12/16/2019 1:00:00 PM	TRC	EPA 200.8	
NO3/N+NO2/N	0.602	mg/L	0.1	12/17/2019 9:48:00 AM	TLM	SM 4500 NO3F	
PO4/P	0.454	mg/L	0.01	12/9/2019 2:07:00 PM	KAS	SM4500PF	
TSS	8	mg/L	1	12/12/2019 10:15:00 AM	BAS	SM 2540D	
TKN	<0.5	mg/L	0.5	12/12/2019 1:36:00 PM	KAS	SM4500NORGC	
Total Nitrogen	0.602	mg/L		12/17/2019 1:52:00 PM	TLM	Calculation	
Total P	0.576	mg/L	0.01	12/12/2019 3:08:00 PM	KAS	SM4500PF	
Diesel	ND	mg/L	0.1	12/17/2019 3:52:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	12/17/2019 3:52:00 AM	LMC	NWTPHDX	
Zinc	0.00504	mg/L	0.001	12/16/2019 1:00:00 PM	TRC	EPA 200.8	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191209036
Project Name: SAND FILTER

Analytical Results Report

Sample Number 191209036-003 **Sampling Date** 12/7/2019 **Date/Time Received** 12/9/2019 8:09 AM
Client Sample ID EF12-12072019 **Sampling Time** 1:40 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00315	mg/L	0.001	12/16/2019 2:07:00 PM	TRC	EPA 200.8	
Dissolved Copper	0.00255	mg/L	0.001	12/16/2019 12:35:00 PM	TRC	EPA 200.8	
Dissolved Iron	0.0489	mg/L	0.01	12/16/2019 12:35:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0115	mg/L	0.001	12/16/2019 12:35:00 PM	TRC	EPA 200.8	
Hardness	101	mg CaCO3/L	2	12/10/2019 11:30:00 AM	NDE	EPA 130.2	
Iron	0.146	mg/L	0.01	12/16/2019 2:07:00 PM	TRC	EPA 200.8	
NO3/N+NO2/N	0.305	mg/L	0.1	12/17/2019 9:49:00 AM	TLM	SM 4500 NO3F	
PO4/P	0.354	mg/L	0.01	12/9/2019 2:08:00 PM	KAS	SM4500PF	
TSS	3	mg/L	1	12/12/2019 10:15:00 AM	BAS	SM 2540D	
TKN	<0.5	mg/L	0.5	12/12/2019 1:37:00 PM	KAS	SM4500NORGC	
Total Nitrogen	ND	mg/L		12/17/2019 1:53:00 PM	TLM	Calculation	
Total P	0.505	mg/L	0.01	12/12/2019 3:09:00 PM	KAS	SM4500PF	
Diesel	ND	mg/L	0.1	12/17/2019 4:47:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	12/17/2019 4:47:00 AM	LMC	NWTPHDX	
Zinc	0.00298	mg/L	0.001	12/16/2019 2:07:00 PM	TRC	EPA 200.8	

Sample Number 191209036-004 **Sampling Date** 12/7/2019 **Date/Time Received** 12/9/2019 8:09 AM
Client Sample ID INDI-12072019 **Sampling Time** 1:40 PM **Extraction Date**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Dissolved Copper	ND	mg/L	0.001	12/16/2019 12:48:00 PM	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	12/16/2019 12:48:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.00778	mg/L	0.001	12/16/2019 12:48:00 PM	TRC	EPA 200.8	

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191209036
Project Name: SAND FILTER

Analytical Results Report

Sample Number 191209036-005 | **Sampling Date** 12/7/2019 | **Date/Time Received** 12/9/2019 8:09 AM
Client Sample ID EF18DI-12072019 | **Sampling Time** 1:40 PM | **Extraction Date**
Matrix Water | **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Dissolved Copper	ND	mg/L	0.001	12/16/2019 12:51:00 PM	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	12/16/2019 12:51:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.00780	mg/L	0.001	12/16/2019 12:51:00 PM	TRC	EPA 200.8	

Sample Number 191209036-006 | **Sampling Date** 12/7/2019 | **Date/Time Received** 12/9/2019 8:09 AM
Client Sample ID EF12DI-12072019 | **Sampling Time** 1:40 PM | **Extraction Date**
Matrix Water | **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Dissolved Copper	ND	mg/L	0.001	12/16/2019 12:54:00 PM	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.01	12/16/2019 12:54:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0114	mg/L	0.001	12/16/2019 12:54:00 PM	TRC	EPA 200.8	

Authorized Signature

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Login Report

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191209036
Order Date: 12/9/2019

Contact Name: ETHAN MURNIN
Project Name: SAND FILTER

Comment:

Sample #: 191209036-001 **Customer Sample #:** IN-12072019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/7/2019
Quantity: 6 **Date Received:** 12/9/2019 8:09:00 AM **Time Collected:** 1:40 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/19/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	12/19/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	12/19/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/19/2019	***Normal (~10 Days)***
TKN-SPO	S	SM4500NORGC	12/19/2019	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	12/19/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	12/19/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	12/19/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***

Sample #: 191209036-002 **Customer Sample #:** EF18-12072019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/7/2019
Quantity: 6 **Date Received:** 12/9/2019 8:09:00 AM **Time Collected:** 1:40 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/19/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	12/19/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	12/19/2019	***Normal (~10 Days)***

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191209036
Order Date: 12/9/2019

Contact Name: ETHAN MURNIN

Project Name: SAND FILTER

Comment:

SOLIDS - TSS	S	SM 2540D	12/19/2019	***Normal (~10 Days)***
TKN-SPO	S	SM4500NORGC	12/19/2019	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	12/19/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	12/19/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	12/19/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***

Sample #: 191209036-003 **Customer Sample #:** EF12-12072019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/7/2019
Quantity: 6 **Date Received:** 12/9/2019 8:09:00 AM **Time Collected:** 1:40 PM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	12/19/2019	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	12/19/2019	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	12/19/2019	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	12/19/2019	***Normal (~10 Days)***
TKN-SPO	S	SM4500NORGC	12/19/2019	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	12/19/2019	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	12/19/2019	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	12/19/2019	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***

Sample #: 191209036-004 **Customer Sample #:** INDI-12072019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/7/2019
Quantity: 1 **Date Received:** 12/9/2019 8:09:00 AM **Time Collected:** 1:40 PM
Comment:

Test	Lab	Method	Due Date	Priority
DISSOLVED COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191209036
Order Date: 12/9/2019

Contact Name: ETHAN MURNIN

Project Name: SAND FILTER

Comment:

Sample #: 191209036-005 **Customer Sample #:** EF18DI-12072019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/7/2019
Quantity: 1 **Date Received:** 12/9/2019 8:09:00 AM **Time Collected:** 1:40 PM
Comment:

Test	Lab	Method	Due Date	Priority
DISSOLVED COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***

Sample #: 191209036-006 **Customer Sample #:** EF12DI-12072019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/7/2019
Quantity: 1 **Date Received:** 12/9/2019 8:09:00 AM **Time Collected:** 1:40 PM
Comment:

Test	Lab	Method	Due Date	Priority
DISSOLVED COPPER SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	12/19/2019	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	2.8
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Labels and chain agree?	No
Total number of containers?	21

'91209 036 SPKC Last Due 12/19/2019
1st SAMP 12/7/2019 1st RCVD 12/9/2019
SAND FILTER

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Company Name:	Spokane County	Project Manager:	Ethan Murnin
Address:	1026 W. Broadway Avenue	Project Name & # :	Sand Filter
City: Spokane	State: WA Zip: 99260	Email Address :	EMURNIN@spokanecounty.org
Phone:	509-477-7420	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Around Time & Reporting

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
8 Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Preservative:

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
	IN-12072019	12-7-19 1340	water	4		8	8	8	8	8	8	8	8	8	8
	EF18-12072019		water	4		8	8	8	8	8	8	8	8	8	8
	EF12-12072019		water	1		8	8	8	8	8	8	8	8	8	8
	INDI-12072019		water	1				8							
	EF18DI-12072019		water					8							
	EF12DI-12072019		water					8							
		per bottles													

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWBS

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	(N)
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~

Cooler | Ice | Hand

Temperature (°C): 2.8 DIG-04

Preservative: HCl R385-3 <2 HNO3 P18009-7B <2
H_2SO_4 R386-3 <2 pH P18285-3V

Date & Time: 12-9-19 | 0805 | 1400

Inspected By: KAS MG

	Printed Name	Signature	Company	Date	Time
Relinquished by	Anna Bonaci	Anna Bonaci		12/09/19	8:05
Received by	Kathy Sattler	Kathy Sattler	Anatek labs	12-9-19	0809
Relinquished by					
Received by					
Relinquished by					
Received by					

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191220035
Project Name: SAND FILTER

Analytical Results Report

Sample Number 191220035-001
Client Sample ID IN-11122019
Matrix Water
Comments

Sampling Date 12/20/2019
Sampling Time 9:00 AM
Sample Location

Date/Time Received 12/20/20112:26 PM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00365	mg/L	0.001	12/26/2019 12:00:00 PM	TRC	EPA 200.8	
Dissolved Copper	0.00215	mg/L	0.001	12/26/2019 11:43:00 AM	TRC	EPA 200.8	
Dissolved Iron	0.0268	mg/L	0.01	12/27/2019 1:34:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.0279	mg/L	0.001	12/26/2019 11:43:00 AM	TRC	EPA 200.8	
Hardness	153	mg CaCO3/L	2	12/20/2019 3:30:00 PM	NDE	EPA 130.2	
Iron	0.164	mg/L	0.01	12/27/2019 1:47:00 PM	TRC	EPA 200.8	
NO3/N+NO2/N	<0.1	mg/L	0.1	12/31/2019 12:01:00 PM	TLM	SM 4500 NO3F	
PO4/P	0.113	mg/L	0.01	12/20/2019 4:15:00 PM	TLM	SM4500PF	
TSS	14	mg/L	2	12/26/2019 7:45:00 AM	BAS	SM 2540D	
TKN	1.18	mg/L	0.5	1/8/2020 3:09:00 PM	TLM	SM4500NORGC	
Total Nitrogen	1.18	mg/L		1/8/2020 4:01:00 PM	TLM	Calculation	
Total P	0.190	mg/L	0.01	1/3/2020 2:06:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	1/3/2020 11:06:00 PM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	1/3/2020 11:06:00 PM	LMC	NWTPHDX	
Zinc	0.0236	mg/L	0.001	12/26/2019 12:00:00 PM	TRC	EPA 200.8	

Surrogate Data

Sample Number 191220035-001

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	95.8	50-150

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191220035
Project Name: SAND FILTER

Analytical Results Report

Sample Number 191220035-002
Client Sample ID EF18-11122019
Matrix Water
Comments

Sampling Date 12/20/2019
Sampling Time 9:00 AM
Sample Location

Date/Time Received 12/20/20112:26 PM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00164	mg/L	0.001	12/26/2019 12:03:00 PM	TRC	EPA 200.8	
Dissolved Copper	0.00127	mg/L	0.001	12/26/2019 11:46:00 AM	TRC	EPA 200.8	
Dissolved Iron	0.0257	mg/L	0.01	12/27/2019 1:41:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.00842	mg/L	0.001	12/26/2019 11:46:00 AM	TRC	EPA 200.8	
Hardness	315	mg CaCO3/L	2	12/20/2019 3:30:00 PM	NDE	EPA 130.2	
Iron	0.158	mg/L	0.01	12/27/2019 1:50:00 PM	TRC	EPA 200.8	
NO3/N+NO2/N	0.201	mg/L	0.1	12/31/2019 12:02:00 PM	TLM	SM 4500 NO3F	
PO4/P	0.283	mg/L	0.01	12/20/2019 4:16:00 PM	TLM	SM4500PF	
TSS	6	mg/L	1	12/26/2019 7:45:00 AM	BAS	SM 2540D	
TKN	<0.5	mg/L	0.5	1/8/2020 3:10:00 PM	TLM	SM4500NORGC	
Total Nitrogen	ND	mg/L		1/8/2020 4:01:00 PM	TLM	Calculation	
Total P	0.496	mg/L	0.1	1/3/2020 2:26:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	1/3/2020 12:02:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	1/3/2020 12:02:00 AM	LMC	NWTPHDX	
Zinc	0.00384	mg/L	0.001	12/26/2019 12:03:00 PM	TRC	EPA 200.8	

Surrogate Data

Sample Number 191220035-002

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	86.6	50-150

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191220035
Project Name: SAND FILTER

Analytical Results Report

Sample Number 191220035-003
Client Sample ID EF12-11122019
Matrix Water
Comments

Sampling Date 12/20/2019
Sampling Time 9:00 AM
Sample Location

Date/Time Received 12/20/20112:26 PM
Extraction Date

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Copper	0.00110	mg/L	0.001	12/26/2019 12:05:00 PM	TRC	EPA 200.8	
Dissolved Copper	ND	mg/L	0.001	12/26/2019 11:49:00 AM	TRC	EPA 200.8	
Dissolved Iron	0.0124	mg/L	0.01	12/27/2019 1:44:00 PM	TRC	EPA 200.8	
Dissolved Zinc	0.00910	mg/L	0.001	12/26/2019 11:49:00 AM	TRC	EPA 200.8	
Hardness	292	mg CaCO3/L	2	12/20/2019 3:30:00 PM	NDE	EPA 130.2	
Iron	0.0291	mg/L	0.01	12/27/2019 1:54:00 PM	TRC	EPA 200.8	
NO3/N+NO2/N	0.110	mg/L	0.1	12/31/2019 12:03:00 PM	TLM	SM 4500 NO3F	
PO4/P	0.215	mg/L	0.01	12/20/2019 4:18:00 PM	TLM	SM4500PF	
TSS	5	mg/L	1	12/26/2019 7:45:00 AM	BAS	SM 2540D	
TKN	<0.5	mg/L	0.5	1/8/2020 3:11:00 PM	TLM	SM4500NORGC	
Total Nitrogen	ND	mg/L		1/8/2020 4:02:00 PM	TLM	Calculation	
Total P	0.409	mg/L	0.1	1/3/2020 2:28:00 PM	TLM	SM4500PF	
Diesel	ND	mg/L	0.1	1/3/2020 12:57:00 AM	LMC	NWTPHDX	
Lube Oil	ND	mg/L	0.4	1/3/2020 12:57:00 AM	LMC	NWTPHDX	
Zinc	0.00130	mg/L	0.001	12/26/2019 12:05:00 PM	TRC	EPA 200.8	

Surrogate Data

Sample Number 191220035-003

Surrogate Standard	Method	Percent Recovery	Control Limits
hexacosane	NWTPHDX	91.4	50-150

Authorized Signature

Kathleen A. Sattler

Kathleen A. Sattler, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191220035
Project Name: SAND FILTER

Analytical Results Report

Quality Control Data

Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
TKN	1.86	mg/L	2	93.0	90-110	1/8/2020	1/8/2020
Diesel	0.840	mg/L	1	84.0	50-150	1/3/2020	1/3/2020
NO3/N+NO2/N	0.202	mg/L	0.2	101.0	80-120	12/31/2019	12/31/2019
Iron	0.114	mg/L	0.1	114.0	85-115	12/24/2019	12/27/2019
Dissolved Iron	0.114	mg/L	0.1	114.0	85-115	12/24/2019	12/27/2019
TSS	98	mg/L	100	98.0	90-110	12/26/2019	12/26/2019
Zinc	0.0460	mg/L	0.05	92.0	85-115	12/24/2019	12/26/2019
Zinc	0.0460	mg/L	0.05	92.0	85-115	12/24/2019	12/26/2019
Dissolved Zinc	0.0460	mg/L	0.05	92.0	85-115	12/24/2019	12/26/2019
Dissolved Copper	0.0469	mg/L	0.05	93.8	85-115	12/24/2019	12/26/2019
Copper	0.0469	mg/L	0.05	93.8	85-115	12/24/2019	12/26/2019
Copper	0.0469	mg/L	0.05	93.8	85-115	12/24/2019	12/26/2019
PO4/P	0.103	mg/L	0.1	103.0	80-120	12/20/2019	12/20/2019
Hardness	101	mg CaCO3/L	100	101.0	90-110	12/20/2019	12/20/2019

Lab Control Sample Duplicate

Parameter	LCSD Result	Units	LCSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Hardness	100	mg CaCO3/L	100	100.0	1.0	0-25	12/20/2019	12/20/2019

Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
191223010-001A	Zinc	0.423	0.461	mg/L	0.05	76.0	70-130	12/24/2019	12/26/2019
191223010-001A	Zinc	0.423	0.461	mg/L	0.05	76.0	70-130	12/24/2019	12/26/2019
191220035-003	Diesel	ND	0.973	mg/L	1	97.3	50-150	1/3/2020	1/3/2020
191219006-001	TKN	1.24	3.45	mg/L	2	110.5	80-120	1/8/2020	1/8/2020
191220035-003	TSS	5	120	mg/L	100	115.0	80-120	12/26/2019	12/26/2019
191220035-003	PO4/P	0.215	0.312	mg/L	0.1	97.0	80-120	12/20/2019	12/20/2019
191223005-001	NO3/N+NO2/N	<0.1	0.197	mg/L	0.2	98.5	70-130	12/31/2019	12/31/2019
191223010-001A	Iron	0.0186	0.125	mg/L	0.1	106.4	70-130	12/24/2019	12/27/2019
191217025-001B	Hardness	135	236	mg CaCO3/L	100	101.0	80-120	12/20/2019	12/20/2019
191223010-001A	Dissolved Zinc	0.423	0.461	mg/L	0.05	76.0	70-130	12/24/2019	12/26/2019
191223010-001A	Dissolved Iron	0.0186	0.125	mg/L	0.1	106.4	70-130	12/24/2019	12/27/2019
191223010-001A	Dissolved Copper	0.105	0.156	mg/L	0.05	102.0	70-130	12/24/2019	12/26/2019

Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191220035
Project Name: SAND FILTER

Analytical Results Report

Quality Control Data

Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
191223010-001A	Copper	0.105	0.156	mg/L	0.05	102.0	70-130	12/24/2019	12/26/2019
191223010-001A	Copper	0.105	0.156	mg/L	0.05	102.0	70-130	12/24/2019	12/26/2019

Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Zinc	0.461	mg/L	0.05	76.0	0.0	0-20	12/24/2019	12/26/2019
Zinc	0.461	mg/L	0.05	76.0	0.0	0-20	12/24/2019	12/26/2019
Diesel	0.915	mg/L	1	91.5	6.1	0-50	1/3/2020	1/3/2020
TSS	118	mg/L	100	113.0	1.7	0-20	12/26/2019	12/26/2019
PO4/P	0.315	mg/L	0.1	100.0	1.0	0-20	12/20/2019	12/20/2019
NO3/N+NO2/N	0.161	mg/L	0.2	80.5	20.1	0-25	12/31/2019	12/31/2019
Iron	0.122	mg/L	0.1	103.4	2.4	0-20	12/24/2019	12/27/2019
Hardness	234	mg CaCO3/L	100	99.0	0.9	0-20	12/20/2019	12/20/2019
Dissolved Zinc	0.461	mg/L	0.05	76.0	0.0	0-20	12/24/2019	12/26/2019
Dissolved Iron	0.122	mg/L	0.1	103.4	2.4	0-20	12/24/2019	12/27/2019
Dissolved Copper	0.157	mg/L	0.05	104.0	0.6	0-20	12/24/2019	12/26/2019
Copper	0.157	mg/L	0.05	104.0	0.6	0-20	12/24/2019	12/26/2019
Copper	0.157	mg/L	0.05	104.0	0.6	0-20	12/24/2019	12/26/2019

Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Copper	ND	mg/L	0.001	12/24/2019	12/26/2019
Copper	ND	mg/L	0.001	12/24/2019	12/26/2019
Diesel	ND	mg/L	0.1	1/3/2020	1/3/2020
Dissolved Copper	ND	mg/L	0.001	12/24/2019	12/26/2019
Dissolved Iron	ND	mg/L	0.001	12/24/2019	12/27/2019
Dissolved Zinc	ND	mg/L	0.001	12/24/2019	12/26/2019
Hardness	<5	mg CaCO3/L	1	12/20/2019	12/20/2019
Iron	ND	mg/L	0.01	12/24/2019	12/27/2019
Lube Oil	ND	mg/L	0.4	1/3/2020	1/3/2020
NO3/N+NO2/N	<0.1	mg/L	0.05	12/31/2019	12/31/2019
PO4/P	ND	mg/L	0.01	12/20/2019	12/20/2019
TKN	<0.5	mg/L	0.5	1/8/2020	1/8/2020
TSS	<1	mg/L	1	12/26/2019	12/26/2019
Zinc	ND	mg/L	0.001	12/24/2019	12/26/2019

Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: SPOKANE COUNTY
Address: 1026 W BROADWAY
SPOKANE, WA 99260-0430
Attn: ETHAN MURNIN

Batch #: 191220035
Project Name: SAND FILTER

Analytical Results Report

Quality Control Data

Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Zinc	ND	mg/L	0.001	12/24/2019	12/26/2019

Duplicate

Sample Number	Parameter	Sample Result	Duplicate Result	Units	%RPD	AR %RPD	Prep Date	Analysis Date
191224006-002	TSS	13	11	mg/L	16.7	0-20	12/26/2019	12/26/2019
191224006-002	TSS	13	11	mg/L	16.7	0-20	12/26/2019	12/26/2019
191211029-001	Hardness	16.5	16.0	mg CaCO3/L	3.1	0-25	12/20/2019	12/20/2019

AR	Acceptable Range
ND	Not Detected
PQL	Practical Quantitation Limit
RPD	Relative Percentage Difference

Comments:

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Login Report

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191220035
Order Date: 12/20/2019

Contact Name: ETHAN MURNIN
Project Name: SAND FILTER

Comment:

Sample #: 191220035-001 **Customer Sample #:** IN-11122019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/20/2019
Quantity: 1 **Date Received:** 12/20/2019 12:26:00 PM **Time Collected:** 9:00 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	1/4/2020	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	1/4/2020	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	1/4/2020	***Normal (~10 Days)***
TKN	S	SM4500NORGC	1/4/2020	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	1/4/2020	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	1/4/2020	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***

Sample #: 191220035-002 **Customer Sample #:** EF18-11122019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/20/2019
Quantity: 1 **Date Received:** 12/20/2019 12:26:00 PM **Time Collected:** 9:00 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	1/4/2020	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	1/4/2020	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191220035
Order Date: 12/20/2019

Contact Name: ETHAN MURNIN

Project Name: SAND FILTER

Comment:

SOLIDS - TSS	S	SM 2540D	1/4/2020	***Normal (~10 Days)***
TKN	S	SM4500NORGC	1/4/2020	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	1/4/2020	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	1/4/2020	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***

Sample #: 191220035-003 **Customer Sample #:** EF12-11122019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/20/2019

Quantity: 1 **Date Received:** 12/20/2019 12:26:00 PM **Time Collected:** 9:00 AM

Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	1/4/2020	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	1/4/2020	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	1/4/2020	***Normal (~10 Days)***
TKN	S	SM4500NORGC	1/4/2020	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	1/4/2020	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	1/4/2020	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	2.2
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	
Is there a trip blank to accompany VOC samples?	
Labels and chain agree?	Yes
Total number of containers?	15

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Login Report

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191220035
Order Date: 12/20/2019

Contact Name: ETHAN MURNIN
Project Name: SAND FILTER

Comment:

Sample #: 191220035-001 **Customer Sample #:** IN-11122019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/20/2019
Quantity: 1 **Date Received:** 12/20/2019 12:26:00 PM **Time Collected:** 9:00 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	1/4/2020	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	1/4/2020	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	1/4/2020	***Normal (~10 Days)***
TKN	S	SM4500NORGC	1/4/2020	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	1/4/2020	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	1/4/2020	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***

Sample #: 191220035-002 **Customer Sample #:** EF18-11122019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/20/2019
Quantity: 1 **Date Received:** 12/20/2019 12:26:00 PM **Time Collected:** 9:00 AM
Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	1/4/2020	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	1/4/2020	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***

Customer Name: SPOKANE COUNTY
1026 W BROADWAY
SPOKANE WA 99260-0430

Order ID: 191220035
Order Date: 12/20/2019

Contact Name: ETHAN MURNIN

Project Name: SAND FILTER

Comment:

SOLIDS - TSS	S	SM 2540D	1/4/2020	***Normal (~10 Days)***
TKN	S	SM4500NORGC	1/4/2020	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	1/4/2020	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	1/4/2020	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***

Sample #: 191220035-003 **Customer Sample #:** EF12-11122019

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 12/20/2019

Quantity: 1 **Date Received:** 12/20/2019 12:26:00 PM **Time Collected:** 9:00 AM

Comment:

Test	Lab	Method	Due Date	Priority
COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED COPPER SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
DISSOLVED ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
HARDNESS EPA 130.2	S	EPA 130.2	1/4/2020	***Normal (~10 Days)***
IRON SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***
NITRATE+NITRITE FIA	S	SM 4500 NO3F	1/4/2020	***Normal (~10 Days)***
PHOSPHATE/P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
SOLIDS - TSS	S	SM 2540D	1/4/2020	***Normal (~10 Days)***
TKN	S	SM4500NORGC	1/4/2020	***Normal (~10 Days)***
TOTAL NITROGEN	S	Calculation	1/4/2020	***Normal (~10 Days)***
TOTAL P FIA	S	SM4500PF	1/4/2020	***Normal (~10 Days)***
TPHDX-NW	S	NWTPHDX	1/4/2020	***Normal (~10 Days)***
ZINC SPO	S	EPA 200.8	1/4/2020	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	2.2
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	
Is there a trip blank to accompany VOC samples?	
Labels and chain agree?	Yes
Total number of containers?	15

191220 035 SPKC Last Due 1/4/2020
1st SAMP 12/20/201 1st RCVD 12/20/2019
SAND FILTER

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Sand Filter
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Around Time & Reporting

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
				Preservative:											
	IN-11122019	12-20-19 0900	water	5		x	x	x	x	x	x	x	x	x	x
	EF18-11122019	12-20-19 0900	water	5		x	x	x	x	x	x	x	x	x	x
	EF12-11122019	12-20-19 0900	water	5		x	x	x	x	x	x	x	x	x	x

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	Y	N

HCl

Temperature (°C): 2-20 Dig-04 BM
Preservative: HCl R385-3
H_2SO_4 R3863 pH <2 P18285
Date & Time: 12-20-19 1400
Inspected By: KAS

	Printed Name	Signature	Company	Date	Time
Relinquished by	T. Hoffman-Ballard	Taylor Hoffman-Ballard	OCT	12/20/19	17:25
Received by	Brock Geiger	Brock Geiger	Anatek	12-20-19	1226
Relinquished by					
Received by					
Relinquished by					
Received by					

Anatek Labs, Inc.

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504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Client:	Spokane County	Work Order:	WAA0225
Address:	1026 W. Broadway Ave.	Project:	Gonzaga
	Spokane, WA 99260-0430	Reported:	2/20/2020 12:49
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	IN-01282010		
Lab/Sample Number:	WAA0225-01	Collect Date:	01/28/20 17:55
Date Received:	01/29/20 09:02	Collected By:	

12" and 18" Effluents were switched in the field.

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N + Nitrite/N	0.420	mg/L	0.100	2/7/20 10:51	TLM	SM 4500-NO3 F	
TKN	<0.5	mg/L	0.500	2/10/20 16:01	TLM	SM 4500-Norg D	
Hardness	20.0	mg CaCO3/L	1.00	2/3/20 11:40	NDE	SM 2340 C	
Phosphate/P	0.0502	mg/L	0.0100	1/30/20 15:29	TLM	SM 4500-P G	
Total P	0.105	mg/L	0.100	2/11/20 15:36	TLM	SM 4500-P F	
TSS	11.0	mg/L	1.00	2/4/20 15:45	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00369	mg/L	0.00100	2/3/20 14:58	Metals	EPA 200.8	
Dissolved Copper	0.00373	mg/L	0.00100	2/3/20 13:40	Metals	EPA 200.8	
Iron	0.313	mg/L	0.0100	2/3/20 14:58	Metals	EPA 200.8	
Dissolved Iron	0.0170	mg/L	0.0100	2/3/20 13:40	Metals	EPA 200.8	
Zinc	0.0217	mg/L	0.00100	2/3/20 14:58	Metals	EPA 200.8	
Dissolved Zinc	0.0192	mg/L	0.00100	2/3/20 13:40	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	2/12/20 3:11	LMC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	2/12/20 3:11	LMC	EPA 8015D	
Diesel	ND	mg/L	0.100	2/12/20 3:11	LMC	EPA 8015D	
Surrogate: n-Hexacosane	*103%*		*50-150*	*2/12/20 3:11*	*LMC*	*EPA 8015D*	

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Sample Location: EF18-01282020
Lab/Sample Number: WAA0225-02 Collect Date: 01/28/20 17:55
Date Received: 01/29/20 09:02 Collected By:

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N + Nitrite/N	1.00	mg/L	0.100	2/7/20 10:52	TLM	SM 4500-NO3 F	
TKN	<0.5	mg/L	0.500	2/10/20 16:02	TLM	SM 4500-Norg D	
Hardness	59.0	mg CaCO3/L	1.00	2/3/20 11:40	NDE	SM 2340 C	
Phosphate/P	0.445	mg/L	0.0100	1/30/20 15:30	TLM	SM 4500-P G	
Total P	0.516	mg/L	0.100	2/11/20 15:39	TLM	SM 4500-P F	
TSS	3.50	mg/L	1.00	2/4/20 15:45	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00685	mg/L	0.00100	2/3/20 15:02	Metals	EPA 200.8	
Dissolved Copper	0.00670	mg/L	0.00100	2/3/20 13:43	Metals	EPA 200.8	
Iron	0.282	mg/L	0.0100	2/3/20 15:02	Metals	EPA 200.8	
Dissolved Iron	0.136	mg/L	0.0100	2/3/20 13:43	Metals	EPA 200.8	
Zinc	0.00570	mg/L	0.00100	2/3/20 15:02	Metals	EPA 200.8	
Dissolved Zinc	0.0176	mg/L	0.00100	2/3/20 13:43	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	2/12/20 4:06	LMC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	2/12/20 4:06	LMC	EPA 8015D	
Diesel	ND	mg/L	0.100	2/12/20 4:06	LMC	EPA 8015D	
Surrogate: n-Hexacosane	*83.4%*		*50-150*	*2/12/20 4:06*	*LMC*	*EPA 8015D*	

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Sample Location: EF12-01282020

Lab/Sample Number: WAA0225-03 Collect Date: 01/28/20 17:55

Date Received: 01/29/20 09:02 Collected By:

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N + Nitrite/N	0.683	mg/L	0.100	2/7/20 10:57	TLM	SM 4500-NO3 F	
TKN	0.801	mg/L	0.500	2/10/20 16:03	TLM	SM 4500-Norg D	
Hardness	52.0	mg CaCO3/L	1.00	2/3/20 11:40	NDE	SM 2340 C	
Phosphate/P	0.738	mg/L	0.0100	1/30/20 15:31	TLM	SM 4500-P G	
Total P	0.945	mg/L	0.100	2/11/20 15:41	TLM	SM 4500-P F	
TSS	1.50	mg/L	1.00	2/4/20 15:45	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00835	mg/L	0.00100	2/3/20 15:05	Metals	EPA 200.8	
Dissolved Copper	0.00840	mg/L	0.00100	2/3/20 13:46	Metals	EPA 200.8	
Iron	0.476	mg/L	0.0100	2/3/20 15:05	Metals	EPA 200.8	
Dissolved Iron	0.166	mg/L	0.0100	2/3/20 13:46	Metals	EPA 200.8	
Zinc	0.00888	mg/L	0.00100	2/3/20 15:05	Metals	EPA 200.8	
Dissolved Zinc	0.0192	mg/L	0.00100	2/3/20 13:46	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	2/12/20 5:00	LMC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	2/12/20 5:00	LMC	EPA 8015D	
Diesel	ND	mg/L	0.100	2/12/20 5:00	LMC	EPA 8015D	
Surrogate: n-Hexacosane	*112%*		*50-150*	*2/12/20 5:00*	*LMC*	*EPA 8015D*	

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Sample Location: INDI-01282020
Lab/Sample Number: WAA0225-04 Collect Date: 01/28/20 17:55
Date Received: 01/29/20 09:02 Collected By:

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00204	mg/L	0.00100	2/3/20 13:49	Metals	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	2/3/20 13:49	Metals	EPA 200.8	
Dissolved Zinc	0.0147	mg/L	0.00100	2/3/20 13:49	Metals	EPA 200.8	

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Sample Location: EF18DI-01282020
Lab/Sample Number: WAA0225-05 Collect Date: 01/28/20 17:55
Date Received: 01/29/20 09:02 Collected By:

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00569	mg/L	0.00100	2/3/20 13:53	Metals	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	2/3/20 13:53	Metals	EPA 200.8	
Dissolved Zinc	0.0828	mg/L	0.00100	2/3/20 13:53	Metals	EPA 200.8	

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Sample Location: EF12DI-01282020
Lab/Sample Number: WAA0225-06 Collect Date: 01/28/20 17:55
Date Received: 01/29/20 09:02 Collected By:

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00247	mg/L	0.00100	2/3/20 13:56	Metals	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	2/3/20 13:56	Metals	EPA 200.8	
Dissolved Zinc	0.00906	mg/L	0.00100	2/3/20 13:56	Metals	EPA 200.8	

Authorized Signature,

Brock Gerger For Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAA0048 - W FIA										
Blank (BAA0048-BLK1)					Prepared & Analyzed: 1/30/2020					
Phosphate/P	ND		0.0100	mg/L						
LCS (BAA0048-BS1)					Prepared & Analyzed: 1/30/2020					
Phosphate/P	0.0958		0.0102	mg/L	0.102		93.9	0-200		
Matrix Spike (BAA0048-MS1)		**Source: WAA0182-02**			Prepared & Analyzed: 1/30/2020					
Phosphate/P	0.286		0.0102	mg/L	0.102	0.186	97.4	0-200		
Matrix Spike Dup (BAA0048-MSD1)		**Source: WAA0182-02**			Prepared & Analyzed: 1/30/2020					
Phosphate/P	0.287		0.0102	mg/L	0.102	0.186	98.4	0-200	0.357	200
Batch: BAB0003 - W Wet Chem										
Blank (BAB0003-BLK1)					Prepared & Analyzed: 2/3/2020					
Hardness	ND		1.00	mg CaCO3/L						
Blank (BAB0003-BLK2)					Prepared & Analyzed: 2/3/2020					
Hardness	ND		1.00	mg CaCO3/L						
LCS (BAB0003-BS1)					Prepared & Analyzed: 2/3/2020					
Hardness	101			mg CaCO3/L	100		101	0-200		
LCS Dup (BAB0003-BSD1)					Prepared & Analyzed: 2/3/2020					
Hardness	100			mg CaCO3/L	100		100	0-200	0.995	200
Duplicate (BAB0003-DUP1)		**Source: WAA0246-01**			Prepared & Analyzed: 2/3/2020					
Hardness	168		2.00	mg CaCO3/L		167			0.597	200

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0003 - W Wet Chem (Continued)										
Matrix Spike (BAB0003-MS1)		**Source: WAA0224-01**			Prepared & Analyzed: 2/3/2020					
Hardness	114			mg CaCO3/L	100	15.0	99.0	0-200		
Matrix Spike Dup (BAB0003-MSD1)		**Source: WAA0224-01**			Prepared & Analyzed: 2/3/2020					
Hardness	115			mg CaCO3/L	100	15.0	100	0-200	0.873	200
Batch: BAB0067 - FIA										
Blank (BAB0067-BLK1)					Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	ND		0.500	mg/L						
Blank (BAB0067-BLK2)					Prepared & Analyzed: 2/12/2020					
TKN	ND		0.500	mg/L						
LCS (BAB0067-BS1)					Prepared & Analyzed: 2/10/2020					
TKN	1.93		0.500	mg/L	2.00		96.5	80-120		
LCS (BAB0067-BS2)					Prepared & Analyzed: 2/10/2020					
TKN	1.87		0.500	mg/L	2.00		93.5	80-120		
Matrix Spike (BAB0067-MS1)		**Source: WAB0075-02**			Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	2.31		0.500	mg/L	2.00	0.361	97.5	70-130		
Matrix Spike (BAB0067-MS2)		**Source: WAB0085-02**			Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	2.70		0.500	mg/L	2.00	0.854	92.1	70-130		
Matrix Spike Dup (BAB0067-MSD1)		**Source: WAB0075-02**			Prepared & Analyzed: 2/10/2020					
TKN	2.44		0.500	mg/L	2.00	0.361	104	70-130	5.39	200

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0067 - FIA (Continued)										
Matrix Spike Dup (BAB0067-MSD2)		**Source: WAB0085-02**			Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	2.78		0.500	mg/L	2.00	0.854	96.4	70-130	3.11	200
Batch: BAB0085 - W Filtration										
Blank (BAB0085-BLK1)					Prepared & Analyzed: 2/4/2020					
TSS	ND		1.00	mg/L						
Blank (BAB0085-BLK2)					Prepared & Analyzed: 2/4/2020					
TSS	ND		1.00	mg/L						
LCS (BAB0085-BS1)					Prepared & Analyzed: 2/4/2020					
TSS	99.0			mg/L	100		99.0	90-110		
LCS Dup (BAB0085-BSD1)					Prepared & Analyzed: 2/4/2020					
TSS	95.0			mg/L	100		95.0	90-110	4.12	10
Duplicate (BAB0085-DUP1)		**Source: WAA0213-01**			Prepared & Analyzed: 2/4/2020					
TSS	33.0		1.00	mg/L		30.0			9.52	20
Matrix Spike (BAB0085-MS1)		**Source: WAA0214-02**			Prepared & Analyzed: 2/4/2020					
TSS	218		2.00	mg/L	100	113	105	80-120		
Matrix Spike Dup (BAB0085-MSD1)		**Source: WAA0214-02**			Prepared & Analyzed: 2/4/2020					
TSS	222		2.00	mg/L	100	113	109	80-120	1.82	20
Batch: BAB0218 - FIA										
Blank (BAB0218-BLK1)					Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0218 - FIA (Continued)										
LCS (BAB0218-BS1)					Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	0.197		0.101	mg/L	0.203		97.2	90-110		
Matrix Spike (BAB0218-MS1)		**Source: WAB0096-01**			Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	2.22		0.101	mg/L	0.203	2.03	95.1	90-110		
Matrix Spike (BAB0218-MS2)		**Source: WAB0096-01**			Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	2.23		0.101	mg/L	0.203	2.03	100	90-110		
Batch: BAB0221 - W FIA										
Blank (BAB0221-BLK1)					Prepared & Analyzed: 2/11/2020					
Total P	ND		0.0100	mg/L						
Blank (BAB0221-BLK2)					Prepared & Analyzed: 2/11/2020					
Total P	ND		0.0100	mg/L						
LCS (BAB0221-BS1)					Prepared & Analyzed: 2/11/2020					
Total P	0.0979		0.0102	mg/L	0.102		96.2	0-200		
LCS (BAB0221-BS2)					Prepared & Analyzed: 2/11/2020					
Total P	0.0949		0.0102	mg/L	0.102		93.2	0-200		
Matrix Spike (BAB0221-MS1)		**Source: WAA0209-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.383		0.0102	mg/L	0.102	0.287	94.4	0-200		
Matrix Spike (BAB0221-MS2)		**Source: WAB0066-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.294		0.0102	mg/L	0.102	0.178	114	0-200		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0221 - W FIA (Continued)										
Matrix Spike Dup (BAB0221-MSD1)		**Source: WAA0209-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.380		0.0102	mg/L	0.102	0.287	91.0	0-200	0.907	200
Matrix Spike Dup (BAB0221-MSD2)		**Source: WAB0066-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.293		0.0102	mg/L	0.102	0.178	113	0-200	0.312	200

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0034 - W 3010 Digest										
Blank (BAB0034-BLK1)					Prepared: 1/31/2020 Analyzed: 2/3/2020					
Zinc	ND		0.00100	mg/L						
Iron	ND		0.0100	mg/L						
Copper	ND		0.00100	mg/L						
LCS (BAB0034-BS1)					Prepared: 1/31/2020 Analyzed: 2/3/2020					
Iron	0.110		0.0100	mg/L	0.100		110	85-115		
Zinc	0.0516		0.00100	mg/L	0.0500		103	85-115		
Copper	0.0537		0.00100	mg/L	0.0500		107	85-115		
Matrix Spike (BAB0034-MS1)		**Source: WAA0226-02**			Prepared: 1/31/2020 Analyzed: 2/3/2020					
Zinc	0.0769		0.00100	mg/L	0.0500	0.0264	101	70-130		
Copper	0.0535		0.00100	mg/L	0.0500	0.00792	91.2	70-130		
Iron	0.162		0.0100	mg/L	0.100	0.0547	107	70-130		
Matrix Spike Dup (BAB0034-MSD1)		**Source: WAA0226-02**			Prepared: 1/31/2020 Analyzed: 2/3/2020					
Iron	0.162		0.0100	mg/L	0.100	0.0547	107	70-130	0.201	20
Zinc	0.0758		0.00100	mg/L	0.0500	0.0264	98.8	70-130	1.40	20
Copper	0.0527		0.00100	mg/L	0.0500	0.00792	89.6	70-130	1.45	20
Batch: BAB0058 - W ICP-MS										
Blank (BAB0058-BLK1)					Prepared & Analyzed: 2/3/2020					
Dissolved Copper	ND		0.00100	mg/L						
Dissolved Iron	ND		0.0100	mg/L						
Dissolved Zinc	ND		0.00100	mg/L						
LCS (BAB0058-BS1)					Prepared & Analyzed: 2/3/2020					
Dissolved Zinc	0.0504		0.00100	mg/L	0.0500		101	85-115		
Dissolved Copper	0.0523		0.00100	mg/L	0.0500		105	85-115		
Dissolved Iron	0.105		0.0100	mg/L	0.100		105	85-115		

Quality Control Data
(Continued)

Semivolatiles

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Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0158 - W TPH-Dx										
Blank (BAB0158-BLK1)					Prepared & Analyzed: 2/11/2020					
Diesel	ND		0.100	mg/L						
Lube Oil	ND		0.500	mg/L						
Mineral Oil	ND		0.100	mg/L						
Surrogate: n-Hexacosane			*49.0*	*ppm*	*50.0*		*98.1*	*50-150*		
LCS (BAB0158-BS1)					Prepared & Analyzed: 2/11/2020					
Diesel	0.936		0.100	mg/L	1.00		93.6	50-150		
Lube Oil	ND		0.500	mg/L				50-150		
Surrogate: n-Hexacosane			*49.4*	*ppm*	*50.0*		*98.8*	*50-150*		
Matrix Spike (BAB0158-MS1)		**Source: WAA0224-03**			Prepared: 2/11/2020 Analyzed: 2/12/2020					
Diesel	0.773		0.100	mg/L	1.00	ND	77.3	50-150		
Lube Oil	ND		0.500	mg/L		ND		50-150		
Surrogate: n-Hexacosane			*44.4*	*ppm*	*50.0*		*88.8*	*50-150*		
Matrix Spike Dup (BAB0158-MSD1)		**Source: WAA0224-03**			Prepared: 2/11/2020 Analyzed: 2/12/2020					
Diesel	0.893		0.100	mg/L	1.00	ND	89.3	50-150	14.3	20
Lube Oil	ND		0.500	mg/L		ND		50-150		20
Surrogate: n-Hexacosane			*52.9*	*ppm*	*50.0*		*106*	*50-150*		

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Chain of Custody Record

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504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Anatek Log-In # WAA0225

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Gonzaga Pond
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: 509-477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Around Time & Reporting

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
8 Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWBS

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340E (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
				Preservative:											
	IN-01282010	01/28/2020; 17:55	water	4		8	8	8	8	8	8	8	8	8	8
	EF18-01282020	01/28/2020; 17:55	water	4		8	8	8	8	8	8	8	8	8	8
	EF12-01282020	01/28/2020; 17:55	water	1		8	8	8	8	8	8	8	8	8	8
	INDI-01282020	01/28/2020; 17:55	water	1				8							
	EF18DI-01282020	01/28/2020; 17:55	water					8							
	EF12DI-01282020	01/28/2020; 17:55	water					8							

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	Y	N

HCl

Temperature (°C): 4.2° Dig-04

Preservative: HNO3 P18809-7B <2 HCl R385-3 <2
H_2SO_4 R400-1 <2 pH P18285-3Y

Date & Time: 1-30-20 1740

Inspected By: MG

	Printed Name	Signature	Company	Date	Time
Relinquished by	Anna Bonacci	Anna Bonacci		1/29	9:01
Received by	Brooke Geiger	Brooke Geiger	Anatek	1-29-20	0907
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

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Client:	Spokane County	Work Order:	WAA0224
Address:	1026 W. Broadway Ave.	Project:	Gonzaga
	Spokane, WA 99260-0430	Reported:	2/20/2020 12:50
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	IN-01302020		
Lab/Sample Number:	WAA0224-01	Collect Date:	01/30/20 08:30
Date Received:	01/30/20 08:53	Collected By:	

12" and 18" Effluents were switched in the field.

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N + Nitrite/N	ND	mg/L	0.100	2/7/20 10:39	TLM	SM 4500-NO3 F	
TKN	0.657	mg/L	0.250	2/13/20 16:37	TLM	SM 4500-Norg D	
Hardness	15.0	mg CaCO3/L	1.00	2/3/20 11:00	NDE	SM 2340 C	
Phosphate/P	0.115	mg/L	0.0100	1/30/20 15:27	TLM	SM 4500-P G	
Total P	0.107	mg/L	0.100	2/11/20 15:28	TLM	SM 4500-P F	
TSS	10.0	mg/L	1.00	2/4/20 15:45	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00414	mg/L	0.00100	2/3/20 14:34	Metals	EPA 200.8	
Dissolved Copper	0.00118	mg/L	0.00100	2/19/20 14:04	Metals	EPA 200.8	
Iron	0.381	mg/L	0.0100	2/3/20 14:34	Metals	EPA 200.8	
Dissolved Iron	0.0208	mg/L	0.0100	2/19/20 14:04	Metals	EPA 200.8	
Zinc	0.0198	mg/L	0.00100	2/3/20 14:34	Metals	EPA 200.8	
Dissolved Zinc	0.00804	mg/L	0.00100	2/19/20 14:04	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	2/12/20 0:27	LMC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	2/12/20 0:27	LMC	EPA 8015D	
Diesel	ND	mg/L	0.100	2/12/20 0:27	LMC	EPA 8015D	
Surrogate: n-Hexacosane	*97.1%*		*50-150*	*2/12/20 0:27*	*LMC*	*EPA 8015D*	

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Sample Location: EF18-01302020
Lab/Sample Number: WAA0224-02 Collect Date: 01/30/20 08:30
Date Received: 01/30/20 08:53 Collected By:

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N + Nitrite/N	0.134	mg/L	0.100	2/7/20 10:41	TLM	SM 4500-NO3 F	
TKN	0.884	mg/L	0.500	2/10/20 16:00	TLM	SM 4500-Norg D	
Hardness	51.0	mg CaCO3/L	1.00	2/3/20 11:00	NDE	SM 2340 C	
Phosphate/P	0.404	mg/L	0.0100	1/30/20 15:27	TLM	SM 4500-P G	
Total P	0.572	mg/L	0.100	2/11/20 15:31	TLM	SM 4500-P F	
TSS	3.50	mg/L	1.00	2/4/20 15:45	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00682	mg/L	0.00100	2/3/20 14:52	Metals	EPA 200.8	
Dissolved Copper	0.00463	mg/L	0.00100	2/19/20 14:07	Metals	EPA 200.8	
Iron	0.385	mg/L	0.0100	2/3/20 14:52	Metals	EPA 200.8	
Dissolved Iron	0.185	mg/L	0.0100	2/19/20 14:07	Metals	EPA 200.8	
Zinc	0.00644	mg/L	0.00100	2/3/20 14:52	Metals	EPA 200.8	
Dissolved Zinc	0.00483	mg/L	0.00100	2/19/20 14:07	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	2/12/20 1:22	LMC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	2/12/20 1:22	LMC	EPA 8015D	
Diesel	ND	mg/L	0.100	2/12/20 1:22	LMC	EPA 8015D	
Surrogate: n-Hexacosane	*110%*		*50-150*	*2/12/20 1:22*	*LMC*	*EPA 8015D*	

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Sample Location: EF12-01302020
Lab/Sample Number: WAA0224-03 Collect Date: 01/30/20 08:30
Date Received: 01/30/20 08:53 Collected By:

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Nitrate/N + Nitrite/N	0.228	mg/L	0.100	2/7/20 10:42	TLM	SM 4500-NO3 F	
TKN	0.865	mg/L	0.500	2/10/20 16:00	TLM	SM 4500-Norg D	
Hardness	48.5	mg CaCO3/L	1.00	2/3/20 11:00	NDE	SM 2340 C	
Phosphate/P	0.776	mg/L	0.0100	1/30/20 15:28	TLM	SM 4500-P G	
Total P	0.911	mg/L	0.100	2/11/20 15:34	TLM	SM 4500-P F	
TSS	ND	mg/L	1.00	2/4/20 15:45	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00762	mg/L	0.00100	2/3/20 14:55	Metals	EPA 200.8	
Dissolved Copper	0.00648	mg/L	0.00100	2/19/20 14:10	Metals	EPA 200.8	
Iron	0.295	mg/L	0.0100	2/3/20 14:55	Metals	EPA 200.8	
Dissolved Iron	0.245	mg/L	0.0100	2/19/20 14:10	Metals	EPA 200.8	
Zinc	0.00776	mg/L	0.00100	2/3/20 14:55	Metals	EPA 200.8	
Dissolved Zinc	0.00649	mg/L	0.00100	2/19/20 14:10	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	2/12/20 2:17	LMC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	2/12/20 2:17	LMC	EPA 8015D	
Diesel	ND	mg/L	0.100	2/12/20 2:17	LMC	EPA 8015D	
Surrogate: n-Hexacosane	*80.8%*		*50-150*	*2/12/20 2:17*	*LMC*	*EPA 8015D*	

Authorized Signature,

Brock Gerger For Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAA0048 - W FIA										
Blank (BAA0048-BLK1)					Prepared & Analyzed: 1/30/2020					
Phosphate/P	ND		0.0100	mg/L						
LCS (BAA0048-BS1)					Prepared & Analyzed: 1/30/2020					
Phosphate/P	0.0958		0.0102	mg/L	0.102		93.9	0-200		
Matrix Spike (BAA0048-MS1)		**Source: WAA0182-02**			Prepared & Analyzed: 1/30/2020					
Phosphate/P	0.286		0.0102	mg/L	0.102	0.186	97.4	0-200		
Matrix Spike Dup (BAA0048-MSD1)		**Source: WAA0182-02**			Prepared & Analyzed: 1/30/2020					
Phosphate/P	0.287		0.0102	mg/L	0.102	0.186	98.4	0-200	0.357	200
Batch: BAB0003 - W Wet Chem										
Blank (BAB0003-BLK1)					Prepared & Analyzed: 2/3/2020					
Hardness	ND		1.00	mg CaCO3/L						
Blank (BAB0003-BLK2)					Prepared & Analyzed: 2/3/2020					
Hardness	ND		1.00	mg CaCO3/L						
LCS (BAB0003-BS1)					Prepared & Analyzed: 2/3/2020					
Hardness	101			mg CaCO3/L	100		101	0-200		
LCS Dup (BAB0003-BSD1)					Prepared & Analyzed: 2/3/2020					
Hardness	100			mg CaCO3/L	100		100	0-200	0.995	200
Duplicate (BAB0003-DUP1)		**Source: WAA0246-01**			Prepared & Analyzed: 2/3/2020					
Hardness	168		2.00	mg CaCO3/L		167			0.597	200

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0003 - W Wet Chem (Continued)										
Matrix Spike (BAB0003-MS1)		**Source: WAA0224-01**			Prepared & Analyzed: 2/3/2020					
Hardness	114			mg CaCO3/L	100	15.0	99.0	0-200		
Matrix Spike Dup (BAB0003-MSD1)		**Source: WAA0224-01**			Prepared & Analyzed: 2/3/2020					
Hardness	115			mg CaCO3/L	100	15.0	100	0-200	0.873	200
Batch: BAB0067 - FIA										
Blank (BAB0067-BLK1)					Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	ND		0.500	mg/L						
Blank (BAB0067-BLK2)					Prepared & Analyzed: 2/12/2020					
TKN	ND		0.500	mg/L						
LCS (BAB0067-BS1)					Prepared & Analyzed: 2/10/2020					
TKN	1.93		0.500	mg/L	2.00		96.5	80-120		
LCS (BAB0067-BS2)					Prepared & Analyzed: 2/10/2020					
TKN	1.87		0.500	mg/L	2.00		93.5	80-120		
Matrix Spike (BAB0067-MS1)		**Source: WAB0075-02**			Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	2.31		0.500	mg/L	2.00	0.361	97.5	70-130		
Matrix Spike (BAB0067-MS2)		**Source: WAB0085-02**			Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	2.70		0.500	mg/L	2.00	0.854	92.1	70-130		
Matrix Spike Dup (BAB0067-MSD1)		**Source: WAB0075-02**			Prepared & Analyzed: 2/10/2020					
TKN	2.44		0.500	mg/L	2.00	0.361	104	70-130	5.39	200

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0067 - FIA (Continued)										
Matrix Spike Dup (BAB0067-MSD2)		**Source: WAB0085-02**			Prepared: 2/6/2020 Analyzed: 2/10/2020					
TKN	2.78		0.500	mg/L	2.00	0.854	96.4	70-130	3.11	200
Batch: BAB0085 - W Filtration										
Blank (BAB0085-BLK1)					Prepared & Analyzed: 2/4/2020					
TSS	ND		1.00	mg/L						
Blank (BAB0085-BLK2)					Prepared & Analyzed: 2/4/2020					
TSS	ND		1.00	mg/L						
LCS (BAB0085-BS1)					Prepared & Analyzed: 2/4/2020					
TSS	99.0			mg/L	100		99.0	90-110		
LCS Dup (BAB0085-BSD1)					Prepared & Analyzed: 2/4/2020					
TSS	95.0			mg/L	100		95.0	90-110	4.12	10
Duplicate (BAB0085-DUP1)		**Source: WAA0213-01**			Prepared & Analyzed: 2/4/2020					
TSS	33.0		1.00	mg/L		30.0			9.52	20
Matrix Spike (BAB0085-MS1)		**Source: WAA0214-02**			Prepared & Analyzed: 2/4/2020					
TSS	218		2.00	mg/L	100	113	105	80-120		
Matrix Spike Dup (BAB0085-MSD1)		**Source: WAA0214-02**			Prepared & Analyzed: 2/4/2020					
TSS	222		2.00	mg/L	100	113	109	80-120	1.82	20
Batch: BAB0218 - FIA										
Blank (BAB0218-BLK1)					Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0218 - FIA (Continued)										
LCS (BAB0218-BS1)					Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	0.197		0.101	mg/L	0.203		97.2	90-110		
Matrix Spike (BAB0218-MS1)		**Source: WAB0096-01**			Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	2.22		0.101	mg/L	0.203	2.03	95.1	90-110		
Matrix Spike (BAB0218-MS2)		**Source: WAB0096-01**			Prepared & Analyzed: 2/7/2020					
Nitrate/N + Nitrite/N	2.23		0.101	mg/L	0.203	2.03	100	90-110		
Batch: BAB0221 - W FIA										
Blank (BAB0221-BLK1)					Prepared & Analyzed: 2/11/2020					
Total P	ND		0.0100	mg/L						
Blank (BAB0221-BLK2)					Prepared & Analyzed: 2/11/2020					
Total P	ND		0.0100	mg/L						
LCS (BAB0221-BS1)					Prepared & Analyzed: 2/11/2020					
Total P	0.0979		0.0102	mg/L	0.102		96.2	0-200		
LCS (BAB0221-BS2)					Prepared & Analyzed: 2/11/2020					
Total P	0.0949		0.0102	mg/L	0.102		93.2	0-200		
Matrix Spike (BAB0221-MS1)		**Source: WAA0209-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.383		0.0102	mg/L	0.102	0.287	94.4	0-200		
Matrix Spike (BAB0221-MS2)		**Source: WAB0066-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.294		0.0102	mg/L	0.102	0.178	114	0-200		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0221 - W FIA (Continued)										
Matrix Spike Dup (BAB0221-MSD1)		**Source: WAA0209-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.380		0.0102	mg/L	0.102	0.287	91.0	0-200	0.907	200
Matrix Spike Dup (BAB0221-MSD2)		**Source: WAB0066-02**			Prepared & Analyzed: 2/11/2020					
Total P	0.293		0.0102	mg/L	0.102	0.178	113	0-200	0.312	200
Batch: BAB0252 - W FIA										
Blank (BAB0252-BLK1)					Prepared & Analyzed: 2/13/2020					
TKN	ND		0.250	mg/L						
Blank (BAB0252-BLK2)					Prepared & Analyzed: 2/13/2020					
TKN	ND		0.250	mg/L						
LCS (BAB0252-BS1)					Prepared & Analyzed: 2/13/2020					
TKN	2.16		0.250	mg/L	2.00		108	80-120		
LCS (BAB0252-BS2)					Prepared & Analyzed: 2/13/2020					
TKN	2.00		0.250	mg/L	2.00		100	80-120		
Matrix Spike (BAB0252-MS1)		**Source: WAB0121-01**			Prepared & Analyzed: 2/13/2020					
TKN	2.94		0.250	mg/L	2.00	1.26	83.7	70-130		
Matrix Spike Dup (BAB0252-MSD1)		**Source: WAB0121-01**			Prepared & Analyzed: 2/13/2020					
TKN	2.99		0.250	mg/L	2.00	1.26	86.6	70-130	1.90	200

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0034 - W 3010 Digest										
Blank (BAB0034-BLK1)					Prepared: 1/31/2020 Analyzed: 2/3/2020					
Zinc	ND		0.00100	mg/L						
Iron	ND		0.0100	mg/L						
Copper	ND		0.00100	mg/L						
LCS (BAB0034-BS1)					Prepared: 1/31/2020 Analyzed: 2/3/2020					
Copper	0.0537		0.00100	mg/L	0.0500		107	85-115		
Zinc	0.0516		0.00100	mg/L	0.0500		103	85-115		
Iron	0.110		0.0100	mg/L	0.100		110	85-115		
Matrix Spike (BAB0034-MS1)		**Source: WAA0226-02**			Prepared: 1/31/2020 Analyzed: 2/3/2020					
Copper	0.0535		0.00100	mg/L	0.0500	0.00792	91.2	70-130		
Iron	0.162		0.0100	mg/L	0.100	0.0547	107	70-130		
Zinc	0.0769		0.00100	mg/L	0.0500	0.0264	101	70-130		
Matrix Spike Dup (BAB0034-MSD1)		**Source: WAA0226-02**			Prepared: 1/31/2020 Analyzed: 2/3/2020					
Iron	0.162		0.0100	mg/L	0.100	0.0547	107	70-130	0.201	20
Copper	0.0527		0.00100	mg/L	0.0500	0.00792	89.6	70-130	1.45	20
Zinc	0.0758		0.00100	mg/L	0.0500	0.0264	98.8	70-130	1.40	20

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0034 - W 3010 Digest (Continued)										
Batch: BAB0348 - W 3010 Digest										
Blank (BAB0348-BLK1)					Prepared & Analyzed: 2/19/2020					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Iron	ND		0.0100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAB0348-BS1)					Prepared & Analyzed: 2/19/2020					
Dissolved Zinc	0.0474		0.00100	mg/L	0.0500		94.8	85-115		
Dissolved Iron	0.101		0.0100	mg/L	0.100		101	85-115		
Dissolved Copper	0.0474		0.00100	mg/L	0.0500		94.8	85-115		

Quality Control Data
(Continued)

Semivolatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0158 - W TPH-Dx										
Blank (BAB0158-BLK1)					Prepared & Analyzed: 2/11/2020					
Diesel	ND		0.100	mg/L						
Lube Oil	ND		0.500	mg/L						
Mineral Oil	ND		0.100	mg/L						
Surrogate: n-Hexacosane			*49.0*	*ppm*	*50.0*		*98.1*	*50-150*		
LCS (BAB0158-BS1)					Prepared & Analyzed: 2/11/2020					
Diesel	0.936		0.100	mg/L	1.00		93.6	50-150		
Lube Oil	ND		0.500	mg/L				50-150		
Surrogate: n-Hexacosane			*49.4*	*ppm*	*50.0*		*98.8*	*50-150*		
Matrix Spike (BAB0158-MS1)		**Source: WAA0224-03**			Prepared: 2/11/2020 Analyzed: 2/12/2020					
Diesel	0.773		0.100	mg/L	1.00	ND	77.3	50-150		
Lube Oil	ND		0.500	mg/L		ND		50-150		
Surrogate: n-Hexacosane			*44.4*	*ppm*	*50.0*		*88.8*	*50-150*		
Matrix Spike Dup (BAB0158-MSD1)		**Source: WAA0224-03**			Prepared: 2/11/2020 Analyzed: 2/12/2020					
Diesel	0.893		0.100	mg/L	1.00	ND	89.3	50-150	14.3	20
Lube Oil	ND		0.500	mg/L		ND		50-150		20
Surrogate: n-Hexacosane			*52.9*	*ppm*	*50.0*		*106*	*50-150*		

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Chain of Custody Record

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Anatek Log-In # WAA0224

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Gonzaga Bioinfiltration
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: 509-477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Around Time & Reporting

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
X Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	Preservative:	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
	IN-01302020	1-30/8:30	water	4			X	X	X	X	X	X	X	X	X	X
	EF18-01302020	1-30/8:30	water	4			X	X	X	X	X	X	X	X	X	X
	EF12-01302020	1-30/8:30	water	1			X	X	X	X	X	X	X	X	X	X
	INDI-01302020	1-30/8:30	water	1					X							
*	EF18DI-01302020	1-30/8:30	water						X							
	EF12DI-01302020	1-30/8:30	water						X							

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

DISSOLVED METALS HAVE NOT BEEN FILTERED.

* no samples rec'd

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	(N)
Containers Sealed?	(Y)	N
VOC Head Space?	Y	N

HCl

Temperature (°C): 5.0°D.g.04

Preservative: HNO3 P18009-7B<2
H_2SO_4 R400-1<2 HCl R385-3<2

Date & Time: 1-30-20 1740

Inspected By: MG

pH P18285-3 ✓

	Printed Name	Signature	Company	Date	Time
Relinquished by	John McNeil			1/30	8:52
Received by	Brock Grenger		Anatek	1-30-20	0853
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WAB0557
Address:	1026 W. Broadway Ave.	Project:	Gonzaga University Bioretention Cell
	Spokane, WA 99260-0430	Reported:	3/11/2020 14:51
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	IN-02232020		
Lab/Sample Number:	WAB0557-01	Collect Date:	02/23/20 18:15
Date Received:	02/24/20 12:08	Collected By:	
Matrix:	Stormwater		

12" and 18" Effluents were switched in the field.

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	24.5	mg CaCO3/L		3/3/20 15:15	NDE	SM 2340 C	
Nitrate/N + Nitrite/N	0.154	mg/L	0.100	2/25/20 11:33	TLM	SM 4500-NO3 F	
Phosphate/P	0.0645	mg/L	0.00980	2/25/20 10:02	TLM	SM 4500-P G	
TKN	0.878	mg/L	0.500	3/3/20 16:16	Franklin	SM 4500-Norg D	
Total Nitrogen	1.03	mg/L	0.600	3/3/20 16:16	Franklin	varies	
Total P	0.153	mg/L	0.0500	3/3/20 10:20	TLM	SM 4500-P F	
TSS	90.0	mg/L	0.100	2/28/20 16:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00759	mg/L	0.00100	2/28/20 14:11	TRC	EPA 200.8	
Dissolved Copper	0.00274	mg/L	0.00100	2/28/20 13:28	TRC	EPA 200.8	
Iron	1.86	mg/L	0.0100	2/28/20 14:11	TRC	EPA 200.8	
Dissolved Iron	0.0514	mg/L	0.0100	2/28/20 13:28	TRC	EPA 200.8	
Zinc	0.0654	mg/L	0.00100	2/28/20 14:11	TRC	EPA 200.8	
Dissolved Zinc	0.0398	mg/L	0.00100	2/28/20 13:28	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	3/6/20 14:28	ARC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	3/6/20 14:28	ARC	EPA 8015D	
Diesel	ND	mg/L	0.100	3/6/20 14:28	ARC	EPA 8015D	
Surrogate: n-Hexacosane	*92.8%*		*50-150*	*3/6/20 14:28*	*ARC*	*EPA 8015D*	

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Sample Location: EF18-02232020
Lab/Sample Number: WAB0557-02 Collect Date: 02/23/20 18:15
Date Received: 02/24/20 12:08 Collected By:
Matrix: Stormwater

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	143	mg CaCO3/L		3/3/20 15:15	NDE	SM 2340 C	
Nitrate/N + Nitrite/N	0.307	mg/L	0.100	2/25/20 11:35	TLM	SM 4500-NO3 F	
Phosphate/P	0.245	mg/L	0.00980	2/25/20 10:02	TLM	SM 4500-P G	
TKN	<0.5	mg/L	0.500	3/3/20 16:16	Franklin	SM 4500-Norg D	
Total Nitrogen	ND	mg/L	0.600	3/3/20 16:16	Franklin	varies	
Total P	0.285	mg/L	0.0500	3/3/20 10:22	TLM	SM 4500-P F	
TSS	2.70	mg/L	0.0100	2/28/20 16:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00181	mg/L	0.00100	2/28/20 14:14	TRC	EPA 200.8	
Dissolved Copper	0.00309	mg/L	0.00100	2/28/20 13:32	TRC	EPA 200.8	
Iron	0.147	mg/L	0.0100	2/28/20 14:14	TRC	EPA 200.8	
Dissolved Iron	0.0449	mg/L	0.0100	2/28/20 13:32	TRC	EPA 200.8	
Zinc	0.00255	mg/L	0.00100	2/28/20 14:14	TRC	EPA 200.8	
Dissolved Zinc	0.0400	mg/L	0.00100	2/28/20 13:32	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	3/6/20 15:24	ARC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	3/6/20 15:24	ARC	EPA 8015D	
Diesel	ND	mg/L	0.100	3/6/20 15:24	ARC	EPA 8015D	
Surrogate: n-Hexacosane	*72.8%*		*50-150*	*3/6/20 15:24*	*ARC*	*EPA 8015D*	

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Sample Location: EF12-02232020
Lab/Sample Number: WAB0557-03 Collect Date: 02/23/20 18:15
Date Received: 02/24/20 12:08 Collected By:
Matrix: Stormwater

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	193	mg CaCO3/L		3/3/20 15:15	NDE	SM 2340 C	
Nitrate/N + Nitrite/N	0.742	mg/L	0.100	2/25/20 11:36	TLM	SM 4500-NO3 F	
Phosphate/P	0.329	mg/L	0.00980	2/25/20 10:05	TLM	SM 4500-P G	
TKN	0.958	mg/L	0.500	3/3/20 16:17	Franklin	SM 4500-Norg D	
Total Nitrogen	1.70	mg/L	0.600	3/3/20 16:17	Franklin	varies	
Total P	0.381	mg/L	0.0500	3/3/20 10:25	TLM	SM 4500-P F	
TSS	1.50	mg/L	0.0100	2/28/20 16:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00164	mg/L	0.00100	2/28/20 14:17	TRC	EPA 200.8	
Dissolved Copper	0.00228	mg/L	0.00100	2/28/20 13:35	TRC	EPA 200.8	
Iron	0.0869	mg/L	0.0100	2/28/20 14:17	TRC	EPA 200.8	
Dissolved Iron	0.0328	mg/L	0.0100	2/28/20 13:35	TRC	EPA 200.8	
Zinc	0.00186	mg/L	0.00100	2/28/20 14:17	TRC	EPA 200.8	
Dissolved Zinc	0.0279	mg/L	0.00100	2/28/20 13:35	Metals	EPA 200.8	
Semivolatiles							
Lube Oil	ND	mg/L	0.500	3/6/20 16:20	ARC	EPA 8015D	
Mineral Oil	ND	mg/L	0.100	3/6/20 16:20	ARC	EPA 8015D	
Diesel	ND	mg/L	0.100	3/6/20 16:20	ARC	EPA 8015D	
Surrogate: n-Hexacosane	*76.9%*		*50-150*	*3/6/20 16:20*	*ARC*	*EPA 8015D*	

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Sample Location: INDI-02232020
Lab/Sample Number: WAB0557-04 Collect Date: 02/23/20 18:15
Date Received: 02/24/20 12:08 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	<0.00007	mg/L	0.00100	2/28/20 13:38	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	2/28/20 13:38	TRC	EPA 200.8	
Dissolved Zinc	0.0131	mg/L	0.00100	2/28/20 13:38	Metals	EPA 200.8	

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Sample Location: EF18DI-02232020
Lab/Sample Number: WAB0557-05 Collect Date: 02/23/20 18:15
Date Received: 02/24/20 12:08 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	2/28/20 13:41	TRC	EPA 200.8	
Dissolved Iron	0.0139	mg/L	0.0100	2/28/20 13:41	TRC	EPA 200.8	
Dissolved Zinc	0.0234	mg/L	0.00100	2/28/20 13:41	Metals	EPA 200.8	

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Sample Location:	EF12DI-02232020		
Lab/Sample Number:	WAB0557-06	Collect Date:	02/23/20 18:15
Date Received:	02/24/20 12:08	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	2/28/20 13:45	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	2/28/20 13:45	TRC	EPA 200.8	
Dissolved Zinc	0.0192	mg/L	0.00100	2/28/20 13:45	Metals	EPA 200.8	

Authorized Signature,

Karice Scott For Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0444 - W FIA										
Blank (BAB0444-BLK1)					Prepared & Analyzed: 2/25/2020					
Phosphate/P	ND		0.00980	mg/L						
LCS (BAB0444-BS1)					Prepared & Analyzed: 2/25/2020					
Phosphate/P	0.0927		0.00980	mg/L	0.100		92.7	85-115		
Matrix Spike (BAB0444-MS1)		**Source: WAB0557-02**			Prepared & Analyzed: 2/25/2020					
Phosphate/P	0.338		0.00980	mg/L	0.100	0.245	93.0	80-120		
Matrix Spike Dup (BAB0444-MSD1)		**Source: WAB0557-02**			Prepared & Analyzed: 2/25/2020					
Phosphate/P	0.341		0.00980	mg/L	0.100	0.245	95.7	80-120	0.795	20
Batch: BAB0448 - FIA										
Blank (BAB0448-BLK1)					Prepared & Analyzed: 2/25/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						
Blank (BAB0448-BLK2)					Prepared & Analyzed: 2/25/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						
LCS (BAB0448-BS1)					Prepared & Analyzed: 2/25/2020					
Nitrate/N + Nitrite/N	0.192		0.100	mg/L	0.200		96.2	85-115		
Matrix Spike (BAB0448-MS1)		**Source: WAB0222-01**			Prepared & Analyzed: 2/25/2020					
Nitrate/N + Nitrite/N	0.330		0.100	mg/L	0.200	0.151	89.8	80-120		
Matrix Spike Dup (BAB0448-MSD1)		**Source: WAB0222-01**			Prepared & Analyzed: 2/25/2020					
Nitrate/N + Nitrite/N	0.329		0.100	mg/L	0.200	0.151	89.3	80-120	0.303	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAC0022 - W Wet Chem										
Blank (BAC0022-BLK1)					Prepared & Analyzed: 3/3/2020					
Hardness	0.500			mg CaCO3/L						
Blank (BAC0022-BLK2)					Prepared & Analyzed: 3/3/2020					
Hardness	0.00			mg CaCO3/L						
LCS (BAC0022-BS1)					Prepared & Analyzed: 3/3/2020					
Hardness	101			mg CaCO3/L	100		101	90-110		
LCS Dup (BAC0022-BSD1)					Prepared & Analyzed: 3/3/2020					
Hardness	100			mg CaCO3/L	100		100	90-110	0.509	20
Duplicate (BAC0022-DUP1)		**Source: WAB0557-01**			Prepared & Analyzed: 3/3/2020					
Hardness	24.0			mg CaCO3/L		24.5			2.06	20
Batch: BAC0026 - W FIA										
Blank (BAC0026-BLK1)					Prepared & Analyzed: 3/3/2020					
Total P	ND		0.00500	mg/L						
Blank (BAC0026-BLK2)					Prepared & Analyzed: 3/3/2020					
Total P	ND		0.00500	mg/L						
LCS (BAC0026-BS1)					Prepared & Analyzed: 3/3/2020					
Total P	0.101		0.00500	mg/L	0.100		101	90-110		
Matrix Spike (BAC0026-MS1)		**Source: WAC0004-02**			Prepared & Analyzed: 3/3/2020					
Total P	0.215		0.00500	mg/L	0.100	0.106	110	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAC0026 - W FIA (Continued)										
Matrix Spike Dup (BAC0026-MSD1)		**Source: WAC0004-02**			Prepared & Analyzed: 3/3/2020					
Total P	0.216		0.00500	mg/L	0.100	0.106	111	80-120	0.417	20
Batch: BAC0027 - W FIA										
Blank (BAC0027-BLK1)					Prepared & Analyzed: 3/3/2020					
TKN	ND		0.500	mg/L						
Blank (BAC0027-BLK2)					Prepared & Analyzed: 3/3/2020					
TKN	ND		0.500	mg/L						
LCS (BAC0027-BS1)					Prepared & Analyzed: 3/3/2020					
TKN	2.04		0.500	mg/L	2.00		102	85-115		
Matrix Spike (BAC0027-MS1)		**Source: WAB0539-02**			Prepared & Analyzed: 3/3/2020					
TKN	2.81		0.500	mg/L	2.00	0.734	104	80-120		
Matrix Spike Dup (BAC0027-MSD1)		**Source: WAB0539-02**			Prepared & Analyzed: 3/3/2020					
TKN	2.90		0.500	mg/L	2.00	0.734	108	80-120	3.28	20
Batch: BAC0056 - W Filtration										
Blank (BAC0056-BLK1)					Prepared & Analyzed: 2/28/2020					
TSS	ND		0.100	mg/L						
Blank (BAC0056-BLK2)					Prepared & Analyzed: 2/28/2020					
TSS	ND		0.100	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAC0056 - W Filtration (Continued)										
Blank (BAC0056-BLK3)					Prepared & Analyzed: 2/28/2020					
TSS	ND		0.100	mg/L						
LCS (BAC0056-BS1)					Prepared & Analyzed: 2/28/2020					
TSS	94.0			mg/L	100		94.0	90-110		
LCS (BAC0056-BS2)					Prepared & Analyzed: 2/28/2020					
TSS	104			mg/L	100		104	90-110		
LCS Dup (BAC0056-BSD1)					Prepared & Analyzed: 2/28/2020					
TSS	94.0			mg/L	100		94.0	90-110	0.00	10
Duplicate (BAC0056-DUP1)		**Source: MAB0083-01**			Prepared & Analyzed: 2/28/2020					
TSS	32.0		0.100	mg/L		30.0			6.45	20
Duplicate (BAC0056-DUP2)		**Source: WAB0564-01**			Prepared & Analyzed: 2/28/2020					
TSS	9.00		0.0330	mg/L		8.00			11.8	20
Matrix Spike (BAC0056-MS1)		**Source: MAB0084-02**			Prepared & Analyzed: 2/28/2020					
TSS	108			mg/L	100	2.50	106	80-120		
Matrix Spike (BAC0056-MS2)		**Source: WAB0592-02**			Prepared & Analyzed: 2/28/2020					
TSS	120			mg/L	100	0.440	120	80-120		
Matrix Spike Dup (BAC0056-MSD1)		**Source: MAB0084-02**			Prepared & Analyzed: 2/28/2020					
TSS	106			mg/L	100	2.50	104	80-120	1.87	20
Matrix Spike Dup (BAC0056-MSD2)		**Source: WAB0592-02**			Prepared & Analyzed: 2/28/2020					
TSS	116			mg/L	100	0.440	116	80-120	3.39	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0511 - W 3010 Digest										
Blank (BAB0511-BLK1)					Prepared: 2/27/2020 Analyzed: 2/28/2020					
Iron	ND		0.0101	mg/L						
Copper	ND		0.00101	mg/L						
Zinc	ND		0.00101	mg/L						
LCS (BAB0511-BS1)					Prepared: 2/27/2020 Analyzed: 2/28/2020					
Copper	0.0474		0.00101	mg/L	0.0503		94.3	85-115		
Iron	0.102		0.0101	mg/L	0.101		101	85-115		
Zinc	0.0469		0.00101	mg/L	0.0503		93.4	85-115		
Matrix Spike (BAB0511-MS1)		**Source: WAB0597-02**			Prepared: 2/27/2020 Analyzed: 2/28/2020					
Copper	0.0445		0.00101	mg/L	0.0503	0.00126	86.0	70-130		
Iron	0.151		0.0101	mg/L	0.101	0.0592	91.1	70-130		
Zinc	0.0685		0.00101	mg/L	0.0503	0.0247	87.1	70-130		

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAB0511 - W 3010 Digest (Continued)										
Matrix Spike Dup (BAB0511-MSD1)		**Source: WAB0597-02**			Prepared: 2/27/2020 Analyzed: 2/28/2020					
Zinc	0.0703		0.00101	mg/L	0.0503	0.0247	90.6	70-130	2.52	20
Copper	0.0457		0.00101	mg/L	0.0503	0.00126	88.4	70-130	2.68	20
Iron	0.154		0.0101	mg/L	0.101	0.0592	94.5	70-130	2.21	20
Batch: BAB0513 - W 3010 Digest										
Blank (BAB0513-BLK1)					Prepared: 2/27/2020 Analyzed: 2/28/2020					
Dissolved Iron	ND		0.0101	mg/L						
Dissolved Zinc	ND		0.00101	mg/L						
Dissolved Copper	ND		0.00101	mg/L						
LCS (BAB0513-BS1)					Prepared: 2/27/2020 Analyzed: 2/28/2020					
Dissolved Zinc	0.0485		0.00101	mg/L	0.0505		96.0	85-115		
Dissolved Copper	0.0476		0.00101	mg/L	0.0505		94.3	85-115		
Dissolved Iron	0.0997		0.0101	mg/L	0.101		98.7	85-115		

Quality Control Data
(Continued)

Semivolatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAC0113 - W TPH-Dx										
Blank (BAC0113-BLK1)					Prepared & Analyzed: 3/6/2020					
Diesel	ND		0.100	mg/L						
Lube Oil	ND		0.500	mg/L						
Mineral Oil	ND		0.100	mg/L						
Surrogate: n-Hexacosane			*45.0*	*ppm*	*50.0*		*90.0*	*50-150*		
LCS (BAC0113-BS1)					Prepared & Analyzed: 3/6/2020					
Diesel	0.824		0.100	mg/L	1.00		82.4	70-130		
Lube Oil	ND		0.500	mg/L				70-130		
Surrogate: n-Hexacosane			*44.4*	*ppm*	*50.0*		*88.8*	*50-150*		
Matrix Spike (BAC0113-MS1)		**Source: WAB0557-01**			Prepared & Analyzed: 3/6/2020					
Diesel	0.706		0.100	mg/L	1.00	ND	70.6	70-130		
Lube Oil	ND		0.500	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*39.4*	*ppm*	*50.0*		*78.7*	*50-150*		
Matrix Spike Dup (BAC0113-MSD1)		**Source: WAB0557-01**			Prepared & Analyzed: 3/6/2020					
Diesel	0.763		0.100	mg/L	1.00	ND	76.3	70-130	7.78	20
Lube Oil	ND		0.500	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*32.1*	*ppm*	*50.0*		*64.3*	*50-150*		

WAB0557

Due: 03/09/20

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & #: Gonzaga University Bioretention Cell
City: Spokane State: WA Zip: 99260	Email Address: EMURNIN@spokanecounty.org
Phone: 509-477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Aroun

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
X Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative:	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
	IN-02232020	2-23-20 1815	water		4		X	X	X	X	X	X	X	X	X	X
	EF18-02232020	"	water		4		X	X	X	X	X	X	X	X	X	X
	EF12-02232020	"	water		1		X	X	X	X	X	X	X	X	X	X
	INDI-02232020		water		1				X							
	EF18DI-02232020		water		1				X							
	EF12DI-02232020		water		1				X							

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWBS

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
VOC Head Space?	Y	N

hci * per bag labels

Temperature (°C): 4.0°D 19-07

Preservative: HCl R385-3 <2 400-1 <2
HNO3 P18009-7B <2 H_2SO_4 R386

Date & Time: 2-24-20 1630

Inspected By: MB

pH P18285-3VV

	Printed Name	Signature	Company	Date	Time
Relinquished by	Anna Bonacci			02/24	12:07
Received by	Brock Gregor		Anatek	2-24-20	1208
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Gonzaga	**Date Received:**	May 8, 2020
Project #:	20S091-01	**Sampled By:**	Others
Client :	Spokane County	**Date Tested:**	May 8, 2020
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

CASE NARRATIVE

1. Three samples were submitted for particle size distribution by laser diffraction according to TAPE 2011 Methods. These methods include running sediment concentration according to modified ASTM D3977, Method C.
2. Particle size distribution is reported as "Concentration per Size Fraction" in mg/L.
3. There were no noted anomalies during this testing.

Reviewed by: EGabriel Goble

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Gonzaga
Project #: 20S091-01
Date Received: May 8, 2020
Date Tested: May 8, 2020

Client: Spokane County
Sampled by: Others
Tested by: B. Goble

Sediment Concentration per Size Fraction

TAPE 2011 / ASTM D3977 Method C

Sample Identification	Concentration of Coarse Fractions (mg/L)		Concentration of <62.5µm Fraction (mg/L)	Total Sample Concentration (mg/L)	Date Sampled	Analysis Date
	>250 µm	250 - 62.5 µm				
INF05062020	4.49	23.93	54.37	82.79	5/7/2020	5/8/2020
EFF1205062020	1.57	3.14	8.52	13.23	5/7/2020	5/8/2020
EFF1805062020	2.05	3.02	3.66	8.73	5/7/2020	5/8/2020

Reviewed by: E Gabe Goble

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Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
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Client:	Spokane County	Work Order:	WAE0230
Address:	1026 W. Broadway Ave.	Project:	Gonzaga
	Spokane, WA 99260-0430	Reported:	5/27/2020 15:36
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF05062020		
Lab/Sample Number:	WAE0230-01	Collect Date:	05/07/20 08:30
Date Received:	05/07/20 10:38	Collected By:	
Matrix:	Stormwater		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	19.6	mg CaCO3/L	3.00	5/12/20 10:15	NDE	SM 2340 C	
Total Nitrate/Nitrite	0.134	mg/L	0.100	5/13/20 14:35	TLM	SM 4500-NO3 F	
Phosphate/P	0.0308	mg/L	0.0180	5/8/20 11:07	TLM	SM 4500-P G	
Total Nitrogen	0.134	mg/L	0.100	5/13/20 14:35	TLM	varies	
Total P	0.358	mg/L	0.0500	5/22/20 10:51	TLM	SM 4500-P H	
TSS	83.0	mg/L	1.00	5/12/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00844	mg/L	0.00100	5/11/20 13:03	TRC	EPA 200.8	
Dissolved Copper	0.00550	mg/L	0.00100	5/11/20 12:35	TRC	EPA 200.8	
Iron	0.677	mg/L	0.0100	5/11/20 13:03	TRC	EPA 200.8	
Dissolved Iron	0.0449	mg/L	0.0100	5/11/20 12:35	TRC	EPA 200.8	
Zinc	0.0575	mg/L	0.00100	5/11/20 13:03	TRC	EPA 200.8	
Dissolved Zinc	0.0355	mg/L	0.00100	5/11/20 12:35	TRC	EPA 200.8	
Hydrocarbons							
Lube Oil	ND	mg/L	0.400	5/16/20 1:45	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	5/16/20 1:45	ARC	NWTPH-Dx	
Diesel	ND	mg/L	0.160	5/16/20 1:45	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*91.9%*		*50-150*	*5/16/20 1:45*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1205062020
Lab/Sample Number: WAE0230-02 Collect Date: 05/07/20 08:30
Date Received: 05/07/20 10:38 Collected By:
Matrix: Stormwater

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	135	mg CaCO3/L	3.00	5/12/20 10:15	NDE	SM 2340 C	
Total Nitrate/Nitrite	0.142	mg/L	0.100	5/13/20 14:36	TLM	SM 4500-NO3 F	
Phosphate/P	0.342	mg/L	0.0180	5/8/20 11:10	TLM	SM 4500-P G	
TKN	1.66	mg/L	0.500	5/27/20 13:27	TLM	SM 4500-Norg D	
Total Nitrogen	1.80	mg/L	0.600	5/27/20 13:27	TLM	varies	
Total P	0.505	mg/L	0.0500	5/22/20 10:54	TLM	SM 4500-P H	
TSS	10.0	mg/L	1.00	5/12/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00533	mg/L	0.00100	5/11/20 13:11	TRC	EPA 200.8	
Dissolved Copper	0.00519	mg/L	0.00100	5/11/20 12:44	TRC	EPA 200.8	
Iron	0.231	mg/L	0.0100	5/11/20 13:11	TRC	EPA 200.8	
Dissolved Iron	0.0633	mg/L	0.0100	5/11/20 12:44	TRC	EPA 200.8	
Zinc	0.00681	mg/L	0.00100	5/11/20 13:11	TRC	EPA 200.8	
Dissolved Zinc	0.0194	mg/L	0.00100	5/11/20 12:44	TRC	EPA 200.8	
Hydrocarbons							
Lube Oil	ND	mg/L	0.400	5/16/20 3:33	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	5/16/20 3:33	ARC	NWTPH-Dx	
Diesel	ND	mg/L	0.160	5/16/20 3:33	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*78.7%*		*50-150*	*5/16/20 3:33*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1805062020
Lab/Sample Number: WAE0230-03 Collect Date: 05/07/20 08:30
Date Received: 05/07/20 10:38 Collected By:
Matrix: Stormwater

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	154	mg CaCO3/L	3.00	5/12/20 10:15	NDE	SM 2340 C	
Total Nitrate/Nitrite	0.328	mg/L	0.100	5/13/20 14:38	TLM	SM 4500-NO3 F	
Phosphate/P	0.574	mg/L	0.0180	5/8/20 11:06	TLM	SM 4500-P G	
TKN	1.56	mg/L	0.500	5/27/20 13:28	TLM	SM 4500-Norg D	
Total Nitrogen	1.88	mg/L	0.600	5/27/20 13:28	TLM	varies	
Total P	0.739	mg/L	0.0500	5/22/20 10:56	TLM	SM 4500-P H	
TSS	5.00	mg/L	1.00	5/12/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Iron	0.272	mg/L	0.0100	5/11/20 13:15	TRC	EPA 200.8	
Dissolved Iron	0.102	mg/L	0.0100	5/11/20 12:47	TRC	EPA 200.8	
Zinc	0.00616	mg/L	0.00100	5/11/20 13:15	TRC	EPA 200.8	
Dissolved Zinc	0.0242	mg/L	0.00100	5/11/20 12:47	TRC	EPA 200.8	
Hydrocarbons							
Lube Oil	ND	mg/L	0.400	5/16/20 4:27	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	5/16/20 4:27	ARC	NWTPH-Dx	
Diesel	ND	mg/L	0.160	5/16/20 4:27	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*76.0%*		*50-150*	*5/16/20 4:27*	*ARC*	*NWTPH-Dx*	

Authorized Signature,

Karice Scott For Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0278 - W Wet Chem										
Blank (BAE0278-BLK1)					Prepared & Analyzed: 5/12/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAE0278-BLK2)					Prepared & Analyzed: 5/12/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAE0278-BS1)					Prepared & Analyzed: 5/12/2020					
Hardness	101			mg CaCO3/L	100		101	90-110		
LCS Dup (BAE0278-BSD1)					Prepared & Analyzed: 5/12/2020					
Hardness	100			mg CaCO3/L	100		100	90-110	0.499	20
Duplicate (BAE0278-DUP1)		**Source: WAE0230-01**			Prepared & Analyzed: 5/12/2020					
Hardness	20.1		3.00	mg CaCO3/L		19.6			2.53	20
Matrix Spike (BAE0278-MS1)		**Source: WAE0172-01**			Prepared & Analyzed: 5/12/2020					
Hardness	111		6.00	mg CaCO3/L	100	9.55	101	80-120		
Matrix Spike Dup (BAE0278-MSD1)		**Source: WAE0172-01**			Prepared & Analyzed: 5/12/2020					
Hardness	110		6.00	mg CaCO3/L	100	9.55	100	80-120	0.913	20
Batch: BAE0335 - W FIA										
Blank (BAE0335-BLK1)					Prepared & Analyzed: 5/13/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						
Blank (BAE0335-BLK2)					Prepared & Analyzed: 5/13/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0335 - W FIA (Continued)										
LCS (BAE0335-BS1)					Prepared & Analyzed: 5/13/2020					
Nitrate/N + Nitrite/N	0.192		0.100	mg/L	0.201		95.4	90-110		
Matrix Spike (BAE0335-MS1)		**Source: WAE0129-01**			Prepared & Analyzed: 5/13/2020					
Nitrate/N + Nitrite/N	1.86		0.100	mg/L	0.201	1.70	82.6	80-120		
Matrix Spike Dup (BAE0335-MSD1)		**Source: WAE0129-01**			Prepared & Analyzed: 5/13/2020					
Nitrate/N + Nitrite/N	1.86		0.100	mg/L	0.201	1.70	82.1	80-120	0.0483	20
Batch: BAE0451 - W Filtration										
Blank (BAE0451-BLK1)					Prepared: 5/11/2020 Analyzed: 5/12/2020					
TSS	ND		1.00	mg/L						
Blank (BAE0451-BLK2)					Prepared: 5/11/2020 Analyzed: 5/12/2020					
TSS	ND		1.00	mg/L						
LCS (BAE0451-BS1)					Prepared: 5/11/2020 Analyzed: 5/12/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS Dup (BAE0451-BSD1)					Prepared: 5/11/2020 Analyzed: 5/12/2020					
TSS	95.0			mg/L	100		95.0	90-110	2.08	10
Duplicate (BAE0451-DUP1)		**Source: WAE0178-02**			Prepared: 5/11/2020 Analyzed: 5/12/2020					
TSS	9.00		1.00	mg/L		9.00			0.00	20
Matrix Spike (BAE0451-MS1)		**Source: WAE0181-02**			Prepared: 5/11/2020 Analyzed: 5/12/2020					
TSS	58.0		1.00	mg/L	50.0	17.0	82.0	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0451 - W Filtration (Continued)										
Matrix Spike Dup (BAE0451-MSD1)		**Source: WAE0181-02**			Prepared: 5/11/2020 Analyzed: 5/12/2020					
TSS	60.0		1.00	mg/L	50.0	17.0	86.0	80-120	3.39	20
Batch: BAE0500 - W FIA										
Blank (BAE0500-BLK1)					Prepared & Analyzed: 5/8/2020					
Phosphate/P	ND		0.0180	mg/L						
LCS (BAE0500-BS1)					Prepared & Analyzed: 5/8/2020					
Phosphate/P	0.103		0.0180	mg/L	0.100		103	85-115		
LCS Dup (BAE0500-BSD1)					Prepared & Analyzed: 5/8/2020					
Phosphate/P	0.103		0.0180	mg/L	0.100		103	85-115	0.0974	20
Batch: BAE0641 - W FIA										
Blank (BAE0641-BLK1)					Prepared & Analyzed: 5/22/2020					
Total P	ND		0.00500	mg/L						
Blank (BAE0641-BLK2)					Prepared & Analyzed: 5/22/2020					
Total P	ND		0.00500	mg/L						
Blank (BAE0641-BLK3)					Prepared & Analyzed: 5/22/2020					
Total P	ND		0.00500	mg/L						
LCS (BAE0641-BS1)					Prepared & Analyzed: 5/22/2020					
Total P	0.100		0.00500	mg/L	0.100		100	90-110		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0641 - W FIA (Continued)										
LCS (BAE0641-BS2)					Prepared & Analyzed: 5/22/2020					
Total P	0.0988		0.00500	mg/L	0.100		98.8	90-110		
Matrix Spike (BAE0641-MS1)		**Source: WAE0565-02**			Prepared & Analyzed: 5/22/2020					
Total P	0.157		0.00500	mg/L	0.100	0.0556	101	80-120		
Matrix Spike (BAE0641-MS2)		**Source: WAE0638-02**			Prepared & Analyzed: 5/22/2020					
Total P	0.159		0.00500	mg/L	0.100	0.0560	103	80-120		
Matrix Spike Dup (BAE0641-MSD1)		**Source: WAE0565-02**			Prepared & Analyzed: 5/22/2020					
Total P	0.162		0.00500	mg/L	0.100	0.0556	106	80-120	3.20	20
Matrix Spike Dup (BAE0641-MSD2)		**Source: WAE0638-02**			Prepared & Analyzed: 5/22/2020					
Total P	0.160		0.00500	mg/L	0.100	0.0560	104	80-120	0.314	20
Batch: BAE0746 - W FIA										
Blank (BAE0746-BLK1)					Prepared & Analyzed: 5/27/2020					
TKN	ND		0.500	mg/L						
Blank (BAE0746-BLK2)					Prepared & Analyzed: 5/27/2020					
TKN	ND		0.500	mg/L						
Blank (BAE0746-BLK3)					Prepared & Analyzed: 5/27/2020					
TKN	ND		0.500	mg/L						
LCS (BAE0746-BS1)					Prepared & Analyzed: 5/27/2020					
TKN	1.99		0.500	mg/L	2.00		99.4	85-115		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0746 - W FIA (Continued)										
LCS (BAE0746-BS2)					Prepared & Analyzed: 5/27/2020					
TKN	1.94		0.500	mg/L	2.00		97.0	85-115		
Matrix Spike (BAE0746-MS1)		**Source: WAE0210-01**			Prepared & Analyzed: 5/27/2020					
TKN	3.16		0.500	mg/L	2.00	1.34	90.9	80-120		
Matrix Spike Dup (BAE0746-MSD1)		**Source: WAE0210-01**			Prepared & Analyzed: 5/27/2020					
TKN	3.18		0.500	mg/L	2.00	1.34	91.7	80-120	0.512	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0197 - W 3010 Digest										
Blank (BAE0197-BLK1)					Prepared: 5/8/2020 Analyzed: 5/11/2020					
Dissolved Copper	ND		0.00100	mg/L						
Dissolved Iron	ND		0.0100	mg/L						
Dissolved Zinc	ND		0.00100	mg/L						
LCS (BAE0197-BS1)					Prepared: 5/8/2020 Analyzed: 5/11/2020					
Dissolved Iron	0.111		0.0100	mg/L	0.100		111	85-115		
Dissolved Zinc	0.0482		0.00100	mg/L	0.0500		96.3	85-115		
Dissolved Copper	0.0482		0.00100	mg/L	0.0500		96.4	85-115		
Matrix Spike (BAE0197-MS1)		**Source: WAE0230-01**			Prepared: 5/8/2020 Analyzed: 5/11/2020					
Dissolved Copper	0.257		0.00500	mg/L	0.250	0.00550	101	70-130		
Dissolved Zinc	0.286		0.00500	mg/L	0.250	0.0355	100	70-130		
Dissolved Iron	0.540		0.0500	mg/L	0.500	0.0449	99.0	70-130		
Matrix Spike Dup (BAE0197-MSD1)		**Source: WAE0230-01**			Prepared: 5/8/2020 Analyzed: 5/11/2020					
Dissolved Iron	0.545		0.0500	mg/L	0.500	0.0449	100	70-130	0.867	20
Dissolved Zinc	0.281		0.00500	mg/L	0.250	0.0355	98.3	70-130	1.83	20
Dissolved Copper	0.253		0.00500	mg/L	0.250	0.00550	99.1	70-130	1.55	20
Batch: BAE0203 - W 3010 Digest										
Blank (BAE0203-BLK1)					Prepared: 5/8/2020 Analyzed: 5/11/2020					
Copper	ND		0.00100	mg/L						
Iron	ND		0.0100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BAE0203-BS1)					Prepared: 5/8/2020 Analyzed: 5/11/2020					
Copper	0.0487		0.00100	mg/L	0.0500		97.4	85-115		
Iron	0.101		0.0100	mg/L	0.100		101	85-115		
Zinc	0.0481		0.00100	mg/L	0.0500		96.2	85-115		

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0203 - W 3010 Digest (Continued)										
Matrix Spike (BAE0203-MS1)		**Source: WAE0230-01**			Prepared: 5/8/2020 Analyzed: 5/11/2020					
Iron	1.25		0.0500	mg/L	0.500	0.677	115	70-130		
Zinc	0.302		0.00500	mg/L	0.250	0.0575	97.7	70-130		
Copper	0.248		0.00500	mg/L	0.250	0.00844	96.0	70-130		
Matrix Spike Dup (BAE0203-MSD1)		**Source: WAE0230-01**			Prepared: 5/8/2020 Analyzed: 5/11/2020					
Copper	0.251		0.00500	mg/L	0.250	0.00844	96.9	70-130	0.998	20
Iron	1.31		0.0500	mg/L	0.500	0.677	127	70-130	4.47	20
Zinc	0.302		0.00500	mg/L	0.250	0.0575	97.8	70-130	0.0729	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAE0062 - W TPH-Dx										
Blank (BAE0062-BLK1)					Prepared: 5/14/2020 Analyzed: 5/15/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*47.2*	*ppm*	*50.0*		*94.3*	*50-150*		
LCS (BAE0062-BS1)					Prepared: 5/14/2020 Analyzed: 5/15/2020					
Diesel	0.781		0.160	mg/L	1.00		78.1	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*45.0*	*ppm*	*50.0*		*89.9*	*50-150*		
Duplicate (BAE0062-DUP1)		**Source: WAE0230-01**			Prepared: 5/14/2020 Analyzed: 5/16/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*45.9*	*ppm*	*50.0*		*91.9*	*50-150*		

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Chain of Custody Record

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Anatek Log-In #

WAE0230

Due: 05/21/20

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W Broadway Avenue	Project Name & #: [redacted] Gonzaga
City: Spokane State: WA Zip: 99260	Email Address: EMURNIN@spokanecounty.org
Phone: (509)477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Around Time

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*______

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
X Email

Provide Sample Description

Stormwater influent + effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total	Cu Zn Fe Dissolved	Hardness SM 2340B (ICP)	Total Phosphorus	NWTPH-Dx Ecology	Ortho-Phosphate	TKN SM4500	NO3-NO2 SM4500	
	INF05062020	05/07/2020 8:30a	water			X	X	X	X	X	X	X	X	X	
	EFF1205062020	↓	↓			X	X	X	X	X	X	X	X	X	
	EFF1805062020					X	X	X	X	X	X	X	X	X	

Preservative:

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org and aimeen@osbornconsulting.org

SWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Taylor Hoffman-Ballard	Taylor Hoffman Ballard	Osborn	5/7/2020	10:40a
Received by	Brock Greger	[signature]	Anatek	5-7-20	1038
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~
Cooler?	(Y)	N
Ice/Ice Packs Present?	(Y)	N

Temperature (°C): 9.9° IR-3-07

Preservative: HCl 2001180 <2 pH 2001015 H2SO4 2001181<2 HNO3 2000994<2

Date & Time: 5-7-20 1530

Inspected By: [signature]

Samples submitted to Anatek Labs may be subcontacted to other accredited labs if necessary. This message serves as notice of this possibility. Subcontracted analyses will be clearly noted on the analytical report.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Gonzaga	**Date Received:**	May 26, 2020
Project #:	20S091-01	**Sampled By:**	Others
Client :	Spokane County	**Date Tested:**	May 26, 2020
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

CASE NARRATIVE

1. The samples were submitted for particle size distribution by laser diffraction according to TAPE 2011 Methods. These methods include running sediment concentration according to modified ASTM D3977, Method C.
2. Particle size distribution is reported as "Concentration per Size Fraction" in mg/L.
3. There were no noted anomalies during this testing.

