Memo

To: Mayor and Hayden City Council

From: Alan Soderling, Public Works Director

Date: 6-2-2025

Agenda Item: Request to Consider Adopting and Amending the 2020 Sewer Master Plan

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Agenda Item Location
New Business

Recommended Action or Motion
Consider adopting a resolution to append the Sewer Master Plan to include a May 29,2025 technical memo adopting the flow meter monitoring for an existing 8-inch located between Hayden Ave and Finucane Drive.

Functional Impact of Authorizing
Approval of this document would allow for the city to adopt and amend the 2020 Sewer Master Plan to include a technical memorandum acknowledging an 8-inch gravity sewer main pipe that is reaching near capacity and recommend replacement of such pipe at a specific capacity.

Functional Impact of Not Authorizing
If this is not approved, then we won't adopt and amend the 2020 sewer master plan with the technical memorandum.

Fiscal Impact
There is no cost impact to amend and adopt the 2020 Sewer Master Plan to the FY2025 budget.

Budget Funding Source
N/A

Attachments
Resolution and Technical Memorandum for Flow Monitoring.

RESOLUTION NO. _____

RESOLUTION ADOPTING AND AMENDING THE CITY'S 2020 SEWER MASTER PLAN TO INCLUDE A TECHNICAL MEMO ACKNOWLEDGING AN 8-INCH GRAVITY MAIN SEWER PIPE THAT IS REACHING NEAR CAPACITY AND RECOMMEND REPLACEMENT OF SUCH PIPE AT A SPECIFC CAPACITY. THE PIPE IS GENERALLY LOCATED BETWEEN HAYDEN AVENUE AND FINUCANE DRIVE WITHIN THE CITY OF HAYDEN, IDAHO.

WHEREAS, The City of Hayden, Idaho adopted the 2020 Sewer Master Plan in February of 2021 with Resolution 2021-5; and

WHEREAS, the Sewer Master Plan's purpose is to provide a robust vision for sewer infrastructure and services to ensure sewer capacity and infrastructure throughout the community for the long term; and

WHEREAS, the Sewer Master Plan includes Sewer Policies, Capital Improvement Plan, and Funding Sources and Strategies; and

WHEREAS, the City desires to periodically provide updates to the plan when specialized study areas have been completed by the city; and

WHEREAS, the specialized plans may make recommendations for improvements that either should be considered by the City's capital planning or work with future development to cure; and

WHEREAS, it is in the interest of the city to iteratively make changes to its long-range plan as new information becomes available.

NOW THEREFORE, BE IT RESOLVED, by the Mayor and City Council of the City of Hayden, Idaho, as follows:

Section 1: Adoption of the Plan. The Mayor and City Council hereby adopt the technical memo included with this resolution dated May 29, 2025, and as stamped by Professional Engineer, Dulci Kau recognizing the Flow Monitoring and recommendations for replacement of the 8-inch gravity main upon acceptance of flow in excess of its capacity.

Section 2: Effective Date. The technical memo shall be effective upon the adoption of this resolution by the City Council and signed by the Mayor of the City of Hayden.

Section 3: Implementation. The staff of the City of Hayden is hereby authorized and directed to carry out such steps as may be necessary to implement the recommendations of this technical memo as being part of the city's long range sewer plan.

PASSED and APPROVED by the City Council on the _____ day of June, 2025.

_____
Alan Davis, Mayor

ATTEST:

_____
Abbi Sanchez, City Clerk

TECHNICAL MEMORANDUM

THE LANGDON GROUP

GATEWAY MAPPING INC.

Flow Monitoring – CIP 2.01.3
City of Hayden

May 29, 2025

Prepared by:

J-U-B ENGINEERS, Inc.
7825 Meadowlark Way
Coeur d' Alene, ID
208-762-8787
www.jub.com

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Chapter 1 Background & Site Selection

The City of Hayden's (City) 2020 Collection System Master Plan (2020 MP) identified an 8-inch gravity sewer pipe that was near capacity and recommended replacement. For this memo, the pipe will be referred to as Reach A. Two flow monitor sites were selected in this reach and installed in February 2025 to gather current data and measure the flow depth and velocity of flow in the pipe. This data allowed for the flow rate and capacity to be calculated.

The first site, HAY_01 is located in the manhole northeast of the Hayden Avenue and Government Way intersection, at the upstream 12-inch PVC pipe penetration. The second site, HAY_02 is in the manhole in front of 9517 N. Finucane Drive in the upstream 10-inch PVC pipe penetration. Refer to **Appendix A** for a map of the sites, and Reach A. These two sites are upstream and downstream Reach A and were selected for accessibility, proximity, and good conditions for reliable measurements.

Chapter 2 Data Summary

ADS Environmental Services (ADS) performed the installation and recording of the flow monitors. For more information, refer to the summary report provided by ADS in **Appendix B**.

The measured peak hour flow rates from the two flow monitoring sites are approximately 0.29 and 0.23 cubic feet per second (cfs) for HAY_01 and HAY_02, respectively. Graphs of the raw data are included in **Appendix C.**

The infiltration and inflow (I/I) assumption from the 2020 Collection System Master Plan (2020 MP) for the H-1 Sewer Basin is 350 gallons/day/acre. Per the model utilized for the 2020 MP, the area upstream of the first manhole in Reach A is approximately 345 acres and the area upstream of HAY_02 is approximately 365 acres.

Applying the principle that flow into a pipe is equal to flow out of a pipe, the sum of peak flow and the infiltration and inflow at HAY_01 was used to calculate the capacity in Reach A. The peak wet weather flow is 0.664 cfs. The influent flow from services downstream of HAY_01 is considered negligible for the purposes of this calculation. The results are summarized in **Table 2-1** below.

