DRAFT MEMORANDUM
CITY OF DUVALL INFILTRATION AND INFLOW (I&I) ANALYSIS

TO: Mr. Brandon Moss, P.E.
DATE: January 5, 2024
FROM: Matthew Smith, P.E.
PROJECT: City of Duvall Infiltration and Inflow (I&I) Analysis
JMT JOB NO.: 23-04112-001
RE: Draft Technical Memorandum - City of Duvall I&I Analysis

PROJECT BACKGROUND

ADS Environmental Services, LLC (ADS), under contract with Parametrix, completed flow monitoring at four (4) locations within the City of Duvall sanitary sewer system from March 2023 through July 2023. One (1) rain gauge was installed to collect rainfall depth during storm events for the same time period. A flow monitoring summary report prepared by ADS, dated August 31, 2023, is included in Attachment A. Johnson, Mirmiran, & Thompson, Inc. (JMT) contracted with Parametrix to complete an infiltration and inflow (I&I) analysis on the flow data collected by ADS and provided to JMT for use in the analysis. The goal of the I&I analysis was to quantify dry weather flows, base infiltration (BI) values, and rainfall derived infiltration and inflow (RDII) values for the captured storm events.

JMT utilized ADS' Sli/icer.com™ (Sli/icer) software to analyze the flow data. The I&I Analysis consisted of the following sub-tasks: Rainfall Analysis, Dry Day Analysis, Wet Weather Analysis, RDII Analysis and I&I Severity Analysis. This technical memorandum provides an overview of the analysis performed and presents the results of the I&I Analysis for the four (4) meter basins.

METER BASIN CHARACTERISTICS

Flow meters were at four (4) locations within the City of Duvall sanitary sewer system. These locations are summarized in Table 1 and shown in Figure 1 below.

Table 1: Flow Monitor Locations

Site ID	MH ID	Pipe Dimensions (H x W in inches)
DUV_SWRMH428	SWRMH466	7.88 x 8.00
DUV_SWRMH430	SWRMH466	8.13 x 8.00
DUV_SWRMH459	SWRMH466	8.13 x 8.00
DUV_SWRMH466	SWRMH466	11.25 x 12.00

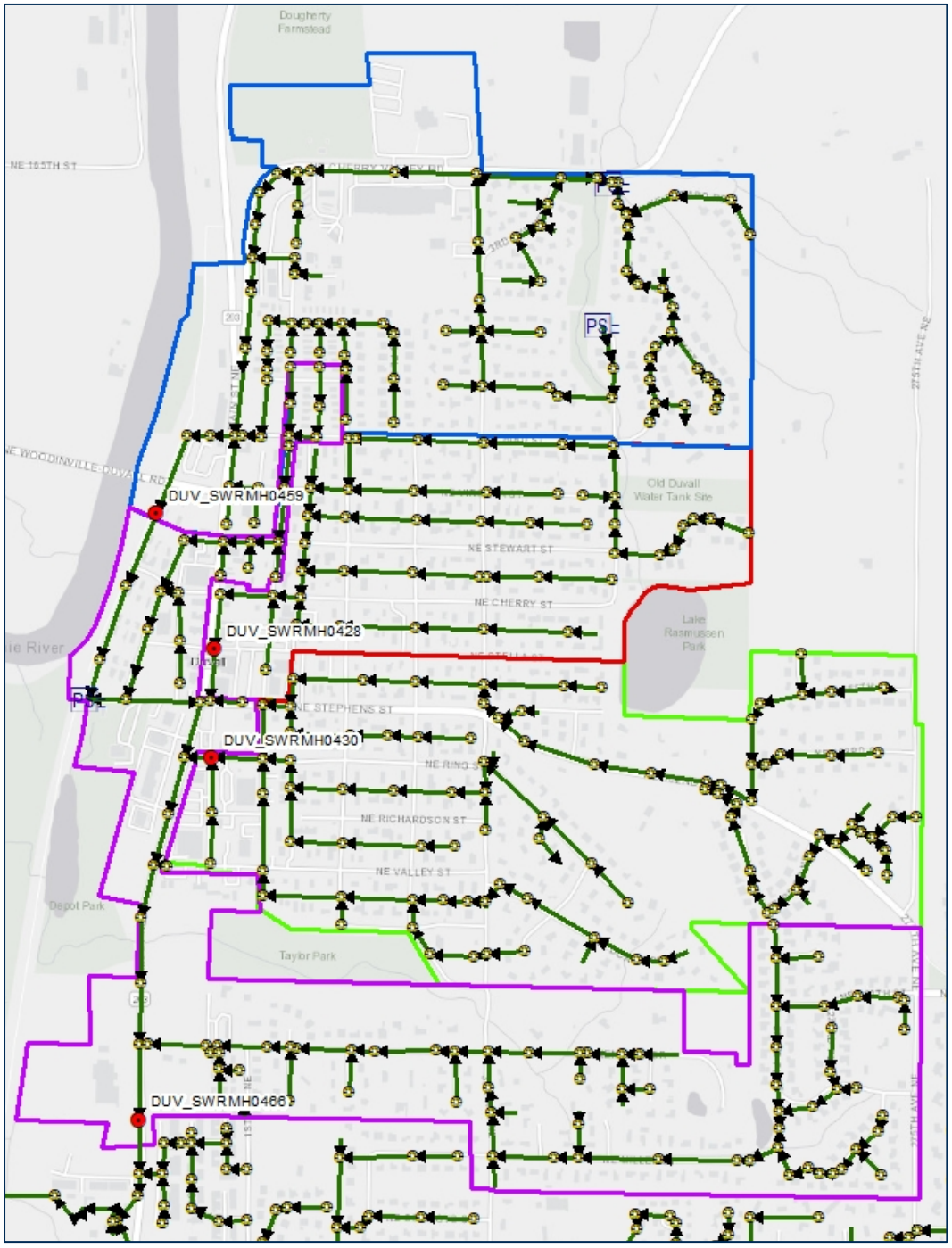


Figure 1: Meter Location with Meter Basin Boundaries

Using GIS data provided by Parametrix, JMT pulled sanitary sewer system characteristics for each of the four (4) meter basins. These system characteristics include the net basin area (in acres), the net linear footage of sanitary sewer pipe (LF), and the net sewer footprint (inch-diameter-mile) tributary to the meter.

Table 2: Meter Basin Sewer System Characteristics

Meter Basin ID	Net Basin Area (AC)	Length of Net Sewer (LF)	Net Sewer Footprint (IDM)
DUV_SWRMH428	60	11,080	16.73
DUV_SWRMH430	117	18,768	28.24
DUV_SWRMH459	106	15,254	22.23
DUV_SWRMH466	127	19,205	30.08

RAINFALL ANALYSIS

For the I&I analysis, JMT utilized rainfall data collected by the temporary rain gauge installed by ADS during their flow monitoring period, DUV_RG.

For the I&I analysis, a Storm Event is defined as a minimum of 0.5-inches of rainfall within a 24-hour period. The rainfall threshold of 0.5-inches must be reached during a time interval without a break in rainfall of more than 300-minutes (5-hours). Analysis of the rainfall data collected by the temporary rain gauge resulted in six (6) Storm Events being used for evaluation. Table 3 provides the rainfall depth recorded during each Storm Event by rain gauge DUV_RG.

Table 3: Rainfall Depths for the Captured Storm Events

Storm Date/Time	DUV_RG Rainfall Depth (in)
3/12/2023 16:00	1.05
4/2/2023 16:00	1.17
4/6/2023 8:00	0.89
4/10/2023 7:00	0.71
4/22/2023 20:00	0.88
6/20/2023 3:00	0.59

DRY DAY ANALYSIS

The purpose of the dry day analysis is to define the volumetric and temporal characteristics of the Average Dry Day Flow (ADDF), shown by the green (weekday) and blue (weekend) curves in Figure 2. The hourly values of the ADDF curve are used with the gross flow during storm events to calculate hourly and total rainfall derived infiltration and

inflow (RDII). ADDF consists of only sanitary flow from sewer service laterals (wastewater production) and base infiltration (BI), shown by the grey horizontal line in Figure 2. It excludes RDII, which occurs only during and shortly after rainfall. Unlike RDII, BI occurs even under low groundwater conditions and is not an immediate result of rainfall.

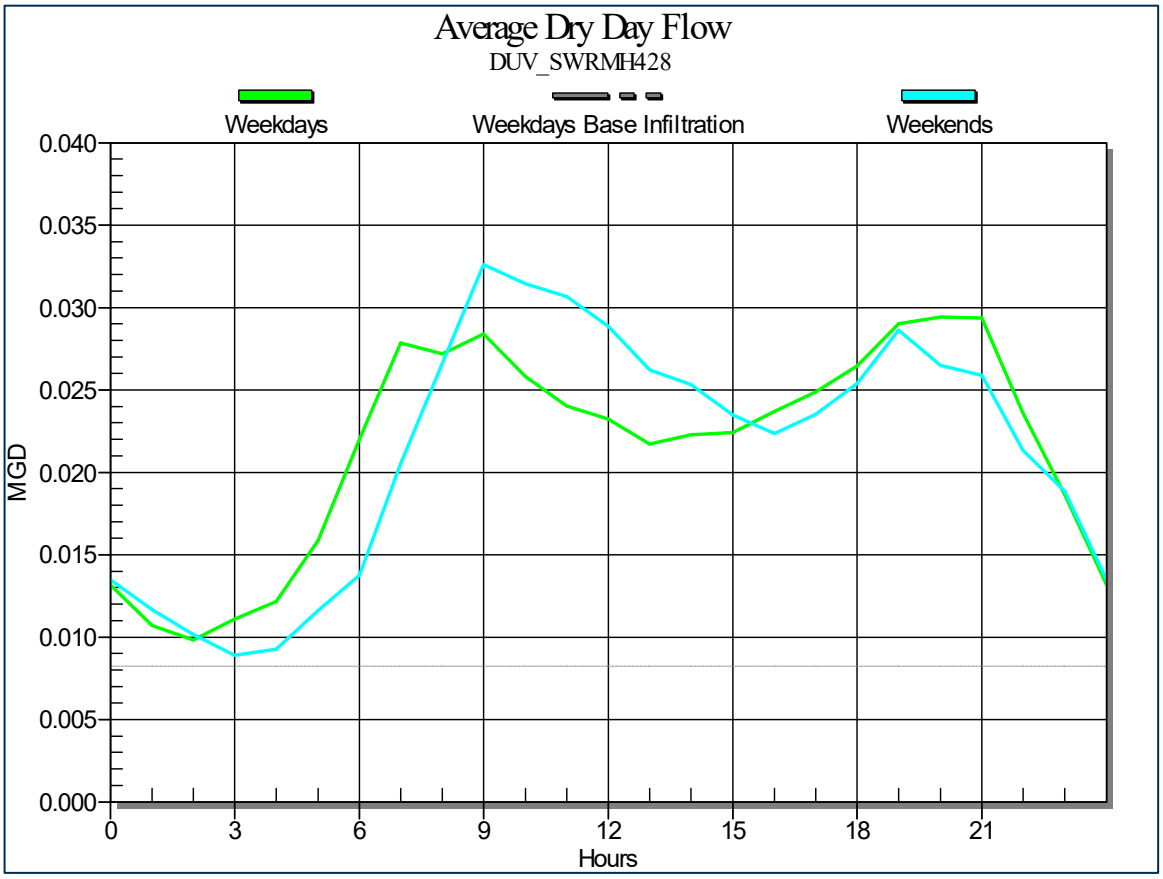


Figure 2: Components of the Average Dry Day Flow

The ADDF curve is calculated by averaging all selected dry days during a given time period, such as weekdays or weekend days. The calculated ADDF curve represents graphically the flow quantity and temporal variation that would have occurred during a storm event had there been no rainfall influence. It is crucial to calculate the ADDF curve from a dataset that contains the fewest possible anomalies. JMT uses a three-step process to ensure acceptable dry day selection. This process is made up of the following steps:

- An antecedent rainfall test,
- A random variation exclusion test, and
- A holiday exclusion step

The antecedent rainfall test applied rainfall thresholds for the one-, three-, and five-day periods prior to each candidate dry day. Only days which passed the antecedent rainfall test at these thresholds (shown in Table 4) were used in the dry day analysis.

Table 4: Rainfall Thresholds for the Antecedent Rainfall Test

No. of Days Prior to Candidate Dry Day	Rainfall Threshold (in)
1	0.2
3	0.4
5	1.0

In addition, JMT removed any candidate dry day from the analysis if its total flow was more than 15 percent lower or higher than the ADDF total for the basin. Each time a candidate dry day was removed, the ADDF total was recalculated, and the test was performed again for all remaining dry days. Any day during the monitoring period that passed the tests described above was designated as a selected dry day.

JMT then divided the dry days into two day groups: Weekdays and Weekends. For the purpose of this analysis, weekdays are defined as Monday through Friday, and weekends were defined as Saturday and Sunday. JMT generated an ADDF curve for each day group by averaging the hourly flows for all selected dry days within the day group. Figure 3 below shows the gross ADDF curves for weekdays and weekends for Basin DUV_SWRMH459.

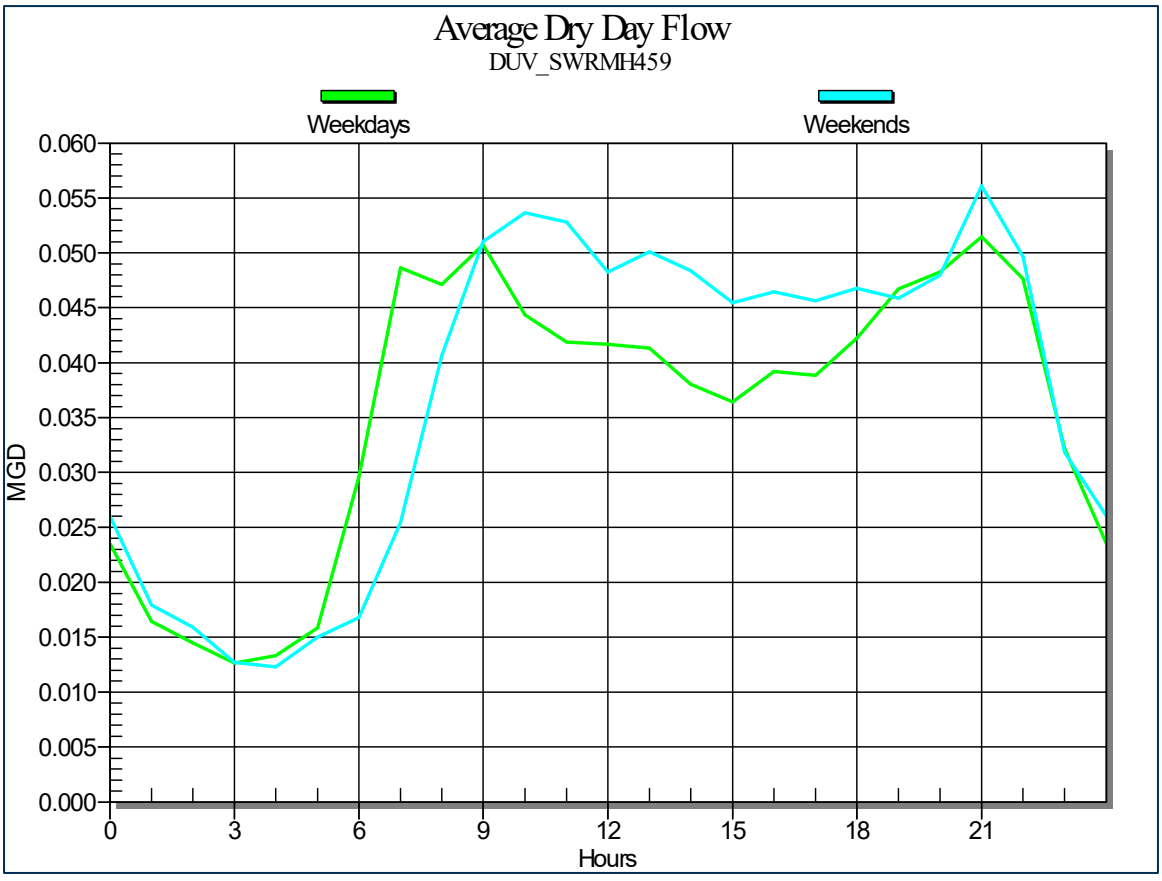


Figure 3: ADDF Curves for Basin DUV_SWRMH459

The results of the dry day analysis, the net weekday and weekend average dry day flows for each basin are presented in Table 5.

Table 5: Net Average Dry Day Flows

Meter Basin ID	2023 Net Average Dry Day Flow (MGD)	
	Weekday	Weekend
DUV_SWRMH428	0.022	0.022
DUV_SWRMH430	0.072	0.067
DUV_SWRMH459	0.036	0.038
DUV_SWRMH466	0.101	0.120

BASE INFILTRATION

Base infiltration (BI) is groundwater that enters the sanitary system independent of rainfall influence. BI can enter the sanitary sewer system through the following sources:

- Sewer main pipe cracks, fractures, and breaks
- Offset or separated sewer main pipe joints
- Service lateral pipe structural defects
- Manhole structural defects

One of the methods for calculating BI is the Stevens/Schutzbach method, which JMT used for this analysis. The Stevens/Schutzbach method calculates BI using the following equation:

$$BI = \frac{0.4 \text{ x MDF}}{[1 - \left(0.6 \text{ x } \left({}^{MDF}/_{ADF}\right)^{(MDF)^{0.7}}\right)]}$$

Where: BI = Base Infiltration
MDF = Minimum Daily Flow rate
ADF = Average Daily Flow Rate

JMT used the weekday ADDF curves for use in calculating BI. Table 6 provides the net BI for each basin, along with the net ADDF from the weekday ADDF curve used to calculate the BI, and the net total wastewater production (WWP) rate. The table also provides the percentage of the ADDF that is attributable to BI.

Table 6: Net Base Infiltration Values

Meter Basin ID	Net ADDF (MGD)	Net WWP (MGD)	Net BI (MGD)	BI Percentage of Net ADDF
DUV_SWRMH428	0.022	0.013	0.009	41%
DUV_SWRMH430	0.072	0.022	0.05	69%
DUV_SWRMH459	0.036	0.025	0.011	31%
DUV_SWRMH466	0.101	0.101	0.000	0%

JMT normalized the net BI values in order to determine the relative severity of BI in each meter basin, which helps with comparison between basins. Table 7 provides net BI values normalized based on net pipe length. A full summary table of BI results is included in Attachment B.

Table 7: Normalized Net Base Infiltration Values

Meter Basin ID	Net BI (MGD)	Pipe Length (LF)	Normalized Net BI (gpd/LF)
DUV_SWRMH428	0.009	11,080	0.8
DUV_SWRMH430	0.050	18,768	2.7
DUV_SWRMH459	0.011	15,254	0.7
DUV_SWRMH466	0.000	19,205	0.0

WET WEATHER ANALYSIS

RDII is the observable increase in sanitary sewer flow attributable to rainfall. Rainfall derived infiltration is infiltration that occurs under the saturated groundwater conditions caused by rainfall. Rainfall derived inflow can be defined as stormwater that enters the sanitary sewer system through direct connections to the system. Inflow may enter the sanitary sewer system through private sources, such as roof leaders, area drains, or broken service lateral cleanout, or from public sources such as cross-connections between the storm and sanitary sewer systems, low lying manholes subject to ponding, or manholes with missing covers.

JMT evaluated storm events, classified as rainfall that consists of a minimum of 0.50-inches of rainfall within a 24-hour period. The rainfall threshold of 0.5-inches must be reached during a time interval without a break in rainfall of more than 300-minutes (5-hours). As mentioned in the Rainfall Analysis Section, using this criteria and the rainfall data collected by rain gauge DUV_RG resulted in six (6) storm events being generated during the monitoring period.

JMT generated storm event hydrographs for each meter basin for each storm event. Storm event hydrographs can be divided into four time periods: Pre-compensation, Rain, Recovery 1, and Recovery 2. Pre-compensation is a calculated value used to adjust the ADDF curve used in the wet weather analysis. Its value is calculated based on the dry weather flow observed during the 24-hour period immediately preceding the storm event. It compensates for unidentified random and systematic variations in flow between the ADDF curve and the dry weather flow just prior to the storm event. The Rain Period begins when rain starts and extends to capture all rainfall that falls during the

storm event. The Recovery 1 and Recovery 2 Periods capture RDII that is present in the sewer system after the rainfall has ended. The two recovery periods represent the same influence: RDII response that occurs after rainfall has stopped.

JMT generated and reviewed storm event hydrographs for each meter basin for each storm event. JMT made two types of adjustments during the wet weather analysis based on the storm event hydrographs: Global Adjustments and Local Adjustments. Global adjustment are modifications to storm events that impact all the meter basins included in this analysis. These adjustments include setting storm start and end times, as well as adjustments to the length of the storm period and two recovery periods. JMT also evaluated globally removing specific storm events from the analysis if no response was observed in any of the meter basins. Following the global adjustments, JMT evaluated each storm event on a local level, meaning for each meter basin. Local storm event adjustments only affect the meter basin for which the adjustment is made. The most significant local adjustment that can be performed was reviewing and modifying the pre-compensation values for each storm, for each meter basin. JMT also reviewed and considered removing storm events on a local level if flow data during the storm period was missing or determined to be unreliable.

An example of a storm event hydrograph for the 4/22/2023 storm event in meter basin DUV_SWRMH459 is shown in Figure 4 below. The graph shows the gross weekday ADDF curve (in green), the gross weekend ADDF curve (in light blue), the gross flow curve recorded by the meter (in blue), the gross RDII curve (in gold), the pre-compensation adjustment (represented by the horizontal dark green bar), and the rainfall hyetograph (represented by the vertical purple bars). The horizontal bars located at the bottom of the storm event hydrograph represent the Pre-compensation (shown in grey), Storm (shown in pink), Recovery 1 (shown in purple) and Recovery 2 (shown in dark purple) Periods as described above.

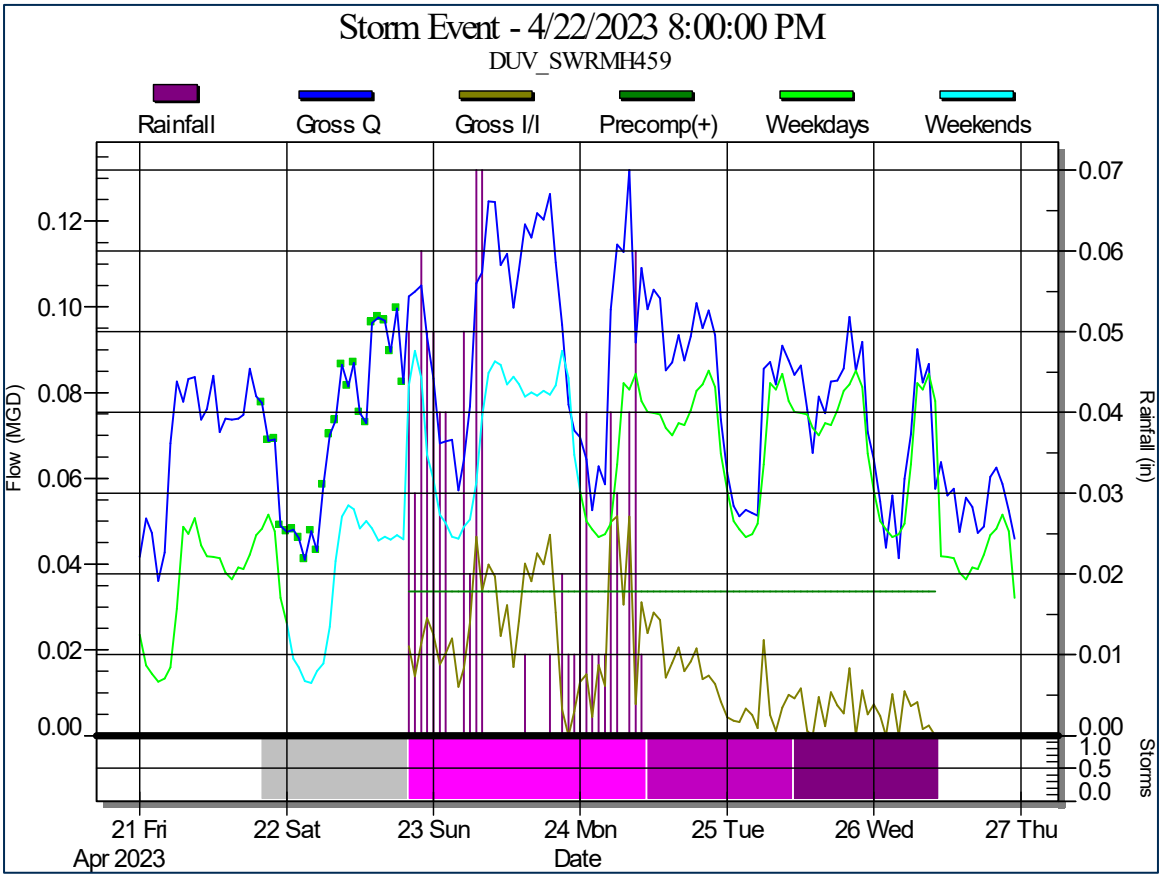


Figure 4: Storm Event Hydrograph - 4/22/2023 Storm Event - Meter Basin DUV_SWRMH459

RDII ANALYSIS

One important purpose of the I/I analysis is to establish a relationship between the amount of rainfall and the RDII for a specific part of the collection system. For each meter basin, a storm event will produce a different RDII response. JMT used the graphical technique known as the "Q versus i" diagram to evaluate and compare the net RDII generated in each meter basin during storm events of varying rainfall depths and intensities. JMT generated two (2) types of Q versus i diagrams for this analysis:

- Total Event Net RDII Volume (in MG) vs. Rainfall Depth (in inches)
- Peak Net RDII (in MGD) vs. Rain Volume to Peak I/I Time (in inches)

RDII Volume:

The ratio of net RDII volume (Q, in million gallons) to rainfall depth (i, in inches) is typically used to access the severity of a meter basin's reaction to a storm event. The relationship between RDII volume and rainfall depth can be plotted on a scatterplot, with each point representing a storm event. JMT generated this scatterplot for each catchment and developed a linear regression through the storm event points that relates the quantity of RDII entering the sewer system in the basin and the amount of rainfall. The slope of the linear regression line represents

the RDII severity by volume of the basin. The steeper the slope, the more severe the RDII is within the basin. Figure 5 shows the Volume Q versus i graph for meter basin DUV_SWRMH428. The RDII Volume Q versus i graphs for all the meter basins are included in Attachment C.

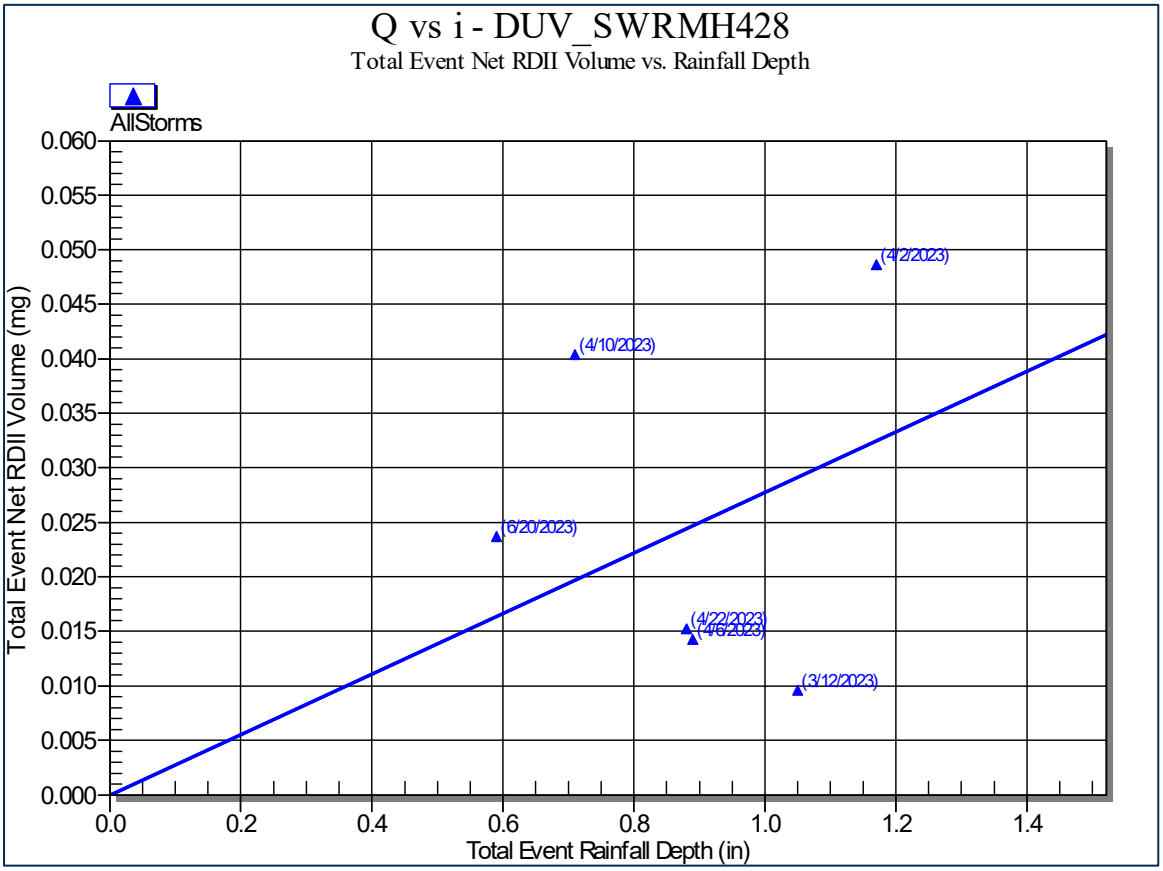


Figure 5: RDII Volume Q versus i Diagram – DUV_SWRMH428

Peak RDII Rate:

In addition to the volumetric analysis, JMT completed a Q versus i analysis for peak net RDII rate because long term capacity management strategies must consider the peak flow that a meter basin contributes to the overall peak RDII in the sewer system. Peak gross RDII is defined as the maximum difference in flow between the gross flow curve during the storm event and the gross ADDF curve, or the maximum value on the gross RDII rate curve. Peak net RDII is the maximum value on the net RDII rate curve. In the Peak Q versus i analysis, the ratio of peak net RDII rate (Q, in MGD) to rainfall (i, in inches) is used, where the rainfall depth includes all the rain that fell prior to the time of the peak net RDII rate. JMT generated a peak RDII severity for each meter basin, using the same technique described above for RDII severity by volume. Figure 6 shows the Peak Q versus i graph for meter basin DUV_SWRMH428. The Peak RDII Q versus i graphs for all the meter basins are included in Attachment D.