Reviewed by: E Gabriel Goble

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Gonzaga
Project #: 20S091-01
Date Received: May 26, 2020
Date Tested: May 26, 2020

Client: Spokane County
Sampled by: Others
Tested by: B. Goble

Sediment Concentration per Size Fraction

TAPE 2011 / ASTM D3977 Method C

Sample Identification	Concentration of Coarse Fractions (mg/L)		Concentration of <62.5µm Fraction (mg/L)	Total Sample Concentration (mg/L)	Date Sampled	Analysis Date
	>250 µm	250 - 62.5 µm				
INF05202020	4.31	15.70	28.92	48.93	5/20/2020	5/26/2020
EFF12052020	1.06	1.73	6.63	9.42	5/20/2020	5/26/2020
EFF1805202020	1.07	2.25	4.93	8.24	5/20/2020	5/26/2020

Reviewed by: E Gabriel Goble

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Client:	Spokane County	Work Order:	WAF0004
Address:	1026 W. Broadway Ave.	Project:	Gonzaga
	Spokane, WA 99260-0430	Reported:	6/25/2020 15:56
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF05302020		
Lab/Sample Number:	WAF0004-01	Collect Date:	05/31/20 16:00
Date Received:	06/01/20 12:23	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	12.7	mg CaCO3/L	6.00	6/11/20 9:45	NDE	SM 2340 C	
TSS	120	mg/L	1.00	6/5/20 11:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00477	mg/L	0.00100	6/19/20 14:53	TRC	EPA 200.8	
Dissolved Copper	0.00119	mg/L	0.00100	6/24/20 14:08	TRC	EPA 200.8	
Iron	0.842	mg/L	0.0100	6/22/20 12:38	TRC	EPA 200.8	
Dissolved Iron	0.0218	mg/L	0.0100	6/24/20 14:08	TRC	EPA 200.8	
Zinc	0.0428	mg/L	0.00100	6/19/20 14:53	TRC	EPA 200.8	
Dissolved Zinc	0.00810	mg/L	0.00100	6/24/20 14:08	TRC	EPA 200.8	
Hydrocarbons							
Lube Oil	ND	mg/L	0.400	6/12/20 21:29	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	6/12/20 21:29	ARC	NWTPH-Dx	
Diesel	ND	mg/L	0.160	6/12/20 21:29	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*77.3%*		*50-150*	*6/12/20 21:29*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF18-05302020
Lab/Sample Number: WAF0004-02 Collect Date: 05/31/20 16:00
Date Received: 06/01/20 12:23 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	116	mg CaCO3/L	6.00	6/11/20 9:45	NDE	SM 2340 C	
TSS	4.00	mg/L	1.00	6/5/20 11:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00488	mg/L	0.00100	6/19/20 14:56	TRC	EPA 200.8	
Dissolved Copper	0.00432	mg/L	0.00100	6/24/20 14:10	TRC	EPA 200.8	
Iron	0.478	mg/L	0.0100	6/22/20 12:40	TRC	EPA 200.8	
Dissolved Iron	0.0984	mg/L	0.0100	6/24/20 14:10	TRC	EPA 200.8	
Zinc	0.00506	mg/L	0.00100	6/19/20 14:56	TRC	EPA 200.8	
Dissolved Zinc	0.00412	mg/L	0.00100	6/24/20 14:10	TRC	EPA 200.8	
Hydrocarbons							
Lube Oil	ND	mg/L	0.400	6/12/20 22:25	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	6/12/20 22:25	ARC	NWTPH-Dx	
Diesel	ND	mg/L	0.160	6/12/20 22:25	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*87.3%*		*50-150*	*6/12/20 22:25*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF12-05302020
Lab/Sample Number: WAF0004-03 Collect Date: 05/31/20 16:00
Date Received: 06/01/20 12:23 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	91.1	mg CaCO3/L	6.00	6/11/20 9:45	NDE	SM 2340 C	
TSS	12.0	mg/L	2.00	6/5/20 11:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00422	mg/L	0.00100	6/19/20 14:58	TRC	EPA 200.8	
Dissolved Copper	0.00344	mg/L	0.00100	6/24/20 14:17	TRC	EPA 200.8	
Iron	0.459	mg/L	0.0100	6/22/20 12:43	TRC	EPA 200.8	
Dissolved Iron	0.0825	mg/L	0.0100	6/24/20 14:17	TRC	EPA 200.8	
Zinc	0.0140	mg/L	0.00100	6/19/20 14:58	TRC	EPA 200.8	
Dissolved Zinc	0.0143	mg/L	0.00100	6/24/20 14:17	TRC	EPA 200.8	
Hydrocarbons							
Lube Oil	ND	mg/L	0.400	6/12/20 23:21	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	6/12/20 23:21	ARC	NWTPH-Dx	
Diesel	ND	mg/L	0.160	6/12/20 23:21	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*90.8%*		*50-150*	*6/12/20 23:21*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	INF-05302020-DI		
Lab/Sample Number:	WAF0004-04	Collect Date:	05/31/20 16:00
Date Received:	06/01/20 12:23	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	<0.00007	mg/L	0.00100	6/24/20 14:20	TRC	EPA 200.8	
Dissolved Iron	0.0163	mg/L	0.0100	6/24/20 14:20	TRC	EPA 200.8	
Dissolved Zinc	0.0254	mg/L	0.00100	6/24/20 14:20	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF18-05302020-DI		
Lab/Sample Number:	WAF0004-05	Collect Date:	05/31/20 16:00
Date Received:	06/01/20 12:23	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	<0.00007	mg/L	0.00100	6/24/20 14:22	TRC	EPA 200.8	
Dissolved Iron	0.0106	mg/L	0.0100	6/24/20 14:22	TRC	EPA 200.8	
Dissolved Zinc	0.0197	mg/L	0.00100	6/24/20 14:22	TRC	EPA 200.8	

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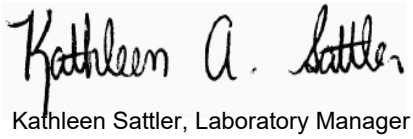
Analytical Results Report

(Continued)

Sample Location: EFF12-05302020-DI
Lab/Sample Number: WAF0004-06 Collect Date: 05/31/20 16:00
Date Received: 06/01/20 12:23 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	<0.00007	mg/L	0.00100	6/24/20 14:34	TRC	EPA 200.8	
Dissolved Iron	<0.00397	mg/L	0.0100	6/24/20 14:34	TRC	EPA 200.8	
Dissolved Zinc	0.0221	mg/L	0.00100	6/24/20 14:34	TRC	EPA 200.8	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

M1	Matrix spike recovery was high; the associated blank spike recovery was acceptable. Potential matrix effect
M2	Matrix spike recovery was low; the associated blank spike recovery was acceptable. Potential matrix effect.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAF0246 - W Filtration										
Blank (BAF0246-BLK1)					Prepared & Analyzed: 6/5/2020					
TSS	ND		1.00	mg/L						
Blank (BAF0246-BLK2)					Prepared & Analyzed: 6/5/2020					
TSS	ND		1.00	mg/L						
Blank (BAF0246-BLK3)					Prepared & Analyzed: 6/5/2020					
TSS	ND		1.00	mg/L						
Blank (BAF0246-BLK4)					Prepared & Analyzed: 6/5/2020					
TSS	ND		1.00	mg/L						
LCS (BAF0246-BS1)					Prepared & Analyzed: 6/5/2020					
TSS	99.0			mg/L	100		99.0	90-110		
LCS (BAF0246-BS2)					Prepared & Analyzed: 6/5/2020					
TSS	98.0			mg/L	100		98.0	90-110		
LCS Dup (BAF0246-BSD1)					Prepared & Analyzed: 6/5/2020					
TSS	100			mg/L	100		100	90-110	1.01	10
LCS Dup (BAF0246-BSD2)					Prepared & Analyzed: 6/5/2020					
TSS	102			mg/L	100		102	90-110	4.00	10
Duplicate (BAF0246-DUP1)		**Source: MAF0054-02**			Prepared & Analyzed: 6/5/2020					
TSS	6.00		1.00	mg/L		7.00			15.4	20
Duplicate (BAF0246-DUP2)		**Source: WAF0152-01**			Prepared & Analyzed: 6/5/2020					
TSS	7.00		1.00	mg/L		4.00			54.5	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAF0246 - W Filtration (Continued)										
Matrix Spike (BAF0246-MS1)		**Source: MAF0052-01**			Prepared & Analyzed: 6/5/2020					
TSS	100		2.00	mg/L	100	ND	100	80-120		
Matrix Spike (BAF0246-MS2)		**Source: WAF0131-01**			Prepared & Analyzed: 6/5/2020					
TSS	100		2.00	mg/L	100	7.00	93.0	80-120		
Matrix Spike Dup (BAF0246-MSD1)		**Source: MAF0052-01**			Prepared & Analyzed: 6/5/2020					
TSS	102		2.00	mg/L	100	ND	102	80-120	1.98	20
Matrix Spike Dup (BAF0246-MSD2)		**Source: WAF0131-01**			Prepared & Analyzed: 6/5/2020					
TSS	104		2.00	mg/L	100	7.00	97.0	80-120	3.92	20
Batch: BAF0364 - W Wet Chem										
Blank (BAF0364-BLK1)					Prepared & Analyzed: 6/11/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAF0364-BS1)					Prepared & Analyzed: 6/11/2020					
Hardness	99.0			mg CaCO3/L	100		99.0	90-110		
LCS Dup (BAF0364-BSD1)					Prepared & Analyzed: 6/11/2020					
Hardness	98.5			mg CaCO3/L	100		98.5	90-110	0.496	20
Duplicate (BAF0364-DUP1)		**Source: WAF0108-01**			Prepared & Analyzed: 6/11/2020					
Hardness	253		6.00	mg CaCO3/L		252			0.388	20
Matrix Spike (BAF0364-MS1)		**Source: WAE0894-01**			Prepared & Analyzed: 6/11/2020					
Hardness	284		12.0	mg CaCO3/L	100	182	102	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAF0364 - W Wet Chem (Continued)										
Matrix Spike Dup (BAF0364-MSD1)		**Source: WAE0894-01**			Prepared & Analyzed: 6/11/2020					
Hardness	282		12.0	mg CaCO3/L	100	182	100	80-120	0.692	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAF0090 - W 3010 Digest										
Blank (BAF0090-BLK1)					Prepared: 6/3/2020 Analyzed: 6/24/2020					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Iron	ND		0.0100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAF0090-BS1)					Prepared: 6/3/2020 Analyzed: 6/24/2020					
Dissolved Zinc	0.0489		0.00100	mg/L	0.0500		97.8	85-115		
Dissolved Copper	0.0480		0.00100	mg/L	0.0500		96.0	85-115		
Dissolved Iron	0.106		0.0100	mg/L	0.100		106	85-115		
Matrix Spike (BAF0090-MS1)		**Source: WAF0004-02**			Prepared: 6/3/2020 Analyzed: 6/24/2020					
Dissolved Zinc	0.250		0.00500	mg/L	0.250	0.00412	98.2	70-130		
Dissolved Iron	0.613		0.0500	mg/L	0.500	0.0984	103	70-130		
Dissolved Copper	0.246		0.00500	mg/L	0.250	0.00432	96.7	70-130		
Matrix Spike Dup (BAF0090-MSD1)		**Source: WAF0004-02**			Prepared: 6/3/2020 Analyzed: 6/24/2020					
Dissolved Iron	0.729		0.0500	mg/L	0.500	0.0984	126	70-130	17.3	20
Dissolved Zinc	0.246		0.00500	mg/L	0.250	0.00412	96.8	70-130	1.40	20
Dissolved Copper	0.242		0.00500	mg/L	0.250	0.00432	95.2	70-130	1.49	20
Batch: BAF0120 - W 3010 Digest										
Blank (BAF0120-BLK1)					Prepared: 6/3/2020 Analyzed: 6/22/2020					
Iron	ND		0.0100	mg/L						
Copper	ND		0.00100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BAF0120-BS1)					Prepared: 6/3/2020 Analyzed: 6/19/2020					
Copper	0.0481		0.00100	mg/L	0.0500		96.2	85-115		
Iron	0.101		0.0100	mg/L	0.100		101	85-115		
Zinc	0.0493		0.00100	mg/L	0.0500		98.6	85-115		

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAF0120 - W 3010 Digest (Continued)										
Matrix Spike (BAF0120-MS1)		**Source: WAE0919-03**			Prepared: 6/3/2020 Analyzed: 6/19/2020					
Copper	0.0470		0.00100	mg/L	0.0500	0.00631	81.3	70-130		
Iron	4.52	M1	0.0100	mg/L	0.100	4.05	463	70-130		
Zinc	0.0560		0.00100	mg/L	0.0500	0.0133	85.4	70-130		
Matrix Spike (BAF0120-MS2)		**Source: WAE0919-14**			Prepared: 6/3/2020 Analyzed: 6/19/2020					
Zinc	0.0466	M2	0.00100	mg/L	0.0500	0.0136	66.0	70-130		
Copper	0.0441		0.00100	mg/L	0.0500	0.00620	75.7	70-130		
Iron	1.10	M2	0.0100	mg/L	0.100	5.94	NR	70-130		
Matrix Spike Dup (BAF0120-MSD1)		**Source: WAE0919-03**			Prepared: 6/3/2020 Analyzed: 6/19/2020					
Copper	0.0500		0.00100	mg/L	0.0500	0.00631	87.4	70-130	6.31	20
Zinc	0.0600		0.00100	mg/L	0.0500	0.0133	93.4	70-130	6.90	20
Iron	4.96	M1	0.0100	mg/L	0.100	4.05	910	70-130	9.43	20
Matrix Spike Dup (BAF0120-MSD2)		**Source: WAE0919-14**			Prepared: 6/3/2020 Analyzed: 6/19/2020					
Zinc	0.0473	M2	0.00100	mg/L	0.0500	0.0136	67.5	70-130	1.55	20
Copper	0.0449		0.00100	mg/L	0.0500	0.00620	77.4	70-130	1.90	20
Iron	1.16	M2	0.0100	mg/L	0.100	5.94	NR	70-130	5.23	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAF0399 - W TPH-Dx										
Blank (BAF0399-BLK1)					Prepared: 6/11/2020 Analyzed: 6/12/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*44.6*	*ppm*	*50.0*		*89.2*	*50-150*		
LCS (BAF0399-BS1)					Prepared: 6/11/2020 Analyzed: 6/12/2020					
Diesel	1.03		0.160	mg/L	1.00		103	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*46.5*	*ppm*	*50.0*		*93.1*	*50-150*		
Duplicate (BAF0399-DUP1)		**Source: WAF0168-01**			Prepared: 6/11/2020 Analyzed: 6/13/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*47.6*	*ppm*	*50.0*		*95.2*	*50-150*		
Matrix Spike (BAF0399-MS1)		**Source: WAF0003-01**			Prepared: 6/11/2020 Analyzed: 6/12/2020					
Diesel	0.901		0.160	mg/L	1.00	ND	90.1	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*44.7*	*ppm*	*50.0*		*89.4*	*50-150*		
Matrix Spike Dup (BAF0399-MSD1)		**Source: WAF0003-01**			Prepared: 6/11/2020 Analyzed: 6/12/2020					

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAF0399 - W TPH-Dx (Continued)										
Matrix Spike Dup (BAF0399-MSD1)		**Source: WAF0003-01**			Prepared: 6/11/2020 Analyzed: 6/12/2020					
Diesel	0.759		0.160	mg/L	1.00	ND	75.9	70-130	17.2	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*42.3*	*ppm*	*50.0*		*84.6*	*50-150*		

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Chain of Custody Record

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Anatek Log-In #

WAF0004

Due: 06/15/20

Company Name:	Spokane County	Project Manager:	Ethan Murnin
Address:	1026 W. Broadway Avenue	Project Name & # :	Gonzaga
City: Spokane State: WA Zip: 99260		Email Address :	EMURNIN@spokanecounty.org
Phone:	(509) 477-7420	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Aroun

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative: # of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	Total Nitrogen SM4500 - Calculated	TKN SM4500	NO3-NO2 SM4500
	INF05302020	5/31/2020 16:00	water			x	x	x	x		x				
	EFF18-05302020	5/31/2020 16:00	water			x	x	x	x		x				
	EFF12-05302020	5/31/2020 16:00	water			x	x	x	x		x				
	INF05302020-DI	5/31/2020 16:00	water					x							
	EFF18-05302020-DI	5/31/2020 16:00	water					x							
	EFF12-05302020-DI	5/31/2020 16:00	water					x							

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	Y	N

H/P/C

	Printed Name	Signature	Company	Date	Time
Relinquished by	Taylor Hoffman-Ballard	Taylor Hoffman Ballard	OCI	6/1/2020	9:00a
Received by	Aurora Younger		anatek	6/1/20	9:00am
Relinquished by					
Received by					
Relinquished by					
Received by					

Temperature (°C): 5.0° dig-07

Preservative: HNO3 2000994 <2

HCl 2001180 <2 ~~H2SO4~~ NaOH pH 2001015

Date & Time: 6-1-20 1230

Inspected By: MG

Form COC01.00 - Eff 1 Mar 2015

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Client:	Spokane County	Work Order:	WAI1018
Address:	1026 W. Broadway Ave.	Project:	Gonzaga
	Spokane, WA 99260-0430	Reported:	10/15/2020 08:23
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF092520		
Lab/Sample Number:	WAI1018-01	Collect Date:	09/25/20 17:30
Date Received:	09/28/20 14:37	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	49.9	mg CaCO3/L	6.00	10/6/20 7:30	ary	SM 2340 C	
Total P	0.477	mg/L	0.0500	9/30/20 16:15	TLM	SM 4500-P H	
TSS	36.0	mg/L	1.00	10/2/20 14:25	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.0146	mg/L	0.00100	10/8/20 12:23	TRC	EPA 200.8	
Dissolved Copper	0.0112	mg/L	0.00100	10/8/20 11:34	TRC	EPA 200.8	
Iron	1.20	mg/L	0.0100	10/8/20 12:23	TRC	EPA 200.8	
Dissolved Iron	0.139	mg/L	0.0100	10/8/20 11:34	TRC	EPA 200.8	
Zinc	0.0595	mg/L	0.00100	10/8/20 12:23	TRC	EPA 200.8	
Dissolved Zinc	0.0444	mg/L	0.00100	10/8/20 11:34	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location: EFF12092520

Lab/Sample Number: WAI1018-02 Collect Date: 09/25/20 17:30

Date Received: 09/28/20 14:37 Collected By:

Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	204	mg CaCO3/L	6.00	10/6/20 7:30	ary	SM 2340 C	
Total P	0.433	mg/L	0.0500	9/30/20 16:18	TLM	SM 4500-P H	
TSS	25.0	mg/L	1.00	10/2/20 14:25	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00674	mg/L	0.00100	10/8/20 12:25	TRC	EPA 200.8	
Dissolved Copper	0.00671	mg/L	0.00100	10/8/20 11:36	TRC	EPA 200.8	
Iron	0.185	mg/L	0.0100	10/8/20 12:25	TRC	EPA 200.8	
Dissolved Iron	0.0543	mg/L	0.0100	10/8/20 11:36	TRC	EPA 200.8	
Zinc	0.00427	mg/L	0.00100	10/14/20 17:21	TRC	EPA 200.8	
Dissolved Zinc	0.00327	mg/L	0.00100	10/14/20 17:16	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location: EFF18092520

Lab/Sample Number: WAI1018-03 Collect Date: 09/25/20 17:30

Date Received: 09/28/20 14:37 Collected By:

Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	196	mg CaCO3/L	12.0	10/6/20 7:30	ary	SM 2340 C	
Total P	0.751	mg/L	0.0500	9/30/20 16:20	TLM	SM 4500-P H	
TSS	153	mg/L	1.00	10/2/20 14:25	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00560	mg/L	0.00100	10/8/20 12:28	TRC	EPA 200.8	
Dissolved Copper	0.00297	mg/L	0.00100	10/8/20 13:33	TRC	EPA 200.8	
Iron	0.435	mg/L	0.0100	10/8/20 12:28	TRC	EPA 200.8	
Dissolved Iron	0.0426	mg/L	0.0100	10/8/20 13:33	TRC	EPA 200.8	
Zinc	0.00940	mg/L	0.00100	10/14/20 17:23	TRC	EPA 200.8	
Dissolved Zinc	0.00323	mg/L	0.00100	10/14/20 17:18	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	INF092520-DI		
Lab/Sample Number:	WAI1018-04	Collect Date:	09/25/20 17:30
Date Received:	09/28/20 14:37	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00611	mg/L	0.00100	10/8/20 11:46	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	10/8/20 11:46	TRC	EPA 200.8	
Dissolved Zinc	0.0743	mg/L	0.00100	10/8/20 11:46	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF12092520-DI		
Lab/Sample Number:	WAI1018-05	Collect Date:	09/25/20 17:30
Date Received:	09/28/20 14:37	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00612	mg/L	0.00100	10/8/20 11:48	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	10/8/20 11:48	TRC	EPA 200.8	
Dissolved Zinc	0.0751	mg/L	0.00100	10/8/20 11:48	TRC	EPA 200.8	

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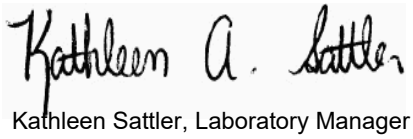
Analytical Results Report

(Continued)

Sample Location:	EFF18092520-DI		
Lab/Sample Number:	WAI1018-06	Collect Date:	09/25/20 17:30
Date Received:	09/28/20 14:37	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00615	mg/L	0.00100	10/8/20 11:51	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	10/8/20 11:51	TRC	EPA 200.8	
Dissolved Zinc	0.0777	mg/L	0.00100	10/8/20 11:51	TRC	EPA 200.8	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAI0922 - W FIA										
Blank (BAI0922-BLK1)					Prepared & Analyzed: 9/30/2020					
Total P	ND		0.00500	mg/L						
Blank (BAI0922-BLK2)					Prepared & Analyzed: 9/30/2020					
Total P	ND		0.00500	mg/L						
Blank (BAI0922-BLK3)					Prepared & Analyzed: 9/30/2020					
Total P	ND		0.00500	mg/L						
LCS (BAI0922-BS1)					Prepared & Analyzed: 9/30/2020					
Total P	0.100		0.00500	mg/L	0.100		100	90-110		
LCS (BAI0922-BS2)					Prepared & Analyzed: 9/30/2020					
Total P	0.105		0.00500	mg/L	0.100		105	90-110		
Matrix Spike (BAI0922-MS1)		**Source: WAI0984-02**			Prepared & Analyzed: 9/30/2020					
Total P	0.143		0.00500	mg/L	0.100	0.0325	110	80-120		
Matrix Spike (BAI0922-MS2)		**Source: WAI0985-02**			Prepared & Analyzed: 9/30/2020					
Total P	0.136		0.00500	mg/L	0.100	0.0312	105	80-120		
Matrix Spike Dup (BAI0922-MSD1)		**Source: WAI0984-02**			Prepared & Analyzed: 9/30/2020					
Total P	0.138		0.00500	mg/L	0.100	0.0325	106	80-120	3.41	20
Matrix Spike Dup (BAI0922-MSD2)		**Source: WAI0985-02**			Prepared & Analyzed: 9/30/2020					
Total P	0.136		0.00500	mg/L	0.100	0.0312	105	80-120	0.147	20
Batch: BAJ0124 - W Wet Chem										
Blank (BAJ0124-BLK1)					Prepared: 10/5/2020 Analyzed: 10/6/2020					
Hardness	ND		3.00	mg CaCO3/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0124 - W Wet Chem (Continued)										
Blank (BAJ0124-BLK2)					Prepared: 10/5/2020 Analyzed: 10/6/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAJ0124-BS1)					Prepared: 10/5/2020 Analyzed: 10/6/2020					
Hardness	101		3.00	mg CaCO3/L	100		101	90-110		
LCS Dup (BAJ0124-BSD1)					Prepared: 10/5/2020 Analyzed: 10/6/2020					
Hardness	98.9		3.00	mg CaCO3/L	100		98.9	90-110	1.92	20
Duplicate (BAJ0124-DUP1)		**Source: WAJ0094-01**			Prepared: 10/5/2020 Analyzed: 10/6/2020					
Hardness	159		6.00	mg CaCO3/L		163			2.38	20
Matrix Spike (BAJ0124-MS1)		**Source: WAI1016-02**			Prepared: 10/5/2020 Analyzed: 10/6/2020					
Hardness	140		6.00	mg CaCO3/L	100	45.1	95.0	80-120		
Matrix Spike Dup (BAJ0124-MSD1)		**Source: WAI1016-02**			Prepared: 10/5/2020 Analyzed: 10/6/2020					
Hardness	140		6.00	mg CaCO3/L	100	45.1	95.0	80-120	0.00	20
Batch: BAJ0151 - W Filtration										
Blank (BAJ0151-BLK1)					Prepared & Analyzed: 10/2/2020					
TSS	ND		1.00	mg/L						
Blank (BAJ0151-BLK2)					Prepared & Analyzed: 10/2/2020					
TSS	ND		1.00	mg/L						
Blank (BAJ0151-BLK3)					Prepared & Analyzed: 10/2/2020					
TSS	ND		1.00	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0151 - W Filtration (Continued)										
Blank (BAJ0151-BLK4)					Prepared & Analyzed: 10/2/2020					
TSS	ND		1.00	mg/L						
LCS (BAJ0151-BS1)					Prepared & Analyzed: 10/2/2020					
TSS	102			mg/L	100		102	90-110		
LCS (BAJ0151-BS2)					Prepared & Analyzed: 10/2/2020					
TSS	98.0			mg/L	100		98.0	90-110		
LCS Dup (BAJ0151-BSD1)					Prepared & Analyzed: 10/2/2020					
TSS	96.0			mg/L	100		96.0	90-110	6.06	10
LCS Dup (BAJ0151-BSD2)					Prepared & Analyzed: 10/2/2020					
TSS	94.0			mg/L	100		94.0	90-110	4.17	10
Duplicate (BAJ0151-DUP1)		**Source: WAI1113-01**			Prepared & Analyzed: 10/2/2020					
TSS	1.00		1.00	mg/L		1.00			0.00	20
Duplicate (BAJ0151-DUP2)		**Source: WAJ0005-02**			Prepared & Analyzed: 10/2/2020					
TSS	1.00		1.00	mg/L		1.00			0.00	20
Matrix Spike (BAJ0151-MS1)		**Source: WAI1018-02**			Prepared & Analyzed: 10/2/2020					
TSS	124		2.00	mg/L	100	25.0	99.0	80-120		
Matrix Spike (BAJ0151-MS2)		**Source: WAJ0007-02**			Prepared & Analyzed: 10/2/2020					
TSS	100		2.00	mg/L	100	3.00	97.0	80-120		
Matrix Spike Dup (BAJ0151-MSD1)		**Source: WAI1018-02**			Prepared & Analyzed: 10/2/2020					
TSS	118		2.00	mg/L	100	25.0	93.0	80-120	4.96	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0151 - W Filtration (Continued)										
Matrix Spike Dup (BAJ0151-MSD2)		**Source: WAJ0007-02**			Prepared & Analyzed: 10/2/2020					
TSS	98.0		2.00	mg/L	100	3.00	95.0	80-120	2.02	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0003 - W 3010 Digest										
Blank (BAJ0003-BLK1)					Prepared: 10/1/2020 Analyzed: 10/8/2020					
Dissolved Copper	ND		0.00100	mg/L						
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Iron	ND		0.0100	mg/L						
LCS (BAJ0003-BS1)					Prepared: 10/1/2020 Analyzed: 10/8/2020					
Dissolved Iron	0.110		0.0100	mg/L	0.100		110	85-115		
Dissolved Copper	0.0484		0.00100	mg/L	0.0500		96.8	85-115		
Dissolved Zinc	0.0450		0.00100	mg/L	0.0500		89.9	85-115		
Matrix Spike (BAJ0003-MS1)		**Source: WAI1018-03**			Prepared: 10/1/2020 Analyzed: 10/8/2020					
Dissolved Iron	0.131		0.0100	mg/L	0.100	0.0426	88.1	70-130		
Dissolved Zinc	0.0468		0.00100	mg/L	0.0500	0.00323	87.2	70-130		
Dissolved Copper	0.0490		0.00100	mg/L	0.0500	0.00297	92.1	70-130		
Matrix Spike Dup (BAJ0003-MSD1)		**Source: WAI1018-03**			Prepared: 10/1/2020 Analyzed: 10/8/2020					
Dissolved Iron	0.130		0.0100	mg/L	0.100	0.0426	87.6	70-130	0.348	20
Dissolved Copper	0.0498		0.00100	mg/L	0.0500	0.00297	93.7	70-130	1.56	20
Dissolved Zinc	0.0471		0.00100	mg/L	0.0500	0.00323	87.7	70-130	0.554	20
Batch: BAJ0004 - W 3010 Digest										
Blank (BAJ0004-BLK1)					Prepared: 10/1/2020 Analyzed: 10/8/2020					
Copper	ND		0.00100	mg/L						
Iron	ND		0.0100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BAJ0004-BS1)					Prepared: 10/1/2020 Analyzed: 10/8/2020					
Copper	0.0474		0.00100	mg/L	0.0500		94.8	85-115		
Iron	0.0983		0.0100	mg/L	0.100		98.3	85-115		
Zinc	0.0440		0.00100	mg/L	0.0500		88.0	85-115		

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0004 - W 3010 Digest (Continued)										
Matrix Spike (BAJ0004-MS1)		**Source: WAI1018-03**			Prepared: 10/1/2020 Analyzed: 10/8/2020					
Copper	0.0516		0.00100	mg/L	0.0500	0.00560	92.1	70-130		
Iron	0.526		0.0100	mg/L	0.100	0.435	90.6	70-130		
Zinc	0.0488		0.00100	mg/L	0.0500	0.00940	78.7	70-130		
Matrix Spike Dup (BAJ0004-MSD1)		**Source: WAI1018-03**			Prepared: 10/1/2020 Analyzed: 10/8/2020					
Iron	0.516		0.0100	mg/L	0.100	0.435	81.2	70-130	1.81	20
Zinc	0.0496		0.00100	mg/L	0.0500	0.00940	80.4	70-130	1.75	20
Copper	0.0520		0.00100	mg/L	0.0500	0.00560	92.8	70-130	0.747	20

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Chain of Custody Record

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Anatek Log-In #

WAI1018

Due: 10/13/20

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : ~~Sand Filter~~ Gonzaga
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Arou

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWBS

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative:	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
	INF092520	09/25/20 5:30 pm	water				x	x	x	x	x					
	EFF12092520	09/25/20 5:30 pm	water				x	x	x	x	x					
	EFF18092520	09/25/20 5:30 pm	water				x	x	x	x	x					
	INF092520-DI	09/25/20 5:30 pm	water						x							
	EFF12092520-DI	09/25/20 5:30 pm	water						x							
	EFF18092520-DI	09/25/20 5:30 pm	water						x							

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	~~Y~~	~~N~~

Temperature (°C): 1.5 IR1 °hci

Preservative: H_2SO_4 200181 <2
HNO_3 2000994 <2 pH 200105

Date & Time: 9-28-20 1655

Inspected By: MWG

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan	Kevin Flanagan	Osborn Consulting Inc	9/28/20	
Received by	Brock Grejtak		Anatek	9-28-20	1437
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WAJ0380
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	10/27/2020 11:48
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF101020		
Lab/Sample Number:	WAJ0380-01	Collect Date:	10/10/20 18:30
Date Received:	10/12/20 16:31	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	26.9	mg CaCO3/L	6.00	10/15/20 13:00	ARY	SM 2340 C	
Total Nitrate/Nitrite	0.120	mg/L	0.100	10/23/20 10:32	TLM	SM 4500-NO3 F	
Phosphate/P	0.194	mg/L	0.0180	10/12/20 17:51	TLM	SM 4500-P G	
TKN	1.39	mg/L	0.500	10/26/20 16:09	TLM	SM 4500-Norg D	
Total Nitrogen	1.51	mg/L	0.600	10/26/20 16:09	TLM	varies	
Total P	0.288	mg/L	0.0500	10/21/20 16:17	TLM	SM 4500-P H	
TSS	12.0	mg/L	1.00	10/16/20 13:28	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00734	mg/L	0.00100	10/22/20 16:21	TRC	EPA 200.8	
Dissolved Copper	0.00491	mg/L	0.00100	10/21/20 15:51	TRC	EPA 200.8	
Iron	0.866	mg/L	0.0100	10/22/20 16:21	TRC	EPA 200.8	
Dissolved Iron	0.0771	mg/L	0.0100	10/22/20 15:31	TRC	EPA 200.8	
Zinc	0.0423	mg/L	0.00100	10/22/20 16:21	TRC	EPA 200.8	
Dissolved Zinc	0.0319	mg/L	0.00100	10/22/20 15:31	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	10/22/20 0:41	ARC	NWTPH-Dx	
Lube Oil	0.520	mg/L	0.400	10/22/20 0:41	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	10/22/20 0:41	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*85.2%*		*50-150*	*10/22/20 0:41*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF12101020
Lab/Sample Number: WAJ0380-02 Collect Date: 10/10/20 18:30
Date Received: 10/12/20 16:31 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	136	mg CaCO3/L	6.00	10/15/20 13:00	ARY	SM 2340 C	
Total Nitrate/Nitrite	0.177	mg/L	0.100	10/23/20 10:34	TLM	SM 4500-NO3 F	
Phosphate/P	0.418	mg/L	0.0180	10/12/20 17:52	TLM	SM 4500-P G	
TKN	2.19	mg/L	0.500	10/26/20 16:10	TLM	SM 4500-Norg D	
Total Nitrogen	2.37	mg/L	0.600	10/26/20 16:10	TLM	varies	
Total P	0.475	mg/L	0.0500	10/21/20 16:20	TLM	SM 4500-P H	
TSS	4.40	mg/L	0.400	10/16/20 13:28	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00742	mg/L	0.00100	10/22/20 16:23	TRC	EPA 200.8	
Dissolved Copper	0.00651	mg/L	0.00100	10/21/20 15:54	TRC	EPA 200.8	
Iron	0.502	mg/L	0.0100	10/22/20 16:23	TRC	EPA 200.8	
Dissolved Iron	0.0826	mg/L	0.0100	10/22/20 15:33	TRC	EPA 200.8	
Zinc	0.00739	mg/L	0.00100	10/22/20 16:23	TRC	EPA 200.8	
Dissolved Zinc	0.0149	mg/L	0.00100	10/22/20 15:33	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	10/22/20 1:36	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	10/22/20 1:36	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	10/22/20 1:36	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*90.4%*		*50-150*	*10/22/20 1:36*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF18101020
Lab/Sample Number: WAJ0380-03 Collect Date: 10/10/20 18:30
Date Received: 10/12/20 16:31 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	146	mg CaCO3/L	6.00	10/15/20 13:00	ARY	SM 2340 C	
Total Nitrate/Nitrite	0.468	mg/L	0.100	10/23/20 10:35	TLM	SM 4500-NO3 F	
Phosphate/P	0.642	mg/L	0.0180	10/12/20 17:53	TLM	SM 4500-P G	
TKN	1.56	mg/L	0.500	10/26/20 16:11	TLM	SM 4500-Norg D	
Total Nitrogen	2.03	mg/L	0.600	10/26/20 16:11	TLM	varies	
Total P	0.715	mg/L	0.0500	10/21/20 16:22	TLM	SM 4500-P H	
TSS	4.00	mg/L	0.333	10/16/20 13:28	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00633	mg/L	0.00100	10/22/20 16:26	TRC	EPA 200.8	
Dissolved Copper	0.00563	mg/L	0.00100	10/21/20 15:57	TRC	EPA 200.8	
Iron	0.444	mg/L	0.0100	10/22/20 16:26	TRC	EPA 200.8	
Dissolved Iron	0.114	mg/L	0.0100	10/22/20 15:36	TRC	EPA 200.8	
Zinc	0.00893	mg/L	0.00100	10/22/20 16:26	TRC	EPA 200.8	
Dissolved Zinc	0.0223	mg/L	0.00100	10/22/20 15:36	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	10/22/20 2:30	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	10/22/20 2:30	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	10/22/20 2:30	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*87.6%*		*50-150*	*10/22/20 2:30*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	INF101020-DI		
Lab/Sample Number:	WAJ0380-04	Collect Date:	10/10/20 18:30
Date Received:	10/12/20 16:31	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00541	mg/L	0.00100	10/21/20 16:01	TRC	EPA 200.8	
Dissolved Iron	0.0213	mg/L	0.0100	10/22/20 15:38	TRC	EPA 200.8	
Dissolved Zinc	0.0654	mg/L	0.00100	10/22/20 15:38	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF12101020-DI		
Lab/Sample Number:	WAJ0380-05	Collect Date:	10/10/20 18:30
Date Received:	10/12/20 16:31	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00383	mg/L	0.00100	10/21/20 16:04	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	10/22/20 15:41	TRC	EPA 200.8	
Dissolved Zinc	0.0174	mg/L	0.00100	10/22/20 15:41	TRC	EPA 200.8	

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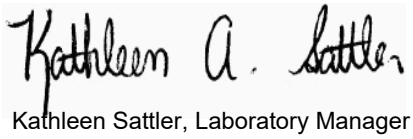
Analytical Results Report

(Continued)

Sample Location:	EFF18101020-DI		
Lab/Sample Number:	WAJ0380-06	Collect Date:	10/10/20 18:30
Date Received:	10/12/20 16:31	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00461	mg/L	0.00100	10/21/20 16:07	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	10/22/20 15:43	TRC	EPA 200.8	
Dissolved Zinc	0.0673	mg/L	0.00100	10/22/20 15:43	TRC	EPA 200.8	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0421 - W Wet Chem										
Blank (BAJ0421-BLK1)					Prepared & Analyzed: 10/15/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAJ0421-BLK2)					Prepared & Analyzed: 10/15/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAJ0421-BS1)					Prepared & Analyzed: 10/15/2020					
Hardness	101			mg CaCO3/L	100		101	90-110		
LCS Dup (BAJ0421-BSD1)					Prepared & Analyzed: 10/15/2020					
Hardness	99.8			mg CaCO3/L	100		99.8	90-110	0.957	20
Duplicate (BAJ0421-DUP1)		**Source: WAJ0129-01**			Prepared & Analyzed: 10/15/2020					
Hardness	194		6.00	mg CaCO3/L		194			0.00	20
Matrix Spike (BAJ0421-MS1)		**Source: WAJ0535-01**			Prepared & Analyzed: 10/15/2020					
Hardness	129		6.00	mg CaCO3/L	100	38.4	90.2	80-120		
Matrix Spike Dup (BAJ0421-MSD1)		**Source: WAJ0535-01**			Prepared & Analyzed: 10/15/2020					
Hardness	136		6.00	mg CaCO3/L	100	38.4	97.9	80-120	5.80	20
Batch: BAJ0516 - W FIA										
Blank (BAJ0516-BLK1)					Prepared & Analyzed: 10/12/2020					
Phosphate/P	ND		0.0180	mg/L						
LCS (BAJ0516-BS1)					Prepared & Analyzed: 10/12/2020					
Phosphate/P	0.0868		0.0180	mg/L	0.100		86.8	85-115		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0516 - W FIA (Continued)										
Matrix Spike (BAJ0516-MS1)		**Source: WAJ0379-02**			Prepared & Analyzed: 10/12/2020					
Phosphate/P	0.392		0.0180	mg/L	0.100	0.303	89.0	80-120		
Matrix Spike Dup (BAJ0516-MSD1)		**Source: WAJ0379-02**			Prepared & Analyzed: 10/12/2020					
Phosphate/P	0.398		0.0180	mg/L	0.100	0.303	95.2	80-120	1.57	20
Batch: BAJ0601 - W Filtration										
Blank (BAJ0601-BLK1)					Prepared & Analyzed: 10/16/2020					
TSS	ND		1.00	mg/L						
Blank (BAJ0601-BLK2)					Prepared & Analyzed: 10/16/2020					
TSS	ND		1.00	mg/L						
LCS (BAJ0601-BS1)					Prepared & Analyzed: 10/16/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS Dup (BAJ0601-BSD1)					Prepared & Analyzed: 10/16/2020					
TSS	94.0			mg/L	100		94.0	90-110	3.14	10
Duplicate (BAJ0601-DUP1)		**Source: WAJ0379-01**			Prepared & Analyzed: 10/16/2020					
TSS	48.0		1.00	mg/L		49.0			2.06	20
Matrix Spike (BAJ0601-MS1)		**Source: MAJ0312-01**			Prepared & Analyzed: 10/16/2020					
TSS	260		2.00	mg/L	100	178	82.0	80-120		
Matrix Spike Dup (BAJ0601-MSD1)		**Source: MAJ0312-01**			Prepared & Analyzed: 10/16/2020					
TSS	270		2.00	mg/L	100	178	92.0	80-120	3.77	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0634 - W FIA										
Blank (BAJ0634-BLK1)					Prepared & Analyzed: 10/21/2020					
Total P	ND		0.00500	mg/L						
Blank (BAJ0634-BLK2)					Prepared & Analyzed: 10/21/2020					
Total P	ND		0.00500	mg/L						
Blank (BAJ0634-BLK3)					Prepared & Analyzed: 10/21/2020					
Total P	ND		0.00500	mg/L						
LCS (BAJ0634-BS1)					Prepared & Analyzed: 10/21/2020					
Total P	0.104		0.00500	mg/L	0.100		104	90-110		
LCS (BAJ0634-BS2)					Prepared & Analyzed: 10/21/2020					
Total P	0.104		0.00500	mg/L	0.100		104	90-110		
Matrix Spike (BAJ0634-MS1)		**Source: WAJ0620-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.158		0.00500	mg/L	0.100	0.0514	107	80-120		
Matrix Spike (BAJ0634-MS2)		**Source: WAJ0626-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.174		0.00500	mg/L	0.100	0.0614	113	80-120		
Matrix Spike Dup (BAJ0634-MSD1)		**Source: WAJ0620-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.162		0.00500	mg/L	0.100	0.0514	110	80-120	2.31	20
Matrix Spike Dup (BAJ0634-MSD2)		**Source: WAJ0626-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.166		0.00500	mg/L	0.100	0.0614	104	80-120	4.94	20
Batch: BAJ0751 - W FIA										
Blank (BAJ0751-BLK1)					Prepared & Analyzed: 10/26/2020					
TKN	ND		0.500	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0751 - W FIA (Continued)										
LCS (BAJ0751-BS1)					Prepared & Analyzed: 10/26/2020					
TKN	2.08		0.500	mg/L	2.00		104	85-115		
Matrix Spike (BAJ0751-MS1)		**Source: WAJ0444-02**			Prepared & Analyzed: 10/26/2020					
TKN	3.66		0.500	mg/L	2.00	1.67	99.3	80-120		
Matrix Spike Dup (BAJ0751-MSD1)		**Source: WAJ0444-02**			Prepared & Analyzed: 10/26/2020					
TKN	3.62		0.500	mg/L	2.00	1.67	97.2	80-120	1.13	20
Batch: BAJ0763 - W FIA										
Blank (BAJ0763-BLK1)					Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						
Blank (BAJ0763-BLK2)					Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						
LCS (BAJ0763-BS1)					Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	0.203		0.100	mg/L	0.201		101	90-110		
Matrix Spike (BAJ0763-MS1)		**Source: WAJ0444-01**			Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	0.309		0.100	mg/L	0.201	0.137	85.7	80-120		
Matrix Spike Dup (BAJ0763-MSD1)		**Source: WAJ0444-01**			Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	0.316		0.100	mg/L	0.201	0.137	89.1	80-120	2.18	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0368 - W 3010 Digest										
Blank (BAJ0368-BLK1)					Prepared: 10/14/2020 Analyzed: 10/22/2020					
Dissolved Iron	ND		0.0100	mg/L						
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAJ0368-BS1)					Prepared: 10/14/2020 Analyzed: 10/21/2020					
Dissolved Copper	0.0489		0.00100	mg/L	0.0500		97.8	85-115		
Dissolved Iron	0.112		0.0100	mg/L	0.100		112	85-115		
Dissolved Zinc	0.0481		0.00100	mg/L	0.0500		96.2	85-115		
Matrix Spike (BAJ0368-MS1)		**Source: WAJ0379-02**			Prepared: 10/14/2020 Analyzed: 10/22/2020					
Dissolved Iron	1.42		0.100	mg/L	1.00	0.208	121	70-130		
Dissolved Zinc	0.535		0.0100	mg/L	0.500	0.0558	95.8	70-130		
Dissolved Copper	0.515		0.0100	mg/L	0.500	0.0149	100	70-130		
Matrix Spike Dup (BAJ0368-MSD1)		**Source: WAJ0379-02**			Prepared: 10/14/2020 Analyzed: 10/21/2020					
Dissolved Zinc	0.540		0.0100	mg/L	0.500	0.0558	96.8	70-130	0.962	20
Dissolved Iron	1.28		0.100	mg/L	1.00	0.208	107	70-130	10.4	20
Dissolved Copper	0.520		0.0100	mg/L	0.500	0.0149	101	70-130	0.977	20

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0368 - W 3010 Digest (Continued)										
Batch: BAJ0369 - W 3010 Digest										
Blank (BAJ0369-BLK1)					Prepared: 10/14/2020 Analyzed: 10/22/2020					
Zinc	ND		0.00100	mg/L						
Copper	ND		0.00100	mg/L						
Iron	ND		0.0100	mg/L						
LCS (BAJ0369-BS1)					Prepared: 10/14/2020 Analyzed: 10/22/2020					
Copper	0.0501		0.00100	mg/L	0.0500		100	85-115		
Iron	0.113		0.0100	mg/L	0.100		113	85-115		
Zinc	0.0487		0.00100	mg/L	0.0500		97.4	85-115		
Matrix Spike (BAJ0369-MS1)		**Source: WAJ0389-01**			Prepared: 10/14/2020 Analyzed: 10/22/2020					
Iron	0.329		0.0100	mg/L	0.100	0.240	89.2	70-130		
Zinc	0.0665		0.00100	mg/L	0.0500	0.0169	99.2	70-130		
Copper	0.0541		0.00100	mg/L	0.0500	0.00191	104	70-130		
Matrix Spike Dup (BAJ0369-MSD1)		**Source: WAJ0389-01**			Prepared: 10/14/2020 Analyzed: 10/22/2020					
Zinc	0.0647		0.00100	mg/L	0.0500	0.0169	95.7	70-130	2.68	20
Copper	0.0523		0.00100	mg/L	0.0500	0.00191	101	70-130	3.37	20
Iron	0.325		0.0100	mg/L	0.100	0.240	85.7	70-130	1.09	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0511 - W TPH-Dx										
Blank (BAJ0511-BLK1)					Prepared & Analyzed: 10/21/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*45.9*	*ppm*	*50.1*		*91.6*	*50-150*		
LCS (BAJ0511-BS1)					Prepared & Analyzed: 10/21/2020					
Diesel	0.986		0.160	mg/L	1.01		97.7	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*45.0*	*ppm*	*50.1*		*89.9*	*50-150*		
Duplicate (BAJ0511-DUP1)		**Source: WAJ0488-02**			Prepared: 10/21/2020 Analyzed: 10/22/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	0.193		0.400	mg/L		0.202			4.58	20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*45.6*	*ppm*	*50.1*		*91.1*	*50-150*		
Matrix Spike (BAJ0511-MS1)		**Source: WAJ0380-03**			Prepared: 10/21/2020 Analyzed: 10/22/2020					
Diesel	0.832		0.160	mg/L	1.01	ND	82.4	70-130		
Lube Oil	0.173		0.400	mg/L		0.174		70-130		
Surrogate: n-Hexacosane			*42.1*	*ppm*	*50.1*		*84.0*	*50-150*		

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0511 - W TPH-Dx (Continued)										
Matrix Spike Dup (BAJ0511-MSD1)			**Source: WAJ0380-03**		Prepared: 10/21/2020 Analyzed: 10/22/2020					
Diesel	0.862		0.160	mg/L	1.01	ND	85.4	70-130	3.54	20
Lube Oil	0.192		0.400	mg/L		0.174		70-130	10.2	20
Surrogate: n-Hexacosane			*44.4*	*ppm*	*50.1*		*88.5*	*50-150*		

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

WAJ0380

Due: 10/27/20

Tur

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Preservative:

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97	no bottle recd	
	INF101020	10/10/20 6:30 pm	water			x	x	x	x	x	x	x	x		
	EFF12101020	10/10/20 6:30 pm	water			x	x	x	x	x	x	x	x		
	EFF18101020	10/10/20 6:30 pm	water			x	x	x	x	x	x	x	x		
	INF101020-DI	10/10/20 6:30 pm	water					x							
	EFF12101020-DI	10/10/20 6:30 pm	water					x							
	EFF18101020-DI	10/10/20 6:30 pm	water					x							

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWPS

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
VOC Head Space?	Y	N

Temperature (°C): 6.7°IR1/6.2° ind

Preservative: HCl 2002747 <2
H_2SO_4 2002583 <2 HNO_3 2002280 <2

Date & Time: 10-12-20 1730

Inspected By:

pH 2001015 HNO_3 2000994 <2

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan		Osborn Consulting	10/12/20	4:15
Received by	Brock Gesler		Anatek	10-12-20	16:31
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

(EFF18 Diss metals)

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

WAJ0380

Due: 10/27/20

Tur

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Preservative:

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97	no bottle	H+ recd Total Nitrate
	INF101020	10/10/20 6:30 pm	water			x	x	x	x	x	x	x	x		
	EFF12101020	10/10/20 6:30 pm	water			x	x	x	x	x	x	x	x		
	EFF18101020	10/10/20 6:30 pm	water			x	x	x	x	x	x	x	x		
	INF101020-DI	10/10/20 6:30 pm	water					x							
	EFF12101020-DI	10/10/20 6:30 pm	water					x							
	EFF18101020-DI	10/10/20 6:30 pm	water					x							

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com per Kevin SWBS

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	Y	N

hoi

Temperature (°C): 6.7°IR1/6.2° incl

Preservative: HCl 2002747 <2

H_2SO_4 2002883 <2 HNO_3 2002880 <2

Date & Time: 10-12-20 1730

Inspected By:

pH 2001015 HNO_3 2000994 <2

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan		Osborn Consulting	10/12/20	4:15
Received by	Brock Geiger		Anatek	10-12-20	16:31
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

(EFF 18 Diss metals)

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WAJ0488
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	11/5/2020 15:54
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF101220		
Lab/Sample Number:	WAJ0488-01	Collect Date:	10/12/20 14:30
Date Received:	10/12/20 16:31	Collected By:	Ethan Murnin
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	19.2	mg CaCO3/L	6.00	10/15/20 13:00	ARY	SM 2340 C	
Total Nitrate/Nitrite	0.159	mg/L	0.100	10/23/20 10:49	TLM	SM 4500-NO3 F	
TKN	0.653	mg/L	0.500	11/4/20 10:39	TLM	SM 4500-Norg D	
Total Nitrogen	0.812	mg/L	0.600	11/4/20 10:39	TLM	varies	
Total P	0.148	mg/L	0.0500	10/21/20 16:25	TLM	SM 4500-P H	
TSS	12.3	mg/L	0.333	10/16/20 13:28	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00523	mg/L	0.00100	10/29/20 13:40	TRC	EPA 200.8	
Dissolved Copper	0.00366	mg/L	0.00100	10/29/20 14:46	TRC	EPA 200.8	
Iron	0.544	mg/L	0.0100	10/29/20 13:40	TRC	EPA 200.8	M2
Dissolved Iron	0.0258	mg/L	0.0100	10/29/20 14:46	TRC	EPA 200.8	
Zinc	0.0274	mg/L	0.00100	10/29/20 13:40	TRC	EPA 200.8	
Dissolved Zinc	0.0244	mg/L	0.00100	10/29/20 14:46	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	10/22/20 5:14	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	10/22/20 5:14	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	10/22/20 5:14	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*89.3%*		*50-150*	*10/22/20 5:14*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF12101220
Lab/Sample Number: WAJ0488-02 Collect Date: 10/12/20 14:30
Date Received: 10/12/20 16:31 Collected By: Ethan Murnin
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	136	mg CaCO3/L	6.00	10/15/20 13:00	ARY	SM 2340 C	
Total Nitrate/Nitrite	0.146	mg/L	0.100	10/23/20 10:50	TLM	SM 4500-NO3 F	
TKN	1.29	mg/L	0.500	11/4/20 10:39	TLM	SM 4500-Norg D	
Total Nitrogen	1.44	mg/L	0.600	11/4/20 10:39	TLM	varies	
Total P	0.427	mg/L	0.0500	10/21/20 16:27	TLM	SM 4500-P H	
TSS	9.40	mg/L	0.200	10/19/20 8:30	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00931	mg/L	0.00100	10/29/20 13:43	TRC	EPA 200.8	
Dissolved Copper	0.00762	mg/L	0.00100	10/29/20 14:49	TRC	EPA 200.8	
Iron	0.676	mg/L	0.0100	10/29/20 13:43	TRC	EPA 200.8	M2
Dissolved Iron	0.0798	mg/L	0.0100	10/29/20 14:49	TRC	EPA 200.8	
Zinc	0.00841	mg/L	0.00100	10/29/20 13:43	TRC	EPA 200.8	
Dissolved Zinc	0.0208	mg/L	0.00100	10/29/20 14:49	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	10/22/20 6:08	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	10/22/20 6:08	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	10/22/20 6:08	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.5%*		*50-150*	*10/22/20 6:08*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF18101220
Lab/Sample Number: WAJ0488-03 Collect Date: 10/12/20 14:30
Date Received: 10/12/20 16:31 Collected By: Ethan Murnin
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	190	mg CaCO3/L	6.00	10/15/20 13:00	ARY	SM 2340 C	
Total Nitrate/Nitrite	0.194	mg/L	0.100	10/23/20 10:53	TLM	SM 4500-NO3 F	
TKN	1.05	mg/L	0.500	11/4/20 10:40	TLM	SM 4500-Norg D	
Total Nitrogen	1.25	mg/L	0.600	11/4/20 10:40	TLM	varies	
Total P	0.450	mg/L	0.0500	10/21/20 16:30	TLM	SM 4500-P H	
TSS	7.60	mg/L	0.200	10/19/20 8:30	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00818	mg/L	0.00100	10/29/20 13:52	TRC	EPA 200.8	
Dissolved Copper	0.00648	mg/L	0.00100	10/29/20 14:56	TRC	EPA 200.8	
Iron	0.447	mg/L	0.0100	10/29/20 13:52	TRC	EPA 200.8	M2
Dissolved Iron	0.0594	mg/L	0.0100	10/29/20 14:56	TRC	EPA 200.8	
Zinc	0.00994	mg/L	0.00100	10/29/20 13:52	TRC	EPA 200.8	
Dissolved Zinc	0.00719	mg/L	0.00100	10/29/20 14:56	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	10/22/20 7:57	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	10/22/20 7:57	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	10/22/20 7:57	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*90.9%*		*50-150*	*10/22/20 7:57*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	INF101220-DI		
Lab/Sample Number:	WAJ0488-04	Collect Date:	10/12/20 14:30
Date Received:	10/12/20 16:31	Collected By:	Ethan Murnin
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	10/29/20 14:58	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	10/29/20 14:58	TRC	EPA 200.8	
Dissolved Zinc	0.0255	mg/L	0.00100	10/29/20 14:58	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF12101220-DI		
Lab/Sample Number:	WAJ0488-05	Collect Date:	10/12/20 14:30
Date Received:	10/12/20 16:31	Collected By:	Ethan Murnin
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	10/29/20 15:00	TRC	EPA 200.8	
Dissolved Iron	0.0131	mg/L	0.0100	10/29/20 15:00	TRC	EPA 200.8	
Dissolved Zinc	0.0111	mg/L	0.00100	10/29/20 15:00	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF18101220-DI		
Lab/Sample Number:	WAJ0488-06	Collect Date:	10/12/20 14:30
Date Received:	10/12/20 16:31	Collected By:	Ethan Murnin
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	10/29/20 15:03	TRC	EPA 200.8	
Dissolved Iron	ND	mg/L	0.0100	10/29/20 15:03	TRC	EPA 200.8	
Dissolved Zinc	0.0124	mg/L	0.00100	10/29/20 15:03	TRC	EPA 200.8	

Authorized Signature,

Karice Scott For Kathleen Sattler, Laboratory Manager

M2	Matrix spike recovery was low; the associated blank spike recovery was acceptable. Potential matrix effect.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0421 - W Wet Chem										
Blank (BAJ0421-BLK1)					Prepared & Analyzed: 10/15/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAJ0421-BLK2)					Prepared & Analyzed: 10/15/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAJ0421-BS1)					Prepared & Analyzed: 10/15/2020					
Hardness	101			mg CaCO3/L	100		101	90-110		
LCS Dup (BAJ0421-BSD1)					Prepared & Analyzed: 10/15/2020					
Hardness	99.8			mg CaCO3/L	100		99.8	90-110	0.957	20
Duplicate (BAJ0421-DUP1)		**Source: WAJ0129-01**			Prepared & Analyzed: 10/15/2020					
Hardness	194		6.00	mg CaCO3/L		194			0.00	20
Matrix Spike (BAJ0421-MS1)		**Source: WAJ0535-01**			Prepared & Analyzed: 10/15/2020					
Hardness	129		6.00	mg CaCO3/L	100	38.4	90.2	80-120		
Matrix Spike Dup (BAJ0421-MSD1)		**Source: WAJ0535-01**			Prepared & Analyzed: 10/15/2020					
Hardness	136		6.00	mg CaCO3/L	100	38.4	97.9	80-120	5.80	20
Batch: BAJ0601 - W Filtration										
Blank (BAJ0601-BLK1)					Prepared & Analyzed: 10/16/2020					
TSS	ND		1.00	mg/L						
Blank (BAJ0601-BLK2)					Prepared & Analyzed: 10/16/2020					
TSS	ND		1.00	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0601 - W Filtration (Continued)										
LCS (BAJ0601-BS1)					Prepared & Analyzed: 10/16/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS Dup (BAJ0601-BSD1)					Prepared & Analyzed: 10/16/2020					
TSS	94.0			mg/L	100		94.0	90-110	3.14	10
Duplicate (BAJ0601-DUP1)		**Source: WAJ0379-01**			Prepared & Analyzed: 10/16/2020					
TSS	48.0		1.00	mg/L		49.0			2.06	20
Matrix Spike (BAJ0601-MS1)		**Source: MAJ0312-01**			Prepared & Analyzed: 10/16/2020					
TSS	260		2.00	mg/L	100	178	82.0	80-120		
Matrix Spike Dup (BAJ0601-MSD1)		**Source: MAJ0312-01**			Prepared & Analyzed: 10/16/2020					
TSS	270		2.00	mg/L	100	178	92.0	80-120	3.77	20
Batch: BAJ0634 - W FIA										
Blank (BAJ0634-BLK1)					Prepared & Analyzed: 10/21/2020					
Total P	ND		0.00500	mg/L						
Blank (BAJ0634-BLK2)					Prepared & Analyzed: 10/21/2020					
Total P	ND		0.00500	mg/L						
Blank (BAJ0634-BLK3)					Prepared & Analyzed: 10/21/2020					
Total P	ND		0.00500	mg/L						
LCS (BAJ0634-BS1)					Prepared & Analyzed: 10/21/2020					
Total P	0.104		0.00500	mg/L	0.100		104	90-110		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0634 - W FIA (Continued)										
LCS (BAJ0634-BS2)					Prepared & Analyzed: 10/21/2020					
Total P	0.104		0.00500	mg/L	0.100		104	90-110		
Matrix Spike (BAJ0634-MS1)		**Source: WAJ0620-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.158		0.00500	mg/L	0.100	0.0514	107	80-120		
Matrix Spike (BAJ0634-MS2)		**Source: WAJ0626-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.174		0.00500	mg/L	0.100	0.0614	113	80-120		
Matrix Spike Dup (BAJ0634-MSD1)		**Source: WAJ0620-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.162		0.00500	mg/L	0.100	0.0514	110	80-120	2.31	20
Matrix Spike Dup (BAJ0634-MSD2)		**Source: WAJ0626-02**			Prepared & Analyzed: 10/21/2020					
Total P	0.166		0.00500	mg/L	0.100	0.0614	104	80-120	4.94	20
Batch: BAJ0671 - W Filtration										
Blank (BAJ0671-BLK1)					Prepared & Analyzed: 10/19/2020					
TSS	ND		1.00	mg/L						
Blank (BAJ0671-BLK2)					Prepared & Analyzed: 10/19/2020					
TSS	ND		1.00	mg/L						
LCS (BAJ0671-BS1)					Prepared & Analyzed: 10/19/2020					
TSS	96.0			mg/L	100		96.0	90-110		
LCS Dup (BAJ0671-BSD1)					Prepared & Analyzed: 10/19/2020					
TSS	96.0			mg/L	100		96.0	90-110	0.00	10

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0671 - W Filtration (Continued)										
Duplicate (BAJ0671-DUP1)		**Source: WAJ0535-01**			Prepared & Analyzed: 10/19/2020					
TSS	54.0		1.00	mg/L		65.0			18.5	20
Matrix Spike (BAJ0671-MS1)		**Source: WAJ0570-01**			Prepared & Analyzed: 10/19/2020					
TSS	136		2.00	mg/L	100	33.0	103	80-120		
Matrix Spike Dup (BAJ0671-MSD1)		**Source: WAJ0570-01**			Prepared & Analyzed: 10/19/2020					
TSS	140		2.00	mg/L	100	33.0	107	80-120	2.90	20
Batch: BAJ0763 - W FIA										
Blank (BAJ0763-BLK1)					Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						
Blank (BAJ0763-BLK2)					Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	ND		0.100	mg/L						
LCS (BAJ0763-BS1)					Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	0.203		0.100	mg/L	0.201		101	90-110		
Matrix Spike (BAJ0763-MS1)		**Source: WAJ0444-01**			Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	0.309		0.100	mg/L	0.201	0.137	85.7	80-120		
Matrix Spike Dup (BAJ0763-MSD1)		**Source: WAJ0444-01**			Prepared & Analyzed: 10/23/2020					
Nitrate/N + Nitrite/N	0.316		0.100	mg/L	0.201	0.137	89.1	80-120	2.18	20
Batch: BAK0106 - W FIA										
Blank (BAK0106-BLK1)					Prepared & Analyzed: 11/4/2020					
TKN	ND		0.500	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0106 - W FIA (Continued)										
Blank (BAK0106-BLK2)					Prepared & Analyzed: 11/4/2020					
TKN	ND		0.500	mg/L						
Blank (BAK0106-BLK3)					Prepared & Analyzed: 11/4/2020					
TKN	ND		0.500	mg/L						
LCS (BAK0106-BS1)					Prepared & Analyzed: 11/4/2020					
TKN	2.23		0.500	mg/L	2.00		112	85-115		
LCS (BAK0106-BS2)					Prepared & Analyzed: 11/4/2020					
TKN	2.11		0.500	mg/L	2.00		106	85-115		
Matrix Spike (BAK0106-MS1)		**Source: WAJ0674-02**			Prepared & Analyzed: 11/4/2020					
TKN	3.35		0.500	mg/L	2.00	1.03	116	80-120		
Matrix Spike Dup (BAK0106-MSD1)		**Source: WAJ0674-02**			Prepared & Analyzed: 11/4/2020					
TKN	2.95		0.500	mg/L	2.00	1.03	96.2	80-120	12.5	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0641 - W 3010 Digest										
Blank (BAJ0641-BLK1)					Prepared: 10/23/2020 Analyzed: 10/29/2020					
Iron	ND		0.0100	mg/L						
Copper	ND		0.00100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BAJ0641-BS1)					Prepared: 10/23/2020 Analyzed: 10/29/2020					
Zinc	0.0520		0.00100	mg/L	0.0500		104	85-115		
Iron	0.108		0.0100	mg/L	0.100		108	85-115		
Copper	0.0507		0.00100	mg/L	0.0500		101	85-115		
Matrix Spike (BAJ0641-MS1)		**Source: WAJ0488-02**			Prepared: 10/23/2020 Analyzed: 10/29/2020					
Copper	0.0554		0.00100	mg/L	0.0500	0.00931	92.1	70-130		
Iron	0.782		0.0100	mg/L	0.100	0.676	106	70-130		
Zinc	0.0570		0.00100	mg/L	0.0500	0.00841	97.2	70-130		
Matrix Spike (BAJ0641-MS2)		**Source: WAJ0539-03**			Prepared: 10/23/2020 Analyzed: 10/29/2020					
Copper	0.0505		0.00100	mg/L	0.0500	0.00476	91.6	70-130		
Zinc	0.0540		0.00100	mg/L	0.0500	0.00625	95.5	70-130		
Iron	2.79	M2	0.0100	mg/L	0.100	2.77	16.0	70-130		
Matrix Spike Dup (BAJ0641-MSD1)		**Source: WAJ0488-02**			Prepared: 10/23/2020 Analyzed: 10/29/2020					
Copper	0.0569		0.00100	mg/L	0.0500	0.00931	95.1	70-130	2.68	20
Iron	0.798		0.0100	mg/L	0.100	0.676	122	70-130	1.97	20
Zinc	0.0581		0.00100	mg/L	0.0500	0.00841	99.4	70-130	1.95	20
Matrix Spike Dup (BAJ0641-MSD2)		**Source: WAJ0539-03**			Prepared: 10/23/2020 Analyzed: 10/29/2020					
Iron	2.62	M2	0.0100	mg/L	0.100	2.77	NR	70-130	6.30	20

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0641 - W 3010 Digest (Continued)										
Matrix Spike Dup (BAJ0641-MSD2)		**Source: WAJ0539-03**			Prepared: 10/23/2020 Analyzed: 10/29/2020					
Zinc	0.0534		0.00100	mg/L	0.0500	0.00625	94.3	70-130	1.13	20
Copper	0.0504		0.00100	mg/L	0.0500	0.00476	91.2	70-130	0.349	20
Batch: BAJ0787 - W 3010 Digest										
Blank (BAJ0787-BLK1)					Prepared: 10/28/2020 Analyzed: 10/29/2020					
Dissolved Iron	ND		0.0100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
Dissolved Zinc	ND		0.00100	mg/L						
LCS (BAJ0787-BS1)					Prepared: 10/28/2020 Analyzed: 10/29/2020					
Dissolved Copper	0.0467		0.00100	mg/L	0.0500		93.4	85-115		
Dissolved Iron	0.104		0.0100	mg/L	0.100		104	85-115		
Dissolved Zinc	0.0491		0.00100	mg/L	0.0500		98.2	85-115		
Matrix Spike (BAJ0787-MS1)		**Source: WAJ0488-02**			Prepared: 10/28/2020 Analyzed: 10/29/2020					
Dissolved Iron	0.695		0.0500	mg/L	0.500	0.0798	123	70-130		
Dissolved Zinc	0.268		0.00500	mg/L	0.250	0.0208	99.0	70-130		
Dissolved Copper	0.250		0.00500	mg/L	0.250	0.00762	96.9	70-130		
Matrix Spike Dup (BAJ0787-MSD1)		**Source: WAJ0488-02**			Prepared: 10/28/2020 Analyzed: 10/29/2020					
Dissolved Iron	0.706		0.0500	mg/L	0.500	0.0798	125	70-130	1.68	20
Dissolved Copper	0.253		0.00500	mg/L	0.250	0.00762	98.1	70-130	1.22	20
Dissolved Zinc	0.270		0.00500	mg/L	0.250	0.0208	99.6	70-130	0.492	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0511 - W TPH-Dx										
Blank (BAJ0511-BLK1)					Prepared & Analyzed: 10/21/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*45.9*	*ppm*	*50.1*		*91.6*	*50-150*		
LCS (BAJ0511-BS1)					Prepared & Analyzed: 10/21/2020					
Diesel	0.986		0.160	mg/L	1.01		97.7	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*45.0*	*ppm*	*50.1*		*89.9*	*50-150*		
Duplicate (BAJ0511-DUP1)		**Source: WAJ0488-02**			Prepared: 10/21/2020 Analyzed: 10/22/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	0.193		0.400	mg/L		0.202			4.58	20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*45.6*	*ppm*	*50.1*		*91.1*	*50-150*		
Matrix Spike (BAJ0511-MS1)		**Source: WAJ0380-03**			Prepared: 10/21/2020 Analyzed: 10/22/2020					

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAJ0511 - W TPH-Dx (Continued)										
Matrix Spike (BAJ0511-MS1)	**Source: WAJ0380-03**			Prepared: 10/21/2020 Analyzed: 10/22/2020						
Diesel	0.832		0.160	mg/L	1.01	ND	82.4	70-130		
Lube Oil	0.173		0.400	mg/L		0.174		70-130		
Surrogate: n-Hexacosane			*42.1*	*ppm*	*50.1*		*84.0*	*50-150*		
Matrix Spike Dup (BAJ0511-MSD1)	**Source: WAJ0380-03**			Prepared: 10/21/2020 Analyzed: 10/22/2020						
Diesel	0.862		0.160	mg/L	1.01	ND	85.4	70-130	3.54	20
Lube Oil	0.192		0.400	mg/L		0.174		70-130	10.2	20
Surrogate: n-Hexacosane			*44.4*	*ppm*	*50.1*		*88.5*	*50-150*		

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Chain of Custody Record

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Anatek Log-In #

WAJ0488

Due: 10/28/20

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS *	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
Preservative:															
	INF101220	10/12/20 2:30	water			x	x	x	x	x	x				
	EFF12101220	10/12/20 2:30	water			x	x	x	x	x	x				
	EFF18101220	10/12/20 2:30	water			x	x	x	x	x	x				
	INF101220-DI							x							
	EFF12101220-DI							x							
	EFF18101220-DI							x							

* metals field filtered

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
~~VOC Head Space?~~	Y	N

hd/chl

Temperature (°C): 5.3/4.8 IR#1

Preservative: H_2SO_4 2002883 HCl 200274 HNO_3 - 2000994 HNO_3 2002280 pH <2

Date & Time: 10-14-2020 1318

Inspected By: KAS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan		Osborn consulting	10/13/20	17:00
Received by	KScaff		anatek	10/13/2020	12:12
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

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Client:	Spokane County	Work Order:	WAK0231
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	11/25/2020 16:50
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF11052020		
Lab/Sample Number:	WAK0231-01	Collect Date:	11/06/20 10:00
Date Received:	11/06/20 12:46	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	18.8	mg CaCO3/L	3.00	11/11/20 14:00	ARY	SM 2340 C	
Phosphate/P	0.204	mg/L	0.0180	11/6/20 15:15	SAG	SM 4500-P G	
Total P	0.600	mg/L	0.200	11/24/20 15:26	SAG	SM 4500-P H	M1
TSS	54.0	mg/L	1.00	11/9/20 10:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00551	mg/L	0.00100	11/20/20 16:18	TRC	EPA 200.8	
Dissolved Copper	0.00293	mg/L	0.00100	11/11/20 15:23	TRC	EPA 200.8	
Iron	1.35	mg/L	0.0100	11/20/20 16:18	TRC	EPA 200.8	M2
Dissolved Iron	0.114	mg/L	0.0100	11/11/20 15:23	TRC	EPA 200.8	
Zinc	0.0343	mg/L	0.00100	11/20/20 16:18	TRC	EPA 200.8	
Dissolved Zinc	0.0167	mg/L	0.00100	11/11/20 15:23	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/18/20 23:29	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/18/20 23:29	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/18/20 23:29	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.9%*		*50-150*	*11/18/20 23:29*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1211052020
Lab/Sample Number: WAK0231-02 Collect Date: 11/06/20 10:00
Date Received: 11/06/20 12:46 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	135	mg CaCO3/L	6.00	11/11/20 14:00	ARY	SM 2340 C	
Phosphate/P	0.290	mg/L	0.0180	11/6/20 15:16	SAG	SM 4500-P G	
Total P	0.232	mg/L	0.200	11/24/20 15:24	SAG	SM 4500-P H	M1
TSS	12.0	mg/L	1.00	11/9/20 10:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00487	mg/L	0.00100	11/20/20 16:20	TRC	EPA 200.8	
Dissolved Copper	0.00395	mg/L	0.00100	11/11/20 15:38	TRC	EPA 200.8	
Iron	0.431	mg/L	0.0100	11/20/20 16:20	TRC	EPA 200.8	M2
Dissolved Iron	0.0591	mg/L	0.0100	11/11/20 15:38	TRC	EPA 200.8	
Zinc	0.00380	mg/L	0.00100	11/20/20 16:20	TRC	EPA 200.8	
Dissolved Zinc	0.00883	mg/L	0.00100	11/11/20 15:38	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/19/20 0:24	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/19/20 0:24	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/19/20 0:24	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*95.2%*		*50-150*	*11/19/20 0:24*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1811052020
Lab/Sample Number: WAK0231-03 Collect Date: 11/06/20 10:00
Date Received: 11/06/20 12:46 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	135	mg CaCO3/L	6.00	11/11/20 14:00	ARY	SM 2340 C	
Phosphate/P	0.454	mg/L	0.0180	11/6/20 15:17	SAG	SM 4500-P G	
Total P	1.92	mg/L	0.200	11/24/20 15:31	SAG	SM 4500-P H	M1
TSS	9.00	mg/L	1.00	11/9/20 10:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00412	mg/L	0.00100	11/20/20 16:23	TRC	EPA 200.8	
Dissolved Copper	0.00341	mg/L	0.00100	11/11/20 15:40	TRC	EPA 200.8	
Iron	0.352	mg/L	0.0100	11/20/20 16:23	TRC	EPA 200.8	M2
Dissolved Iron	0.0730	mg/L	0.0100	11/11/20 15:40	TRC	EPA 200.8	
Zinc	0.00688	mg/L	0.00100	11/20/20 16:23	TRC	EPA 200.8	
Dissolved Zinc	0.00906	mg/L	0.00100	11/11/20 15:40	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/19/20 1:19	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/19/20 1:19	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/19/20 1:19	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*88.2%*		*50-150*	*11/19/20 1:19*	*ARC*	*NWTPH-Dx*	

Authorized Signature,

Brock Gerger For Kathleen Sattler, Laboratory Manager

M1	Matrix spike recovery was high; the associated blank spike recovery was acceptable. Potential matrix effect
M2	Matrix spike recovery was low; the associated blank spike recovery was acceptable. Potential matrix effect.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0200 - W FIA										
Blank (BAK0200-BLK1)					Prepared & Analyzed: 11/6/2020					
Phosphate/P	ND		0.0180	mg/L						
LCS (BAK0200-BS1)					Prepared & Analyzed: 11/6/2020					
Phosphate/P	0.103		0.0180	mg/L	0.100		103	85-115		
Matrix Spike (BAK0200-MS1)		**Source: WAK0231-03**			Prepared & Analyzed: 11/6/2020					
Phosphate/P	0.563		0.0180	mg/L	0.100	0.454	109	80-120		
Matrix Spike Dup (BAK0200-MSD1)		**Source: WAK0231-03**			Prepared & Analyzed: 11/6/2020					
Phosphate/P	0.565		0.0180	mg/L	0.100	0.454	112	80-120	0.390	20
Batch: BAK0269 - W Filtration										
Blank (BAK0269-BLK1)					Prepared & Analyzed: 11/9/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0269-BLK2)					Prepared & Analyzed: 11/9/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0269-BLK3)					Prepared & Analyzed: 11/9/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0269-BLK4)					Prepared & Analyzed: 11/9/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0269-BLK5)					Prepared & Analyzed: 11/9/2020					
TSS	ND		1.00	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0269 - W Filtration (Continued)										
LCS (BAK0269-BS1)					Prepared & Analyzed: 11/9/2020					
TSS	94.0			mg/L	100		94.0	90-110		
LCS (BAK0269-BS2)					Prepared & Analyzed: 11/9/2020					
TSS	96.0			mg/L	100		96.0	90-110		
LCS (BAK0269-BS3)					Prepared & Analyzed: 11/9/2020					
TSS	93.0			mg/L	100		93.0	90-110		
LCS Dup (BAK0269-BSD1)					Prepared & Analyzed: 11/9/2020					
TSS	96.0			mg/L	100		96.0	90-110	2.11	10
LCS Dup (BAK0269-BSD2)					Prepared & Analyzed: 11/9/2020					
TSS	98.0			mg/L	100		98.0	90-110	2.06	10
LCS Dup (BAK0269-BSD3)					Prepared & Analyzed: 11/9/2020					
TSS	101			mg/L	100		101	90-110	8.25	10
Duplicate (BAK0269-DUP1)		**Source: WAK0063-02**			Prepared & Analyzed: 11/9/2020					
TSS	14.0		1.00	mg/L		15.0			6.90	20
Duplicate (BAK0269-DUP2)		**Source: WAK0167-02**			Prepared & Analyzed: 11/9/2020					
TSS	19.0		1.00	mg/L		19.0			0.00	20
Duplicate (BAK0269-DUP3)		**Source: WAK0229-01**			Prepared & Analyzed: 11/9/2020					
TSS	45.0		1.00	mg/L		43.0			4.55	20
Matrix Spike (BAK0269-MS1)		**Source: WAK0114-01**			Prepared & Analyzed: 11/9/2020					
TSS	106		2.00	mg/L	100	3.00	103	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0269 - W Filtration (Continued)										
Matrix Spike (BAK0269-MS2)		**Source: WAK0171-01**			Prepared & Analyzed: 11/9/2020					
TSS	124		2.00	mg/L	100	26.0	98.0	80-120		
Matrix Spike (BAK0269-MS3)		**Source: WAK0111-01**			Prepared & Analyzed: 11/9/2020					
TSS	214		2.00	mg/L	100	118	96.0	80-120		
Matrix Spike Dup (BAK0269-MSD1)		**Source: WAK0114-01**			Prepared & Analyzed: 11/9/2020					
TSS	106		2.00	mg/L	100	3.00	103	80-120	0.00	20
Matrix Spike Dup (BAK0269-MSD2)		**Source: WAK0171-01**			Prepared & Analyzed: 11/9/2020					
TSS	118		2.00	mg/L	100	26.0	92.0	80-120	4.96	20
Matrix Spike Dup (BAK0269-MSD3)		**Source: WAK0111-01**			Prepared & Analyzed: 11/9/2020					
TSS	214		2.00	mg/L	100	118	96.0	80-120	0.00	20
Batch: BAK0289 - W Wet Chem										
Blank (BAK0289-BLK1)					Prepared: 11/10/2020 Analyzed: 11/11/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAK0289-BS1)					Prepared: 11/10/2020 Analyzed: 11/11/2020					
Hardness	102			mg CaCO3/L	100		102	90-110		
LCS Dup (BAK0289-BSD1)					Prepared: 11/10/2020 Analyzed: 11/11/2020					
Hardness	100			mg CaCO3/L	100		100	90-110	1.96	20
Duplicate (BAK0289-DUP1)		**Source: WAK0231-01**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Hardness	19.8		3.00	mg CaCO3/L		18.8			5.13	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0289 - W Wet Chem (Continued)										
Matrix Spike (BAK0289-MS1)		**Source: WAK0229-01**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Hardness	139		6.00	mg CaCO3/L	100	40.6	98.0	80-120		
Matrix Spike Dup (BAK0289-MSD1)		**Source: WAK0229-01**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Hardness	143		6.00	mg CaCO3/L	100	40.6	102	80-120	2.82	20
Batch: BAK0782 - W FIA										
Blank (BAK0782-BLK1)					Prepared & Analyzed: 11/24/2020					
Total P	ND		0.00500	mg/L						
Blank (BAK0782-BLK2)					Prepared & Analyzed: 11/24/2020					
Total P	ND		0.00500	mg/L						
LCS (BAK0782-BS1)					Prepared & Analyzed: 11/24/2020					
Total P	0.108	M1	0.00500	mg/L	0.100		108	90-110		
Matrix Spike (BAK0782-MS1)		**Source: WAK0257-02**			Prepared & Analyzed: 11/24/2020					
Total P	0.206	M1	0.00500	mg/L	0.100	0.0703	136	80-120		
Matrix Spike Dup (BAK0782-MSD1)		**Source: WAK0257-02**			Prepared & Analyzed: 11/24/2020					
Total P	0.210	M1	0.00500	mg/L	0.100	0.0703	139	80-120	1.59	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0257 - W 3010 Digest										
Blank (BAK0257-BLK1)					Prepared: 11/10/2020 Analyzed: 11/11/2020					
Dissolved Copper	ND		0.00100	mg/L						
Dissolved Iron	ND		0.0100	mg/L						
Dissolved Zinc	ND		0.00100	mg/L						
LCS (BAK0257-BS1)					Prepared: 11/10/2020 Analyzed: 11/11/2020					
Dissolved Iron	0.106		0.0100	mg/L	0.100		106	85-115		
Dissolved Copper	0.0432		0.00100	mg/L	0.0500		86.3	85-115		
Dissolved Zinc	0.0435		0.00100	mg/L	0.0500		87.0	85-115		
Matrix Spike (BAK0257-MS1)		**Source: WAK0150-01**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Dissolved Zinc	0.235		0.00500	mg/L	0.250	0.00285	93.0	70-130		
Dissolved Iron	0.481		0.0500	mg/L	0.500	ND	96.2	70-130		
Dissolved Copper	0.232		0.00500	mg/L	0.250	0.000562	92.5	70-130		
Matrix Spike (BAK0257-MS2)		**Source: WAK0150-10**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Dissolved Zinc	0.228		0.00500	mg/L	0.250	0.00341	89.8	70-130		
Dissolved Copper	0.227		0.00500	mg/L	0.250	0.000585	90.4	70-130		
Dissolved Iron	0.500		0.0500	mg/L	0.500	ND	100	70-130		
Matrix Spike Dup (BAK0257-MSD1)		**Source: WAK0150-01**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Dissolved Zinc	0.224		0.00500	mg/L	0.250	0.00285	88.5	70-130	4.90	20

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0257 - W 3010 Digest (Continued)										
Matrix Spike Dup (BAK0257-MSD1)		**Source: WAK0150-01**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Dissolved Iron	0.496		0.0500	mg/L	0.500	ND	99.2	70-130	3.05	20
Dissolved Copper	0.225		0.00500	mg/L	0.250	0.000562	89.9	70-130	2.82	20
Matrix Spike Dup (BAK0257-MSD2)		**Source: WAK0150-10**			Prepared: 11/10/2020 Analyzed: 11/11/2020					
Dissolved Iron	0.491		0.0500	mg/L	0.500	ND	98.2	70-130	1.81	20
Dissolved Copper	0.229		0.00500	mg/L	0.250	0.000585	91.4	70-130	1.11	20
Dissolved Zinc	0.232		0.00500	mg/L	0.250	0.00341	91.3	70-130	1.54	20
Batch: BAK0509 - W 3010 Digest										
Blank (BAK0509-BLK1)					Prepared: 11/18/2020 Analyzed: 11/20/2020					
Copper	ND		0.00100	mg/L						
Iron	ND		0.0100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BAK0509-BS1)					Prepared: 11/18/2020 Analyzed: 11/20/2020					
Copper	0.0517		0.00100	mg/L	0.0500		103	85-115		
Zinc	0.0506		0.00100	mg/L	0.0500		101	85-115		
Iron	0.0943		0.0100	mg/L	0.100		94.3	85-115		
Matrix Spike (BAK0509-MS1)		**Source: WAK0214-03**			Prepared: 11/18/2020 Analyzed: 11/20/2020					
Iron	0.981	M2	0.0100	mg/L	0.100	1.06	NR	70-130		
Zinc	0.0542		0.00100	mg/L	0.0500	0.00719	94.1	70-130		
Copper	0.0450		0.00100	mg/L	0.0500	ND	90.0	70-130		
Matrix Spike (BAK0509-MS2)		**Source: WAK0214-14**			Prepared: 11/18/2020 Analyzed: 11/20/2020					
Iron	0.960	M2	0.0100	mg/L	0.100	1.01	NR	70-130		
Copper	0.0483		0.00100	mg/L	0.0500	ND	96.6	70-130		
Zinc	0.0522		0.00100	mg/L	0.0500	0.00648	91.5	70-130		

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0509 - W 3010 Digest (Continued)										
Matrix Spike Dup (BAK0509-MSD1)		**Source: WAK0214-03**			Prepared: 11/18/2020 Analyzed: 11/20/2020					
Iron	0.899	M2	0.0100	mg/L	0.100	1.06	NR	70-130	8.81	20
Zinc	0.0503		0.00100	mg/L	0.0500	0.00719	86.3	70-130	7.49	20
Copper	0.0435		0.00100	mg/L	0.0500	ND	87.1	70-130	3.35	20
Matrix Spike Dup (BAK0509-MSD2)		**Source: WAK0214-14**			Prepared: 11/18/2020 Analyzed: 11/20/2020					
Iron	0.946	M2	0.0100	mg/L	0.100	1.01	NR	70-130	1.55	20
Copper	0.0479		0.00100	mg/L	0.0500	ND	95.8	70-130	0.800	20
Zinc	0.0520		0.00100	mg/L	0.0500	0.00648	91.1	70-130	0.349	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0508 - W TPH-Dx										
Blank (BAK0508-BLK1)					Prepared & Analyzed: 11/18/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*42.2*	*ppm*	*50.1*		*84.2*	*50-150*		
LCS (BAK0508-BS1)					Prepared & Analyzed: 11/18/2020					
Diesel	0.971		0.160	mg/L	1.01		96.1	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*47.0*	*ppm*	*50.1*		*93.9*	*50-150*		
Duplicate (BAK0508-DUP1)		**Source: WAK0416-02**			Prepared: 11/18/2020 Analyzed: 11/19/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*46.6*	*ppm*	*50.1*		*92.9*	*50-150*		
Matrix Spike (BAK0508-MS1)		**Source: WAK0416-01**			Prepared: 11/18/2020 Analyzed: 11/19/2020					
Diesel	0.876		0.160	mg/L	1.01	ND	86.7	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*46.0*	*ppm*	*50.1*		*91.8*	*50-150*		
Matrix Spike Dup (BAK0508-MSD1)		**Source: WAK0416-01**			Prepared: 11/18/2020 Analyzed: 11/19/2020					
Diesel	0.854		0.160	mg/L	1.01	ND	84.6	70-130	2.48	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*44.2*	*ppm*	*50.1*		*88.2*	*50-150*		

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Chain of Custody Record

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Anatek Log-In #

WAK0231

Due: 11/20/20

Company Name:	Spokane County	Project Manager:	Ethan Murnin
Address:	1026 W. Broadway Avenue	Project Name & # :	Gonzaga BioRetention Cell
City:	Spokane State: WA Zip: 99260	Email Address :	EMURNIN@spokanecounty.org
Phone:	(509) 477-7420	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Aro

Please refer to ou... http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWBS

Lab ID	Sample Identification	Sampling Date/Time	Matrix	Preservative: # of Containers	Sample Volume	TSS SM 2540D	Cu Zn Fe Total EPA 200.8 ICP/MS	Cu Zn Fe Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97			
	INF11052020	11/06/20 10:00 AM	water	6		x	x	x	x	x	x	x				
	EFF1211052020	11/06/20 10:00 AM	water			x	x	x	x	x	x	x				
	EFF1811052020	11/06/20 10:00 AM	water			x	x	x	x	x	x	x				

Inspection Checklist

Received Intact?	Y	N
Labels & Chains Agree?	Y	N
Containers Sealed?	Y	N
VOC Head Space?	~~Y~~	N

lcc

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan		Osborn Consulting	11/6/2020	12:31
Received by	Brock Gamps		Anatek	11-6-20	1746
Relinquished by					
Received by					
Relinquished by					
Received by					

Temperature (°C): 6.5°/6.3°IR1

Preservative: HCl 2001139 HNO3 2000904 H2SO4 2001181 pH 2001015

Date & Time: 11-6-20 1400

Inspected By:

Form COC01.00 - Eff 1 Mar 2015

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Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WAK0521
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	11/30/2020 14:43
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF11132020		
Lab/Sample Number:	WAK0521-01	Collect Date:	11/13/20 17:30
Date Received:	11/16/20 16:02	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	36.6	mg CaCO3/L	3.00	11/23/20 10:00	ARY	SM 2340 C	
Total P	0.392	mg/L	0.200	11/25/20 10:50	SAG	SM 4500-P H	
TSS	15.0	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00286	mg/L	0.00100	11/24/20 14:27	TRC	EPA 200.8	
Dissolved Copper	0.00198	mg/L	0.00100	11/30/20 11:31	TRC	EPA 200.8	
Zinc	0.0192	mg/L	0.00100	11/24/20 14:27	TRC	EPA 200.8	
Dissolved Zinc	0.0238	mg/L	0.00100	11/30/20 11:31	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/19/20 10:34	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/19/20 10:34	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/19/20 10:34	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*71.9%*		*50-150*	*11/19/20 10:34*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	EFF1211132020		
Lab/Sample Number:	WAK0521-02	Collect Date:	11/13/20 17:30
Date Received:	11/16/20 16:02	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	117	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Total P	0.268	mg/L	0.200	11/25/20 10:53	SAG	SM 4500-P H	
TSS	3.67	mg/L	0.333	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00306	mg/L	0.00100	11/24/20 14:30	TRC	EPA 200.8	
Dissolved Copper	0.00255	mg/L	0.00100	11/30/20 11:34	TRC	EPA 200.8	
Zinc	0.00329	mg/L	0.00100	11/24/20 14:30	TRC	EPA 200.8	
Dissolved Zinc	0.0125	mg/L	0.00100	11/30/20 11:34	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/19/20 11:30	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/19/20 11:30	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/19/20 11:30	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.3%*		*50-150*	*11/19/20 11:30*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1811132020
Lab/Sample Number: WAK0521-03 Collect Date: 11/13/20 17:30
Date Received: 11/16/20 16:02 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	200	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Total P	0.300	mg/L	0.200	11/25/20 10:55	SAG	SM 4500-P H	
TSS	4.00	mg/L	0.333	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00227	mg/L	0.00100	11/24/20 14:32	TRC	EPA 200.8	
Dissolved Copper	0.00178	mg/L	0.00100	11/30/20 11:49	TRC	EPA 200.8	
Zinc	0.00264	mg/L	0.00100	11/24/20 14:32	TRC	EPA 200.8	
Dissolved Zinc	0.00956	mg/L	0.00100	11/30/20 11:49	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/25/20 23:45	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/25/20 23:45	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/25/20 23:45	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*88.9%*		*50-150*	*11/25/20 23:45*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	INF-DI		
Lab/Sample Number:	WAK0521-04	Collect Date:	11/13/20 17:30
Date Received:	11/16/20 16:02	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	11/30/20 11:51	TRC	EPA 200.8	
Dissolved Zinc	0.0153	mg/L	0.00100	11/30/20 11:51	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF12-DI		
Lab/Sample Number:	WAK0521-05	Collect Date:	11/13/20 17:30
Date Received:	11/16/20 16:02	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	<0.00003	mg/L	0.00100	11/30/20 11:53	TRC	EPA 200.8	
Dissolved Zinc	0.0167	mg/L	0.00100	11/30/20 11:53	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF18-DI		
Lab/Sample Number:	WAK0521-06	Collect Date:	11/13/20 17:30
Date Received:	11/16/20 16:02	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	<0.00003	mg/L	0.00100	11/30/20 11:56	TRC	EPA 200.8	
Dissolved Zinc	0.0141	mg/L	0.00100	11/30/20 11:56	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location: INF11132020-2
Lab/Sample Number: WAK0521-07 Collect Date: 11/13/20 17:30
Date Received: 11/16/20 16:02 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	40.6	mg CaCO3/L	3.00	11/23/20 10:00	ARY	SM 2340 C	
Total P	1.16	mg/L	0.200	11/25/20 11:10	SAG	SM 4500-P H	
TSS	13.0	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00285	mg/L	0.00100	11/24/20 14:34	TRC	EPA 200.8	
Zinc	0.0201	mg/L	0.00100	11/24/20 14:34	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location: EFF1211132020-2
Lab/Sample Number: WAK0521-08 Collect Date: 11/13/20 17:30
Date Received: 11/16/20 16:02 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	119	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Total P	0.792	mg/L	0.200	11/25/20 11:12	SAG	SM 4500-P H	
TSS	5.67	mg/L	0.333	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00311	mg/L	0.00100	11/24/20 14:37	TRC	EPA 200.8	
Zinc	0.00320	mg/L	0.00100	11/24/20 14:37	TRC	EPA 200.8	

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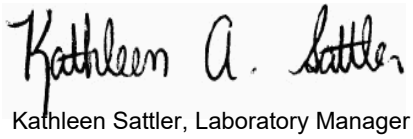
Analytical Results Report

(Continued)

Sample Location:	EFF1811132020-2		
Lab/Sample Number:	WAK0521-09	Collect Date:	11/13/20 17:30
Date Received:	11/16/20 16:02	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	204	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Total P	0.720	mg/L	0.200	11/25/20 11:15	SAG	SM 4500-P H	
TSS	3.75	mg/L	0.250	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00235	mg/L	0.00100	11/24/20 14:39	TRC	EPA 200.8	
Zinc	0.00365	mg/L	0.00100	11/24/20 14:39	TRC	EPA 200.8	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0655 - W Wet Chem										
Blank (BAK0655-BLK1)					Prepared & Analyzed: 11/23/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAK0655-BLK2)					Prepared & Analyzed: 11/23/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAK0655-BS1)					Prepared & Analyzed: 11/23/2020					
Hardness	101			mg CaCO3/L	100		101	90-110		
LCS Dup (BAK0655-BSD1)					Prepared & Analyzed: 11/23/2020					
Hardness	102			mg CaCO3/L	100		102	90-110	1.01	20
Duplicate (BAK0655-DUP1)		**Source: WAK0519-03**			Prepared & Analyzed: 11/23/2020					
Hardness	158		6.00	mg CaCO3/L		152			3.82	20
Matrix Spike (BAK0655-MS1)		**Source: WAK0521-09**			Prepared & Analyzed: 11/23/2020					
Hardness	297		6.00	mg CaCO3/L	100	204	93.1	80-120		
Matrix Spike Dup (BAK0655-MSD1)		**Source: WAK0521-09**			Prepared & Analyzed: 11/23/2020					
Hardness	295		6.00	mg CaCO3/L	100	204	91.1	80-120	0.676	20
Batch: BAK0734 - W Filtration										
Blank (BAK0734-BLK1)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK2)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
Blank (BAK0734-BLK3)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK4)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK5)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK6)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK7)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
LCS (BAK0734-BS1)					Prepared & Analyzed: 11/20/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS (BAK0734-BS2)					Prepared & Analyzed: 11/20/2020					
TSS	96.0			mg/L	100		96.0	90-110		
LCS (BAK0734-BS3)					Prepared & Analyzed: 11/20/2020					
TSS	96.0			mg/L	100		96.0	90-110		
LCS (BAK0734-BS4)					Prepared & Analyzed: 11/20/2020					
TSS	98.0			mg/L	100		98.0	90-110		
LCS Dup (BAK0734-BSD1)					Prepared & Analyzed: 11/20/2020					
TSS	106			mg/L	100		106	90-110	8.87	10

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
LCS Dup (BAK0734-BSD2)					Prepared & Analyzed: 11/20/2020					
TSS	101			mg/L	100		101	90-110	5.08	10
LCS Dup (BAK0734-BSD3)					Prepared & Analyzed: 11/20/2020					
TSS	103			mg/L	100		103	90-110	7.04	10
LCS Dup (BAK0734-BSD4)					Prepared & Analyzed: 11/20/2020					
TSS	97.0			mg/L	100		97.0	90-110	1.03	10
Duplicate (BAK0734-DUP1)		**Source: WAK0519-03**			Prepared & Analyzed: 11/20/2020					
TSS	22.0		1.00	mg/L		23.0			4.44	20
Duplicate (BAK0734-DUP2)		**Source: WAK0545-02**			Prepared & Analyzed: 11/20/2020					
TSS	24.0		1.00	mg/L		25.0			4.08	20
Duplicate (BAK0734-DUP3)		**Source: WAK0677-01**			Prepared & Analyzed: 11/20/2020					
TSS	1.00		1.00	mg/L		1.00			0.00	20
Duplicate (BAK0734-DUP4)		**Source: WAK0682-02**			Prepared & Analyzed: 11/20/2020					
TSS	9.00		1.00	mg/L		9.00			0.00	20
Matrix Spike (BAK0734-MS1)		**Source: MAK0523-01**			Prepared & Analyzed: 11/20/2020					
TSS	158		2.00	mg/L	100	66.0	92.0	80-120		
Matrix Spike (BAK0734-MS2)		**Source: WAK0567-01**			Prepared & Analyzed: 11/20/2020					
TSS	112		2.00	mg/L	100	17.0	95.0	80-120		
Matrix Spike (BAK0734-MS3)		**Source: WAK0649-01**			Prepared & Analyzed: 11/20/2020					
TSS	114		2.00	mg/L	100	15.0	99.0	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
Matrix Spike (BAK0734-MS4)		**Source: WAK0681-01**			Prepared & Analyzed: 11/20/2020					
TSS	108		2.00	mg/L	100	9.00	99.0	80-120		
Matrix Spike Dup (BAK0734-MSD1)		**Source: MAK0523-01**			Prepared & Analyzed: 11/20/2020					
TSS	148		2.00	mg/L	100	66.0	82.0	80-120	6.54	20
Matrix Spike Dup (BAK0734-MSD2)		**Source: WAK0567-01**			Prepared & Analyzed: 11/20/2020					
TSS	110		2.00	mg/L	100	17.0	93.0	80-120	1.80	20
Matrix Spike Dup (BAK0734-MSD3)		**Source: WAK0649-01**			Prepared & Analyzed: 11/20/2020					
TSS	126		2.00	mg/L	100	15.0	111	80-120	10.0	20
Matrix Spike Dup (BAK0734-MSD4)		**Source: WAK0681-01**			Prepared & Analyzed: 11/20/2020					
TSS	112		2.00	mg/L	100	9.00	103	80-120	3.64	20
Batch: BAK0798 - W FIA										
Blank (BAK0798-BLK1)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						
Blank (BAK0798-BLK2)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						
Blank (BAK0798-BLK3)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						
Blank (BAK0798-BLK4)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0798 - W FIA (Continued)										
LCS (BAK0798-BS1)					Prepared & Analyzed: 11/25/2020					
Total P	0.0967		0.00500	mg/L	0.100		96.7	90-110		
LCS (BAK0798-BS2)					Prepared & Analyzed: 11/25/2020					
Total P	0.0931		0.00500	mg/L	0.100		93.1	90-110		
Matrix Spike (BAK0798-MS1)		**Source: WAK0489-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.185		0.00500	mg/L	0.100	0.0731	112	80-120		
Matrix Spike (BAK0798-MS2)		**Source: WAK0495-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.184		0.00500	mg/L	0.100	0.0681	116	80-120		
Matrix Spike Dup (BAK0798-MSD1)		**Source: WAK0489-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.187		0.00500	mg/L	0.100	0.0731	114	80-120	1.34	20
Matrix Spike Dup (BAK0798-MSD2)		**Source: WAK0495-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.188		0.00500	mg/L	0.100	0.0681	120	80-120	2.16	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0657 - W 3010 Digest										
Blank (BAK0657-BLK1)					Prepared: 11/23/2020 Analyzed: 11/24/2020					
Copper	ND		0.00100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BAK0657-BS1)					Prepared: 11/23/2020 Analyzed: 11/24/2020					
Copper	0.0498		0.00100	mg/L	0.0500		99.7	85-115		
Zinc	0.0490		0.00100	mg/L	0.0500		97.9	85-115		
Matrix Spike (BAK0657-MS1)		**Source: WAK0519-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Copper	0.0584		0.00100	mg/L	0.0500	0.0103	96.3	70-130		
Zinc	0.123		0.00100	mg/L	0.0500	0.0739	98.0	70-130		
Matrix Spike (BAK0657-MS2)		**Source: WAK0588-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Copper	0.0583		0.00100	mg/L	0.0500	0.0132	90.3	70-130		
Zinc	0.0597		0.00100	mg/L	0.0500	0.0144	90.6	70-130		
Matrix Spike Dup (BAK0657-MSD1)		**Source: WAK0519-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Copper	0.0586		0.00100	mg/L	0.0500	0.0103	96.5	70-130	0.176	20
Zinc	0.123		0.00100	mg/L	0.0500	0.0739	98.4	70-130	0.154	20
Matrix Spike Dup (BAK0657-MSD2)		**Source: WAK0588-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Zinc	0.0617		0.00100	mg/L	0.0500	0.0144	94.5	70-130	3.16	20
Copper	0.0605		0.00100	mg/L	0.0500	0.0132	94.6	70-130	3.57	20
Batch: BAK0775 - W 3010 Digest										
Blank (BAK0775-BLK1)					Prepared: 11/25/2020 Analyzed: 11/30/2020					

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0775 - W 3010 Digest (Continued)										
Blank (BAK0775-BLK1)					Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAK0775-BS1)					Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Zinc	0.0508		0.00100	mg/L	0.0500		102	85-115		
Dissolved Copper	0.0517		0.00100	mg/L	0.0500		103	85-115		
Matrix Spike (BAK0775-MS1)		**Source: WAK0567-02**			Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Copper	0.0526		0.00100	mg/L	0.0500	0.00313	99.0	70-130		
Dissolved Zinc	0.0539		0.00100	mg/L	0.0500	0.00684	94.1	70-130		
Matrix Spike Dup (BAK0775-MSD1)		**Source: WAK0567-02**			Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Zinc	0.0540		0.00100	mg/L	0.0500	0.00684	94.3	70-130	0.213	20
Dissolved Copper	0.0522		0.00100	mg/L	0.0500	0.00313	98.1	70-130	0.843	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0508 - W TPH-Dx										
Blank (BAK0508-BLK1)					Prepared & Analyzed: 11/18/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*42.2*	*ppm*	*50.1*		*84.2*	*50-150*		
LCS (BAK0508-BS1)					Prepared & Analyzed: 11/18/2020					
Diesel	0.971		0.160	mg/L	1.01		96.1	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*47.0*	*ppm*	*50.1*		*93.9*	*50-150*		
Duplicate (BAK0508-DUP1)		**Source: WAK0416-02**			Prepared: 11/18/2020 Analyzed: 11/19/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*46.6*	*ppm*	*50.1*		*92.9*	*50-150*		
Matrix Spike (BAK0508-MS1)		**Source: WAK0416-01**			Prepared: 11/18/2020 Analyzed: 11/19/2020					
Diesel	0.876		0.160	mg/L	1.01	ND	86.7	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*46.0*	*ppm*	*50.1*		*91.8*	*50-150*		
Matrix Spike Dup (BAK0508-MSD1)		**Source: WAK0416-01**			Prepared: 11/18/2020 Analyzed: 11/19/2020					
Diesel	0.854		0.160	mg/L	1.01	ND	84.6	70-130	2.48	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*44.2*	*ppm*	*50.1*		*88.2*	*50-150*		

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0676 - W TPH-Dx										
Blank (BAK0676-BLK1)					Prepared & Analyzed: 11/25/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*48.0*	*ppm*	*50.1*		*95.7*	*50-150*		
LCS (BAK0676-BS1)					Prepared & Analyzed: 11/25/2020					
Diesel	0.988		0.160	mg/L	1.01		97.8	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*46.5*	*ppm*	*50.1*		*92.9*	*50-150*		
Duplicate (BAK0676-DUP1)		**Source: WAK0521-03**			Prepared: 11/25/2020 Analyzed: 11/26/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*46.6*	*ppm*	*50.1*		*93.1*	*50-150*		
Matrix Spike (BAK0676-MS1)		**Source: WAK0567-01**			Prepared: 11/25/2020 Analyzed: 11/26/2020					
Diesel	0.992		0.160	mg/L	1.01	ND	98.3	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*37.8*	*ppm*	*50.1*		*75.5*	*50-150*		
Matrix Spike Dup (BAK0676-MSD1)		**Source: WAK0567-01**			Prepared: 11/25/2020 Analyzed: 11/26/2020					
Diesel	1.00		0.160	mg/L	1.01	ND	99.3	70-130	1.04	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*36.6*	*ppm*	*50.1*		*73.1*	*50-150*		

Chain of Custody Record

Anatek Labs, Inc.