Table 2-1 Flow Rate Summary

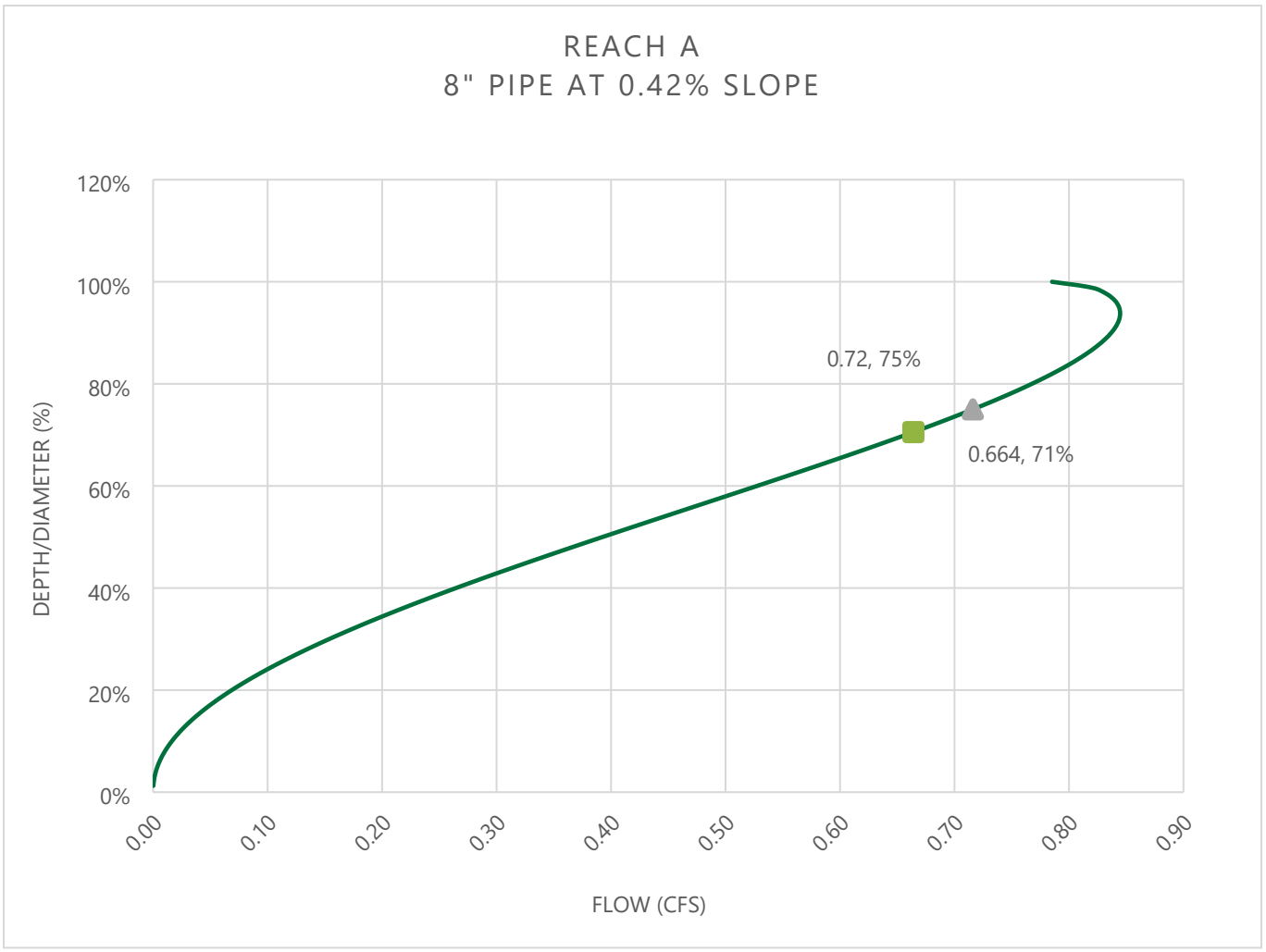
	HAY_01	HAY_02
Observed Peak Flow (cfs)	0.290	0.230
I/I (cfs)	0.374	0.454
Peak Wet Weather Flow (cfs)	**0.664**	0.684

2.1 Pipe Capacity Analysis

The shallowest slope in Reach A is 0.42% calculated using the Sewer Map Book, printed on 2/3/2021. The depth over diameter (d/D) for Reach A is calculated to be 71% using Mannning's Equation to relate the flow rate to the geometric properties of the flow channel. **Figure 2-1** shows the relationship between d/D and pipe flow for Reach A.

Per the 2020 Master Plan, pipes with a d/D greater than 75% are recommended for replacement. At 0.72 cfs, Reach A has a d/D = 75%. Using the 2020 Master Plan value of 172.5 gallons per day per Equivalent Residential (ER) unit, Reach A can receive an additional 191 ER units before the pipe should be replaced.

Figure 2-1 - Reach A Depth over Diameter



Appendices

Appendix A – Flow Monitoring and Collection System Map
Appendix B – City of Hayden Flow Monitoring Report
Appendix C – Flow Monitor Data

Appendix A

Flow Monitoring and Collection System Map

CITY OF HAYDEN IDAHO

Sewer Map Book
Existing System

HAY_01

HAY_02

REACH A

85 ft | 214 ft | 400 ft | 115 ft

JENSEN | MELROSE | BAACK | MORSE | HAYDEN | LAMSON | DEMPSEY | PTARMIGAN | HILLVIEW | SCHOOL ACCESS | LORALEE | JUNO | MIDTOWN | LA COSTA | RETREAT | MAPLE | ASH | FERRIANS | WILLOW TREE | LITTLE BEAR | KAYLA | RYAN | ORCHARD | CHESAPEAKE | PIPER | CUFF | BALDWIN | FINUCANE

RIM: 2276.7 IE: 2265.68
RIM: 2278.45 IE: 2269.46
RIM: 2274.38 IE: 2263.23
RIM: 2274.22 IE: 2262.65
RIM: 2273.56 IE: 2262.01
RIM: 2273.2 IE: 2259.37
RIM: 2278.41 IE: 2267.29
RIM: 2273.79 IE: 2260.73
RIM: 2280.11 IE: 2265.63
RIM: 2280.4 IE: 2266.22
RIM: 2285.5 IE: 2275.06
RIM: 2285.03 IE: 2270.6
RIM: 2277.75 IE: 2267.75
RIM: 2273.53 IE: 2264.65
RIM: 2271.84 IE: 2263.43
RIM: 2261.25 IE: 2249.5
RIM: 2259.95 IE: 2248.66
RIM: 2270.94 IE: 2262.69
RIM: 2269.92 IE: 2261.64
RIM: 2271.03 IE: 2262.99
RIM: 2270.14 IE: 2262.16
RIM: 2268.2 IE: 2260.2
RIM: 2273.25 IE: 2258.76
RIM: 2270.46 IE: 2256.87
RIM: 2270.74 IE: 2255.21
RIM: 2272.38 IE: 2253.66
RIM: 2275.31 IE: 2252.89
RIM: 2268.94 IE: 2252.07
RIM: 2269.91 IE: 2251.27
RIM: 2266.79 IE: 2259.25
RIM: 2268.93 IE: 2250.72
RIM: 2260.98 IE: 2245.05
RIM: 2270.02 IE: 2256.16
RIM: 2269.67 IE: 2257.75
RIM: 2270.5 IE: 2260.45
RIM: 2264.89 IE: 2257.62
RIM: 2256.41 IE: 2241.48
RIM: 2255.3 IE: 2243.83
RIM: 2266.86 IE: 2257.1
RIM: 2266.17 IE: 2259.4
RIM: 2264 IE: 2253.9
RIM: 2263.22 IE: 2256.54
RIM: 2271.61 IE: 2264.75
RIM: 2268.17 IE: 2258.03
RIM: 2261.08 IE: 2253.06
RIM: 2262 IE: 2252.38
RIM: 2261.46 IE: 2253.12
RIM: 2264.08 IE: 2250.76
RIM: 2253.98 IE: 2242.48
RIM: 2274.04 IE: 2262
RIM: 2271.55 IE: 2263.01
RIM: 2270.26 IE: 2263.75
RIM: 2262 IE: 2249.53
RIM: 2259.89 IE: 2255.15
RIM: 2260.27 IE: 2255.15
RIM: 2274.43 IE: 2261.47
RIM: 2272.41 IE: 2262.81
RIM: 2272 IE: 2258.35
RIM: 2268.5 IE: 2256.47
RIM: 2264.5 IE: 2252.76
RIM: 2260.78 IE: 2248.6
RIM: 2250.49 IE: 2238.33
RIM: 2266.4 IE: 2256.34
RIM: 2257.76 IE: 2247.44

