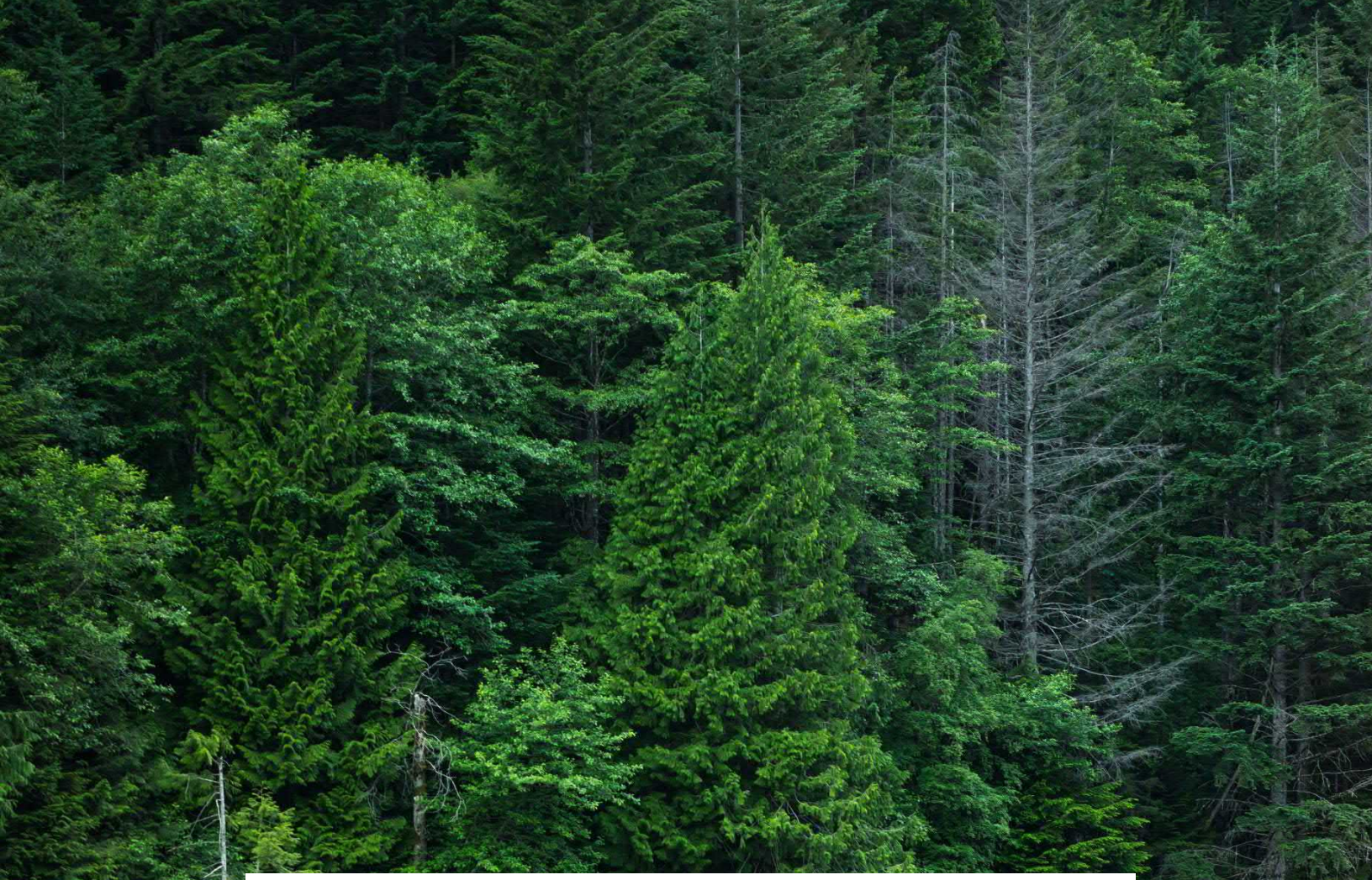

SANITARY SEWER MODEL AND MASTER PLAN

TOWN OF GOLDEN

JUNE 2025

URBAN SYSTEMS

101 - 134 11 Avenue SE, Calgary, AB T2G 0X5 | T: 403.291.1193

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PREPARED FOR:

The Town of Golden
810 9th Ave SW
Golden, BC V0A 1 H0

Permit:

PERMIT TO PRACTICE
URBAN SYSTEMS LTD.
Signature
Date 2025-06-20
PERMIT NUMBER: 1000527
Engineers and Geoscientists BC (EGBC)

Seal:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
Dr. M. G. ELENANY
36087

101 - 134 11 Avenue SE, Calgary, AB T2G 0X5 | T: 403.291.1193

File: 0404.0244.01

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EXECUTIVE SUMMARY

The Town of Golden engaged Urban Systems Ltd. to analyse the Town's existing and future sanitary demands and their impact on the sanitary sewer infrastructure to help manage the Town's sanitary sewer assets and guide decision making in determining future capital works or operational requirements. All available information relevant to the Town's sanitary sewer system within the Town's boundaries was gathered and reviewed. Pipe lengths, sizes, slopes and manhole inverts and rims were validated with record drawings and GIS data was updated accordingly.

A previous version of this Master Plan was issued dated June 2024. However, this updated version dated June 2025 will supersede the previous version. Additional record drawings were recovered, and further field verification was done at 5th St/5th Ave S, and at 12th St/11 Ave S. Additionally, further information about the observed operation of the 12th St Lift Station is included. The model results and recommendations have been updated.

BOT Corp. was engaged to complete a Sanitary Sewer Flow Monitoring and Rainfall Study from May 2020 to October 2020. Flow monitoring was completed at six locations throughout Golden in residential, industrial, commercial and institutional (ICI) land use areas. Using this collected data, peaking factors were determined, R-T-K parameters and unit hydrographs were generated to calculate inflow and infiltration (I&I), and a model of the existing sanitary system was developed.

The sanitary sewer model was used to identify current limitations in capacity. The results of the model were reviewed and verified by Golden's operations staff: under existing demands, no infrastructure conditions were identified that would be cause for immediate infrastructure upgrades. Projected 10-year and 25-year growth models were then developed to assess the impact of future development and population growth on the sanitary network. It should be noted that existing conditions refers to sanitary sewer conditions in 2021, 10-year growth refers to 2021-2031, and 25-year growth refers to 2021-2046.

Future system capacity issues were identified, and a prioritized list of capital improvement projects was developed, if development proceeds as assumed in the 10-year projection:

- Kicking Horse Dr
- 12th St S and 13th St S
- Mains upstream of 12th St Lift Station
- 12th St Lift Station Pump Upgrades
- 5th Ave S – east-side sanitary main

1.0 INTRODUCTION

1.1 BACKGROUND

The Town of Golden's (Town) sanitary sewer system collects wastewater from customers within the municipal boundary and directs flows to the wastewater treatment plant (WWTP) for treatment and disposal. The Town has identified the need to update the sanitary sewer model and the sanitary sewer master plan to assist with sanitary sewer asset management and guide decision making for future sewer upgrades within the Town.

This analysis and report cover topics including existing system capacity analysis, projecting future growth of sewer customer loads, as well as recommendations for risk management and developing a prioritized list of capital improvements. This plan characterizes sewer flows and identifies system deficiencies and prioritized upgrades to address those deficiencies.

1.1.1 INFRASTRUCTURE OVERVIEW

The Town of Golden owns, maintains, and operates the municipal sanitary sewer utility that generally consists of:

- 35.5 km of gravity sewer pipe
- 7 lift stations
- 2.7 km of force main

1.2 STUDY OBJECTIVES

The primary objectives of the sanitary sewer model and Master Plan update were to:

- Develop and calibrate a new sanitary sewer model with actual data from the Town's network. Validate infrastructure data in terms of pipe lengths and sizes, rim elevations, ground and manhole elevations.
- Review and update design criteria.
- Conduct a hydraulic analysis and assessment for the Town's sanitary sewer model for existing and future conditions (10 and 25-year growth conditions)
- Generate a report that analyzes the existing sanitary sewer system and future conditions. The Sanitary Sewer Master Plan report provides accurate information and data to support the management of the Town's sanitary sewer assets by providing recommendations to optimize and upgrade the existing sewer assets, if needed, and efficiently manage future demands.

1.3 METHODOLOGY

The methodology used in this study to achieve these objectives is:

- Gather and review existing information including flow monitoring (from May to October 2020) to determine existing sewer loads.
- Review the Town of Golden guidelines and MMCD design standards to identify appropriate design rates.
- Develop and calibrate a dynamic model for the existing and future sanitary sewer system using PCSWMM.

- Perform a hydraulic analysis of the sanitary system and identify any deficiencies in the current system and any potential issues for future development areas.
- Prepare a Sanitary Sewer Master Plan including all assumptions and information used for the model development and calibration, analysis results and mapping of results, conclusions, recommendations, and Class "C" cost estimates for future sanitary system upgrades.

2.0 REVIEW OF EXISTING INFORMATION AND UPDATE

2.1 DATA COLLECTION

All available information relevant to the Town's sanitary sewer system within the Town of Golden boundaries for both the existing and future development was gathered and reviewed, including available GIS files and record drawings for existing conditions and developed and constructed areas. The gathered information included but was not limited to the following:

- Rim elevations, taken from the Town's existing GIS database, which included information on manhole depths and pipe sizing.
- The Town's record drawings of the sanitary system, where available, were used to update the GIS database and model where information in the original GIS database created unrealistic pipe slope conditions.
- Lift station record drawings and pump curves were used where available. When not available, the Town provided wet well measurements and pump design points, which were extrapolated into pump curves for the model. A summary of lift station information can be found in Appendix A.
- Current land use information was provided from the Town's existing GIS data. This information is shown in Figure 1.

2.2 DATA VALIDATION AND INFRASTRUCTURE CHARACTERISTICS

The physical characteristics of the Town's sanitary sewer system were confirmed to provide the Town of Golden with a validated and working model. The physical data of the existing sanitary sewer model, such as pipe lengths, material, sizes, slopes, manhole inverts and rim elevations were verified in areas where record drawings were available. The Town's operations staff reviewed this information and identified areas where upgrades had been completed. The model was then reviewed and adjusted as required. The existing sanitary sewer infrastructure with pipe sizes, manhole locations, lift station locations and the WWTP are shown in Figure 2. Manhole numbering is shown in Figure 3.

To keep the model up to date, it is recommended to update the model with as-constructed information as it is made available on a regular basis.

Manning Coefficients for Sanitary Mains

Pipe age and material data were taken from the GIS database and used to assign each pipe a roughness coefficient, called Manning's roughness value. In general, pipes installed in the last 20-30 years were assigned a Manning's Roughness Coefficient of n= 0.013. Pipes older than 30 years old have a Manning's Roughness Coefficient of n= 0.015 in the model.

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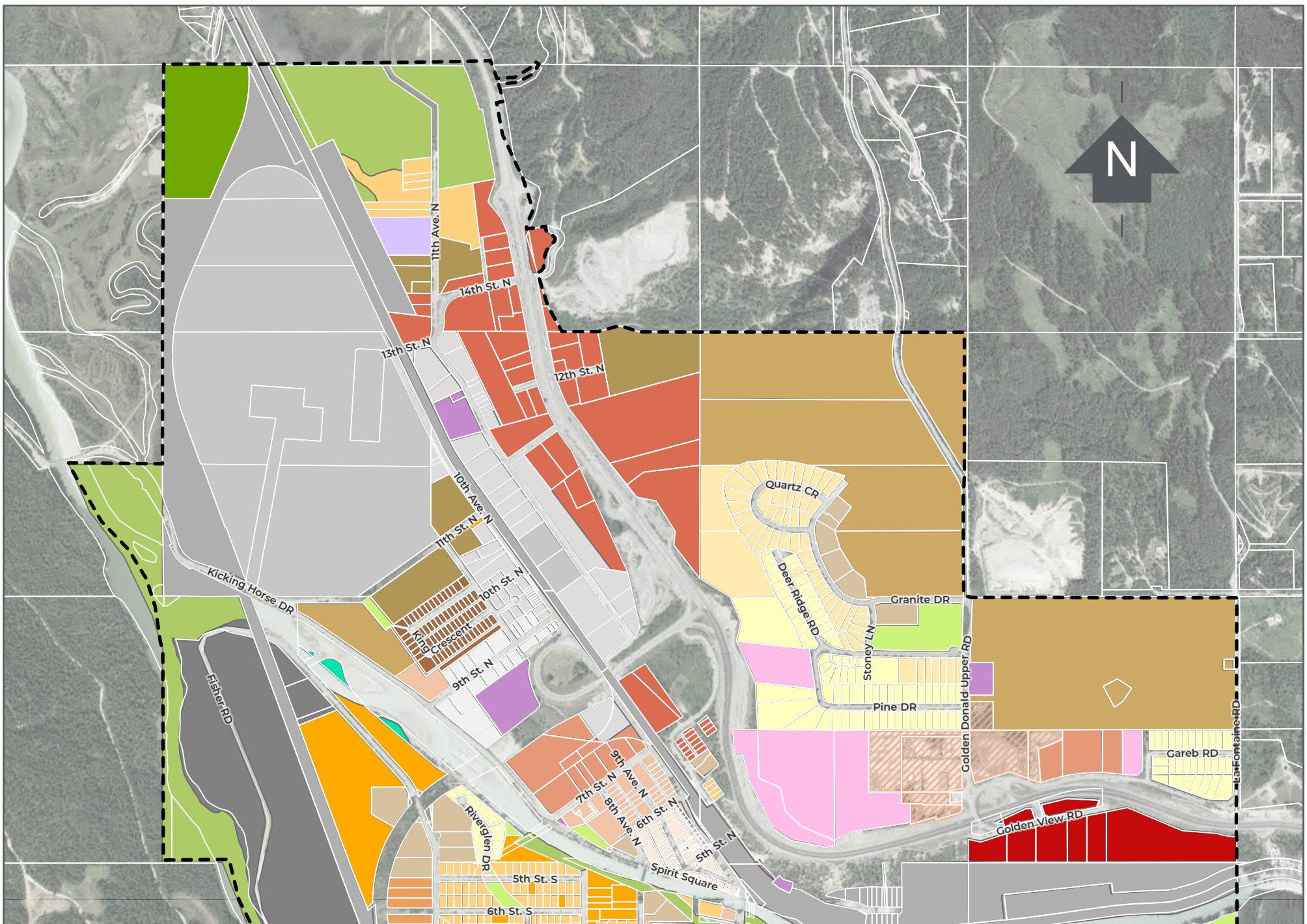

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Project #:	0404.0244.01
Author:	SDF
Checked:	CG
Status:	**Review**
Revision:	A
Date:	2025 / 6 / 17

0 100 200 300
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

Scale: 1:15,000
(When plotted at 11"x17")

Data Sources:
- Data provided by government of B.C. and Town of Golden

The accuracy & completeness of information shown on his drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

Legend

Town Boundary

Zoning

Residential
- R1
- R1D
- R1S
- R2
- R2A
- R3
- R4
- R5
- R6
- R7

Community
- I1
- I2
- I3

Parks, Recreation, Environment
- P1
- P2
- ER

Commercial
- C1
- C2
- C3
- C4
- C5
- C6

Industrial
- M1
- M2
- M3
- M4
- M5

Other
- CD1
- CD2
- CL
- AR

TOWN OF GOLDEN
Riding Horse Country

Sanitary Master Plan

Current Land Use

FIGURE 1

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INSET 1

INSET 2

INSET 3

N

Twinned mains
(450mm,300mm)
see Inset

Waste Water Treatment Plant

Project #:	0404.0244.01
Author:	SDF
Checked:	CG
Status:	Review
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Date:	2025 / 6 / 20

0 100 200 300
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

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Legend

- WWTP
- Sanitary Lift Station
- Sanitary Manhole
- Town Boundary

Sanitary Forcemains
- 50mm
- 75mm
- 100mm
- 150mm
- 250mm
- 300mm

Sanitary Gravity Mains
- 100mm
- 150mm
- 200mm
- 250mm
- 300mm
- 350mm
- 375mm
- 400mm
- 450mm
- 525mm

TOWN OF GOLDEN
Riding Horse Country

Sanitary Master Plan

Existing Sanitary Sewer Infrastructure

FIGURE 2

U:\Projects_CAL\0404\0244\01\D-Design\GIS\Projects\Pro_Projects\0404024401_Golden_SMP_Updated_20250617.aprx\Golden - SMP - Ex Sanitary Infrastructure - 20250617

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INSET 1

INSET 2

INSET 3

INSET 4

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Checked:	CG
Status:	Review
Revision:	A
Date:	2025 / 6 / 20

0 100 200 300
Meters

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:15,000 (When plotted at 11"x17")

Data Sources:
- Data provided by government of B.C. and Town of Golden

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Legend
- WWTP
- Sanitary Lift Station
- Sanitary Manhole
- Sanitary Forcemain
- Sanitary Gravity Main
- Town Boundary

TOWN OF GOLDEN Riding Horse Country

Sanitary Master Plan

Existing Sanitary Manholes

FIGURE 3

U:\Projects_CAL\0404\0244\01\D-Design\GIS\Projects\Pro_Projects\0404024401_Golden_SMP_Updated_20250617.aprx\Golden - SMP - Ex Sanitary Manholes - 20250617

2.3 FLOW CHARACTERIZATION

As indicated in many publications on the subject, the daily flow conveyed in a sanitary system can be divided into five components:

- Groundwater infiltration: a function of pipe condition and pipe elevation with respect to the saturated soil zone and groundwater table elevation.
- Baseline sanitary flow: a function of per-capita water consumption.
- Dry weather flow: the sum of groundwater infiltration and baseline sanitary flow. This is also referred to as Average Dry Weather Flow (ADWF) when averaged over 24 hours.
- Rainfall-dependent inflow and infiltration (RDI&I): the sewer flow response to rainfall in a sewershed.
- Wet weather flow: the sum of Dry Weather Flow and Rainfall-Dependent Inflow and Infiltration. The maximum wet weather flow is referred to as Peak Wet Weather Flow (PWWF).

The relationship between these components is illustrated in the diagram below:

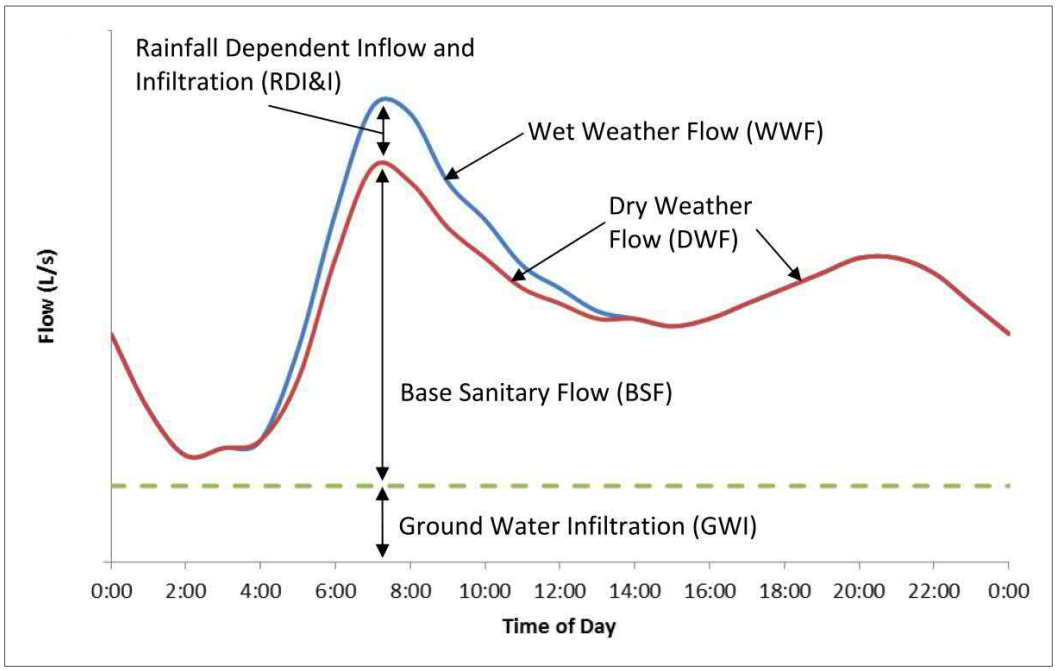

Figure 4. Relationship between Components of Sanitary Flow

2.4 FLOW MONITORING PROGRAM

The primary intent of a sanitary sewer system is to reliably collect and convey sewage to permitted wastewater treatment facilities so that flows can be safely returned to the environment. A secondary and large purpose of the system is to effectively convey inflow and infiltration flows as they are normal and challenging conditions of any sanitary sewer system. Inflow typically enters the sanitary sewer system through overland points such as manhole covers. Infiltration is typically more dispersed through sanitary pipes. Thousands of small entry points at poor pipe couplings, tree-root holes, pipe defects such as cracks, displaced joints, and manhole and service connection points can create area-wide flow impacts.

BOT Corp. company was engaged to complete a Sanitary Sewer Flow Monitoring and Rainfall Study for the Town of Golden. This data was collected between May 9 2020 and October 13 2020, and used to establish the average dry weather flow, infiltration and inflow allowances, and peaking factors for different areas of the Town. Flow monitoring was completed at six locations throughout the Town in residential, industrial, commercial and institutional (ICI) land use areas, and rainfall data was collected using a rain gauge.

The tabular results of the Sanitary Sewer Flow Monitoring and Rainfall Study can be found in Appendix B. Using this data, model parameters were generated for the different land use areas and used as design criteria. These design criteria are summarized in Section 3 of this report.

Table 1 and Figure 5 summarize the six flow monitoring stations and their respective catchment land uses.

Table 1. Sanitary Flow Monitoring Catchment Land Uses

FLOW MONITORING STATION	CATCHMENT LAND USE
Flow Monitoring Location #1	Mixed-Use, Primarily Industrial and Commercial
Flow Monitoring Location #2	Mixed-Use, Industrial, Residential and Commercial
Flow Monitoring Location #3	Residential
Flow Monitoring Location #4	Mixed-Use, Primarily Residential with some Commercial
Flow Monitoring Location #5	Mixed-Use, Primarily Institutional
Flow Monitoring Location #6	Residential

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Flow Monitoring Station #1 (MH 414)

Flow Monitoring Station #2 (MH 401)

Flow Monitoring Station #3 (MH 23)

Flow Monitoring Station #4 (MH 226)

Flow Monitoring Station #5 (MH 102)

Flow Monitoring Station #6 (MH 701)

Flow Monitoring Station	Catchment Area (ha)
1	78.9
2	25.6
3	7.5
4	76.4
5	12.2
6	34.1

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0 100 200 300
Meters

Coordinate System: NAD 1983 UTM Zone 11N

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Data Sources:
- Data provided by government of B.C. and Town of Golden

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Legend

Flow Monitoring Locations
- Location 1 (SMH-414)
- Location 2 (SMH-401)
- Location 3 (SMH-23)
- Location 4 (SMH-226)
- Location 5 (SMH-102)
- Location 6 (SMH-701)

- Flow Monitor Catchments
- Sanitary Gravity Main
- Sanitary Forcemain
- Town Boundary

TOWN OF GOLDEN Riding Horse Country

Sanitary Master Plan

Sanitary Flow Monitoring Locations

FIGURE 5

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3.0 DESIGN CRITERIA

Several design criteria and assumptions were required to build the sanitary model and generate existing and future sewer flows.

These parameters include:

a) Average Dry Weather Flow (ADWF) Sewage Generation per capita
b) Peaking factors
c) Inflow and Infiltration allowances

The chosen values for each parameter were reviewed and agreed upon with the Town of Golden operations staff during the model building process, based on recommendations and review by Urban Systems Ltd.

3.1 AVERAGE DRY WEATHER FLOW

The sanitary model requires average dry weather sanitary flow (ADWF) value inputs to build the base model. ADWF is calculated for Industrial/Commercial/Institutional (ICI) and Residential areas.

3.1.1 INDUSTRIAL/COMMERCIAL/INSTITUTIONAL (ICI) ADWF

The existing conditions ADWF for ICI areas were calculated using water meter records from the Town of Golden, which were then converted to sanitary flow to allow for proper model calibration and accuracy. The future conditions ADWF was calculated based on the Town of Golden Subdivision Servicing Bylaw (2008) design criteria.

EXISTING CONDITIONS – ICI ADWF

The Town of Golden supplied water meter records for ICI users from 2016-2022. Yearly flow totals were calculated, excluding flows from irrigation meters. A per-hectare water usage rate for ICI land use was calculated based on the existing build-out of ICI land use parcels. This per-hectare rate was converted to sanitary flow using an assumed conversion rate from water to wastewater of 90%.

This provided an **existing conditions ICI ADWF value of 0.081 L/s/ha.**

FUTURE SANITARY DEMANDS – ICI ADWF

Future ICI ADWF values were based on the Town of Golden Subdivision Servicing Bylaw (2008) design criteria for sewage generation and population densities. This resulted in a sewage generation of 350 L/capita/day, and population densities for Commercial and Industrial at 75 capita/ha, and Institutional at 50 capita/ha.

This provided an equivalent **ICI ADWF value of Commercial and Industrial at 0.3 L/s/ha and Institutional at 0.2 L/s/ha.**

3.1.2 RESIDENTIAL ADWF

Similarly to the ADWF calculation for ICI land uses, water record data was used to calculate the existing conditions' residential ADWF sanitary flows. Town of Golden Subdivision Servicing Bylaw (2008) design criteria was used for future sanitary demand calculations.

To inform the existing conditions ADWF calculations, Town populations were first collected for existing scenarios and projected for future scenarios.

CURRENT AND PAST POPULATION CALCULATIONS

Federal census population data from the Town of Golden Census Subdivision (see reference link in Section 6) is available between 2016 and 2021 (shown in **bold** in the table below).

Population for the years between this range has been linearly interpolated.

Table 2. Population Data 2016-2021

YEAR	POPULATION
2016	**3708**
2017	3764
2018	3819
2019	3875
2020	3930
2021	**3986**

FUTURE POPULATION CALCULATIONS

Future population scenarios used an assumed average population growth of 1.5% per year, as per the Town of Golden Transportation Plan (Urban Systems Ltd, 2023) and historically observed population growth rates within the Town. This growth rate was applied to the base population from Golden's 2021 census data.

Table 3. Future Population Projections 2021-2046

YEAR	POPULATION	POPULATION INCREASE, COMPARED TO 2021 CENSUS POPULATION
2021	**3986**	**0**
2031 (10-year projection)	4631	645
2046 (25-year projection)	5797	1811

Population data was then used to calculate the residential ADWF.

EXISTING CONDITIONS – RESIDENTIAL ADWF

The Town of Golden supplied water records from the Town's total well water output, irrigation meter records, and industrial, commercial, and institutional (ICI) user meter records from 2016-2022.

The following formula was used to calculate residential water usage from the above listed information, since residential water use is not individually metered in the Town:

$$\textit{Residential Water Use} = \textit{Yearly Average Well Water Output} - \textit{Irrigation} - \textit{ICI usage} - \textit{Losses in distribution system}$$

The above calculation assumed a 15% loss in the distribution system (as per typical industry practice). Yearly well water output was calculated as an average from January to May and September to December. These months best reflect water usage that is converted to sanitary flow. This approach prevents inflated data from being included when increased water usage does not enter the sanitary system (e.g., residents watering gardens and lawns).

This residential water usage was then converted to a residential sanitary flow output using an assumed a conversion rate from water usage to wastewater output of 90%, and the per-capita sanitary ADWF was then calculated by dividing the residential-only sanitary flows by the Town population.

Based on the above calculation, the per-capita residential sanitary generation rate was calculated to be 237 L/capita/day and rounded up to provide a buffer for any inaccuracies in the assumption of distribution system losses.

This provided an **existing condition residential ADWF value of 250L/capita/day.**

FUTURE SANITARY DEMANDS – RESIDENTIAL ADWF

Future Residential ADWF values were based on the Town of Golden Subdivision Servicing Bylaw (2008) design criteria.

This provided a **future residential ADWF value of 350 L/capita/day.**

3.2 PEAKING FACTORS

Peaking factors were determined as a ratio of the hourly observed sanitary flow compared to the average observed flow at each flow monitoring site, using only dry weather flow data. Using dry weather data ensures that the peaks observed are from users of the sanitary system, and not from rainfall events.

A typical residential diurnal curve has two distinct peaks in the morning and evening, whereas an industrial/commercial/institutional (ICI) peaking factor curve typically shows one larger peak in the middle of the day. The flow monitoring sites' peaking factor graphs did not directly match a residential or ICI curve shape, likely due to mixed land use and potential high inflow and infiltration levels in the sanitary system.

Since there was no single peaking factor graph that fit a particular land use designation as expected, nodes in the model were assigned peaking factors to match the flow monitoring site that was geographically closest to it.

In general, peaking factor values range from 0.35 – 1.79, as shown in the below figures.

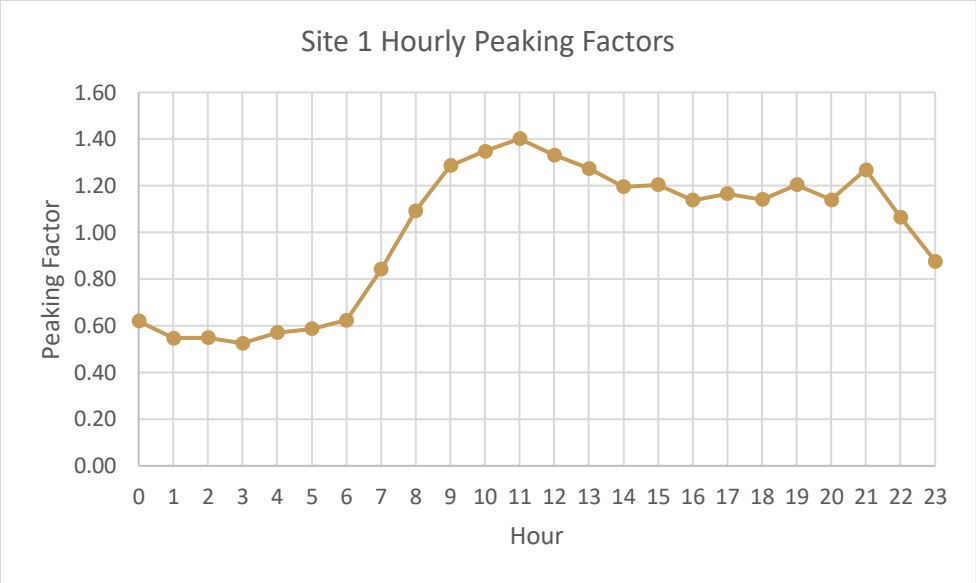

Figure 6. Site 1 Peaking Factors
Mixed-Use, Primarily Industrial and Commercial

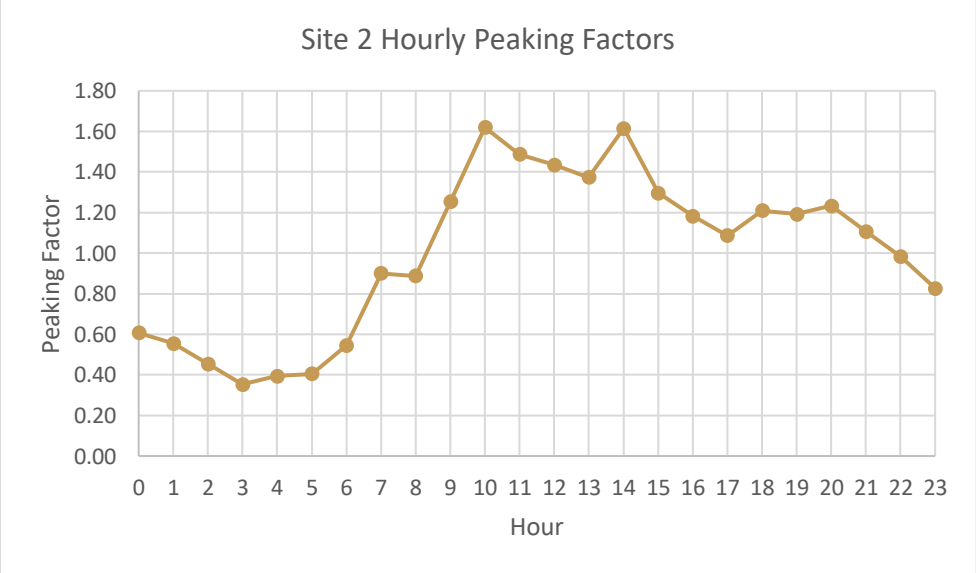

Figure 7. Site 2 Peaking Factors
Mixed-Use: Residential, Industrial and Commercial

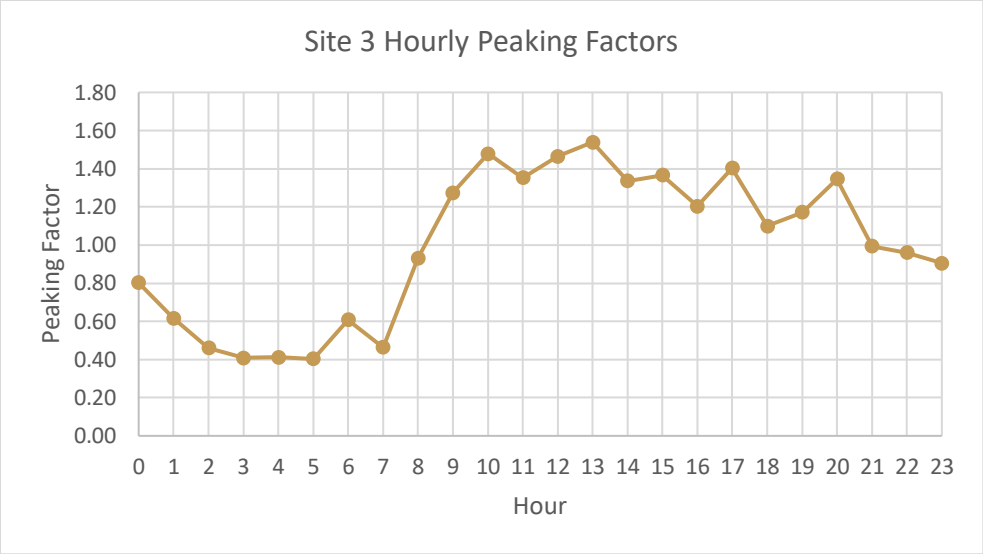

Figure 8. Site 3 Peaking Factors
Residential

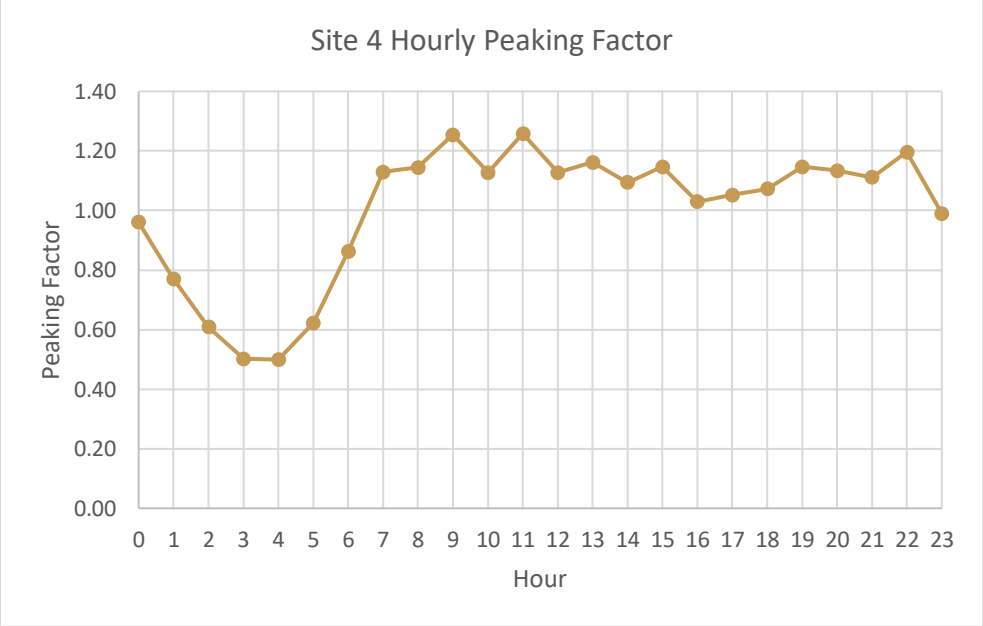

Figure 9. Site 4 Peaking Factors
Mixed-Use, Primarily Residential with some Commercial

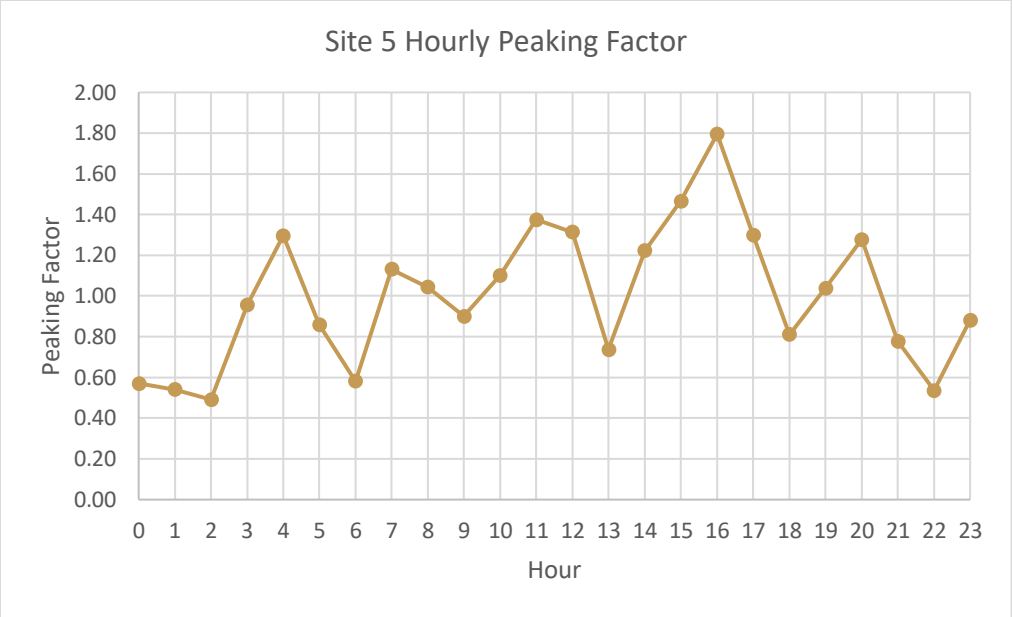

Figure 10. Site 5 Peaking Factors
Mixed-Use, Primarily Institutional

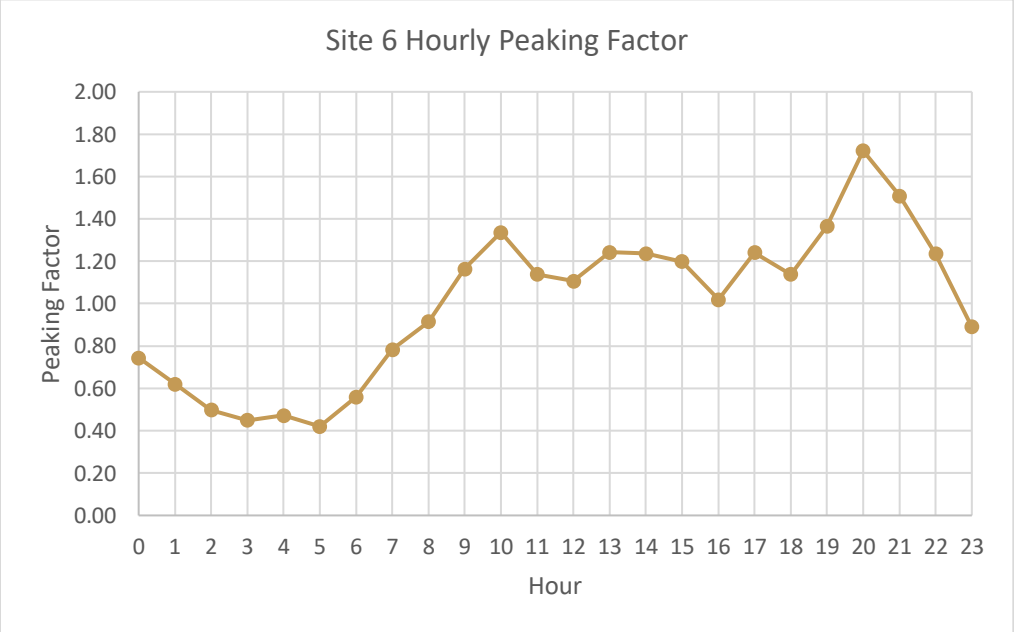

Figure 11. Site 6 Peaking Factors
Residential

The tables of data for each site's peaking factors can be found in Appendix C.

3.3 INFLOW AND INFILTRATION ALLOWANCES

Sanitary flows are comprised of generated sewage flows, and Inflow and Infiltration (I&I) due to rainwater and groundwater entering the sewer system. Sanitary generation and I&I together comprise wet weather sanitary flows.

I&I was calculated from the flow monitoring data and developed into R-T-K parameters for the sanitary model. It was then assigned to a 5-year design storm to calculate I&I flows.

3.3.1 RTK PARAMETERS FROM FLOW MONITORING DATA

RTK parameters were used instead of using a per-hectare inflow and infiltration (I&I) rate, since the per-hectare method tends to overestimate I&I flows.

RTK parameters represent the fast, medium and slow response that sanitary flow levels change in relation to rainfall events. A higher fast response indicates more inflow from surface rainwater, whereas a higher slow response indicates more infiltration from groundwater. The R-value represents the fraction of rainfall that enters the sanitary system. The T-value represents the time from the start of the rain event to the peak observed flow, in hours. The K-value represents the ratio of time from the observed peak flow to the return to normal flows.

Full tables of RTK parameters can be found in Appendix C.

3.3.2 DESIGN STORM

RTK parameters are used alongside a design storm in the sanitary model to calculate I&I flows. The design storm chosen will impact how much I&I appears in the model. The Town of Golden Subdivision Servicing Bylaw (2008) notes that the 5-year design storm should be modeled for gravity pipes and minor systems. Therefore, a 5-year design storm was used in the sanitary model, applied in a 24-hour duration.

The Town of Golden Master Drainage Plan Update (February 2019) presents updated rain intensity duration frequency (IDF) curves and scenarios to reflect climate change impacts.

The Chicago storm distribution was applied to Golden's 5-year storm event IDF curve values to create the 24-hour duration design storm used in the sanitary model.

Table 4. IDF Curve Values for Golden's 5-year storm event, using 2006-2056 Median Scenario

DURATION	INTENSITY (MM/HR)
5 min	61.2
10 min	39.0
15 min	30.0
30 min	19.1
1 hr	12.2
2 hr	7.8
6 hr	3.8
12 hr	2.4
24 hr	1.6

3.4 SCENARIO DEVELOPMENT

Based on the above-described criteria and assumptions, the following model scenarios were developed to reflect the Town of Golden's sanitary sewer existing conditions, and the future conditions based on 10-year and 25-year growth projections.

3.4.1 EXISTING SCENARIO

2021 Scenario:
The year 2021 was selected to be the existing conditions scenario since it is the closest Census data publication date and is close to the year the flow monitoring was conducted. This scenario is used to identify any pipe capacity issues that the current system is susceptible to have under existing peak wet weather flow conditions.

3.4.2 FUTURE SCENARIOS:

Future population scenarios were built around the assumed population growth as described in Section 3.1.2.

2031 (10-year growth) Scenario:

The 2031 scenario represents a 10-year growth projection. Specific sites in the Town were identified as sites that have potential to be developed within the 10-year horizon. The amount of projected buildout used in this scenario was calibrated to the average 1.5% permanent population growth per year by 2031. In addition to the permanent population growth projection, the 10-year projection also includes non-residential flows (for example, commercial and hotel land uses) from sites identified in the Town that have potential for development within this time horizon. These were used to calculate future sanitary flows. This assumed future growth is shown in Figure 12.

The 2031 scenario was used to identify any capacity issues that the current system is susceptible to have under the 10-year build out's peak wet weather flow condition. Potential infrastructure upgrade sizing is not necessarily determined by the 10-year growth scenario, since future growth upstream of the area could mean further upgrades again before the newly installed pipe has reached the end of its serviceable lifespan. Therefore, the 10-year scenario is used to identify locations where capacity issues will develop within 10 years and to help inform the timing of potential upgrades, however the upgrade sizing is determined in the 25-year scenario.

2046 (25-year growth) Scenario:

The 2046 scenario represents a 25-year growth projection. Specific sites in the Town were assumed to have development within the 25-year horizon. The amount of projected buildout used in this scenario was calibrated to the average 1.5% permanent population growth per year by 2046, in addition to the assumed non-residential developments. These were used to calculate future sanitary flows. This assumed future growth is shown in Figure 13.

The 2046 scenario is used to identify any capacity issues that the current system is susceptible to under the 25-year build-out's peak wet weather flow condition and to determine infrastructure upgrades, if deemed necessary.

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Adventure Park and Campground

Residential

Residential

Hotel and Commercial

Residential

Residential

Residential

Residential

Residential

Residential and Commercial

Commercial

Residential

Residential

URBAN SYSTEMS

Project #:	0404.0244.01
Author:	SDF
Checked:	CG
Status:	Review
Revision:	A
Date:	2025 / 6 / 20

0 100 200 300

Meters

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:15,000 (When plotted at 11"x17")

Data Sources:
- Data provided by government of B.C. and Town of Golden

The accuracy & completeness of information shown on his drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

Legend

- Future Sanitary Connection
- Sanitary Gravity Mains
- Sanitary Forcemains
- Town Boundary

Zoning

Residential: R1, R1D, R1S, R2, R2A, R3, R4, R5, R6, R7

Community: I1, I2, I3

Parks, Recreation, Environment: P1, P2

Commercial: C1, C2, C3, C4, C5, C6

Industrial: M1, M2, M3, M4, M5

Other: CD1, CD2, CL, AR, ER

TOWN OF GOLDEN Kicking Horse Country

Sanitary Master Plan

10-year Growth Assumptions

FIGURE 12

U:\Projects_CAL\0404\0244\01\D-Design\GIS\Projects\Pro_Projects\0404024401_Golden_SMP_Updated_20250617.aprx\Golden - SMP - 10yr Growth Projections - Simplified - 20250617

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N

Residential

Residential

Residential

Residential

Residential

Residential and Highway Commercial

Hotel

Residential

Commercial

High Density Residential

URBAN SYSTEMS

Project #:	0404.0244.01
Author:	SDF
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Status:	Review
Revision:	A
Date:	2025 / 6 / 20

0 100 200 300

Meters

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:15,000 (When plotted at 11"x17")

Data Sources:
- Data provided by government of B.C. and Town of Golden

Notes:
- Based on 10 year projections

The accuracy & completeness of information shown on his drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

Legend

- Future Sanitary Connection
- Sanitary Gravity Mains
- Sanitary Forcemains
- Town Boundary

Zoning

Residential: R1, R1D, R1S, R2, R2A, R3, R4, R5, R6, R7

Community: I1, I2, I3

Parks, Recreation, Environment: P1, P2

Commercial: C1, C2, C3, C4, C5, C6

Industrial: M1, M2, M3, M4, M5

Other: CD1, CD2, CL, AR, ER

TOWN OF GOLDEN Kicking Horse Country

Sanitary Master Plan

25-year Growth Assumptions

FIGURE 13

U:\Projects_CAL\0404\0244\01\D-Design\GIS\Projects\Pro_Projects\0404024401_Golden_SMP_Updated_20250617.aprx\Golden - SMP - 25yr Growth Projections - Simplified - 20250617

3.5 FUTURE SANITARY FLOW CALCULATIONS

Peak Wet Weather Flow (PWWF) was calculated using the assumed growth projections in Section 3.4 and the sanitary design criteria in Section 3.1. The future development areas were linked to the nearest downstream manhole (representing nodes in the model) as a direct inflow. It was assumed that flow rates for each land use remain consistent. Therefore, the future flows were estimated using the same diurnal curves as in the existing scenario. Inflow and infiltration rates depend on the pipe's condition – older pipe typically experiences more I&I. For the purpose of this model, it was assumed that pipes will be regularly maintained and undergo repairs or replacement as necessary. Therefore, the same RTK parameters were used in both existing and future scenarios.

4.0 SANITARY SEWER MODEL ANALYSIS

4.1 MODEL CALIBRATION

Flow outputs from the existing conditions model were compared to flow monitoring data recorded in 2020 for the purposes of calibrating the model. In general, the modelled PWWF is producing representative flows within 5-20% of the observed flows. The model outputs conservative results where there are any discrepancies. The cause of discrepancies is known for each site and are reasonable for the model's purpose.

Modeled flows for flow monitoring sites 1, 2, 4 and 6 fit with the observed flows well. However, there were two monitoring sites (Site 3 and Site 5) with larger data discrepancies upon initial modeling.

Site 3

Site 3 collects flows from 10th St S, a wholly residential area. Flow monitoring data from Site 3 starts with a lower average flow but shows a large peak (a ten-fold increase) in flow from approximately June 29 to July 6th before returning to a similar average flow over the following months.

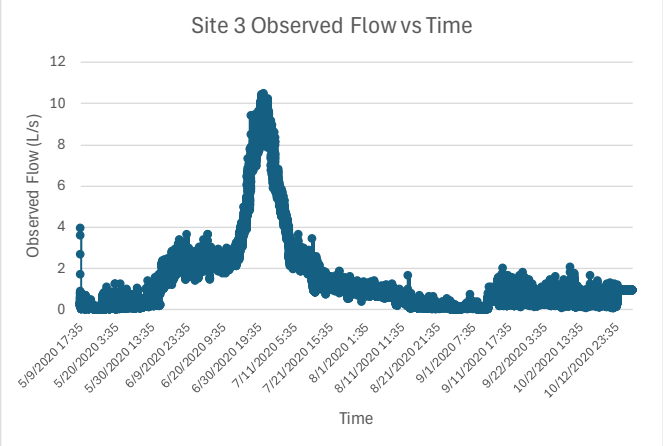

Figure 14. Site 3 Observed Flow vs Time

Town of Golden operations staff attributed this to a seasonal rise in groundwater levels, and indicated this result was expected for this area of Town, possibly due to potential sump pumps in the area tying to the sanitary mains, as well as many older pipes with high chance of increased I&I when groundwater levels rise. The modeled flows were initially much lower than observed flows during this peak, however

the model was updated to represent peak flows for this groundwater surge. This was achieved by attributing baseline flows for nodes between 5th Ave S and 7th Ave S, from 5th St S to 13th St S to account for this groundwater. Once this baseline flow was added, average modeled flow at this location vs the flow monitoring data matches within 3% over the June 29-July 6th week.

This means that the sanitary models (in existing conditions, as well as future growth conditions) will represent the highest flows the Town will see throughout the year, since the height of the groundwater surge is reflected in the model results.

Site 5

Site 5 monitored flows from many Institutional parcels, including the Golden Secondary School, Swimming Pool, and Arena. When modeled, flows were up to three times higher than observed flows on average. This discrepancy likely occurred because observed flows at this site were artificially low, considering the flow monitoring data collection was completed in 2020 and use of the school buildings and recreation facilities use were likely much lower than normal due to the COVID-19 pandemic. The model has calculated "expected normal" flows for these land use conditions, based on the ADWF design criteria.

A decision was made with Town administration to hold the modeled flows and not try to match the observed flows. Given the magnitude of flow from this catchment (approximately 1L/s), risk of being over-conservative is low.

4.2 HYDRAULIC ASSESSMENT

The developed sanitary sewer model, along with the peak flow scenarios, were utilized to evaluate the hydraulic performance of Golden's existing sanitary sewer system and assess future development's impact on the existing system's capacity.

The sanitary sewer hydraulic assessments are carried out based on the following criteria:

Gravity Main

- Pipes were found to have sufficient capacity if the pipe's flow was less than 75% full by depth (depth of flow/pipe diameter) in peak wet weather flow conditions.
- Furthermore, in peak wet weather flow conditions:
    - Surcharging pipe = 75-99% full by depth
    - Over-capacity pipe = More than 99% full by depth

Force mains

- Force mains were found to have sufficient capacity if the velocity during peak wet weather flow was less than 3.5 m/s.

Lift Station

- Lift stations were generally found to have sufficient capacity if:
    - The number of starts and stops of the pump does not exceed 6 per hour
    - Pumping requirements at PWWF can be satisfied while there is an available standby pump to provide redundancy
    - The peak wet weather sewage rate entering the lift station in the model does not exceed the pumping capacity of the duty pump(s)

Lift station capacity was considered together with the wet well capacity, pump capacity and force main capacity.

4.3 MODEL RESULTS - EXISTING CONDITIONS

The system was reviewed under the peak wet weather sanitary flows.

In general, the existing system was found to have no critical capacity issues under existing sanitary demands that would be cause for immediate infrastructure upgrades. However, short-term surcharging in the 5th Ave S sanitary mains, from 9th St S to 12th St S, was noted once the groundwater peak was added to the model.

Other isolated areas of the Town experience minor short-term capacity issues in the model. The Town should monitor these areas for capacity concerns upon upstream development, but it does not warrant any immediate upgrades based on existing flows. The minor surcharged/over-capacity areas include:

- 12th St S and 13th St S mains, from 8th Ave S to 5th Ave S
- Mains in Kicking Horse Drive, from 9th St N to 7th St N

The Town is aware that the sanitary main downstream of Pine Drive has also had intermittent capacity issues in the past, based on resident comments and observations from the Operations team. The Town should monitor this area for capacity concerns upon upstream development.

Figure 15 illustrates the modeled pipe capacities of the existing sanitary sewer system.

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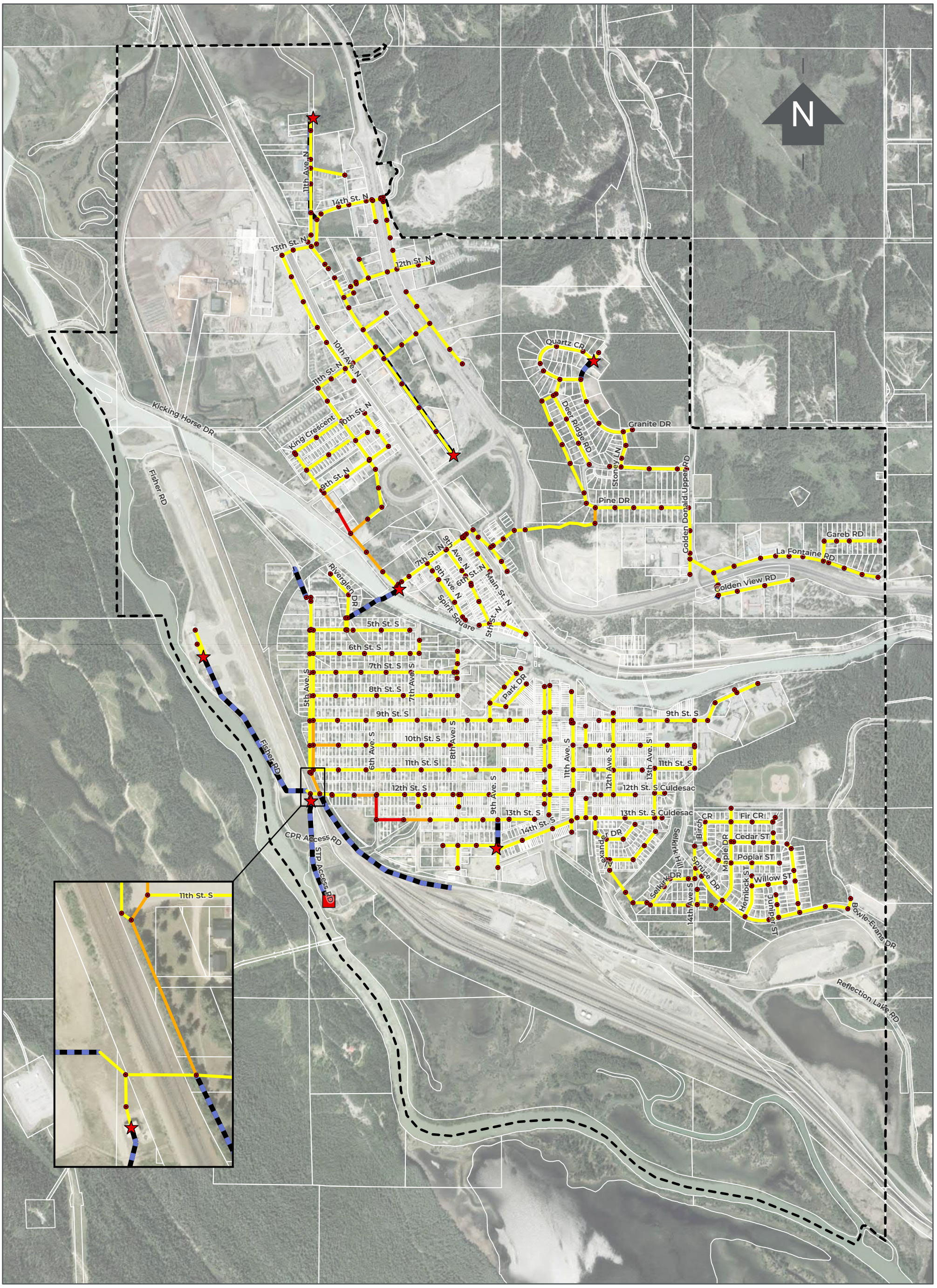

URBAN SYSTEMS

Project #:	0404.0244.01
Author:	SDF
Checked:	CG
Status:	Review
Revision:	A
Date:	2025 / 6 / 20

0 100 200 300
Meters

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:15,000 (When plotted at 11"x17")

Data Sources:
- Data provided by government of B.C. and Town of Golden

The accuracy & completeness of information shown on his drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

Legend

- WWTP
- Sanitary Lift Station
- Sanitary Manhole
- Town Boundary
- Sanitary Forcemains

Sanitary Pipes

- Under Capacity (<=0.75)
- Surcharged (0.75-0.99)
- Over Capacity (>0.99)

Notes:
- Pipe capacities are based on the ratio of depth of flow vs pipe diameter

TOWN OF GOLDEN
Kicking Horse Country

Sanitary Master Plan

Existing Conditions Model Results

FIGURE 15

U:\Projects_CAL\0404\0244\01\D-Design\GIS\Projects\Pro_Projects\0404024401_Golden_SMP_Updated_20250617.aprx\Golden - SMP - Ex Sanitary Model Capacity - 20250617

4.4 MODEL RESULTS - FUTURE CONDITIONS

The purpose of the future model scenarios is to evaluate the sanitary sewer system conditions under the 10-year and 25-year growth projections outlined in Section 3.4.

Table 5 and 6 show the areas that will experience surcharge and/or overcapacity conditions based on the two modeled scenarios.

Figure 16 illustrates the modeled pipe capacities of the existing sanitary sewer system under the 10-year growth demands.

Table 5. 10-year Growth: Sanitary Main Capacity

LOCATION	CURRENTLY SERVICED BY	PIPE CAPACITY	SURCHARGING OR FLOODING MANHOLES
Pine Drive and Golden Donald Upper RD	200mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
Kickinghorse Drive (from 9th St N to 7th St N)	300 and 250mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
12th Street S to 13th Street S (between 8th Ave S and 5th Ave S)	300 and 250mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
5th Ave S (East Side of Road) (between 8th St S and 11th St S)	300mm Gravity Main	Surcharged	Surcharging
Mains upstream of 12th St. Lift Station (5th Ave S, from 11th St S to Lift Station)	450mm Gravity Main	Surcharged/ Over-Capacity	Surcharging

Figure 17 illustrates the modeled pipe capacities of the existing sanitary sewer system under the 25-year growth demands.

Table 6. 25-year Growth: Sanitary Main Capacity

LOCATION	CURRENTLY SERVICED BY	PIPE CAPACITY	SURCHARGING OR FLOODING MANHOLES
Pine Drive and Golden Donald Upper RD	200mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
Kickinghorse Drive (from 9th St N to 7th St N)	300 and 250mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
12th Street S to 13th Street S (between 8th Ave S and 5th Ave S)	300 and 250mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
5th Ave S (East side of road) (between 8th St S and 11th St S)	300mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
5th Ave S (West side of road) (between 6th St S and 8th St S)	450mm Gravity Main	Surcharged	Surcharging
Mains upstream of 12th St. Lift Station (5th Ave S, from 11th St S to Lift Station)	450mm Gravity Main	Surcharged/ Over-Capacity	Surcharging
Fisher Road	100mm and 200mm Gravity Main	Over-Capacity	Surcharging
Highway 95 Crossing	300 and 250mm Gravity Main	Surcharged	N/A

Capacity issues present in the 10-year growth model are still present in the 25-year growth model, but have worsened due to the additional development.

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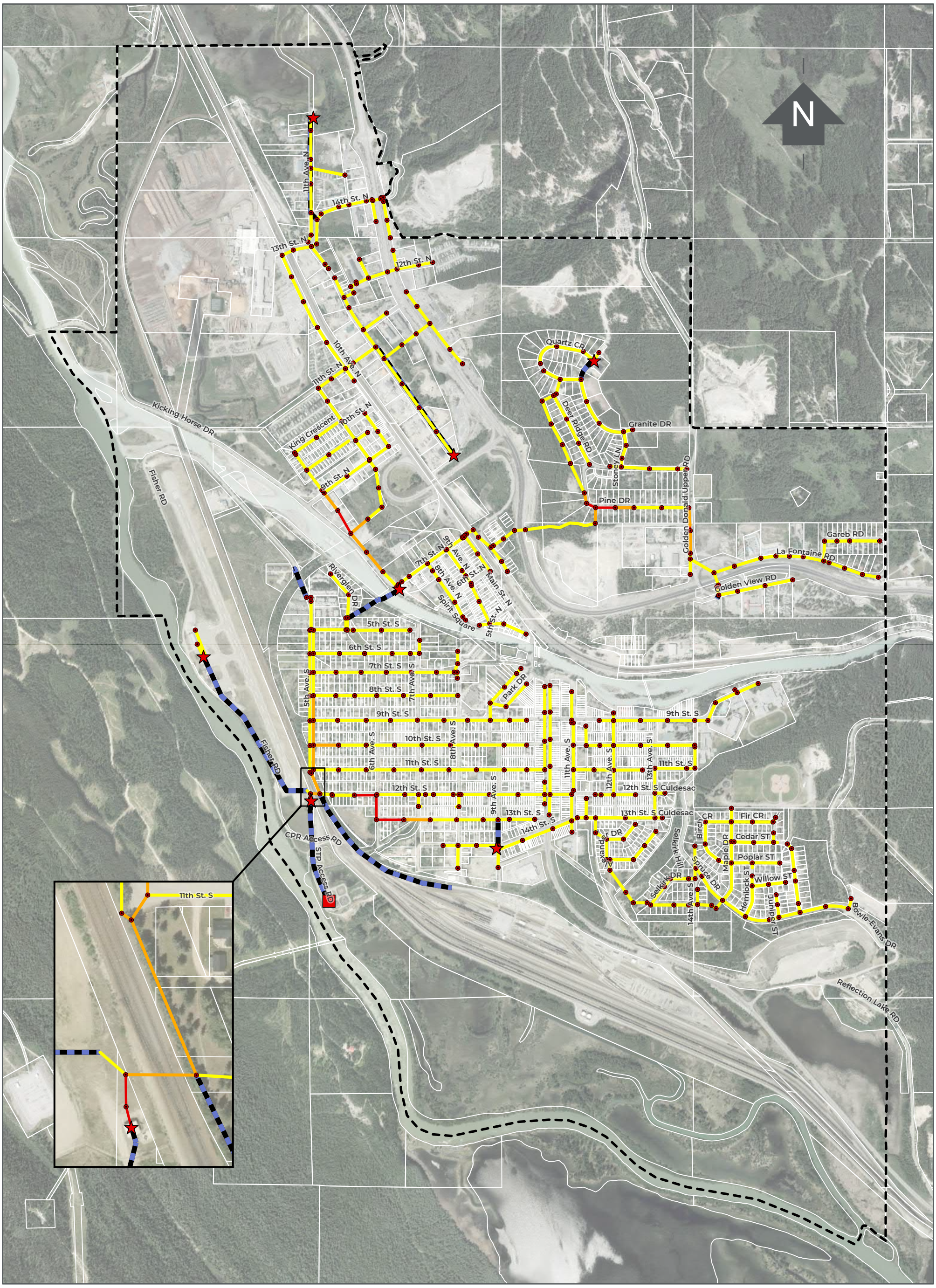

URBAN SYSTEMS

Project #:	0404.0244.01
Author:	SDF
Checked:	CG
Status:	Review
Revision:	A
Date:	2025 / 6 / 20

0 100 200 300
Meters

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:15,000 (When plotted at 11"x17")

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Legend

- WWTP
- Sanitary Lift Station
- Sanitary Manhole
- Town Boundary
- Sanitary Forcemains

Sanitary Pipes

- Under Capacity (<=0.75)
- Surcharged (0.75-0.99)
- Over Capacity (>0.99)

Notes:
- Pipe capacities are based on the ratio of depth of flow vs pipe diameter

TOWN OF GOLDEN
Kicking Horse Country

Sanitary Master Plan

10-year Growth Model Results

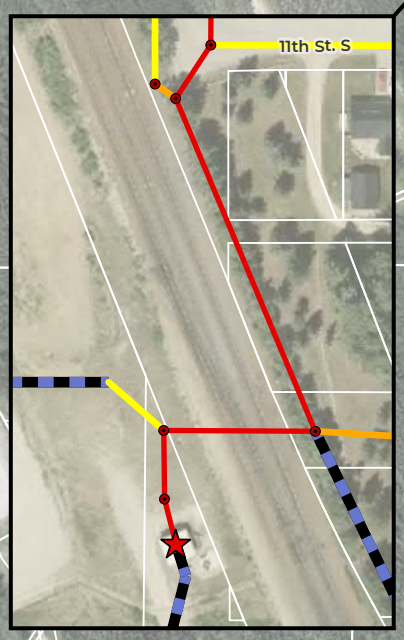
FIGURE 16

U:\Projects_CAL\0404\0244\01\D-Design\GIS\Projects\Pro_Projects\0404024401_Golden_SMP_Updated_20250617.aprx\Golden - SMP - 10yr Growth Sanitary Capacity - 20250617

Last exported by sdeboerfuller on Friday, June 20, 2025 2:08 PM Last printed by sdeboerfuller on Monday, September 25, 2017 11:46 AM
Last updated by sdeboerfuller on Friday, June 20, 2025 at 2:08 PM

N

11th Ave. N
14th St. N
13th St. N
12th St. N
10th Ave. N
11th St. N
10th St. N
King Crescent
9th St. N
Kicking Horse DR
Fisher RD
Riverglen DR
7th St. N
8th Ave. N
9th Ave. N
6th St. N
Main St. N
5th St. N
Spirit Square
Quartz CR
Deer Ridge RD
Granite DR
Stoney LN
Pine DR
Golden Donald Upper RD
Gareb RD
La Fontaine RD
Golden View RD
5th St. S
6th St. S
7th St. S
8th St. S
9th St. S
10th St. S
11th St. S
12th St. S
13th St. S
14th St. S
5th Ave. S
6th Ave. S
7th Ave. S
8th Ave. S
9th Ave. S
10th Ave. S
11th Ave. S
12th Ave. S
13th Ave. S
Park DR
12th St. S Culdesac
13th St. S Culdesac
Alexander DR
Selkirk DR
Selkirk Hill
14th Ave. S
Birch CR
Fir CR
Maple DR
Cedar ST
Spruce DR
Poplar ST
Hemlock ST
Willow ST
Juniper ST
Bowle-Evans DR
Reflection Lake RD
CPR Access RD
STP Access RD
Fisher RD



URBAN SYSTEMS

Project #:	0404.0244.01
Author:	SDF
Checked:	CG
Status:	Review
Revision:	A
Date:	2025 / 6 / 20

0 100 200 300
Meters

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:15,000 (When plotted at 11"x17")

Data Sources:
- Data provided by government of B.C. and Town of Golden

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Legend

- WWTP
- Sanitary Lift Station
- Sanitary Manhole
- Town Boundary
- Sanitary Forcemains

Sanitary Pipes

- Under Capacity (<=0.75)
- Surcharged (0.75-0.99)
- Over Capacity (>0.99)

Notes:
- Pipe capacities are based on the ratio of depth of flow vs pipe diameter

TOWN OF GOLDEN
Kicking Horse Country

Sanitary Master Plan

25-year Growth Model Results

FIGURE 17

U:\Projects_CAL\0404\0244\01\D-Design\GIS\Projects\Pro_Projects\0404024401_Golden_SMP_Updated_20250617.aprx\Golden - SMP - 25yr Growth Sanitary Capacity - 20250617

4.5 RESULTS – LIFT STATIONS

Lift station capacities are summarized for the different model scenarios in the following table.