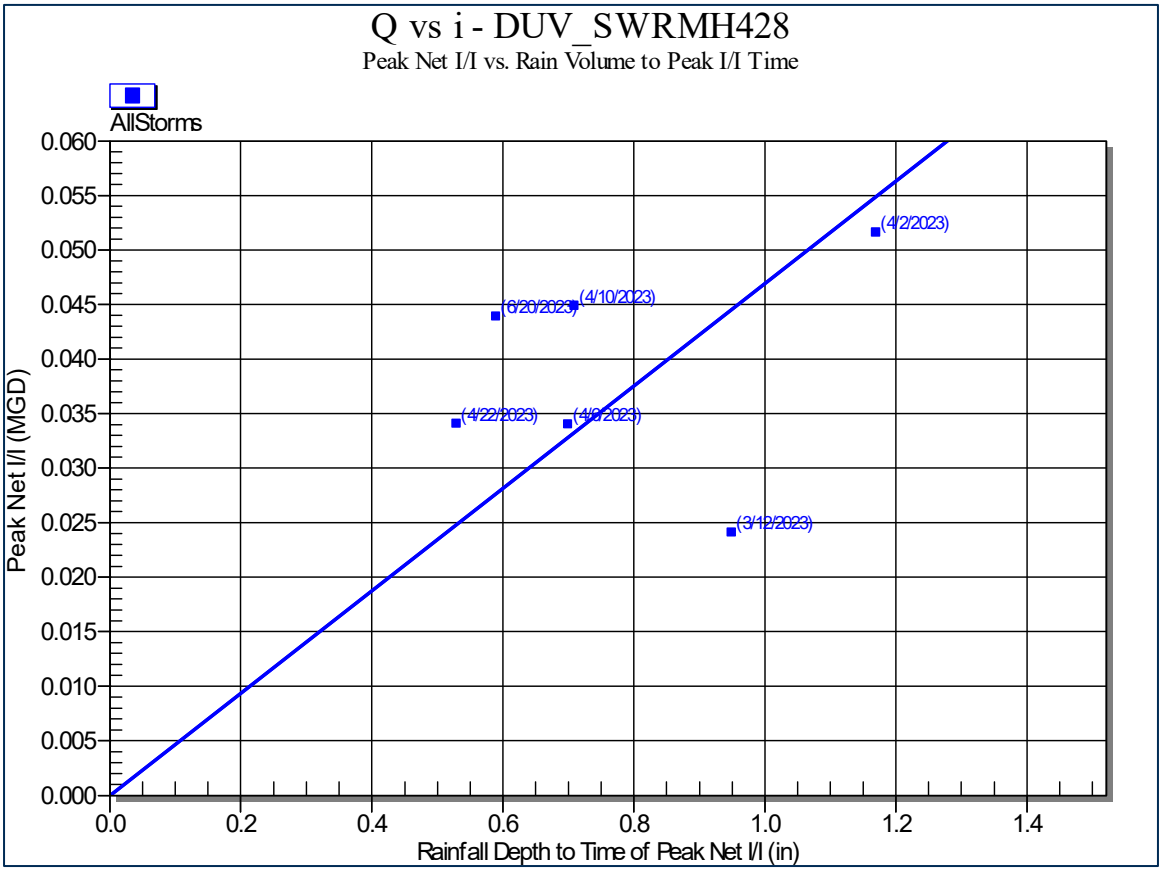


Figure 6: Peak RDII Rate versus i Diagram - DUV_SWRMH428

RDII RESULTS

As described above, the I/I analysis established a relationship between the amount of rainfall and the RDII for a specific part of the collection system. JMT generated two types of Q versus i diagrams for this analysis: RDII Volume versus rainfall depth and Peak RDII Rate versus rainfall depth. The results of the I/I analysis are the RDII severity (both volume and peak rate) and the calculated capture coefficient for each meter basin.

RDII Severity by Volume Rankings:

As described above, the Volume Q versus i graph can be used to determine the net RDII severity by volume for each meter basin. JMT normalized these RDII values in order to determine the relative severity of RDII in each basin. Table 8 provides the net RDII volumes normalized based on pipe length. A full summary table of RDII severity by volume results is included in Attachment B. The table also ranks the basins in terms of severity, with a ranking of one (1) representing the most sever and a ranking of four (4) representing the least severity.

Table 8: Normalized RDII Severity by Volume

Meter Basin ID	Net RDII Severity by Volume (MG/in)	Pipe Length (LF)	Normalized Net RDII Severity by Volume (gal/in/LF)	Net RDII Severity by Volume Ranking
DUV_SWRMH428	0.03	11,080	2.7	4
DUV_SWRMH430	0.73	18,768	38.9	1
DUV_SWRMH459	0.06	15,254	3.9	2
DUV_SWRMH466	0.06	19,205	3.1	3

Peak RDII Severity Rankings:

As described above, the Peak Q versus i graph can be used to determine the peak net RDII rate severity for each meter basin. JMT normalized these RDII values in order to determine the relative severity of RDII in each basin. Table 9 provides the peak net RDII rates normalized based on pipe length. A full summary table of peak net RDII severity results is included in Attachment B. The table also ranks the basins in terms of severity, with a ranking of one (1) representing the most sever and a ranking of four (4) representing the least severity.

Table 9: Normalized Peak RDII Severity

Meter Basin ID	Peak Net RDII Severity (MGD/in)	Pipe Length (LF)	Normalized Peak Net RDII Severity (gpd/in/LF)	Peak Net RDII Severity Ranking
DUV_SWRMH428	0.05	11,080	4.5	3
DUV_SWRMH430	0.36	18,768	19.2	1
DUV_SWRMH459	0.05	15,254	3.3	4
DUV_SWRMH466	0.14	19,205	7.3	2

Capture Coefficients:

The volume Q versus i diagram can be used to determine the capture coefficient for each meter basin. The capture coefficient (R) is the percentage of the volume of the rain that falls on a meter basin and finds its way into the collection system. It is given by the following equation:

$$R = \frac{(36.83\left(Acres \times \frac{in}{MG}\right) \times S\left(\frac{MG}{in}\right))}{A\,(Acres)}$$

Where: R = capture coefficient
S = slope of the regression line on the RDII volume Q versus i graph
A = basin area

The capture coefficients for the meter basins evaluated in this study are presented in Table 10.

Table 10: RDII Capture Coefficients

Meter Basin ID	Net RDII Severity by Volume (MG/in)	Basin Area (ac)	Net Capture Coefficient
DUV_SWRMH428	0.03	60.3	1.8%
DUV_SWRMH430	0.73	116.8	23.0%
DUV_SWRMH459	0.06	106.4	2.1%
DUV_SWRMH466	0.06	127.0	1.7%

CONCLUSIONS

JMT utilized ADS' Sli/icer.com™ (Sli/icer) software to analyze the flow data captured at four (4) locations within the City of Duvall sanitary sewer system from March 2023 through July 2023. The analysis also utilized data collected by one (1) rain gauge that captured data for the same time period. All data utilized in the analysis was provided by Parametrix. JMT assumes that the flow and rainfall data provided was complete and of sufficient quality to obtain accurate I&I analysis results. JMT provides no guarantee of the quality of the flow and rainfall data provided by Parametrix for use in the analysis.

The I&I Analysis consisted of the following sub-tasks: Rainfall Analysis, Dry Day Analysis, Wet Weather Analysis, RDII Analysis and I&I Severity Analysis. These sub-tasks were described and detailed in the previous sections of this technical memorandum.

Based on the analysis completed, the meter basin with the most severe I&I response is meter basin DUV_SWRMH430. Should the City desire to complete additional sanitary sewer evaluation survey (SSES) activities to locate and eliminate sources of I&I, we recommend those efforts be focused within meter basin DUV_SWRMH430. However, it should be noted that only six (6) storm events were captured during the flow monitoring period, with the most severe storm event totaling 1.17 inches of rainfall. No significant storm events were captured during the temporary flow monitoring period. Were more severe storm events captured, it is possible the results of the I&I analysis would differ.

If you have any questions or need further information, please do not hesitate to contact me at 410-316-2329 or msmith@jmt.com

Very truly yours,

Johnson, Mirmiran, and Thompson, Inc.

Matthew D. Smith
Senior Associate | Project Manager

Attachment A: ADS 2023 Duvall Washington Flow Monitoring Report

2023 Duvall Washington Flow Monitoring

Final Report Submitted to **Parametrix**
August 31, 2023

ADS ENVIRONMENTAL SERVICES

340 The Bridge Street, Suite 204
Huntsville, AL 35806

800-633-7246
www.adsenv.com

2023 Duvall Washington Flow Monitoring

Prepared For:

Randy Raymond, P.E.
Parametrix
14525 Main Street NE
Duvall, WA, 98019

Prepared By:

ADS, LLC
846 Industry Dr.
Tukwila, WA, 98188

August 31, 2023

Randy Raymond, P.E.
Parametrix
14525 Main Street NE
Duvall, WA, 98019

SUBJECT: 2023 Duvall Washington Flow Monitoring

Dear Randy Raymond,

ADS is pleased to submit the report for the **2023 Duvall Washington Flow Monitoring** completed on behalf of Parametrix. The metering was conducted at four (4) locations and one (1) rain guage. The study was conducted during the period of Wednesday, 01 March 2023 to Thursday, 10 August 2023.

The report contains depth, velocity, and quantity hydrographs as well as daily long tables for the metering period. An Excel file containing depth, quantity, and velocity entities for the monitoring location in 5-minute format is also provided.

In addition, we would be happy to further explain any details about the report that may seem unclear. Should you have any questions or comments, you may contact the Project Manager, Samuel Reash at 206.458.8423.

It has been our pleasure to be of service to you in the performance of this project. Thank you for choosing ADS products and services to meet your flow monitoring needs.

Sincerely,
ADS ENVIRONMENTAL SERVICES

Tyler Bui
Data Analyst

Scope and Methodology

Introduction

Parametrix entered into an agreement with ADS Environmental Services to conduct flow monitoring at (4) four locations and (1) rain gauge in the Duvall Sanitary Collection System. The study was scheduled for a period of (5) five months. Once in place, the flow monitoring equipment was to be used to measure depth, velocity, and to quantify flows. The objective of this study was for general flow study.

Project Scope

The scope of this study involved using a flow monitor to quantify wastewater flow at the designated locations for the study period. Specifically, the study included the following key components.

- Investigate the proposed flow-monitoring site for adequate hydraulic conditions
- Flow monitor installation
- Flow monitor confirmations and data collections
- Flow data analysis

Equipment installation was completed on March 01, 2023. The monitoring period began on March 02, 2023, and was completed on August 02, 2023. Upon completion of the study, equipment was removed from the system.

Flow Monitoring Equipment

The ***ADS FlowShark Triton*** monitor was selected for this project. This flow monitor is an area velocity flow monitor that uses both the Continuity and Manning's equations to measure flow.

The ADS FlowShark Triton monitor consists of data acquisition sensors and a battery-powered microcomputer. The microcomputer includes a processor unit, data storage, and an on-board clock to control and synchronize the sensor recordings. The monitor was programmed to acquire and store depth of flow and velocity readings at 5-minute intervals.

The FS Triton monitor features cross-checking using multiple technologies in each sensor for continuous running of comparisons and tolerances. The FS Triton monitor can support two (2) sets of sensors. The sensor option used for this project was:

The Peak Combo Sensor installed at the bottom of the pipe includes three types of data acquisition technologies.

The ***up looking ultrasonic depth*** uses sound waves from two independent transceivers to measure the distance from the sensor upward toward the flow surface; applying the speed of sound in the water and the temperature measured by sensor to calculate depth.

The ***pressure depth*** is calculated by using a piezo-resistive crystal to determine the difference between hydrostatic and atmospheric pressure. The pressure sensor is temperature compensated and vented to the atmosphere through a desiccant filled breather tube.

To obtain ***peak velocity*****,** the sensor sends an ultrasonic signal at an angle upward through the widest cross-section of the oncoming flow. The signal is reflected by suspended particles, air bubbles, or organic matter with a frequency shift proportional to the velocity of the reflecting objects. The reflected signal is received by the sensor and processed using digital spectrum analysis to determine the peak flow velocity.

Installation

Installation of flow monitoring equipment typically proceeds in four steps. First, the site is investigated for safety and to determine physical and hydraulic suitability for the flow monitoring equipment. Second, the equipment is physically installed at the selected location. Third, the monitor is tested to assure proper operation of the velocity and depth of flow sensors and verify that the monitor clock is operational and synchronized to the master computer clock. Fourth, the depth and velocity sensors are confirmed and line confirmations are performed.

In pipes up to 42 inches in diameter, the sensors were mounted on expandable stainless-steel rings, inserted at least a foot upstream into influent pipes and tightened against the inside walls of the pipes. Influent pipe installations reduce the influences of turbulence and backwater often caused by changes in channel geometry in manholes.

Data Collection, Confirmation, and Quality Assurance

Data collects were done remotely via wireless connect on a weekly basis. As needed, during the monitoring period, field crews visit each monitoring location to verify proper monitor operation and document field conditions. The following quality assurance steps are taken to assure the integrity of the collected data:

Measure power supplies: monitors were powered by dry cell battery packs. Voltages were recorded and battery packs replaced, as necessary. Separate batteries provided back-up power to memory allowing primary batteries to be replaced without loss of data.

Clock synchronization: Field crews synchronized monitor clocks to master clocks.

Confirm depth and velocity readings: Field crews descended into meter manholes to manually measure depths and velocities and compare the meter readings to confirm that they agreed. The site met the criteria for confirmation for depth and velocity unless noted otherwise in the site commentary section. They also measured silt levels, if any, in the inverts of the pipes. Silt areas were subtracted from flow areas to compute true areas of flow.

Confirm average velocities through cross-sectional velocity profiles: Since ADS velocity sensors measure peak velocity, field crews collected cross-sectional velocity profiles in order to develop a relationship between peak and average velocity in lines that meet the hydraulic criteria.

Upload and Review Data: Data collected from the monitors were uploaded and reviewed by a Data Analyst for completeness, outliers and deviations in the flow patterns, which indicate system anomalies or equipment failure.

Flow Quantification Methods

There are two main equations used to measure open channel flow: the ***Continuity Equation*** and the ***Manning Equation.*** The Continuity Equation, which is considered the most accurate, can be used if both depth of flow and velocity are available. In cases where velocity measurements are not available or not practical to obtain, the Manning Equation can be used to estimate velocity from the depth data based on certain physical characteristics of the pipe (i.e. the slope and roughness of the pipe being measured). However, the Manning equation assumes uniform, steady flow hydraulic conditions with non-varying roughness, which are typically invalid assumptions in most sanitary sewers. The Continuity Equation was used exclusively for this study.

Continuity Equation

The Continuity Equation states that the flow quantity (Q) is equal to the wetted area (A) multiplied by the average velocity (V) of the flow.

Q = A * V

This equation is applicable in a variety of conditions including backwater, surcharge, and reverse flow.

Data Analysis and Presentation

Data Analysis

A flow monitor is typically programmed to collect data at 5-minute intervals throughout the monitoring period. The monitor stores raw data consisting of (1) the ultrasonic depth, (2) the peak velocity and (3) the pressure depth. The data is imported into ADS's proprietary software and is examined by a data analyst to verify its integrity. The data analyst also reviews the daily field reports and site visit records to identify conditions that would affect the collected data.

Velocity profiles and the line confirmation data developed by the field personnel are reviewed by the data analyst to identify inconsistencies and verify data integrity. Velocity profiles are reviewed and an average to peak velocity ratio is calculated for the site. This ratio is used in converting the peak velocity measured by the sensor to the average velocity used in the Continuity equation. The data analyst selects which depth sensor entity will be used to calculate the final depth information. Silt levels present at each site visit are reviewed and representative silt levels established.

Occasionally the velocity sensor's performance may be compromised resulting in invalid readings sporadically during the monitoring period. This is generally caused by excessive debris (silt) blocking the sensor's crystals, shallow flows (~< 1") that may drop below the top of the sensor or very clear flows lacking the particles needed to measure rate. In order to use the Continuity equation to quantify the flow during these periods, a Data Analyst and/or Engineer will use the site's historical pipe curve (depth vs. velocity) data along with valid field confirmations to reconstitute and replace the false velocity recordings with expected velocity readings for a given historical depth along the curve.

Selections for the above parameters can be constant or can change during the monitoring period. While the data analysis process is described in a linear manner, it often requires an iterative approach to accurately complete.

Data Presentation

This type of flow monitoring project generates a large volume of data. To facilitate review of the data, results have been provided in graphical and tabular formats. The flow data is presented graphically in the form of scattergraphs and hydrographs. Hydrographs are based on 15-minute averaging. Tables are provided in 5-minute format. These tables show the flow rate for each day, along with the daily minimum and maximums, the times they were observed, the total daily flow, and total flow for the month (or monitoring period). The following explanation of terms may aid in interpretation of the flow data table and hydrograph.

DEPTH - Final calculated depth measurement (in inches)

QUANTITY - Final calculated flow rate (in MGD)

VELOCITY - Final calculated flow velocity (in feet per second)

REPORT TOTAL - Total volume of flow recorded for the indicated time period (in MG)

DUV_SWRMH428

Site Commentary

SITE INFORMATION

Pipe	Elliptical (7.88 in H x 8 in W)
Silt	0.00 (in)

OBSERVATIONS

This site functioned under normal conditions during the study period. No surcharge conditions were experienced at this location.

5-min flow depth, velocity, and quantity data observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.87	0.74	0.031
Minimum	0.80	0.14	0.002
Maximum	3.99	2.72	0.225
Min Time	06/15/2023 2:50:00 AM	06/17/2023 4:40:00 AM	06/17/2023 4:40:00 AM
Max Time	04/11/2023 6:50:00 PM	04/26/2023 8:20:00 PM	04/11/2023 7:40:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions are based on the five minutes intervals.

Values in the graphical reports are based on the fifteen minutes average.

Values in the tabular report are based on the five minutes intervals.

DATA UPTIME

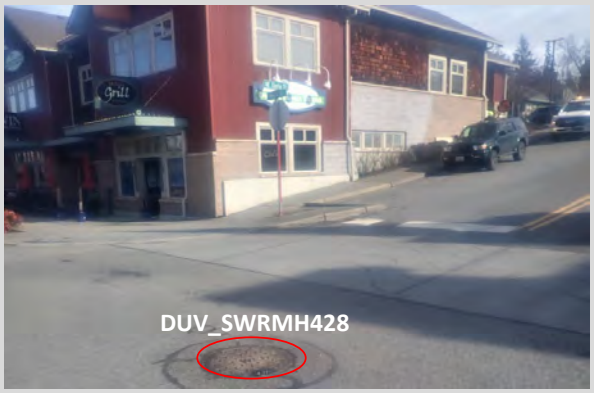
Data uptime observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023** is provided in the following table:

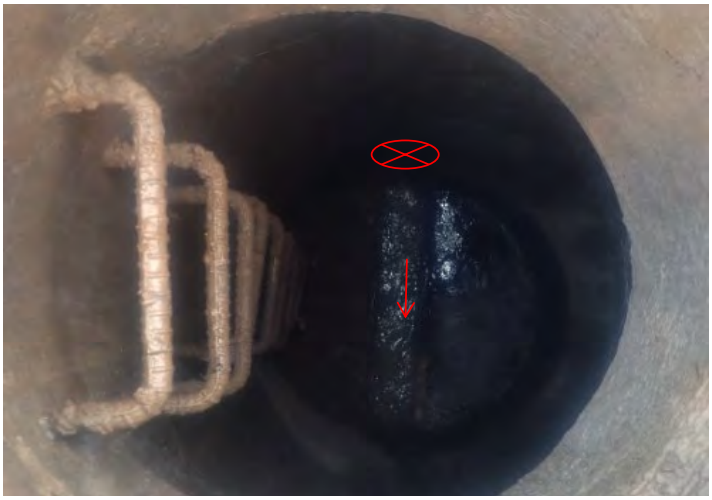
Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

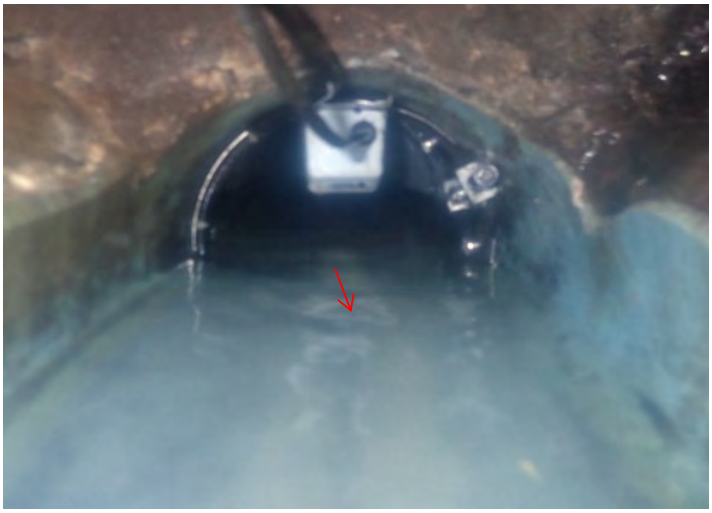
Duvall.Parametrix.TFM.WA23		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	DUV_SWRMH428

Site Address /Location:	Main St NE, Duvall, WA			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Main St NE and NE Stella St SW Intersection	Latitude:	47.739361	Pipe Size (H x W)	Pipe Shape
		Longitude:	-121.986000	7.88 x 8.00	Elliptical

Manhole #	System Characteristics
SWRMH428	Commercial
Access	Traffic
Drive	Medium







ADS Project Name:	Duvall.Parametrix.TFM.WA23
ADS Project Number:	22905.11 .325

Installation Information	
Installation Date:	Installation Type:
Wednesday, March 1, 2023	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
10:51:00 AM	
Depth of Flow (Wet DOF) (in)	
2.13	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.41	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
8	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
PVC	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

Additional Photos

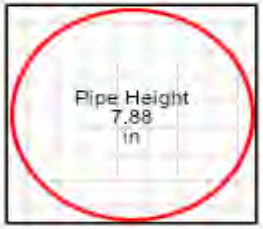
Monitoring Point Inlet	Outlet	
		
Top Down	Location	
		
	KEY	
	Flow Direction Monitoring Point	

Hydrograph Report

DUV_SWRMH428

Flow Monitor

DUV_SWRMH428



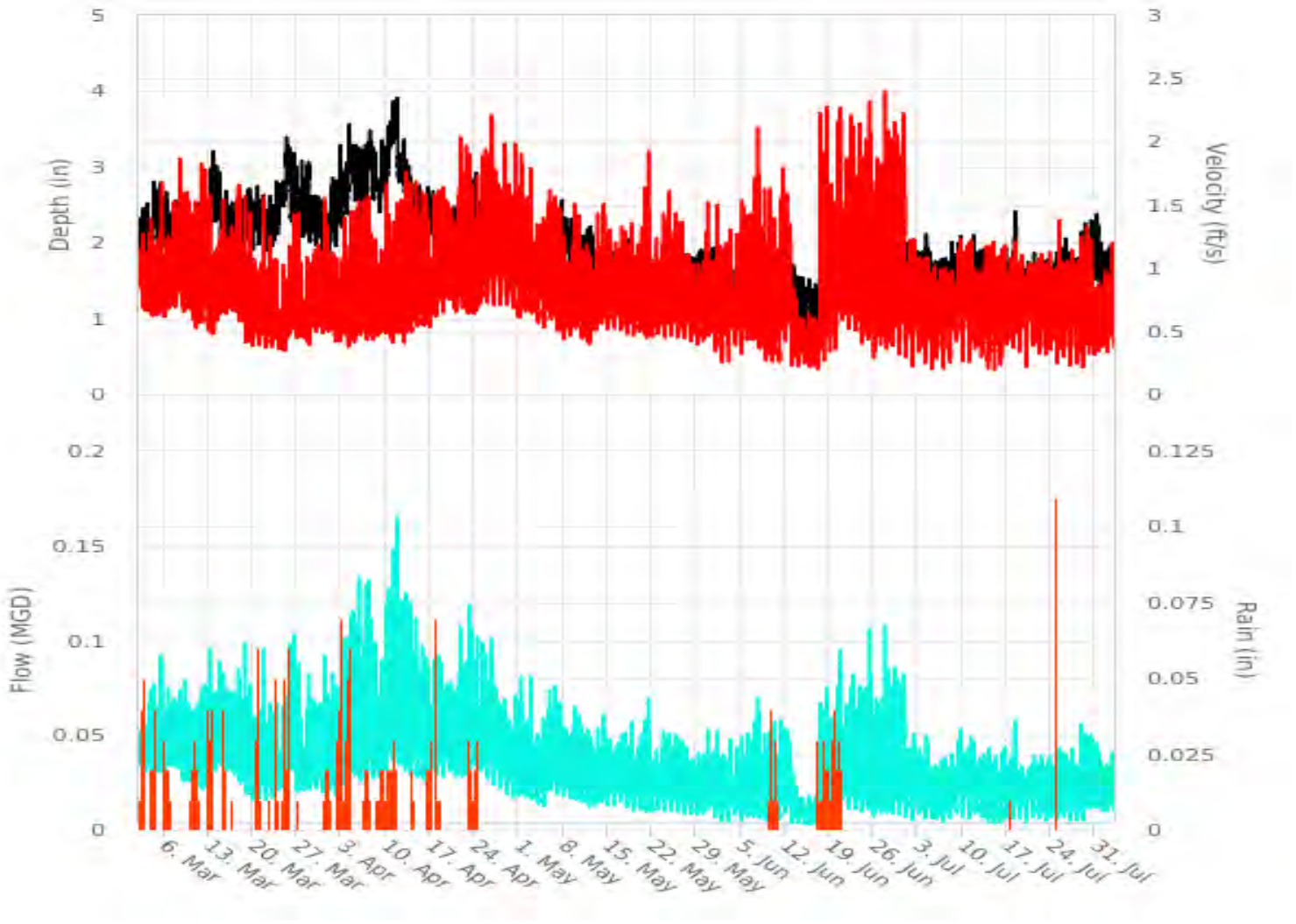
Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL
Rain
VFINAL
QFINAL