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Anatek Log-In #

WAK0521

Due: 12/03/20

Company Name:	Spokane County
Address:	1026 W. Broadway Avenue
City:	Spokane State: WA Zip: 99260
Phone:	(509) 477-7420
Fax:	
Project Manager:	Ethan Murnin
Project Name & # :	Gonzaga BioRetention Cell
Email Address :	EMURNIN@spokanecounty.org
Purchase Order #:	
Sampler Name & phone:	(509)995-0557

Turn Ar

Please refer t

http://www.anateklabs.com/service

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97
	INF11132020	11/13/20 5:30 PM	water	5		x	x	x	x	x	x		
	* EFF1211132020	11/13/20 5:30 PM	water	5		x	x	x	x	x	x		
	EFF1811132020	11/13/20 5:30 PM	water	5		x	x	x	x	x	x		
	INF-DI	11/13/20 5:30 PM	water	1				x					
	EFF12-DI	11/13/20 5:30 PM	water	1				x					
	EFF18-DI	11/13/20 5:30 PM	water	1				x					
	INF11132020-2	11/13/20 5:30 PM	water	3		x	x		x	x			
	* EFF1211132020-2	11/13/20 5:30 PM	water	3		x	x		x	x			
	EFF1811132020-2	11/13/20 5:30 PM	water	3		x	x		x	x			

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

* cooler #2 5.8°/5.6° IR1

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	(N)
Containers Sealed?	(Y)	N
VOC Head Space?	Y	N

HCl

Temperature (°C): 4.7°/4.5° IR1

Preservative: HNO3 2002280 <2, 2000991 <2

HCl 2002747 <2, H2SO4 2001181 <2

Date & Time: 11-16-20 1710 R386 <2

Inspected By: AW 2002883 <2

	Printed Name	Signature	Company	Date	Time
Relinquished by	Megan Ehlebracht		OCI	11/16/20	4:00
Received by	Brock Geyer		Anatek	11-16-20	1602
Relinquished by					
Received by					
Relinquished by					
Received by					

pH 2001015

Form COC01.00 - Eff 1 Mar 2015

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

Anatek Labs, Inc.

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Client:	Spokane County	Work Order:	WAK0567
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	11/30/2020 14:46
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF11172020		
Lab/Sample Number:	WAK0567-01	Collect Date:	11/17/20 10:00
Date Received:	11/17/20 15:54	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Total P	0.552	mg/L	0.200	11/25/20 11:58	SAG	SM 4500-P H	
TSS	17.0	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00308	mg/L	0.00100	11/24/20 14:41	TRC	EPA 200.8	
Dissolved Copper	0.00337	mg/L	0.00100	11/30/20 11:58	TRC	EPA 200.8	
Zinc	0.0175	mg/L	0.00100	11/24/20 14:41	TRC	EPA 200.8	
Dissolved Zinc	0.0248	mg/L	0.00100	11/30/20 11:58	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 3:25	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 3:25	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 3:25	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*65.1%*		*50-150*	*11/26/20 3:25*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	EFF1211172020		
Lab/Sample Number:	WAK0567-02	Collect Date:	11/17/20 10:00
Date Received:	11/17/20 15:54	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Total P	0.264	mg/L	0.200	11/25/20 11:28	SAG	SM 4500-P H	
TSS	2.25	mg/L	0.250	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00289	mg/L	0.00100	11/24/20 14:44	TRC	EPA 200.8	
Dissolved Copper	0.00313	mg/L	0.00100	11/30/20 12:00	TRC	EPA 200.8	
Zinc	0.00187	mg/L	0.00100	11/24/20 14:44	TRC	EPA 200.8	
Dissolved Zinc	0.00684	mg/L	0.00100	11/30/20 12:00	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 6:10	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 6:10	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 6:10	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*80.8%*		*50-150*	*11/26/20 6:10*	*ARC*	*NWTPH-Dx*	

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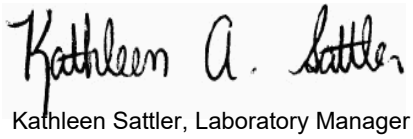
Analytical Results Report

(Continued)

Sample Location:	EFF1811172020		
Lab/Sample Number:	WAK0567-03	Collect Date:	11/17/20 10:00
Date Received:	11/17/20 15:54	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Total P	0.664	mg/L	0.200	11/25/20 11:30	SAG	SM 4500-P H	
TSS	2.50	mg/L	0.250	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00243	mg/L	0.00100	11/24/20 14:46	TRC	EPA 200.8	
Dissolved Copper	0.00243	mg/L	0.00100	11/30/20 12:48	TRC	EPA 200.8	
Zinc	0.00255	mg/L	0.00100	11/24/20 14:46	TRC	EPA 200.8	
Dissolved Zinc	0.00727	mg/L	0.00100	11/30/20 12:48	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 7:05	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 7:05	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 7:05	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*82.6%*		*50-150*	*11/26/20 7:05*	*ARC*	*NWTPH-Dx*	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration										
Blank (BAK0734-BLK1)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK2)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK3)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK4)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK5)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK6)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK7)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
LCS (BAK0734-BS1)					Prepared & Analyzed: 11/20/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS (BAK0734-BS2)					Prepared & Analyzed: 11/20/2020					
TSS	96.0			mg/L	100		96.0	90-110		
LCS (BAK0734-BS3)					Prepared & Analyzed: 11/20/2020					
TSS	96.0			mg/L	100		96.0	90-110		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
LCS (BAK0734-BS4)					Prepared & Analyzed: 11/20/2020					
TSS	98.0			mg/L	100		98.0	90-110		
LCS Dup (BAK0734-BSD1)					Prepared & Analyzed: 11/20/2020					
TSS	106			mg/L	100		106	90-110	8.87	10
LCS Dup (BAK0734-BSD2)					Prepared & Analyzed: 11/20/2020					
TSS	101			mg/L	100		101	90-110	5.08	10
LCS Dup (BAK0734-BSD3)					Prepared & Analyzed: 11/20/2020					
TSS	103			mg/L	100		103	90-110	7.04	10
LCS Dup (BAK0734-BSD4)					Prepared & Analyzed: 11/20/2020					
TSS	97.0			mg/L	100		97.0	90-110	1.03	10
Duplicate (BAK0734-DUP1)		**Source: WAK0519-03**			Prepared & Analyzed: 11/20/2020					
TSS	22.0		1.00	mg/L		23.0			4.44	20
Duplicate (BAK0734-DUP2)		**Source: WAK0545-02**			Prepared & Analyzed: 11/20/2020					
TSS	24.0		1.00	mg/L		25.0			4.08	20
Duplicate (BAK0734-DUP3)		**Source: WAK0677-01**			Prepared & Analyzed: 11/20/2020					
TSS	1.00		1.00	mg/L		1.00			0.00	20
Duplicate (BAK0734-DUP4)		**Source: WAK0682-02**			Prepared & Analyzed: 11/20/2020					
TSS	9.00		1.00	mg/L		9.00			0.00	20
Matrix Spike (BAK0734-MS1)		**Source: MAK0523-01**			Prepared & Analyzed: 11/20/2020					
TSS	158		2.00	mg/L	100	66.0	92.0	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
Matrix Spike (BAK0734-MS2)		**Source: WAK0567-01**			Prepared & Analyzed: 11/20/2020					
TSS	112		2.00	mg/L	100	17.0	95.0	80-120		
Matrix Spike (BAK0734-MS3)		**Source: WAK0649-01**			Prepared & Analyzed: 11/20/2020					
TSS	114		2.00	mg/L	100	15.0	99.0	80-120		
Matrix Spike (BAK0734-MS4)		**Source: WAK0681-01**			Prepared & Analyzed: 11/20/2020					
TSS	108		2.00	mg/L	100	9.00	99.0	80-120		
Matrix Spike Dup (BAK0734-MSD1)		**Source: MAK0523-01**			Prepared & Analyzed: 11/20/2020					
TSS	148		2.00	mg/L	100	66.0	82.0	80-120	6.54	20
Matrix Spike Dup (BAK0734-MSD2)		**Source: WAK0567-01**			Prepared & Analyzed: 11/20/2020					
TSS	110		2.00	mg/L	100	17.0	93.0	80-120	1.80	20
Matrix Spike Dup (BAK0734-MSD3)		**Source: WAK0649-01**			Prepared & Analyzed: 11/20/2020					
TSS	126		2.00	mg/L	100	15.0	111	80-120	10.0	20
Matrix Spike Dup (BAK0734-MSD4)		**Source: WAK0681-01**			Prepared & Analyzed: 11/20/2020					
TSS	112		2.00	mg/L	100	9.00	103	80-120	3.64	20
Batch: BAK0798 - W FIA										
Blank (BAK0798-BLK1)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						
Blank (BAK0798-BLK2)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0798 - W FIA (Continued)										
Blank (BAK0798-BLK3)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						
Blank (BAK0798-BLK4)					Prepared & Analyzed: 11/25/2020					
Total P	ND		0.00500	mg/L						
LCS (BAK0798-BS1)					Prepared & Analyzed: 11/25/2020					
Total P	0.0967		0.00500	mg/L	0.100		96.7	90-110		
LCS (BAK0798-BS2)					Prepared & Analyzed: 11/25/2020					
Total P	0.0931		0.00500	mg/L	0.100		93.1	90-110		
Matrix Spike (BAK0798-MS1)		**Source: WAK0489-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.185		0.00500	mg/L	0.100	0.0731	112	80-120		
Matrix Spike (BAK0798-MS2)		**Source: WAK0495-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.184		0.00500	mg/L	0.100	0.0681	116	80-120		
Matrix Spike Dup (BAK0798-MSD1)		**Source: WAK0489-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.187		0.00500	mg/L	0.100	0.0731	114	80-120	1.34	20
Matrix Spike Dup (BAK0798-MSD2)		**Source: WAK0495-02**			Prepared & Analyzed: 11/25/2020					
Total P	0.188		0.00500	mg/L	0.100	0.0681	120	80-120	2.16	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0657 - W 3010 Digest										
Blank (BAK0657-BLK1)					Prepared: 11/23/2020 Analyzed: 11/24/2020					
Zinc	ND		0.00100	mg/L						
Copper	ND		0.00100	mg/L						
LCS (BAK0657-BS1)					Prepared: 11/23/2020 Analyzed: 11/24/2020					
Copper	0.0498		0.00100	mg/L	0.0500		99.7	85-115		
Zinc	0.0490		0.00100	mg/L	0.0500		97.9	85-115		
Matrix Spike (BAK0657-MS1)		**Source: WAK0519-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Zinc	0.123		0.00100	mg/L	0.0500	0.0739	98.0	70-130		
Copper	0.0584		0.00100	mg/L	0.0500	0.0103	96.3	70-130		
Matrix Spike (BAK0657-MS2)		**Source: WAK0588-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Zinc	0.0597		0.00100	mg/L	0.0500	0.0144	90.6	70-130		
Copper	0.0583		0.00100	mg/L	0.0500	0.0132	90.3	70-130		
Matrix Spike Dup (BAK0657-MSD1)		**Source: WAK0519-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Copper	0.0586		0.00100	mg/L	0.0500	0.0103	96.5	70-130	0.176	20
Zinc	0.123		0.00100	mg/L	0.0500	0.0739	98.4	70-130	0.154	20
Matrix Spike Dup (BAK0657-MSD2)		**Source: WAK0588-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0657 - W 3010 Digest (Continued)										
Matrix Spike Dup (BAK0657-MSD2)		**Source: WAK0588-01**			Prepared: 11/23/2020 Analyzed: 11/24/2020					
Zinc	0.0617		0.00100	mg/L	0.0500	0.0144	94.5	70-130	3.16	20
Copper	0.0605		0.00100	mg/L	0.0500	0.0132	94.6	70-130	3.57	20
Batch: BAK0775 - W 3010 Digest										
Blank (BAK0775-BLK1)					Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAK0775-BS1)					Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Zinc	0.0508		0.00100	mg/L	0.0500		102	85-115		
Dissolved Copper	0.0517		0.00100	mg/L	0.0500		103	85-115		
Matrix Spike (BAK0775-MS1)		**Source: WAK0567-02**			Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Zinc	0.0539		0.00100	mg/L	0.0500	0.00684	94.1	70-130		
Dissolved Copper	0.0526		0.00100	mg/L	0.0500	0.00313	99.0	70-130		
Matrix Spike Dup (BAK0775-MSD1)		**Source: WAK0567-02**			Prepared: 11/25/2020 Analyzed: 11/30/2020					
Dissolved Zinc	0.0540		0.00100	mg/L	0.0500	0.00684	94.3	70-130	0.213	20
Dissolved Copper	0.0522		0.00100	mg/L	0.0500	0.00313	98.1	70-130	0.843	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0676 - W TPH-Dx										
Blank (BAK0676-BLK1)					Prepared & Analyzed: 11/25/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*48.0*	*ppm*	*50.1*		*95.7*	*50-150*		
LCS (BAK0676-BS1)					Prepared & Analyzed: 11/25/2020					
Diesel	0.988		0.160	mg/L	1.01		97.8	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*46.5*	*ppm*	*50.1*		*92.9*	*50-150*		
Duplicate (BAK0676-DUP1)		**Source: WAK0521-03**			Prepared: 11/25/2020 Analyzed: 11/26/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*46.6*	*ppm*	*50.1*		*93.1*	*50-150*		
Matrix Spike (BAK0676-MS1)		**Source: WAK0567-01**			Prepared: 11/25/2020 Analyzed: 11/26/2020					
Diesel	0.992		0.160	mg/L	1.01	ND	98.3	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*37.8*	*ppm*	*50.1*		*75.5*	*50-150*		

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0676 - W TPH-Dx (Continued)										
Matrix Spike Dup (BAK0676-MSD1)		**Source: WAK0567-01**		Prepared: 11/25/2020 Analyzed: 11/26/2020						
Diesel	1.00		0.160	mg/L	1.01	ND	99.3	70-130	1.04	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*36.6*	*ppm*	*50.1*		*73.1*	*50-150*		

WAK0567

Due: 12/04/20

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

Company Name:	Spokane County	Project Manager:	Ethan Murnin
Address:	1026 W. Broadway Avenue	Project Name & #:	Gonzaga BioRetention Cell
City: Spokane	State: WA Zip: 99260	Email Address:	EMURNIN@spokanecounty.org
Phone:	(509) 477-7420	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Aro[und]

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*______

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
Preservative:															
	INF11172020	11/17/20 10:00 AM	water			X	X	X		X	X				
	EFF1211172020	11/17/20 10:00 AM	water			X	X	X		X	X				
	EFF1811172020	11/17/20 10:00 AM	water			X	X	X		X	X				

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan	[signature]	Osborn Consulting	11/17/20	4:00 PM
Received by	[illegible]	[signature]	Anatek	11/17/20	1554
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~

hd | Cl

Temperature (°C): 6.8 / 6.6° (R#1

Preservative: H2SO4 2002883 <2

m-HNO3 2002280 <2 HCl 2002747 <2

Date & Time: 11/17/20 17:00

Inspected By: [signature]

PH 2002015

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WAK0682
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	12/9/2020 07:35
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF11192020		
Lab/Sample Number:	WAK0682-01	Collect Date:	11/19/20 09:30
Date Received:	11/19/20 15:40	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	28.7	mg CaCO3/L	3.00	11/23/20 10:00	ARY	SM 2340 C	
Phosphate/P	0.113	mg/L	0.0180	11/23/20 9:28	SAG	SM 4500-P G	H2
Total P	0.170	mg/L	0.00500	12/7/20 14:33	SAG	SM 4500-P H	
TSS	21.0	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00443	mg/L	0.00100	12/2/20 15:03	TRC	EPA 200.8	
Dissolved Copper	0.00330	mg/L	0.00100	12/1/20 12:45	TRC	EPA 200.8	
Zinc	0.0240	mg/L	0.00100	12/2/20 15:03	TRC	EPA 200.8	
Dissolved Zinc	0.0151	mg/L	0.00100	12/1/20 12:45	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 8:00	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 8:00	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 8:00	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*85.4%*		*50-150*	*11/26/20 8:00*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	EFF1211192020		
Lab/Sample Number:	WAK0682-02	Collect Date:	11/19/20 09:30
Date Received:	11/19/20 15:40	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	103	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Phosphate/P	0.378	mg/L	0.0180	11/23/20 9:29	SAG	SM 4500-P G	H2
Total P	0.656	mg/L	0.200	12/7/20 14:25	SAG	SM 4500-P H	
TSS	9.00	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00430	mg/L	0.00100	12/2/20 15:06	TRC	EPA 200.8	
Dissolved Copper	0.00337	mg/L	0.00100	12/1/20 12:48	TRC	EPA 200.8	
Zinc	0.00281	mg/L	0.00100	12/2/20 15:06	TRC	EPA 200.8	
Dissolved Zinc	0.00484	mg/L	0.00100	12/1/20 12:48	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 8:56	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 8:56	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 8:56	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*89.7%*		*50-150*	*11/26/20 8:56*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1811192020
Lab/Sample Number: WAK0682-03 Collect Date: 11/19/20 09:30
Date Received: 11/19/20 15:40 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	109	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Phosphate/P	0.494	mg/L	0.0180	11/23/20 9:30	SAG	SM 4500-P G	H2
Total P	0.720	mg/L	0.200	12/7/20 14:32	SAG	SM 4500-P H	
TSS	8.00	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00318	mg/L	0.00100	12/2/20 15:10	TRC	EPA 200.8	
Dissolved Copper	0.00326	mg/L	0.00100	12/1/20 12:50	TRC	EPA 200.8	
Zinc	0.00320	mg/L	0.00100	12/2/20 15:10	TRC	EPA 200.8	
Dissolved Zinc	0.00532	mg/L	0.00100	12/1/20 12:50	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 9:51	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 9:51	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 9:51	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*88.6%*		*50-150*	*11/26/20 9:51*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: INF11192020-02
Lab/Sample Number: WAK0682-04 Collect Date: 11/19/20 09:30
Date Received: 11/19/20 15:40 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	30.7	mg CaCO3/L	3.00	11/23/20 10:00	ARY	SM 2340 C	
Phosphate/P	0.0988	mg/L	0.0180	11/23/20 9:31	SAG	SM 4500-P G	H2
Total P	0.432	mg/L	0.200	12/7/20 14:35	SAG	SM 4500-P H	
TSS	25.0	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00436	mg/L	0.00100	12/2/20 15:13	TRC	EPA 200.8	
Dissolved Copper	0.00309	mg/L	0.00100	12/1/20 12:52	TRC	EPA 200.8	
Zinc	0.0248	mg/L	0.00100	12/2/20 15:13	TRC	EPA 200.8	
Dissolved Zinc	0.0147	mg/L	0.00100	12/1/20 12:52	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 10:47	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 10:47	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 10:47	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*74.8%*		*50-150*	*11/26/20 10:47*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	EFF1211192020-02		
Lab/Sample Number:	WAK0682-05	Collect Date:	11/19/20 09:30
Date Received:	11/19/20 15:40	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	109	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Phosphate/P	0.383	mg/L	0.0180	11/23/20 9:32	SAG	SM 4500-P G	H2
Total P	0.592	mg/L	0.200	12/7/20 14:38	SAG	SM 4500-P H	
TSS	11.0	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00375	mg/L	0.00100	12/2/20 15:29	TRC	EPA 200.8	
Dissolved Copper	0.00353	mg/L	0.00100	12/1/20 12:55	TRC	EPA 200.8	
Zinc	0.00328	mg/L	0.00100	12/2/20 15:29	TRC	EPA 200.8	
Dissolved Zinc	0.00483	mg/L	0.00100	12/1/20 12:55	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 11:42	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 11:42	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 11:42	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*91.5%*		*50-150*	*11/26/20 11:42*	*ARC*	*NWTPH-Dx*	

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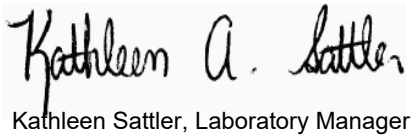
Analytical Results Report

(Continued)

Sample Location:	EFF1811192020-02		
Lab/Sample Number:	WAK0682-06	Collect Date:	11/19/20 09:30
Date Received:	11/19/20 15:40	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	117	mg CaCO3/L	6.00	11/23/20 10:00	ARY	SM 2340 C	
Phosphate/P	0.504	mg/L	0.0180	11/23/20 9:33	SAG	SM 4500-P G	H2
Total P	0.856	mg/L	0.200	12/7/20 14:41	SAG	SM 4500-P H	
TSS	11.0	mg/L	1.00	11/20/20 14:00	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00321	mg/L	0.00100	12/2/20 15:32	TRC	EPA 200.8	
Dissolved Copper	0.00339	mg/L	0.00100	12/1/20 12:57	TRC	EPA 200.8	
Zinc	0.00324	mg/L	0.00100	12/2/20 15:32	TRC	EPA 200.8	
Dissolved Zinc	0.00550	mg/L	0.00100	12/1/20 12:57	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	11/26/20 12:38	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	11/26/20 12:38	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	11/26/20 12:38	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*87.0%*		*50-150*	*11/26/20 12:38*	*ARC*	*NWTPH-Dx*	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

H2	Initial analysis within holding time, Reanalysis for the required dilution was past holding time.
PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a certified analyte
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0618 - W FIA										
Blank (BAK0618-BLK1)					Prepared & Analyzed: 11/20/2020					
Phosphate/P	ND		0.0180	mg/L						
Matrix Spike (BAK0618-MS1)		**Source: WAK0682-02**			Prepared & Analyzed: 11/20/2020					
Phosphate/P	0.460		0.0180	mg/L	0.100	0.378	81.6	80-120		
Batch: BAK0655 - W Wet Chem										
Blank (BAK0655-BLK1)					Prepared & Analyzed: 11/23/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAK0655-BLK2)					Prepared & Analyzed: 11/23/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAK0655-BS1)					Prepared & Analyzed: 11/23/2020					
Hardness	101			mg CaCO3/L	100		101	90-110		
LCS Dup (BAK0655-BSD1)					Prepared & Analyzed: 11/23/2020					
Hardness	102			mg CaCO3/L	100		102	90-110	1.01	20
Duplicate (BAK0655-DUP1)		**Source: WAK0519-03**			Prepared & Analyzed: 11/23/2020					
Hardness	158		6.00	mg CaCO3/L		152			3.82	20
Matrix Spike (BAK0655-MS1)		**Source: WAK0521-09**			Prepared & Analyzed: 11/23/2020					
Hardness	297		6.00	mg CaCO3/L	100	204	93.1	80-120		
Matrix Spike Dup (BAK0655-MSD1)		**Source: WAK0521-09**			Prepared & Analyzed: 11/23/2020					
Hardness	295		6.00	mg CaCO3/L	100	204	91.1	80-120	0.676	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0668 - W FIA										
Blank (BAK0668-BLK1)					Prepared & Analyzed: 11/23/2020					
Phosphate/P	ND		0.0180	mg/L						
LCS (BAK0668-BS1)					Prepared & Analyzed: 11/23/2020					
Phosphate/P	0.107		0.0180	mg/L	0.100		107	85-115		
Matrix Spike (BAK0668-MS1)		**Source: WAK0682-06**			Prepared & Analyzed: 11/23/2020					
Phosphate/P	0.615		0.0180	mg/L	0.100	0.504	111	80-120		
Matrix Spike Dup (BAK0668-MSD1)		**Source: WAK0682-06**			Prepared & Analyzed: 11/23/2020					
Phosphate/P	0.613		0.0180	mg/L	0.100	0.504	110	80-120	0.195	20
Batch: BAK0734 - W Filtration										
Blank (BAK0734-BLK1)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK2)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK3)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK4)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK5)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
Blank (BAK0734-BLK6)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
Blank (BAK0734-BLK7)					Prepared & Analyzed: 11/20/2020					
TSS	ND		1.00	mg/L						
LCS (BAK0734-BS1)					Prepared & Analyzed: 11/20/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS (BAK0734-BS2)					Prepared & Analyzed: 11/20/2020					
TSS	96.0			mg/L	100		96.0	90-110		
LCS (BAK0734-BS3)					Prepared & Analyzed: 11/20/2020					
TSS	96.0			mg/L	100		96.0	90-110		
LCS (BAK0734-BS4)					Prepared & Analyzed: 11/20/2020					
TSS	98.0			mg/L	100		98.0	90-110		
LCS Dup (BAK0734-BSD1)					Prepared & Analyzed: 11/20/2020					
TSS	106			mg/L	100		106	90-110	8.87	10
LCS Dup (BAK0734-BSD2)					Prepared & Analyzed: 11/20/2020					
TSS	101			mg/L	100		101	90-110	5.08	10
LCS Dup (BAK0734-BSD3)					Prepared & Analyzed: 11/20/2020					
TSS	103			mg/L	100		103	90-110	7.04	10
LCS Dup (BAK0734-BSD4)					Prepared & Analyzed: 11/20/2020					
TSS	97.0			mg/L	100		97.0	90-110	1.03	10

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
Duplicate (BAK0734-DUP1)		**Source: WAK0519-03**			Prepared & Analyzed: 11/20/2020					
TSS	22.0		1.00	mg/L		23.0			4.44	20
Duplicate (BAK0734-DUP2)		**Source: WAK0545-02**			Prepared & Analyzed: 11/20/2020					
TSS	24.0		1.00	mg/L		25.0			4.08	20
Duplicate (BAK0734-DUP3)		**Source: WAK0677-01**			Prepared & Analyzed: 11/20/2020					
TSS	1.00		1.00	mg/L		1.00			0.00	20
Duplicate (BAK0734-DUP4)		**Source: WAK0682-02**			Prepared & Analyzed: 11/20/2020					
TSS	9.00		1.00	mg/L		9.00			0.00	20
Matrix Spike (BAK0734-MS1)		**Source: MAK0523-01**			Prepared & Analyzed: 11/20/2020					
TSS	158		2.00	mg/L	100	66.0	92.0	80-120		
Matrix Spike (BAK0734-MS2)		**Source: WAK0567-01**			Prepared & Analyzed: 11/20/2020					
TSS	112		2.00	mg/L	100	17.0	95.0	80-120		
Matrix Spike (BAK0734-MS3)		**Source: WAK0649-01**			Prepared & Analyzed: 11/20/2020					
TSS	114		2.00	mg/L	100	15.0	99.0	80-120		
Matrix Spike (BAK0734-MS4)		**Source: WAK0681-01**			Prepared & Analyzed: 11/20/2020					
TSS	108		2.00	mg/L	100	9.00	99.0	80-120		
Matrix Spike Dup (BAK0734-MSD1)		**Source: MAK0523-01**			Prepared & Analyzed: 11/20/2020					
TSS	148		2.00	mg/L	100	66.0	82.0	80-120	6.54	20
Matrix Spike Dup (BAK0734-MSD2)		**Source: WAK0567-01**			Prepared & Analyzed: 11/20/2020					
TSS	110		2.00	mg/L	100	17.0	93.0	80-120	1.80	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0734 - W Filtration (Continued)										
Matrix Spike Dup (BAK0734-MSD3)		**Source: WAK0649-01**			Prepared & Analyzed: 11/20/2020					
TSS	126		2.00	mg/L	100	15.0	111	80-120	10.0	20
Matrix Spike Dup (BAK0734-MSD4)		**Source: WAK0681-01**			Prepared & Analyzed: 11/20/2020					
TSS	112		2.00	mg/L	100	9.00	103	80-120	3.64	20
Batch: BAL0238 - W FIA										
Blank (BAL0238-BLK1)					Prepared & Analyzed: 12/7/2020					
Total P	ND		0.00500	mg/L						
Blank (BAL0238-BLK2)					Prepared & Analyzed: 12/7/2020					
Total P	ND		0.00500	mg/L						
LCS (BAL0238-BS1)					Prepared & Analyzed: 12/7/2020					
Total P	0.105		0.00500	mg/L	0.100		105	90-110		
Matrix Spike (BAL0238-MS1)		**Source: WAK0848-02**			Prepared & Analyzed: 12/7/2020					
Total P	0.248		0.00500	mg/L	0.100	0.128	120	80-120		
Matrix Spike Dup (BAL0238-MSD1)		**Source: WAK0848-02**			Prepared & Analyzed: 12/7/2020					
Total P	0.237		0.00500	mg/L	0.100	0.128	109	80-120	4.45	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0827 - W 3010 Digest										
Blank (BAK0827-BLK1)					Prepared: 11/30/2020 Analyzed: 12/1/2020					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAK0827-BS1)					Prepared: 11/30/2020 Analyzed: 12/1/2020					
Dissolved Copper	0.0496		0.00100	mg/L	0.0500		99.3	85-115		
Dissolved Zinc	0.0489		0.00100	mg/L	0.0500		97.9	85-115		
Matrix Spike (BAK0827-MS1)		**Source: WAK0605-02**			Prepared: 11/30/2020 Analyzed: 12/1/2020					
Dissolved Zinc	0.0508		0.00100	mg/L	0.0500	0.00214	97.3	70-130		
Dissolved Copper	0.0495		0.00100	mg/L	0.0500	0.000217	98.5	70-130		
Matrix Spike (BAK0827-MS2)		**Source: WAK0605-05**			Prepared: 11/30/2020 Analyzed: 12/1/2020					
Dissolved Zinc	0.253		0.00500	mg/L	0.250	0.00346	99.9	70-130		
Dissolved Copper	0.252		0.00500	mg/L	0.250	0.000194	101	70-130		
Matrix Spike Dup (BAK0827-MSD1)		**Source: WAK0605-02**			Prepared: 11/30/2020 Analyzed: 12/1/2020					
Dissolved Zinc	0.0511		0.00100	mg/L	0.0500	0.00214	97.9	70-130	0.522	20
Dissolved Copper	0.0491		0.00100	mg/L	0.0500	0.000217	97.8	70-130	0.679	20
Matrix Spike Dup (BAK0827-MSD2)		**Source: WAK0605-05**			Prepared: 11/30/2020 Analyzed: 12/1/2020					
Dissolved Zinc	0.252		0.00500	mg/L	0.250	0.00346	99.4	70-130	0.491	20

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0827 - W 3010 Digest (Continued)										
Matrix Spike Dup (BAK0827-MSD2)		**Source: WAK0605-05**			Prepared: 11/30/2020 Analyzed: 12/1/2020					
Dissolved Copper	0.266		0.00500	mg/L	0.250	0.000194	106	70-130	5.36	20
Batch: BAL0001 - W 3010 Digest										
Blank (BAL0001-BLK1)					Prepared: 12/1/2020 Analyzed: 12/2/2020					
Copper	ND		0.00100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BAL0001-BS1)					Prepared: 12/1/2020 Analyzed: 12/2/2020					
Zinc	0.0508		0.00100	mg/L	0.0500		102	85-115		
Copper	0.0501		0.00100	mg/L	0.0500		100	85-115		
Matrix Spike (BAL0001-MS1)		**Source: WAK0605-02**			Prepared: 12/1/2020 Analyzed: 12/2/2020					
Zinc	0.0476		0.00100	mg/L	0.0500	ND	95.1	70-130		
Copper	0.0475		0.00100	mg/L	0.0500	0.000369	94.3	70-130		
Matrix Spike (BAL0001-MS2)		**Source: WAK0608-01**			Prepared: 12/1/2020 Analyzed: 12/2/2020					
Copper	0.0483		0.00100	mg/L	0.0500	0.000491	95.7	70-130		
Zinc	0.0498		0.00100	mg/L	0.0500	0.000714	98.3	70-130		
Matrix Spike Dup (BAL0001-MSD1)		**Source: WAK0605-02**			Prepared: 12/1/2020 Analyzed: 12/2/2020					
Zinc	0.0480		0.00100	mg/L	0.0500	ND	96.0	70-130	0.925	20
Copper	0.0483		0.00100	mg/L	0.0500	0.000369	95.9	70-130	1.62	20
Matrix Spike Dup (BAL0001-MSD2)		**Source: WAK0608-01**			Prepared: 12/1/2020 Analyzed: 12/2/2020					
Zinc	0.0496		0.00100	mg/L	0.0500	0.000714	97.7	70-130	0.583	20
Copper	0.0487		0.00100	mg/L	0.0500	0.000491	96.4	70-130	0.703	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0676 - W TPH-Dx										
Blank (BAK0676-BLK1)					Prepared & Analyzed: 11/25/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*48.0*	*ppm*	*50.1*		*95.7*	*50-150*		
LCS (BAK0676-BS1)					Prepared & Analyzed: 11/25/2020					
Diesel	0.988		0.160	mg/L	1.01		97.8	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*46.5*	*ppm*	*50.1*		*92.9*	*50-150*		
Duplicate (BAK0676-DUP1)		**Source: WAK0521-03**			Prepared: 11/25/2020 Analyzed: 11/26/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAK0676 - W TPH-Dx (Continued)										
Duplicate (BAK0676-DUP1)		**Source: WAK0521-03**		Prepared: 11/25/2020 Analyzed: 11/26/2020						
Surrogate: n-Hexacosane			*46.6*	*ppm*	*50.1*		*93.1*	*50-150*		
Matrix Spike (BAK0676-MS1)		**Source: WAK0567-01**		Prepared: 11/25/2020 Analyzed: 11/26/2020						
Diesel	0.992		0.160	mg/L	1.01	ND	98.3	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*37.8*	*ppm*	*50.1*		*75.5*	*50-150*		
Matrix Spike Dup (BAK0676-MSD1)		**Source: WAK0567-01**		Prepared: 11/25/2020 Analyzed: 11/26/2020						
Diesel	1.00		0.160	mg/L	1.01	ND	99.3	70-130	1.04	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*36.6*	*ppm*	*50.1*		*73.1*	*50-150*		

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Chain of Custody Record

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Anatek Log-In #

WAK0682

Due: 12/08/20

Company Name:	Spokane County	Project Manager:	Ethan Murnin
Address:	1026 W. Broadway Avenue	Project Name & # :	Gonzaga BioRetention Cell
City:	Spokane State: WA Zip: 99260	Email Address :	EMURNIN@spokanecounty.org
Phone:	(509) 477-7420	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Arou

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Preservative:

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
	INF11192020	11/19/20 9:30 AM	water			x	x	x	x	x	x	x			
	EFF1211192020	11/19/20 9:30 AM	water			x	x	x	x	x	x	x			
	EFF1811192020	11/19/20 9:30 AM	water			x	x	x	x	x	x	x			
	INF11192020-02	11/19/20 9:30 AM	water			x	x	x	x	x	x	x			
	EFF1211192020-02	11/19/20 9:30 AM	water			x	x	x	x	x	x	x			
	EFF1811192020-02	11/19/20 9:30 AM	water			x	x	x	x	x	x	x			

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWBS

Cooler 1 3.5/3.3° IR ~~PH~~ 1

Cooler 2 3.4/3.2° IR ~~PH~~ 1

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	N

hd/c/i 2 coolers

Temperature (°C):

Preservative: H_2SO_4 2001181<2, 2002887<2
HCl 2002747<2, 2003851<2

Date & Time: 11-19-20 1650

Inspected By: W/cz

pH 2001015

HNO_3 2002280<2

	Printed Name	Signature	Company	Date	Time
Relinquished by	Megan Ehlebracht		OCI	11/19/20	3:40
Received by	KS att		Anatek	11/19/20	1540
Relinquished by					
Received by					
Relinquished by					
Received by					

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Client:	Spokane County	Work Order:	WAL0676
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	1/6/2021 13:35
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF12192020		
Lab/Sample Number:	WAL0676-01	Collect Date:	12/20/20 12:30
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	10.9	mg CaCO3/L	3.00	12/22/20 13:30	ARY	SM 2340 C	
Phosphate/P	0.0476	mg/L	0.0180	12/22/20 11:42	SAG	SM 4500-P G	
Total P	<0.005	mg/L	0.200	12/28/20 13:06	SAG	SM 4500-P H	
TSS	10.5	mg/L	0.500	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00262	mg/L	0.00100	1/5/21 13:05	TRC	EPA 200.8	
Dissolved Copper	ND	mg/L	0.00100	1/4/21 11:51	TRC	EPA 200.8	
Zinc	0.0122	mg/L	0.00100	1/5/21 13:05	TRC	EPA 200.8	
Dissolved Zinc	0.0152	mg/L	0.00100	1/4/21 11:51	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/29/20 23:16	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/29/20 23:16	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/29/20 23:16	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.3%*		*50-150*	*12/29/20 23:16*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1212192020
Lab/Sample Number: WAL0676-02 Collect Date: 12/20/20 12:30
Date Received: 12/21/20 14:30 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	111	mg CaCO3/L	12.0	12/22/20 13:30	ARY	SM 2340 C	
Phosphate/P	0.257	mg/L	0.0180	12/22/20 11:42	SAG	SM 4500-P G	
Total P	0.872	mg/L	0.200	12/28/20 13:13	SAG	SM 4500-P H	
TSS	2.12	mg/L	0.125	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00364	mg/L	0.00100	1/5/21 13:22	TRC	EPA 200.8	
Dissolved Copper	0.00280	mg/L	0.00100	1/4/21 11:53	TRC	EPA 200.8	
Zinc	0.00246	mg/L	0.00100	1/5/21 13:22	TRC	EPA 200.8	
Dissolved Zinc	0.0170	mg/L	0.00100	1/4/21 11:53	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 1:59	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 1:59	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 1:59	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*91.6%*		*50-150*	*12/30/20 1:59*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1812192020
Lab/Sample Number: WAL0676-03 Collect Date: 12/20/20 12:30
Date Received: 12/21/20 14:30 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	150	mg CaCO3/L	12.0	12/22/20 13:30	ARY	SM 2340 C	
Phosphate/P	0.373	mg/L	0.0180	12/22/20 11:43	SAG	SM 4500-P G	
Total P	0.292	mg/L	0.200	12/28/20 13:16	SAG	SM 4500-P H	
TSS	1.43	mg/L	0.143	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00391	mg/L	0.00100	1/5/21 13:29	TRC	EPA 200.8	
Dissolved Copper	0.00330	mg/L	0.00100	1/4/21 11:55	TRC	EPA 200.8	
Zinc	0.00363	mg/L	0.00100	1/5/21 13:29	TRC	EPA 200.8	
Dissolved Zinc	0.0170	mg/L	0.00100	1/4/21 11:55	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 2:54	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 2:54	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 2:54	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*91.3%*		*50-150*	*12/30/20 2:54*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	INF12192020-DI		
Lab/Sample Number:	WAL0676-04	Collect Date:	12/20/20 12:30
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	1/4/21 11:58	TRC	EPA 200.8	
Dissolved Zinc	0.0178	mg/L	0.00100	1/4/21 11:58	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF1212192020-DI		
Lab/Sample Number:	WAL0676-05	Collect Date:	12/20/20 12:30
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	1/4/21 12:10	TRC	EPA 200.8	
Dissolved Zinc	0.0253	mg/L	0.00100	1/4/21 12:10	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF1812192020-DI		
Lab/Sample Number:	WAL0676-06	Collect Date:	12/20/20 12:30
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	ND	mg/L	0.00100	1/4/21 12:12	TRC	EPA 200.8	
Dissolved Zinc	0.0307	mg/L	0.00100	1/4/21 12:12	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	INF12192020-02		
Lab/Sample Number:	WAL0676-07	Collect Date:	12/20/20 12:30
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	9.75	mg/L	0.250	12/23/20 9:15	BAS	SM 2540 D	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 3:48	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 3:48	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 3:48	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*86.5%*		*50-150*	*12/30/20 3:48*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	EFF1212192020-02		
Lab/Sample Number:	WAL0676-08	Collect Date:	12/20/20 12:30
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	2.00	mg/L	0.143	12/23/20 9:15	BAS	SM 2540 D	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 4:43	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 4:43	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 4:43	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.4%*		*50-150*	*12/30/20 4:43*	*ARC*	*NWTPH-Dx*	

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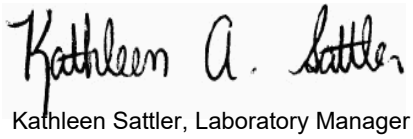
Analytical Results Report

(Continued)

Sample Location: EFF1812192020-02
Lab/Sample Number: WAL0676-09 Collect Date: 12/20/20 12:30
Date Received: 12/21/20 14:30 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	<2	mg/L	0.143	12/23/20 9:15	BAS	SM 2540 D	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 6:33	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 6:33	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 6:33	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*96.3%*		*50-150*	*12/30/20 6:33*	*ARC*	*NWTPH-Dx*	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0688 - W Wet Chem										
Blank (BAL0688-BLK1)					Prepared & Analyzed: 12/22/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAL0688-BLK2)					Prepared & Analyzed: 12/22/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAL0688-BS1)					Prepared & Analyzed: 12/22/2020					
Hardness	103		3.00	mg CaCO3/L	100		103	90-110		
LCS Dup (BAL0688-BSD1)					Prepared & Analyzed: 12/22/2020					
Hardness	101		3.00	mg CaCO3/L	100		101	90-110	1.94	20
Duplicate (BAL0688-DUP1)		**Source: WAL0676-03**			Prepared & Analyzed: 12/22/2020					
Hardness	147		12.0	mg CaCO3/L		150			2.67	20
Matrix Spike (BAL0688-MS1)		**Source: WAL0676-02**			Prepared & Analyzed: 12/22/2020					
Hardness	313		12.0	mg CaCO3/L	200	111	101	80-120		
Matrix Spike Dup (BAL0688-MSD1)		**Source: WAL0676-02**			Prepared & Analyzed: 12/22/2020					
Hardness	313		12.0	mg CaCO3/L	200	111	101	80-120	0.00	20
Batch: BAL0716 - W FIA										
Blank (BAL0716-BLK1)					Prepared & Analyzed: 12/22/2020					
Phosphate/P	ND		0.0180	mg/L						
LCS (BAL0716-BS1)					Prepared & Analyzed: 12/22/2020					
Phosphate/P	0.106		0.0180	mg/L	0.100		106	85-115		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0716 - W FIA (Continued)										
LCS Dup (BAL0716-BSD1)					Prepared & Analyzed: 12/22/2020					
Phosphate/P	0.107		0.0180	mg/L	0.100		107	85-115	1.03	20
Batch: BAL0795 - W FIA										
Blank (BAL0795-BLK1)					Prepared & Analyzed: 12/28/2020					
Total P	ND		0.00500	mg/L						
Blank (BAL0795-BLK2)					Prepared & Analyzed: 12/28/2020					
Total P	ND		0.00500	mg/L						
Blank (BAL0795-BLK3)					Prepared & Analyzed: 12/28/2020					
Total P	ND		0.00500	mg/L						
LCS (BAL0795-BS1)					Prepared & Analyzed: 12/28/2020					
Total P	0.104		0.00500	mg/L	0.100		104	90-110		
LCS (BAL0795-BS2)					Prepared & Analyzed: 12/28/2020					
Total P	0.102		0.00500	mg/L	0.100		102	90-110		
Matrix Spike (BAL0795-MS1)		**Source: WAL0578-02**			Prepared & Analyzed: 12/28/2020					
Total P	0.248		0.0500	mg/L	0.100	0.151	96.8	80-120		
Matrix Spike (BAL0795-MS2)		**Source: WAL0640-02**			Prepared & Analyzed: 12/28/2020					
Total P	0.245		0.0500	mg/L	0.100	0.159	86.4	80-120		
Matrix Spike Dup (BAL0795-MSD1)		**Source: WAL0578-02**			Prepared & Analyzed: 12/28/2020					
Total P	0.247		0.0500	mg/L	0.100	0.151	95.8	80-120	0.404	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0795 - W FIA (Continued)										
Matrix Spike Dup (BAL0795-MSD2)		**Source: WAL0640-02**			Prepared & Analyzed: 12/28/2020					
Total P	0.251		0.00500	mg/L	0.100	0.159	92.5	80-120	2.46	20
Batch: BAL0804 - W Filtration										
Blank (BAL0804-BLK1)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK2)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK3)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK4)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
LCS (BAL0804-BS1)					Prepared & Analyzed: 12/23/2020					
TSS	91.0			mg/L	100		91.0	90-110		
LCS (BAL0804-BS2)					Prepared & Analyzed: 12/23/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS Dup (BAL0804-BSD1)					Prepared & Analyzed: 12/23/2020					
TSS	94.0			mg/L	100		94.0	90-110	3.24	10
LCS Dup (BAL0804-BSD2)					Prepared & Analyzed: 12/23/2020					
TSS	98.0			mg/L	100		98.0	90-110	1.03	10

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0804 - W Filtration (Continued)										
Duplicate (BAL0804-DUP1)		**Source: WAL0661-02**			Prepared & Analyzed: 12/23/2020					
TSS	9.00		1.00	mg/L		9.00			0.00	20
Duplicate (BAL0804-DUP2)		**Source: MAL0669-01**			Prepared & Analyzed: 12/23/2020					
TSS	84.0		1.00	mg/L		88.0			4.65	20
Matrix Spike (BAL0804-MS1)		**Source: MAL0634-01**			Prepared & Analyzed: 12/23/2020					
TSS	396		2.00	mg/L	100	314	82.0	80-120		
Matrix Spike (BAL0804-MS2)		**Source: MAL0646-01**			Prepared & Analyzed: 12/23/2020					
TSS	204		2.00	mg/L	100	108	96.0	80-120		
Matrix Spike Dup (BAL0804-MSD1)		**Source: MAL0634-01**			Prepared & Analyzed: 12/23/2020					
TSS	404		2.00	mg/L	100	314	90.0	80-120	2.00	20
Matrix Spike Dup (BAL0804-MSD2)		**Source: MAL0646-01**			Prepared & Analyzed: 12/23/2020					
TSS	200		2.00	mg/L	100	108	92.0	80-120	1.98	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0811 - W 3010 Digest										
Blank (BAL0811-BLK1)					Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAL0811-BS1)					Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0558		0.00100	mg/L	0.0500		112	85-115		
Dissolved Zinc	0.0548		0.00100	mg/L	0.0500		110	85-115		
Matrix Spike (BAL0811-MS1)		**Source: WAL0675-02**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	0.0575		0.00100	mg/L	0.0500	0.0178	79.3	70-130		
Dissolved Copper	0.0559		0.00100	mg/L	0.0500	0.00607	99.6	70-130		
Matrix Spike (BAL0811-MS2)		**Source: WAL0675-06**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	0.0559		0.00100	mg/L	0.0500	0.0168	78.1	70-130		
Dissolved Copper	0.0546		0.00100	mg/L	0.0500	0.00734	94.5	70-130		
Matrix Spike Dup (BAL0811-MSD1)		**Source: WAL0675-02**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	0.0562		0.00100	mg/L	0.0500	0.0178	76.7	70-130	2.32	20
Dissolved Copper	0.0561		0.00100	mg/L	0.0500	0.00607	100	70-130	0.404	20
Matrix Spike Dup (BAL0811-MSD2)		**Source: WAL0675-06**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0526		0.00100	mg/L	0.0500	0.00734	90.5	70-130	3.68	20
Dissolved Zinc	0.0532		0.00100	mg/L	0.0500	0.0168	72.9	70-130	4.82	20

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0005 - W 3010 Digest										
Blank (BBA0005-BLK1)					Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	ND		0.00100	mg/L						
Copper	ND		0.00100	mg/L						
LCS (BBA0005-BS1)					Prepared: 1/4/2021 Analyzed: 1/5/2021					
Copper	0.0495		0.00100	mg/L	0.0500		99.0	85-115		
Zinc	0.0485		0.00100	mg/L	0.0500		97.1	85-115		
Matrix Spike (BBA0005-MS1)		**Source: WAL0605-01**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.231		0.00100	mg/L	0.0500	0.182	97.4	70-130		
Copper	0.0714		0.00100	mg/L	0.0500	0.0237	95.5	70-130		
Matrix Spike (BBA0005-MS2)		**Source: WAL0676-02**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.0510		0.00100	mg/L	0.0500	0.00246	97.1	70-130		
Copper	0.0536		0.00100	mg/L	0.0500	0.00364	100	70-130		
Matrix Spike Dup (BBA0005-MSD1)		**Source: WAL0605-01**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.231		0.00100	mg/L	0.0500	0.182	96.8	70-130	0.128	20
Copper	0.0723		0.00100	mg/L	0.0500	0.0237	97.4	70-130	1.28	20
Matrix Spike Dup (BBA0005-MSD2)		**Source: WAL0676-02**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Copper	0.0525		0.00100	mg/L	0.0500	0.00364	97.6	70-130	2.23	20
Zinc	0.0500		0.00100	mg/L	0.0500	0.00246	95.2	70-130	1.95	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0710 - W TPH-Dx										
Blank (BAL0710-BLK1)					Prepared & Analyzed: 12/29/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*47.3*	*ppm*	*50.1*		*94.4*	*50-150*		
LCS (BAL0710-BS1)					Prepared & Analyzed: 12/29/2020					
Diesel	1.09		0.160	mg/L	1.00		109	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*47.3*	*ppm*	*50.1*		*94.4*	*50-150*		
Duplicate (BAL0710-DUP1)		**Source: WAL0676-08**			Prepared: 12/29/2020 Analyzed: 12/30/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*47.1*	*ppm*	*50.1*		*94.1*	*50-150*		

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0710 - W TPH-Dx (Continued)										
Matrix Spike (BAL0710-MS1)		**Source: WAL0676-01**			Prepared: 12/29/2020 Analyzed: 12/30/2020					
Diesel	1.05		0.160	mg/L	1.00	ND	105	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*47.2*	*ppm*	*50.1*		*94.1*	*50-150*		
Matrix Spike Dup (BAL0710-MSD1)		**Source: WAL0676-01**			Prepared: 12/29/2020 Analyzed: 12/30/2020					
Diesel	0.931		0.160	mg/L	1.00	ND	92.7	70-130	12.2	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*38.3*	*ppm*	*50.1*		*76.5*	*50-150*		

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Chain of Custody Record

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Anatek Log-In #

WAL0676

Due: 01/11/21

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & #: Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address: EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Around

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*______

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
	INF12192020	12/20/20 12:30 PM	water	6		x	x	x	x	x	x	x			①
	* EFF1212192020	12/20/20 12:30 PM	water	6		x	x	x	x	x	x	x			~~②~~ ③
	EFF1812192020	12/20/20 12:30 PM	water	6		x	x	x	x	x	x	x			~~②~~ ③
	INF12192020-DI	12/20/20 12:30 PM	water	1				x							①
	EFF1212192020-DI	12/20/20 12:30 PM	water	1				x							~~②~~ ③
	EFF1812192020-DI	12/20/20 12:30 PM	water	1				x							~~②~~ ③
	INF12192020-02	12/20/20 12:30 PM	water	2		x					x				①
	EFF1212192020-02	12/20/20 12:30 PM	water	2		x					x				~~②~~ ③
	EFF1812192020-02	12/20/20 12:30 PM	water	2		x					x			③	~~②~~

Preservative:

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

* one metals bottle (p250) marked as EFF18 but came out of EFF12 bag. W/Z

MW 12/21/20

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan	Kevin Flanagan	Osborn Consulting	12/21/20	2:30 PM
Received by	Kathy Sattler	Kathy Sattler	Anatek Labs	12-21-2020	1430
Relinquished by					
Received by					
Relinquished by					
Received by					

③ Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	(N)
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~

Cooler | Ice | Hand

Temperature (°C): Cooler #1 | 0.7 | 1.0 ② C2 0.7 | 0.5 C3 1.4 | 1.2 IR#1

Preservative: HNO3 2002280 <2 pH 2001015
HCl 2003851 <2 H_2SO_4 2002883 <2

Date & Time: 12-21-20 1720

Inspected By: W/Z

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WAL0675
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRentention Cell
	Spokane, WA 99260-0430	Reported:	1/6/2021 13:32
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location: INF12202020 *Should be 12212020 - storm started early morning on 12/21*

Lab/Sample Number: WAL0675-01 Collect Date: 12/21/20 13:00

Date Received: 12/21/20 14:30 Collected By:

Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	8.91	mg CaCO3/L	3.00	12/22/20 13:30	ARY	SM 2340 C	
TSS	9.00	mg/L	0.500	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00274	mg/L	0.00100	1/5/21 12:58	TRC	EPA 200.8	
Dissolved Copper	0.00232	mg/L	0.00100	1/4/21 11:28	TRC	EPA 200.8	
Zinc	0.0125	mg/L	0.00100	1/5/21 12:58	TRC	EPA 200.8	
Dissolved Zinc	0.0646	mg/L	0.00100	1/4/21 11:28	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 7:28	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 7:28	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 7:28	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.2%*		*50-150*	*12/30/20 7:28*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1212202020 *Should be 12212020 - storm started early morning on 12/21*

Lab/Sample Number: WAL0675-02 Collect Date: 12/21/20 13:00

Date Received: 12/21/20 14:30 Collected By:

Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	145	mg CaCO3/L	6.00	12/22/20 13:30	ARY	SM 2340 C	
TSS	1.80	mg/L	0.100	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00611	mg/L	0.00100	1/5/21 13:01	TRC	EPA 200.8	
Dissolved Copper	0.00607	mg/L	0.00100	1/4/21 11:30	TRC	EPA 200.8	
Zinc	0.00518	mg/L	0.00100	1/5/21 13:01	TRC	EPA 200.8	
Dissolved Zinc	0.0178	mg/L	0.00100	1/4/21 11:30	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 8:23	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 8:23	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 8:23	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*95.2%*		*50-150*	*12/30/20 8:23*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1812202020 *Should be 12212020 - storm started early morning on 12/21*

Lab/Sample Number: WAL0675-03 Collect Date: 12/21/20 13:00

Date Received: 12/21/20 14:30 Collected By:

Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	115	mg CaCO3/L	6.00	12/22/20 13:30	ARY	SM 2340 C	
TSS	1.90	mg/L	0.100	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00747	mg/L	0.00100	1/5/21 13:03	TRC	EPA 200.8	
Dissolved Copper	0.00743	mg/L	0.00100	1/4/21 11:37	TRC	EPA 200.8	
Zinc	0.00639	mg/L	0.00100	1/5/21 13:03	TRC	EPA 200.8	
Dissolved Zinc	0.0150	mg/L	0.00100	1/4/21 11:37	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 9:18	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 9:18	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 9:18	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*88.5%*		*50-150*	*12/30/20 9:18*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	INF12202020-2		
Lab/Sample Number:	WAL0675-04	Collect Date:	12/21/20 13:00
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00167	mg/L	0.00100	1/4/21 11:39	TRC	EPA 200.8	
Dissolved Zinc	0.0223	mg/L	0.00100	1/4/21 11:39	TRC	EPA 200.8	

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Analytical Results Report

(Continued)

Sample Location:	EFF1212202020-2		
Lab/Sample Number:	WAL0675-05	Collect Date:	12/21/20 13:00
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00576	mg/L	0.00100	1/4/21 11:42	TRC	EPA 200.8	
Dissolved Zinc	0.0138	mg/L	0.00100	1/4/21 11:42	TRC	EPA 200.8	

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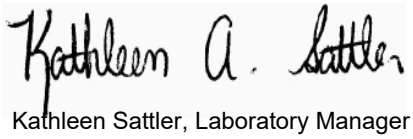
Analytical Results Report

(Continued)

Sample Location:	EFF1812202020-2		
Lab/Sample Number:	WAL0675-06	Collect Date:	12/21/20 13:00
Date Received:	12/21/20 14:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Metals by ICP-MS							
Dissolved Copper	0.00734	mg/L	0.00100	1/4/21 11:44	TRC	EPA 200.8	
Dissolved Zinc	0.0168	mg/L	0.00100	1/4/21 11:44	TRC	EPA 200.8	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0688 - W Wet Chem										
Blank (BAL0688-BLK1)					Prepared & Analyzed: 12/22/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAL0688-BLK2)					Prepared & Analyzed: 12/22/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAL0688-BS1)					Prepared & Analyzed: 12/22/2020					
Hardness	103		3.00	mg CaCO3/L	100		103	90-110		
LCS Dup (BAL0688-BSD1)					Prepared & Analyzed: 12/22/2020					
Hardness	101		3.00	mg CaCO3/L	100		101	90-110	1.94	20
Duplicate (BAL0688-DUP1)		**Source: WAL0676-03**			Prepared & Analyzed: 12/22/2020					
Hardness	147		12.0	mg CaCO3/L		150			2.67	20
Matrix Spike (BAL0688-MS1)		**Source: WAL0676-02**			Prepared & Analyzed: 12/22/2020					
Hardness	313		12.0	mg CaCO3/L	200	111	101	80-120		
Matrix Spike Dup (BAL0688-MSD1)		**Source: WAL0676-02**			Prepared & Analyzed: 12/22/2020					
Hardness	313		12.0	mg CaCO3/L	200	111	101	80-120	0.00	20
Batch: BAL0804 - W Filtration										
Blank (BAL0804-BLK1)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK2)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0804 - W Filtration (Continued)										
Blank (BAL0804-BLK3)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK4)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
LCS (BAL0804-BS1)					Prepared & Analyzed: 12/23/2020					
TSS	91.0			mg/L	100		91.0	90-110		
LCS (BAL0804-BS2)					Prepared & Analyzed: 12/23/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS Dup (BAL0804-BSD1)					Prepared & Analyzed: 12/23/2020					
TSS	94.0			mg/L	100		94.0	90-110	3.24	10
LCS Dup (BAL0804-BSD2)					Prepared & Analyzed: 12/23/2020					
TSS	98.0			mg/L	100		98.0	90-110	1.03	10
Duplicate (BAL0804-DUP1)		**Source: WAL0661-02**			Prepared & Analyzed: 12/23/2020					
TSS	9.00		1.00	mg/L		9.00			0.00	20
Duplicate (BAL0804-DUP2)		**Source: MAL0669-01**			Prepared & Analyzed: 12/23/2020					
TSS	84.0		1.00	mg/L		88.0			4.65	20
Matrix Spike (BAL0804-MS1)		**Source: MAL0634-01**			Prepared & Analyzed: 12/23/2020					
TSS	396		2.00	mg/L	100	314	82.0	80-120		
Matrix Spike (BAL0804-MS2)		**Source: MAL0646-01**			Prepared & Analyzed: 12/23/2020					
TSS	204		2.00	mg/L	100	108	96.0	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0804 - W Filtration (Continued)										
Matrix Spike Dup (BAL0804-MSD1)		**Source: MAL0634-01**			Prepared & Analyzed: 12/23/2020					
TSS	404		2.00	mg/L	100	314	90.0	80-120	2.00	20
Matrix Spike Dup (BAL0804-MSD2)		**Source: MAL0646-01**			Prepared & Analyzed: 12/23/2020					
TSS	200		2.00	mg/L	100	108	92.0	80-120	1.98	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0811 - W 3010 Digest										
Blank (BAL0811-BLK1)					Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAL0811-BS1)					Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	0.0548		0.00100	mg/L	0.0500		110	85-115		
Dissolved Copper	0.0558		0.00100	mg/L	0.0500		112	85-115		
Matrix Spike (BAL0811-MS1)		**Source: WAL0675-02**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	0.0575		0.00100	mg/L	0.0500	0.0178	79.3	70-130		
Dissolved Copper	0.0559		0.00100	mg/L	0.0500	0.00607	99.6	70-130		
Matrix Spike (BAL0811-MS2)		**Source: WAL0675-06**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	0.0559		0.00100	mg/L	0.0500	0.0168	78.1	70-130		
Dissolved Copper	0.0546		0.00100	mg/L	0.0500	0.00734	94.5	70-130		
Matrix Spike Dup (BAL0811-MSD1)		**Source: WAL0675-02**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0561		0.00100	mg/L	0.0500	0.00607	100	70-130	0.404	20
Dissolved Zinc	0.0562		0.00100	mg/L	0.0500	0.0178	76.7	70-130	2.32	20
Matrix Spike Dup (BAL0811-MSD2)		**Source: WAL0675-06**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0526		0.00100	mg/L	0.0500	0.00734	90.5	70-130	3.68	20
Dissolved Zinc	0.0532		0.00100	mg/L	0.0500	0.0168	72.9	70-130	4.82	20
Batch: BBA0005 - W 3010 Digest										
Blank (BBA0005-BLK1)					Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	ND		0.00100	mg/L						
Copper	ND		0.00100	mg/L						

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0005 - W 3010 Digest (Continued)										
LCS (BBA0005-BS1)					Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.0485		0.00100	mg/L	0.0500		97.1	85-115		
Copper	0.0495		0.00100	mg/L	0.0500		99.0	85-115		
Matrix Spike (BBA0005-MS1)		**Source: WAL0605-01**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.231		0.00100	mg/L	0.0500	0.182	97.4	70-130		
Copper	0.0714		0.00100	mg/L	0.0500	0.0237	95.5	70-130		
Matrix Spike (BBA0005-MS2)		**Source: WAL0676-02**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.0510		0.00100	mg/L	0.0500	0.00246	97.1	70-130		
Copper	0.0536		0.00100	mg/L	0.0500	0.00364	100	70-130		
Matrix Spike Dup (BBA0005-MSD1)		**Source: WAL0605-01**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.231		0.00100	mg/L	0.0500	0.182	96.8	70-130	0.128	20
Copper	0.0723		0.00100	mg/L	0.0500	0.0237	97.4	70-130	1.28	20
Matrix Spike Dup (BBA0005-MSD2)		**Source: WAL0676-02**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.0500		0.00100	mg/L	0.0500	0.00246	95.2	70-130	1.95	20
Copper	0.0525		0.00100	mg/L	0.0500	0.00364	97.6	70-130	2.23	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0710 - W TPH-Dx										
Blank (BAL0710-BLK1)					Prepared & Analyzed: 12/29/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*47.3*	*ppm*	*50.1*		*94.4*	*50-150*		
LCS (BAL0710-BS1)					Prepared & Analyzed: 12/29/2020					
Diesel	1.09		0.160	mg/L	1.00		109	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*47.3*	*ppm*	*50.1*		*94.4*	*50-150*		
Duplicate (BAL0710-DUP1)		**Source: WAL0676-08**			Prepared: 12/29/2020 Analyzed: 12/30/2020					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*47.1*	*ppm*	*50.1*		*94.1*	*50-150*		
Matrix Spike (BAL0710-MS1)		**Source: WAL0676-01**			Prepared: 12/29/2020 Analyzed: 12/30/2020					
Diesel	1.05		0.160	mg/L	1.00	ND	105	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0710 - W TPH-Dx (Continued)										
Matrix Spike (BAL0710-MS1)		**Source: WAL0676-01**			Prepared: 12/29/2020 Analyzed: 12/30/2020					
Surrogate: n-Hexacosane			*47.2*	*ppm*	*50.1*		*94.1*	*50-150*		
Matrix Spike Dup (BAL0710-MSD1)		**Source: WAL0676-01**			Prepared: 12/29/2020 Analyzed: 12/30/2020					
Diesel	0.931		0.160	mg/L	1.00	ND	92.7	70-130	12.2	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*38.3*	*ppm*	*50.1*		*76.5*	*50-150*		

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

WAL0675

Due: 01/11/21

Company Name:	Spokane County	Project Manager:	Ethan Murnin
Address:	1026 W. Broadway Avenue	Project Name & # :	Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260		Email Address :	EMURNIN@spokanecounty.org
Phone:	(509) 477-7420	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Around

Please refer to our ... http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal __Next Day* __2nd Day* __Other*_____

*All rush order requests must be prior approved.

__Phone __Mail __Fax x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Preservative:

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG	PSD ASTM D3977-97		
	INF12202020	12/21/20 1:00 PM	water	4		x	x	x	x		x				(3) (2)
	EFF1212202020	12/21/20 1:00 PM	water	4		x	x	x	x		x				(1) N/A
	EFF1812202020	12/21/20 1:00 PM	water	4		x	x	x	x		x				(3) (2)
	INF12202020-2	12/21/20 1:00 PM	water	1				x							(3) (2)
	EFF1212202020-2	12/21/20 1:00 PM	water	1				x							(1)
	EFF1812202020-2	12/21/20 1:00 PM	water	1				x							(3) (2)

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

SWBS

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
VOC Head Space?	Y	N

Cooler / Ice / Hand

Temperature (°C): C1 = 0.7/0.5 C2 = 0.7/0.5 C3 = 1.4/1.2 JH

Preservative: ① HCl 2003851 <2 ② ③

HNO3 2002280 <2 pH 2001015

Date & Time: 12-21-20 1720

Inspected By: N/A

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan	Kevin Flanagan	Osborn Consulting	12/21/20	2:30 PM
Received by	Kathy Sattler	Kathy Sattler	Anatek labs	12-21-2020	1430
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WAL0704
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	1/8/2021 08:46
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location: INF12212020 *Should be 12222020 - storm started early morning on 12/22*
Lab/Sample Number: WAL0704-01 Collect Date: 12/22/20 11:30
Date Received: 12/22/20 12:37 Collected By:
Matrix: Stormwater

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	12.9	mg CaCO3/L	3.00	12/22/20 13:30	ARY	SM 2340 C	
Phosphate/P	0.0305	mg/L	0.0180	12/23/20 13:51	SAG	SM 4500-P G	
Total P	0.0917	mg/L	0.00500	1/7/21 14:14	SAG	SM 4500-P H	
TSS	38.0	mg/L	1.00	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00269	mg/L	0.00100	1/5/21 13:31	TRC	EPA 200.8	
Dissolved Copper	0.00180	mg/L	0.00100	1/4/21 12:14	TRC	EPA 200.8	
Zinc	0.0118	mg/L	0.00100	1/5/21 13:31	TRC	EPA 200.8	
Dissolved Zinc	0.0114	mg/L	0.00100	1/4/21 12:14	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 15:50	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 15:50	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 15:50	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*88.3%*		*50-150*	*12/30/20 15:50*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1212212020 *Should be 12222020 - storm started early morning on 12/22*

Lab/Sample Number: WAL0704-02 Collect Date: 12/22/20 11:30

Date Received: 12/22/20 12:37 Collected By:

Matrix: Stormwater

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	107	mg CaCO3/L	12.0	12/22/20 13:30	ARY	SM 2340 C	
Phosphate/P	0.338	mg/L	0.0180	12/23/20 13:52	SAG	SM 4500-P G	
Total P	0.620	mg/L	0.0500	1/7/21 14:41	SAG	SM 4500-P H	
TSS	14.0	mg/L	1.00	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00623	mg/L	0.00100	1/5/21 13:33	TRC	EPA 200.8	
Dissolved Copper	0.00615	mg/L	0.00100	1/4/21 12:17	TRC	EPA 200.8	
Zinc	0.00476	mg/L	0.00100	1/5/21 13:33	TRC	EPA 200.8	
Dissolved Zinc	0.00927	mg/L	0.00100	1/4/21 12:17	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 16:46	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 16:46	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 16:46	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*89.4%*		*50-150*	*12/30/20 16:46*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location: EFF1812212020 *Should be 12222020 - storm started early morning on 12/22*

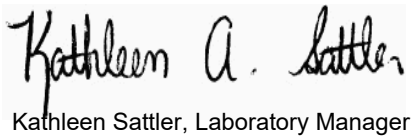
Lab/Sample Number: WAL0704-03 Collect Date: 12/22/20 11:30

Date Received: 12/22/20 12:37 Collected By:

Matrix: Stormwater

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	83.2	mg CaCO3/L	12.0	12/22/20 13:30	ARY	SM 2340 C	
Phosphate/P	0.569	mg/L	0.0180	12/23/20 13:52	SAG	SM 4500-P G	
Total P	0.779	mg/L	0.0500	1/7/21 14:43	SAG	SM 4500-P H	
TSS	19.0	mg/L	1.00	12/23/20 9:15	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00799	mg/L	0.00100	1/5/21 13:36	TRC	EPA 200.8	
Dissolved Copper	0.00929	mg/L	0.00100	1/4/21 12:19	TRC	EPA 200.8	
Zinc	0.00660	mg/L	0.00100	1/5/21 13:36	TRC	EPA 200.8	
Dissolved Zinc	0.0123	mg/L	0.00100	1/4/21 12:19	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	12/30/20 17:42	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	12/30/20 17:42	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	12/30/20 17:42	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*94.5%*		*50-150*	*12/30/20 17:42*	*ARC*	*NWTPH-Dx*	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0688 - W Wet Chem										
Blank (BAL0688-BLK1)					Prepared & Analyzed: 12/22/2020					
Hardness	ND		3.00	mg CaCO3/L						
Blank (BAL0688-BLK2)					Prepared & Analyzed: 12/22/2020					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BAL0688-BS1)					Prepared & Analyzed: 12/22/2020					
Hardness	103		3.00	mg CaCO3/L	100		103	90-110		
LCS Dup (BAL0688-BSD1)					Prepared & Analyzed: 12/22/2020					
Hardness	101		3.00	mg CaCO3/L	100		101	90-110	1.94	20
Duplicate (BAL0688-DUP1)		**Source: WAL0676-03**			Prepared & Analyzed: 12/22/2020					
Hardness	147		12.0	mg CaCO3/L		150			2.67	20
Matrix Spike (BAL0688-MS1)		**Source: WAL0676-02**			Prepared & Analyzed: 12/22/2020					
Hardness	313		12.0	mg CaCO3/L	200	111	101	80-120		
Matrix Spike Dup (BAL0688-MSD1)		**Source: WAL0676-02**			Prepared & Analyzed: 12/22/2020					
Hardness	313		12.0	mg CaCO3/L	200	111	101	80-120	0.00	20
Batch: BAL0757 - W FIA										
Blank (BAL0757-BLK1)					Prepared & Analyzed: 12/23/2020					
Phosphate/P	ND		0.0180	mg/L						
LCS (BAL0757-BS1)					Prepared & Analyzed: 12/23/2020					
Phosphate/P	0.0945		0.0180	mg/L	0.100		94.5	85-115		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0757 - W FIA (Continued)										
Matrix Spike (BAL0757-MS1)		**Source: WAL0729-02**			Prepared & Analyzed: 12/23/2020					
Phosphate/P	0.220		0.0180	mg/L	0.100	0.116	104	80-120		
Matrix Spike Dup (BAL0757-MSD1)		**Source: WAL0729-02**			Prepared & Analyzed: 12/23/2020					
Phosphate/P	0.223		0.0180	mg/L	0.100	0.116	106	80-120	1.13	20
Batch: BAL0804 - W Filtration										
Blank (BAL0804-BLK1)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK2)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK3)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
Blank (BAL0804-BLK4)					Prepared & Analyzed: 12/23/2020					
TSS	ND		1.00	mg/L						
LCS (BAL0804-BS1)					Prepared & Analyzed: 12/23/2020					
TSS	91.0			mg/L	100		91.0	90-110		
LCS (BAL0804-BS2)					Prepared & Analyzed: 12/23/2020					
TSS	97.0			mg/L	100		97.0	90-110		
LCS Dup (BAL0804-BSD1)					Prepared & Analyzed: 12/23/2020					
TSS	94.0			mg/L	100		94.0	90-110	3.24	10

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0804 - W Filtration (Continued)										
LCS Dup (BAL0804-BSD2)					Prepared & Analyzed: 12/23/2020					
TSS	98.0			mg/L	100		98.0	90-110	1.03	10
Duplicate (BAL0804-DUP1)		**Source: WAL0661-02**			Prepared & Analyzed: 12/23/2020					
TSS	9.00		1.00	mg/L		9.00			0.00	20
Duplicate (BAL0804-DUP2)		**Source: MAL0669-01**			Prepared & Analyzed: 12/23/2020					
TSS	84.0		1.00	mg/L		88.0			4.65	20
Matrix Spike (BAL0804-MS1)		**Source: MAL0634-01**			Prepared & Analyzed: 12/23/2020					
TSS	396		2.00	mg/L	100	314	82.0	80-120		
Matrix Spike (BAL0804-MS2)		**Source: MAL0646-01**			Prepared & Analyzed: 12/23/2020					
TSS	204		2.00	mg/L	100	108	96.0	80-120		
Matrix Spike Dup (BAL0804-MSD1)		**Source: MAL0634-01**			Prepared & Analyzed: 12/23/2020					
TSS	404		2.00	mg/L	100	314	90.0	80-120	2.00	20
Matrix Spike Dup (BAL0804-MSD2)		**Source: MAL0646-01**			Prepared & Analyzed: 12/23/2020					
TSS	200		2.00	mg/L	100	108	92.0	80-120	1.98	20
Batch: BBA0143 - W FIA										
Blank (BBA0143-BLK1)					Prepared & Analyzed: 1/7/2021					
Total P	ND		0.00500	mg/L						
Blank (BBA0143-BLK2)					Prepared & Analyzed: 1/7/2021					
Total P	ND		0.00500	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0143 - W FIA (Continued)										
Blank (BBA0143-BLK3)					Prepared & Analyzed: 1/7/2021					
Total P	ND		0.00500	mg/L						
LCS (BBA0143-BS1)					Prepared & Analyzed: 1/7/2021					
Total P	0.106		0.00500	mg/L	0.100		106	90-110		
LCS (BBA0143-BS2)					Prepared & Analyzed: 1/7/2021					
Total P	0.110		0.00500	mg/L	0.100		110	90-110		
Matrix Spike (BBA0143-MS1)		**Source: WAL0741-02**			Prepared & Analyzed: 1/7/2021					
Total P	0.289		0.00500	mg/L	0.100	0.197	91.9	80-120		
Matrix Spike (BBA0143-MS2)		**Source: WAL0757-02**			Prepared & Analyzed: 1/7/2021					
Total P	0.267		0.00500	mg/L	0.100	0.173	93.5	80-120		
Matrix Spike Dup (BBA0143-MSD1)		**Source: WAL0741-02**			Prepared & Analyzed: 1/7/2021					
Total P	0.306		0.00500	mg/L	0.100	0.197	109	80-120	5.78	20
Matrix Spike Dup (BBA0143-MSD2)		**Source: WAL0757-02**			Prepared & Analyzed: 1/7/2021					
Total P	0.262		0.00500	mg/L	0.100	0.173	88.8	80-120	1.78	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0811 - W 3010 Digest										
Blank (BAL0811-BLK1)					Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Copper	ND		0.00100	mg/L						
LCS (BAL0811-BS1)					Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0558		0.00100	mg/L	0.0500		112	85-115		
Dissolved Zinc	0.0548		0.00100	mg/L	0.0500		110	85-115		
Matrix Spike (BAL0811-MS1)		**Source: WAL0675-02**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0559		0.00100	mg/L	0.0500	0.00607	99.6	70-130		
Dissolved Zinc	0.0575		0.00100	mg/L	0.0500	0.0178	79.3	70-130		
Matrix Spike (BAL0811-MS2)		**Source: WAL0675-06**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Zinc	0.0559		0.00100	mg/L	0.0500	0.0168	78.1	70-130		
Dissolved Copper	0.0546		0.00100	mg/L	0.0500	0.00734	94.5	70-130		
Matrix Spike Dup (BAL0811-MSD1)		**Source: WAL0675-02**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0561		0.00100	mg/L	0.0500	0.00607	100	70-130	0.404	20
Dissolved Zinc	0.0562		0.00100	mg/L	0.0500	0.0178	76.7	70-130	2.32	20
Matrix Spike Dup (BAL0811-MSD2)		**Source: WAL0675-06**			Prepared: 12/29/2020 Analyzed: 1/4/2021					

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0811 - W 3010 Digest (Continued)										
Matrix Spike Dup (BAL0811-MSD2)		**Source: WAL0675-06**			Prepared: 12/29/2020 Analyzed: 1/4/2021					
Dissolved Copper	0.0526		0.00100	mg/L	0.0500	0.00734	90.5	70-130	3.68	20
Dissolved Zinc	0.0532		0.00100	mg/L	0.0500	0.0168	72.9	70-130	4.82	20
Batch: BBA0005 - W 3010 Digest										
Blank (BBA0005-BLK1)					Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	ND		0.00100	mg/L						
Copper	ND		0.00100	mg/L						
LCS (BBA0005-BS1)					Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.0485		0.00100	mg/L	0.0500		97.1	85-115		
Copper	0.0495		0.00100	mg/L	0.0500		99.0	85-115		
Matrix Spike (BBA0005-MS1)		**Source: WAL0605-01**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.231		0.00100	mg/L	0.0500	0.182	97.4	70-130		
Copper	0.0714		0.00100	mg/L	0.0500	0.0237	95.5	70-130		
Matrix Spike (BBA0005-MS2)		**Source: WAL0676-02**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Zinc	0.0510		0.00100	mg/L	0.0500	0.00246	97.1	70-130		
Copper	0.0536		0.00100	mg/L	0.0500	0.00364	100	70-130		
Matrix Spike Dup (BBA0005-MSD1)		**Source: WAL0605-01**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Copper	0.0723		0.00100	mg/L	0.0500	0.0237	97.4	70-130	1.28	20
Zinc	0.231		0.00100	mg/L	0.0500	0.182	96.8	70-130	0.128	20
Matrix Spike Dup (BBA0005-MSD2)		**Source: WAL0676-02**			Prepared: 1/4/2021 Analyzed: 1/5/2021					
Copper	0.0525		0.00100	mg/L	0.0500	0.00364	97.6	70-130	2.23	20
Zinc	0.0500		0.00100	mg/L	0.0500	0.00246	95.2	70-130	1.95	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0710 - W TPH-Dx										
Blank (BAL0710-BLK1)					Prepared & Analyzed: 12/29/2020					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*47.3*	*ppm*	*50.1*		*94.4*	*50-150*		
LCS (BAL0710-BS1)					Prepared & Analyzed: 12/29/2020					
Diesel	1.09		0.160	mg/L	1.00		109	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*47.3*	*ppm*	*50.1*		*94.4*	*50-150*		

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BAL0710 - W TPH-Dx (Continued)										
Duplicate (BAL0710-DUP1)		**Source: WAL0676-08**		Prepared: 12/29/2020 Analyzed: 12/30/2020						
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*47.1*	*ppm*	*50.1*		*94.1*	*50-150*		
Matrix Spike (BAL0710-MS1)		**Source: WAL0676-01**		Prepared: 12/29/2020 Analyzed: 12/30/2020						
Diesel	1.05		0.160	mg/L	1.00	ND	105	70-130		
Lube Oil	ND		0.400	mg/L		ND		70-130		
Surrogate: n-Hexacosane			*47.2*	*ppm*	*50.1*		*94.1*	*50-150*		
Matrix Spike Dup (BAL0710-MSD1)		**Source: WAL0676-01**		Prepared: 12/29/2020 Analyzed: 12/30/2020						
Diesel	0.931		0.160	mg/L	1.00	ND	92.7	70-130	12.2	20
Lube Oil	ND		0.400	mg/L		ND		70-130		20
Surrogate: n-Hexacosane			*38.3*	*ppm*	*50.1*		*76.5*	*50-150*		

WAL0704

Due: 01/11/21

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & #: Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address: EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Arou[nd]

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__Normal
__Next Day*
__2nd Day*
__Other*______

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG			
	INF12212020	12/22/20 11:30 AM	water			x	x	x	x	x	x	x			
	EFF1212212020	12/22/20 11:30 AM	water			x	x	x	x	x	x	x			
	EFF1812212020	12/22/20 11:30 AM	water			x	x	x	x	x	x	x			

Preservative:

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Sample EFF1212212020 016-001-001 w-orthoP recieved empty - Pour off from TSS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan	[signature]	Osborn Consulting	12/22	12:15
Received by	Taylor H-B	[signature]	Osborn	12/22	12:15
Relinquished by	Taylor H-B	[signature]	Osborn	12/22	12:33
Received by	Brock Gregor	[signature]	AnaTek	12/22	1237
Relinquished by					
Received by					

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	N
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~

HCl

Temperature (°C): 5.3°/5.1° IR1

Preservative: HCl 2003851 <2 H2SO4 2002883 <2 HNO3 2002280 <2

pH 201015

Date & Time: 12:45 12/22/20

Inspected By: [signature]

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

WAL0704

Due: 01/11/21

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

Company Name: Spokane County		Project Manager: Ethan Murnin	
Address: 1026 W. Broadway Avenue		Project Name & #: Gonzaga BioRetention Cell	
City: Spokane	State: WA Zip: 99260	Email Address: EMURNIN@spokanecounty.org	
Phone: (509) 477-7420		Purchase Order #:	
Fax:		Sampler Name & phone: (509)995-0557	

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__Normal
__Next Day*
__2nd Day*
__Other*______

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG			
	INF12212020	12/22/20 11:30 AM	water			X	X	X	X	X	X	X			
	EFF1212212020	12/22/20 11:30 AM	water			X	X	X	X	X	X	X			
	EFF1812212020	12/22/20 11:30 AM	water			X	X	X	X	X	X	X			

Preservative:

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Sample EFF1212212020 016-001-001 w-orthoP recieved empty - Pour off from TSS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan	Kevin Flanagan	Osborn Consulting	12/22	12:15
Received by	Taylor H-B	Taylor Hollin Ballard	Osborn	12/22	12:15
Relinquished by	Taylor H-B	Taylor Hollin Ballard	Osborn	12/22	12:33
Received by	Brock Greger	[signature]	AnaTek	12/22	1237
Relinquished by					
Received by					

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	N
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~

HCl

Temperature (°C): 5.3°/5.1° IR1

Preservative: HCl 2003851 <2
H2SO4 2002883 <2 N-HNO3 2002280 <2

PH 200105

Date & Time: ~~12:45~~ 12/22/20

Inspected By: [signature]

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Client:	Spokane County	Work Order:	WBA0053
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRentention Cell
	Spokane, WA 99260-0430	Reported:	1/12/2021 09:08
Attn:	Ethan Murnin		

Analytical Results Report

Should be 01022021

Sample Location:	INF01022020		
Lab/Sample Number:	WBA0053-01	Collect Date:	01/03/21 11:50
Date Received:	01/05/21 13:06	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	13.0	mg/L	0.333	1/8/21 12:50	BAS	SM 2540 D	

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Analytical Results Report

(Continued)

Should be 01022021

Sample Location: EFF1201022020
Lab/Sample Number: WBA0053-02 Collect Date: 01/03/21 11:50
Date Received: 01/05/21 13:06 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	3.80	mg/L	0.200	1/8/21 12:50	BAS	SM 2540 D	

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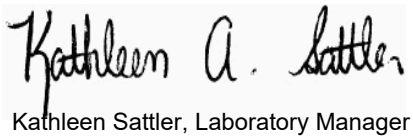
Analytical Results Report

(Continued)

Sample Location: EFF1801022020 *Should be 01022021*
Lab/Sample Number: WBA0053-03 Collect Date: 01/03/21 11:50
Date Received: 01/05/21 13:06 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	3.00	mg/L	0.200	1/8/21 12:50	BAS	SM 2540 D	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

QL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0238 - W Filtration										
Blank (BBA0238-BLK1)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0238-BLK2)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0238-BLK3)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0238-BLK4)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
LCS (BBA0238-BS1)					Prepared & Analyzed: 1/8/2021					
TSS	98.0			mg/L	100		98.0	90-110		
LCS (BBA0238-BS2)					Prepared & Analyzed: 1/8/2021					
TSS	98.0			mg/L	100		98.0	90-110		
LCS Dup (BBA0238-BSD1)					Prepared & Analyzed: 1/8/2021					
TSS	95.0			mg/L	100		95.0	90-110	3.11	10
LCS Dup (BBA0238-BSD2)					Prepared & Analyzed: 1/8/2021					
TSS	96.0			mg/L	100		96.0	90-110	2.06	10
Duplicate (BBA0238-DUP1)		**Source: MBA0152-01**			Prepared & Analyzed: 1/8/2021					
TSS	25.0		1.00	mg/L		27.0			7.69	20
Duplicate (BBA0238-DUP2)		**Source: WBA0149-01**			Prepared & Analyzed: 1/8/2021					
TSS	17.0		1.00	mg/L		17.0			0.00	20

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0238 - W Filtration (Continued)										
Matrix Spike (BBA0238-MS1)		**Source: MBA0066-02**			Prepared & Analyzed: 1/8/2021					
TSS	126		2.00	mg/L	100	27.0	99.0	80-120		
Matrix Spike (BBA0238-MS2)		**Source: WBA0051-01**			Prepared & Analyzed: 1/8/2021					
TSS	132		2.00	mg/L	100	33.0	99.0	80-120		
Matrix Spike Dup (BBA0238-MSD1)		**Source: MBA0066-02**			Prepared & Analyzed: 1/8/2021					
TSS	120		2.00	mg/L	100	27.0	93.0	80-120	4.88	20
Matrix Spike Dup (BBA0238-MSD2)		**Source: WBA0051-01**			Prepared & Analyzed: 1/8/2021					
TSS	140		2.00	mg/L	100	33.0	107	80-120	5.88	20

Anatek Labs, Inc.

Chain of Custody Record

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Anatek Log-In #

WBA0053

Due: 01/19/21

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Ar

Please refer to our normal ... http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Preservative:

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG			
	INF01022020	01/03/20 11:50 AM	water			x									
	EFF1201022020	01/03/20 11:50 AM	water			x									
	EFF1801022020	01/03/20 11:50 AM	water			x									

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Sample IDs do not match COC

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	(N)
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~

hdl @ 1i

Temperature (°C): 2.3/2.1 IR#1

Preservative:

Date & Time: 1356 1/5/21

Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	Taylor Hoffman-Ballard	Taylor Hoffman-Ballard	OCI	1/5/2021	11:30a
Received by	Kevin Flanagan	Kevin Flanagan	OCI	1/5/21	11:36am
Relinquished by	Kevin Flanagan	Kevin Flanagan	OCI	1/5/21	1:06pm
Received by	K Scott	K Scott	anatek	1/5/21	1306
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WBA0048
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRention Cell -1/5/21
	Spokane, WA 99260-0430	Reported:	1/28/2021 09:38
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location: INF01042020 *Should be 01042021*
Lab/Sample Number: WBA0048-01 Collect Date: 01/04/21 07:45
Date Received: 01/05/21 10:15 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	12.1	mg CaCO3/L	6.00	1/14/21 8:55	BAS	SM 2340 C	
Total Nitrate/Nitrite	<0.1	mg/L	0.100	1/12/21 16:40	SAG	SM 4500-NO3 F	
Phosphate/P	0.0384	mg/L	0.0180	1/5/21 14:21	SAG	SM 4500-P G	
TKN	<0.5	mg/L	0.500	1/14/21 17:01	SAG	SM 4500-Norg C	
Total Nitrogen	ND	mg/L	0.600	1/14/21 17:01	SAG	Calculation	*
Total P	0.0539	mg/L	0.00500	1/11/21 17:05	SAG	SM 4500-P H	
TSS	50.0	mg/L	1.00	1/8/21 12:50	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00213	mg/L	0.00100	1/20/21 13:44	Metals	EPA 200.8	
Dissolved Copper	0.00124	mg/L	0.00100	1/20/21 13:41	TRC	EPA 200.8	
Iron	0.496	mg/L	0.0100	1/11/21 13:36	TRC	EPA 200.8	
Dissolved Iron	0.0172	mg/L	0.0100	1/15/21 12:19	TRC	EPA 200.8	
Zinc	0.0147	mg/L	0.00100	1/11/21 13:36	TRC	EPA 200.8	
Dissolved Zinc	0.00540	mg/L	0.00100	1/15/21 12:19	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/8/21 23:09	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/8/21 23:09	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/8/21 23:09	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.3%*		*50-150*	*1/8/21 23:09*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Should be 01042021

Sample Location: EFF1201042020
Lab/Sample Number: WBA0048-02 Collect Date: 01/04/21 07:45
Date Received: 01/05/21 10:15 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	18.2	mg CaCO3/L	6.00	1/14/21 8:55	BAS	SM 2340 C	
Total Nitrate/Nitrite	<0.1	mg/L	0.100	1/12/21 16:44	SAG	SM 4500-NO3 F	
Phosphate/P	0.348	mg/L	0.0180	1/5/21 14:21	SAG	SM 4500-P G	
TKN	<0.5	mg/L	0.500	1/14/21 17:09	SAG	SM 4500-Norg C	
Total Nitrogen	ND	mg/L	0.600	1/14/21 17:09	SAG	Calculation	*
Total P	0.542	mg/L	0.0250	1/11/21 17:21	SAG	SM 4500-P H	
TSS	5.40	mg/L	0.200	1/8/21 12:50	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00475	mg/L	0.00100	1/11/21 13:48	TRC	EPA 200.8	
Dissolved Copper	0.00395	mg/L	0.00100	1/15/21 12:22	TRC	EPA 200.8	
Iron	0.818	mg/L	0.0100	1/11/21 13:48	TRC	EPA 200.8	
Dissolved Iron	0.105	mg/L	0.0100	1/15/21 12:22	TRC	EPA 200.8	
Zinc	0.00368	mg/L	0.00100	1/11/21 13:48	TRC	EPA 200.8	
Dissolved Zinc	0.00224	mg/L	0.00100	1/15/21 12:22	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/9/21 0:58	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/9/21 0:58	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/9/21 0:58	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*93.2%*		*50-150*	*1/9/21 0:58*	*ARC*	*NWTPH-Dx*	

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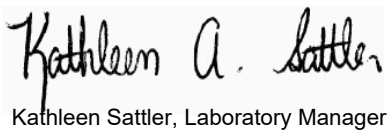
Analytical Results Report

(Continued)

Sample Location: EFF1801042020 *Should be 01042021*
Lab/Sample Number: WBA0048-03 Collect Date: 01/04/21 07:45
Date Received: 01/05/21 10:15 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	28.3	mg CaCO3/L	3.00	1/14/21 8:55	BAS	SM 2340 C	
Total Nitrate/Nitrite	<0.1	mg/L	0.100	1/12/21 16:45	SAG	SM 4500-NO3 F	
Phosphate/P	0.515	mg/L	0.0180	1/5/21 14:22	SAG	SM 4500-P G	
TKN	<0.5	mg/L	0.500	1/14/21 17:12	SAG	SM 4500-Norg C	
Total Nitrogen	ND	mg/L	0.600	1/14/21 17:12	SAG	Calculation	*
Total P	0.831	mg/L	0.0250	1/11/21 17:23	SAG	SM 4500-P H	
TSS	3.40	mg/L	0.200	1/8/21 12:50	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00564	mg/L	0.00100	1/11/21 13:50	TRC	EPA 200.8	
Dissolved Copper	0.00542	mg/L	0.00100	1/15/21 12:26	TRC	EPA 200.8	
Iron	0.616	mg/L	0.0100	1/11/21 13:50	TRC	EPA 200.8	
Dissolved Iron	0.180	mg/L	0.0100	1/15/21 12:26	TRC	EPA 200.8	
Zinc	0.00434	mg/L	0.00100	1/11/21 13:50	TRC	EPA 200.8	
Dissolved Zinc	0.0116	mg/L	0.00100	1/15/21 12:26	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/9/21 1:52	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/9/21 1:52	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/9/21 1:52	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.6%*		*50-150*	*1/9/21 1:52*	*ARC*	*NWTPH-Dx*	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0071 - W FIA										
Blank (BBA0071-BLK1)					Prepared & Analyzed: 1/5/2021					
Phosphate/P	ND		0.0180	mg/L						
LCS (BBA0071-BS1)					Prepared & Analyzed: 1/5/2021					
Phosphate/P	0.103		0.0180	mg/L	0.100		103	85-115		
Matrix Spike (BBA0071-MS1)		**Source: WBA0014-02**			Prepared & Analyzed: 1/5/2021					
Phosphate/P	0.610		0.0180	mg/L	0.100	0.513	97.5	80-120		
Matrix Spike Dup (BBA0071-MSD1)		**Source: WBA0014-02**			Prepared & Analyzed: 1/5/2021					
Phosphate/P	0.613		0.0180	mg/L	0.100	0.513	100	80-120	0.474	20
Batch: BBA0238 - W Filtration										
Blank (BBA0238-BLK1)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0238-BLK2)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0238-BLK3)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0238-BLK4)					Prepared & Analyzed: 1/8/2021					
TSS	ND		1.00	mg/L						
LCS (BBA0238-BS1)					Prepared & Analyzed: 1/8/2021					
TSS	98.0			mg/L	100		98.0	90-110		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0238 - W Filtration (Continued)										
LCS (BBA0238-BS2)					Prepared & Analyzed: 1/8/2021					
TSS	98.0			mg/L	100		98.0	90-110		
LCS Dup (BBA0238-BSD1)					Prepared & Analyzed: 1/8/2021					
TSS	95.0			mg/L	100		95.0	90-110	3.11	10
LCS Dup (BBA0238-BSD2)					Prepared & Analyzed: 1/8/2021					
TSS	96.0			mg/L	100		96.0	90-110	2.06	10
Duplicate (BBA0238-DUP1)			**Source: MBA0152-01**		Prepared & Analyzed: 1/8/2021					
TSS	25.0		1.00	mg/L		27.0			7.69	20
Duplicate (BBA0238-DUP2)			**Source: WBA0149-01**		Prepared & Analyzed: 1/8/2021					
TSS	17.0		1.00	mg/L		17.0			0.00	20
Matrix Spike (BBA0238-MS1)			**Source: MBA0066-02**		Prepared & Analyzed: 1/8/2021					
TSS	126		2.00	mg/L	100	27.0	99.0	80-120		
Matrix Spike (BBA0238-MS2)			**Source: WBA0051-01**		Prepared & Analyzed: 1/8/2021					
TSS	132		2.00	mg/L	100	33.0	99.0	80-120		
Matrix Spike Dup (BBA0238-MSD1)			**Source: MBA0066-02**		Prepared & Analyzed: 1/8/2021					
TSS	120		2.00	mg/L	100	27.0	93.0	80-120	4.88	20
Matrix Spike Dup (BBA0238-MSD2)			**Source: WBA0051-01**		Prepared & Analyzed: 1/8/2021					
TSS	140		2.00	mg/L	100	33.0	107	80-120	5.88	20
Batch: BBA0244 - W FIA										
Blank (BBA0244-BLK1)					Prepared & Analyzed: 1/11/2021					
Total P	ND		0.00500	mg/L						

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Quality Control Data

(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0244 - W FIA (Continued)										
Blank (BBA0244-BLK2)					Prepared & Analyzed: 1/11/2021					
Total P	ND		0.00500	mg/L						
LCS (BBA0244-BS1)					Prepared & Analyzed: 1/11/2021					
Total P	0.0901		0.00500	mg/L	0.100		90.1	90-110		
Matrix Spike (BBA0244-MS1)		**Source: WBA0159-02**			Prepared & Analyzed: 1/11/2021					
Total P	0.351		0.0100	mg/L	0.100	0.232	120	80-120		
Matrix Spike Dup (BBA0244-MSD1)		**Source: WBA0159-02**			Prepared & Analyzed: 1/11/2021					
Total P	0.352		0.0100	mg/L	0.100	0.232	120	80-120	0.171	20
Batch: BBA0271 - W FIA										
Blank (BBA0271-BLK1)					Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	ND		0.100	mg/L						
Blank (BBA0271-BLK2)					Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	ND		0.100	mg/L						
Blank (BBA0271-BLK3)					Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	ND		0.100	mg/L						
LCS (BBA0271-BS1)					Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	0.219		0.100	mg/L	0.201		109	90-110		
LCS (BBA0271-BS2)					Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	0.209		0.100	mg/L	0.201		104	90-110		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0271 - W FIA (Continued)										
Matrix Spike (BBA0271-MS1)		**Source: WBA0017-01**			Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	0.366		0.100	mg/L	0.201	0.193	85.8	80-120		
Matrix Spike (BBA0271-MS2)		**Source: WBA0109-01**			Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	1.03		0.100	mg/L	0.201	0.830	101	80-120		
Matrix Spike Dup (BBA0271-MSD1)		**Source: WBA0017-01**			Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	0.354		0.100	mg/L	0.201	0.193	80.0	80-120	3.28	20
Matrix Spike Dup (BBA0271-MSD2)		**Source: WBA0109-01**			Prepared & Analyzed: 1/12/2021					
Total Nitrate/Nitrite	1.03		0.100	mg/L	0.201	0.830	101	80-120	0.0194	20
Batch: BBA0294 - W Wet Chem										
Blank (BBA0294-BLK1)					Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BBA0294-BS1)					Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	103			mg CaCO3/L	100		103	90-110		
LCS Dup (BBA0294-BSD1)					Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	102			mg CaCO3/L	100		102	90-110	0.985	20
Duplicate (BBA0294-DUP1)		**Source: WBA0341-01**			Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	4.04		6.00	mg CaCO3/L		4.04			0.00	20
Matrix Spike (BBA0294-MS1)		**Source: WBA0136-01**			Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	283		6.00	mg CaCO3/L	100	181	102	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0294 - W Wet Chem (Continued)										
Matrix Spike Dup (BBA0294-MSD1)		**Source: WBA0136-01**			Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	285		6.00	mg CaCO3/L	100	181	104	80-120	0.712	20
Batch: BBA0356 - W FIA										
Blank (BBA0356-BLK1)					Prepared & Analyzed: 1/14/2021					
TKN	ND		0.500	mg/L						
Blank (BBA0356-BLK2)					Prepared: 1/14/2021 Analyzed: 1/15/2021					
TKN	ND		0.500	mg/L						
Blank (BBA0356-BLK3)					Prepared: 1/14/2021 Analyzed: 1/15/2021					
TKN	ND		0.500	mg/L						
LCS (BBA0356-BS1)					Prepared & Analyzed: 1/14/2021					
TKN	2.29		0.500	mg/L	2.00		114	85-115		
LCS (BBA0356-BS2)					Prepared: 1/14/2021 Analyzed: 1/15/2021					
TKN	2.12		0.500	mg/L	2.00		106	85-115		
Matrix Spike (BBA0356-MS1)		**Source: WBA0048-02**			Prepared & Analyzed: 1/14/2021					
TKN	1.71		0.500	mg/L	2.00	<0.5	85.7	80-120		
Matrix Spike Dup (BBA0356-MSD1)		**Source: WBA0048-02**			Prepared & Analyzed: 1/14/2021					
TKN	1.70		0.500	mg/L	2.00	<0.5	85.0	80-120	0.890	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0114 - W 3010 Digest										
Blank (BBA0114-BLK1)					Prepared: 1/7/2021 Analyzed: 1/11/2021					
Iron	ND		0.0100	mg/L						
Zinc	ND		0.00100	mg/L						
Copper	ND		0.00100	mg/L						
LCS (BBA0114-BS1)					Prepared: 1/7/2021 Analyzed: 1/11/2021					
Copper	0.0522		0.00100	mg/L	0.0500		104	85-115		
Iron	0.109		0.0100	mg/L	0.100		109	85-115		
Zinc	0.0497		0.00100	mg/L	0.0500		99.5	85-115		
Matrix Spike (BBA0114-MS1)		**Source: WAL0744-01**			Prepared: 1/7/2021 Analyzed: 1/11/2021					
Iron	1.03		0.0100	mg/L	0.100	0.952	80.9	70-130		
Zinc	0.0663		0.00100	mg/L	0.0500	0.0158	101	70-130		
Copper	0.0521		0.00100	mg/L	0.0500	0.000584	103	70-130		
Matrix Spike (BBA0114-MS2)		**Source: WAL0744-06**			Prepared: 1/7/2021 Analyzed: 1/11/2021					
Zinc	0.0733		0.00100	mg/L	0.0500	0.0240	98.6	70-130		
Iron	0.112		0.0100	mg/L	0.100	0.00955	102	70-130		
Copper	0.0504		0.00100	mg/L	0.0500	0.000528	99.6	70-130		
Matrix Spike Dup (BBA0114-MSD1)		**Source: WAL0744-01**			Prepared: 1/7/2021 Analyzed: 1/11/2021					

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Quality Control Data
(Continued)

Metals by ICP-MS (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0114 - W 3010 Digest (Continued)										
Matrix Spike Dup (BBA0114-MSD1)		**Source: WAL0744-01**			Prepared: 1/7/2021 Analyzed: 1/11/2021					
Iron	1.07		0.0100	mg/L	0.100	0.952	120	70-130	3.74	20
Zinc	0.0644		0.00100	mg/L	0.0500	0.0158	97.2	70-130	2.96	20
Copper	0.0504		0.00100	mg/L	0.0500	0.000584	99.6	70-130	3.35	20
Matrix Spike Dup (BBA0114-MSD2)		**Source: WAL0744-06**			Prepared: 1/7/2021 Analyzed: 1/11/2021					
Copper	0.0470		0.00100	mg/L	0.0500	0.000528	93.0	70-130	6.79	20
Zinc	0.0696		0.00100	mg/L	0.0500	0.0240	91.2	70-130	5.22	20
Iron	0.109		0.0100	mg/L	0.100	0.00955	99.2	70-130	2.76	20
Batch: BBA0322 - W 3010 Digest										
Blank (BBA0322-BLK1)					Prepared: 1/14/2021 Analyzed: 1/15/2021					
Dissolved Copper	ND		0.00100	mg/L						
Dissolved Zinc	ND		0.00100	mg/L						
Dissolved Iron	ND		0.0100	mg/L						
LCS (BBA0322-BS1)					Prepared: 1/14/2021 Analyzed: 1/15/2021					
Dissolved Iron	0.107		0.0100	mg/L	0.100		107	85-115		
Dissolved Zinc	0.0486		0.00100	mg/L	0.0500		97.3	85-115		
Dissolved Copper	0.0510		0.00100	mg/L	0.0500		102	85-115		
Matrix Spike (BBA0322-MS1)		**Source: WBA0048-03**			Prepared: 1/14/2021 Analyzed: 1/15/2021					
Dissolved Zinc	0.254		0.00500	mg/L	0.250	0.0116	96.8	70-130		
Dissolved Iron	0.712		0.0500	mg/L	0.500	0.180	106	70-130		
Dissolved Copper	0.269		0.00500	mg/L	0.250	0.00542	106	70-130		
Matrix Spike Dup (BBA0322-MSD1)		**Source: WBA0048-03**			Prepared: 1/14/2021 Analyzed: 1/15/2021					
Dissolved Zinc	0.261		0.00500	mg/L	0.250	0.0116	99.7	70-130	2.82	20
Dissolved Copper	0.279		0.00500	mg/L	0.250	0.00542	109	70-130	3.49	20
Dissolved Iron	0.725		0.0500	mg/L	0.500	0.180	109	70-130	1.85	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0116 - W TPH-Dx										
Blank (BBA0116-BLK1)					Prepared & Analyzed: 1/8/2021					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*48.1*	*ppm*	*50.1*		*96.1*	*50-150*		
LCS (BBA0116-BS1)					Prepared & Analyzed: 1/8/2021					
Diesel	1.06		0.160	mg/L	1.00		105	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*47.9*	*ppm*	*50.1*		*95.6*	*50-150*		
Duplicate (BBA0116-DUP1)		**Source: WBA0048-01**			Prepared: 1/8/2021 Analyzed: 1/9/2021					
Diesel	ND		0.160	mg/L		ND				20

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Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0116 - W TPH-Dx (Continued)										
Duplicate (BBA0116-DUP1)		**Source: WBA0048-01**			Prepared: 1/8/2021 Analyzed: 1/9/2021					
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*46.8*	*ppm*	*50.1*		*93.3*	*50-150*		
Matrix Spike (BBA0116-MS1)		**Source: WBA0063-01**			Prepared: 1/8/2021 Analyzed: 1/9/2021					
Diesel	1.01		0.160	mg/L	1.00		101	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*48.9*	*ppm*	*50.1*		*97.7*	*50-150*		
Matrix Spike Dup (BBA0116-MSD1)		**Source: WBA0063-01**			Prepared: 1/8/2021 Analyzed: 1/9/2021					
Diesel	1.10		0.160	mg/L	1.00		110	70-130	8.82	20
Lube Oil	ND		0.400	mg/L				70-130		20
Surrogate: n-Hexacosane			*48.4*	*ppm*	*50.1*		*96.6*	*50-150*		

WBA0048

Due: 01/19/21

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Chain of Custody Record

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Anatek Log-In #

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & #: Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address: EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn Ar[ound]

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*______

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG			
	INF01042020	01/04/20 7:45 AM	water			X	X	X	X		X	X			
	EFF1201042020	01/04/20 7:45 AM	water			X	X	X	X		X	X			
	EFF1801042020	01/04/20 7:45 AM	water			X	X	X	X		X	X			

Preservative:

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

GWKS

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan	[signature]	Osborn Consulting	1/5/20	10:15
Received by	Breck Greger	[signature]	Anatek	1-5-20	10:15
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact? (Y) N
Labels & Chains Agree? Y N
Containers Sealed? (Y) N
VOC Head Space? ~~Y N~~ NA

Temperature (°C): 5.3°/5.1° IR1
Preservative: H2SO4 20028B3L2
PH 2001015 20038S1L2
Date & Time: 11:25 1/5/21
Inspected By: [signature]

M-HNO3 2002280

Form COC01.00 - Eff 1 Mar 2015

Page 1 of 1

Samples submitted to Anatek Labs may be subcontracted to other accredited labs if necessary. This message serves as notice of this possibility. Sub-contracted analyses will be clearly noted on the analytical report.