Table 7. Lift Station Capacity Assessment Results

	EDELWEISS (2024 LIFT STATION)	A&T	14TH ST	12TH ST	AIRPORT	7TH ST	CANYON RIDGE
Capacity under existing conditions	OK	OK	OK	OK	OK	OK	OK
Capacity under 10-year Growth conditions	OK	OK	Monitor Development. Upgrades may be required	Upgrades required	OK	OK	Monitor Development. Upgrades may be required
Capacity under 25-year Growth conditions	OK	OK	Monitor Development. Upgrades may be required	Upgrades required	OK	OK	Monitor Development. Upgrades may be required

12th St Lift Station

The 12th St Lift Station is equipped with three identical pumps. The station will run two pumps in parallel if needed during high flows. The third pump is intended to be a backup pump only.

Theoretical lift station operating points were calculated based on the pump curve data and theoretical system curve calculations. The theoretical lift station operating points are:

- Theoretical output running one pump: 117L/s at 17.7m TDH
- Theoretical output running two pumps in parallel: 138L/s at 22.2m TDH

However, the actual output of the lift station observed by Town Operations Staff differs from the theorized points. Causes of discrepancy could include pump wear and tear, which decreases flow output capability compared to theoretical capability, or the older forcemain condition increasing head losses compared to the assumed losses.

Actual lift station operation points observed by Operations staff are summarized below:

- Actual output running one pump: 105L/s at unknown pressure
- Actual output running two pumps in parallel: 136L/s at unknown pressure

The 12th St lift station does not contain a pressure transmitter or pressure gauges on the piping downstream of the pumps. Therefore, it is not possible to directly compare the actual pump capabilities

or output pressures to the theoretical calculations without further data being acquired. Further data acquisition and study of the lift station is recommended at time of preliminary design of potential upgrades.

The pump curve used in the sanitary model is from the pump curve datasheets for the 12th St lift station pumps. Sensitivity analysis shows that the discrepancy in actual lift station output vs modeled lift station output does not change the results about the need for lift station upgrades.

Modeled peak wet weather flows incoming into the 12th St lift station are summarized below:

- Existing conditions incoming PWWF = 169 L/s
- 10-year Growth incoming PWWF = 186 L/s
- 25-year Growth incoming PWWF = 193 L/s

In the existing conditions scenario, the existing pumps, even while running in parallel, output less flow than the incoming peak wet weather flow. However, the modelling shows that the wet well volume can buffer the difference during the short time of peak flows, and the resulting hydraulic backup into the sanitary mains in 5th Ave is minimal. Therefore, no upgrades are recommended in existing conditions.

In future growth scenarios, the existing pumps operating in parallel cannot keep up with the projected peak wet weather flow and head requirements. This causes increased hydraulic backup into the 5th Ave sanitary mains. Pump upgrades for the 12th St lift station are recommended to prevent increased hydraulic backup from the wet well back into the upstream sanitary mains.

Even though pump upgrades are required, upgrading the 12th St Lift Station forcemain is not recommended at this time. The forcemain experiences a velocity over 4m/s for about one hour per day (during peak flows), but the remaining velocity is 2.5-3m/s on average for the rest of the day.

14th St Lift Station

The 14th St lift station pumps can handle the 25-year peak wet weather flows and head requirements. However, the new operating point to pump these flows becomes very close to the end of the pump curve. This is an operational risk. It is recommended to review the lift station capacity once the details of the future developments are known.

7th St Lift Station

The 7th St lift station pumps can still accommodate the 25-year flow and head requirements; therefore, no upgrades are required based on the projected growth.

Canyon Ridge Lift Station

The Canyon Ridge lift station may require upgrades, depending on the densities and specifics of the future developments within its catchment area. It is recommended to review the lift station capacity once the details of the future developments are known.

4.6 FUTURE CONDITIONS INFRASTRUCTURE UPGRADES

Figure 18 and Table 8 show the recommended sanitary sewer improvements to alleviate future conditions' efficiency and capacity issues due to future growth.

The recommended lengths of pipe upgrades are based on pipe capacity alone. Therefore, a pipe that is modeled and shown to be surcharging only due to hydraulic backup from downstream pipes or lift stations would not be included. This occurs at:

- 5th Ave S - East side – 300mm mains: The model shows surcharge from 8th St to 11th St, however hydraulic backup is the cause of the surcharge from 8th to 9th St, whereas pipe capacity is the issue for 9th St to 11th St. Therefore, the recommended upgrade is from 9th St to 11th St.
- Kickinghorse Drive – The 250mm main directly downstream of 9th St N presents as surcharged in the 25-year results, however upgrading the pipe capacity downstream resolves the surcharge condition in this pipe. Therefore, the recommended upgrade begins at the next manhole downstream of 9th St N.

Table 8. Pipe Sizing for Upgraded Sewer Mains

LOCATION	CURRENT PIPE SIZE	UPGRADED PIPE SIZE	LENGTH OF RECOMMENDED UPGRADE
Kickinghorse Drive (Mid-lot South of 9th St N to 7th St N)	300mm and 250mm Gravity Main	375mm Gravity Main	427m
12th Street S to 13th Street S (between 8th Ave S and 5th Ave S)	300mm and 250mm Gravity Main	375mm and 300mm Gravity Main	689m
5th Ave S (East side of road) (between 9th St S and 11th St S)	300mm Gravity Main	375mm Gravity Main	224m
Mains upstream of 12th St. Lift Station (5th Ave S, from 11th St S to Lift Station)	450mm Gravity Main	525mm Gravity Main	166m
Highway 95 Crossing	250mm Gravity Main	300mm Gravity Main	162m

No upgrades were proposed for the surcharging 450mm sanitary mains in 5th Ave S (north of 11th St S) since the surcharging pipes are very localized. Upstream development should be monitored, and the capacity of this pipe should be reviewed at each Master Plan update, or if growth increases beyond the 25-year growth assumptions in this report.

No upgrades were proposed for Pine Drive and Golden Donald Upper Rd due to the new pipe alignment that diverts all flows coming from the parcels east of Golden Donald Upper Rd. The new pipe alignment starts near existing manhole 310 and runs to existing manhole 304. It was designed in 2025 and will be tendered and constructed in 2025/2026. This new pipe alignment alleviates all capacity concerns in Pine Drive and Golden Donald Upper Rd except one area - the pipe between existing manhole 311 and 310 should be monitored as upstream development proceeds.

No upgrades were proposed for the sanitary mains immediately adjacent to Fisher Rd parcels due to the uncertainty of the site's servicing plan, and scale and density of potential development in this parcel. The proposed downstream sewer main upgrades in 5th Ave S account for some future flows from the Fisher Rd parcels. However, pipe capacities and the need for upgrades should be evaluated once there is more development certainty.

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N

Upsized 375mm Gravity Sewer

Upsized 300mm Gravity Sewer

New pipe alignment to be constructed in 2026 (250mm or 300mm Sanitary)

Upsized 375mm Gravity Sewer on East Side of 5th Ave S (starting south of 9th St S)

Upsized 525mm Gravity Sewer

Upsized Pumps in 12th St Lift Station

Upsized 300mm Gravity Sewer

Upsized 375mm Gravity Sewer

URBAN SYSTEMS	0 100 200 300 Meters	Legend	
Project #: 0404.0244.01	**Coordinate System:** NAD 1983 UTM Zone 11N	WWTP	150mm
Author: SDF	**Scale:** 1:15,000 (When plotted at 11"x17")	Sanitary Lift Station	200mm
Checked: CG	**Data Sources:** - Data provided by government of B.C. and Town of Golden	Sanitary Manhole	250mm
Status: Review		Town Boundary	300mm
Revision: A	The accuracy & completeness of information shown on his drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.	Planned Sanitary Main	375mm
Date: 2025 / 6 / 20		Sanitary Pipes	450mm
		100mm	525mm

Sanitary Forcemains: 50mm, 75mm, 100mm, 150mm, 250mm

TOWN OF GOLDEN Riding Horse Country

Sanitary Master Plan
Sanitary Sewer Infrastructure Upgrades Required
FIGURE 18

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5.0 RECOMMENDATIONS

5.1 CONCLUSIONS AND RECOMMENDATIONS

The Sanitary Sewer Model and Master Plan outlines a prioritized capacity-based capital program that allows the Town of Golden to accommodate future development objectives.

The following are recommended next steps to provide capacity for future development or redevelopment:

Strategic Initiatives

- The sanitary sewer system capacity should be verified and confirmed with every change to the current Land Use and development review.
- Review and recalibrate the sanitary sewer system model at least once every 5 years.
    - Update existing GIS base to include up-to-date information after every sanitary infrastructure construction project
- New developments upstream of the Kicking Horse Drive sanitary sewer system will trigger the upgrade of the existing sanitary mains to 300 and 375mm mains. This project could be developer-funded and cost-shared between the upstream developers.
- When new developments are reviewed upstream of the 13th St S and 12th St S sanitary sewer system, the existing mains should be upgraded to 300mm mains and 375mm mains respectively. This project could be a DCC funded project.
- Upgrade the 12th St Lift Station pumps by the time the growth assumed in the 10-year projection has occurred. Future preliminary study and true pump capacities should be confirmed to determine the required upgrades, including installing pressure monitoring instrumentation. The Class D cost estimate provided is approximate and should be confirmed in the preliminary study. This project could be a DCC funded project.
- Monitor the 12th St Lift Station forcemain performance and upstream development. A forcemain upgrade is not recommended due to reasonable operation conditions for most of the day during peak wet weather conditions. However, should upstream development increase beyond the assumed rates, forcemain upgrades may be triggered. This project could be a DCC funded project.
- Monitor upstream development from the 14th St Lift station. Growth beyond the assumed rates will impact pump performance and trigger the need for upgraded pumps. This project could be a DCC funded project.
- New developments upstream of the Canyon Ridge lift station could trigger the upgrade of the existing lift station to meet the future flows depending on size and characteristics of the future development. This project could be developer-funded and cost-shared between the upstream developers as required.
- The east-side sanitary main in 5th Ave S should be upsized from a 300mm main to 375mm, and the mains leading to the 12th St Lift Station should be upgraded from 450mm to 525mm. This upgrade is benefitting all new developments and redevelopments for the area upstream of 5th Ave S and could be considered a DCC project.
- The Highway 95 sanitary main crossing capacity issues are only triggered in the 25-year growth projection. It is recommended to monitor for upstream development in this area, and capacity should be re-evaluated once more developer certainty is known. This project could be a DCC funded project.

- Fisher Rd sanitary main capacity issues are only triggered in the 25-year growth projection. It is recommended to monitor for upstream development in this area, and capacity should be re-evaluated once more developer certainty is known.

Operations and Maintenance

- Review measures to reduce groundwater infiltration in sanitary mains in 5th Ave S and 7th Ave S, from 5th St S to 13th St S
- Review measures to redirect potential residential sump pumps draining to sanitary mains in 5th Ave S and 7th Ave S, from 5th St S to 13th St S
- Confirm missing pump information during detailed design of recommended upgrades
- Install pressure-monitoring instrumentation to allow more accurate assessment of the 12th St Lift Station

5.2 PRIORITIZATION APPROACH AND PRIORITY PROJECTS

Based on the above recommendations, the following criteria were considered when determining priority projects:

- Amount of future population growth
- Timing of future population growth and service requirements.

Based on the above criteria, the recommended priority projects are listed in Table 9. Cost estimates for these projects are included in Appendix D. Cost estimates are all Class C estimates, except the 12th St Lift Station pump upgrades, which is a Class D estimate.

Table 9. Priority Projects and Estimated Costs

PROJECT	PRIORITY LEVEL	TYPE OF PROJECT	ESTIMATED COST
Kicking Horse Drive (between 9th St N and 7th St N)	1	Developer Funded	$1,354,000
12th Street S to 13th Street S (between 8th Ave S and 5th Ave S)	2	Developer Funded and/or DCC	$2,961,000
12th St Lift Station Pump Upgrades	2	DCC	$1,346,000
Mains upstream of 12th St. Lift Station (5th Ave S, from 11th St S to Lift Station)	2	DCC	$1,455,000
5th Ave S (between 9th St S and 11th St S)	2	DCC	$1,050,000
Hwy 95 Crossing	3	DCC	$1,550,000
		Total	**$9,716,000**

As noted in Section 5.1, pipe upgrades directly adjacent to the Fisher Rd parcels have not been estimated. Costs to upgrade the immediately adjacent sanitary mains could be Developer-funded.

5.3 COST ESTIMATE ASSUMPTIONS

Cost estimates are Class C estimates (except for the 12th St Lift Station pump upgrades estimate, which is a Class D estimate) and are based on preliminary information that is contained within the sanitary model and analysis. Therefore, estimated costs are based on the following general assumptions:

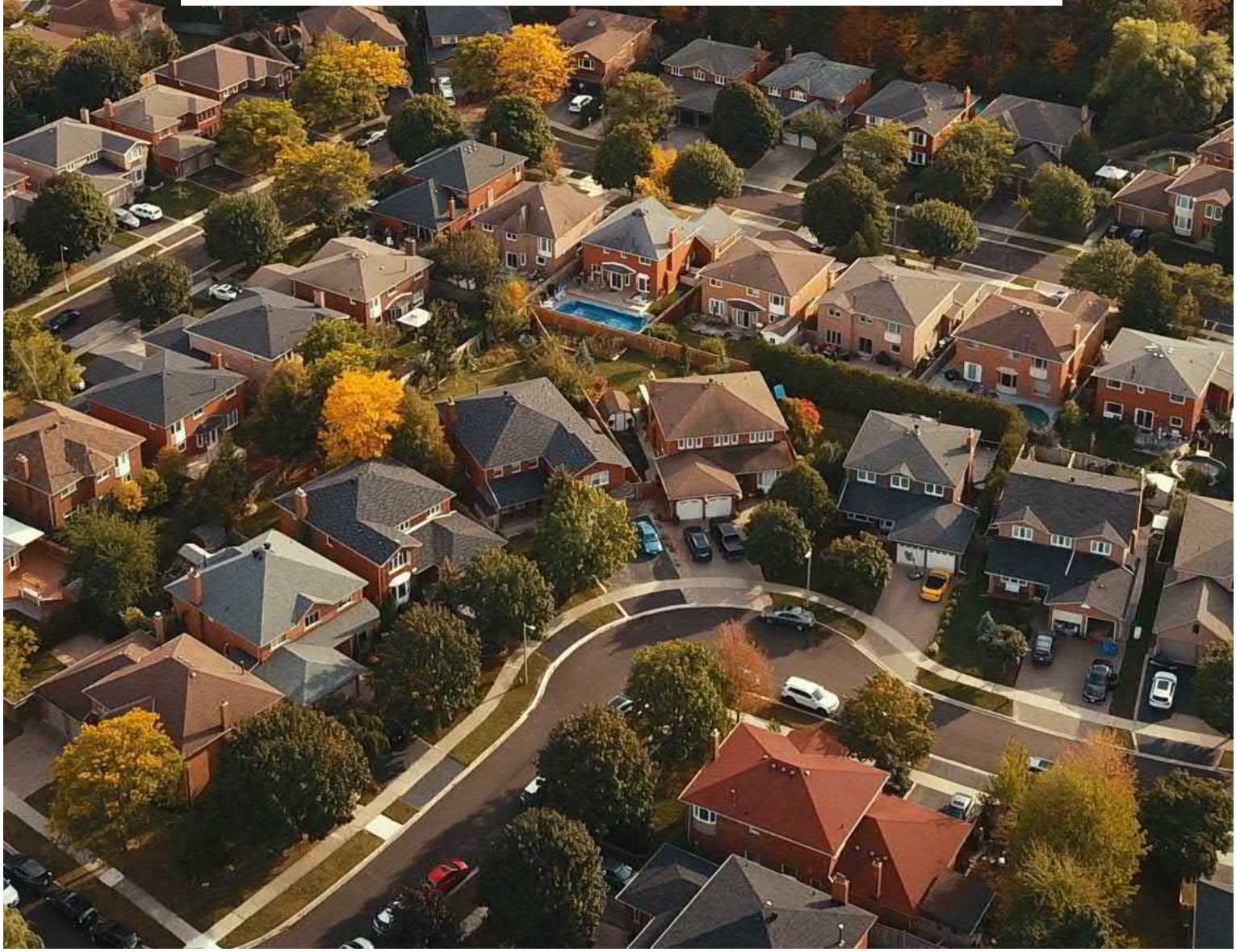
- Estimated costs are in 2024 dollars and do not include GST.
- 35% Contingency and 15% Engineering are included in the estimated costs.
    - Class D estimate uses 50% contingency
- Road rehabilitation will be restored to its existing state (gravel roads will remain gravel, asphalt will remain asphalt).
- Surface works (concrete curbs, sidewalks) will be restored to their existing state.
- Large, landscaped areas will be restored with topsoil replacement, hydroseeding and tree replacement.
- Where sanitary mains are upgraded, all manholes along the extents will also be replaced.
- Where residential house services tie to an upgraded sanitary main, sanitary services will also be upgraded to the property line.
- Where an upgraded sanitary sewermain crosses a train track, directional drilling and steel encasement is required.
- Existing sewer flow bypass costs are included in the estimates.
- Existing shallow utility support costs (for existing power poles and streetlights) are included for locations with adjacent shallow utility infrastructure.
- 12th St Lift Station pump replacement costs are preliminary and could include pump upgrades, associated electrical equipment upgrades and associated electrical service upgrades.
    - Due to the uncertainty of the scope of upgrades required for the 12th St Lift Station, a Class D cost estimate has been provided for the work

6.0 REFERENCES

Statistics Canada, 2021 Census of Population, Town of Golden Subdivision Census:

https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Golden&DGUIDlist=2021A00055939007&GENDERlist=1,2,3&STATISTIClist=1,4&HEADERlist=0

APPENDIX A:
LIFT STATION INFORMATION

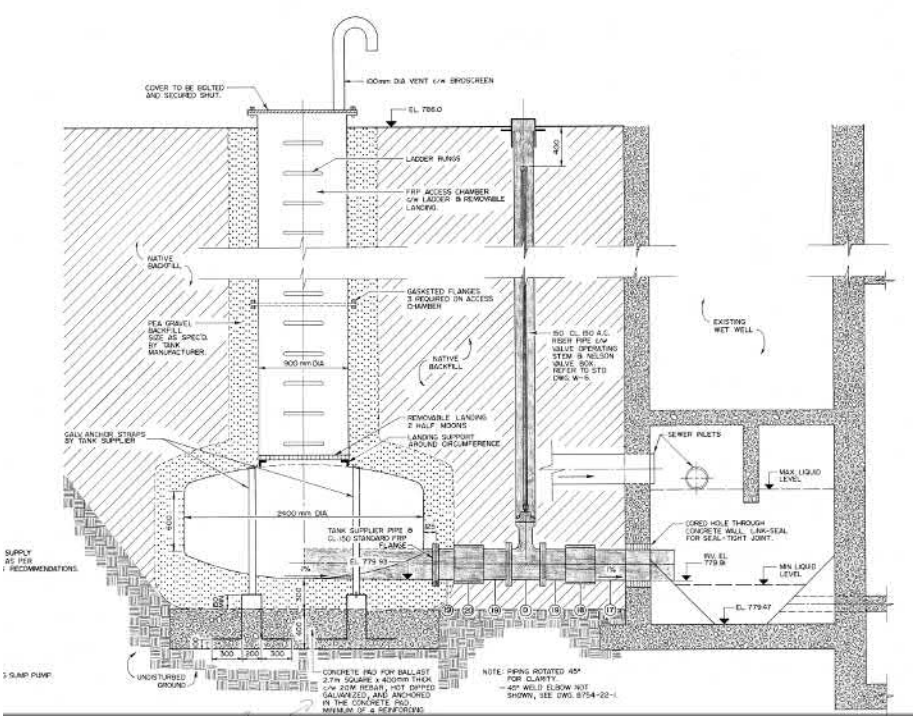


APPENDIX A: LIFT STATION INFORMATION

The following is a summary of the lift station information that was used to build the sanitary model.

7TH ST LIFT STATION

- Wet well cross-sectional area : 3.72m^2
- Wet well bottom elevation 779.47m, rim elevation = 786m
- Pump operation levels
    - Start: 0.78m
    - Stop: 0.42m
- Number of pumps: 2 in standby/duty configuration
- Forcemain pipe size: 250mm
- Forcemain pipe material: Steel pipe, cement mortar lined interior
- Pump curve graph/design point: 80 L/s at 12.8m TDH (1268 GPM @ 42 ft TDH)
- Surge tank is in use



14TH ST LIFT STATION

- Wet well cross-sectional area :4.7m^2
- Wet well bottom elevation 779.724m, rim elevation 785.68m
- Pump operation levels
    - Start: 1.23m
    - Stop: 0.53m
- Number of pumps: 2 in duty/stand by configuration
- Forcemain pipe size: 150mm
- Forcemain pipe material: PVC
- Pump curve graph/design point: 22 L/s at 5.5m TDH

A&T LIFT STATION

- Wet well cross-sectional area 2.5m^2
- Wet well bottom elevation 779.57m, rim elevation is 784.44m
- Pump operation levels
    - Start: 1.33m
    - Stop: 0.8m
- Number of pumps 2: duty/standby configuration
- Forcemain pipe size: 100mm
- Forcemain pipe material: ACASS
- Pump curve graph/design point: 7L/s at 12 m TDH .

CANYONRIDGE LIFT STATION

- Wet well cross-sectional area: 2.5m^2
- Wet well bottom elevation 883m, rim elevation 889.08m
- Pump operation levels
    - Start: 1.38m
    - Stop: 0.69m

- Number of pumps: 2 pumps in duty/ standby configuration.
- Forcemain pipe size: 100mm
- Forcemain pipe material: PVC
- Pump curve graph/design point: 9.78 L/s at 10.5m TDH

EDELWEISS LIFT STATION (2023/2024 IN-CONSTRUCTION LIFT STATION)

- Wet well bottom cross-sectional area 2.63m^2
- Wet well bottom elevation 780.65m, rim elevation 783m
- Pump operation levels
    - HHHWL 780.65m/HHWL 780.6m/LLWL 779.8m
    - Start: 1.2m
    - Stop: 0.7m
- Number of pumps: 2 in duty/standby configuration
- Forcemain pipe size: 75 mm
- Forcemain pipe material: HDPE DR11
- Pump curve graph/design point: 6 L/s at 23 m TDH
- Outlet elevation: 780.84m

AIRPORT LIFT STATION

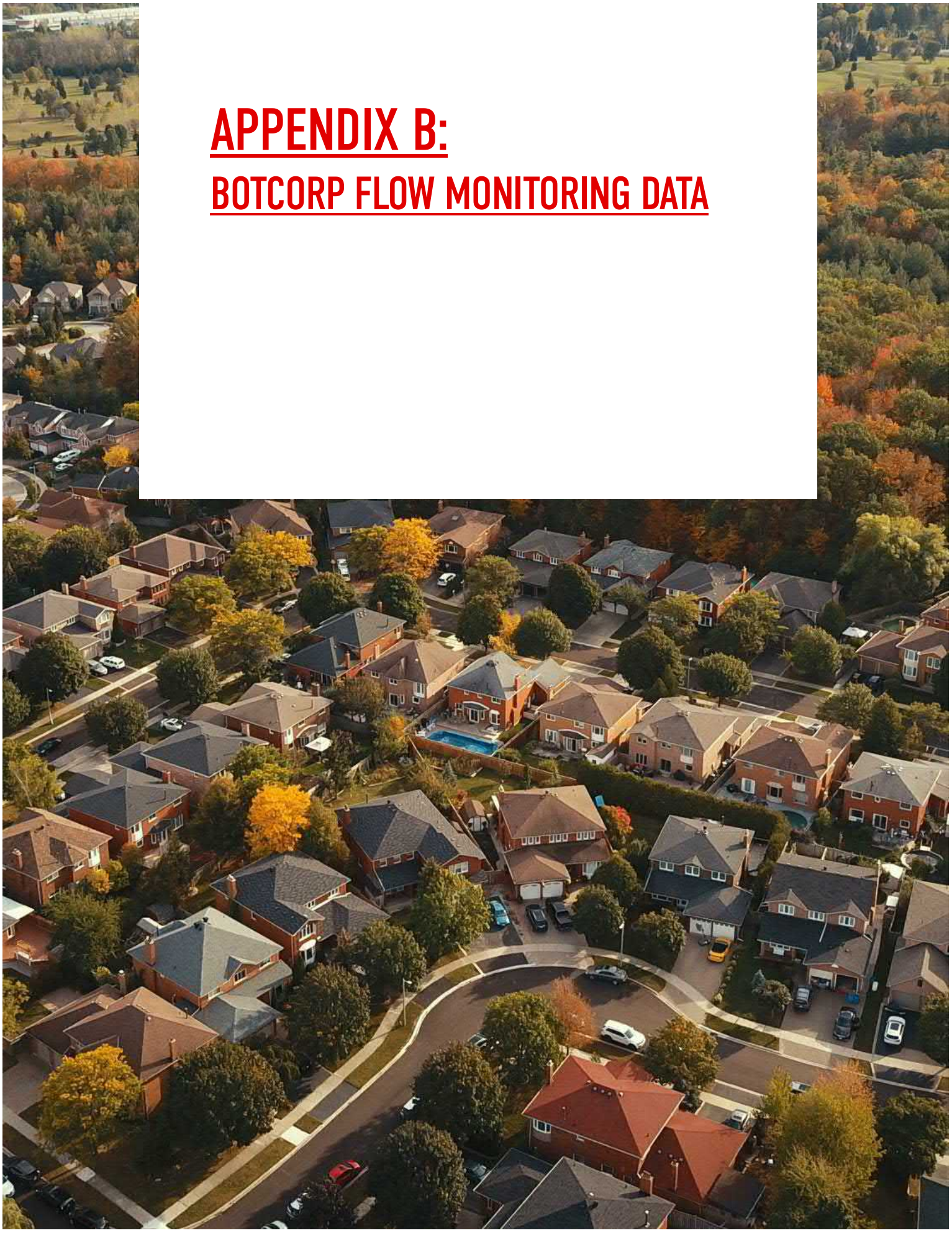
- Wet well cross-sectional area 0.9m^2
- Wet well bottom elevation 781.906m, rim elevation 785.556m
- Pump operation levels
    - Start: 1.2m (assumed)
    - Stop: 0.7m (assumed)
- Number of pumps: 1
- Forcemain pipe size: 50mm
- Forcemain pipe material: ACASS
- Pump curve graph/design point: 2L/s @ 27m TDH

12TH ST LIFT STATION

- Wet well cross-sectional area 11.8m^2
- Wet well bottom elevation 777.885m, rim elevation 786.9936m (assumed)
- Pump operation levels
    - Start first pump: 1.35m
    - Start second pump: 1.80m
    - Start third pump: 2.43m
    - Stop (all pumps): 1.05m
- Number of pumps: 3. Two pumps can run in parallel, the third pump is intended as a backup only
- Forcemain pipe size: 250mm
- Forcemain pipe material: AC
- Single Pump curve graph/design point: 117 L/s at 17.7m

APPENDIX B:

BOTCORP FLOW MONITORING DATA



BOT Corp
ENVIRONMENTAL MONITORING

Sewer Flow Monitoring and Rainfall Study

Prepared for: **Urban Systems**

June 20, 2024

Prepared for:
Claire Gillis, P. Eng., Project Engineer

By:

_____
Brian Bot
Project Manager, Bot Corp
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BOT Corp
ENVIRONMENTAL MONITORING

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Appendices

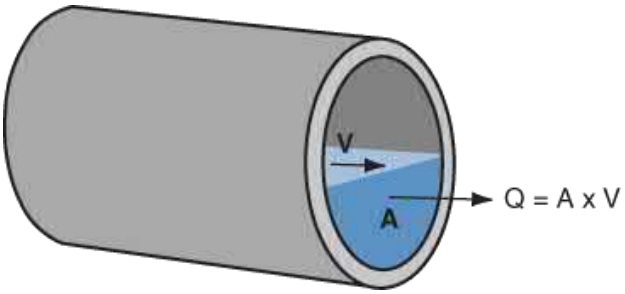
1. PROJECT DETAILS

BOT Corp was contracted to perform a sewer flow monitoring and rainfall study.

Client:	Urban Systems
Location:	Town of Golden
Number of Sewer Sites:	6
Number of Rain Gauge Sites	1
Project Start Date:	May 09th, 2020
Project Finish Date:	October 13th, 2020

2. METHOLOGY

Bot Corp uses area/Velocity flow meters to calculate flow at most of our sites. All flow readings are calculated using the continuity equation Q=A x V or (**Q**) Flow equals the **A**rea of the flow multiplied by **V**elocity



In some cases, where the flow is too low, or the approach hydraulics are poor, we will install weirs or flumes depending on the situation. If this is the case, we will use a stage discharge relationship curve to calculate flow.

2.1 Measuring the Depth of Flow

Measuring the depth of flow is achieved typically by using a differential pressure transducer. Both the velocity and depth sensor are enclosed in the same sensor head. As the depth increases, it puts more strain on the sensor which in turn sends out a larger signal to the data logger. The sensors are linear and very accurate.

Depending on the site conditions, sometimes we will install ultrasonic sensors which measure the air gap between the sensor and the water level. These ultrasonic sensors are non-contact and again, very accurate.

2.2 Depth Verification

Once the sensor is installed at the site, the depth is adjusted in the flow meter so that the flow meter will read the exact level of the effluent. All depth measurements are taken in the exact same spot at every site. That location is directly in front of the sensor and band at the invert of the pipe.

Three actual depth readings are taken and compared to the three monitor readings. These numbers are recorded on the site verification form with a corresponding time.

All depth verifications are conducted with the flow monitoring technician out of the flow as to never cause a backwater condition. When larger pipes are verified, the technician will use a scaffolding designed for a pipe to suspend themselves above the flow to take the readings.

2.3 Velocity Verification

Velocity verifications are performed using a calibrated Marsh McBirney Flo-Mate point velocity meter. The instrument uses faradays principal to measure water velocity flowing over electrodes. This allows an accurate velocity to be measured in a small area of the total flow.

There are different techniques used to verify actual velocity and monitor velocity. The two methods we typically use are:

0.9 x Maximum Velocity
T-Section

In smaller, low flow pipes, we would use the 0.9 x maximum velocity technique due to the fact that we physically can only get one reading.

Step 1 Using your Point Velocity meter, take a series of point velocities in the cross section.

Step 2 Try to determine the fastest point velocity in the cross section. Usually it will be in the center, just below the surface.

Step 3 Multiply the fastest point velocity by 0.9 to determine the average velocity.

Example:

If you determine your maximum velocity to be .87 m/s, then: .87 * 0.9 = .78m/s

Most sewers between the sizes of 12 to 48 inch use the t-section method. This is the most common method and works very well.

Step 1 Determine the center line of your cross-section.

Step 2 Take a point velocity reading above the sensor and at about 80 percent of the depth.

Step 3 Take two-point velocity readings on the parallel lines located half way from the center line and the pipe wall.

Step 4 Average all four points to determine your average velocity

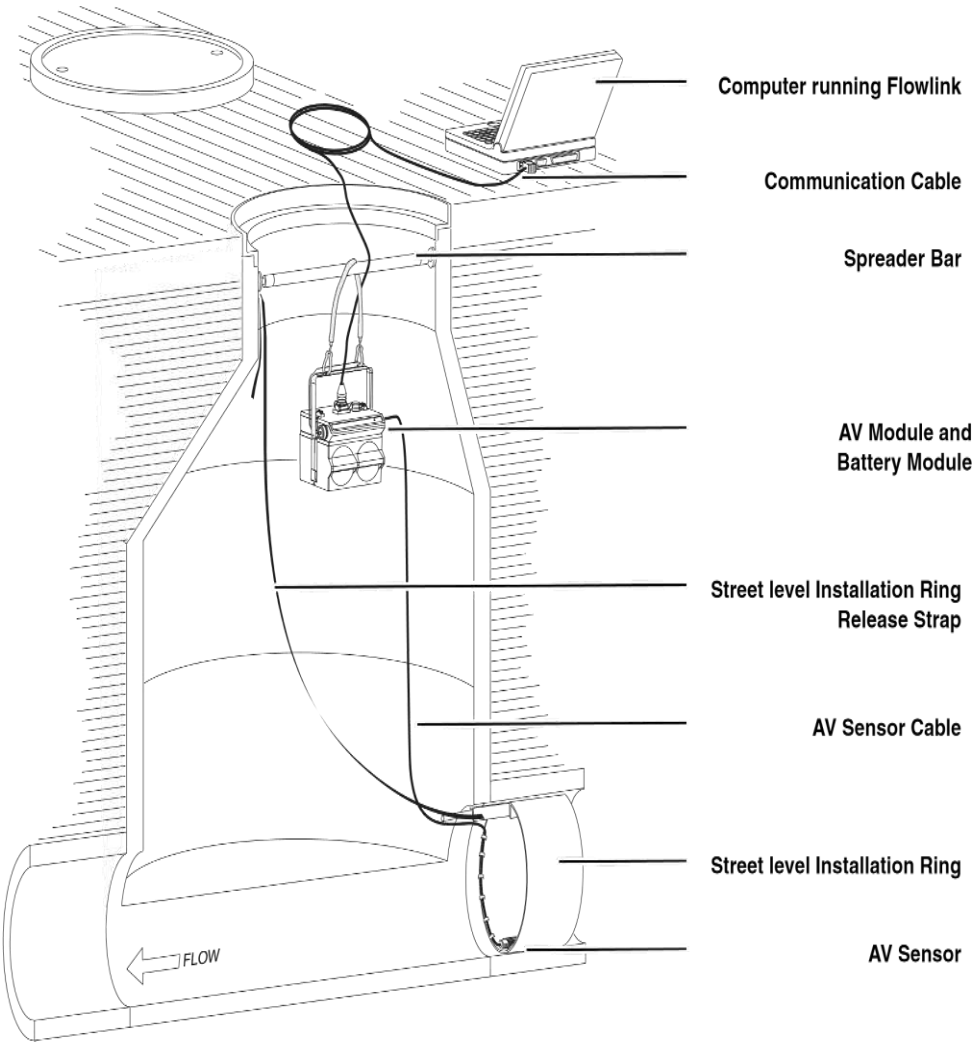


Figure 1 Typical flow monitoring installation

APPENDIX I

DATA
GRAPHS AND TABULAR REPORTS

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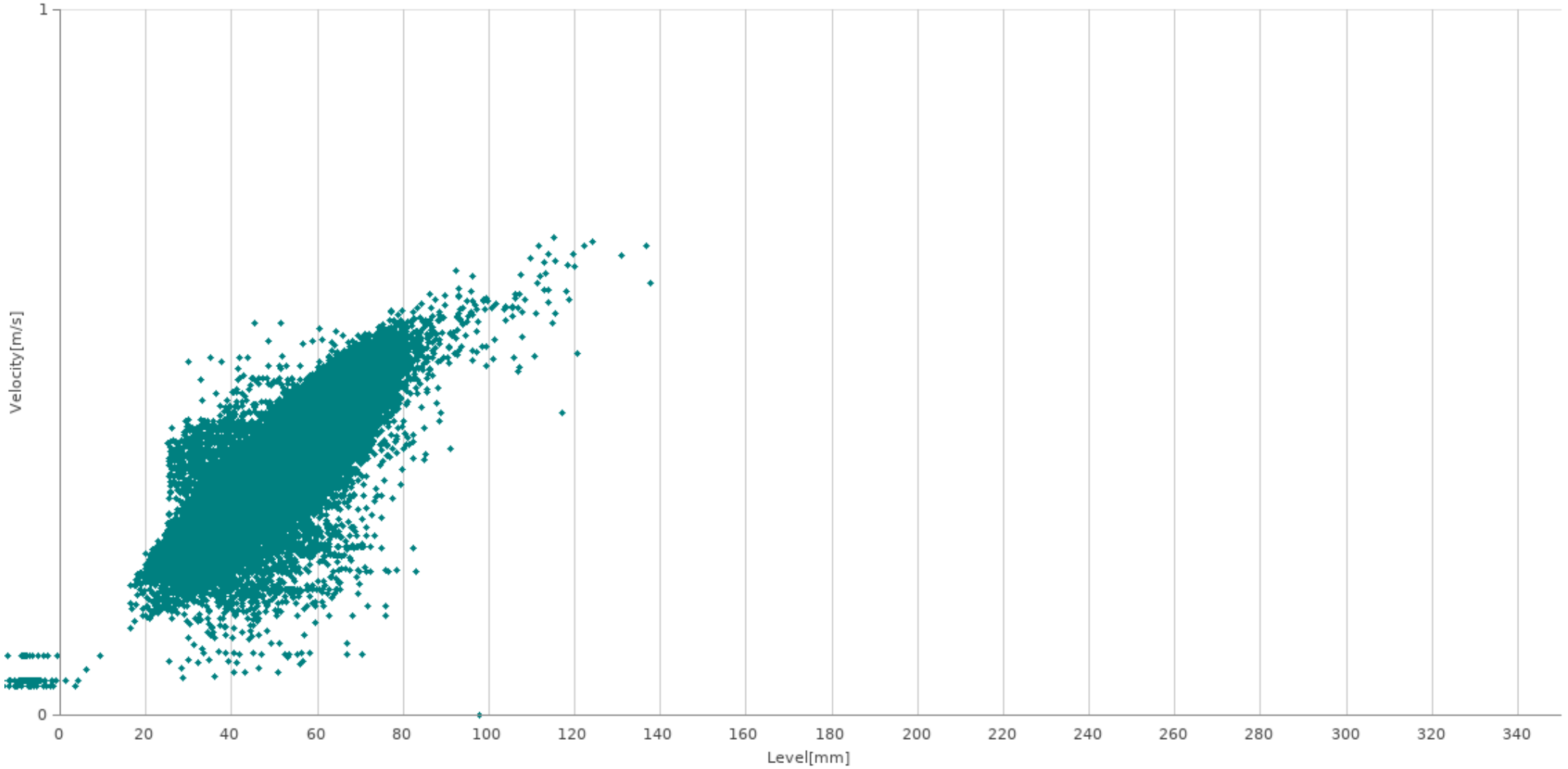
April, 2020 to October, 2020



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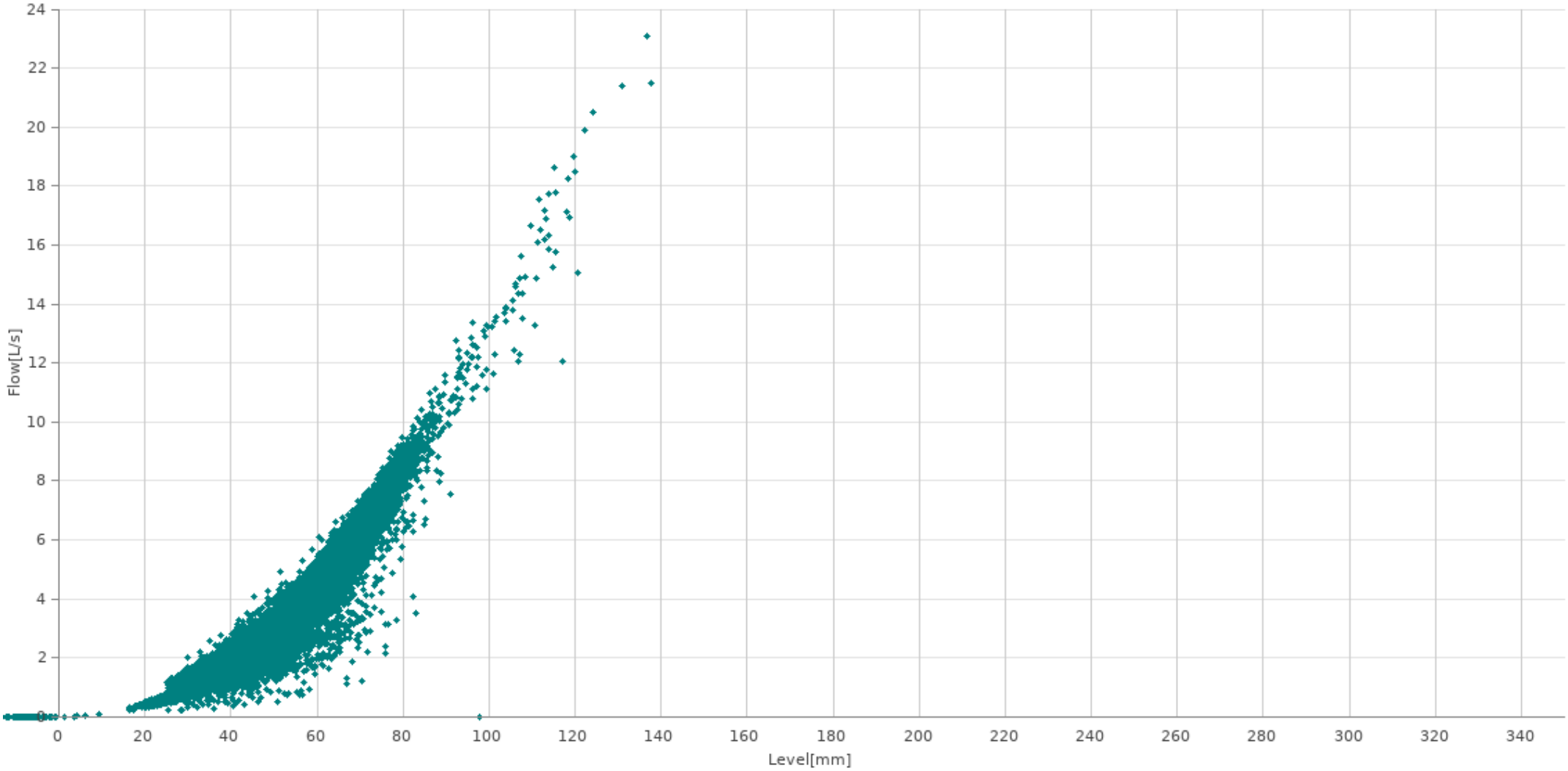

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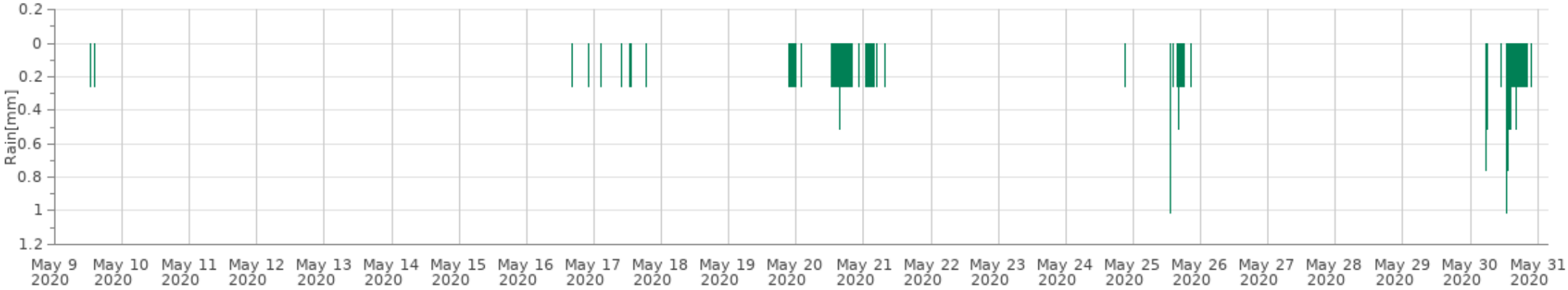

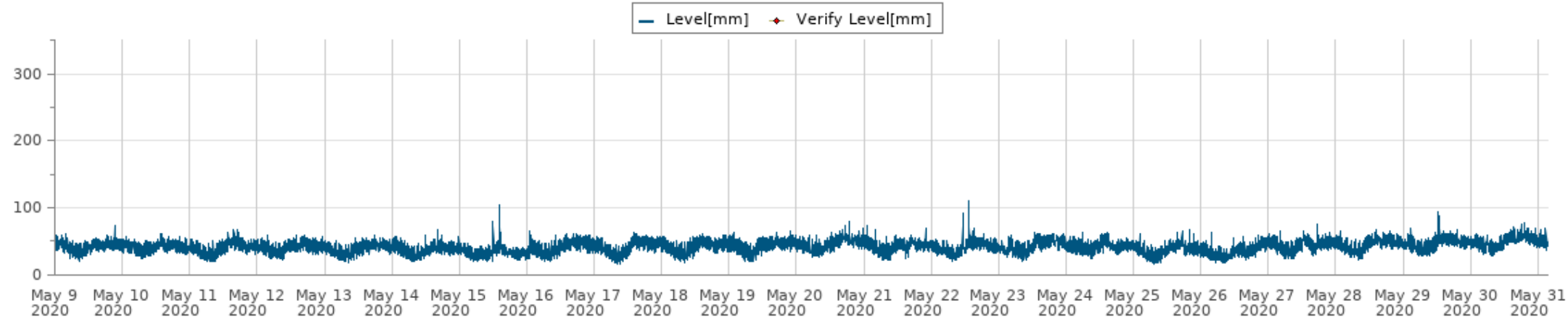

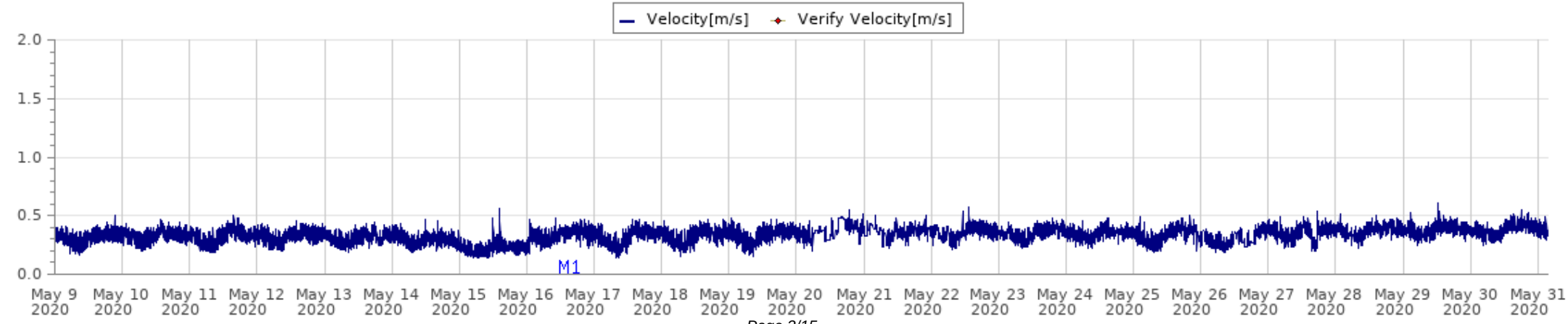

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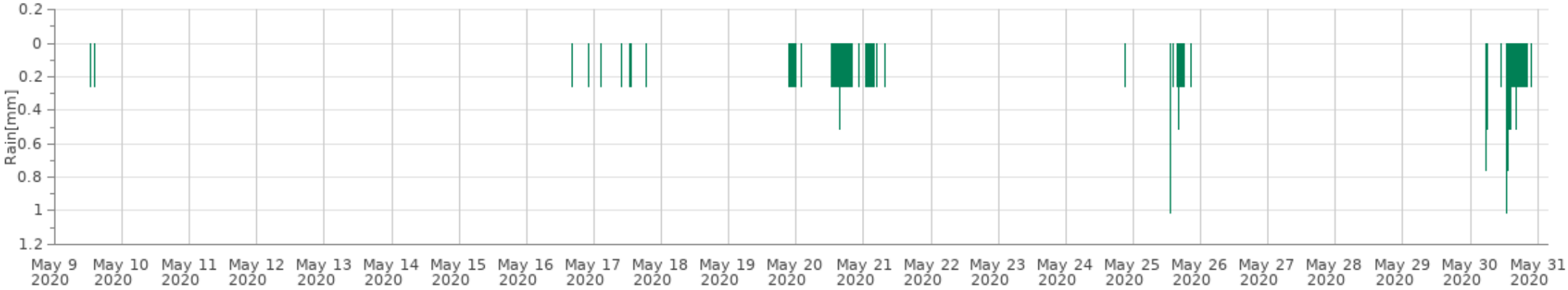

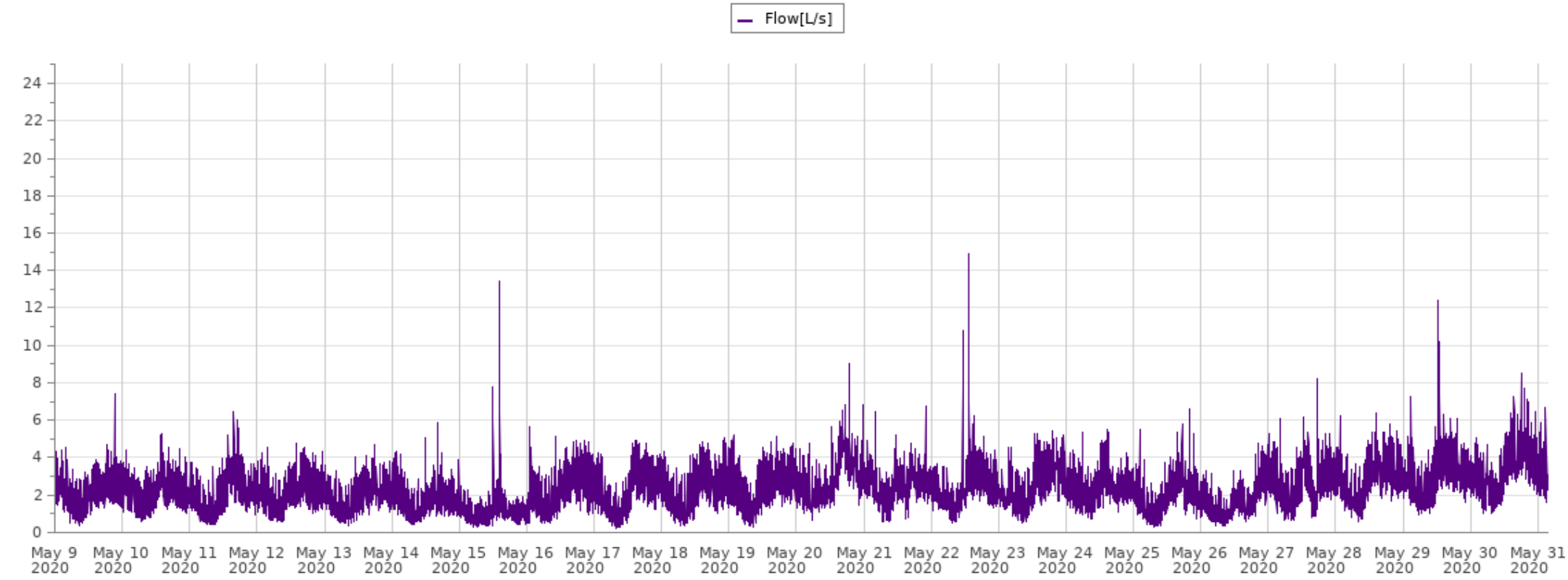

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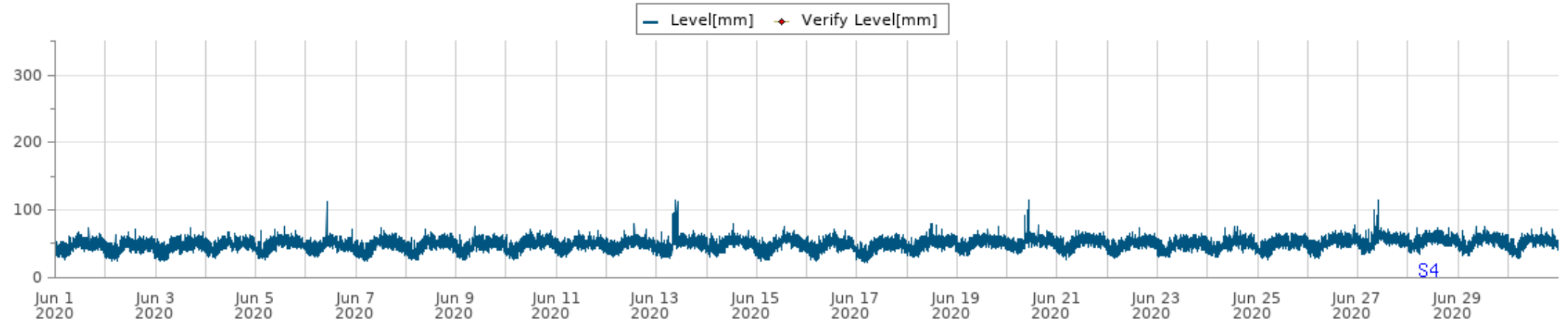

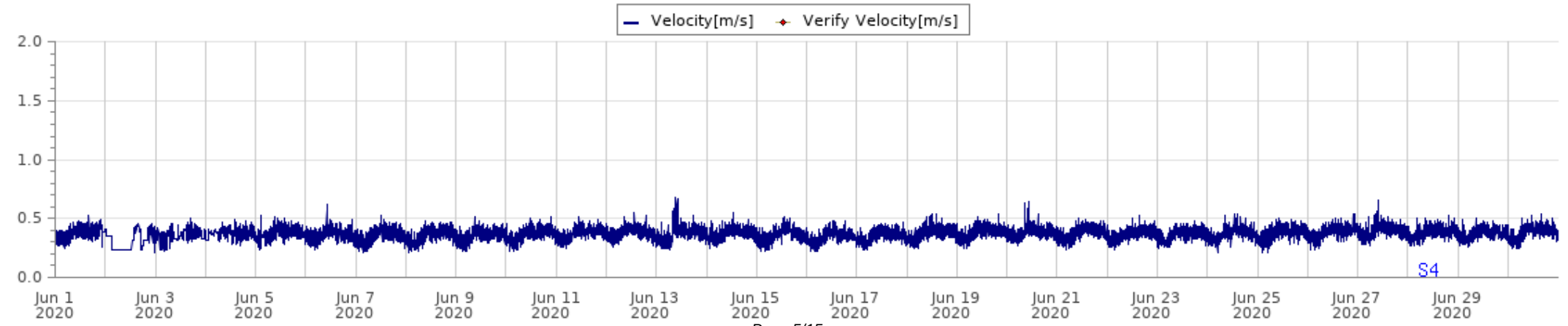

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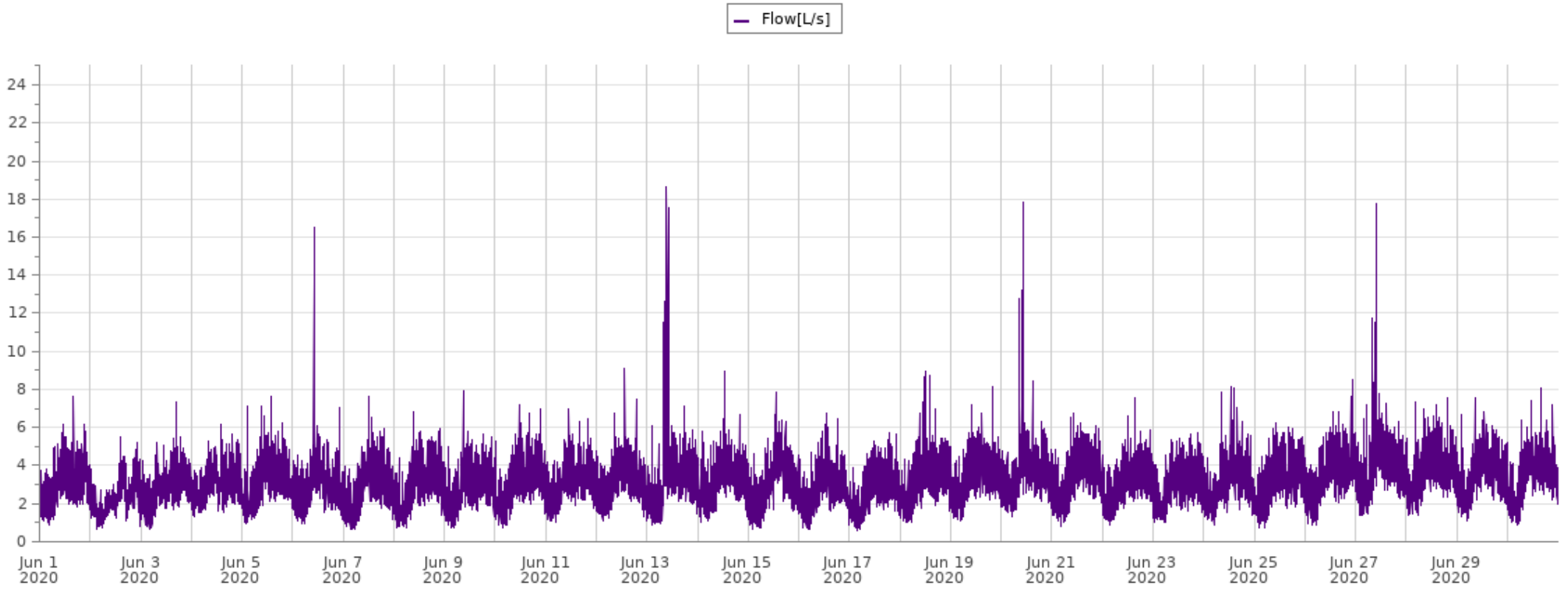

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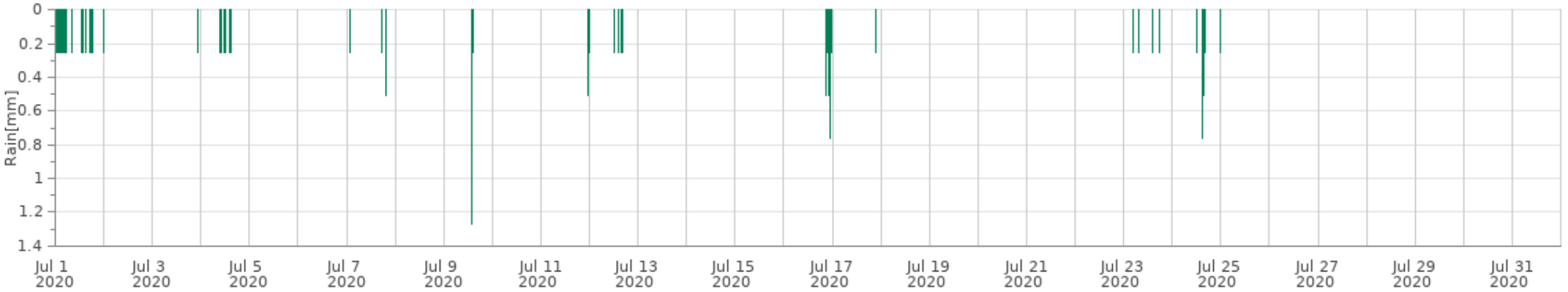

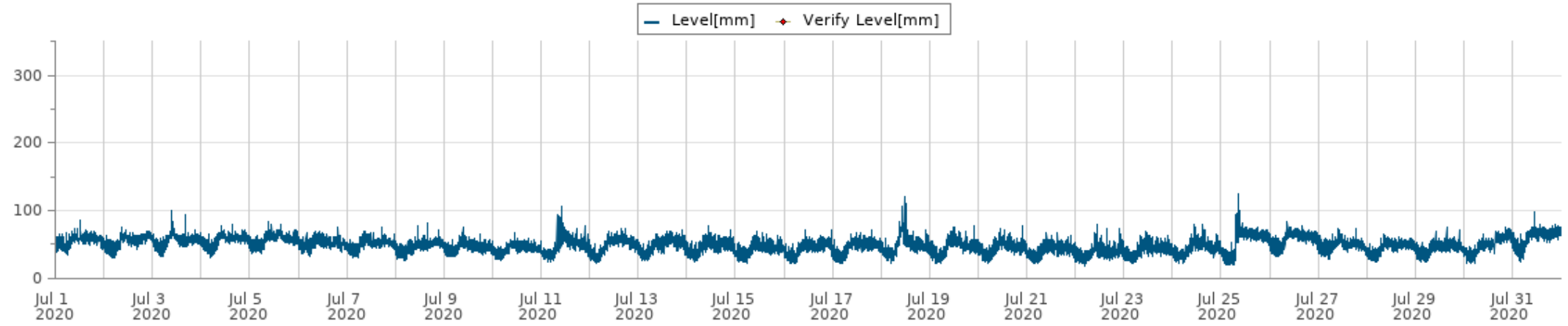

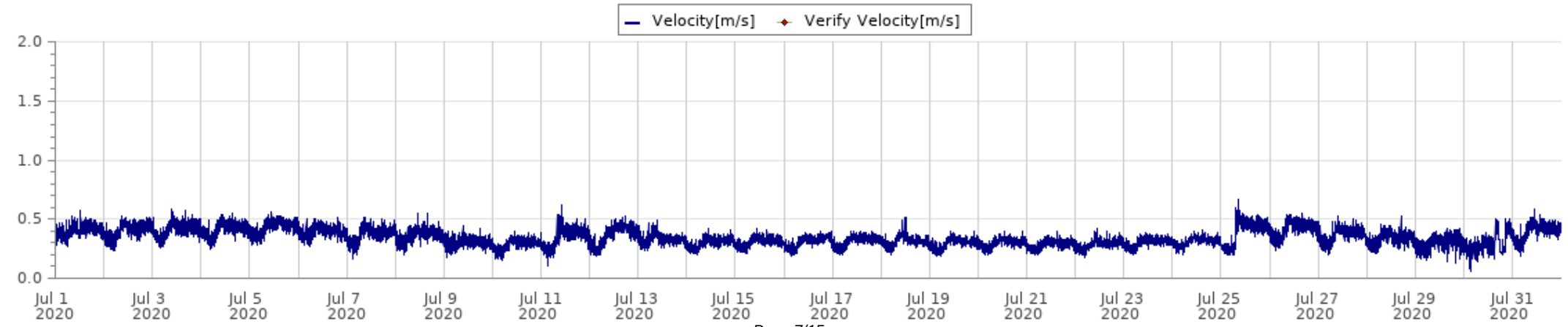

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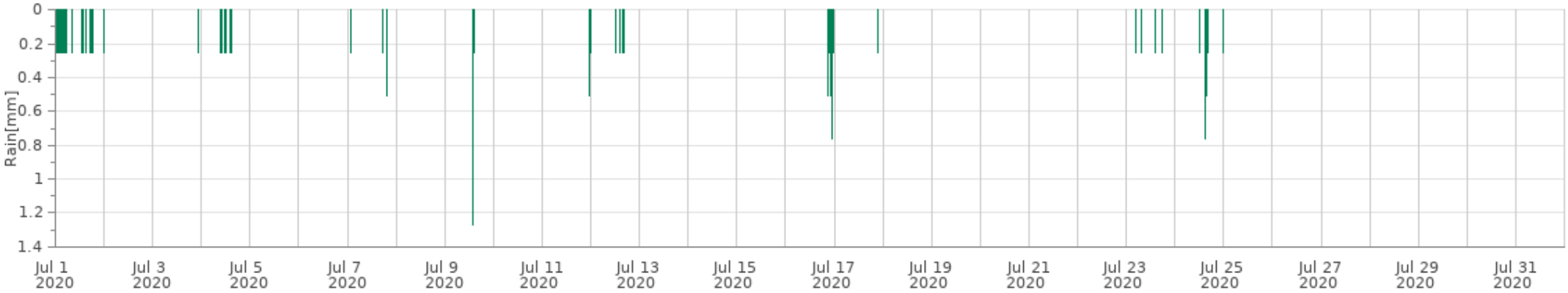