ADS ENVIRONMENTAL SERVICES



Scattergraph Report

DUV_SWRMH428

Flow Monitor

DUV_SWRMH428

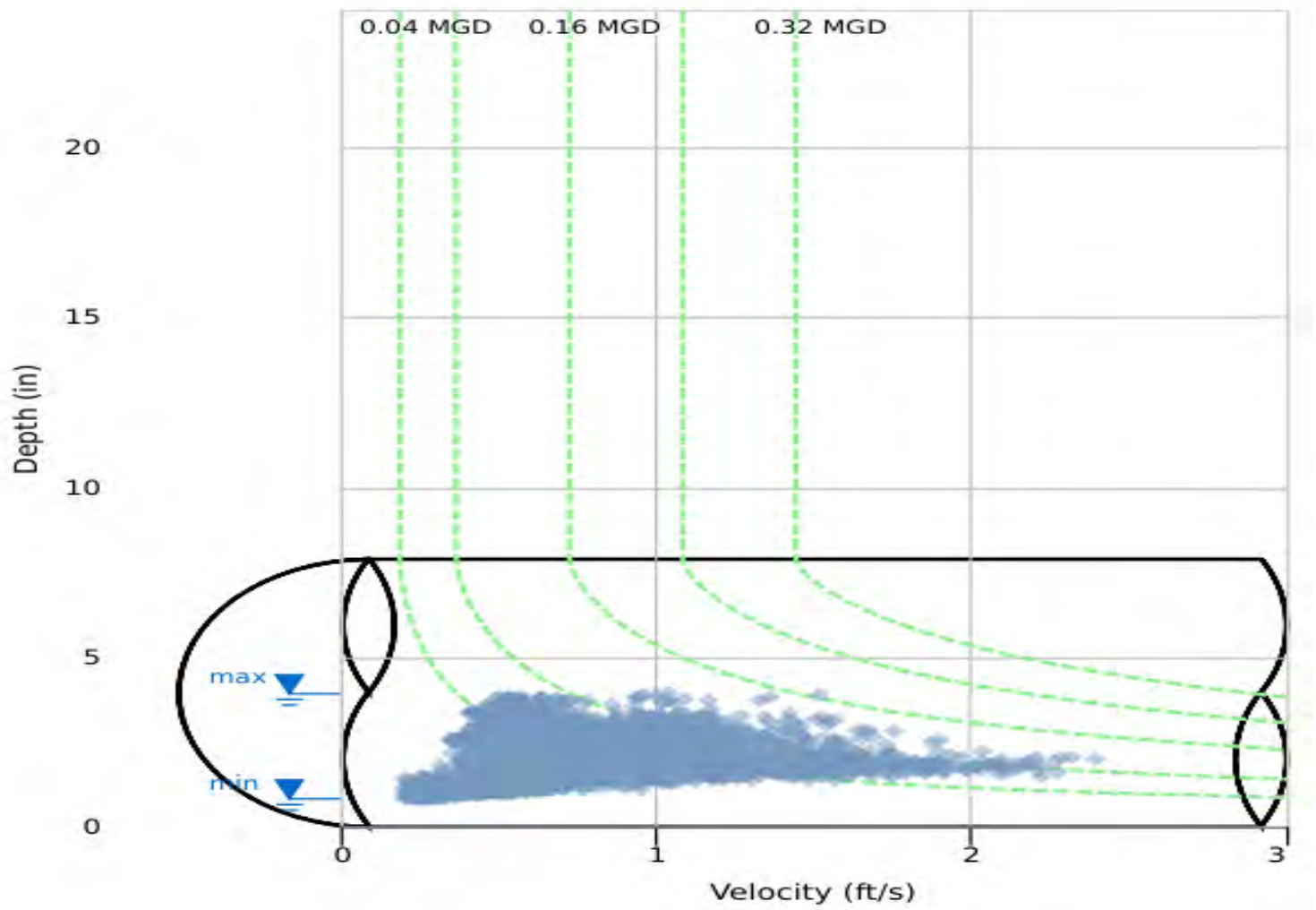
Pipe Height
7.88
in

Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



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Daily Tabular Report

03/02/2023 00:00 - 08/02/2023 23:59
DUV_SWRMH428Pipe: Elliptical (7.88 in H x 8 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/02/2023	01:10	1.72	17:15	2.58	2.03	20:45	0.60	17:30	2.18	0.90	03:50	0.030	17:30	0.108	0.040	0.040	0.30
03/03/2023	02:50	1.89	10:05	2.58	2.13	21:30	0.60	18:50	2.26	0.86	22:45	0.028	22:25	0.123	0.042	0.042	0.11
03/04/2023	04:00	1.99	14:20	3.15	2.34	20:40	0.56	09:00	2.06	0.73	06:25	0.027	08:50	0.137	0.041	0.041	0.29
03/05/2023	03:05	2.00	10:00	2.88	2.25	23:10	0.58	15:35	2.33	0.80	23:10	0.027	10:00	0.162	0.042	0.042	0.17
03/06/2023	01:50	1.95	08:45	3.09	2.18	05:25	0.54	16:00	2.14	0.76	05:25	0.025	16:00	0.140	0.038	0.038	0.05
03/07/2023	03:20	1.86	19:25	2.69	2.11	07:00	0.62	16:05	2.34	0.90	04:20	0.032	07:05	0.127	0.043	0.043	-
03/08/2023	08:55	1.69	20:30	2.71	1.98	20:30	0.62	08:55	2.57	0.96	23:35	0.024	09:00	0.108	0.042	0.042	-
03/09/2023	12:10	1.68	09:35	2.73	1.87	04:05	0.61	12:50	2.51	1.01	04:05	0.024	09:40	0.125	0.041	0.041	-
03/10/2023	00:40	1.75	19:15	2.44	1.91	17:15	0.54	19:55	2.27	0.89	13:35	0.023	16:40	0.101	0.037	0.037	0.19
03/11/2023	13:55	1.77	09:35	2.92	1.97	00:40	0.47	18:35	2.54	0.89	02:40	0.020	19:55	0.120	0.039	0.039	0.04
03/12/2023	04:35	1.76	09:00	2.43	1.95	23:40	0.48	07:00	2.30	0.86	23:40	0.019	12:55	0.119	0.037	0.037	0.41
03/13/2023	00:50	1.84	20:05	3.36	2.60	14:25	0.45	07:00	2.07	0.59	02:35	0.020	07:00	0.127	0.038	0.038	0.54
03/14/2023	23:30	2.06	07:35	3.09	2.52	01:10	0.54	20:00	2.23	0.72	01:55	0.029	20:25	0.160	0.044	0.044	-
03/15/2023	23:30	1.88	18:15	2.94	2.24	11:30	0.59	08:50	2.38	0.79	23:30	0.029	08:50	0.128	0.041	0.041	0.10
03/16/2023	03:05	1.92	13:25	2.58	2.18	11:30	0.61	19:55	2.28	0.83	11:30	0.029	05:55	0.130	0.042	0.042	0.01
03/17/2023	02:40	1.88	18:40	2.72	2.12	20:00	0.51	12:55	2.21	0.78	21:30	0.024	18:10	0.111	0.038	0.038	-
03/18/2023	01:20	1.86	16:40	2.77	2.22	23:25	0.38	08:50	2.23	0.70	23:25	0.019	19:15	0.135	0.036	0.036	-
03/19/2023	23:50	1.97	12:15	2.81	2.32	23:15	0.37	07:35	1.96	0.59	23:15	0.017	13:45	0.121	0.033	0.033	-
03/20/2023	03:30	1.90	19:15	2.91	2.25	00:05	0.36	11:35	1.91	0.57	00:05	0.015	06:55	0.111	0.030	0.030	0.30
03/21/2023	01:20	1.97	18:35	2.73	2.29	02:35	0.37	20:10	2.11	0.57	02:35	0.016	20:10	0.130	0.031	0.031	0.04
03/22/2023	01:20	1.86	18:55	2.73	2.22	00:45	0.35	15:55	1.95	0.57	01:35	0.015	17:35	0.120	0.030	0.030	0.01
03/23/2023	03:55	1.95	17:10	2.87	2.25	02:20	0.35	13:40	1.97	0.59	03:55	0.015	13:40	0.123	0.032	0.032	0.09
03/24/2023	00:00	2.10	22:05	2.88	2.55	00:25	0.34	21:15	1.69	0.51	00:00	0.019	21:15	0.116	0.032	0.032	0.44
03/25/2023	00:00	2.53	08:55	3.48	2.89	00:30	0.33	16:25	1.60	0.53	00:00	0.021	20:55	0.135	0.039	0.039	0.21
03/26/2023	23:35	2.09	12:00	3.32	2.63	17:55	0.44	14:25	2.10	0.63	23:10	0.022	13:20	0.150	0.041	0.041	0.02
03/27/2023	03:15	2.03	19:00	3.37	2.37	23:55	0.41	14:05	2.11	0.55	23:55	0.019	08:25	0.122	0.031	0.031	-
03/28/2023	23:55	2.02	20:05	3.19	2.40	21:00	0.37	15:25	1.98	0.55	02:05	0.020	20:10	0.161	0.032	0.032	-
03/29/2023	23:25	1.96	10:15	2.76	2.27	00:45	0.44	20:35	2.13	0.64	00:45	0.020	19:40	0.131	0.035	0.035	-
03/30/2023	23:55	1.91	06:30	2.64	2.23	06:25	0.48	16:20	2.13	0.64	02:35	0.021	16:20	0.127	0.033	0.033	-
03/31/2023	03:35	1.83	08:50	2.59	2.18	00:30	0.44	08:40	2.05	0.64	01:35	0.018	08:40	0.122	0.032	0.032	0.26
04/01/2023	04:35	1.88	09:35	3.02	2.23	23:50	0.42	14:30	2.10	0.64	23:50	0.019	15:30	0.158	0.033	0.033	-
04/02/2023	04:15	1.96	21:45	3.36	2.49	20:05	0.39	08:25	1.83	0.54	04:20	0.017	08:25	0.126	0.033	0.033	0.63
04/03/2023	02:15	2.20	18:05	3.10	2.67	02:25	0.44	11:00	2.05	0.60	02:25	0.022	18:05	0.162	0.040	0.040	0.26
04/04/2023	00:00	2.45	18:10	3.63	3.05	02:50	0.35	20:15	1.98	0.62	02:50	0.023	18:10	0.183	0.050	0.050	0.43
04/05/2023	23:55	2.36	19:15	3.53	2.82	01:50	0.40	21:15	2.17	0.71	02:50	0.026	19:15	0.194	0.051	0.051	-
04/06/2023	01:40	2.32	20:15	3.38	2.70	00:40	0.44	20:15	2.05	0.68	01:45	0.024	20:15	0.187	0.047	0.047	0.48
04/07/2023	01:00	2.50	12:55	3.60	3.06	08:20	0.41	21:05	2.16	0.70	01:00	0.026	18:40	0.184	0.057	0.057	0.23
04/08/2023	04:25	2.56	09:05	3.31	2.74	14:15	0.41	08:40	2.24	0.57	01:40	0.026	08:40	0.180	0.040	0.040	0.08
04/09/2023	03:00	2.36	18:45	3.56	2.77	03:00	0.45	12:55	2.26	0.62	03:00	0.025	12:10	0.167	0.044	0.044	0.52
04/10/2023	01:15	2.59	19:10	3.79	3.17	23:20	0.40	05:10	2.21	0.63	01:20	0.030	11:50	0.185	0.053	0.053	0.53
04/11/2023	23:55	2.89	18:50	3.99	3.58	02:40	0.39	19:55	2.07	0.66	23:40	0.034	19:40	0.225	0.065	0.065	0.20
04/12/2023	20:50	2.75	23:15	3.42	2.93	23:35	0.39	08:55	2.25	0.74	00:35	0.032	08:55	0.193	0.055	0.055	-
04/13/2023	23:55	2.56	07:20	3.16	2.80	02:05	0.46	17:10	2.41	0.75	02:05	0.030	08:25	0.177	0.053	0.053	0.02
04/14/2023	23:50	2.31	08:05	2.85	2.57	00:20	0.46	18:30	2.50	0.80	02:25	0.027	21:00	0.163	0.051	0.051	0.01
04/15/2023	23:35	2.15	08:35	2.97	2.42	01:50	0.49	20:35	2.56	0.81	01:50	0.026	19:40	0.160	0.047	0.047	-
04/16/2023	02:05	2.11	10:40	2.98	2.39	02:35	0.52	08:05	2.56	0.83	02:35	0.025	11:35	0.152	0.048	0.048	0.23
04/17/2023	22:50	2.10	12:15	3.15	2.31	01:40	0.50	17:25	2.54	0.86	02:05	0.025	17:25	0.152	0.047	0.047	0.12
04/18/2023	02:30	2.00	20:05	2.82	2.20	00:50	0.59	08:25	2.57	0.98	00:50	0.027	08:25	0.158	0.050	0.050	0.05
04/19/2023	02:15	1.92	20:35	2.54	2.17	03:15	0.62	17:50	2.55	1.01	03:15	0.026	14:25	0.128	0.051	0.051	-
04/20/2023	03:20	1.91	20:05	2.54	2.10	23:00	0.66	13:20	2.15	1.02	03:20	0.029	13:20	0.098	0.049	0.049	-
04/21/2023	23:55	1.94	06:15	2.43	2.10	07:00	0.58	18:30	2.56	1.05	01:20	0.027	18:30	0.140	0.050	0.050	-
04/22/2023	02:30	1.86	15:50	2.46	2.04	13:10	0.57	18:15	2.64	1.05	12:55	0.027	07:20	0.129	0.048	0.048	0.19
04/23/2023	01:20	2.02	10:10	3.03	2.48	05:35	0.59	12:05	2.49	0.94	02:50	0.027	12:05	0.168	0.058	0.058	0.40
04/24/2023	08:40	2.08	06:50	2.96	2.39	02:45	0.58	05:00	2.41	0.85	02:45	0.032	07:00	0.154	0.048	0.048	0.29
04/25/2023	23:40	1.84	07:05	2.43	2.10	02:05	0.60	19:30	2.53	1.02	02:05	0.026	07:50	0.131	0.049	0.049	-
04/26/2023	23:40	1.71	08:50	2.16	1.88	02:45	0.66	20:20	2.72	1.17	02:45	0.024	17:35	0.127	0.048	0.048	-
04/27/2023	23:35	1.60	20:55	2.13	1.76	04:10	0.65	20:50	2.66	1.13	04:10	0.022	08:20	0.111	0.042	0.042	-
04/28/2023	23:40	1.50	08:20	2.25	1.65	02:30	0.63	07:30	2.70	1.08	02:30	0.020	07:30	0.114	0.037	0.037	-
04/29/2023	04:40	1.38	09:25	1.89	1.59	07:35	0.66	12:30	2.60	1.01	04:30	0.018	12:30	0.091	0.033	0.033	-
04/30/2023	04:15	1.33	10:15	2.22	1.61	23:10	0.58	15:00	2.60	1.04	02:35	0.016	10:15	0.123	0.035	0.035	-
05/01/2023	23:20	1.51	09:50	2.12	1.73	00:35	0.56	07:10	2.55	1.00	03:45	0.018	07:10	0.106	0.037	0.037	-
05/02/2023	02:35	1.39	21:05	2.15	1.64	01:50	0.61	19:25	2.52	0.98	02:35	0.016	21:05	0.103	0.034	0.034	-
05/03/2023	03:30	1.33	21:05	2.12	1.63	03:35	0.58	12:55	1.79	0.92	03:35	0.015	20:45	0.068	0.031	0.031	-
05/04/2023	04:05	1.30	20:40	1.98	1.60	03:10	0.54	21:20	2.09	0.88	03:10	0.013	21:20	0.090	0.029	0.029	-
05/05/2023	03:00	1.28	19:50	2.15	1.75	02:50	0.50	21:50	2.21	0.84	02:50	0.012	21:50	0.100	0.032	0.032	-
05/06/2023	04:55	1.67	20:20	2.53	1.95	02:30	0.55	18:30	2.14	0.76	04:55	0.019	18:30	0.106	0.033	0.033	-
05/07/2023	04:00	1.75	19:25	2.66	2.07	03:05	0.46	13:40	2.12	0.66	03:05	0.017	13:40	0.104	0.031	0.031	-
05/08/2023	23:50	1.82	10:50	2.38	2.05	01:45	0.42	13:35	1.85	0.65	01:45	0.017	08:50	0.094	0.030	0.030	-
05/09/2023	23:55	1.62	07:20	2.52	1.89	02:50	0.42	18:05	2.22	0.70	02:50	0.015	18:05	0.101	0.029	0.029	-
05/10/2023	00:55	1.51	19:45	2.30	1.83	23:35	0.49	10:00	2.20	0.69	01:00	0.015	20:50	0.104	0.027	0.027	-
05/11/2023	02:15	1.60	19:55	2.35	1.87	02:15	0.42	10:20	2.01	0.65	02:15	0.014	10:20	0.092	0.027	0.027	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
05/12/2023	03:40	1.57	08:25	2.28	1.86	03:15	0.38	09:15	1.96	0.64	03:15	0.012	09:15	0.090	0.026	0.026	-
05/13/2023	03:40	1.36	10:55	1.88	1.69	05:10	0.47	12:00	2.23	0.78	03:35	0.012	12:00	0.084	0.028	0.028	-
05/14/2023	03:35	1.35	09:20	2.20	1.69	03:00	0.54	10:55	2.49	0.85	03:35	0.014	11:20	0.102	0.031	0.031	-
05/15/2023	03:45	1.34	23:10	1.94	1.67	01:30	0.49	12:20	1.87	0.77	01:30	0.013	12:20	0.069	0.027	0.027	-
05/16/2023	03:40	1.29	20:35	1.98	1.67	03:40	0.48	23:15	2.03	0.81	03:40	0.012	23:15	0.075	0.028	0.028	-
05/17/2023	03:30	1.33	20:50	1.91	1.66	01:10	0.49	21:15	2.24	0.76	02:00	0.014	21:15	0.088	0.027	0.027	-
05/18/2023	03:20	1.25	11:30	2.78	1.65	01:40	0.45	17:00	2.09	0.76	01:40	0.011	21:15	0.092	0.026	0.026	-
05/19/2023	03:10	1.23	23:15	2.26	1.60	04:00	0.46	18:45	2.07	0.73	04:00	0.010	18:45	0.072	0.024	0.024	-
05/20/2023	04:25	1.19	09:55	1.89	1.60	01:25	0.46	21:20	2.47	0.77	03:35	0.010	21:20	0.088	0.026	0.026	-
05/21/2023	03:10	1.21	21:40	1.80	1.57	05:05	0.42	12:15	2.47	0.80	04:55	0.009	12:15	0.087	0.026	0.026	-
05/22/2023	03:20	1.20	15:45	1.80	1.58	03:35	0.42	02:10	1.66	0.74	01:45	0.010	02:10	0.055	0.024	0.024	-
05/23/2023	03:00	1.20	19:50	1.80	1.58	02:30	0.46	21:20	2.31	0.75	02:40	0.010	21:20	0.084	0.024	0.024	-
05/24/2023	03:05	1.20	07:10	1.83	1.55	02:15	0.44	19:55	2.39	0.74	02:25	0.010	09:10	0.075	0.024	0.024	-
05/25/2023	02:10	1.21	22:15	1.88	1.56	02:35	0.43	21:10	2.40	0.77	02:35	0.009	21:10	0.077	0.025	0.025	-
05/26/2023	02:45	1.20	09:10	1.81	1.54	02:40	0.43	06:00	2.29	0.74	02:40	0.009	06:00	0.081	0.024	0.024	-
05/27/2023	04:55	1.09	09:55	1.98	1.51	05:05	0.39	20:10	1.82	0.71	05:05	0.008	20:10	0.062	0.022	0.022	-
05/28/2023	04:35	1.13	09:45	1.87	1.50	05:10	0.40	07:15	1.48	0.68	05:10	0.008	14:30	0.049	0.021	0.021	-
05/29/2023	03:15	1.09	19:15	2.01	1.54	05:05	0.38	19:10	1.21	0.69	04:20	0.007	19:10	0.051	0.022	0.022	-
05/30/2023	03:10	1.09	19:55	1.93	1.52	02:40	0.38	20:40	1.97	0.67	02:40	0.008	20:30	0.068	0.021	0.021	-
05/31/2023	02:10	1.17	20:35	2.19	1.53	00:05	0.38	16:40	1.84	0.66	02:10	0.010	21:10	0.065	0.021	0.021	-
06/01/2023	03:55	1.06	20:25	1.93	1.43	04:35	0.22	10:10	2.01	0.66	04:35	0.004	10:10	0.069	0.019	0.019	-
06/02/2023	04:25	1.02	07:00	1.76	1.39	02:40	0.21	20:30	1.98	0.63	02:40	0.004	07:05	0.068	0.017	0.017	-
06/03/2023	05:25	0.93	09:40	1.86	1.39	05:40	0.19	10:10	1.98	0.65	05:40	0.003	10:10	0.073	0.018	0.018	-
06/04/2023	05:50	1.10	12:00	1.82	1.41	06:45	0.29	09:45	2.23	0.72	06:45	0.006	09:45	0.079	0.020	0.020	-
06/05/2023	04:10	0.96	09:30	1.67	1.33	04:20	0.28	10:15	2.13	0.67	04:20	0.004	07:20	0.063	0.017	0.017	-
06/06/2023	03:55	1.00	07:30	1.75	1.40	02:25	0.36	07:20	2.34	0.71	02:25	0.006	21:20	0.085	0.020	0.020	-
06/07/2023	02:15	1.01	19:55	1.80	1.38	00:40	0.32	07:00	2.24	0.74	03:30	0.007	19:55	0.084	0.021	0.021	-
06/08/2023	03:05	1.02	08:15	1.76	1.43	04:35	0.33	13:50	2.35	0.69	02:35	0.006	13:50	0.081	0.020	0.020	-
06/09/2023	05:25	1.03	10:40	2.12	1.48	04:20	0.19	18:50	2.12	0.66	04:20	0.003	18:00	0.071	0.020	0.020	0.20
06/10/2023	02:30	1.12	11:00	1.94	1.50	02:55	0.23	11:05	2.35	0.65	02:25	0.005	11:05	0.097	0.020	0.020	0.20
06/11/2023	03:20	1.24	09:35	1.97	1.54	04:30	0.23	10:35	2.38	0.75	04:30	0.006	10:35	0.093	0.024	0.024	-
06/12/2023	04:45	1.13	21:20	1.77	1.42	04:45	0.35	14:40	2.40	0.75	04:45	0.007	21:15	0.078	0.021	0.021	-
06/13/2023	03:55	0.99	08:30	1.81	1.30	03:25	0.17	20:00	1.49	0.47	03:25	0.003	20:00	0.046	0.012	0.012	-
06/14/2023	03:20	0.95	07:15	1.68	1.24	02:10	0.19	08:35	1.11	0.38	02:10	0.003	08:35	0.031	0.009	0.009	-
06/15/2023	02:50	0.80	20:30	1.54	1.21	02:40	0.21	18:15	1.20	0.40	02:40	0.003	18:15	0.031	0.009	0.009	-
06/16/2023	04:05	0.85	21:15	1.56	1.17	00:30	0.19	17:15	0.68	0.37	00:35	0.003	19:40	0.020	0.008	0.008	0.10
06/17/2023	04:05	0.82	12:55	1.75	1.26	04:40	0.14	15:05	2.33	0.58	04:40	0.002	20:55	0.076	0.015	0.015	0.11
06/18/2023	05:15	1.02	10:25	1.72	1.37	04:50	0.18	10:30	2.44	0.86	04:50	0.003	10:25	0.085	0.024	0.024	0.22
06/19/2023	04:10	1.00	19:55	1.87	1.43	04:35	0.30	19:50	2.41	0.83	04:40	0.005	19:50	0.096	0.024	0.024	0.16
06/20/2023	01:40	1.07	11:50	1.98	1.59	02:25	0.28	19:40	2.49	1.00	02:25	0.005	19:40	0.106	0.034	0.034	0.60
06/21/2023	01:10	1.38	21:10	1.83	1.58	00:35	0.52	08:40	2.44	0.91	00:35	0.014	08:40	0.094	0.030	0.030	-
06/22/2023	03:15	1.23	20:25	1.95	1.55	02:45	0.49	20:25	2.51	0.97	03:25	0.011	20:25	0.108	0.032	0.032	-
06/23/2023	03:25	1.22	18:10	1.84	1.54	03:15	0.49	20:50	2.37	0.89	03:15	0.011	18:10	0.091	0.029	0.029	-
06/24/2023	04:15	1.17	11:45	1.98	1.60	04:45	0.37	21:35	2.35	0.84	04:20	0.009	11:45	0.100	0.029	0.029	-
06/25/2023	02:40	1.34	10:15	2.16	1.70	04:50	0.41	10:10	2.51	0.87	04:50	0.010	10:10	0.118	0.033	0.033	-
06/26/2023	03:20	1.28	18:50	2.02	1.65	02:50	0.22	18:50	2.23	0.75	02:50	0.006	18:50	0.100	0.027	0.027	-
06/27/2023	02:00	1.28	20:25	2.11	1.62	04:10	0.39	20:25	2.50	0.90	04:10	0.009	20:25	0.119	0.031	0.031	-
06/28/2023	03:05	1.27	21:35	2.07	1.66	03:15	0.33	11:20	2.37	0.87	03:05	0.008	09:05	0.099	0.031	0.031	-
06/29/2023	04:50	1.24	19:50	2.13	1.63	04:10	0.31	17:45	2.30	0.90	04:10	0.008	10:00	0.093	0.031	0.031	-
06/30/2023	02:10	1.30	08:50	2.02	1.64	02:30	0.22	19:10	2.41	0.91	02:30	0.005	08:40	0.102	0.032	0.032	-
07/01/2023	03:20	1.26	12:00	2.05	1.62	04:55	0.22	11:25	1.57	0.65	04:55	0.005	11:25	0.066	0.023	0.023	-
07/02/2023	04:55	1.25	11:10	2.03	1.63	04:00	0.21	10:10	1.59	0.68	04:00	0.005	10:10	0.060	0.024	0.024	-
07/03/2023	04:05	1.28	00:00	2.11	1.67	14:35	0.26	08:10	1.59	0.67	02:25	0.008	08:10	0.064	0.024	0.024	-
07/04/2023	04:05	1.27	09:00	2.19	1.67	05:35	0.18	14:30	1.55	0.67	05:35	0.004	14:30	0.059	0.024	0.024	-
07/05/2023	11:55	1.09	18:50	1.94	1.41	06:25	0.19	17:50	1.48	0.66	06:25	0.005	18:50	0.048	0.018	0.018	-
07/06/2023	02:45	1.02	19:50	1.86	1.49	01:50	0.25	18:50	1.60	0.68	01:50	0.005	19:15	0.050	0.020	0.020	-
07/07/2023	03:10	1.11	10:15	1.86	1.50	03:05	0.16	16:20	1.46	0.66	03:05	0.003	21:25	0.049	0.020	0.020	-
07/08/2023	02:25	1.13	10:45	2.07	1.57	03:55	0.22	10:20	1.34	0.66	03:10	0.005	10:20	0.058	0.022	0.022	-
07/09/2023	03:50	1.12	19:15	2.13	1.62	05:20	0.34	19:05	1.56	0.72	05:20	0.007	19:05	0.068	0.025	0.025	-
07/10/2023	04:10	1.23	16:10	1.96	1.64	04:40	0.18	07:25	1.60	0.71	04:40	0.005	18:35	0.057	0.024	0.024	-
07/11/2023	02:35	1.21	21:15	2.21	1.60	03:30	0.23	07:15	1.57	0.69	03:30	0.006	09:40	0.063	0.023	0.023	-
07/12/2023	02:10	1.19	18:35	2.02	1.59	04:50	0.19	13:35	1.60	0.69	04:50	0.004	13:35	0.054	0.023	0.023	-
07/13/2023	04:15	1.14	09:20	1.98	1.58	01:30	0.18	19:20	1.60	0.67	01:45	0.004	10:05	0.056	0.022	0.022	-
07/14/2023	01:40	1.07	13:05	1.88	1.51	03:05	0.16	23:05	1.57	0.68	03:05	0.003	11:30	0.059	0.021	0.021	-
07/15/2023	03:00	0.95	10:30	2.23	1.40	03:25	0.18	18:30	1.56	0.69	03:10	0.003	09:25	0.049	0.019	0.019	-
07/16/2023	06:10	0.98	21:35	2.15	1.43	04:40	0.19	19:05	1.58	0.69	04:40	0.004	19:05	0.053	0.020	0.020	-
07/17/2023	02:00	1.00	09:05	1.80	1.43	04:00	0.18	22:35	1.58	0.71	04:00	0.003	18:40	0.053	0.020	0.020	0.01
07/18/2023	03:15	0.92	09:55	2.56	1.62	03:20	0.24	16:00	1.57	0.71	03:20	0.004	06:45	0.068	0.025	0.025	-
07/19/2023	02:40	0.92	16:55	1.73	1.37	02:10	0.25	10:25	1.58	0.70	03:15	0.004	10:25	0.051	0.019	0.019	-
07/20/2023	04:00	0.98	09:35	1.76	1.43	03:05	0.16	09:05	1.57	0.68	03:05	0.003	09:05	0.046	0.020	0.020	-
07/21/2023	03:15	0.94	19:05	2.02	1.43	04:10	0.16	10:40	1.60	0.69	04:10	0.003	09:05	0.054	0.020	0.020	-
07/22/2023	05:30	1.05	08:55	1.97	1.46	04:05	0.28	12:35	1.58	0.71	04:05	0.005	12:35	0.056	0.021	0.021	-
07/23/2023	04:40	0.97	12:05	1.81	1.44	04:35	0.30	23:25	1.44	0.71	04:35	0.005	12:10	0.048	0.020	0.020	-
07/24/2023	03:30	1.02	21:45	1.92	1.46	00:10	0.23	06:45	1.57	0.69	00:10	0.005	11:00	0.051	0.020	0.020	0.38

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
07/25/2023	03:15	1.15	08:30	2.05	1.58	02:00	0.22	20:20	1.60	0.68	03:15	0.005	21:50	0.062	0.022	0.022	-
07/26/2023	03:30	1.23	09:45	2.29	1.60	00:25	0.22	09:35	1.59	0.67	02:50	0.005	19:35	0.056	0.022	0.022	-
07/27/2023	03:25	1.17	08:25	1.91	1.51	02:50	0.20	08:55	1.54	0.66	03:25	0.004	08:40	0.055	0.020	0.020	-
07/28/2023	01:45	1.16	20:35	2.29	1.58	04:25	0.19	14:10	1.58	0.63	02:35	0.004	19:20	0.065	0.021	0.021	-
07/29/2023	05:35	1.22	09:20	2.30	1.77	00:35	0.19	19:15	1.60	0.65	05:30	0.004	10:30	0.071	0.026	0.026	-
07/30/2023	02:50	1.34	10:50	2.43	1.73	02:50	0.18	08:35	1.46	0.64	02:50	0.004	10:05	0.067	0.024	0.024	-
07/31/2023	13:15	1.46	08:05	2.44	1.81	14:50	0.28	09:50	1.19	0.64	14:50	0.010	09:50	0.059	0.025	0.025	-
08/01/2023	05:55	1.39	20:55	1.93	1.65	04:55	0.32	16:15	1.51	0.63	05:55	0.009	22:05	0.052	0.021	0.021	-
08/02/2023	02:00	1.15	20:40	2.05	1.59	00:35	0.25	18:55	1.49	0.63	00:35	0.007	09:15	0.050	0.020	0.020	-

03/02/2023 00:00 - 08/02/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			4.755	10.23
Average	1.87	0.74	0.031	

DUV_SWRMH430

Site Commentary

SITE INFORMATION

Pipe	Elliptical (8.13 in H x 8 in W)
Silt	0.00 (in)

OBSERVATIONS

This site functioned under poor hydraulic conditions during the study period. The flow conditions were shallow and very fast; therefore, lower confidence level in this data set. No surcharge conditions were experienced at this location.

5-min flow depth, velocity, and quantity data observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.02	4.75	0.082
Minimum	0.72	1.21	0.015
Maximum	1.57	7.84	0.211
Min Time	05/12/2023 3:40:00 AM	07/12/2023 3:10:00 AM	07/14/2023 12:35:00 AM
Max Time	03/02/2023 7:05:00 PM	04/11/2023 10:05:00 AM	04/24/2023 7:05:00 PM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions are based on the five minutes intervals.

Values in the graphical reports are based on the fifteen minutes average.

Values in the tabular report are based on the five minutes intervals.