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Client:	Spokane County	Work Order:	WBA0198
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRetention Cell
	Spokane, WA 99260-0430	Reported:	1/18/2021 09:51
Attn:	Ethan Murnin		

Analytical Results Report

Should be 01062021

Sample Location:	INF01062020		
Lab/Sample Number:	WBA0198-01	Collect Date:	01/07/21 09:15
Date Received:	01/07/21 16:00	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	11.0	mg/L	0.500	1/11/21 10:10	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00234	mg/L	0.00100	1/15/21 13:10	TRC	EPA 200.8	
Zinc	0.0127	mg/L	0.00100	1/15/21 13:10	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/9/21 7:20	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/9/21 7:20	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/9/21 7:20	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*84.7%*		*50-150*	*1/9/21 7:20*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Should be 01062021

Sample Location: EFF1201062020
Lab/Sample Number: WBA0198-02 Collect Date: 01/07/21 09:15
Date Received: 01/07/21 16:00 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	4.33	mg/L	0.333	1/11/21 10:10	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00580	mg/L	0.00100	1/15/21 13:13	TRC	EPA 200.8	
Zinc	0.00569	mg/L	0.00100	1/15/21 13:13	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/9/21 8:15	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/9/21 8:15	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/9/21 8:15	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*86.1%*		*50-150*	*1/9/21 8:15*	*ARC*	*NWTPH-Dx*	

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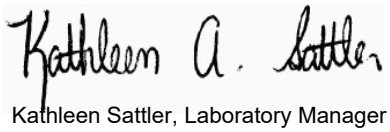
Analytical Results Report

(Continued)

Sample Location: EFF1801062020 *Should be 01062021*
Lab/Sample Number: WBA0198-03 Collect Date: 01/07/21 09:15
Date Received: 01/07/21 16:00 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
TSS	2.75	mg/L	0.250	1/11/21 10:10	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00633	mg/L	0.00100	1/15/21 13:16	TRC	EPA 200.8	
Zinc	0.00545	mg/L	0.00100	1/15/21 13:16	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/9/21 9:10	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/9/21 9:10	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/9/21 9:10	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*89.4%*		*50-150*	*1/9/21 9:10*	*ARC*	*NWTPH-Dx*	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0351 - W Filtration										
Blank (BBA0351-BLK1)					Prepared & Analyzed: 1/11/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0351-BLK2)					Prepared & Analyzed: 1/11/2021					
TSS	ND		1.00	mg/L						
LCS (BBA0351-BS1)					Prepared & Analyzed: 1/11/2021					
TSS	101			mg/L	100		101	90-110		
LCS Dup (BBA0351-BSD1)					Prepared & Analyzed: 1/11/2021					
TSS	93.0			mg/L	100		93.0	90-110	8.25	10
Duplicate (BBA0351-DUP1)		**Source: WBA0184-01**			Prepared & Analyzed: 1/11/2021					
TSS	52.0		1.00	mg/L		55.0			5.61	20
Matrix Spike (BBA0351-MS1)		**Source: WBA0184-02**			Prepared & Analyzed: 1/11/2021					
TSS	128		2.00	mg/L	100	48.0	80.0	80-120		
Matrix Spike Dup (BBA0351-MSD1)		**Source: WBA0184-02**			Prepared & Analyzed: 1/11/2021					
TSS	140		2.00	mg/L	100	48.0	92.0	80-120	8.96	20

Quality Control Data

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0321 - W 3010 Digest										
Blank (BBA0321-BLK1)					Prepared: 1/14/2021 Analyzed: 1/15/2021					
Copper	ND		0.00100	mg/L						
Zinc	ND		0.00100	mg/L						
LCS (BBA0321-BS1)					Prepared: 1/14/2021 Analyzed: 1/15/2021					
Copper	0.0510		0.00100	mg/L	0.0500		102	85-115		
Zinc	0.0483		0.00100	mg/L	0.0500		96.6	85-115		
Matrix Spike (BBA0321-MS1)		**Source: WBA0105-01**			Prepared: 1/14/2021 Analyzed: 1/15/2021					
Zinc	0.159		0.00100	mg/L	0.0500	0.110	98.3	70-130		
Copper	0.185		0.00100	mg/L	0.0500	0.133	104	70-130		
Matrix Spike (BBA0321-MS2)		**Source: WBA0216-01**			Prepared: 1/14/2021 Analyzed: 1/15/2021					
Zinc	0.124		0.00100	mg/L	0.0500	0.0758	96.5	70-130		
Copper	0.0898		0.00100	mg/L	0.0500	0.0395	101	70-130		
Matrix Spike Dup (BBA0321-MSD1)		**Source: WBA0105-01**			Prepared: 1/14/2021 Analyzed: 1/15/2021					
Copper	0.182		0.00100	mg/L	0.0500	0.133	99.6	70-130	1.34	20
Zinc	0.156		0.00100	mg/L	0.0500	0.110	92.6	70-130	1.81	20
Matrix Spike Dup (BBA0321-MSD2)		**Source: WBA0216-01**			Prepared: 1/14/2021 Analyzed: 1/15/2021					
Copper	0.0909		0.00100	mg/L	0.0500	0.0395	103	70-130	1.20	20
Zinc	0.125		0.00100	mg/L	0.0500	0.0758	99.1	70-130	1.07	20

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Quality Control Data

(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0116 - W TPH-Dx										
Blank (BBA0116-BLK1)					Prepared & Analyzed: 1/8/2021					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*48.1*	*ppm*	*50.1*		*96.1*	*50-150*		
LCS (BBA0116-BS1)					Prepared & Analyzed: 1/8/2021					
Diesel	1.06		0.160	mg/L	1.00		105	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*47.9*	*ppm*	*50.1*		*95.6*	*50-150*		
Duplicate (BBA0116-DUP1)		**Source: WBA0048-01**			Prepared: 1/8/2021 Analyzed: 1/9/2021					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*46.8*	*ppm*	*50.1*		*93.3*	*50-150*		
Matrix Spike (BBA0116-MS1)		**Source: WBA0063-01**			Prepared: 1/8/2021 Analyzed: 1/9/2021					
Diesel	1.01		0.160	mg/L	1.00		101	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*48.9*	*ppm*	*50.1*		*97.7*	*50-150*		
Matrix Spike Dup (BBA0116-MSD1)		**Source: WBA0063-01**			Prepared: 1/8/2021 Analyzed: 1/9/2021					
Diesel	1.10		0.160	mg/L	1.00		110	70-130	8.82	20
Lube Oil	ND		0.400	mg/L				70-130		20
Surrogate: n-Hexacosane			*48.4*	*ppm*	*50.1*		*96.6*	*50-150*		

WBA0198

Due: 01/22/21

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Chain of Custody Record

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Anatek Log-In #

Company Name:	Spokane County	Project Manager:	Ethan Murnin
Address:	1026 W. Broadway Avenue	Project Name & # :	Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260		Email Address :	EMURNIN@spokanecounty.org
Phone:	(509) 477-7420	Purchase Order #:	
Fax:		Sampler Name & phone:	(509)995-0557

Turn Around

Please refer to our normal turn around times at:
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG
	INF01062020	01/07/20 9:15 AM	water	3		x	x				x	
	EFF1201062020	01/07/20 9:15 AM	water	3		x	x				x	
	EFF1801062020	01/07/20 9:15 AM	water	3		x	x				x	

Preservative:

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	(N)
Containers Sealed?	(Y)	N
VOC Head Space?	Y	N

hd 1/8/21

Temperature (°C): 0.4/0.2° IR#1

Preservative: M-HNO3 200228062

HCl200385162 PH200015

Date & Time: 1618 1/7/21

Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	Kevin Flanagan		OCI	1/7/21	3:00
Received by	KScott		Anatek	1/7/21	1500
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

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Client:	Spokane County	Work Order:	WBA0341
Address:	1026 W. Broadway Ave.	Project:	Gonzaga BioRentention Cell
	Spokane, WA 99260-0430	Reported:	1/26/2021 07:59
Attn:	Ethan Murnin		

Analytical Results Report

Sample Location:	INF01122021		
Lab/Sample Number:	WBA0341-01	Collect Date:	01/13/21 08:00
Date Received:	01/13/21 10:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	ND	mg CaCO3/L	6.00	1/14/21 8:55	BAS	SM 2340 C	
Phosphate/P	0.0491	mg/L	0.0180	1/14/21 10:16	SAG	SM 4500-P G	
Total P	5.75	mg/L	0.200	1/25/21 15:47	SAG	SM 4500-P H	
TSS	18.0	mg/L	0.333	1/15/21 13:16	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00211	mg/L	0.00100	1/20/21 14:00	TRC	EPA 200.8	
Zinc	0.0143	mg/L	0.00100	1/20/21 14:00	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/21/21 13:21	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/21/21 13:21	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/21/21 13:21	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*72.1%*		*50-150*	*1/21/21 13:21*	*ARC*	*NWTPH-Dx*	

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Analytical Results Report

(Continued)

Sample Location:	EFF1201122021		
Lab/Sample Number:	WBA0341-02	Collect Date:	01/13/21 08:00
Date Received:	01/13/21 10:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	34.3	mg CaCO3/L	6.00	1/14/21 8:55	BAS	SM 2340 C	
Phosphate/P	0.362	mg/L	0.0180	1/14/21 10:17	SAG	SM 4500-P G	
Total P	0.506	mg/L	0.0250	1/25/21 15:47	SAG	SM 4500-P H	
TSS	2.80	mg/L	0.200	1/15/21 13:16	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00341	mg/L	0.00100	1/20/21 14:09	TRC	EPA 200.8	
Zinc	0.00271	mg/L	0.00100	1/20/21 14:09	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/21/21 15:12	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/21/21 15:12	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/21/21 15:12	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*81.9%*		*50-150*	*1/21/21 15:12*	*ARC*	*NWTPH-Dx*	

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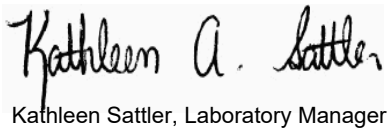
Analytical Results Report

(Continued)

Sample Location:	EFF1801122021		
Lab/Sample Number:	WBA0341-03	Collect Date:	01/13/21 08:00
Date Received:	01/13/21 10:30	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Inorganics							
Hardness	44.4	mg CaCO3/L	6.00	1/14/21 8:55	BAS	SM 2340 C	
Phosphate/P	0.503	mg/L	0.0180	1/14/21 10:18	SAG	SM 4500-P G	
Total P	0.701	mg/L	0.0250	1/25/21 15:47	SAG	SM 4500-P H	
TSS	2.33	mg/L	0.167	1/15/21 13:16	BAS	SM 2540 D	
Metals by ICP-MS							
Copper	0.00416	mg/L	0.00100	1/20/21 14:12	TRC	EPA 200.8	
Zinc	0.00367	mg/L	0.00100	1/20/21 14:12	TRC	EPA 200.8	
Hydrocarbons							
Diesel	ND	mg/L	0.160	1/21/21 16:07	ARC	NWTPH-Dx	
Lube Oil	ND	mg/L	0.400	1/21/21 16:07	ARC	NWTPH-Dx	
Mineral Oil	ND	mg/L	0.160	1/21/21 16:07	ARC	NWTPH-Dx	
Surrogate: n-Hexacosane	*92.3%*		*50-150*	*1/21/21 16:07*	*ARC*	*NWTPH-Dx*	

Authorized Signature,



Kathleen Sattler, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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Certifications

Code	Description	Facility	Number
W WA DOE	Washington Department of Ecology	Anatek-Spokane, WA	C585

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Quality Control Data

Inorganics

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0294 - W Wet Chem										
Blank (BBA0294-BLK1)					Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	ND		3.00	mg CaCO3/L						
LCS (BBA0294-BS1)					Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	103			mg CaCO3/L	100		103	90-110		
LCS Dup (BBA0294-BSD1)					Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	102			mg CaCO3/L	100		102	90-110	0.985	20
Duplicate (BBA0294-DUP1)		**Source: WBA0341-01**			Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	4.04		6.00	mg CaCO3/L		4.04			0.00	20
Matrix Spike (BBA0294-MS1)		**Source: WBA0136-01**			Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	283		6.00	mg CaCO3/L	100	181	102	80-120		
Matrix Spike Dup (BBA0294-MSD1)		**Source: WBA0136-01**			Prepared: 1/13/2021 Analyzed: 1/14/2021					
Hardness	285		6.00	mg CaCO3/L	100	181	104	80-120	0.712	20
Batch: BBA0334 - W FIA										
Blank (BBA0334-BLK1)					Prepared & Analyzed: 1/14/2021					
Phosphate/P	ND		0.0180	mg/L						
LCS (BBA0334-BS1)					Prepared & Analyzed: 1/14/2021					
Phosphate/P	0.110		0.0180	mg/L	0.100		110	85-115		
Matrix Spike (BBA0334-MS1)		**Source: WBA0346-02**			Prepared & Analyzed: 1/14/2021					
Phosphate/P	0.391		0.0180	mg/L	0.100	0.284	107	80-120		

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0334 - W FIA (Continued)										
Matrix Spike Dup (BBA0334-MSD1)	**Source: WBA0346-02**				Prepared & Analyzed: 1/14/2021					
Phosphate/P	0.375		0.0180	mg/L	0.100	0.284	91.1	80-120	4.20	20
Batch: BBA0432 - W Filtration										
Blank (BBA0432-BLK1)					Prepared & Analyzed: 1/15/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0432-BLK2)					Prepared & Analyzed: 1/15/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0432-BLK3)					Prepared & Analyzed: 1/15/2021					
TSS	ND		1.00	mg/L						
Blank (BBA0432-BLK4)					Prepared & Analyzed: 1/15/2021					
TSS	ND		1.00	mg/L						
LCS (BBA0432-BS1)					Prepared & Analyzed: 1/15/2021					
TSS	95.0			mg/L	100		95.0	90-110		
LCS (BBA0432-BS2)					Prepared & Analyzed: 1/15/2021					
TSS	91.0			mg/L	100		91.0	90-110		
LCS Dup (BBA0432-BSD1)					Prepared & Analyzed: 1/15/2021					
TSS	96.0			mg/L	100		96.0	90-110	1.05	10
LCS Dup (BBA0432-BSD2)					Prepared & Analyzed: 1/15/2021					
TSS	95.0			mg/L	100		95.0	90-110	4.30	10

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0432 - W Filtration (Continued)										
Duplicate (BBA0432-DUP1)			**Source: MBA0224-02**		Prepared & Analyzed: 1/15/2021					
TSS	43.0		1.00	mg/L		45.0			4.55	20
Duplicate (BBA0432-DUP2)			**Source: WBA0281-01**		Prepared & Analyzed: 1/15/2021					
TSS	7.00		1.00	mg/L		8.00			13.3	20
Matrix Spike (BBA0432-MS1)			**Source: MBA0189-01**		Prepared & Analyzed: 1/15/2021					
TSS	226		2.00	mg/L	100	132	94.0	80-120		
Matrix Spike (BBA0432-MS2)			**Source: WBA0286-01**		Prepared & Analyzed: 1/15/2021					
TSS	132		2.00	mg/L	100	43.0	89.0	80-120		
Matrix Spike Dup (BBA0432-MSD1)			**Source: MBA0189-01**		Prepared & Analyzed: 1/15/2021					
TSS	234		2.00	mg/L	100	132	102	80-120	3.48	20
Matrix Spike Dup (BBA0432-MSD2)			**Source: WBA0286-01**		Prepared & Analyzed: 1/15/2021					
TSS	126		2.00	mg/L	100	43.0	83.0	80-120	4.65	20
Batch: BBA0632 - W FIA										
Blank (BBA0632-BLK1)					Prepared & Analyzed: 1/25/2021					
Total P	ND		0.00500	mg/L						
Blank (BBA0632-BLK2)					Prepared & Analyzed: 1/25/2021					
Total P	ND		0.00500	mg/L						
Blank (BBA0632-BLK3)					Prepared & Analyzed: 1/25/2021					
Total P	ND		0.00500	mg/L						

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Quality Control Data
(Continued)

Inorganics (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0632 - W FIA (Continued)										
LCS (BBA0632-BS1)					Prepared & Analyzed: 1/25/2021					
Total P	0.110		0.00500	mg/L	0.100		110	90-110		
LCS (BBA0632-BS2)					Prepared & Analyzed: 1/25/2021					
Total P	0.109		0.00500	mg/L	0.100		109	90-110		
Matrix Spike (BBA0632-MS1)		**Source: WBA0429-02**			Prepared & Analyzed: 1/25/2021					
Total P	0.365		0.0100	mg/L	0.100	0.251	114	80-120		
Matrix Spike (BBA0632-MS2)		**Source: WBA0601-02**			Prepared & Analyzed: 1/25/2021					
Total P	0.358		0.0100	mg/L	0.100	0.239	118	80-120		
Matrix Spike Dup (BBA0632-MSD1)		**Source: WBA0429-02**			Prepared & Analyzed: 1/25/2021					
Total P	0.365		0.0100	mg/L	0.100	0.251	114	80-120	0.164	20
Matrix Spike Dup (BBA0632-MSD2)		**Source: WBA0601-02**			Prepared & Analyzed: 1/25/2021					
Total P	0.358		0.0100	mg/L	0.100	0.239	118	80-120	0.00	20

Quality Control Data
(Continued)

Metals by ICP-MS

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0459 - W 3010 Digest										
Blank (BBA0459-BLK1)					Prepared: 1/19/2021 Analyzed: 1/20/2021					
Zinc	ND		0.00100	mg/L						
Copper	ND		0.00100	mg/L						
LCS (BBA0459-BS1)					Prepared: 1/19/2021 Analyzed: 1/20/2021					
Copper	0.0495		0.00100	mg/L	0.0500		99.0	85-115		
Zinc	0.0480		0.00100	mg/L	0.0500		96.0	85-115		
Matrix Spike (BBA0459-MS1)		**Source: WBA0341-01**			Prepared: 1/19/2021 Analyzed: 1/20/2021					
Zinc	0.243		0.00500	mg/L	0.250	0.0143	91.5	70-130		
Copper	0.233		0.00500	mg/L	0.250	0.00211	92.2	70-130		
Matrix Spike Dup (BBA0459-MSD1)		**Source: WBA0341-01**			Prepared: 1/19/2021 Analyzed: 1/20/2021					
Zinc	0.248		0.00500	mg/L	0.250	0.0143	93.3	70-130	1.85	20
Copper	0.239		0.00500	mg/L	0.250	0.00211	94.8	70-130	2.83	20

Quality Control Data
(Continued)

Hydrocarbons

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0364 - W TPH-Dx										
Blank (BBA0364-BLK1)					Prepared & Analyzed: 1/21/2021					
Diesel	ND		0.160	mg/L						
Lube Oil	ND		0.400	mg/L						

Anatek Labs, Inc.

1282 Alturas Drive - Moscow, ID 83843 - (208) 883-2839 - Fax (208) 8829246 - email moscow@anateklabs.com
504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Quality Control Data
(Continued)

Hydrocarbons (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBA0364 - W TPH-Dx (Continued)										
Blank (BBA0364-BLK1)					Prepared & Analyzed: 1/21/2021					
Mineral Oil	ND		0.160	mg/L						
Surrogate: n-Hexacosane			*47.7*	*ppm*	*50.1*		*95.2*	*50-150*		
LCS (BBA0364-BS1)					Prepared & Analyzed: 1/21/2021					
Diesel	0.969		0.160	mg/L	1.00		96.4	70-130		
Lube Oil	ND		0.400	mg/L				70-130		
Surrogate: n-Hexacosane			*45.7*	*ppm*	*50.1*		*91.2*	*50-150*		
Duplicate (BBA0364-DUP1)		**Source: WBA0341-01**			Prepared & Analyzed: 1/21/2021					
Diesel	ND		0.160	mg/L		ND				20
Lube Oil	ND		0.400	mg/L		ND				20
Mineral Oil	ND		0.160	mg/L		ND				20
Surrogate: n-Hexacosane			*39.4*	*ppm*	*50.1*		*78.7*	*50-150*		

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Anatek Log-In #

WBA0341

Due: 01/27/21

Company Name: Spokane County	Project Manager: Ethan Murnin
Address: 1026 W. Broadway Avenue	Project Name & # : Gonzaga BioRetention Cell
City: Spokane State: WA Zip: 99260	Email Address : EMURNIN@spokanecounty.org
Phone: (509) 477-7420	Purchase Order #:
Fax:	Sampler Name & phone: (509)995-0557

Turn

Please refer to our normal ...
http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
x Email

Provide Sample Description

stormwater influent and effluent

List Analyses Requested

Preservative:

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	TSS SM 2540D	Cu Zn Total EPA 200.8 ICP/MS	Cu Zn Dissolved EPA 200.8 ICP/MS	Hardness, SM 2340B (ICP)	Total Phosphorus, SM4500-PF	NWTPH, Ecology NWTPH Dx	Ortho Phosphate SM 4500-PG
	INF01122021	01/13/21 8:00 AM	water	5		x	x		x	x	x	x
	EFF1201122021	01/13/21 8:00 AM	water	5		x	x		x	x	x	x
	EFF1801122021	01/13/21 8:00 AM	water	5		x	x		x	x	x	x

Note Special Instructions/Comments

Please email results to both EMURNIN@spokanecounty.org & aimeen@osbornconsulting.com

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	Y	N
Containers Sealed?	(Y)	N
VOC Head Space?	~~Y~~	~~N~~

hd/cli

Temperature (°C): 0.3/0.1 IR#1

Preservative: H2SO4 2002883 L2
HCl 2003851 L2 pH 200105

Date & Time: 11 19 1/13/21

Inspected By:

	Printed Name	Signature	Company	Date	Time
Relinquished by	Megan Ehlebracht		OCI	1/13/21	10:30
Received by	RScott		Anatek	1/13/21	1030
Relinquished by					
Received by					
Relinquished by					
Received by					

Form COC01.00 - Eff 1 Mar 2015

Appendix A.2 Bioretention Soil Media Reports

soiltest farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

PAP-Accredited NAPT 2019

Soil & Plant Program 2019 NAPT Participating Laboratory

SOILTEST FARM CONSULTANTS - 1
2925 DRIGGS DR

Moses Lake , WA 98837
Laboratory #: S19-00971

Date Received: 3/7/2019
Grower: SPOKANE COUNTY
Sampled By:
Field: UNINSTALLED
Customer Account #:
Customer Sample ID:

Soil Test Results

Cation Exchange	CEC	meq/100g	9.9

pH 1:1
E.C. 1:1 m.mhos/cm
Est Sat Paste E.C. m.mhos/cm
Effervescence

Lbs/Acre

Ammonium - N mg/kg
Organic Matter W.B. % ENR:

Other Tests:

Organic Matter (LOI): 5.0 %:

SAT PASTE pH = 7.3, Ca = 5.25 meq/L, Mg = 3.68 meq/L, Na = 0.47 meq/L SAR - 0.27, %MOISTURE = 0.9%

This is your Invoice #: S19-00971 Account # 100100 Reviewed by: KEB List Cost: $155.00

soiltest
farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Client: **SPOKANE COUNTY**
ETHAN MURNIN
1026 W BROADWAY AVE
SPOKANE, WA 99260

Sample I.D. UNINSTALLED
Date Received: 03/07/19

Date Reported: 3/22/2019
Laboratory # S19-971
Reveiwed by Brent Thyssen, CPSSc
AMOUNT:

	Method	Dry Wt.	Units				MDL		
Calcium	3050B DIGEST/6010D	**7547**	mg/Kg				9.00		
Copper	3050B DIGEST/6010D	**17.3**	mg/Kg				0.20		
Magnesium	3050B DIGEST/6010D	**7055**	mg/Kg				1.00		
Zinc	3050B DIGEST/6010D	**57.7**	mg/Kg				0.30		

PAP-Accredited NAPT 2019

soiltest farm consultants, inc.

2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Soil & Plant Program 2019 NAPT Participating Laboratory

SOILTEST FARM CONSULTANTS - 1
2925 DRIGGS DR

Moses Lake , WA 98837

Laboratory #: S19-00972

Date Received: 3/7/2019
Grower: SPOKANE COUNTY
Sampled By:
Field: INSTALLED 18IN
Customer Account #:
Customer Sample ID:

Soil Test Results

Cation Exchange	CEC	meq/100g	9.6

pH 1:1
E.C. 1:1 m.mhos/cm
Est Sat Paste E.C. m.mhos/cm
Effervescence

Lbs/Acre

Ammonium - N mg/kg
Organic Matter W.B. % ENR:

Other Tests:

Organic Matter (LOI): 4.5 %:

SAT PASTE pH = 6.9, Ca = 3.05 meq/L, Mg = 8.30 meq/L, Na = 17.76 meq/L SAR - 7.46, %MOISTURE = 33.4%

This is your Invoice #: S19-00972 Account # 100100 Reviewed by: KEB List Cost: $155.00

soiltest
farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Client: **SPOKANE COUNTY**
ETHAN MURNIN
1026 W BROADWAY AVE
SPOKANE, WA 99260

Sample I.D. INSTALLED 18IN
Date Received: 03/07/19

Date Reported: 3/22/2019
Laboratory # S19-972
Reveiwed by Brent Thyssen, CPSSc
AMOUNT:

	Method	Dry Wt.	Units				MDL		
Calcium	3050B DIGEST/6010D	**2867**	mg/Kg				9.00		
Copper	3050B DIGEST/6010D	**16.8**	mg/Kg				0.20		
Magnesium	3050B DIGEST/6010D	**7270**	mg/Kg				1.00		
Zinc	3050B DIGEST/6010D	**86.4**	mg/Kg				0.30		

PAP-Accredited NAPT 2019

soiltest farm consultants, inc.

2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Soil & Plant Program 2019 NAPT Participating Laboratory

SOILTEST FARM CONSULTANTS - 1
2925 DRIGGS DR

Moses Lake , WA 98837

Laboratory #: S19-00973

Date Received: 3/7/2019
Grower: SPOKANE COUNTY
Sampled By:
Field: INSTALLED 12IN
Customer Account #:
Customer Sample ID:

Soil Test Results

Cation Exchange	CEC	meq/100g	10.7

pH 1:1
E.C. 1:1 m.mhos/cm
Est Sat Paste E.C. m.mhos/cm
Effervescence

Lbs/Acre

Ammonium - N mg/kg
Organic Matter W.B. % ENR:

Other Tests:

Organic Matter (LOI): 6.2 %:

SAT PASTE pH =7.0, Ca = 3.74 meq/L, Mg = 9.18 meq/L, Na = 12.77 meq/L SAR - 5.02, %MOISTURE = 57.8%

This is your Invoice #: S19-00973 Account # 100100 Reviewed by: KEB List Cost: $155.00

soiltest
farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Client: **SPOKANE COUNTY**
ETHAN MURNIN
1026 W BROADWAY AVE
SPOKANE, WA 99260

Sample I.D. INSTALLED 12IN
Date Received: 03/07/19

Date Reported: 3/22/2019
Laboratory # S19-973
Reveiwed by Brent Thyssen, CPSSc
AMOUNT:

	Method	Dry Wt.	Units				MDL		
Calcium	3050B DIGEST/6010D	**3702**	mg/Kg				9.00		
Copper	3050B DIGEST/6010D	**16.1**	mg/Kg				0.20		
Magnesium	3050B DIGEST/6010D	**7529**	mg/Kg				1.00		
Zinc	3050B DIGEST/6010D	**82.6**	mg/Kg				0.30		

Comparison of Ecology Bioretention Soil Media to Uninstalled and Installed Media

Parameter	Ecology 60:40 Specification (Ecology, 2019)	2014 Pre-Installation	2019 18-inch	2019 12-inch	% Diff 18-inch	% Diff 12-inch
Cation Exchange Capacity (meq/100g)	≥ 5	9.9	9.6	10.7	3.03%	-8.08%
Organic Matter Content (%)	5-8	5	4.50	6.20	10.00%	-24.00%
Calcium (meq/L)	N/A	5.25	3.05	3.74	41.90%	28.76%
Copper (mg/kg)	N/A	17.3	16.8	16.1	2.89%	6.94%
Magnesium (meq/L)	N/A	3.68	8.3	9.18	-125.54%	-149.46%
Zinc (mg/kg)	N/A	57.7	86.4	82.6	-49.74%	-43.15%

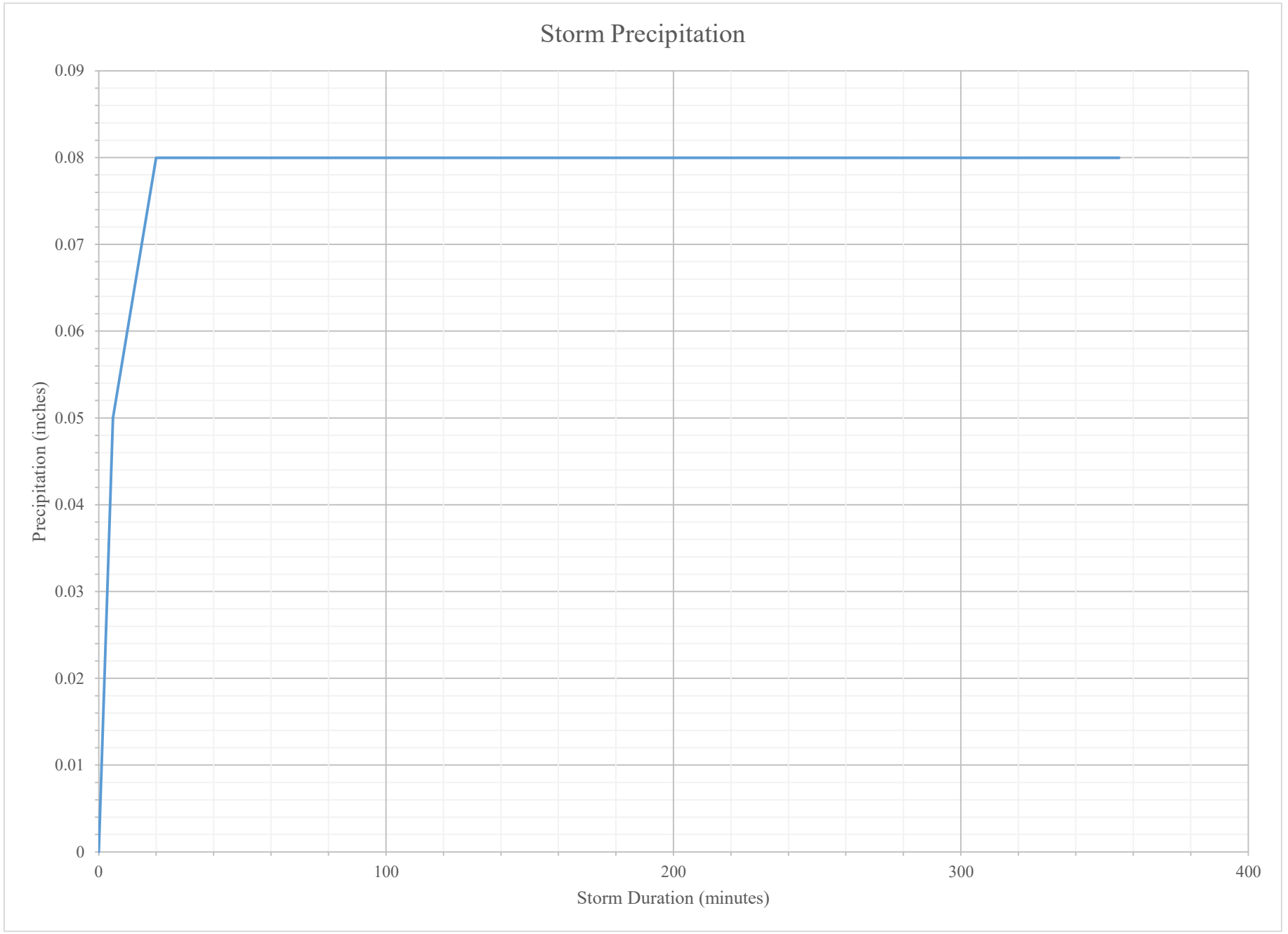
Note negative values indicate an increase in the parameter since the media was installed.

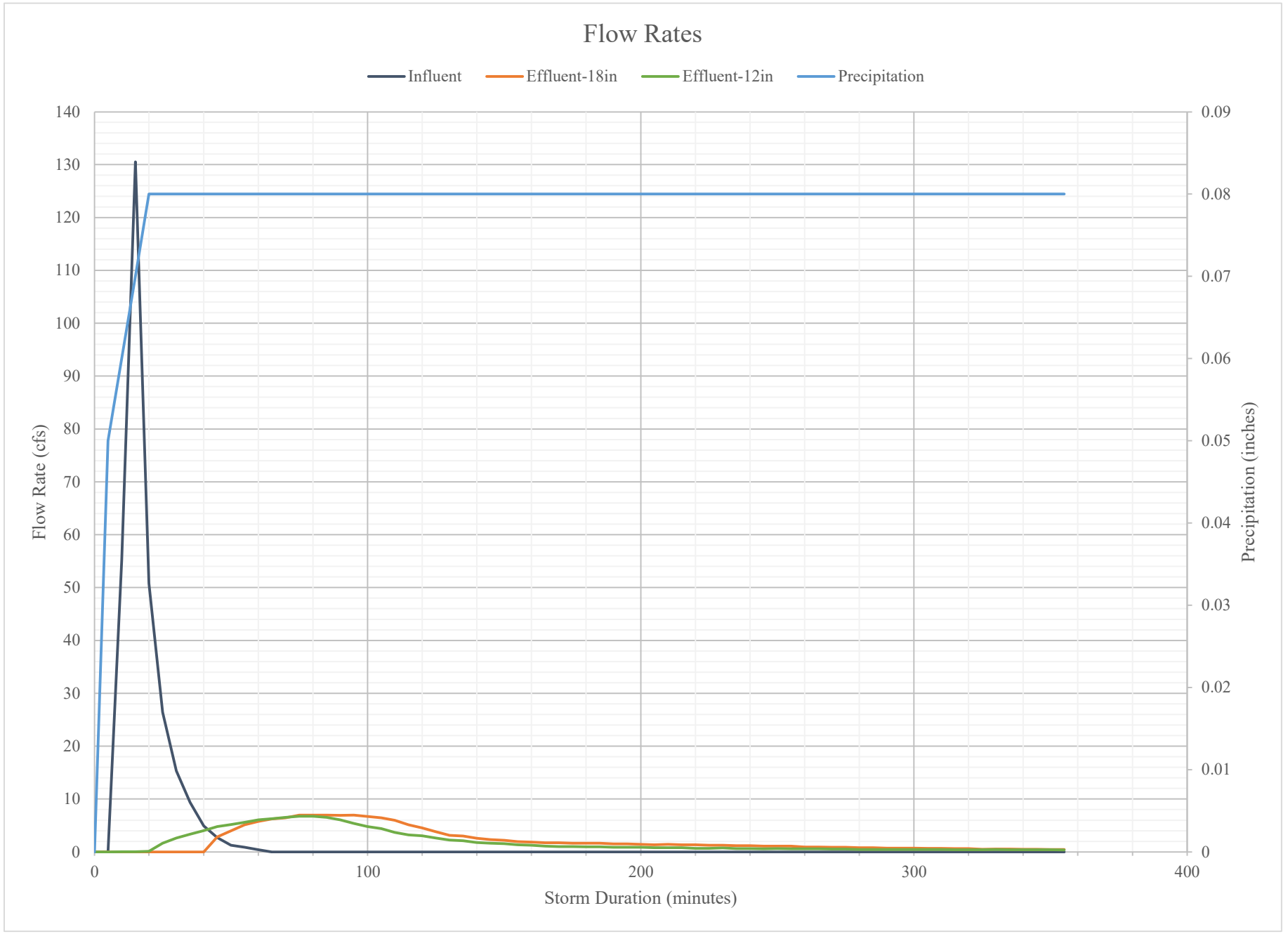
Appendix B. Storm Reports

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	11/22/2018	-	Date storm event started	
	Storm Start Date and Time	11/22/18 8:35 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	11/22/18 2:25 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.080	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	5.83	hours	Duration of storm event	
	Storm Average Intensity	0.01	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	432.50	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	52.616	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	24.020	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	27.287	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	7.153	gpm	Average influent flow rate during storm event	
	12" Effluent	0.513	gpm	Average effluent flow rate during storm event	
	18" Effluent	0.648	gpm	Average bypass flow rate during storm event	
Peak Flow Rate	Influent	34.489	gpm	Peak influent flow rate during storm event	
	12" Effluent	1.787	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.833	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	6	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	2	-		
	18" Effluent	3	-		
Sample Duration	Influent	0.50	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	0.75	hours		
	18" Effluent	3.17	hours		
Threshold	Influent	240	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	240	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	240	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	96.7%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	70.6%	%		
	% of 18 Effluent	93.2%	%		
90th Percentile Flow Rate	Influent	14.565	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 11/22/2018

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	74.7	20	100	31	36	58.50%	51.81%	1		
	Total Copper	mg/L	0.0065	N/A	N/A	0.00531	0.004	18.31%	38.46%	0.00007		
	Dissolved Copper	mg/L	0.00321	0.005	0.02	0.00434	0.00416	-35.20%	-29.60%	0.00007		Dissolved copper for effluents
	Total Zinc	mg/L	0.0649	N/A	N/A	0.0201	0.0213	69.03%	67.18%	0.00025		
	Dissolved Zinc	mg/L	0.0385	0.02	0.3	0.0406	0.0279	-5.45%	27.53%	0.00025	Flag	Dissolved zinc for 12" Eff
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	13	N/A	N/A	148	183	-1038.46%	-1307.69%	1		Hardness for effluents
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

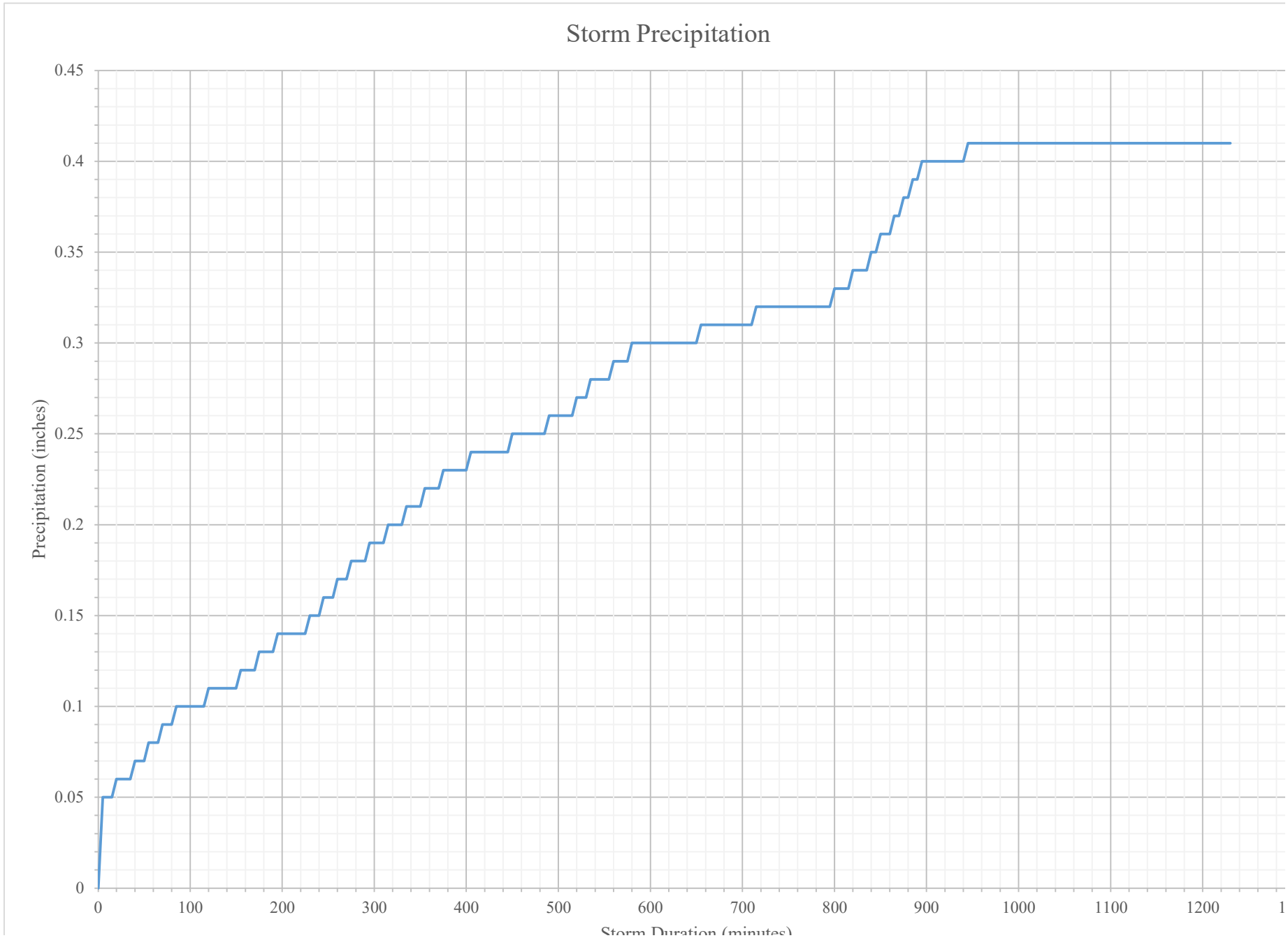

Storm Precipitation
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Precipitation (inches)
0
100
200
300
400
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0
100
200
300
400

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	12/16/2018	-	Date storm event started	
	Storm Start Date and Time	12/16/18 5:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	12/17/18 2:20 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.41	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	20.42	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	64.33	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	243.175	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	178.824	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	151.759	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	2.032	gpm	Average influent flow rate during storm event	
	12" Effluent	1.108	gpm	Average effluent flow rate during storm event	
	18" Effluent	0.939	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	9.792	gpm	Peak influent flow rate during storm event	
	12" Effluent	1.482	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.299	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	27	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	40	-		
	18" Effluent	34	-		
Sample Duration	Influent	13.25	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	18.00	hours		
	18" Effluent	17.92	hours		
Threshold	Influent	250	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	125	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	125	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	98.1%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	98.8%	%		
	% of 18 Effluent	99.0%	%		
90th Percentile Flow Rate	Influent	3.164	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 12/16/2018

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	9	20	100	5	7	44.44%	22.22%	1		
	Total Copper	mg/L	0.00321	N/A	N/A	0.00155	0.00147	51.71%	54.21%	0.00007		
	Dissolved Copper	mg/L	0.00289	0.005	0.02	0.00149	0.00132	48.44%	54.33%	0.00007		
	Total Zinc	mg/L	0.0261	N/A	N/A	0.0111	0.0059	57.47%	77.39%	0.00025		
	Dissolved Zinc	mg/L	0.0285	0.02	0.3	0.0129	0.0111	54.74%	61.05%	0.00025		
	Total Phosphorus	mg/L	0.118	0.1	0.5	0.35	0.388	-196.61%	-228.81%	0.00505		Increase in total P in Eff
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	43	N/A	N/A	222	243	-416.28%	-465.12%	1		Increase in hardness in Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
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0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
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0
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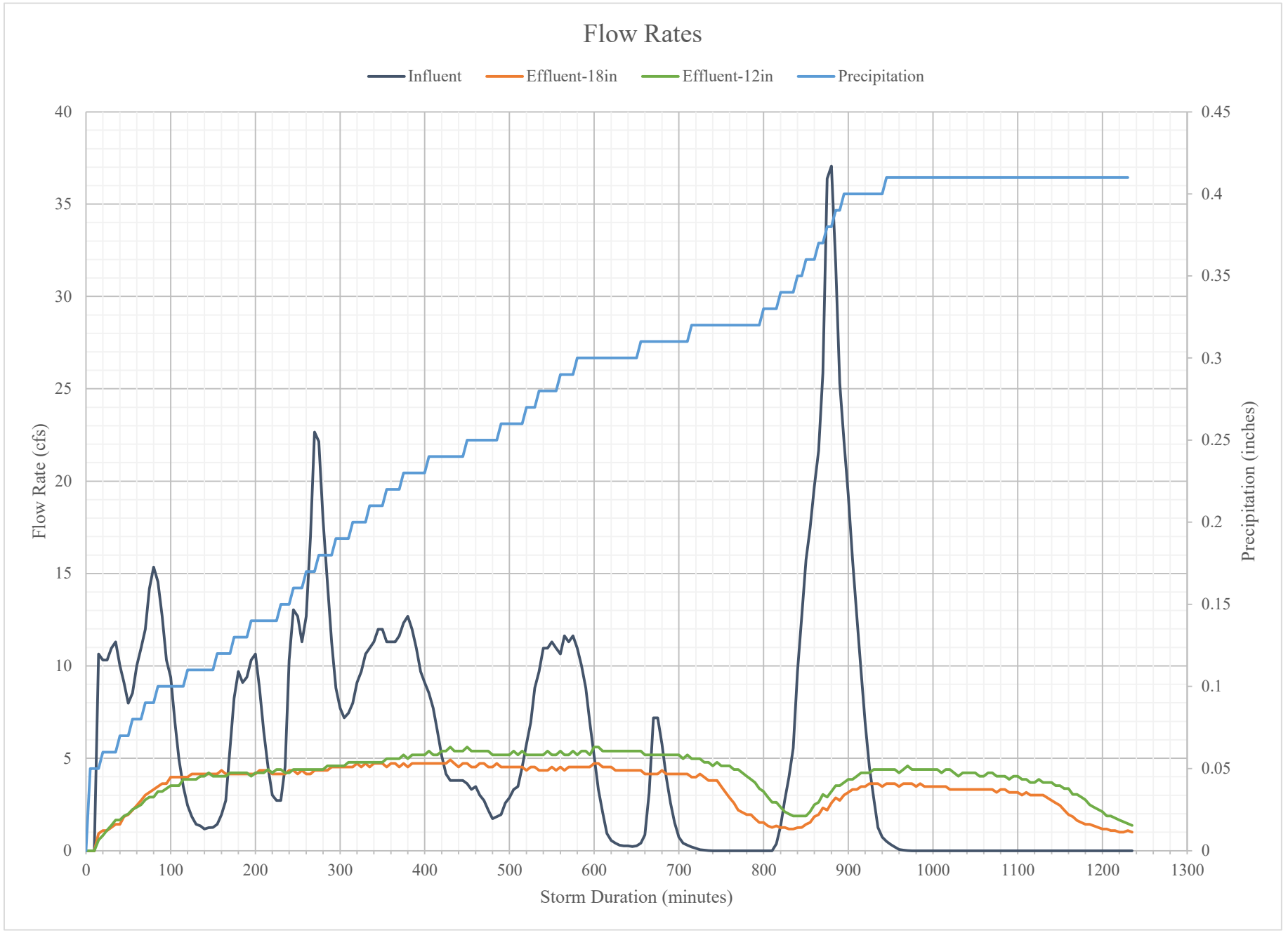
200
300
400
500
600
700
800
900
1000
1100
1200
1
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
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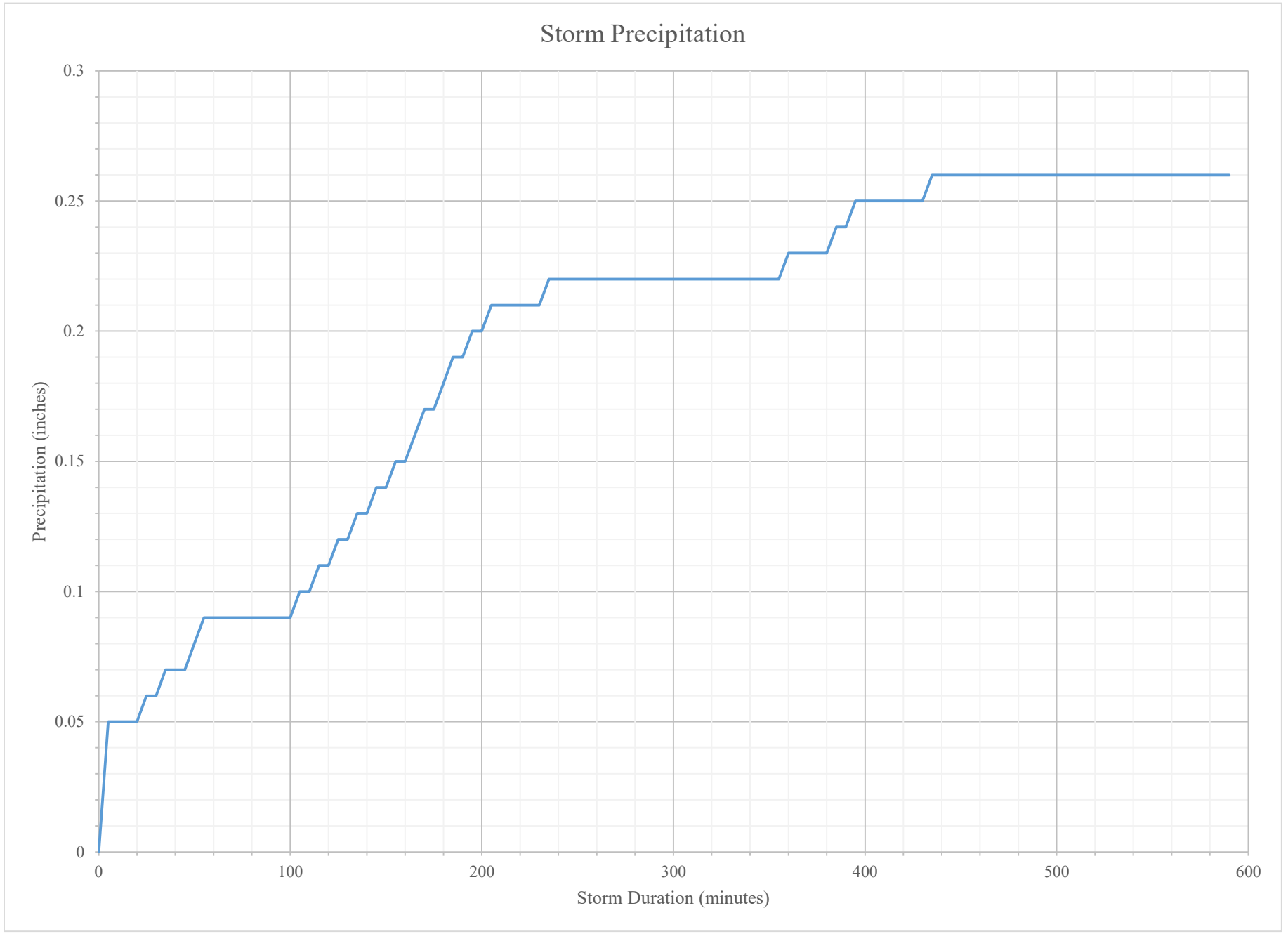
5
10
15
20
25
30
35
40
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	1/17/2019	-	Date storm event started	
	Storm Start Date and Time	1/17/19 9:35 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	1/17/19 7:20 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.26	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	9.75	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	171.75	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	322.731	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	98.736	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	75.990	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	4.007	gpm	Average influent flow rate during storm event	
	12" Effluent	1.317	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.021	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	22.012	gpm	Peak influent flow rate during storm event	
	12" Effluent	2.179	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.768	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	30	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	7	-		
	18" Effluent	6	-		
Sample Duration	Influent	4.67	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	2.42	hours		
	18" Effluent	2.33	hours		
Threshold	Influent	300	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	150	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	150	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	98.5%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	37.6%	%		
	% of 18 Effluent	41.9%	%		
90th Percentile Flow Rate	Influent	9.649	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 1/17/2019

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	8	20	100	1	5	87.50%	37.50%	1		
	Total Copper	mg/L	0.00451	N/A	N/A	0.00139	0.00148	69.18%	67.18%	0.00007		
	Dissolved Copper	mg/L	0.00406	0.005	0.02	0.00142	0.00146	65.02%	64.04%	0.00007		
	Total Zinc	mg/L	0.0338	N/A	N/A	0.00832	0.0125	75.38%	63.02%	0.00025		
	Dissolved Zinc	mg/L	0.0291	0.02	0.3	0.0134	0.0146	53.95%	49.83%	0.00025		
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	N/A	N/A	N/A	N/A	N/A	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
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0.2
0.15
0.1
0.05
0
0
100
200
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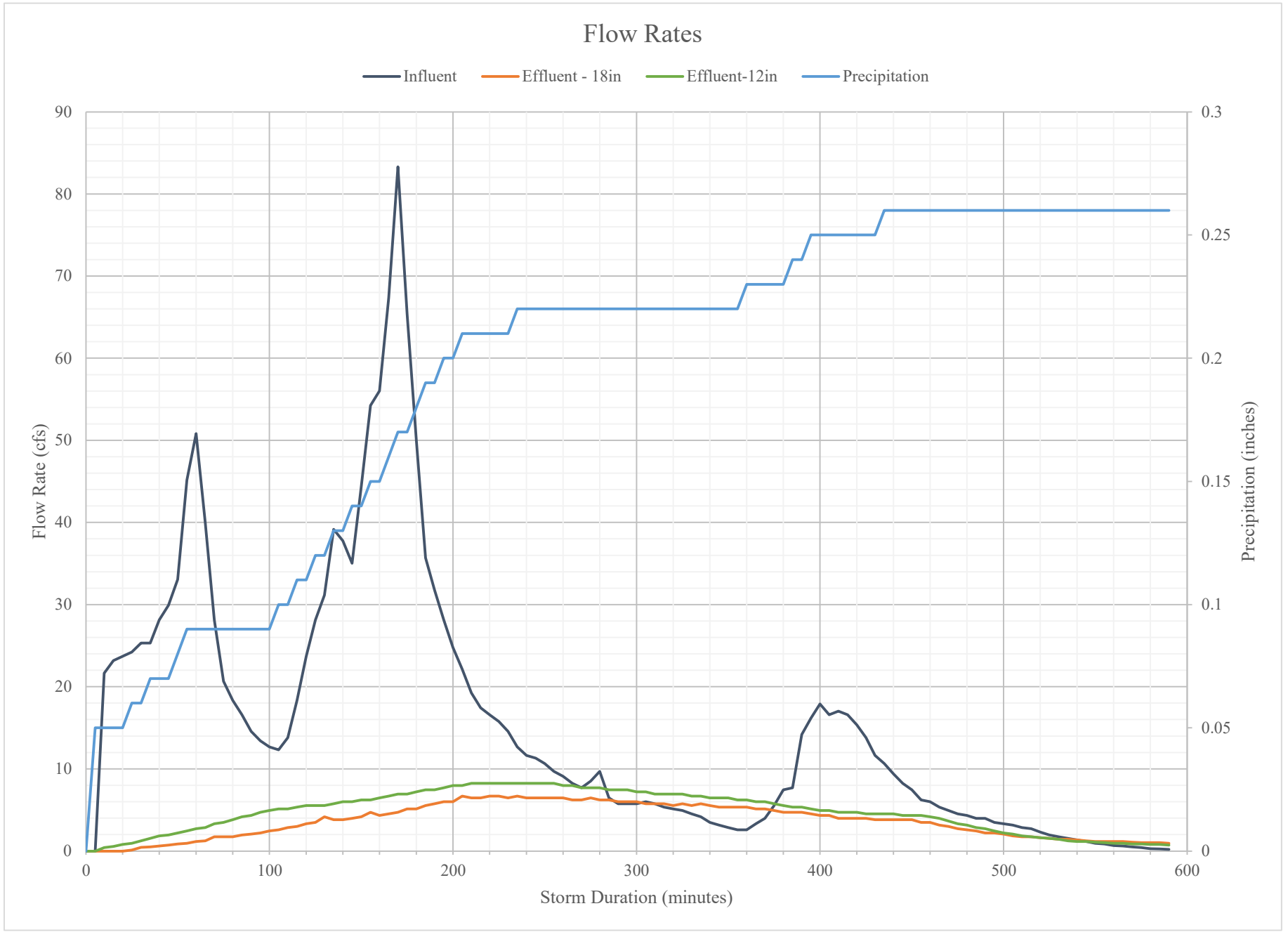
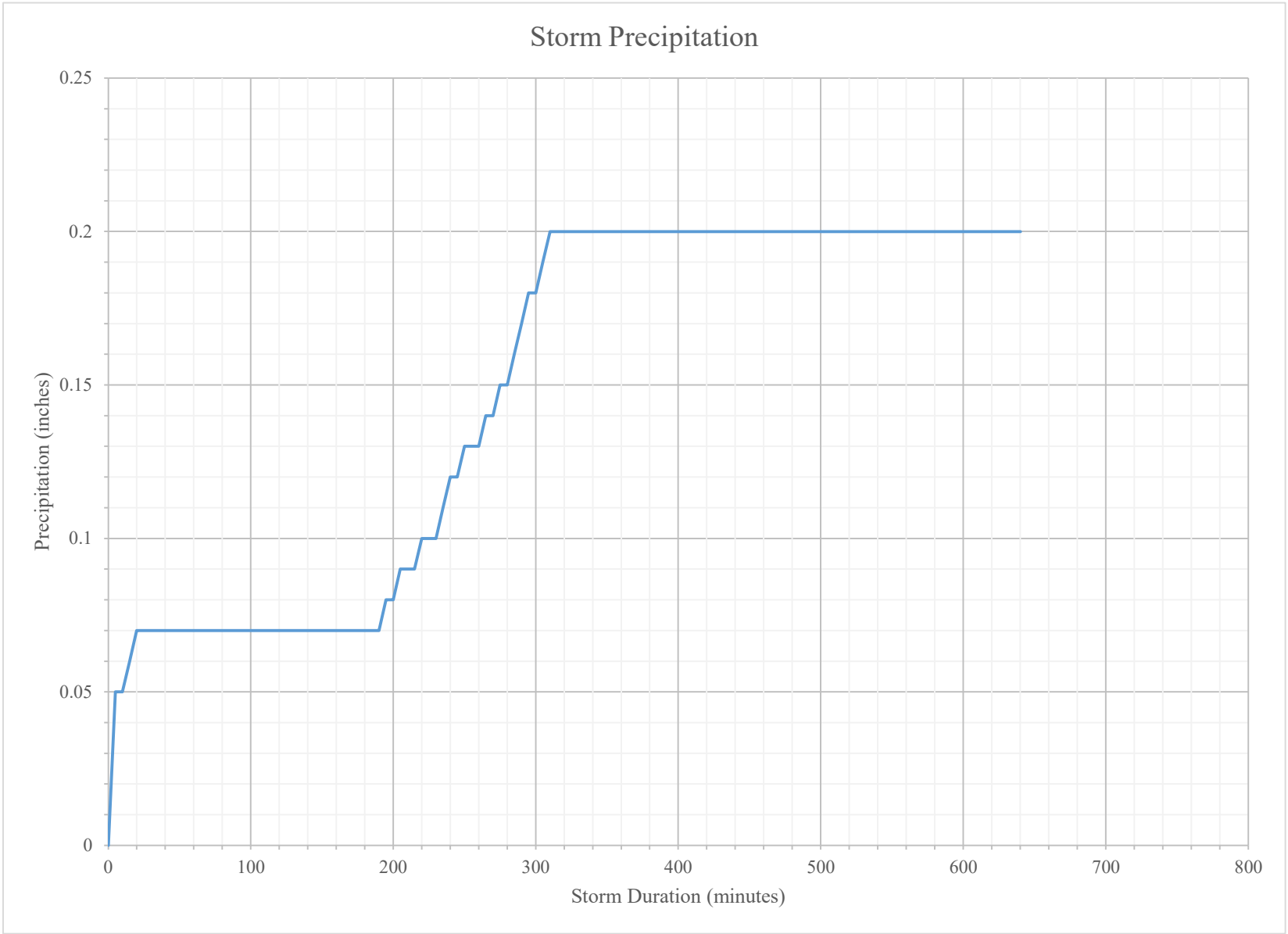
400
500
600
Storm Duration (minutes)


Flow Rates
Influent
Effluent - 18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
70
80
90
0
0.05
0.1
0.15
0.2
0.25
0.3
0
100
200
300
400
500
600

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	7/24/2019	-	Date storm event started	
	Storm Start Date and Time	7/23/19 10:05 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	7/24/19 8:40 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.20	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	10.58	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	176.42	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	207.084	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	89.981	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	109.733	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	3.091	gpm	Average influent flow rate during storm event	
	12" Effluent	1.061	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.297	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	37.321	gpm	Peak influent flow rate during storm event	
	12" Effluent	3.350	gpm	Peak effluent flow rate during storm event	
	18" Effluent	3.164	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	>45	-		
Sample Duration	Influent	6.08	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	6.42	hours		
	18" Effluent	5.83	hours		
Threshold	Influent	100	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	50	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	50	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	76.8%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	88.4%	%		
	% of 18 Effluent	72.5%	%		
90th Percentile Flow Rate	Influent	11.604	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 7/24/2019

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	78	20	100	12	34	84.62%	56.41%	1		
	Total Copper	mg/L	0.00885	N/A	N/A	0.0064	0.00533	27.68%	39.77%	0.00007		
	Dissolved Copper	mg/L	0.00676	0.005	0.02	0.00608	0.00515	10.06%	23.82%	0.00007		
	Total Zinc	mg/L	0.0565	N/A	N/A	0.0139	0.00852	75.40%	84.92%	0.00025		
	Dissolved Zinc	mg/L	0.0307	0.02	0.3	0.0074	0.0102	75.90%	66.78%	0.00025		
	Total Phosphorus	mg/L	0.334	0.1	0.5	0.886	1.28	-165.27%	-283.23%	0.00505		Increase of total P in Eff
	Iron	mg/L	0.633	N/A	N/A	0.169	0.3	73.30%	52.61%	0.01		
	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	52	N/A	N/A	128	244	-146.15%	-369.23%	0.865		Increase of hardness in Eff
Other Parameters	Dissolved Iron	mg/L	0.128	N/A	N/A	0.048	0.0628	62.50%	50.94%	0.01		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
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0.2
0.15
0.1
0.05
0
0
100
200
300
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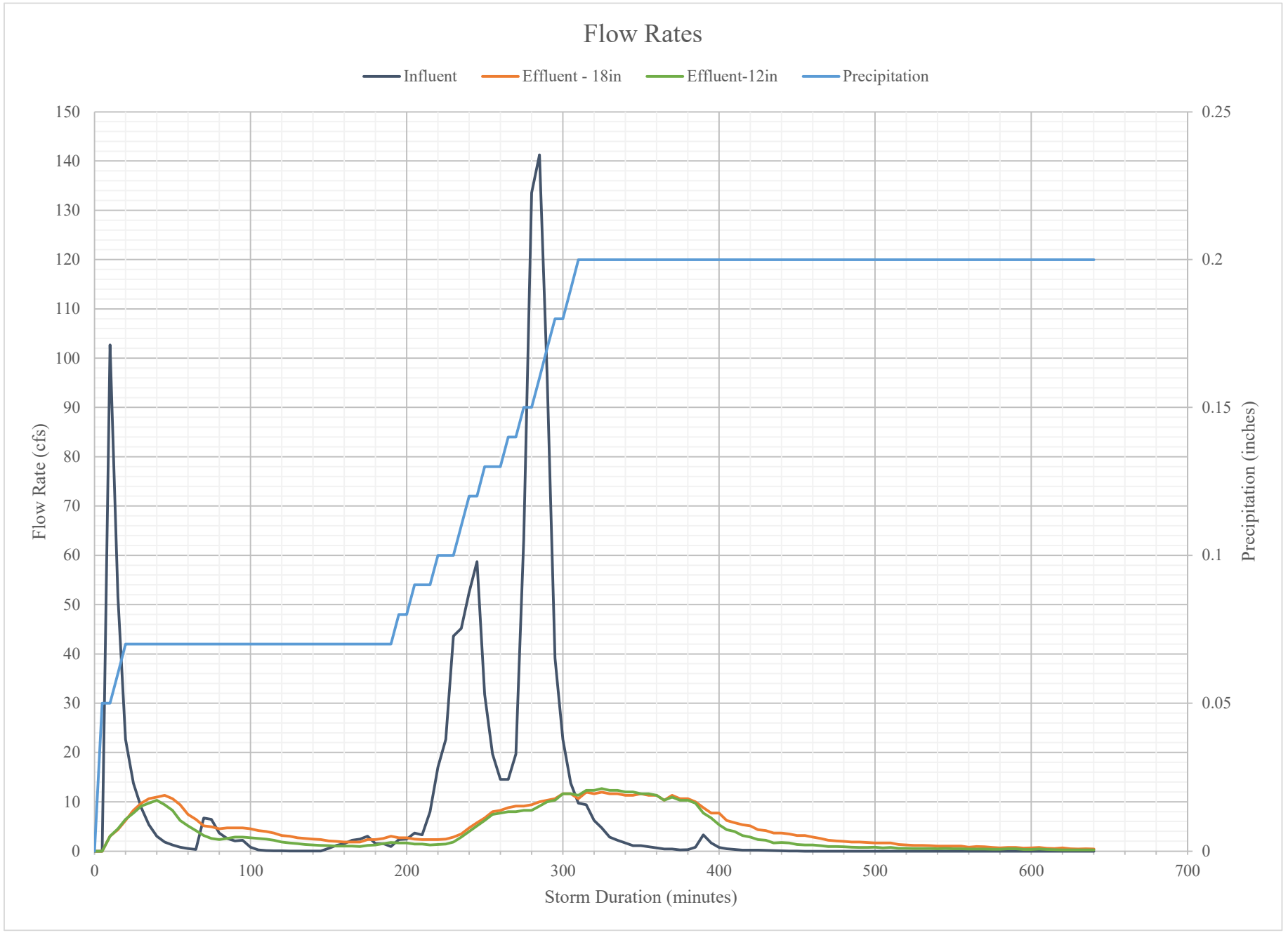
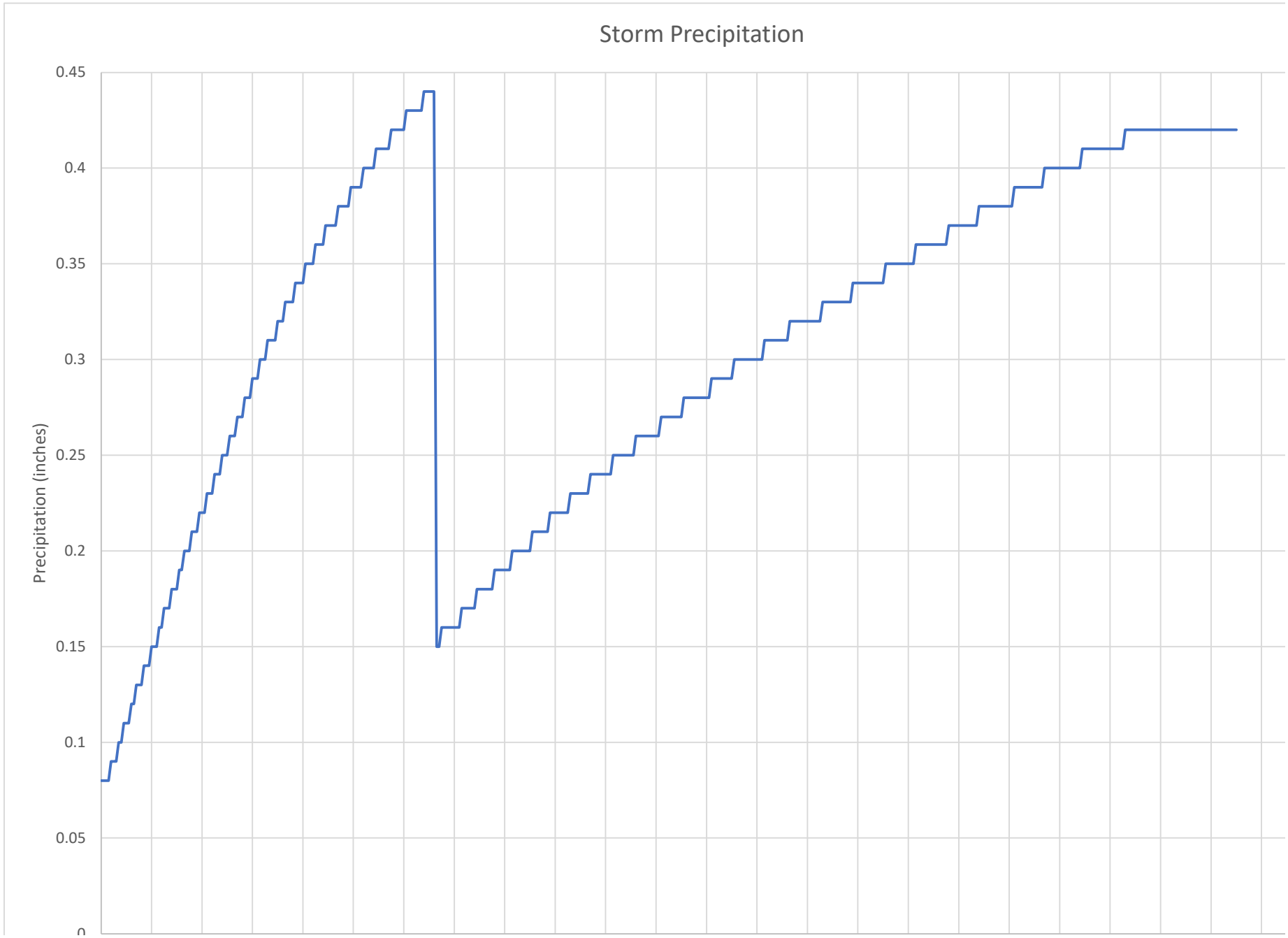
600
700
800
Storm Duration (minutes)


Flow Rates
Influent
Effluent - 18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
0.05
0.1
0.15
0.2
0.25
0
100
200
300
400
500
600
700

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	9/28/2019	-	Date storm event started	
	Storm Start Date and Time	9/28/19 4:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	9/29/19 6:20 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.71	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	37.42	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	432.42	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	2340.989	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	124.128	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	158.591	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	21.345	gpm	Average influent flow rate during storm event	
	12" Effluent	0.636	gpm	Average effluent flow rate during storm event	
	18" Effluent	0.573	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	112.439	gpm	Peak influent flow rate during storm event	
	12" Effluent	2.404	gpm	Peak effluent flow rate during storm event	
	18" Effluent	2.897	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	
	12" Effluent	16	-		
	18" Effluent	41	-		
Sample Duration	Influent	3.58	hours	Time in hours between the collection of the first and last aliquots	
	12" Effluent	8.33	hours		
	18" Effluent	8.58	hours		
Threshold	Influent	400	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	200	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	100	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	27.2%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	91.1%	%		
	% of 18 Effluent	91.4%	%		
90th Percentile Flow Rate	Influent	83.561	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 9/28/2019

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	68	20	100	N/A	50	-	26.47%	1		
	Total Copper	mg/L	0.0033	N/A	N/A	N/A	0.0051	-	-54.55%	0.00007		Increased in copper
	Dissolved Copper	mg/L	0.00133	0.005	0.02	N/A	0.00469	-	-252.63%	0.00007		Increased in dissolved copper
	Total Zinc	mg/L	0.0403	N/A	N/A	N/A	0.0513	-	-27.30%	0.00025		Increased in zinc
	Dissolved Zinc	mg/L	0.0599	0.02	0.3	N/A	0.0181	-	69.78%	0.00025		
	Total Phosphorus	mg/L	0.0991	0.1	0.5	N/A	0.793	-	-700.20%	0.00505		Increase in phosphorous
	Iron	mg/L	0.435	N/A	N/A	N/A	0.785	-	-80.46%	0.01		Increased in dissolved iron in Eff
	Dissolved Iron	mg/L	0.0126	N/A	N/A	N/A	0.0513	-	-307.14%	0.01		Increased in iron in Eff
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	N/A	ND	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	N/A	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0501	N/A	N/A	N/A	0.7	-	-1297.21%	N/A		
	Hardness	mg CaCO3/L	18	N/A	N/A	N/A	145	-	-705.56%	0.865		Increase in hardness in Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
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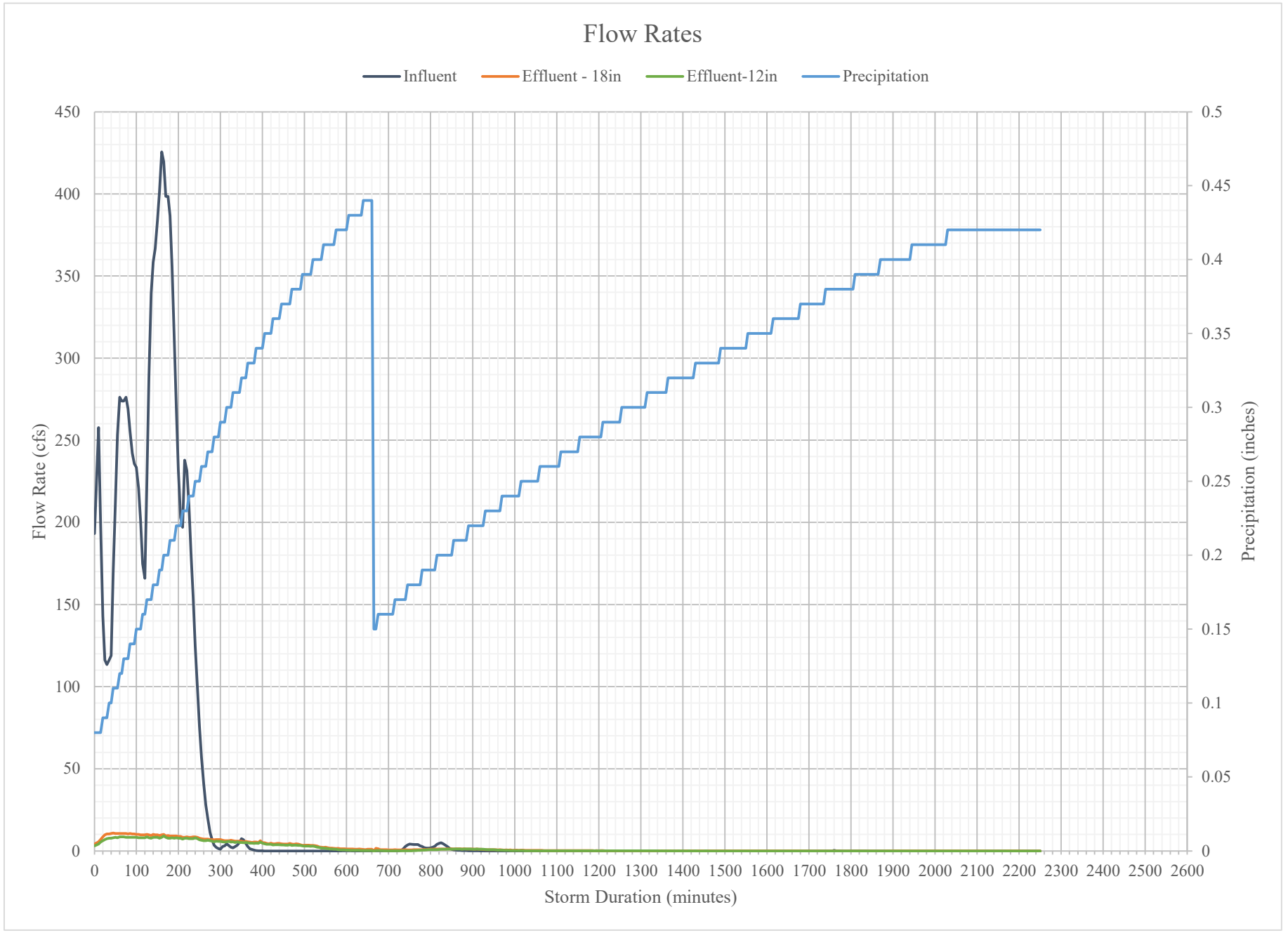
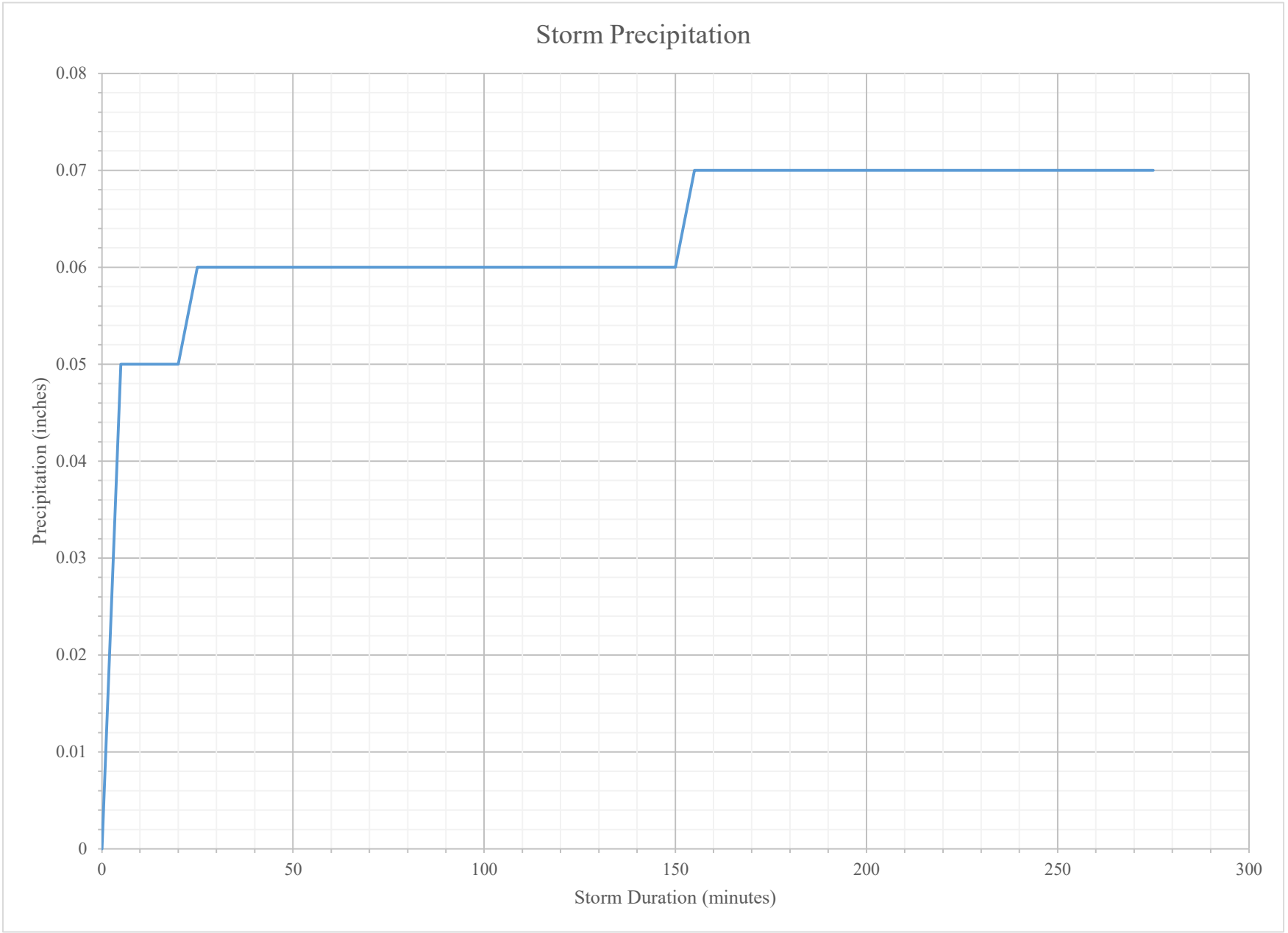
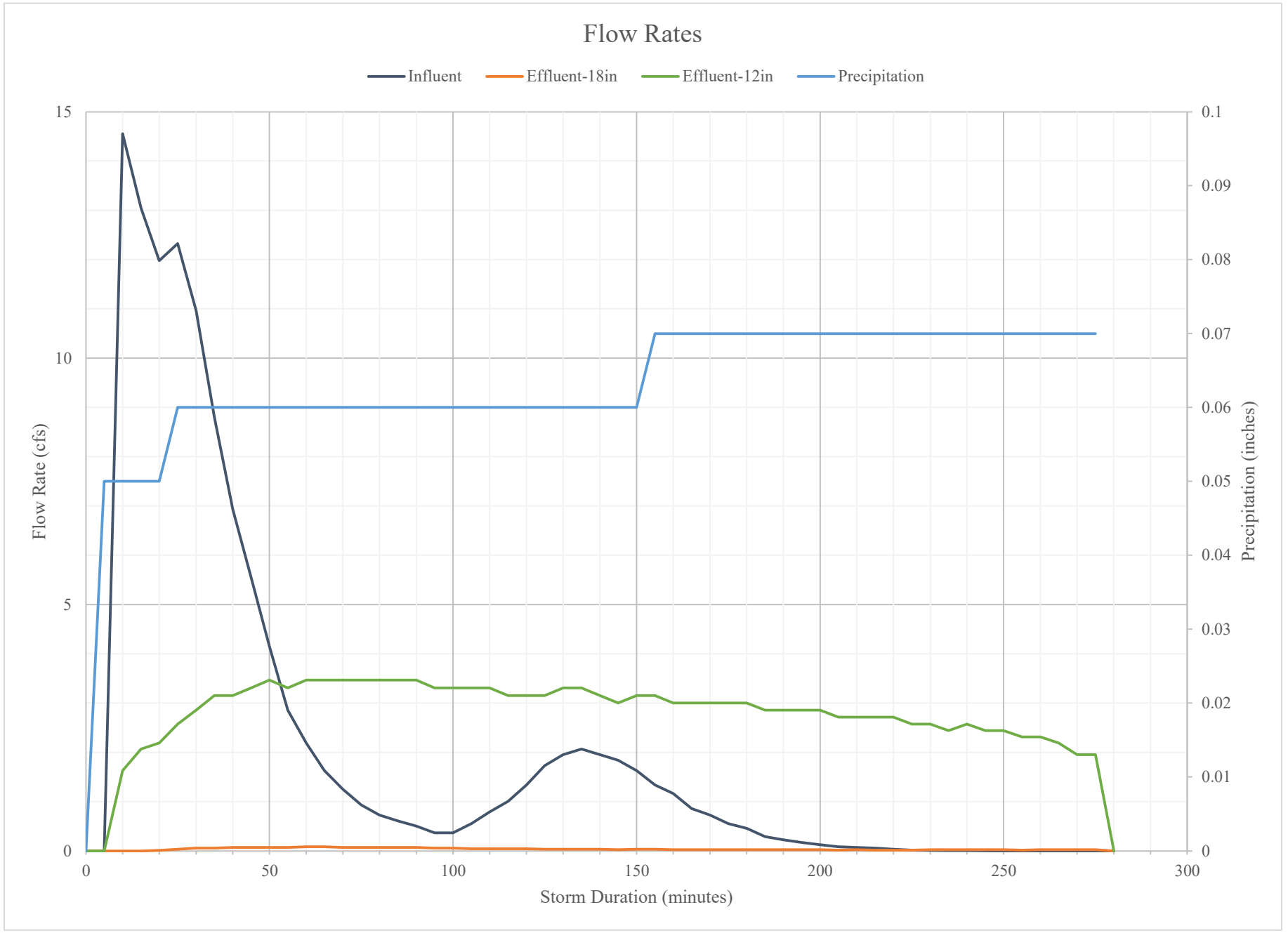

Flow Rates
Influent
Effluent - 18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
50
100
150
200
250
300
350
400
450
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	11/19/2019	-	Date storm event started	
	Storm Start Date and Time	11/19/19 1:05 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	11/19/19 5:40 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.07	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	4.58	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	44.83	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	21.338	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	27.694	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	0.351	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	0.003	gpm	Average influent flow rate during storm event	
	12" Effluent	0.627	gpm	Average effluent flow rate during storm event	
	18" Effluent	0.006	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	0.009	gpm	Peak influent flow rate during storm event	
	12" Effluent	0.717	gpm	Peak effluent flow rate during storm event	
	18" Effluent	0.006	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	2	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	7	-		
	18" Effluent	0	-		
Sample Duration	Influent	0.33	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.42	hours		
	18" Effluent	0.00	hours		
Threshold	Influent	210	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	105	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	105	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	69.6%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	93.8%	%		
	% of 18 Effluent	0.0%	%		
90th Percentile Flow Rate	Influent	2.498	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 11/19/2019

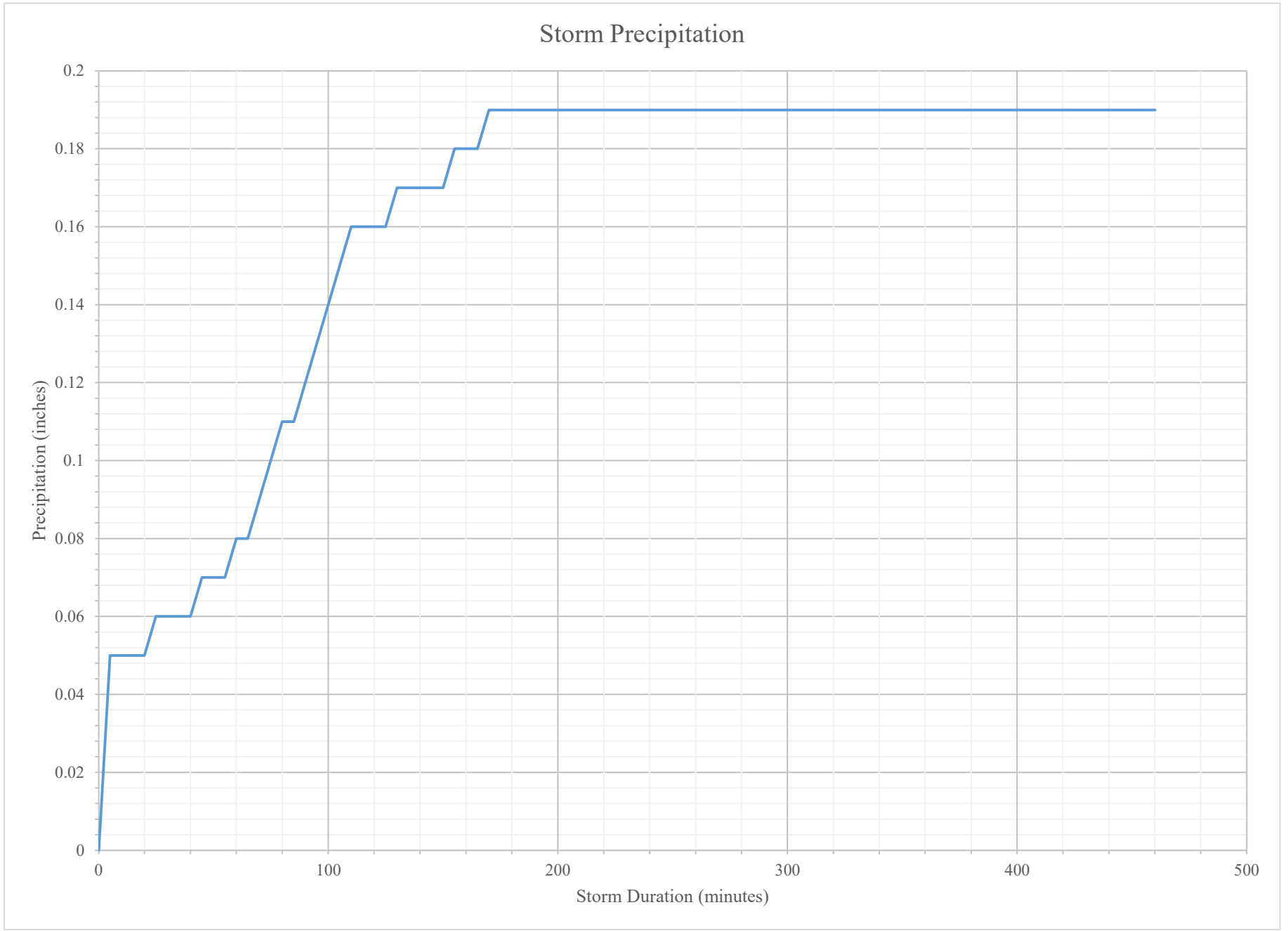
	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	22	20	100	1	N/A	95.45%	-	1		No data for 18" eff
	Total Copper	mg/L	N/A	N/A	N/A	0.00338	N/A	-	-	0.00007		No inf data, no 18" eff data
	Dissolved Copper	mg/L	N/A	0.005	0.02	0.00324	N/A	-	-	0.00007		No inf data, no 18" eff data
	Total Zinc	mg/L	N/A	N/A	N/A	0.0125	N/A	-	-	0.00025		No inf data, no 18" eff data
	Dissolved Zinc	mg/L	N/A	0.02	0.3	0.0134	N/A	-	-	0.00025		No inf data, no 18" eff data
	Total Phosphorus	mg/L	N/A	0.1	0.5	0.416	N/A	-	-	0.00505		No inf data, no 18" eff data
	Iron	mg/L	N/A	N/A	N/A	0.192	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	0.0589	N/A	-	-	0.01		No inf data, no 18" eff data
	NWTPH-Dx											
	Lube Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0901	N/A	N/A	0.349	N/A	-287.35%	-	N/A		Increased orthophosphate in eff
	Hardness	mg CaCO3/L	N/A	N/A	N/A	104	N/A	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	0.803	N/A	-	-	N/A		No inf data, no 18" eff data
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	15.6	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	16.4	N/A	-	-	N/A		

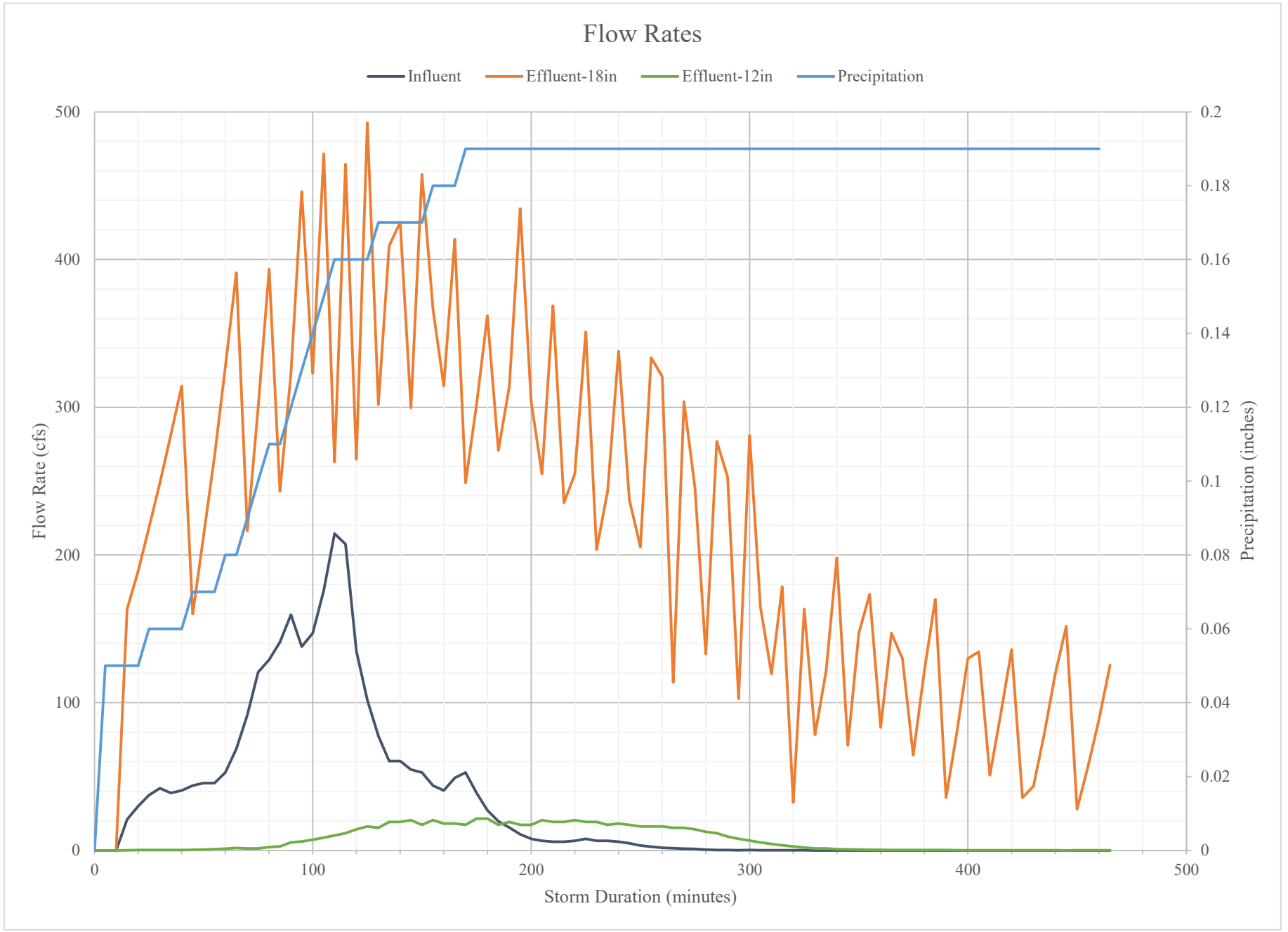

Storm Precipitation
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Precipitation (inches)
0
50
100
150
200
250
300
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
5
10
15
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
0
50
100
150
200
250
300

Storm Date: 12/7/2019

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	16	20	100	3	8	81.25%	50.00%	1		
	Total Copper	mg/L	0.00353	N/A	N/A	0.00315	0.00386	10.76%	-9.35%	0.00007		Increased in 18in eff
	Dissolved Copper	mg/L	0.00306	0.005	0.02	0.00255	0.00361	16.67%	-17.97%	0.00007		Increased in 18in eff
	Total Zinc	mg/L	0.0246	N/A	N/A	0.00298	0.00504	87.89%	79.51%	0.00025		
	Dissolved Zinc	mg/L	0.024	0.02	0.3	0.0115	0.0133	52.08%	44.58%	0.00025		
	Total Phosphorus	mg/L	N/A	0.1	0.5	0.505	0.576	-	-	0.00505		Increase of total P in Eff
	Iron	mg/L	0.315	N/A	N/A	0.146	0.301	53.65%	4.44%	0.01		
	Dissolved Iron	mg/L	0.176	N/A	N/A	0.0489	0.00977	72.22%	94.45%	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.122	N/A	N/A	0.354	0.454	-190.16%	-272.13%	N/A		Increased in PO4/P
	Hardness	mg CaCO3/L	14.5	N/A	N/A	101	148	-596.55%	-920.69%	1		Increase of hardness in Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	0.5	N/A	N/A	0.5	0.5	0.00%	0.00%	N/A		
	Nitrate-Nitrite	mg/L	0.188	N/A	N/A	0.305	0.602	-62.23%	-220.21%	N/A		Increase in nitrate-nitrite
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	ND	N/A	N/A	ND	0.602	-	-	N/A		


Storm Precipitation
Precipitation (inches)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
100
200
300
400
500
Storm Duration (minutes)

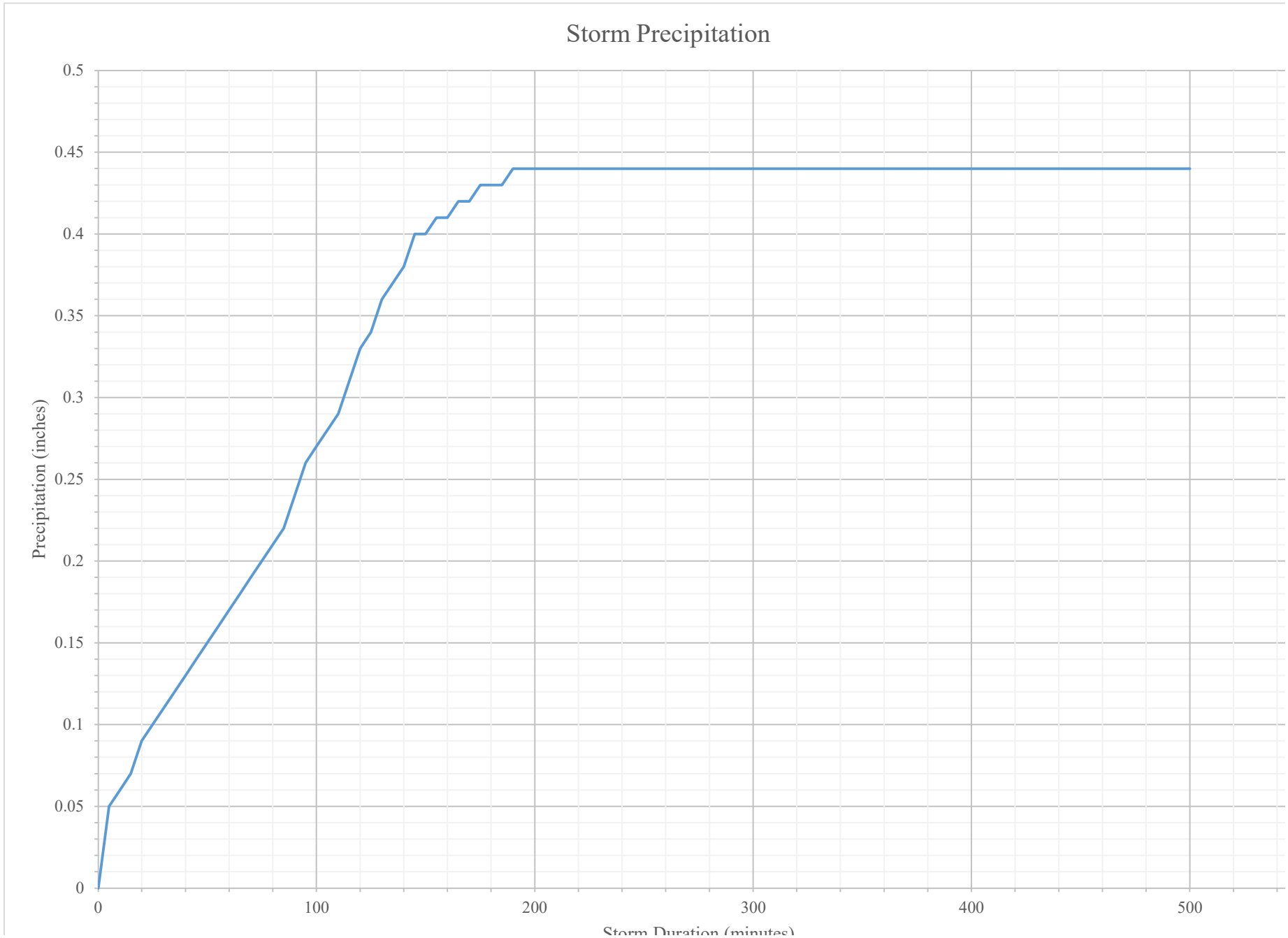

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
100
200
300
400
500
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2

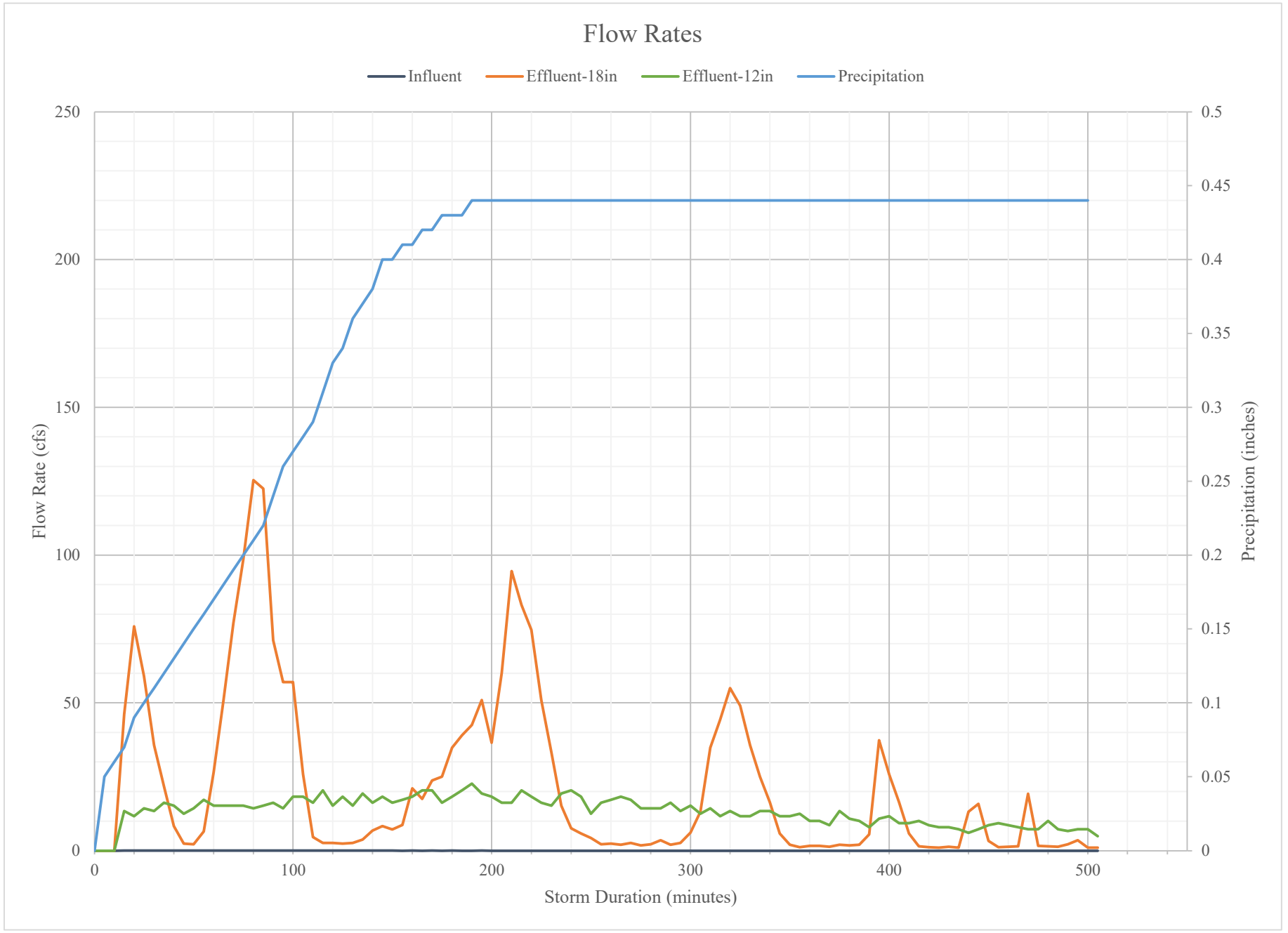
	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	12/7/2019	-	Date storm event started	
	Storm Start Date and Time	12/7/19 5:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	12/7/19 1:30 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.19	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	7.58	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	420.25	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	513.869	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	125.317	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	3675.194	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	12.197	gpm	Average influent flow rate during storm event	
	12" Effluent	2.082	gpm	Average effluent flow rate during storm event	
	18" Effluent	60.393	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	56.669	gpm	Peak influent flow rate during storm event	
	12" Effluent	5.690	gpm	Peak effluent flow rate during storm event	
	18" Effluent	130.134	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	35	-		
	18" Effluent	>45	-		
Sample Duration	Influent	3.67	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.92	hours		
	18" Effluent	3.67	hours		
Threshold	Influent	200	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	100	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	200	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	61.9%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	98.7%	%		
	% of 18 Effluent	8.7%	%		
90th Percentile Flow Rate	Influent	36.288	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 12/19/2019

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	14	20	100	5	6	64.29%	57.14%	1		
	Total Copper	mg/L	0.00365	N/A	N/A	0.0011	0.00164	69.86%	55.07%	0.00007		
	Dissolved Copper	mg/L	0.00215	0.005	0.02	ND	0.00127	-	40.93%	0.00007		
	Total Zinc	mg/L	0.0236	N/A	N/A	0.0013	0.00384	94.49%	83.73%	0.00025		
	Dissolved Zinc	mg/L	0.0279	0.02	0.3	0.0091	0.00842	67.38%	69.82%	0.00025		
	Total Phosphorus	mg/L	0.19	0.1	0.5	0.409	0.496	-115.26%	-161.05%	0.00505		Increase in total P in Eff
	Iron	mg/L	0.164	N/A	N/A	0.0291	0.158	82.26%	3.66%	0.01		
	Dissolved Iron	mg/L	0.0268	N/A	N/A	0.0124	0.0257	53.73%	4.10%	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.113	N/A	N/A	0.215	0.283	-90.27%	-150.44%	N/A		Increase in phosphate
	Hardness	mg CaCO3/L	153	N/A	N/A	292	315	-90.85%	-105.88%	1		Increase in hardness in Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	1.18	N/A	N/A	0.5	0.5	57.63%	57.63%	N/A		
	Nitrate-Nitrite	mg/L	0.1	N/A	N/A	0.11	0.201	-10.00%	-101.00%	N/A		Increase in Nitrate-Nitrite
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	1.18	N/A	N/A	ND	ND	-	-	N/A		

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	12/19/2019	-	Date storm event started	Not a qualifying event because does not have a 6 hour dry period after the storm (4 hr 15 min)
	Storm Start Date and Time	12/19/19 6:55 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	12/20/19 3:10 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.44	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	8.25	hours	Duration of storm event	
	Storm Average Intensity	0.05	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.36	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	159.08	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	1113.728	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	240.007	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	392.860	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	19.836	gpm	Average influent flow rate during storm event	
	12" Effluent	3.630	gpm	Average effluent flow rate during storm event	
	18" Effluent	5.621	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	60.596	gpm	Peak influent flow rate during storm event	
	12" Effluent	5.997	gpm	Peak effluent flow rate during storm event	
	18" Effluent	33.132	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	35	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	19	-		
	18" Effluent	31	-		
Sample Duration	Influent	2.83	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	7.67	hours		
	18" Effluent	7.50	hours		
Threshold	Influent	710	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	355	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	355	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	78.8%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	99.3%	%		
	% of 18 Effluent	99.0%	%		
90th Percentile Flow Rate	Influent	55.705	gpm	90th Percentile flow rate from storm start and end time.	