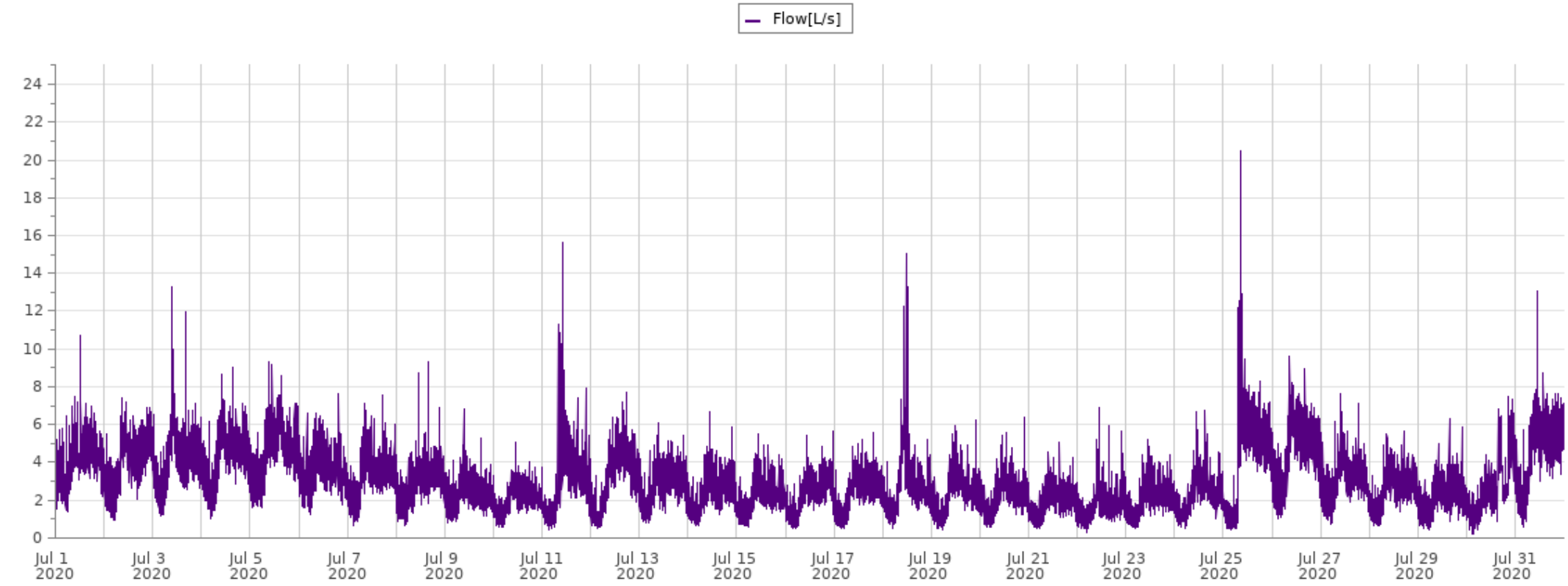

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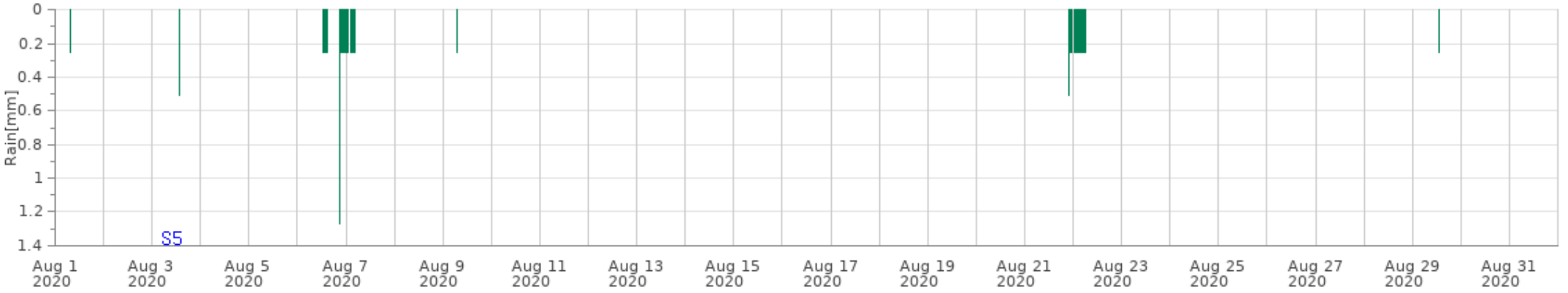

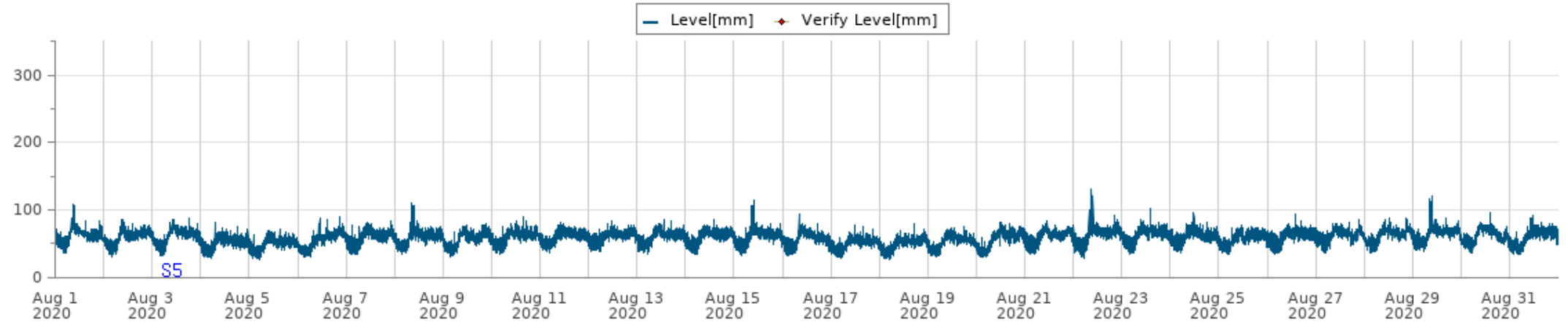

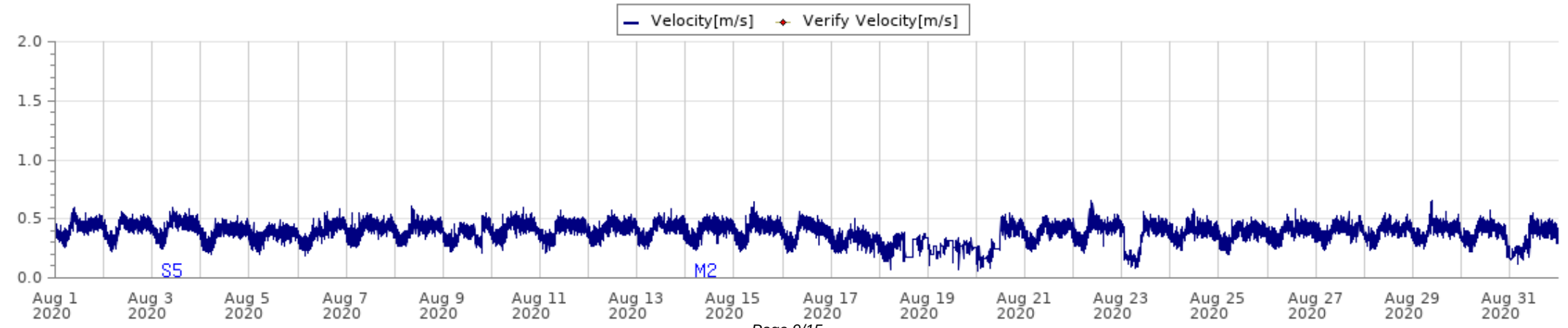

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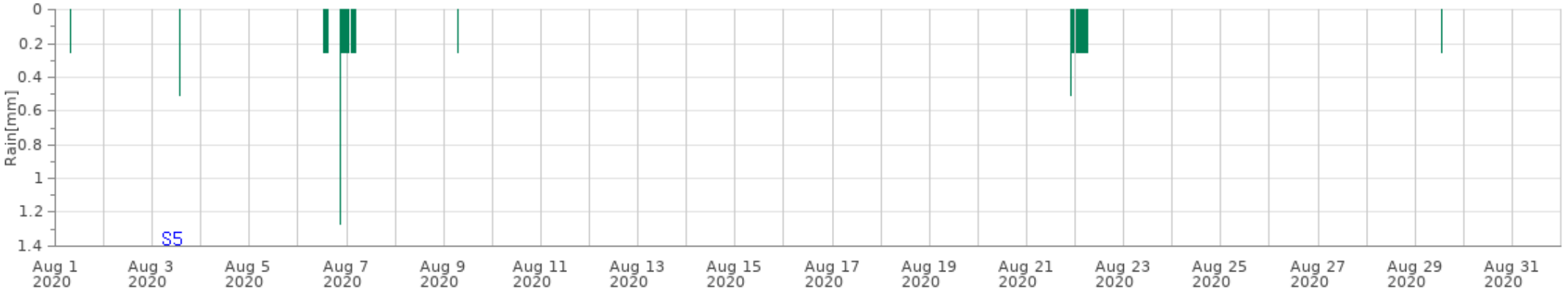

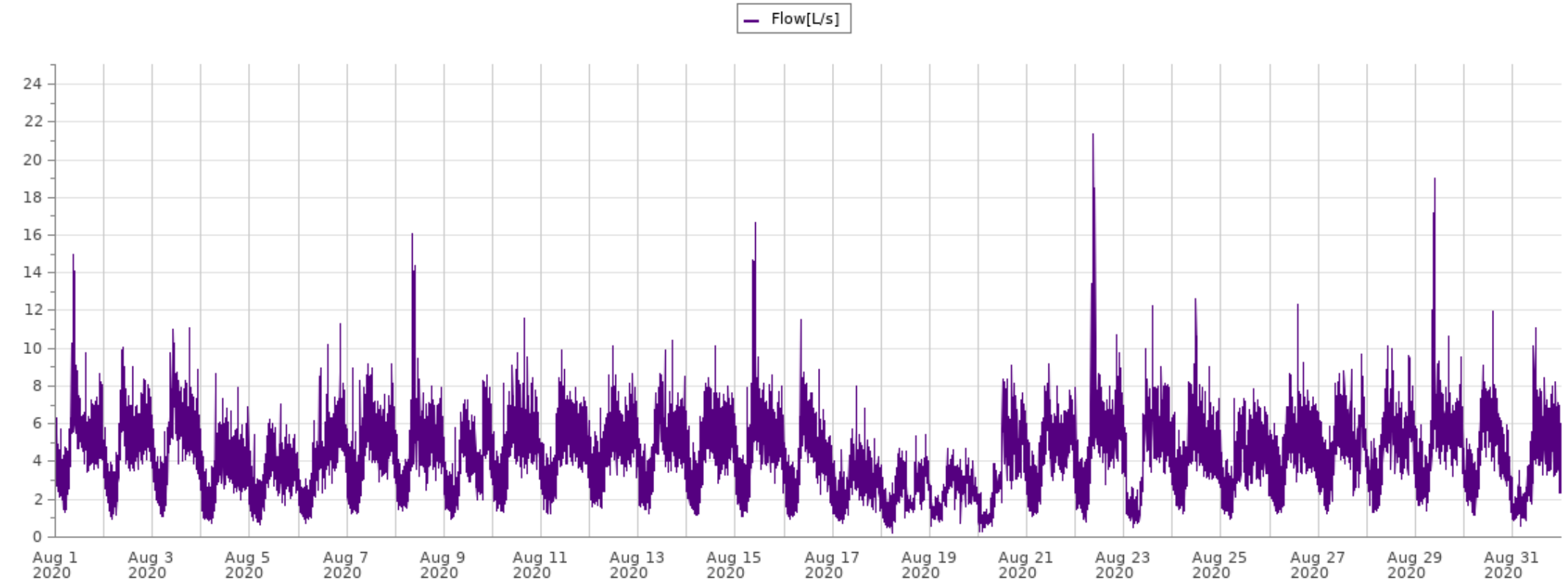

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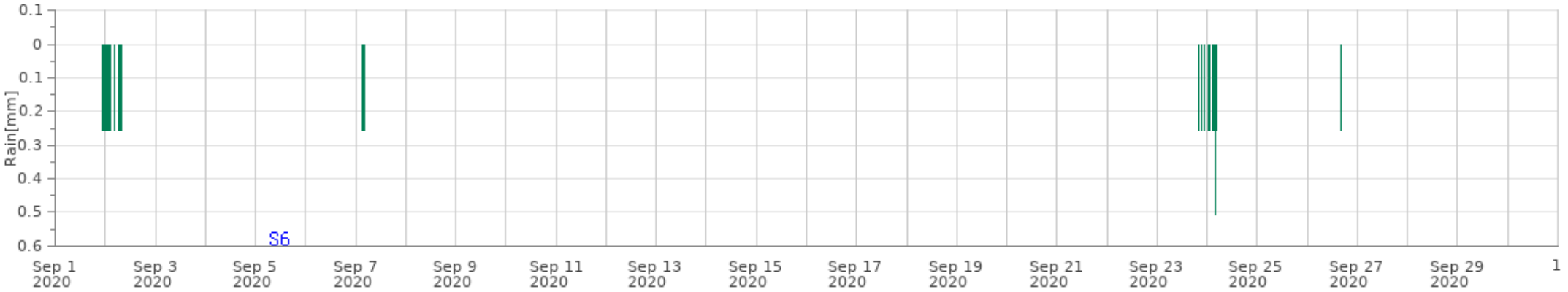

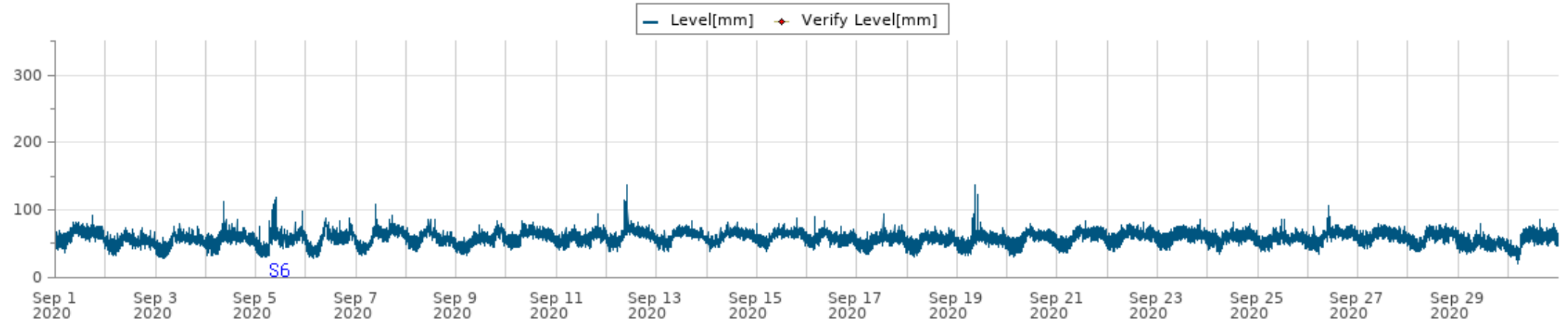

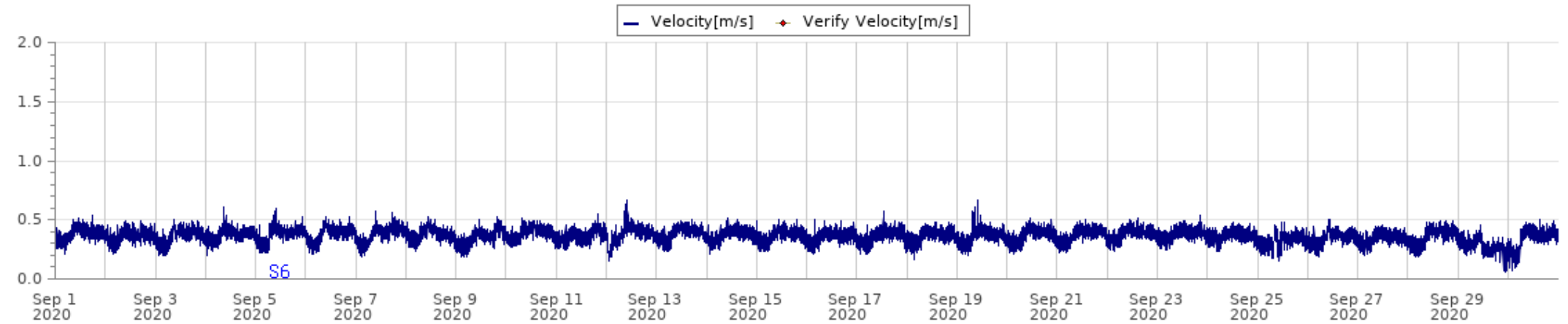

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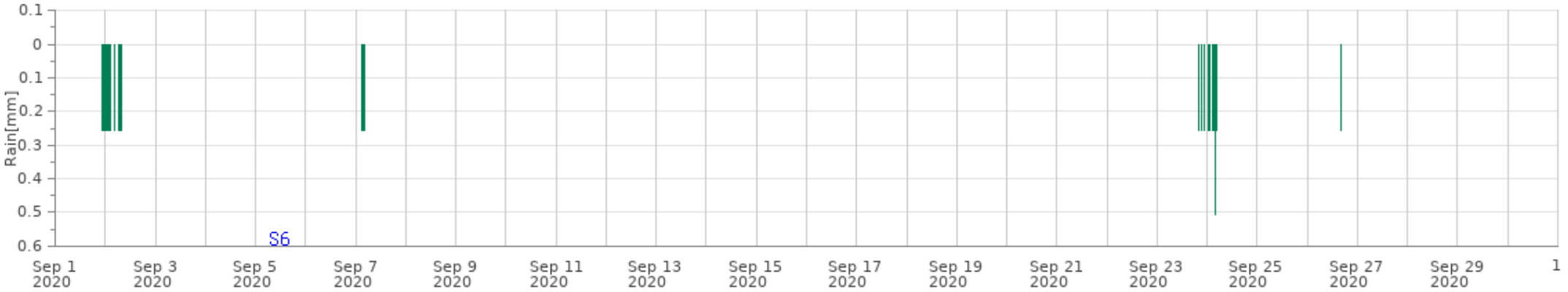

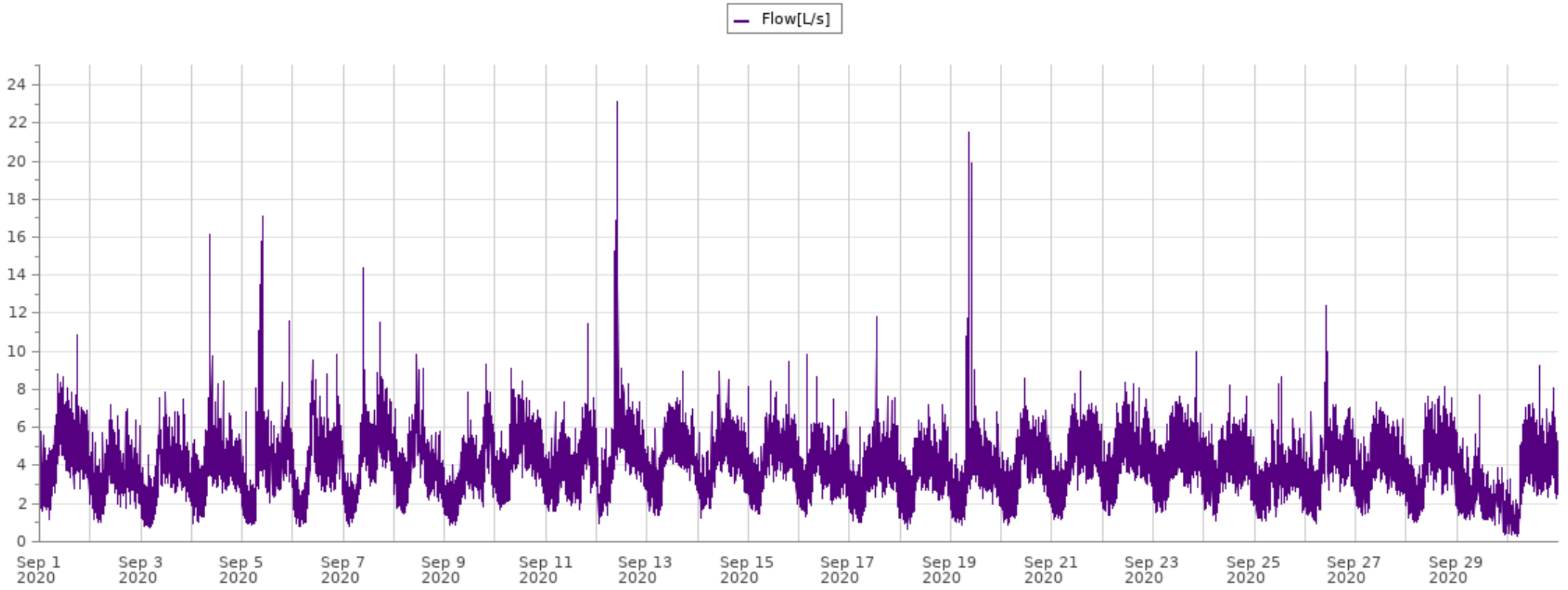

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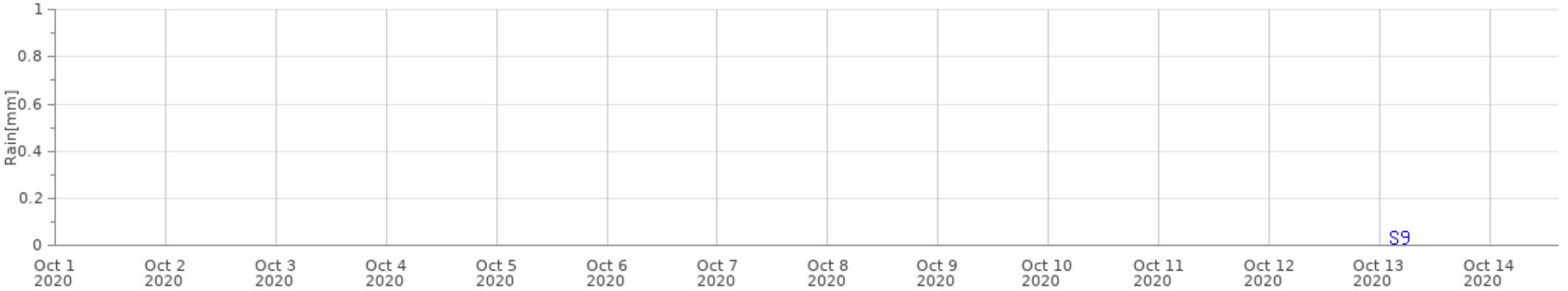

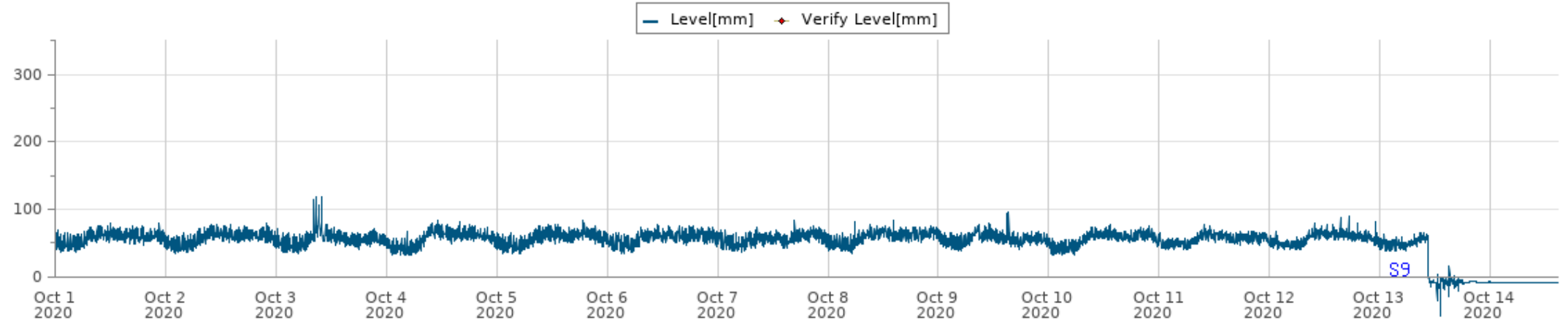

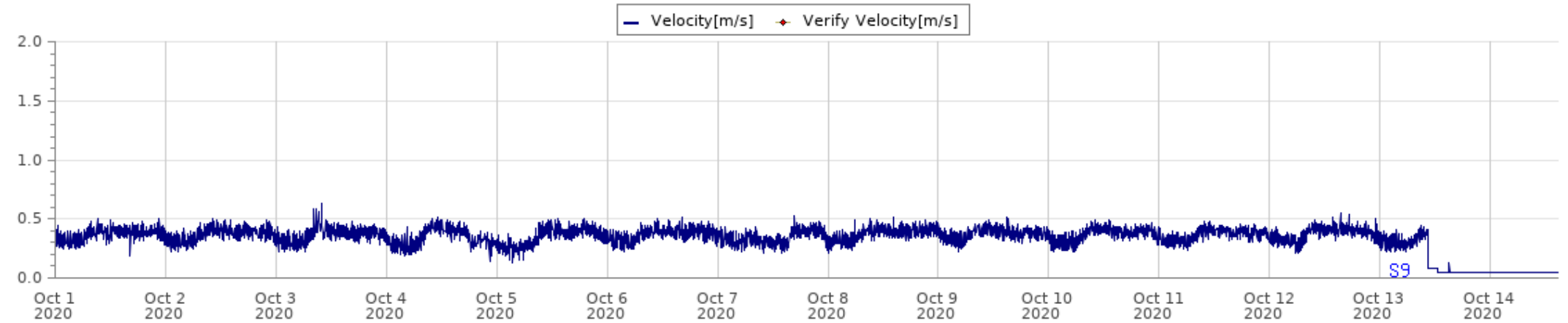

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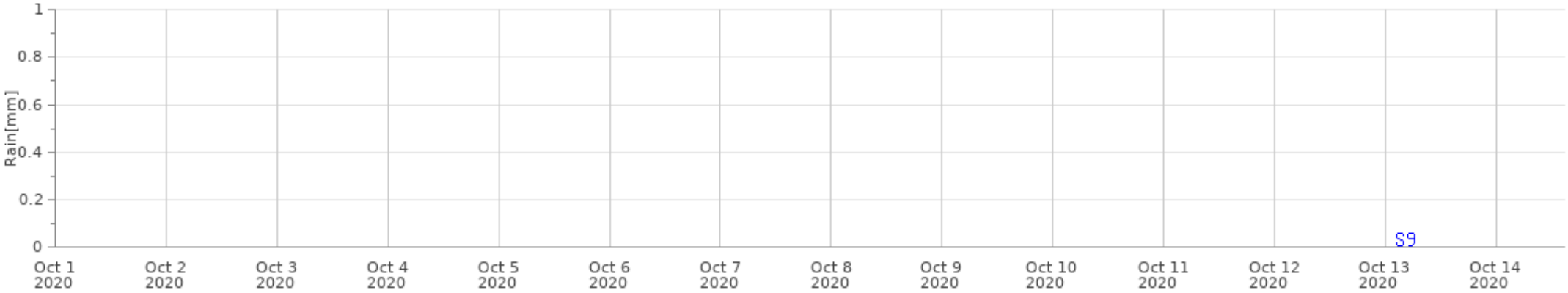

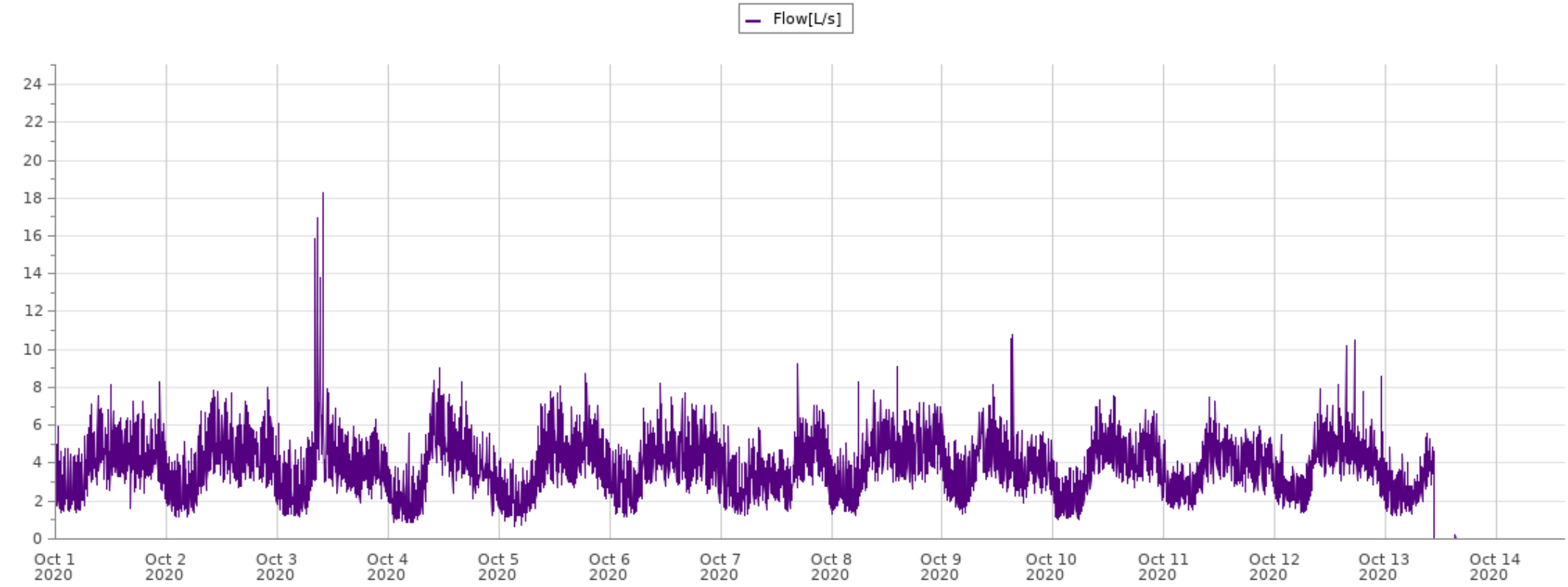

Monthly Data Report. 114-1008-001 / Site 1
May, 2020 to October, 2020

Notes	
M1	**2020-05-22 04:50:00 to 2020-05-17 13:35:00 : Correction: Velocity From Lookup Table** .
M2	**2020-09-01 16:10:00 to 2020-08-14 12:25:00 : Correction: Velocity From Lookup Table** .
S3	**2020-05-09 20:30:00 to 2020-05-09 20:00:00 : Service Report** Install Report. The target manhole would not produce good data so we used the downstream manhole. The sensor was installed in the upstream pipe.
S4	**2020-06-28 11:30:00 to 2020-06-28 11:15:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Battery is good.
S5	**2020-08-03 12:02:00 to 2020-08-03 12:02:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Checked Battery
S6	**2020-09-05 14:00:00 to 2020-09-05 13:30:00 : Service Report** Minor Report. donwloaded data
S9	**2020-10-13 09:30:00 to 2020-10-13 05:00:00 : Service Report** Remove Report. We arrived to site downloaded data and removed our equipment.

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Tabular Report - May 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
May	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
9	33	98	47	0	0.41	0.32	0	4.4	2.5	31
10	20	73	41	0.17	0.51	0.31	0.4	7.4	2.1	181
11	24	62	40	0.2	0.47	0.32	0.6	5.3	2.1	179
12	20	67	40	0.19	0.5	0.32	0.4	6.4	2.1	181
13	23	59	40	0.2	0.45	0.32	0.6	4.7	2.1	176
14	18	58	39	0.19	0.44	0.31	0.4	4.7	2	168
15	19	67	36	0.15	0.46	0.27	0.4	5.9	1.6	133
16	20	104	34	0.14	0.56	0.24	0.3	13.4	1.3	113
17	21	61	41	0.2	0.48	0.33	0.5	5.2	2.3	194
18	16	64	40	0.13	0.47	0.31	0.2	4.9	2.1	182
19	19	63	42	0.15	0.48	0.32	0.3	5.2	2.3	195
20	19	66	42	0.15	0.47	0.33	0.3	5.1	2.3	198
21	26	79	46	0.2	0.56	0.38	0.7	9	2.9	252
22	21	69	41	0.23	0.51	0.36	0.5	6.8	2.4	203
23	21	111	41	0.21	0.57	0.36	0.5	14.9	2.4	205
24	21	64	43	0.22	0.47	0.35	0.5	5.4	2.6	219
25	25	63	41	0.22	0.49	0.34	0.7	5.5	2.3	197
26	17	68	36	0.18	0.5	0.33	0.3	6.6	1.9	165
27	17	64	37	0.18	0.47	0.31	0.3	5.3	1.9	159
28	24	75	43	0.2	0.54	0.35	0.7	8.2	2.6	221
29	23	70	45	0.23	0.53	0.37	0.6	7.2	2.8	242
30	28	93	47	0.25	0.61	0.37	1	12.4	3	258
31	29	77	50	0.24	0.55	0.38	1	8.5	3.3	286
Minimum	16	58	34	0	0.41	0.24	0	4.4	1.3	Total
Maximum	33	111	50	0.25	0.61	0.38	1	14.9	3.3	4,337
Average	22	73	41	0.18	0.5	0.33	0.5	7.1	2.3	

Shaded areas are weekends

114-1008-001 - Site 1

Tabular Report - June 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
June	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	26	73	47	0.24	0.52	0.37	0.8	7.6	3	257
2	24	72	45	0.21	0.46	0.31	0.7	5.5	2.3	193
3	25	74	46	0.22	0.5	0.36	0.7	7.3	2.7	235
4	29	67	48	0.27	0.49	0.38	1.3	6.1	3	259
5	27	76	48	0.24	0.52	0.37	0.9	7.6	3.1	265
6	30	112	47	0.23	0.62	0.36	1	16.5	2.9	253
7	25	73	46	0.21	0.52	0.35	0.7	7.6	2.8	243
8	26	72	47	0.21	0.48	0.35	0.7	6.8	2.9	246
9	26	76	47	0.22	0.51	0.35	0.7	7.9	2.9	247
10	26	72	48	0.22	0.52	0.36	0.7	7.2	3.1	262
11	31	69	48	0.24	0.52	0.37	1	7	3.1	268
12	31	80	48	0.26	0.55	0.38	1.1	9.1	3.1	265
13	28	115	50	0.24	0.68	0.37	0.9	18.6	3.4	289
14	31	79	50	0.24	0.55	0.37	1	9	3.2	276
15	25	76	48	0.22	0.51	0.35	0.7	7.8	3	254
16	25	71	47	0.22	0.48	0.34	0.6	6.8	2.7	235
17	23	66	45	0.23	0.47	0.35	0.6	5.7	2.7	229
18	30	80	49	0.25	0.54	0.37	1	8.9	3.2	278
19	32	76	50	0.25	0.54	0.37	1.1	8.2	3.3	282
20	34	115	53	0.27	0.64	0.38	1.3	17.8	3.6	312
21	27	69	50	0.23	0.51	0.37	0.8	6.7	3.3	284
22	28	73	48	0.24	0.52	0.36	0.9	7.6	3	260
23	30	65	47	0.25	0.47	0.36	1	5.7	2.9	250
24	30	75	48	0.21	0.54	0.37	0.9	8.1	3.1	267
25	27	65	49	0.21	0.5	0.37	0.7	6.2	3.2	275
26	28	78	51	0.24	0.54	0.38	0.9	8.5	3.5	300
27	34	114	56	0.27	0.65	0.4	1.4	17.8	4.1	350
28	36	74	55	0.26	0.52	0.38	1.4	7.6	3.7	322
29	32	75	52	0.25	0.5	0.37	1.1	7.6	3.4	294
30	28	74	51	0.24	0.54	0.38	0.9	8.1	3.5	297
Minimum	23	65	45	0.21	0.46	0.31	0.6	5.5	2.3	Total
Maximum	36	115	56	0.27	0.68	0.4	1.4	18.6	4.1	8,049
Average	28	79	49	0.24	0.53	0.36	0.9	8.8	3.1	

Shaded areas are weekends

114-1008-001 - Site 1

Tabular Report - July 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
July	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	36	87	56	0.27	0.58	0.41	1.4	10.7	4.2	359
2	30	75	54	0.24	0.52	0.4	0.9	7.4	4	340
3	33	99	56	0.25	0.59	0.41	1.2	13.3	4.2	362
4	31	80	56	0.24	0.55	0.41	1	9	4.2	361
5	37	83	57	0.28	0.56	0.43	1.6	9.3	4.5	390
6	33	75	52	0.27	0.51	0.39	1.3	7.6	3.6	307
7	30	75	51	0.17	0.51	0.37	0.7	7.5	3.3	287
8	26	81	47	0.2	0.55	0.36	0.7	9.3	2.9	250
9	32	76	46	0.17	0.44	0.3	0.8	6.8	2.4	203
10	27	67	44	0.15	0.4	0.28	0.6	5	2	176
11	25	107	48	0.1	0.62	0.34	0.4	15.6	3.1	265
12	23	74	48	0.19	0.52	0.37	0.5	7.7	3.2	275
13	26	72	48	0.23	0.49	0.33	0.8	6.1	2.7	233
14	25	77	46	0.2	0.43	0.3	0.6	6.7	2.4	205
15	23	70	43	0.21	0.42	0.31	0.6	5.5	2.2	190
16	22	71	44	0.19	0.4	0.31	0.5	5.6	2.3	198
17	21	71	45	0.19	0.4	0.31	0.5	5.6	2.4	208
18	23	121	49	0.2	0.51	0.31	0.5	15.1	2.8	236
19	21	77	46	0.19	0.4	0.29	0.4	6.3	2.3	201
20	23	78	44	0.2	0.39	0.29	0.5	6.4	2.2	190
21	22	67	41	0.19	0.39	0.28	0.5	5.1	1.9	164
22	18	80	38	0.17	0.42	0.29	0.3	6.9	1.8	151
23	22	70	42	0.2	0.38	0.3	0.5	5.2	2.1	181
24	21	80	44	0.2	0.41	0.31	0.5	6.8	2.3	198
25	20	124	55	0.2	0.67	0.39	0.4	20.5	4.4	374
26	32	84	58	0.23	0.56	0.42	1	9.6	4.5	391
27	28	73	49	0.2	0.52	0.37	0.7	7.6	3.1	268
28	24	66	45	0.21	0.53	0.33	0.6	5.7	2.6	220
29	25	75	44	0.13	0.42	0.29	0.5	6.3	2.2	187
30	22	75	49	0.05	0.5	0.29	0.2	7.5	2.6	224
31	25	99	60	0.19	0.59	0.39	0.6	13.1	4.6	392
Minimum	18	66	38	0.05	0.38	0.28	0.2	5	1.8	Total
Maximum	37	124	60	0.28	0.67	0.43	1.6	20.5	4.6	7,985
Average	26	81	49	0.2	0.49	0.34	0.7	8.4	3	

Shaded areas are weekends

114-1008-001 - Site 1

Tabular Report - August 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
August	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	36	109	61	0.25	0.59	0.43	1.3	14.9	5	431
2	31	86	60	0.22	0.56	0.42	0.9	10.1	4.8	414
3	32	88	61	0.24	0.6	0.43	1.1	11.1	5.1	437
4	28	82	51	0.19	0.52	0.38	0.7	8.6	3.5	302
5	27	72	49	0.19	0.49	0.36	0.7	7	3.1	267
6	30	90	55	0.19	0.58	0.38	0.8	11.3	4	346
7	34	84	59	0.25	0.56	0.41	1.2	9.2	4.7	399
8	35	111	59	0.26	0.61	0.41	1.3	16.1	4.7	400
9	31	79	56	0.21	0.55	0.37	1	8.6	3.9	334
10	35	90	60	0.24	0.59	0.42	1.3	11.6	4.8	409
11	37	82	60	0.21	0.57	0.4	1.2	9.9	4.6	395
12	38	83	60	0.27	0.58	0.41	1.6	10.1	4.7	407
13	34	85	60	0.25	0.58	0.41	1.2	10.4	4.7	401
14	34	85	60	0.24	0.56	0.4	1.1	10.1	4.6	396
15	33	114	61	0.22	0.65	0.41	1.1	16.7	4.9	418
16	32	94	56	0.21	0.56	0.39	1	11.5	4.1	351
17	28	78	50	0.17	0.5	0.32	0.8	8	2.8	243
18	27	80	50	0.07	0.38	0.27	0.2	5.4	2.4	206
19	31	75	53	0.07	0.34	0.26	0.6	4.7	2.5	212
20	30	82	56	0.06	0.55	0.31	0.3	9.1	3.5	297
21	34	83	60	0.22	0.53	0.39	1.1	9.2	4.4	378
22	29	131	62	0.21	0.65	0.4	0.8	21.4	5	431
23	35	101	62	0.08	0.56	0.33	0.5	12.3	4.2	360
24	36	96	60	0.23	0.59	0.39	1.3	12.6	4.5	385
25	34	77	57	0.2	0.52	0.37	0.9	7.9	4	343
26	35	95	60	0.24	0.59	0.39	1.2	12.4	4.5	385
27	37	86	62	0.23	0.56	0.4	1.2	9.7	4.8	412
28	37	87	63	0.23	0.55	0.4	1.3	10.1	4.9	417
29	38	120	65	0.25	0.65	0.4	1.4	19	5.2	450
30	36	95	62	0.17	0.57	0.38	1.1	12	4.6	393
31	35	93	60	0.11	0.55	0.33	0.6	11.1	3.9	339
Minimum	27	72	49	0.06	0.34	0.26	0.2	4.7	2.4	Total
Maximum	38	131	65	0.27	0.65	0.43	1.6	21.4	5.2	11,357
Average	33	91	58	0.2	0.56	0.38	1	11	4.3	

Shaded areas are weekends

114-1008-001 - Site 1

Tabular Report - September 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
September	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	37	92	62	0.21	0.54	0.37	1.1	10.9	4.5	388
2	33	74	53	0.21	0.49	0.36	1	7.2	3.4	293
3	28	81	52	0.2	0.5	0.36	0.7	7.8	3.4	295
4	32	113	56	0.2	0.6	0.37	0.9	16.2	3.9	332
5	30	118	55	0.22	0.6	0.37	0.9	17.1	3.9	338
6	29	88	55	0.2	0.53	0.37	0.8	9.8	3.9	335
7	32	108	60	0.19	0.57	0.38	0.8	14.4	4.5	382
8	40	87	57	0.23	0.53	0.37	1.4	9.8	4	341
9	33	83	55	0.18	0.53	0.35	0.9	9.3	3.5	301
10	41	83	61	0.26	0.52	0.38	1.7	9.1	4.5	387
11	41	94	58	0.25	0.55	0.36	1.6	11.5	4	342
12	38	137	63	0.15	0.66	0.38	0.9	23.1	4.8	410
13	39	84	61	0.23	0.51	0.38	1.4	9	4.4	375
14	39	83	61	0.21	0.52	0.37	1.2	8.9	4.3	366
15	39	87	61	0.23	0.51	0.36	1.4	9.4	4.2	363
16	42	89	58	0.21	0.51	0.35	1.3	9.8	3.8	326
17	34	93	55	0.21	0.58	0.36	1	11.8	3.6	309
18	30	75	54	0.16	0.48	0.36	0.7	7.2	3.5	300
19	32	138	55	0.2	0.66	0.36	0.9	21.5	3.8	323
20	31	80	56	0.21	0.52	0.37	0.9	8.6	3.9	334
21	36	83	59	0.22	0.51	0.37	1.2	8.9	4.2	360
22	38	82	60	0.24	0.51	0.38	1.4	8.3	4.3	372
23	40	87	60	0.24	0.54	0.37	1.5	10	4.2	364
24	34	82	58	0.23	0.48	0.36	1.1	8.2	3.9	332
25	38	85	56	0.15	0.48	0.32	1.1	8.7	3.3	279
26	35	106	61	0.19	0.51	0.34	0.9	12.4	4	345
27	43	79	61	0.2	0.46	0.34	1.4	7.3	3.9	334
28	38	80	58	0.18	0.5	0.35	1	8.2	3.9	336
29	35	81	49	0.06	0.46	0.27	0.4	7.7	2.3	198
30	20	85	54	0.07	0.51	0.34	0.3	9.2	3.5	299
Minimum	20	74	49	0.06	0.46	0.27	0.3	7.2	2.3	Total
Maximum	43	138	63	0.26	0.66	0.38	1.7	23.1	4.8	10,060
Average	35	91	58	0.2	0.53	0.36	1.1	10.7	3.9	

Shaded areas are weekends

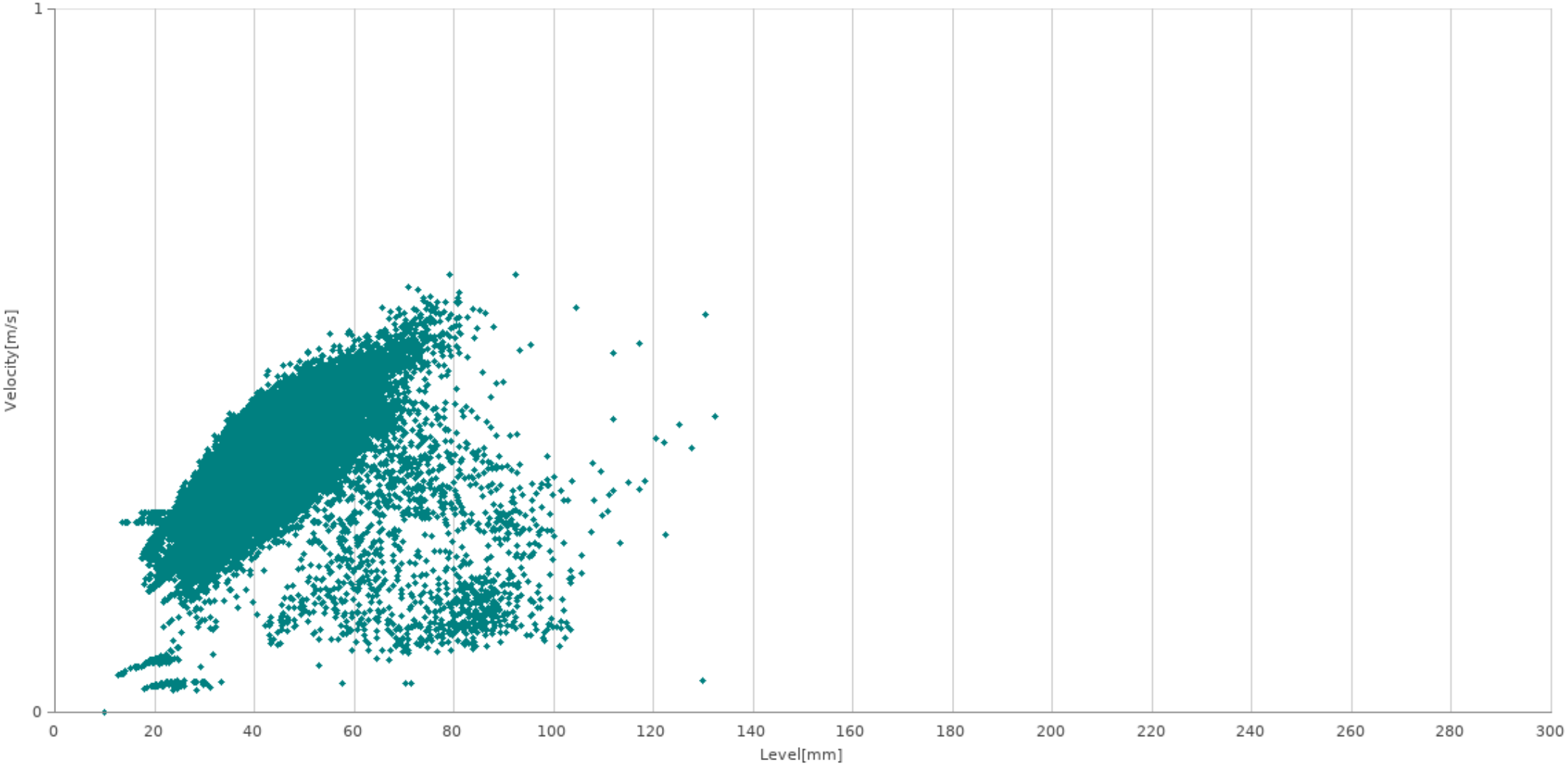
114-1008-001 - Site 1

Tabular Report - October 2020

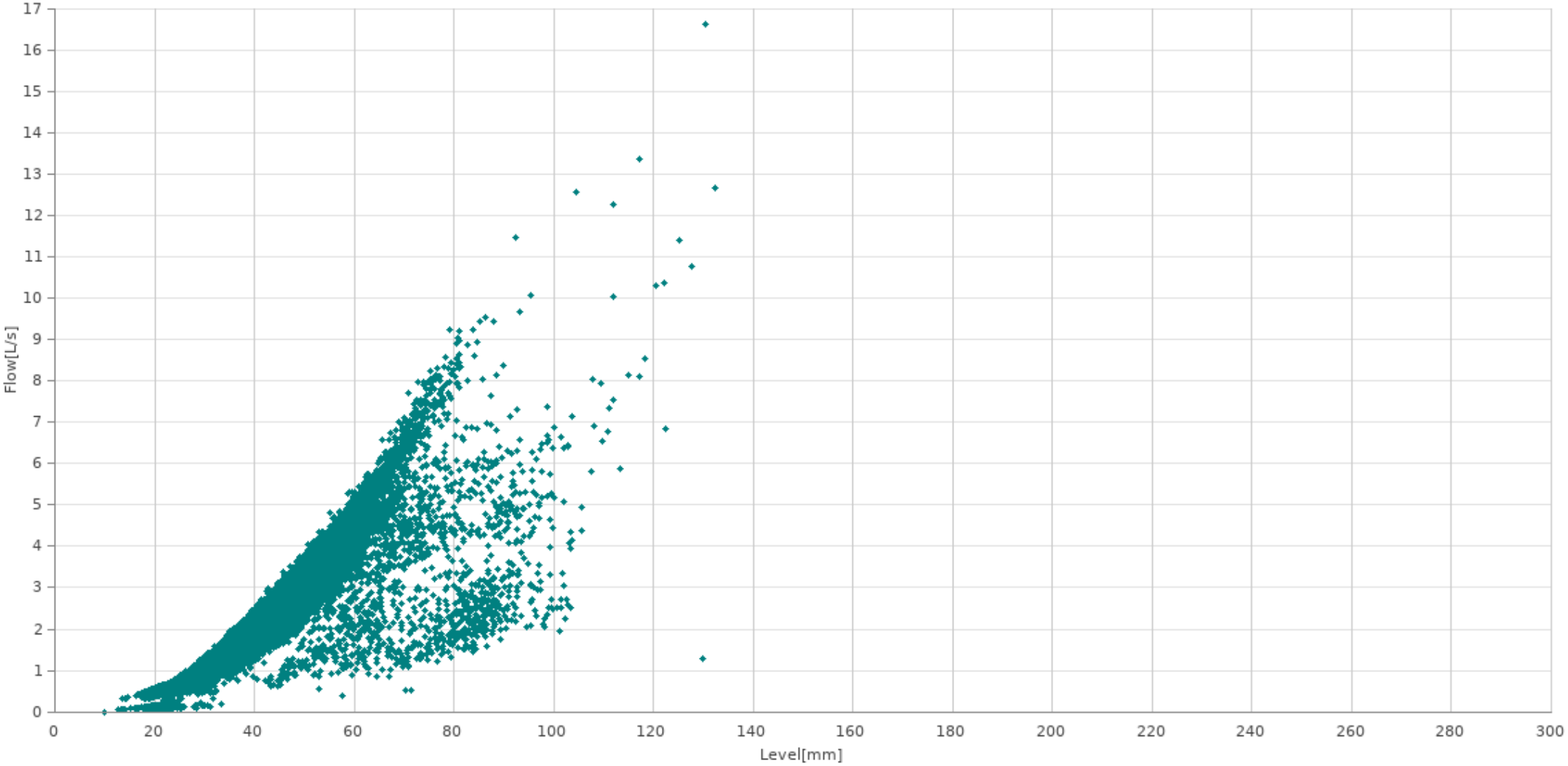
	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
October	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	37	81	57	0.19	0.5	0.36	1.4	8.3	3.9	337
2	35	79	57	0.22	0.51	0.37	1.1	8	4	340
3	35	119	56	0.22	0.64	0.36	1.2	18.2	3.8	327
4	31	84	56	0.14	0.51	0.34	0.8	9	3.6	311
5	34	85	57	0.13	0.5	0.34	0.6	8.8	3.7	315
6	35	79	57	0.22	0.52	0.37	1.1	8.2	3.9	336
7	38	83	56	0.2	0.53	0.34	1.2	9.2	3.4	295
8	35	84	59	0.21	0.52	0.37	1.2	9.1	4.2	359
9	38	96	56	0.22	0.52	0.37	1.3	10.8	3.9	332
10	32	77	56	0.22	0.49	0.37	1	7.6	3.8	325
11	40	77	56	0.24	0.48	0.36	1.5	7.5	3.7	318
12	40	89	57	0.21	0.54	0.37	1.4	10.5	4	343
13	-59	66	17	0.04	0.45	0.17	0	5.5	1.2	103
14	-9	0	-8	0.05	0.05	0.05	0	0	0	0
Minimum	-59	0	-8	0.04	0.05	0.05	0	0	0	Total
Maximum	40	119	59	0.24	0.64	0.37	1.5	18.2	4.2	4,041
Average	26	78	49	0.18	0.48	0.32	1	8.6	3.4	

Shaded areas are weekends

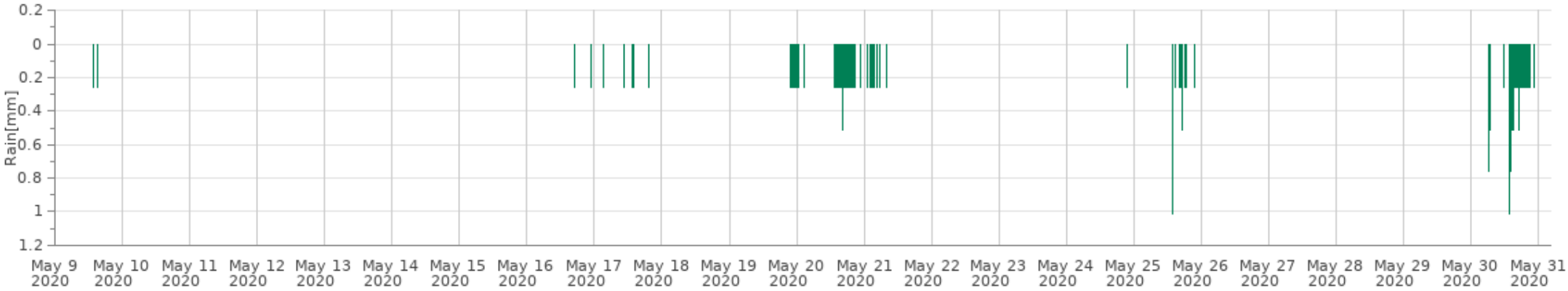
Monthly Data Report. 114-1008-002 / Site2
May, 2020 to October, 2020

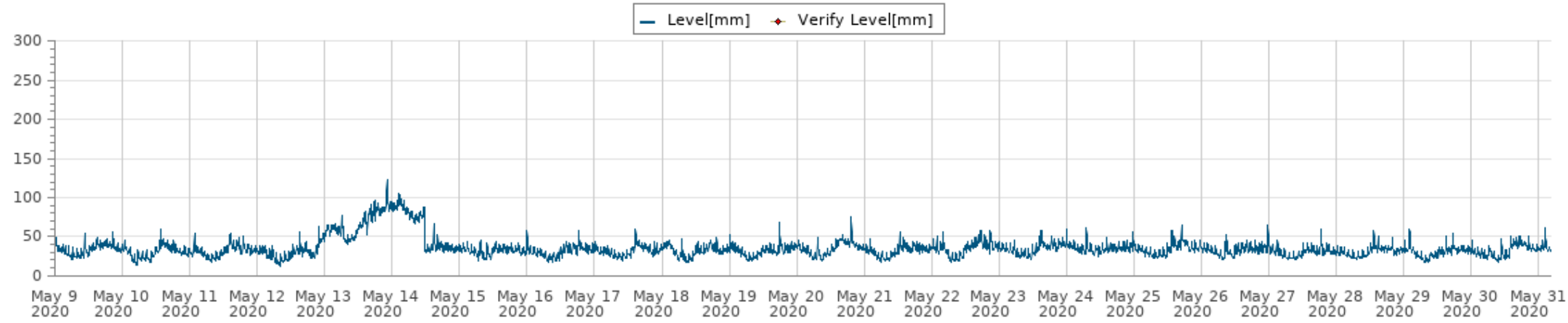


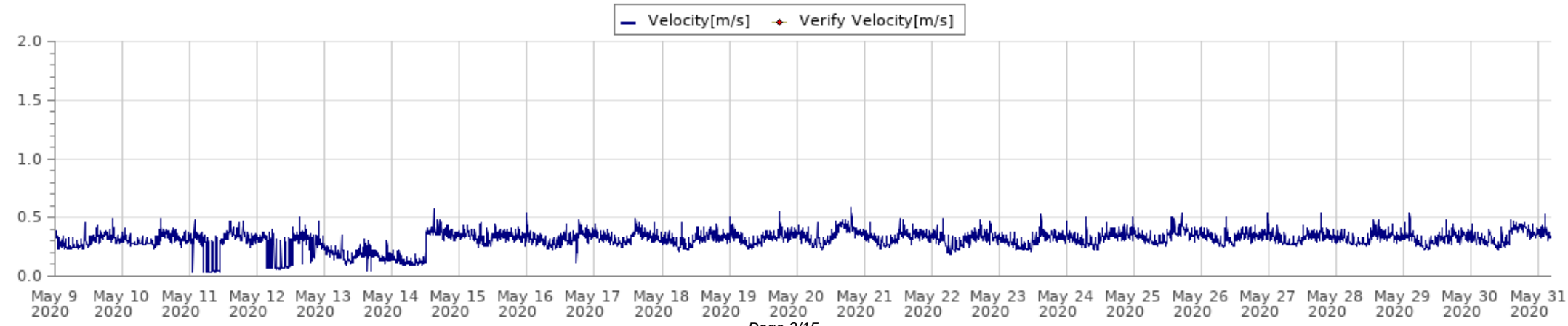
Monthly Data Report. 114-1008-002 / Site2
May, 2020 to October, 2020



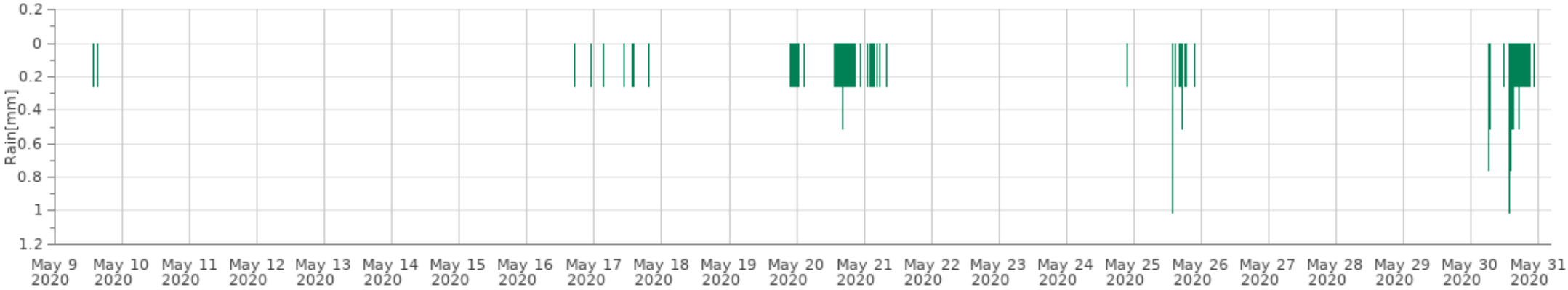
Monthly Data Report. 114-1008-002 / Site2
May, 2020

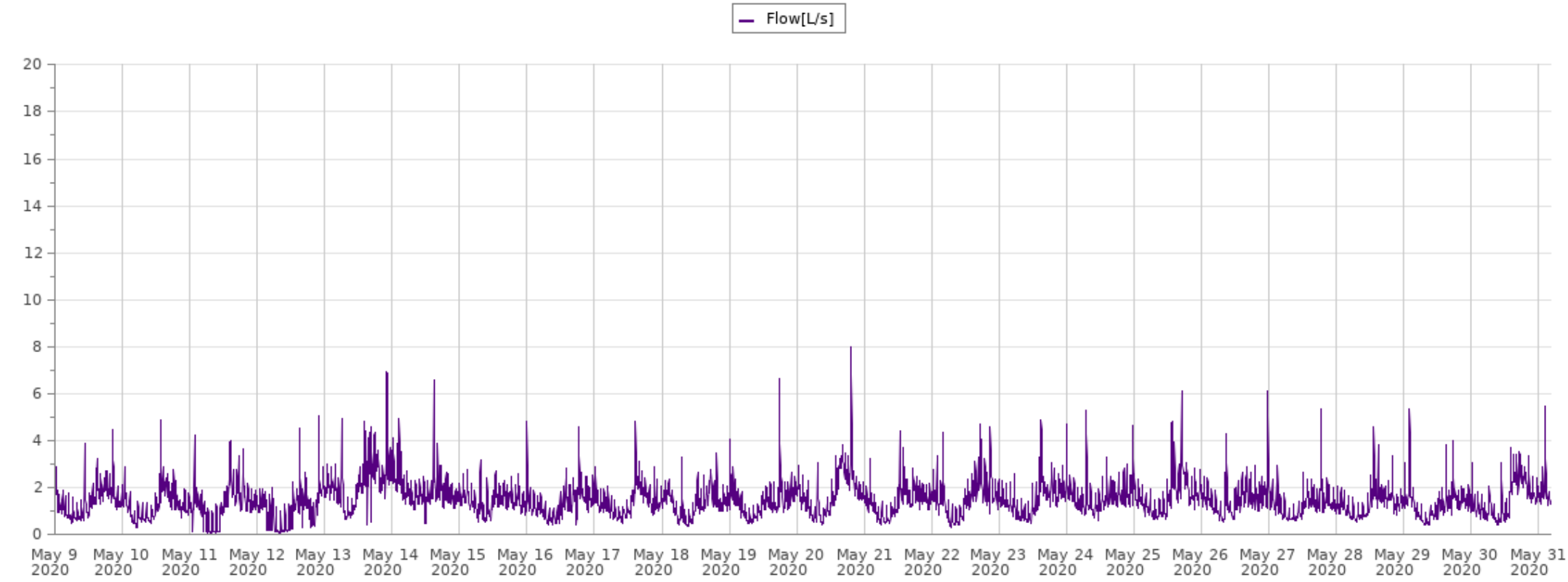




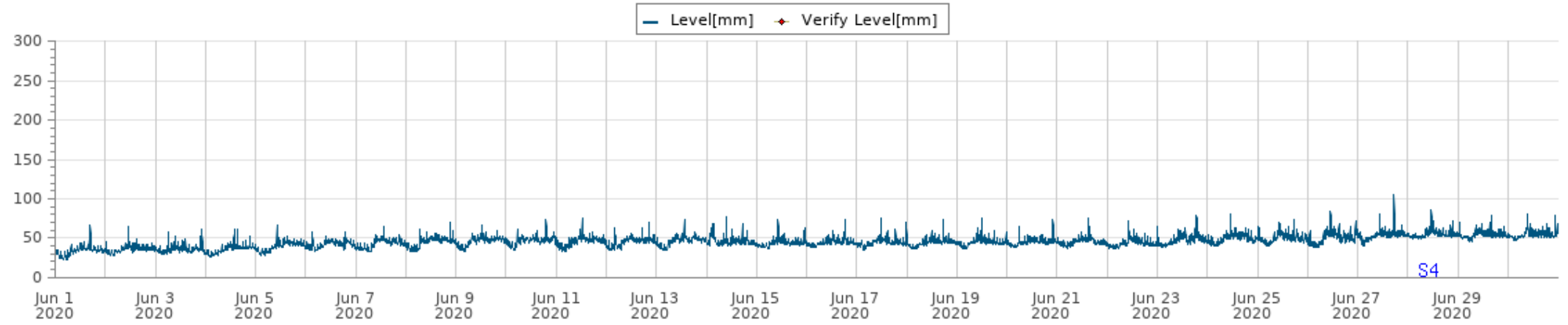


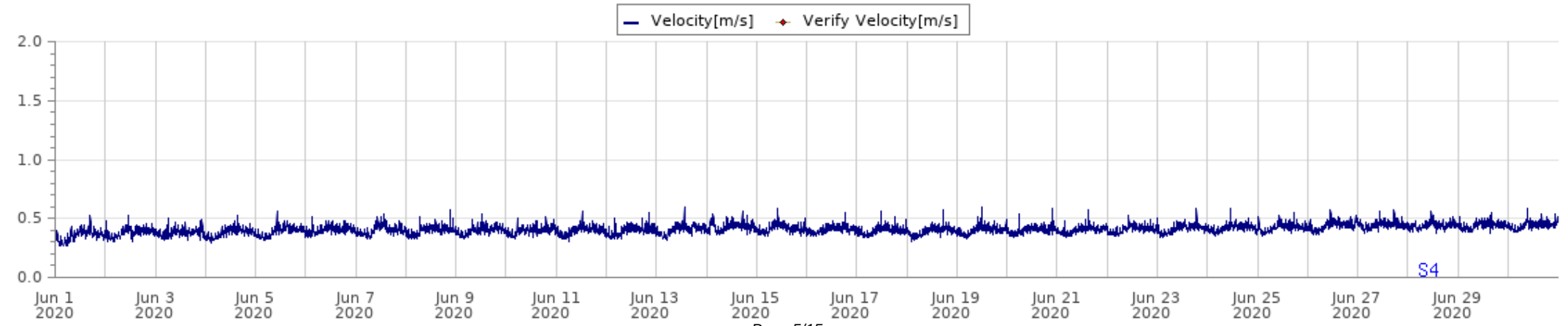
Monthly Data Report. 114-1008-002 / Site2
May, 2020