DATA UPTIME

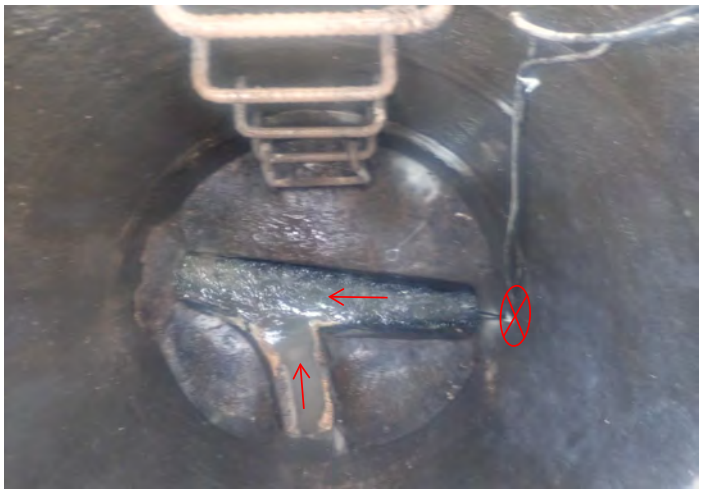
Data uptime observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Duvall.Parametrix.TFM.WA23		Site Name
Flow Monitoring Site Report		DUV_SWRMH430

Site Address /Location:	NE Ring St, Duvall, WA			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	NE Ring St and Brown St SW Intersection	Latitude:	47.739361	Pipe Size (H x W)	Pipe Shape
		Longitude:	-121.986000	8.13 x 8.00	Elliptical

Manhole #	System Characteristics
SWRMH430	Commercial
Access	Traffic
Drive	Medium



ADS Project Name:	Duvall.Parametrix.TFM.WA23
ADS Project Number:	22905.11 .325

Installation Information	
Installation Date:	Installation Type:
Wednesday, March 1, 2023	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
9:16:00 AM	
Depth of Flow (Wet DOF) (in)	
1.00	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
6.34	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
8	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
Yes, Inside	Normal
Pipe Material	Pipe Condition:
Concrete	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

Additional Photos

Monitoring Point Inlet	Outlet	Side Connection
		
Top Down	Location	
		
	KEY	
	Flow Direction Monitoring Point	

Hydrograph Report

DUV_SWRMH430

Flow Monitor

DUV_SWRMH430

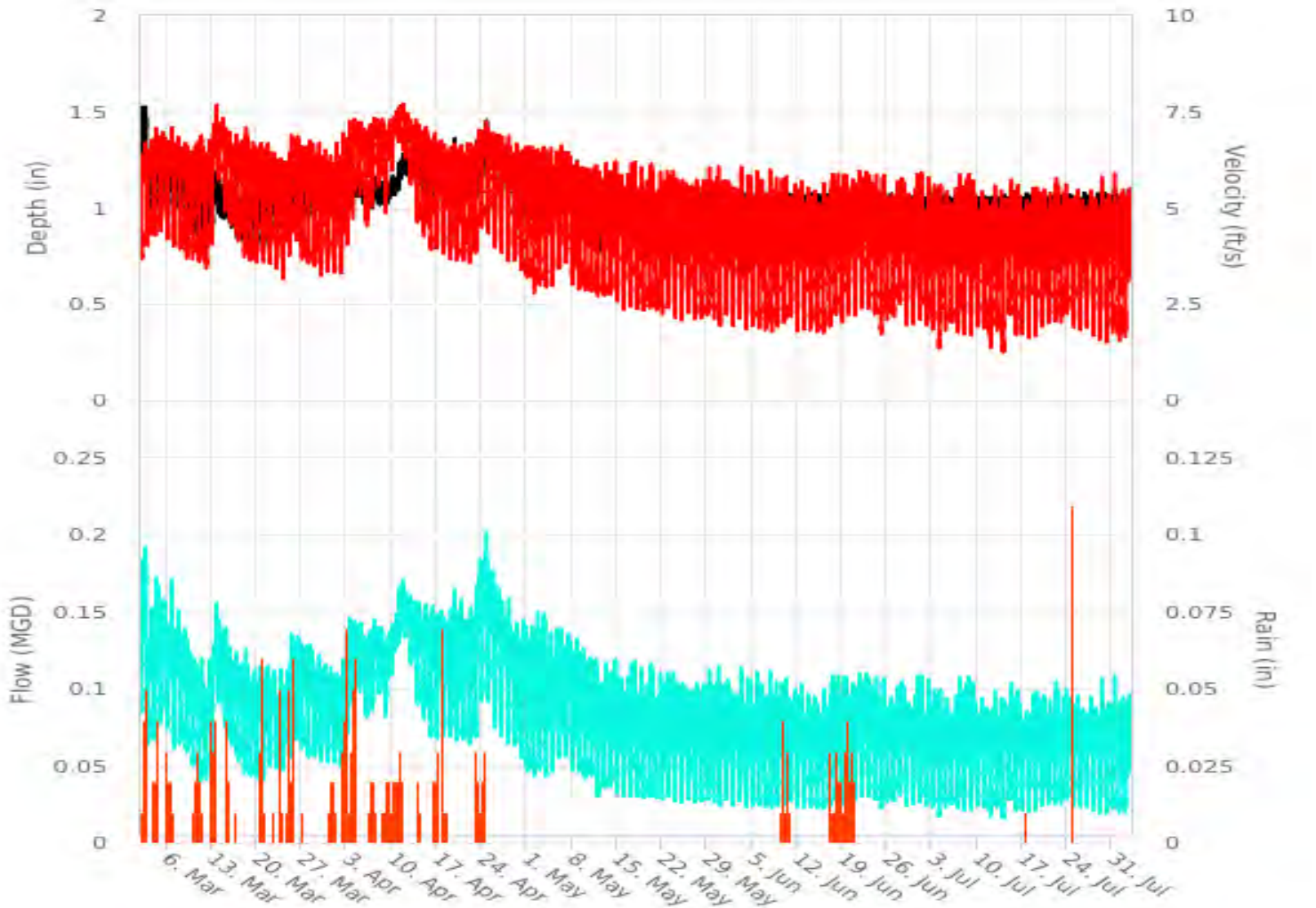
Pipe Height
8.13
in

Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL
Rain
VFINAL
QFINAL



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Scattergraph Report

DUV_SWRMH430

Flow Monitor

DUV_SWRMH430

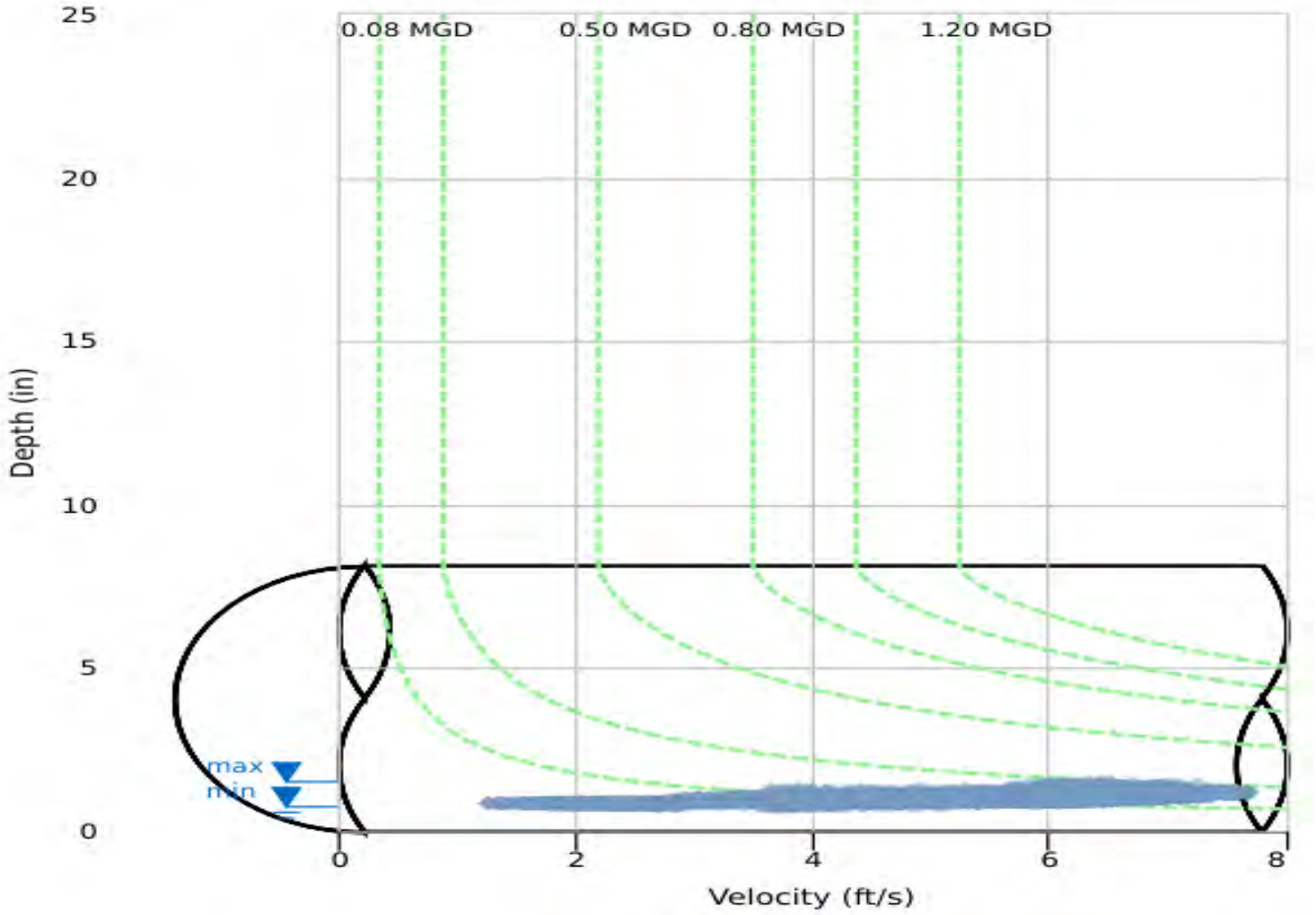
Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth

ADS ENVIRONMENTAL SERVICES



Daily Tabular Report

03/02/2023 00:00 - 08/02/2023 23:59
DUV_SWRMH430Pipe: Elliptical (8.13 in H x 8 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/02/2023	23:40	1.04	19:05	1.57	1.35	03:55	3.51	18:45	6.79	5.56	23:25	0.078	19:05	0.203	0.141	0.141	0.30
03/03/2023	04:40	0.94	19:30	1.29	1.12	01:55	3.91	17:55	6.88	5.78	01:55	0.061	19:30	0.160	0.112	0.112	0.11
03/04/2023	05:55	0.92	12:35	1.38	1.16	05:55	4.02	11:55	7.30	6.02	05:55	0.058	11:55	0.186	0.122	0.122	0.29
03/05/2023	00:50	1.02	13:55	1.34	1.16	03:35	4.13	16:40	7.24	5.97	03:35	0.073	13:55	0.174	0.122	0.122	0.17
03/06/2023	03:40	0.99	20:00	1.38	1.14	01:40	4.10	20:00	7.37	5.98	01:35	0.073	20:00	0.190	0.118	0.118	0.05
03/07/2023	03:05	0.92	20:35	1.28	1.10	02:50	3.91	20:30	7.11	5.88	03:05	0.058	20:35	0.159	0.111	0.111	-
03/08/2023	05:20	0.98	07:05	1.21	1.09	03:05	3.82	19:30	6.88	5.72	00:45	0.064	19:30	0.143	0.106	0.106	-
03/09/2023	23:45	0.93	18:30	1.18	1.03	05:10	3.46	18:30	6.80	5.51	05:10	0.053	18:30	0.140	0.094	0.094	-
03/10/2023	02:05	0.82	10:25	1.13	0.98	02:25	3.47	19:50	6.96	5.61	02:15	0.047	12:55	0.129	0.089	0.089	0.19
03/11/2023	03:40	0.75	12:05	1.10	0.91	03:20	3.48	10:05	7.06	5.50	03:40	0.038	12:05	0.126	0.079	0.079	0.04
03/12/2023	03:35	0.79	18:50	1.07	0.91	04:50	3.33	20:20	6.97	5.41	04:50	0.040	18:50	0.122	0.078	0.078	0.41
03/13/2023	02:35	0.81	17:05	1.21	1.03	02:35	3.85	20:25	7.81	6.39	02:35	0.046	20:25	0.161	0.111	0.111	0.54
03/14/2023	11:55	0.93	06:05	1.21	1.05	03:40	5.39	19:40	7.52	6.65	23:55	0.080	06:05	0.154	0.115	0.115	-
03/15/2023	00:20	0.93	06:50	1.20	1.02	02:30	4.47	19:55	7.30	6.22	02:30	0.069	06:50	0.151	0.103	0.103	0.10
03/16/2023	23:50	0.87	19:20	1.10	0.98	01:05	4.12	20:00	7.02	5.96	01:05	0.060	19:20	0.128	0.094	0.094	0.01
03/17/2023	01:55	0.82	17:05	1.09	0.95	01:10	3.95	06:30	7.17	5.78	01:10	0.050	17:05	0.125	0.087	0.087	-
03/18/2023	05:35	0.81	12:55	1.12	0.92	02:40	3.53	09:50	7.25	5.58	02:40	0.043	09:50	0.135	0.081	0.081	-
03/19/2023	04:05	0.79	12:00	1.07	0.92	00:40	3.54	16:50	6.93	5.30	05:20	0.042	16:50	0.119	0.077	0.077	-
03/20/2023	02:50	0.79	18:10	1.07	0.93	02:25	3.32	20:30	6.95	5.39	02:40	0.040	17:55	0.120	0.079	0.079	0.30
03/21/2023	00:40	0.79	08:55	1.11	0.93	03:10	3.47	20:20	6.75	5.38	03:15	0.041	19:50	0.117	0.080	0.080	0.04
03/22/2023	01:45	0.87	20:15	1.08	0.98	02:35	3.38	15:55	6.88	5.36	01:55	0.047	18:30	0.116	0.085	0.085	0.01
03/23/2023	05:00	0.84	19:25	1.10	0.95	01:40	3.31	19:25	6.83	5.10	04:10	0.046	19:25	0.127	0.078	0.078	0.09
03/24/2023	00:00	0.87	19:40	1.10	0.98	02:35	3.02	06:15	6.54	5.06	00:50	0.045	19:40	0.119	0.080	0.080	0.44
03/25/2023	01:30	0.89	13:35	1.17	1.05	02:25	3.60	09:40	6.99	5.71	01:30	0.052	13:35	0.142	0.100	0.100	0.21
03/26/2023	01:50	0.96	17:00	1.18	1.07	23:00	3.82	12:00	7.13	5.64	04:40	0.063	17:00	0.145	0.102	0.102	0.02
03/27/2023	00:00	1.00	06:05	1.17	1.07	03:55	3.37	20:25	6.84	5.55	03:55	0.056	06:05	0.137	0.099	0.099	-
03/28/2023	03:15	0.96	06:05	1.14	1.04	02:50	3.33	19:40	7.00	5.38	02:50	0.051	06:05	0.131	0.093	0.093	-
03/29/2023	08:20	0.96	19:00	1.12	1.04	00:05	3.29	19:10	7.06	5.26	00:05	0.053	19:10	0.131	0.091	0.091	-
03/30/2023	14:25	0.95	05:25	1.09	1.03	02:15	3.14	18:55	6.80	5.16	01:55	0.050	18:55	0.123	0.087	0.087	-
03/31/2023	23:55	0.92	06:25	1.09	1.03	01:50	3.16	13:25	6.76	5.08	03:00	0.048	13:25	0.122	0.086	0.086	0.26
04/01/2023	15:15	0.92	08:10	1.06	0.99	03:50	3.16	10:15	6.91	5.30	00:40	0.049	13:25	0.118	0.085	0.085	-
04/02/2023	01:10	0.91	17:55	1.11	1.01	01:10	3.01	10:40	7.33	5.25	01:10	0.042	10:40	0.124	0.087	0.087	0.63
04/03/2023	12:00	1.01	10:55	1.17	1.09	03:05	3.75	10:55	7.33	5.98	03:05	0.065	10:55	0.149	0.110	0.110	0.26
04/04/2023	09:40	1.04	05:55	1.18	1.10	00:30	4.35	06:10	7.49	6.58	00:30	0.083	05:55	0.153	0.122	0.122	0.43
04/05/2023	11:00	1.02	05:55	1.16	1.09	23:40	4.69	06:25	7.38	6.43	23:40	0.081	05:55	0.146	0.118	0.118	-
04/06/2023	12:35	1.00	18:20	1.14	1.06	03:30	4.03	18:45	7.38	6.18	02:55	0.072	19:30	0.143	0.110	0.110	0.48
04/07/2023	00:55	0.97	07:35	1.21	1.08	00:20	4.71	07:15	7.59	6.67	00:20	0.082	07:35	0.154	0.122	0.122	0.23
04/08/2023	05:00	1.00	09:00	1.15	1.06	23:50	5.19	13:05	7.56	6.55	23:50	0.085	09:00	0.144	0.115	0.115	0.08
04/09/2023	01:20	0.99	22:15	1.15	1.08	01:50	4.40	14:35	7.71	6.47	01:50	0.073	14:35	0.151	0.117	0.117	0.52
04/10/2023	01:20	1.06	05:35	1.19	1.11	01:30	5.67	20:00	7.77	6.95	01:30	0.101	19:35	0.157	0.131	0.131	0.53
04/11/2023	02:15	1.06	17:30	1.30	1.19	22:50	6.56	10:05	7.84	7.32	02:15	0.121	12:45	0.173	0.152	0.152	0.20
04/12/2023	23:15	1.14	17:15	1.29	1.22	23:05	5.82	10:10	7.59	6.90	23:15	0.114	07:55	0.166	0.148	0.148	-
04/13/2023	05:20	1.13	06:55	1.27	1.20	23:55	4.91	18:40	7.49	6.49	23:55	0.097	09:15	0.167	0.136	0.136	0.02
04/14/2023	23:55	1.09	17:30	1.27	1.19	23:55	4.36	08:35	7.52	6.11	23:55	0.080	08:35	0.162	0.127	0.127	0.01
04/15/2023	00:30	1.06	10:35	1.25	1.17	02:10	4.08	08:30	7.52	5.94	02:10	0.076	10:35	0.163	0.121	0.121	-
04/16/2023	23:50	0.99	10:40	1.28	1.15	04:05	3.72	17:00	7.30	5.76	04:00	0.066	10:40	0.164	0.115	0.115	0.23
04/17/2023	00:05	1.02	18:45	1.29	1.16	03:10	3.77	19:25	7.08	5.65	03:10	0.064	20:05	0.160	0.115	0.115	0.12
04/18/2023	05:05	1.06	18:20	1.27	1.19	03:25	3.62	21:20	6.82	5.45	01:35	0.067	20:05	0.151	0.114	0.114	0.05
04/19/2023	05:10	1.07	18:25	1.40	1.21	02:05	3.46	19:45	6.99	5.47	02:05	0.065	19:00	0.178	0.119	0.119	-
04/20/2023	04:15	1.06	20:50	1.35	1.18	00:20	3.46	20:35	6.97	5.40	00:20	0.063	20:35	0.167	0.112	0.112	-
04/21/2023	23:45	1.04	06:45	1.30	1.17	02:15	3.44	15:30	6.87	5.47	02:15	0.063	06:40	0.152	0.113	0.113	-
04/22/2023	01:50	1.05	08:55	1.30	1.17	03:00	3.42	08:55	6.92	5.41	01:40	0.062	08:55	0.164	0.111	0.111	0.19
04/23/2023	00:20	1.03	17:00	1.40	1.23	02:35	3.56	17:35	7.37	5.84	04:30	0.063	17:35	0.192	0.130	0.130	0.40
04/24/2023	00:10	1.14	19:05	1.48	1.30	03:25	4.22	19:05	7.41	6.25	03:25	0.087	19:05	0.211	0.150	0.150	0.29
04/25/2023	22:45	1.16	05:55	1.39	1.27	23:55	4.10	06:45	7.25	6.10	23:55	0.083	06:45	0.187	0.141	0.141	-
04/26/2023	02:30	1.07	06:55	1.37	1.22	04:05	3.86	17:40	7.18	5.83	02:30	0.072	20:10	0.181	0.127	0.127	-
04/27/2023	02:45	1.06	20:55	1.30	1.19	02:20	3.68	18:10	6.94	5.74	02:20	0.067	18:10	0.162	0.120	0.120	-
04/28/2023	02:50	1.04	06:20	1.30	1.15	03:25	3.35	07:40	7.20	5.58	03:25	0.059	06:05	0.165	0.112	0.112	-
04/29/2023	22:05	1.00	11:20	1.27	1.11	02:55	3.46	11:20	7.12	5.32	02:55	0.061	11:20	0.163	0.101	0.101	-
04/30/2023	04:10	0.97	11:00	1.27	1.12	02:35	3.28	19:35	7.02	5.19	04:10	0.051	19:35	0.155	0.101	0.101	-
05/01/2023	02:40	0.92	18:10	1.23	1.07	03:20	3.07	05:55	6.91	5.10	02:40	0.044	18:10	0.148	0.093	0.093	-
05/02/2023	03:35	0.93	18:20	1.30	1.10	03:35	2.58	17:55	6.86	5.01	03:35	0.038	18:20	0.159	0.095	0.095	-
05/03/2023	23:55	0.94	18:15	1.31	1.07	01:45	2.91	18:10	6.99	4.86	23:55	0.045	18:15	0.163	0.089	0.089	-
05/04/2023	00:55	0.90	19:55	1.23	1.06	01:45	2.84	19:50	6.99	4.91	00:55	0.041	19:50	0.151	0.088	0.088	-
05/05/2023	01:45	0.96	17:50	1.23	1.08	01:40	2.81	17:30	6.72	5.02	01:40	0.043	17:30	0.145	0.092	0.092	-
05/06/2023	03:30	0.97	11:10	1.22	1.08	01:45	3.22	11:10	6.72	5.14	03:40	0.052	11:10	0.145	0.095	0.095	-
05/07/2023	00:50	0.97	20:40	1.24	1.09	23:25	3.33	08:45	6.81	5.15	23:25	0.052	11:00	0.145	0.096	0.096	-
05/08/2023	03:00	0.98	20:10	1.27	1.10	03:05	2.89	20:10	6.52	4.75	03:05	0.045	20:10	0.149	0.089	0.089	-
05/09/2023	23:55	0.93	18:15	1.24	1.10	02:15	2.82	06:00	6.36	4.56	02:15	0.044	06:00	0.136	0.086	0.086	-
05/10/2023	00:45	0.91	19:55	1.19	1.04	03:10	2.78	06:10	6.18	4.60	02:20	0.039	06:25	0.125	0.081	0.081	-
05/11/2023	23:25	0.90	19:50	1.18	1.02	02:00	2.69	19:40	6.35	4.56	00:35	0.042	19:50	0.123	0.077	0.077	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
05/12/2023	02:10	0.72	12:30	1.11	0.96	02:10	2.57	06:10	6.43	4.52	02:10	0.026	06:10	0.115	0.070	0.070	-
05/13/2023	02:25	0.84	09:25	1.13	1.00	02:25	2.56	09:25	6.38	4.56	02:25	0.032	09:25	0.123	0.076	0.076	-
05/14/2023	02:20	0.84	08:25	1.13	0.99	05:00	2.57	20:00	6.40	4.38	02:20	0.032	20:00	0.124	0.071	0.071	-
05/15/2023	01:30	0.84	07:45	1.13	0.98	04:10	2.47	07:45	6.33	4.47	02:20	0.031	07:45	0.122	0.072	0.072	-
05/16/2023	00:15	0.84	20:25	1.13	0.98	03:00	2.24	20:25	6.27	4.26	03:00	0.028	20:25	0.121	0.069	0.069	-
05/17/2023	00:30	0.84	16:00	1.14	0.98	03:45	2.32	20:00	6.58	4.37	03:45	0.029	20:00	0.129	0.070	0.070	-
05/18/2023	00:20	0.84	19:15	1.13	0.97	03:30	2.27	19:15	6.33	4.13	03:30	0.028	19:15	0.122	0.066	0.066	-
05/19/2023	00:30	0.84	09:55	1.11	0.97	02:10	2.22	09:55	6.03	4.07	02:10	0.028	09:55	0.113	0.065	0.065	-
05/20/2023	00:20	0.84	08:40	1.15	0.97	01:50	2.29	08:40	6.68	4.12	01:50	0.029	08:40	0.132	0.066	0.066	-
05/21/2023	00:15	0.84	19:30	1.13	0.97	05:05	2.17	19:30	6.36	4.06	05:05	0.027	19:30	0.123	0.065	0.065	-
05/22/2023	00:05	0.84	19:30	1.13	0.97	03:25	2.12	19:30	6.40	4.15	03:25	0.027	19:30	0.124	0.066	0.066	-
05/23/2023	00:30	0.84	20:15	1.14	0.97	01:35	2.34	20:15	6.47	4.17	01:35	0.029	20:15	0.127	0.066	0.066	-
05/24/2023	00:20	0.84	07:30	1.13	0.97	03:50	2.02	07:30	6.43	4.13	03:50	0.025	07:30	0.124	0.066	0.066	-
05/25/2023	00:00	0.84	19:55	1.13	0.97	03:35	2.01	19:55	6.34	4.01	01:55	0.025	19:55	0.123	0.064	0.064	-
05/26/2023	00:45	0.84	15:10	1.13	0.97	04:00	2.12	17:30	6.42	4.11	02:50	0.027	17:30	0.124	0.066	0.066	-
05/27/2023	00:20	0.84	08:45	1.13	0.96	03:00	1.92	08:45	6.43	3.94	03:00	0.024	08:45	0.124	0.062	0.062	-
05/28/2023	00:25	0.84	11:55	1.11	0.96	02:40	1.92	12:10	6.12	3.82	02:40	0.024	12:10	0.115	0.060	0.060	-
05/29/2023	00:20	0.84	09:45	1.14	0.96	02:15	2.10	10:15	6.56	4.02	00:55	0.026	10:15	0.128	0.064	0.064	-
05/30/2023	00:20	0.84	07:25	1.13	0.97	03:40	1.88	14:50	6.42	4.00	03:40	0.024	14:50	0.124	0.063	0.063	-
05/31/2023	00:10	0.84	05:50	1.12	0.97	02:20	1.87	05:50	6.20	4.09	02:20	0.023	05:50	0.118	0.065	0.065	-
06/01/2023	00:30	0.84	06:10	1.13	0.97	01:40	2.02	06:10	6.41	4.05	01:40	0.025	06:10	0.124	0.064	0.064	-
06/02/2023	00:10	0.84	19:05	1.13	0.97	02:30	1.88	19:05	6.28	4.05	02:30	0.024	19:05	0.121	0.065	0.065	-
06/03/2023	00:20	0.84	08:25	1.13	0.97	02:50	2.00	08:25	6.42	3.88	02:50	0.025	08:25	0.124	0.062	0.062	-
06/04/2023	00:50	0.84	08:55	1.13	0.97	04:05	1.75	08:55	6.43	4.03	04:05	0.022	08:55	0.124	0.064	0.064	-
06/05/2023	00:00	0.84	18:00	1.12	0.96	02:35	1.84	18:30	6.26	3.96	02:35	0.023	18:30	0.119	0.063	0.063	-
06/06/2023	00:00	0.84	16:25	1.11	0.97	02:30	1.73	16:25	6.07	3.86	02:30	0.022	16:25	0.114	0.061	0.061	-
06/07/2023	00:05	0.84	20:00	1.13	0.97	03:20	1.58	20:00	6.34	4.02	03:20	0.020	20:00	0.123	0.064	0.064	-
06/08/2023	00:10	0.84	20:00	1.14	0.97	03:15	1.31	20:00	6.43	3.98	03:15	0.016	20:00	0.126	0.063	0.063	-
06/09/2023	00:05	0.84	16:40	1.10	0.96	01:35	1.83	18:55	5.95	3.89	01:25	0.023	18:55	0.110	0.061	0.061	0.20
06/10/2023	00:05	0.84	10:20	1.12	0.96	03:10	1.93	10:20	6.18	3.92	02:10	0.024	10:20	0.118	0.062	0.062	0.20
06/11/2023	00:45	0.84	20:05	1.11	0.96	04:40	1.83	20:05	6.02	3.96	04:40	0.023	20:05	0.113	0.062	0.062	-
06/12/2023	00:00	0.84	07:15	1.12	0.96	01:55	1.72	07:15	6.16	3.95	01:50	0.022	07:15	0.118	0.062	0.062	-
06/13/2023	00:00	0.84	17:25	1.11	0.96	02:50	1.77	17:25	6.11	3.85	02:50	0.022	17:25	0.115	0.060	0.060	-
06/14/2023	00:00	0.84	06:55	1.10	0.97	01:40	1.73	18:20	5.96	3.88	01:40	0.022	18:20	0.111	0.061	0.061	-
06/15/2023	00:15	0.84	21:15	1.12	0.96	03:05	1.71	21:15	6.15	3.74	03:05	0.021	21:15	0.117	0.058	0.058	-
06/16/2023	00:10	0.84	07:15	1.12	0.96	04:00	1.57	07:15	6.13	3.84	04:00	0.020	07:15	0.117	0.060	0.060	0.10
06/17/2023	00:05	0.84	08:10	1.12	0.96	04:05	1.77	08:10	6.19	3.95	04:05	0.022	08:10	0.118	0.062	0.062	0.11
06/18/2023	00:00	0.84	08:40	1.13	0.97	04:15	1.92	08:40	6.34	3.94	04:15	0.024	08:40	0.122	0.063	0.063	0.22
06/19/2023	00:20	0.84	10:10	1.13	0.97	02:50	1.90	10:10	6.37	4.10	02:50	0.024	10:10	0.123	0.065	0.065	0.16
06/20/2023	00:05	0.84	18:50	1.14	0.98	00:45	2.14	18:50	6.54	4.28	00:45	0.027	18:50	0.128	0.069	0.069	0.60
06/21/2023	00:40	0.84	19:00	1.15	0.98	03:00	2.20	19:00	6.76	4.42	03:00	0.028	19:00	0.134	0.072	0.072	-
06/22/2023	00:40	0.84	11:05	1.13	0.98	03:10	2.32	11:05	6.43	4.35	03:10	0.029	11:05	0.124	0.070	0.070	-
06/23/2023	01:15	0.84	07:25	1.12	0.98	02:00	2.28	07:25	6.21	4.24	02:00	0.029	07:25	0.118	0.068	0.068	-
06/24/2023	00:00	0.84	10:45	1.12	0.97	03:30	2.08	10:45	6.15	3.98	02:50	0.026	10:45	0.117	0.063	0.063	-
06/25/2023	00:00	0.84	13:35	1.11	0.96	03:20	1.59	13:35	6.12	3.73	03:20	0.020	13:35	0.115	0.058	0.058	-
06/26/2023	00:00	0.84	06:50	1.11	0.96	02:00	1.86	14:30	6.09	4.00	02:00	0.023	14:30	0.115	0.063	0.063	-
06/27/2023	00:00	0.84	19:00	1.12	0.97	03:45	1.87	19:00	6.24	3.98	03:45	0.023	19:00	0.119	0.063	0.063	-
06/28/2023	01:40	0.84	08:30	1.13	0.98	03:00	2.40	08:30	6.35	4.21	01:40	0.030	08:30	0.123	0.067	0.067	-
06/29/2023	00:15	0.84	08:45	1.09	0.96	02:50	1.84	08:45	5.86	3.98	02:50	0.023	08:45	0.107	0.062	0.062	-
06/30/2023	00:00	0.84	17:55	1.11	0.97	02:20	1.80	17:55	6.03	3.99	02:20	0.023	17:55	0.113	0.064	0.064	-
07/01/2023	00:10	0.84	09:35	1.13	0.96	05:10	1.98	09:35	6.42	3.87	05:10	0.025	09:35	0.124	0.061	0.061	-
07/02/2023	00:00	0.84	10:15	1.11	0.96	03:55	1.78	10:25	6.07	3.65	03:55	0.022	10:25	0.114	0.057	0.057	-
07/03/2023	00:00	0.84	08:10	1.11	0.97	02:40	1.70	09:55	6.10	3.80	02:40	0.021	09:55	0.115	0.060	0.060	-
07/04/2023	00:15	0.84	08:40	1.11	0.96	03:30	1.25	08:40	6.10	3.57	02:00	0.016	08:40	0.115	0.056	0.056	-
07/05/2023	00:25	0.84	09:45	1.10	0.96	03:05	1.67	09:45	5.96	3.72	03:05	0.021	09:45	0.111	0.058	0.058	-
07/06/2023	00:00	0.84	18:55	1.12	0.96	03:30	1.73	18:55	6.21	3.74	03:25	0.022	18:55	0.118	0.059	0.059	-
07/07/2023	00:05	0.84	08:00	1.12	0.96	03:30	1.57	08:00	6.17	3.92	02:55	0.020	08:00	0.118	0.062	0.062	-
07/08/2023	01:00	0.84	17:45	1.13	0.97	02:45	1.39	17:55	6.41	4.03	02:45	0.017	17:55	0.124	0.064	0.064	-
07/09/2023	00:00	0.84	09:35	1.11	0.96	04:05	1.60	09:35	6.09	3.77	04:05	0.020	09:35	0.115	0.059	0.059	-
07/10/2023	00:20	0.84	08:40	1.11	0.96	03:35	1.77	08:40	6.02	3.77	03:35	0.022	08:40	0.113	0.059	0.059	-
07/11/2023	00:00	0.84	10:05	1.08	0.96	02:05	1.80	10:05	5.69	3.63	00:40	0.023	10:05	0.103	0.057	0.057	-
07/12/2023	00:10	0.84	18:55	1.10	0.97	03:10	1.21	18:55	5.98	3.73	03:10	0.015	18:55	0.111	0.059	0.059	-
07/13/2023	00:05	0.84	18:50	1.10	0.95	23:10	1.45	18:50	5.94	3.59	23:10	0.018	18:50	0.110	0.056	0.056	-
07/14/2023	00:00	0.84	07:05	1.12	0.96	00:35	1.22	07:05	6.16	3.75	00:00	0.015	07:05	0.117	0.059	0.059	-
07/15/2023	00:25	0.84	10:15	1.11	0.96	04:35	2.11	10:15	6.03	3.93	04:35	0.026	10:15	0.113	0.061	0.061	-
07/16/2023	00:05	0.84	10:40	1.09	0.96	03:20	1.51	16:40	5.88	3.70	03:20	0.019	16:40	0.108	0.058	0.058	-
07/17/2023	00:05	0.84	19:05	1.12	0.96	02:55	1.51	19:05	6.21	3.77	02:55	0.019	19:05	0.118	0.059	0.059	0.01
07/18/2023	00:00	0.84	18:35	1.11	0.96	03:30	1.46	18:35	6.02	3.73	03:30	0.018	18:35	0.113	0.058	0.058	-
07/19/2023	00:10	0.84	09:55	1.11	0.97	02:15	1.63	09:55	6.02	3.77	02:15	0.020	09:55	0.113	0.060	0.060	-
07/20/2023	00:00	0.84	09:35	1.11	0.97	04:25	1.67	09:35	6.01	3.81	04:25	0.021	09:35	0.113	0.060	0.060	-
07/21/2023	00:45	0.84	10:15	1.09	0.97	02:50	1.96	10:15	5.87	3.88	02:35	0.025	10:15	0.108	0.061	0.061	-
07/22/2023	00:05	0.84	09:35	1.12	0.96	02:50	1.86	09:35	6.26	4.02	02:50	0.023	09:35	0.119	0.063	0.063	-
07/23/2023	00:35	0.84	12:40	1.09	0.97	03:20	1.90	20:25	5.86	3.91	02:20	0.024	12:40	0.107	0.062	0.062	-
07/24/2023	00:30	0.84	13:25	1.12	0.96	01:40	2.02	13:25	6.21	3.95	01:40	0.025	13:25	0.118	0.062	0.062	0.38

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
07/25/2023	00:00	0.84	08:25	1.11	0.96	03:35	1.40	08:25	6.03	3.89	03:35	0.018	08:25	0.113	0.061	0.061	-
07/26/2023	00:00	0.84	08:55	1.08	0.96	01:40	1.52	10:30	5.71	3.78	01:40	0.019	10:30	0.103	0.059	0.059	-
07/27/2023	00:00	0.84	05:40	1.08	0.96	03:25	1.54	18:10	5.70	3.93	03:25	0.019	10:30	0.103	0.061	0.061	-
07/28/2023	00:00	0.84	09:15	1.11	0.96	02:10	1.59	09:15	6.06	3.82	02:10	0.020	09:15	0.114	0.060	0.060	-
07/29/2023	00:00	0.84	08:40	1.13	0.96	01:50	1.48	08:40	6.27	3.88	01:50	0.018	08:40	0.121	0.061	0.061	-
07/30/2023	00:25	0.84	09:35	1.11	0.96	03:20	1.49	09:35	6.08	3.83	03:15	0.019	09:35	0.114	0.060	0.060	-
07/31/2023	00:05	0.84	10:15	1.12	0.96	02:30	1.69	10:15	6.13	3.96	02:30	0.021	10:15	0.117	0.062	0.062	-
08/01/2023	00:10	0.84	10:20	1.08	0.96	03:40	1.50	11:35	5.75	3.91	02:20	0.019	11:35	0.104	0.062	0.062	-
08/02/2023	00:25	0.84	13:15	1.10	0.96	03:45	1.50	13:15	5.90	3.90	02:20	0.019	13:15	0.110	0.061	0.061	-

03/02/2023 00:00 - 08/02/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			12.672	10.23
Average	1.02	4.75	0.082	

DUV_SWRMH459

Site Commentary

SITE INFORMATION

Pipe	Elliptical (8.13 in H x 8 in W)
Silt	0.00 (in)

OBSERVATIONS

This site functioned under poor hydraulic conditions during the study period. The flow conditions were shallow and slow; therefore, lower confidence level in this data set. No surcharge conditions were experienced at this location.