2280 | 2285 | 2275 | 2270 | 2265 | 2255 | 2250 | 2260

46 | 47 | 48 | 55 | 56 | 57 | 64 | 65 | 66

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Hayden City Limits
- Parcel Line
- 5 ft Contour
- HARSB WWTP
- Existing Lift Station
- Private Lift Station
- Existing Manhole

FM Junctions
- Tee
- Valve

Pipe Designation
- Airport Infrastructure
- Dry Line
- Model Pipes Only

Existing Force Main
- 1.5"
- 2"
- 4"
- 6"
- 8"
- 10"
- 12"
- 14"
- 15"
- 16"
- 18"

Existing Gravity Sewer
- <= 4"
- 6"
- 8"
- 10"
- 12"
- 15"
- 18"
- 20"
- 24"

BOEKEL | ATLAS | RAMSEY | HIGHWAY 95 | STADIUM

LANCASTER

		1	2	3	4	5	6	7
		8	9	10	11	12	13	14
		15	16	17	18	19	20	21
	22	23	24	25	26	27	28	29	30
WYOMING	31	32	33	34	35	36	37	38	39
	40	41	42	43	44	45	46	47	48
HAYDEN	49	50	51	52	53	54	55		57
KEYSUCKLE	58	59	60	61	62	63	64	65	66
PRAIRIE	67	68	69	70	71	72	73	74	75

N

0 75 150 300 Feet

1 inch : 247 feet

56

J·U·B ENGINEERS, INC.

PRINT DATE: 2/3/2021

NOTE: PREPARED BY JUB ENGINEERS, INC. - PROGRESS PRINT OF SEWER GIS DATABASE, POPULATED WITH CITY OF HAYDEN WORKING DOCUMENTS. NOT ALL SEWER PIPES ARE SHOWN.

Appendix B

City of Hayden Flow Monitoring Report

City of Hayden Flow Monitoring Report

Final Report Submitted to **J-U-B Engineers, Inc.**
March 20, 2025

ADS ENVIRONMENTAL SERVICES

City of Hayden Flow Monitoring Report

Prepared For:

Jon Baune, Design Engineer
J-U-B Engineers, Inc.
7825 N Meadowlark Way
Coeur d'Alene, ID 83815

Prepared By:

ADS, LLC
846 Industry Dr
Tukwila, WA 98188

March 20, 2025

Jon Baune, Design Engineer
J-U-B Engineers, Inc.
7825 N Meadowlark Way
Coeur d'Alene, ID 83815

SUBJECT: City of Hayden Flow Monitoring Report

Dear Jon Baune,

ADS is pleased to submit the report for the City of Hayden Flow Monitoring Report completed on behalf of J-U-B Engineers, Inc. The metering was conducted at two location(s). The study was conducted during the period of Friday, 14 February 2025 to Friday, 28 February 2025.

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 15-minute format has been provided previously.

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, Cody Mahaffey at 425.620.6412.

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

Chris Kong
Hydraulic Data Analyst

Scope and Methodology

Introduction

J-U-B Engineers, Inc. entered into an agreement with ADS Environmental Services to conduct flow monitoring at two locations in the Hayden, ID Sanitary Collection System. The study was scheduled for a period of (14) fourteen days. Once in place, the flow monitoring equipment was to be used to measure depth, velocity, and to quantify flows. The purpose of this study was sewer modeling for a master plan.

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 February 13th, 2025. The monitoring period began on February 14th, 2025, and was completed on February 28th, 2025. 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)

HAY_01

Site Commentary

SITE INFORMATION

Pipe	Elliptical (12.75 in H x 12.75 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Friday, 14 February 2025 to Friday, 28 February 2025**, along with observed minimum and maximum data, are provided in the following table.

This site functioned under normal conditions during the study period. No surcharge conditions were experienced at this location. A review of balancing indicated no issues.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.58	1.33	0.114
Minimum	1.68	0.75	0.036
Maximum	3.97	1.91	0.278
Min Time	02/15/2025 4:20:00 AM	02/27/2025 2:50:00 AM	02/27/2025 2:55:00 AM
Max Time	02/24/2025 9:50:00 AM	02/24/2025 9:45:00 AM	02/24/2025 9:45:00 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 fifteen minutes average.

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

Values in the tabular report are based on the fifteen minutes average.

DATA UPTIME

Data uptime observed during **Friday, 14 February 2025 to Friday, 28 February 2025** is provided in the following table:

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

Hayden.JUB.TFM.ID25		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	HAY_01

Site Address /Location:	9650 N Government Wy, Hayden, ID 83835			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Within parking lot	Latitude:	47.76031	Pipe Size (H x W)	Pipe Shape
		Longitude:	-116.785634	12.75 x 12.75	Circular

Manhole #	System Characteristics
6344	Residential
Access	Traffic
Drive	None

ADS Project Name:	Hayden.JUB.TFM.ID25
ADS Project Number:	23121.11.325

Installation Information

Installation Date:	Installation Type:
Thursday, February 13, 2025	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	
10:47:00 AM	
Depth of Flow (Wet DOF) (in)	
3.00	
CS5/CS8 Physical Offset (in)	Measurement Confidence (in)
2.5	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.73	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
13.25	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

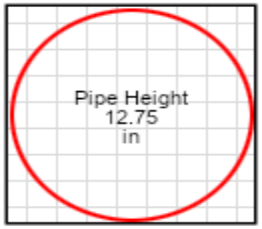
Additional Site Info. / Comments:

Hydrograph Report

HAY_01

Flow Monitor

HAY_01



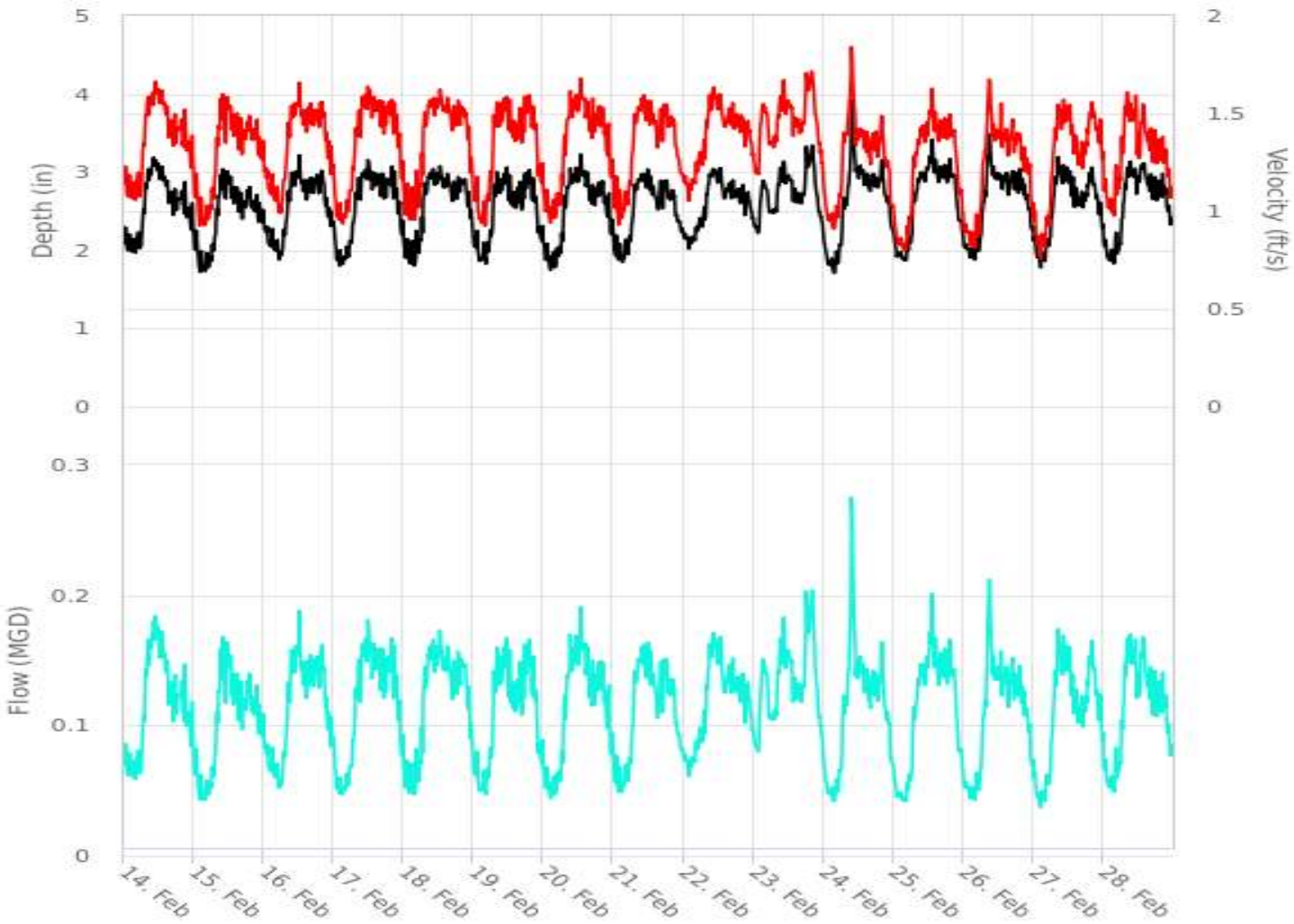
Report Period

02/14/2025
To
02/28/2025

Legend

DFINAL
QFINAL
VFINAL
RAIN FINAL

ADS ENVIRONMENTAL SERVICES

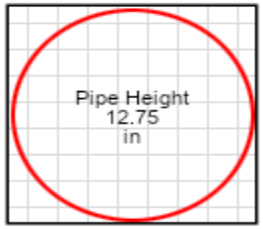


Scattergraph Report

HAY_01

Flow Monitor

HAY_01



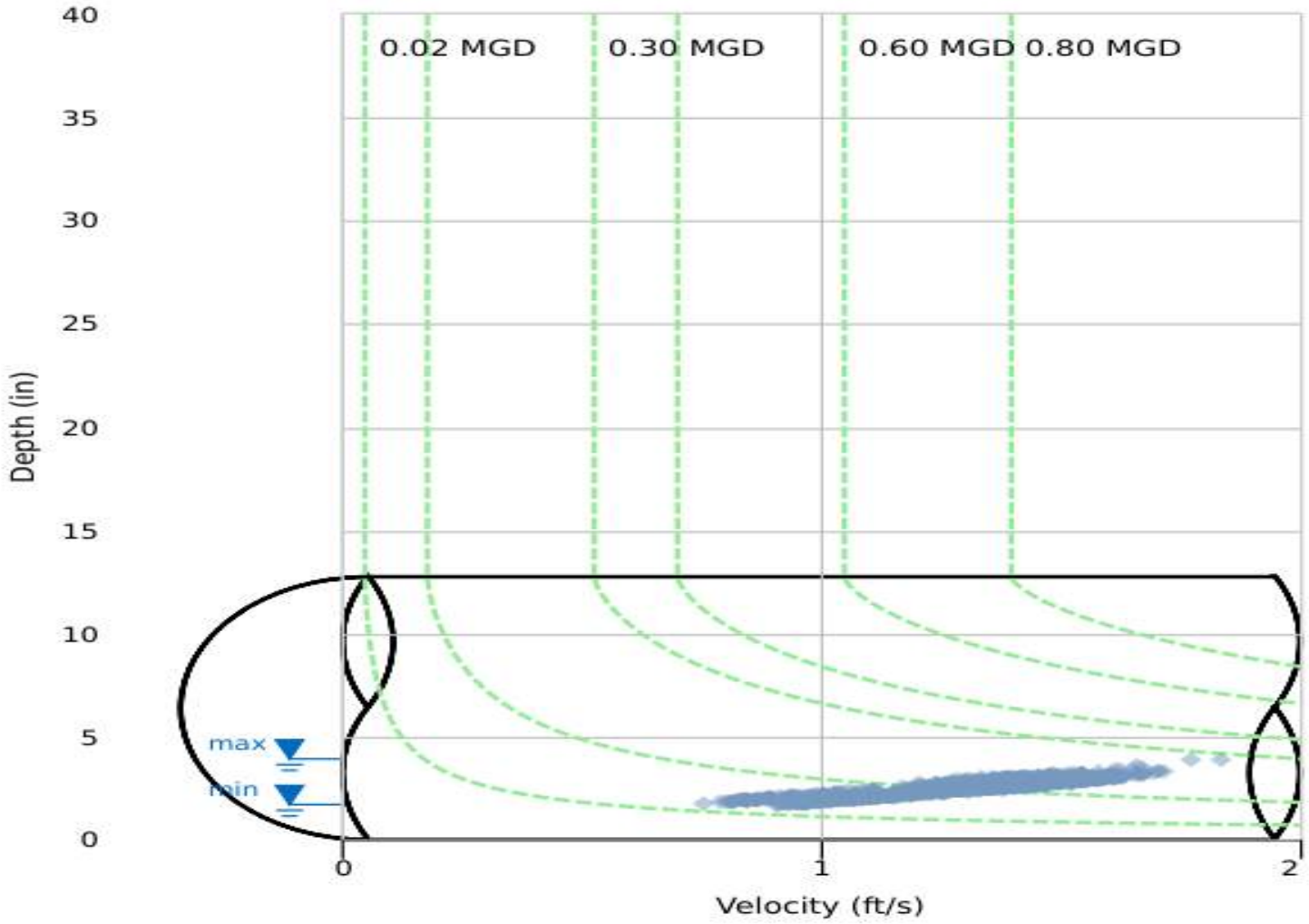
Report Period

02/14/2025
To
02/28/2025

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth

ADS ENVIRONMENTAL SERVICES



Daily Tabular Report

02/14/2025 00:00 - 02/28/2025 23:59
HAY_01 Pipe: Elliptical (12.75 in H x 12.75 in W), Silt 0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
02/14/2025	02:45	1.96	11:10	3.23	2.58	02:45	1.05	11:10	1.71	1.37	02:45	0.059	11:10	0.195	0.117	0.117
02/15/2025	04:20	1.68	09:55	3.19	2.43	04:20	0.90	10:40	1.64	1.30	04:20	0.040	09:55	0.183	0.103	0.103
02/16/2025	05:25	1.86	12:20	3.26	2.56	05:25	0.98	12:20	1.68	1.34	05:25	0.050	12:20	0.194	0.114	0.114
02/17/2025	02:05	1.77	11:55	3.19	2.57	03:20	0.93	12:40	1.73	1.35	02:05	0.045	11:50	0.185	0.116	0.116
02/18/2025	03:45	1.77	12:35	3.10	2.59	04:15	0.93	12:30	1.65	1.37	03:45	0.045	12:30	0.178	0.119	0.119
02/19/2025	04:25	1.81	19:25	3.12	2.52	04:00	0.92	19:25	1.62	1.33	04:25	0.047	19:25	0.176	0.111	0.111
02/20/2025	04:15	1.73	12:50	3.26	2.53	02:30	0.94	12:50	1.69	1.34	04:15	0.044	12:50	0.195	0.113	0.113
02/21/2025	03:10	1.84	11:45	3.06	2.52	01:45	0.92	10:30	1.63	1.34	01:55	0.048	10:30	0.171	0.112	0.112
02/22/2025	02:05	2.01	12:45	3.07	2.60	02:10	1.05	10:35	1.68	1.39	02:05	0.061	10:20	0.173	0.119	0.119
02/23/2025	01:55	2.19	20:25	3.35	2.75	00:45	1.16	20:15	1.72	1.46	01:55	0.077	20:15	0.206	0.135	0.135
02/24/2025	03:45	1.70	09:50	3.97	2.62	03:45	0.90	09:45	1.91	1.27	03:45	0.041	09:45	0.278	0.113	0.113
02/25/2025	04:25	1.84	13:40	3.45	2.65	03:45	0.79	13:35	1.64	1.23	04:30	0.041	13:35	0.206	0.112	0.112
02/26/2025	04:10	1.86	09:00	3.49	2.63	04:10	0.81	09:05	1.71	1.23	04:10	0.042	09:05	0.217	0.110	0.110
02/27/2025	02:55	1.77	08:50	3.20	2.58	02:50	0.75	19:50	1.62	1.27	02:55	0.036	10:35	0.177	0.110	0.110