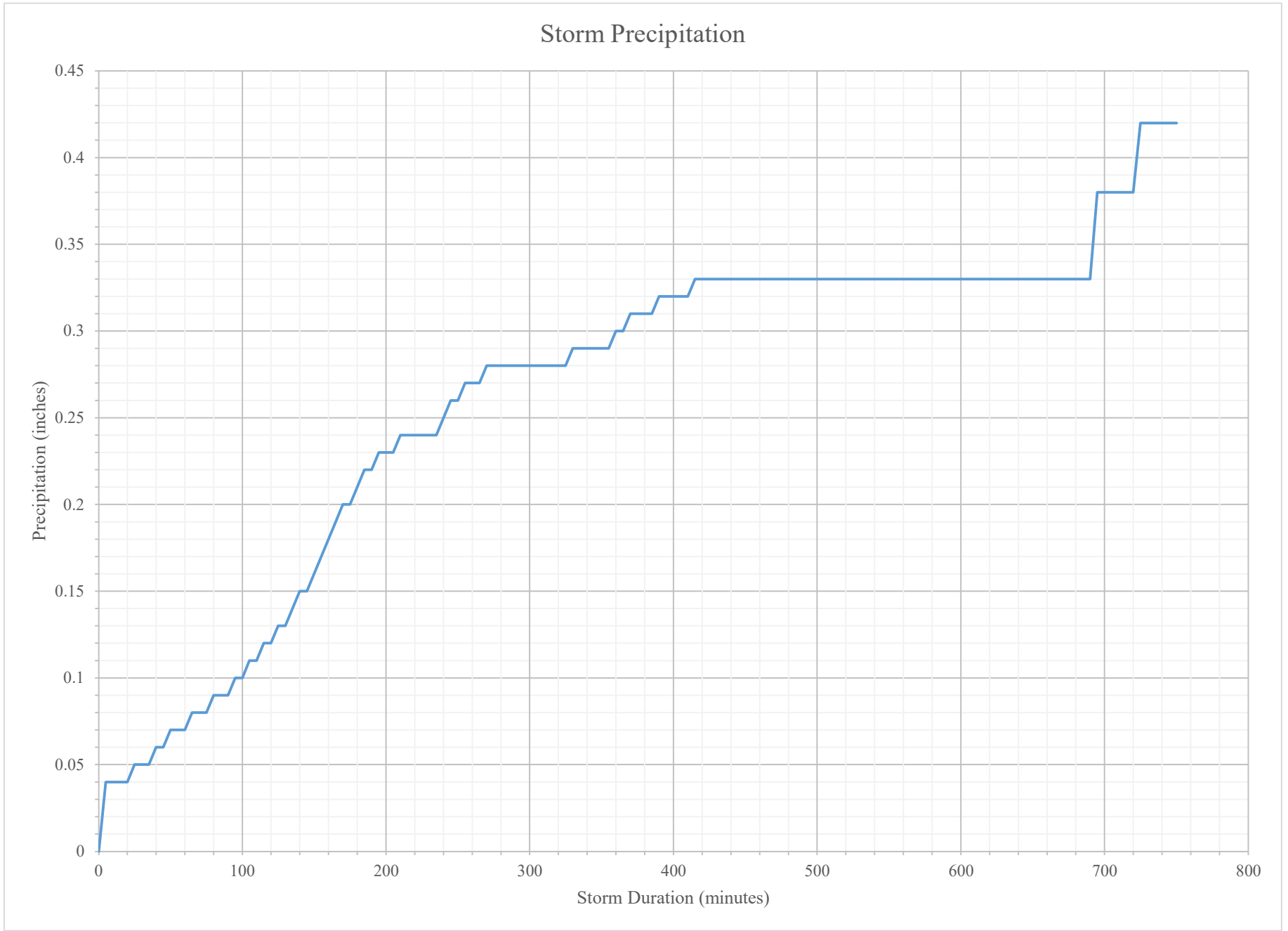

Storm Precipitation
Precipitation (inches)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
Storm Duration (minutes)

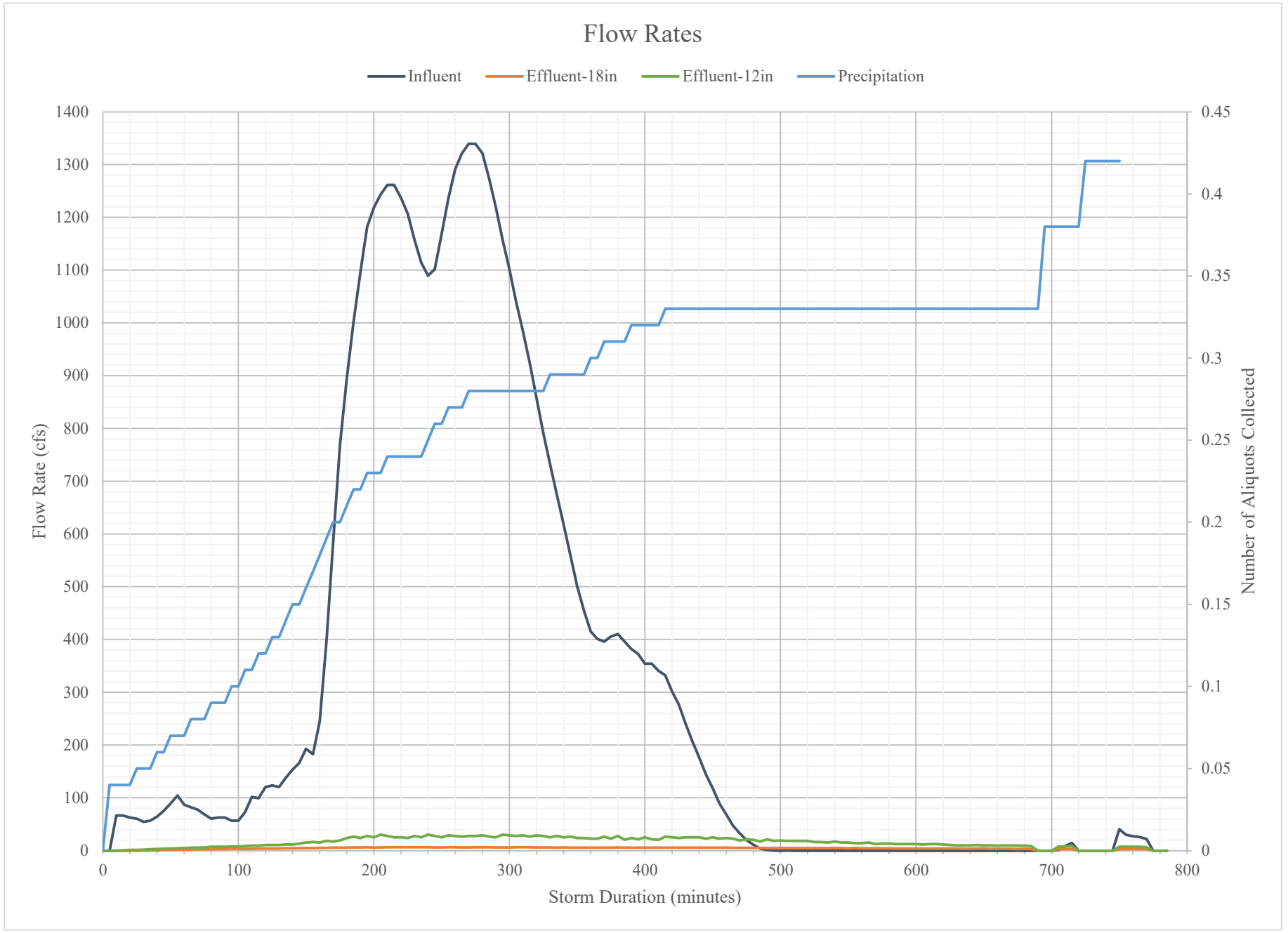

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
50
100
150
200
250
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0
100
200
300
400
500

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	1/28/2020	-	Date storm event started	Combined three storms into one, storms status = 3 at 1/28/2020 13:25, 1/28/2020 13:55 and 1/29/2020 14:25
	Storm Start Date and Time	1/28/20 2:05 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	1/28/20 2:50 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.42	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	12.75	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	15.17	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	90.927	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	28.930	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	12.190	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	123.496	gpm	Average influent flow rate during storm event	
	12" Effluent	4.545	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.239	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	353.844	gpm	Peak influent flow rate during storm event	
	12" Effluent	8.016	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.799	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	18	-		
Sample Duration	Influent	3.67	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	5.92	hours		
	18" Effluent	9.58	hours		
Threshold	Influent	350	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	175	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	175	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	100.0%	%	Number of aliquots times the threshold volume, divided by the total storm volume	Calculated storm volume sampled = 612%; changed to 100%
	% of 12 Effluent	100.0%	%		Calculated storm volume sampled = 962%; changed to 100%
	% of 18 Effluent	100.0%	%		Calculated storm volume sampled = 913%; changed to 100%
90th Percentile Flow Rate	Influent	323.847	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 1/28/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Flags
Required Parameters	TSS	mg/L	11	20	100	3.5	1.5	68.18%	86.36%	1		
	Total Copper	mg/L	0.00369	N/A	N/A	0.00685	0.00835	-85.64%	-126.29%	0.00007		Increase in copper
	Dissolved Copper	mg/L	0.00373	0.005	0.02	0.0067	0.0084	-79.62%	-125.20%	0.00007		Increase in dissolved copper
	Total Zinc	mg/L	0.0217	N/A	N/A	0.0057	0.00888	73.73%	59.08%	0.00025		
	Dissolved Zinc	mg/L	0.0192	0.02	0.3	0.0176	0.0192	8.33%	0.00%	0.00025		
	Total Phosphorus	mg/L	0.105	0.1	0.5	0.516	0.945	-391.43%	-800.00%	0.00505		Increase in total P in Eff
	Iron	mg/L	0.313	N/A	N/A	0.282	0.476	9.90%	-52.08%	0.01		Increase in iron for 18in
	Dissolved Iron	mg/L	0.017	N/A	N/A	0.136	0.166	-700.00%	-876.47%	0.01		Increase in dissolved iron
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0502	N/A	N/A	0.445	0.738	-786.45%	-1370.12%	N/A		Increase in phosphate
	Hardness	mg CaCO3/L	20	N/A	N/A	59	52	-195.00%	-160.00%	1		Increase in hardness in Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	0.5	N/A	N/A	0.5	0.801	0.00%	-60.20%	N/A		Increase in TKN in 18in
	Nitrate-Nitrite	mg/L	0.42	N/A	N/A	1	0.683	-138.10%	-62.62%	N/A		Increase in nitrate-nitrite
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

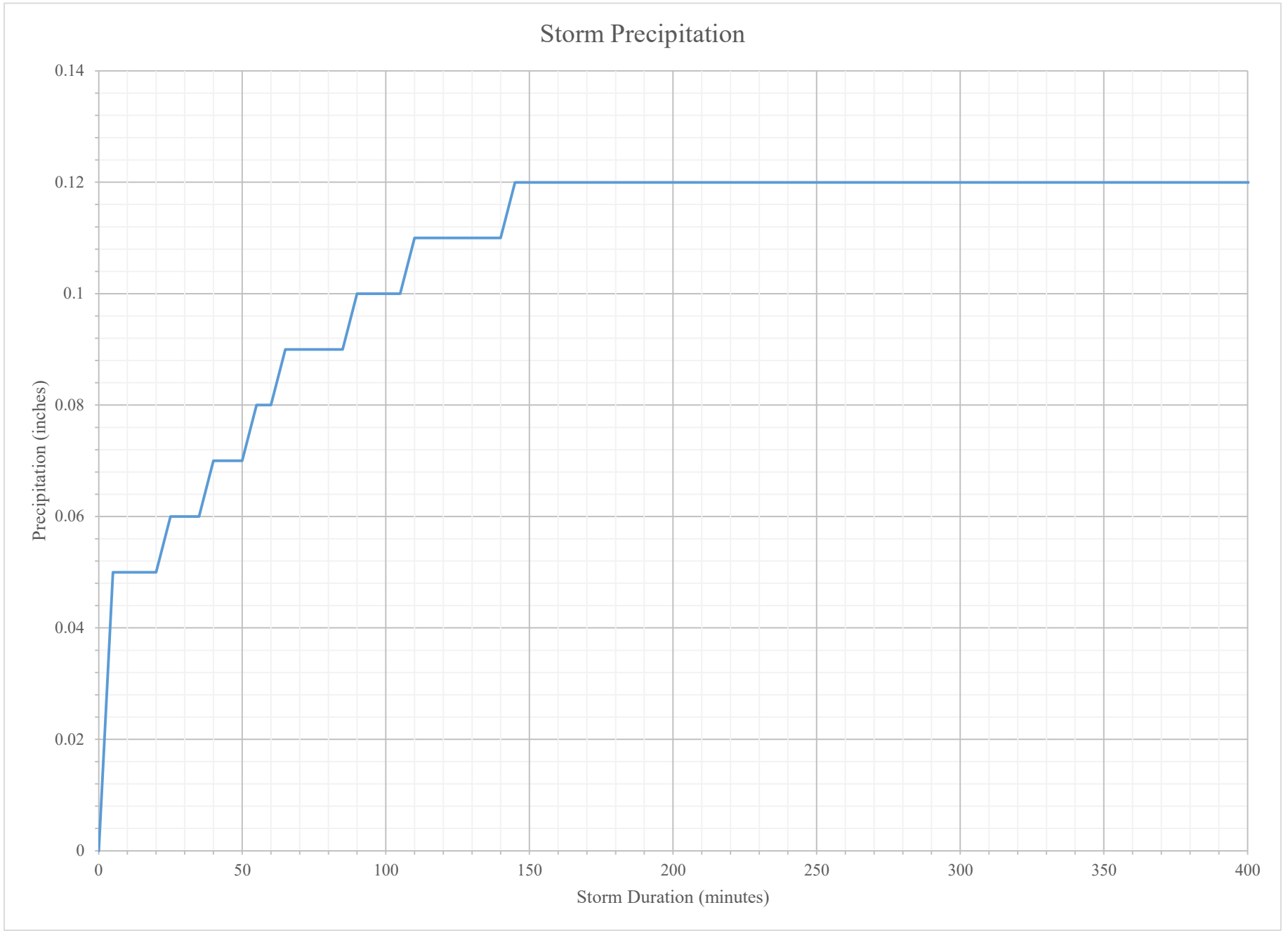

Storm Precipitation
Precipitation (inches)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600
700
800
Storm Duration (minutes)

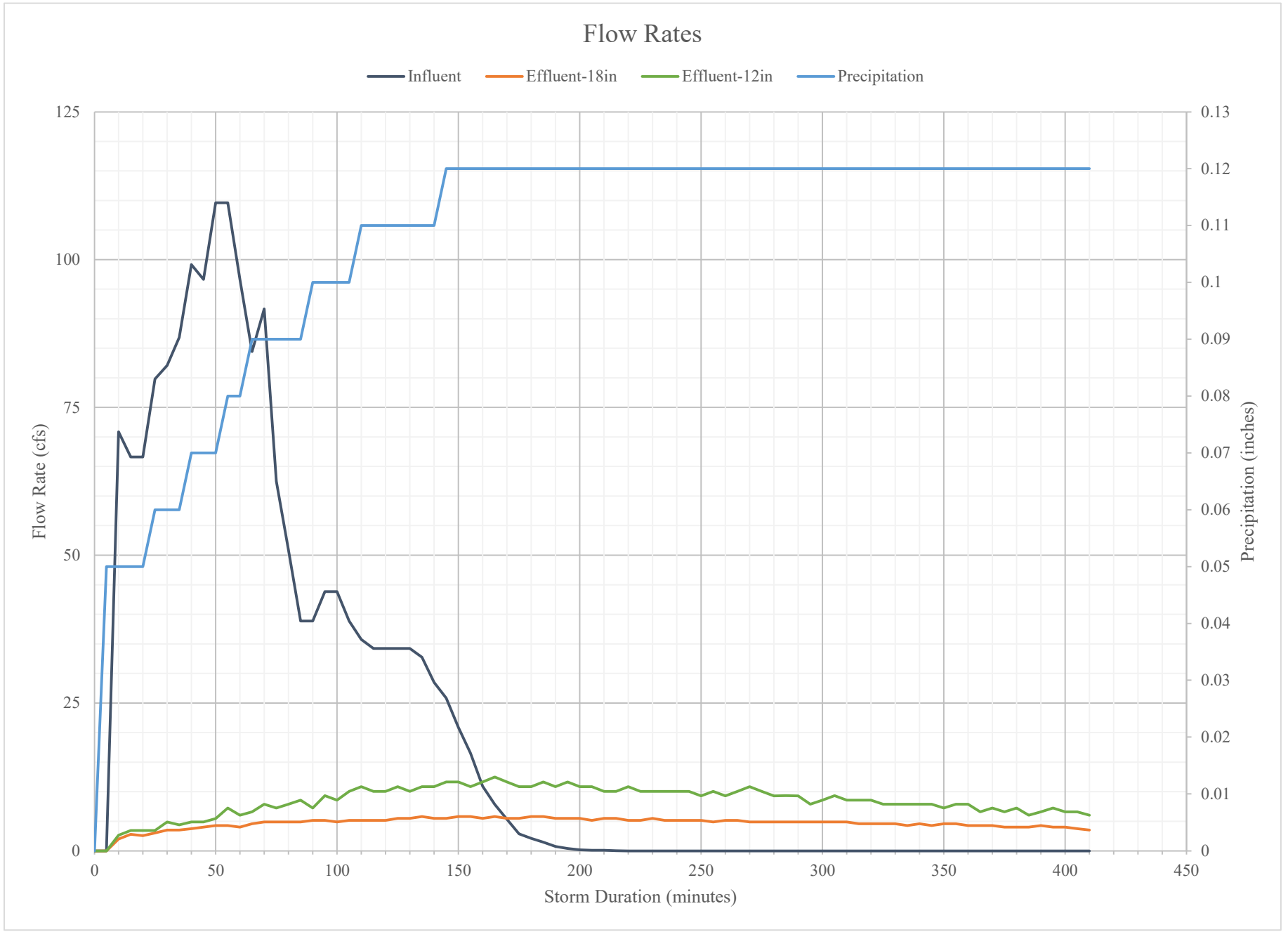

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Number of Aliquots Collected
Storm Duration (minutes)
0
100
200
300
400
500
600
700
800
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	1/30/2020	-	Date storm event started	
	Storm Start Date and Time	1/29/20 3:50 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	1/29/20 10:35 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.120	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	6.75	hours	Duration of storm event	
	Storm Average Intensity	0.018	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.120	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	25	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	316	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	123	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	68	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	11.244	gpm	Average influent flow rate during storm event	
	12" Effluent	2.266	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.251	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	28.96	gpm	Peak influent flow rate during storm event	
	12" Effluent	3.30	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.53	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	43	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	27	-		
Sample Duration	Influent	3.50	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	5.58	hours		
	18" Effluent	6.17	hours		
Threshold	Influent	140	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	70	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	70	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	67.4%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	90.7%	%		
	% of 18 Effluent	98.6%	%		
90th Percentile Flow Rate	Influent	25.400	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 1/30/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	10	20	100	3.5	ND	65.00%	-	1		
	Total Copper	mg/L	0.00414	N/A	N/A	0.00682	0.00762	-64.73%	-84.06%	0.00007		Increase in copper
	Dissolved Copper	mg/L	0.00118	0.005	0.02	0.00463	0.00648	-292.37%	-449.15%	0.00007		Increase in dissolved copper
	Total Zinc	mg/L	0.0198	N/A	N/A	0.00644	0.00776	67.47%	60.81%	0.00025		
	Dissolved Zinc	mg/L	0.00804	0.02	0.3	0.00483	0.00649	39.93%	19.28%	0.00025		
	Total Phosphorus	mg/L	0.107	0.1	0.5	0.572	0.911	-434.58%	-751.40%	0.00505		Increase in total P in Eff
	Iron	mg/L	0.381	N/A	N/A	0.385	0.295	-1.05%	22.57%	0.01		
	Dissolved Iron	mg/L	0.0208	N/A	N/A	0.185	0.245	-789.42%	-1077.88%	0.01		Increase in dissolved iron
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.115	N/A	N/A	0.404	0.776	-251.30%	-574.78%	N/A		Increase in phosphate
	Hardness	mg CaCO3/L	15	N/A	N/A	51	48.5	-240.00%	-223.33%	1		Increase in hardness in Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	0.657	N/A	N/A	0.884	0.865	-34.55%	-31.66%	N/A		Increase in TKN in 18in
	Nitrate-Nitrite	mg/L	ND	N/A	N/A	0.134	0.228	-34.00%	-128.00%	N/A		Increase in nitrate-nitrite, The PQL =0.100 was used to determine the removal efficieny
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

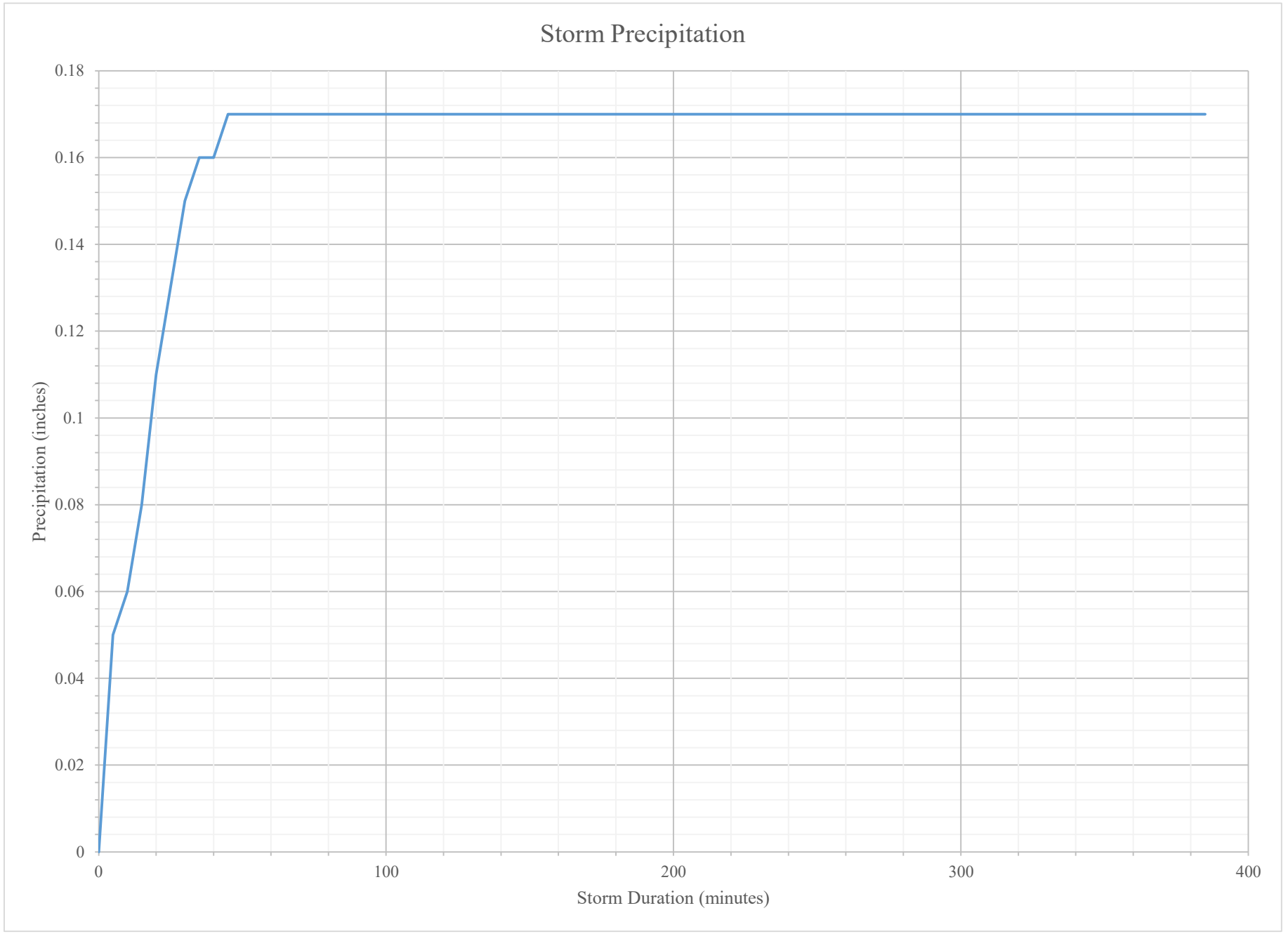

Storm Precipitation
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Precipitation (inches)
0
50
100
150
200
250
300
350
400
Storm Duration (minutes)

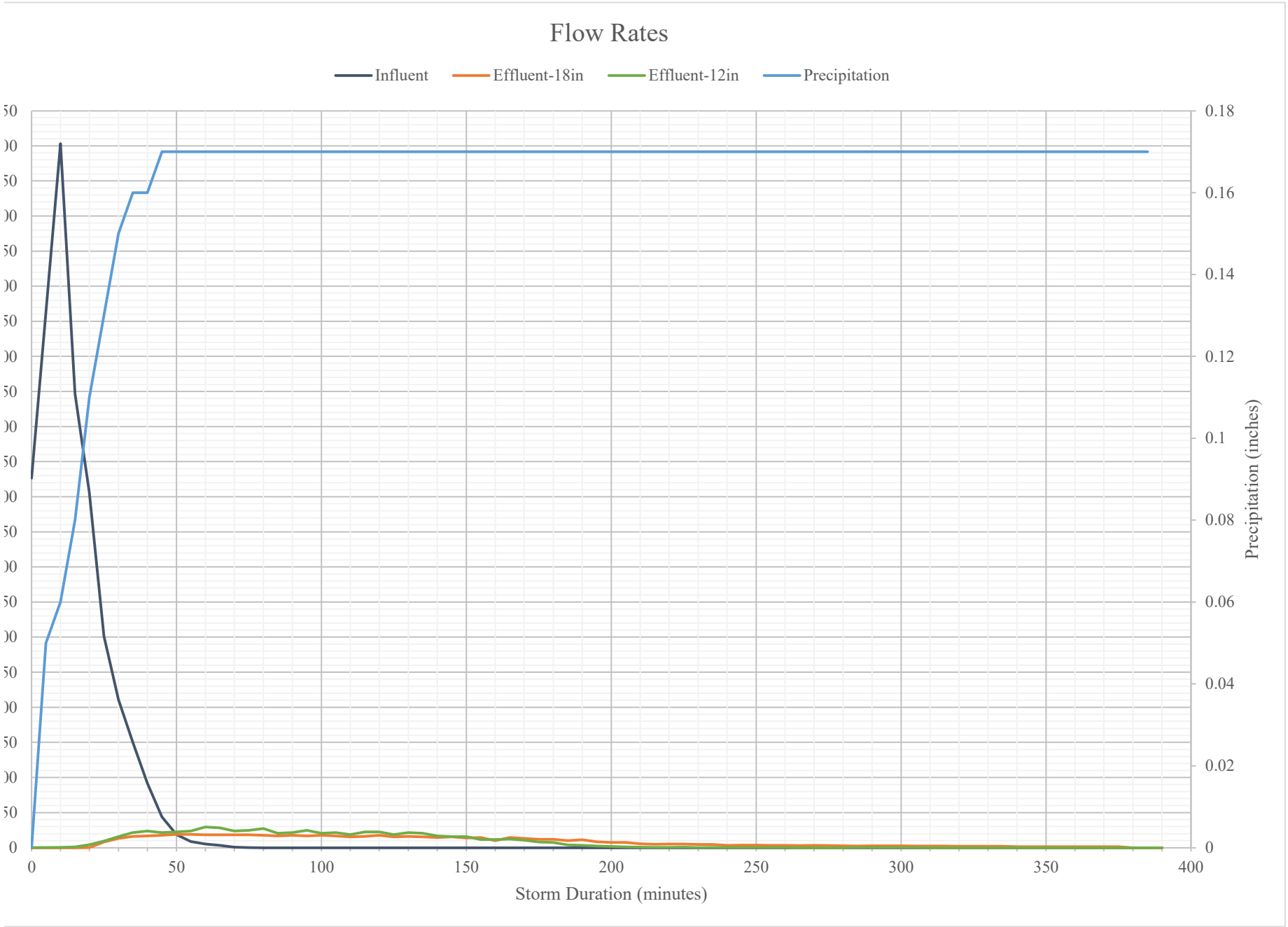

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
25
50
75
100
125
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
0.11
0.12
0.13
0
50
100
150
200
250
300
350
400
450

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	2/23/2020	-	Date storm event started	
	Storm Start Date and Time	2/23/20 1:40 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	2/23/20 8:00 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.17	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	6.33	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.36	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	179.42	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	657.237	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	111.860	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	113.090	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	61.934	gpm	Average influent flow rate during storm event	
	12" Effluent	2.935	gpm	Average effluent flow rate during storm event	
	18" Effluent	2.349	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	265.026	gpm	Peak influent flow rate during storm event	
	12" Effluent	7.794	gpm	Peak effluent flow rate during storm event	
	18" Effluent	5.030	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	16	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	38	-		
	18" Effluent	38	-		
Sample Duration	Influent	1.25	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.08	hours		
	18" Effluent	5.25	hours		
Threshold	Influent	165	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	83	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	83	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	14.2%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	99.6%	%		
	% of 18 Effluent	98.5%	%		
90th Percentile Flow Rate	Influent	154.940	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 2/23/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	90	20	100	2.7	1.5	97.00%	98.33%	1		
	Total Copper	mg/L	0.00759	N/A	N/A	0.00181	0.00164	76.15%	78.39%	0.00007		
	Dissolved Copper	mg/L	0.00274	0.005	0.02	0.00309	0.00228	-12.77%	16.79%	0.00007		Increased in 12in
	Total Zinc	mg/L	0.0654	N/A	N/A	0.00255	0.00186	96.10%	97.16%	0.00025		
	Dissolved Zinc	mg/L	0.0398	0.02	0.3	0.04	0.0279	-0.50%	29.90%	0.00025		Increased in dissolved zinc for 12in
	Total Phosphorus	mg/L	0.153	0.1	0.5	0.285	0.381	-86.27%	-149.02%	0.00505		Increase in total P in Eff
	Iron	mg/L	1.86	N/A	N/A	0.147	0.0869	92.10%	95.33%	0.01		
	Dissolved Iron	mg/L	0.0514	N/A	N/A	0.0449	0.0328	12.65%	36.19%	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0645	N/A	N/A	0.245	0.329	-279.84%	-410.08%	N/A		Increase in orthophosphate
	Hardness	mg CaCO3/L	24.5	N/A	N/A	143	193	-483.67%	-687.76%	1		Increase in hardness in Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	0.878	N/A	N/A	0.5	0.958	43.05%	-9.11%	N/A		Increase in TKN in 18in
	Nitrate-Nitrite	mg/L	0.154	N/A	N/A	0.307	0.742	-99.35%	-381.82%	N/A		Increase in nitrate-nitrite
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	1.03	N/A	N/A	ND	1.7	-	-65.05%	N/A		Increased in 18in

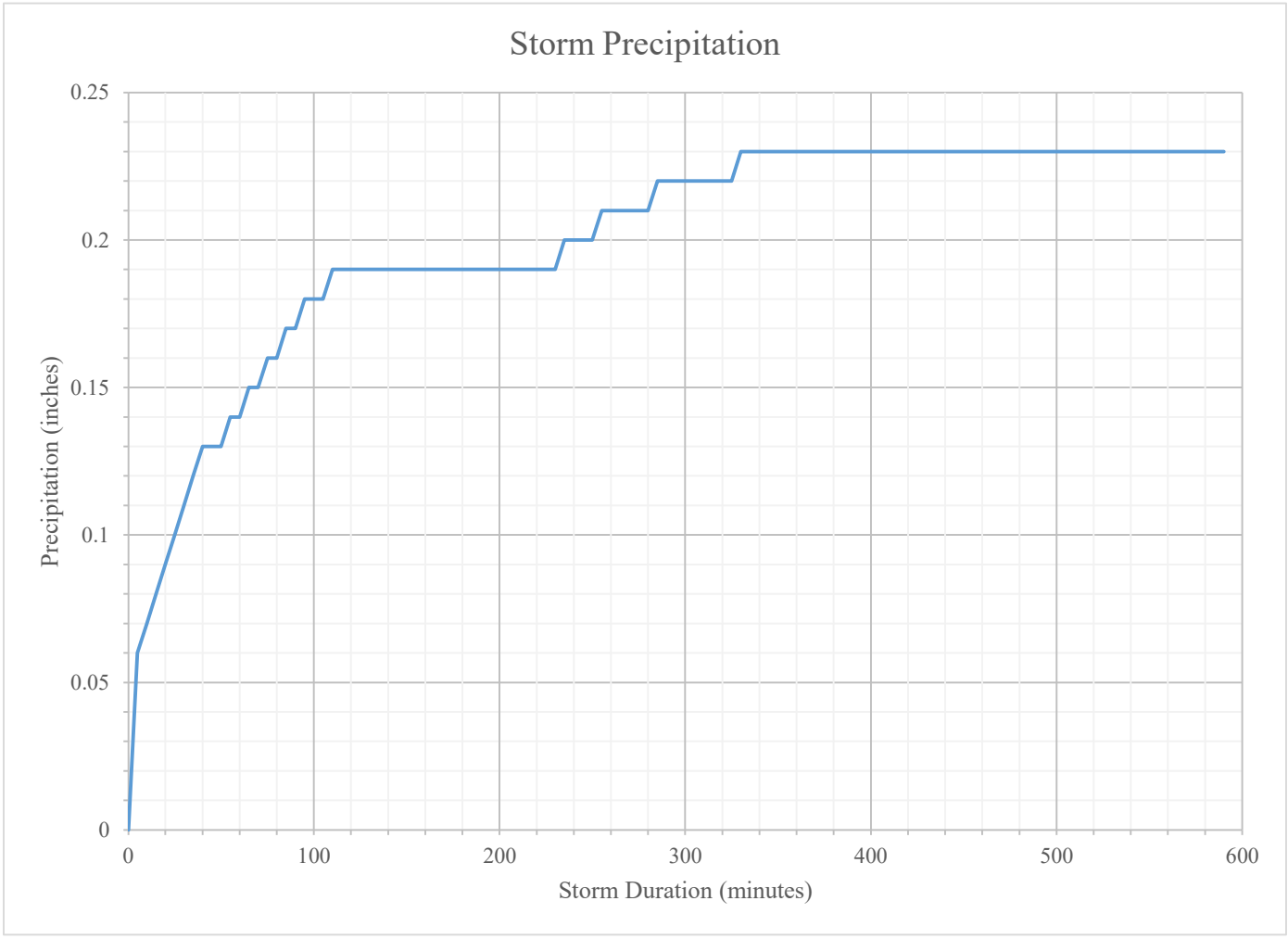

Storm Precipitation
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Precipitation (inches)
0
100
200
300
400
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Precipitation (inches)
0
50
100
150
200
250
300
350
400
Storm Duration (minutes)

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	5/6/2020	-	Date storm event started	
	Storm Start Date and Time	5/6/20 9:10 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	5/6/20 6:55 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.23	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	9.75	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	2.74	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	74.08	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	192.103	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	131.125	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	104.421	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	2.672	gpm	Average influent flow rate during storm event	
	12" Effluent	1.690	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.370	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	31.793	gpm	Peak influent flow rate during storm event	
	12" Effluent	5.852	gpm	Peak effluent flow rate during storm event	
	18" Effluent	4.383	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	19	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	26	-		
	18" Effluent	21	-		
Sample Duration	Influent	5.08	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	6.25	hours		
	18" Effluent	8.33	hours		
Threshold	Influent	278	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	139	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	139	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	97.2%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	97.4%	%		
	% of 18 Effluent	98.8%	%		
90th Percentile Flow Rate	Influent	7.373	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 5/6/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	83	20	100	10	5	87.95%	93.98%	1		
	Total Copper	mg/L	0.00844	N/A	N/A	0.00533	N/A	36.85%	-	0.00007		
	Dissolved Copper	mg/L	0.0055	0.005	0.02	0.00519	N/A	5.64%	-	0.00007		
	Total Zinc	mg/L	0.0575	N/A	N/A	0.00681	0.00616	88.16%	89.29%	0.00025		
	Dissolved Zinc	mg/L	0.0355	0.02	0.3	0.0194	0.0242	45.35%	31.83%	0.00025		
	Total Phosphorus	mg/L	0.358	0.1	0.5	0.505	0.739	-41.06%	-106.42%	0.00505		Increased Total P for Eff
	Iron	mg/L	0.677	N/A	N/A	0.231	0.272	65.88%	59.82%	0.01		
	Dissolved Iron	mg/L	0.0449	N/A	N/A	0.0633	0.102	-40.98%	-127.17%	0.01		Increased dissolved iron for Eff
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	4.49	N/A	N/A	1.57	2.05	65.03%	54.34%	N/A		
	250 - 62.5	µm	23.93	N/A	N/A	3.14	3.02	86.88%	87.38%	N/A		
	<62.5	µm	54.37	N/A	N/A	8.52	3.66	84.33%	93.27%	N/A		
	pH		7.68	N/A	N/A	6.68	6.73	13.02%	12.37%	N/A		
	Orthophosphate	mg/L	0.0308	N/A	N/A	0.342	0.574	-1010.39%	-1763.64%	N/A		Increased orthophosphate for Eff
	Hardness	mg CaCO3/L	19.6	N/A	N/A	135	154	-588.78%	-685.71%	1		Increased Hardness for Eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	1.66	1.56	-	-	N/A		
	Nitrate-Nitrite	mg/L	0.134	N/A	N/A	0.142	0.328	-5.97%	-144.78%	N/A		Increased nitrate-nititrite for Eff
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	0.134	N/A	N/A	1.8	1.88	-1243.28%	-1302.99%	N/A		Increased total nitrogen for Eff


Storm Precipitation
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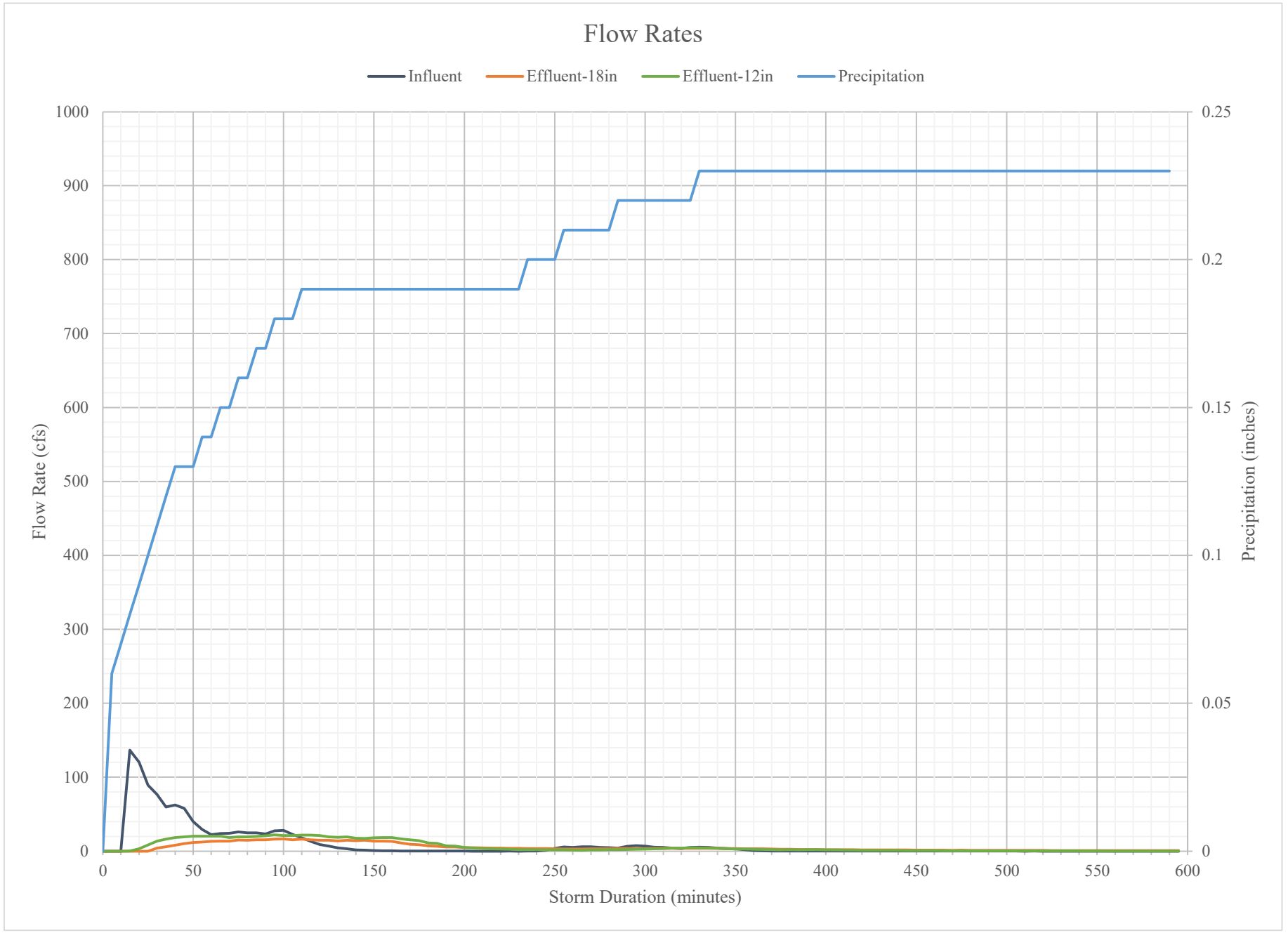
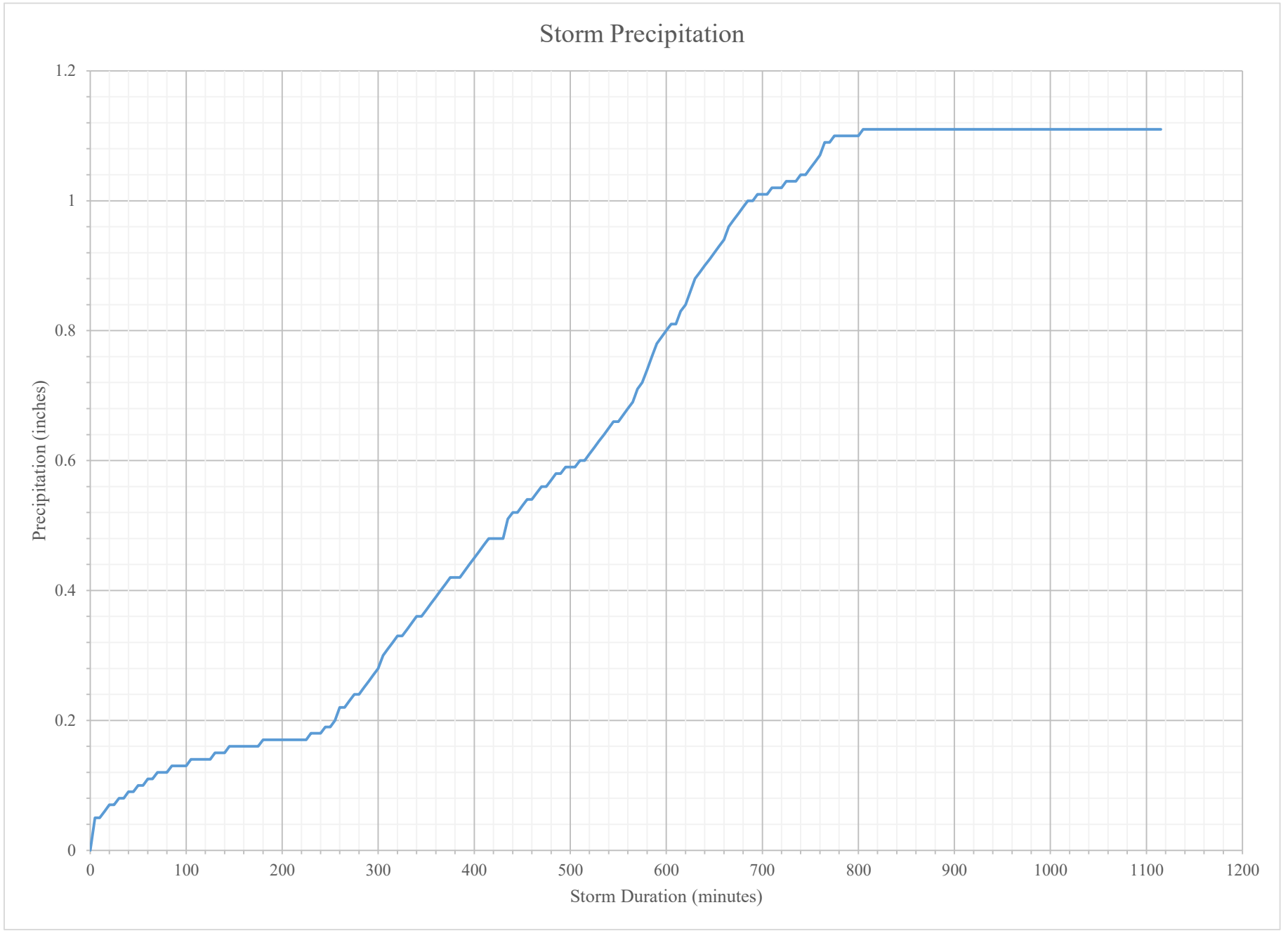
0.2
0.15
0.1
0.05
0
Precipitation (inches)
0
100
200
300
400
500
600
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
100
200
300
400
500
600
700
800
900
1000
0
0.05
0.1
0.15
0.2
0.25
0
50
100
150
200
250
300
350
400
450
500
550
600

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	5/20/2020	-	Date storm event started	
	Storm Start Date and Time	5/20/20 11:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	5/21/20 6:25 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	1.11	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	18.50	hours	Duration of storm event	
	Storm Average Intensity	0.06	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	1.53	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	5.17	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	11386.908	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	393.625	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	352.704	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	96.748	gpm	Average influent flow rate during storm event	
	12" Effluent	2.651	gpm	Average effluent flow rate during storm event	
	18" Effluent	2.376	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	689.839	gpm	Peak influent flow rate during storm event	
	12" Effluent	4.163	gpm	Peak effluent flow rate during storm event	
	18" Effluent	3.845	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	31	-		
	18" Effluent	28	-		
Sample Duration	Influent	8.25	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	15.92	hours		
	18" Effluent	17.17	hours		
Threshold	Influent	712	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	356	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	356	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	9.9%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	99.1%	%		
	% of 18 Effluent	99.9%	%		
90th Percentile Flow Rate	Influent	429.479	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 5/20/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	N/A	20	100	N/A	N/A	-	-	1		
	Total Copper	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.00007		
	Dissolved Copper	mg/L	N/A	0.005	0.02	N/A	N/A	-	-	0.00007		
	Total Zinc	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.00025		
	Dissolved Zinc	mg/L	N/A	0.02	0.3	N/A	N/A	-	-	0.00025		
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	4.31	N/A	N/A	1.06	1.07	75.41%	75.17%	N/A		
	250 - 62.5	µm	15.7	N/A	N/A	1.73	2.25	88.98%	85.67%	N/A		
	<62.5	µm	28.92	N/A	N/A	6.63	4.93	77.07%	82.95%	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	N/A	N/A	N/A	N/A	N/A	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
1.2
1
0.8
0.6
0.4
0.2
0
0
100
200
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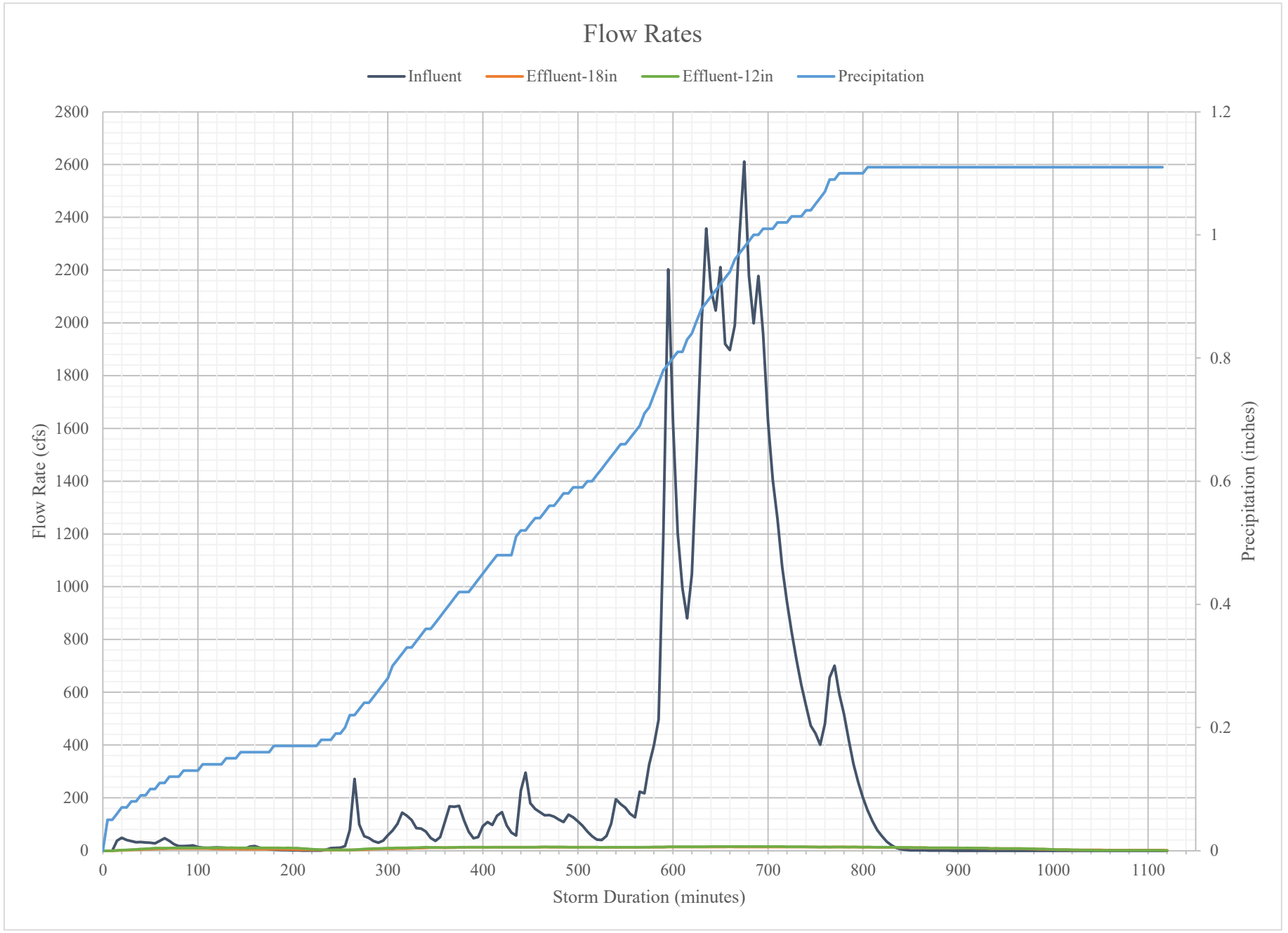
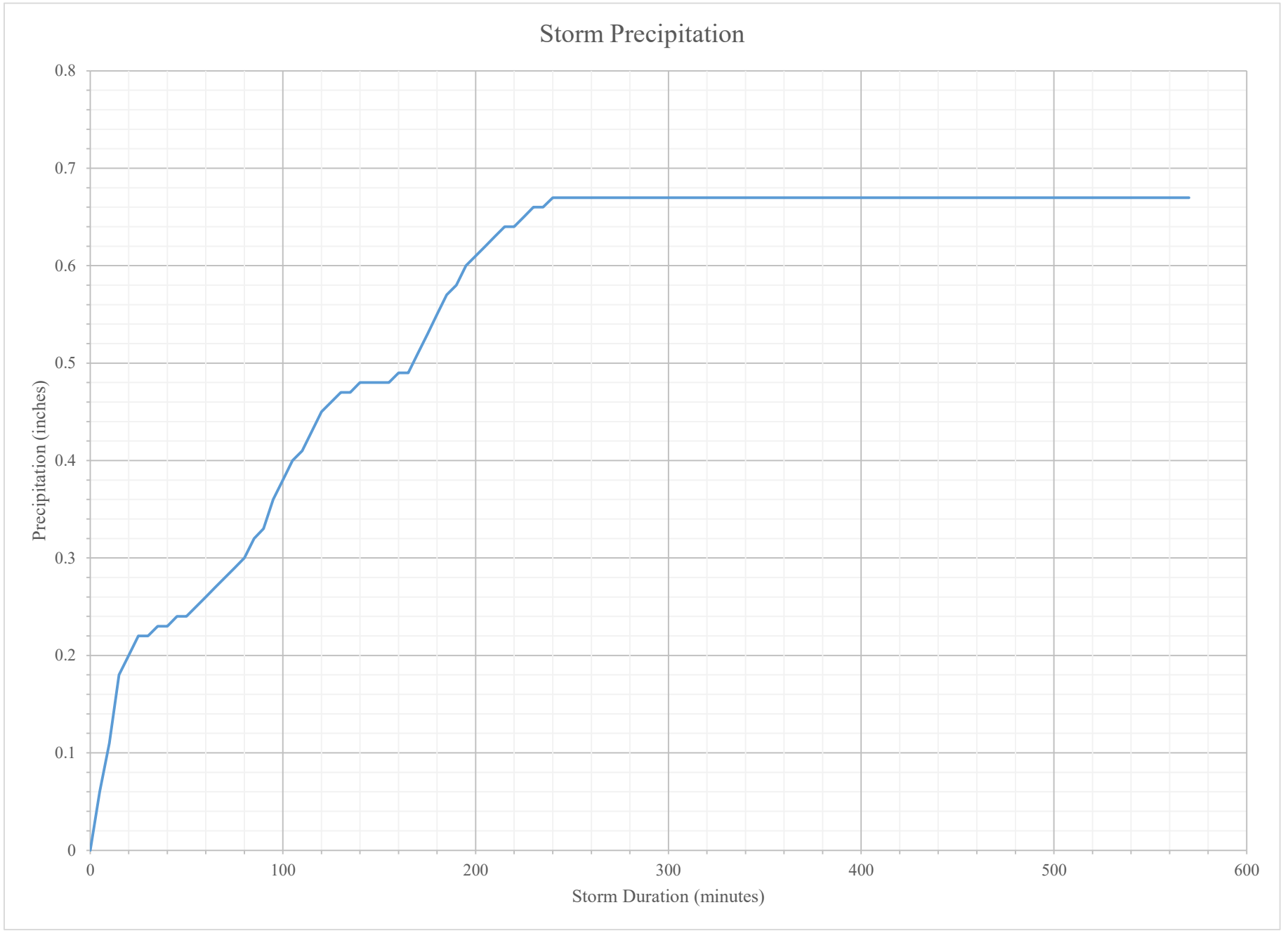
600
700
800
900
1000
1100
1200
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
0
0.2
0.4
0.6
0.8
1
1.2
0
100
200
300
400
500
600
700
800
900
1000
1100

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	5/31/2020	-	Date storm event started	
	Storm Start Date and Time	5/31/20 3:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	5/31/20 1:20 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.67	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	9.42	hours	Duration of storm event	
	Storm Average Intensity	0.07	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	3.07	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	129.92	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	3457.199	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	387.122	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	229.710	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	29.591	gpm	Average influent flow rate during storm event	
	12" Effluent	4.162	gpm	Average effluent flow rate during storm event	
	18" Effluent	2.594	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	104.483	gpm	Peak influent flow rate during storm event	
	12" Effluent	9.078	gpm	Peak effluent flow rate during storm event	
	18" Effluent	5.208	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	28	-		
Sample Duration	Influent	3.67	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	5.42	hours		
	18" Effluent	7.08	hours		
Threshold	Influent	450	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	225	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	225	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	20.7%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	92.4%	%		
	% of 18 Effluent	96.9%	%		
90th Percentile Flow Rate	Influent	141.279	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 5/31/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	120	20	100	12	4	90.00%	96.67%	1		
	Total Copper	mg/L	0.00477	N/A	N/A	0.00344	0.00488	27.88%	-2.31%	0.00007		Increased total copper in 18" eff
	Dissolved Copper	mg/L	0.00119	0.005	0.02	0.00344	0.00432	-189.08%	-263.03%	0.00007		Increased dissolved copper in eff
	Total Zinc	mg/L	0.0428	N/A	N/A	0.014	0.00506	67.29%	88.18%	0.00025		
	Dissolved Zinc	mg/L	0.0081	0.02	0.3	0.0143	0.00412	-76.54%	49.14%	0.00025		Increased dissolved zinc in 12" eff
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	0.842	N/A	N/A	0.459	0.478	45.49%	43.23%	0.01		
	Dissolved Iron	mg/L	0.0218	N/A	N/A	0.0825	0.0984	-278.44%	-351.38%	0.01		Increased dissolved iron in eff
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	12.7	N/A	N/A	91.1	116	-617.32%	-813.39%	1		Increased hardness in eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
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0.7
0.6
0.5
0.4
0.3
0.2
0.1
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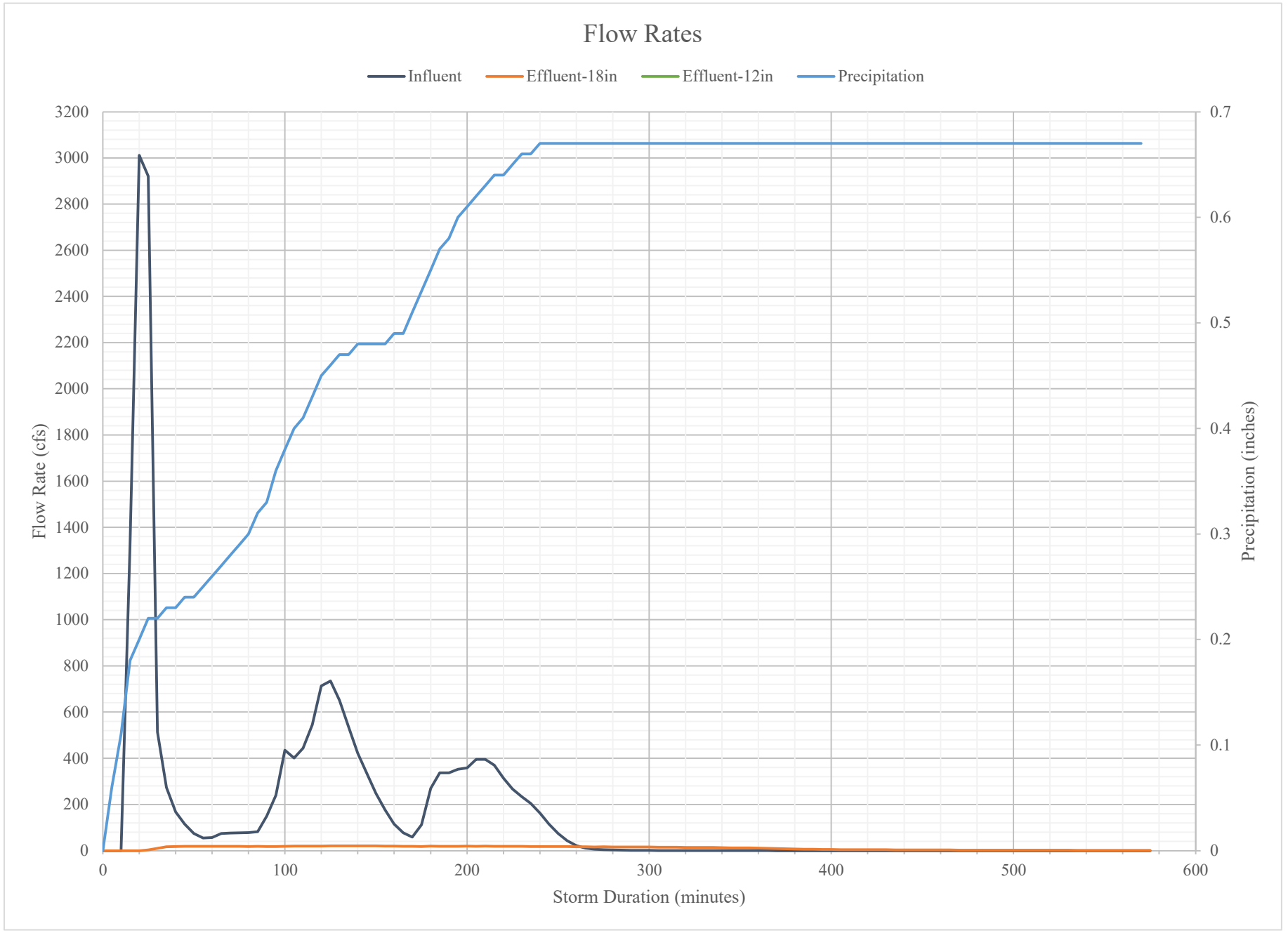
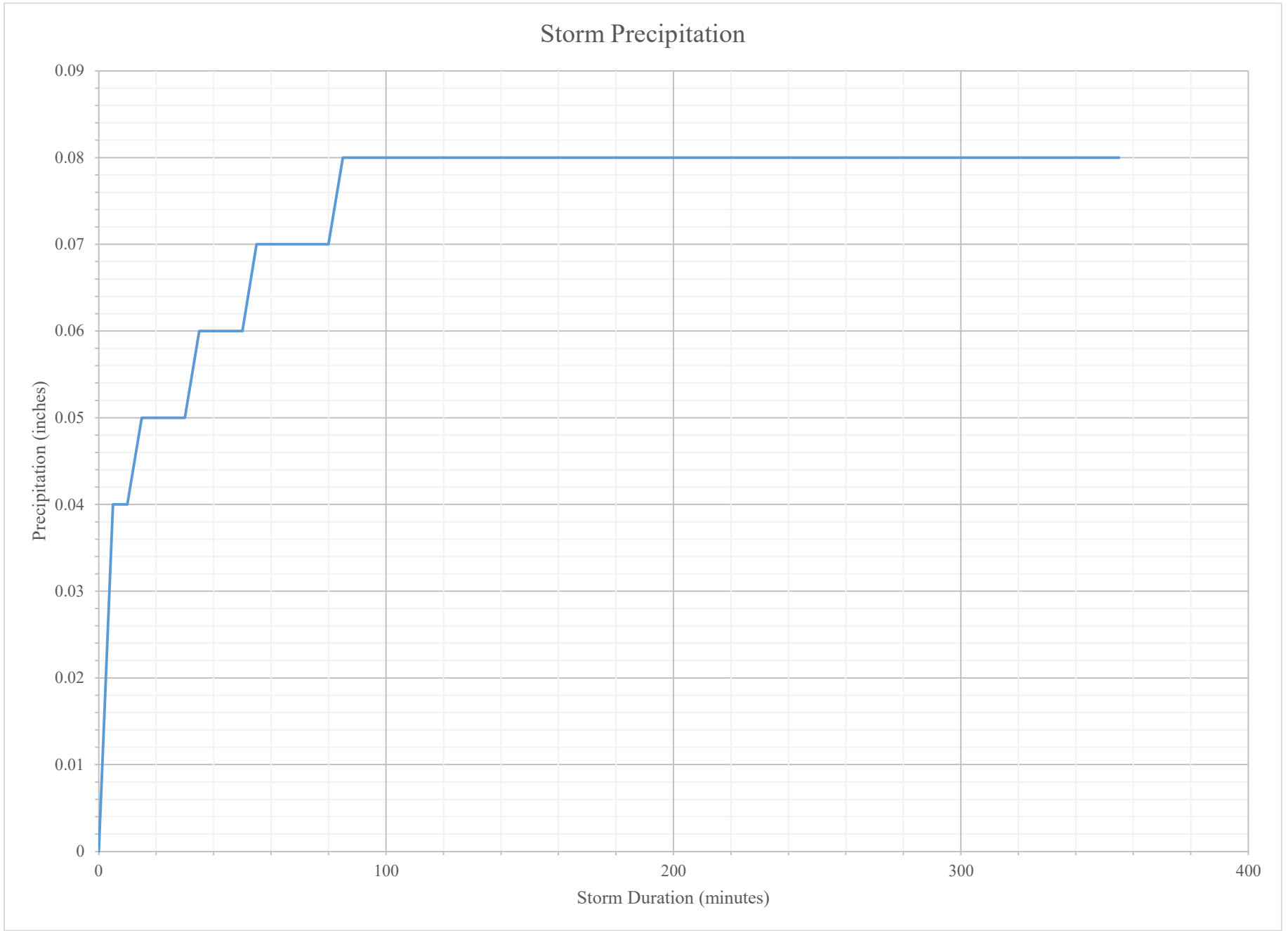
400
500
600
Storm Duration (minutes)

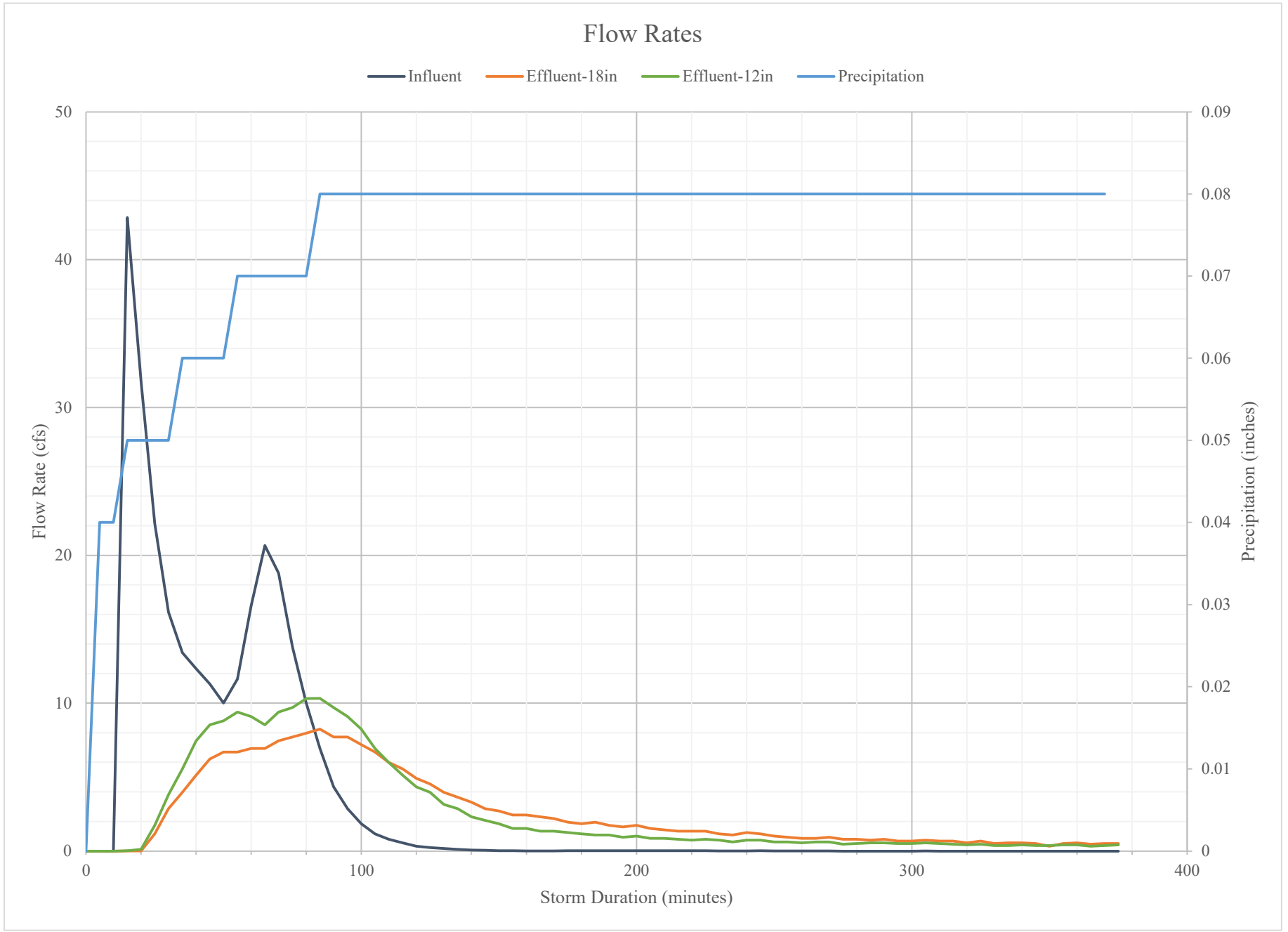

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
100
200
300
400
500
600

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	9/25/2020	-	Date storm event started	
	Storm Start Date and Time	9/25/20 10:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	9/25/20 5:00 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.08	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	6.08	hours	Duration of storm event	
	Storm Average Intensity	0.01	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	29.17	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	47.905	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	35.279	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	34.247	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	1.352	gpm	Average influent flow rate during storm event	
	12" Effluent	0.723	gpm	Average effluent flow rate during storm event	
	18" Effluent	0.702	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	11.322	gpm	Peak influent flow rate during storm event	
	12" Effluent	2.726	gpm	Peak effluent flow rate during storm event	
	18" Effluent	2.179	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	8	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	12	-		
	18" Effluent	12	-		
Sample Duration	Influent	1.08	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.17	hours		
	18" Effluent	4.17	hours		
Threshold	Influent	154	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	77	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	77	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	90.9%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	92.5%	%		
	% of 18 Effluent	95.3%	%		
90th Percentile Flow Rate	Influent	4.360	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 9/25/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	36	20	100	25	153	30.56%	-325.00%	1		Increase TSS for 18" Eff
	Total Copper	mg/L	0.0146	N/A	N/A	0.00674	0.0056	53.84%	61.64%	0.00007		
	Dissolved Copper	mg/L	0.0112	0.005	0.02	0.00671	0.00297	40.09%	73.48%	0.00007		
	Total Zinc	mg/L	0.0595	N/A	N/A	0.00427	0.0094	92.82%	84.20%	0.00025		
	Dissolved Zinc	mg/L	0.0444	0.02	0.3	0.00327	0.00323	92.64%	92.73%	0.00025		
	Total Phosphorus	mg/L	0.477	0.1	0.5	0.433	0.751	9.22%	-57.44%	0.00505		Increase total phosphorus for 18" Eff
	Iron	mg/L	1.2	N/A	N/A	0.185	0.435	84.58%	63.75%	0.01		
	Dissolved Iron	mg/L	0.139	N/A	N/A	0.0543	0.0426	60.94%	69.35%	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	49.9	N/A	N/A	204	196	-308.82%	-292.79%	1		Hardness for effluents
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

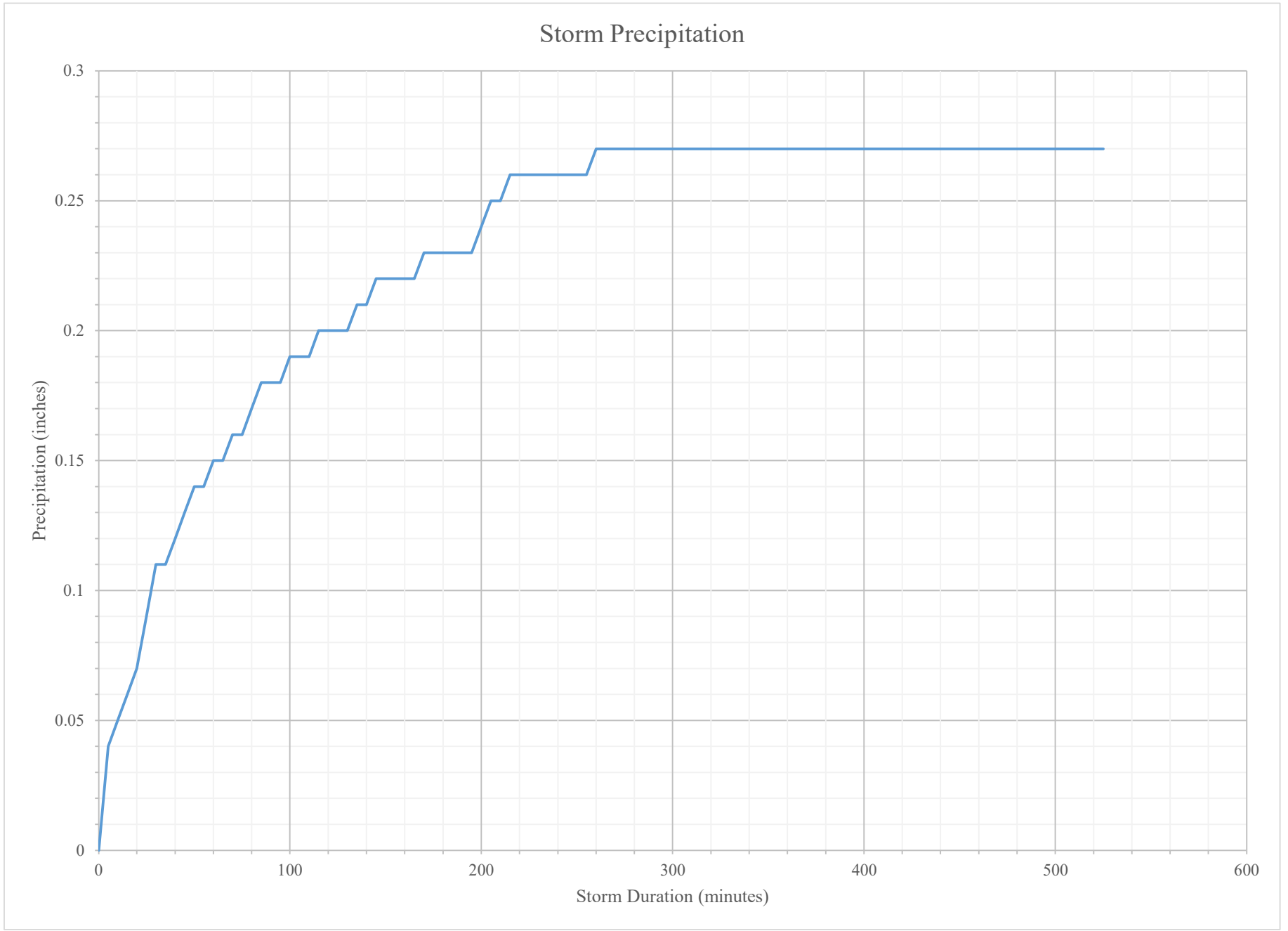

Storm Precipitation
Precipitation (inches)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
100
200
300
400
Storm Duration (minutes)

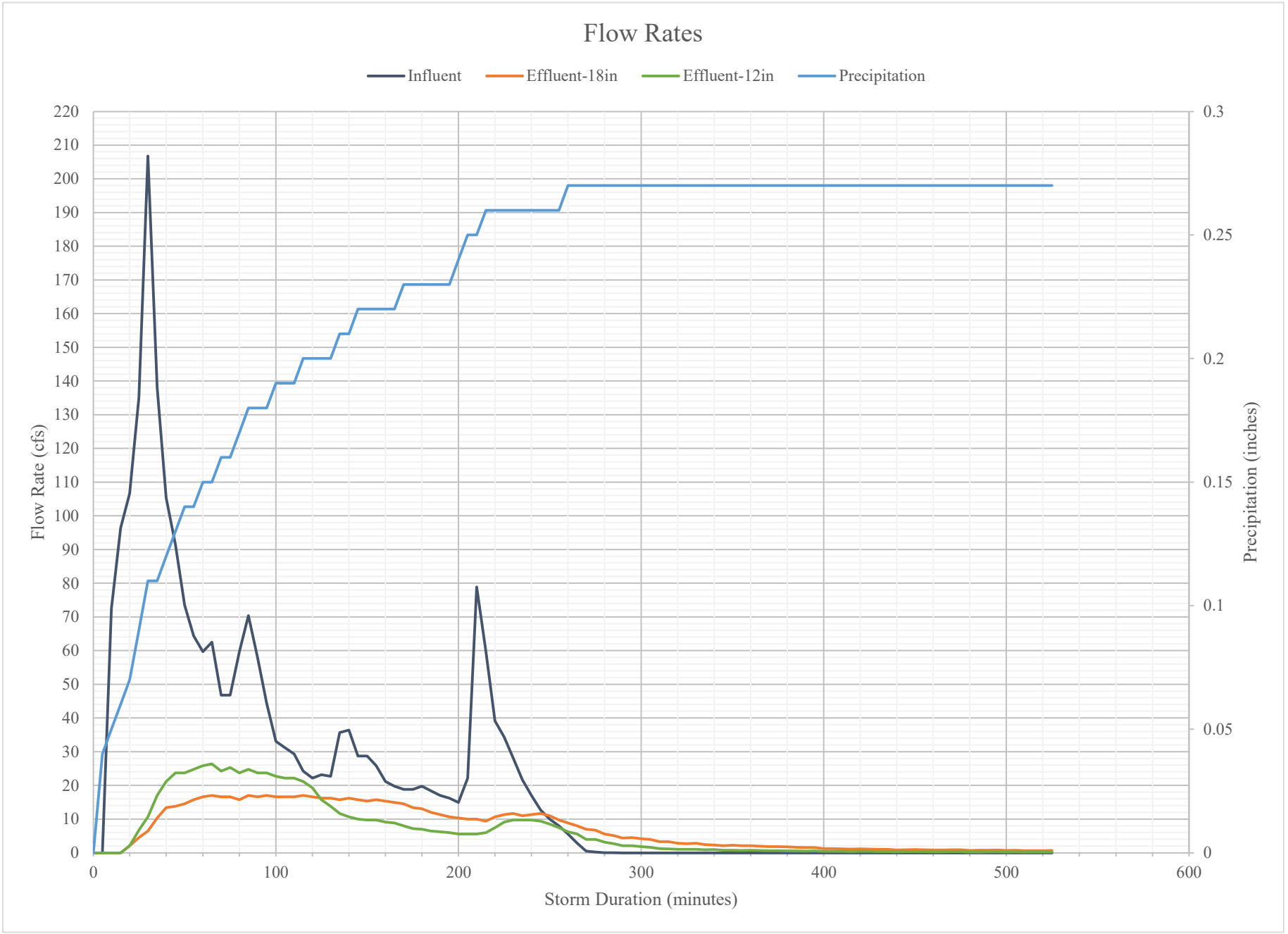

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0
100
200
300
400

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	10/10/2020	-	Date storm event started	
	Storm Start Date and Time	10/10/20 9:05 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	10/10/20 5:45 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.27	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	8.67	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.24	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	352.08	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	421.263	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	127.844	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	134.703	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	11.249	gpm	Average influent flow rate during storm event	
	12" Effluent	1.874	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.975	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	54.635	gpm	Peak influent flow rate during storm event	
	12" Effluent	6.979	gpm	Peak effluent flow rate during storm event	
	18" Effluent	4.495	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	30	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	18	-		
	18" Effluent	19	-		
Sample Duration	Influent	3.83	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	4.75	hours		
	18" Effluent	6.25	hours		
Threshold	Influent	392	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	196	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	196	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	98.6%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	97.5%	%		
	% of 18 Effluent	97.7%	%		
90th Percentile Flow Rate	Influent	24.819	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 10/10/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	12	20	100	4.4	4	63.33%	66.67%	1		
	Total Copper	mg/L	0.00734	N/A	N/A	0.00742	0.00633	-1.09%	13.76%	0.00007		Total copper for 12" Eff
	Dissolved Copper	mg/L	0.00491	0.005	0.02	0.00651	0.00563	-32.59%	-14.66%	0.00007		Dissolved copper for effluents
	Total Zinc	mg/L	0.0423	N/A	N/A	0.00739	0.00893	82.53%	78.89%	0.00025		
	Dissolved Zinc	mg/L	0.0319	0.02	0.3	0.0149	0.0223	53.29%	30.09%	0.00025		
	Total Phosphorus	mg/L	0.288	0.1	0.5	0.475	0.715	-64.93%	-148.26%	0.00505		Total phosphorus for effluents
	Iron	mg/L	0.866	N/A	N/A	0.502	0.444	42.03%	48.73%	0.01		
	Dissolved Iron	mg/L	0.0771	N/A	N/A	0.0826	0.114	-7.13%	-47.86%	0.01		Dissolved iron for effluents
	NWTPH-Dx											
	Lube Oil	mg/kg	0.52	N/A	N/A	ND	ND	23.08%	23.08%	0.4		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	26.9	N/A	N/A	136	146	-405.58%	-442.75%	1		Hardness for effluents
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	1.39	N/A	N/A	2.19	1.56	-57.55%	-12.23%	N/A		TKN for effluents
	Nitrate-Nitrite	mg/L	0.12	N/A	N/A	0.177	0.468	-47.50%	-290.00%	N/A		Nitrate-Nitrite for effluents
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	0.194	N/A	N/A	0.418	0.642	-115.46%	-230.93%	N/A		PO4/P for effluents
	Total Nitrogen	mg/L	1.51	N/A	N/A	2.37	2.03	-56.95%	-34.44%	N/A		Total Nitrogen for effluents

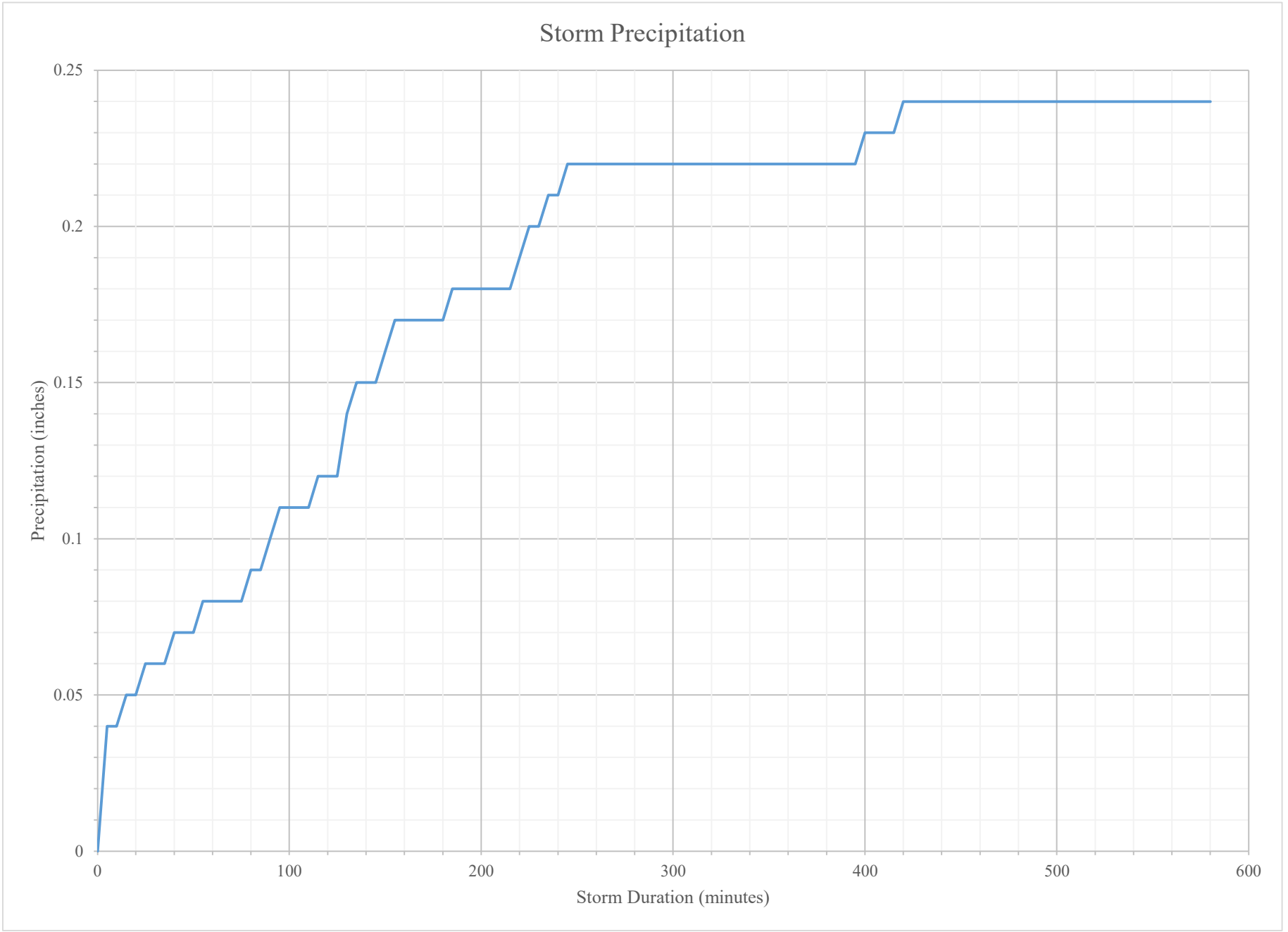

Storm Precipitation
Precipitation (inches)
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600
Storm Duration (minutes)

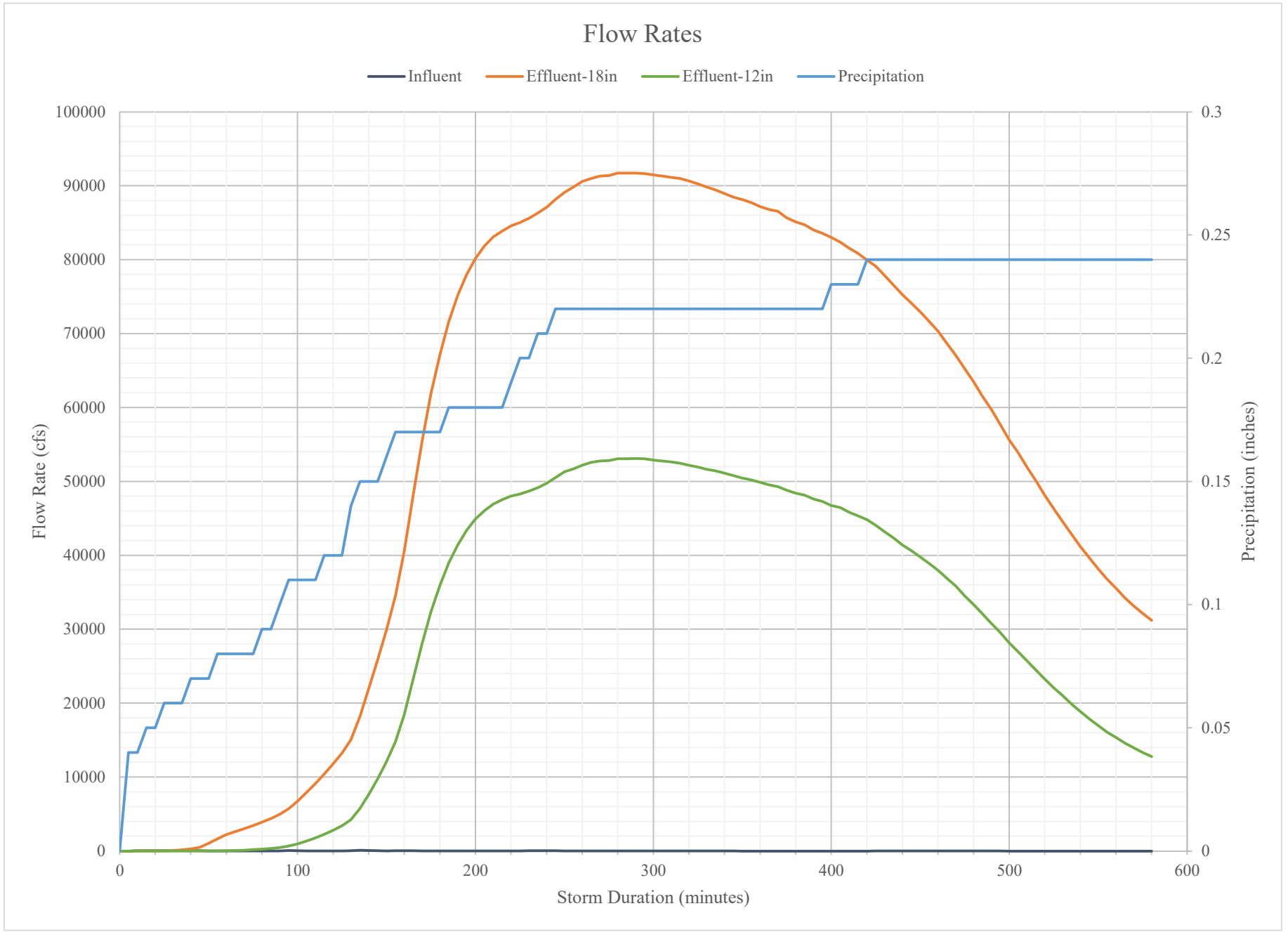

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
0
0.05
0.1
0.15
0.2
0.25
0.3
0
100
200
300
400
500
600

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	10/11/2020	-	Date storm event started	
	Storm Start Date and Time	10/11/20 6:20 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	10/12/20 3:55 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.24	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	9.58	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	3.16	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	24.58	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	191.709	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	612592.933	ft^3	Total volume of effluent from start of event to end of event	Effluent larger than influent flows
	18" Effluent	1133901.413	ft^3	Total volume of effluent from start of event to end of event	Effluent larger than influent flows
Average Flow Rate	Influent	3.050	gpm	Average influent flow rate during storm event	
	12" Effluent	7965.714	gpm	Average effluent flow rate during storm event	Effluent larger than influent flows
	18" Effluent	14744.431	gpm	Average bypass flow rate during storm event	Effluent larger than influent flows
Peak Flow Rate	Influent	27.824	gpm	Peak influent flow rate during storm event	
	12" Effluent	14030.383	gpm	Peak effluent flow rate during storm event	Effluent larger than influent flows
	18" Effluent	24229.855	gpm	Peak bypass flow rate during storm event	Effluent larger than influent flows
Aliquots	Influent	11	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	>45	-		
Sample Duration	Influent	3.92	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.75	hours		
	18" Effluent	3.67	hours		
Threshold	Influent	474	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	237	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	237	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	96.1%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	0.1%	%		
	% of 18 Effluent	0.0%	%		
90th Percentile Flow Rate	Influent	7.906	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 10/11/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	12.3	20	100	9.4	7.6	23.58%	38.21%	1		
	Total Copper	mg/L	0.00523	N/A	N/A	0.00931	0.00818	-78.01%	-56.41%	0.00007		Increased total copper in effluents
	Dissolved Copper	mg/L	0.00366	0.005	0.02	0.00762	0.00648	-108.20%	-77.05%	0.00007		Increased dissolved copper in effluents
	Total Zinc	mg/L	0.0274	N/A	N/A	0.00841	0.00994	69.31%	63.72%	0.00025		
	Dissolved Zinc	mg/L	0.0244	0.02	0.3	0.0208	0.00719	14.75%	70.53%	0.00025		
	Total Phosphorus	mg/L	0.148	0.1	0.5	0.427	0.45	-188.51%	-204.05%	0.00505		Increased total phosphorus in effluents
	Iron	mg/L	0.544	N/A	N/A	0.676	0.447	-24.26%	17.83%	0.01		Increaed iron in 12" eff
	Dissolved Iron	mg/L	0.0258	N/A	N/A	0.0798	0.0594	-209.30%	-130.23%	0.01		Increased dissolved iron in effluents
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	19.2	N/A	N/A	136	190	-608.33%	-889.58%	1		Increased hardness in effluents
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	0.653	N/A	N/A	1.29	1.05	-97.55%	-60.80%	N/A		Increased TKN in effluents
	Nitrate-Nitrite	mg/L	0.159	N/A	N/A	0.146	0.194	8.18%	-22.01%	N/A		Increased Nitrate-nitrite in 18" eff
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	0.812	N/A	N/A	1.44	1.25	-77.34%	-53.94%	N/A		Increased total nitrogen in effluents