5-min flow depth, velocity, and quantity data observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.62	1.27	0.045
Minimum	0.61	0.08	0.002
Maximum	4.98	2.81	0.222
Min Time	06/06/2023 3:40:00 AM	08/02/2023 12:55:00 PM	07/31/2023 5:40:00 AM
Max Time	05/09/2023 9:45:00 AM	03/30/2023 11:45:00 AM	03/30/2023 11:45:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions are based on the five minutes intervals.

Values in the graphical reports are based on the fifteen minutes average.

Values in the tabular report are based on the five minutes intervals.

DATA UPTIME

Data uptime observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Duvall.Parametrix.TFM.WA23		Site Name
Flow Monitoring Site Report		DUV_SWRMH459

Site Address /Location:	NE Ring St NE, Duvall, WA			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	NE Ring St and Brown St SW Intersection	Latitude:	47.742874	Pipe Size (H x W)	Pipe Shape
		Longitude:	-121.987122	8.13 x 8.00	Elliptical

Manhole #	System Characteristics
SWRMH459	Commercial
Access	Traffic
Drive	Medium

ADS Project Name:	Duvall.Parametrix.TFM.WA23
ADS Project Number:	22905.11 .325

Installation Information	
Installation Date:	Installation Type:
Wednesday, March 1, 2023	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
1:52:00 PM	
Depth of Flow (Wet DOF) (in)	
1.75	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.83	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
8	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

Additional Photos

Monitoring Point Inlet	Outlet	
		
Top Down	Location	
		
	KEY	
	Flow Direction Monitoring Point	

Hydrograph Report

DUV_SWRMH459

Flow Monitor

DUV_SWRMH459

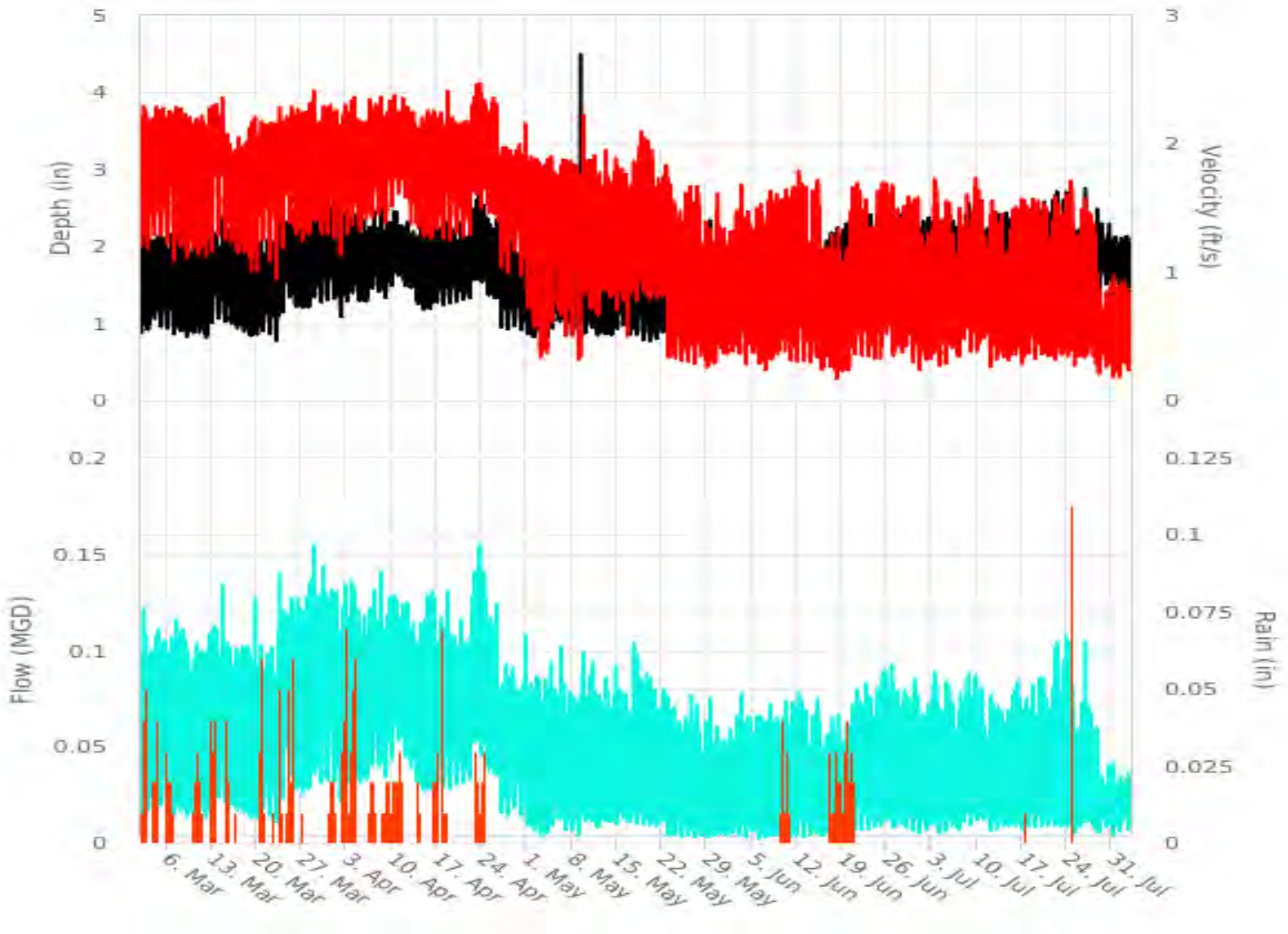
Pipe Height
8.13
in

Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL
Rain
VFINAL
QFINAL



800-633-7246
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Scattergraph Report

DUV_SWRMH459

Flow Monitor

DUV_SWRMH459

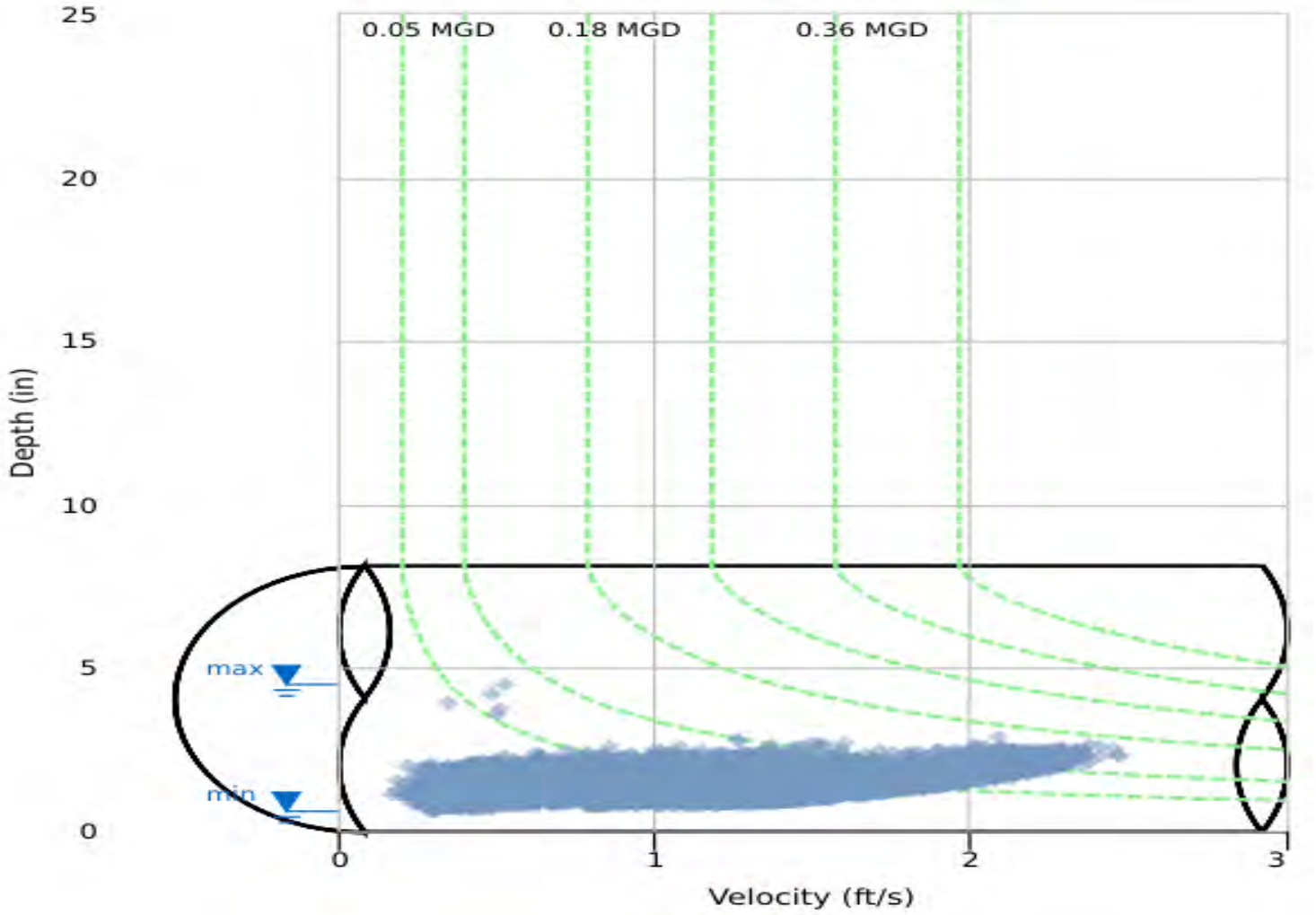
Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth

ADS ENVIRONMENTAL SERVICES



Daily Tabular Report

03/02/2023 00:00 - 08/02/2023 23:59
DUV_SWRMH459Pipe: Elliptical (8.13 in H x 8 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/02/2023	03:50	0.87	12:05	2.86	1.49	04:20	1.17	12:05	2.70	1.84	04:20	0.016	12:05	0.194	0.057	0.057	0.30
03/03/2023	05:10	0.91	18:30	2.56	1.48	04:35	1.02	21:25	2.50	1.80	04:35	0.015	17:45	0.144	0.055	0.055	0.11
03/04/2023	05:05	1.04	15:00	2.45	1.57	03:55	1.22	20:50	2.51	1.88	04:50	0.022	17:00	0.144	0.062	0.062	0.29
03/05/2023	05:05	0.94	18:00	2.67	1.54	02:20	0.99	19:10	2.56	1.85	02:20	0.016	18:00	0.162	0.060	0.060	0.17
03/06/2023	04:45	0.92	18:40	2.46	1.48	04:05	1.03	13:45	2.52	1.83	04:05	0.015	09:05	0.141	0.056	0.056	0.05
03/07/2023	04:50	0.86	12:15	2.61	1.45	03:10	1.02	12:15	2.53	1.78	03:05	0.014	12:15	0.161	0.054	0.054	-
03/08/2023	02:20	0.88	12:25	2.88	1.57	03:25	1.04	21:30	2.54	1.80	03:25	0.014	09:50	0.169	0.061	0.061	-
03/09/2023	04:15	0.82	08:35	2.50	1.41	03:25	0.95	09:30	2.48	1.73	03:25	0.012	07:05	0.145	0.051	0.051	-
03/10/2023	03:25	0.87	18:35	2.75	1.44	02:45	1.08	18:35	2.47	1.76	05:05	0.015	18:35	0.169	0.052	0.052	0.19
03/11/2023	03:10	0.87	12:45	2.37	1.46	02:40	1.05	12:20	2.47	1.75	03:15	0.014	12:20	0.134	0.054	0.054	0.04
03/12/2023	05:10	0.80	09:25	2.81	1.46	04:50	0.94	22:55	2.57	1.78	04:50	0.011	09:25	0.174	0.055	0.055	0.41
03/13/2023	01:25	1.00	20:15	2.79	1.63	03:05	1.02	11:35	2.56	1.94	03:05	0.017	11:35	0.177	0.068	0.068	0.54
03/14/2023	02:15	1.06	20:20	2.68	1.59	01:15	1.22	21:20	2.58	1.89	03:20	0.022	20:20	0.153	0.063	0.063	-
03/15/2023	03:25	1.01	20:40	2.64	1.63	03:35	1.16	12:15	2.47	1.68	03:35	0.019	12:15	0.144	0.058	0.058	0.10
03/16/2023	02:35	0.98	21:00	2.77	1.58	00:40	1.05	22:30	2.55	1.65	02:40	0.018	21:00	0.144	0.055	0.055	0.01
03/17/2023	01:05	0.92	07:45	2.80	1.57	01:10	1.07	07:20	2.33	1.63	01:10	0.016	18:45	0.160	0.054	0.054	-
03/18/2023	01:40	0.89	12:10	2.65	1.51	03:55	1.06	22:40	2.36	1.62	03:55	0.015	18:15	0.151	0.052	0.052	-
03/19/2023	03:45	0.83	19:30	2.86	1.44	05:25	0.76	13:35	2.48	1.74	05:25	0.009	19:30	0.171	0.053	0.053	-
03/20/2023	02:55	0.85	19:15	2.55	1.50	03:40	0.95	19:15	2.38	1.79	03:40	0.013	19:15	0.146	0.056	0.056	0.30
03/21/2023	02:00	0.88	10:40	2.58	1.45	00:25	1.04	17:25	2.42	1.80	02:05	0.016	10:40	0.138	0.054	0.054	0.04
03/22/2023	03:35	0.83	08:10	2.90	1.44	03:05	0.94	16:30	2.54	1.78	03:05	0.012	08:10	0.178	0.053	0.053	0.01
03/23/2023	03:40	0.77	15:15	2.78	1.54	02:30	0.85	14:55	2.62	1.72	03:55	0.009	14:55	0.179	0.058	0.058	0.09
03/24/2023	02:45	1.14	18:35	2.79	1.73	00:45	1.10	18:35	2.56	1.76	02:55	0.022	18:35	0.178	0.067	0.067	0.44
03/25/2023	04:35	1.33	11:35	2.81	1.84	03:45	1.27	11:15	2.53	1.88	03:45	0.032	11:35	0.177	0.076	0.076	0.21
03/26/2023	03:55	1.20	12:40	3.11	1.81	03:50	1.16	10:15	2.56	1.84	03:50	0.025	12:40	0.192	0.075	0.075	0.02
03/27/2023	03:40	1.20	20:25	3.00	1.78	03:50	1.09	19:45	2.59	1.84	03:50	0.023	20:25	0.188	0.073	0.073	-
03/28/2023	01:35	1.20	18:25	2.90	1.87	02:15	1.18	17:20	2.59	1.85	03:35	0.026	16:15	0.180	0.078	0.078	-
03/29/2023	02:30	1.34	19:10	2.98	1.88	01:05	1.30	06:25	2.48	1.86	01:05	0.033	19:10	0.180	0.078	0.078	-
03/30/2023	03:40	1.26	11:45	3.07	1.87	03:10	1.18	11:45	2.81	1.84	03:10	0.027	11:45	0.222	0.077	0.077	-
03/31/2023	03:50	1.29	17:20	3.15	1.89	04:35	1.25	20:50	2.64	1.83	02:45	0.030	20:50	0.206	0.077	0.077	0.26
04/01/2023	23:20	1.30	09:55	2.89	1.80	03:45	1.18	11:05	2.51	1.78	05:40	0.029	11:05	0.184	0.071	0.071	-
04/02/2023	04:10	1.08	20:50	2.89	1.78	03:20	1.00	21:40	2.57	1.82	03:20	0.018	20:50	0.176	0.073	0.073	0.63
04/03/2023	03:45	1.27	18:10	2.76	1.83	01:30	1.19	18:05	2.58	1.88	01:30	0.029	18:05	0.169	0.076	0.076	0.26
04/04/2023	00:05	1.36	12:45	2.92	1.88	03:20	1.29	08:15	2.49	1.92	00:05	0.033	07:45	0.161	0.080	0.080	0.43
04/05/2023	02:30	1.28	18:50	2.85	1.74	02:40	1.12	10:15	2.45	1.84	02:40	0.027	18:50	0.162	0.069	0.069	-
04/06/2023	02:50	1.28	19:15	2.67	1.79	03:20	1.15	08:05	2.56	1.88	03:20	0.027	18:00	0.162	0.074	0.074	0.48
04/07/2023	01:20	1.45	08:30	2.83	1.86	02:05	1.26	06:10	2.53	1.91	02:05	0.035	19:55	0.162	0.078	0.078	0.23
04/08/2023	02:55	1.41	09:10	3.01	1.82	03:00	1.21	10:00	2.64	1.89	03:00	0.032	09:10	0.187	0.075	0.075	0.08
04/09/2023	03:05	1.33	19:55	2.90	1.84	03:55	1.21	13:15	2.58	1.89	03:55	0.029	19:55	0.178	0.077	0.077	0.52
04/10/2023	03:15	1.48	08:30	2.82	1.91	03:40	1.31	16:50	2.55	1.94	03:40	0.038	16:50	0.173	0.082	0.082	0.53
04/11/2023	23:50	1.56	09:55	2.74	1.92	16:00	1.45	18:00	2.58	1.95	02:15	0.049	08:25	0.165	0.083	0.083	0.20
04/12/2023	03:25	1.48	09:05	2.72	1.77	23:45	1.46	09:45	2.50	1.87	03:05	0.043	09:45	0.161	0.071	0.071	-
04/13/2023	23:35	1.34	08:40	2.74	1.74	01:25	1.34	09:15	2.50	1.84	23:35	0.034	20:25	0.155	0.068	0.068	0.02
04/14/2023	02:40	1.24	13:00	2.78	1.70	02:55	1.15	17:05	2.61	1.80	02:55	0.026	06:45	0.153	0.066	0.066	0.01
04/15/2023	01:25	1.17	13:05	2.92	1.69	01:20	1.11	07:10	2.51	1.78	01:20	0.023	13:05	0.181	0.065	0.065	-
04/16/2023	01:55	1.18	10:15	2.86	1.74	05:50	1.06	19:15	2.55	1.81	02:00	0.024	14:25	0.162	0.069	0.069	0.23
04/17/2023	03:50	1.27	10:35	2.78	1.72	03:50	1.17	07:55	2.61	1.82	03:50	0.027	20:00	0.152	0.067	0.067	0.12
04/18/2023	01:20	1.23	09:50	2.95	1.68	02:50	1.18	18:40	2.56	1.82	02:50	0.027	09:50	0.178	0.066	0.066	0.05
04/19/2023	03:15	1.26	21:35	2.93	1.69	04:35	1.12	19:25	2.57	1.81	03:30	0.026	21:35	0.156	0.065	0.065	-
04/20/2023	02:55	1.28	18:15	2.68	1.71	03:05	1.15	08:35	2.55	1.81	03:05	0.027	18:15	0.158	0.067	0.067	-
04/21/2023	02:25	1.31	16:40	2.97	1.74	03:50	1.16	16:40	2.57	1.83	03:50	0.029	16:40	0.195	0.069	0.069	-
04/22/2023	03:55	1.30	18:40	2.93	1.85	03:50	1.18	16:15	2.69	1.87	03:50	0.029	22:15	0.181	0.077	0.077	0.19
04/23/2023	04:45	1.56	15:45	3.24	2.11	05:45	1.48	19:30	2.66	2.02	05:45	0.048	18:30	0.197	0.097	0.097	0.40
04/24/2023	03:35	1.52	07:40	3.00	1.99	02:50	1.41	11:20	2.72	2.02	02:50	0.043	11:20	0.193	0.090	0.090	0.29
04/25/2023	04:20	1.35	21:20	2.86	1.82	04:20	1.33	21:20	2.67	1.92	04:20	0.033	21:20	0.193	0.076	0.076	-
04/26/2023	23:55	1.16	09:15	2.80	1.62	23:50	1.25	07:20	2.50	1.75	23:50	0.027	09:15	0.161	0.059	0.059	-
04/27/2023	02:45	0.94	21:05	2.44	1.45	02:45	0.89	21:05	2.47	1.59	02:45	0.013	21:05	0.143	0.047	0.047	-
04/28/2023	03:20	0.92	09:25	2.52	1.46	04:05	0.85	08:55	2.51	1.53	03:20	0.013	08:55	0.139	0.046	0.046	-
04/29/2023	04:00	0.95	10:40	2.27	1.45	03:45	0.94	23:05	2.31	1.59	03:45	0.015	10:40	0.105	0.046	0.046	-
04/30/2023	05:20	0.91	19:20	2.52	1.50	03:50	0.84	19:25	2.53	1.60	03:50	0.012	19:20	0.145	0.051	0.051	-
05/01/2023	04:25	0.86	19:15	2.38	1.48	04:05	0.65	19:50	2.12	1.50	04:05	0.009	19:50	0.112	0.047	0.047	-
05/02/2023	04:25	0.81	19:20	2.59	1.46	04:20	0.55	15:40	2.15	1.45	04:20	0.007	15:40	0.129	0.046	0.046	-
05/03/2023	04:25	0.85	20:45	2.54	1.41	04:20	0.33	22:55	1.98	1.29	04:25	0.004	20:45	0.110	0.039	0.039	-
05/04/2023	02:25	0.82	11:55	2.68	1.38	04:00	0.36	06:05	2.01	1.25	02:10	0.004	20:20	0.109	0.038	0.038	-
05/05/2023	03:35	0.91	17:55	2.52	1.56	03:05	0.58	13:25	1.96	1.39	03:10	0.009	17:55	0.105	0.046	0.046	-
05/06/2023	06:15	0.98	11:00	2.62	1.49	07:00	0.62	17:35	1.97	1.42	06:05	0.010	11:00	0.118	0.044	0.044	-
05/07/2023	06:20	0.85	11:25	2.58	1.42	01:30	0.42	18:25	2.01	1.36	01:30	0.006	11:25	0.101	0.041	0.041	-
05/08/2023	04:40	0.85	06:25	2.75	1.39	05:25	0.44	11:50	1.97	1.30	04:40	0.006	06:25	0.129	0.038	0.038	-
05/09/2023	01:30	0.84	09:45	4.98	1.58	01:40	0.31	22:45	2.38	1.20	01:40	0.004	22:15	0.134	0.041	0.041	-
05/10/2023	01:40	0.85	14:20	2.75	1.48	02:25	0.80	00:00	2.38	1.35	02:50	0.011	07:25	0.131	0.043	0.043	-
05/11/2023	04:40	0.94	09:00	2.53	1.45	03:05	0.71	09:00	2.13	1.26	04:40	0.011	09:00	0.129	0.039	0.039	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
05/12/2023	02:05	0.84	17:40	2.64	1.32	05:40	0.66	17:40	2.06	1.15	02:05	0.008	17:40	0.133	0.032	0.032	-
05/13/2023	04:55	0.86	13:35	2.51	1.37	23:55	0.77	10:20	2.07	1.25	05:40	0.011	22:25	0.116	0.036	0.036	-
05/14/2023	05:25	0.84	21:40	2.48	1.43	08:15	0.75	23:00	2.10	1.26	05:25	0.010	22:30	0.106	0.039	0.039	-
05/15/2023	04:30	0.91	11:30	2.39	1.42	02:30	0.70	22:45	2.15	1.23	04:30	0.010	11:30	0.116	0.037	0.037	-
05/16/2023	01:10	0.95	09:05	2.62	1.46	16:20	0.37	05:05	2.05	1.25	16:20	0.008	09:05	0.114	0.038	0.038	-
05/17/2023	03:15	0.84	16:15	2.88	1.39	04:10	0.80	20:45	2.01	1.30	04:10	0.011	16:15	0.143	0.038	0.038	-
05/18/2023	03:25	0.84	07:25	2.44	1.40	01:25	0.76	13:10	2.36	1.30	02:55	0.010	21:50	0.127	0.039	0.039	-
05/19/2023	04:30	0.76	09:55	2.50	1.36	06:25	0.80	09:55	2.36	1.34	04:05	0.009	09:55	0.141	0.039	0.039	-
05/20/2023	05:20	0.75	22:45	2.67	1.43	05:10	0.77	21:55	2.43	1.27	05:20	0.008	22:45	0.147	0.039	0.039	-
05/21/2023	04:45	0.79	12:40	2.41	1.39	05:15	0.76	11:35	2.10	1.18	05:15	0.009	13:40	0.110	0.034	0.034	-
05/22/2023	04:50	0.88	15:10	2.50	1.43	03:30	0.80	21:40	2.26	1.25	03:30	0.011	15:10	0.132	0.038	0.038	-
05/23/2023	03:10	0.77	18:10	2.67	1.34	05:55	0.28	00:25	2.00	0.94	03:10	0.003	15:20	0.110	0.028	0.028	-
05/24/2023	04:35	0.74	20:25	2.43	1.39	05:10	0.31	22:50	1.75	0.82	02:00	0.004	19:35	0.096	0.026	0.026	-
05/25/2023	04:10	0.75	20:30	2.45	1.41	16:30	0.26	17:30	1.73	0.75	04:00	0.003	20:30	0.094	0.024	0.024	-
05/26/2023	03:40	0.80	10:15	2.47	1.40	11:05	0.25	13:55	1.84	0.82	03:00	0.003	07:30	0.094	0.026	0.026	-
05/27/2023	04:55	0.72	14:45	2.60	1.30	04:20	0.27	12:00	1.85	0.85	04:20	0.003	14:45	0.106	0.025	0.025	-
05/28/2023	04:20	0.65	22:20	2.59	1.30	22:35	0.28	01:00	1.81	0.74	04:20	0.003	22:20	0.100	0.021	0.021	-
05/29/2023	05:35	0.72	13:00	2.91	1.42	02:00	0.21	18:00	1.63	0.76	02:00	0.002	13:00	0.117	0.024	0.024	-
05/30/2023	04:05	0.84	22:30	2.27	1.32	03:30	0.26	17:35	1.86	0.72	04:30	0.004	19:55	0.084	0.021	0.021	-
05/31/2023	04:50	0.76	17:40	2.36	1.34	14:50	0.27	10:40	1.79	0.76	04:40	0.004	12:05	0.083	0.022	0.022	-
06/01/2023	05:00	0.73	17:50	2.68	1.32	06:35	0.26	14:55	1.81	0.71	03:50	0.004	17:50	0.110	0.020	0.020	-
06/02/2023	05:05	0.84	16:10	2.47	1.32	03:10	0.27	23:05	1.87	0.80	04:15	0.005	16:45	0.098	0.022	0.022	-
06/03/2023	05:25	0.80	12:45	2.66	1.36	15:30	0.17	08:30	1.84	0.92	15:30	0.003	12:45	0.114	0.028	0.028	-
06/04/2023	05:30	0.77	12:55	2.47	1.47	05:20	0.28	10:00	1.86	0.79	05:20	0.003	10:00	0.104	0.026	0.026	-
06/05/2023	04:15	0.85	14:00	2.39	1.39	07:10	0.32	16:20	1.81	0.79	04:15	0.005	20:35	0.098	0.024	0.024	-
06/06/2023	03:40	0.61	09:45	2.42	1.41	00:50	0.25	10:15	1.74	0.76	03:35	0.002	08:20	0.096	0.024	0.024	-
06/07/2023	04:30	0.84	08:00	2.56	1.44	03:50	0.22	18:55	1.83	0.83	03:55	0.003	17:40	0.095	0.027	0.027	-
06/08/2023	04:00	0.74	10:05	2.41	1.39	02:15	0.29	18:25	1.85	0.83	02:15	0.003	10:05	0.101	0.026	0.026	-
06/09/2023	05:00	0.69	10:05	2.40	1.38	10:10	0.27	19:35	1.84	0.89	02:40	0.003	09:35	0.093	0.027	0.027	0.20
06/10/2023	03:40	0.82	18:35	2.42	1.45	22:10	0.35	14:10	1.92	1.00	04:55	0.005	11:30	0.094	0.032	0.032	0.20
06/11/2023	03:50	0.72	14:00	2.37	1.43	02:50	0.30	10:55	1.97	1.03	02:50	0.003	12:55	0.100	0.034	0.034	-
06/12/2023	02:55	0.79	07:25	2.58	1.48	02:45	0.29	08:55	1.94	0.96	02:45	0.003	08:25	0.108	0.032	0.032	-
06/13/2023	04:30	0.67	07:40	2.31	1.42	03:40	0.27	09:30	1.89	0.85	03:50	0.003	07:40	0.097	0.027	0.027	-
06/14/2023	05:50	0.85	07:10	2.45	1.47	03:35	0.27	13:25	1.87	0.82	05:55	0.004	13:25	0.098	0.027	0.027	-
06/15/2023	02:00	0.87	08:20	2.31	1.42	05:20	0.30	10:55	1.88	0.82	05:20	0.005	08:20	0.099	0.026	0.026	-
06/16/2023	03:35	0.88	20:25	2.30	1.44	00:20	0.23	17:15	1.52	0.62	03:30	0.004	17:15	0.078	0.020	0.020	0.10
06/17/2023	03:55	0.90	12:05	2.38	1.60	14:35	0.25	12:25	1.88	0.66	05:55	0.004	12:25	0.100	0.024	0.024	0.11
06/18/2023	03:30	1.10	10:00	2.68	1.59	05:45	0.12	13:05	1.58	0.65	05:45	0.002	12:15	0.088	0.024	0.024	0.22
06/19/2023	04:55	1.05	08:05	2.82	1.61	05:25	0.21	21:25	1.61	0.66	05:25	0.004	08:05	0.102	0.024	0.024	0.16
06/20/2023	01:00	1.00	09:20	2.48	1.64	02:00	0.21	19:40	1.70	0.90	02:20	0.004	19:40	0.097	0.033	0.033	0.60
06/21/2023	04:05	1.07	08:50	2.70	1.60	14:25	0.27	23:40	1.87	1.05	03:50	0.006	08:50	0.121	0.037	0.037	-
06/22/2023	00:30	1.05	19:40	2.64	1.68	03:10	0.32	13:40	1.88	0.98	03:10	0.006	21:45	0.111	0.037	0.037	-
06/23/2023	05:40	1.12	12:20	2.84	1.79	21:35	0.27	17:55	1.87	0.77	05:40	0.006	11:15	0.123	0.033	0.033	-
06/24/2023	06:00	1.25	12:05	2.78	1.75	03:40	0.30	16:15	1.86	0.85	01:55	0.008	13:25	0.119	0.034	0.034	-
06/25/2023	06:35	1.25	12:45	2.70	1.77	01:25	0.27	14:20	1.88	1.13	01:25	0.007	09:25	0.112	0.046	0.046	-
06/26/2023	03:15	1.24	19:35	2.58	1.75	23:25	0.32	16:50	1.83	1.09	05:00	0.011	22:15	0.110	0.043	0.043	-
06/27/2023	04:05	1.25	11:20	2.74	1.80	14:10	0.27	02:45	1.79	0.83	03:45	0.007	08:50	0.107	0.034	0.034	-
06/28/2023	03:10	1.25	22:10	2.87	1.75	12:05	0.31	17:15	1.96	0.88	04:25	0.009	20:50	0.108	0.036	0.036	-
06/29/2023	04:00	1.15	12:20	2.99	1.76	14:30	0.33	01:10	1.77	0.87	03:50	0.008	22:50	0.107	0.036	0.036	-
06/30/2023	04:55	1.14	11:45	2.76	1.71	04:55	0.28	14:25	1.92	0.90	04:55	0.005	11:45	0.118	0.036	0.036	-
07/01/2023	05:05	1.12	16:35	2.89	1.72	04:15	0.23	09:35	1.72	0.71	04:15	0.005	09:35	0.107	0.028	0.028	-
07/02/2023	03:50	1.25	21:25	2.84	1.75	20:30	0.24	09:30	1.60	0.63	05:30	0.007	09:30	0.108	0.026	0.026	-
07/03/2023	22:30	1.36	15:25	2.69	1.76	00:30	0.26	08:40	1.82	0.84	01:35	0.009	08:40	0.116	0.034	0.034	-
07/04/2023	06:00	1.07	10:25	2.61	1.65	05:35	0.26	13:40	1.77	0.76	06:00	0.005	13:40	0.102	0.029	0.029	-
07/05/2023	03:55	1.16	20:05	2.70	1.76	03:25	0.27	19:05	1.70	0.89	04:00	0.006	07:30	0.103	0.036	0.036	-
07/06/2023	03:30	1.22	08:45	2.64	1.78	23:45	0.26	01:45	1.56	0.75	05:15	0.008	07:15	0.095	0.030	0.030	-
07/07/2023	07:10	1.13	16:45	2.82	1.74	22:15	0.28	22:10	1.64	0.81	07:10	0.006	16:45	0.116	0.033	0.033	-
07/08/2023	04:30	1.28	21:00	3.00	1.85	20:10	0.35	08:30	1.88	0.89	05:30	0.011	21:00	0.128	0.038	0.038	-
07/09/2023	02:35	1.30	19:40	2.61	1.86	12:40	0.31	22:55	1.89	0.93	02:20	0.008	23:25	0.113	0.040	0.040	-
07/10/2023	05:50	1.32	17:20	3.00	1.79	12:45	0.31	09:40	1.83	0.91	06:35	0.009	17:20	0.134	0.037	0.037	-
07/11/2023	01:35	1.30	15:45	2.90	1.70	11:35	0.29	11:30	1.83	0.81	00:15	0.009	08:05	0.109	0.030	0.030	-
07/12/2023	04:40	1.21	14:15	2.61	1.70	03:30	0.24	13:45	1.64	0.89	03:30	0.005	14:15	0.099	0.034	0.034	-
07/13/2023	02:40	1.27	08:50	2.74	1.78	02:20	0.27	12:45	1.74	0.86	02:20	0.006	20:40	0.103	0.035	0.035	-
07/14/2023	07:05	1.31	20:35	2.74	1.88	04:30	0.29	20:35	1.64	0.65	04:30	0.008	20:35	0.111	0.028	0.028	-
07/15/2023	03:05	1.36	10:35	2.81	1.82	00:40	0.23	20:55	1.74	0.85	01:35	0.008	14:40	0.104	0.036	0.036	-
07/16/2023	04:40	1.29	10:35	2.62	1.78	03:25	0.30	22:50	1.74	0.96	03:25	0.008	10:35	0.108	0.039	0.039	-
07/17/2023	04:20	1.22	20:05	2.71	1.75	03:50	0.27	08:40	1.71	0.92	03:50	0.007	20:05	0.103	0.037	0.037	0.01
07/18/2023	04:40	1.22	18:10	3.04	1.76	02:00	0.33	13:40	1.75	0.89	02:00	0.008	18:10	0.126	0.036	0.036	-
07/19/2023	04:55	1.29	21:00	2.80	1.71	04:10	0.30	14:00	1.93	0.87	04:10	0.007	21:00	0.102	0.033	0.033	-
07/20/2023	04:05	1.28	13:25	2.98	1.82	14:55	0.23	08:05	1.84	0.83	14:55	0.008	09:05	0.117	0.035	0.035	-
07/21/2023	03:45	1.29	20:15	3.00	1.89	08:20	0.30	23:25	1.81	0.77	04:45	0.008	23:25	0.119	0.034	0.034	-
07/22/2023	23:55	1.43	10:25	3.10	1.93	00:20	0.29	17:35	1.81	0.88	04:20	0.009	12:05	0.139	0.041	0.041	-
07/23/2023	04:45	1.23	11:15	2.91	1.87	07:05	0.29	01:10	1.77	0.91	07:05	0.008	11:15	0.120	0.041	0.041	-
07/24/2023	05:45	1.20	16:45	3.17	1.74	04:25	0.27	16:45	1.79	0.92	04:25	0.006	16:45	0.148	0.037	0.037	0.38