02/28/2025	03:50	1.82	09:40	3.25	2.60	03:50	0.96	13:55	1.67	1.29	03:50	0.048	09:40	0.182	0.112	0.112

02/14/2025 00:00 - 02/28/2025 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)
Total			1.716
Average	2.58	1.33	0.114

HAY_02

Site Commentary

SITE INFORMATION

Pipe	Elliptical (10.75 in H x 10.88 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Friday, 14 February 2025 to Friday, 28 February 2025**, along with observed minimum and maximum data, are provided in the following table.

This site functioned under normal conditions during the study period.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.52	1.10	0.086
Minimum	1.37	0.66	0.020
Maximum	4.01	1.61	0.226
Min Time	02/27/2025 3:25:00 AM	02/27/2025 3:25:00 AM	02/27/2025 3:25:00 AM
Max Time	02/24/2025 10:15:00 AM	02/24/2025 10:15:00 AM	02/24/2025 10:15:00 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 fifteen minutes average.

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

Values in the tabular report are based on the fifteen minutes average.

DATA UPTIME

Data uptime observed during **Friday, 14 February 2025 to Friday, 28 February 2025** is provided in the following table:

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

Hayden.JUB.TFM.ID25		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	HAY_02

Site Address /Location:	9517 N Finucane Dr, Hayden, ID 83835			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	On Road	Latitude:	47.758102	Pipe Size (H x W)	Pipe Shape
		Longitude:	-116.773242	10.75 x 10.88	Circular

Manhole #	System Characteristics
4243	Residential
Access	Traffic
Drive	Medium

ADS Project Name:	Hayden.JUB.TFM.ID25
ADS Project Number:	23121.11.325

Installation Information	
Installation Date:	Installation Type:
Wednesday, February 12, 2025	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 5 psi
Installation Confirmation:	
Time	
2:08:00 PM	
Depth of Flow (Wet DOF) (in)	
2.75	
CS5/CS8 Physical Offset (in)	Measurement Confidence (in)
N/A	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.33	N/A
Silt (in)	Silt Type
0	