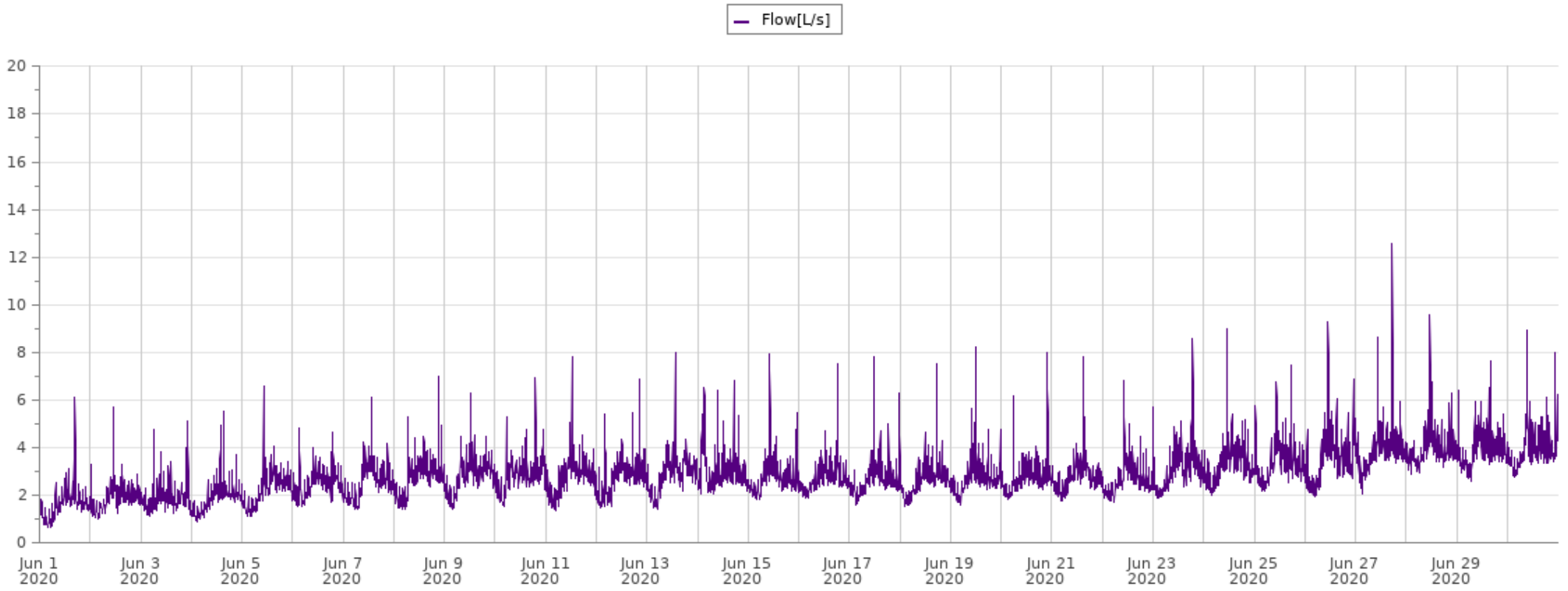


Monthly Data Report. 114-1008-002 / Site2
June, 2020

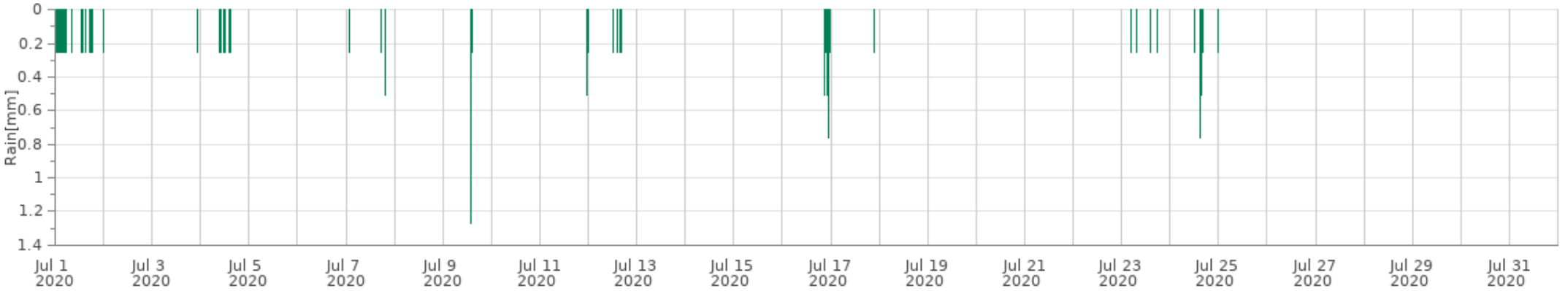


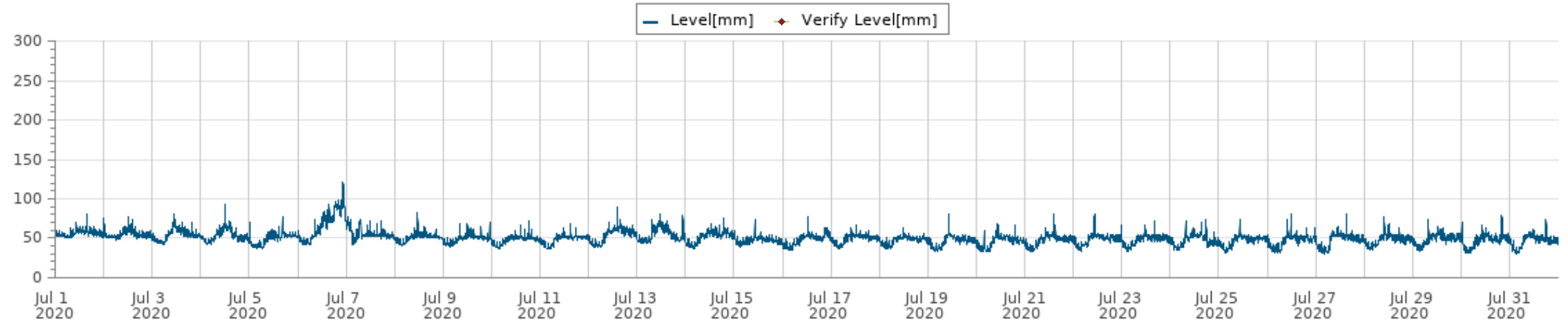


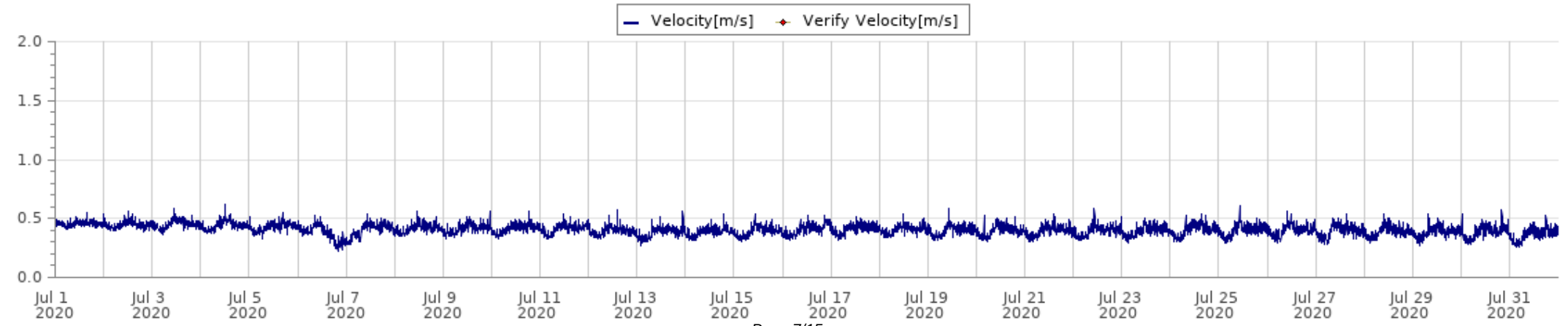
Monthly Data Report. 114-1008-002 / Site2
June, 2020



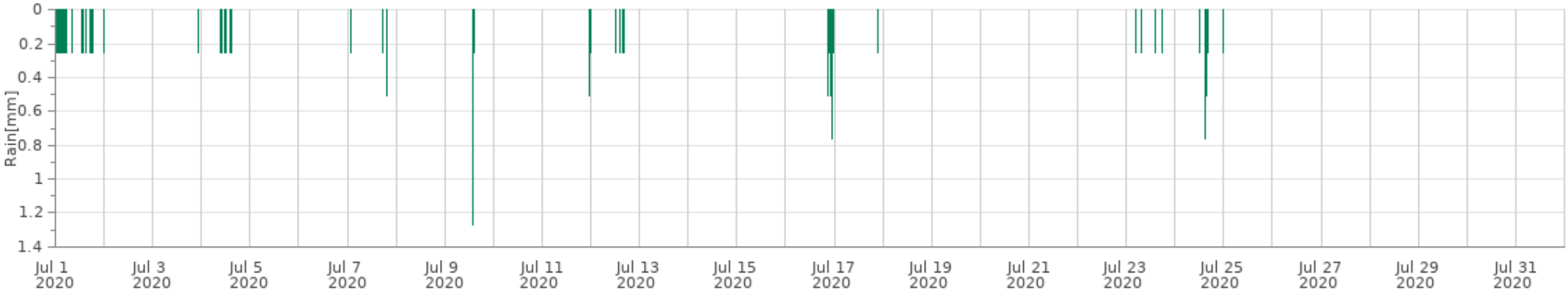
Monthly Data Report. 114-1008-002 / Site2
July, 2020

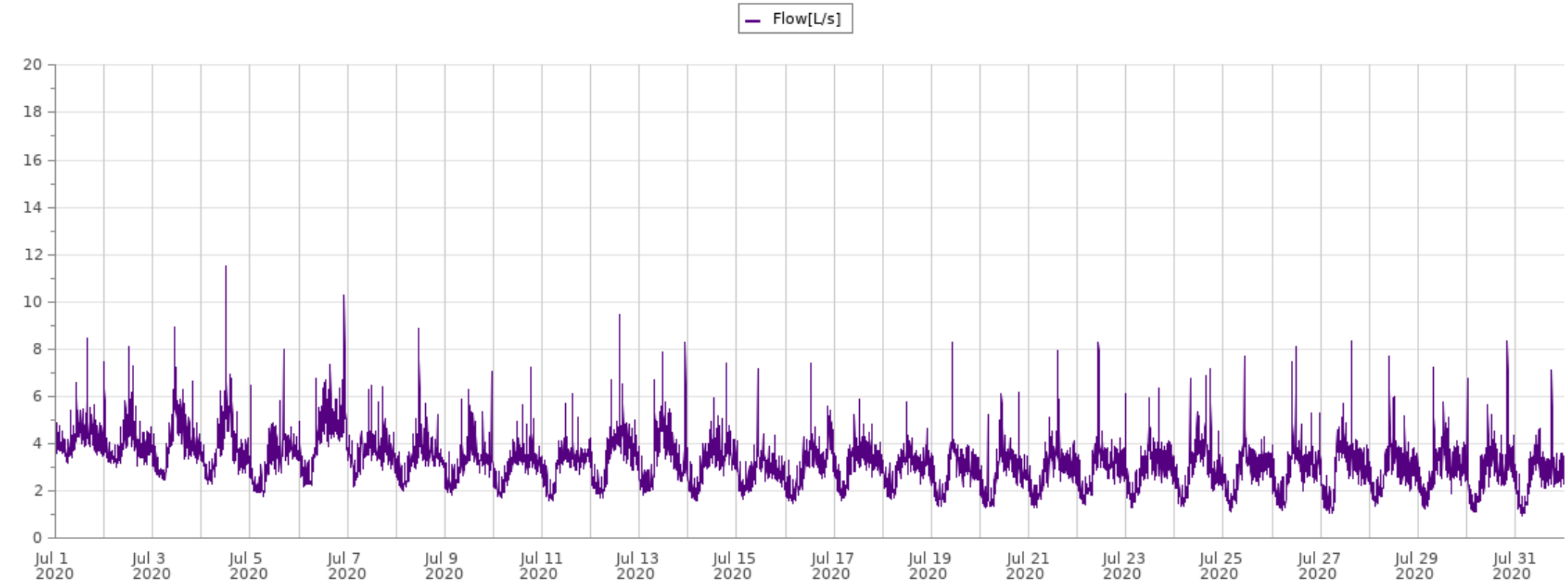




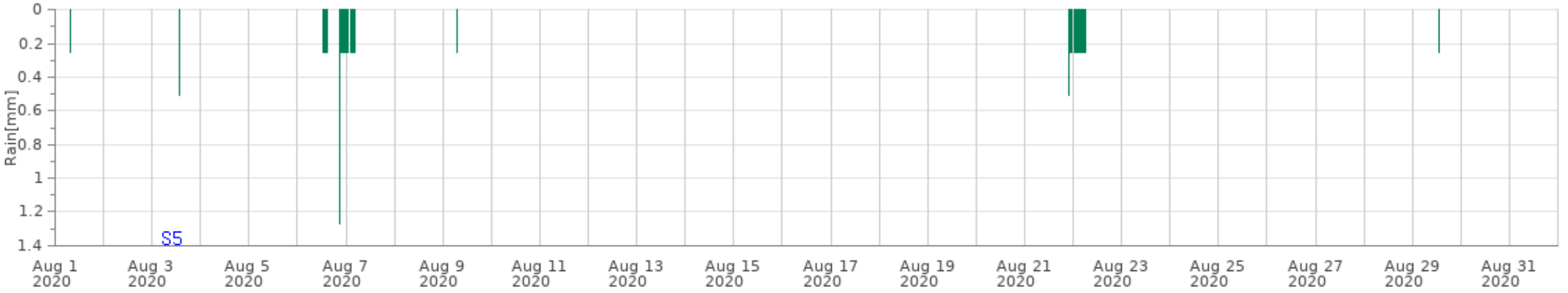


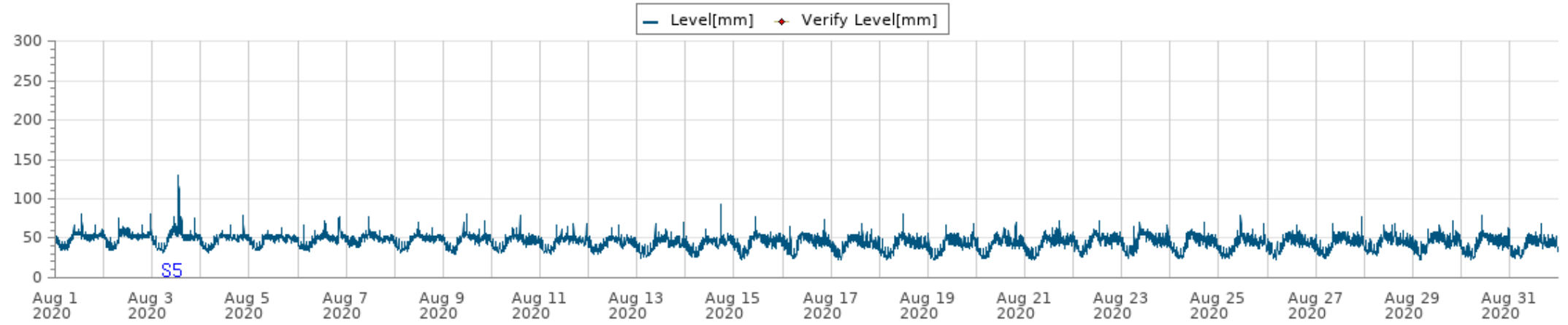
Monthly Data Report. 114-1008-002 / Site2
July, 2020

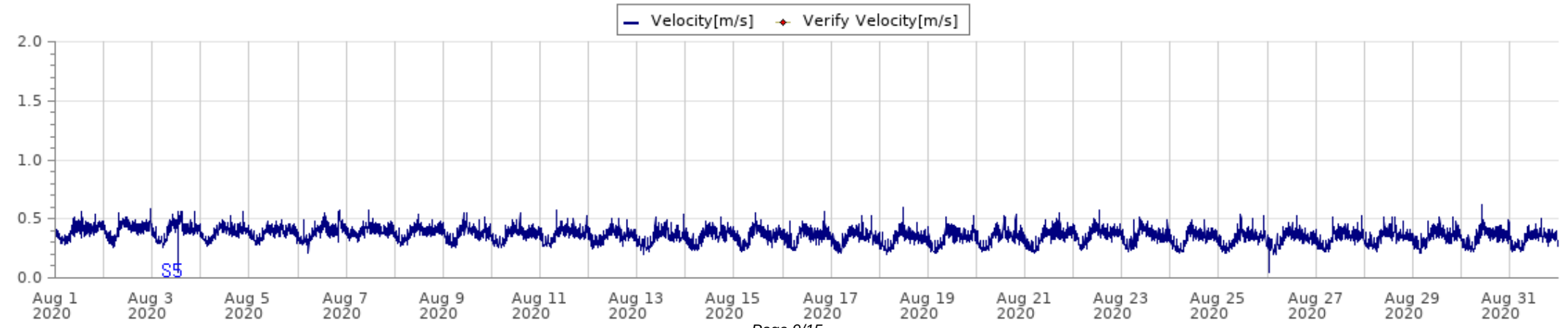




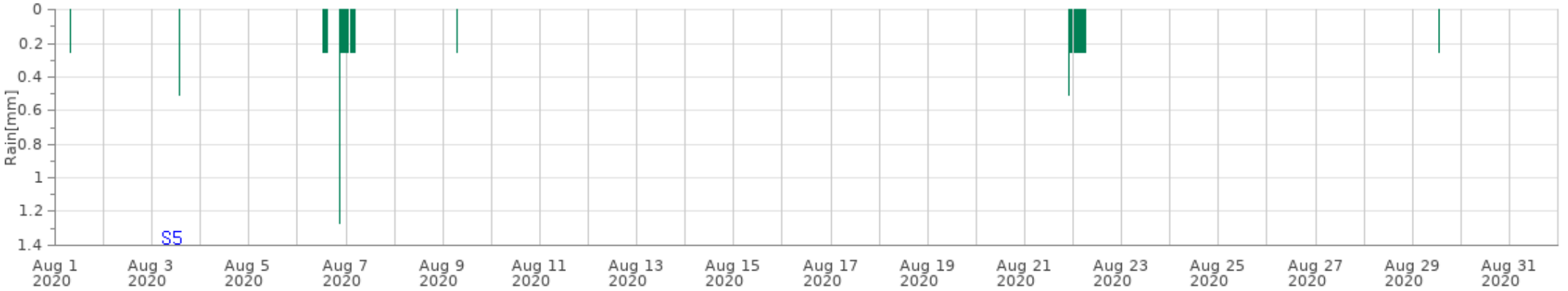
Monthly Data Report. 114-1008-002 / Site2
August, 2020

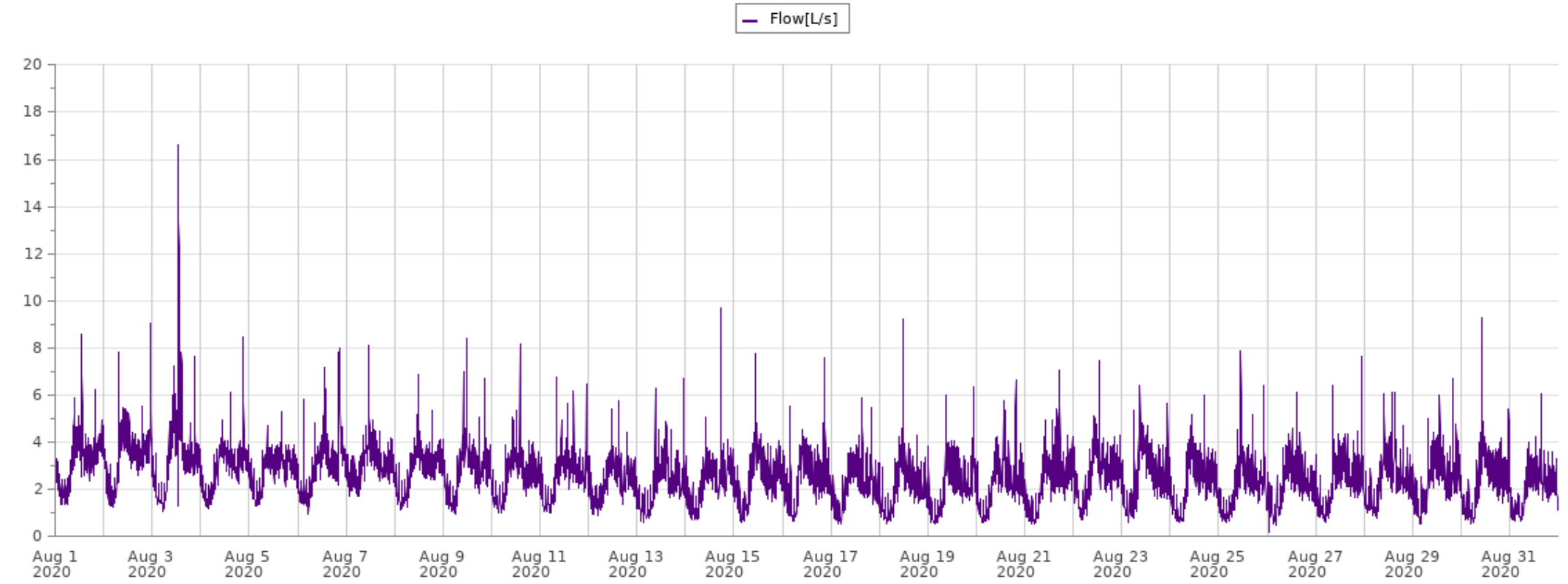




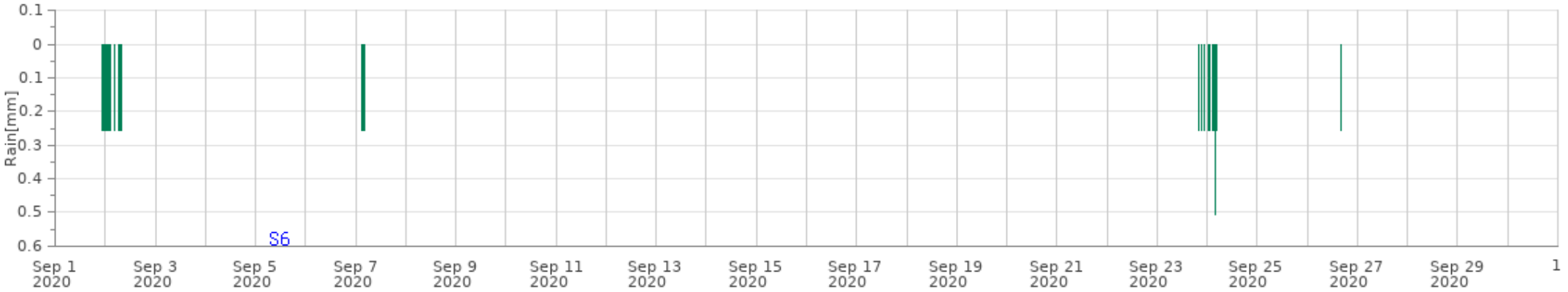


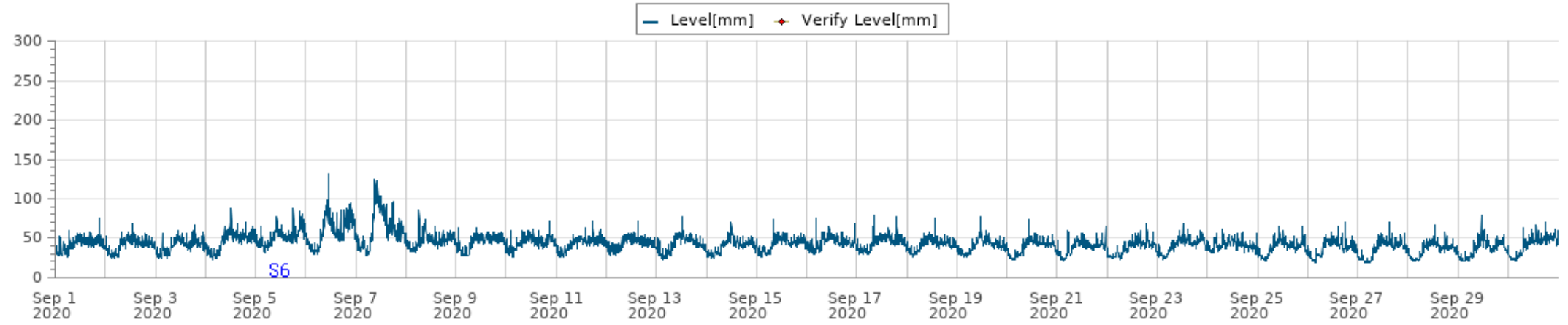
Monthly Data Report. 114-1008-002 / Site2
August, 2020

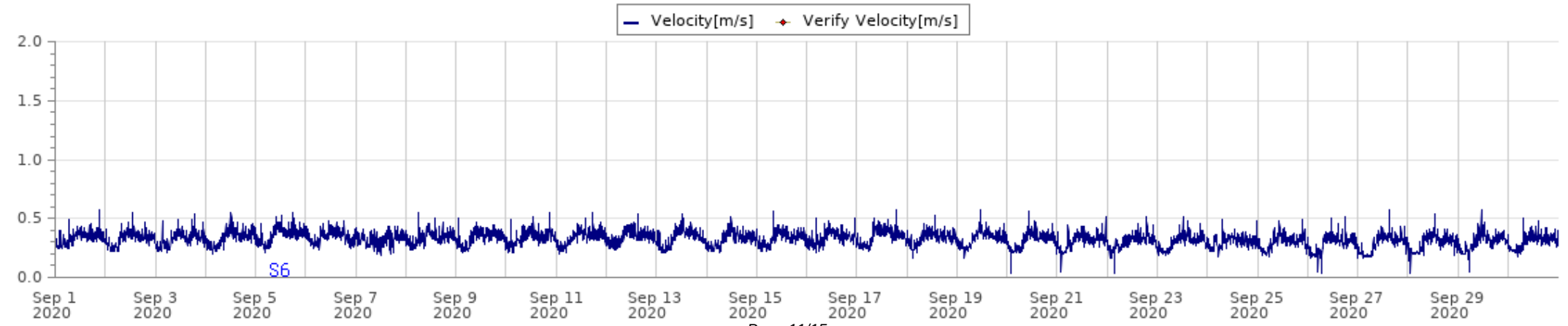




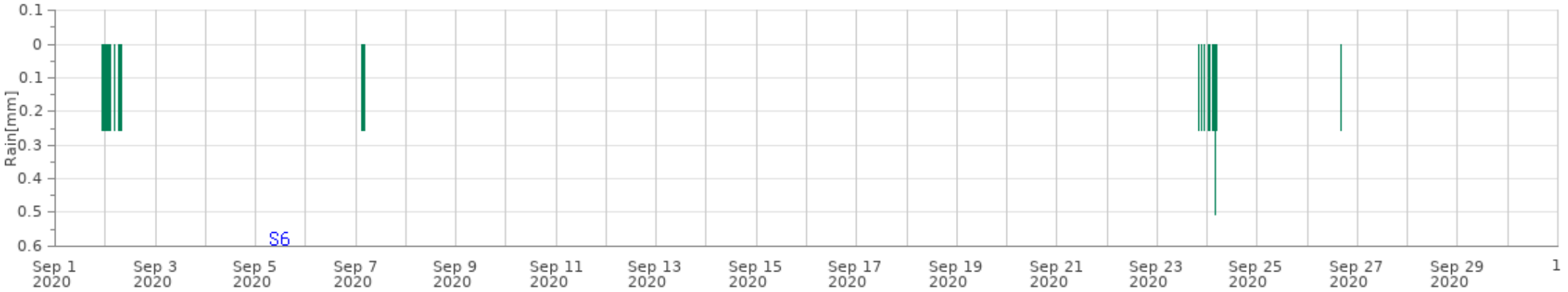
Monthly Data Report. 114-1008-002 / Site2
September, 2020

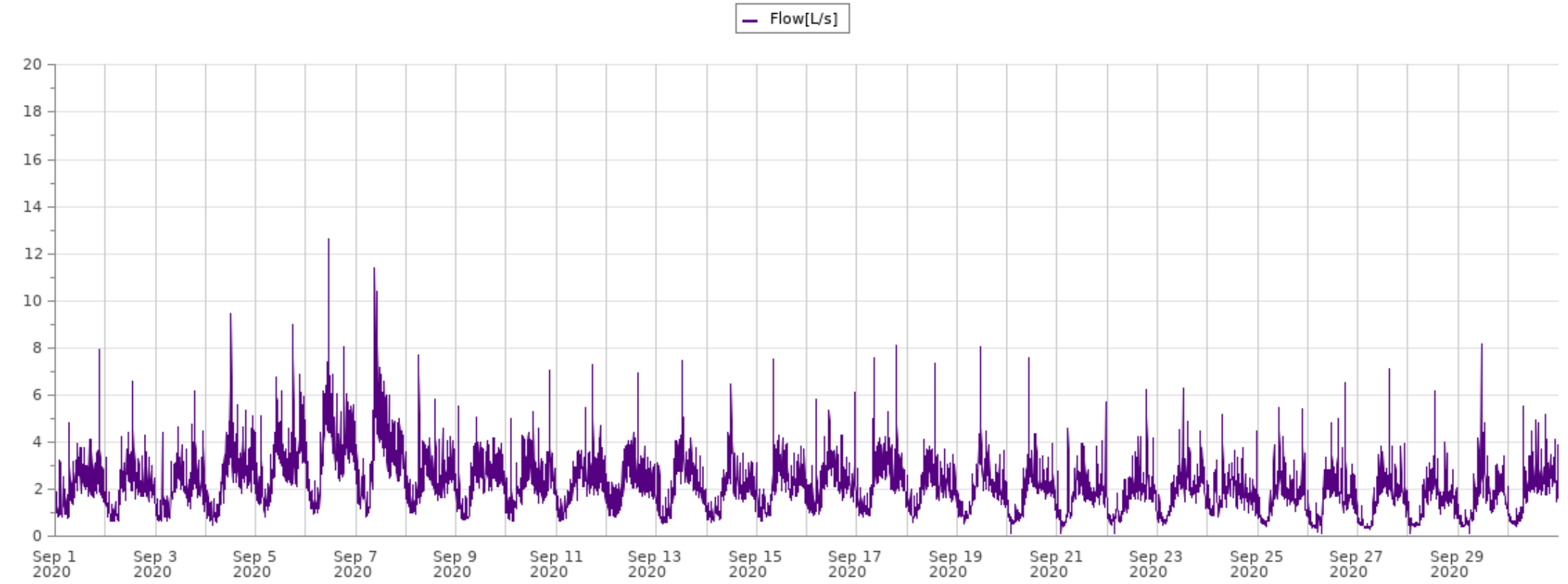




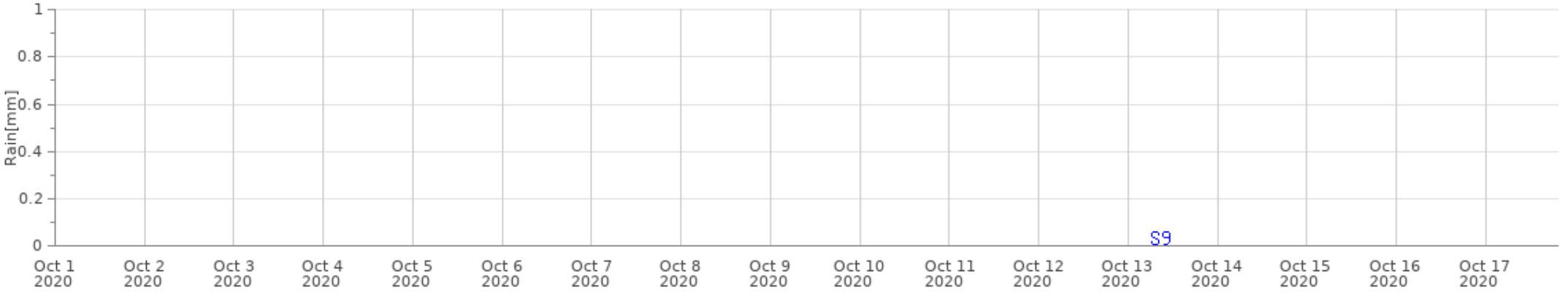


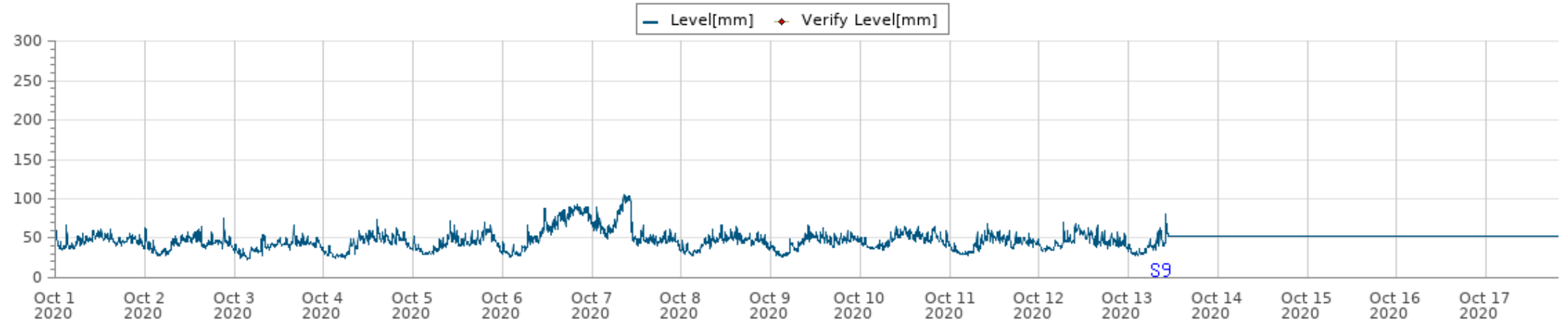
Monthly Data Report. 114-1008-002 / Site2
September, 2020

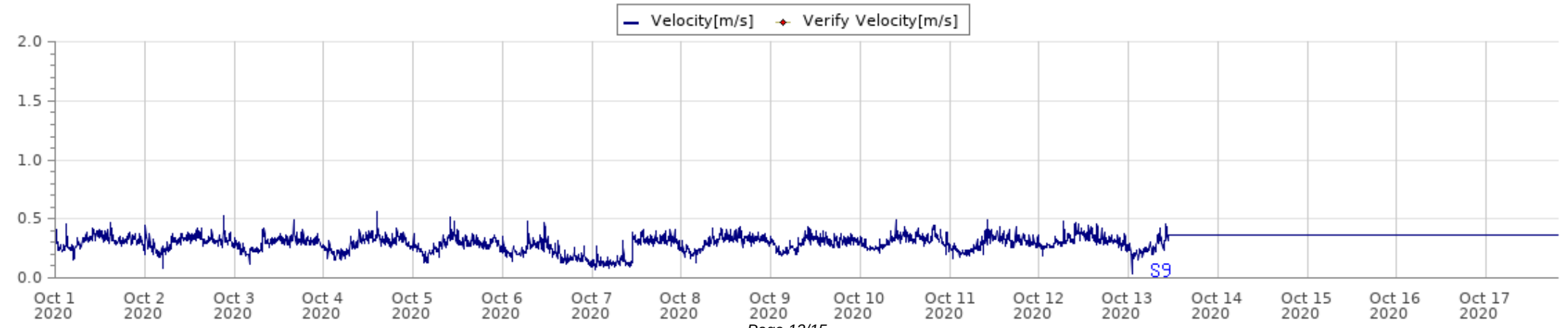




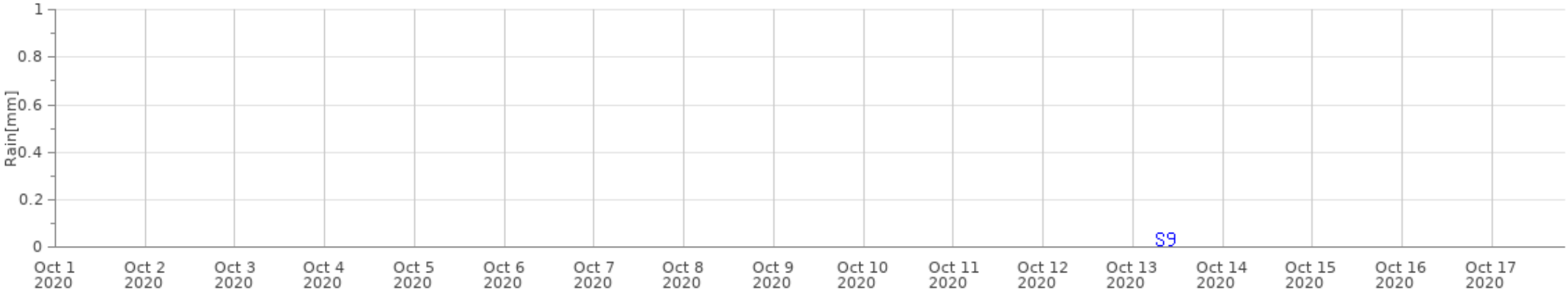
Monthly Data Report. 114-1008-002 / Site2
October, 2020

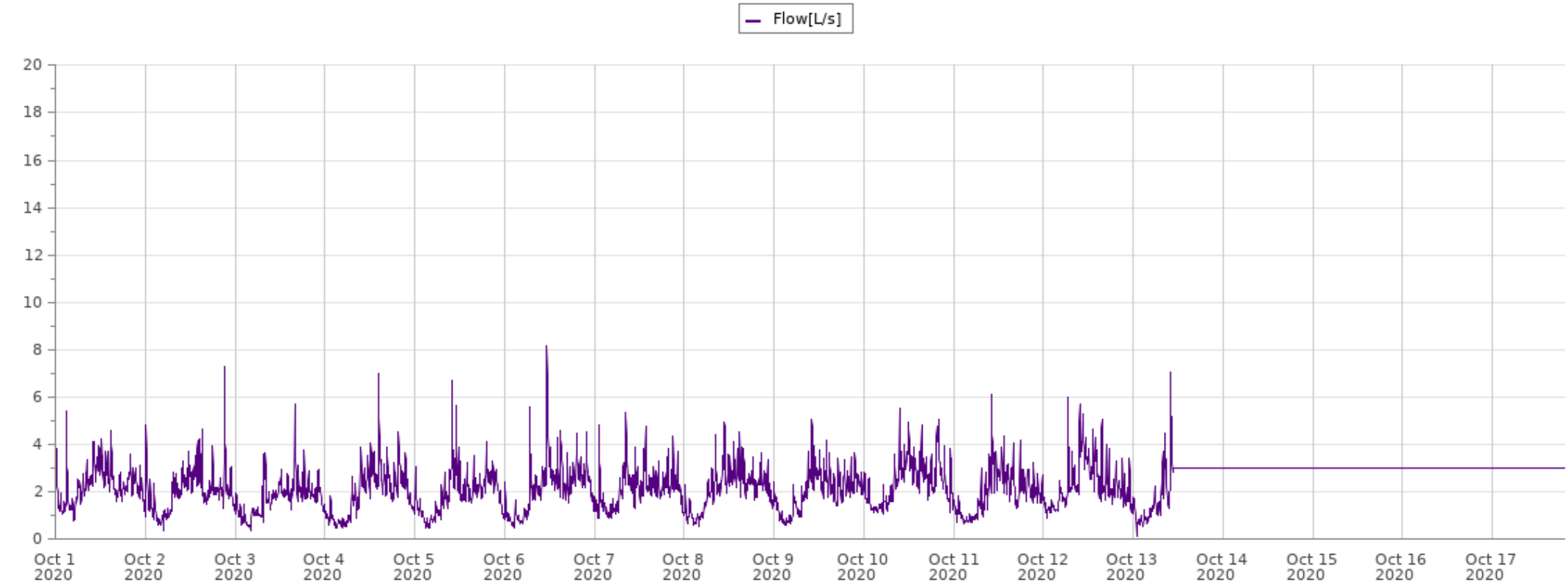






Monthly Data Report. 114-1008-002 / Site2
October, 2020





Monthly Data Report. 114-1008-002 / Site2
May, 2020 to October, 2020

Notes	
S3	**2020-05-09 20:00:00 to 2020-05-09 19:30:00 : Service Report** Install Report. Installed sensor in the upstream pipe of the target manhole.
S4	**2020-06-28 11:45:00 to 2020-06-28 11:30:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Battery is good.
S5	**2020-08-03 12:03:00 to 2020-08-03 12:03:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Checked Battery
S6	**2020-09-05 14:30:00 to 2020-09-05 14:00:00 : Service Report** Minor Report. Downloaded data
S9	**2020-10-13 09:45:00 to 2020-10-13 09:30:00 : Service Report** Remove Report. We arrived to site downloaded data and removed our equipment.

114-1008-002 - Site2

Tabular Report - May 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
May	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
9	10	49	34	0	0.38	0.28	0	2.9	1.3	20
10	17	56	33	0.23	0.5	0.3	0.4	4.5	1.4	120
11	14	59	31	0.03	0.49	0.32	0.1	4.9	1.3	109
12	18	54	31	0.03	0.47	0.28	0.1	4	1.2	106
13	13	67	35	0.05	0.5	0.24	0.1	5.1	1.2	107
14	40	122	73	0.04	0.34	0.17	0.4	6.9	2.3	195
15	28	88	49	0.09	0.57	0.29	0.5	6.6	1.7	149
16	20	57	32	0.25	0.54	0.33	0.5	4.8	1.4	117
17	18	58	31	0.12	0.48	0.32	0.4	4.6	1.3	112
18	20	59	33	0.24	0.49	0.33	0.5	4.8	1.4	122
19	18	52	32	0.21	0.5	0.32	0.4	4	1.3	116
20	19	68	32	0.24	0.55	0.33	0.5	6.6	1.4	121
21	19	75	35	0.22	0.58	0.35	0.4	8	1.7	150
22	18	55	33	0.23	0.5	0.33	0.4	4.4	1.5	124
23	18	59	35	0.18	0.48	0.31	0.3	4.7	1.5	129
24	21	60	35	0.21	0.52	0.31	0.5	4.9	1.5	132
25	24	61	35	0.22	0.51	0.33	0.6	5.3	1.6	134
26	22	65	34	0.26	0.54	0.35	0.6	6.1	1.6	140
27	21	65	33	0.24	0.54	0.33	0.5	6.1	1.5	125
28	21	59	30	0.26	0.54	0.32	0.6	5.3	1.2	106
29	20	60	32	0.26	0.54	0.33	0.5	5.3	1.4	120
30	18	55	30	0.22	0.48	0.32	0.4	4	1.2	103
31	18	62	34	0.22	0.52	0.35	0.4	5.4	1.6	141
Minimum	10	49	30	0	0.34	0.17	0	2.9	1.2	Total
Maximum	40	122	73	0.26	0.58	0.35	0.6	8	2.3	2,800
Average	20	64	35	0.18	0.5	0.31	0.4	5.2	1.5	

Shaded areas are weekends

114-1008-002 - Site2

Tabular Report - June 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
June	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	23	67	34	0.26	0.52	0.35	0.7	6.1	1.6	138
2	28	64	36	0.31	0.53	0.38	1	5.7	1.9	161
3	29	61	36	0.31	0.5	0.38	1.1	5.1	1.9	162
4	26	62	36	0.29	0.52	0.38	0.9	5.5	1.9	163
5	29	67	40	0.32	0.56	0.39	1.1	6.6	2.2	191
6	33	58	42	0.34	0.52	0.4	1.5	4.8	2.5	213
7	32	65	43	0.33	0.54	0.4	1.4	6.1	2.6	219
8	33	70	45	0.32	0.57	0.4	1.4	7	2.8	236
9	34	67	46	0.32	0.54	0.4	1.4	6.3	2.8	240
10	35	74	47	0.33	0.51	0.4	1.5	6.9	2.9	245
11	33	76	46	0.3	0.56	0.4	1.3	7.8	2.7	235
12	35	70	46	0.32	0.54	0.4	1.5	6.8	2.8	237
13	34	73	46	0.31	0.6	0.4	1.4	8	2.8	243
14	40	77	46	0.36	0.56	0.43	2	6.8	3	261
15	37	74	45	0.35	0.58	0.42	1.8	7.9	2.8	238
16	38	74	45	0.35	0.55	0.41	1.9	7.5	2.7	233
17	36	76	45	0.34	0.56	0.4	1.6	7.8	2.7	228
18	36	74	45	0.3	0.57	0.39	1.5	7.5	2.6	226
19	36	75	45	0.33	0.59	0.4	1.6	8.2	2.7	233
20	38	74	46	0.34	0.59	0.4	1.8	8	2.8	236
21	38	75	46	0.34	0.57	0.4	1.8	7.8	2.7	236
22	37	72	44	0.35	0.52	0.41	1.7	6.8	2.7	229
23	39	78	48	0.34	0.58	0.41	1.9	8.6	3.1	262
24	40	81	50	0.35	0.58	0.42	2	9	3.3	281
25	40	74	50	0.35	0.55	0.42	2.2	7.4	3.3	286
26	38	84	50	0.36	0.57	0.44	1.9	9.3	3.5	298
27	39	104	53	0.38	0.57	0.44	2.1	12.6	3.8	329
28	48	86	55	0.38	0.57	0.44	2.8	9.5	3.9	338
29	46	79	55	0.38	0.54	0.44	2.6	7.7	3.9	336
30	48	80	55	0.38	0.58	0.44	2.8	8.9	3.9	336
Minimum	23	58	34	0.26	0.5	0.35	0.7	4.8	1.6	Total
Maximum	48	104	55	0.38	0.6	0.44	2.8	12.6	3.9	7,271
Average	36	74	46	0.33	0.56	0.41	1.7	7.5	2.8	

Shaded areas are weekends

114-1008-002 - Site2

Tabular Report - July 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
July	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	50	81	57	0.4	0.55	0.45	3.2	8.5	4.2	364
2	48	77	55	0.39	0.56	0.45	3	8.1	4	344
3	42	81	54	0.37	0.58	0.45	2.4	8.9	4	342
4	42	92	53	0.37	0.62	0.44	2.3	11.5	3.8	323
5	37	77	49	0.33	0.56	0.43	1.8	8	3.3	283
6	42	120	67	0.23	0.53	0.37	2.2	10.3	4.3	368
7	42	77	56	0.27	0.54	0.4	2.2	6.4	3.6	313
8	41	83	51	0.35	0.56	0.41	2	8.9	3.4	288
9	39	70	50	0.33	0.56	0.41	1.8	7	3.2	277
10	37	72	48	0.33	0.56	0.41	1.7	7.2	3.1	264
11	36	68	48	0.32	0.53	0.41	1.6	6.1	3.1	265
12	38	90	54	0.33	0.57	0.39	1.7	9.4	3.5	301
13	43	81	55	0.27	0.56	0.38	1.8	8.3	3.5	297
14	37	75	52	0.31	0.53	0.38	1.6	7.4	3.2	274
15	38	73	47	0.31	0.53	0.39	1.6	7.1	2.8	243
16	35	76	49	0.32	0.52	0.41	1.5	7.4	3.1	266
17	36	66	49	0.32	0.51	0.41	1.6	5.9	3.2	272
18	36	63	48	0.34	0.54	0.41	1.6	5.7	3	255
19	33	80	46	0.31	0.58	0.4	1.3	8.3	2.8	244
20	32	69	46	0.31	0.52	0.4	1.3	6.2	2.8	241
21	33	80	47	0.3	0.53	0.39	1.3	7.9	2.9	247
22	34	81	49	0.31	0.58	0.4	1.4	8.3	3	258
23	33	72	48	0.3	0.51	0.39	1.3	6.4	2.9	249
24	34	74	47	0.3	0.54	0.4	1.3	7.1	3	256
25	31	74	47	0.29	0.61	0.4	1.1	7.7	2.9	245
26	31	80	47	0.29	0.56	0.4	1.2	8.1	2.9	250
27	30	81	47	0.28	0.54	0.39	1	8.3	2.9	252
28	35	77	48	0.29	0.54	0.38	1.3	7.7	2.9	245
29	34	74	48	0.27	0.54	0.38	1.2	7.2	2.9	250
30	31	78	47	0.28	0.57	0.38	1.1	8.3	2.8	243
31	30	74	47	0.26	0.52	0.36	0.9	7.1	2.6	224
Minimum	30	63	46	0.23	0.51	0.36	0.9	5.7	2.6	Total
Maximum	50	120	67	0.4	0.62	0.45	3.2	11.5	4.3	8,544
Average	37	78	50	0.31	0.55	0.4	1.7	7.8	3.2	

Shaded areas are weekends

114-1008-002 - Site2

Tabular Report - August 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
August	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	34	81	50	0.29	0.56	0.4	1.3	8.6	3.2	273
2	34	81	51	0.26	0.59	0.41	1.2	9	3.4	290
3	32	130	51	0.04	0.56	0.4	1	16.6	3.4	289
4	32	79	48	0.27	0.56	0.38	1.1	8.4	2.9	246
5	35	63	48	0.28	0.49	0.38	1.3	5.3	2.8	242
6	34	77	48	0.21	0.57	0.39	0.9	8	3	260
7	38	78	49	0.31	0.58	0.4	1.7	8.1	3.1	264
8	32	71	47	0.27	0.54	0.38	1.1	6.9	2.8	241
9	30	81	47	0.26	0.55	0.37	0.9	8.4	2.8	237
10	31	79	46	0.25	0.55	0.36	1	8.2	2.6	222
11	30	68	45	0.26	0.57	0.37	1	6.7	2.5	219
12	29	66	43	0.25	0.5	0.35	0.9	5.8	2.3	199
13	25	70	42	0.19	0.54	0.34	0.6	6.7	2.2	190
14	26	93	43	0.23	0.52	0.36	0.7	9.7	2.3	198
15	23	77	44	0.22	0.55	0.35	0.6	7.8	2.4	210
16	25	73	45	0.23	0.57	0.35	0.6	7.6	2.5	211
17	23	68	42	0.21	0.53	0.34	0.5	5.9	2.2	185
18	23	81	41	0.2	0.6	0.33	0.5	9.2	2.1	181
19	22	69	41	0.21	0.52	0.34	0.5	6.4	2.1	182
20	24	69	42	0.22	0.54	0.34	0.6	6.6	2.2	186
21	22	71	42	0.21	0.55	0.34	0.5	7	2.3	194
22	26	72	45	0.23	0.57	0.37	0.7	7.4	2.6	221
23	24	70	45	0.22	0.51	0.35	0.6	6.4	2.5	214
24	24	69	43	0.21	0.49	0.33	0.6	6	2.2	193
25	25	78	42	0.2	0.54	0.33	0.6	7.9	2.1	184
26	22	67	42	0.04	0.52	0.33	0.2	6.1	2.1	183
27	24	78	44	0.22	0.53	0.34	0.6	7.6	2.3	201
28	28	68	45	0.22	0.52	0.35	0.7	6.1	2.4	204
29	22	71	45	0.21	0.52	0.35	0.5	6.7	2.4	209
30	23	79	43	0.22	0.62	0.34	0.5	9.3	2.3	196
31	25	68	41	0.22	0.51	0.33	0.6	6.1	2.1	176
Minimum	22	63	41	0.04	0.49	0.33	0.2	5.3	2.1	Total
Maximum	38	130	51	0.31	0.62	0.41	1.7	16.6	3.4	6,701
Average	27	76	45	0.22	0.54	0.36	0.8	7.6	2.5	

Shaded areas are weekends

114-1008-002 - Site2

Tabular Report - September 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
September	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	27	75	42	0.24	0.57	0.34	0.8	8	2.1	184
2	24	68	42	0.22	0.54	0.33	0.6	6.6	2.1	178
3	25	66	41	0.21	0.54	0.33	0.6	6.2	2	174
4	22	88	47	0.2	0.55	0.34	0.5	9.4	2.6	222
5	31	87	52	0.21	0.55	0.36	0.8	9	3.1	263
6	30	132	60	0.23	0.48	0.35	0.9	12.6	3.6	311
7	28	125	62	0.19	0.44	0.32	0.8	11.4	3.5	296
8	31	87	47	0.23	0.55	0.34	0.9	7.7	2.5	213
9	27	64	45	0.21	0.5	0.33	0.7	5.5	2.3	201
10	26	71	45	0.21	0.55	0.34	0.6	7.1	2.3	200
11	26	73	43	0.19	0.55	0.34	0.6	7.3	2.2	191
12	28	71	43	0.23	0.54	0.34	0.8	6.9	2.3	194
13	23	77	42	0.21	0.53	0.34	0.5	7.4	2.2	188
14	24	70	40	0.21	0.51	0.32	0.6	6.5	2	167
15	26	73	43	0.22	0.56	0.33	0.7	7.5	2.2	188
16	30	75	45	0.21	0.5	0.34	0.9	6.1	2.3	199
17	29	79	44	0.22	0.57	0.35	0.8	8.1	2.4	206
18	27	76	42	0.16	0.52	0.34	0.6	7.3	2.1	182
19	26	76	41	0.17	0.57	0.33	0.5	8	2	174
20	22	73	39	0.04	0.56	0.32	0.1	7.5	1.9	159
21	21	65	39	0.05	0.51	0.31	0.1	5.7	1.8	156
22	23	68	38	0.04	0.52	0.31	0.1	6.2	1.7	149
23	22	69	42	0.19	0.52	0.3	0.5	6.3	1.9	165
24	30	62	42	0.17	0.49	0.3	0.8	5.1	1.9	160
25	21	65	39	0.18	0.49	0.3	0.4	5.4	1.7	148
26	19	70	38	0.03	0.52	0.29	0.1	6.5	1.6	141
27	19	70	37	0.16	0.57	0.29	0.3	7.1	1.6	139
28	20	66	36	0.04	0.53	0.3	0.1	6.1	1.5	133
29	20	79	37	0.04	0.58	0.3	0.1	8.1	1.7	144
30	20	70	42	0.17	0.5	0.31	0.4	5.5	2	173
Minimum	19	62	36	0.03	0.44	0.29	0.1	5.1	1.5	Total
Maximum	31	132	62	0.24	0.58	0.36	0.9	12.6	3.6	5,598
Average	25	76	43	0.17	0.53	0.32	0.5	7.3	2.2	

Shaded areas are weekends

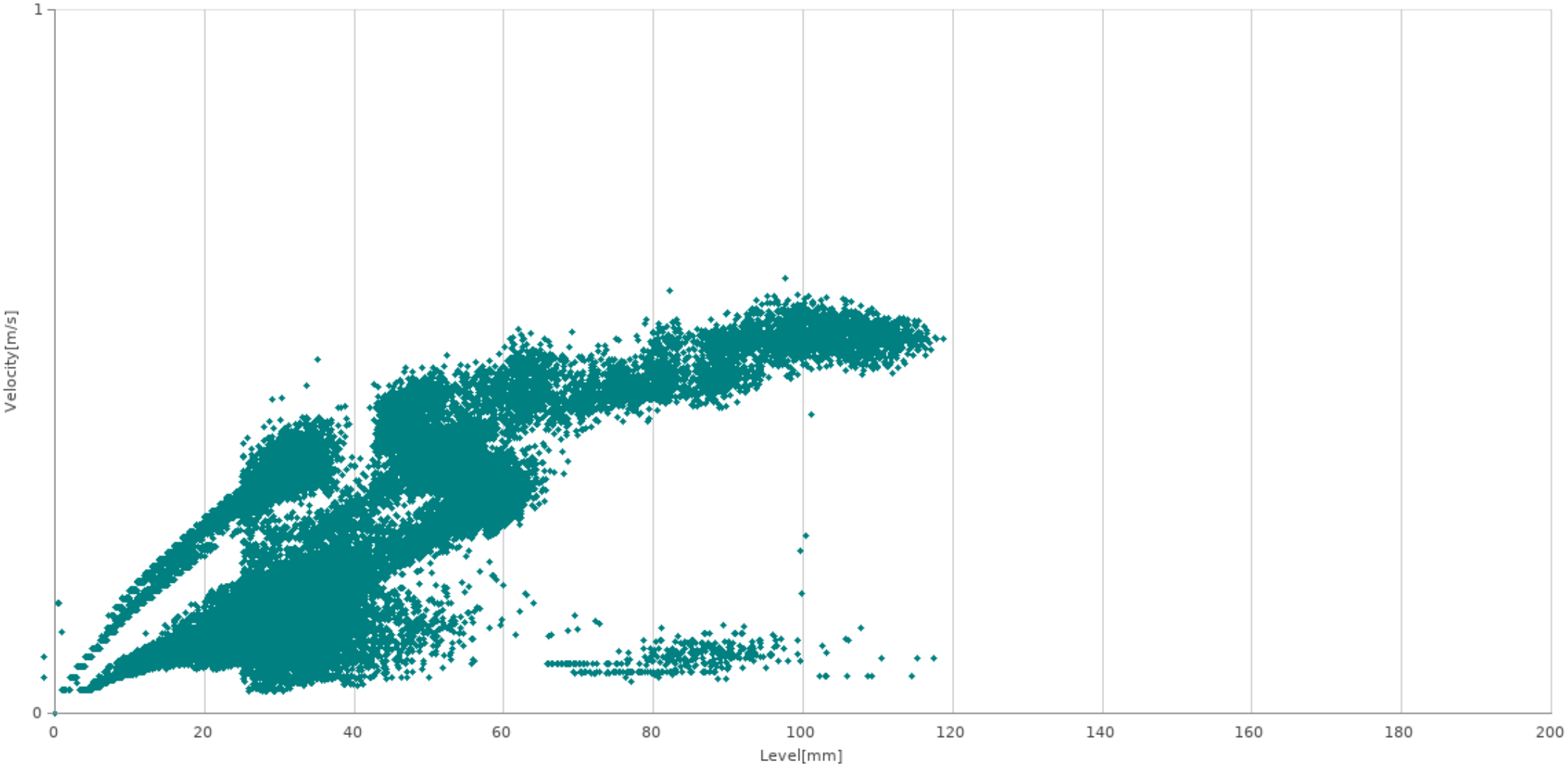
114-1008-002 - Site2

Tabular Report - October 2020

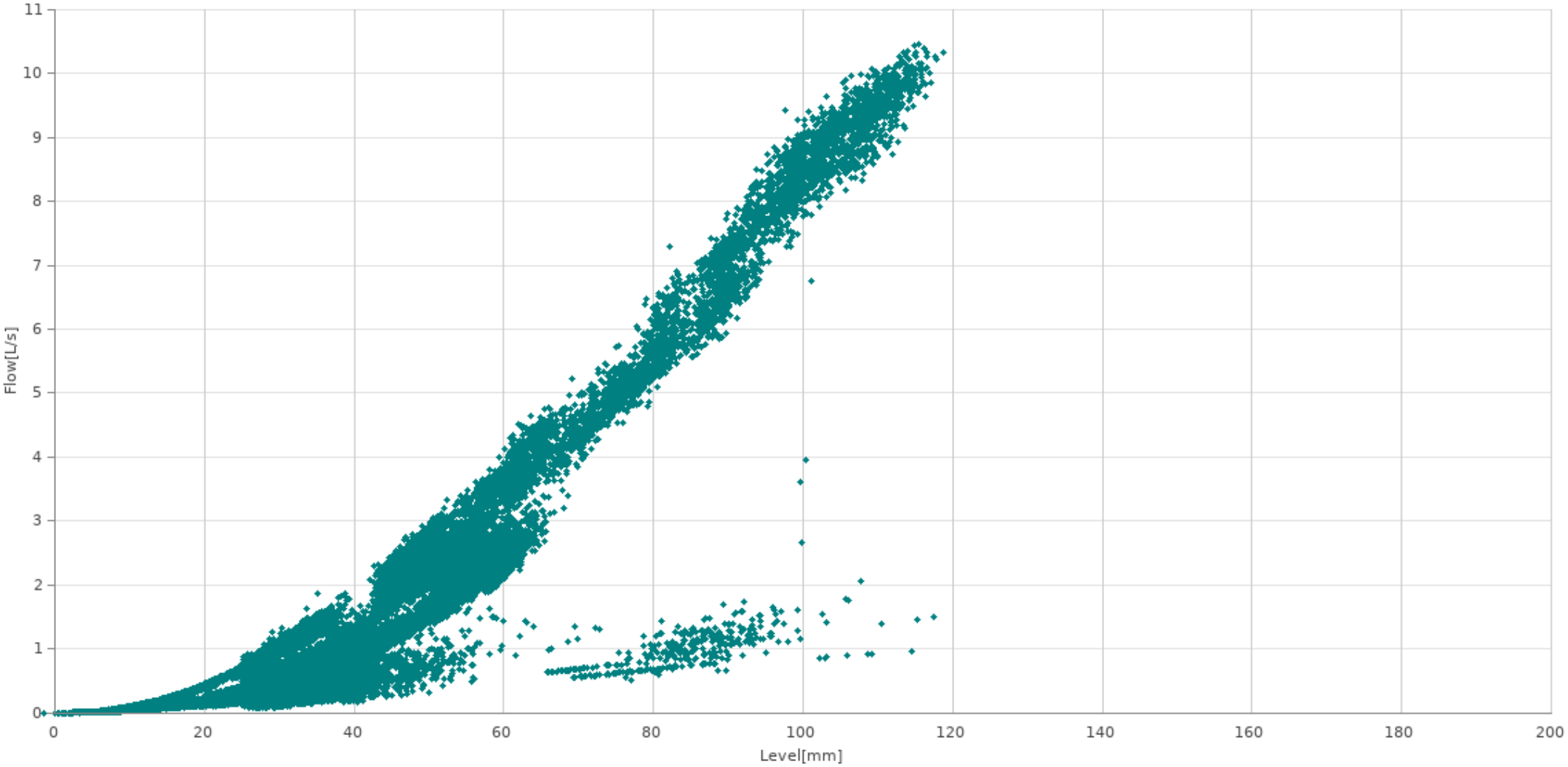
	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
October	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	36	67	47	0.15	0.46	0.32	0.7	5.4	2.3	199
2	27	75	43	0.08	0.53	0.31	0.3	7.3	2	175
3	23	66	40	0.11	0.5	0.29	0.3	5.7	1.7	148
4	25	73	43	0.15	0.57	0.29	0.4	7	2	168
5	29	72	44	0.13	0.51	0.28	0.4	6.7	1.9	167
6	27	93	60	0.1	0.47	0.22	0.4	8.1	2.2	189
7	34	106	60	0.07	0.41	0.23	0.8	5.3	2.1	182
8	28	67	45	0.13	0.44	0.31	0.5	4.9	2.1	182
9	26	66	44	0.18	0.44	0.3	0.6	5.1	2	175
10	35	65	48	0.2	0.49	0.32	1	5.5	2.4	209
11	29	69	43	0.16	0.5	0.3	0.7	6.1	2	170
12	33	70	46	0.19	0.47	0.32	0.9	6	2.3	199
13	27	81	47	0.04	0.46	0.31	0.1	7	2.4	204
14	53	53	53	0.36	0.36	0.36	3	3	3	256
15	53	53	53	0.36	0.36	0.36	3	3	3	256
16	53	53	53	0.36	0.36	0.36	3	3	3	256
17	53	53	53	0.36	0.36	0.36	3	3	3	206
Minimum	23	53	40	0.04	0.36	0.22	0.1	3	1.7	Total
Maximum	53	106	60	0.36	0.57	0.36	3	8.1	3	3,342
Average	35	69	48	0.18	0.45	0.31	1.1	5.4	2.3	

Shaded areas are weekends

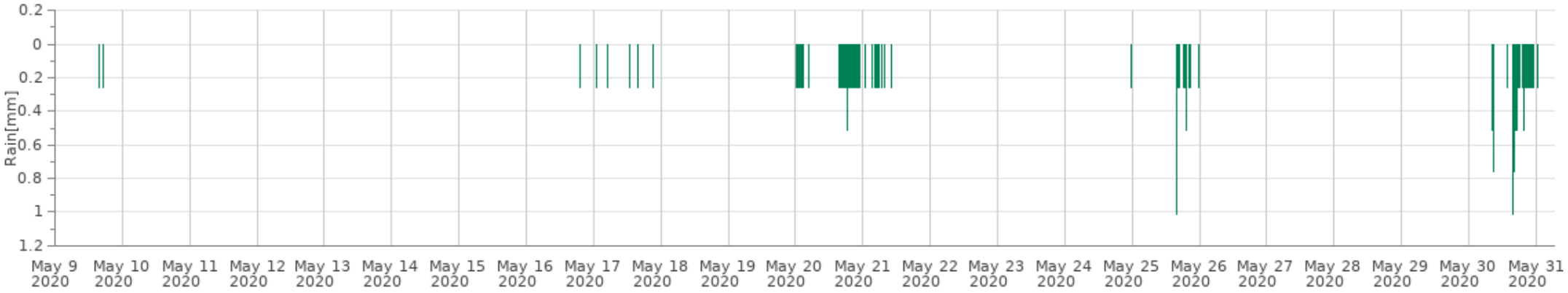
Monthly Data Report. 114-1008-003 / Site3
May, 2020 to October, 2020