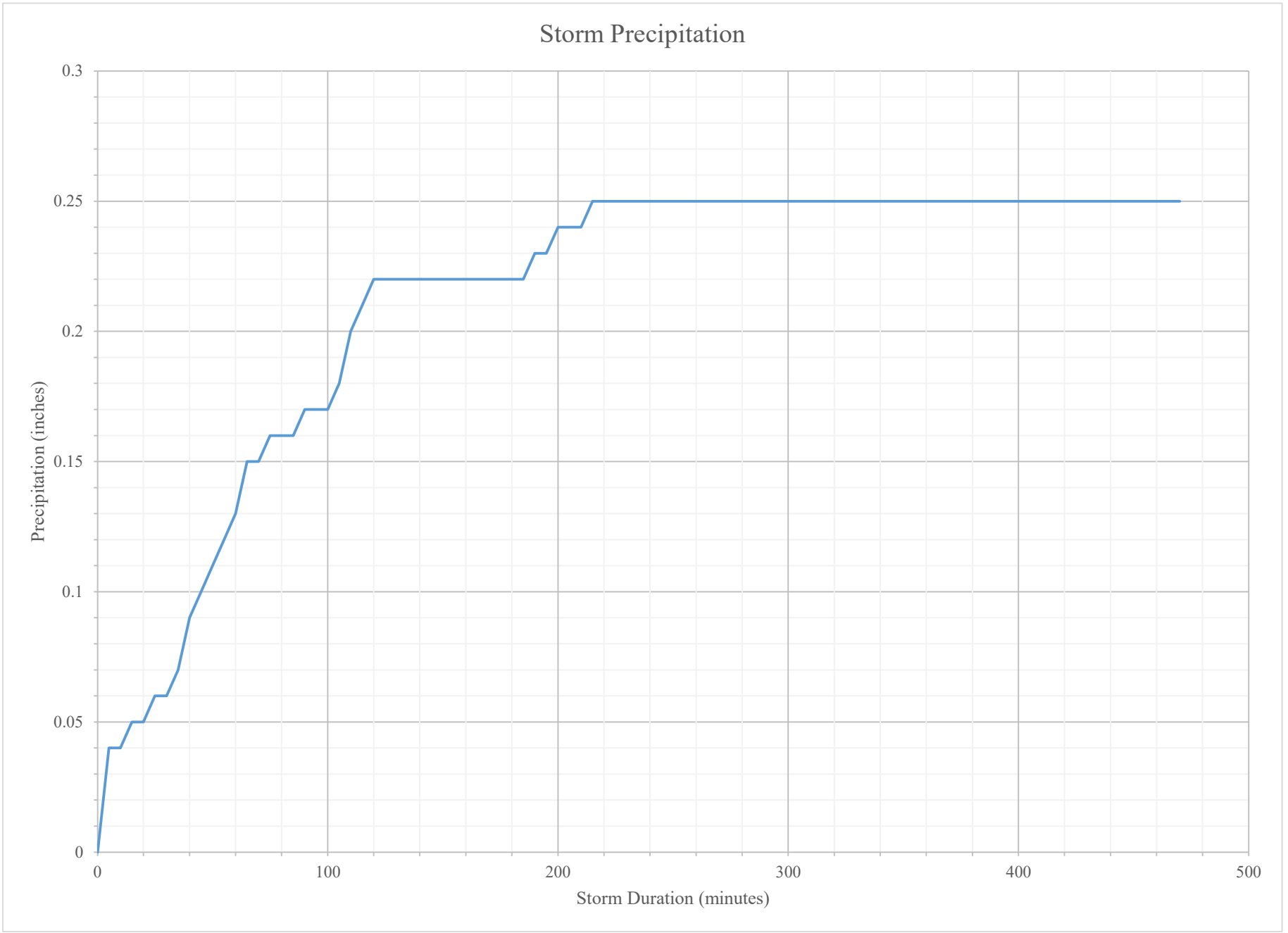

Storm Precipitation
0.25
0.2
0.15
0.1
0.05
0
Precipitation (inches)
0
100
200
300
400
500
600
Storm Duration (minutes)

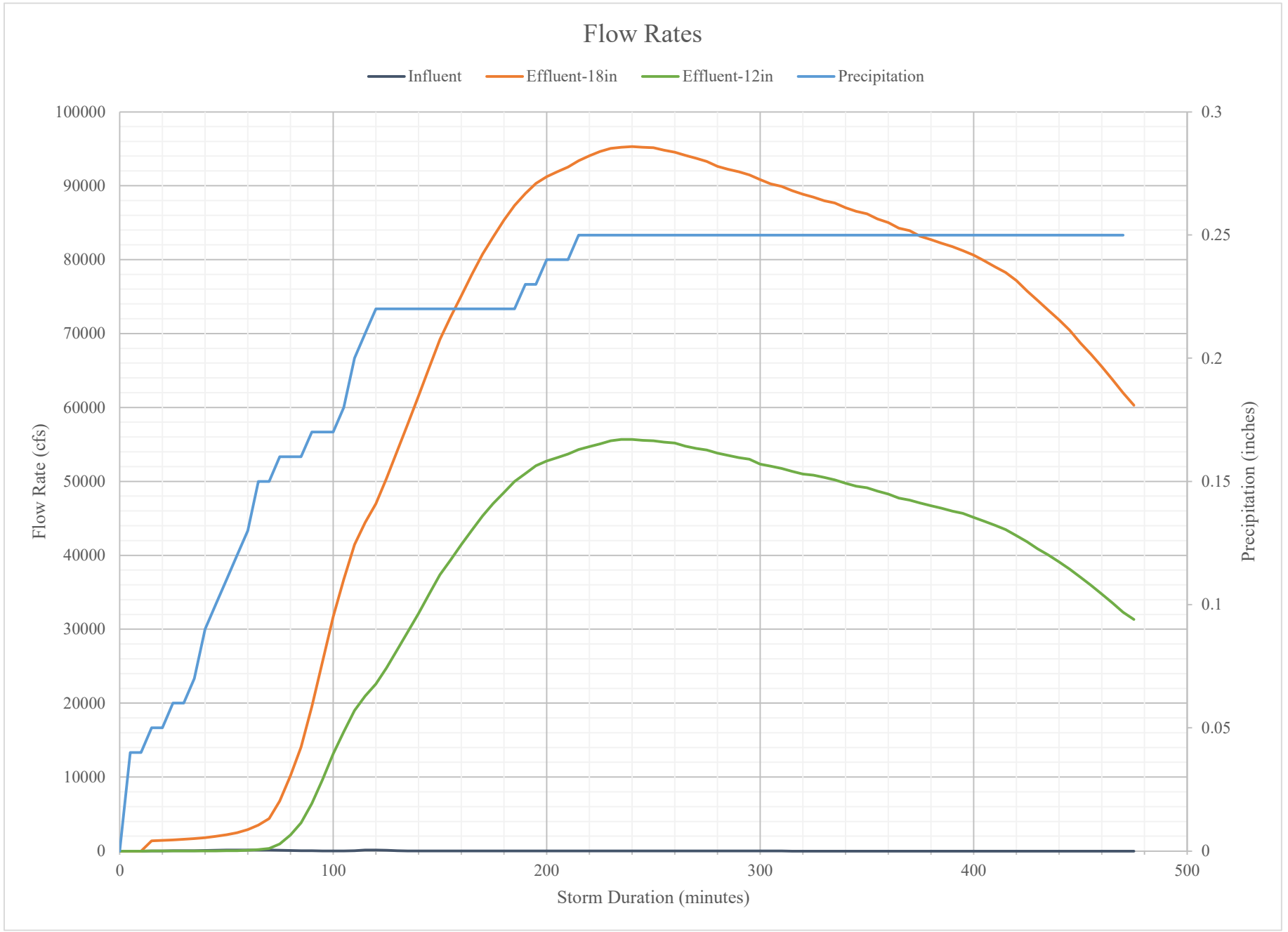

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	10/13/2020	-	Date storm event started	
	Storm Start Date and Time	10/13/20 7:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	10/13/20 3:40 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.25	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	7.75	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.24	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	28.00	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	310.457	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	603503.180	ft^3	Total volume of effluent from start of event to end of event	Effluent larger than influent flows
	18" Effluent	1085944.876	ft^3	Total volume of effluent from start of event to end of event	Effluent larger than influent flows
Average Flow Rate	Influent	7.254	gpm	Average influent flow rate during storm event	
	12" Effluent	9703.919	gpm	Average effluent flow rate during storm event	Effluent larger than influent flows
	18" Effluent	17461.252	gpm	Average bypass flow rate during storm evnt	Effluent larger than influent flows
Peak Flow Rate	Influent	36.091	gpm	Peak influent flow rate during storm event	
	12" Effluent	14710.330	gpm	Peak effluent flow rate during storm event	Effluent larger than influent flows
	18" Effluent	25176.750	gpm	Peak bypass flow rate during storm event	Effluent larger than influent flows
Aliquots	Influent	20	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	>45	-		
Sample Duration	Influent	3.67	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.67	hours		
	18" Effluent	4.25	hours		
Threshold	Influent	438	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	219	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	219	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	99.7%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	0.1%	%		
	% of 18 Effluent	0.0%	%		
90th Percentile Flow Rate	Influent	29.840	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 10/13/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	N/A	20	100	N/A	N/A	-	-	1		
	Total Copper	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.00007		
	Dissolved Copper	mg/L	N/A	0.005	0.02	N/A	N/A	-	-	0.00007		
	Total Zinc	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.00025		
	Dissolved Zinc	mg/L	N/A	0.02	0.3	N/A	N/A	-	-	0.00025		
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.05		
Screening Parameters	PSD											
	>250	µm		N/A	N/A			-	-	N/A		
	250 - 62.5	µm		N/A	N/A			-	-	N/A		
	<62.5	µm		N/A	N/A			-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	N/A	N/A	N/A	N/A	N/A	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

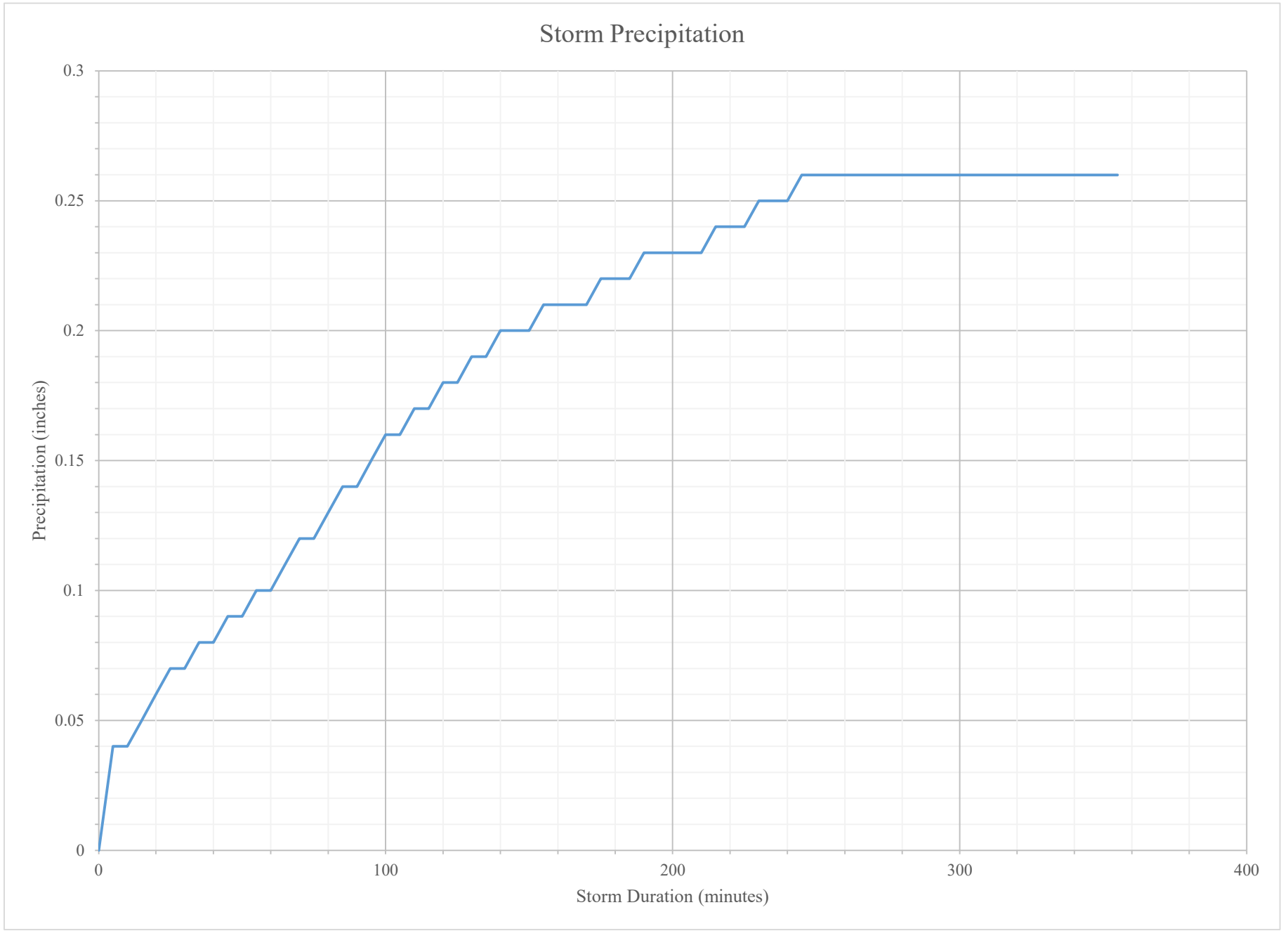

Storm Precipitation
Precipitation (inches)
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
Storm Duration (minutes)

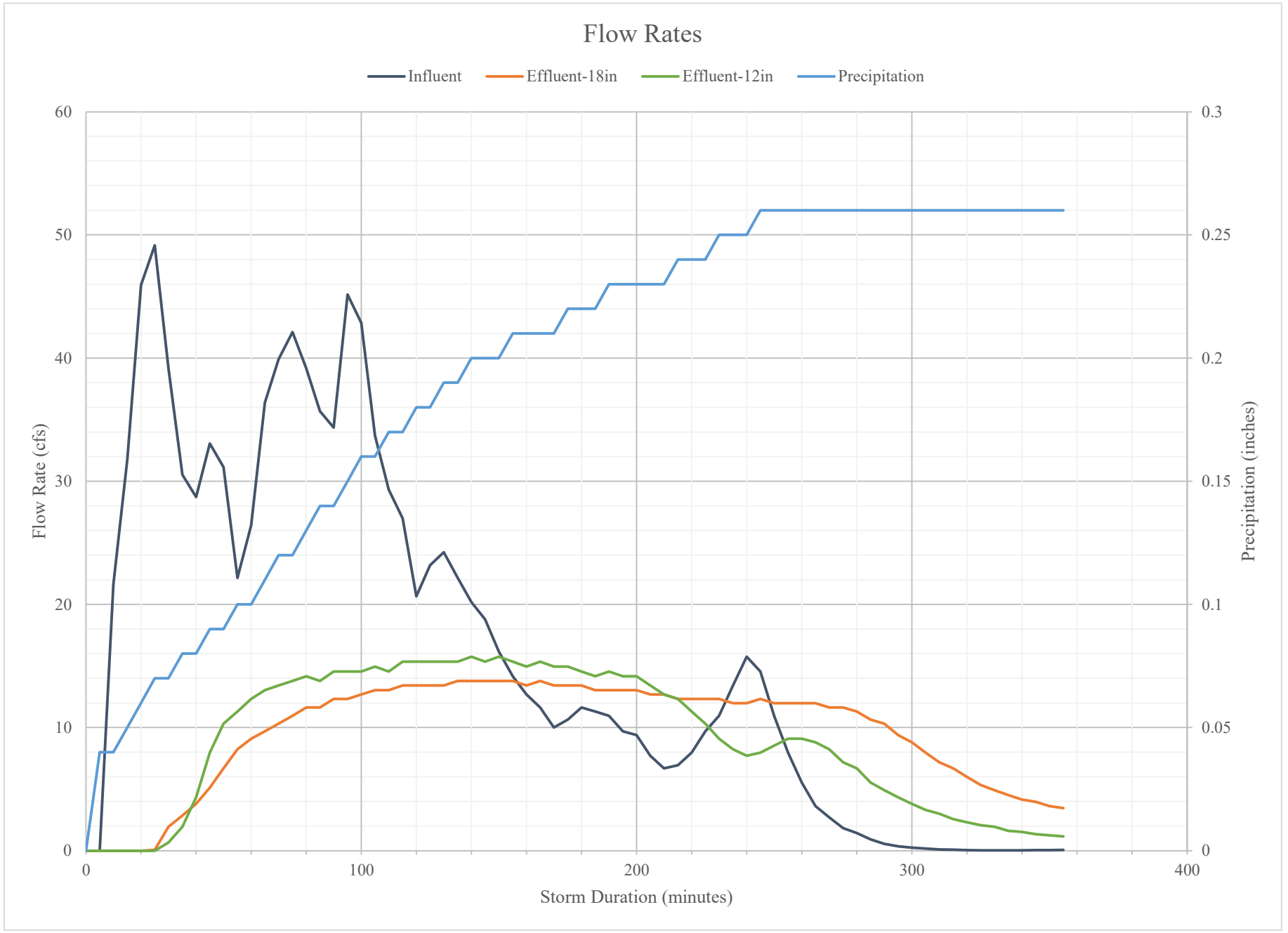

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	11/5/2020	-	Date storm event started	
	Storm Start Date and Time	11/5/20 5:05 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	11/6/20 2:30 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.27	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	9.42	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	3.35	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	41.58	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	203.803	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	118.835	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	133.903	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	4.010	gpm	Average influent flow rate during storm event	
	12" Effluent	1.615	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.820	gpm	Average bypass flow rate during storm event	
Peak Flow Rate	Influent	12.989	gpm	Peak influent flow rate during storm event	
	12" Effluent	4.163	gpm	Peak effluent flow rate during storm event	
	18" Effluent	3.642	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	17	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	20	-		
	18" Effluent	22	-		
Sample Duration	Influent	3.92	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	6.42	hours		
	18" Effluent	6.42	hours		
Threshold	Influent	332	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	166	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	166	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	97.9%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	98.7%	%		
	% of 18 Effluent	96.4%	%		
90th Percentile Flow Rate	Influent	9.980	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 11/5/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	54	20	100	12	9	77.78%	83.33%	1		
	Total Copper	mg/L	0.00551	N/A	N/A	0.00487	0.00412	11.62%	25.23%	0.00007		
	Dissolved Copper	mg/L	0.00293	0.005	0.02	0.00395	0.00341	-34.81%	-16.38%	0.00007		Increased dissolved copper in eff
	Total Zinc	mg/L	0.0343	N/A	N/A	0.0038	0.00688	88.92%	79.94%	0.00025		
	Dissolved Zinc	mg/L	0.0167	0.02	0.3	0.00883	0.00906	47.13%	45.75%	0.00025		
	Total Phosphorus	mg/L	0.6	0.1	0.5	0.232	1.92	61.33%	-220.00%	0.00505		Increased TP in 18" eff
	Iron	mg/L	1.35	N/A	N/A	0.431	0.352	68.07%	73.93%	0.01		
	Dissolved Iron	mg/L	0.114	N/A	N/A	0.0591	0.073	48.16%	35.96%	0.01		
	NWTPH-Dx							-	-			
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	18.8	N/A	N/A	135	135	-618.09%	-618.09%	1		Increased hardness in eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/4	mg/L	0.204	N/A	N/A	0.29	0.454			N/A		

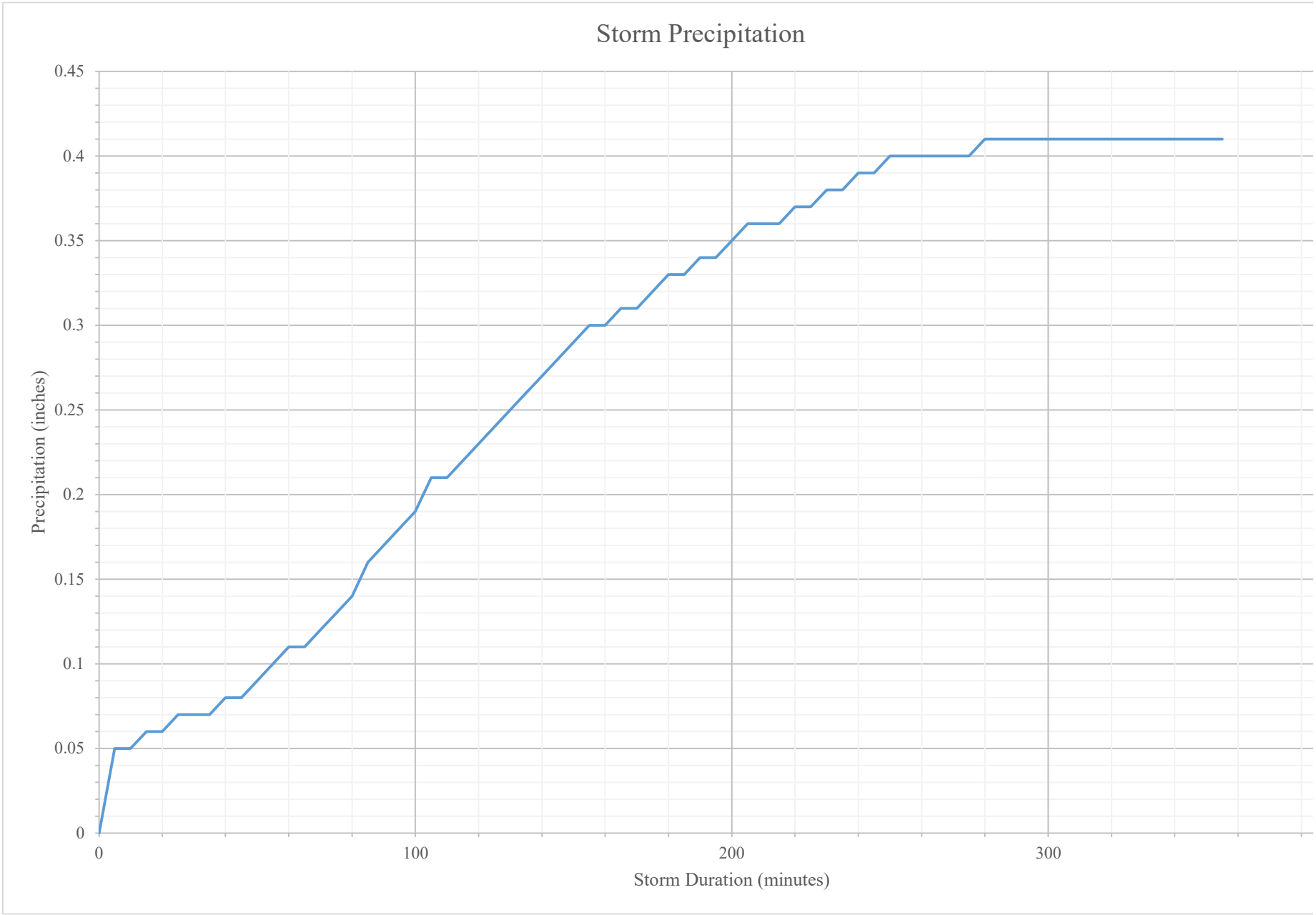

Storm Precipitation
0.3
0.25
0.2
0.15
0.1
0.05
0
Precipitation (inches)
0
100
200
300
400
Storm Duration (minutes)

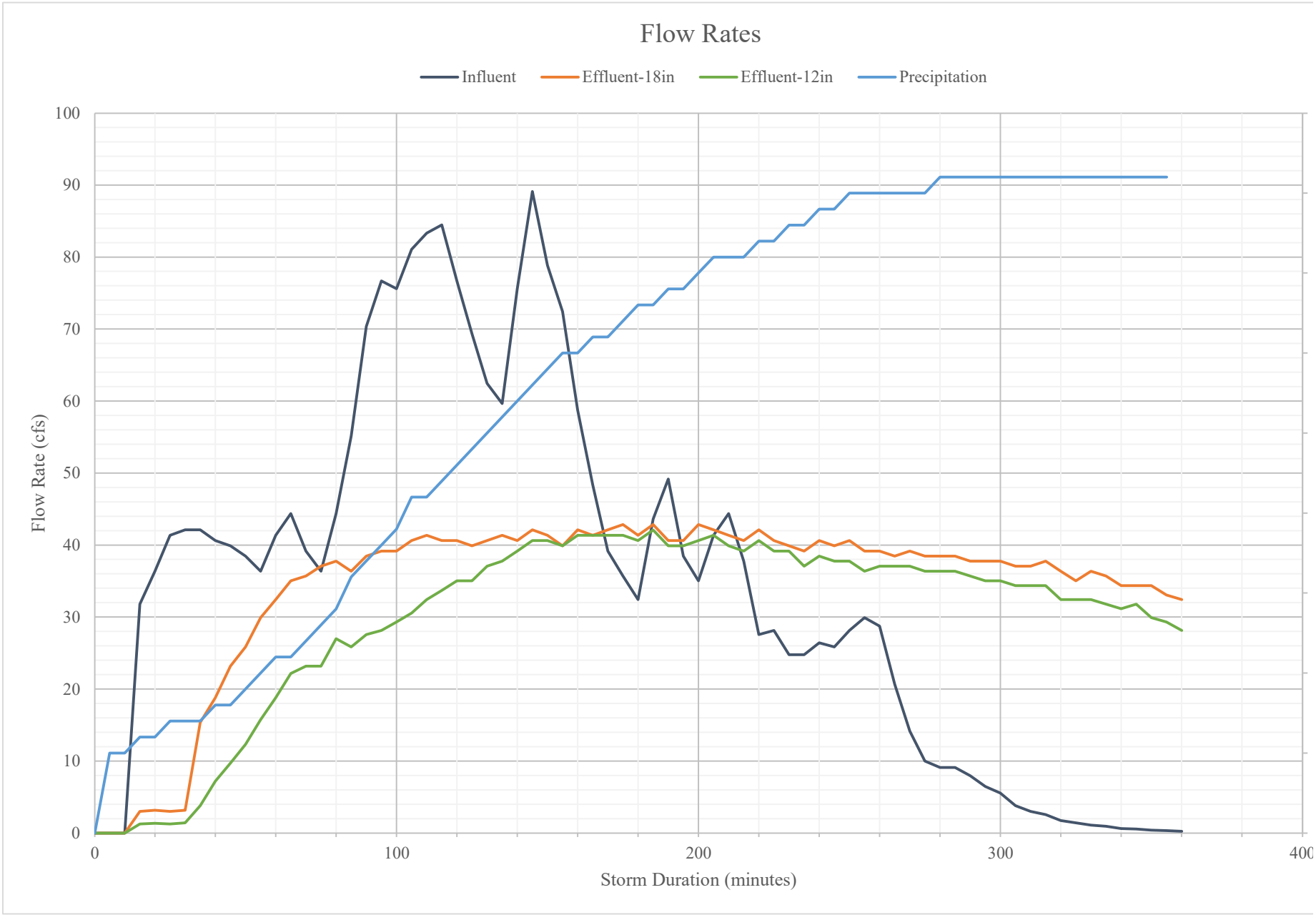

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
0
0.05
0.1
0.15
0.2
0.25
0.3
0
100
200
300
400

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	11/13/2020	-	Date storm event started	
	Storm Start Date and Time	11/13/20 7:55 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	11/13/20 5:55 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.43	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	10.00	hours	Duration of storm event	
	Storm Average Intensity	0.04	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	3.21	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	59.67	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	459.964	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	472.460	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	615.278	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	6.810	gpm	Average influent flow rate during storm event	
	12" Effluent	5.888	gpm	Average effluent flow rate during storm event	
	18" Effluent	7.667	gpm	Average bypass flow rate during storm event	
Peak Flow Rate	Influent	23.543	gpm	Peak influent flow rate during storm event	
	12" Effluent	11.123	gpm	Peak effluent flow rate during storm event	
	18" Effluent	11.322	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	28	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	>45	-		
Sample Duration	Influent	5.75	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	4.83	hours		
	18" Effluent	4.33	hours		
Threshold	Influent	460	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	230	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	230	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	98.9%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	77.4%	%		
	% of 18 Effluent	59.4%	%		
90th Percentile Flow Rate	Influent	18.590	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 11/13/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	15	20	100	3.67	4	75.53%	73.33%	1		
	Total Copper	mg/L	0.00286	N/A	N/A	0.00306	0.00227	-6.99%	20.63%	0.00007		Increased total copper in 12" eff
	Dissolved Copper	mg/L	0.00198	0.005	0.02	0.00255	0.00178	-28.79%	10.10%	0.00007		Increased dissolved copper in 12" eff
	Total Zinc	mg/L	0.0192	N/A	N/A	0.00329	0.00264	82.86%	86.25%	0.00025		
	Dissolved Zinc	mg/L	0.0238	0.02	0.3	0.0125	0.00956	47.48%	59.83%	0.00025		
	Total Phosphorus	mg/L	0.392	0.1	0.5	0.268	0.3	31.63%	23.47%	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	36.6	N/A	N/A	117	200	-219.67%	-446.45%	1		Increased hardness in eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

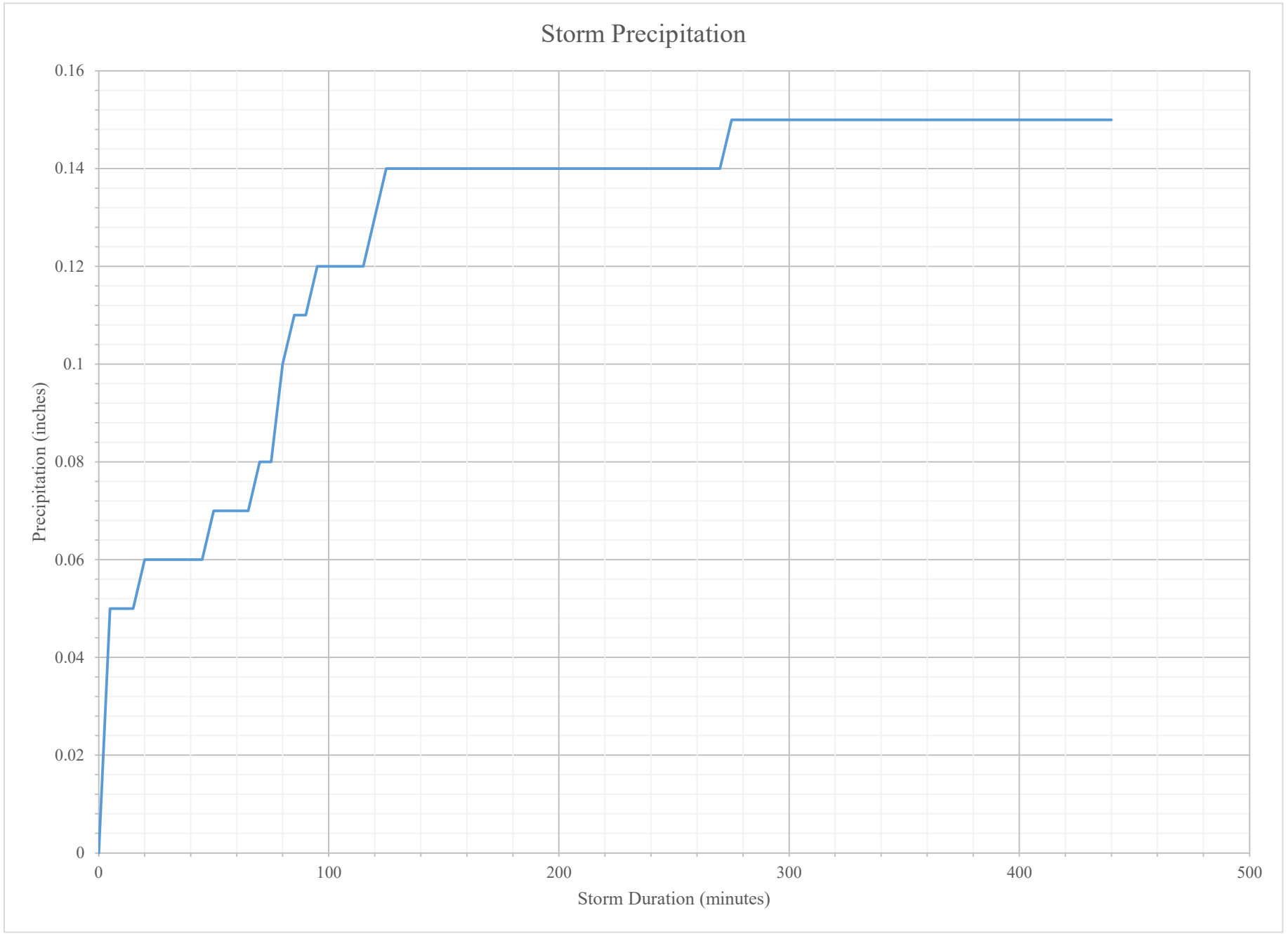

Storm Precipitation
Precipitation (inches)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
Storm Duration (minutes)

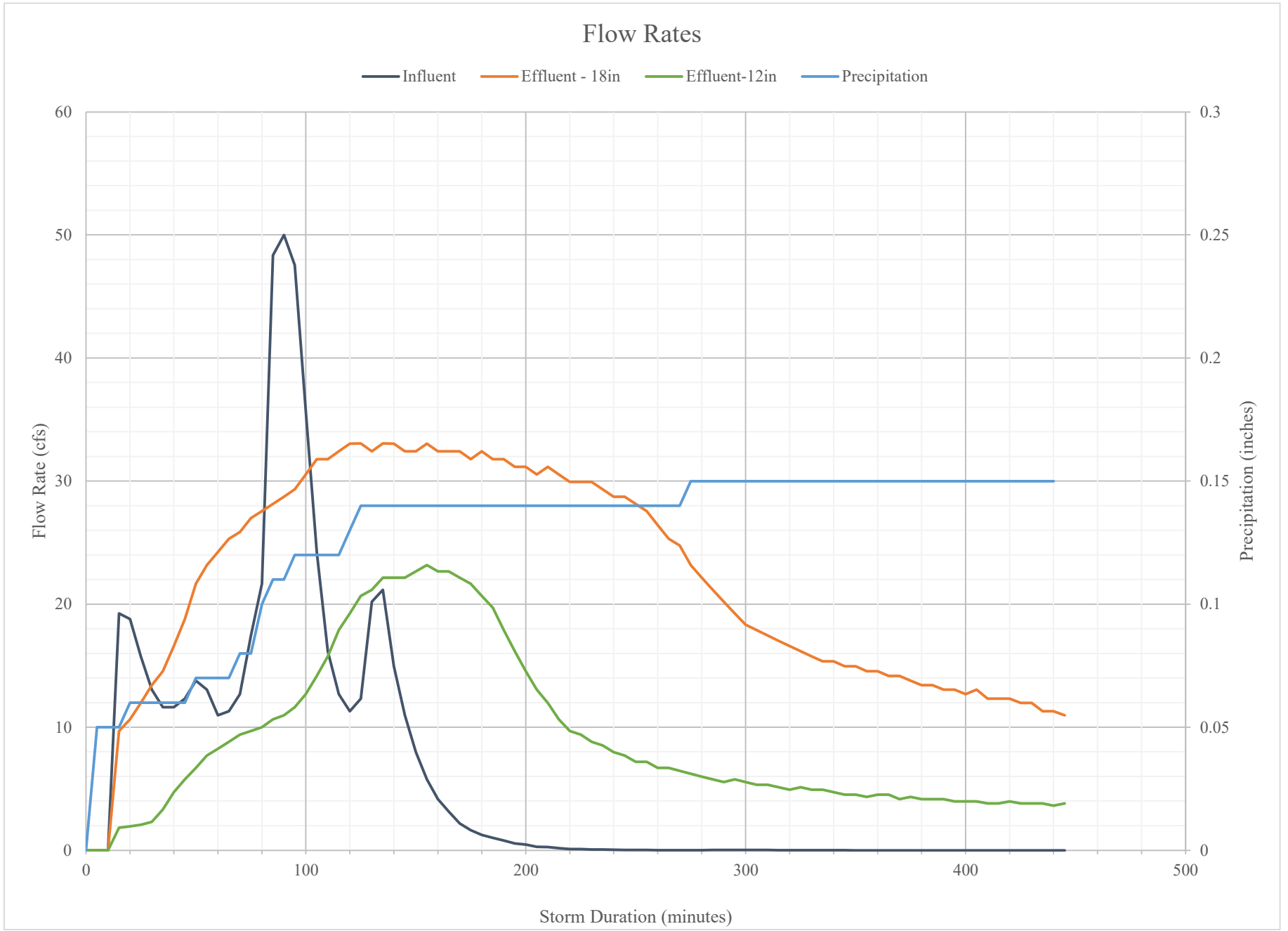

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
Storm Duration (minutes)

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	11/16/2020	-	Date storm event started	
	Storm Start Date and Time	11/16/20 3:10 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	11/16/20 10:25 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.15	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	7.25	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.24	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	34.25	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	98.777	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	143.220	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	346.979	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	2.031	gpm	Average influent flow rate during storm event	
	12" Effluent	2.591	gpm	Average effluent flow rate during storm event	
	18" Effluent	6.155	gpm	Average bypass flow rate during storm event	
Peak Flow Rate	Influent	13.208	gpm	Peak influent flow rate during storm event	
	12" Effluent	6.123	gpm	Peak effluent flow rate during storm event	
	18" Effluent	8.733	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	23	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	>45	-		
Sample Duration	Influent	2.33	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.67	hours		
	18" Effluent	3.92	hours		
Threshold	Influent	118	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	59	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	59	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	97.1%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	65.5%	%		
	% of 18 Effluent	27.0%	%		
90th Percentile Flow Rate	Influent	5.436	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 11/16/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	17	20	100	2.25	2.5	86.76%	85.29%	1		
	Total Copper	mg/L	0.00308	N/A	N/A	0.00289	0.00243	6.17%	21.10%	0.00007		
	Dissolved Copper	mg/L	0.00337	0.005	0.02	0.00313	0.00243	7.12%	27.89%	0.00007		
	Total Zinc	mg/L	0.0175	N/A	N/A	0.00187	0.00255	89.31%	85.43%	0.00025		
	Dissolved Zinc	mg/L	0.0248	0.02	0.3	0.00684	0.00727	72.42%	70.69%	0.00025		
	Total Phosphorus	mg/L	0.552	0.1	0.5	0.264	0.664	52.17%	-20.29%	0.00505		Increased phosphorus in 18" eff
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		6.45	N/A	N/A	6.47	6.39	-0.31%	0.93%	N/A		Increased pH in 12" eff
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	N/A	N/A	N/A	N/A	N/A	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

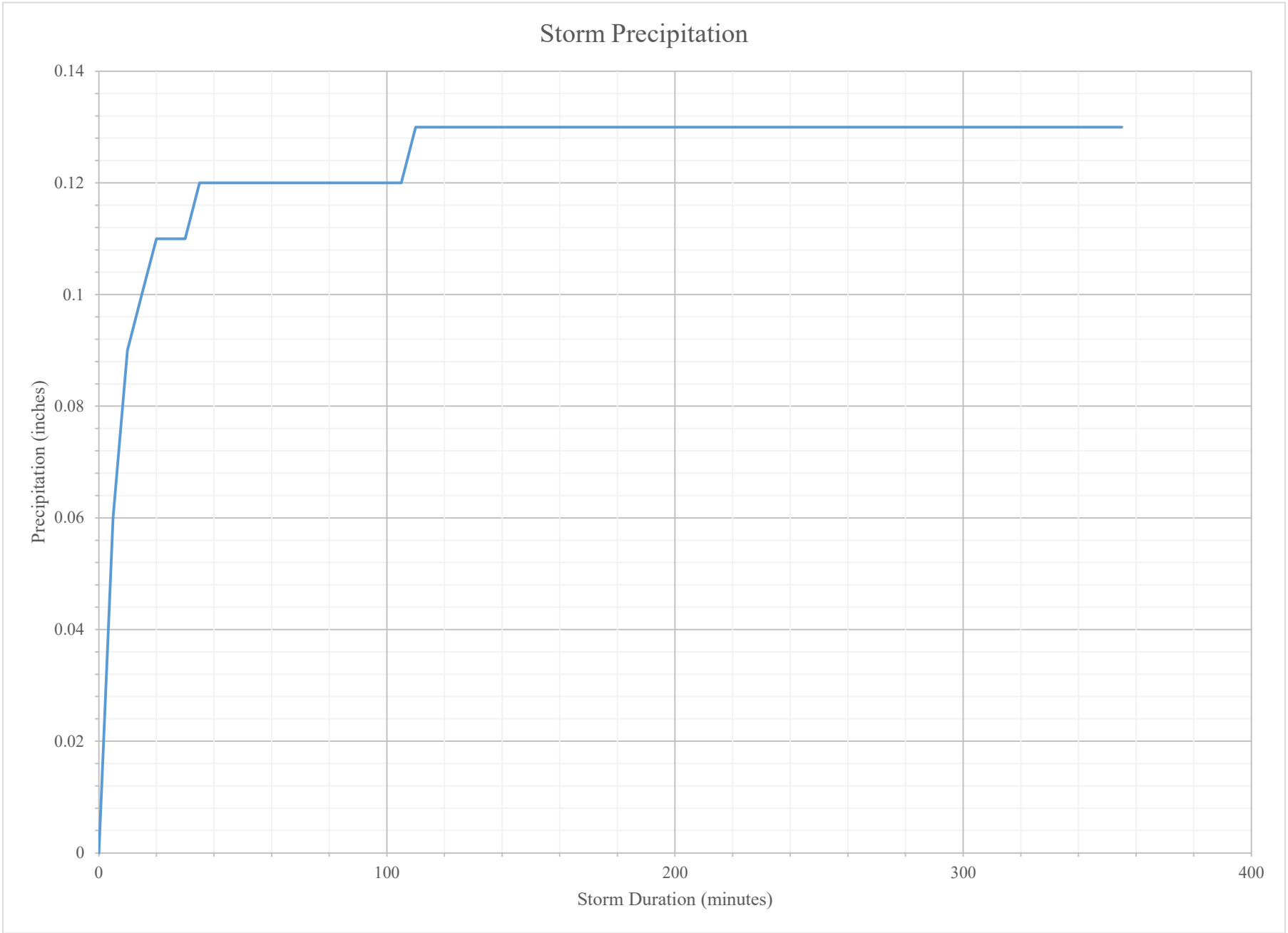

Storm Precipitation
Precipitation (inches)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
100
200
300
400
500
Storm Duration (minutes)


Flow Rates
Influent
Effluent - 18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
0
0.05
0.1
0.15
0.2
0.25
0.3
0
100
200
300
400
500

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	11/18/2020	-	Date storm event started	
	Storm Start Date and Time	11/18/20 2:30 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	11/18/20 8:35 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.13	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	6.08	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.72	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	40.08	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	2607.043	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	182.435	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	285.220	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	53.404	gpm	Average influent flow rate during storm event	
	12" Effluent	3.737	gpm	Average effluent flow rate during storm event	
	18" Effluent	5.843	gpm	Average bypass flow rate during storm event	
Peak Flow Rate	Influent	1756.638	gpm	Peak influent flow rate during storm event	
	12" Effluent	8.563	gpm	Peak effluent flow rate during storm event	
	18" Effluent	9.610	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	>45	-		
Sample Duration	Influent	3.67	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	3.67	hours		
	18" Effluent	3.67	hours		
Threshold	Influent	142	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	71	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	71	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	8.7%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	61.9%	%		
	% of 18 Effluent	39.6%	%		
90th Percentile Flow Rate	Influent	3.493	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 11/18/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	21	20	100	9	8	57.14%	61.90%	1		
	Total Copper	mg/L	0.00443	N/A	N/A	0.0043	0.00318	2.93%	28.22%	0.00007		
	Dissolved Copper	mg/L	0.0033	0.005	0.02	0.00337	0.00326	-2.12%	1.21%	0.00007		Increased dissolved copper in the 12" eff
	Total Zinc	mg/L	0.024	N/A	N/A	0.00281	0.0032	88.29%	86.67%	0.00025		
	Dissolved Zinc	mg/L	0.0151	0.02	0.3	0.00484	0.00532	67.95%	64.77%	0.00025		
	Total Phosphorus	mg/L	0.17	0.1	0.5	0.656	0.72	-285.88%	-323.53%	0.00505		Increased total phosphorus in the eff
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.113	N/A	N/A	0.378	0.494	-234.51%	-337.17%	N/A		Increased orthophosphate in the eff
	Hardness	mg CaCO3/L	28.7	N/A	N/A	103	109	-258.89%	-279.79%	1		Increased hardness in the eff
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
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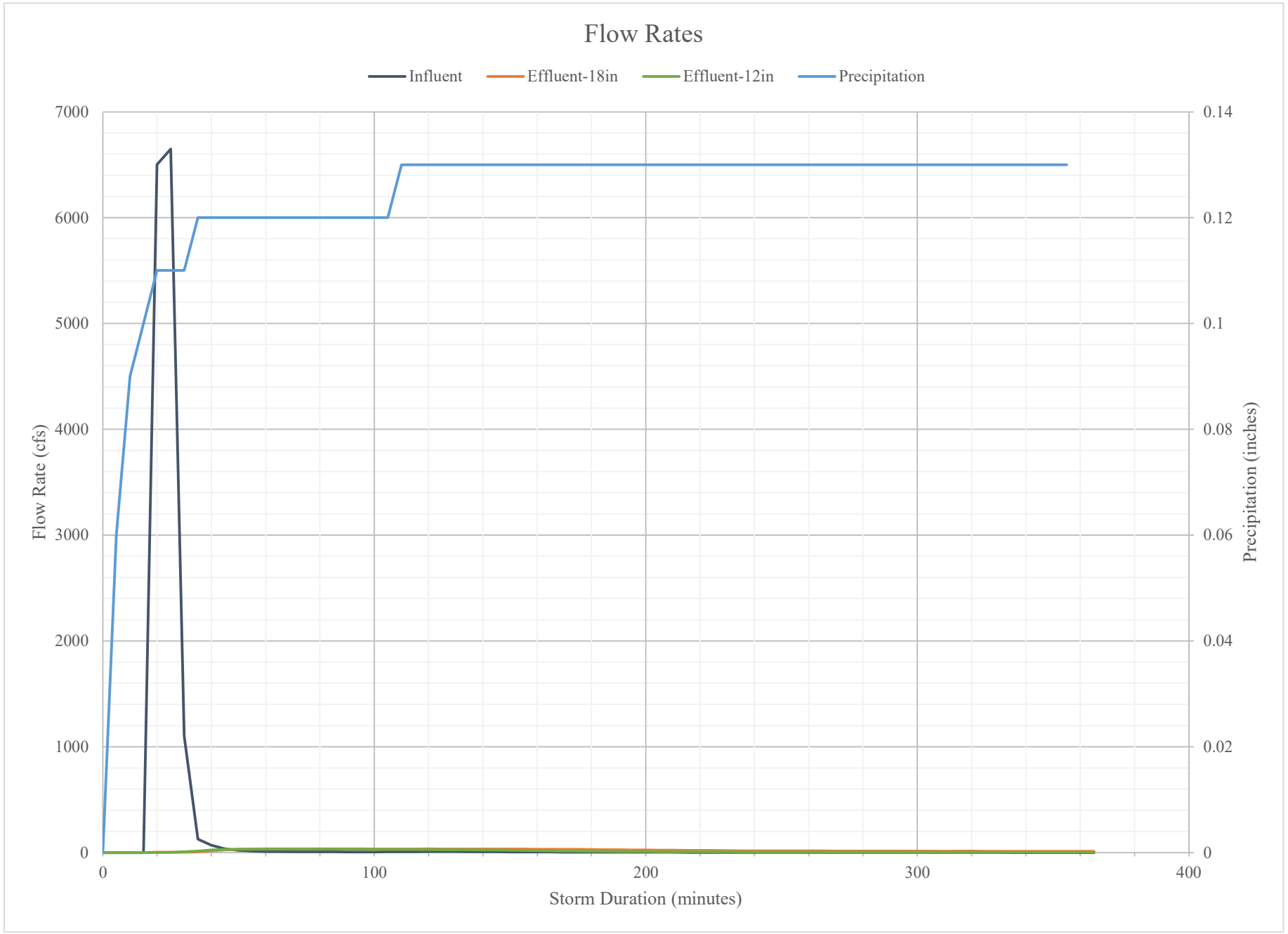
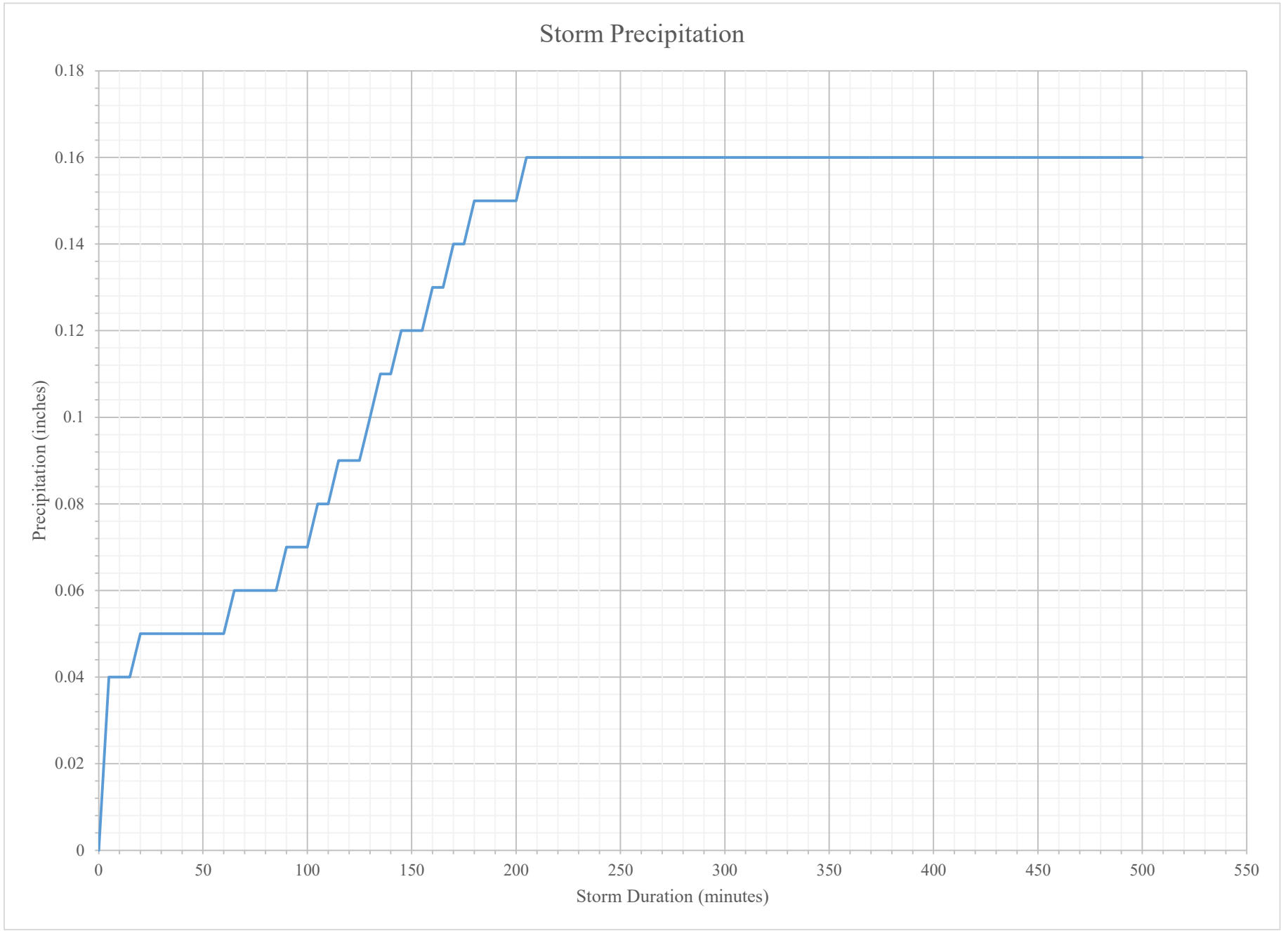
0.12
0.1
0.08
0.06
0.04
0.02
0
Precipitation (inches)
0
100
200
300
400
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
7000
6000
5000
4000
3000
2000
1000
0
Flow Rate (cfs)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Precipitation (inches)
0
100
200
300
400
Storm Duration (minutes)

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	12/19/2020	-	Date storm event started	
	Storm Start Date and Time	12/19/20 8:40 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	12/20/20 4:55 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.16	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	8.25	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	63.58	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	224.992	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	116.659	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	111.120	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	3.398	gpm	Average influent flow rate during storm event	
	12" Effluent	1.762	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.678	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	14.333	gpm	Peak influent flow rate during storm event	
	12" Effluent	3.949	gpm	Peak effluent flow rate during storm event	
	18" Effluent	2.984	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	>45	-		
Sample Duration	Influent	3.83	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	4.33	hours		
	18" Effluent	4.25	hours		
Threshold	Influent	96	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	48	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	48	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	67.8%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	65.4%	%		
	% of 18 Effluent	68.7%	%		
90th Percentile Flow Rate	Influent	8.939	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 12/19/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	10.5	20	100	2.12	1.43	79.81%	86.38%	1		
	Total Copper	mg/L	0.00262	N/A	N/A	0.00364	0.00391	-38.93%	-49.24%	0.00007		
	Dissolved Copper	mg/L	ND	0.005	0.02	0.0028	0.0033	-	-	0.00007		
	Total Zinc	mg/L	0.0122	N/A	N/A	0.00246	0.00363	79.84%	70.25%	0.00025		
	Dissolved Zinc	mg/L	0.0152	0.02	0.3	0.017	0.017	-11.84%	-11.84%	0.00025		
	Total Phosphorus	mg/L	<0.005	0.1	0.5	0.872	0.292	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0476	N/A	N/A	0.257	0.373	-439.92%	-683.61%	N/A		
	Hardness	mg CaCO3/L	10.9	N/A	N/A	111	150	-918.35%	-1276.15%	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
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0.16
0.14
0.12
0.1
0.08
0.06
0.04
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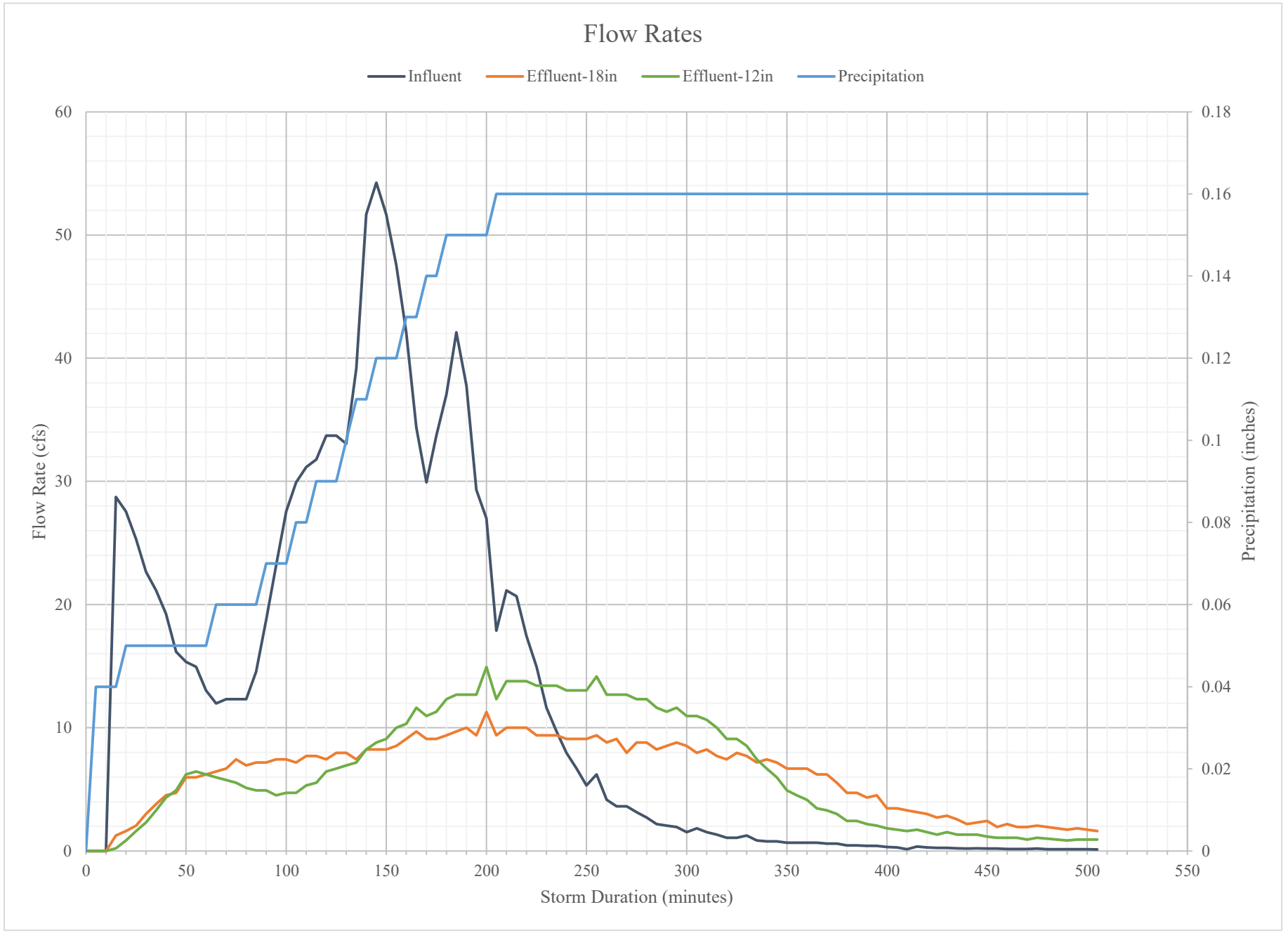
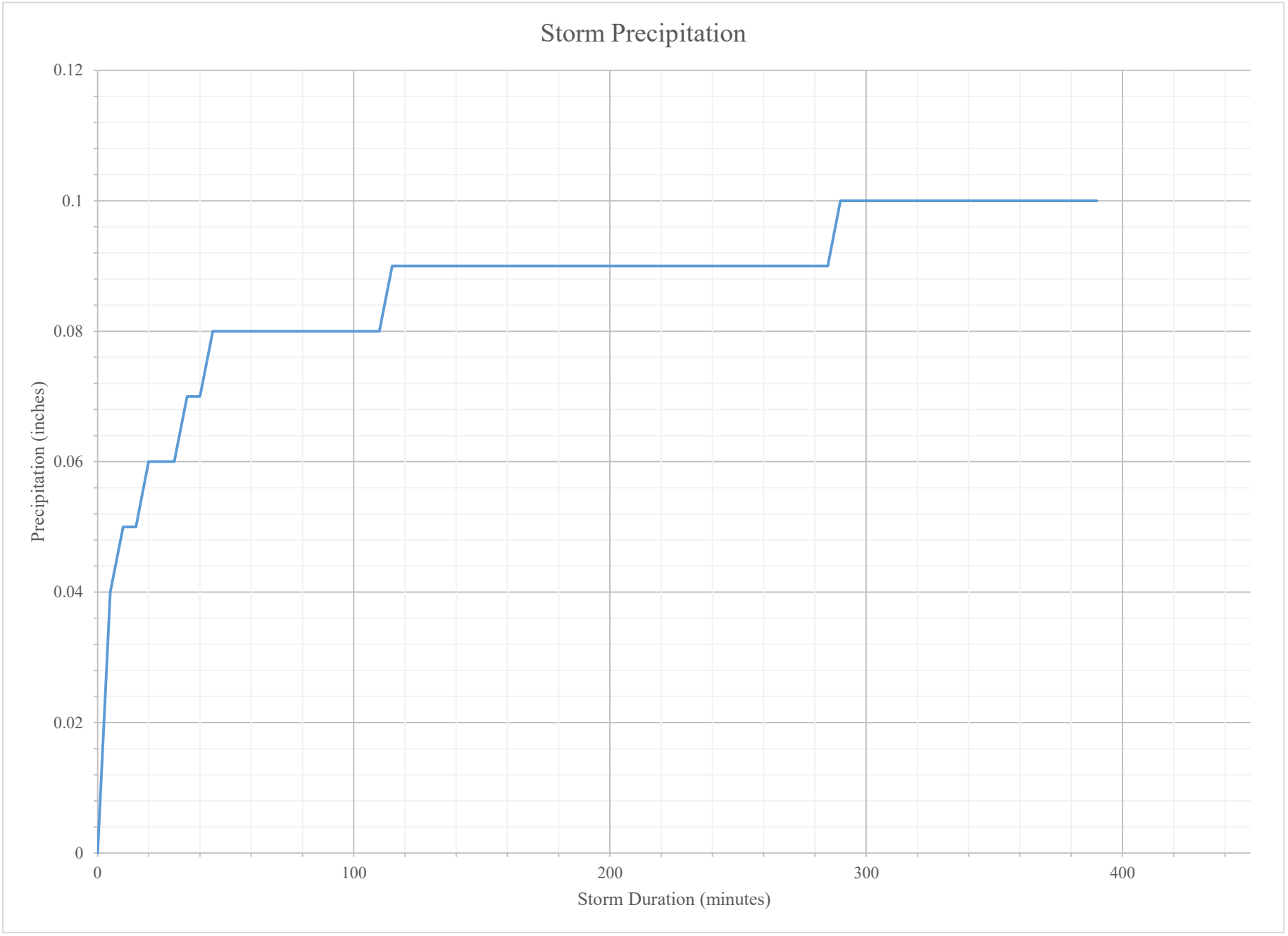
450
500
550
Storm Duration (minutes)

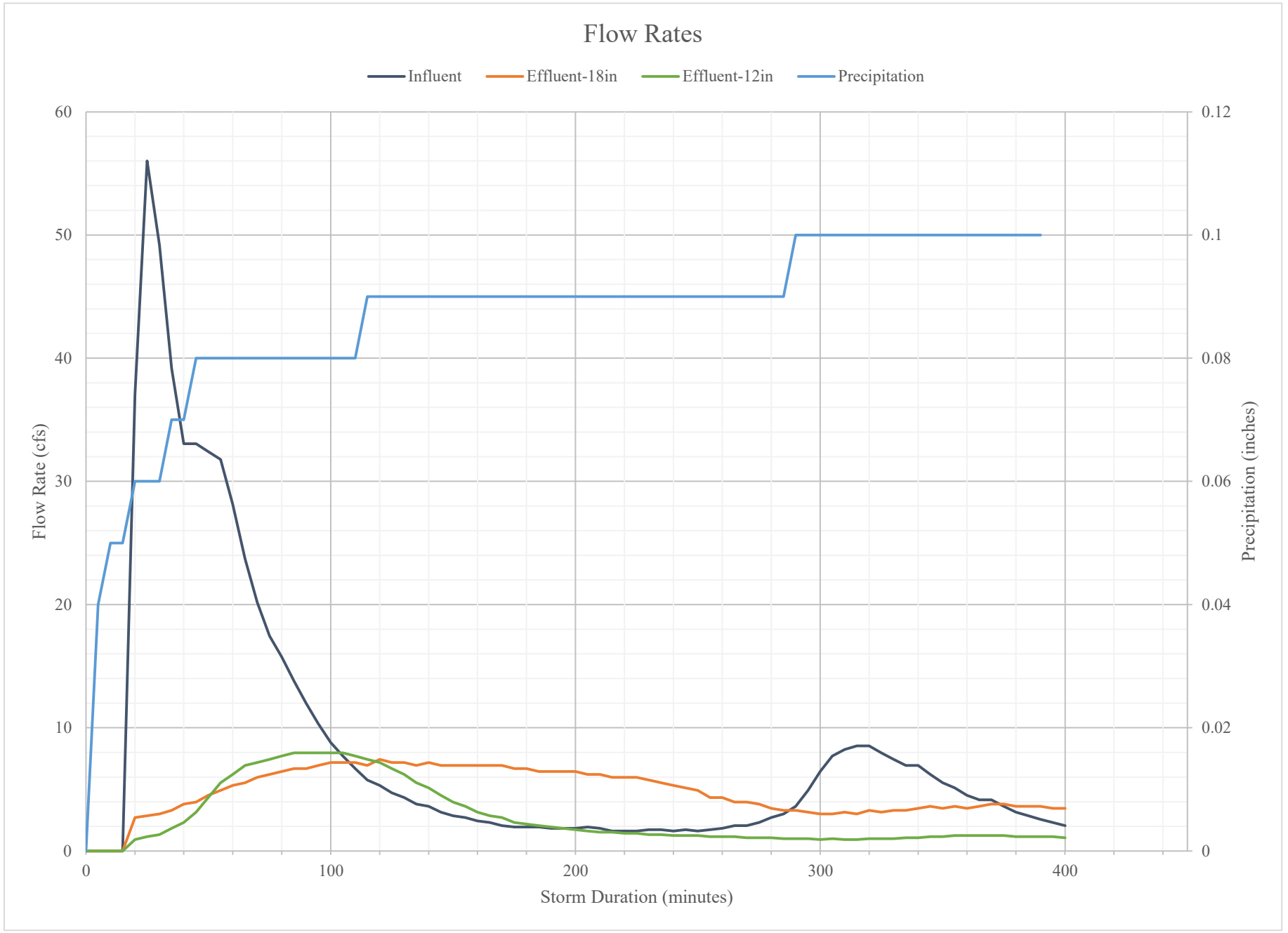

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0
50
100
150
200
250
300
350
400
450
500
550

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	12/21/2020	-	Date storm event started	
	Storm Start Date and Time	12/21/20 6:15 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	12/21/20 12:40 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.10	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	6.42	hours	Duration of storm event	
	Storm Average Intensity	0.02	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	25.33	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	121.411	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	39.194	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	68.359	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	2.358	gpm	Average influent flow rate during storm event	
	12" Effluent	0.761	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.328	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	14.799	gpm	Peak influent flow rate during storm event	
	12" Effluent	2.107	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.967	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	17	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	11	-		
	18" Effluent	19	-		
Sample Duration	Influent	6.00	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	5.67	hours		
	18" Effluent	5.75	hours		
Threshold	Influent	200	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	100	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	100	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	99.0%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	99.2%	%		
	% of 18 Effluent	98.2%	%		
90th Percentile Flow Rate	Influent	7.819	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 12/21/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	9	20	100	1.8	1.9	80.00%	78.89%	1		
	Total Copper	mg/L	0.00274	N/A	N/A	0.00611	0.00747	-122.99%	-172.63%	0.00007		
	Dissolved Copper	mg/L	0.00232	0.005	0.02	0.00607	0.00743	-161.64%	-220.26%	0.00007		
	Total Zinc	mg/L	0.0125	N/A	N/A	0.00518	0.00639	58.56%	48.88%	0.00025		
	Dissolved Zinc	mg/L	0.0646	0.02	0.3	0.0178	0.015	72.45%	76.78%	0.00025		
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	8.91	N/A	N/A	145	115	-1527.38%	-1190.68%	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

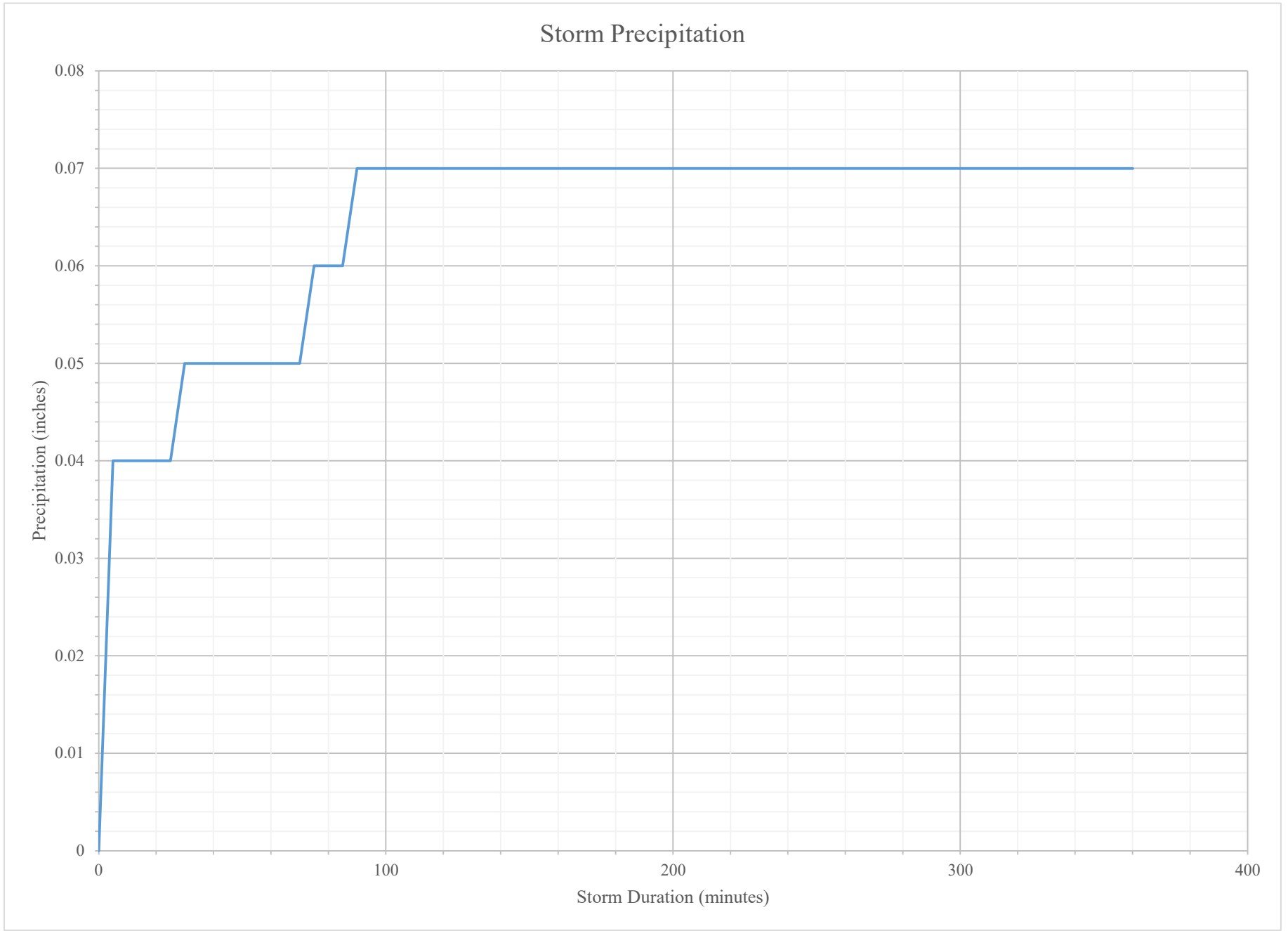

Storm Precipitation
0.12
0.1
0.08
0.06
0.04
0.02
0
Precipitation (inches)
0
100
200
300
400
Storm Duration (minutes)

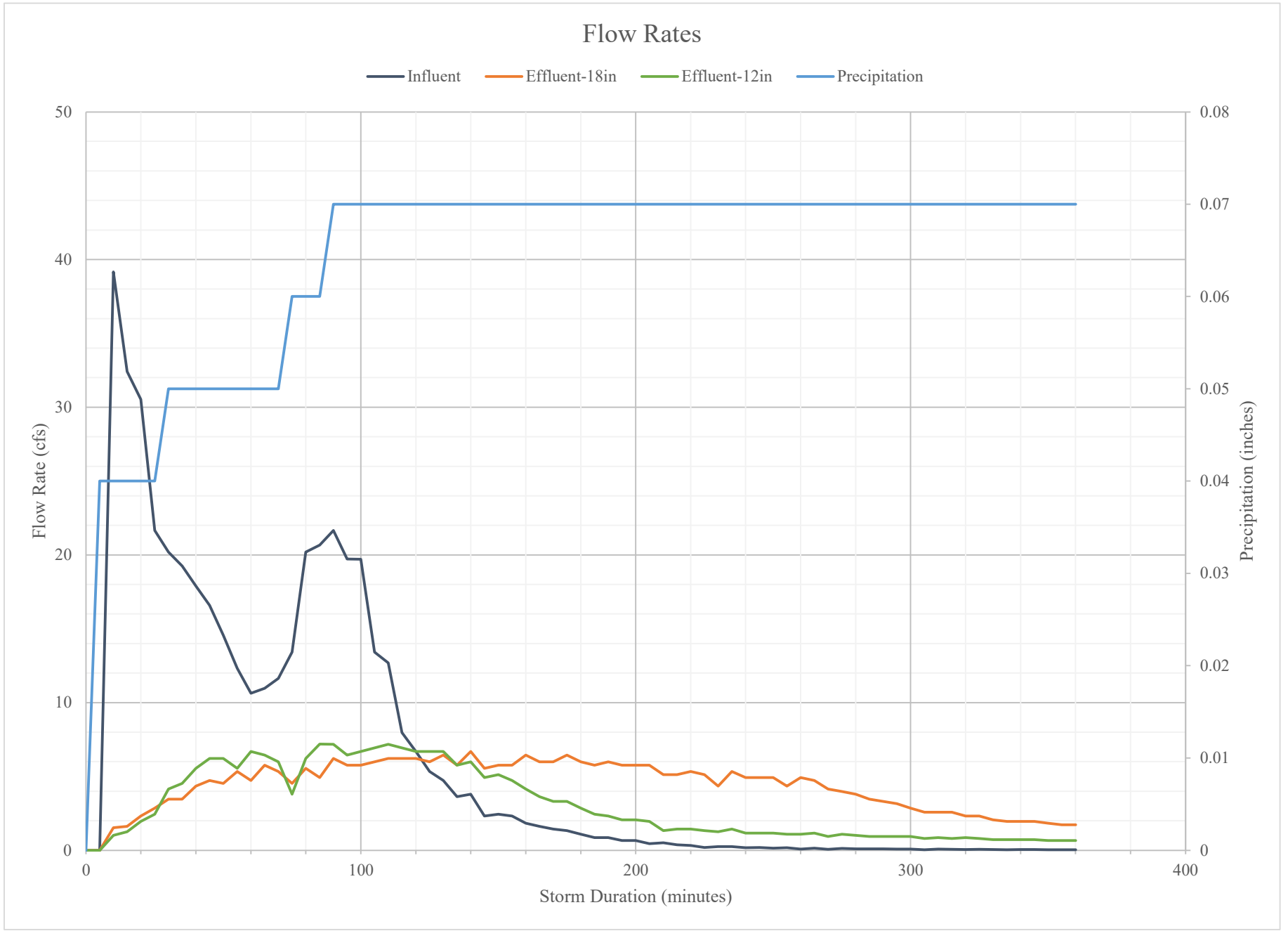

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
0
0.02
0.04
0.06
0.08
0.1
0.12
0
100
200
300
400

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	12/22/2020	-	Date storm event started	
	Storm Start Date and Time	12/22/20 12:35 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	12/22/20 6:30 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.07	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	5.92	hours	Duration of storm event	
	Storm Average Intensity	0.01	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	11.92	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	80.104	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	39.231	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	56.293	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	1.687	gpm	Average influent flow rate during storm event	
	12" Effluent	0.826	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.186	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	10.350	gpm	Peak influent flow rate during storm event	
	12" Effluent	1.899	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.768	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	23	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	23	-		
	18" Effluent	33	-		
Sample Duration	Influent	2.58	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	5.42	hours		
	18" Effluent	5.42	hours		
Threshold	Influent	96	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	48	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	48	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	97.4%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	99.4%	%		
	% of 18 Effluent	99.4%	%		
90th Percentile Flow Rate	Influent	5.333	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 12/22/2020

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	38	20	100	14	19	63.16%	50.00%	1		
	Total Copper	mg/L	0.00269	N/A	N/A	0.00623	0.00799	-131.60%	-197.03%	0.00007		
	Dissolved Copper	mg/L	0.0018	0.005	0.02	0.00615	0.00929	-241.67%	-416.11%	0.00007		
	Total Zinc	mg/L	0.0118	N/A	N/A	0.00476	0.0066	59.66%	44.07%	0.00025		
	Dissolved Zinc	mg/L	0.0114	0.02	0.3	0.00927	0.0123	18.68%	-7.89%	0.00025		
	Total Phosphorus	mg/L	0.0917	0.1	0.5	0.62	0.779	-576.12%	-749.51%	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0305	N/A	N/A	0.338	0.569	-1008.20%	-1765.57%	N/A		
	Hardness	mg CaCO3/L	12.9	N/A	N/A	107	83.2	-729.46%	-544.96%	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

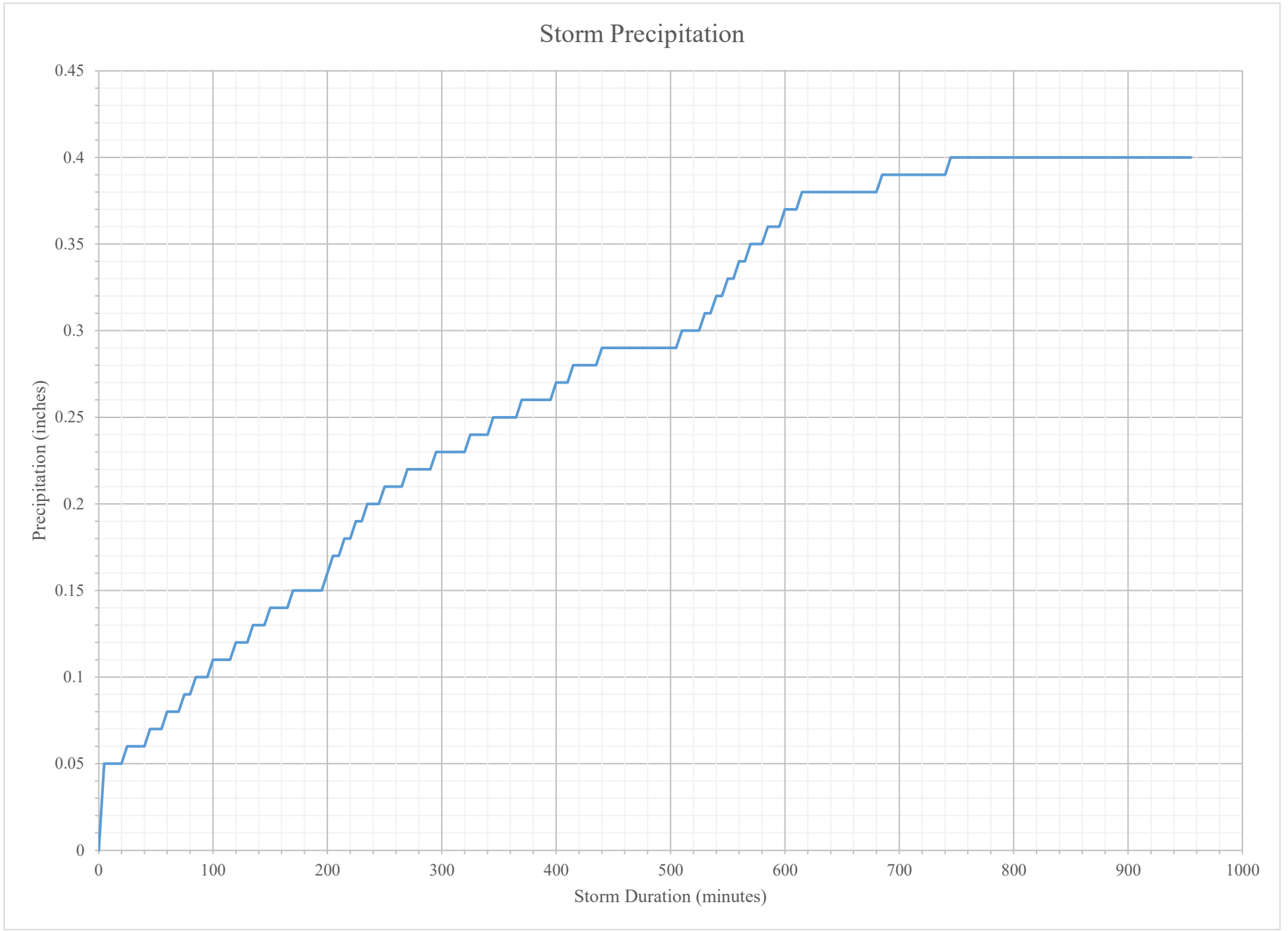

Storm Precipitation
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Precipitation (inches)
0
100
200
300
400
Storm Duration (minutes)

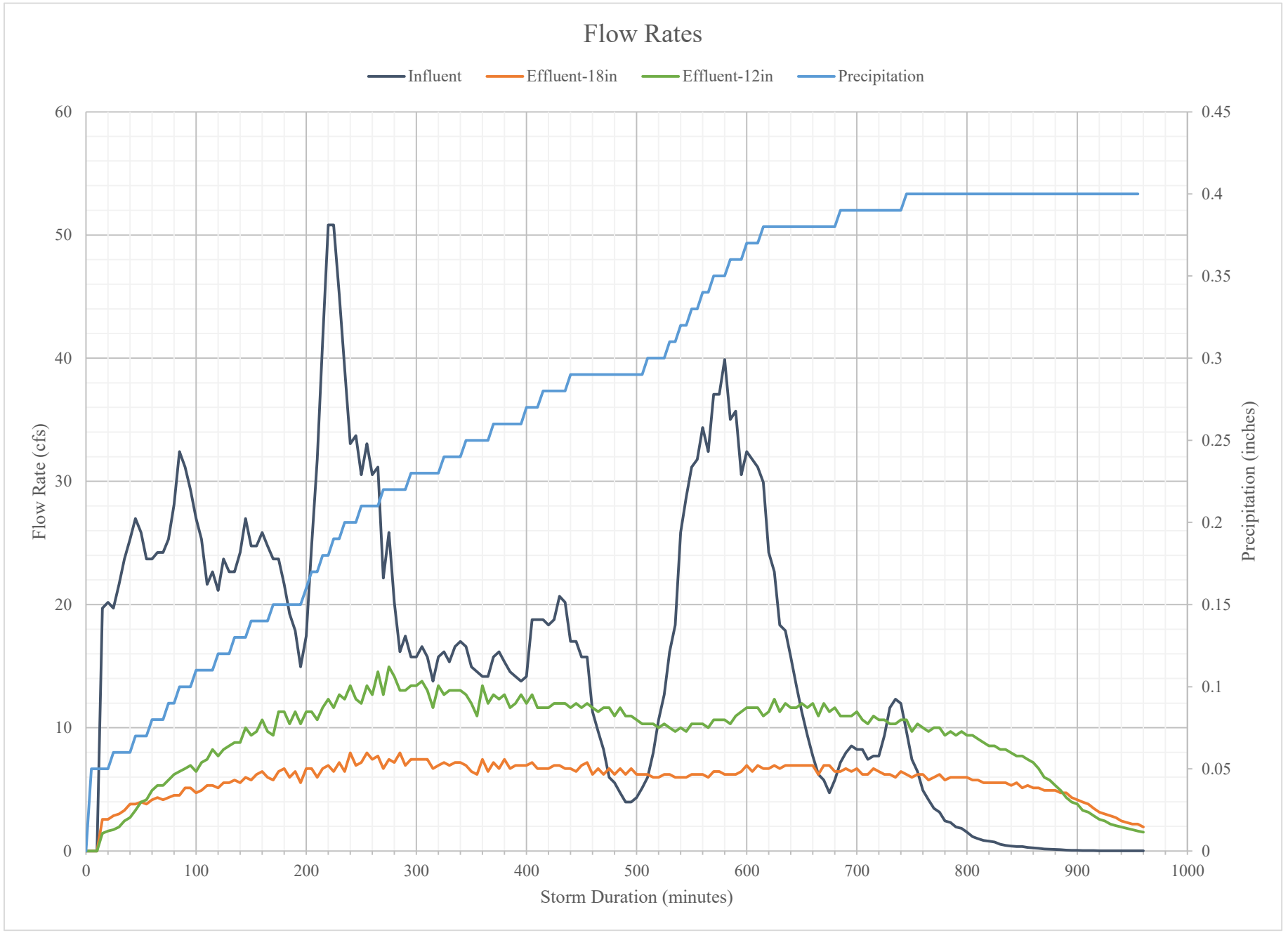

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0
100
200
300
400

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	1/2/2021	-	Date storm event started	
	Storm Start Date and Time	1/2/21 7:10 PM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	1/3/21 11:00 AM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.40	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	15.83	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	2.21	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	12.50	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	530.967	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	320.243	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	198.313	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	4.179	gpm	Average influent flow rate during storm event	
	12" Effluent	2.520	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.561	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	13.428	gpm	Peak influent flow rate during storm event	
	12" Effluent	3.949	gpm	Peak effluent flow rate during storm event	
	18" Effluent	2.107	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	31	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	38	-		
	18" Effluent	23	-		
Sample Duration	Influent	11.58	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	13.75	hours		
	18" Effluent	1.83	hours		
Threshold	Influent	470	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	235	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	235	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	97.0%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	98.5%	%		
	% of 18 Effluent	96.3%	%		
90th Percentile Flow Rate	Influent	8.563	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 1/2/2021

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	13	20	100	3.8	3	70.77%	76.92%	1		
	Total Copper	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.00007		
	Dissolved Copper	mg/L	N/A	0.005	0.02	N/A	N/A	-	-	0.00007		
	Total Zinc	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.00025		
	Dissolved Zinc	mg/L	N/A	0.02	0.3	N/A	N/A	-	-	0.00025		
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.25		
	Mineral Oil	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Diesel	mg/kg	N/A	N/A	N/A	N/A	N/A	-	-	0.05		
Screening Parameters	PSD											
	>250	µm		N/A	N/A			-	-	N/A		
	250 - 62.5	µm		N/A	N/A			-	-	N/A		
	<62.5	µm		N/A	N/A			-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	N/A	N/A	N/A	N/A	N/A	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

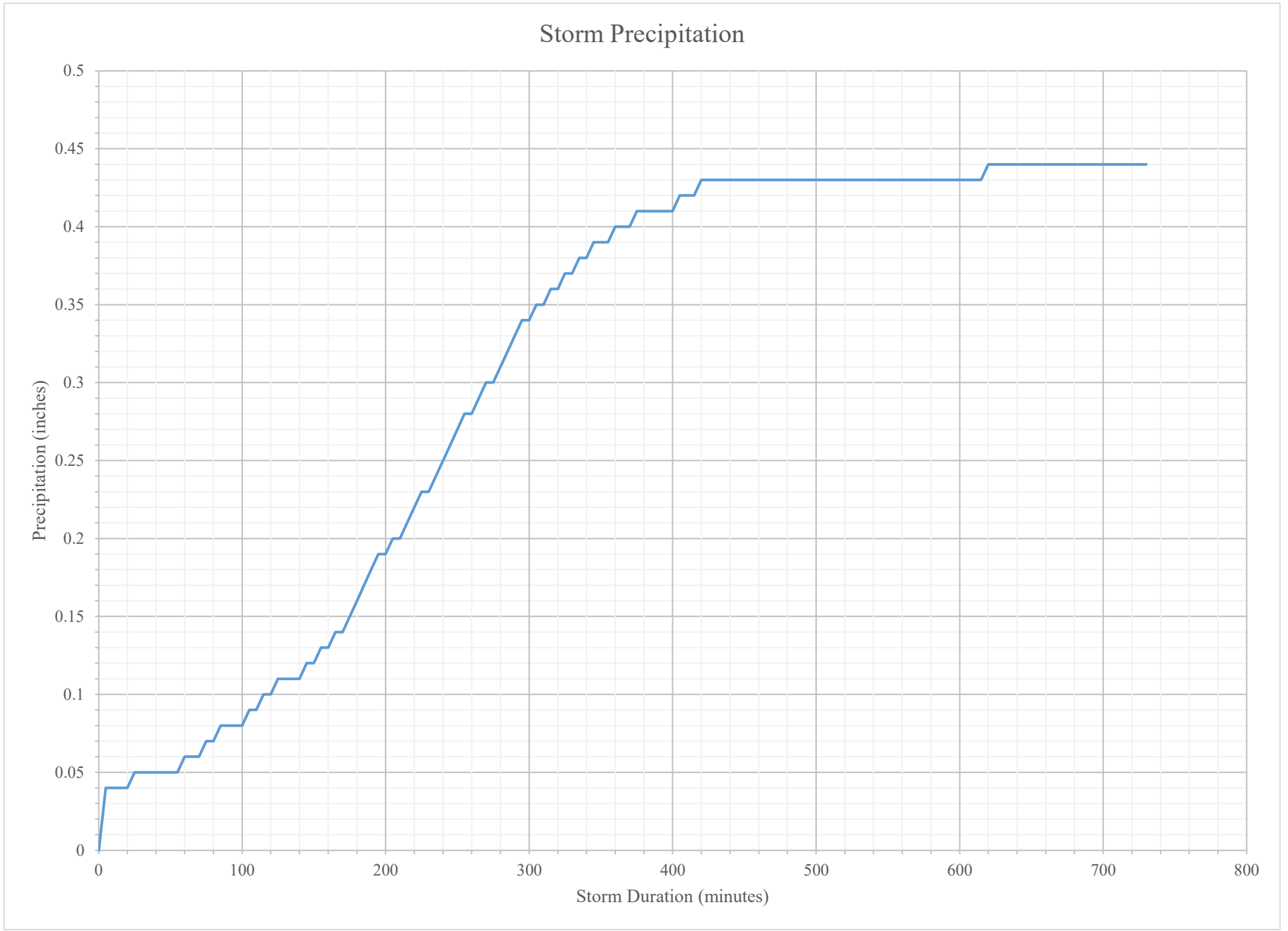

Storm Precipitation
Precipitation (inches)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600
700
800
900
1000
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0
100
200
300
400
500
600
700
800
900
1000

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	1/4/2021	-	Date storm event started	
	Storm Start Date and Time	1/4/21 11:00 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	1/4/21 11:05 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.44	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	12.08	hours	Duration of storm event	
	Storm Average Intensity	0.04	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	2.93	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	24.00	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	1155.380	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	262.183	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	188.030	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	11.915	gpm	Average influent flow rate during storm event	
	12" Effluent	2.704	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.939	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	62.830	gpm	Peak influent flow rate during storm event	
	12" Effluent	4.495	gpm	Peak effluent flow rate during storm event	
	18" Effluent	2.897	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	>45	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	>45	-		
	18" Effluent	40	-		
Sample Duration	Influent	4.92	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	7.42	hours		
	18" Effluent	10.58	hours		
Threshold	Influent	260	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	130	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	130	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	35.8%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	78.8%	%		
	% of 18 Effluent	97.7%	%		
90th Percentile Flow Rate	Influent	39.686	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 1/4/2021

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	50	20	100	5.4	3.4	89.20%	93.20%	1		
	Total Copper	mg/L	0.00213	N/A	N/A	0.00475	0.00564	-123.00%	-164.79%	0.00007		
	Dissolved Copper	mg/L	0.00124	0.005	0.02	0.00395	0.00542	-218.55%	-337.10%	0.00007		
	Total Zinc	mg/L	0.0147	N/A	N/A	0.00368	0.00434	74.97%	70.48%	0.00025		
	Dissolved Zinc	mg/L	0.0054	0.02	0.3	0.00224	0.0116	58.52%	-114.81%	0.00025		
	Total Phosphorus	mg/L	0.0539	0.1	0.5	0.542	0.831	-905.57%	-1441.74%	0.00505		
	Iron	mg/L	0.496	N/A	N/A	0.818	0.616	-64.92%	-24.19%	0.01		
	Dissolved Iron	mg/L	0.0172	N/A	N/A	0.105	0.18	-510.47%	-946.51%	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0384	N/A	N/A	0.348	0.515	-806.25%	-1241.15%	N/A		
	Hardness	mg CaCO3/L	12.1	N/A	N/A	18.2	28.3	-50.41%	-133.88%	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	<0.5	N/A	N/A	<0.5	<0.5	-	-	N/A		
	Nitrate-Nitrite	mg/L	<0.1	N/A	N/A	<0.1	<0.1	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	ND	N/A	N/A	ND	ND	-	-	N/A		


Storm Precipitation
Precipitation (inches)
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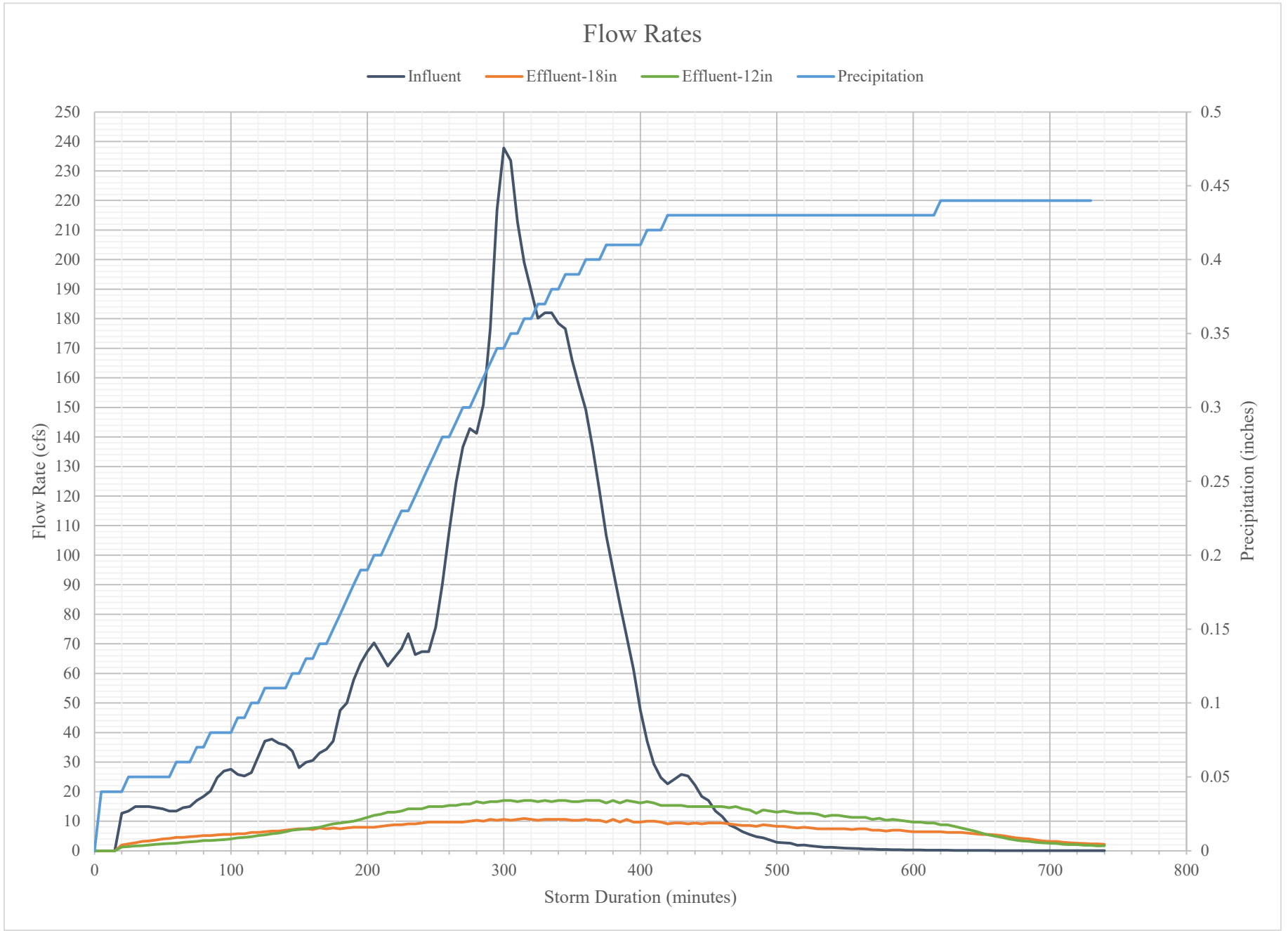
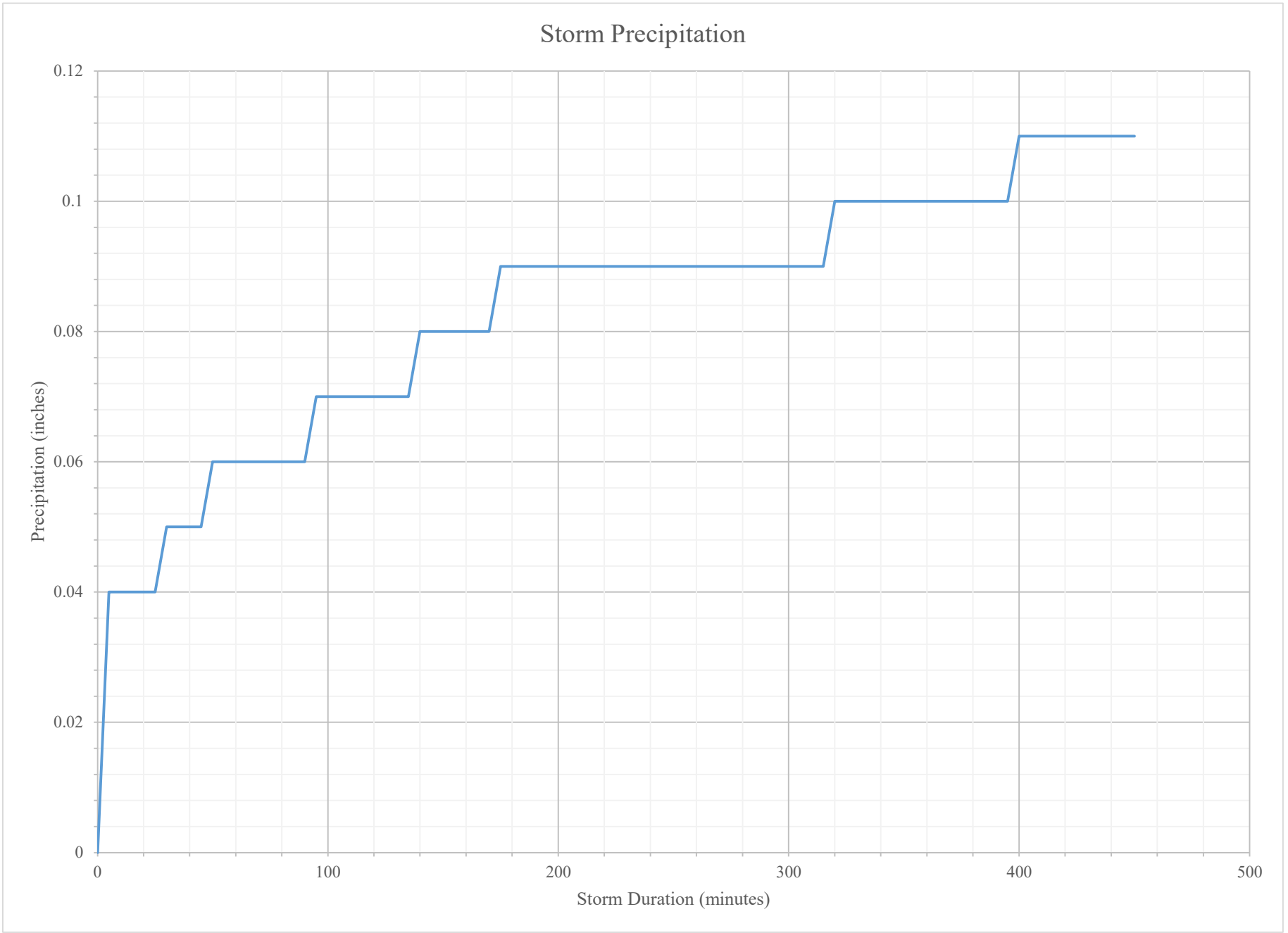
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600
700
800
Storm Duration (minutes)