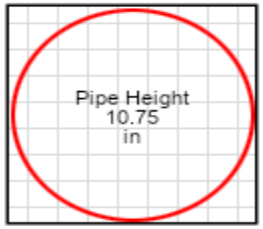
Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
13.25	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material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

Hydrograph Report

HAY_02

Flow Monitor

HAY_02



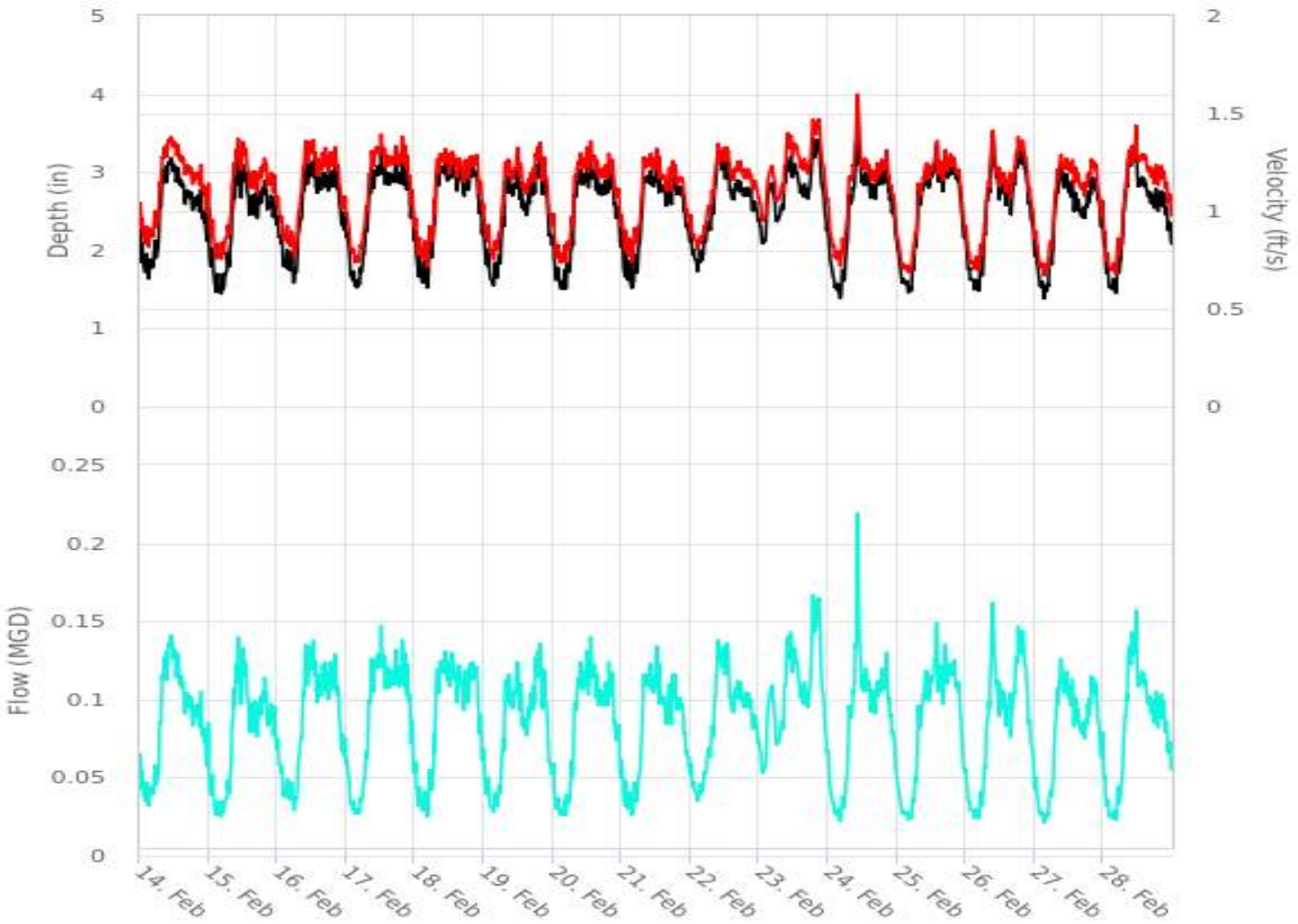
Report Period

02/14/2025
To
02/28/2025

Legend

DFINAL
QFINAL
VFINAL
RAIN FINAL

ADS ENVIRONMENTAL SERVICES

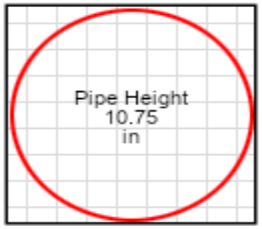


Scattergraph Report

HAY_02

Flow Monitor

HAY_02



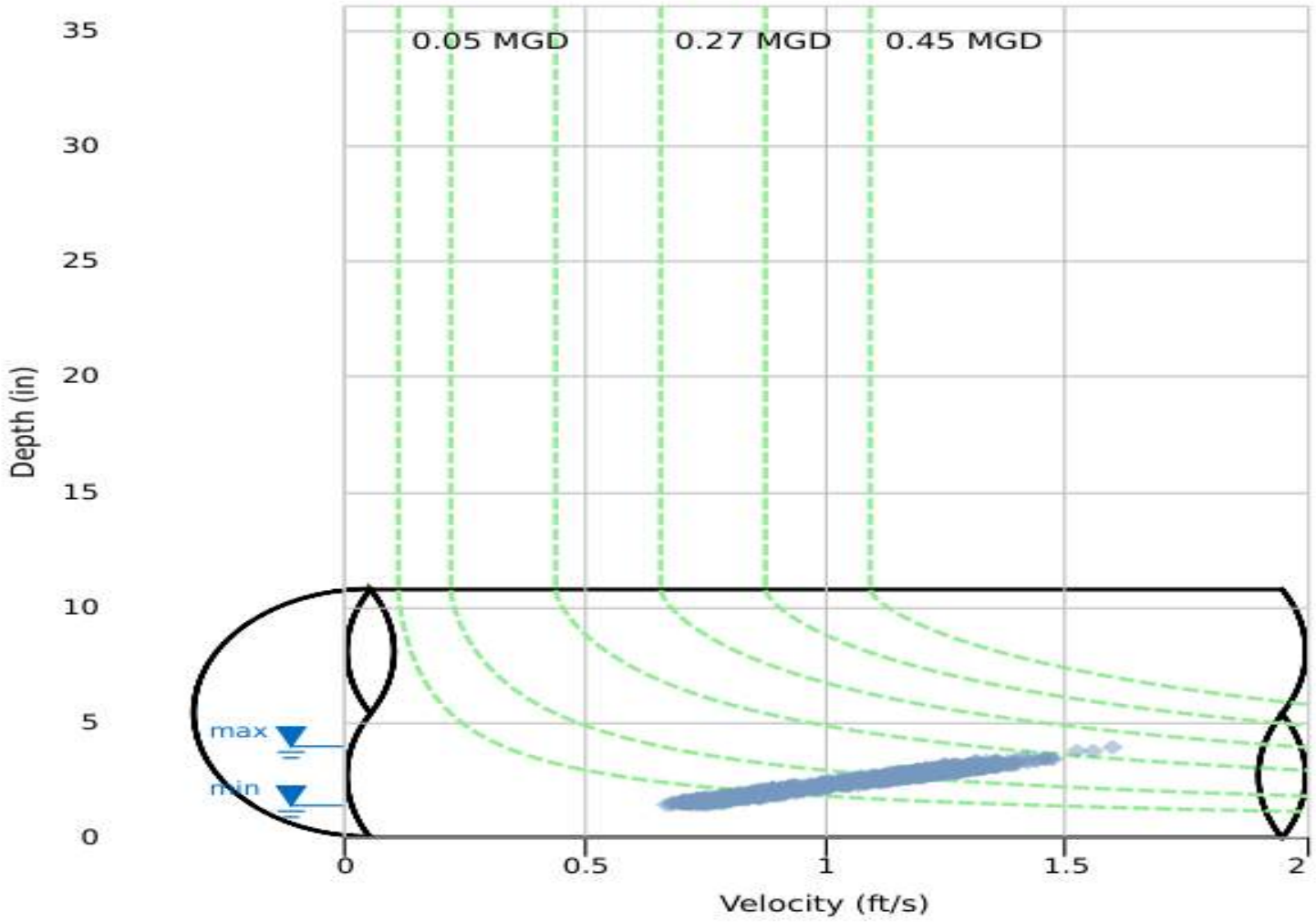
Report Period

02/14/2025
To
02/28/2025

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth

ADS ENVIRONMENTAL SERVICES



Daily Tabular Report

02/14/2025 00:00 - 02/28/2025 23:59
HAY_02 Pipe: Elliptical (10.75 in H x 10.88 in W), Silt 0.00 in

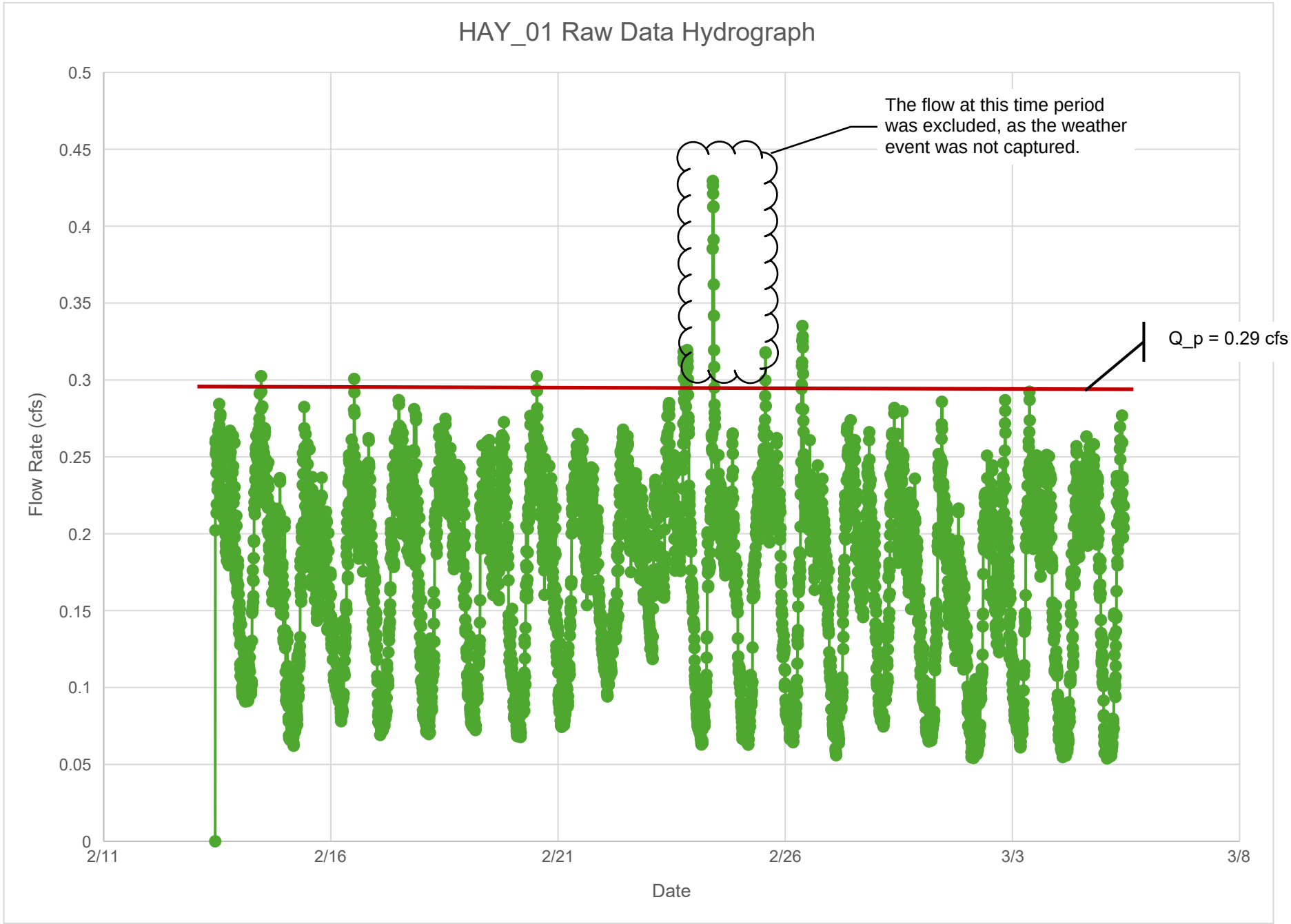
	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
02/14/2025	03:20	1.60	11:20	3.22	2.51	03:20	0.81	10:55	1.39	1.14	03:20	0.031	11:20	0.143	0.087	0.087
02/15/2025	03:00	1.41	10:20	3.27	2.37	04:50	0.74	10:25	1.39	1.09	03:00	0.024	10:20	0.147	0.078	0.078
02/16/2025	05:55	1.54	12:45	3.20	2.52	05:55	0.75	12:45	1.39	1.12	05:55	0.027	12:45	0.143	0.087	0.087