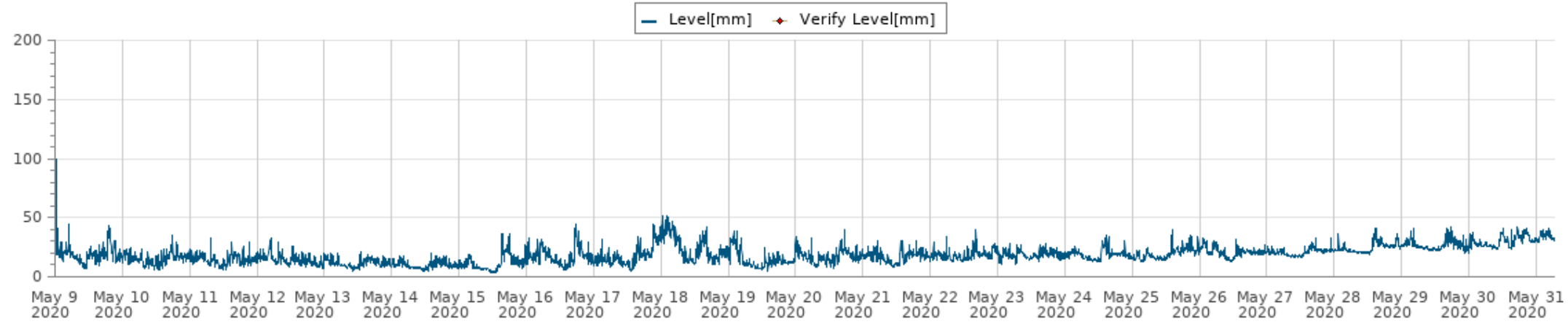


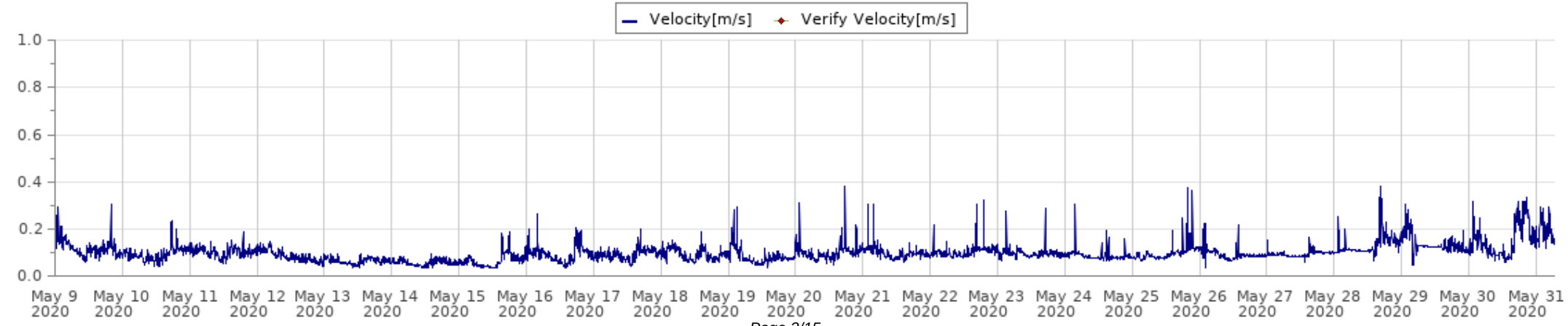
Monthly Data Report. 114-1008-003 / Site3
May, 2020 to October, 2020



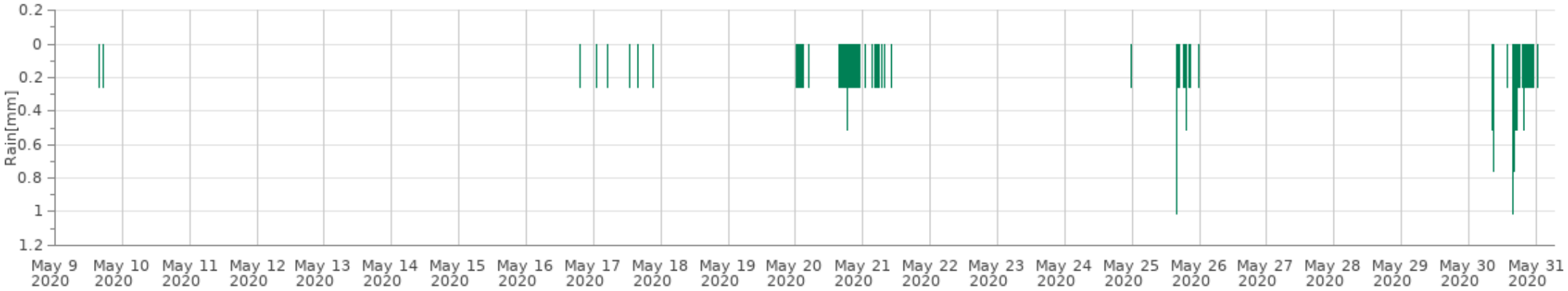
Monthly Data Report. 114-1008-003 / Site3
May, 2020

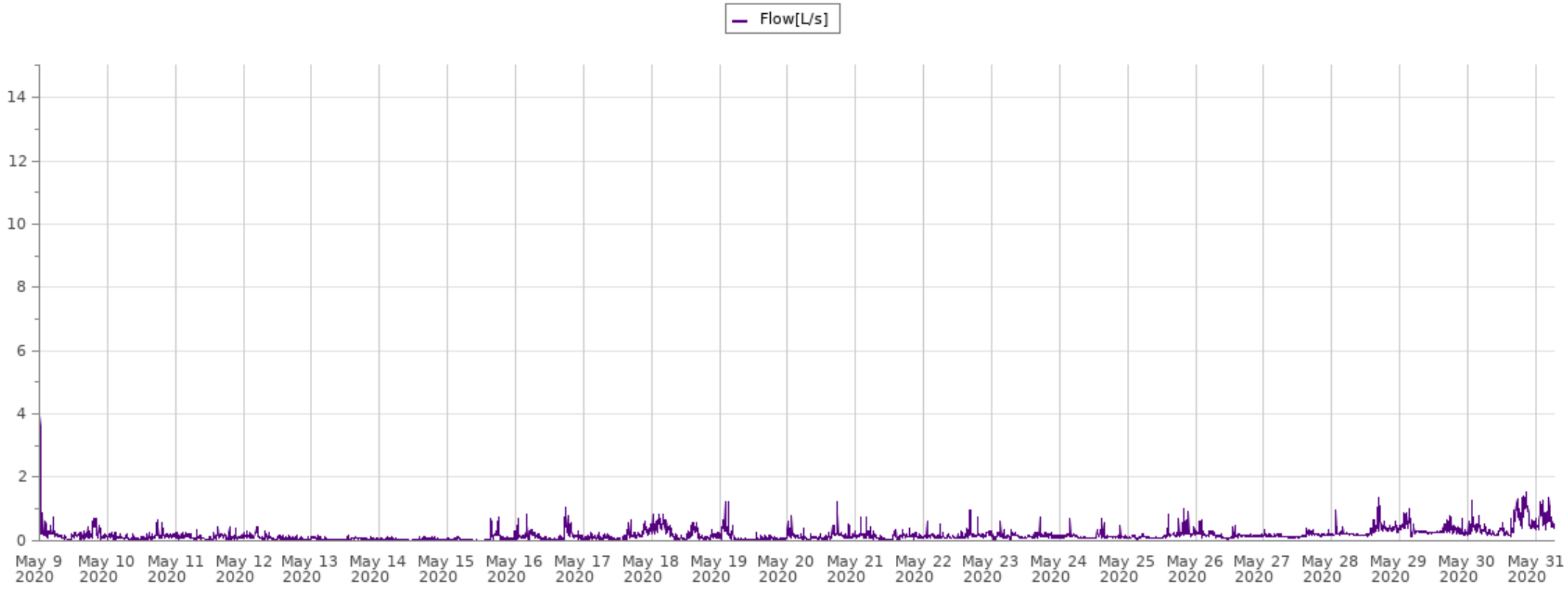




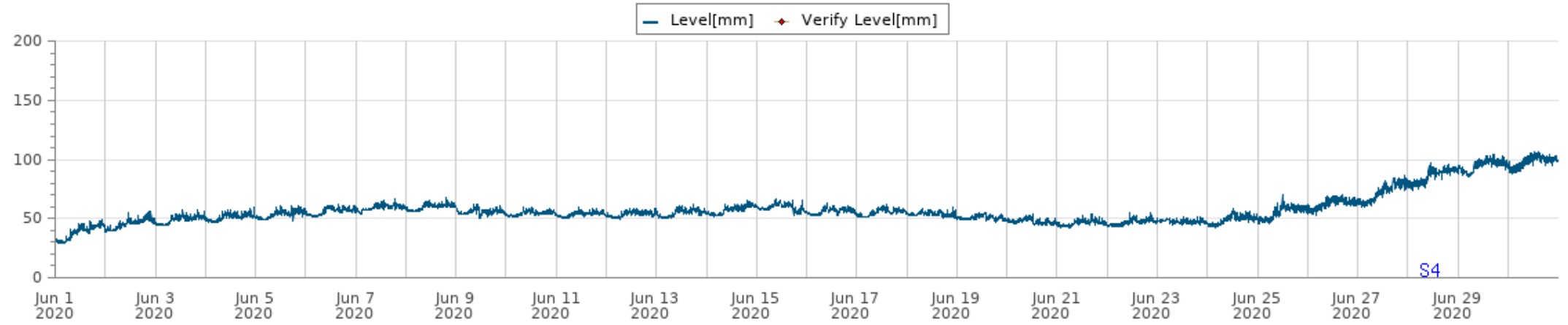


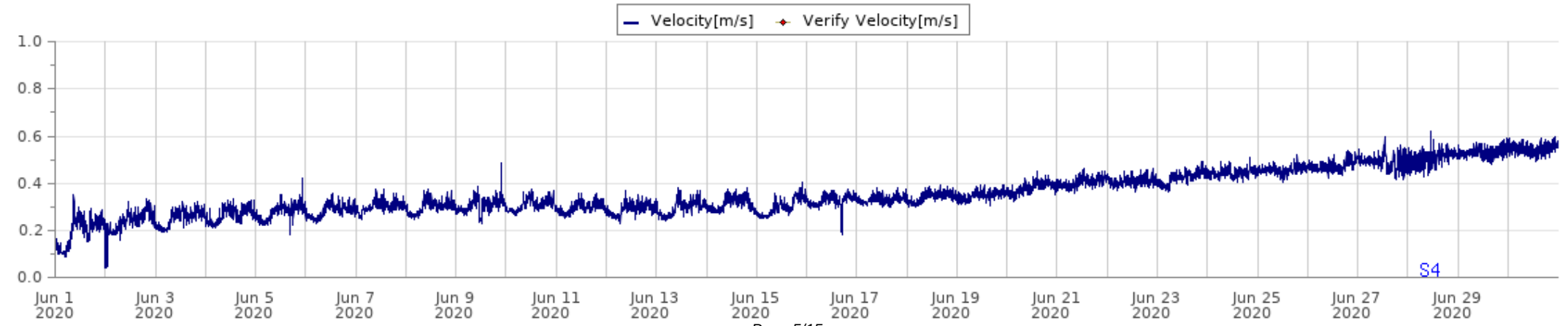
Monthly Data Report. 114-1008-003 / Site3
May, 2020



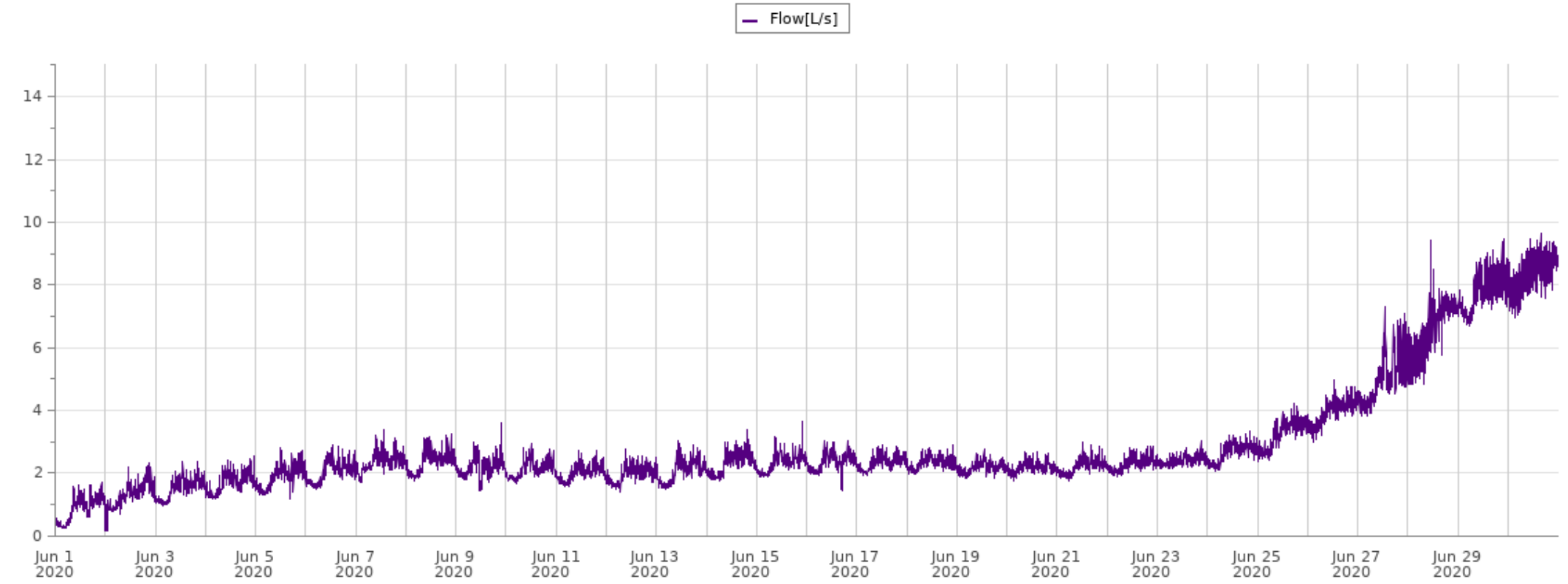


Monthly Data Report. 114-1008-003 / Site3
June, 2020

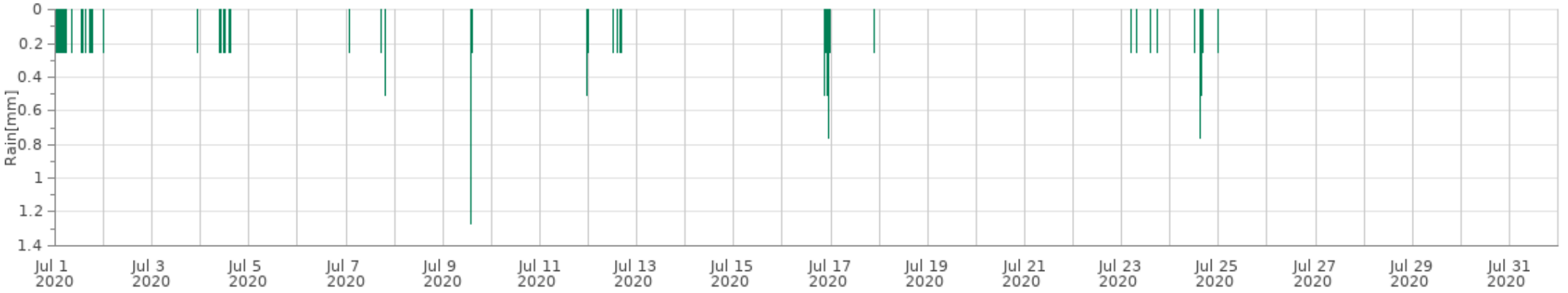


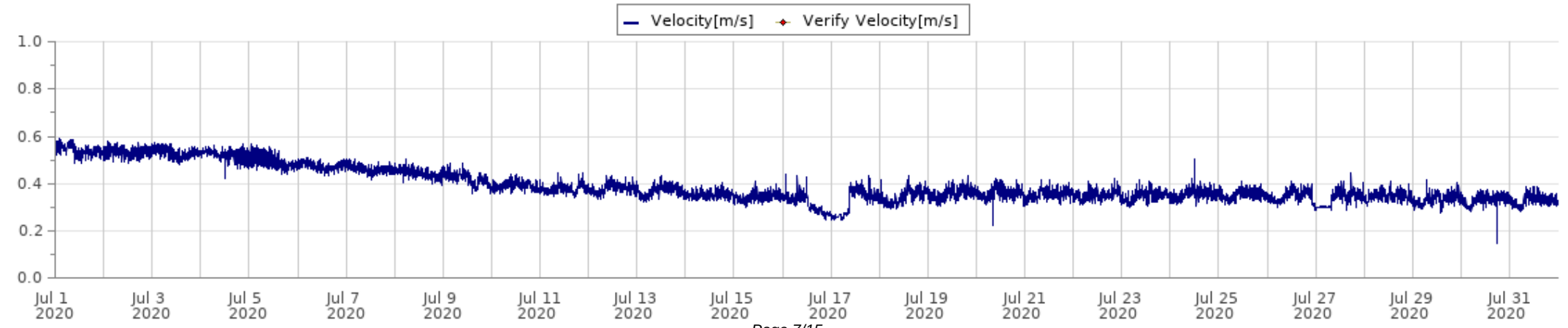


Monthly Data Report. 114-1008-003 / Site3
June, 2020

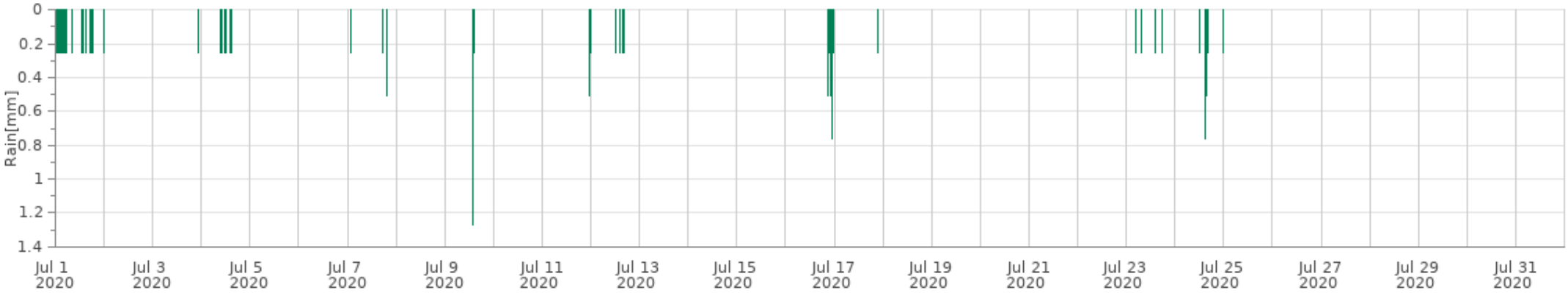


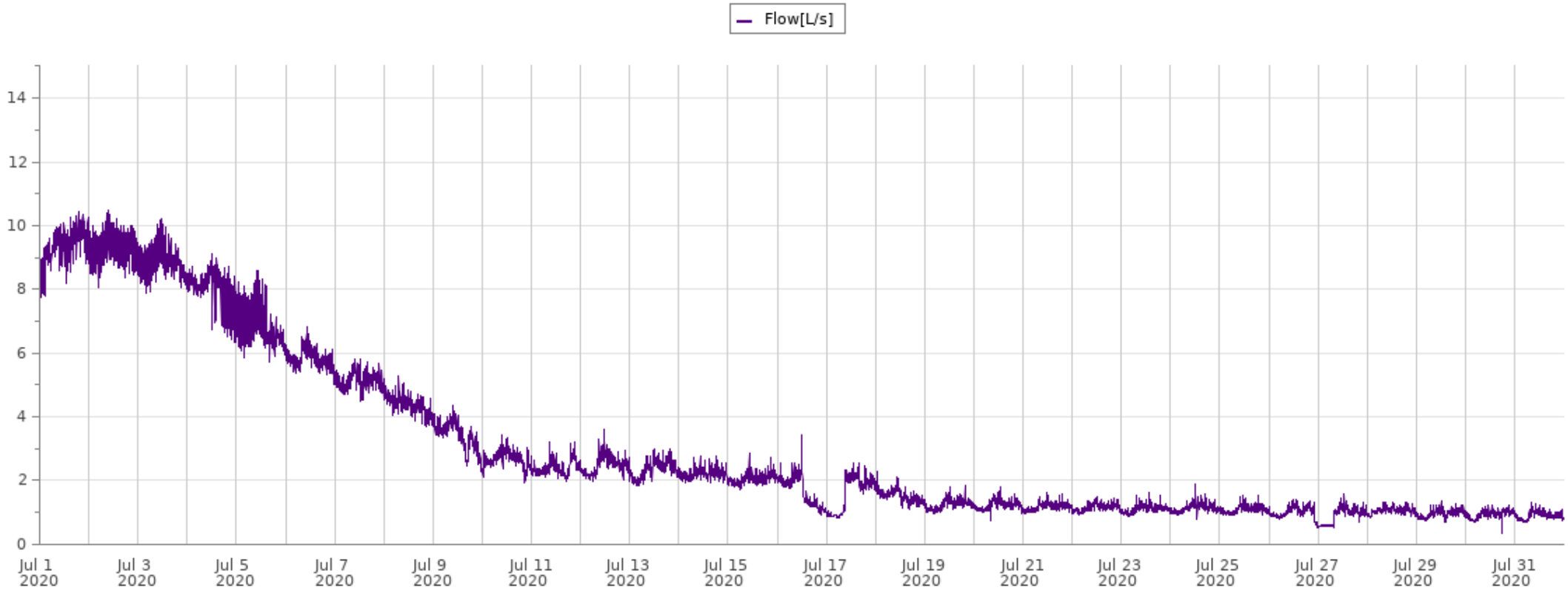
Monthly Data Report. 114-1008-003 / Site3
July, 2020



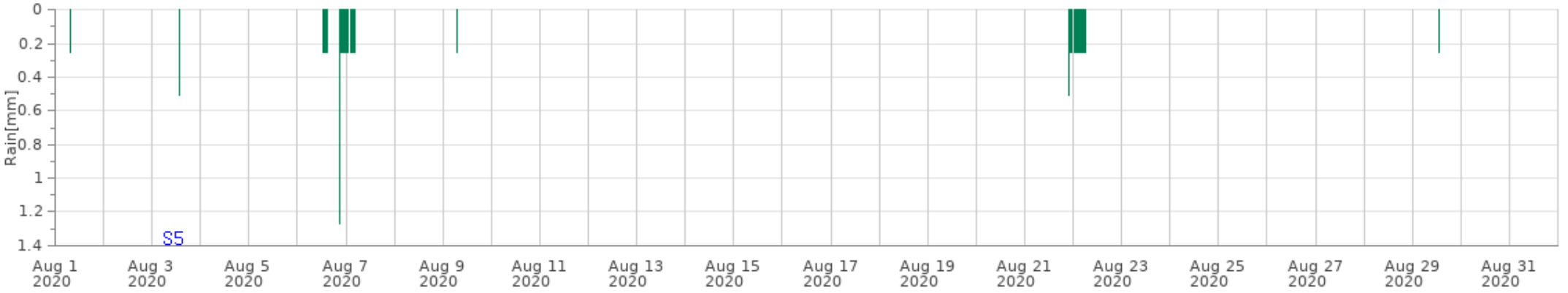


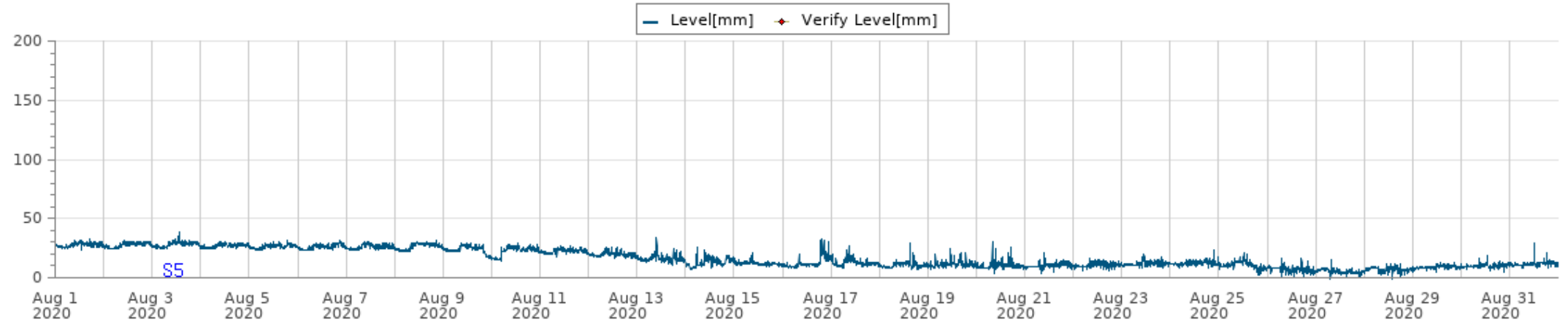
Monthly Data Report. 114-1008-003 / Site3
July, 2020

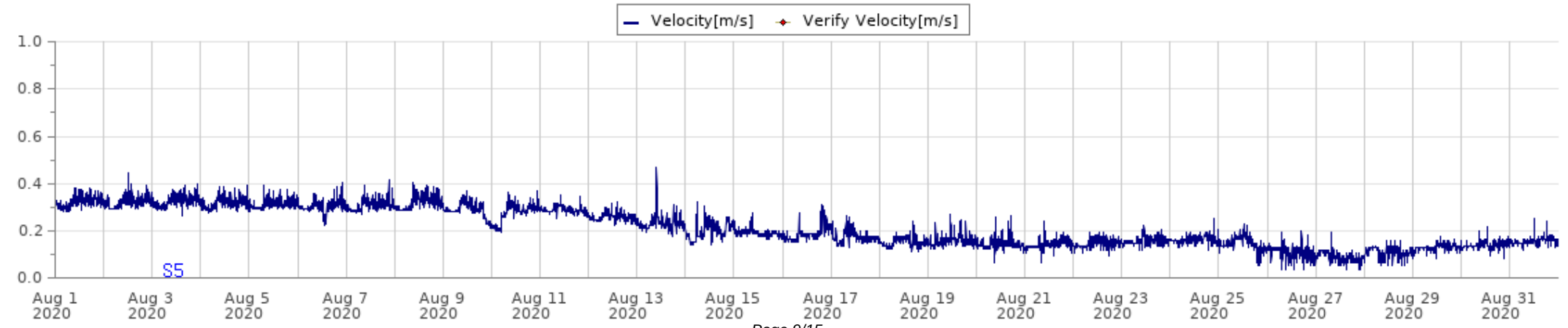




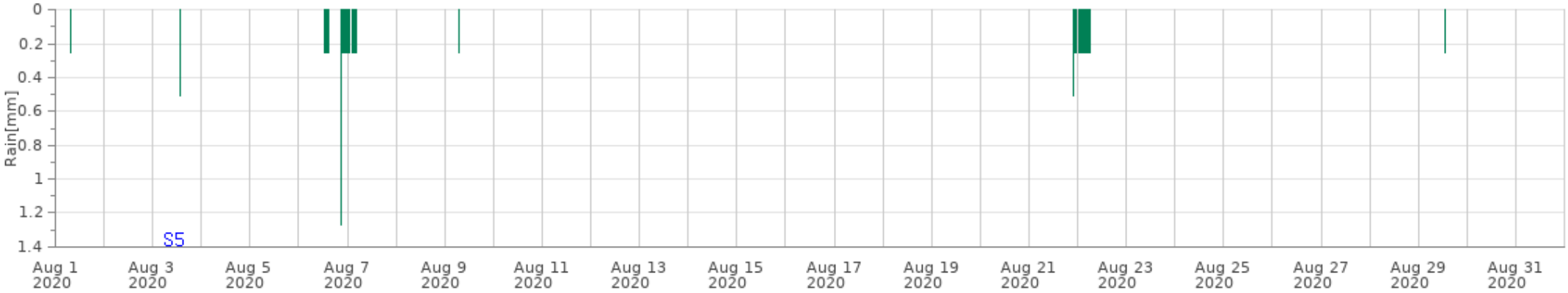
Monthly Data Report. 114-1008-003 / Site3
August, 2020

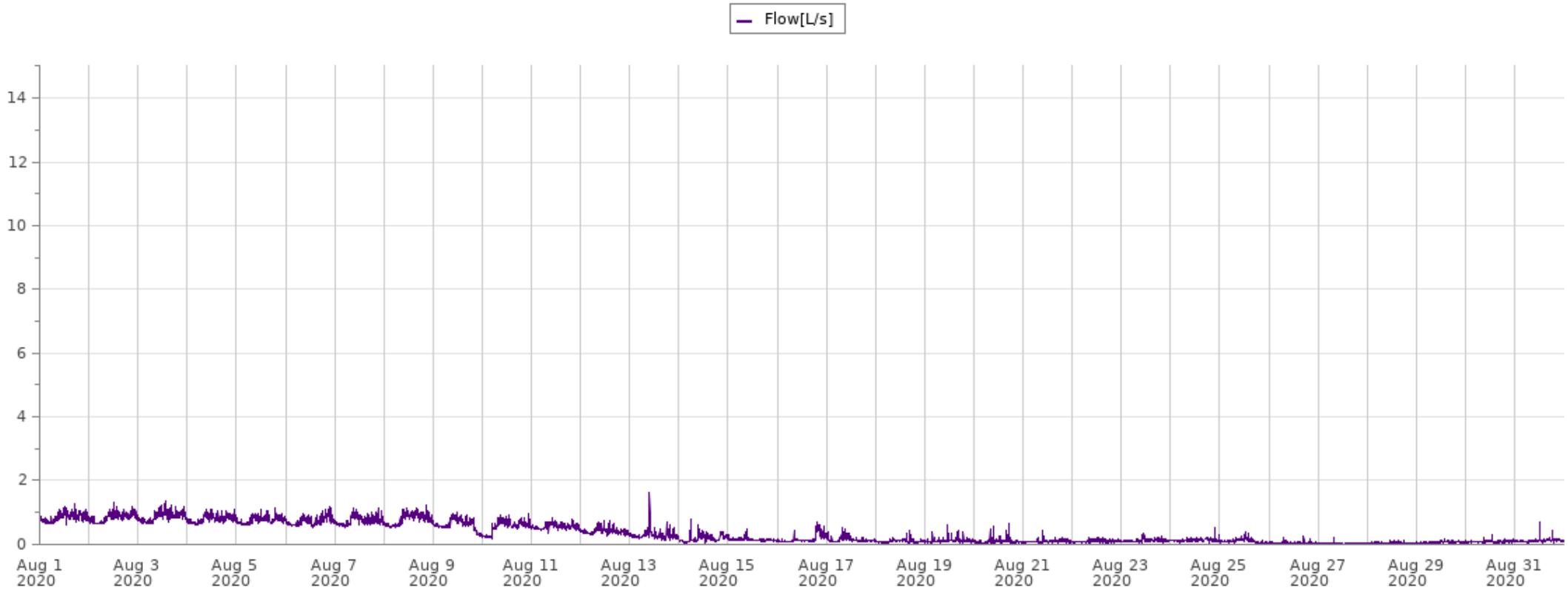




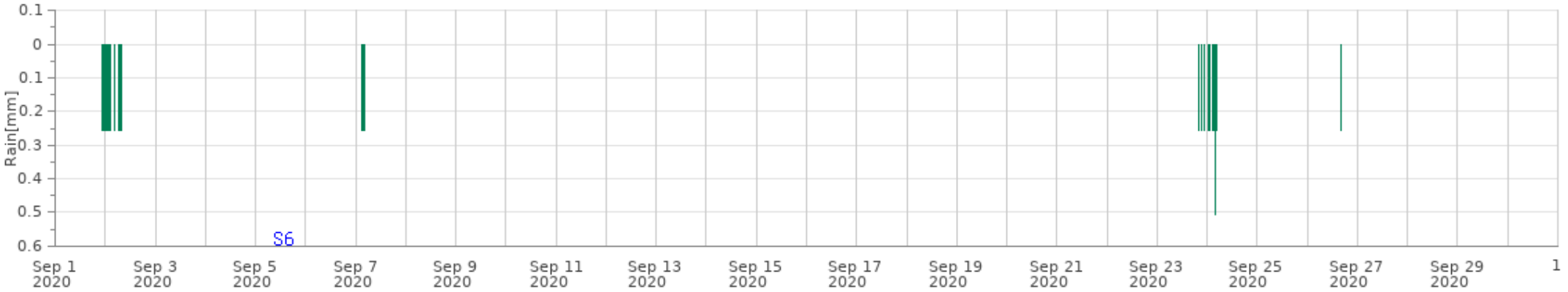


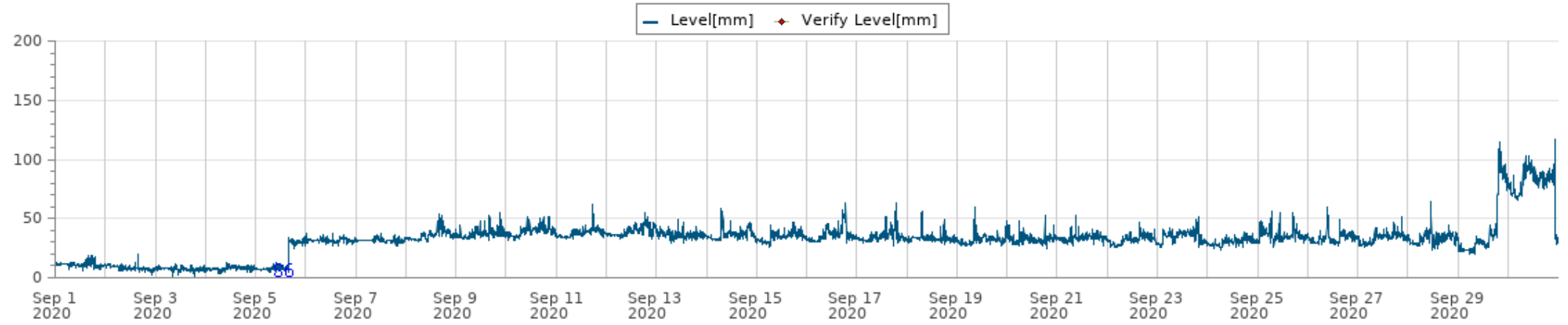
Monthly Data Report. 114-1008-003 / Site3
August, 2020

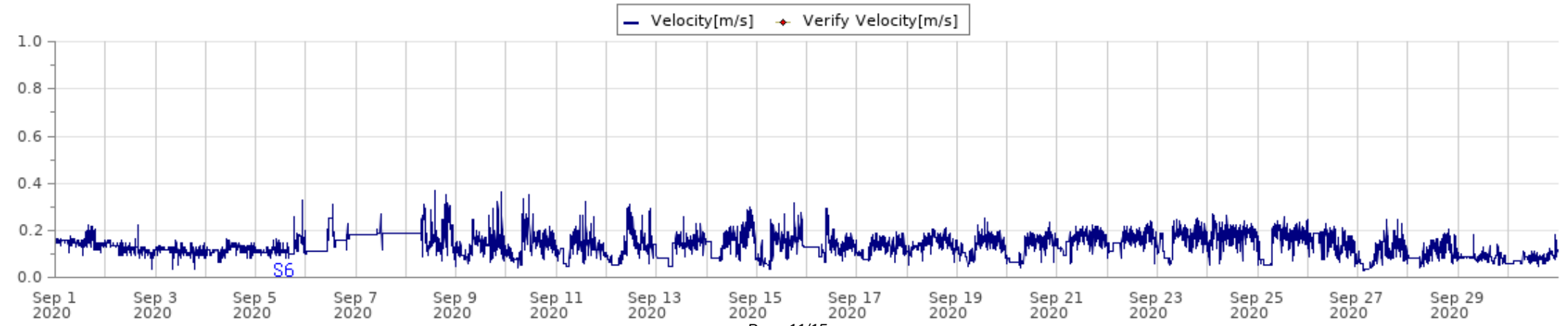




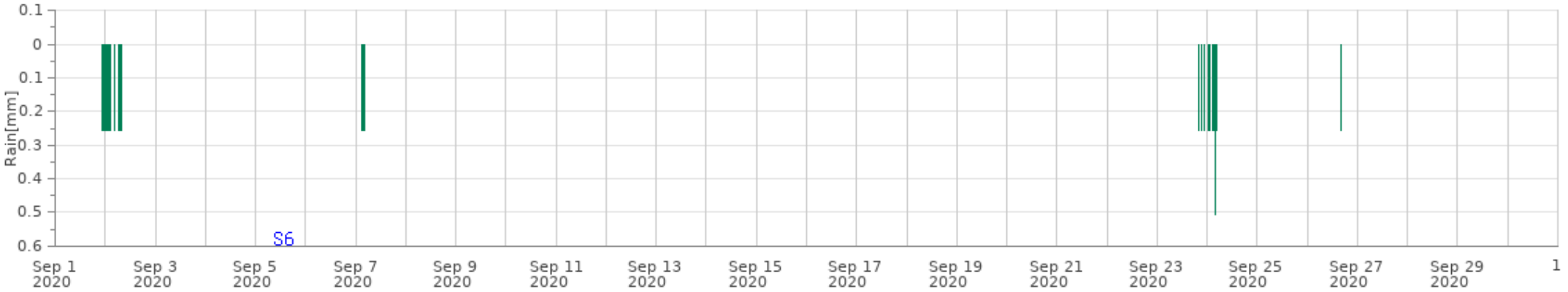
Monthly Data Report. 114-1008-003 / Site3
September, 2020

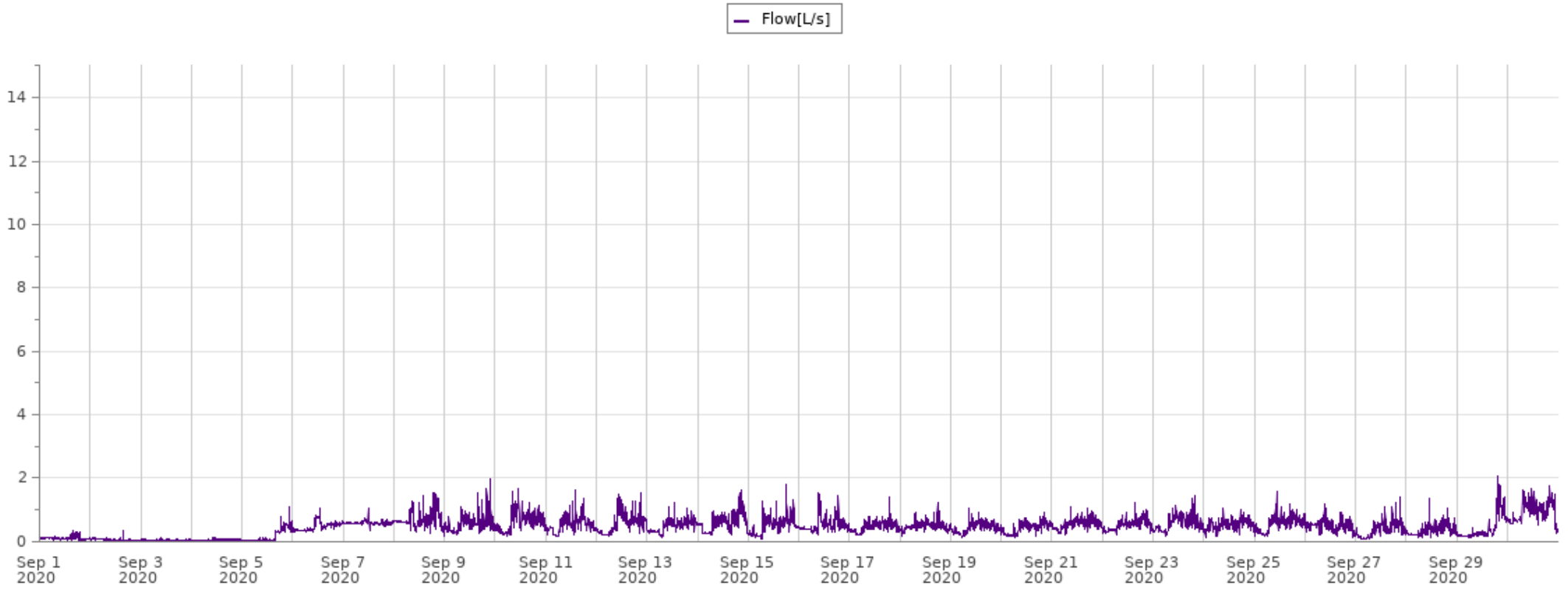




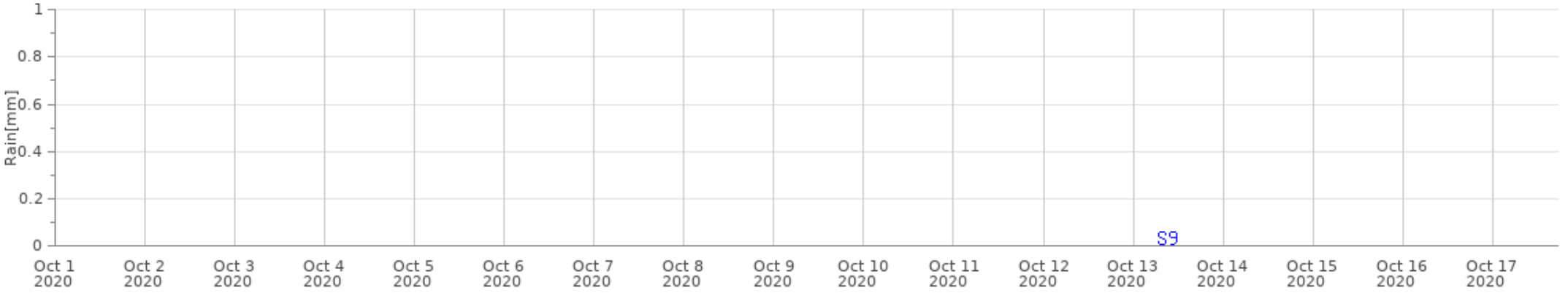


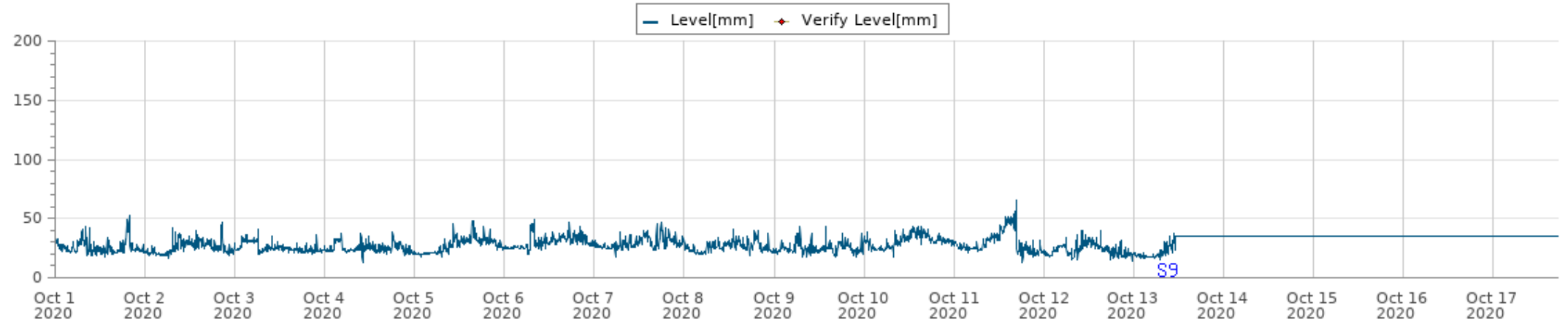
Monthly Data Report. 114-1008-003 / Site3
September, 2020

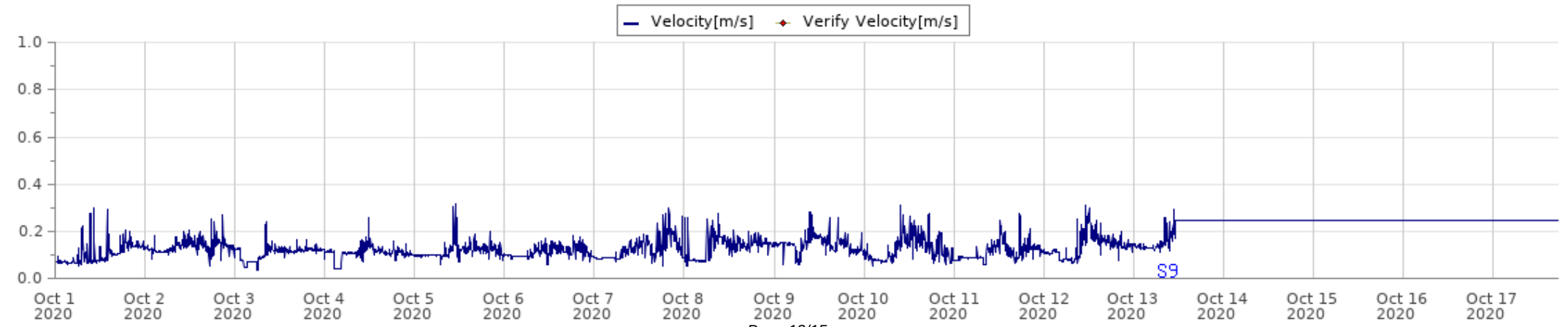




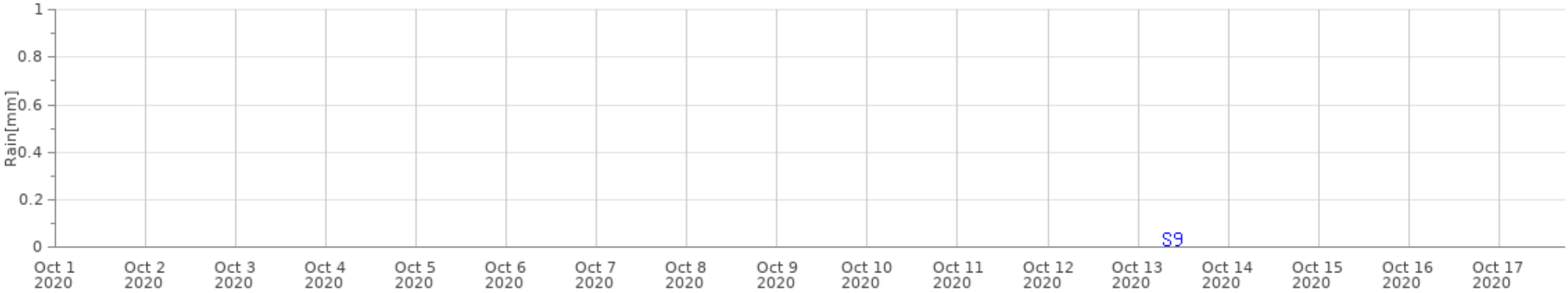
Monthly Data Report. 114-1008-003 / Site3
October, 2020

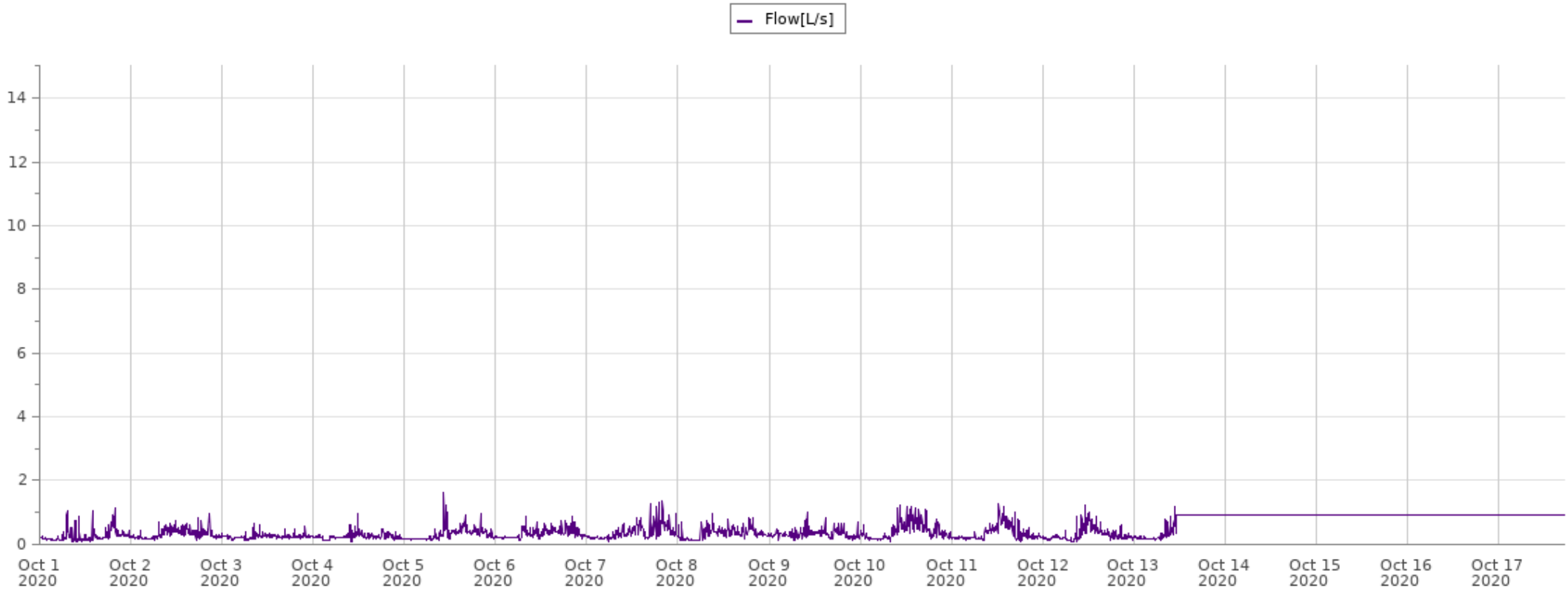






Monthly Data Report. 114-1008-003 / Site3
October, 2020





Monthly Data Report. 114-1008-003 / Site3
May, 2020 to October, 2020

Notes	
S3	**2020-05-09 18:00:00 to 2020-05-09 17:00:00 : Service Report** Install Report. Installed sensor in the 200mm pipe from 10th street (see drawing) of the target manhole. Site has low flow but markings on the pipe suggest the flow will increase.
S4	**2020-06-28 12:30:00 to 2020-06-28 12:00:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Battery is good. THe data looks like it is drifting upwards but velocity is trending up as well. The level looks correct.
S5	**2020-08-03 12:52:00 to 2020-08-03 12:52:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Checked Battery
S6	**2020-09-05 16:00:00 to 2020-09-05 15:30:00 : Service Report** Minor Report. Downloaded data - adjusted level to 30mm
S9	**2020-10-13 10:15:00 to 2020-10-13 10:00:00 : Service Report** Remove Report. We arrived to site, downloaded data and removed our equipment.

114-1008-003 - Site3

Tabular Report - May 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
May	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
9	-0	100	26	0	0.29	0.15	0	4	0.4	10
10	7	43	17	0.06	0.3	0.1	0	0.7	0.2	13
11	5	34	15	0.04	0.23	0.1	0	0.7	0.1	11
12	6	33	15	0.05	0.19	0.1	0	0.4	0.1	10
13	6	30	13	0.04	0.12	0.07	0	0.3	0.1	6
14	5	21	11	0.03	0.09	0.06	0	0.2	0	4
15	4	20	10	0.03	0.09	0.06	0	0.1	0	3
16	3	37	14	0.03	0.26	0.08	0	0.8	0.1	9
17	5	44	16	0.04	0.2	0.09	0	1.1	0.1	11
18	5	51	24	0.04	0.2	0.1	0	0.8	0.2	21
19	9	43	20	0.05	0.29	0.09	0	1.2	0.2	15
20	5	33	14	0.04	0.31	0.08	0	0.8	0.1	8
21	7	39	17	0.05	0.38	0.1	0	1.2	0.2	14
22	8	33	17	0.06	0.22	0.09	0	0.6	0.1	10
23	11	39	18	0.07	0.32	0.1	0	1	0.2	14
24	10	27	19	0.07	0.3	0.09	0	0.7	0.1	13
25	12	35	18	0.06	0.19	0.08	0.1	0.7	0.1	10
26	14	40	21	0.03	0.37	0.1	0.1	1	0.2	18
27	13	31	20	0.07	0.22	0.09	0.1	0.5	0.1	12
28	16	37	21	0.06	0.25	0.1	0.1	1	0.2	16
29	19	41	26	0.05	0.38	0.14	0.1	1.4	0.4	31
30	20	42	27	0.09	0.32	0.13	0.2	1.3	0.3	29
31	23	42	31	0.06	0.33	0.16	0.1	1.5	0.6	47
Minimum	-0	20	10	0	0.09	0.06	0	0.1	0	Total
Maximum	23	100	31	0.09	0.38	0.16	0.2	4	0.6	335
Average	9	39	19	0.05	0.25	0.1	0	1	0.2	

Shaded areas are weekends

114-1008-003 - Site3

Tabular Report - June 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
June	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	29	49	38	0.04	0.35	0.19	0.2	1.7	0.8	73
2	39	56	46	0.04	0.33	0.24	0.2	2.3	1.3	112
3	44	58	49	0.19	0.32	0.25	1	2.4	1.5	130
4	47	59	51	0.21	0.33	0.26	1.2	2.5	1.7	145
5	48	61	54	0.18	0.42	0.28	1.2	2.8	1.9	163
6	52	62	56	0.23	0.36	0.28	1.5	2.9	2.1	177
7	54	67	59	0.25	0.38	0.3	1.7	3.4	2.3	201
8	56	68	60	0.25	0.37	0.3	1.8	3.3	2.4	203
9	50	62	56	0.23	0.49	0.31	1.4	3.6	2.2	188
10	51	60	54	0.26	0.38	0.31	1.7	2.9	2.1	183
11	50	59	54	0.25	0.36	0.3	1.6	2.7	2	173
12	49	59	54	0.23	0.37	0.29	1.4	2.8	2	169
13	50	62	55	0.24	0.38	0.29	1.5	3	2.1	176
14	52	65	57	0.26	0.38	0.31	1.8	3.4	2.3	197
15	53	66	59	0.25	0.4	0.3	1.9	3.6	2.3	200
16	52	63	56	0.18	0.37	0.33	1.4	3	2.4	202
17	51	62	55	0.3	0.38	0.33	1.9	2.9	2.3	200
18	50	59	54	0.3	0.39	0.34	2	2.9	2.3	199
19	47	55	51	0.3	0.39	0.35	1.8	2.8	2.2	187
20	44	54	48	0.32	0.45	0.38	1.8	2.7	2.2	187
21	42	54	46	0.36	0.46	0.4	1.7	3	2.2	191
22	43	55	47	0.36	0.47	0.41	1.9	2.9	2.3	197
23	44	51	47	0.36	0.49	0.42	2.1	3	2.4	207
24	42	59	49	0.41	0.51	0.45	2.1	3.3	2.7	229
25	45	70	55	0.4	0.52	0.46	2.4	4.2	3.2	279
26	52	70	62	0.42	0.54	0.47	3	5	4	339
27	59	86	72	0.41	0.6	0.49	3.8	7.3	5	428
28	74	98	86	0.43	0.62	0.51	4.8	9.4	6.6	566
29	85	104	95	0.48	0.59	0.53	6.7	9.5	7.8	669
30	88	106	98	0.49	0.6	0.55	7	9.6	8.4	722
Minimum	29	49	38	0.04	0.32	0.19	0.2	1.7	0.8	Total
Maximum	88	106	98	0.49	0.62	0.55	7	9.6	8.4	7,293
Average	51	65	57	0.29	0.43	0.35	2.1	3.8	2.8	

Shaded areas are weekends

114-1008-003 - Site3

Tabular Report - July 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
July	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	94	118	108	0.49	0.59	0.54	7.7	10.4	9.4	807
2	102	119	109	0.48	0.58	0.54	8.1	10.5	9.4	808
3	98	118	105	0.48	0.57	0.53	7.9	10.2	8.9	764
4	89	109	98	0.42	0.57	0.52	6.3	9.1	8	690
5	84	101	90	0.44	0.57	0.49	5.7	8.6	6.8	581
6	76	90	83	0.43	0.51	0.47	5	6.8	5.8	501
7	73	83	77	0.42	0.5	0.46	4.5	5.8	5.1	439
8	63	77	70	0.39	0.5	0.44	3.7	5.3	4.4	375
9	50	69	61	0.36	0.49	0.42	2.3	4.4	3.4	292
10	45	60	54	0.36	0.44	0.39	1.9	3.4	2.7	231
11	48	57	51	0.34	0.45	0.38	2	3.2	2.4	207
12	48	62	52	0.33	0.44	0.38	2	3.6	2.5	213
13	46	57	51	0.32	0.43	0.37	1.8	3	2.4	203
14	49	57	51	0.32	0.41	0.35	1.9	2.8	2.2	191
15	47	55	49	0.3	0.41	0.34	1.7	2.9	2.1	178
16	35	61	45	0.25	0.44	0.31	0.9	3.4	1.7	143
17	33	52	42	0.25	0.43	0.32	0.8	2.6	1.6	138
18	33	49	40	0.29	0.43	0.34	1.1	2.3	1.5	129
19	30	39	34	0.3	0.43	0.36	1	1.8	1.2	107
20	31	39	33	0.22	0.42	0.36	0.7	1.8	1.2	105
21	31	38	33	0.31	0.42	0.35	1	1.6	1.2	101
22	30	40	32	0.31	0.42	0.35	0.9	1.5	1.2	99
23	30	37	32	0.3	0.42	0.35	0.9	1.6	1.1	96
24	27	39	32	0.3	0.5	0.36	0.8	1.9	1.1	98
25	29	38	31	0.31	0.41	0.35	0.9	1.5	1.1	94
26	21	34	30	0.29	0.41	0.35	0.5	1.4	1	87
27	22	36	28	0.29	0.45	0.33	0.5	1.6	0.9	78
28	28	37	31	0.3	0.41	0.35	0.8	1.3	1.1	91
29	27	37	29	0.27	0.42	0.33	0.7	1.4	1	82
30	25	33	29	0.15	0.37	0.33	0.3	1.2	0.9	80
31	26	33	29	0.28	0.39	0.33	0.7	1.3	0.9	78
Minimum	21	33	28	0.15	0.37	0.31	0.3	1.2	0.9	Total
Maximum	102	119	109	0.49	0.59	0.54	8.1	10.5	9.4	8,084
Average	47	60	53	0.33	0.46	0.39	2.4	3.8	3	

Shaded areas are weekends

114-1008-003 - Site3

Tabular Report - August 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
August	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	24	33	27	0.28	0.38	0.32	0.6	1.3	0.8	72
2	24	31	28	0.29	0.45	0.32	0.6	1.3	0.8	72
3	25	39	28	0.26	0.4	0.32	0.6	1.4	0.9	74
4	24	30	27	0.27	0.39	0.32	0.6	1.1	0.8	68
5	24	31	26	0.28	0.39	0.31	0.6	1.1	0.8	66
6	23	32	26	0.22	0.4	0.3	0.5	1.2	0.7	63
7	23	30	26	0.27	0.42	0.31	0.5	1.2	0.7	64
8	22	32	26	0.28	0.41	0.32	0.5	1.2	0.8	67
9	16	29	24	0.21	0.37	0.29	0.2	1	0.6	53
10	14	29	22	0.19	0.37	0.28	0.2	1	0.6	48
11	18	27	22	0.25	0.35	0.29	0.4	0.8	0.6	47
12	16	25	20	0.22	0.32	0.26	0.3	0.7	0.4	35
13	11	34	16	0.18	0.47	0.23	0.1	1.6	0.3	24
14	7	26	13	0.14	0.32	0.2	0	0.8	0.2	17
15	9	21	12	0.16	0.27	0.19	0.1	0.5	0.1	13
16	8	33	12	0.15	0.31	0.19	0.1	0.7	0.2	15
17	8	27	12	0.13	0.26	0.17	0.1	0.5	0.1	13
18	6	29	10	0.11	0.24	0.15	0	0.4	0.1	8
19	7	25	11	0.12	0.27	0.16	0	0.6	0.1	11
20	4	30	10	0.07	0.27	0.14	0	0.6	0.1	8
21	4	21	10	0.07	0.24	0.14	0	0.4	0.1	8
22	5	16	11	0.09	0.19	0.15	0	0.2	0.1	8
23	7	20	12	0.12	0.22	0.16	0	0.3	0.1	10
24	7	24	12	0.12	0.25	0.16	0	0.5	0.1	11
25	2	20	11	0.05	0.23	0.15	0	0.4	0.1	9
26	1	16	7	0.03	0.2	0.1	0	0.2	0	3
27	-1	16	5	0.03	0.19	0.09	0	0.2	0	2
28	-1	12	7	0.05	0.16	0.11	0	0.1	0	3
29	4	13	9	0.08	0.17	0.13	0	0.2	0.1	5
30	5	19	10	0.08	0.21	0.14	0	0.3	0.1	7
31	8	29	12	0.12	0.25	0.16	0	0.7	0.1	10
Minimum	-1	12	5	0.03	0.16	0.09	0	0.1	0	Total
Maximum	25	39	28	0.29	0.47	0.32	0.6	1.6	0.9	916
Average	11	26	16	0.16	0.3	0.21	0.2	0.7	0.3	

Shaded areas are weekends

114-1008-003 - Site3

Tabular Report - September 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
September	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	6	19	11	0.09	0.22	0.15	0	0.3	0.1	9
2	2	20	8	0.03	0.22	0.12	0	0.4	0.1	5
3	1	11	7	0.03	0.16	0.11	0	0.1	0	4
4	3	12	8	0.07	0.16	0.12	0	0.1	0	4
5	4	34	15	0.08	0.33	0.12	0	1.1	0.2	15
6	26	38	31	0.1	0.31	0.15	0.3	1.1	0.5	41
7	26	37	31	0.12	0.27	0.19	0.4	1.1	0.6	50
8	30	54	36	0.05	0.37	0.18	0.2	1.5	0.7	59
9	31	55	37	0.06	0.36	0.14	0.2	2	0.6	49
10	31	51	39	0.04	0.35	0.14	0.2	1.7	0.6	52
11	32	62	38	0.05	0.32	0.13	0.2	1.6	0.5	47
12	33	54	39	0.05	0.31	0.13	0.2	1.5	0.6	50
13	29	49	36	0.05	0.26	0.13	0.1	1.2	0.5	42
14	30	58	36	0.07	0.3	0.15	0.2	1.6	0.6	52
15	25	47	35	0.03	0.32	0.14	0.1	1.8	0.5	45
16	29	63	36	0.07	0.3	0.13	0.2	1.5	0.5	45
17	27	63	35	0.06	0.19	0.13	0.2	1.4	0.5	40
18	28	56	33	0.05	0.21	0.14	0.1	1.2	0.5	42
19	26	60	32	0.05	0.25	0.13	0.1	1	0.4	37
20	25	53	32	0.04	0.23	0.12	0.1	0.9	0.4	36
21	27	52	34	0.06	0.22	0.16	0.2	1.1	0.5	47
22	26	47	32	0.06	0.24	0.16	0.2	1.2	0.5	45
23	26	51	35	0.05	0.25	0.16	0.2	1.5	0.6	50
24	23	38	30	0.05	0.27	0.18	0.1	1	0.5	46
25	26	56	37	0.05	0.26	0.15	0.1	1.6	0.6	49
26	27	60	33	0.05	0.23	0.14	0.1	1.2	0.5	43
27	26	51	34	0.03	0.25	0.1	0.1	1.4	0.4	32
28	23	64	33	0.04	0.2	0.1	0.1	1.3	0.4	31
29	20	114	41	0.05	0.18	0.08	0.1	2.1	0.4	35
30	28	117	80	0.05	0.18	0.08	0.3	1.7	0.9	82
Minimum	1	11	7	0.03	0.16	0.08	0	0.1	0	Total
Maximum	33	117	80	0.12	0.37	0.19	0.4	2.1	0.9	1,184
Average	23	52	32	0.06	0.26	0.14	0.1	1.2	0.5	