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
07/25/2023	05:25	1.10	12:10	2.63	1.68	05:30	0.25	10:10	1.61	0.78	05:30	0.005	10:10	0.092	0.029	0.029	-
07/26/2023	06:25	1.16	22:10	3.81	1.67	00:20	0.28	22:10	1.93	0.81	03:50	0.007	22:10	0.203	0.031	0.031	-
07/27/2023	04:20	1.24	09:05	2.55	1.74	00:25	0.30	07:40	1.84	0.91	01:25	0.008	09:05	0.101	0.036	0.036	-
07/28/2023	05:00	1.23	17:15	2.73	1.64	23:45	0.21	01:10	1.54	0.64	23:45	0.005	10:10	0.084	0.023	0.023	-
07/29/2023	00:25	1.24	15:10	2.54	1.79	05:10	0.13	13:00	1.13	0.47	05:10	0.004	09:50	0.043	0.018	0.018	-
07/30/2023	23:10	1.47	17:00	2.59	1.82	20:20	0.10	07:15	1.33	0.52	02:40	0.004	17:00	0.056	0.020	0.020	-
07/31/2023	04:15	1.23	14:30	2.37	1.76	05:40	0.09	08:35	1.36	0.48	05:40	0.002	08:35	0.062	0.018	0.018	-
08/01/2023	02:30	1.49	12:50	2.48	1.77	06:20	0.09	10:45	1.32	0.52	06:20	0.003	10:45	0.055	0.019	0.019	-
08/02/2023	16:00	1.40	21:10	2.28	1.78	12:55	0.08	20:40	1.28	0.49	12:55	0.003	12:30	0.056	0.018	0.018	-

03/02/2023 00:00 - 08/02/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			6.969	10.23
Average	1.62	1.27	0.045	

DUV_SWRMH466

Site Commentary

SITE INFORMATION

Pipe	Elliptical (11.25 in H x 12 in W)
Silt	0.00 (in)

OBSERVATIONS

This site functioned under normal conditions during the study period. Daily backwater conditions were observed. Surcharge conditions were recorded at this location.

5-min flow depth, velocity, and quantity data observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.10	2.61	0.289
Minimum	1.29	0.87	0.034
Maximum	14.35	3.71	0.914
Min Time	06/08/2023 2:20:00 AM	07/16/2023 3:35:00 AM	07/04/2023 4:10:00 AM
Max Time	04/11/2023 7:45:00 AM	03/27/2023 11:05:00 PM	04/11/2023 7:45:00 AM

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions are based on the five minutes intervals.

Values in the graphical reports are based on the fifteen minutes average.

Values in the tabular report are based on the five minutes.

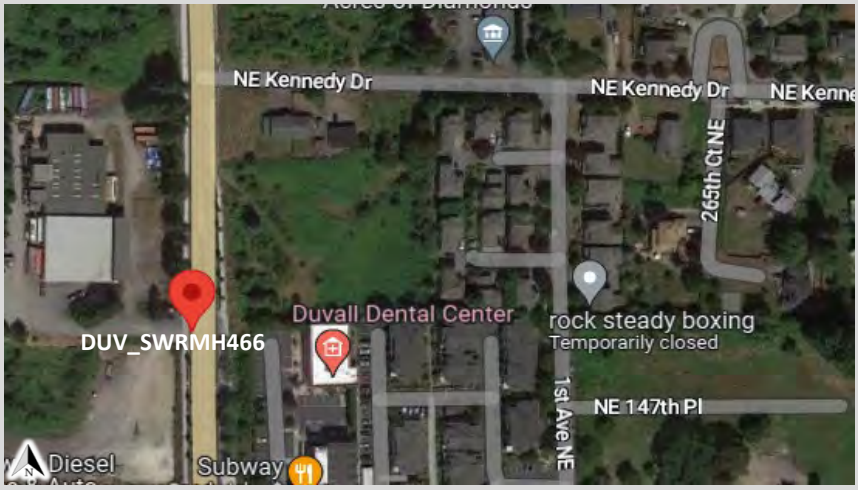
DATA UPTIME

Data uptime observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Duvall.Parametrix.TFM.WA23		Site Name
Flow Monitoring Site Report		DUV_SWRMH466

Site Address /Location:	14849-14755 Carnation Duvall Rd, Duvall,WA			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Located on road edge	Latitude:	47.734303	Pipe Size (H x W)	Pipe Shape
		Longitude:	-121.987404	11.25 x 12.00	Elliptical



Manhole #	System Characteristics
SWRMH466	Commercial
Access	Traffic
Drive	Medium

ADS Project Name:	Duvall.Parametrix.TFM.WA23
ADS Project Number:	22905.11 .325

Installation Information	
Installation Date:	Installation Type:
Wednesday, March 1, 2023	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi
Installation Confirmation:	
Time	
12:30:00 PM	
Depth of Flow (Wet DOF) (in)	
2.88	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.5	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
12	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
Yes, Inside	Normal
Pipe Material	Pipe Condition:
PVC	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole
Additional Site Info. / Comments:	

Additional Photos

Monitoring Point Inlet	Outlet	Side Connection
		
Top Down	**Location**	
		
	KEY	
	Flow Direction Monitoring Point	

Hydrograph Report

DUV_SWRMH466

Flow Monitor

DUV_SWRMH466

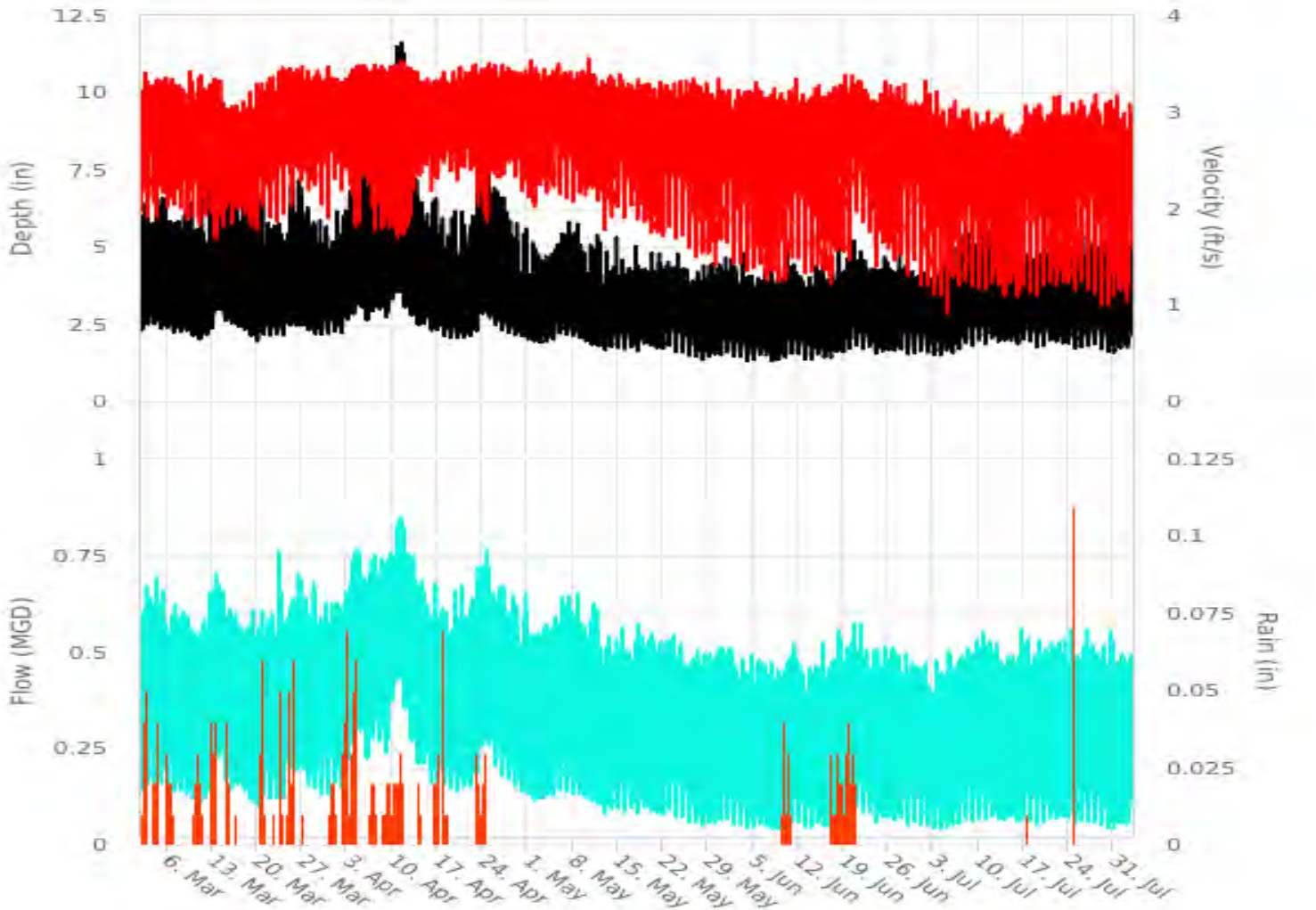
Pipe Height
11.25
in

Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL
Rain
VFINAL
QFINAL



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Scattergraph Report

DUV_SWRMH466

Flow Monitor

DUV_SWRMH466

Pipe Height
11.25
in

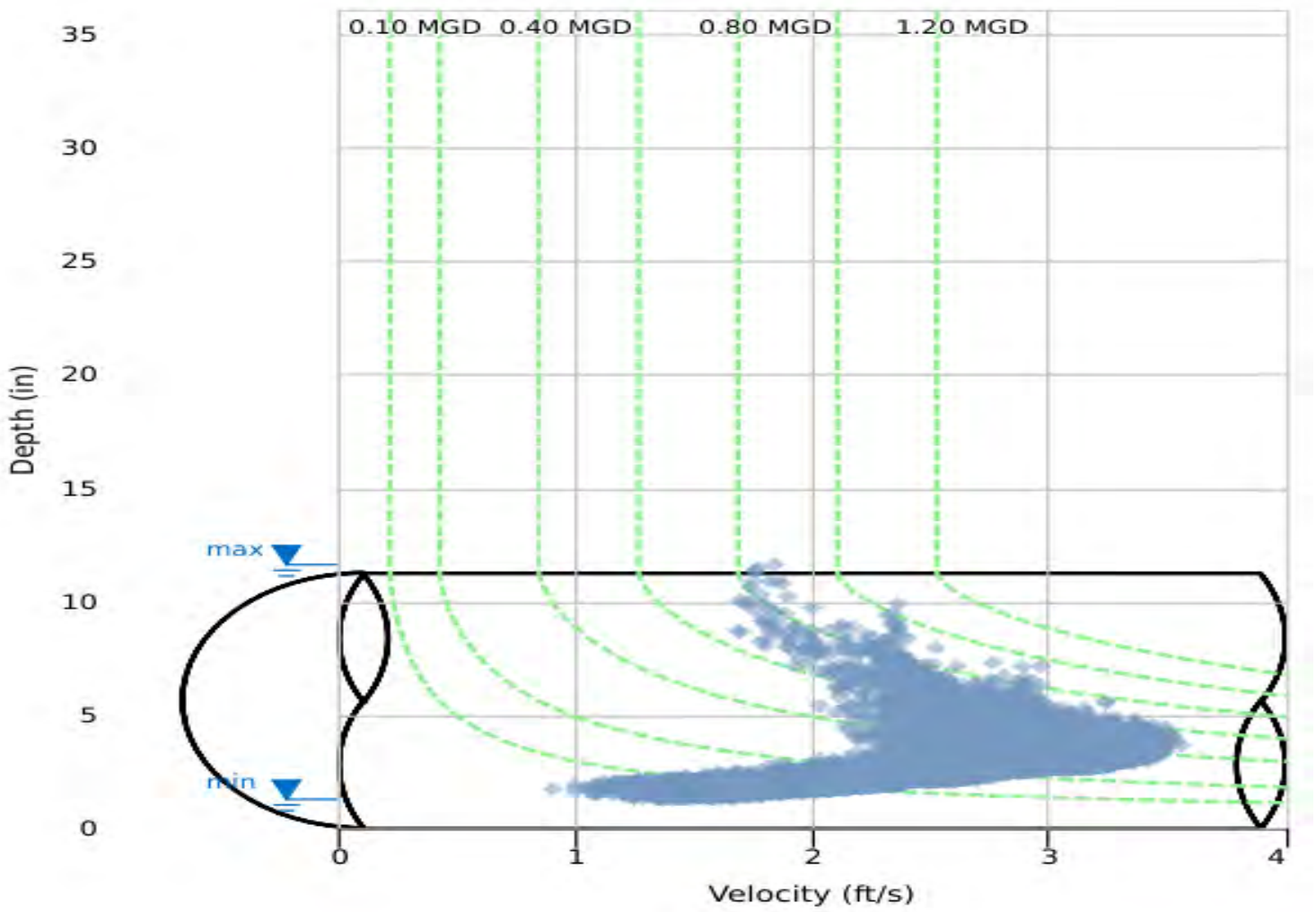
Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth

ADS ENVIRONMENTAL SERVICES



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Daily Tabular Report

03/02/2023 00:00 - 08/02/2023 23:59
DUV_SWRMH466Pipe: Elliptical (11.25 in H x 12 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/02/2023	03:10	2.29	20:40	8.06	3.53	22:05	1.85	22:55	3.46	2.74	01:50	0.135	09:35	0.777	0.355	0.355	0.30
03/03/2023	03:50	2.47	19:00	7.80	3.53	01:30	1.74	09:55	3.44	2.77	01:30	0.143	12:15	0.768	0.360	0.360	0.11
03/04/2023	03:10	2.50	10:40	9.60	3.81	13:15	1.60	01:20	3.46	2.81	03:05	0.155	10:00	0.756	0.383	0.383	0.29
03/05/2023	06:05	2.32	11:45	9.00	3.55	20:05	1.73	23:40	3.50	2.85	05:50	0.154	20:40	0.757	0.350	0.350	0.17
03/06/2023	02:15	2.37	19:55	7.82	3.42	08:25	1.55	02:35	3.50	2.80	03:55	0.125	22:35	0.722	0.337	0.337	0.05
03/07/2023	03:35	2.21	20:45	8.52	3.31	19:25	1.79	00:25	3.49	2.79	03:25	0.130	14:45	0.735	0.329	0.329	-
03/08/2023	04:05	2.23	18:20	7.70	3.38	23:40	1.68	02:00	3.45	2.68	02:40	0.135	13:35	0.715	0.326	0.326	-
03/09/2023	04:35	2.23	19:45	8.26	3.12	02:20	1.61	00:25	3.57	2.67	02:20	0.114	09:15	0.700	0.292	0.292	-
03/10/2023	02:05	2.09	11:15	7.89	3.07	02:50	1.82	18:20	3.44	2.70	02:50	0.113	15:10	0.703	0.289	0.289	0.19
03/11/2023	03:20	1.98	09:55	9.26	3.11	09:55	1.54	22:45	3.50	2.66	03:40	0.096	23:35	0.732	0.291	0.291	0.04
03/12/2023	05:30	2.12	19:00	10.30	3.28	19:05	1.58	11:05	3.45	2.66	03:00	0.116	19:00	0.756	0.310	0.310	0.41
03/13/2023	01:10	2.35	19:30	11.62	4.51	20:05	1.53	02:40	3.45	2.67	00:55	0.140	19:30	0.786	0.422	0.422	0.54
03/14/2023	23:55	2.80	19:00	11.56	4.40	19:45	1.55	05:40	3.51	2.63	01:00	0.211	19:00	0.817	0.412	0.412	-
03/15/2023	01:45	2.57	06:20	9.24	3.84	07:00	1.57	00:35	3.41	2.60	01:20	0.164	06:15	0.723	0.358	0.358	0.10
03/16/2023	01:45	2.52	18:30	8.79	3.66	01:50	1.62	15:35	3.37	2.56	01:50	0.130	11:20	0.717	0.337	0.337	0.01
03/17/2023	03:15	2.41	19:10	8.30	3.53	01:30	1.75	01:20	3.48	2.59	02:15	0.142	02:25	0.710	0.330	0.330	-
03/18/2023	03:05	2.30	09:05	9.31	3.38	09:05	1.57	01:00	3.43	2.54	00:50	0.129	09:00	0.684	0.301	0.301	-
03/19/2023	04:00	2.10	12:10	9.10	3.29	12:10	1.59	01:25	3.52	2.52	02:10	0.110	19:05	0.661	0.290	0.290	-
03/20/2023	02:55	1.93	20:35	8.85	3.17	06:25	1.71	08:30	3.49	2.65	02:25	0.099	20:35	0.707	0.296	0.296	0.30
03/21/2023	02:50	2.14	20:35	7.74	3.21	03:10	1.87	00:45	3.51	2.69	03:10	0.122	21:15	0.684	0.308	0.308	0.04
03/22/2023	02:40	2.11	20:15	8.26	3.16	01:10	1.77	09:00	3.53	2.63	02:50	0.113	10:20	0.683	0.296	0.296	0.01
03/23/2023	01:20	2.16	08:00	8.32	3.21	01:50	1.63	23:50	3.63	2.78	01:50	0.109	20:45	0.765	0.324	0.324	0.09
03/24/2023	02:50	2.12	20:25	7.18	3.08	02:40	1.82	01:25	3.63	2.84	02:40	0.115	19:35	0.759	0.309	0.309	0.44
03/25/2023	03:05	2.44	10:00	10.62	3.75	10:00	1.63	04:40	3.58	2.96	01:50	0.186	21:05	0.764	0.390	0.390	0.21
03/26/2023	01:40	2.43	09:55	9.18	3.68	10:00	1.66	02:15	3.69	2.96	01:35	0.187	11:15	0.751	0.384	0.384	0.02
03/27/2023	23:50	2.40	19:15	8.90	3.45	19:15	1.79	23:05	3.71	2.98	03:30	0.189	14:20	0.770	0.361	0.361	-
03/28/2023	02:25	2.29	20:05	7.87	3.25	16:10	1.78	04:30	3.69	2.91	02:05	0.145	20:55	0.747	0.333	0.333	-
03/29/2023	02:20	2.18	07:15	8.42	3.13	00:10	1.96	11:20	3.65	2.90	00:10	0.131	18:40	0.795	0.319	0.319	-
03/30/2023	01:50	2.15	20:05	7.14	3.19	03:20	1.73	00:25	3.63	2.86	03:20	0.111	09:45	0.733	0.324	0.324	-
03/31/2023	03:10	2.18	20:40	6.79	3.18	01:35	1.64	19:50	3.68	2.86	00:35	0.114	18:20	0.754	0.326	0.326	0.26
04/01/2023	02:45	2.24	11:30	7.88	3.35	11:30	1.98	03:35	3.61	2.85	01:30	0.144	10:40	0.759	0.341	0.341	-
04/02/2023	01:40	2.21	19:15	8.62	3.53	10:15	1.78	02:15	3.52	2.83	04:20	0.139	19:15	0.783	0.359	0.359	0.63
04/03/2023	02:40	2.64	18:30	9.97	4.01	18:35	1.69	23:40	3.56	2.94	01:35	0.212	18:30	0.794	0.420	0.420	0.26
04/04/2023	01:05	2.79	18:20	11.60	4.71	19:30	1.66	06:45	3.53	2.98	00:40	0.248	18:20	0.847	0.500	0.500	0.43
04/05/2023	23:55	2.76	06:00	9.15	4.18	07:25	1.82	08:00	3.53	3.02	23:50	0.253	01:50	0.781	0.452	0.452	-
04/06/2023	02:35	2.61	20:00	10.52	3.97	20:00	1.69	21:45	3.56	3.00	03:05	0.214	19:55	0.784	0.424	0.424	0.48
04/07/2023	01:30	2.93	10:10	11.21	4.81	18:55	1.66	23:50	3.62	2.91	01:40	0.264	10:10	0.875	0.498	0.498	0.23
04/08/2023	02:25	2.96	09:35	11.57	4.45	14:45	1.64	08:45	3.53	2.93	02:20	0.260	09:35	0.842	0.462	0.462	0.08
04/09/2023	03:05	2.72	19:35	10.77	4.66	17:00	1.59	18:10	3.53	2.92	03:40	0.221	16:55	0.801	0.484	0.484	0.52
04/10/2023	02:10	3.29	18:05	13.01	5.56	11:05	1.56	08:30	3.54	2.88	01:05	0.370	18:05	0.871	0.561	0.561	0.53
04/11/2023	23:50	3.07	07:45	14.35	6.21	08:30	1.66	06:20	3.61	2.85	23:45	0.348	07:45	0.914	0.601	0.601	0.20
04/12/2023	23:50	2.86	07:40	11.03	4.83	18:30	1.64	18:20	3.55	3.00	23:50	0.307	07:40	0.815	0.507	0.507	-
04/13/2023	23:50	2.58	08:50	9.93	4.21	08:50	1.69	11:30	3.55	3.04	23:50	0.233	08:05	0.790	0.459	0.459	0.02
04/14/2023	01:40	2.46	08:45	9.80	3.70	08:45	1.62	20:25	3.52	3.01	02:55	0.202	10:05	0.782	0.398	0.398	0.01
04/15/2023	23:45	2.45	09:40	8.52	3.62	09:45	1.85	02:55	3.55	2.91	01:15	0.207	06:30	0.762	0.379	0.379	-
04/16/2023	03:30	2.27	10:25	8.23	3.62	10:25	1.78	02:25	3.48	2.85	03:00	0.151	13:45	0.730	0.367	0.367	0.23
04/17/2023	02:55	2.30	19:15	8.07	3.32	19:15	1.94	01:10	3.50	2.91	02:55	0.156	20:35	0.747	0.341	0.341	0.12
04/18/2023	02:45	2.10	20:15	7.94	3.15	20:10	1.91	00:55	3.53	2.91	02:45	0.147	14:20	0.707	0.319	0.319	0.05
04/19/2023	03:25	2.06	06:45	7.70	3.15	06:45	1.99	15:25	3.56	2.91	03:20	0.143	20:35	0.724	0.319	0.319	-
04/20/2023	02:35	2.03	20:45	7.72	3.10	20:50	1.95	23:15	3.61	2.92	02:25	0.128	07:55	0.746	0.317	0.317	-
04/21/2023	02:05	2.06	06:55	7.55	3.11	06:55	1.98	16:25	3.58	3.00	02:00	0.139	13:25	0.694	0.327	0.327	-
04/22/2023	03:30	2.11	09:55	8.65	3.25	09:55	1.73	01:40	3.63	2.96	03:25	0.141	11:50	0.766	0.340	0.340	0.19
04/23/2023	03:00	2.26	19:25	9.69	4.00	19:25	1.72	04:25	3.56	2.97	04:40	0.174	21:15	0.783	0.427	0.427	0.40
04/24/2023	02:10	2.82	18:45	10.17	4.45	07:00	1.64	21:45	3.57	2.97	02:25	0.251	18:00	0.816	0.476	0.476	0.29
04/25/2023	23:35	2.61	19:30	8.98	3.98	20:15	1.80	21:20	3.63	3.04	23:35	0.238	14:35	0.829	0.432	0.432	-
04/26/2023	23:55	2.40	07:05	8.68	3.56	07:05	1.78	00:40	3.65	3.02	02:05	0.193	06:20	0.757	0.379	0.379	-
04/27/2023	02:50	2.29	07:20	7.83	3.28	07:20	1.98	00:05	3.64	3.02	00:50	0.172	10:55	0.756	0.347	0.347	-
04/28/2023	02:50	2.20	07:05	7.38	3.18	07:05	2.03	02:20	3.65	2.98	03:30	0.156	08:30	0.787	0.331	0.331	-
04/29/2023	02:55	2.13	08:20	6.91	3.05	09:05	2.16	19:55	3.64	2.92	01:35	0.143	11:10	0.759	0.313	0.313	-
04/30/2023	04:25	2.10	18:30	7.10	3.08	09:40	1.97	21:10	3.59	2.91	02:50	0.125	19:05	0.723	0.315	0.315	-
05/01/2023	02:50	1.98	19:20	6.48	2.85	04:05	2.07	15:35	3.64	2.87	02:05	0.124	17:10	0.704	0.285	0.285	-
05/02/2023	01:55	1.93	06:30	6.27	2.77	03:05	1.84	19:40	3.59	2.83	03:05	0.101	20:25	0.714	0.270	0.270	-
05/03/2023	01:40	1.89	07:25	6.57	2.81	01:15	2.16	19:00	3.54	2.80	01:15	0.115	19:45	0.711	0.274	0.274	-
05/04/2023	01:00	1.91	18:15	6.06	2.87	03:50	1.88	14:10	3.54	2.79	03:50	0.107	19:45	0.710	0.281	0.281	-
05/05/2023	02:05	1.97	20:15	6.76	3.10	18:10	1.99	21:00	3.57	2.91	03:10	0.124	08:00	0.731	0.322	0.322	-
05/06/2023	04:10	2.18	10:00	6.90	3.21	12:30	2.02	02:05	3.59	2.93	02:40	0.138	13:55	0.728	0.338	0.338	-
05/07/2023	02:35	2.15	11:00	7.09	3.22	02:25	2.07	03:05	3.62	2.87	04:20	0.133	13:05	0.731	0.330	0.330	-
05/08/2023	02:10	2.12	19:35	7.17	3.03	06:40	2.00	10:35	3.56	2.86	02:25	0.126	18:45	0.727	0.306	0.306	-
05/09/2023	02:25	2.04	19:55	7.12	2.91	00:45	2.07	20:30	3.60	2.85	23:45	0.127	19:55	0.726	0.291	0.291	-
05/10/2023	01:40	1.94	18:50	6.96	2.79	04:30	2.03	13:05	3.62	2.81	01:35	0.116	21:45	0.677	0.272	0.272	-
05/11/2023	01:25	1.81	19:50	7.03	2.70	23:40	1.99	10:15	3.52	2.76	02:55	0.109	19:50	0.724	0.256	0.256	-