02/17/2025	03:55	1.48	12:20	3.27	2.55	03:10	0.72	12:20	1.40	1.12	03:10	0.025	12:20	0.148	0.089	0.089
02/18/2025	04:20	1.50	12:55	3.20	2.59	04:20	0.71	10:35	1.33	1.11	04:20	0.025	12:55	0.137	0.090	0.090
02/19/2025	03:35	1.52	18:55	3.21	2.48	03:35	0.75	18:55	1.38	1.09	03:35	0.027	18:55	0.143	0.082	0.082
02/20/2025	04:45	1.44	13:15	3.27	2.48	04:45	0.71	12:00	1.41	1.09	04:45	0.023	13:15	0.145	0.083	0.083
02/21/2025	03:45	1.51	12:20	3.20	2.49	03:40	0.74	12:20	1.33	1.08	03:40	0.026	12:20	0.137	0.082	0.082
02/22/2025	02:35	1.72	11:50	3.24	2.57	02:35	0.79	11:50	1.35	1.11	02:35	0.034	11:50	0.141	0.087	0.087
02/23/2025	01:15	2.06	20:15	3.46	2.78	01:15	0.94	20:55	1.48	1.22	01:15	0.052	20:15	0.169	0.105	0.105
02/24/2025	04:25	1.38	10:15	4.01	2.51	04:15	0.71	10:15	1.61	1.10	04:25	0.022	10:15	0.226	0.086	0.086
02/25/2025	04:10	1.45	14:00	3.41	2.53	04:05	0.68	14:00	1.37	1.06	04:05	0.023	14:00	0.154	0.085	0.085
02/26/2025	04:45	1.45	09:30	3.48	2.53	04:50	0.69	09:30	1.42	1.08	04:45	0.023	09:30	0.165	0.086	0.086
02/27/2025	03:25	1.37	09:30	3.09	2.42	03:25	0.66	13:10	1.31	1.06	03:25	0.020	09:15	0.127	0.078	0.078
02/28/2025	04:20	1.45	11:20	3.37	2.46	04:40	0.67	11:20	1.50	1.08	04:35	0.023	11:20	0.166	0.082	0.082