Shaded areas are weekends

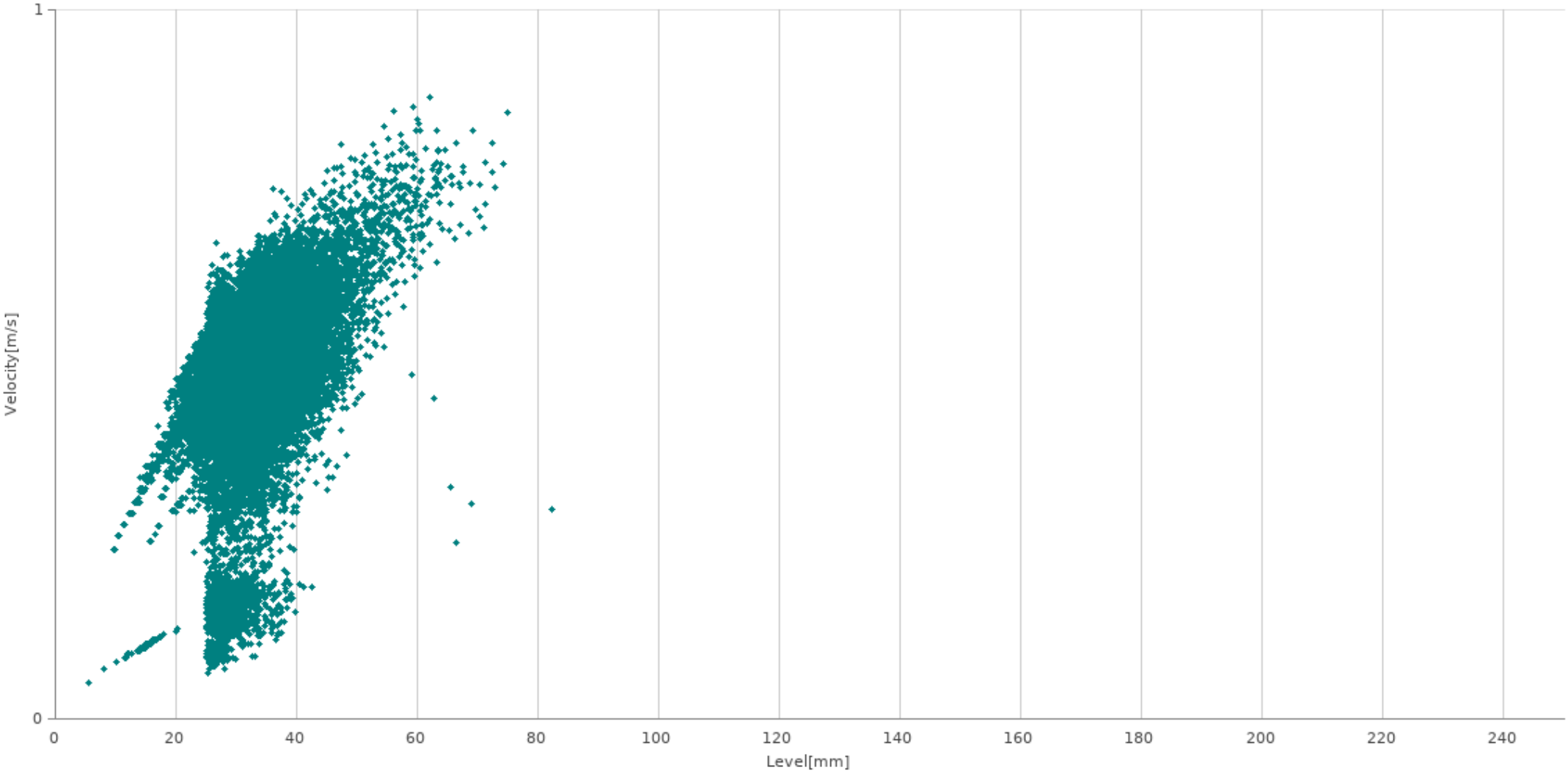
114-1008-003 - Site3

Tabular Report - October 2020

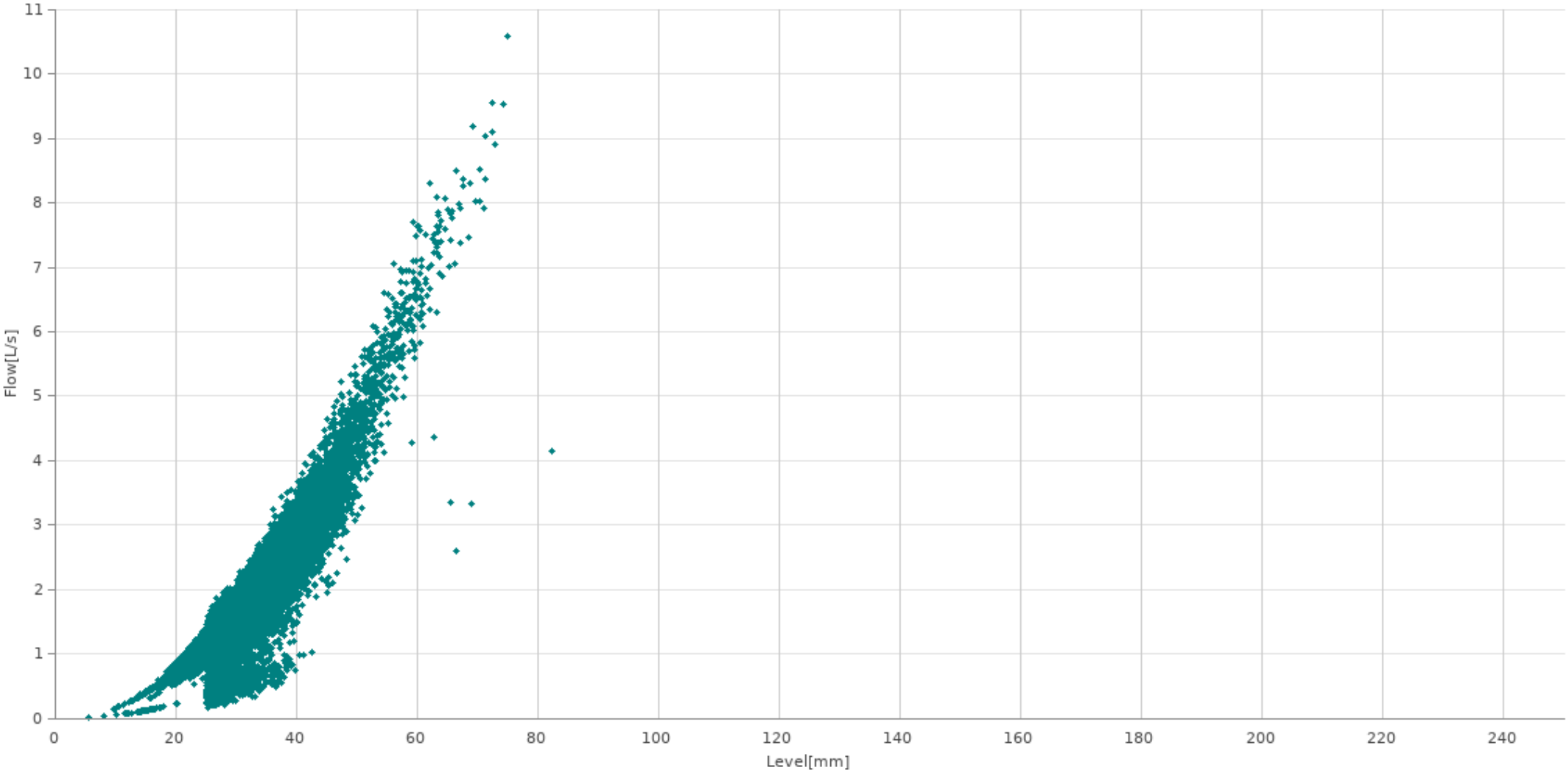
	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
October	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	18	52	26	0.05	0.3	0.11	0.1	1.1	0.3	23
2	17	47	26	0.05	0.27	0.14	0.1	1	0.3	28
3	20	41	25	0.03	0.24	0.11	0.1	0.6	0.2	21
4	13	38	25	0.04	0.26	0.11	0.1	0.9	0.2	21
5	17	48	27	0.06	0.32	0.12	0.1	1.6	0.3	28
6	20	50	30	0.06	0.18	0.11	0.1	0.9	0.3	30
7	18	47	29	0.05	0.3	0.12	0.1	1.4	0.4	32
8	18	41	26	0.05	0.27	0.14	0.1	0.9	0.3	30
9	18	44	25	0.06	0.28	0.14	0.1	1	0.3	28
10	17	44	31	0.05	0.31	0.13	0.1	1.2	0.4	36
11	13	66	30	0.06	0.28	0.11	0.1	1.3	0.4	30
12	14	39	24	0.06	0.31	0.14	0.1	1.2	0.3	26
13	15	37	28	0.11	0.3	0.2	0.1	1.2	0.6	53
14	35	35	35	0.25	0.25	0.25	0.9	0.9	0.9	78
15	35	35	35	0.25	0.25	0.25	0.9	0.9	0.9	78
16	35	35	35	0.25	0.25	0.25	0.9	0.9	0.9	78
17	35	35	35	0.25	0.25	0.25	0.9	0.9	0.9	57
Minimum	13	35	24	0.03	0.18	0.11	0.1	0.6	0.2	Total
Maximum	35	66	35	0.25	0.32	0.25	0.9	1.6	0.9	678
Average	21	43	29	0.1	0.27	0.16	0.3	1.1	0.5	

Shaded areas are weekends

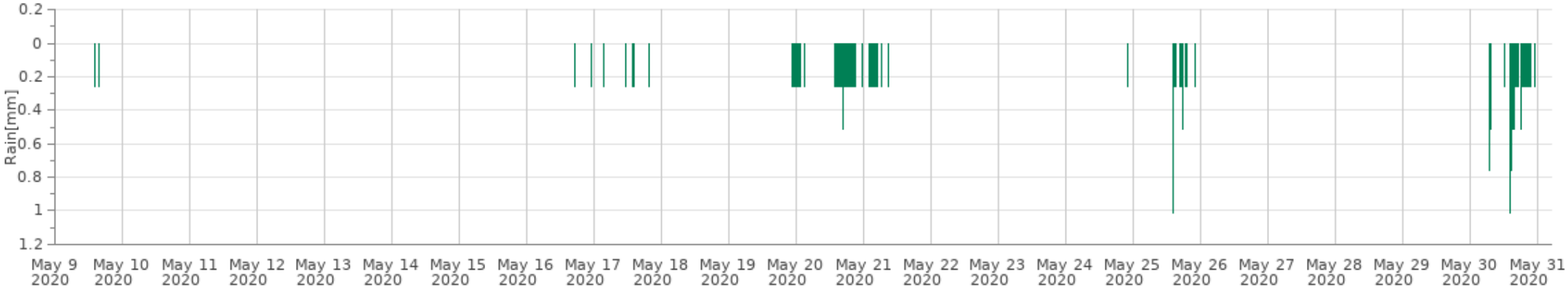
Monthly Data Report. 114-1008-004 / Site4
April, 2020 to October, 2020

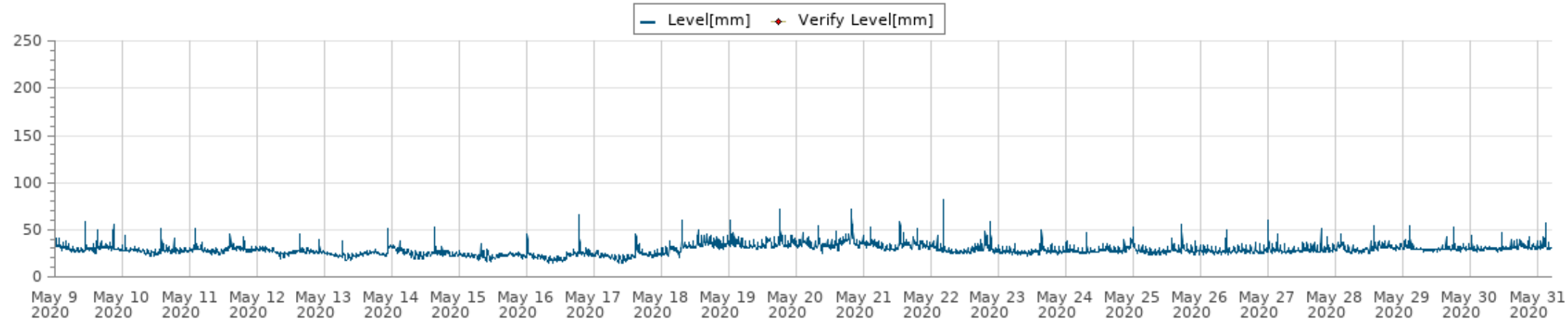


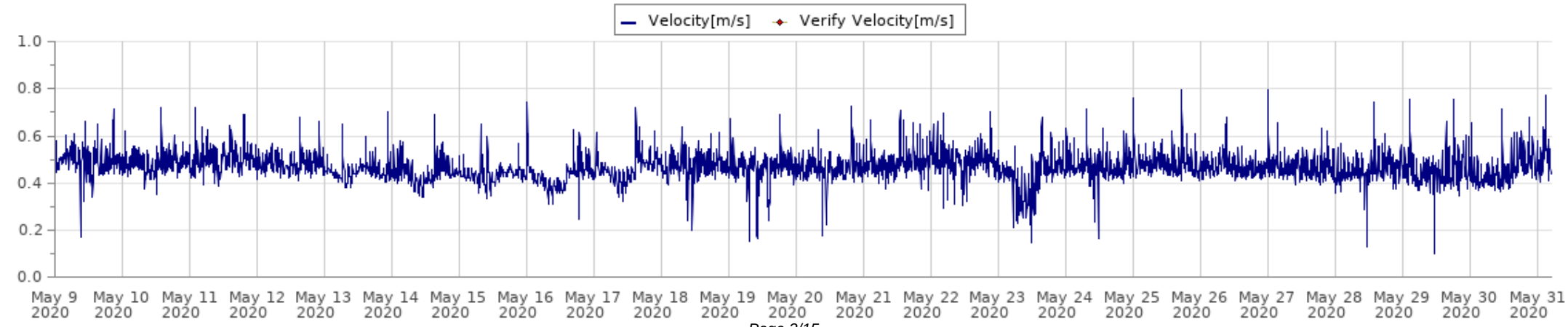
Monthly Data Report. 114-1008-004 / Site4
April, 2020 to October, 2020



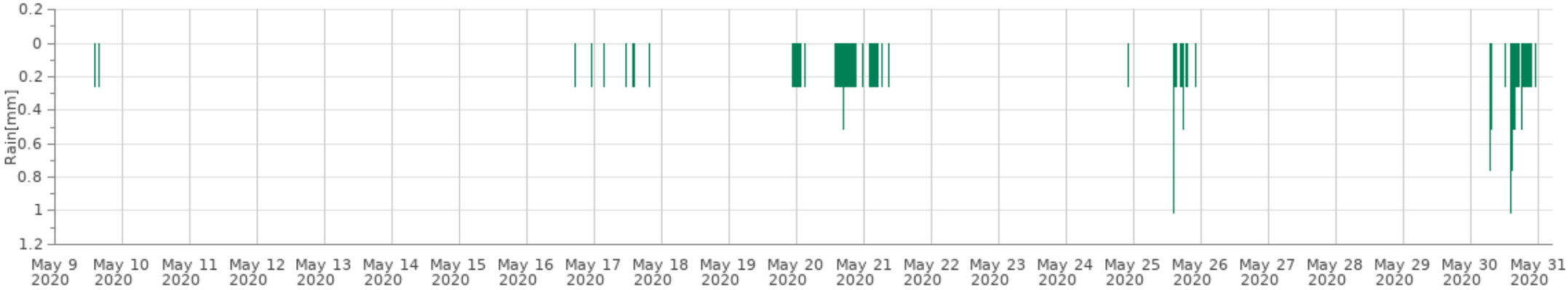
Monthly Data Report. 114-1008-004 / Site4
May, 2020

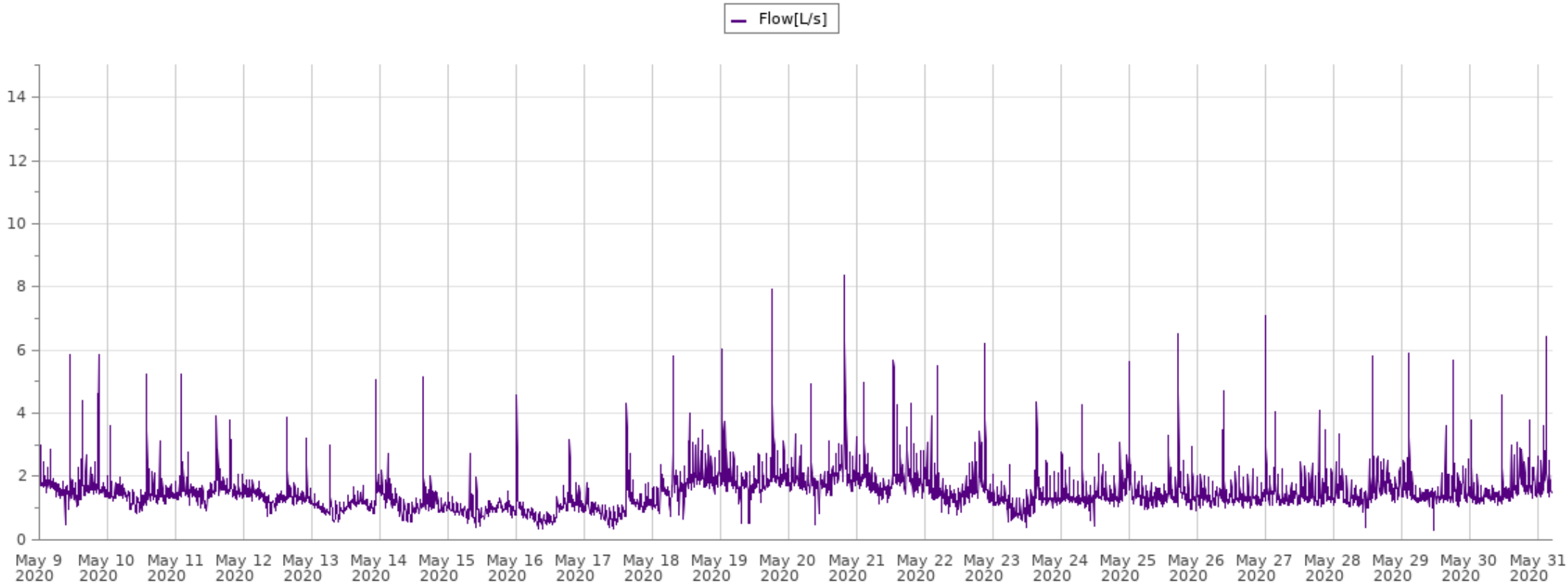




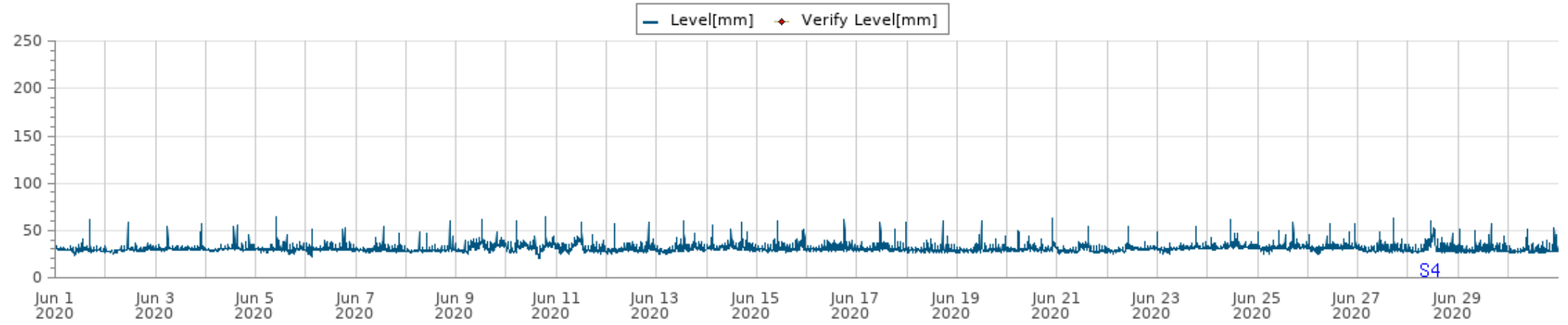


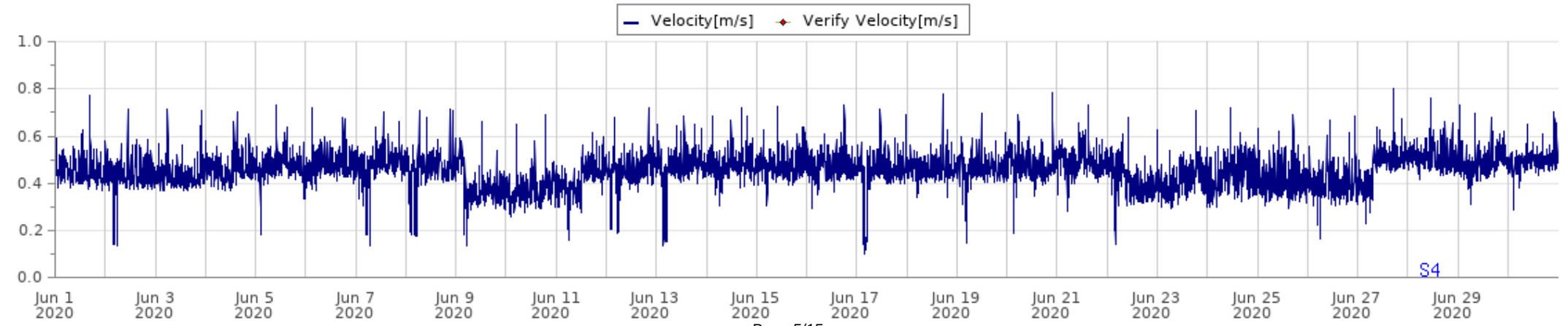
Monthly Data Report. 114-1008-004 / Site4
May, 2020



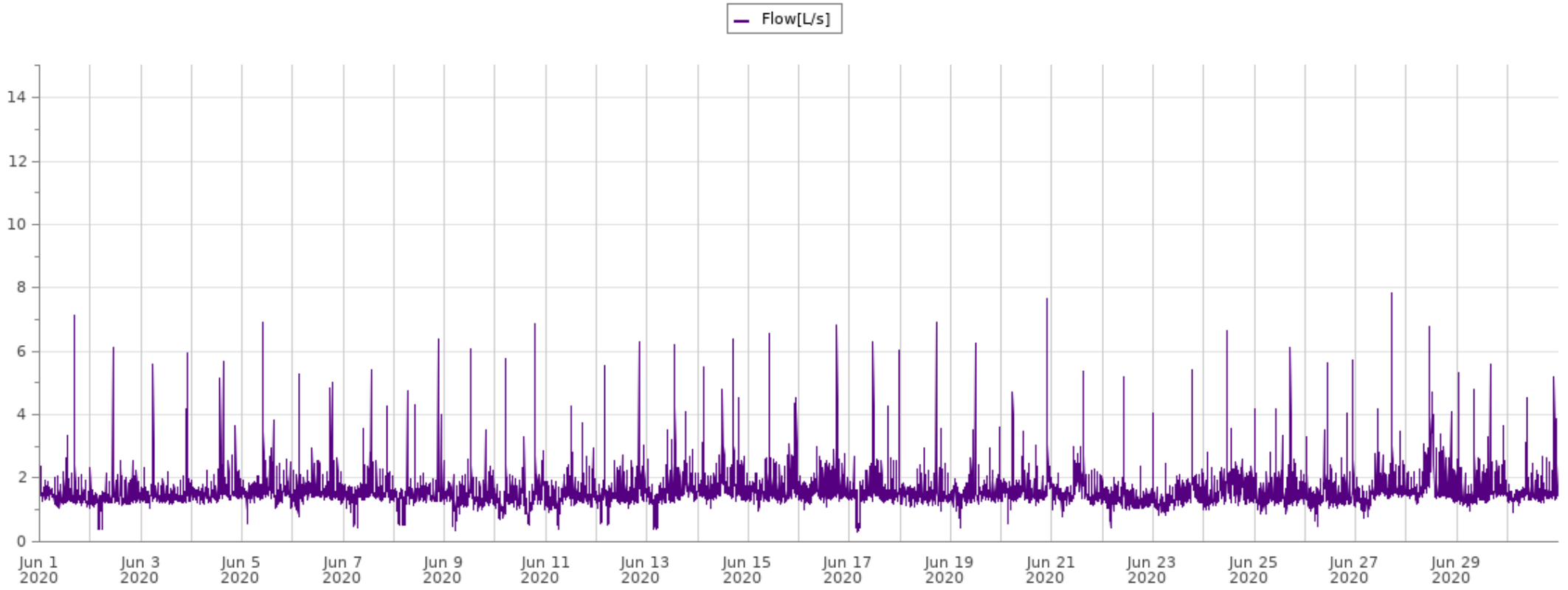


Monthly Data Report. 114-1008-004 / Site4
June, 2020

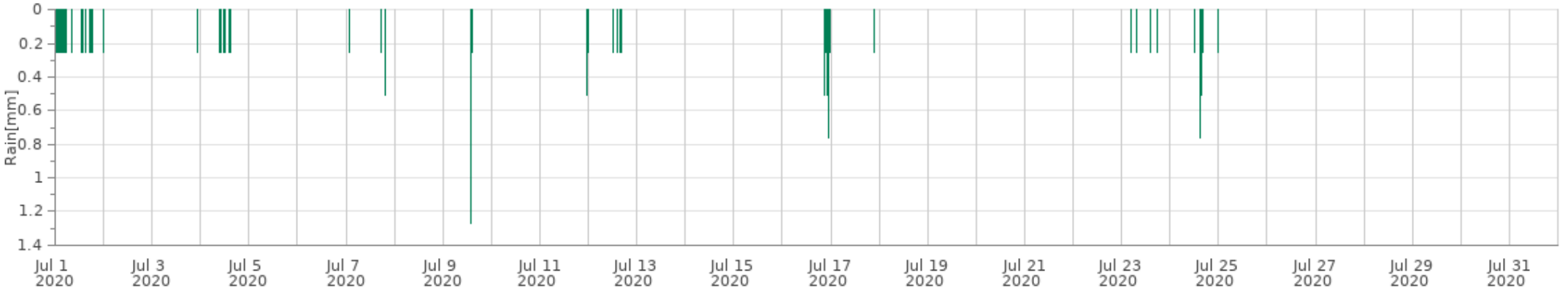


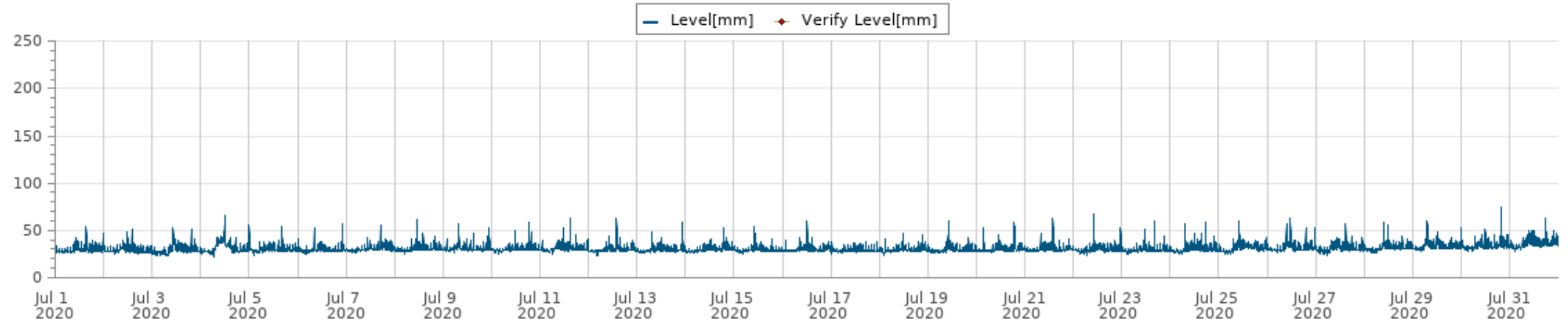


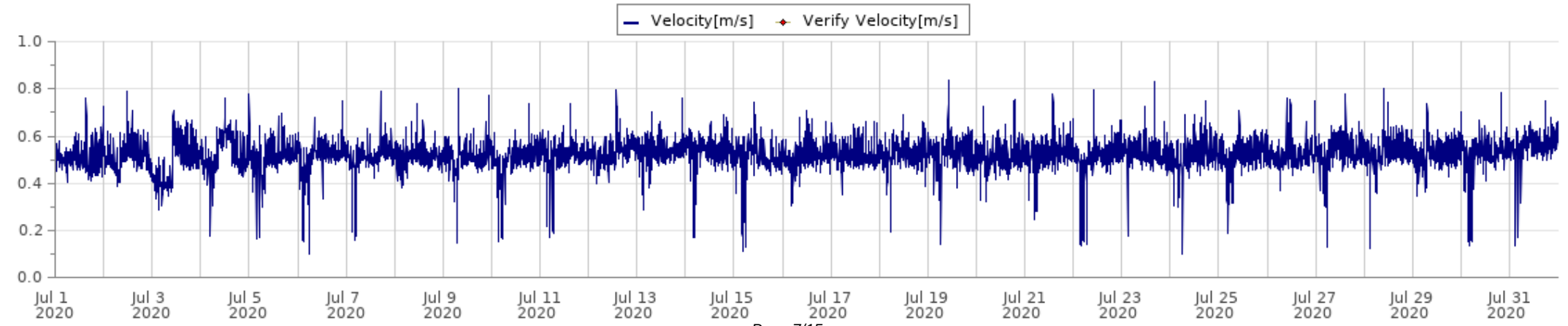
Monthly Data Report. 114-1008-004 / Site4
June, 2020



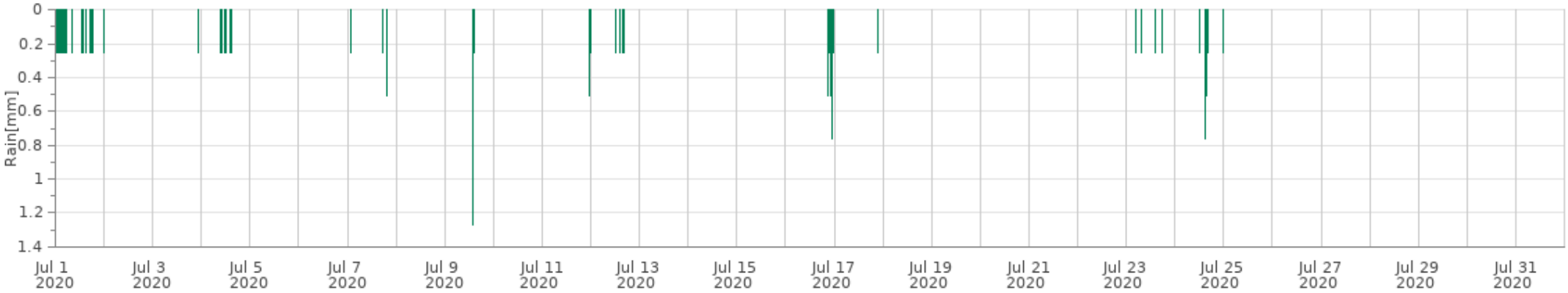
Monthly Data Report. 114-1008-004 / Site4
July, 2020

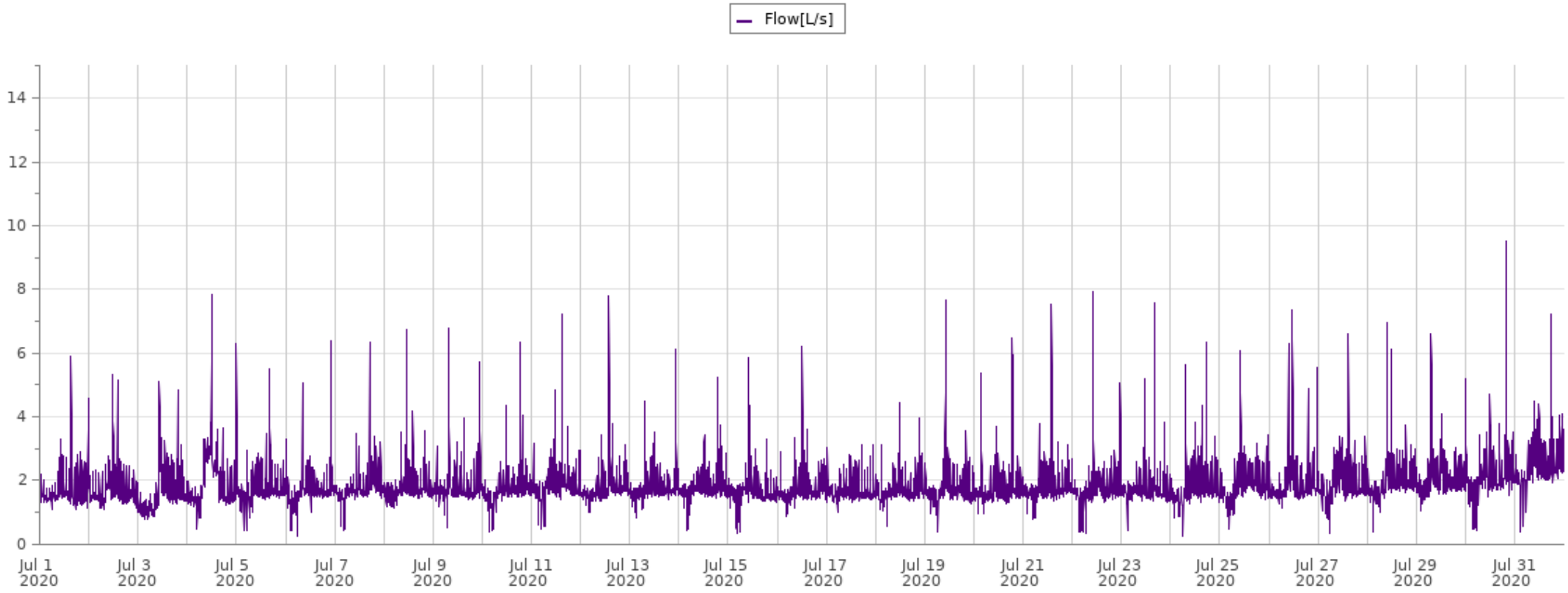




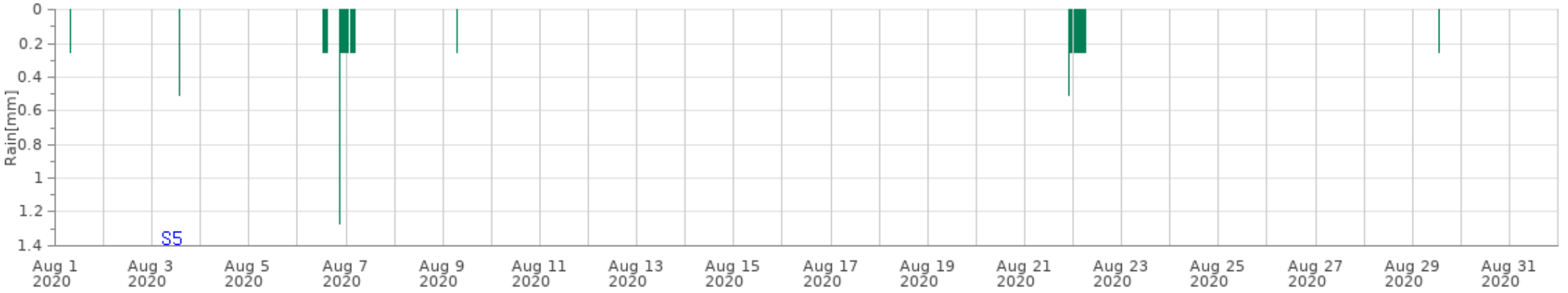


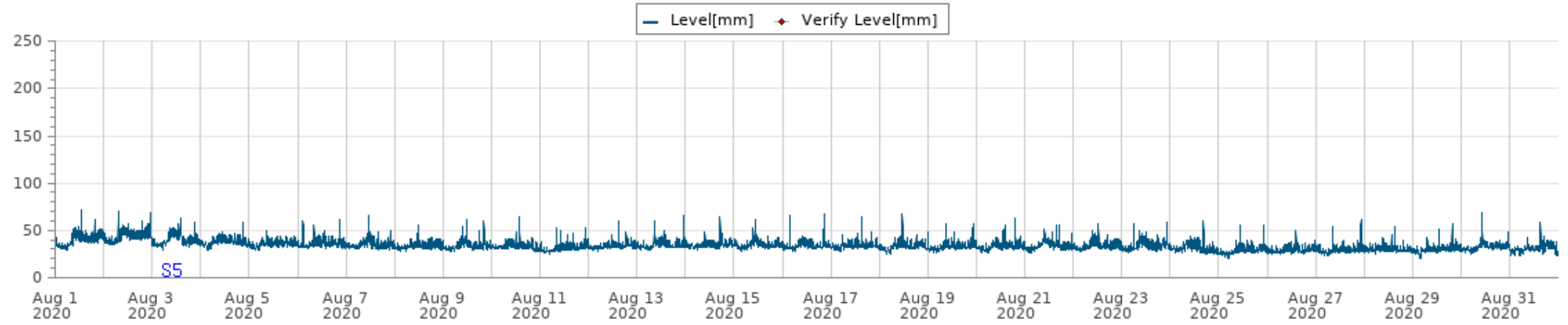
Monthly Data Report. 114-1008-004 / Site4
July, 2020

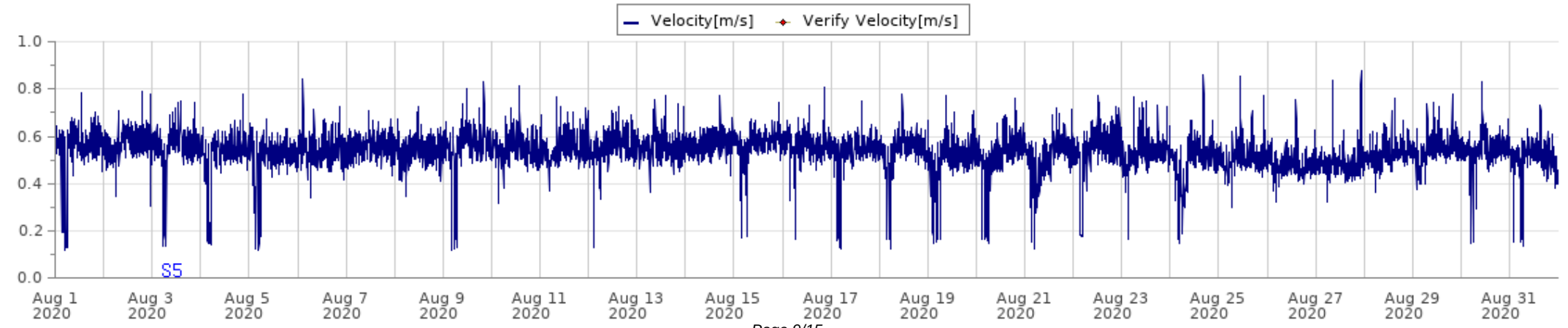




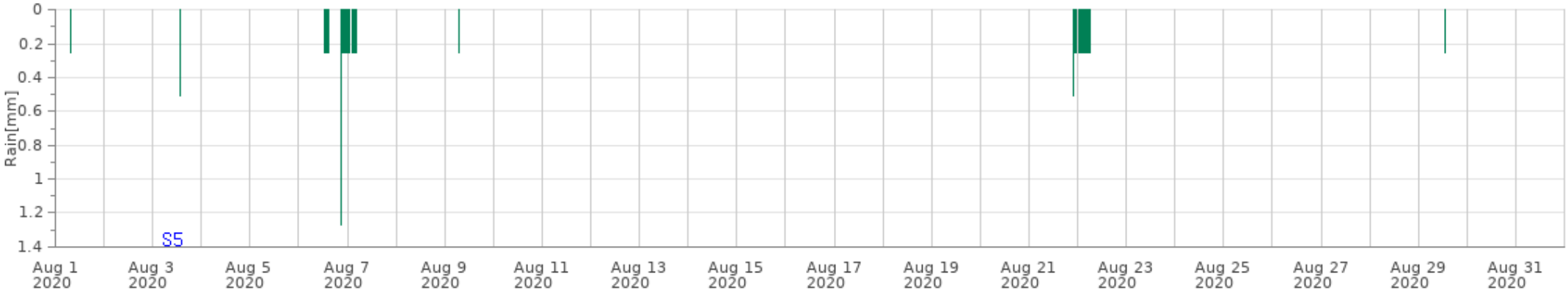
Monthly Data Report. 114-1008-004 / Site4
August, 2020

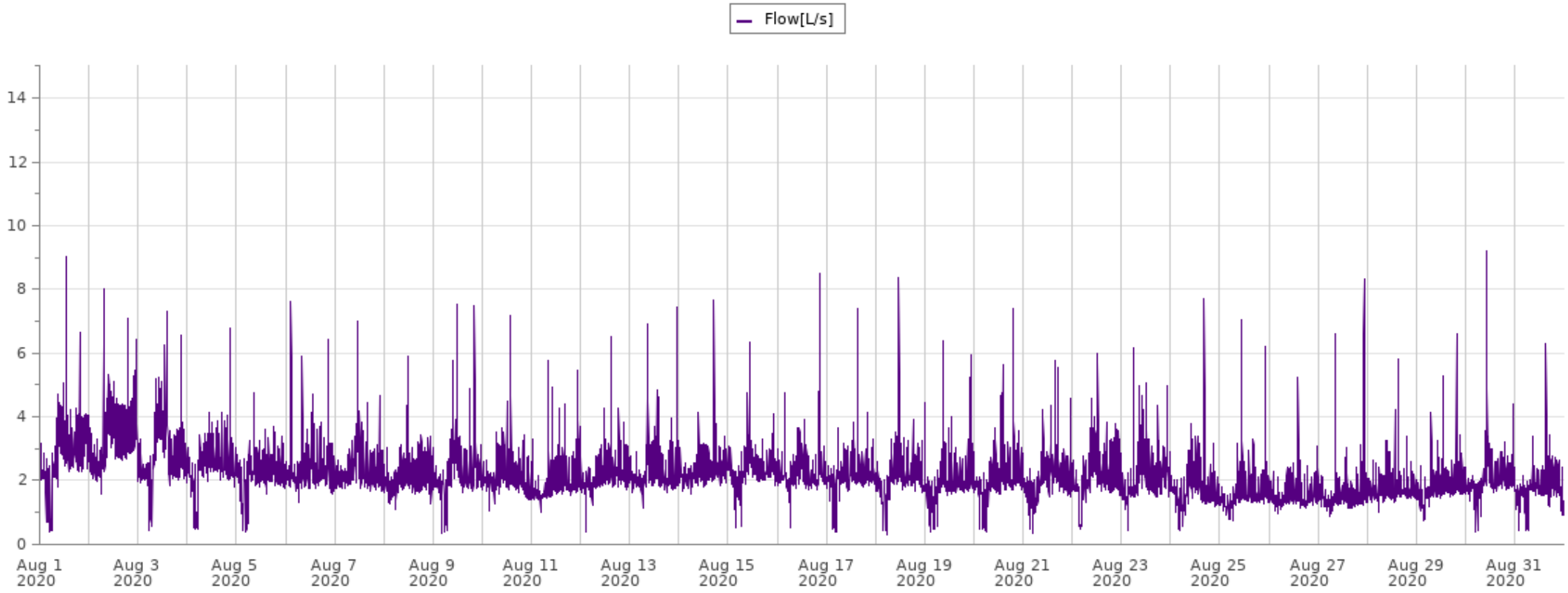




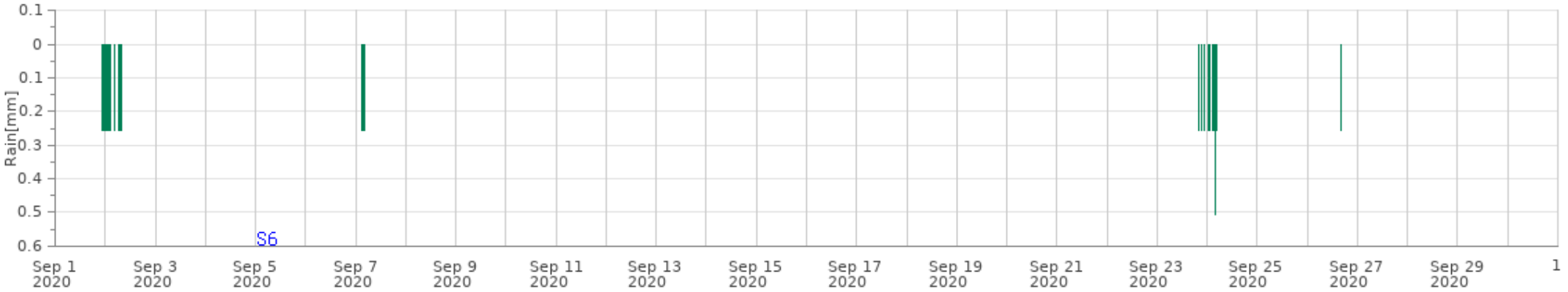


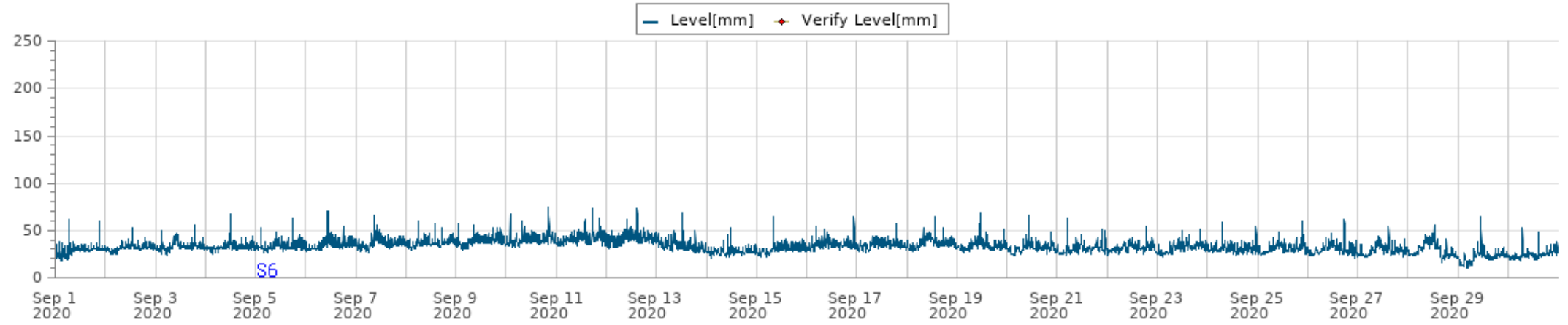
Monthly Data Report. 114-1008-004 / Site4
August, 2020

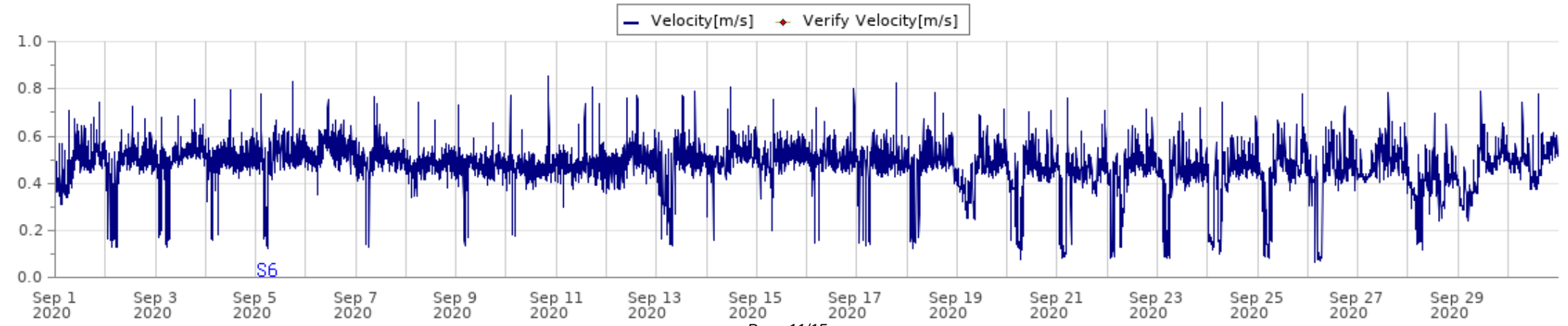




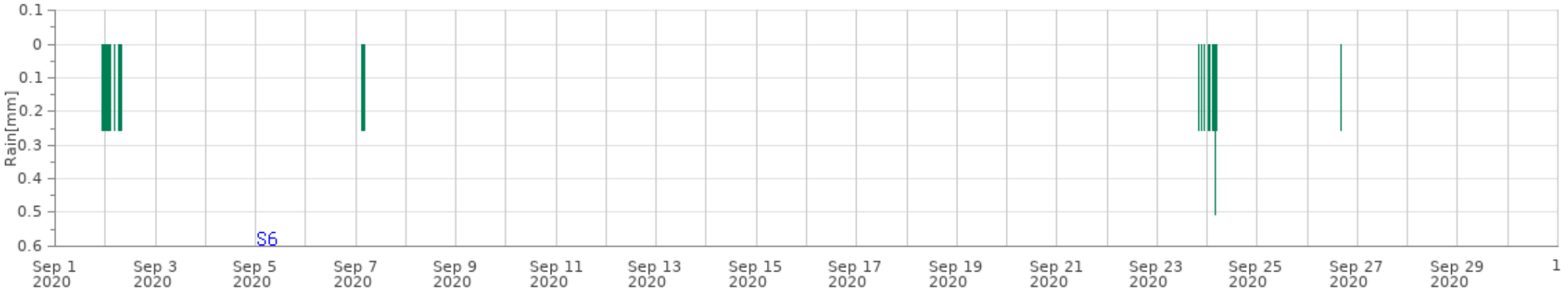
Monthly Data Report. 114-1008-004 / Site4
September, 2020

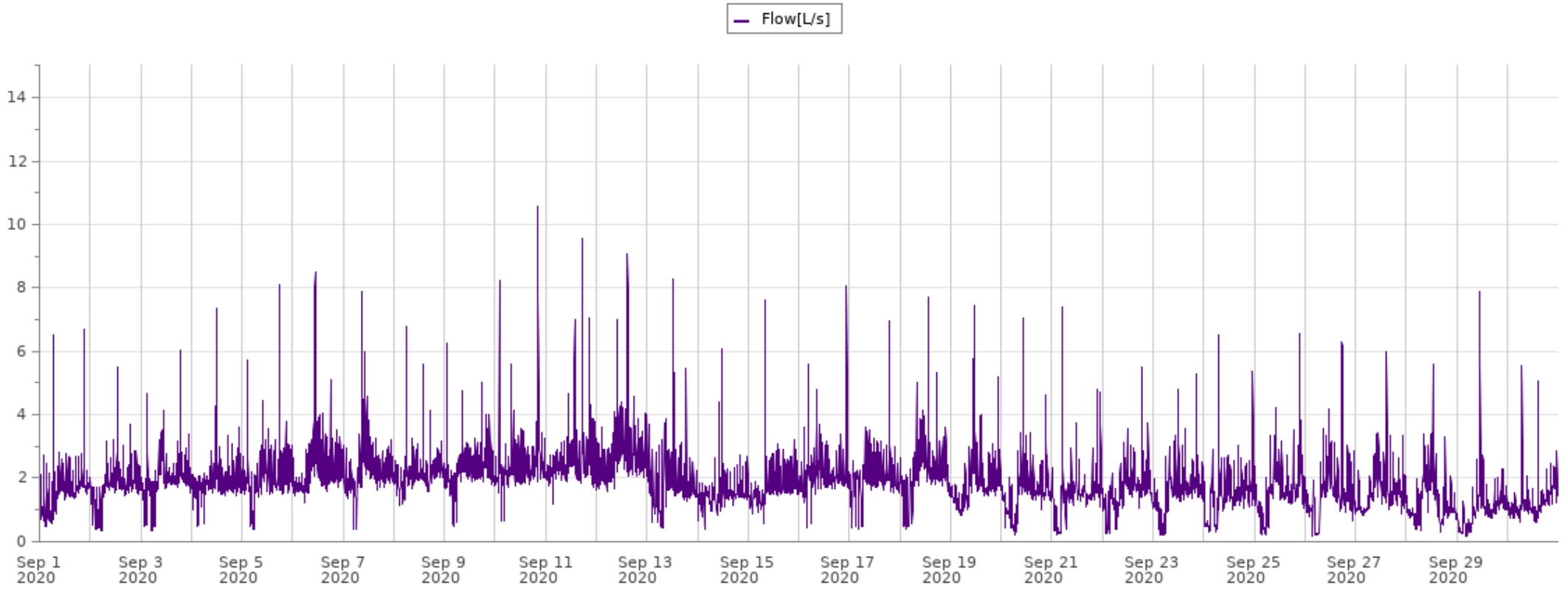




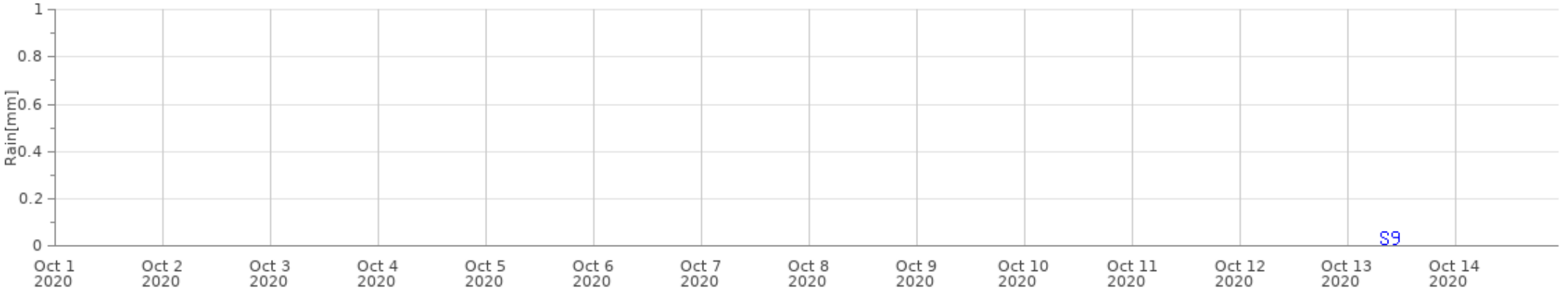


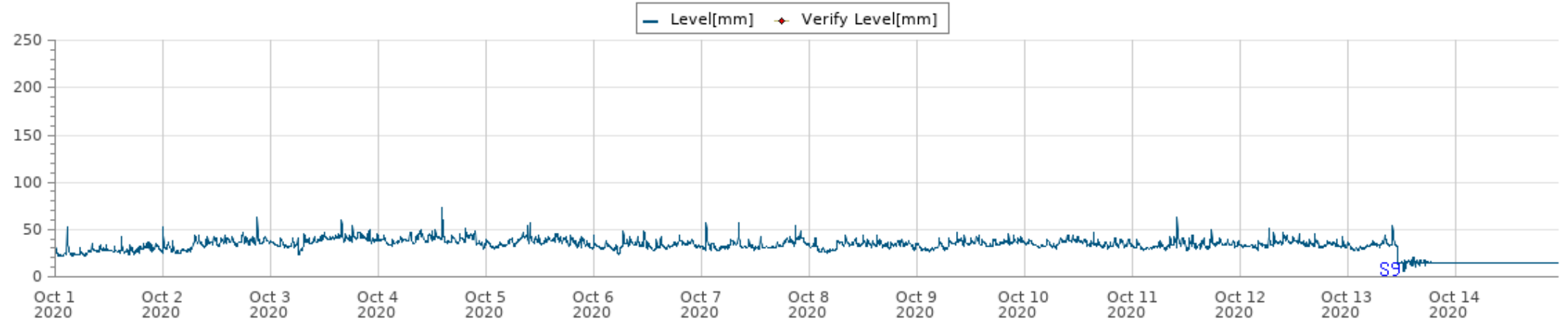
Monthly Data Report. 114-1008-004 / Site4
September, 2020

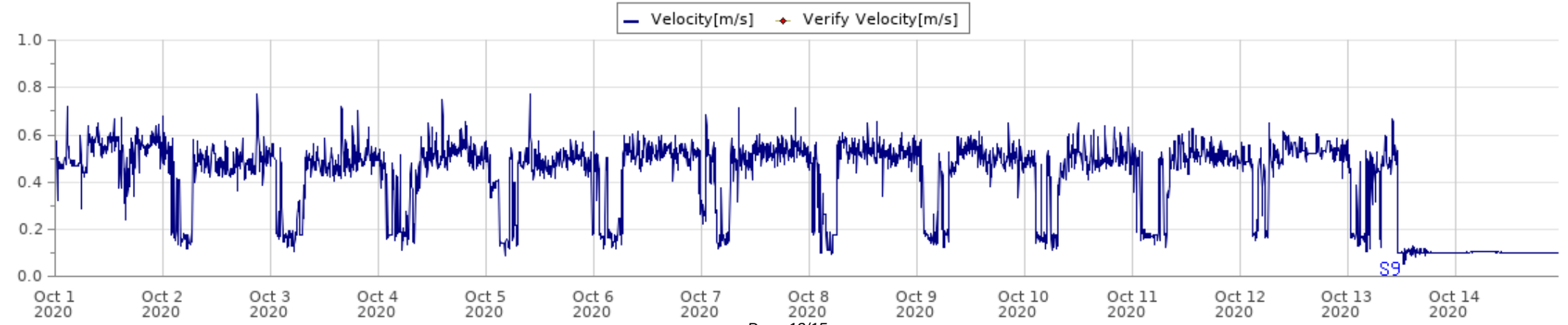




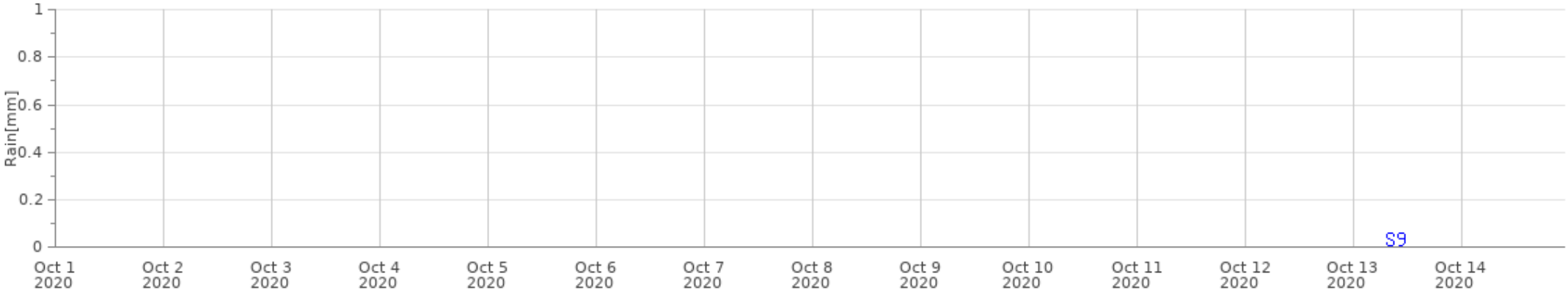
Monthly Data Report. 114-1008-004 / Site4
October, 2020

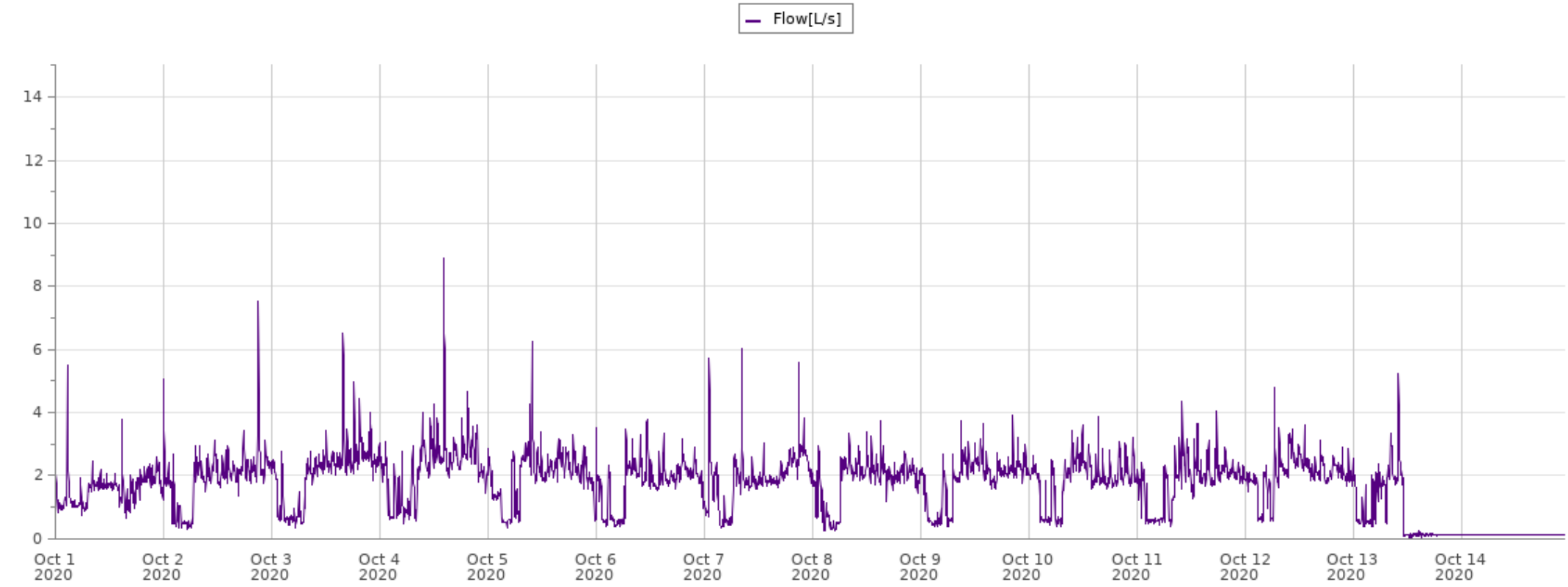






Monthly Data Report. 114-1008-004 / Site4
October, 2020





Monthly Data Report. 114-1008-004 / Site4
May, 2020 to October, 2020

Notes	
S3	**2020-05-09 19:30:00 to 2020-05-09 19:00:00 : Service Report** Install Report. Installed sensor in the downstream pipe of the target manhole.
S4	**2020-06-28 12:00:00 to 2020-06-28 11:45:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Battery is good.
S5	**2020-08-03 12:32:00 to 2020-08-03 12:32:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Checked Battery
S6	**2020-09-05 13:00:00 to 2020-09-05 08:00:00 : Service Report** Minor Report. Downloded data
S9	**2020-10-13 10:00:00 to 2020-10-13 09:45:00 : Service Report** Remove Report. We arrived to site, downloaded data and removed our equipment.