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
05/12/2023	03:35	1.78	06:20	6.66	2.57	04:05	1.92	02:40	3.48	2.72	04:05	0.097	11:05	0.682	0.237	0.237	-
05/13/2023	02:50	1.64	09:30	5.86	2.77	01:05	1.67	22:10	3.52	2.71	01:05	0.076	17:15	0.726	0.267	0.267	-
05/14/2023	02:35	1.76	20:50	6.56	2.67	03:40	1.72	13:30	3.48	2.70	03:40	0.082	14:20	0.694	0.248	0.248	-
05/15/2023	03:05	1.72	19:35	5.86	2.62	02:00	1.90	18:45	3.52	2.68	03:05	0.089	08:55	0.689	0.241	0.241	-
05/16/2023	03:05	1.66	20:15	6.00	2.64	02:25	1.74	09:35	3.45	2.66	03:00	0.082	19:30	0.689	0.242	0.242	-
05/17/2023	03:30	1.70	20:00	6.08	2.65	23:30	1.85	17:35	3.46	2.63	03:30	0.090	19:20	0.659	0.239	0.239	-
05/18/2023	02:45	1.61	19:45	5.68	2.74	02:25	1.75	17:25	3.42	2.62	01:25	0.075	21:20	0.707	0.253	0.253	-
05/19/2023	02:35	1.86	14:00	7.35	2.73	02:45	1.80	21:05	3.63	2.58	02:45	0.094	14:00	0.751	0.246	0.246	-
05/20/2023	04:05	1.80	08:50	5.97	2.72	04:10	1.68	14:05	3.45	2.56	04:10	0.082	08:45	0.726	0.246	0.246	-
05/21/2023	04:25	1.72	19:20	6.12	2.74	04:15	1.65	15:05	3.63	2.54	04:15	0.076	09:45	0.708	0.247	0.247	-
05/22/2023	02:25	1.69	19:00	6.74	2.76	03:40	1.61	10:55	3.43	2.57	02:15	0.074	20:35	0.702	0.249	0.249	-
05/23/2023	23:50	1.78	20:15	6.07	2.71	03:00	1.71	15:55	3.47	2.55	01:55	0.084	06:00	0.689	0.242	0.242	-
05/24/2023	01:40	1.59	07:40	5.98	2.61	01:15	1.50	08:30	3.41	2.52	01:15	0.064	21:05	0.676	0.229	0.229	-
05/25/2023	02:15	1.57	08:50	5.87	2.59	02:55	1.57	15:40	3.44	2.51	02:55	0.066	07:15	0.717	0.225	0.225	-
05/26/2023	03:00	1.42	10:10	5.46	2.52	03:00	1.34	19:10	3.42	2.50	03:00	0.047	15:05	0.694	0.219	0.219	-
05/27/2023	02:45	1.43	19:20	5.58	2.39	03:30	1.36	09:20	3.67	2.43	03:30	0.050	08:25	0.680	0.199	0.199	-
05/28/2023	02:25	1.32	10:40	6.04	2.31	02:10	1.40	10:00	3.59	2.41	02:10	0.047	13:55	0.709	0.190	0.190	-
05/29/2023	03:35	1.44	13:55	6.63	2.55	03:30	1.29	14:50	3.35	2.45	03:30	0.046	11:45	0.677	0.219	0.219	-
05/30/2023	03:35	1.51	20:35	6.41	2.45	03:55	1.34	18:00	3.57	2.47	03:55	0.051	11:20	0.699	0.208	0.208	-
05/31/2023	02:30	1.48	20:05	6.20	2.43	02:15	1.41	16:15	3.42	2.48	02:15	0.055	06:20	0.693	0.205	0.205	-
06/01/2023	02:00	1.58	19:50	6.22	2.46	02:45	1.29	18:15	3.38	2.46	02:45	0.054	06:50	0.644	0.205	0.205	-
06/02/2023	02:20	1.44	06:00	5.60	2.40	01:55	1.37	19:25	3.41	2.41	02:40	0.050	18:30	0.658	0.198	0.198	-
06/03/2023	02:15	1.43	09:20	6.63	2.48	02:40	1.21	11:40	3.40	2.41	02:40	0.044	17:25	0.705	0.209	0.209	-
06/04/2023	03:50	1.29	20:15	6.33	2.45	02:45	1.19	12:50	3.38	2.40	03:35	0.038	20:10	0.628	0.206	0.206	-
06/05/2023	03:30	1.32	20:10	5.99	2.39	01:25	1.12	12:05	3.39	2.42	03:25	0.040	16:50	0.643	0.198	0.198	-
06/06/2023	02:55	1.49	20:20	5.92	2.55	03:10	1.31	17:45	3.38	2.41	02:50	0.050	18:40	0.647	0.214	0.214	-
06/07/2023	02:05	1.48	21:55	6.07	2.56	01:50	1.14	09:25	3.41	2.39	01:50	0.043	07:25	0.637	0.214	0.214	-
06/08/2023	02:20	1.29	08:55	5.90	2.38	01:15	1.16	09:45	3.39	2.40	02:55	0.037	21:05	0.642	0.197	0.197	-
06/09/2023	01:45	1.34	18:45	5.82	2.40	03:20	1.10	20:15	3.37	2.38	02:00	0.036	18:45	0.635	0.197	0.197	0.20
06/10/2023	02:50	1.39	10:50	6.83	2.51	03:35	1.09	18:25	3.43	2.38	02:45	0.038	10:10	0.629	0.209	0.209	0.20
06/11/2023	04:55	1.50	20:10	6.56	2.52	04:15	1.26	16:10	3.42	2.48	04:15	0.050	15:25	0.684	0.217	0.217	-
06/12/2023	04:05	1.52	20:25	5.84	2.42	03:05	1.34	21:20	3.40	2.44	04:05	0.055	09:40	0.684	0.201	0.201	-
06/13/2023	01:45	1.34	06:25	5.73	2.37	03:30	1.14	07:10	3.44	2.40	03:30	0.038	19:40	0.636	0.195	0.195	-
06/14/2023	02:00	1.31	19:20	6.55	2.40	02:55	1.21	06:35	3.39	2.38	02:55	0.039	20:10	0.653	0.195	0.195	-
06/15/2023	02:10	1.48	20:40	6.24	2.43	01:15	1.20	18:15	3.41	2.44	02:10	0.046	19:45	0.694	0.202	0.202	-
06/16/2023	01:45	1.41	06:50	5.57	2.39	02:50	1.17	07:40	3.42	2.40	02:50	0.041	15:35	0.670	0.197	0.197	0.10
06/17/2023	03:00	1.40	09:45	5.66	2.45	02:55	1.08	20:25	3.45	2.37	02:55	0.037	19:30	0.676	0.204	0.204	0.11
06/18/2023	04:30	1.57	09:20	7.61	2.53	03:35	1.43	21:30	3.47	2.48	04:30	0.058	09:20	0.743	0.217	0.217	0.22
06/19/2023	03:05	1.57	20:25	6.52	2.62	03:50	1.35	06:45	3.47	2.51	03:50	0.058	18:15	0.689	0.230	0.230	0.16
06/20/2023	03:25	1.69	19:05	7.00	2.88	00:55	1.32	21:50	3.52	2.63	00:55	0.062	19:00	0.732	0.271	0.271	0.60
06/21/2023	02:15	1.80	20:05	7.29	2.82	02:55	1.62	13:45	3.47	2.70	02:55	0.080	12:10	0.683	0.264	0.264	-
06/22/2023	02:00	1.68	20:25	6.77	2.74	02:45	1.77	07:10	3.42	2.62	02:00	0.081	05:35	0.653	0.248	0.248	-
06/23/2023	02:15	1.74	12:40	6.22	2.71	02:55	1.56	11:55	3.43	2.57	02:15	0.073	21:00	0.734	0.240	0.240	-
06/24/2023	03:45	1.52	09:55	6.18	2.66	03:00	1.28	18:40	3.43	2.51	03:00	0.052	14:35	0.682	0.234	0.234	-
06/25/2023	04:10	1.59	10:35	7.11	2.72	04:25	1.53	20:30	3.39	2.52	04:20	0.065	15:15	0.687	0.242	0.242	-
06/26/2023	03:05	1.65	07:40	5.47	2.67	02:30	1.32	15:15	3.42	2.49	02:30	0.058	18:40	0.669	0.234	0.234	-
06/27/2023	02:30	1.63	19:35	5.83	2.69	02:05	1.30	20:25	3.37	2.44	02:35	0.056	18:05	0.698	0.231	0.231	-
06/28/2023	02:50	1.64	08:15	6.02	2.63	02:25	1.33	22:00	3.38	2.42	02:25	0.058	11:10	0.607	0.221	0.221	-
06/29/2023	02:55	1.51	09:00	6.13	2.56	02:55	1.20	20:25	3.43	2.37	02:55	0.046	18:40	0.666	0.211	0.211	-
06/30/2023	02:35	1.55	19:50	6.07	2.51	02:35	1.25	06:55	3.47	2.37	02:35	0.050	08:40	0.670	0.205	0.205	-
07/01/2023	02:45	1.59	11:15	5.66	2.57	01:30	1.16	20:20	3.41	2.31	01:30	0.049	09:35	0.601	0.207	0.207	-
07/02/2023	03:55	1.54	08:40	5.61	2.49	02:25	1.04	20:40	3.36	2.26	02:25	0.044	13:45	0.584	0.195	0.195	-
07/03/2023	03:35	1.49	09:55	6.73	2.56	02:15	0.93	19:25	3.39	2.26	02:15	0.037	08:55	0.604	0.202	0.202	-
07/04/2023	04:10	1.47	10:55	6.92	2.53	04:10	0.92	14:25	3.34	2.21	04:10	0.034	18:40	0.656	0.194	0.194	-
07/05/2023	02:25	1.61	21:00	7.03	2.73	03:50	0.88	21:45	3.37	2.29	03:50	0.041	08:00	0.663	0.219	0.219	-
07/06/2023	02:55	1.55	19:20	6.95	2.72	02:55	1.17	11:20	3.31	2.31	02:55	0.046	22:30	0.662	0.222	0.222	-
07/07/2023	02:25	1.64	13:50	6.72	2.89	01:25	1.01	19:30	3.30	2.28	02:25	0.046	21:05	0.670	0.238	0.238	-
07/08/2023	02:20	1.85	10:25	6.80	3.05	03:00	1.07	14:05	3.30	2.27	03:00	0.056	15:50	0.660	0.253	0.253	-
07/09/2023	04:25	1.77	09:40	7.85	3.14	02:15	1.05	14:25	3.35	2.24	04:25	0.055	17:45	0.671	0.262	0.262	-
07/10/2023	03:35	1.95	20:50	7.95	3.36	02:45	1.06	20:10	3.40	2.27	02:45	0.060	10:15	0.657	0.286	0.286	-
07/11/2023	02:00	1.84	10:25	7.23	3.13	03:00	1.02	09:40	3.35	2.26	03:00	0.058	16:15	0.643	0.260	0.260	-
07/12/2023	01:55	2.02	19:20	8.22	3.13	01:50	1.11	10:30	3.35	2.27	01:50	0.065	20:05	0.656	0.258	0.258	-
07/13/2023	02:55	1.90	09:40	6.91	3.05	02:55	1.10	19:35	3.34	2.23	02:55	0.058	07:25	0.645	0.246	0.246	-
07/14/2023	01:00	1.93	17:50	7.73	3.10	03:55	0.96	19:25	3.37	2.25	01:00	0.054	10:10	0.636	0.255	0.255	-
07/15/2023	03:45	1.88	11:30	7.75	3.06	02:15	1.04	13:05	3.39	2.25	02:15	0.060	09:05	0.648	0.249	0.249	-
07/16/2023	04:35	1.77	08:55	7.52	3.07	03:35	0.87	08:50	3.29	2.19	03:35	0.047	19:00	0.663	0.247	0.247	-
07/17/2023	02:40	1.97	17:05	6.34	2.97	02:40	0.96	09:25	3.30	2.30	02:40	0.053	18:45	0.641	0.248	0.248	0.01
07/18/2023	03:15	1.93	20:55	6.32	2.95	02:35	1.02	19:15	3.37	2.28	03:15	0.058	18:30	0.650	0.245	0.245	-
07/19/2023	02:40	1.73	19:30	6.84	2.93	03:50	0.94	20:45	3.42	2.30	02:35	0.046	09:50	0.682	0.247	0.247	-
07/20/2023	03:55	1.77	10:25	6.80	2.97	02:30	1.06	21:30	3.39	2.29	03:50	0.056	11:25	0.657	0.249	0.249	-
07/21/2023	03:00	1.91	09:50	6.66	2.94	02:35	1.13	11:30	3.34	2.28	02:35	0.063	10:40	0.649	0.244	0.244	-
07/22/2023	02:10	1.89	18:40	7.78	3.01	02:00	1.10	16:05	3.40	2.28	02:10	0.062	16:10	0.672	0.250	0.250	-
07/23/2023	02:45	1.83	11:20	7.00	2.96	03:50	1.11	11:15	3.38	2.26	03:50	0.064	20:30	0.651	0.244	0.244	-
07/24/2023	01:45	1.83	19:00	7.24	2.96	01:25	1.08	18:55	3.38	2.26	01:45	0.060	13:55	0.612	0.243	0.243	0.38

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
07/25/2023	03:25	1.69	18:55	6.40	2.84	02:25	1.04	17:10	3.34	2.26	02:25	0.049	08:50	0.610	0.231	0.231	-
07/26/2023	00:35	1.68	18:20	6.36	2.86	02:55	1.16	18:15	3.43	2.30	03:00	0.054	20:10	0.645	0.238	0.238	-
07/27/2023	03:00	1.74	20:30	6.81	2.87	03:10	1.09	14:25	3.37	2.29	02:10	0.053	07:20	0.661	0.238	0.238	-
07/28/2023	02:05	1.80	17:55	6.86	2.96	01:55	0.99	09:50	3.30	2.22	01:55	0.052	16:20	0.639	0.240	0.240	-
07/29/2023	02:30	1.66	08:50	7.54	2.91	02:10	0.88	11:45	3.38	2.21	02:30	0.042	08:00	0.654	0.236	0.236	-
07/30/2023	03:15	1.59	10:00	7.64	2.90	04:30	0.90	18:15	3.40	2.22	04:30	0.038	20:40	0.671	0.237	0.237	-
07/31/2023	01:30	1.54	10:25	7.17	2.86	00:20	0.91	19:20	3.35	2.26	01:35	0.037	13:00	0.655	0.234	0.234	-
08/01/2023	01:35	1.69	19:45	7.03	2.86	05:05	1.03	08:25	3.30	2.24	02:25	0.049	07:35	0.634	0.232	0.232	-
08/02/2023	03:30	1.73	10:05	7.10	2.87	02:35	1.00	13:40	3.34	2.17	02:45	0.050	06:40	0.638	0.223	0.223	-

03/02/2023 00:00 - 08/02/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			44.487	10.23
Average	3.10	2.61	0.289	

DUV_RG

Site Commentary

SITE INFORMATION

RainGauge	8" tipping bucket type
Silt	0.00 (in)

OBSERVATIONS

A review of the hydrograph indicates DUV_RG functioned under normal conditions during the study period.

The total rainfall recorded during the study period was 10.23 in.

DATA UPTIME

Data uptime observed during **Thursday, 02 March 2023 to Wednesday, 02 August 2023** is provided in the following table:

Percent Uptime	
RAINFINAL (in)	100

Duvall.Parametrix.TFM.WA23		Site Name
Flow Monitoring Site Report		DUV_RG

Site Address /Location:	Snoqualmie Valley Trail, Duvall, WA		
Site Access Details:	Located within pump station	Latitude:	47.74017
		Longitude:	-121.988540

Monitor Series	Location Type
Rain Alert III	Temporary
Installation Date	
3/1/2023	

Location	
On Ground	
Access	Traffic
Walk (Commercial)	None

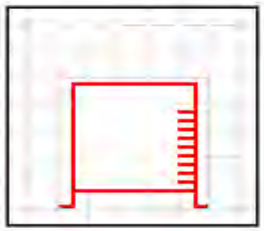
ADS Project Name:	Duvall.Parametrix.TFM.WA23
ADS Project Number:	22905.11 .325

Hydrograph Report

DUV_RG

Rain Gauge

DUV_RG

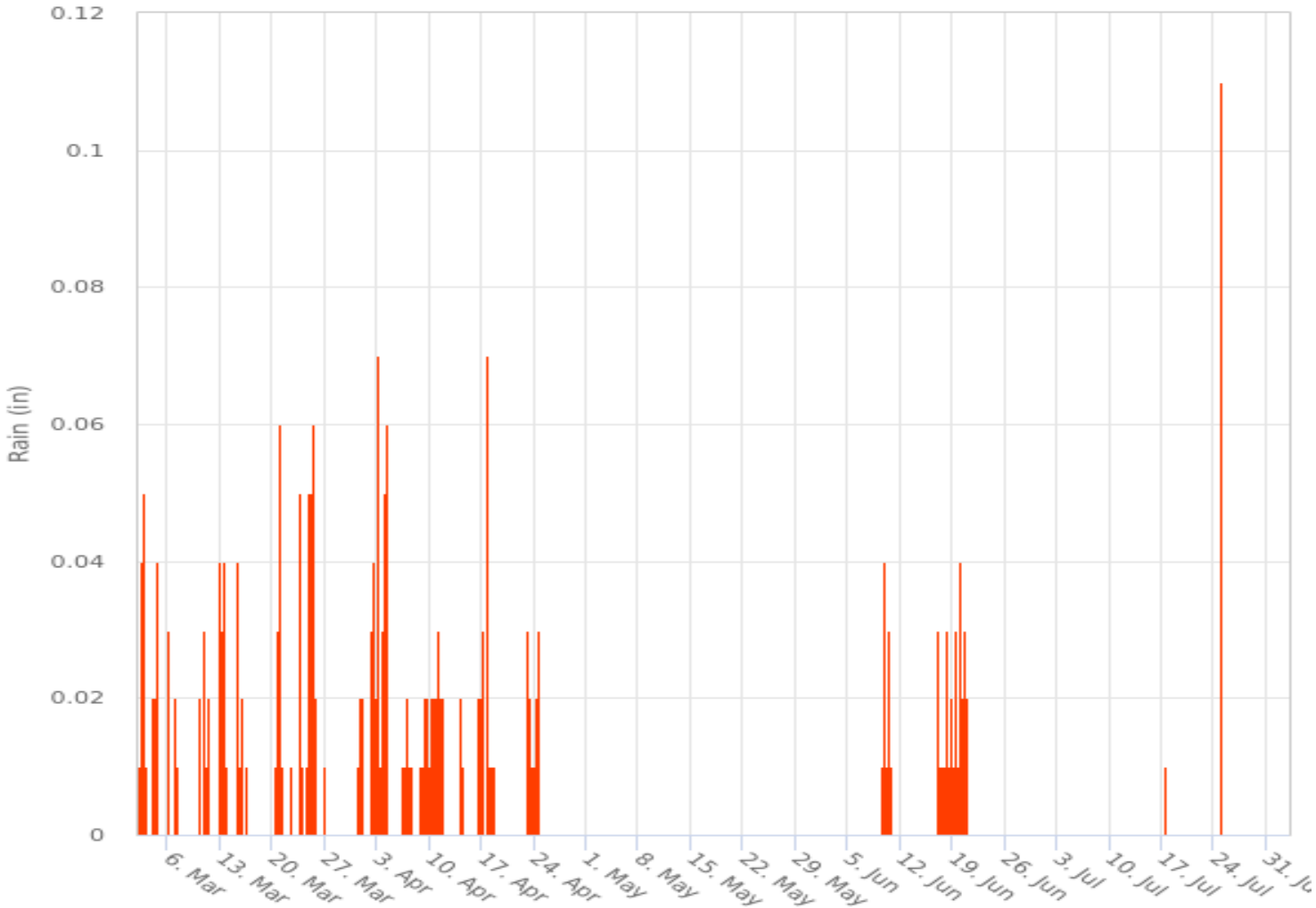


Report Period

03/02/2023
To
08/02/2023

Legend

DFINAL
Rain
VFINAL
QFINAL



Daily Tabular Report

03/02/2023 00:00 - 08/02/2023 23:59
DUV_RGRainGauge: Unknown (0 H x 0 W), Silt0.00

	Rain (in)
Date	Total
03/02/2023	0.30
03/03/2023	0.11
03/04/2023	0.29
03/05/2023	0.17
03/06/2023	0.05
03/07/2023	-
03/08/2023	-
03/09/2023	-
03/10/2023	0.19
03/11/2023	0.04
03/12/2023	0.41
03/13/2023	0.54
03/14/2023	-
03/15/2023	0.10
03/16/2023	0.01
03/17/2023	-
03/18/2023	-
03/19/2023	-
03/20/2023	0.30
03/21/2023	0.04
03/22/2023	0.01
03/23/2023	0.09
03/24/2023	0.44
03/25/2023	0.21
03/26/2023	0.02
03/27/2023	-
03/28/2023	-
03/29/2023	-
03/30/2023	-
03/31/2023	0.26
04/01/2023	-
04/02/2023	0.63
04/03/2023	0.26
04/04/2023	0.43
04/05/2023	-
04/06/2023	0.48
04/07/2023	0.23
04/08/2023	0.08
04/09/2023	0.52
04/10/2023	0.53
04/11/2023	0.20
04/12/2023	-
04/13/2023	0.02
04/14/2023	0.01
04/15/2023	-
04/16/2023	0.23
04/17/2023	0.12
04/18/2023	0.05
04/19/2023	-
04/20/2023	-
04/21/2023	-
04/22/2023	0.19
04/23/2023	0.40
04/24/2023	0.29
04/25/2023	-
04/26/2023	-
04/27/2023	-
04/28/2023	-
04/29/2023	-
04/30/2023	-
05/01/2023	-
05/02/2023	-
05/03/2023	-
05/04/2023	-
05/05/2023	-
05/06/2023	-
05/07/2023	-
05/08/2023	-
05/09/2023	-
05/10/2023	-
05/11/2023	-
05/12/2023	-
05/13/2023	-

	Rain (in)
Date	Total
05/14/2023	-
05/15/2023	-
05/16/2023	-
05/17/2023	-
05/18/2023	-
05/19/2023	-
05/20/2023	-
05/21/2023	-
05/22/2023	-
05/23/2023	-
05/24/2023	-
05/25/2023	-
05/26/2023	-
05/27/2023	-
05/28/2023	-
05/29/2023	-
05/30/2023	-
05/31/2023	-
06/01/2023	-
06/02/2023	-
06/03/2023	-
06/04/2023	-
06/05/2023	-
06/06/2023	-
06/07/2023	-
06/08/2023	-
06/09/2023	0.20
06/10/2023	0.20
06/11/2023	-
06/12/2023	-
06/13/2023	-
06/14/2023	-
06/15/2023	-
06/16/2023	0.10
06/17/2023	0.11
06/18/2023	0.22
06/19/2023	0.16
06/20/2023	0.60
06/21/2023	-
06/22/2023	-
06/23/2023	-
06/24/2023	-
06/25/2023	-
06/26/2023	-
06/27/2023	-
06/28/2023	-
06/29/2023	-
06/30/2023	-
07/01/2023	-
07/02/2023	-
07/03/2023	-
07/04/2023	-
07/05/2023	-
07/06/2023	-
07/07/2023	-
07/08/2023	-
07/09/2023	-
07/10/2023	-
07/11/2023	-
07/12/2023	-
07/13/2023	-
07/14/2023	-
07/15/2023	-
07/16/2023	-
07/17/2023	0.01
07/18/2023	-
07/19/2023	-
07/20/2023	-
07/21/2023	-
07/22/2023	-
07/23/2023	-
07/24/2023	0.38
07/25/2023	-
07/26/2023	-
07/27/2023	-

	Rain (in)
Date	Total
07/28/2023	-
07/29/2023	-
07/30/2023	-
07/31/2023	-
08/01/2023	-
08/02/2023	-

03/02/2023 00:00 - 08/02/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total				10.23
Average				

Attachment B: RDII Result Summary Tables

Normalized Net Base Infiltration Values

Meter Basin ID	Net BI (MGD)	Pipe Length (LF)	Normalized Net BI (gpd/LF)	Basin Area (ac)	Normalized Net BI (gpd/ac)	Footprint (IDM)	Normalized Net BI (gpd/IDM)
DUV_SWRMH428	0.009	11,080	0.8	60.3	149	16.7	538
DUV_SWRMH430	0.050	18,768	2.7	116.8	428	28.2	1,771
DUV_SWRMH459	0.011	15,254	0.7	106.4	103	22.2	495
DUV_SWRMH466	0.000	19,205	0.0	127.0	0	30.1	0