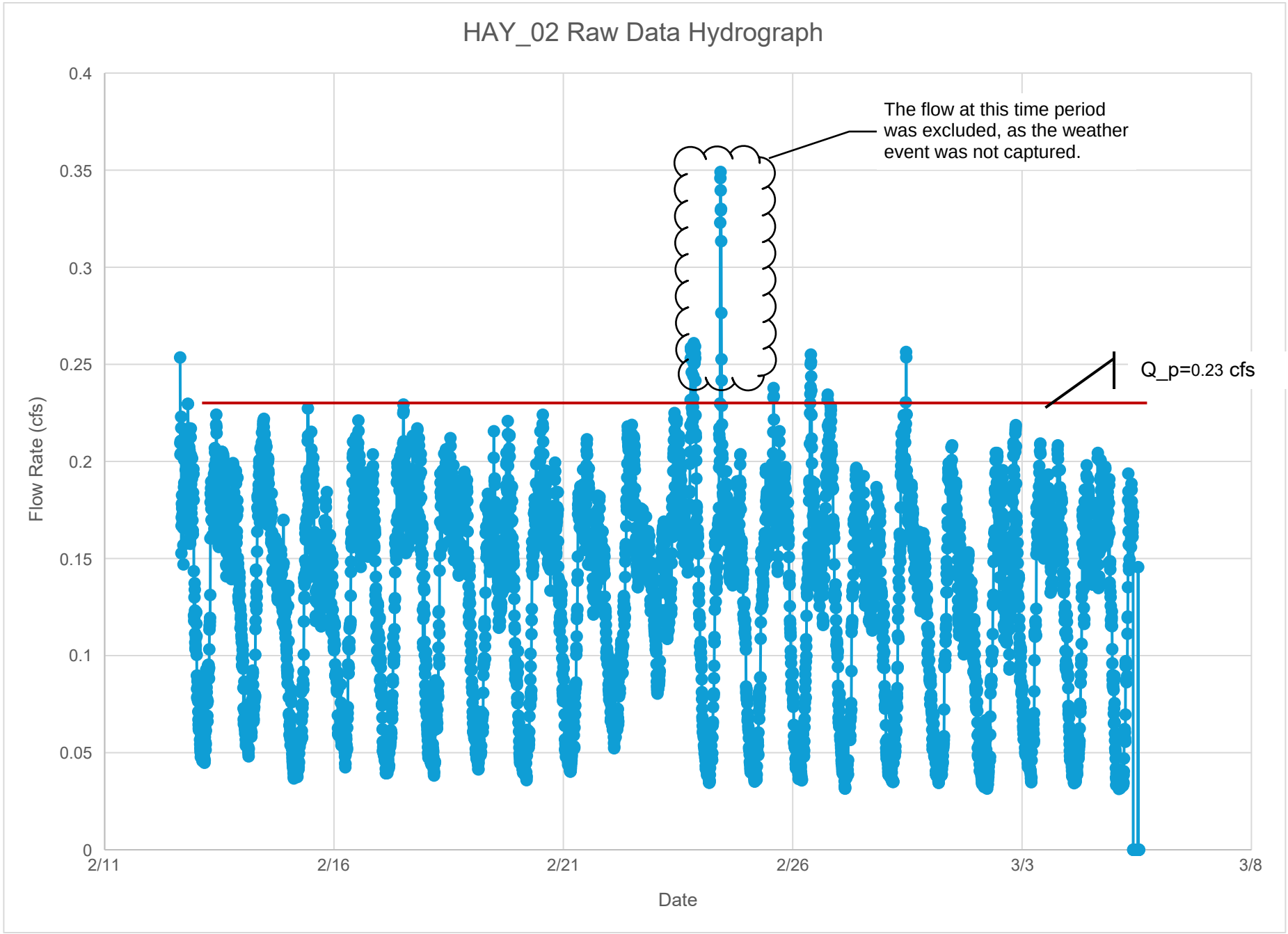
02/14/2025 00:00 - 02/28/2025 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)
Total			1.288
Average	2.52	1.10	0.086

Appendix C

Flow Monitor Data


HAY_01 Raw Data Hydrograph
The flow at this time period was excluded, as the weather event was not captured.
Q_p = 0.29 cfs
Flow Rate (cfs)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/11
2/16
2/21
2/26
3/3
3/8
Date


HAY_02 Raw Data Hydrograph
The flow at this time period was excluded, as the weather event was not captured.
Q_p=0.23 cfs
Flow Rate (cfs)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/11
2/16
2/21
2/26
3/3
3/8
Date