114-1008-004 - Site4

Tabular Report - May 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
May	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
9	28	41	33	0.34	0.6	0.5	1.5	3	1.9	32
10	25	59	30	0.17	0.71	0.49	0.5	5.8	1.7	143
11	21	52	28	0.35	0.72	0.49	0.8	5.3	1.5	127
12	23	45	29	0.39	0.69	0.5	0.9	3.9	1.6	135
13	19	45	26	0.41	0.68	0.48	0.7	3.9	1.3	110
14	17	51	25	0.38	0.7	0.46	0.6	5.1	1.2	104
15	18	52	24	0.34	0.69	0.44	0.5	5.1	1.1	93
16	15	46	22	0.33	0.74	0.43	0.4	4.6	1	82
17	14	66	22	0.25	0.63	0.43	0.3	3.2	1	82
18	14	45	23	0.32	0.72	0.46	0.3	4.3	1.1	96
19	20	60	34	0.2	0.68	0.47	0.7	6	2	169
20	29	71	35	0.15	0.69	0.46	0.5	7.9	1.9	166
21	25	71	36	0.17	0.73	0.47	0.5	8.4	2	176
22	27	82	33	0.29	0.71	0.49	1.1	5.7	1.9	165
23	24	59	28	0.3	0.7	0.48	0.8	6.2	1.5	129
24	22	49	27	0.15	0.68	0.43	0.4	4.4	1.3	110
25	24	52	29	0.16	0.76	0.48	0.4	5.7	1.5	130
26	23	56	28	0.41	0.8	0.48	0.9	6.5	1.5	126
27	23	59	28	0.41	0.8	0.47	1	7.1	1.5	128
28	24	52	29	0.36	0.63	0.46	1.1	4.1	1.5	127
29	25	54	30	0.13	0.76	0.46	0.4	5.9	1.6	138
30	26	53	30	0.1	0.75	0.44	0.3	5.7	1.5	127
31	26	57	31	0.36	0.77	0.47	1.1	6.4	1.7	148
Minimum	14	41	22	0.1	0.6	0.43	0.3	3	1	Total
Maximum	29	82	36	0.41	0.8	0.5	1.5	8.4	2	2,843
Average	22	56	29	0.28	0.71	0.47	0.7	5.4	1.5	

Shaded areas are weekends

114-1008-004 - Site4

Tabular Report - June 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
June	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	23	61	29	0.37	0.77	0.46	1.1	7.1	1.5	129
2	25	58	29	0.13	0.72	0.44	0.4	6.1	1.4	123
3	27	57	31	0.37	0.71	0.43	1.1	5.9	1.5	131
4	27	55	31	0.37	0.7	0.46	1.2	5.7	1.6	139
5	24	64	31	0.18	0.73	0.48	0.6	6.9	1.7	143
6	21	52	30	0.37	0.72	0.48	0.8	5.3	1.7	144
7	26	54	30	0.13	0.7	0.48	0.4	5.4	1.6	138
8	26	61	29	0.17	0.71	0.46	0.5	6.4	1.5	132
9	25	61	33	0.13	0.66	0.38	0.3	6.1	1.5	127
10	20	64	32	0.26	0.69	0.37	0.5	6.9	1.4	123
11	25	59	32	0.16	0.61	0.41	0.4	4.3	1.5	129
12	24	59	30	0.19	0.72	0.46	0.5	6.3	1.6	136
13	24	60	30	0.13	0.68	0.47	0.4	6.2	1.6	140
14	27	59	32	0.31	0.72	0.48	1.1	6.4	1.8	157
15	27	60	31	0.31	0.73	0.48	1	6.6	1.7	150
16	28	61	31	0.29	0.73	0.47	1	6.8	1.7	145
17	27	59	31	0.1	0.72	0.45	0.3	6.3	1.6	138
18	26	59	30	0.34	0.78	0.46	0.9	6.9	1.5	132
19	26	60	30	0.15	0.7	0.47	0.4	6.3	1.6	133
20	26	63	31	0.18	0.78	0.47	0.6	7.6	1.7	144
21	25	54	29	0.28	0.73	0.5	0.8	5.4	1.6	139
22	25	53	30	0.14	0.68	0.41	0.4	5.2	1.4	120
23	24	53	31	0.29	0.71	0.41	0.8	5.4	1.4	124
24	30	61	33	0.3	0.72	0.43	1	6.6	1.7	143
25	24	59	32	0.29	0.69	0.42	0.9	6.1	1.6	134
26	25	57	32	0.16	0.68	0.4	0.5	5.7	1.5	129
27	26	63	31	0.23	0.8	0.47	0.7	7.8	1.7	143
28	26	60	32	0.42	0.76	0.51	1.2	6.8	1.9	162
29	26	56	30	0.31	0.73	0.49	0.9	5.6	1.7	143
30	26	53	29	0.29	0.71	0.49	0.9	5.2	1.6	137
Minimum	20	52	29	0.1	0.61	0.37	0.3	4.3	1.4	Total
Maximum	30	64	33	0.42	0.8	0.51	1.2	7.8	1.9	4,105
Average	25	59	31	0.24	0.72	0.45	0.7	6.2	1.6	

Shaded areas are weekends

114-1008-004 - Site4

Tabular Report - July 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
July	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	26	54	29	0.41	0.76	0.51	1.1	5.9	1.7	144
2	24	51	29	0.38	0.79	0.51	1	5.3	1.7	145
3	23	52	29	0.29	0.71	0.48	0.8	5.1	1.6	138
4	22	65	31	0.18	0.76	0.53	0.5	7.8	1.9	165
5	24	54	30	0.16	0.7	0.5	0.4	5.5	1.7	147
6	24	58	30	0.1	0.75	0.51	0.3	6.4	1.7	148
7	26	55	30	0.16	0.79	0.51	0.4	6.3	1.8	151
8	25	61	31	0.38	0.74	0.52	1.1	6.7	1.8	154
9	27	57	31	0.15	0.8	0.51	0.5	6.8	1.8	156
10	25	58	30	0.15	0.74	0.5	0.4	6.3	1.7	149
11	25	63	31	0.17	0.74	0.52	0.5	7.2	1.8	158
12	24	63	30	0.4	0.8	0.53	1	7.8	1.8	151
13	26	58	30	0.29	0.76	0.54	0.8	6.1	1.8	155
14	26	53	30	0.17	0.69	0.54	0.4	5.2	1.8	154
15	25	55	29	0.11	0.74	0.51	0.3	5.9	1.7	143
16	27	60	30	0.3	0.71	0.52	0.9	6.2	1.8	150
17	25	38	29	0.35	0.66	0.52	1	3.1	1.7	145
18	24	47	29	0.19	0.69	0.52	0.6	4.4	1.7	144
19	26	60	30	0.14	0.84	0.53	0.4	7.6	1.8	152
20	27	58	30	0.32	0.75	0.51	0.9	6.5	1.8	150
21	27	63	30	0.25	0.78	0.52	0.8	7.5	1.8	154
22	23	67	30	0.14	0.8	0.5	0.4	7.9	1.7	148
23	25	60	30	0.17	0.83	0.53	0.4	7.6	1.8	153
24	24	58	30	0.1	0.75	0.51	0.3	6.3	1.8	155
25	24	59	31	0.19	0.71	0.52	0.5	6.1	1.9	159
26	26	63	32	0.37	0.76	0.52	1.1	7.4	1.9	165
27	24	57	31	0.13	0.78	0.53	0.4	6.6	1.9	162
28	26	58	32	0.12	0.81	0.53	0.4	7	1.9	166
29	28	59	33	0.35	0.74	0.52	1.1	6.6	2	175
30	27	74	34	0.14	0.78	0.52	0.5	9.5	2.1	182
31	27	63	36	0.13	0.75	0.55	0.4	7.2	2.5	212
Minimum	22	38	29	0.1	0.66	0.48	0.3	3.1	1.6	Total
Maximum	28	74	36	0.41	0.84	0.55	1.1	9.5	2.5	4,831
Average	25	58	31	0.22	0.75	0.52	0.6	6.5	1.8	

Shaded areas are weekends

114-1008-004 - Site4

Tabular Report - August 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
August	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	29	71	40	0.12	0.79	0.55	0.4	9	2.8	244
2	34	70	44	0.3	0.79	0.57	1.6	8	3.4	290
3	29	63	39	0.13	0.75	0.55	0.4	7.3	2.8	241
4	29	58	38	0.14	0.78	0.52	0.5	6.8	2.4	210
5	29	50	36	0.12	0.67	0.51	0.4	4.7	2.2	191
6	31	61	36	0.34	0.84	0.55	1.3	7.6	2.4	208
7	29	65	35	0.43	0.71	0.56	1.6	7	2.3	200
8	28	56	33	0.35	0.73	0.54	1.1	5.9	2.2	185
9	28	61	34	0.12	0.83	0.55	0.4	7.5	2.2	192
10	28	64	33	0.32	0.81	0.55	1.1	7.2	2.2	185
11	25	53	31	0.37	0.77	0.55	1	5.8	2	172
12	28	60	33	0.13	0.73	0.55	0.4	6.5	2.2	187
13	28	65	34	0.36	0.77	0.56	1.1	7.4	2.3	198
14	29	64	34	0.44	0.78	0.57	1.6	7.6	2.3	201
15	27	62	34	0.17	0.75	0.56	0.5	6.3	2.3	199
16	28	67	34	0.16	0.81	0.56	0.5	8.5	2.3	196
17	27	64	34	0.12	0.75	0.53	0.4	7.4	2.2	186
18	25	68	33	0.12	0.78	0.53	0.3	8.4	2.1	180
19	26	57	33	0.15	0.77	0.5	0.4	6.4	2	172
20	26	63	33	0.15	0.76	0.52	0.4	7.4	2.1	176
21	26	55	34	0.12	0.72	0.51	0.3	5.8	2.1	178
22	27	57	34	0.17	0.77	0.54	0.5	6	2.2	188
23	26	58	34	0.16	0.77	0.53	0.4	6.2	2.2	185
24	25	59	31	0.15	0.86	0.49	0.4	7.7	1.8	152
25	21	56	29	0.3	0.86	0.51	0.8	7	1.6	141
26	25	50	29	0.32	0.76	0.48	1	5.2	1.6	133
27	23	62	29	0.32	0.88	0.48	0.9	8.3	1.6	136
28	25	53	30	0.36	0.76	0.52	1	5.8	1.8	151
29	21	57	30	0.37	0.78	0.55	0.8	6.6	1.8	158
30	25	69	32	0.14	0.83	0.54	0.4	9.2	2	175
31	23	58	31	0.14	0.73	0.5	0.4	6.3	1.7	149
Minimum	21	50	29	0.12	0.67	0.48	0.3	4.7	1.6	Total
Maximum	34	71	44	0.44	0.88	0.57	1.6	9.2	3.4	5,760
Average	27	61	34	0.23	0.78	0.53	0.7	7	2.2	

Shaded areas are weekends

114-1008-004 - Site4

Tabular Report - September 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
September	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	17	61	29	0.31	0.74	0.49	0.5	6.7	1.6	141
2	24	53	31	0.13	0.73	0.46	0.3	5.5	1.7	147
3	23	55	33	0.13	0.76	0.49	0.3	6	1.9	167
4	25	67	32	0.16	0.8	0.5	0.5	7.4	1.9	163
5	27	63	33	0.13	0.83	0.51	0.4	8.1	2	175
6	28	70	35	0.35	0.75	0.54	1.2	8.5	2.3	197
7	27	66	36	0.13	0.77	0.49	0.4	7.9	2.2	193
8	29	60	37	0.34	0.75	0.48	1.1	6.8	2.2	188
9	30	57	39	0.13	0.73	0.47	0.5	6.2	2.3	198
10	31	75	40	0.17	0.86	0.46	0.6	10.6	2.4	207
11	33	72	41	0.3	0.81	0.48	1.2	9.6	2.6	220
12	30	72	41	0.37	0.77	0.5	1.6	9.1	2.7	232
13	26	69	34	0.14	0.79	0.46	0.4	8.3	1.9	159
14	21	53	28	0.16	0.81	0.51	0.4	6.1	1.6	133
15	21	64	30	0.2	0.76	0.51	0.6	7.6	1.7	150
16	28	65	35	0.15	0.8	0.5	0.4	8.1	2.2	186
17	27	57	35	0.14	0.82	0.48	0.4	7	2	176
18	28	64	36	0.13	0.78	0.47	0.4	7.7	2.2	185
19	27	68	34	0.24	0.71	0.46	0.8	7.5	1.9	160
20	23	66	32	0.08	0.71	0.43	0.2	7.1	1.6	139
21	23	63	31	0.08	0.76	0.43	0.2	7.4	1.6	135
22	24	54	32	0.08	0.71	0.44	0.2	5.5	1.6	138
23	22	52	31	0.08	0.72	0.42	0.2	5.3	1.6	136
24	24	59	31	0.1	0.75	0.42	0.3	6.5	1.5	130
25	23	60	31	0.08	0.78	0.44	0.2	6.5	1.6	137
26	20	61	30	0.06	0.73	0.43	0.2	6.3	1.5	130
27	22	53	29	0.4	0.79	0.49	0.8	6	1.6	136
28	16	55	29	0.11	0.7	0.39	0.3	5.6	1.3	114
29	10	65	22	0.24	0.79	0.45	0.2	7.9	1.1	90
30	17	52	24	0.37	0.78	0.5	0.6	5.5	1.3	108
Minimum	10	52	22	0.06	0.7	0.39	0.2	5.3	1.1	Total
Maximum	33	75	41	0.4	0.86	0.54	1.6	10.6	2.7	4,770
Average	24	62	33	0.18	0.77	0.47	0.5	7.1	1.9	

Shaded areas are weekends

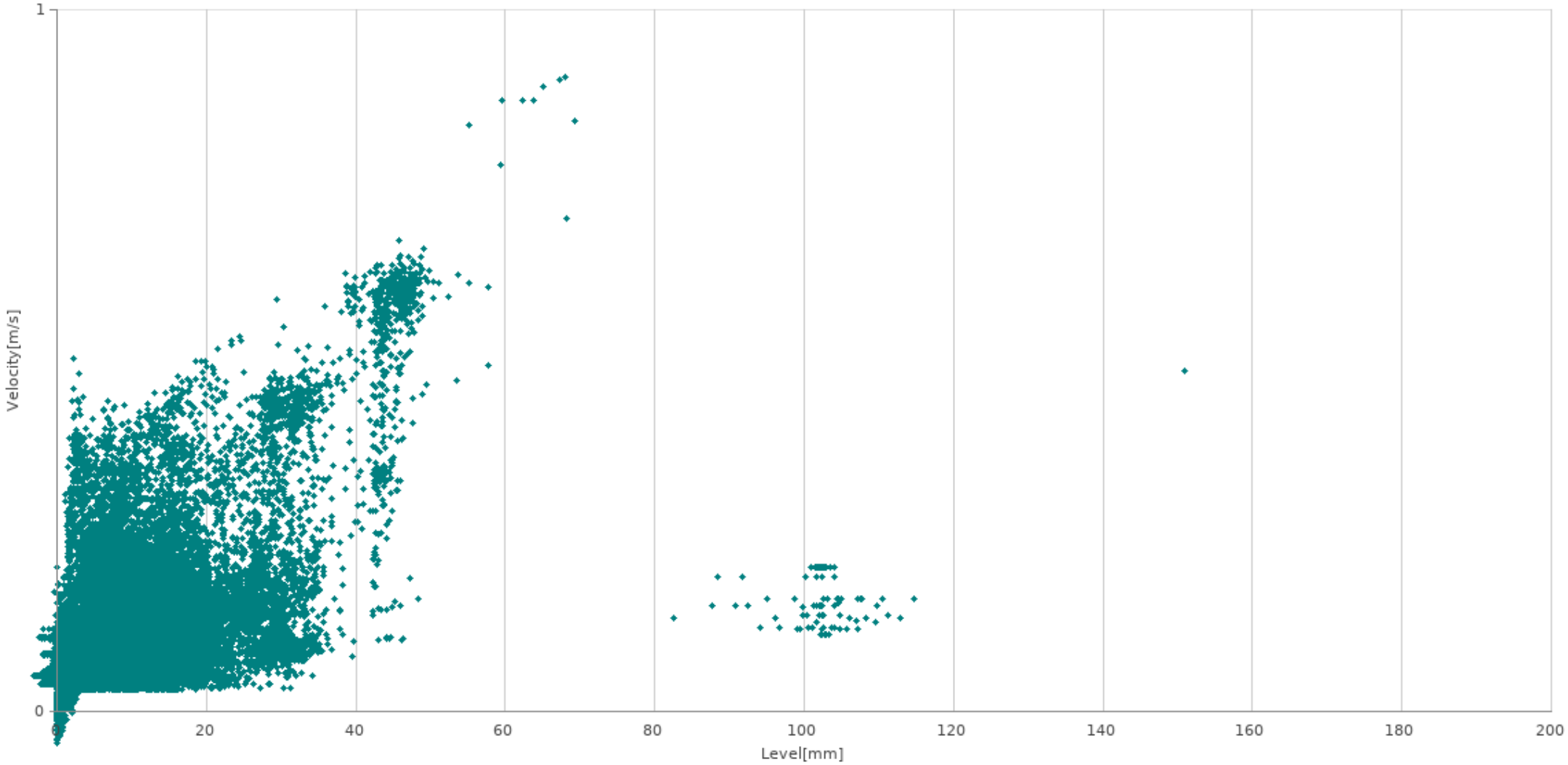
114-1008-004 - Site4

Tabular Report - October 2020

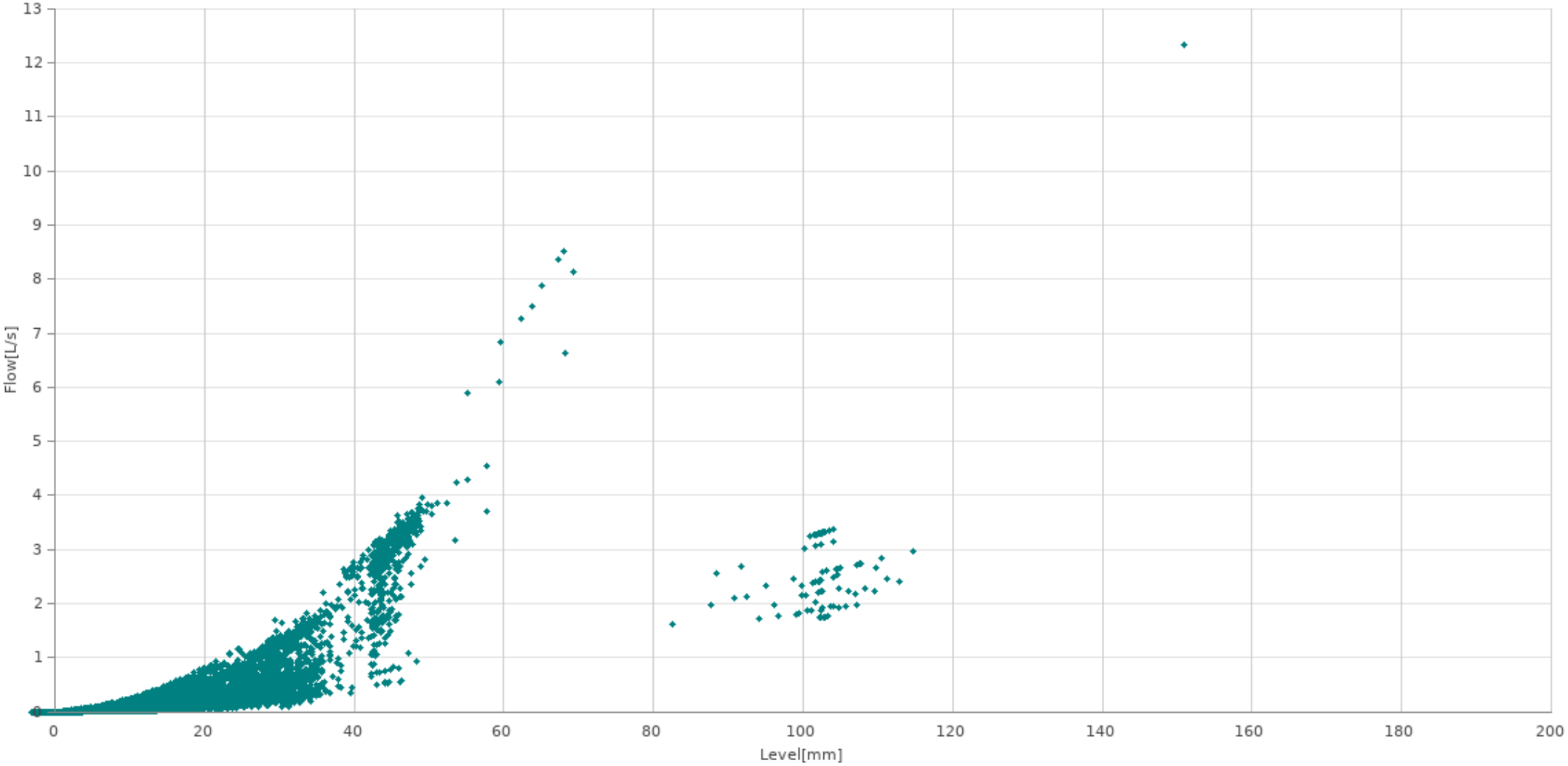
	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
October	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	21	53	27	0.24	0.72	0.52	0.7	5.5	1.6	135
2	24	63	35	0.12	0.77	0.44	0.3	7.5	1.9	165
3	23	60	38	0.11	0.72	0.42	0.4	6.5	2.1	181
4	29	73	40	0.11	0.75	0.44	0.5	8.9	2.3	195
5	29	57	37	0.09	0.77	0.43	0.3	6.2	2	170
6	23	49	33	0.12	0.62	0.45	0.4	3.8	1.8	154
7	27	57	34	0.11	0.71	0.46	0.3	6	1.9	164
8	25	43	33	0.09	0.65	0.46	0.3	3.7	1.8	158
9	26	47	35	0.13	0.65	0.44	0.4	3.9	1.9	162
10	29	46	35	0.11	0.65	0.44	0.4	3.9	1.9	163
11	27	63	34	0.12	0.63	0.44	0.4	4.4	1.8	154
12	27	52	35	0.15	0.65	0.5	0.5	4.8	2.1	179
13	6	54	23	0.05	0.67	0.22	0	5.2	0.7	63
14	14	15	15	0.1	0.11	0.1	0.1	0.1	0.1	10
Minimum	6	15	15	0.05	0.11	0.1	0	0.1	0.1	Total
Maximum	29	73	40	0.24	0.77	0.52	0.7	8.9	2.3	2,054
Average	24	52	32	0.12	0.65	0.41	0.4	5	1.7	

Shaded areas are weekends

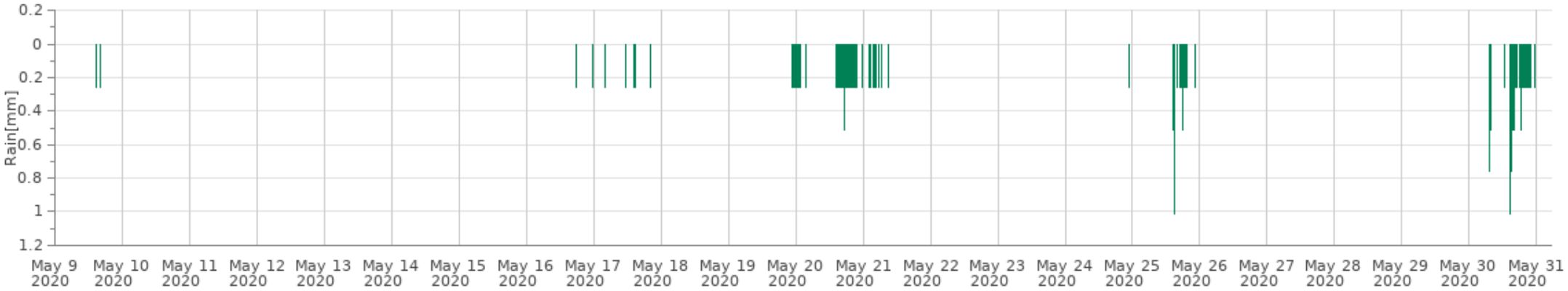
Monthly Data Report. 114-1008-005 / Site5
February, 2020 to October, 2020

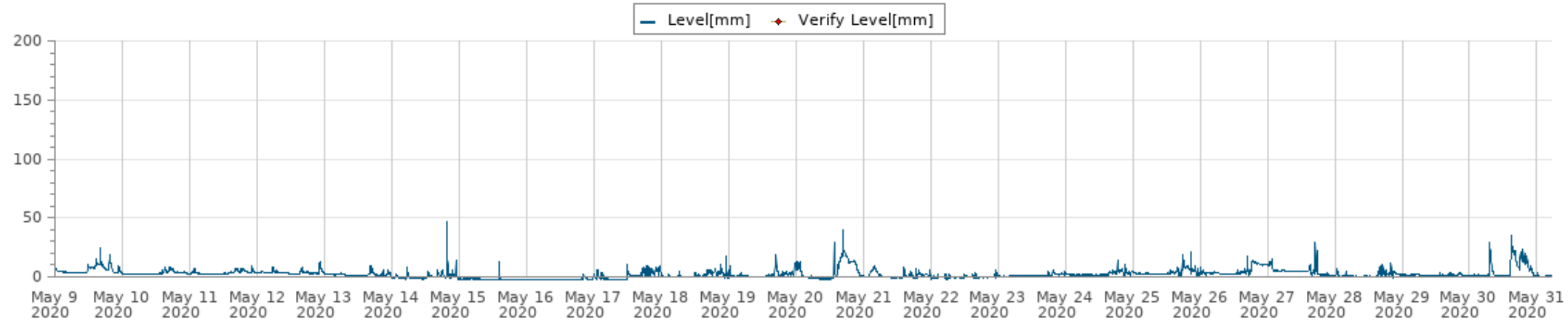


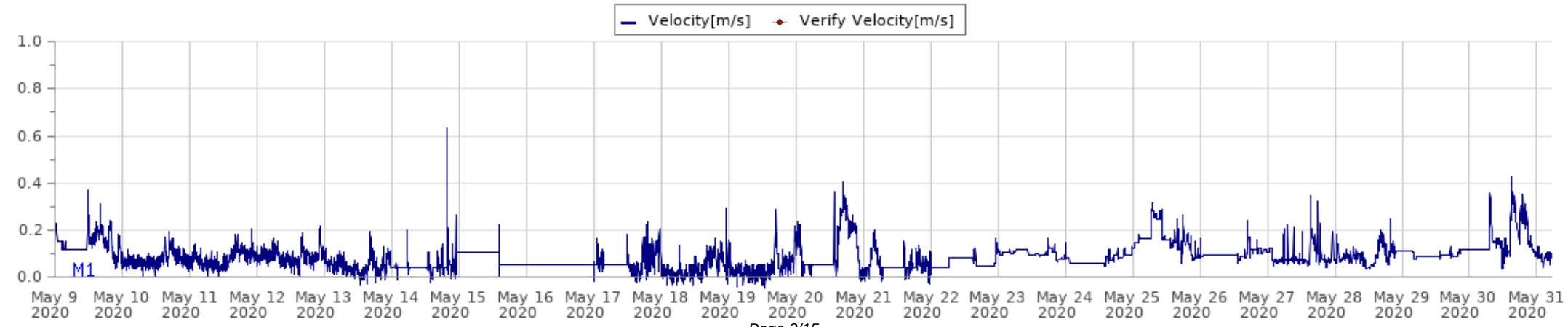
Monthly Data Report. 114-1008-005 / Site5
February, 2020 to October, 2020



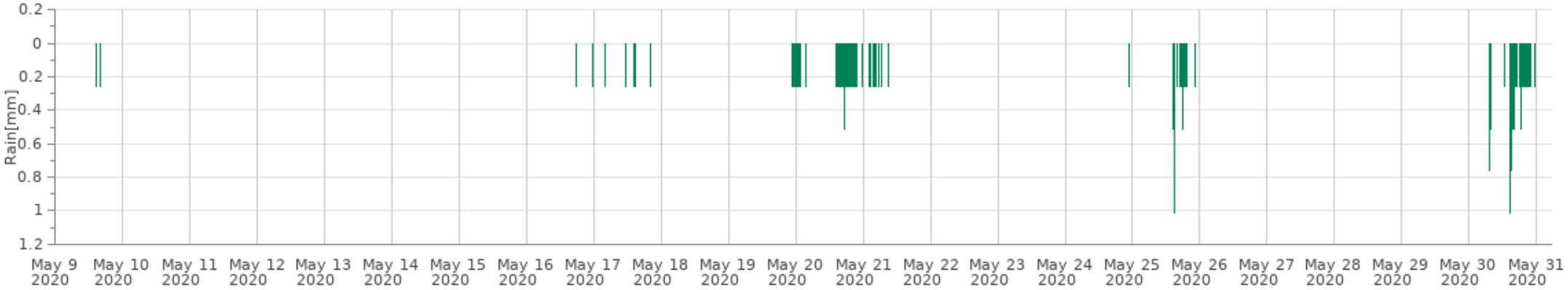
Monthly Data Report. 114-1008-005 / Site5
May, 2020

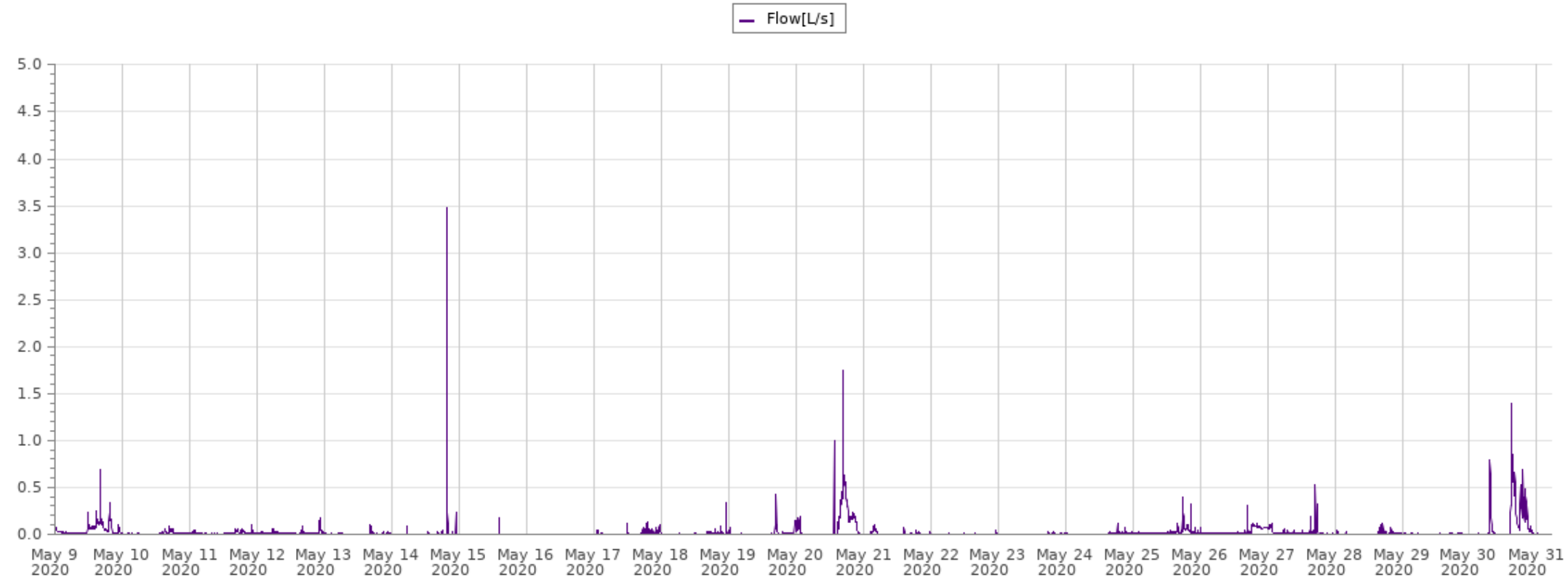




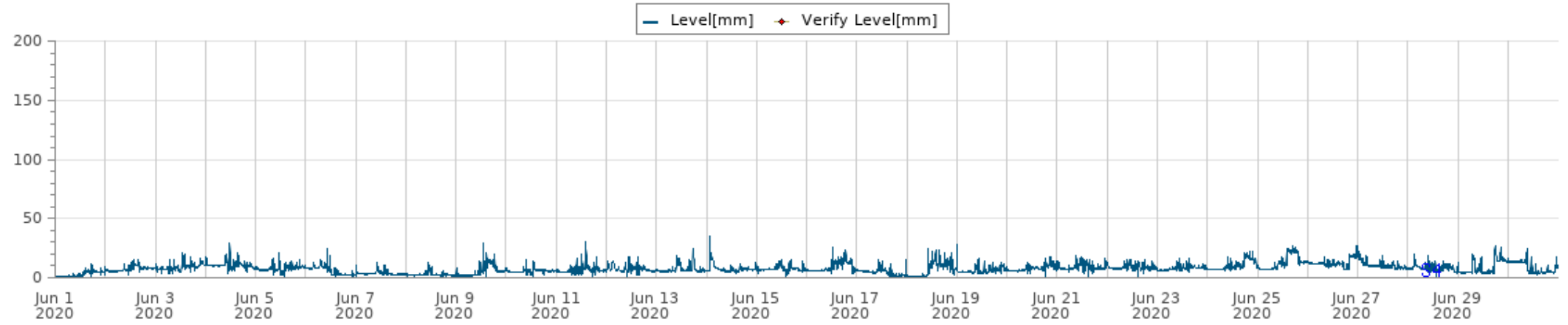


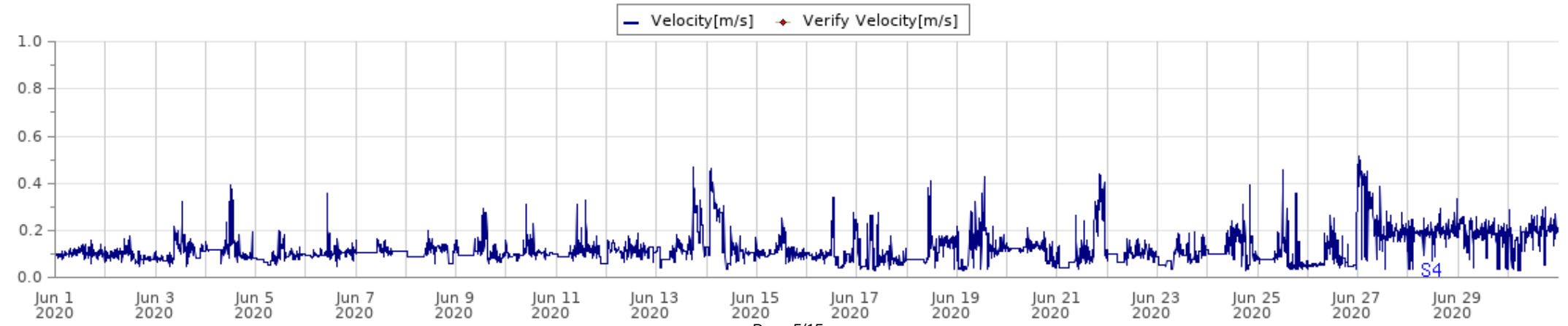
Monthly Data Report. 114-1008-005 / Site5
May, 2020



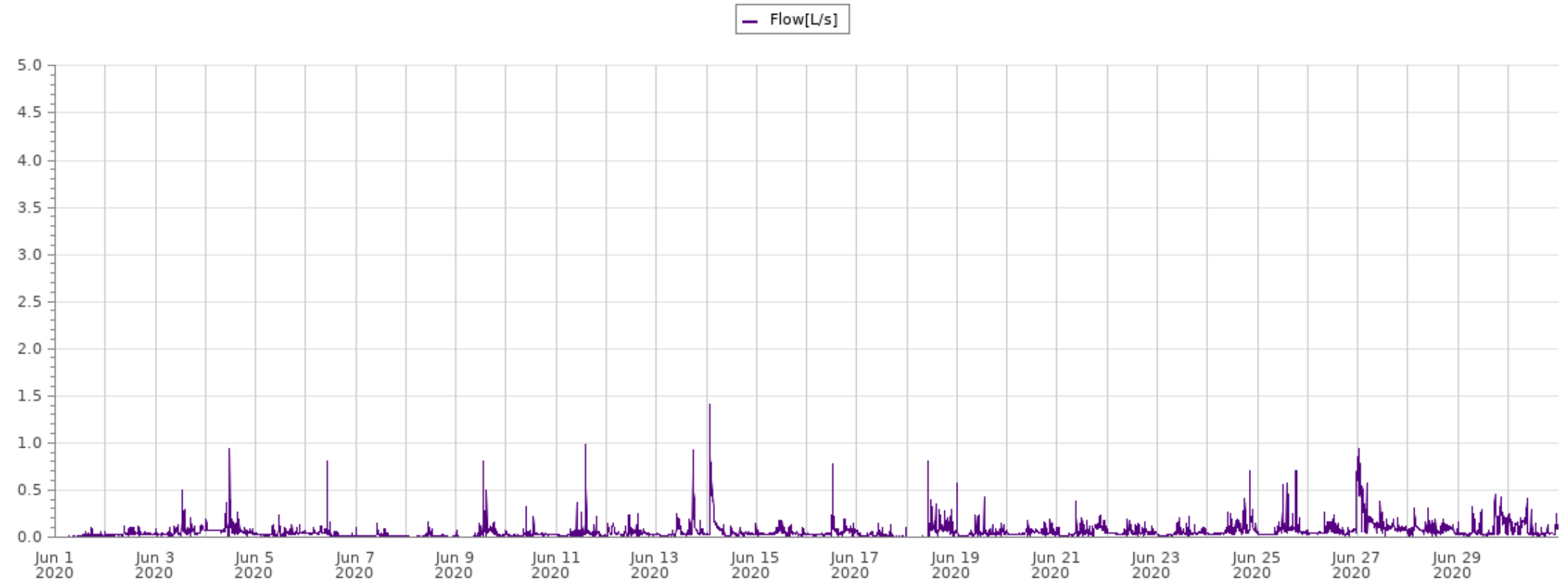


Monthly Data Report. 114-1008-005 / Site5
June, 2020

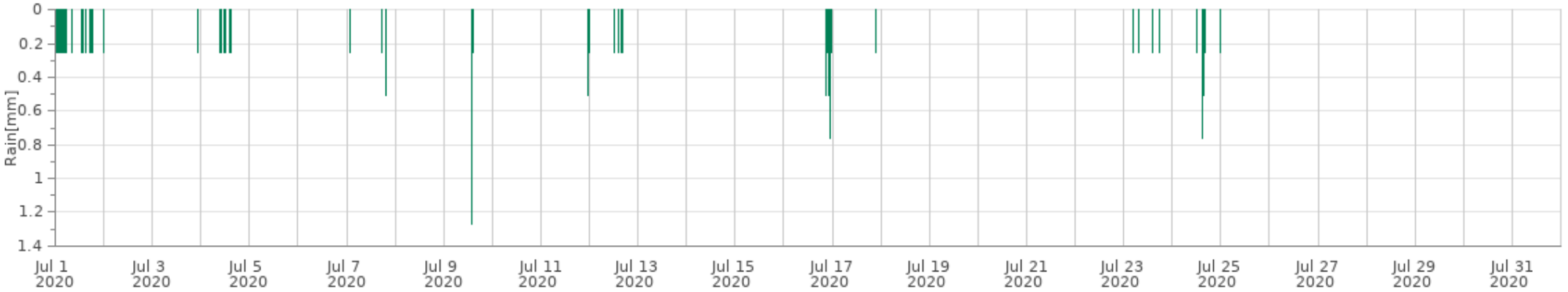


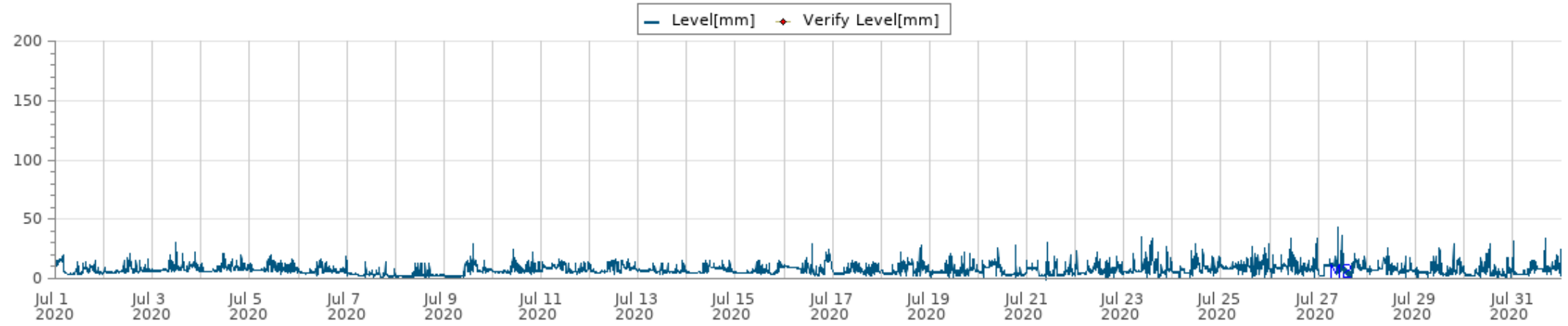


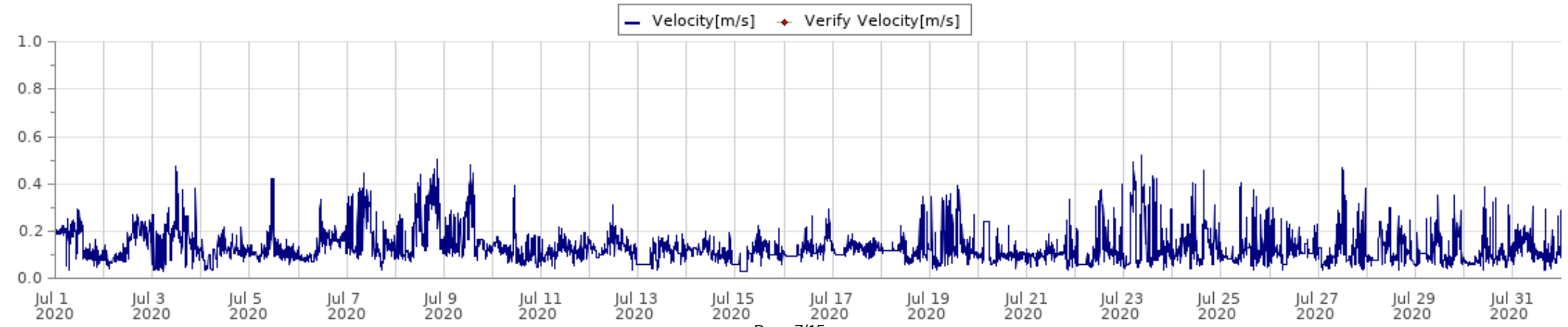
Monthly Data Report. 114-1008-005 / Site5
June, 2020



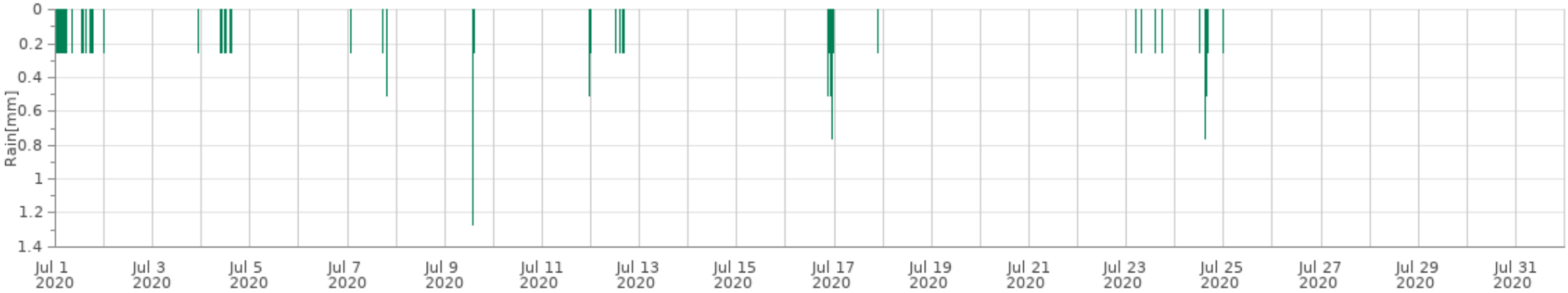
Monthly Data Report. 114-1008-005 / Site5
July, 2020

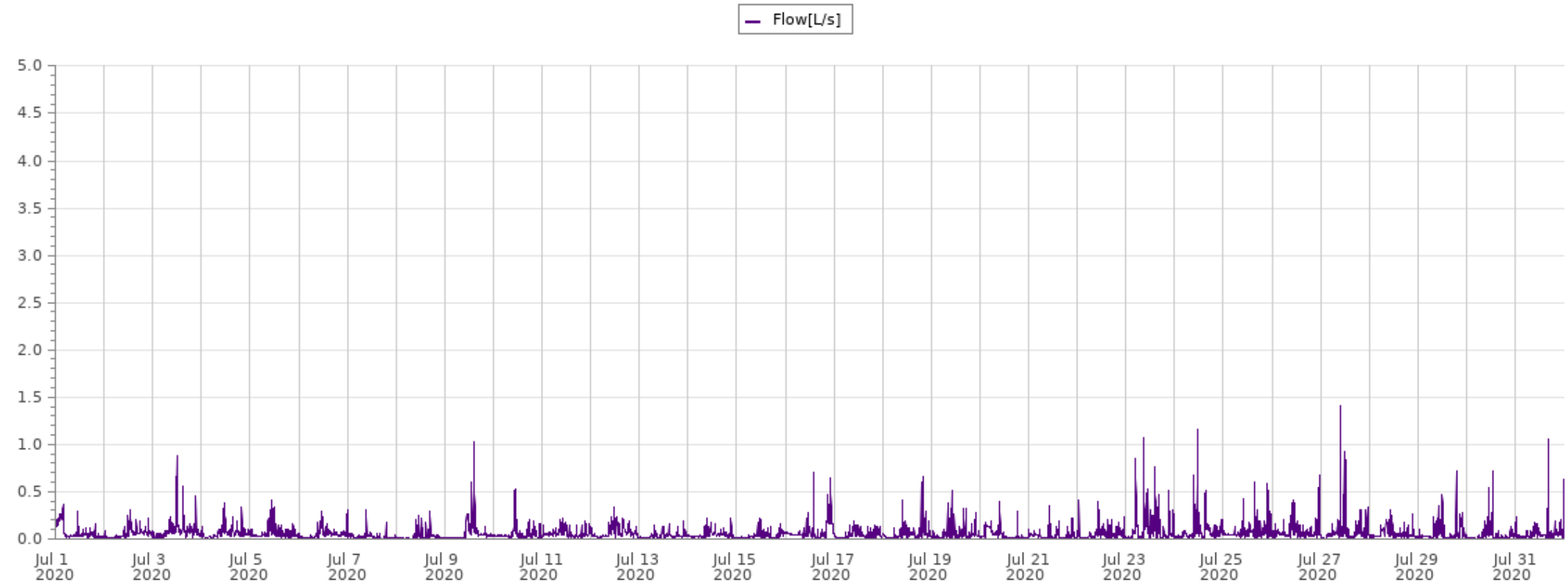




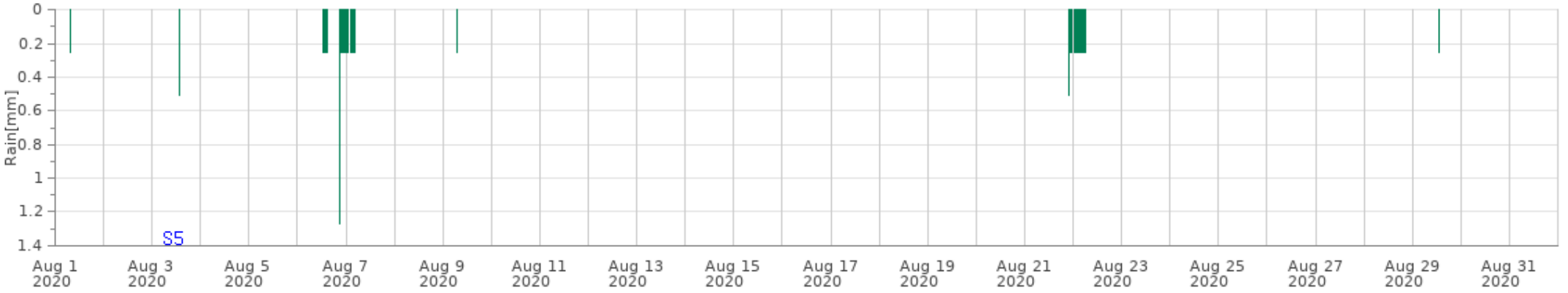


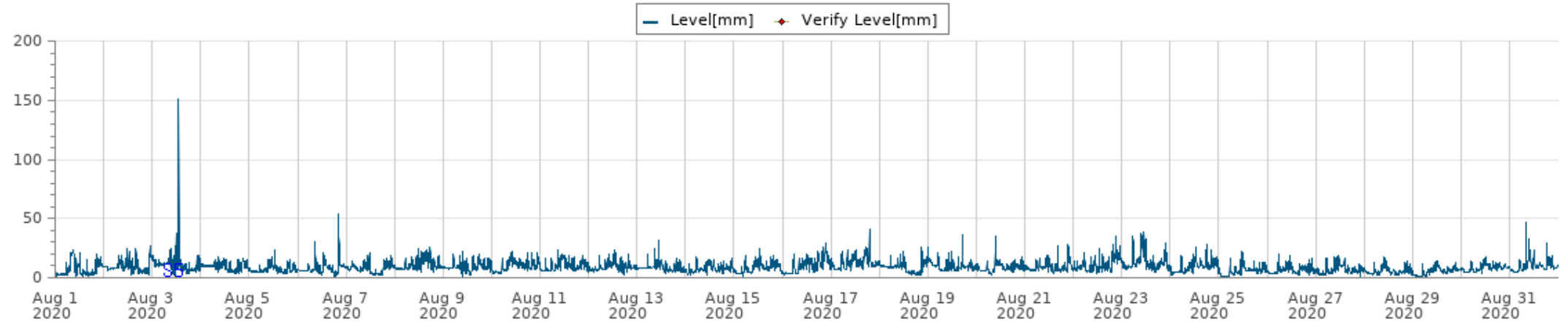
Monthly Data Report. 114-1008-005 / Site5
July, 2020

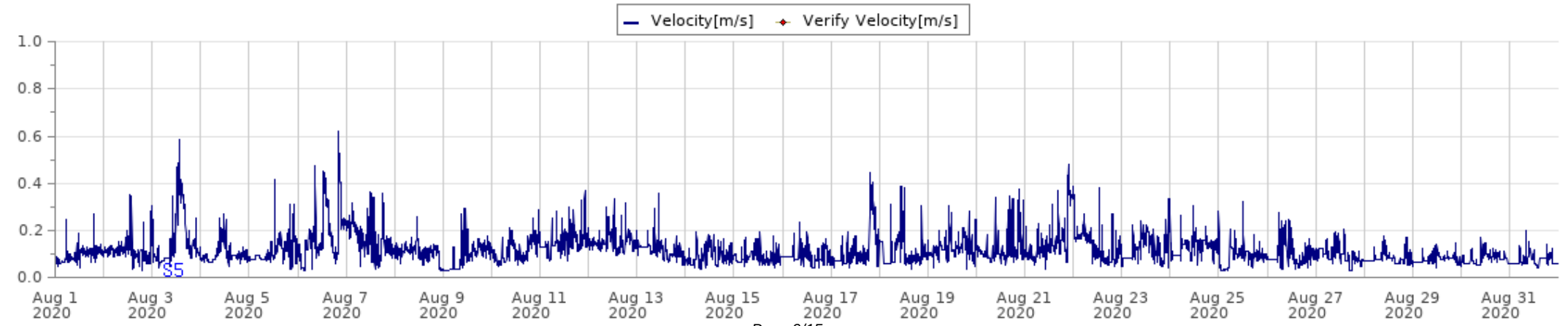




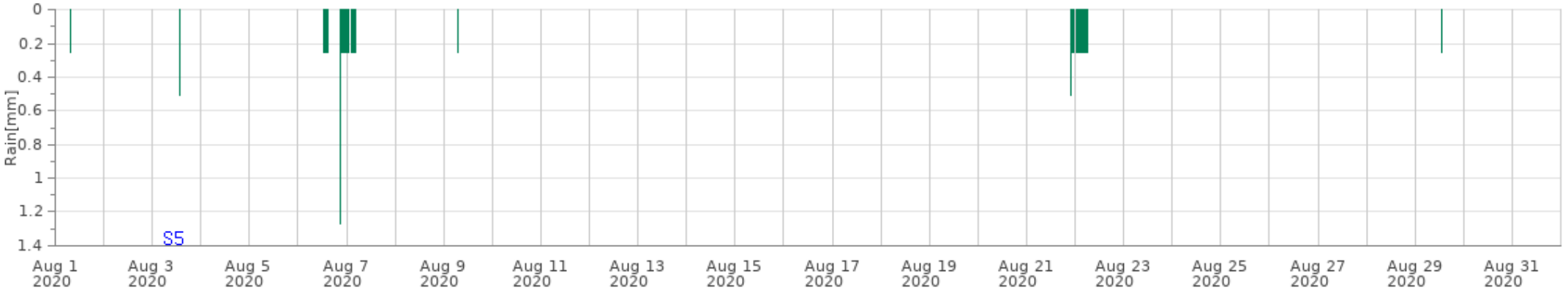
Monthly Data Report. 114-1008-005 / Site5
August, 2020

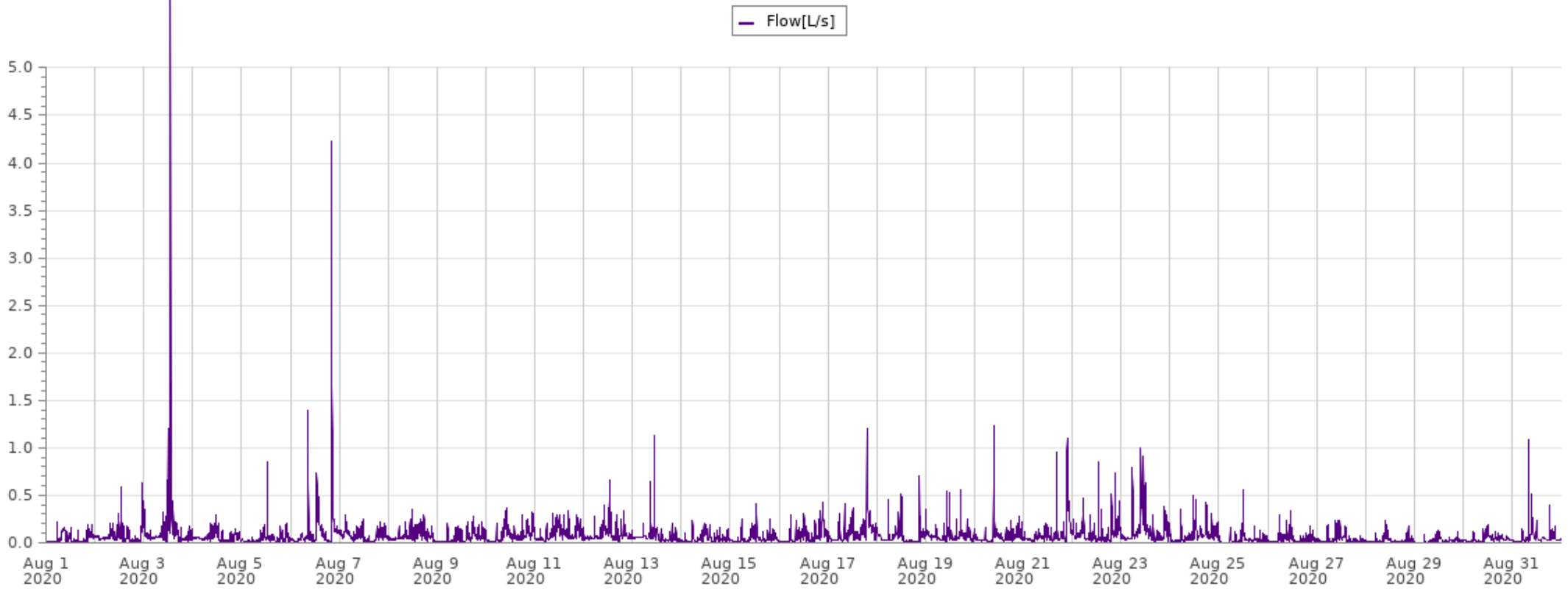




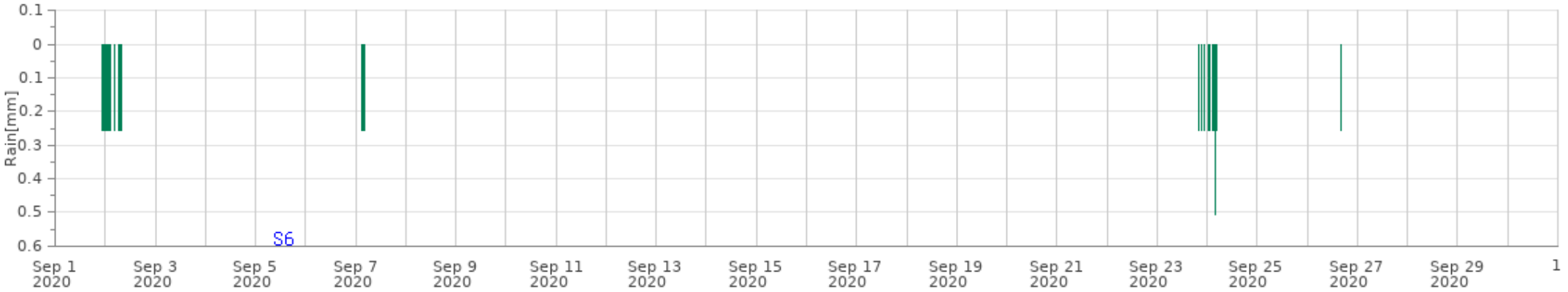


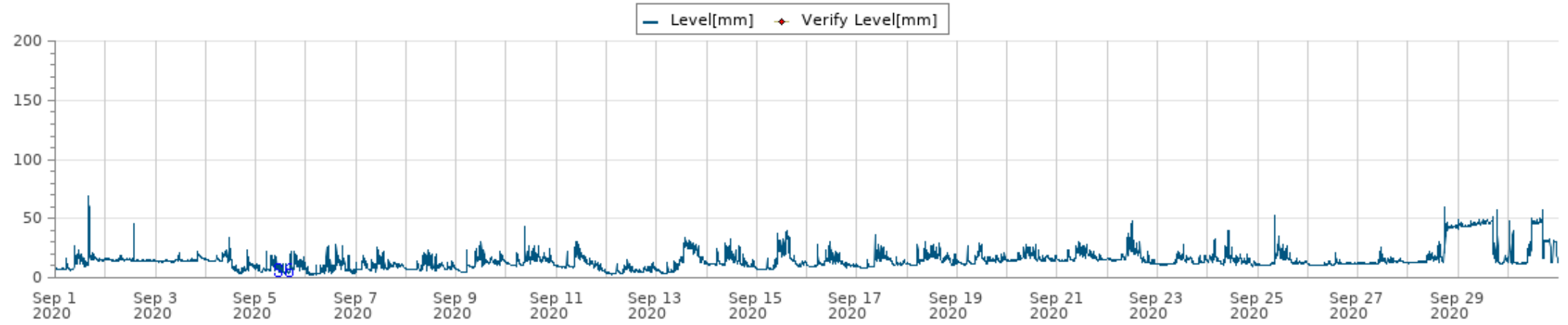
Monthly Data Report. 114-1008-005 / Site5
August, 2020

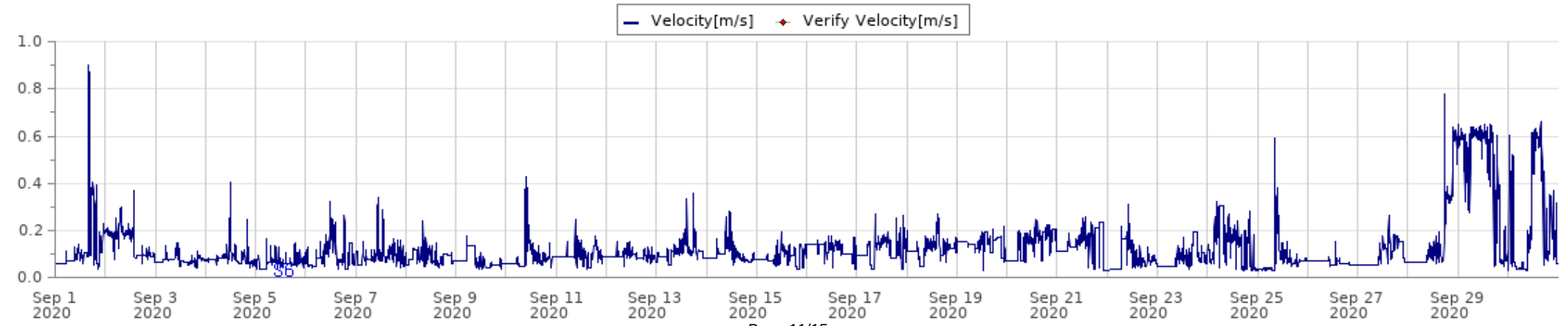




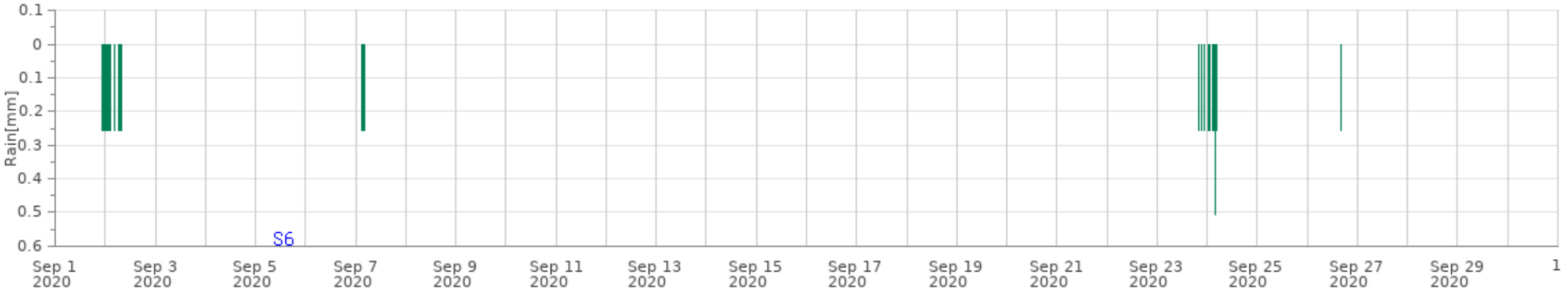
Monthly Data Report. 114-1008-005 / Site5
September, 2020

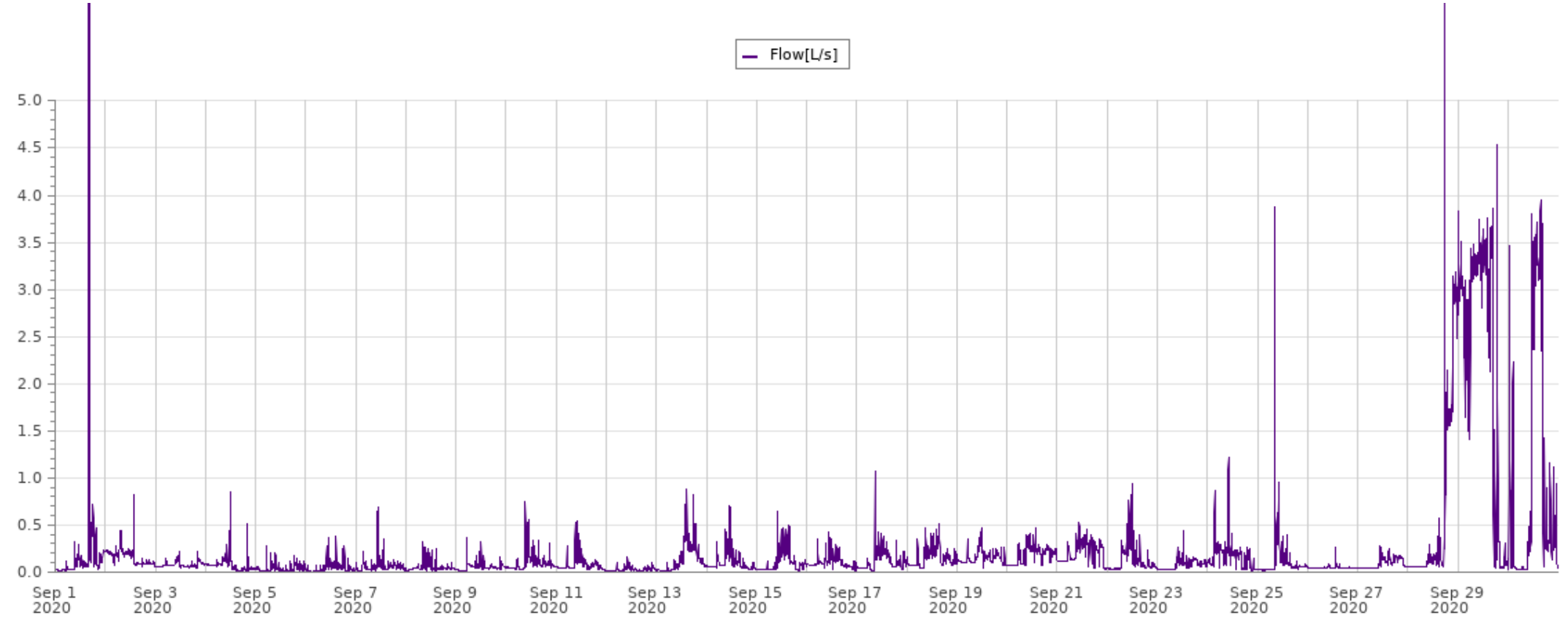




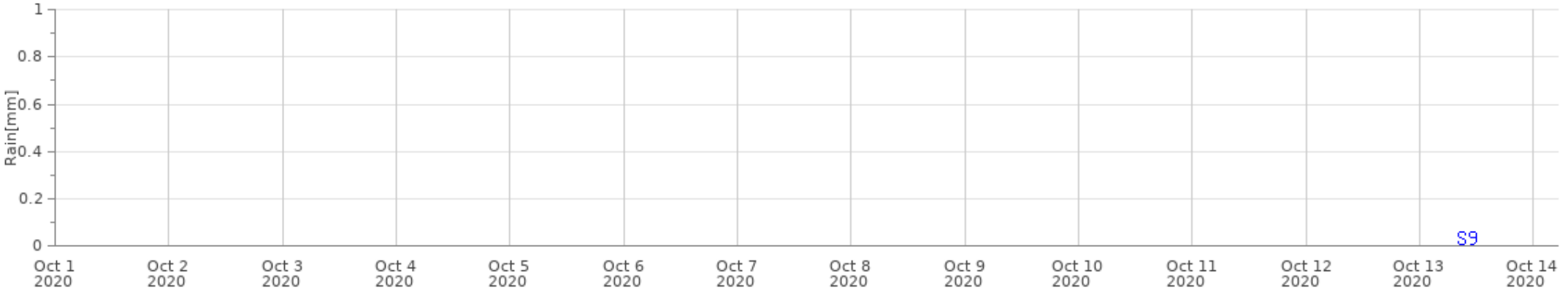


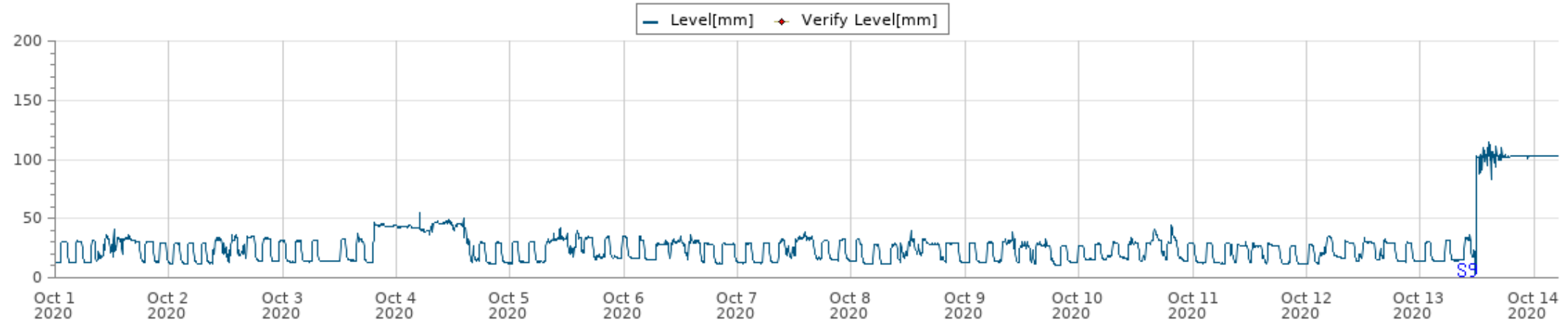
Monthly Data Report. 114-1008-005 / Site5
September, 2020

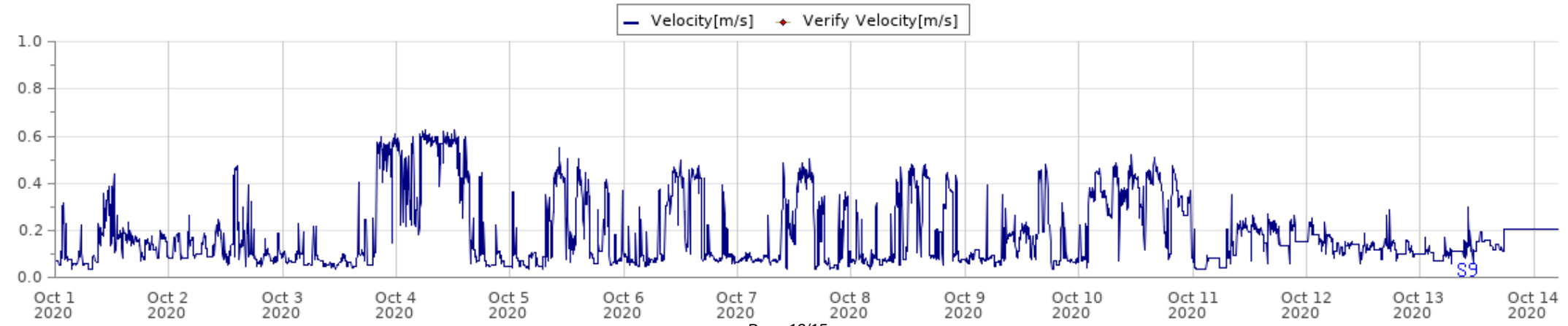




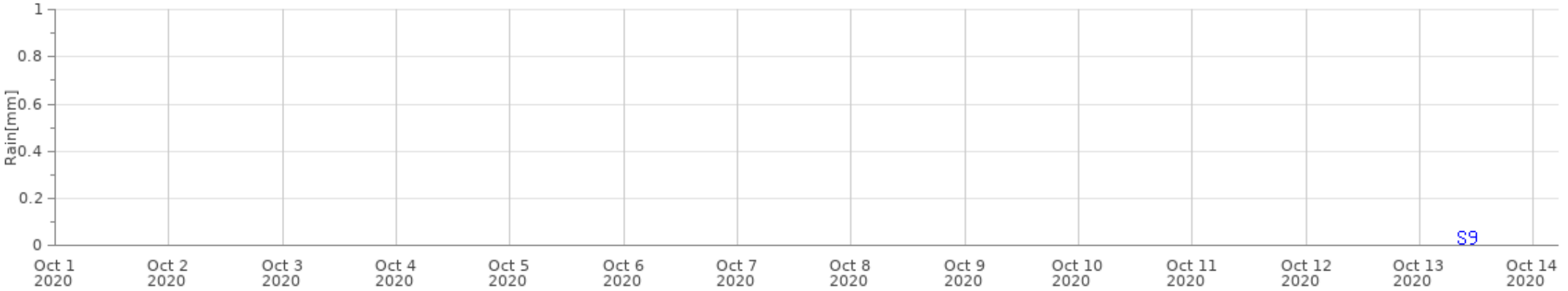
Monthly Data Report. 114-1008-005 / Site5
October, 2020

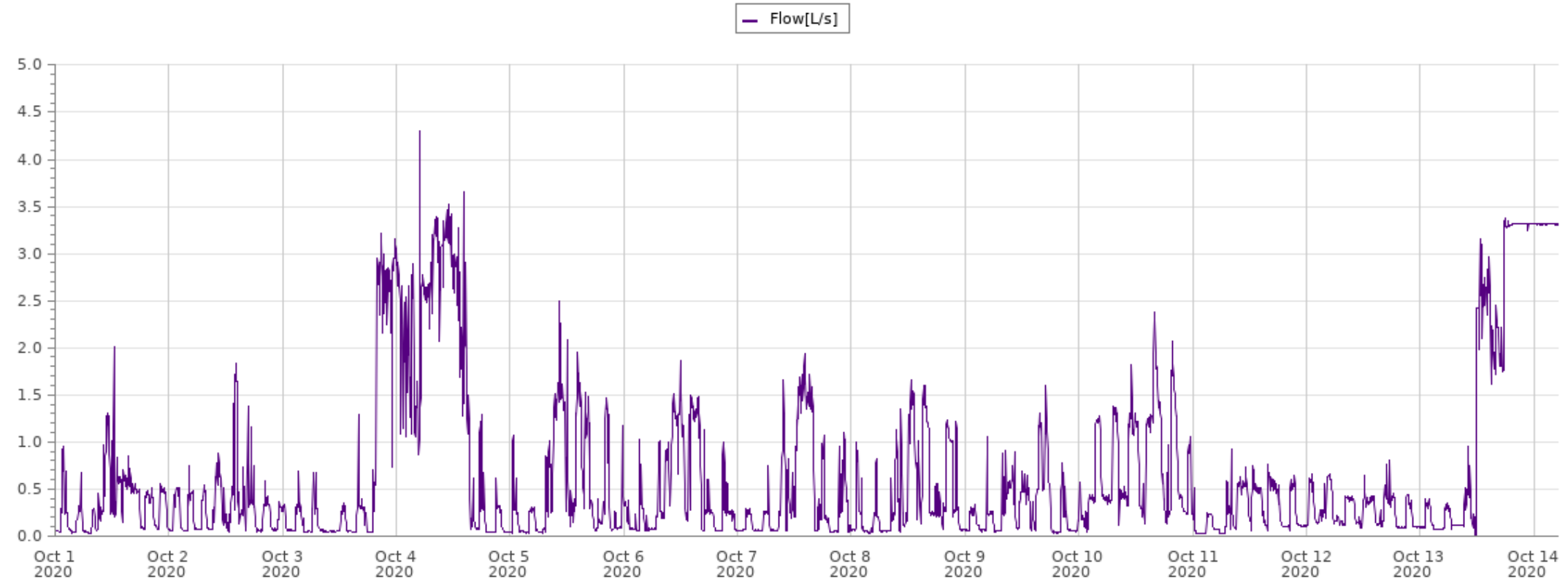






Monthly Data Report. 114-1008-005 / Site5
October, 2020





Monthly Data Report. 114-1008-005 / Site5
May, 2020 to October, 2020

Notes	
M1	**2020-05-22 19:45:00 to 2020-05-10 07:00:00 : Correction: Velocity From Lookup Table** .
M2	**2020-10-13 11:50:00 to 2020-07-27 13:05:00 : Level Corrected** Offset correction using: -100 [mm] . .
S3	**2020-05-09 19:00:00 to 2020-05-09 18:30:00 : Service Report** Install Report. Installed sensor in target manhole. There was no flow at the time of installation. We presumed it was tied to a pump station.
S4	**2020-06-28 13:00:00 to 2020-06-28 12:45:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Battery is good.
S5	**2020-08-03 13:05:00 to 2020-08-03 13:05:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Checked Battery
S6	**2020-09-05 20:00:00 to 2020-09-05 15:30:00 : Service Report** Minor Report. Downloaded data
S9	**2020-10-13 18:00:00 to 2020-10-13 10:30:00 : Service Report** Remove Report. We arrived to site downloaded data and removed are equipment.