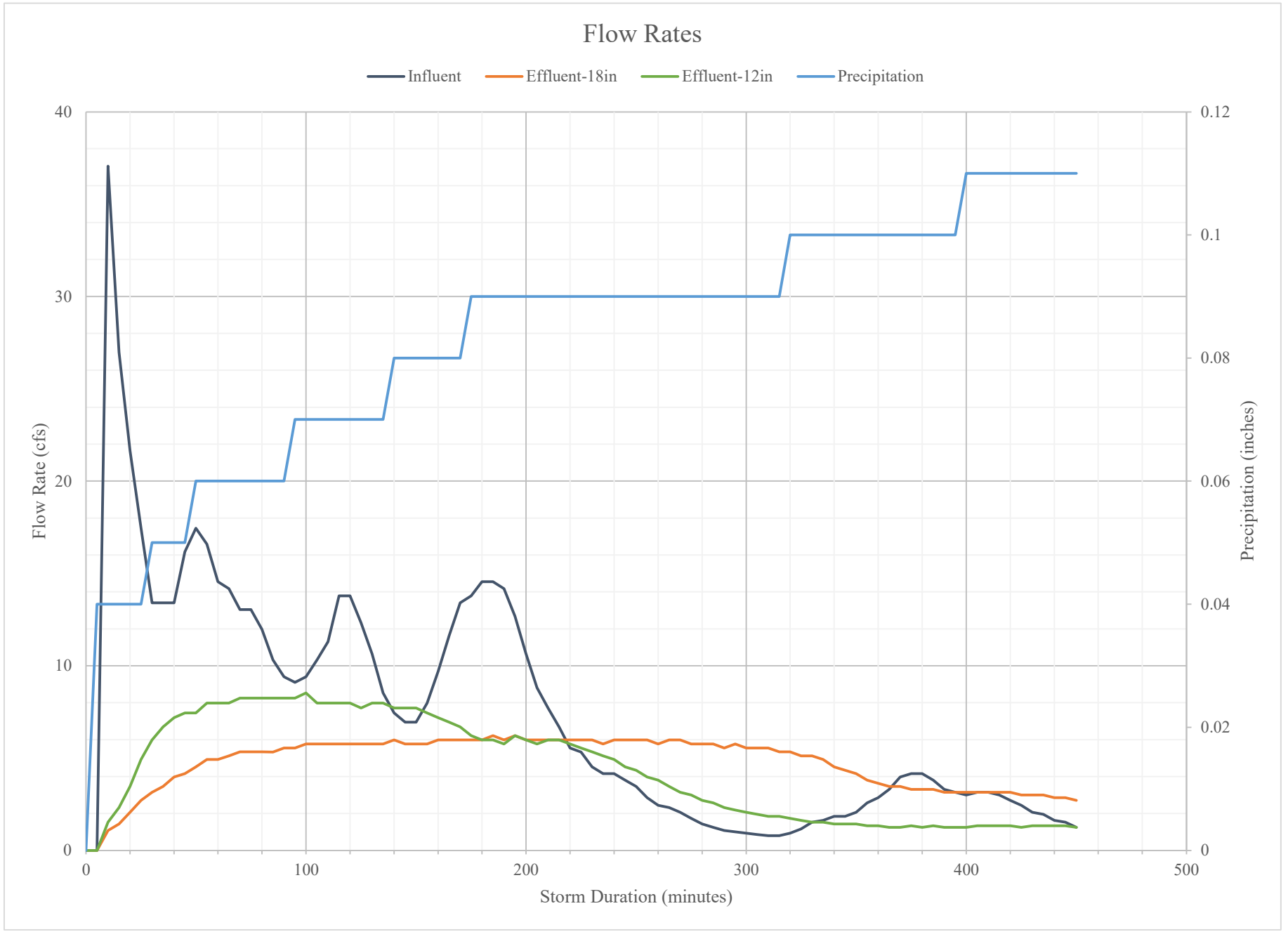

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0
100
200
300
400
500
600
700
800

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	11/22/2018	-	Date storm event started	
	Storm Start Date and Time	1/6/21 9:50 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	1/6/21 5:15 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.11	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	7.42	hours	Duration of storm event	
	Storm Average Intensity	0.01	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	0.12	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	34.75	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	117.591	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	70.128	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	75.779	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	1.976	gpm	Average influent flow rate during storm event	
	12" Effluent	1.178	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.273	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	9.792	gpm	Peak influent flow rate during storm event	
	12" Effluent	2.253	gpm	Peak effluent flow rate during storm event	
	18" Effluent	1.643	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	15	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	18	-		
	18" Effluent	19	-		
Sample Duration	Influent	7.00	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	6.92	hours		
	18" Effluent	6.50	hours		
Threshold	Influent	220	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	110	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	110	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	99.2%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	99.8%	%		
	% of 18 Effluent	97.5%	%		
90th Percentile Flow Rate	Influent	3.845	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 1/6/2021

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	11	20	100	4.33	2.75	60.64%	75.00%	1		
	Total Copper	mg/L	0.00234	N/A	N/A	0.0058	0.00633	-147.86%	-170.51%	0.00007		
	Dissolved Copper	mg/L	N/A	0.005	0.02	N/A	N/A	-	-	0.00007		
	Total Zinc	mg/L	0.0127	N/A	N/A	0.00569	0.00545	55.20%	57.09%	0.00025		
	Dissolved Zinc	mg/L	N/A	0.02	0.3	N/A	N/A	-	-	0.00025		
	Total Phosphorus	mg/L	N/A	0.1	0.5	N/A	N/A	-	-	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Hardness	mg CaCO3/L	N/A	N/A	N/A	N/A	N/A	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		

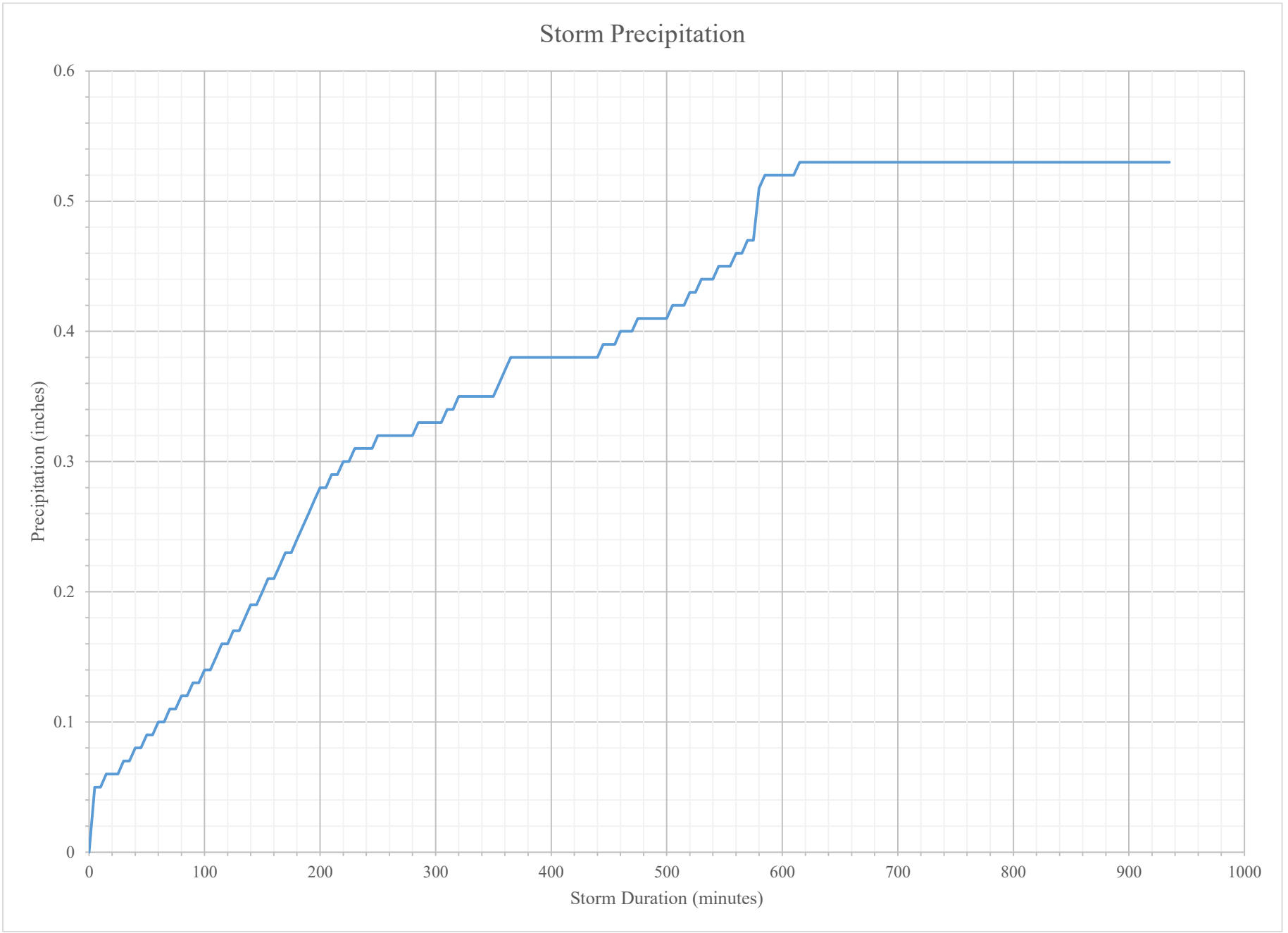

Storm Precipitation
0.12
0.1
0.08
0.06
0.04
0.02
0
Precipitation (inches)
0
100
200
300
400
500
Storm Duration (minutes)

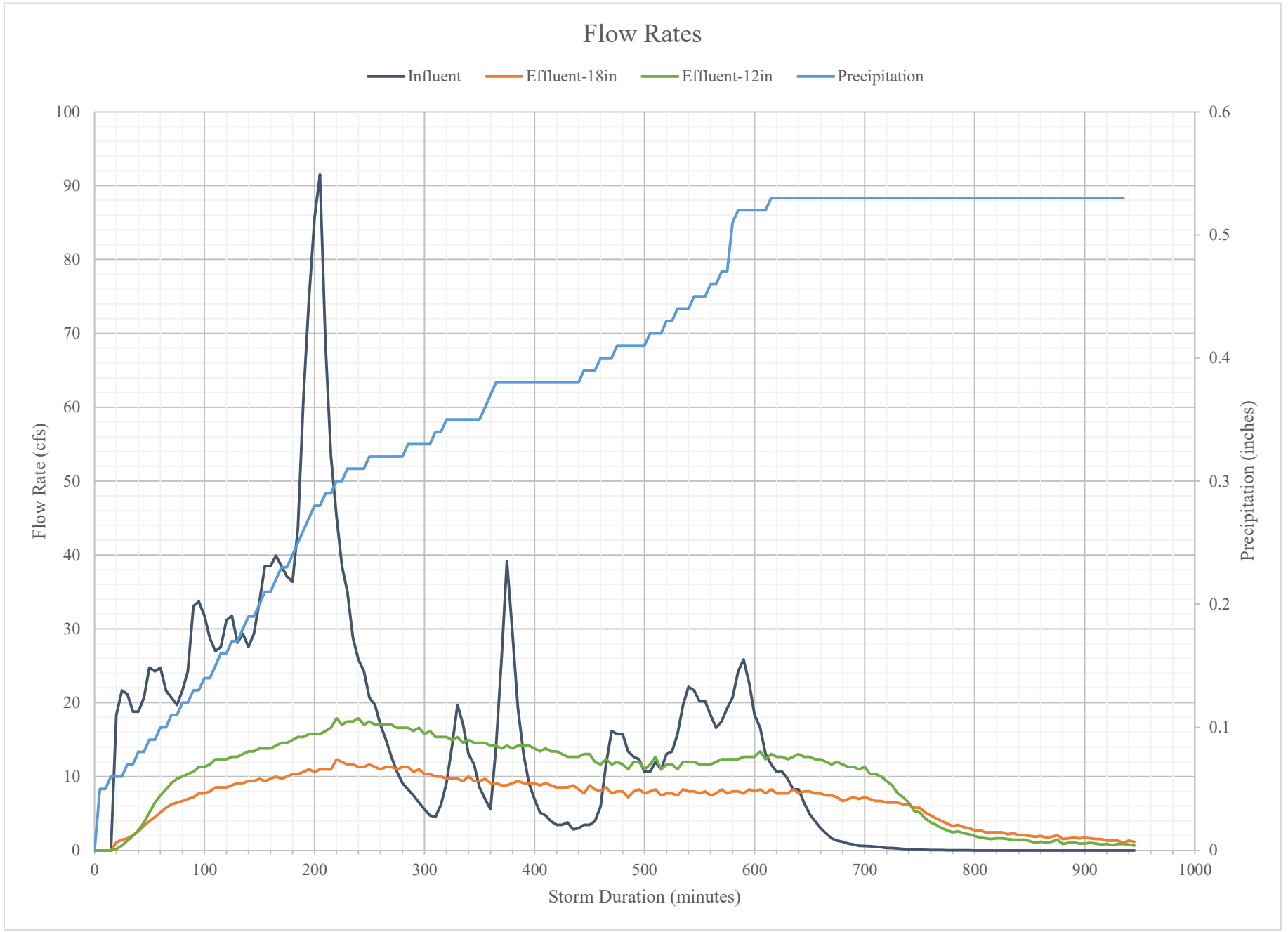

Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
0
0.02
0.04
0.06
0.08
0.1
0.12
0
100
200
300
400
500

	Paramter	Value	Units	Definition	Notes
Storm Data	Storm ID	1/12/2021	-	Date storm event started	
	Storm Start Date and Time	1/12/21 4:00 AM	-	Defines storm event start: 6 hours minimim with ≥ than 0.04" of rain	
	Storm End Date and Time	1/12/21 7:30 PM	-	Defines storm event end: 6 hours minimim with less than 0.04" of rain	
	Total Precipitation Depth	0.53	inches	Cumulative rainfall from the start of the qualifying storm event and the end of the qualifying storm event	
	Storm Duration	15.50	hours	Duration of storm event	
	Storm Average Intensity	0.03	in/hr	Total rainfall amount divided by total rainfall duration (e.g., inches per hour)	
	Storm Peak Intensity	2.35	in/hr	Maximum precipitation depth per time interval (5 minutes) converted to in/hr	
	Storm Antecedent Dry Period	115.00	hours	From end of the last rainfall event to start of current rainfall event	
Total Volume	Influent	467.660	ft^3	Total volume of influent from start of event to end of event	
	12" Effluent	333.905	ft^3	Total volume of effluent from start of event to end of event	
	18" Effluent	232.068	ft^3	Total volume of effluent from start of event to end of event	
Average Flow Rate	Influent	4.483	gpm	Average influent flow rate during storm event	
	12" Effluent	2.684	gpm	Average effluent flow rate during storm event	
	18" Effluent	1.866	gpm	Average bypass flow rate during storm evnt	
Peak Flow Rate	Influent	24.173	gpm	Peak influent flow rate during storm event	
	12" Effluent	4.726	gpm	Peak effluent flow rate during storm event	
	18" Effluent	3.256	gpm	Peak bypass flow rate during storm event	
Aliquots	Influent	25	-	Total number of aliquots obtained during qualifying storm event	The maximum of aliquots that can be collected is 45
	12" Effluent	37	-		
	18" Effluent	25	-		
Sample Duration	Influent	9.42	hours	Time in hours between the collection of the first and last aliquots	The duration reflects the time between the first and last aliquots, or the first and 45th aliquot if the number of aliquots reported exceeds 45
	12" Effluent	14.25	hours		
	18" Effluent	12.42	hours		
Threshold	Influent	510	L	Volume of stormwater that pass through the influent before a aliquot is collected	
	12" Effluent	255	L	Volume of stormwater that pass through the 12" effluent before a aliquot is collected	
	18" Effluent	255	L	Volume of stormwater that pass through the 18" effluent before a aliquot is collected	
Storm Volume Sampled	% of Influent	96.3%	%	Number of aliquots times the threshold volume, divided by the total storm volume	
	% of 12 Effluent	99.8%	%		
	% of 18 Effluent	97.1%	%		
90th Percentile Flow Rate	Influent	9.432	gpm	90th Percentile flow rate from storm start and end time.	

Storm Date: 1/12/2021

	Parameter	Units	Influent EMC Measured	Influent Conc. Minimum Limit	Influent Conc. Maximum Limit	12" Effluent	18" Effluent	12" Removal Efficiency	18" Removal Efficiency	Detection Limit (DL)	Flags	Notes
Required Parameters	TSS	mg/L	18	20	100	2.8	2.33	84.44%	87.06%	1		
	Total Copper	mg/L	0.00211	N/A	N/A	0.00341	0.00416	-61.61%	-97.16%	0.00007		
	Dissolved Copper	mg/L	N/A	0.005	0.02	N/A	N/A	-	-	0.00007		
	Total Zinc	mg/L	0.0143	N/A	N/A	0.00271	0.00367	81.05%	74.34%	0.00025		
	Dissolved Zinc	mg/L	N/A	0.02	0.3	N/A	N/A	-	-	0.00025		
	Total Phosphorus	mg/L	5.75	0.1	0.5	0.506	0.701	91.20%	87.81%	0.00505		
	Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	Dissolved Iron	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	0.01		
	NWTPH-Dx											
	Lube Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.25		
	Mineral Oil	mg/kg	ND	N/A	N/A	ND	ND	-	-	N/A		
	Diesel	mg/kg	ND	N/A	N/A	ND	ND	-	-	0.05		
Screening Parameters	PSD											
	>250	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	250 - 62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	<62.5	µm	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	pH		N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Orthophosphate	mg/L	0.0491	N/A	N/A	0.362	0.503	-637.27%	-924.44%	N/A		
	Hardness	mg CaCO3/L	ND	N/A	N/A	34.3	44.4	-	-	1		
Other Parameters	Calcium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Magnesium	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	TKN	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Nitrate-Nitrite	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Dissolved Lead	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	PO4/P	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		
	Total Nitrogen	mg/L	N/A	N/A	N/A	N/A	N/A	-	-	N/A		


Storm Precipitation
Precipitation (inches)
0.6
0.5
0.4
0.3
0.2
0.1
0
0
100
200
300
400
500
600
700
800
900
1000
Storm Duration (minutes)


Flow Rates
Influent
Effluent-18in
Effluent-12in
Precipitation
Flow Rate (cfs)
Precipitation (inches)
Storm Duration (minutes)
0
10
20
30
40
50
60
70
80
90
100
0
0.1
0.2
0.3
0.4
0.5
0.6
0
100
200
300
400
500
600
700
800
900
1000

Appendix C. Data Quality Assessment

Appendix C.1 Quality Objectives

This section describes the assessment performed to review the quality of the data collected during the study. The purpose of the assessment was to determine whether measurement performance criteria (MPCs) identified in the study QAPP were met for each of the data quality indicators (DQIs). The DQIs for the project included precision, bias, representativeness, completeness, comparability, and sensitivity. Detailed definitions of each DQI and descriptions for each MPC are included in the study QAPP. This section describes the evaluation of each DQI with respect to the MPCs for the data collected during the study.

Precision

DQI #1: Developing and consistently following SOPs for collecting samples and measuring data will reduce the potential of collecting imprecise data.

MPC #1: An audit will be conducted to verify that sampling staff are following the SOPs. Data will be considered acceptable if the sampling staff are consistently following the SOPs.

Assessment: An audit was performed to verify that sampling staff are following the SOPs. A copy of the audit results is included in Appendix C.4. SOPs were followed unless improvements were made to procedures which included: addition of steps that provided a data quality benefit (i.e. tightening of weir wheels to limit any leaking of flow around the weir seal); revision of steps following installation of equipment or guidance provided by manufacturers, analytical laboratories, or others (i.e. addition of sample blank for dissolved metals); and removal of items that were not necessary to ensure data quality (i.e. disconnect power supply to battery in order to test voltage of battery).The data are, as a result, considered acceptable.

DQI #2: Duplicate analytical testing will be performed for the water quality parameters shown in Table 6.2 of the study QAPP.

MPC #2: If the results of the duplicate sampling meet the respective relative percent difference (RPD) for the parameters listed in Table 6.2 of the study QAPP, the results of the analytical testing will be considered acceptable.

Assessment: Laboratory and field duplicates were obtained during the study. Data which met the RPD as described in Appendix C.5 was considered acceptable. Field duplicates which exceeded the RPD were rejected along with the sample result. Corrective action was taken following the sample to properly collect field duplicates for future events.

DQI #3: Rain gauge and flow measurements will also be assessed.

MPC #3: If the flow measurements and rain gauge data meet the RPD defined in section 6.1 of the study QAPP, that data will be considered acceptable.

Assessment: Flow measurements and rain gauge RPD procedures were revised as described in Appendix C.5. Data is considered acceptable.

Bias

DQI #1: Calibration of instruments, including the pH meter, pressure transducers and ISCO, will occur according to manufacturer's specifications. Buffer solutions will be used to calibrate the pH meter to reduce the potential for bias.

MPC #1: To reduce the potential for biased measurements, the instruments requiring calibration will be calibrated according to the procedures and frequency outlined in Section 8.0 of the study QAPP, per manufacturer's specifications. An audit will be conducted to verify that sampling staff are following the calibration procedures.

Assessment: Instruments were maintained and calibrated during the study according to the SOPs in Section 8.1 of the study QAPP, per manufacturer specifications. An audit was performed to verify the SOPs were followed and can be found in Appendix C.4.

DQI #2: Lack of maintenance at the site can be a source of bias in sample values or measurements. For example, if ISCO tubing is not cleaned regularly, sediment, oils, etc. can accumulate in the tubing and affect sample results. For that reason, manufacturer's recommendations for maintenance frequency and procedures will be followed to reduce the potential for bias.

MPC #2: An audit (Section 12.0 of the study QAPP) will be conducted to verify that sampling staff are following the SOPs outlined in Section 8.0 of the study QAPP (written to match manufacturer's specifications).

Assessment: An audit was performed to verify that sampling staff are following the SOPs. See Precision DQI #1 for further discussion on the audit and SOPs.

DQI #3: SOPs defined in Section 8.0 of the QAPP will be followed when collecting samples and measuring data to limit bias.

MPC #3: An audit (Section 12.0 of the study QAPP) will be conducted to verify that sampling staff are following the SOPs outlined in Section 8.0 of the study QAPP.

Assessment: An audit was performed to verify that sampling staff are following the SOPs. See Precision DQI #1 for further discussion on the audit and SOPs.

DQI #4: Method blanks, matrix spikes, and field duplicates will be analyzed to check for bias.

MPC #4: Sample results will be accepted if results of the method blanks, matrix spikes, and/or field duplicates are below the limits.

Assessment: Samples were accepted if results of the method blanks, matrix spikes, and field duplicates were below the limits.

Representativeness

DQI #1: The location selected for this study is at the downstream end of a parking lot with an expected high number of trip returns.

MPC #1: These conditions reflect the characteristics of a location where a bioretention cell would be installed: an area where high loading of TSS and metals are expected.

Assessment: The bioretention cells were installed and monitored at the downstream end of a parking lot with an expected high number of trip returns. As such, the site is expected to accurately represent a typical site where a bioretention cell would be installed.

DQI #2: Hydrologic conditions at the site should be representative of a range of weather patterns and conditions seen throughout the wet season.

MPC #2: Local stormwater hydrologic conditions are represented by conducting the study over two wet seasons and collecting data from a minimum of 12 qualifying storm events (described in Section 7.5 of the study QAPP).

Assessment: The study was conducted over two and a half wet seasons (2018-2019, 2019-2020, 2020-early 2021) as well as during the dry seasons when rainfall occurred. Data was collected from a total 29 storm events. As a result, the data collected is expected to represent local stormwater hydrologic conditions.

DQI #3: Rainfall data, flow data, and water quality samples should be representative of the site.

MPC #3: Equipment will be set up to achieve representative rainfall, flow, and water quality data as follows:

- The rain gauge will be installed within the drainage basin of the bioretention cells and in a location where no buildings, trees, or other objects obstruct or divert rainfall from entering the rain gage.
- Pressure transducers will be installed upstream of weirs in influent, effluent pipes, which will mimic typical bioretention cell construction.
- Water quality samples will be collected as composite samples. pH measurements will also be taken from the composite samples. The composite samples will capture at least 10 aliquots and 75% of the qualifying rainfall event hydrograph to be representative of water quality during the storm.

Assessment: The rain gauge was located directly next to the monitoring vault at the test site. The pressure transducers were installed upstream of weirs in influent and effluent pipes. The influent, and effluent pipes mimicked bioretention construction. Water quality samples were collected as composite samples which captured at least 75% of the storm event hydrograph. Per TAPE (Ecology, 2018), aliquots as low as 7 for a storm event were accepted if other storm event guidelines, sampling requirements, and QA/QC criteria were met.

DQI #4: Equipment at the site will be installed per manufacturer specifications.

MPC #4: No MPC was listed for this DQI.

Assessment: Equipment at the site was installed per manufacturer specifications.

Completeness

DQI #1: A minimum of 12 qualifying rainfall events (Section 7.5) are required to be sampled for the duration of the study, per TAPE. Additionally, at least 10 aliquots and 75% of the hydrograph must be sampled during the qualifying rainfall event.

MPC #1: The number of rainfall events sampled will be compared to the minimum amount at the end of the project, and additional rainfall events will be sampled as needed. Samples which represent less than 75% of the hydrograph will not be accepted. If samples only consist of 7-9 aliquots, the samples may be accepted if rationale is provided in the TER as to why the sample was used (per TAPE).

Assessment: Water quality samples were collected for 29 events which captured an estimated 75% of the storm event hydrograph at minimum. Per TAPE (Ecology, 2018), aliquots as low as 7 for a storm event were accepted if other storm event guidelines, sampling requirements, and QA/QC criteria were met.

DQI #2: A minimum of 95% of the samples analyzed by the lab must be considered valid prior to the end of the study.

MPC #2: 95% of the samples must be accompanied by method blanks, matrix spikes, lab control spikes, and field duplicate results which are valid. Additionally, the samples must be received and analyzed within the appropriate temperatures and holding times. Temperature will be verified from the results reported by the lab.

Assessment: Approximately 74% of samples from qualifying or potentially qualifying events were initially accompanied by method blanks, matrix spikes, lab control spikes, and field duplicate results. Early lab reports through 12/7/2019 were not accompanied by QA/QC results and as a result corrective action was taken. QA/QC results were requested at a later date for reports missing that data and collected for an additional two events (resulting in 83% of samples accompanied by method blanks, matrix spikes, lab control spikes, and field duplicate results). No QA/QC issues were noted in the two recovered reports. It is expected that the QA/QC results for the reports which were not recovered would have a similar rate of valid method blanks, matrix spikes, lab control spikes, and field duplicate results as the analytical reports received after 12/7/2019 (4% on average), resulting in greater than 95% of the samples analyzed by the lab being accompanied by valid method blanks, matrix spikes, lab control spikes, and field duplicate results.

Samples were received within the appropriate holding times or rejected. An exception was made for samples above 6 degrees Celsius as further analysis indicated that there was not a relationship between the sample results obtained and temperature (see Appendix C.6). Samples above the 6 degrees Celsius were determined to be acceptable.

DQI #3: Define procedures for handling missing data, use appropriate coding for missing data, and report missing data with the results.

MPC #3: Procedures for handling missing data and coding missing data are defined in section 11.0 of the study QAPP. The Final Technical Report for this study will include consideration for how missing data could limit the comparability of the data set.

Assessment: Missing data was not encountered during the study.

DQI #4: Conduct routine maintenance for equipment at the site, in accordance with SOPs outlined in Section 8.0 of the study QAPP, to limit the possibility of missing or invalid data.

MPC #4: An audit (Section 12.0 of the study QAPP) will be conducted to verify that sampling staff are following the SOPs outlined in Section 8.0 of the study QAPP (written to match manufacturer's specifications).

Assessment: An audit was performed to verify that sampling staff are following the SOPs. See Precision DQI #1 for further discussion on the audit and SOPs.

DQI #5: An equipment checklist and Chain of Custody forms will be used to prevent loss of data resulting from missing containers, inoperable delivery and collection apparatus or sample delivery.

MPC #5: No MPC was listed for this DQI.

Assessment: Chain of custody forms were used to prevent the loss of data resulting from missing containers, inoperable delivery and collection apparatus, or sample delivery.

Comparability

DQI #1: The test site is located downstream of a parking area on the Gonzaga University campus with an expected high trip end count.

MPC #1: The process for selecting the study area is defined in section 7.2: the process focused on having a test site that is representative of locations where a bioretention cell would be installed.

Assessment: The biofiltration cells were installed and monitored downstream of a parking area on the Gonzaga University campus. As such, the site is expected to accurately represent a typical site where a bioretention cell would be installed.

DQI #2: Define and consistently follow SOPs for sample collection and field measurements.

MPC #2: SOPs were developed and will be consistently followed during this study.

Assessment: An audit was performed to verify that sampling staff are following the SOPs. See Precision DQI #1 for further discussion on the audit and SOPs.

DQI #3: All data and sample collection will be conducted in accordance with the SOPs outlined in Section 8.0.

MPC #3: An audit (Section 12.0) will be conducted to verify that sampling staff are following the SOPs outlined in Section 8.0.

Assessment: An audit was performed to verify that sampling staff are following the SOPs. See Precision DQI #1 for further discussion on the audit and SOPs.

DQI #4: Standard testing methods will be used to analyze samples submitted to the lab.

MPC #4: Anatek, the laboratory proposed for water quality testing in this study, is certified by Ecology and will follow standard methods approved by the US Environmental Protection Agency (EPA) (APHA et al. 1992, 1998; US EPA 1983, 1984). The methods to be used are listed in Table 9.1. Deviations from methods will be noted on analytical reports.

Assessment: Methods used by Anatek were recorded for each sampling event monitored. The methods were recorded in the QA worksheets, which are located in Appendix C.2. Methods used were standard methods approved by the EPA, and matched or were equivalent methods to those proposed in the study QAPP.

Sensitivity

DQI #1: Analytical results for water quality samples will be reported if they are above the reporting limit.

MPC #1: Reporting limits for water quality parameters are listed in Table 6.2 of the study QAPP. Data reported as below the detection limit will be calculated using the reporting limit shown in Table 9.1 of the study QAPP.

Assessment: Data reported below the detection limit was calculated using the reporting limit shown in the laboratory report. As methods used by the laboratory were standard methods and matched or were equivalent tests to those proposed in the QAPP, detection limits used in the laboratory reports were assumed to be sufficient.

DQI #2: All water quality testing methods selected have detection limits below the expected range of results.

MPC #2: The expected range of results and respective reporting limit were compared in Table 9.1 of the study QAPP.

Assessment: Per the study QAPP (Osborn Consulting, Inc., 2020), the reporting/detection limits for each method were below the expected range of results.

DQI #3: Instruments capable of accurately measuring variables at the site will be used during the study.

MPC #3: The sensitivity of instruments at the site is included with the monitoring equipment specifications in Appendix G of the study QAPP.

Assessment: Per the study QAPP, the instruments used during the study were selected to be capable of accurately measuring variables at the site.

Appendix C.2 Quality Assurance Worksheets

Data Quality Assurance Spreadsheet																									
Project Name	Gonzaga		Sample ID:	IN07232019, 12EF07232019, 18EF07232019 (No QC included in Lab Report, QC was recovered)																				
Sample Date:	7/24/2019		Lab Report #:	190725050-001, 190725050-002, 190725050-003																				
Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	No	SM2540D	7/24/19 8:00	7/30/19 12:35	6.19	7	14.4		1		80-120	97	90-110				≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	No	EPA 200.8	7/24/19 8:00	8/1/19 12:04	8.17	180	14.4		0.001		70-130	104.6	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	No	EPA 200.8	7/24/19 8:00	8/1/19 12:04	8.17	180	14.4		0.001		70-130	102.4	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	No	EPA 200.8	7/24/19 8:00	8/1/19 12:04	8.17	180	14.4		0.01		70-130	110	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	No	EPA 200.8	7/24/19 8:00	8/1/19 12:07	8.17	180	14.4		0.001		70-130	102.4	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	No	EPA 200.8	7/24/19 8:00	8/1/19 12:07	8.17	180	14.4		0.001		70-130	104.6	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	No	EPA 130.2	7/24/19 8:00	8/2/19 9:45	9.07	180	14.4		3		80-120	101	90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	No	SM4500-P F	7/24/19 8:00	7/25/19 17:25	1.39	2	14.4		0.018		80-120	94.2	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	No	SM4500-P F	7/24/19 8:00	7/31/19 11:36	7.15	28	14.4		0.005		80-120	104	80-120				≤ 20%		≤ 20%		
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	No	NWTPH-Dx	7/24/19 8:00	8/6/19 9:42	13.07	14	14.4		0.16		70-130	88.4	50-150				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	No	NWTPH-Dx	7/24/19 8:00	8/6/19 9:42	13.07	14	14.4		0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**IN-09282019, EF18-09282019 (No QC included in Lab Report, QC was recovered)**
Sample Date:	**9/28/2019**	**Lab Report #:**	**190930019-001, 190930019-002**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	9/28/19 18:00	10/4/19 11:00	5.71	7	1.5		1		80-120	97	90-110				≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/28/19 18:00	10/2/19 17:43	3.99	180	1.5		0.001		70-130	110.8	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/28/19 18:00	10/2/19 17:43	3.99	180	1.5		0.001		70-130	103	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/28/19 18:00	10/2/19 17:40	3.99	180	1.5		0.01		70-130	111	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/28/19 18:00	10/2/19 17:37	3.98	180	1.5		0.001		70-130	103	85-115				≤ 20%		≤ 20%		Metals filtered for dissolved
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/28/19 18:00	10/2/19 17:37	3.98	180	1.5		0.001		70-130	110.8	85-115				≤ 20%		≤ 20%		Metals filtered for dissolved
	Hardness as CaCO3	SM 2340B (ICP)	NO	EPA 130.2	9/28/19 18:00	10/3/19 10:00	4.67	180	1.5		3		80-120	100	90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM4500-PF	9/28/19 18:00	9/30/19 16:34	1.94	2	1.5		0.018		80-120	97.2	80-120				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM4500-PF	9/28/19 18:00	10/8/19 17:16	9.97	28	1.5		0.005		80-120		90-100				≤ 20%		≤ 20%		
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH Dx	9/28/19 18:00	10/9/19 4:02	10.42	14	1.5		0.16		70-130	79.1	50-150				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH Dx	9/28/19 18:00	10/9/19 4:02	10.42	14	1.5		0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**IN-11122019, EF12-11122019, EF18-11122019**
Sample Date:	**12/19/2019**	**Lab Report #:**	**191220035-001, 191220035-002, 191220035-003**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	12/20/19 9:00	12/26/19 7:45	5.95	7	2.2	<1	1	114	80-120	98	90-110				≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/19 9:00	12/26/19 11:43	6.11	180	2.2	ND	0.001	103	70-130	93.8	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/19 9:00	12/26/19 11:43	6.11	180	2.2	ND	0.001	76	70-130	92	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/19 9:00	12/27/19 13:34	7.19	180	2.2	ND	0.01	104.9	70-130	114	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/19 9:00	12/26/19 12:00	6.13	180	2.2	ND	0.001	76	70-130	92	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/19 9:00	12/26/19 12:00	6.13	180	2.2	ND	0.001	103	70-130	93.8	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	EPA 130.2	12/20/19 9:00	12/20/19 15:30	0.27	180	2.2	ND	3	100	80-120	100.5	90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM4500-PF	12/20/19 9:00	12/20/19 16:15	0.30	2	2.2	ND	0.018	98.5	80-120	103	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM4500-PF	12/20/19 9:00	1/3/20 14:06	14.21	28	2.2		0.005		80-120		90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA	NO	SM 4500 NO3F	12/20/19 9:00	12/31/19 12:01	11.13	NA	2.2	<0.1	0.05	89.5	70-130	101	80-120				NA		NA		
	TKN	NA	NO	SM 4500 NORGC	12/20/19 9:00	1/8/20 15:09	19.26	NA	2.2	<0.5	0.5	110.5	80-120	93	90-110				NA		NA		
	Total Nitrogen	NA	NO	Calculation	12/20/19 9:00	1/8/20 16:01	19.29	NA	2.2										NA		NA		
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	12/20/19 9:00	1/3/20 23:06	14.59	14	2.2	ND	0.16	94.4	70-130	84	70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	12/20/19 9:00	1/3/20 23:06	14.59	14	2.2	ND	0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet																									
Project Name	**Gonzaga**		**Sample ID:**	**IN-01282010, EF12-01282020, EF18-01282020**																					
Sample Date:	**1/28/2020**		**Lab Report #:**	**WAA0225-01, WAA0225-02, WAA0225-03**																					
Matrix	**Parameter**	**Method**	**Chain-of-Custody Issues?**	**Completeness/ Methodology**	**Holding Times (days)**				**Cooler Temperature (°C)**	**Blanks (mg/L)**		**Matrix Spikes/ Surrogate Recovery (%)**		**Lab Control Samples Recovery (%)**		**Lab Duplicates RPD (%)**		**Influent Field Duplicates RPD (%)**		**Effluent Field Duplicates RPD (%)**		**Flagged**	**ACTION/NOTES**
					Date Collected	**Date Analyzed**	**Reported**	**Goal**		**Result**	**Reporting Limit**	**Reported**	**Goal**	**Reported**	**Goal**	**RPD**	**RPD Limit**	**Reported**	**Goal**	**Reported**	**Goal**		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	1/28/20 17:55	2/4/20 15:45	6.91	7	4.2	ND	1	107	80-120	97	90-110	9.52	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/28/20 17:55	2/3/20 13:40	5.82	180	4.2	ND	0.001		70-130	105	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/28/20 17:55	2/3/20 13:40	5.82	180	4.2	ND	0.001		70-130	101	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/28/20 17:55	2/3/20 13:40	5.82	180	4.2	ND	0.01		70-130	105	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/28/20 17:55	2/3/20 14:58	5.88	180	4.2	ND	0.001	99.9	70-130	103	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/28/20 17:55	2/3/20 14:58	5.88	180	4.2	ND	0.001	90.4	70-130	107	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	1/28/20 17:55	2/3/20 11:40	5.74	180	4.2	ND	3	99.5	80-120	100.5	90-110	0.597	200		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	1/28/20 17:55	1/30/20 15:29	1.90	2	4.2	ND	0.018	97.9	80-120	93.9	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P F	1/28/20 17:55	2/11/20 15:36	13.90	28	4.2	ND	0.005	103.1	80-120	94.7	90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	SM 4500-NO3 F	NO	NA	1/28/20 17:55	2/7/20 10:51	9.71	NA	4.2	ND	0.5	97.5	70-130	95	80-120				NA		NA		
	TKN	SM 4500-Norg D	NO	NA	1/28/20 17:55	2/10/20 16:01	12.92	NA	4.2	ND	0.1	97.6	90-110	97.2	90-110				NA		NA		
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	EPA 8015D	1/28/20 17:55	2/12/20 3:11	14.39	14	4.2	ND	0.16	83.3	70-130	93.6	70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	EPA 8015D	1/28/20 17:55	2/12/20 3:11	14.39	14	4.2	ND	0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	EPA 8015D	1/28/20 17:55	2/12/20 3:11	14.39	14	4.2	ND	0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**IN-01302020, EF12-01302020, EF18-01302020**
Sample Date:	**1/30/2020**	**Lab Report #:**	**WAA0224-01, WAA0224-02, WAA0224-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540 D	1/30/20 8:30	2/4/20 15:45	5.30	7	5.8	ND	1	107	80-120	97	90-110	9.52	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/30/20 8:30	2/19/20 14:04	20.23	180	5.8	ND	0.001		70-130	94.8	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/30/20 8:30	2/19/20 14:04	20.23	180	5.8	ND	0.001		70-130	94.8	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/30/20 8:30	2/19/20 14:04	20.23	180	5.8	ND	0.01		70-130	101	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/30/20 8:30	2/3/20 14:34	4.25	180	5.8	ND	0.001	99.9	70-130	103	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/30/20 8:30	2/3/20 14:34	4.25	180	5.8	ND	0.001	90.4	70-130	107	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	1/30/20 8:30	2/3/20 11:00	4.10	180	5.8	ND	3	99.5	80-120	100.5	90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	1/30/20 8:30	1/30/20 15:27	0.29	2	5.8	ND	0.018	97.9	80-120	93.9	85-115	0.597	200		≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500- P F	1/30/20 8:30	2/11/20 15:28	12.29	28	5.8	ND	0.005	104.2	80-120	98.35	90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA	NO	SM 4500-NO3 F	1/30/20 8:30	2/7/20 10:39	8.09	NA	5.8	ND	0.5	97.55	90-110	97.2	90-110				NA		NA		
	TKN	NA	NO	SM 4500-Norg D	1/30/20 8:30	2/13/20 16:37	14.34	NA	5.8	ND	0.1	97.5	70-130	95	80-120				NA		NA		
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	EPA 8015D	1/30/20 8:30	2/12/20 0:27	12.66	14	5.8	ND	0.16	83.3	70-130	93.6	70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	EPA 8015D	1/30/20 8:30	2/12/20 0:27	12.66	14	5.8	ND	0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	EPA 8015D	1/30/20 8:30	2/12/20 0:27	12.66	14	5.8	ND	0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**IN-02232020, EF12-02232020, EF18-02232020**
Sample Date:	**2/23/2020**	**Lab Report #:**	**WAB0557-01, WAB0557-01, WAB0557-01**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	2/23/20 18:15	2/28/20 16:00	4.91	7	4	ND	1	111.5	80-120	97.3	90-110	9.125	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	2/23/20 18:15	2/28/20 13:28	4.80	180	4	ND	0.001		70-130	94.3	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	2/23/20 18:15	2/28/20 13:28	4.80	180	4	ND	0.001		70-130	96	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	2/23/20 18:15	2/28/20 13:28	4.80	180	4	ND	0.01		70-130	98.7	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	2/23/20 18:15	2/28/20 14:11	4.83	180	4	ND	0.001	88.85	70-130	93.4	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	2/23/20 18:15	2/28/20 14:11	4.83	180	4	ND	0.001	87.2	70-130	94.3	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	2/23/20 18:15	3/3/20 15:15	8.88	180	4	0.25	3		80-120	100.5	90-110	2.06	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	2/23/20 18:15	2/25/20 10:02	1.66	2	4	ND	0.018	94.35	80-120	92.7	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P F	2/23/20 18:15	3/3/20 10:20	8.67	28	4	ND	0.005	110.5	80-120	101	90-110				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA	NO	SM 4500-NO3 F	2/23/20 18:15	2/25/20 11:33	1.72	NA	4	ND	0.1	89.55	80-120	96.2	85-115				NA		NA		
	TKN	NA	NO	SM 4500-Norg D	2/23/20 18:15	3/3/20 16:16	8.92	NA	4	ND	0.5	106	80-120	102	85-115				NA		NA		
	Total Nitrogen	NA	NO	Calculation	2/23/20 18:15	3/3/20 16:16	8.92	NA	4										NA		NA		
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	EPA 8015D	2/23/20 18:15	3/6/20 14:28	11.84	14	4	ND	0.16	73.45	70-130	82.4	70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	EPA 8015D	2/23/20 18:15	3/6/20 14:28	11.84	14	4	ND	0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	EPA 8015D	2/23/20 18:15	3/6/20 14:28	11.84	14	4	ND	0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF05062020, EFF1205062020, EFF1805062020**
Sample Date:	**5/7/2020**	**Lab Report #:**	**WAE0230-01, WAE0230-02, WAE0230-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	5/7/20 8:30	5/12/20 14:00	5.23	7	9.9	ND	1	84	80-120	96	90-110	0	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/7/20 8:30	5/11/20 12:35	4.17	180	9.9	ND	0.001	100.05	70-130	96.4	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/7/20 8:30	5/11/20 12:35	4.17	180	9.9	ND	0.001	99.15	70-130	96.3	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/7/20 8:30	5/11/20 12:35	4.17	180	9.9	ND	0.01	99.5	70-130	111	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/7/20 8:30	5/11/20 13:03	4.19	180	9.9	ND	0.001	97.8	70-130	96.2	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/7/20 8:30	5/11/20 13:03	4.19	180	9.9	ND	0.001	96.45	70-130	97.4	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	5/7/20 8:30	5/12/20 10:15	5.07	180	9.9	ND	3	100.5	80-120	100.5	90-110	2.53	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	5/7/20 8:30	5/8/20 11:07	1.11	2	9.9	ND	0.018		80-120	103	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	5/7/20 8:30	5/22/20 10:51	15.10	28	9.9	0.005	0.005	103.5	80-120	99.4	90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA	NO	SM 4500-NO3 F	5/7/20 8:30	5/13/20 14:35	6.25	NA	9.9	ND	0.1	82.35	80-120	95.4	90-110				NA		NA		
	TKN	NA	NO	SM 4500-Norg D	5/7/20 8:30	5/27/20 13:27	20.21	NA	9.9	ND	0.5	91.3	80-120	98.2	85-115				NA		NA		
	Total Nitrogen	NA	NO	Calculation	5/7/20 8:30	5/27/20 13:27	20.21	NA	9.9										NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)	NO	TAPE 2011 / ASTM D3977 Method C	5/7/20 8:30	5/8/20 0:00	0.65	NA															From lab: "There were no noted anomalies during this testing".
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	5/7/20 8:30	5/16/20 1:45	8.72	14	9.9	ND	0.16		70-130	78.1	70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	5/7/20 8:30	5/16/20 1:45	8.72	14	9.9	ND	0.4		70-130	ND	70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	5/7/20 8:30	5/16/20 1:45	8.72	14	9.9	ND	0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet																									
Project Name	**Gonzaga**		**Sample ID:**	**INF05202020, EFF12052020, EFF1805202020**																					
Sample Date:	**5/20/2020**		**Lab Report #:**	**20S091-01**																					
Matrix	**Parameter**	**Method**	**Chain-of-Custody Issues?**	**Completeness/ Methodology**	**Holding Times (days)**				**Cooler Temperature (°C)**	**Blanks (mg/L)**		**Matrix Spikes/ Surrogate Recovery (%)**		**Lab Control Samples Recovery (%)**		**Lab Duplicates RPD (%)**		**Influent Field Duplicates RPD (%)**		**Effluent Field Duplicates RPD (%)**		**Flagged**	**ACTION/NOTES**
					Date Collected	**Date Analyzed**	**Reported**	**Goal**		**Result**	**Reporting Limit**	**Reported**	**Goal**	**Reported**	**Goal**	**RPD**	**RPD Limit**	**Reported**	**Goal**	**Reported**	**Goal**		
Stormwater	Total Suspended Solids (TSS)	SM 2540D					0.00	7			1		80-120		90-110				≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)					0.00	180			3		80-120		90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F					0.00	28			0.005		80-120		90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)	NO	TAPE 2011 / ASTM D3977 Method C	5/20/20 0:00	5/26/20 0:00	6.00	NA															From lab: "There were no noted anomalies during this testing".
	NWTPH-Dx , Diesel	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx					0.00	14			0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF05302020, EFF12-05302020, EFF18-05302020**
Sample Date:	**5/31/2020**	**Lab Report #:**	**WAF0004-01,WAF0004-02, WAF0004-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 4540D	5/31/20 16:00	6/5/20 11:00	4.79	7	5	ND	1	98	80-120	99.8	90-110	34.95	20		≤ 25%		≤ 25%		Lab duplicate RPD exceeded limit. Only test exceeded (by one unrelated sample). Will accept sample result.
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/31/20 16:00	6/24/20 14:08	23.92	180	5	ND	0.001	96.0	70-130	96	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/31/20 16:00	6/24/20 14:08	23.92	180	5	ND	0.001	97.5	70-130	97.8	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/31/20 16:00	6/24/20 14:08	23.92	180	5	ND	0.01	114.5	70-130	106	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/31/20 16:00	6/19/20 14:53	18.95	180	5	ND	0.001	78.1	70-130	98.6	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	5/31/20 16:00	6/19/20 14:53	18.95	180	5	ND	0.001	80.5	70-130	96.2	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 4340C	5/31/20 16:00	6/11/20 9:45	10.74	180	5	ND	3	101	80-120	98.8	90-110	0.388	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F					0.00	28			0.005		80-120		90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	5/31/20 16:00	6/12/20 21:29	12.23	14	5	ND	0.16	83	70-130	103	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	5/31/20 16:00	6/12/20 21:29	12.23	14	5	ND	0.4		70-130		70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	5/31/20 16:00	6/12/20 21:29	12.23	14	5	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF092520, EFF12092520, EFF18092520**
Sample Date:	**9/25/2020**	**Lab Report #:**	**WAI1018-01, WAI1018-02, WAI1018-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	9/25/20 17:30	10/2/20 14:25	6.87	7	1.5	ND	1	96.0	80-120	97.5	90-110	0	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/25/20 17:30	10/8/20 11:34	12.75	180	1.5	ND	0.001	92.9	70-130	96.8	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/25/20 17:30	10/8/20 11:34	12.75	180	1.5	ND	0.001	87.5	70-130	89.9	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/25/20 17:30	10/8/20 11:34	12.75	180	1.5	ND	0.01	87.85	70-130	110	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/25/20 17:30	10/8/20 12:23	12.79	180	1.5	ND	0.001	79.6	70-130	88	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	9/25/20 17:30	10/8/20 12:23	12.79	180	1.5	ND	0.001	92.5	70-130	94.8	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	9/25/20 17:30	10/6/20 7:30	10.58	180	1.5	ND	3	95	80-120	100.0	90-110	2.38	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	9/25/20 17:30	9/30/20 16:15	4.95	28	1.5	ND	0.005	106.5	80-120	102.5	90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx					0.00	14			0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF101020, EFF12101020, EFF18101020**
Sample Date:	**10/10/2020**	**Lab Report #:**	**WAJ0380-01, WAJ0380-02, WAJ0380-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 4540D	10/10/20 18:30	10/16/20 13:28	5.79	7	6.7	ND	1	87	80-120	95.5	90-110	2.06	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/10/20 18:30	10/21/20 15:51	10.89	180	6.7	ND	0.001	100.5	70-130	97.8	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/10/20 18:30	10/22/20 15:31	11.88	180	6.7	ND	0.001	96.3	70-130	96.2	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/10/20 18:30	10/22/20 15:31	11.88	180	6.7	ND	0.01	114	70-130	112	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/10/20 18:30	10/22/20 16:21	11.91	180	6.7	ND	0.001	97.5	70-130	97.4	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/10/20 18:30	10/22/20 16:21	11.91	180	6.7	ND	0.001	102.5	70-130	100	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	10/10/20 18:30	10/15/20 13:00	4.77	180	6.7	ND	3	94.1	80-120	100.4	90-110	0	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	10/10/20 18:30	10/12/20 17:51	1.97	2	6.7	ND	0.018	92.1	80-120	86.8	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	10/10/20 18:30	10/21/20 16:17	10.91	28	6.7	ND	0.005	108.5	80-120	104	90-110				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA	NO	SM 4500-NO3 F	10/10/20 18:30	10/23/20 10:32	12.67	NA	6.7	ND	0.1	87.4	80-120	101	85-115				NA		NA		
	TKN	NA	NO	SM 4500-Norg D	10/10/20 18:30	10/26/20 16:09	15.90	NA	6.7	ND	0.5	98.25	80-120	104	85-115				NA		NA		
	Total Nitrogen	NA	NO	Calculation	10/10/20 18:30	10/26/20 16:09	15.90	NA	6.7										NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	10/10/20 18:30	10/22/20 0:41	11.26	14	6.7	ND	0.16	83.9	70-130	97.7	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	10/10/20 18:30	10/22/20 0:41	11.26	14	6.7	ND	0.4		70-130		70-130	4.58	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	10/10/20 18:30	10/22/20 0:41	11.26	14	6.7	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	Gonzaga	**Sample ID:**	INF101220, EFF12101220, EFF18101220
Sample Date:	10/12/2020	**Lab Report #:**	WAJ0488-01, WAJ0488-02,WAJ0488-03

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	10/12/20 14:30	10/16/20 13:28	3.96	7	5.3	ND	1	96	80-120	95.75	90-110	2.06	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/12/20 14:30	10/29/20 14:46	17.01	180	5.3	ND	0.001	97.5	70-130	93.4	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/12/20 14:30	10/29/20 14:46	17.01	180	5.3	ND	0.001	99.3	70-130	98.2	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/12/20 14:30	10/29/20 14:46	17.01	180	5.3	ND	0.01	124	70-130	104	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/12/20 14:30	10/29/20 13:40	16.97	180	5.3	ND	0.001	96.6	70-130	104	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	10/12/20 14:30	10/29/20 13:40	16.97	180	5.3	ND	0.001	92.5	70-130	101	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	10/12/20 14:30	10/15/20 13:00	2.94	180	5.3	ND	3	94.1	80-120	100.4	90-110	0	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	10/12/20 14:30	10/21/20 16:25	9.08	28	5.3	ND	0.005	108.5	80-120	104	90-110				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA	NO	SM 4500-NO3 F	10/12/20 14:30	10/23/20 10:49	10.85	NA	5.3	ND	0.1	87.4	80-120	101	85-115				NA		NA		
	TKN	NA	NO	SM 4500-Norg D	10/12/20 14:30	11/4/20 10:39	22.84	NA	5.3	ND	0.5	106.1	80-120	109	85-115				NA		NA		
	Total Nitrogen	NA	NO	Calculation	10/12/20 14:30	11/4/20 10:39	22.84	NA	5.3										NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	10/12/20 14:30	10/22/20 5:14	9.61	14	5.3	ND	0.16	83.9	70-130	97.7	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	10/12/20 14:30	10/22/20 5:14	9.61	14	5.3	ND	0.4		70-130		70-130	4.58	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	10/12/20 14:30	10/22/20 5:14	9.61	14	5.3	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF11052020, EFF1211052020, EFF1811052020**
Sample Date:	**11/6/2020**	**Lab Report #:**	**WAK0231-01, WAK0231-02, WAK0231-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	11/6/20 10:00	11/9/20 10:00	3.00	7	6.5	ND	1	98	80-120	96.3	90-110	3.82	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/6/20 10:00	11/11/20 15:23	5.22	180	6.5	ND	0.001	91.1	70-130	86.3	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/6/20 10:00	11/20/20 15:23	14.22	180	6.5	ND	0.001	90.7	70-130	87	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/6/20 10:00	11/11/20 15:23	5.22	180	6.5	ND	0.01	98.4	70-130	106	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/6/20 10:00	11/20/20 16:18	14.26	180	6.5	ND	0.001	90.75	70-130	101	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/6/20 10:00	11/20/20 16:18	14.26	180	6.5	ND	0.001	92.375	70-130	103	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340 C	11/6/20 10:00	11/11/20 14:00	5.17	180	6.5	ND	3	100	80-120	101	90-110	5.13	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	11/6/20 10:00	11/6/20 15:15	0.22	2	6.5	ND	0.018	110.5	80-120	103	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	11/6/20 10:00	11/24/20 15:26	18.23	28	6.5	ND	0.005	137.5	80-120	108	90-110				≤ 20%		≤ 20%		Matrix spike recovery was high; the associated blank spike recovery was acceptable.
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	11/6/20 10:00	11/18/20 23:29	12.56	14	6.5	ND	0.16	85.7	70-130	96.1	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/6/20 10:00	11/18/20 23:29	12.56	14	6.5	ND	0.4	ND	70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/6/20 10:00	11/18/20 23:29	12.56	14	6.5	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF11132020, EFF1211132020, EFF1811132020, INF11132020-2, EFF1211132020-2, EFF1811132020-2**
Sample Date:	**11/13/2020**	**Lab Report #:**	**WAK0521-01, WAK0521-02, WAK0521-03, WAK0521-07, WAK0521-08, WAK0521-09**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		12" Effluent Field Duplicates RPD (%)		18" Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2340D	11/13/20 17:30	11/20/20 14:00	6.85	7	4.7/5.8	ND	1	96.8	80-120	99.3	90-110	2.13	20	14.29	≤ 25%	42.83	≤ 25%	6.45	≤ 25%		12" effluent field duplicate RPD exceeds goal
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/13/20 17:30	11/30/20 11:31	16.75	180	4.7/5.8	ND	0.001	98.6	70-130	103	85-115				≤ 20%		≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/13/20 17:30	11/30/20 11:31	16.75	180	4.7/5.8	ND	0.001	94.2	70-130	102	85-115				≤ 20%		≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/13/20 17:30	11/24/20 14:27	10.87	180	4.7/5.8	ND	0.001	95.4	70-130	97.9	85-115			4.58	≤ 20%	2.77	≤ 20%	32.11	≤ 20%		18" effluent field duplicate RPD exeeds goal
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/13/20 17:30	11/24/20 14:27	10.87	180	4.7/5.8	ND	0.001	94.4	70-130	99.7	85-115			0.35	≤ 20%	1.62	≤ 20%	3.46	≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	11/13/20 17:30	11/23/20 10:00	9.69	180	4.7/5.8	ND	3	92.1	80-120	101.5	90-110	3.82	20	10.36	≤ 20%	1.69	≤ 20%	1.98	≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	11/13/20 17:30	11/25/20 10:50	11.72	28	4.7/5.8	ND	0.005	115.5	80-120	94.9	90-100			98.97	≤ 20%	98.87	≤ 20%	0.82	≤ 20%		Influent and 12" effluent field duplicates RPD exceeds goal
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA																	
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	11/13/20 17:30	11/25/20 23:45	12.26	14	4.7/5.8	ND	0.16	85.7	70-130	0.971	70-130	ND	20		≤ 40%		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/13/20 17:30	11/25/20 23:45	12.26	14	4.7/5.8	ND	0.4	ND	70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/13/20 17:30	11/25/20 23:45	12.26	14	4.7/5.8	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																							
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																							
	Cation Exchange Capacity	S-10.10																							
	Maximum Dry Density	ASTM D1557																							
	Saturated Hydraulic Conductivity	ASTM D2434																							
	Particle Size Distribution	ASTM D422																							
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																							
	Total Organic Carbon	EPA 415.3																							
	C:N Ratio	EPA 415.3/351.2																							

Data Quality Assurance Spreadsheet																								
Project Name	**Gonzaga**		**Sample ID:**	**INF11172020, EFF1211172020, EFF1811172020**																				
Sample Date:	**11/16/2020**		**Lab Report #:**	**WAK0567-01, WAK0567-02, WAK0567-03**																				
Matrix	**Parameter**	**Method**	**Chain-of-Custody Issues?**	**Completeness/ Methodology**	**Holding Times (days)**				**Cooler Temperature (°C)**	**Blanks (mg/L)**		**Matrix Spikes/ Surrogate Recovery (%)**		**Lab Control Samples Recovery (%)**		**Lab Duplicates RPD (%)**		**Influent Field Duplicates RPD (%)**		**Effluent Field Duplicates RPD (%)**		**Flagged**	**ACTION/NOTES**
					Date Collected	**Date Analyzed**	**Reported**	**Goal**		**Result**	**Reporting Limit**	**Reported**	**Goal**	**Reported**	**Goal**	**RPD**	**RPD Limit**	**Reported**	**Goal**	**Reported**	**Goal**		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	11/17/20 10:00	11/20/20 14:00	3.17	7	6.8	ND	1	96.8	80-120	99.3	90-110	2.13	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/17/20 10:00	11/30/20 11:58	13.08	180	6.8	ND	0.001	98.6	70-130	103	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/17/20 10:00	11/30/20 11:58	13.08	180	6.8	ND	0.001	94.2	70-130	102	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/17/20 10:00	11/24/20 14:41	7.20	180	6.8	ND	0.001	95.4	70-130	90.6	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/17/20 10:00	11/24/20 14:41	7.20	180	6.8	ND	0.001	94.4	70-130	90.3	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)					0.00	180			3		80-120		90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	11/17/20 10:00	11/25/20 11:58	8.08	28	6.8	ND	0.005	115.5	80-120	94.9	90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	11/17/20 10:00	11/26/20 3:25	8.73	14	6.8	ND	0.16	98.8	70-130	97.8	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/17/20 10:00	11/26/20 3:25	8.73	14	6.8	ND	0.4	ND	70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/17/20 10:00	11/26/20 3:25	8.73	14	6.8	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF11182020, EFF1211182020, EFF1811182020, INF11182020-2, EFF1211182020-2, EFF1811182020-2**
Sample Date:	**11/19/2020**	**Lab Report #:**	**WAK0682-01, WAK0682-02, WAK0682-03, WAK0682-04, WAK0682-05, WAK0682-06**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		12" Effluent Field Duplicates RPD (%)		18" Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	11/19/20 9:30	11/20/20 14:00	1.19	7	3.5/3.4	ND	1	96.8	80-120	99.3	90-110	2.13	20	17.4	≤ 25%	20.0	≤ 25%	31.6	≤ 25%		18" Effluent field duplicate RPD exceeds goal
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/19/20 9:30	12/1/20 12:45	12.14	180	3.5/3.4	ND	0.001	100.8	70-130	99.3	85-115			6.6	≤ 20%	4.6	≤ 20%	3.9	≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/19/20 9:30	12/1/20 12:45	12.14	180	3.5/3.4	ND	0.001	98.6	70-130	97.9	85-115			2.7	≤ 20%	0.2	≤ 20%	3.3	≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/19/20 9:30	12/2/20 15:03	13.23	180	3.5/3.4	ND	0.001	96.8	70-130	102.0	85-115			3.3	≤ 20%	15.4	≤ 20%	1.2	≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	11/19/20 9:30	12/2/20 15:03	13.23	180	3.5/3.4	ND	0.001	95.6	70-130	100.0	85-115			1.6	≤ 20%	13.7	≤ 20%	0.9	≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	11/19/20 9:30	11/23/20 10:00	4.02	180	3.5/3.4	ND	3	92.1	80-120	101.5	90-110	3.82	20	6.7	≤ 20%	5.7	≤ 20%	7.1	≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	11/19/20 9:30	11/23/20 9:28	4.00	2	3.5/3.4	ND	0.018	100.9	80-120	107.0	85-115			13.4	≤ 20%	1.3	≤ 20%	2.0	≤ 20%		Initial analysis was within holding time, reanalysis for the required dilution was past holding time. Because other lab QC tests met limits, will accept result.
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	11/19/20 9:30	12/7/20 14:33	18.21	28	3.5/3.4	ND	0.005	114.5	80-120	105.0	90-110			87.0	≤ 20%	10.3	≤ 20%	17.3	≤ 20%		Influent field duplicate RPD exceeds goal
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA																	
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	11/19/20 9:30	11/26/20 8:00	6.94	14	3.5/3.4	ND	0.16	98.8	70-130	97.8	70-130	ND	20	0	≤ 40%	0	≤ 40%	0	≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/19/20 9:30	11/26/20 8:00	6.94	14	3.5/3.4	ND	0.4	ND	70-130	ND	70-130	ND	20	0	≤ 40%	0	≤ 40%	0	≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	11/19/20 9:30	11/26/20 8:00	6.94	14	3.5/3.4	ND	0.16		70-130		70-130	ND	20	0	≤ 40%	0	≤ 40%	0	≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																							
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																							
	Cation Exchange Capacity	S-10.10																							
	Maximum Dry Density	ASTM D1557																							
	Saturated Hydraulic Conductivity	ASTM D2434																							
	Particle Size Distribution	ASTM D422																							
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																							
	Total Organic Carbon	EPA 415.3																							
	C:N Ratio	EPA 415.3/351.2																							

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF12192020, EFF1212192020, EFF1812192020, INF12192020-DI, EFF1212192020-DI, EFF1812192020-DI, INF12192020-02, EFF1212192020-02, EFF1812192020-02**
Sample Date:	**12/19/2020**	**Lab Report #:**	**WAL0676-01, WAL0676-02, WAL0676-03, WAL0676-04, WAL0676-05, WAL0676-06**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		12" Effluent Field Duplicates RPD (%)		18" Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	12/20/20 12:30	12/23/20 9:15	2.86	7	0.7/0.7/1.4	ND	1	90.0	80-120	95.0	90-110	2.33	20	7%	≤ 25%	6%	≤ 25%	33%	≤ 25%		18" effluent results were 1.43 and <2. Will accept results as other two field duplicates met RPD limits.
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/20 12:30	1/4/21 11:51	14.97	180	0.7/0.7/1.4	ND	0.001	96.2	70-130	112.0	85-115				≤ 20%		≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/20 12:30	1/4/21 11:51	14.97	180	0.7/0.7/1.4	ND	0.001	76.8	70-130	110.0	85-115				≤ 20%		≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/20 12:30	1/5/21 13:05	16.02	180	0.7/0.7/1.4	ND	0.001	96.6	70-130	97.1	85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/20/20 12:30	1/5/21 13:05	16.02	180	0.7/0.7/1.4	ND	0.001	97.6	70-130	99.0	85-115				≤ 20%		≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	12/20/20 12:30	12/22/20 13:30	2.04	180	0.7/0.7/1.4	ND	3	101.0	80-120	102.0	90-110	2.67	20		≤ 20%		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	12/20/20 12:30	12/22/20 11:42	1.97	2	0.7/0.7/1.4	ND	0.018		80-120	106.5	85-115				≤ 20%		≤ 20%		≤ 20%		Note from the lab: "Sample EFF1212212020 w-orthop received empty - poured from TSS"
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	12/20/20 12:30	12/28/20 13:06	8.02	28	0.7/0.7/1.4	ND	0.005	92.9	80-120	103.0	90-110				≤ 20%		≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA																	
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	12/20/20 12:30	12/30/20 15:50	10.14	14	5.3	ND	0.16	98.9	70-130	109.0	70-130	ND	20	0	≤ 40%	0	≤ 40%	0	≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	12/20/20 12:30	12/30/20 15:50	10.14	14	5.3	ND	0.4	ND	70-130	ND	70-130	ND	20	0	≤ 40%	0	≤ 40%	0	≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	12/20/20 12:30	12/30/20 15:50	10.14	14	5.3	ND	0.16		70-130		70-130	ND	20	0	≤ 40%	0	≤ 40%	0	≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																							
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																							
	Cation Exchange Capacity	S-10.10																							
	Maximum Dry Density	ASTM D1557																							
	Saturated Hydraulic Conductivity	ASTM D2434																							
	Particle Size Distribution	ASTM D422																							
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																							
	Total Organic Carbon	EPA 415.3																							
	C:N Ratio	EPA 415.3/351.2																							

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF12212020, EFF1212212020, EFF1812212020, INF12212020-2, EFF1212212020-2, EFF1812212020-2**
Sample Date:	**12/21/2020**	**Lab Report #:**	**WAL0675-01, WAL0675-02, WAL0675-03, WAL0675-04, WAL0675-05, WAL0675-06**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		12" Effluent Field Duplicates RPD (%)		18" Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	12/21/20 13:00	12/23/20 9:15	1.84	7	0.7	ND	1	90.0	80-120	95.0	90-110	2.33	20		≤ 25%		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/21/20 13:00	1/4/21 11:28	13.94	180	0.7	ND	0.001	96.2	70-130	112.0	85-115			32.6	≤ 20%	5.2	≤ 20%	1.2	≤ 20%		Influent field duplicate RPD exceeds goal
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/21/20 13:00	1/4/21 11:28	13.94	180	0.7	ND	0.001	76.8	70-130	110.0	85-115			97.4	≤ 20%	25.3	≤ 20%	11.3	≤ 20%		Influent and 12" effluent field duplicates RPD exceeds goal
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/21/20 13:00	1/5/21 12:58	15.00	180	0.7	ND	0.001	96.6	70-130	97.1	85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/21/20 13:00	1/5/21 12:58	15.00	180	0.7	ND	0.001	97.6	70-130	99.0	85-115				≤ 20%		≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	12/21/20 13:00	12/22/20 13:30	1.02	180	0.7	ND	3	101.0	80-120	102.0	90-110	2.67	20		≤ 20%		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F					0.00	28			0.005		80-120		90-100				≤ 20%		≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA																	
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	12/21/20 13:00	12/30/20 7:28	8.77	14	0.7	ND	0.16	98.9	70-130	109.0	70-130	ND	20		≤ 40%		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	12/21/20 13:00	12/30/20 7:28	8.77	14	0.7	ND	0.4	ND	70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	12/21/20 13:00	12/30/20 7:28	8.77	14	0.7	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																							
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																							
	Cation Exchange Capacity	S-10.10																							
	Maximum Dry Density	ASTM D1557																							
	Saturated Hydraulic Conductivity	ASTM D2434																							
	Particle Size Distribution	ASTM D422																							
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																							
	Total Organic Carbon	EPA 415.3																							
	C:N Ratio	EPA 415.3/351.2																							

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF12222020, EFF1212222020, EFF181812222020**
Sample Date:	**12/22/2020**	**Lab Report #:**	**WAL0704-01, WAL0704-02, WAL0704-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	12/22/20 11:30	12/23/20 9:15	0.91	7	5.3	ND	1	90.0	80-120	95.0	90-110	2.33	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/22/20 11:30	1/4/21 12:14	13.03	180	5.3	ND	0.001	92.1	70-130	112.0	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/22/20 11:30	1/4/21 12:14	13.03	180	5.3	ND	0.001	76.8	70-130	110.0	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/22/20 11:30	1/5/21 13:31	14.08	180	5.3	ND	0.001	96.6	70-130	97.1	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	12/22/20 11:30	1/5/21 13:31	14.08	180	5.3	ND	0.001	97.6	70-130	99.0	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	12/22/20 11:30	12/22/20 13:30	0.08	180	5.3	ND	3	101.0	80-120	102.0	90-110	2.67	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	12/22/20 11:30	12/23/20 13:51	1.10	2	5.3	ND	0.018	105.0	80-120	94.5	85-115				≤ 20%		≤ 20%		Note from the lab: "Sample EFF1212212020 w-orthop received empty - poured from TSS"
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	12/22/20 11:30	1/7/21 14:14	16.11	28	5.3	ND	0.005	95.8	80-120	108.0	90-110				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	12/22/20 11:30	12/30/20 15:50	8.18	14	5.3	ND	0.16	98.9	70-130	109.0	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	12/22/20 11:30	12/30/20 15:50	8.18	14	5.3	ND	0.4	ND	70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	12/22/20 11:30	12/30/20 15:50	8.18	14	5.3	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF01022021, EFF1201022021, EFF1801022021**
Sample Date:	**1/3/2021**	**Lab Report #:**	**WBA0053-01, WBA0053-02, WBA0053-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	1/3/21 11:50	1/8/21 12:50	5.04	7	2.3	ND	1	99.5	80-120	96.8	90-110	3.85	20		≤ 25%		≤ 25%		Chain of custody note: "Sample ID's do not match COC"
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)					0.00	180			3		80-120		90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F					0.00	28			0.005		80-120		90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx					0.00	14			0.4		70-130		70-130				≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx					0.00	14			0.16		70-130		70-130				≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet			
Project Name	**Gonzaga**	**Sample ID:**	**INF01042021, EFF1201042021, EFF1801042021**
Sample Date:	**1/4/2021**	**Lab Report #:**	**WBA0048-01, WBA0048-02, WBA0048-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540 D	1/4/21 7:45	1/8/21 12:50	4.21	7	5.3	ND	1	99.5	80-120	97.3	90-110	3.85	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/4/21 7:45	1/20/21 13:41	16.25	180	5.3	ND	0.001	107.5	70-130	102.0	85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/4/21 7:45	1/15/21 12:19	11.19	180	5.3	ND	0.001	98.3	70-130	97.3	85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/4/21 7:45	1/15/21 12:19	11.19	180	5.3	ND	0.01	107.5	70-130	107.0	85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/4/21 7:45	1/11/21 13:36	7.24	180	5.3	ND	0.001	97.0	70-130	99.5	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/4/21 7:45	1/20/21 13:44	16.25	180	5.3	ND	0.001	98.8	70-130	104.0	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM2340C	1/4/21 7:45	1/14/21 0:00	9.68	180	5.3	ND	3	103.0	80-120	102.5	90-110	0.00	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	Sm 4500-P G	1/4/21 7:45	1/5/21 14:21	1.28	2	5.3	ND	0.018	98.8	80-120	103.0	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	1/4/21 7:45	1/11/21 17:05	7.39	28	5.3	ND	0.005	120.0	80-120	90.1	90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA	NO	SM 4500-NO3 F	1/4/21 7:45	1/12/21 0:00	7.68	NA	5.3	ND	0.1	92.0	80-120	106.5	85-115				NA		NA		
	TKN	NA	NO	SM 4500-Norg C	1/4/21 7:45	1/14/21 17:01	10.39	NA	5.3	ND	0.5	85.4	80-120	110.0	85-115				NA		NA		
	Total Nitrogen	NA	NO	Calculation	1/4/21 7:45	1/14/21 17:01	10.39	NA	5.3										NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	1/4/21 7:45	1/8/21 23:09	4.64	14	5.3	ND	0.16	105.5	70-130	105.0	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	1/4/21 7:45	1/8/21 23:09	4.64	14	5.3	ND	0.4	ND	70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	1/4/21 7:45	1/8/21 23:09	4.64	14	5.3	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet

Project Name	**Gonzaga**	**Sample ID:**	**INF01062021, EFF1201062021, EFF1801062021**
Sample Date:	**1/7/2021**	**Lab Report #:**	**WBA0198-01, WBA0198-02, WBA0198-03**

Matrix	Parameter	Method	Chain-of-Custody Issues?	Completeness/ Methodology	Holding Times (days)				Cooler Temperature (°C)	Blanks (mg/L)		Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Influent Field Duplicates RPD (%)		Effluent Field Duplicates RPD (%)		Flagged	ACTION/NOTES
					Date Collected	Date Analyzed	Reported	Goal		Result	Reporting Limit	Reported	Goal	Reported	Goal	RPD	RPD Limit	Reported	Goal	Reported	Goal		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	1/7/21 9:15	1/11/21 10:10	4.04	7	0.4	ND	1	86.0	80-120	97.0	90-110	5.61	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/7/21 9:15	1/15/21 13:10	8.16	180	0.4	ND	0.001	96.6	70-130	96.6	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/7/21 9:15	1/15/21 13:10	8.16	180	0.4	ND	0.001	101.9	70-130	102.0	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)					0.00	180			3		80-120		90-110				≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G					0.00	2			0.018		80-120		85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F					0.00	28			0.005		80-120		90-100				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	1/7/21 9:15	1/9/21 7:20	1.92	14	0.4	ND	0.16	105.5	70-130	105.0	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	1/7/21 9:15	1/9/21 7:20	1.92	14	0.4	ND	0.4	ND	70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	1/7/21 9:15	1/9/21 7:20	1.92	14	0.4	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Data Quality Assurance Spreadsheet																									
Project Name	**Gonzaga**		**Sample ID:**	**ING01122021, EFF1201122021, EFF1801122021**																					
Sample Date:	**1/13/2021**		**Lab Report #:**	**WBA0341-01, WBA0341-02, WBA0341-03**																					
Matrix	**Parameter**	**Method**	**Chain-of-Custody Issues?**	**Completeness/ Methodology**	**Holding Times (days)**				**Cooler Temperature (°C)**	**Blanks (mg/L)**		**Matrix Spikes/ Surrogate Recovery (%)**		**Lab Control Samples Recovery (%)**		**Lab Duplicates RPD (%)**		**Influent Field Duplicates RPD (%)**		**Effluent Field Duplicates RPD (%)**		**Flagged**	**ACTION/NOTES**
					Date Collected	**Date Analyzed**	**Reported**	**Goal**		**Result**	**Reporting Limit**	**Reported**	**Goal**	**Reported**	**Goal**	**RPD**	**RPD Limit**	**Reported**	**Goal**	**Reported**	**Goal**		
Stormwater	Total Suspended Solids (TSS)	SM 2540D	NO	SM 2540D	1/13/21 8:00	1/15/21 13:16	2.22	7	0.3	ND	1	92.0	80-120	94.3	90-110	8.93	20		≤ 25%		≤ 25%		
	Dissolved Copper (Cu)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Zinc (Zn)	EPA 200.8 (ICP/MS)					0.00	180			0.001		70-130		85-115				≤ 20%		≤ 20%		
	Dissolved Iron	EPA 200.8 (ICP/MS)					0.00	180			0.01		70-130		85-115				≤ 20%		≤ 20%		
	Total Zinc (Zn)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/13/21 8:00	1/20/21 14:00	7.25	180	0.3	ND	0.001	92.4	70-130	96.0	85-115				≤ 20%		≤ 20%		
	Total Copper (Cu)	EPA 200.8 (ICP/MS)	NO	EPA 200.8	1/13/21 8:00	1/20/21 14:00	7.25	180	0.3	ND	0.001	93.5	70-130	99.0	85-115				≤ 20%		≤ 20%		
	Hardness as CaCO3	SM 2340B (ICP)	NO	SM 2340C	1/13/21 8:00	1/14/21 8:55	1.04	180	0.3	ND	3	103.0	80-120	102.5	90-110	0.00	20		≤ 20%		≤ 20%		
	Ortho-phosphate (OP)	SM 4500-P G	NO	SM 4500-P G	1/13/21 8:00	1/14/21 10:16	1.09	2	0.3	ND	0.018	99.1	80-120	110.0	85-115				≤ 20%		≤ 20%		
	Total Phosphorus (TP)	SM 4500-P F	NO	SM 4500-P H	1/13/21 8:00	1/25/21 15:47	12.32	28	0.3	ND	0.005	116.0	80-120	109.5	90-110				≤ 20%		≤ 20%		
	NO3/N+NO2/N	NA					0.00	NA			0.1		80-120		85-115				NA		NA		
	TKN	NA					0.00	NA			0.5		80-120		85-115				NA		NA		
	Total Nitrogen	NA					0.00	NA											NA		NA		
	PSD	Modified SSC Method (based on ASTM D3977097)					0.00	NA															
	NWTPH-Dx , Diesel	Ecology NWTPH Dx	NO	NWTPH-Dx	1/13/21 8:00	1/21/21 13:21	8.22	14	0.3	ND	0.16		70-130	96.4	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Lube Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	1/13/21 8:00	1/21/21 13:21	8.22	14	0.3	ND	0.4		70-130	ND	70-130	ND	20		≤ 40%		≤ 40%		
	NWTPH-Dx , Mineral Oil	Ecology NWTPH Dx	NO	NWTPH-Dx	1/13/21 8:00	1/21/21 13:21	8.22	14	0.3	ND	0.16		70-130		70-130	ND	20		≤ 40%		≤ 40%		
Sediment	Sediment Dry Weight	EPA 1684																					
	Sediment PSD	ASTM D422																	≤ 25%		≤ 25%		
Gonzaga Media	pH	S-2.20																					
	Cation Exchange Capacity	S-10.10																					
	Maximum Dry Density	ASTM D1557																					
	Saturated Hydraulic Conductivity	ASTM D2434																					
	Particle Size Distribution	ASTM D422																					
	Total Elements (Zn, Cu, Pb, Fe, Al, P, Mg, Ca)	EPA 3050A/6010B																					
	Total Organic Carbon	EPA 415.3																					
	C:N Ratio	EPA 415.3/351.2																					

Appendix C.3 Field Forms

Monthly Maintenance Field Forms

Field staff names: Taylor, Kevin, Megan	Date: 08/05/2020 Time: 8:25

Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): Nothing noted

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping	✓	Debris removed? (Y) N		
Adjust weir fit in pipe (as needed)				
Pressure Transducer (PT) Calibration	inlet	Initial inf raw reading: 0.268	Initial inf offset: -0.263 (0.263)	Initial inf reading: 0.005
		New inf raw reading: [illegible]	New inf offset: -0.263	New inf reading: 0.000
	12"	Intial eff raw reading: 0.654	Intial eff offset: [illegible]	Initial eff reading: -0.001
		New eff raw reading: 0.655	New eff offset: -0.655	New eff reading: 0.000
Pressure transducers (PT) and mounts cleaning (quarterly)		PTs cleaned? Y (N)	Mounts cleaned? Y (N)	
Check voltage of battery	[illegible] ✓	Measured voltage: 13.1 V		
Rain gage internal part cleanliness and level (quarterly)		Debris removed? Y (N)	Reset level of gage? Y (N) -	
ISCO head tubing check		Tubing replaced? Y (N)		
ISCO pump tubing check (something to do w/ an error)	influent, might need repl.	Tubing replaced? Y (N)		
ISCO suction tubing check	12" Kink ✓	Tubing replaced? Y (N)		
Check tubing, bulkhead caps, and cable attachments	✓			
ISCO Internal Humidity Indicator check *		Indicator Color and Percent:		Desiccant replaced? Y N
PT #1 Humidity Indicator Check	✓	Indicator Color: yellow		Desiccant replaced? Y (N)
PT #2 Humidity Indicator Check	✓	Indicator Color: yellow		Desiccant replaced? Y (N)
PT #3 Humidity Indicator Check	✓	Indicator Color: yellow		Desiccant replaced? Y (N)
Deflate ISCO controller pad (as needed) +	✓			
ISCO pump capabilities	✓			
ISCO volumetric verification (performed quarterly)	✓	Service needed? Y N	Pulled 200 mL, got 250 mL	
Clean catch basin and HVF on up-turned elbow (as needed) *				

✓

PT calibration: 18"

initial inf reading raw: 0.255 initial inf offset: -0.268 initial reading: -0.013

new inf reading raw: 0.258 new inf offset: -0.258 new reading: 0.000

Field staff names: Megan, Taylor, Kenn	Date: 09/23/2020 Time: 3:30
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):	

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping		Debris removed? (Y) N		
Visit Report		Start Visit Report ☑	End Visit Report ☐	
Pressure Transducer (PT) Calibration	inf	Initial inf raw reading: -0.018	Initial inf offset: -0.763	Initial inf reading: -0.781
		New inf raw reading: 0.764	New inf offset: -0.764	New inf reading: 0.000
	12"	Intial eff raw reading: 0.651	Intial eff offset: 0.655	Initial eff reading: -0.004 (48)
		New eff raw reading: 0.649	New eff offset: -0.649	New eff reading: 0.000
	18"	Intial eff raw reading: 0.261	Intial eff offset: -0.258	Initial eff reading: 0.003
		New eff raw reading: 0.257	New eff offset: -0.257	New eff reading: 0.000
Pressure transducers (PT) and mounts cleaning (quarterly)		PTs cleaned? Y N	Mounts cleaned? Y N	
Check voltage of battery	✓	Measured voltage: 13.1 V		
Rain gage internal part cleanliness and level (quarterly)		Debris removed? Y N	Reset level of gage? Y N	
ISCO head tubing check		Tubing replaced? Y N		
ISCO pump tubing check		Tubing replaced? Y N		
ISCO suction tubing check		Tubing replaced? Y N		
Check tubing, bulkhead caps, and cable attachments				
ISCO Internal Humidity Indicator check	influent	Indicator Color and Percent: Blue 40		Desiccant replaced? Y N
	12"	Indicator Color and Percent: Blue <20		Desiccant replaced? Y N
	18"	Indicator Color and Percent: Blue ~40		Desiccant replaced? Y N
PT #1 Humidity Indicator Check (influent)	✓	Indicator Color: orange		Desiccant replaced? Y N
PT #2 Humidity Indicator Check (12")	✓	Indicator Color: orange		Desiccant replaced? Y N
PT #3 Humidity Indicator Check (18")	✓	Indicator Color: orange		Desiccant replaced? Y N
Deflate ISCO controller pad (as needed)	NA	Unscrew Flow Meter Cable or connector cap on back of the controller		
ISCO pump capabilities				
ISCO volumetric verification (performed quarterly)		Service needed? Y N		
Adjust weir fit in pipe (as needed)				
Clean catch basin inlet grate and grates on the end of the flow split pipes	✓			

.26 -.255 .002
=.661

Field staff names: Megan, Kevin, Taylor

Date: 10/19/2020

Time: 2:41 pm

Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): No

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping	✓	Debris removed? (Y) N	Removed sediment + water from manhole	
Visit Report	✓	Start Visit Report ☑	End Visit Report ☐	
Pressure Transducer (PT) Calibration	influent	Initial inf raw reading: 0.339	Initial inf offset: -0.364	Initial inf reading: -0.076
		New inf raw reading: 0.364	New inf offset: -0.363	New inf reading: 0.001
	12" 0.652	Intial eff raw reading: [illegible]	Intial eff offset: -0.649	Initial eff reading: 0.003
		New eff raw reading: 0.651	New eff offset: -0.651	New eff reading: 0.000
	18"	Intial eff raw reading: 0.364	Intial eff offset: -0.357	Initial eff reading: ~~0.000~~ 0.007
		New eff raw reading: 0.357	New eff offset: -0.357	New eff reading: 0.000
Pressure transducers (PT) and mounts cleaning (quarterly		PTs cleaned? Y (N)	Mounts cleaned? Y (N)	
Check voltage of battery	✓	Measured voltage: 13.1 V		
Rain gage internal part cleanliness and level (quarterly)		Debris removed? Y N	Reset level of gage? Y N	
ISCO head tubing check	IN ✓	Tubing replaced? Y (N)	Kink	
ISCO pump tubing check	18 ✓	Tubing replaced? Y (N)	Kink	
ISCO suction tubing check	18 ✓	Tubing replaced? Y (N)		
Check tubing, bulkhead caps, and cable attachments	✓			
ISCO Internal Humidity Indicator check	✓	Indicator Color and Percent: 40	Blue	Desiccant replaced? Y (N)
	✓	Indicator Color and Percent: 20	Blue	Desiccant replaced? Y (N)
	✓	Indicator Color and Percent: 40	Blue	Desiccant replaced? Y (N)
PT #1 Humidity Indicator Check	✓	Indicator Color: Yellow		Desiccant replaced? Y (N)
PT #2 Humidity Indicator Check	✓	Indicator Color: Yellow		Desiccant replaced? Y (N)
PT #3 Humidity Indicator Check	✓	Indicator Color: Yellow		Desiccant replaced? Y (N)
Deflate ISCO controller pad (as needed)	NA	Unscrew Flow Meter Cable or connector cap on back of the controller		
ISCO pump capabilities				
ISCO volumetric verification (performed quarterly)		Service needed? Y N		
Adjust weir fit in pipe (as needed)				
Clean catch basin inlet grate and grates on the end of the flow split pipes	✓			

Field staff names: Megan + Kaela	Date: 11/11/2020 Time: 9:30 AM
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): No	

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping		Debris removed? Y N		
Visit Report	✓	Start Visit Report ☐	End Visit Report ☐	
Pressure Transducer (PT) Calibration	INF	Initial inf raw reading: 0.762	Initial inf offset: -0.762	Initial inf reading: 0.000
		New inf raw reading: 0.762	New inf offset: -0.762	New inf reading: 0.000
	12"	Intial eff raw reading: 0.590	Intial eff offset: -0.651	Initial eff reading: -0.061
		New eff raw reading: 0.623	New eff offset: -0.623	New eff reading: 0.000
	18"	Intial eff raw reading: 0.705	Intial eff offset: -0.757	Initial eff reading: -0.057
		New eff raw reading: 0.706	New eff offset: -0.706	New eff reading: 0.000
Pressure transducers (PT) and mounts cleaning (quarterly		PTs cleaned? Y N	Mounts cleaned? Y N	
Check voltage of battery	✓	Measured voltage:	13.2	
Rain gage internal part cleanliness and level (quarterly)		Debris removed? Y N	Reset level of gage? Y N	
ISCO head tubing check INF	✓	Tubing replaced? Y (N)	Kink	
ISCO pump tubing check 12"	✓	Tubing replaced? Y (N)	Kink	
ISCO suction tubing check 18"	✓	Tubing replaced? Y (N)		
Check tubing, bulkhead caps, and cable attachments				
ISCO Internal Humidity Indicator check	INF ✓	Indicator Color and Percent: 40 Blue/white		Desiccant replaced? Y (N)
	12 ✓	Indicator Color and Percent: 20 Blue		Desiccant replaced? Y (N)
	18 ✓	Indicator Color and Percent: 40 Blue		Desiccant replaced? Y (N)
PT #1 Humidity Indicator Check	✓	Indicator Color: Yellow/white		Desiccant replaced? Y (N)
PT #2 Humidity Indicator Check	✓	Indicator Color: Yellow/white		Desiccant replaced? Y (N)
PT #3 Humidity Indicator Check	✓	Indicator Color: Yellow/white		Desiccant replaced? Y (N)
Deflate ISCO controller pad (as needed)	Not needed	Unscrew Flow Meter Cable or connector cap on back of the controller		
ISCO pump capabilities	✓			
ISCO volumetric verification (performed quarterly)		Service needed? Y N		
Adjust weir fit in pipe (as needed)				
Clean catch basin inlet grate and grates on the end of the flow split pipes	✓			

Field staff names: Kevin + megan				Date: 12/14/2020 Time: 1:30 pm
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): NO				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping	✓	Debris removed? (Y) N		
Visit Report	✓	Start Visit Report ☐✓	End Visit Report ☐✓	
Pressure Transducer (PT) Calibration	Inf ✓	Initial inf raw reading: 0.228	Initial inf offset: -0.262	Initial inf reading: -0.034
		New inf raw reading: 0.241	New inf offset: -0.241	New inf reading: 0.000
	12" ✓	Intial eff raw reading: 0.656	Intial eff offset: -0.623	Initial eff reading: 0.032
		New eff raw reading: 0.653	New eff offset: -0.653	New eff reading: 0.000
	18" ✓	Intial eff raw reading: 0.256	Intial eff offset: -0.206	Initial eff reading: 0.050
		New eff raw reading: 0.255	New eff offset: -0.255	New eff reading: 0.000
Pressure transducers (PT) and mounts cleaning (quarterly	✓	PTs cleaned? Y N	Mounts cleaned? Y N	
Check voltage of battery	✓	Measured voltage:	13.1V	
Rain gage internal part cleanliness and level (quarterly)		Debris removed? Y N	Reset level of gage? Y N	
ISCO head tubing check	✓	Tubing replaced? Y (N)		
ISCO pump tubing check	✓	Tubing replaced? Y (N)		
ISCO suction tubing check	✓	Tubing replaced? Y (N)		
Check tubing, bulkhead caps, and cable attachments	✓			
ISCO Internal Humidity Indicator check	✓	Indicator Color and Percent: 40 Bluish white		Desiccant replaced? Y (N)
	✓	Indicator Color and Percent: 20 Blue		Desiccant replaced? Y (N)
	✓	Indicator Color and Percent: 40 Bluish white		Desiccant replaced? Y (N)
PT #1 Humidity Indicator Check	✓	Indicator Color: yellowish white		Desiccant replaced? Y (N)
PT #2 Humidity Indicator Check	✓	Indicator Color: yellowish white		Desiccant replaced? Y (N)
PT #3 Humidity Indicator Check	✓	Indicator Color: yellowish white		Desiccant replaced? Y (N)
Deflate ISCO controller pad (as needed)	N/A	Unscrew Flow Meter Cable or connector cap on back of the controller		
ISCO pump capabilities		Performed during pre-storm maint		
ISCO volumetric verification (performed quarterly)		Service needed? Y N		
Adjust weir fit in pipe (as needed)				
Clean catch basin inlet grate and grates on the end of the flow split pipes				

Field staff names: Kevin F & Taylor HB	Date: 1/11/21
	Time: 1:30

Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):

NO

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):			
Debris/Obstruction Removal from piping	✓	Debris removed? (Y) N			
Visit Report	✓	Start Visit Report ☑	End Visit Report ☐		
Pressure Transducer (PT) Calibration	✓ INF	Initial inf raw reading: ~~0.274~~ 0.241	Initial inf offset: -0.241	Initial inf reading: ~~0.033~~ 0.033	
		New inf raw reading: ~~0.269~~ 0.264	New inf offset: -0.264	New inf reading: 0	
	✓ 12"	Intial eff raw reading: 12" 0.659	Intial eff offset: -0.659	Initial eff reading: 0.006	
		New eff raw reading: 0.655	New eff offset: -0.655	New eff reading: 0	
	✓ 15"	Intial eff raw reading: 15" ~~0.265~~ 0.255	Intial eff offset: -0.255	Initial eff reading: ~~0.010~~ 0.010	
		New eff raw reading: 0.263	New eff offset: -0.263	New eff reading: 0	
Pressure transducers (PT) and mounts cleaning (quarterly	✓	PTs cleaned? (Y) N	Mounts cleaned? (Y) N		
Check voltage of battery	✓	Measured voltage: 13.1			
Rain gage internal part cleanliness and level (quarterly)		Debris removed? Y N	Reset level of gage? Y N		
ISCO head tubing check	✓	Tubing replaced? Y (N)			
ISCO pump tubing check	✓	Tubing replaced? Y (N)			
ISCO suction tubing check	✓	Tubing replaced? Y N	Kinks in INF & 12"		
Check tubing, bulkhead caps, and cable attachments					
ISCO Internal Humidity Indicator check	✓ INF	Indicator Color and Percent: White/replate		Desiccant replaced? Y (N)	
	✓ 12	Indicator Color and Percent: Blue/good ✓		Desiccant replaced? Y (N)	
	✓ 15	Indicator Color and Percent: White/replate		Desiccant replaced? Y (N)	
PT #1 Humidity Indicator Check	✓ 11	Indicator Color: White/replate		Desiccant replaced? Y (N)	
PT #2 Humidity Indicator Check	✓ 9	Indicator Color: White/replate		Desiccant replaced? Y (N)	
PT #3 Humidity Indicator Check	✓ 13	Indicator Color: White/replate		Desiccant replaced? Y (N)	
Deflate ISCO controller pad (as needed)		Unscrew Flow Meter Cable or connector cap on back of the controller			
ISCO pump capabilities	✓				
ISCO volumetric verification (performed quarterly)	✓	Service needed? Y (N)			
Adjust weir fit in pipe (as needed)	✓				
Clean catch basin inlet grate and grates on the end of the flow split pipes	✓				

Pre-Storm Maintenance Field Forms

Pre-Storm Maintenance Form

Field staff names: Megan, Taylor, Kevin	Date: 9/23/2020 Time: 4:00
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):	

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? (Y) N		
Sample tubing placement checked	✓			
Grab sample taken to verify pump function	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Threshold value:	In: 11.8L ; 12", 18": 5.9L	
Weir wheels tightened	✓			
Clean catch basin and HVF on up-turned elbow (as needed)	✓			

Pre-Storm Maintenance Form GU

Field staff names: Meepn + Kevin			Date: 10/09/2020 Time: 11:45
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): No			
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**	
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? (Y) N	
Grab Sample taken to verify pump function	✓		
Sample tubing placement checked	✓	Kink in inlet ~~water~~ tubing	
Sample jars placed in ISCOs, with ice packs as needed	✓		
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N
Threshold values set	✓	Inf Threshold value: 392	12" Threshold value: 196	18" Threshold value: 196
Weir wheels tightened			
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)	✓	Was clean, no major debris	

Gonzaga 10/9/2020

Pre-Storm Maintenance Form

Field staff names: Kevin F, Megan E.	Date: 10/10/2020
	Time: ~~9:00~~ 9:00 pm
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):	

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? (Y) N		
Grab Sample taken to verify pump function				
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed				
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 474	12" Threshold value: 237	18" Threshold value: 237
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)	✓			

Pre-Storm Maintenance Form

Field staff names: Kevin F				Date: 10/12/2020 Time: 5:00
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): No				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	Yes	Debris removed? Y (N)	No visible debris to remove	
Grab Sample taken to verify pump function	No			
Sample tubing placement checked	Yes			
Sample jars placed in ISCOs, with ice packs as needed	Yes			
Data logger and ISCO set to sample	Yes	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	Yes	Inf Threshold value: 438	12" Threshold value: 219	18" Threshold value: 219
Weir wheels tightened	No			
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form GU

Field staff names: Kevin + Megan				Date: 10/23/2020 Time: 9:45 am
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): No				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)		Debris removed? Y N		
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed				
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 356	12" Threshold value: 178	18" Threshold value: 178
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)	✓	Not needed		

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Kevin Flanagan, Taylor Hoffman Ballard				Date: 11/4/2020 Time: 3:30
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): No				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)	No Debri	
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 332	12" Threshold value: 166	18" Threshold value: 166
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Megan + Koela	Date: 11/11/2020 Time: 11:00 am

Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):

No

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? (Y) N		
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓	[illegible]		
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 262	12" Threshold value: 131	18" Threshold value: 131
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)	✓			

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Taylor	Date: 11/13/2020 Time: 6:30 pm
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):	

Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)		
Grab Sample taken to verify pump function				
Sample tubing placement checked				
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 460	12" Threshold value: 230	18" Threshold value: 230
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Megan + Taylor			Date: 11/15/2020	
			Time: 1:30 pm	
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): None				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)		
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 118	12" Threshold value: 59	18" Threshold value: 59
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Kevin + megan				Date: 11/17/2020 Time: 11:30 am
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): None				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)		
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: [redacted]42	12" Threshold value: 71 [redacted]	18" Threshold value: [redacted] 71
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Megan + Nicole				Date: 11/25/2020 Time: 10:30 am
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): None				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)		
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 96	12" Threshold value: 48	18" Threshold value: 48
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Kevin + megan	Date: 12/16/2020
	Time:
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):	

Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)		
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed				
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 108	12" Threshold value: 54	18" Threshold value: 54
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Megan + Kevin			Date: 12/17/2020	
			Time: 1:15 pm	
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)		Debris removed? Y (N)		
Grab Sample taken to verify pump function	✓			
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 96	12" Threshold value: 48	18" Threshold value: 48
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Kevin Flanagan and Taylor Hoffman-Ballard				Date: 12/20/2020 Time: 12:30 PM
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)		
Grab Sample taken to verify pump function				
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 200	12" Threshold value: 100	18" Threshold value: 100
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Kevin Flanagan and Taylor Hoffman-Ballard				Date: 12/21/2020 Time: 3:30 PM
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	✓	Debris removed? Y (N)		
Grab Sample taken to verify pump function				
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 96	12" Threshold value: 48	18" Threshold value: 48
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Taylor Hoffman-Ballard				Date: 1/2/2021 Time: 10:30 AM
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)		Debris removed? Y (N)		
Grab Sample taken to verify pump function				
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 470	12" Threshold value: 235	18" Threshold value: 235
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Taylor Hoffman-Ballard				Date: 1/3/2021 Time: 6:30 PM
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)		Debris removed? Y (N)		
Grab Sample taken to verify pump function				
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	✓	Inf Threshold value: 260	12" Threshold value: 130	18" Threshold value: 130
Weir wheels tightened				
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Kevin Flanagan	Date: 1/5/21 Time: 10:00

Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment):

NO

Maintenance Activities	Activity Performed?	Notes (circle text as appropriate):		
Debris/Obstruction Removal from piping (as needed)	NO	Debris removed? Y N	ICE covering inlet	
Grab Sample taken to verify pump function				
Sample tubing placement checked	✓			
Sample jars placed in ISCOs, with ice packs as needed	✓			
Data logger and ISCO set to sample	✓	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set		Inf Threshold value: 220	12" Threshold value: 110	18" Threshold value: 110
Weir wheels tightened	NO	Ice covering inlet		
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)		Ice covering inlet		

Pre-Storm Maintenance Form - Gonzaga Bioretention

Field staff names: Kevin F + Taylor				Date: 1/11/21 Time: 1:30
Any indication of damage/tampering during site inspection (surrounding area, pipes, cables, wiring, cords, tubing, monitoring equipment): NO				
Maintenance Activities	**Activity Performed?**	**Notes (circle text as appropriate):**		
Debris/Obstruction Removal from piping (as needed)	√	Debris removed? (Y) N		
Grab Sample taken to verify pump function	√			
Sample tubing placement checked	√			
Sample jars placed in ISCOs, with ice packs as needed	√			
Data logger and ISCO set to sample	√	DL set? (Y) N	ISCO set? (Y) N	
Threshold values set	√	Inf Threshold value: 510	12" Threshold value: 255	18" Threshold value: 255
Weir wheels tightened	√			
Clean catch basin inlet grate and grates i and HVF on up-turned elbow (as needed)				

Appendix C.4 Field Audit

Gonzaga BSM Thickness Effectiveness Study Audit

Storm Selection and Tracking		Notes Overall for SOP:	
Step #	**Standard Operating Procedure (SOP)**	**Yes/No/Modified**	**If No or Modified, explain:**
1	Using the local weather forecast, identify the likelihood of storm meeting TAPE guidelines and using the qualitative classification system of "Unlikely", "Marginal", or "Likely".	Modified	Taking probabillity into account sampled when predicted storm was .1 or greater
2	If deemed "Unlikely", the storm was not sampled. If deemed "Marginal" or "Likely", project manager used best judgement whether to prepare for the storm.	Modified	See above, D5
3	If the storm was selected for monitoring, a bottle request was submitted to the lab.	Yes	
4	If the storm was selected for monitoring, the actual rain gauges at the test site were monitored remotely to understand when it is time to collect samples.	Yes	Monitored NWS Airport rain gauge.
Storm Monitoring Equipment Maintenance (every month unless otherwise noted)		**Notes Overall for SOP:**	
Step #	**Standard Operating Procedure (SOP)**	**Yes/No/Modified**	**If No or Modified, explain:**
1	Open the sump, catch basins, manhole and monitoring equipment vault and visually inspect site for damage or tampering.	Yes	
2	Inspect catchbasin, pipes, tees, and weirs for debris and clean as needed.	Yes	
3	Disconnect power supply and test voltage of battery for greater than 10.3 volts.	Modified	Didn't need to disconnect to test power supply.
4	Insert USB and start visit report.	Yes	
5	Inspect rain gauge every three months for levelness and cleanliness.	Yes	
6	Inspect ISCO suction tubing, head tubing, and pump tubing for wear and tear.	Yes	
7	Check humidity indicators for ISCO and PTs and replace dessicant as needed.	Yes	
8	Check ISCO controller pad. If the controller pad is inflated, remove bulkhead screw to relieve pressure behind the pad.	Yes	
9	Check pump capabilities of ISCOs and calibrate volume pumped as nescessary or every 3 months.	Yes	
10	End visit report and remove USB. Secure the sump, manhole, and monitoring equipment vault.	Yes	

Preparing Stormwater Monitoring Equipment for Storm Sampling (before every storm unless otherwise noted)		Notes Overall for SOP: #5, #8 & #10 moved to monthly maintenance based on experience.	
Step #	**Standard Operating Procedure (SOP)**	**Yes/No/Modified**	**If No or Modified, explain:**
1	Open the sump, catch basins, manhole and monitoring equipment vault and visually inspect site for damage or tampering.	Yes	
2	Insert USB and start visit report.	Yes	
3	Inspect pipes, tees, weirs and connections for debris.	Yes	
4	Collect a water surface elevation measurement from the reference point on the control tee. Subtract the measurement from the reference elevation. Compare this value to the to measurement collected by the data logger to identify any instrument drift.	Modified	Used the data logger measurement and visually monitored for difference.
5	Remove debris and any water from pipe tees, weirs, elbows and connections using a vacuum.	Modified	moved to monthly maintenance based on experience
6	Inspect ISCO pump tubing for wear and tear (i.e. kinks and bellies) and replace as needed. Clean ISCO tubing that was not replaced using a triple rinse of 10% HNO3 acid solution, liquinox soap solution, then lastly a triple rinse of DI water.	Modified	Replaced tubing as needed as opposed to cleaning.
7	Access influent autosampler; place clean suction tubing in carboy of DI water and place clean pump tubing over one bottle provided by the lab for rinsate blank. Set ISCO to "Pump Forward" and fill bottle so that no airspace is remaining when cap is replaced. Once both rinsate bottles are filled, place bottles in a cooler and fill out Chain of Custody for rinsate samples.	Modified	Rinsate samples conducted 3 times. Conducted pre-monitoring , during monitoring and p
8	Adjust weirs and pipe tees to a level position and note in form if weirs or tees were not level.	Yes	Weirs were tightened. Moved to monthly maintenance based on experience.
9	Inspect PTs for cleanliness; if PTs and/or mounts are dirty, remove PT and remove material gently.	Modified	Didn't need to remove PT. Rinsed with ample water.
10	Fill control tee with clean water and use data logger to get a current PT reading. Set PT reading to zero if no change in water surface elevation occurs.	Modified	moved to monthly maintenance based on experience
11	Place sample jars in ISCO, and set ISCOs to sample. Set the data logger value Sampl_enabl to 0 and set threshold values on the data logger.	Yes	
12	Ensure all tubing is connected properly, bulkhead caps are secured, and that all cables are properly attached.	Yes	
13	End visit report, and secure the sump, manhole, and monitoring equipment vault.	Yes	

14	Obtain pH probe at office and inspect cable and electrode for damage or buildup. Clean as necessary.	Yes	
Stormwater Sample Collection and Processing (following each storm event)		**Notes Overall for SOP:**	
Step #	**Standard Operating Procedure (SOP)**	**Yes/No/Modified**	**If No or Modified, explain:**
1	Place sample bottles in refrigerator before leaving for the site to keep cool.	Yes	
2	Open the sump, catch basins, manhole and monitoring equipment vault and visually inspect site for damage or tampering.	Yes	
3	Insert USB and start visit report.	Yes	
4	Check ISCO to visually check that the amount of water collected correlates to the number of aliquots reported to have been collected by the ISCO.	Yes	
5	Pour some sample into a beaker for a pH test. Record pH and temperature on field form.	Yes	pH tested at Lab.
6	Move composite samples to cooler and repeat for other samples.	Yes	
7	End visit report, and secure the sump, manhole, and monitoring equipment vault.	Yes	
8	At the office, transfer composite samples to laboratory-specified bottles and filter samples for dissolved metals and ortho-phosphate.	Yes	Filtered as needed.
9	Using a filter and syringe, filter 50 mL of DI water into the dissolved metals blank bottle.	Yes	
10	Place a new filter on the syringe, fill the syringe with 50mL of sample, and waste the 50mL to rinse the filter. Collect an additional 50mL of sample and filter into the sample bottle. Repeat until the sample bottle is filled; repeat process for remaining dissolved metals and orthophosphate bottles.	Modified	Do not waste the 50mL to rinse the filter, per Lab.
11	Fill remaining bottles, place the filled bottles into a cooler, and fill out the Chain of Custody. Measure the temperature in the cooler and record on Chain of Custody.	Modified	Lab measures and records the temp on CoC
12	Deliever samples to Anatek under 6 deg C.	Yes	
Monitoring Equipment Data Download (following each storm event)		**Notes Overall for SOP:**	
Step #	**Standard Operating Procedure (SOP)**	**Yes/No/Modified**	**If No or Modified, explain:**
1	Open the sump, catch basins, manhole and monitoring equipment vault and visually inspect site for damage or tampering.	Yes	

2	Insert USB and download data.	Yes	
3	Remove USB and secure the sump, manhole, and monitoring equipment vault.	Yes	
Falling Head Test		**Notes Overall for SOP:**	
Step #	**Standard Operating Procedure (SOP)**	**Yes/No/Modified**	**If No or Modified, explain:**
1	Contact Gonzaga Plant Services and make arrangements for Plant Services to turn on fire hydrant located north of test site.	Yes	
2	Connect fire hose and turn on hydrant. Spray parking lot and fill bioretention cells with water until water has ponded 12 inches above the cell surface. Use yardsticks to verify 12 inches have ponded.	Yes	
3	Allow time for the media to saturate, then re-fill the cells to just above 6 inches. Once water level reaches 6 inches, start the timer.	Yes	
4	Record the time for the water to drop 1 inch. Continue recording until Ksat is stable and doesn't change more than 10% for three intervals.	Yes	
5	Secure the sump, manhole, and monitoring equipment vault.	Yes	

Appendix C.5 Deviations from QAPP

Revision #	Section and Page	Original Instructions	Suggested Revision	Reason for Deviation
1	Section 6.1; page 21	Precision for laboratory duplicates will be ± 40 percent relative percent difference (RPD) for oils (NWTPH-Dx), ± 25 percent for TSS, and 20 percent for all other water quality parameters (Table 6.1).	Precision for laboratory duplicates will be 20 percent for all water quality parameters (Table 6.1).	Text was revised to be consistent with analytical laboratory's (Anatek) RPD limits.
2	Section 6.1; page 21	Rain gauge and flow measurement precision will be assessed at the beginning and end of the study. The rain gage precision will be assessed by pouring a known quantity of water into the tipping bucket two times. Precision for the rain gage measurements will be ± 20 percent RPD. Precision for flow will be assessed by comparing repeated pressure measurements with a known depth of water over each of the respective pressure transducers. Precision for pressure transducer measurements will be ± 20 percent RPD.	Rain gauge and flow measurement precision will be assessed as needed throughout the study. The rain gauge precision will be checked against nearby rain gauges. Precision for the rain gage measurements will be ± 20 percent RPD. Precision for flow will be assessed by comparing repeated pressure measurements with a known depth of water over each of the respective pressure transducers. Precision for pressure transducer measurements will be ± 20 percent RPD.	Nearby rain gauges and weather stations provide a check to determine whether the rain gauge is operating properly and whether maintenance is needed for the rain gauge. Precision for flow is assessed each time the pressure transducers are calibrated; depth measurements are accepted for calibration only if differences between measurements are equal to or less than ±0.001.
3	Section 6.2; page 21	Rinsate blank values will not exceed two times the reporting limit.	Rinsate blank values will not exceed 1/10th of composite sample concentrations to be considered unacceptably affected.	Per 2018 TAPE Guidance Manual, composite sample concentrations greater than 10 times the result of rinsate blanks are considered unacceptably affected.
4	Section 8.1.1, page 35	Whether to monitor an upcoming storm event is based upon the qualitative classification system of "Unlikely", "Marginal", or "Likely". The minimum rainfall amount to monitor is 0.15 inches.	Lowed the minimum rainfall amount to 0.08-0.10 inches. If the sum product of probability and rainfall amounts over the duration of the storm is greater than or equal to 0.08 inches, set up the site to monitor the storm event.	Multiplying the probability of rainfall by the predicted rainfall amount forecasted on the NWS Spokane Station website provided more accurate estimates of whether a storm could be successfully monitored. In this case, successfully monitored means the storm depth was predicted to gather at least 10 aliquots for influent and effluent and capture 75% of the hydrograph.
5	Section 8.1.2, page 36	Disconnect power to battery to check the voltage of the battery.	Delete "Disconnect power to battery"	Power did not need to be disconnected to check the voltage of the batteries.
6	Section 8.1.2, page 36	Once every three months, unplug the rain gage from the data logger. Remove cover from rain gage and check instrument for levelness and cleanliness of internal parts. Clear any debris carefully. Note any discrepancies and reset level of rain gage platform if needed. Replace cover on rain gage and plug rain gage back in to the data logger.	If nearby rain gauges indicate there is a discrepancy in the rain gauge readings, unplug the rain gage from the data logger. Remove cover from rain gage and check instrument for levelness and cleanliness of internal parts. Clear any debris carefully. Note any discrepancies and reset level of rain gage platform if needed. Replace cover on rain gage and plug rain gage back in to the data logger.	During the study, nearby rain gauges were used to check the readings of the rain gauge at the site. If consistent differences begin to arise, maintenance would then be performed.
7	Section 8.1.3, page 39	Before starting to clean, collect a water surface elevation measurement from the reference point on the control tee. Record the measurement and reference elevation on the Pre-Storm Event Maintenance Checklist in the assigned space. Assign a + or – value to your reading if there is any uncertainty due to debris, blockage, etc. Subtract the measurement from the reference elevation to determine water surface elevation and record the value on the form. Compare this value to the measurement collected by the data logger to identify any prior instrument drift.	Delete this step from SOP.	The water depth recorded by the pressure transducer was occasionally checked with a tape measure or similar device during calibration. No difference was ever observed.
8	Section 8.1.3, page 40	Inspect the pump, suction, and head tubing for the ISCO. If kinks or bellies are observed in the tubing, replace the tubing. Clean any ISCO tubing that was not replaced.	Inspect the pump, suction, and head tubing for the ISCO. If kinks or bellies are observed in the tubing, replace the tubing.	Replacement of tubing appears to be the best way to reduce contamination and is safer than lowering a solution of nitric acid above someone's head into a manhole.