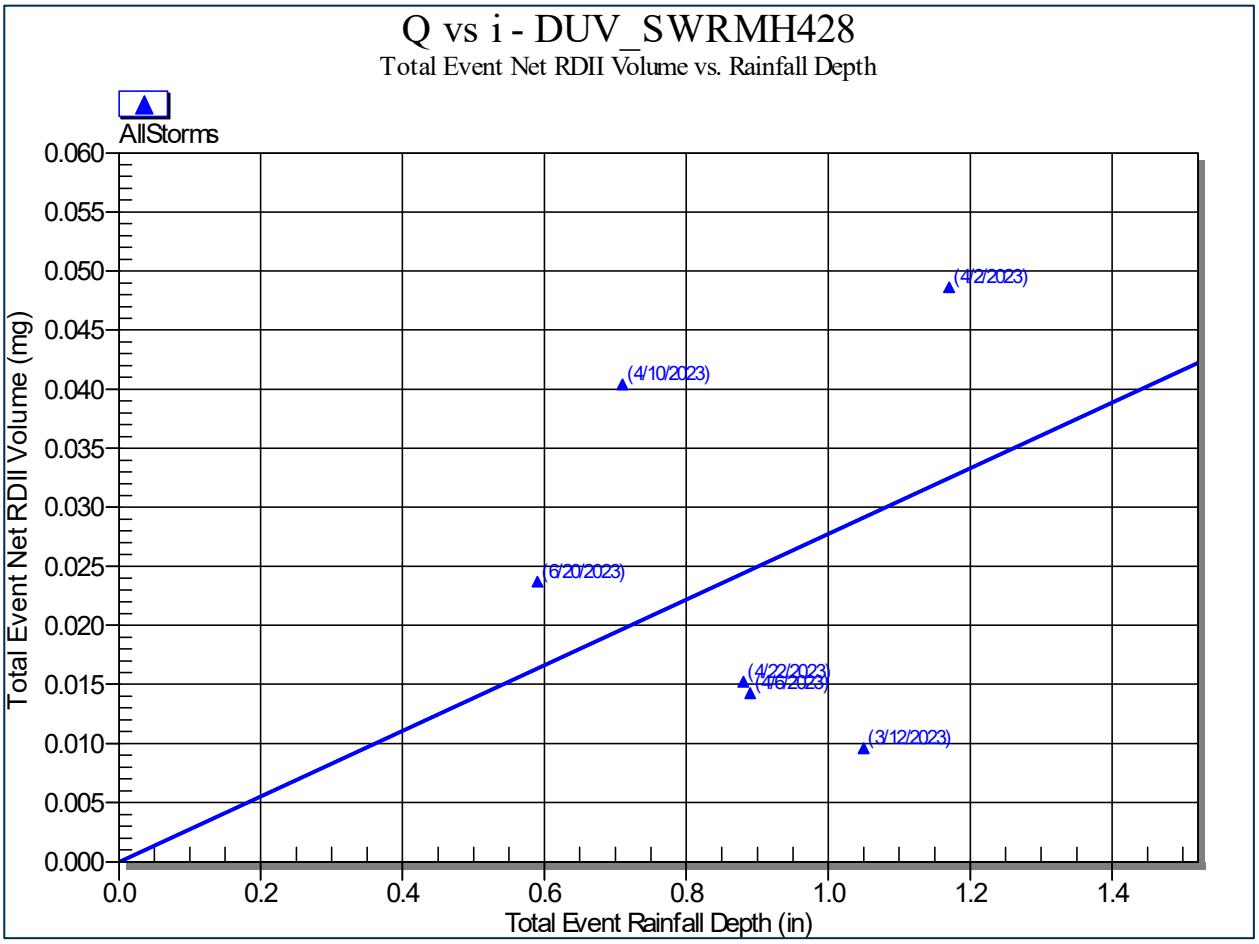
Normalized RDII Severity by Volume

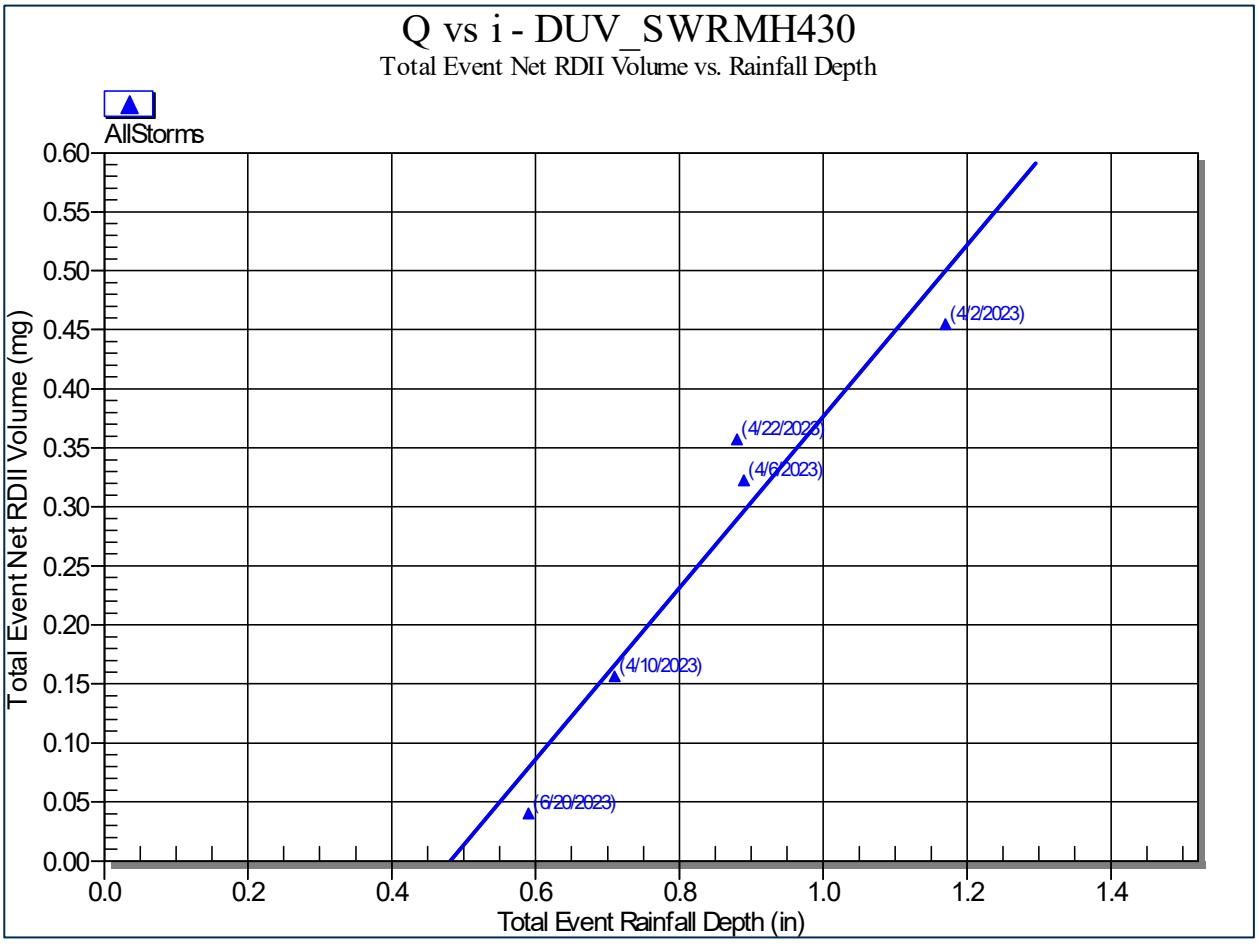
Meter Basin ID	Net RDII Severity by Volume (MG/in)	Pipe Length (LF)	Normalized Net RDII Severity by Volume (gal/in/LF)	Basin Area (ac)	Normalized Net RDII Severity by Volume (gal/in/ac)	Footprint (IDM)	Normalized Net RDII Severity by Volume (gal/in/IDM)
DUV_SWRMH428	0.03	11,080	2.7	60.3	497	16.7	1,793
DUV_SWRMH430	0.73	18,768	38.9	116.8	6,247	28.2	25,851
DUV_SWRMH459	0.06	15,254	3.9	106.4	564	22.2	2,699
DUV_SWRMH466	0.06	19,205	3.1	127.0	473	30.1	1,995

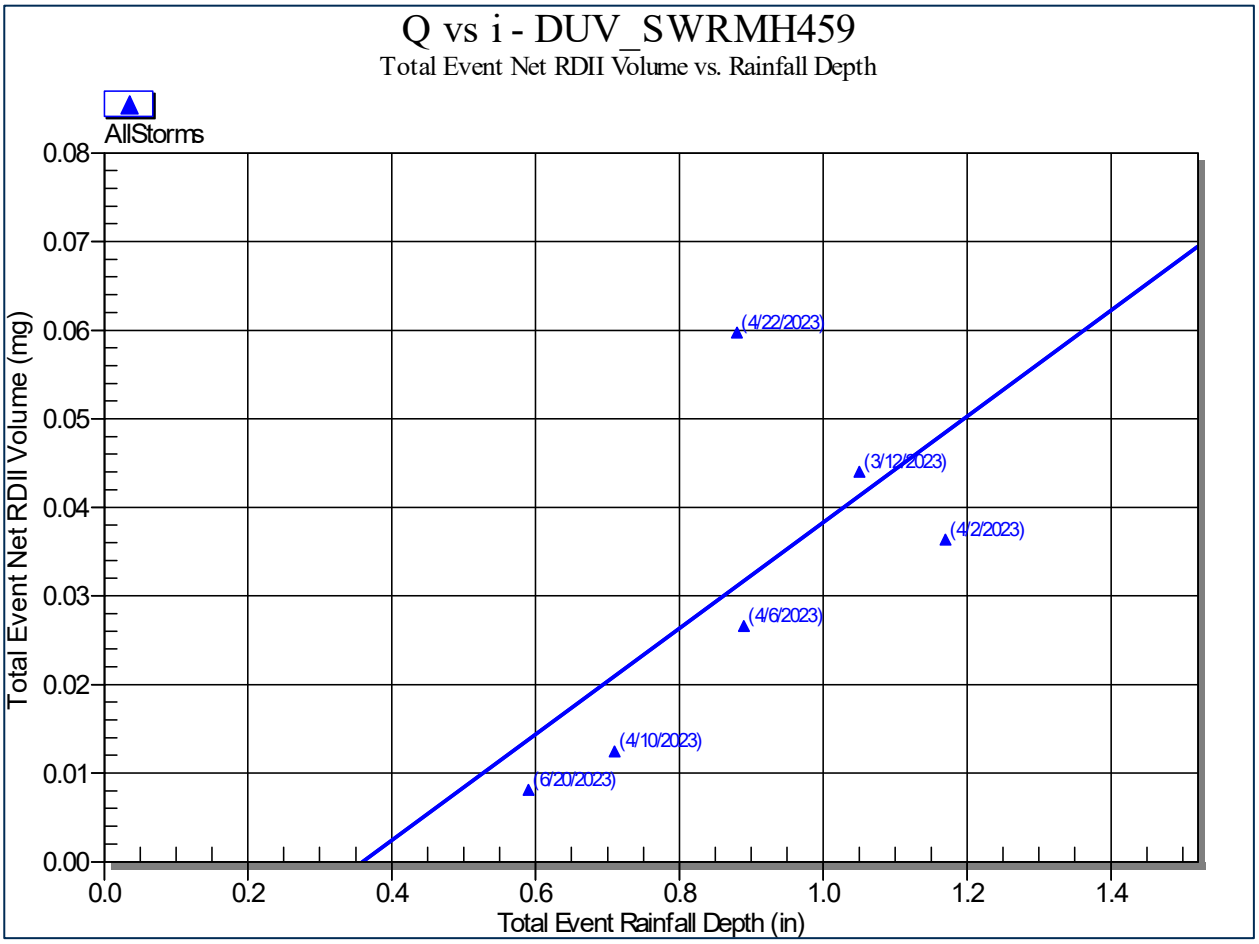
Normalized Peak RDII Severity

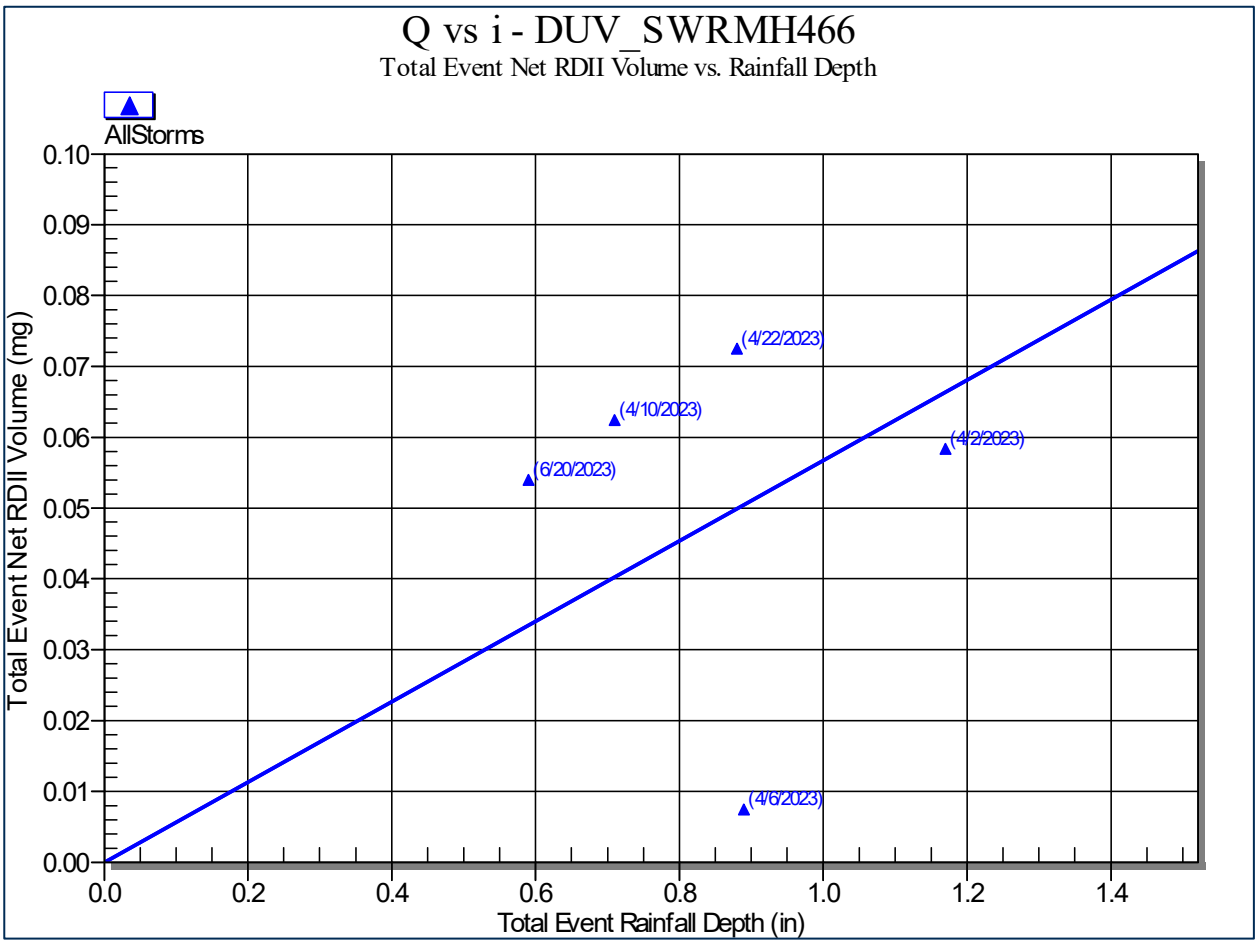
Meter Basin ID	Peak Net RDII Severity (MGD/in)	Pipe Length (LF)	Normalized Peak Net RDII Severity (gpd/in/LF)	Basin Area (ac)	Normalized Peak Net RDII Severity (gpd/in/ac)	Footprint (IDM)	Normalized Peak Net RDII Severity (gpd/in/IDM)
DUV_SWRMH428	0.05	11,080	4.5	60.3	829	16.7	2,988
DUV_SWRMH430	0.36	18,768	19.2	116.8	3,081	28.2	12,748
DUV_SWRMH459	0.05	15,254	3.3	106.4	470	22.2	2,249
DUV_SWRMH466	0.14	19,205	7.3	127.0	1,103	30.1	4,654

Attachment C: RDII Volume Q vs. i Graphs

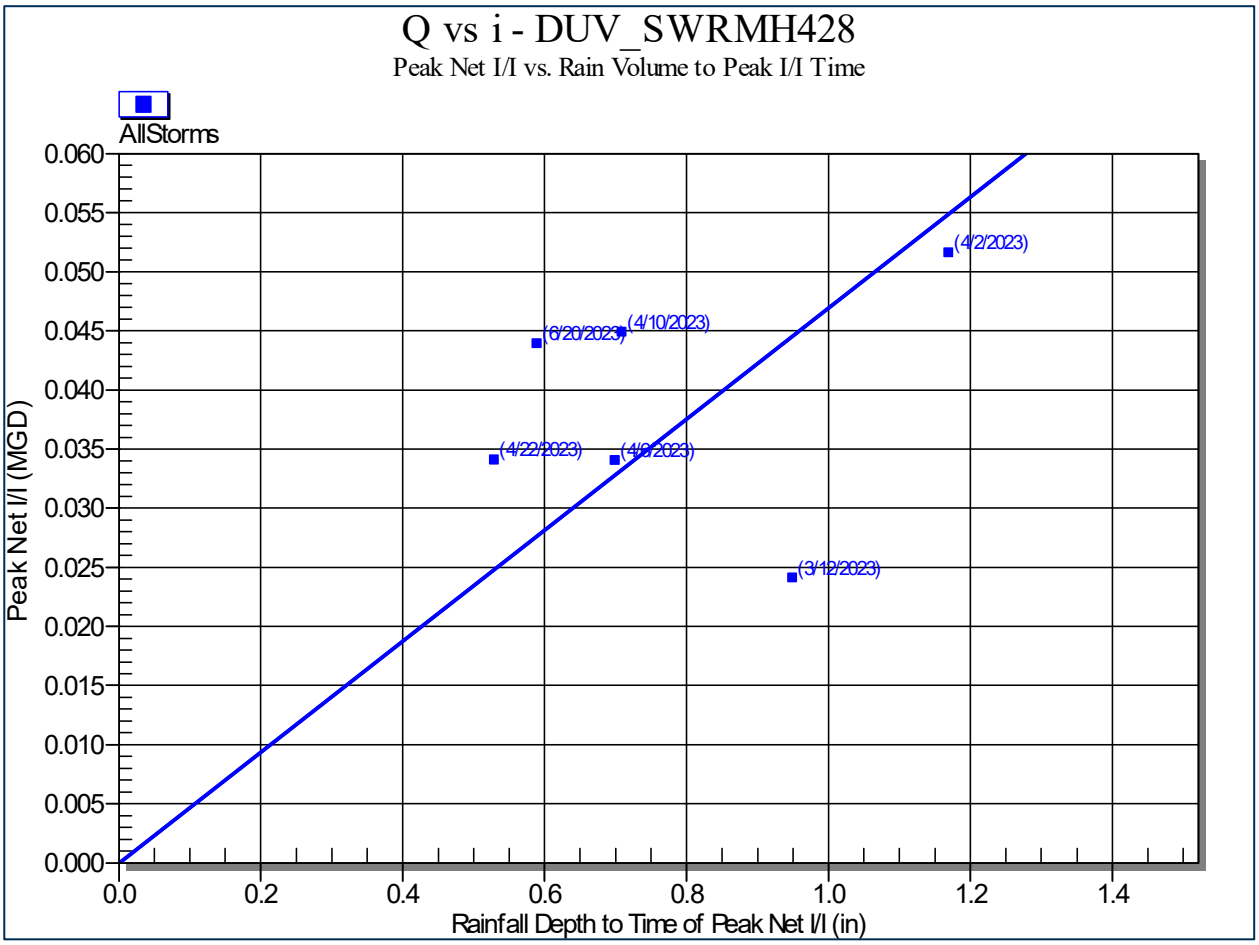

Q vs i - DUV_SWRMH428
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Total Event Rainfall Depth (in)
(4/2/2023)
(4/10/2023)
(6/20/2023)
(4/22/2023)
(4/6/2023)
(3/12/2023)

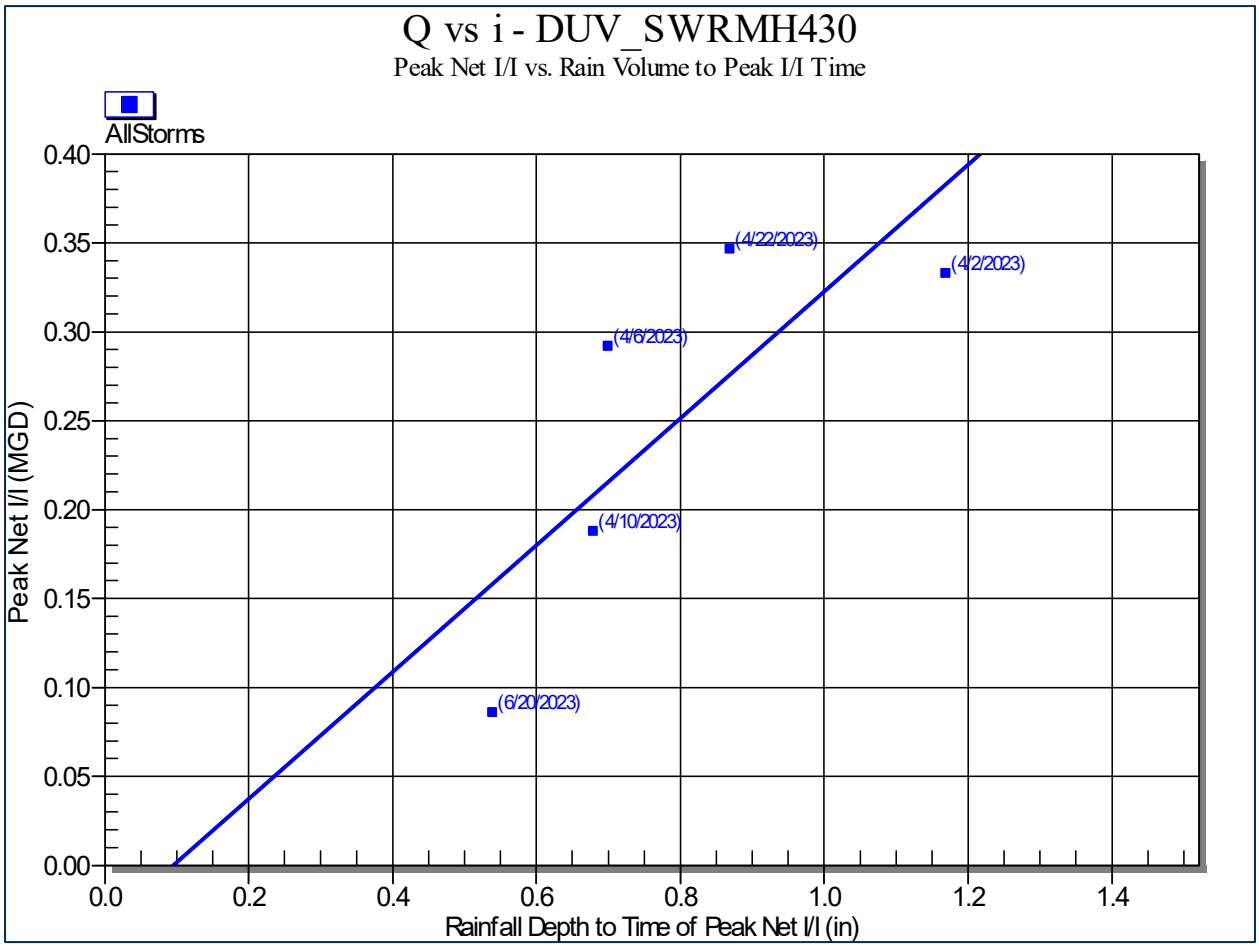

Q vs i - DUV_SWRMH430
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Total Event Rainfall Depth (in)
(4/2/2023)
(4/22/2023)
(4/6/2023)
(4/10/2023)
(6/20/2023)

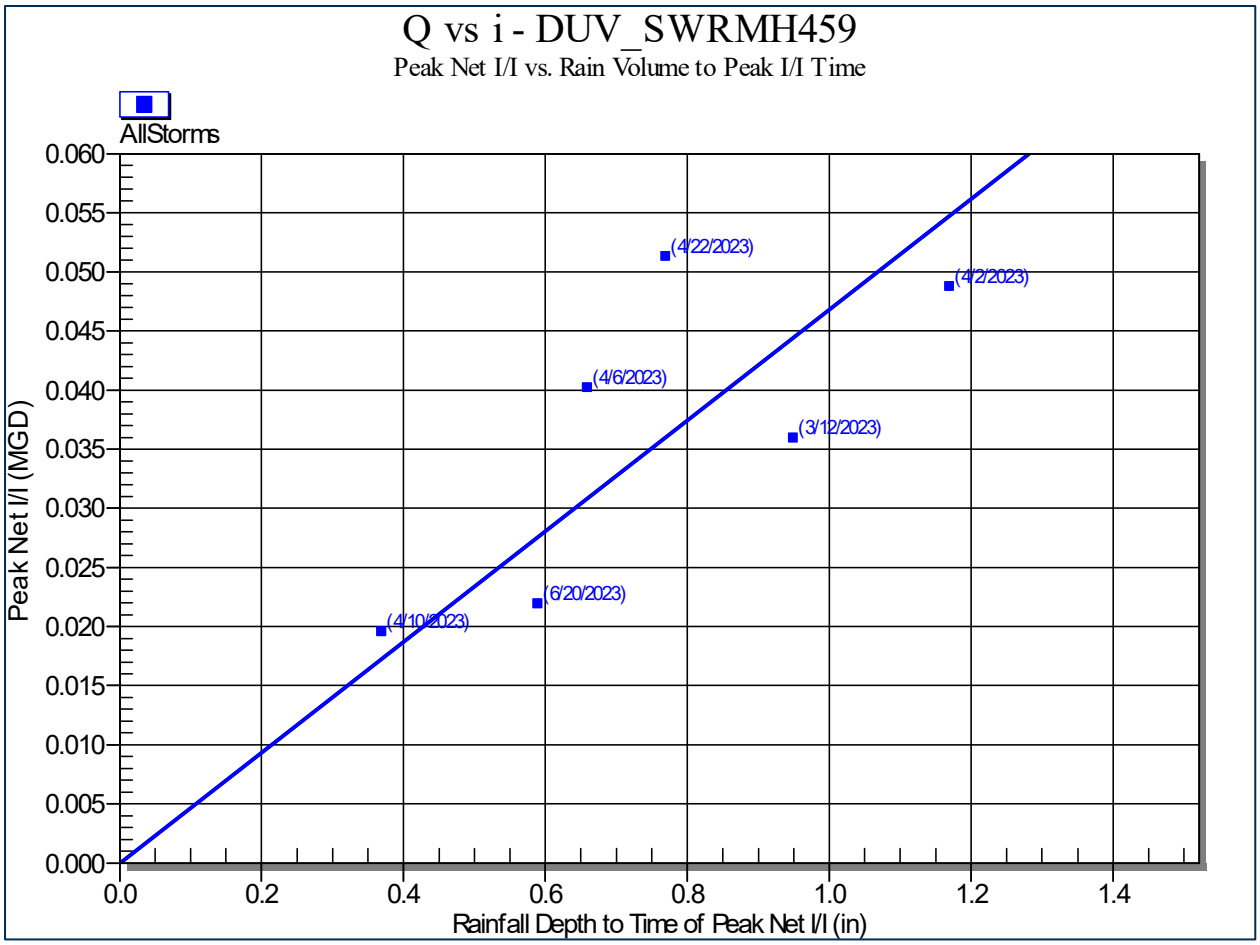

Q vs i - DUV_SWRMH459
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Total Event Rainfall Depth (in)
(4/22/2023)
(3/12/2023)
(4/2/2023)
(4/6/2023)
(4/10/2023)
(6/20/2023)

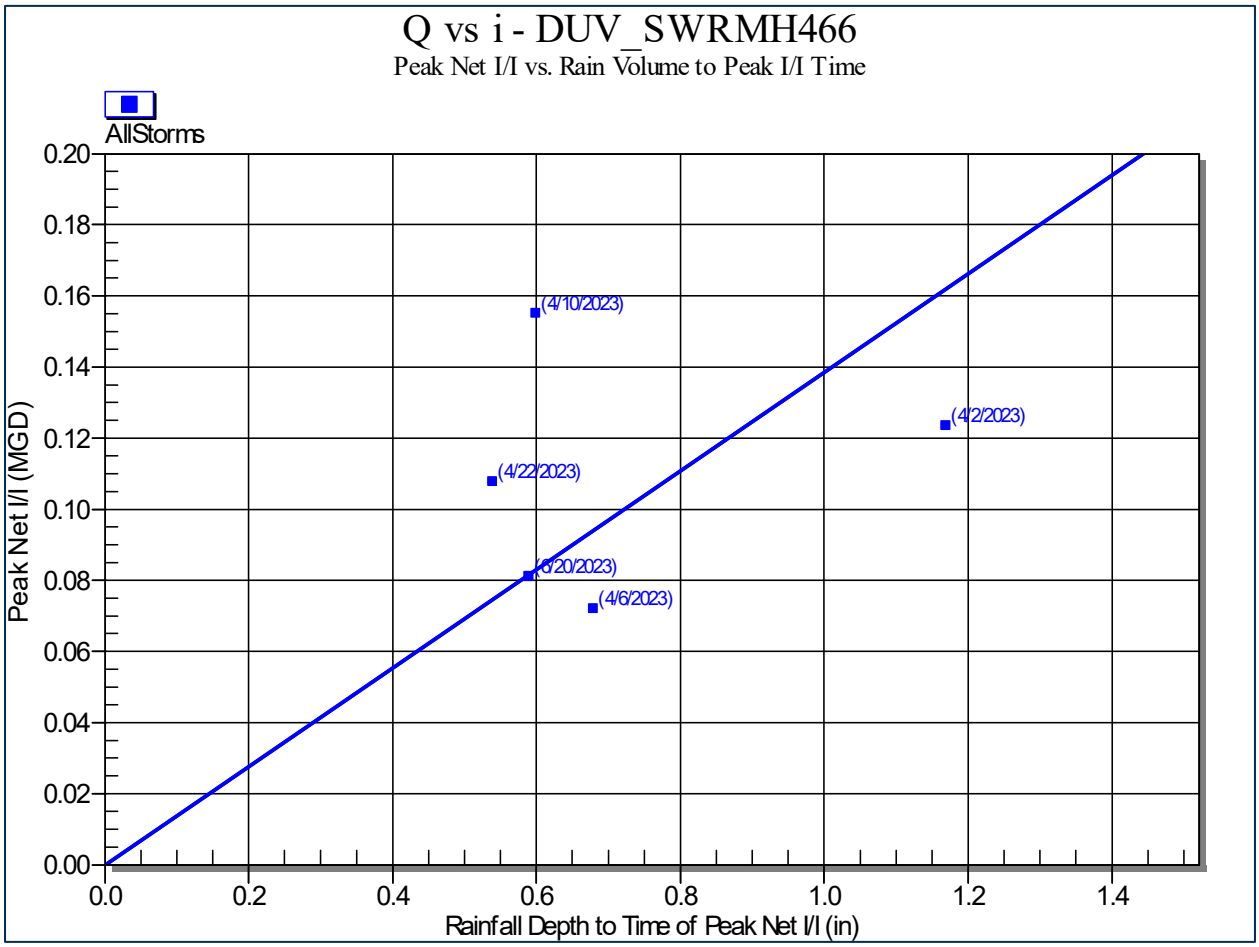

Q vs i - DUV_SWRMH466
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Total Event Rainfall Depth (in)
(4/22/2023)
(4/10/2023)
(4/2/2023)
(6/20/2023)
(4/6/2023)

Attachment D: Peak RDII Q vs. i Graphs


Q vs i - DUV_SWRMH428
Peak Net I/I vs. Rain Volume to Peak I/I Time
AllStorms
Peak Net I/I (MGD)
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Rainfall Depth to Time of Peak Net I/I (in)
(4/2/2023)
(6/20/2023)
(4/10/2023)
(4/22/2023)
(4/6/2023)
(3/12/2023)


Q vs i - DUV_SWRMH430
Peak Net I/I vs. Rain Volume to Peak I/I Time
AllStorms
Peak Net I/I (MGD)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Rainfall Depth to Time of Peak Net I/I (in)
(4/22/2023)
(4/2/2023)
(4/6/2023)
(4/10/2023)
(6/20/2023)


Q vs i - DUV_SWRMH459
Peak Net I/I vs. Rain Volume to Peak I/I Time
AllStorms
Peak Net I/I (MGD)
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Rainfall Depth to Time of Peak Net I/I (in)
(4/22/2023)
(4/2/2023)
(4/6/2023)
(3/12/2023)
(6/20/2023)
(4/10/2023)


Q vs i - DUV_SWRMH466
Peak Net I/I vs. Rain Volume to Peak I/I Time
AllStorms
Peak Net I/I (MGD)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Rainfall Depth to Time of Peak Net I/I (in)
(4/10/2023)
(4/2/2023)
(4/22/2023)
(4/20/2023)
(4/6/2023)