Revision #	Section and Page	Original Instructions	Suggested Revision	Reason for Deviation
9	Section 8.1.3, Steps 7-11	Steps 7-11 cover collection of rinsate blanks.	Remove steps from Section 8.1.3, place in separate SOP.	Rinsate blank samples are taken three times during the project as opposed to before every storm event.
10	Section 8.1.3, page 40	Use a level to check position of weirs and pipe tees. Adjust to a level position as needed, and note if weirs or tees were not level on the Pre-Storm Event Maintenance Checklist.	Move step to Section 8.1.2, and change to "tighten weirs".	Weirs do not move once they are installed, but the gasket can become loose enough to allow water to leak underneath the gasket. Tightening the weirs once per month appeared to solve that issue.
11	Section 8.1.3, Steps 14-15	Steps 14-15 cover calibration of the pressure transducer zero-depth reading.	Move step to Section 8.1.2.	After the study had begun, and following some analysis of the data, it appeared that calibrating the pressure transducers once per month was sufficient. These steps could be moved to Section 8.1.2.
12	Section 8.1.3, Steps 22-35	Steps 21-34 cover maintenace of the pH meter.	Move step to Section 8.1.5.	It is preferable to maintain and calibrate the pH meter immediately before taking pH measurements.
13	Section 8.1.5, Steps 7-10	Steps cover pH reading performed in the field.	Revise to indicate pH measurement is done at the office.	It was significantly easier to take pH measurements in the office immediately after sample collection rather than in the field.
14	Section 8.1.5, page 44	None	Add a step covering collection of a metals blank for use at the lab if dissolved metals sample is filtered at OCI.	Per instructions from the lab, a blank is needed prior to collecting any sample through one of the 0.45 micron filters.
15	Section 8.1.5, page 44	None	Add a step which describes how to fill the cooler with ice when samples are ready for transport to Anatek.	During the study, the analytical laboratory (Anatek) recommended we place a layer of ice into the cooler, place the samples above that layer, and then fill the rest of the cooler to the brim with ice. This ensures samples arrive at approximately 2 degrees Celsius at the lab.
16	Section 8.1.6	Section covers data download from monitoring site.	Add the steps from this SOP to Section 8.1.5.	Data was downloaded at the same time as samples were collected. A separate trip to the site was not made to download the data.

Appendix C.6 Identification of Quality Assurance Issues & Recommended Solutions

A common quality assurance issue identified during the study was related to the temperature of the samples once they arrived at the laboratory. The samples could be surrounded in ice packs and stored in the freezer for up to the past 24 hours, but still be recorded above the maximum temperature of 6 degrees Celsius. Upon discussion with the lab, corrective action was taken. The corrective action adjusted how samples were transported to the laboratory. Instead of ice packs, ice was used in the cooler. First, a shallow layer of ice was placed in the bottom of the cooler before samples were put into the cooler. The samples were then placed on top of the layer of ice. Once the samples were in the cooler it was filled to the rim with ice. This resulted in samples being measured at a consistent temperature of 2 degrees Celsius at the lab.

Results of samples were plotted against temperature to observe whether temperature influenced the sample concentrations. A consistent relationship was not identified for TSS, dissolved copper, or dissolved zinc. The plots for TSS, dissolved copper, and dissolved zinc are shown in Figures C6.1, C.6.2, and C.6.3.

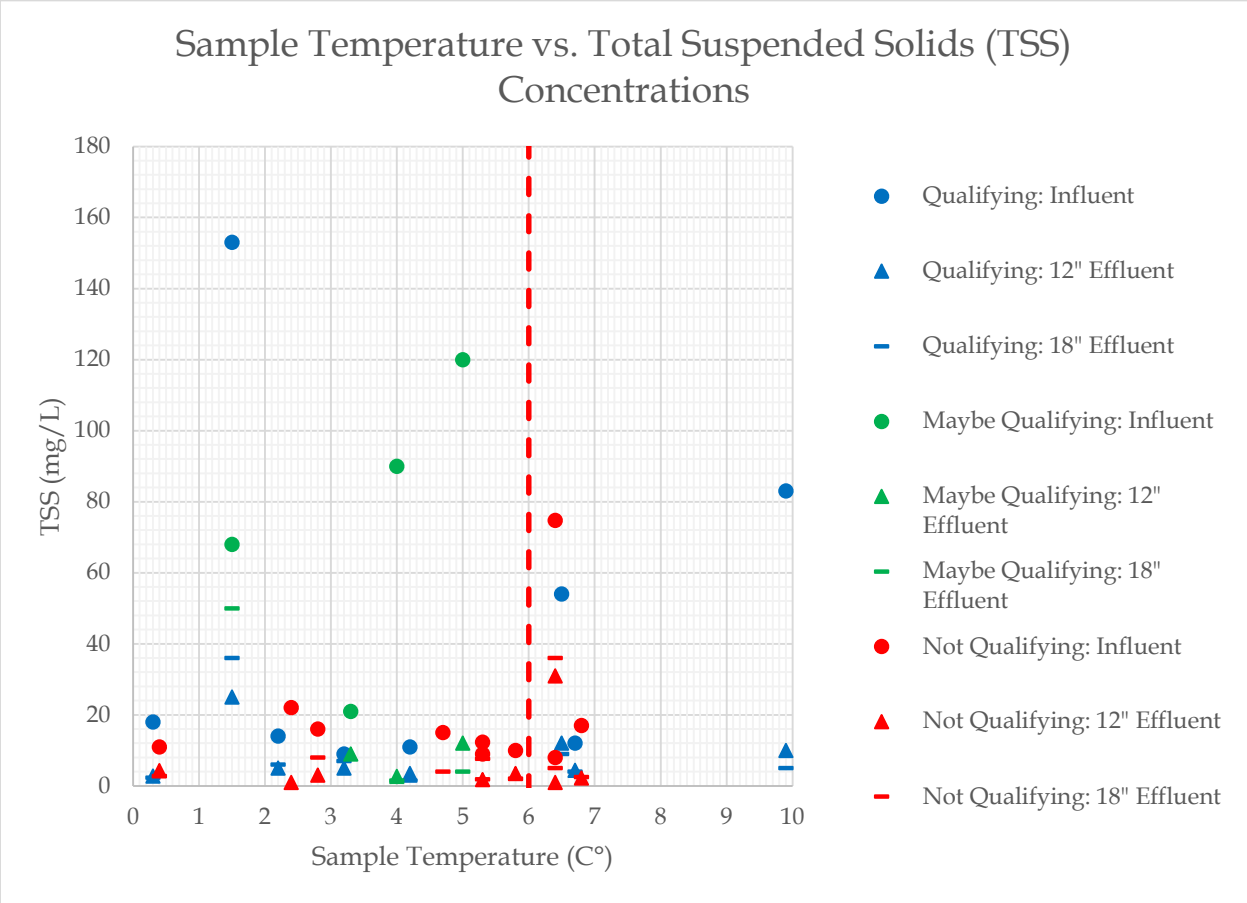


Figure C.6.1 Storm Sample Temperature vs. TSS Concentration

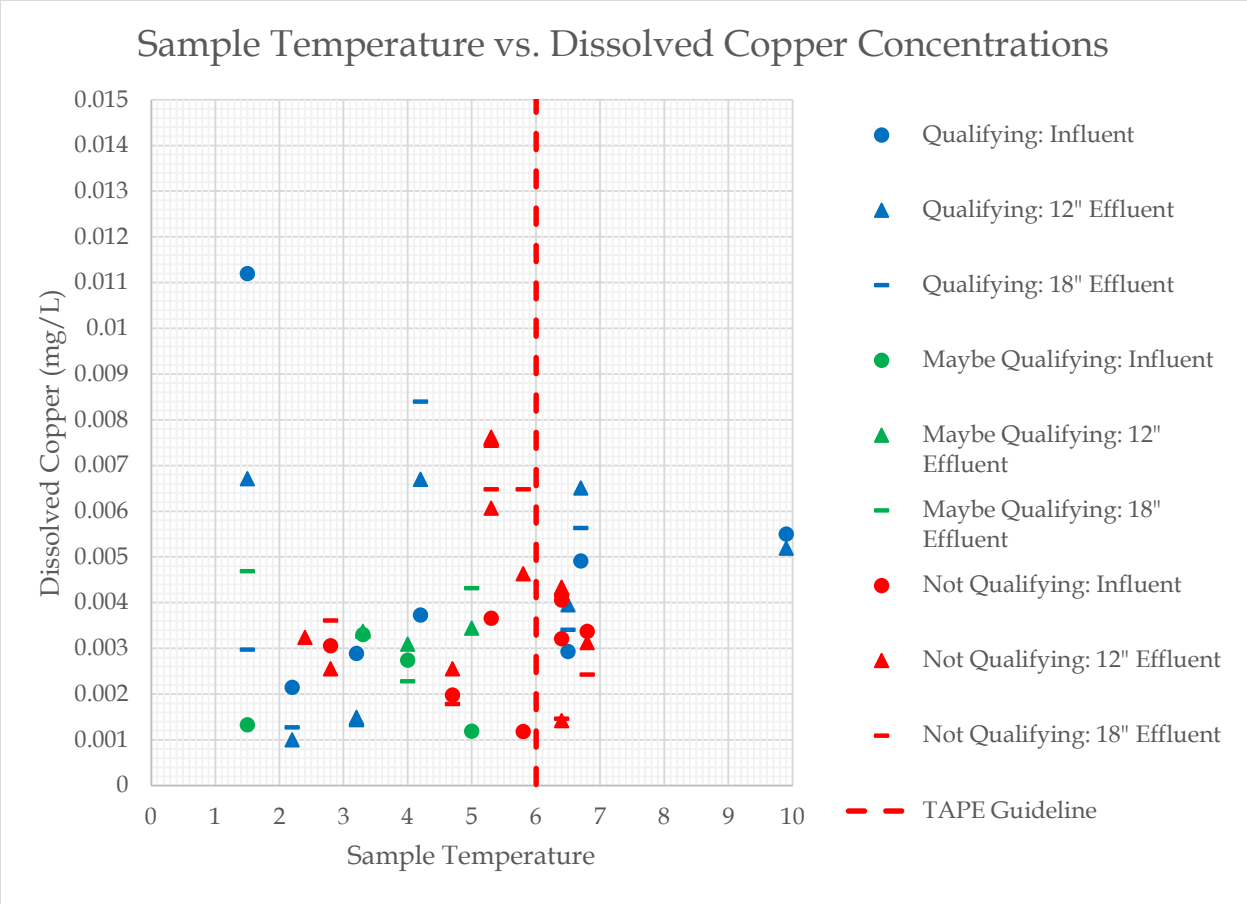


Figure C.6.2 Storm Sample Temperature vs. Dissolved Copper Concentration

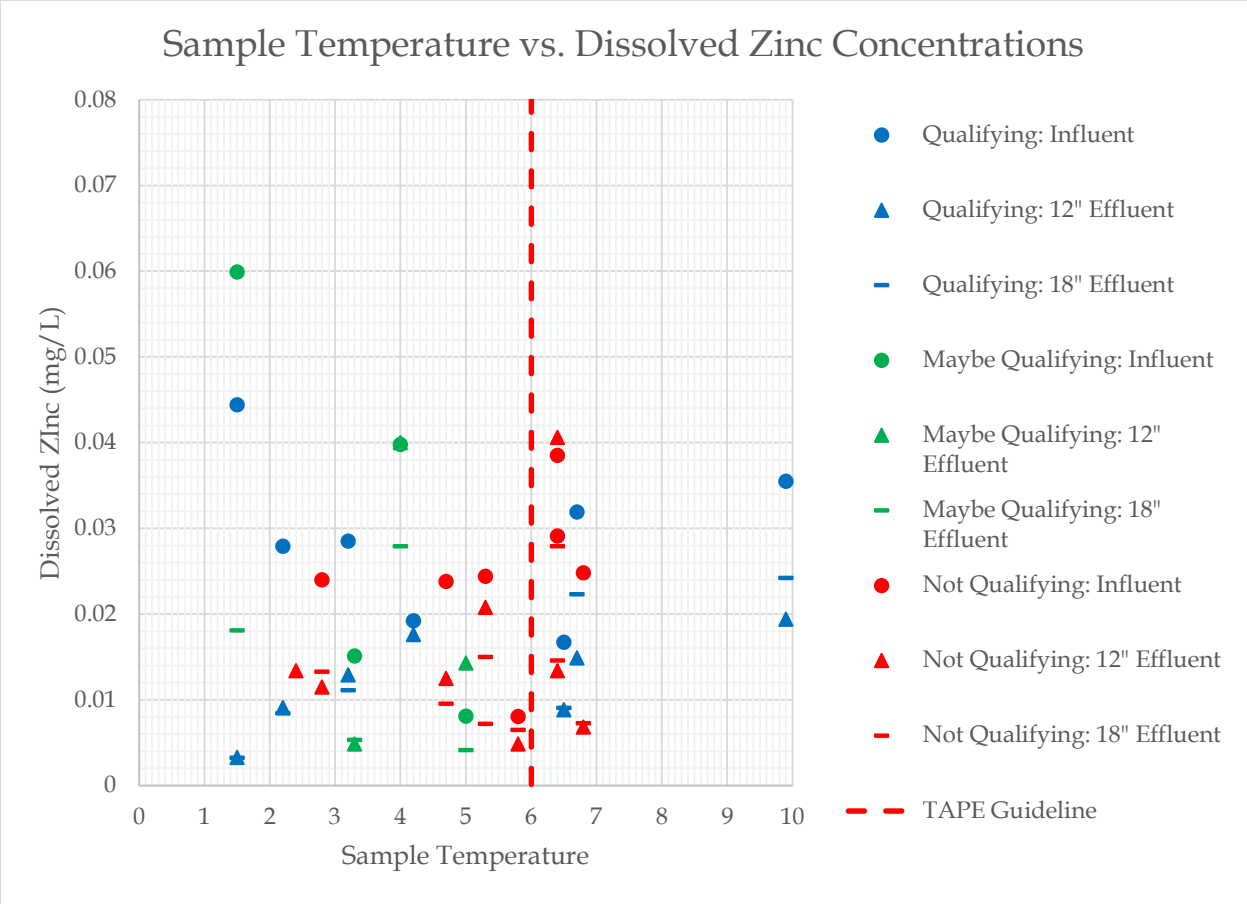


Figure C.6.2 Storm Sample Temperature vs. Dissolved Zinc Concentration

No other quality assurance issues were identified during the study.

Appendix D. Statistical and Data Analysis

Appendix D.1 Statistical Comparison of Influent and Effluent

Statistical Results

OSBORN
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INCORPORATED

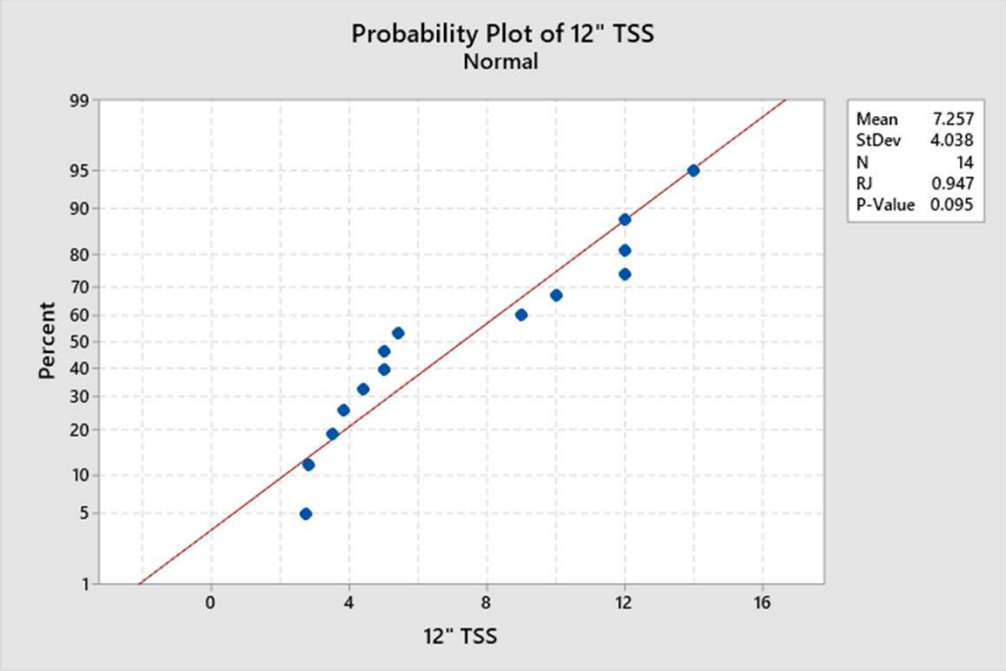
Data Distribution
Overview

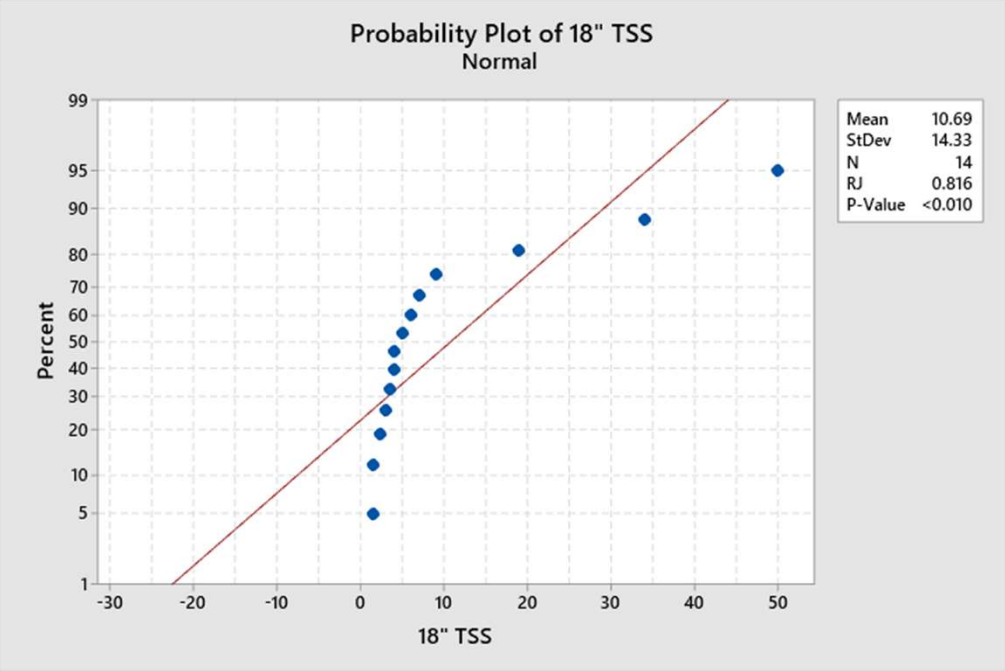
OSBORN CONSULTING INCORPORATED

- Results of Normality Test:
  - Normally Distributed
    - Dissolved Copper 12” and 18” Effluent Concentrations
    - Dissolved Zinc 18” Effluent Concentrations
    - Total Phosphorus 12” Effluent Concentrations
  - Non-Normally Distributed
    - TSS 12” and 18” Effluent Concentrations
    - Dissolved Zinc 12” Effluent Concentrations
    - Total Phosphorus 18” Effluent Concentrations

Data Distribution
TSS Normality

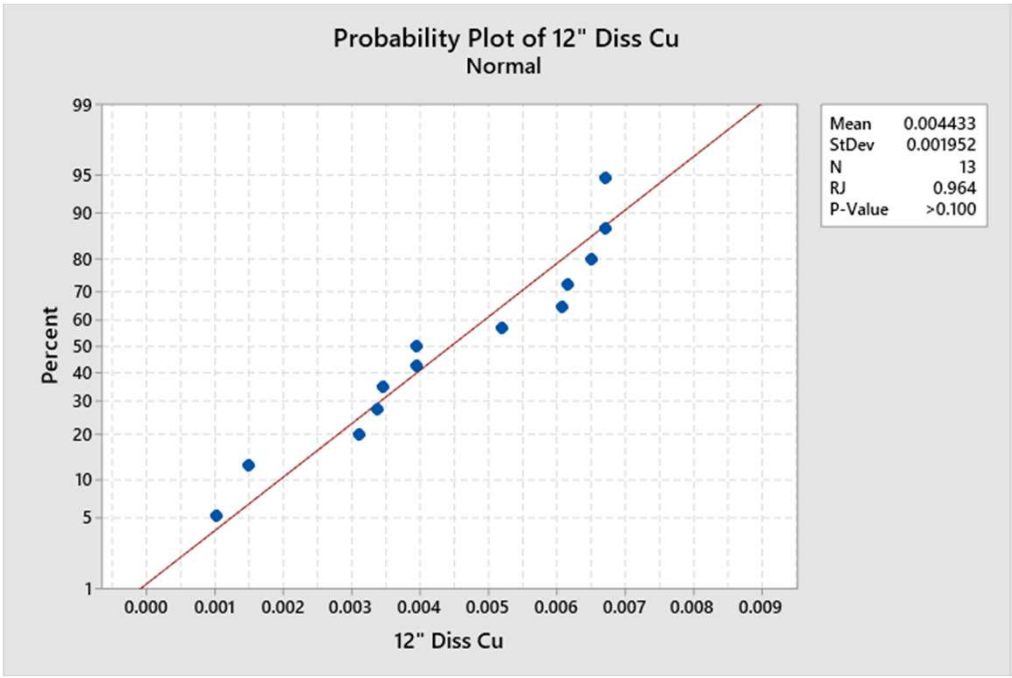
OSBORN CONSULTING INCORPORATED

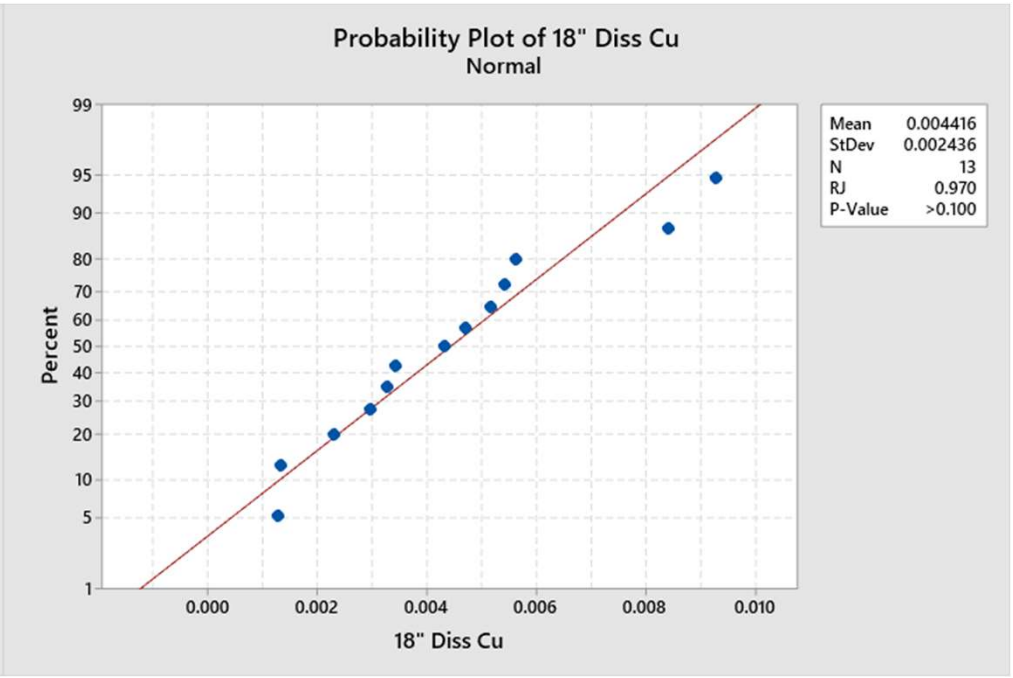




Data Distribution
Dissolved Cu Normality

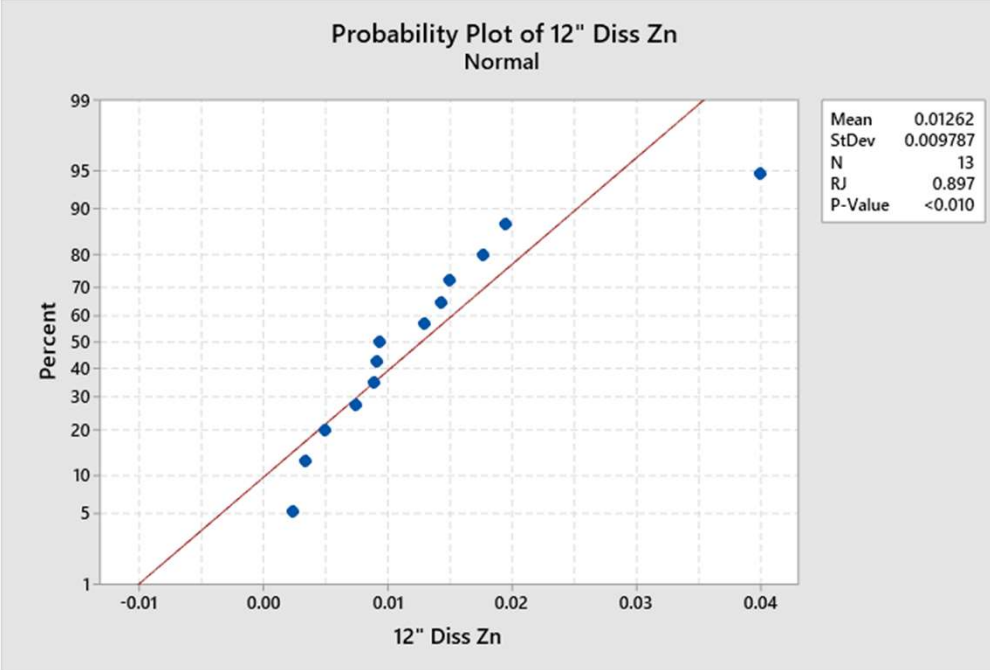
OSBORN CONSULTING INCORPORATED

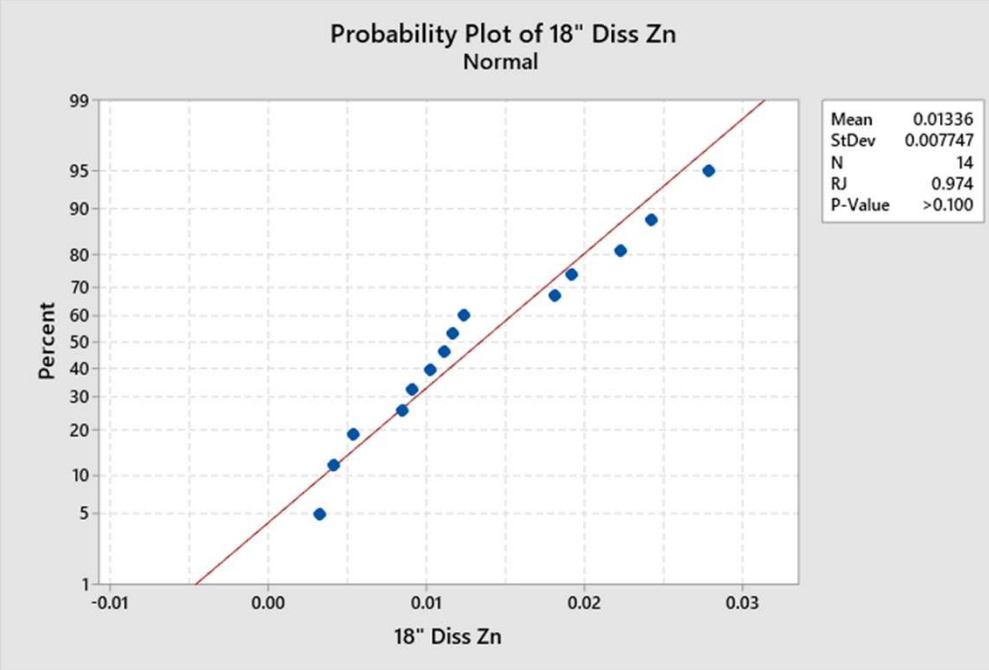




Data Distribution
Dissolved Zn Normality

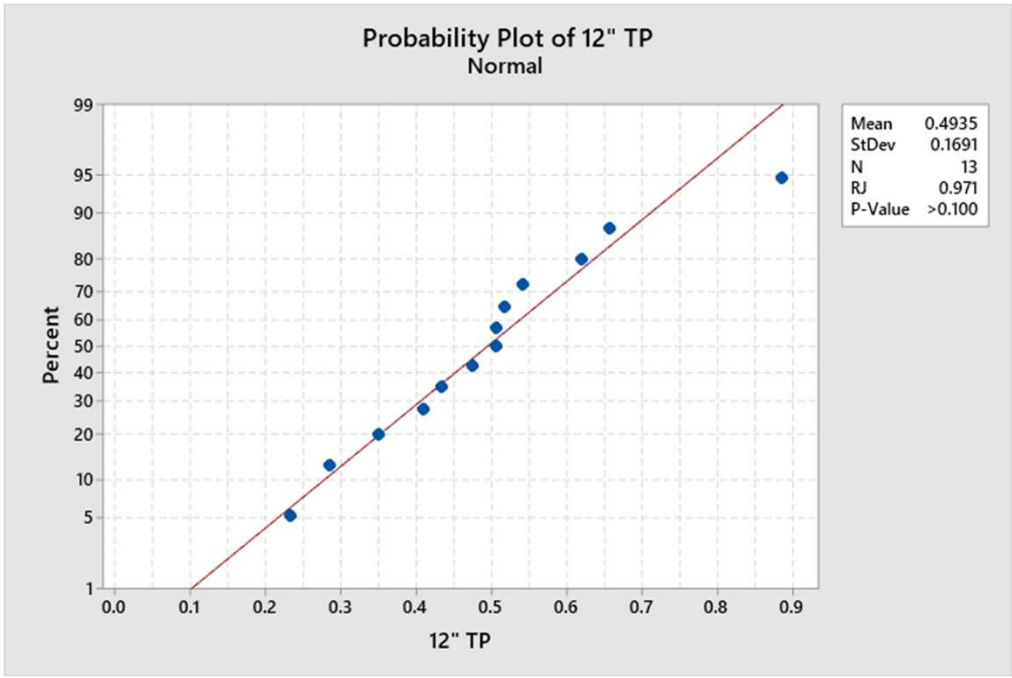
OSBORN CONSULTING INCORPORATED

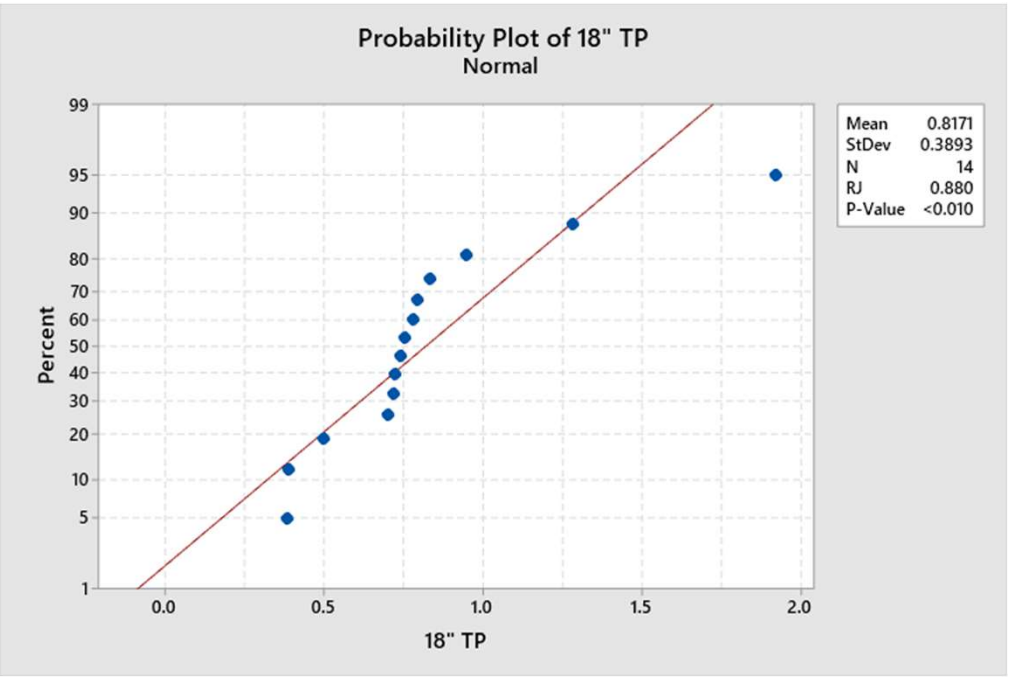




Data Distribution
Total Phosphorus Normality

OSBORN CONSULTING INCORPORATED





Statistically Significant Difference
Overview

OSBORN CONSULTING INCORPORATED

- Two Sample T-Test and Mann-Whitney Test used
  - T-Test used for pairs of normally distributed data
    - Dissolved Cu 12” and 18” effluent concentrations
  - Mann-Whitney Test used for remaining data pairs

Statistically Significant Difference
Overview

OSBORN CONSULTING INCORPORATED

- Results:
  - No statistically significant difference between:
    - TSS 12” and 18” effluent concentrations
    - Dissolved Cu 12” and 18” effluent concentrations
    - Dissolved Zn 12” and 18” effluent concentrations
  - Statistically significant difference between:
    - Total Phosphorus 12” and 18” effluent concentrations

Statistically Significant Difference
TSS Concentrations

OSBORN CONSULTING INCORPORATED

Mann-Whitney: 12" TSS, 18" TSS

Descriptive Statistics

Sample	N	Median
12" TSS	15	5.4
18" TSS	15	5.0

Estimation for Difference

Difference	CI for Difference	Achieved Confidence
1	(-4.3, 5)	95.35%

Test

Null hypothesis	$H_0: \eta_1 - \eta_2 = 0$
Alternative hypothesis	$H_1: \eta_1 - \eta_2 \neq 0$

Method	W-Value	P-Value
Not adjusted for ties	243.50	0.663
Adjusted for ties	243.50	0.663

Statistically Significant Difference
Dissolved Cu Concentrations

OSBORN CONSULTING INCORPORATED

Two-Sample T-Test and CI: 12" Diss Cu, 18" Diss Cu

Descriptive Statistics

Sample	N	Mean	StDev	SE Mean
12" Diss Cu	13	0.00443	0.00195	0.00054
18" Diss Cu	13	0.00442	0.00244	0.00068

Estimation for Difference

Difference	95% CI for Difference
0.000017	(-0.001779, 0.001812)

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
0.02	22	0.985

Statistically Significant Difference
Dissolved Zn Concentrations

OSBORN CONSULTING INCORPORATED

Mann-Whitney: 12" Diss Zn, 18" Diss Zn

Descriptive Statistics

Sample	N	Median
12" Diss Zn	13	0.00927
18" Diss Zn	14	0.01135

Estimation for Difference

Difference	CI for Difference	Achieved Confidence
-0.0016300	(-0.0079600, 0.0047100)	95.06%

Test

Null hypothesis $H_0: \eta_1 - \eta_2 = 0$

Alternative hypothesis $H_1: \eta_1 - \eta_2 \neq 0$

W-Value	P-Value
172.00	0.645

Statistically Significant Difference
Total Phosphorus Concentrations

OSBORN CONSULTING INCORPORATED

Mann-Whitney: 12" TP, 18" TP

Descriptive Statistics

Sample	N	Median
12" TP	13	0.505
18" TP	14	0.745

Estimation for Difference

Difference	CI for Difference	Achieved Confidence
-0.266	(-0.429, -0.103000)	95.06%

Test

Null hypothesis	$H_0: \eta_1 - \eta_2 = 0$
Alternative hypothesis	$H_1: \eta_1 - \eta_2 \neq 0$

W-Value	P-Value
126.00	0.007

Appendix D.2 Pollutant Effluent Concentrations and Removal Efficiencies

	TAPE Qualifying Parameters	Units	TAPE Guideline							
Storm Data	Storm ID			2	8	9	12	15	16	19	26
				12/16/2018	12/19/2019	1/28/2020	5/6/2020	9/25/2020	10/10/2020	11/5/2020	1/2/2021
			Qualified?	Y	Y	Y	Y	Y	Y	Y	Y
	Total Storm Depth	inches	0.15"	0.41	0.44	0.42	0.23	0.08	0.27	0.27	0.4
	Total Storm Duration	hours	1 hour	20.42	8.25	12.75	9.75	6.08	8.67	9.42	15.83
	Storm Average Intensity	in/hr	Range of rainfall intensities	0.020	0.053	0.033	0.024	0.013	0.031	0.029	0.025
	Storm Peak Intensity	in/hr		0.120	0.360	0.120	2.738	0.120	0.240	3.352	2.212
	Storm Antecedent Dry Period	hours	6 hrs w/ <0.04" rainfall before the storm start	64.33	159.08	15.17	74.08	29.17	352.08	41.58	12.50
Total Volume	Influent	ft^3	none	243.175	1113.728	90.927	192.103	47.905	421.263	203.803	530.967
	12in Effluent	ft^3		178.824	240.007	28.930	131.125	35.279	127.844	118.835	320.243
	18in Effluent	ft^3		151.759	392.860	12.190	104.421	34.247	134.703	133.903	198.313
Average Flow Rate	Influent	gpm	Range	2.032	19.836	123.496	2.672	1.352	11.249	4.010	4.179
	12in Effluent	gpm		1.108	3.630	4.545	1.690	0.723	1.874	1.615	2.520
	18in Effluent	gpm		0.939	5.621	1.239	1.370	0.702	1.975	1.820	1.561
Peak Flow Rate	Influent	gpm	Range	9.792	60.596	353.844	31.793	11.322	54.635	12.989	13.428
	12in Effluent	gpm		1.482	5.997	8.016	5.852	2.726	6.979	4.163	3.949
	18in Effluent	gpm		1.299	33.132	1.799	4.383	2.179	4.495	3.642	2.107
Aliquots	Influent	-	10 aliquots minimum	27	35	45	19	8	30	17	31
	12in Effluent	-		40	19	45	26	12	18	20	38
	18in Effluent	-		34	31	18	21	12	19	22	23
Sample Duration	Influent	hours	36 hours maximum	13.25	2.83	3.67	5.08	1.08	3.83	3.92	11.58
	12in Effluent	hours		18.00	7.67	5.92	6.25	3.17	4.75	6.42	13.75
	18in Effluent	hours		17.92	7.50	9.58	8.33	4.17	6.25	6.42	1.83
Storm Volume Sampled	% of Influent	%	75% of storm for the first 24 hours	98.08%	78.84%	100.00%	97.16%	90.88%	98.64%	97.86%	96.96%
	% of 12in Effluent	%		98.80%	99.30%	100.00%	97.39%	92.55%	97.51%	98.72%	98.53%
	% of 18in Effluent	%		98.96%	98.98%	100.00%	98.78%	95.34%	97.69%	96.37%	96.31%
90th Percentile Flow Rate	Influent	gpm	none	3.164	55.705	323.847	7.373	4.360	24.819	9.980	8.563
Influent Concentration	TSS	mg/L	≥20 mg/L	9	14	11	83	153	12	54	13
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00289	0.00215	0.00373	0.0055	0.0112	0.00491	0.00293	
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.0285	0.0279	0.0192	0.0355	0.0444	0.0319	0.0167	
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.118	0.19	0.105	0.358	0.477	0.288	0.6	
12" Effluent Concentration	TSS	mg/L	≥20 mg/L	5	5	3.5	10	25	4.4	12	3.8
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00149	0.001	0.0067	0.00519	0.00671	0.00651	0.00395	
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.0129	0.0091	0.0176	0.0194	0.00327	0.0149	0.00883	
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.35	0.409	0.516	0.505	0.433	0.475	0.232	
18" Effluent Concentration	TSS	mg/L	≥20 mg/L	7	6	1.5	5	36	4	9	3
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00132	0.00127	0.0084		0.00297	0.00563	0.00341	
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.0111	0.00842	0.0192	0.0242	0.00323	0.0223	0.00906	
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.388	0.496	0.945	0.739	0.751	0.715	1.92	
Post Storm Data	Post Storm Dry Period > 6hr?	-	6 hours minimum with less than 0.04 inches of rain	Y	Y	Y	Y	Y	Y	Y	Y
Sample Data	Temperature < 6°C	Celsius	Sample Temperature cannot exceed 6°C	3.2	2.2	4.2	9.9	1.5	6.7	6.5	

	TAPE Qualifying Parameters	Units	TAPE Guideline							
Storm Data	Storm ID			29	4	5	11	13	14	22	25
				1/12/2021	7/24/2019	9/28/2019	2/23/2020	5/20/2020	5/31/2020	11/18/2020	12/22/2020
			Qualified?	Y	M	M	M	M	M	M	M
	Total Storm Depth	inches	0.15"	0.53	0.2	0.71	0.17	1.11	0.67	0.13	0.07
	Total Storm Duration	hours	1 hour	15.50	10.58	37.42	6.33	18.50	9.42	6.08	5.92
	Storm Average Intensity	in/hr		0.034	0.019	0.019	0.027	0.060	0.071	0.021	0.012
	Storm Peak Intensity	in/hr	Range of rainfall intensities	2.349	0.120	0.120	0.360	1.532	3.074	0.720	0.120
	Storm Antecedent Dry Period	hours	6 hrs w/ <0.04" rainfall before the storm start	115.00	176.42	432.42	179.42	5.17	129.92	40.08	11.92
Total Volume	Influent	ft^3	none	467.660	207.084	2340.989	657.237	11386.908	3457.199	2607.043	80.104
	12in Effluent	ft^3		333.905	89.981	124.128	111.860	393.625	387.122	182.435	39.231
	18in Effluent	ft^3		232.068	109.733	158.591	113.090	352.704	229.710	285.220	56.293
Average Flow Rate	Influent	gpm	Range	4.483	3.091	21.345	61.934	96.748	29.591	53.404	1.687
	12in Effluent	gpm		2.684	1.061	0.636	2.935	2.651	4.162	3.737	0.826
	18in Effluent	gpm		1.866	1.297	0.573	2.349	2.376	2.594	5.843	1.186
Peak Flow Rate	Influent	gpm	Range	24.173	37.321	112.439	265.026	689.839	104.483	1756.638	10.350
	12in Effluent	gpm		4.726	3.350	2.404	7.794	4.163	9.078	8.563	1.899
	18in Effluent	gpm		3.256	3.164	2.897	5.030	3.845	5.208	9.610	1.768
Aliquots	Influent	-	10 aliquots minimum	25	45	45	16	45	45	45	23
	12in Effluent	-		37	45	16	38	31	45	45	23
	18in Effluent	-		25	45	41	38	28	28	45	33
Sample Duration	Influent	hours	36 hours maximum	9.42	6.08	3.58	1.25	8.25	3.67	3.67	2.58
	12in Effluent	hours		14.25	6.42	8.33	3.08	15.92	5.42	3.67	5.42
	18in Effluent	hours		12.42	5.83	8.58	5.25	17.17	7.08	3.67	5.42
Storm Volume Sampled	% of Influent	%	75% of storm for the first 24 hours	96.34%	76.79%	27.17%	14.19%	9.94%	20.70%	8.66%	97.40%
	% of 12in Effluent	%		99.85%	88.36%	91.10%	99.63%	99.07%	92.42%	61.88%	99.44%
	% of 18in Effluent	%		97.07%	72.45%	91.35%	98.55%	99.86%	96.91%	39.58%	99.43%
90th Percentile Flow Rate	Influent	gpm	none	9.432	11.604	83.561	154.940	0.099	141.279	3.493	5.333
Influent Concentration	TSS	mg/L	≥20 mg/L	18	78	68	90		120	21	38
	Dissolved Cu	mg/L	0.005-0.02 mg/L		0.00676	0.00133	0.00274		0.00119	0.0033	0.0018
	Dissolved Zn	mg/L	0.02-0.03 mg/L		0.0307	0.0599	0.0398		0.0081	0.0151	0.0114
	Total Phosphorus	mg/L	0.1-0.5 mg/L	5.75	0.334	0.0991	0.153				0.0917
12" Effluent Concentration	TSS	mg/L	≥20 mg/L	2.8	12		2.7		12	9	14
	Dissolved Cu	mg/L	0.005-0.02 mg/L		0.00608		0.00309		0.00344	0.00337	0.00615
	Dissolved Zn	mg/L	0.02-0.03 mg/L		0.0074		0.04		0.0143	0.00484	0.00927
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.506	0.886		0.285			0.656	0.62
18" Effluent Concentration	TSS	mg/L	≥20 mg/L	2.33	34	50	1.5		4		19
	Dissolved Cu	mg/L	0.005-0.02 mg/L		0.00515	0.00469	0.00228		0.00432	0.00326	0.00929
	Dissolved Zn	mg/L	0.02-0.03 mg/L		0.0102	0.0181	0.0279		0.00412	0.00532	0.0123
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.701	1.28	0.793	0.381			0.72	0.779
Post Storm Data	Post Storm Dry Period > 6hr?	-	6 hours minimum with less than 0.04 inches of rain	Y	Y	Y	Y	N	N/A	Y	Y
Sample Data	Temperature < 6°C	Celsius	Sample Temperature cannot exceed 6°C	0.3	14.4	1.5	4		5	3.3	

	TAPE Qualifying Parameters	Units	TAPE Guideline						
Storm Data	Storm ID			27	28	3	1	6	7	10
				1/4/2021	1/6/2021	1/17/2019	11/22/2018	11/19/2019	12/7/2019	1/30/2020
			Qualified?	M	N	N	N	N	N	N
	Total Storm Depth	inches	0.15"	0.44	0.11	0.26	0.08	0.07	0.19	0.12
	Total Storm Duration	hours	1 hour	12.08	7.42	9.75	5.83	4.58	7.58	6.75
	Storm Average Intensity	in/hr	Range of rainfall intensities	0.036	0.015	0.027	0.014	0.015	0.025	0.018
	Storm Peak Intensity	in/hr		2.930	0.120	0.120	0.120	0.120	0.120	0.120
	Storm Antecedent Dry Period	hours	6 hrs w/ <0.04" rainfall before the storm start	24.00	34.75	171.75	432.50	44.83	420.25	25.00
Total Volume	Influent	ft^3	none	1155.380	117.591	322.731	52.616	21.338	513.869	315.796
	12in Effluent	ft^3		262.183	70.128	98.736	24.020	27.694	125.317	122.718
	18in Effluent	ft^3		188.030	75.779	75.990	27.287	0.351	3675.194	67.743
Average Flow Rate	Influent	gpm	Range	11.915	1.976	4.007	7.153	0.003	12.197	11.244
	12in Effluent	gpm		2.704	1.178	1.317	0.513	0.627	2.082	2.266
	18in Effluent	gpm		1.939	1.273	1.021	0.648	0.006	60.393	1.251
Peak Flow Rate	Influent	gpm	Range	62.830	9.792	22.012	34.489	0.009	56.669	28.962
	12in Effluent	gpm		4.495	2.253	2.179	1.787	0.717	5.690	3.304
	18in Effluent	gpm		2.897	1.643	1.768	1.833	0.006	130.134	1.530
Aliquots	Influent	-	10 aliquots minimum	45	15	30	6	2	45	43
	12in Effluent	-		45	18	7	2	7	35	>45
	18in Effluent	-		40	19	6	3	0	45	27
Sample Duration	Influent	hours	36 hours maximum	4.92	7.00	4.67	0.50	0.33	3.67	3.50
	12in Effluent	hours		7.42	6.92	2.42	0.75	3.42	3.92	5.58
	18in Effluent	hours		10.58	6.50	2.33	3.17	0.00	3.67	6.17
Storm Volume Sampled	% of Influent	%	75% of storm for the first 24 hours	35.78%	99.16%	98.54%	96.71%	69.55%	61.89%	67.36%
	% of 12in Effluent	%		78.84%	99.77%	37.58%	70.61%	93.78%	98.69%	90.70%
	% of 18in Effluent	%		97.72%	97.46%	41.85%	93.24%	0.00%	8.65%	98.59%
90th Percentile Flow Rate	Influent	gpm	none	39.686	3.845	9.649	14.565	2.498	36.288	25.400
Influent Concentration	TSS	mg/L	≥20 mg/L	50	11	8	74.7	22	16	10
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00124		0.00406	0.00321		0.00306	0.00118
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.0054		0.0291	0.0385		0.024	0.00804
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.0539						0.107
12" Effluent Concentration	TSS	mg/L	≥20 mg/L	5.4	4.33	1	31	1	3	3.5
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00395		0.00142	0.00434	0.00324	0.00255	0.00463
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.00224		0.0134	0.0406	0.0134	0.0115	0.00483
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.542				0.416	0.505	0.572
18" Effluent Concentration	TSS	mg/L	≥20 mg/L	3.4	2.75	5	36		8	2
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00542		0.00146	0.00416		0.00361	0.00648
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.0116		0.0146	0.0279		0.0133	0.00649
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.831					0.576	0.911
Post Storm Data	Post Storm Dry Period > 6hr?	-	6 hours minimum with less than 0.04 inches of rain	Y	Y	N/A	No, 5 hours 20	N/A	Y	N/A
Sample Data	Temperature < 6°C	Celsius	Sample Temperature cannot exceed 6°C		0.4	6.4	6.4	2.4	2.8	5.8

	TAPE Qualifying Parameters	Units	TAPE Guideline						
Storm Data	Storm ID			17	18	20	21	23	24
				10/11/2020	10/13/2020	11/13/2020	11/16/2020	12/19/2020	12/21/2020
			Qualified?	N	N	N	N	N	N
	Total Storm Depth	inches	0.15"	0.24	0.25	0.43	0.15	0.16	0.1
	Total Storm Duration	hours	1 hour	9.58	7.75	10.00	7.25	8.25	6.42
	Storm Average Intensity	in/hr	Range of rainfall intensities	0.025	0.032	0.043	0.021	0.019	0.016
	Storm Peak Intensity	in/hr		3.162	0.240	3.213	0.240	0.120	0.120
	Storm Antecedent Dry Period	hours	6 hrs w/ <0.04" rainfall before the storm start	24.58	28.00	59.67	34.25	63.58	25.33
Total Volume	Influent	ft^3	none	191.709	310.457	459.964	98.777	224.992	121.411
	12in Effluent	ft^3		612592.933	603503.180	472.460	143.220	116.659	39.194
	18in Effluent	ft^3		1133901.413	1085944.876	615.278	346.979	111.120	68.359
Average Flow Rate	Influent	gpm	Range	3.050	7.254	6.810	2.031	3.398	2.358
	12in Effluent	gpm		7965.714	9703.919	5.888	2.591	1.762	0.761
	18in Effluent	gpm		14744.431	17461.252	7.667	6.155	1.678	1.328
Peak Flow Rate	Influent	gpm	Range	27.824	36.091	23.543	13.208	14.333	14.799
	12in Effluent	gpm		14030.383	14710.330	11.123	6.123	3.949	2.107
	18in Effluent	gpm		24229.855	25176.750	11.322	8.733	2.984	1.967
Aliquots	Influent	-	10 aliquots minimum	11	20	28	23	45	17
	12in Effluent	-		45	45	45	45	45	11
	18in Effluent	-		45	45	45	45	45	19
Sample Duration	Influent	hours	36 hours maximum	3.92	3.67	5.75	2.33	3.83	6.00
	12in Effluent	hours		3.75	3.67	4.83	3.67	4.33	5.67
	18in Effluent	hours		3.67	4.25	4.33	3.92	4.25	5.75
Storm Volume Sampled	% of Influent	%	75% of storm for the first 24 hours	96.10%	99.70%	98.95%	97.09%	67.85%	98.95%
	% of 12in Effluent	%		0.06%	0.06%	77.41%	65.50%	65.43%	99.17%
	% of 18in Effluent	%		0.03%	0.03%	59.44%	27.04%	68.69%	98.21%
90th Percentile Flow Rate	Influent	gpm	none	7.906	29.840	18.590	5.436	8.939	7.819
Influent Concentration	TSS	mg/L	≥20 mg/L	12.3		15	17	10.5	9
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00366		0.00198	0.00337	0.001	
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.0244		0.0238	0.0248	0.0152	
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.148			0.552	0.005	
12" Effluent Concentration	TSS	mg/L	≥20 mg/L	9.4			2.25	2.12	1.8
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00762		0.00255	0.00313	0.0028	0.00607
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.0208		0.0125	0.00684	0.017	
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.427			0.264	0.872	
18" Effluent Concentration	TSS	mg/L	≥20 mg/L	7.6		4	2.5	1.43	1.9
	Dissolved Cu	mg/L	0.005-0.02 mg/L	0.00648		0.00178	0.00243	0.0033	0.00743
	Dissolved Zn	mg/L	0.02-0.03 mg/L	0.00719		0.00956	0.00727	0.017	0.015
	Total Phosphorus	mg/L	0.1-0.5 mg/L	0.45		0.3	0.664	0.292	
Post Storm Data	Post Storm Dry Period > 6hr?	-	6 hours minimum with less than 0.04 inches of rain	Y		Y	Y	Y	Y
Sample Data	Temperature < 6°C	Celsius	Sample Temperature cannot exceed 6°C	5.3		4.7	6.8		5.3

Dissolved Copper							
Qualifying?	Storm Event	Influent Analytical Result (mg/L)	12" Effluent Analytical Result (mg/L)	18" Effluent Analytical Result (mg/L)	12" Percent Reduction	18" Percent Reduction	Notes
Y	12/16/2018	0.00289	0.00149	0.00132	48.44%	54.33%	
Y	12/19/2019	0.00215	0.001	0.00127	53.49%	40.93%	
Y	1/28/2020	0.00373	0.0067	0.0084	-79.62%	-125.20%	12" and 18" samples were switched
Y	5/6/2020	0.0055	0.00519	0	5.64%	100.00%	
Y	9/25/2020	0.0112	0.00671	0.00297	40.09%	73.48%	
Y	10/10/2020	0.00491	0.00651	0.00563	-32.59%	-14.66%	
Y	11/5/2020	0.00293	0.00395	0.00341	-34.81%	-16.38%	
Y	1/2/2021	0	0	0			
Y	1/12/2021	0	0	0			
M	7/24/2019	0.00676	0.00608	0.00515	10.06%	23.82%	
M	9/28/2019	0.00133	0	0.00469	100.00%	-252.63%	Influent and 18" inital concention = ND, used PQL limit = 0.001
M	2/23/2020	0.00274	0.00309	0.00228	-12.77%	16.79%	12" and 18" samples were switched Initial Infuent concentration = <0.00007, used 0.00007 Initial 18" concentration = ND, used PQL limit = 0.001
M	5/20/2020	0	0	0			
M	5/31/2020	0.00119	0.00344	0.00432	-189.08%	-263.03%	Initial Infuent, 12" and 18" concentration = <0.00007, used 0.00007
M	11/18/2020	0.0033	0.00337	0.00326	-2.12%	1.21%	
M	12/22/2020	0.0018	0.00615	0.00929	-241.67%	-416.11%	
M	1/4/2021	0.00124	0.00395	0.00542	-218.55%	-337.10%	
N	1/6/2021	0	0	0			
N	1/17/2019	0.00406	0.00142	0.00146	65.02%	64.04%	
N	11/22/2018	0.00321	0.00434	0.00416	-35.20%	-29.60%	One dissolved metal blank sample, used for all the samples Initial concentration = ND, used PQL limit = 0.001
N	11/19/2019	0	0.00324	0			
N	12/7/2019	0.00306	0.00255	0.00361	16.67%	-17.97%	Initial concentration = ND, used PQL limit = 0.001
N	1/30/2020	0.00118	0.00463	0.00648	-292.37%	-449.15%	
N	10/11/2020	0.00366	0.00762	0.00648	-108.20%	-77.05%	Initial concentration = ND, used PQL limit = 0.001
N	10/13/2020	0	0	0			
N	11/13/2020	0.00198	0.00255	0.00178	-28.79%	10.10%	Initial influent concentration = ND, used PQL limit = 0.001 Initial 12" and 18" concentration = <0.00003, used 0.00003
N	11/16/2020	0.00337	0.00313	0.00243	7.12%	27.89%	
N	12/19/2020	0.001	0.0028	0.0033	-180.00%	-230.00%	Initial concentration = ND, used PQL limit = 0.001
N	12/21/2020	0	0.00607	0.00743			

Dissovled Copper Averages					
Averages	Influent	12" Effluent	18" Effluent	12" Percent Reduction	18" Percent Reduction
Qualifying Average	0.004759	0.004507	0.003833	0.09%	14.06%
Maybe Qualifying Average	0.002623	0.004347	0.004916	-109.02%	-175.29%
Qualifying and Maybe Average	0.003445	0.004433	0.004416	-50.27%	-79.61%

Dissovled Copper Averages - Opts Samples w/ Influent Concentrations less than 0.005 mg/L					
Averages	Influent	12" Effluent	18" Effluent	12" Percent Reduction	18" Percent Reduction
Qualifying Average	0.00835	0.00595	0.00297	22.86%	73.48%
Maybe Qualifying Average	0.00676	0.00608	0.00515	10.06%	23.82%
Qualifying and Maybe Average	0.00782	0.005993	0.00406	18.59%	48.65%

Notes:

Cells highlighted in blue have calculations.

Cells highlighted in yellow are not included in the average

Cells highlighted in orange have an influent concentration of less than 0.005 mg/L

Cells highlighted in green have calculations for the adjusted values

Dissolved Zinc								
Qualifying?	Storm Event	Influent Analytical Result (mg/L)	Initial Influent Concentration (mg/L)	12" Effluent Analytical Result (mg/L)	18" Effluent Analytical Result (mg/L)	12" Percent Reduction	18" Percent Reduction	Notes
Y	12/16/2018	0.0285	N/A	0.0129	0.0111	54.74%	61.05%	
Y	12/19/2019	0.0279	N/A	0.0091	0.00842	67.38%	69.82%	
Y	1/28/2020	0.0192	0.0147	0.0176	0.0192	8.33%	0.00%	
Y	5/6/2020	0.0355	N/A	0.0194	0.0242	45.35%	31.83%	Calculated 18" Effluent is negative, the sampling bottles
Y	9/25/2020	0.0444	0.0743	0.00327	0.00323	92.64%	92.73%	
Y	10/10/2020	0.0319	0.0654	0.0149	0.0223	53.29%	30.09%	
Y	11/5/2020	0.0167	N/A	0.00883	0.00906	47.13%	45.75%	
Y	1/2/2021	0	N/A	0	0			
Y	1/12/2021	0	N/A	0	0			
M	7/24/2019	0.0307	N/A	0.0074	0.0102	75.90%	66.78%	
M	9/28/2019	0.0599	0.0419	0	0.0181	100.00%	69.78%	
M	2/23/2020	0.0398	0.0131	0.04	0.0279	-0.50%	29.90%	
M	5/20/2020	0	N/A	0	0			
M	5/31/2020	0.0081	0.0254	0.0143	0.00412	-76.54%	49.14%	
M	11/18/2020	0.0151	N/A	0.00484	0.00532	67.95%	64.77%	
M	12/22/2020	0.0114	N/A	0.00927	0.0123	18.68%	-7.89%	
M	1/4/2021	0.0054	N/A	0.00224	0.0116	58.52%	-114.81%	
N	1/6/2021	0	N/A	0	0			
N	1/17/2019	0.0291	N/A	0.0134	0.0146	53.95%	49.83%	
N	11/22/2018	0.0385	0.0531	0.0406	0.0279	-5.45%	27.53%	One dissolved metal blank sample, used for all the samples
N	11/19/2019	0	N/A	0.0134	0			
N	12/7/2019	0.024	0.00778	0.0115	0.0133	52.08%	44.58%	
N	1/30/2020	0.00804	N/A	0.00483	0.00649	39.93%	19.28%	
N	10/11/2020	0.0244	0.0255	0.0208	0.00719	14.75%	70.53%	
N	10/13/2020	0	N/A	0	0			
N	11/13/2020	0.0238	0.0153	0.0125	0.00956	47.48%	59.83%	
N	11/16/2020	0.0248	N/A	0.00684	0.00727	72.42%	70.69%	
N	12/19/2020	0.0152	0.0178	0.017	0.017	-11.84%	-11.84%	
N	12/21/2020	0	N/A	0	0.015			

Dissolved Zinc Averages					
Averages	Influent	12" Effluent	18" Effluent	12" Percent Reduction	18" Percent Reduction
Qualifying Average	0.029157	0.012286	0.01393	52.69%	47.32%
Maybe Qualifying Average	0.024343	0.013008	0.012791	24.00%	22.52%
Qualifying and Maybe Average	0.02675	0.012619	0.013361	39.45%	34.92%

Dissolved Zinc Averages - Opts Samples w/ Influent Concentrations less than 0.02 mg/L					
Averages	Influent	12" Effluent	18" Effluent	12" Percent Reduction	18" Percent Reduction
Qualifying Average	0.03364	0.011914	0.01385	62.68%	57.10%
Maybe Qualifying Average	0.043467	0.0158	0.018733	37.70%	55.49%
Qualifying and Maybe Average	0.037325	0.015281	0.015681	55.54%	56.50%

Notes:

Cells highlighted in blue have calculations.

Cells highlighted in yellow are not included in the average

Cells highlighted in orange have an influent concentration of less than 0.02 mg/L

TP						
Qualifying?	Storm Event	Influent (mg/L)	12" Effluent (mg/L)	18" Effluent (mg/L)	12" Percent Reduction	18" Percent Reduction
Y	12/16/2018	0.118	0.35	0.388	-196.61%	-228.81%
Y	12/19/2019	0.19	0.409	0.496	-115.26%	-161.05%
Y	1/28/2020	0.105	0.516	0.945	-391.43%	-800.00%
Y	5/6/2020	0.358	0.505	0.739	-41.06%	-106.42%
Y	9/25/2020	0.477	0.433	0.751	9.22%	-57.44%
Y	10/10/2020	0.288	0.475	0.715	-64.93%	-148.26%
Y	11/5/2020	0.6	0.232	1.92	61.33%	-220.00%
Y	1/2/2021	0	0	0		
Y	1/12/2021	5.75	0.506	0.701	91.20%	87.81%
M	7/24/2019	0.334	0.886	1.28	-165.27%	-283.23%
M	9/28/2019	0.0991	0	0.793	100.00%	-700.20%
M	2/23/2020	0.153	0.285	0.381	-86.27%	-149.02%
M	5/20/2020	0	0	0		
M	5/31/2020	0	0	0		
M	11/18/2020	0	0.656	0.72		
M	12/22/2020	0.0917	0.62	0.779	-576.12%	-749.51%
M	1/4/2021	0.0539	0.542	0.831	-905.57%	-1441.74%
N	1/6/2021	0	0	0		
N	1/17/2019	0	0	0		
N	11/22/2018	0	0	0		
N	11/19/2019	0	0.416	0		
N	12/7/2019	0	0.505	0.576		
N	1/30/2020	0.107	0.572	0.911	-434.58%	-751.40%
N	10/11/2020	0.148	0.427	0.45	-188.51%	-228.81%
N	10/13/2020	0	0	0		-161.05%
N	11/13/2020	0	0	0.3		
N	11/16/2020	0.552	0.264	0.664	52.17%	-20.29%
N	12/19/2020	0.005	0.872	0.292		
N	12/21/2020	0	0	0		

TP Averages					
Averages	Influent	12" Effluent	18" Effluent	12" Percent Reduction	18" Percent Reduction
Qualifying Average	0.986	0.428	0.832	-0.809	-2.043
Maybe Qualifying Average	0.122	0.598	0.797	-433.31%	-664.74%
Qualifying and Maybe Average	0.663	0.493	0.817	-198.40%	-381.38%

Notes:

Cells highlighted in blue have calculations.

Cells highlighted in yellow are not included in the average

No influent concentrations below 0.1 mg/L

TSS						
Qualifying?	Storm Event	Influent (mg/L)	12" Effluent (mg/L)	18" Effluent (mg/L)	12" Percent Reduction	18" Percent Reduction
Y	12/16/2018	9	5	7	44.44%	22.22%
Y	12/19/2019	14	5	6	64.29%	57.14%
Y	1/28/2020	11	3.5	1.5	68.18%	86.36%
Y	5/6/2020	83	10	5	87.95%	93.98%
Y	9/25/2020	153	25	36	30.56%	-325.00%
Y	10/10/2020	12	4.4	4	63.33%	66.67%
Y	11/5/2020	54	12	9	77.78%	83.33%
Y	1/2/2021	13	3.8	3	70.77%	76.92%
Y	1/12/2021	18	2.8	2.33	84.44%	87.06%
M	7/24/2019	78	12	34	84.62%	56.41%
M	9/28/2019	68	0	50	100.00%	26.47%
M	2/23/2020	90	2.7	1.5	97.00%	98.33%
M	5/20/2020	0	0	0		
M	5/31/2020	120	12	4	90.00%	96.67%
M	11/18/2020	21	9	0	57.14%	100.00%
M	12/22/2020	38	14	19	63.16%	50.00%
M	1/4/2021	50	5.4	3.4	89.20%	93.20%
N	1/6/2021	11	4.33	2.75	60.64%	75.00%
N	1/17/2019	8	1	5	87.50%	37.50%
N	11/22/2018	74.7	31	36	58.50%	51.81%
N	11/19/2019	22	1	0	95.45%	100.00%
N	12/7/2019	16	3	8	81.25%	50.00%
N	1/30/2020	10	3.5	2	65.00%	80.00%
N	10/11/2020	12.3	9.4	7.6	23.58%	38.21%
N	10/13/2020	0	0	0		
N	11/13/2020	15	0	4	100.00%	73.33%
N	11/16/2020	17	2.25	2.5	86.76%	85.29%
N	12/19/2020	10.5	2.12	1.43	79.81%	86.38%
N	12/21/2020	9	1.8	1.9	80.00%	78.89%

TSS Averages					
TSS Averages	Influent	12" Effluent	18" Effluent	12" Percent Reduction	18" Percent Reduction
Qualifying Average	27.78	7.94	21.20	65.75%	27.63%
Maybe Qualifying Average	66.43	9.18	18.65	80.19%	70.18%
Qualifying and Maybe Average	44.69	8.44	20.18	71.52%	44.65%

Notes:

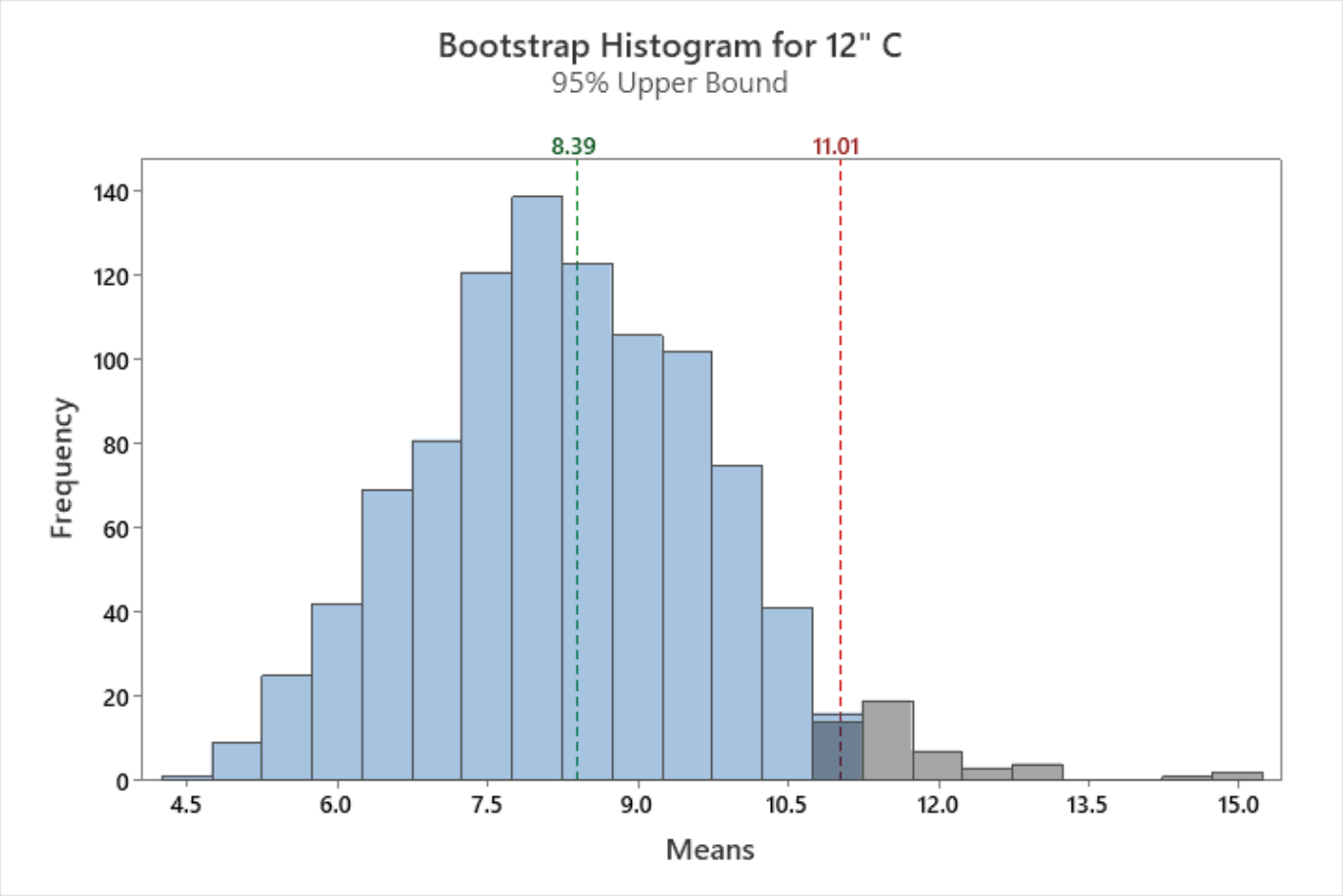
Cells highlighted in blue have calculations.

Cells highlighted in yellow are not included in the average

Appendix D.3 Ecology Bootstrapping Method

TSS

Bootstrapping for 1-Sample Mean: 12" BSM Effluent TSS Concentration



Observed Sample

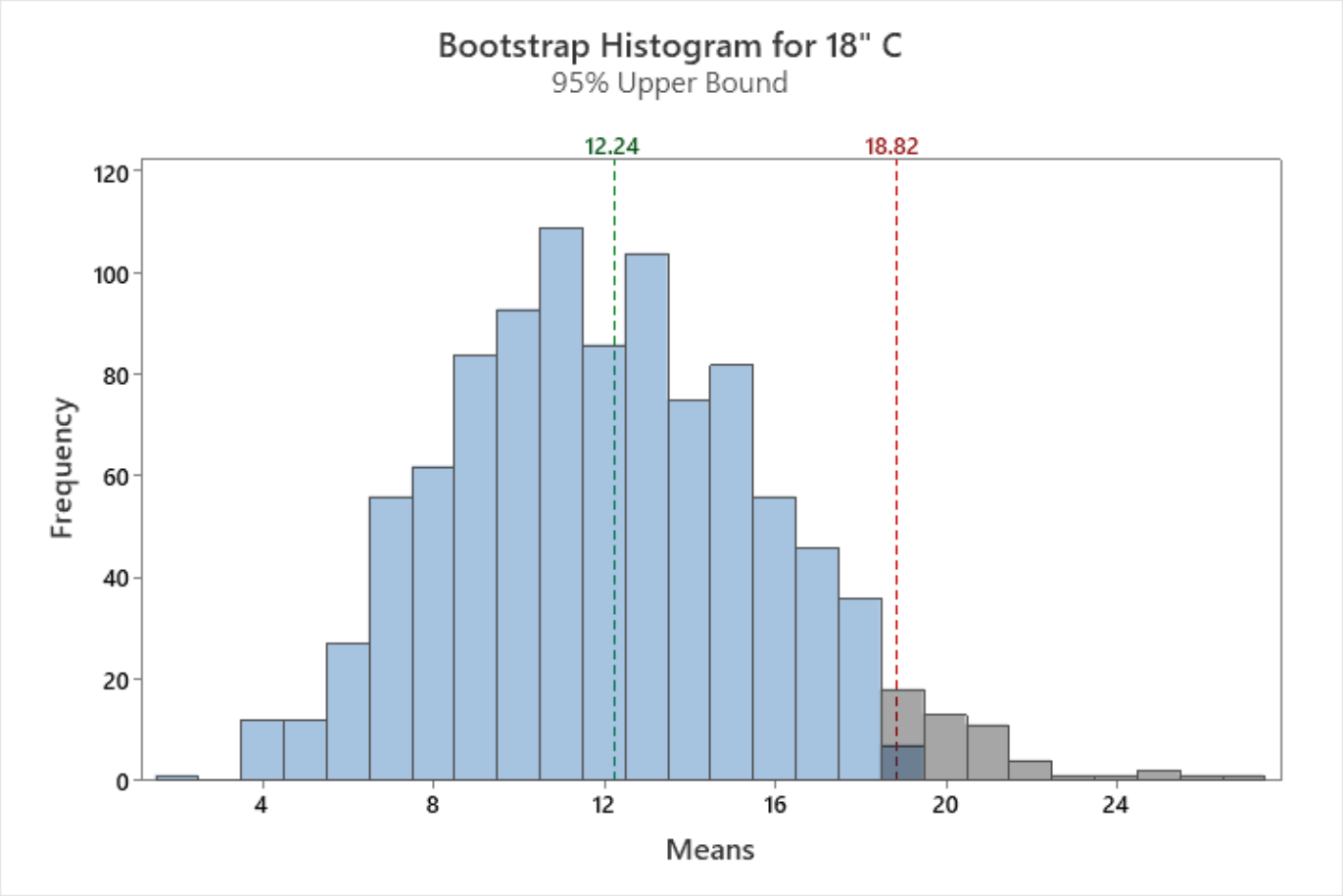
Variable	N	Mean	StDev	Variance	Sum	Minimum	Median	Maximum
12" C	15	8.44	6.01	36.13	126.60	2.70	5.40	25.00

Bootstrap Samples for Mean

Number of Resamples	Mean	StDev	95% Upper Bound for μ
1000	8.3894	1.5343	11.0133

TSS

Bootstrapping for 1-Sample Mean: 18" BSM Effluent TSS Concentration



Observed Sample

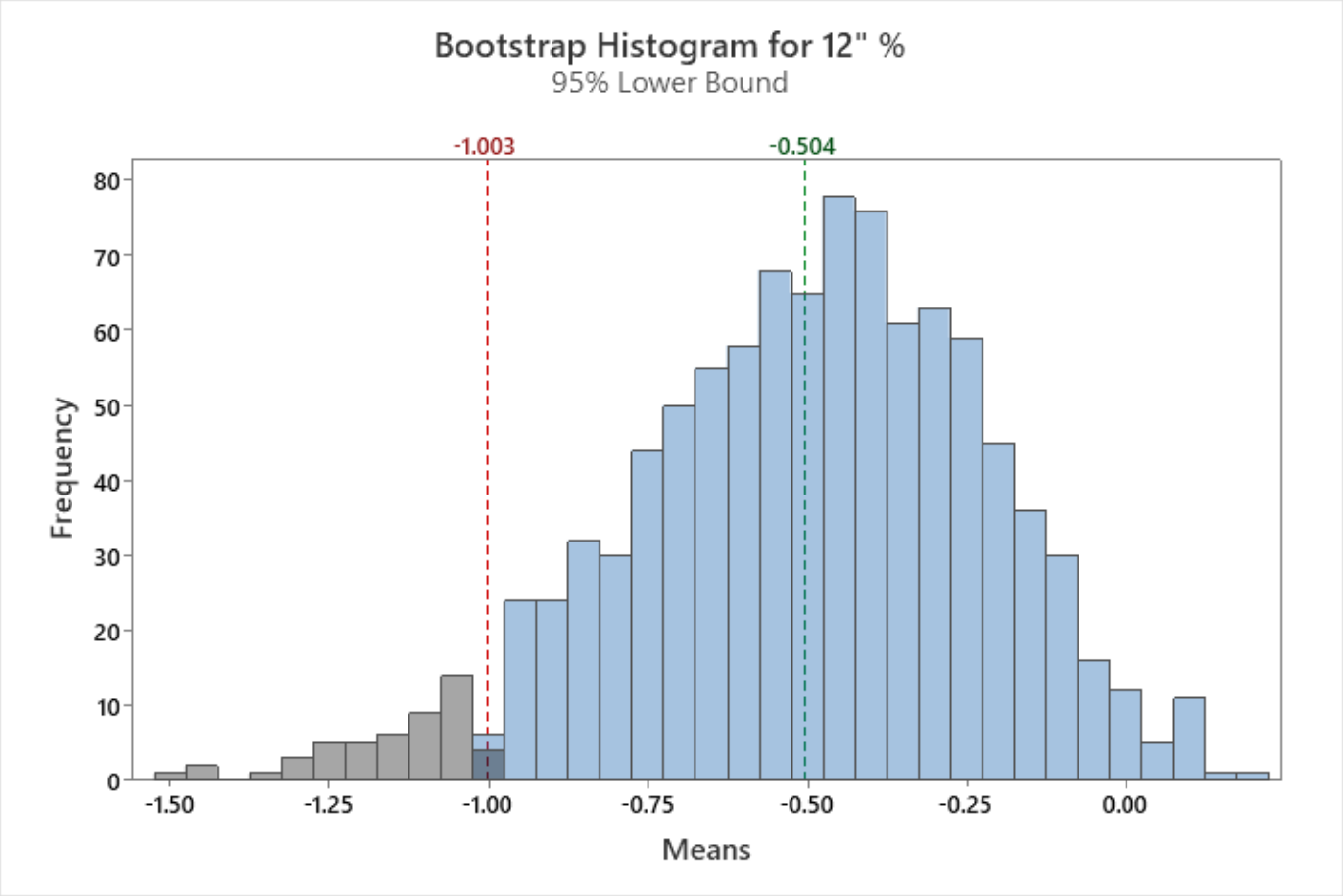
Variable	N	Mean	StDev	Variance	Sum	Minimum	Median	Maximum
18" C	15	12.38	15.28	233.34	185.73	1.50	5.00	50.00

Bootstrap Samples for Mean

Number of Resamples	Mean	StDev	95% Upper Bound for μ
1000	12.244	3.852	18.822

DISSCU

Bootstrapping for 1-Sample Mean: 12" BSM Dissolved Copper Removal



Observed Sample

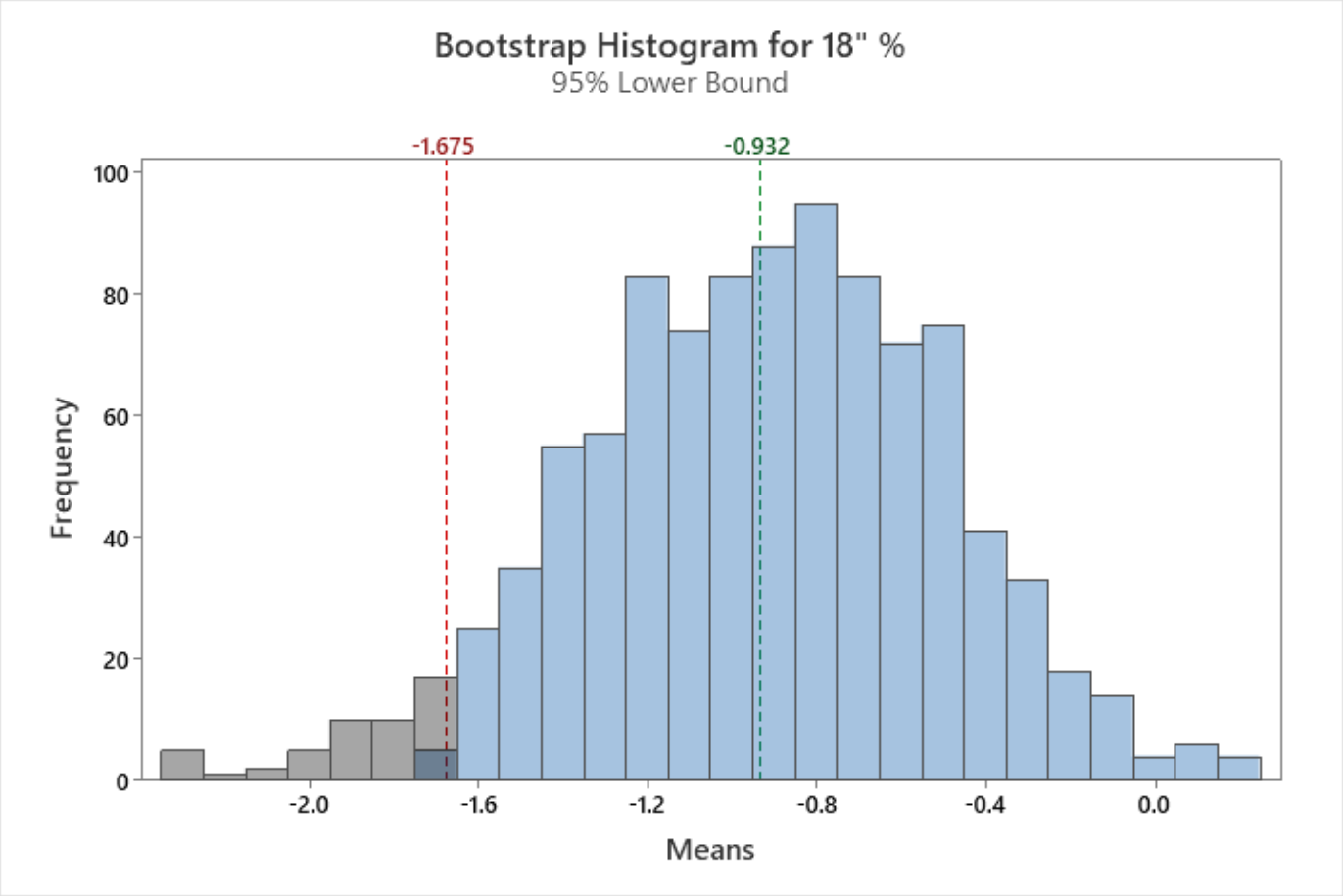
Variable	N	Mean	StDev	Variance	Sum	Minimum	Median	Maximum
12" %	13	-0.503	1.020	1.040	-6.535	-2.417	-0.128	0.535

Bootstrap Samples for Mean

Number of Resamples	Mean	StDev	95% Lower Bound for μ
1000	-0.50439	0.28213	-1.00311

DISSCU

Bootstrapping for 1-Sample Mean: 18" BSM Dissolved Copper Removal



Observed Sample

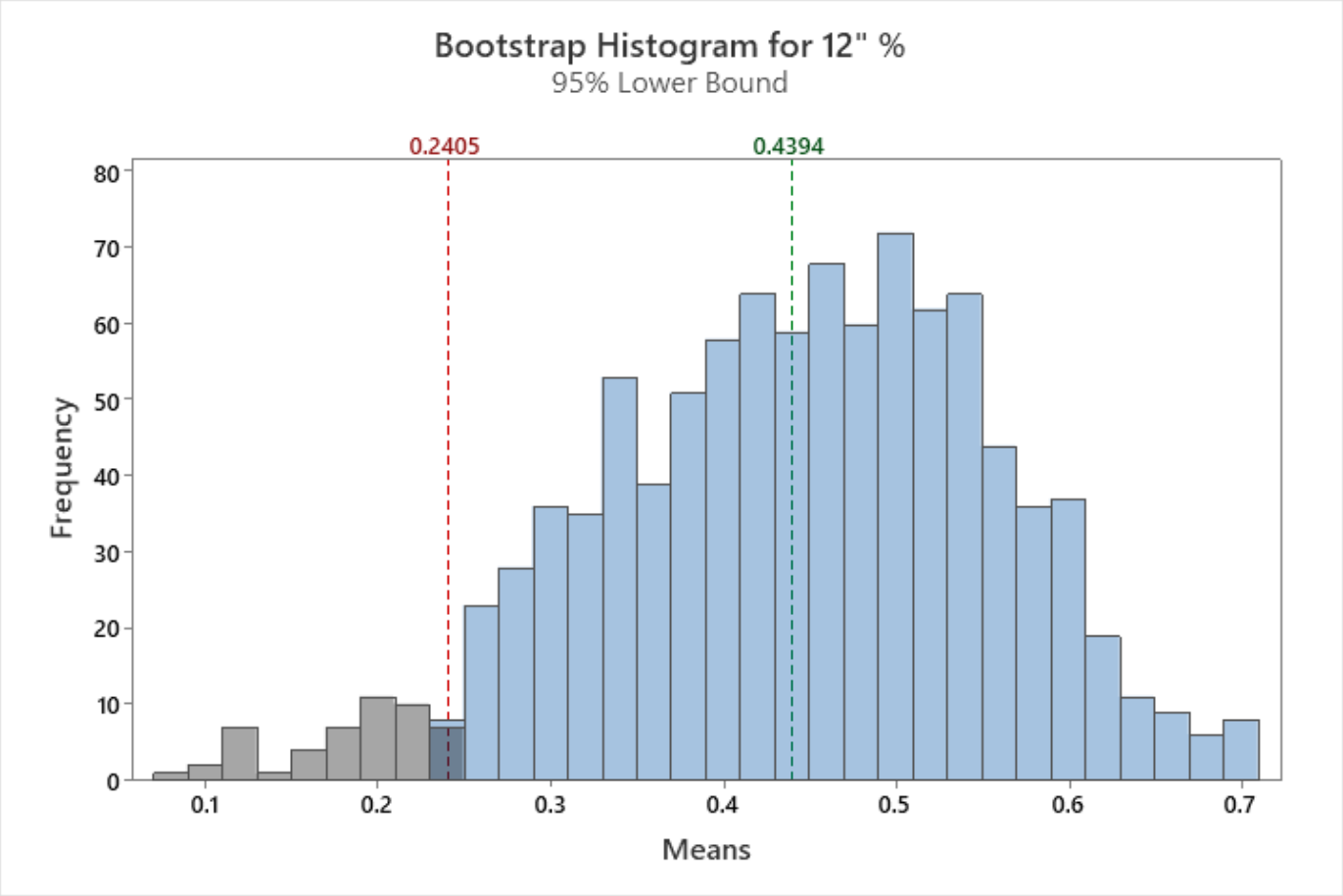
Variable	N	Mean	StDev	Variance	Sum	Minimum	Median	Maximum
18" %	13	-0.934	1.667	2.778	-12.146	-4.161	-0.147	0.735

Bootstrap Samples for Mean

Number of Resamples	Mean	StDev	95% Lower Bound for μ
1000	-0.9324	0.4331	-1.6752

DISSZN

Bootstrapping for 1-Sample Mean: 12" BSM Dissolved Zinc Removal



Observed Sample

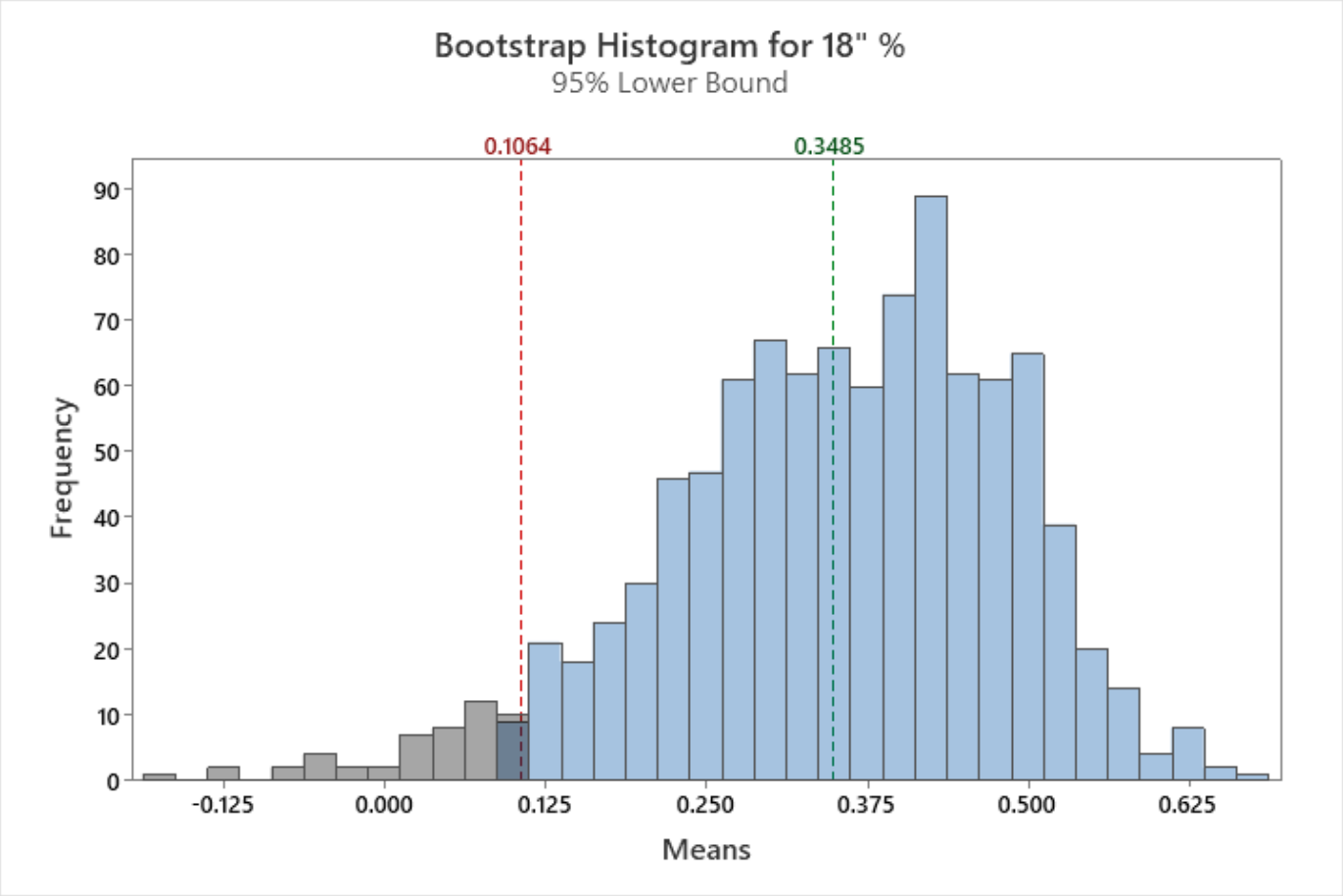
Variable	N	Mean	StDev	Variance	Sum	Minimum	Median	Maximum
12" %	14	0.438	0.451	0.204	6.129	-0.765	0.540	1.000

Bootstrap Samples for Mean

Number of Resamples	Mean	StDev	95% Lower Bound for μ
1000	0.43943	0.11614	0.24054

DISSZN

Bootstrapping for 1-Sample Mean: 18" BSM Dissolved Zinc Removal



Observed Sample

Variable	N	Mean	StDev	Variance	Sum	Minimum	Median	Maximum
18" %	14	0.349	0.513	0.263	4.889	-1.148	0.474	0.927

Bootstrap Samples for Mean

Number of Resamples	Mean	StDev	95% Lower Bound for μ
1000	0.34852	0.13521	0.10636

Appendix E. TAG Comment Responses