114-1008-005 - Site5

Tabular Report - May 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
May	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
9	1	7	4	0.04	0.23	0.14	0	0.1	0	0
10	2	25	5	0.03	0.37	0.13	0	0.7	0	4
11	2	8	3	-0	0.19	0.08	-0	0.1	0	1
12	2	9	3	0	0.2	0.08	0	0.1	0	1
13	1	13	3	0	0.21	0.08	0	0.2	0	1
14	-2	9	1	-0.03	0.19	0.04	-0	0.1	0	0
15	-2	46	0	-0.02	0.64	0.07	-0	3.5	0	2
16	-3	12	-2	0.01	0.22	0.07	0	0.2	0	0
17	-3	6	-2	-0.02	0.16	0.06	-0	0	0	0
18	-3	10	1	-0.03	0.23	0.05	-0	0.1	0	1
19	-1	17	2	-0.04	0.29	0.04	-0	0.3	0	1
20	-1	18	2	-0.05	0.29	0.05	-0	0.4	0	1
21	-2	39	5	-0.02	0.4	0.11	-0	1.7	0.1	8
22	-2	8	0	-0.03	0.15	0.05	-0	0.1	0	0
23	-2	6	-0	0.04	0.17	0.08	0	0	0	0
24	1	6	1	0.06	0.17	0.09	0	0	0	0
25	-1	14	3	0.05	0.18	0.09	0	0.1	0	1
26	-0	21	4	0.06	0.32	0.15	0	0.4	0	2
27	-0	17	6	0.04	0.24	0.1	0	0.3	0	3
28	-1	29	3	0.04	0.35	0.09	0	0.5	0	1
29	-1	11	1	0.03	0.24	0.1	0	0.1	0	1
30	1	3	1	0.08	0.13	0.1	0	0	0	0
31	-0	35	6	0.03	0.43	0.16	0	1.4	0.1	10
Minimum	-3	3	-2	-0.05	0.13	0.04	-0	0	0	Total
Maximum	2	46	6	0.08	0.64	0.16	0	3.5	0.1	39
Average	-1	16	2	0.01	0.26	0.09	0	0.5	0	

Shaded areas are weekends

114-1008-005 - Site5

Tabular Report - June 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
June	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	0	12	3	0.06	0.16	0.1	0	0.1	0	1
2	2	15	7	0.04	0.18	0.09	0	0.1	0	3
3	3	21	9	0.05	0.32	0.11	0	0.5	0.1	5
4	4	30	10	0.06	0.39	0.12	0	0.9	0.1	7
5	0	21	8	0.05	0.2	0.09	0	0.2	0	3
6	0	25	6	0.05	0.35	0.1	0	0.8	0	3
7	1	13	3	0.09	0.17	0.11	0	0.1	0	1
8	-0	13	2	0.06	0.2	0.1	0	0.2	0	1
9	-1	29	6	0.06	0.29	0.11	0	0.8	0	3
10	1	15	5	0.07	0.31	0.1	0	0.3	0	2
11	1	30	7	0.06	0.33	0.1	0	1	0	4
12	1	18	7	0.06	0.19	0.11	0	0.2	0	4
13	4	25	7	0.04	0.47	0.14	0	0.9	0.1	6
14	4	35	7	0.03	0.46	0.16	0	1.4	0.1	8
15	1	15	7	0.06	0.25	0.11	0	0.2	0	4
16	3	25	9	0.04	0.34	0.11	0	0.8	0.1	5
17	-0	15	5	0.03	0.27	0.09	0	0.1	0	2
18	0	24	7	0.04	0.41	0.12	0	0.8	0.1	6
19	3	19	6	0.03	0.43	0.13	0	0.4	0	4
20	0	17	8	0.04	0.21	0.12	0	0.2	0	4
21	0	18	9	0.04	0.44	0.12	0	0.4	0.1	5
22	1	16	9	0.05	0.16	0.1	0	0.2	0	4
23	5	16	8	0.03	0.2	0.09	0	0.2	0	4
24	6	22	10	0.03	0.39	0.13	0	0.7	0.1	7
25	7	27	13	0.03	0.46	0.09	0	0.7	0.1	7
26	7	27	12	0.04	0.3	0.09	0	0.7	0.1	6
27	6	22	10	0.03	0.52	0.24	0	0.9	0.2	14
28	1	19	8	0.03	0.33	0.19	0	0.3	0.1	7
29	3	27	8	0.03	0.26	0.18	0	0.5	0.1	8
30	2	25	9	0.03	0.3	0.18	0	0.4	0.1	7
Minimum	-1	12	2	0.03	0.16	0.09	0	0.1	0	Total
Maximum	7	35	13	0.09	0.52	0.24	0	1.4	0.2	144
Average	2	21	8	0.05	0.31	0.12	0	0.5	0.1	

Shaded areas are weekends

114-1008-005 - Site5

Tabular Report - July 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
July	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	3	20	7	0.04	0.29	0.15	0	0.4	0.1	6
2	4	21	7	0.04	0.27	0.14	0	0.3	0.1	5
3	6	31	9	0.03	0.48	0.16	0	0.9	0.1	8
4	5	21	9	0.03	0.22	0.11	0	0.4	0.1	5
5	4	20	9	0.06	0.42	0.12	0	0.4	0.1	6
6	3	18	7	0.07	0.33	0.14	0	0.3	0.1	4
7	-0	14	3	0.04	0.45	0.18	0	0.3	0	2
8	1	13	3	0.07	0.5	0.21	0	0.3	0	2
9	1	29	6	0.07	0.48	0.17	0	1	0.1	5
10	3	24	7	0.04	0.39	0.12	0	0.5	0.1	4
11	4	16	9	0.04	0.22	0.12	0	0.2	0.1	5
12	4	16	9	0.03	0.31	0.13	0	0.3	0.1	6
13	3	15	7	0.03	0.18	0.1	0	0.2	0	3
14	4	16	7	0.05	0.2	0.11	0	0.2	0	4
15	3	15	6	0.03	0.22	0.1	0	0.2	0	3
16	2	29	9	0.07	0.29	0.12	0	0.7	0.1	7
17	3	15	7	0.08	0.19	0.12	0	0.2	0	4
18	2	28	8	0.06	0.35	0.12	0	0.7	0.1	5
19	-0	23	7	0.04	0.39	0.14	0	0.5	0.1	5
20	1	28	7	0.04	0.24	0.11	0	0.4	0	4
21	-1	31	6	0.03	0.33	0.1	0	0.3	0	3
22	-0	23	7	0.05	0.4	0.12	0	0.4	0	4
23	-0	35	9	0.04	0.52	0.17	0	1.1	0.1	9
24	0	29	8	0.04	0.46	0.14	0	1.2	0.1	7
25	1	30	10	0.03	0.4	0.12	0	0.6	0.1	6
26	1	34	10	0.03	0.3	0.12	0	0.7	0.1	6
27	0	43	9	0.03	0.47	0.12	0	1.4	0.1	7
28	0	25	8	0.03	0.3	0.12	0	0.3	0.1	5
29	1	30	7	0.04	0.35	0.11	0	0.7	0.1	4
30	-0	29	6	0.03	0.39	0.1	0	0.7	0	3
31	2	34	8	0.04	0.3	0.13	0	1.1	0.1	5
Minimum	-1	13	3	0.03	0.18	0.1	0	0.2	0	Total
Maximum	6	43	10	0.08	0.52	0.21	0	1.4	0.1	151
Average	2	24	7	0.04	0.34	0.13	0	0.5	0.1	

Shaded areas are weekends

114-1008-005 - Site5

Tabular Report - August 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
August	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	-1	23	7	0.04	0.27	0.09	0	0.2	0	3
2	2	26	9	0.03	0.35	0.12	0	0.6	0.1	7
3	1	151	12	0.04	0.59	0.16	0	12.3	0.3	22
4	4	17	9	0.05	0.27	0.1	0	0.3	0.1	5
5	3	23	7	0.03	0.42	0.11	0	0.8	0	4
6	1	54	8	0.03	0.62	0.18	0	4.2	0.1	12
7	2	21	8	0.03	0.36	0.17	0	0.3	0.1	6
8	5	26	11	0.03	0.26	0.11	0	0.3	0.1	7
9	1	22	9	0.03	0.29	0.09	0	0.3	0.1	5
10	4	23	10	0.05	0.29	0.11	0	0.4	0.1	7
11	5	23	10	0.07	0.37	0.15	0	0.3	0.1	8
12	2	23	9	0.09	0.33	0.16	0	0.7	0.1	8
13	3	32	8	0.05	0.35	0.12	0	1.1	0.1	5
14	2	17	8	0.03	0.2	0.09	0	0.2	0	4
15	1	24	8	0.04	0.19	0.09	0	0.4	0	4
16	3	29	10	0.04	0.24	0.09	0	0.4	0.1	6
17	6	41	12	0.04	0.44	0.12	0	1.2	0.1	10
18	2	26	8	0.04	0.39	0.11	0	0.7	0.1	5
19	5	36	10	0.04	0.31	0.13	0	0.6	0.1	7
20	3	35	8	0.05	0.38	0.12	0	1.2	0.1	6
21	3	28	9	0.04	0.48	0.15	0	1.1	0.1	8
22	4	35	11	0.05	0.38	0.13	0	0.9	0.1	8
23	4	38	13	0.04	0.33	0.12	0	1	0.1	12
24	2	27	9	0.05	0.3	0.13	0	0.5	0.1	7
25	0	22	6	0.03	0.32	0.09	0	0.6	0	3
26	2	20	7	0.04	0.27	0.1	0	0.3	0	3
27	1	18	7	0.03	0.21	0.1	0	0.2	0	3
28	2	18	5	0.05	0.18	0.08	0	0.2	0	2
29	1	14	5	0.04	0.15	0.08	0	0.1	0	2
30	4	17	8	0.05	0.17	0.08	0	0.2	0	3
31	5	47	10	0.04	0.2	0.07	0	1.1	0.1	5
Minimum	-1	14	5	0.03	0.15	0.07	0	0.1	0	Total
Maximum	6	151	13	0.09	0.62	0.18	0	12.3	0.3	197
Average	3	31	9	0.04	0.32	0.11	0	1.1	0.1	

Shaded areas are weekends

114-1008-005 - Site5

Tabular Report - September 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
September	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	6	69	14	0.03	0.9	0.14	0	8.5	0.4	31
2	13	46	15	0.06	0.37	0.15	0.1	0.8	0.2	14
3	13	23	15	0.04	0.14	0.07	0	0.2	0.1	7
4	3	34	12	0.04	0.4	0.08	0	0.9	0.1	6
5	3	23	9	0.04	0.17	0.06	0	0.3	0	3
6	2	27	8	0.03	0.32	0.09	0	0.4	0	4
7	4	26	10	0.04	0.34	0.09	0	0.7	0.1	6
8	5	24	9	0.04	0.24	0.08	0	0.3	0	4
9	5	31	12	0.03	0.18	0.07	0	0.4	0.1	5
10	10	43	15	0.04	0.43	0.08	0	0.8	0.1	9
11	4	31	12	0.03	0.25	0.09	0	0.5	0.1	7
12	3	15	6	0.04	0.15	0.09	0	0.2	0	2
13	4	34	14	0.05	0.36	0.11	0	0.9	0.1	12
14	8	33	14	0.05	0.28	0.09	0	0.7	0.1	9
15	6	40	14	0.04	0.19	0.09	0	0.6	0.1	9
16	8	30	13	0.03	0.18	0.12	0	0.4	0.1	9
17	8	37	13	0.03	0.27	0.12	0	1.1	0.1	10
18	10	31	16	0.04	0.27	0.12	0	0.5	0.2	13
19	11	30	15	0.03	0.22	0.14	0	0.5	0.2	13
20	13	29	17	0.06	0.25	0.14	0.1	0.5	0.2	16
21	14	30	18	0.03	0.26	0.15	0	0.5	0.2	18
22	11	48	18	0.03	0.31	0.08	0	0.9	0.1	12
23	11	28	14	0.04	0.19	0.08	0	0.4	0.1	7
24	9	40	16	0.03	0.32	0.14	0	1.2	0.2	15
25	10	52	14	0.03	0.59	0.08	0	3.9	0.1	10
26	10	21	12	0.05	0.15	0.06	0	0.3	0	4
27	11	26	13	0.05	0.26	0.1	0	0.3	0.1	8
28	12	59	23	0.06	0.78	0.18	0.1	6.1	0.7	56
29	12	58	37	0.05	0.65	0.46	0	4.5	2.3	195
30	12	58	26	0.03	0.66	0.25	0	3.9	1	85
Minimum	2	15	6	0.03	0.14	0.06	0	0.2	0	Total
Maximum	14	69	37	0.06	0.9	0.46	0.1	8.5	2.3	599
Average	8	36	15	0.04	0.34	0.12	0	1.4	0.2	

Shaded areas are weekends

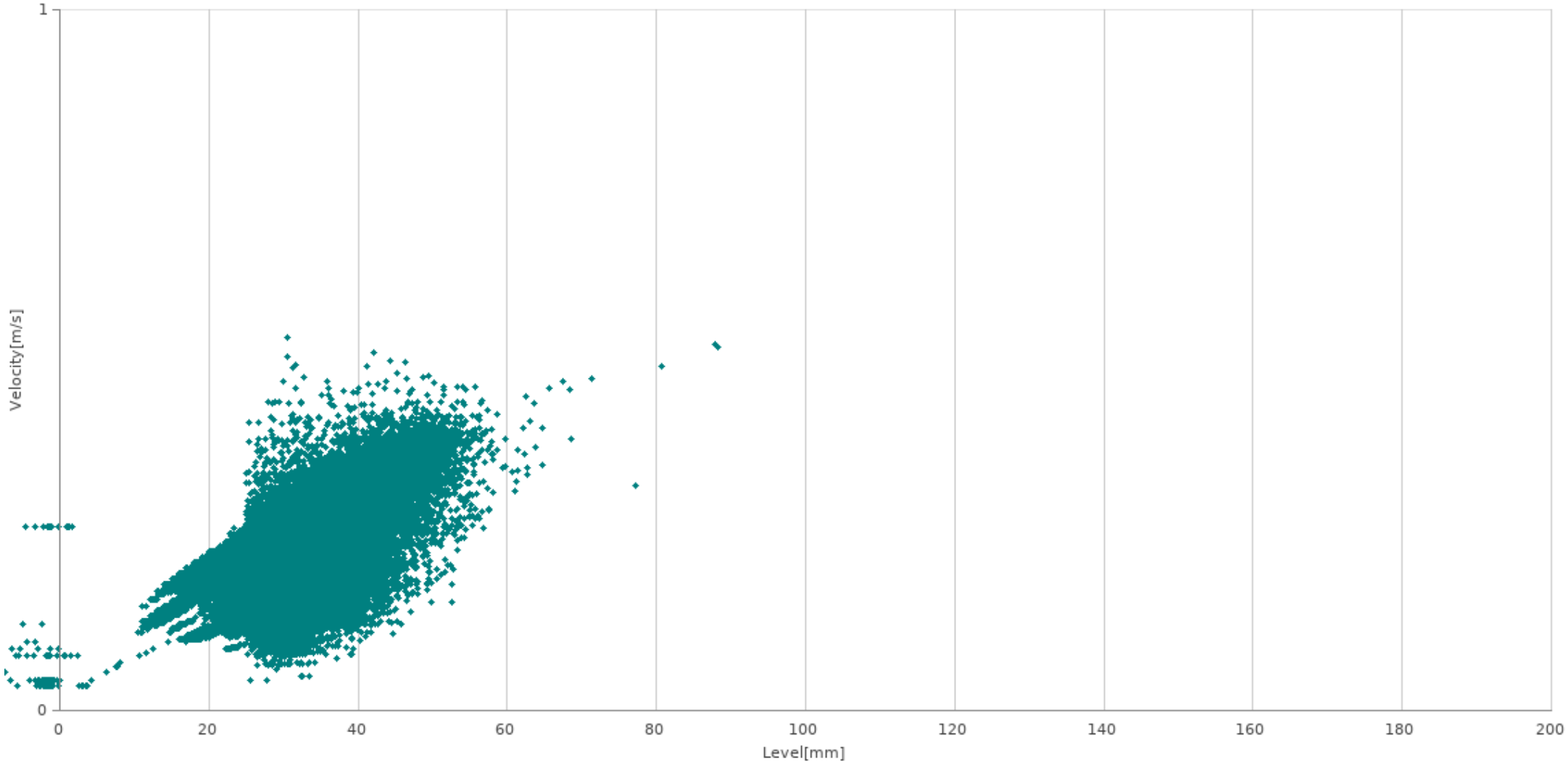
114-1008-005 - Site5

Tabular Report - October 2020

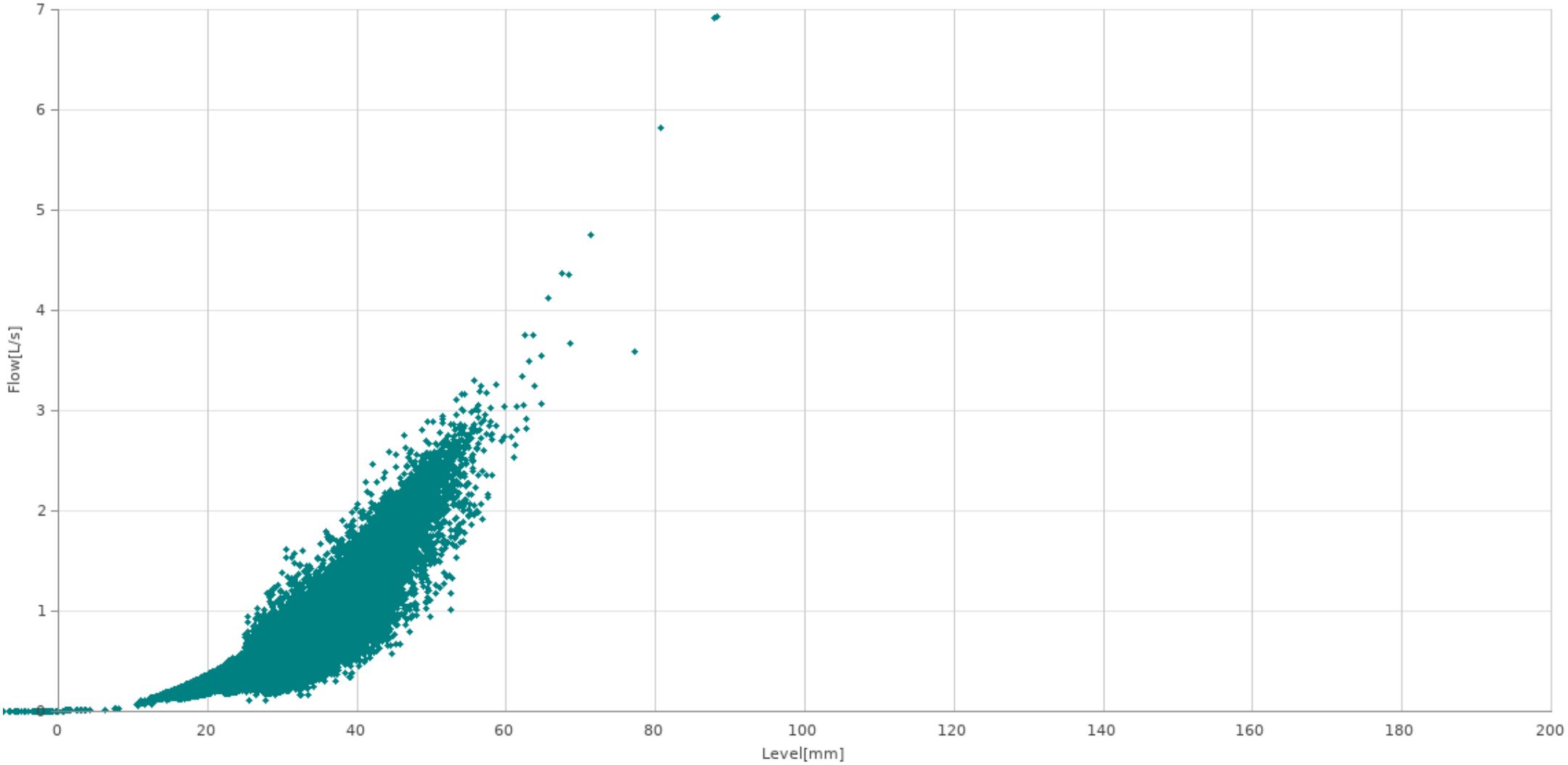
	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
October	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	12	41	24	0.03	0.44	0.13	0	2	0.3	30
2	12	36	23	0.04	0.47	0.13	0	1.8	0.3	27
3	12	46	24	0.04	0.61	0.16	0	3.2	0.6	52
4	12	55	34	0.05	0.63	0.35	0	4.3	1.6	140
5	12	42	24	0.04	0.55	0.18	0	2.5	0.5	46
6	12	36	24	0.05	0.5	0.19	0	1.9	0.5	42
7	12	38	23	0.04	0.5	0.18	0	1.9	0.5	40
8	11	39	22	0.03	0.48	0.19	0	1.7	0.5	39
9	11	38	21	0.04	0.48	0.14	0	1.6	0.3	26
10	13	44	24	0.04	0.52	0.33	0	2.4	0.8	66
11	11	30	20	0.03	0.35	0.14	0	0.9	0.3	23
12	11	35	22	0.06	0.29	0.13	0.1	0.8	0.3	24
13	3	115	62	0.06	0.3	0.14	0	3.4	1.5	131
14	102	103	103	0.2	0.2	0.2	3.3	3.3	3.3	60
Minimum	3	30	20	0.03	0.2	0.13	0	0.8	0.3	Total
Maximum	102	115	103	0.2	0.63	0.35	3.3	4.3	3.3	745
Average	18	50	32	0.05	0.45	0.19	0.3	2.3	0.8	

Shaded areas are weekends

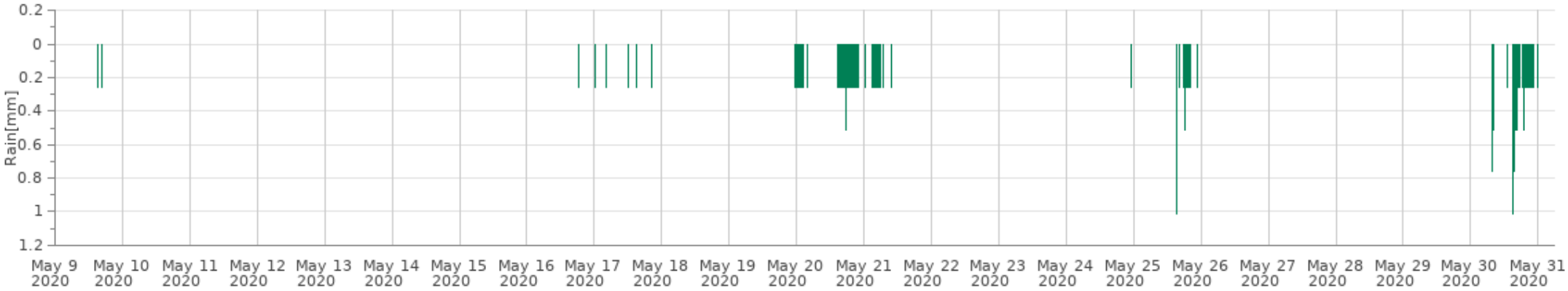
Monthly Data Report. 114-1008-006 / Site6
February, 2020 to October, 2020

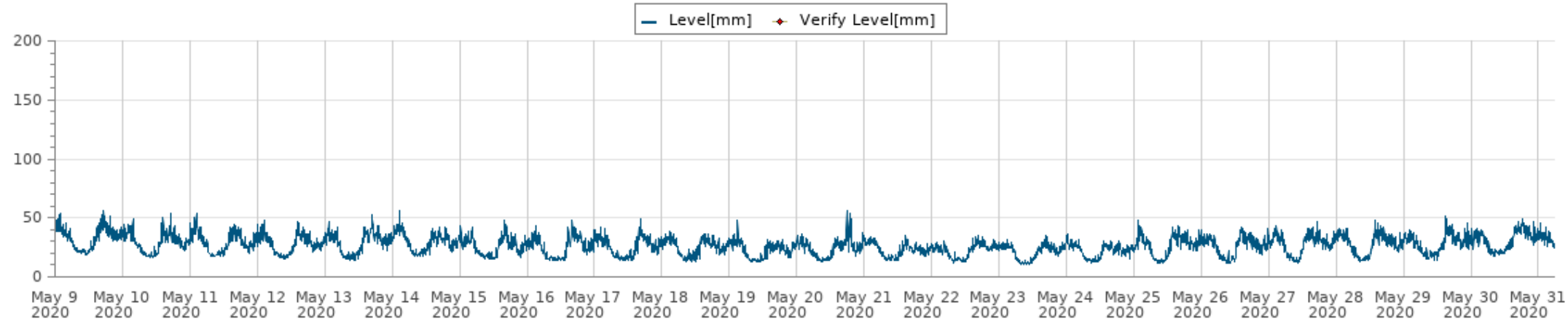


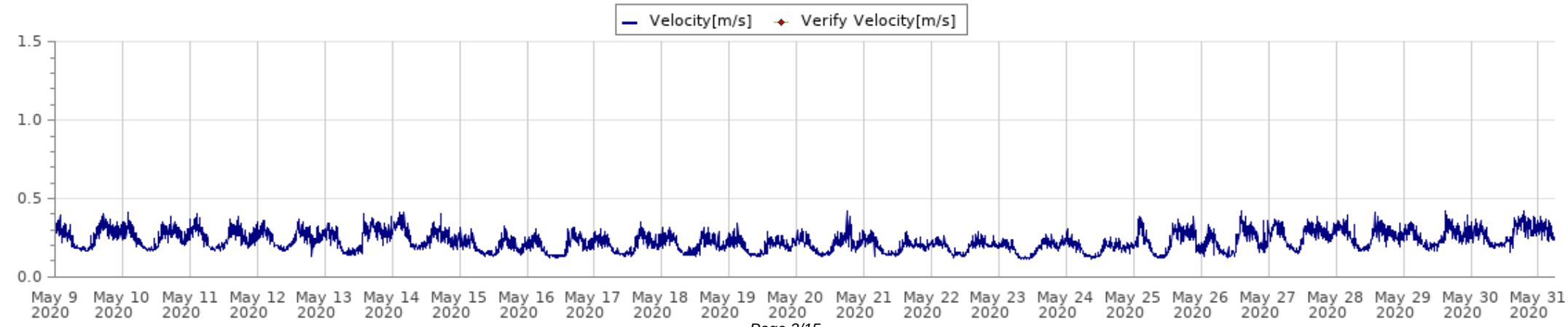
Monthly Data Report. 114-1008-006 / Site6
February, 2020 to October, 2020



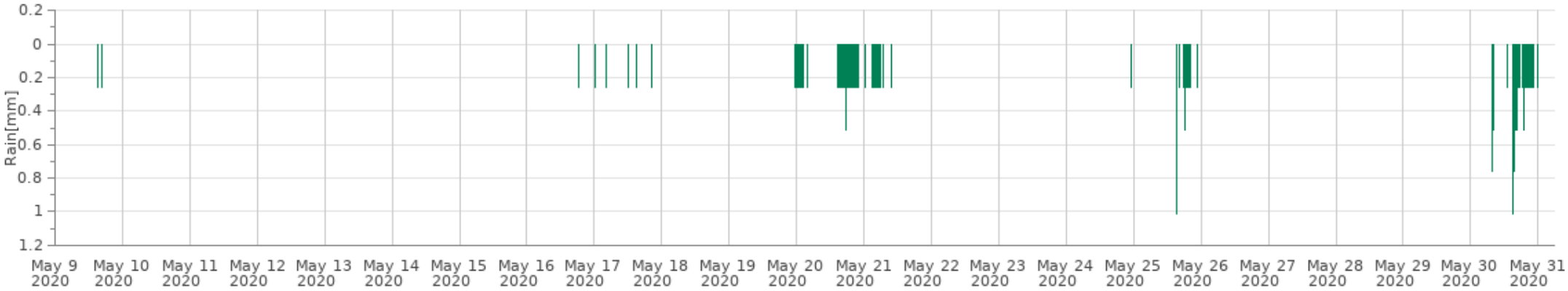
Monthly Data Report. 114-1008-006 / Site6
May, 2020

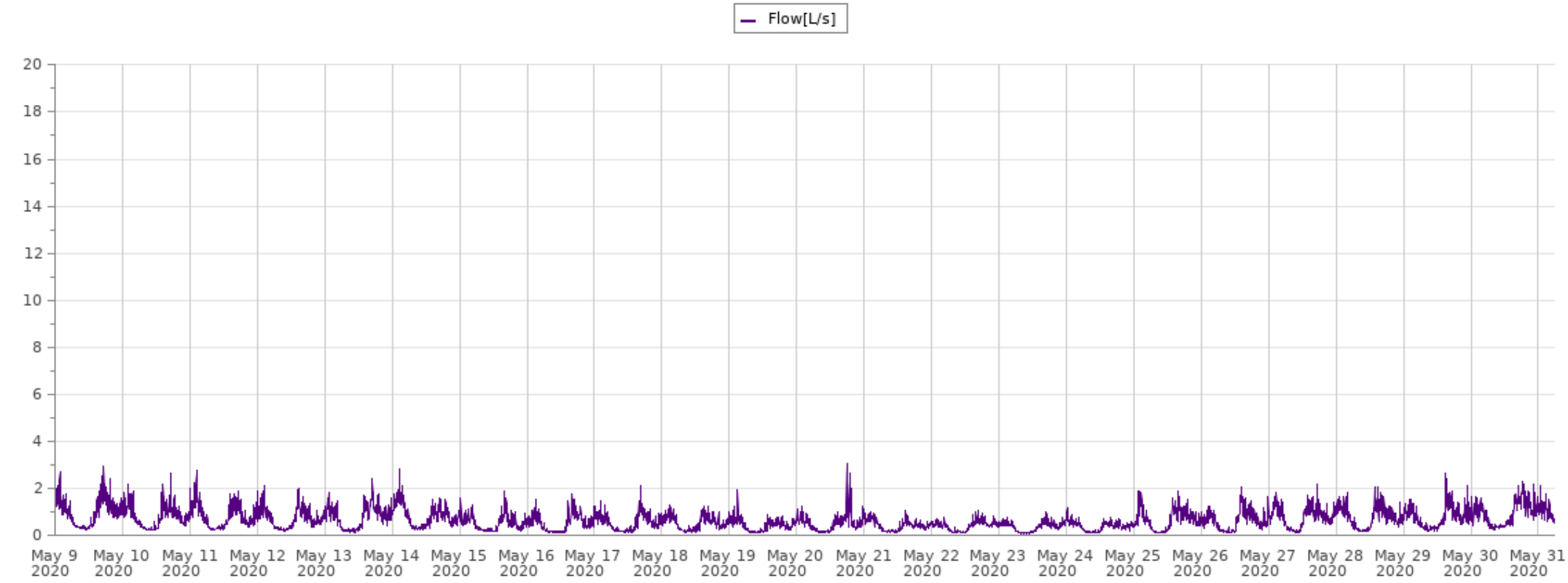




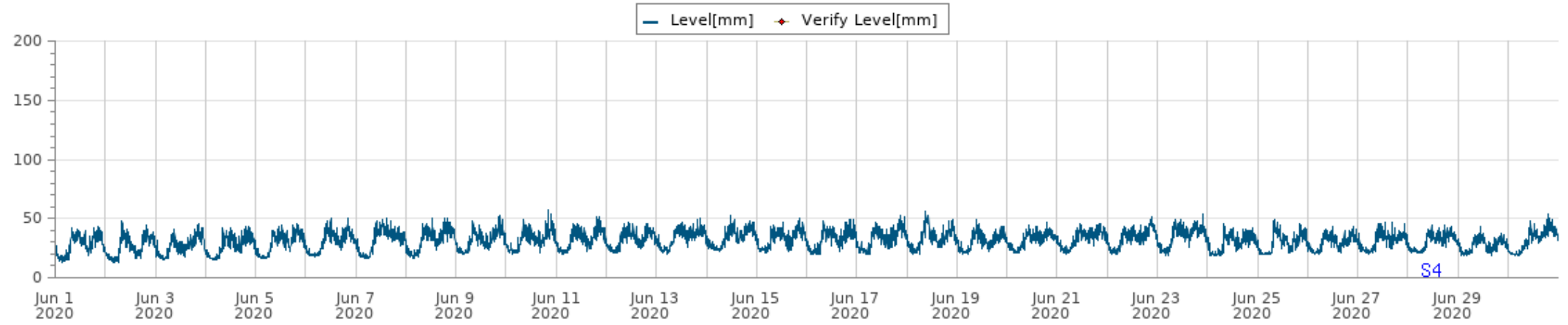


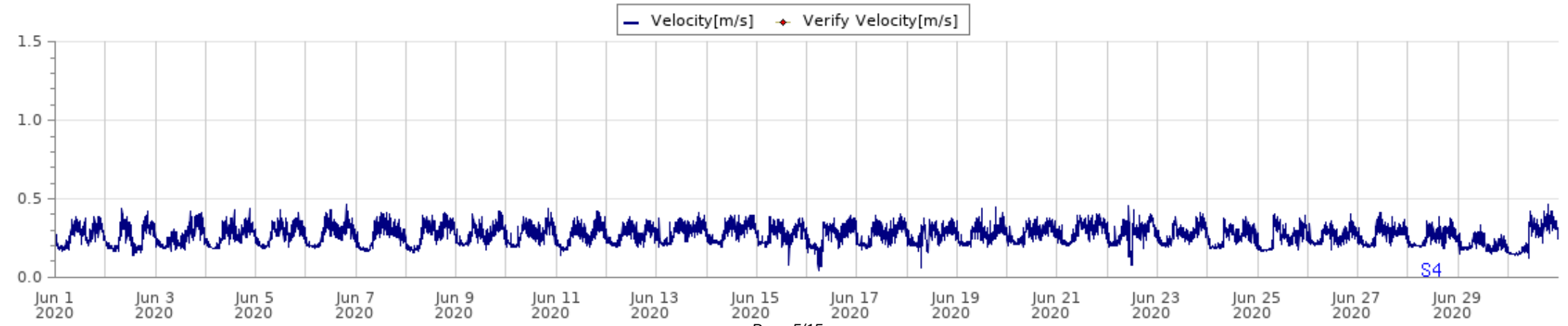
Monthly Data Report. 114-1008-006 / Site6
May, 2020



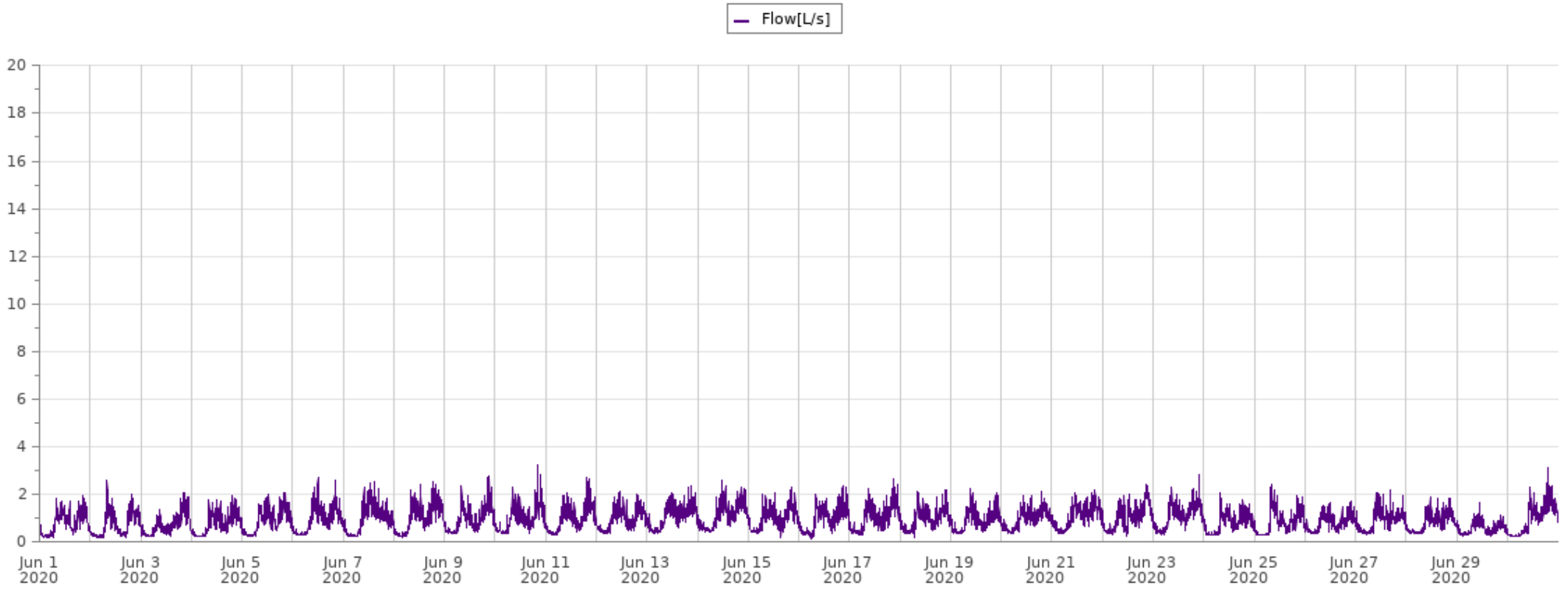


Monthly Data Report. 114-1008-006 / Site6
June, 2020

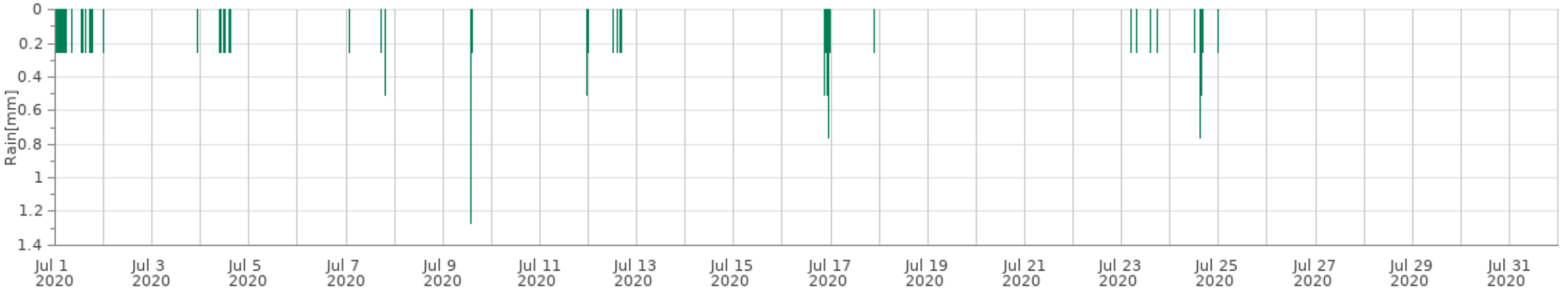


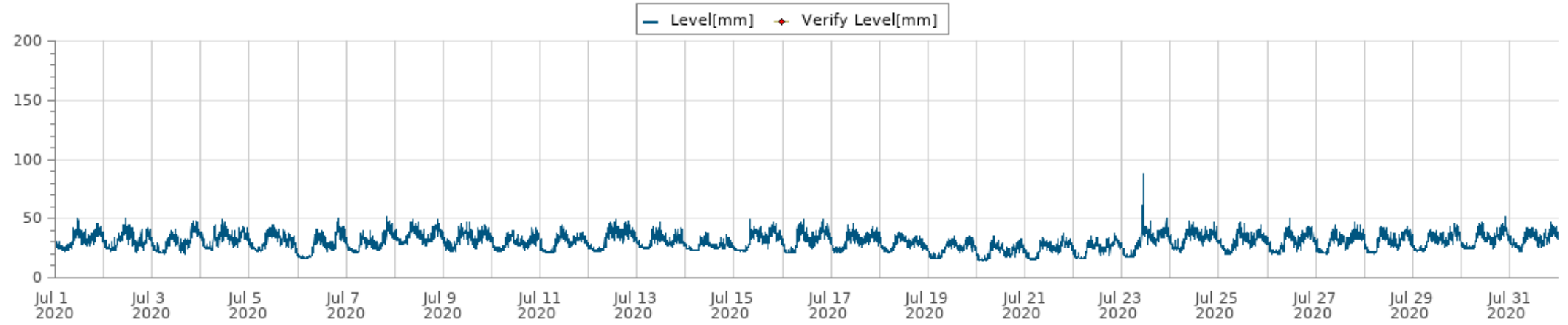


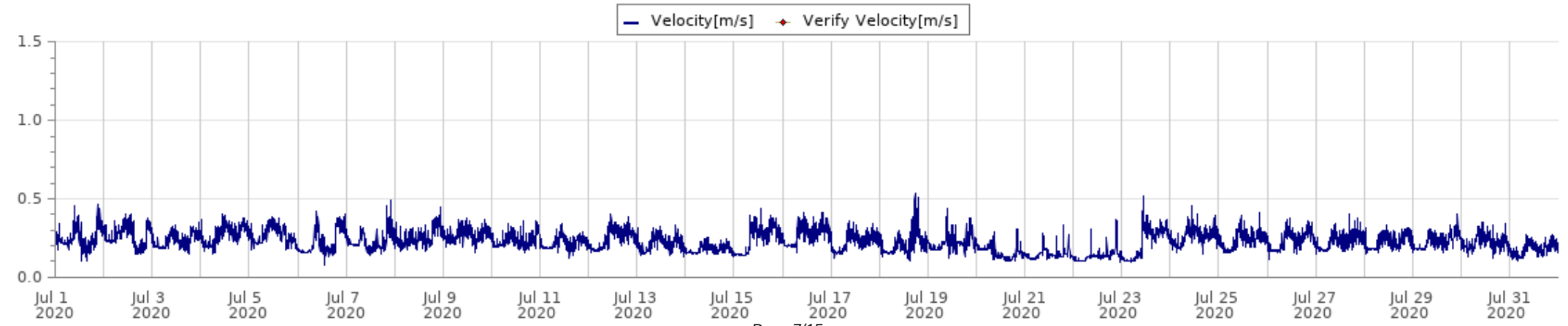
Monthly Data Report. 114-1008-006 / Site6
June, 2020



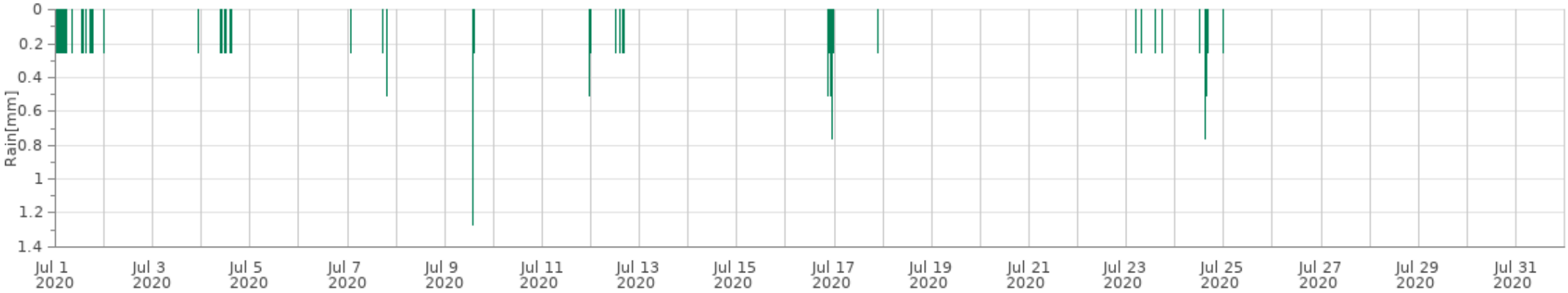
Monthly Data Report. 114-1008-006 / Site6
July, 2020

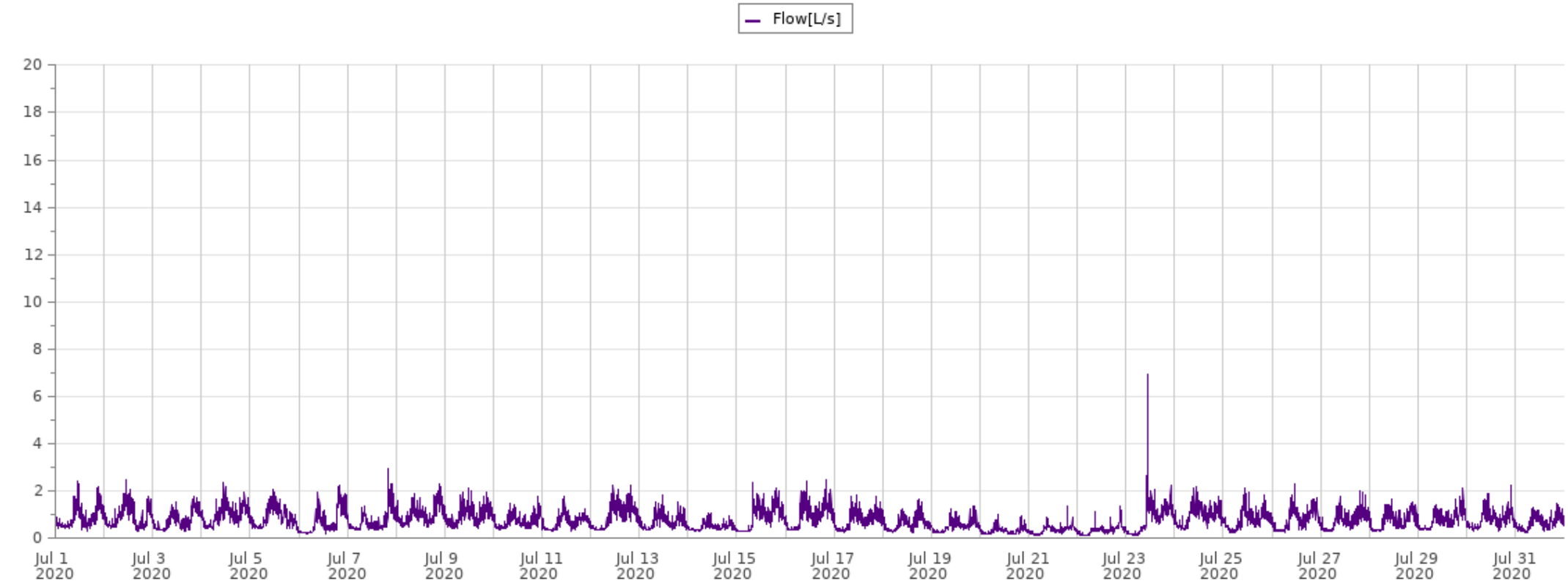




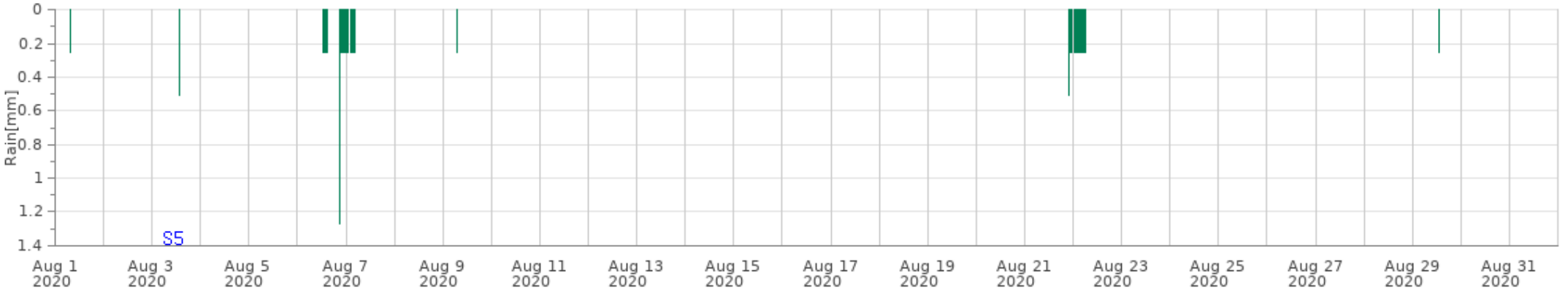


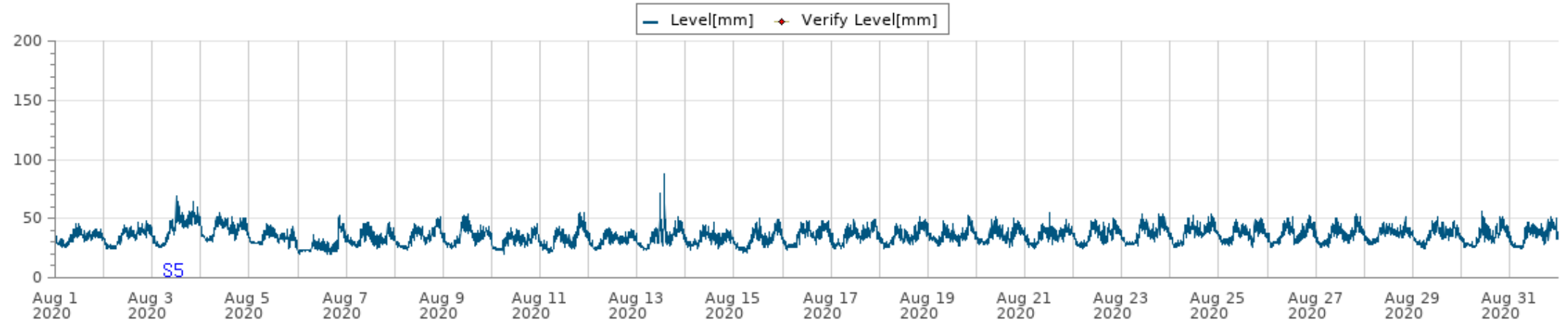
Monthly Data Report. 114-1008-006 / Site6
July, 2020

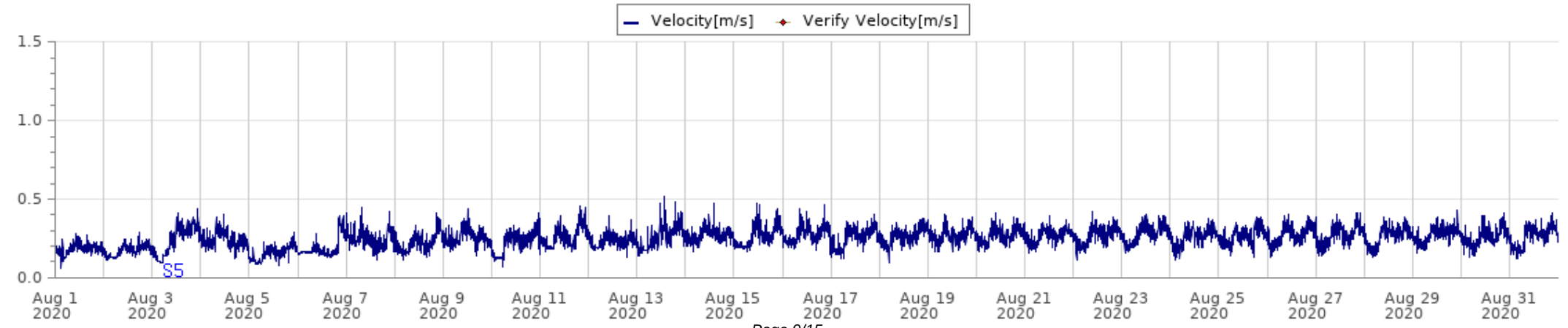




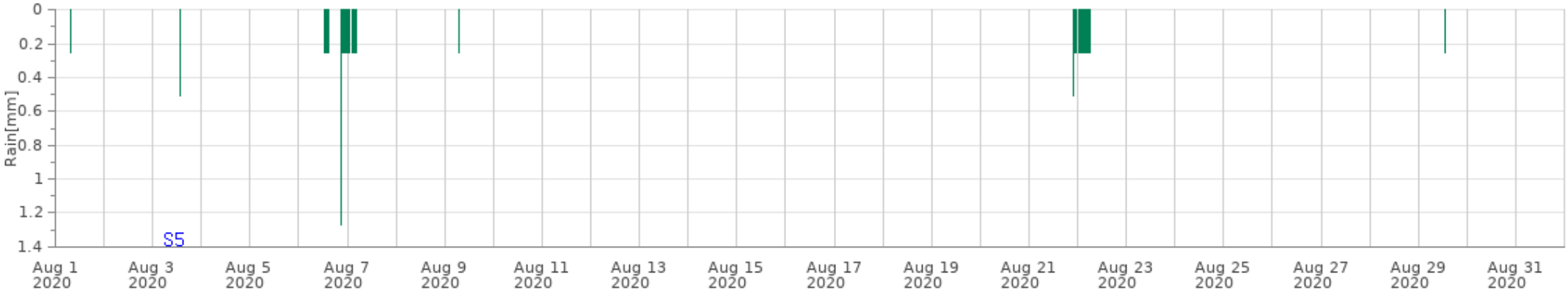
Monthly Data Report. 114-1008-006 / Site6
August, 2020

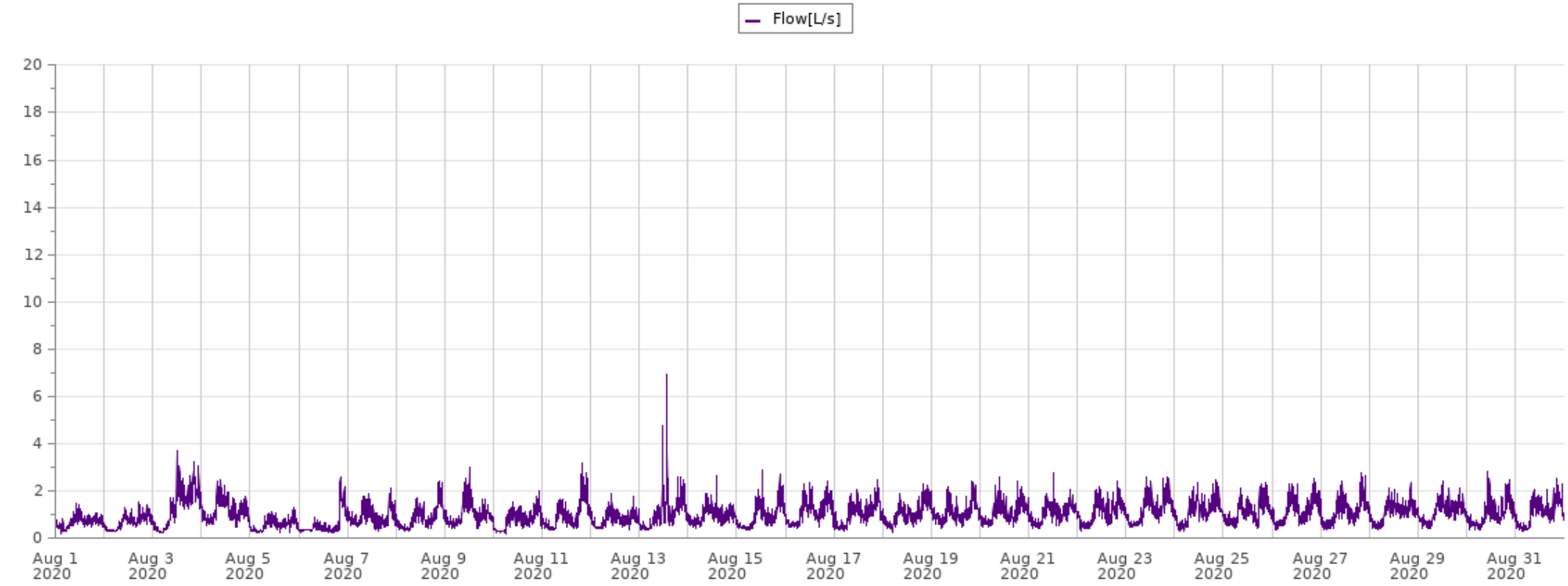




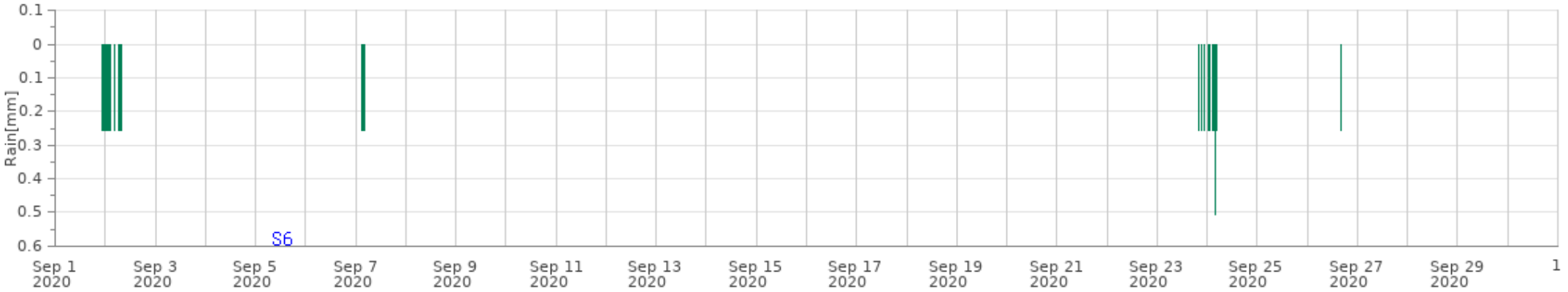


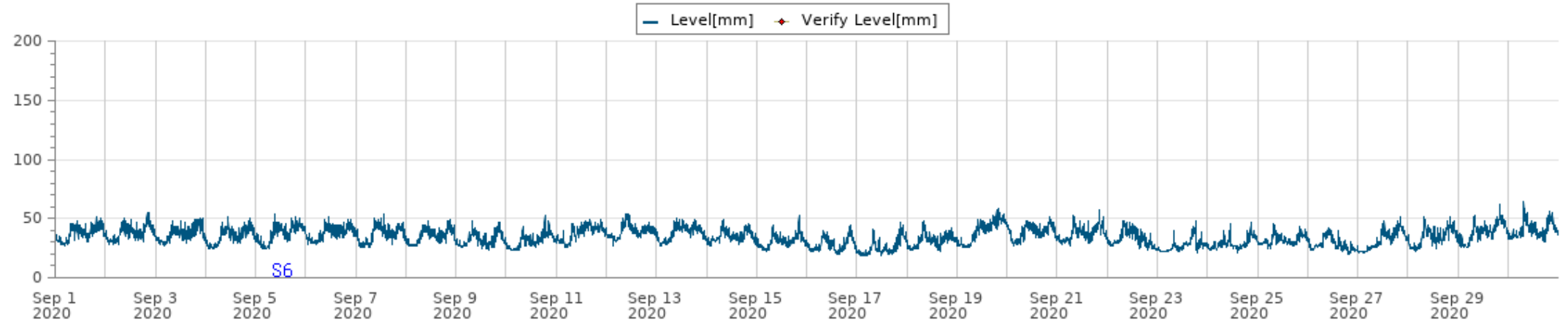
Monthly Data Report. 114-1008-006 / Site6
August, 2020

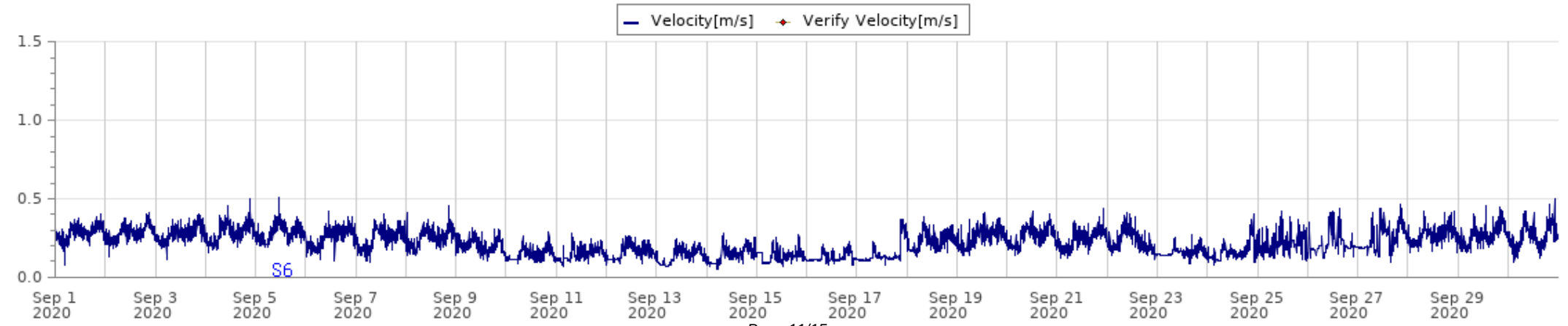




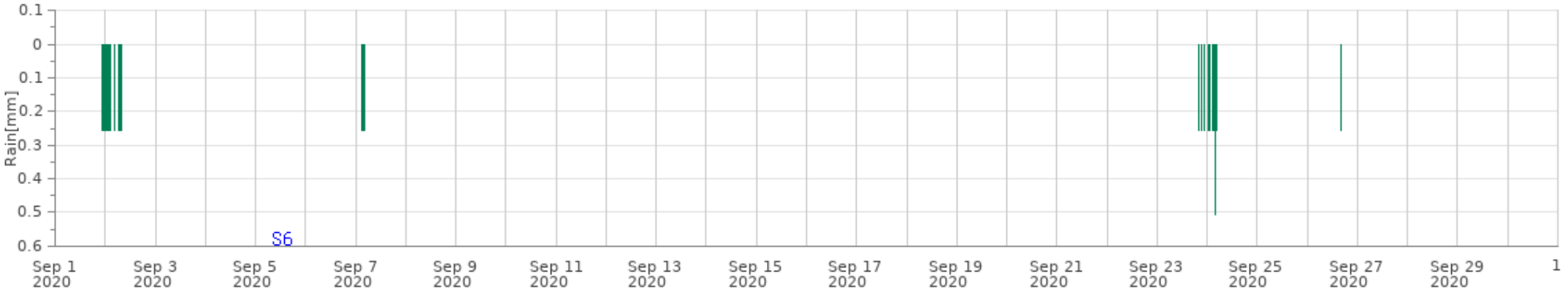
Monthly Data Report. 114-1008-006 / Site6
September, 2020

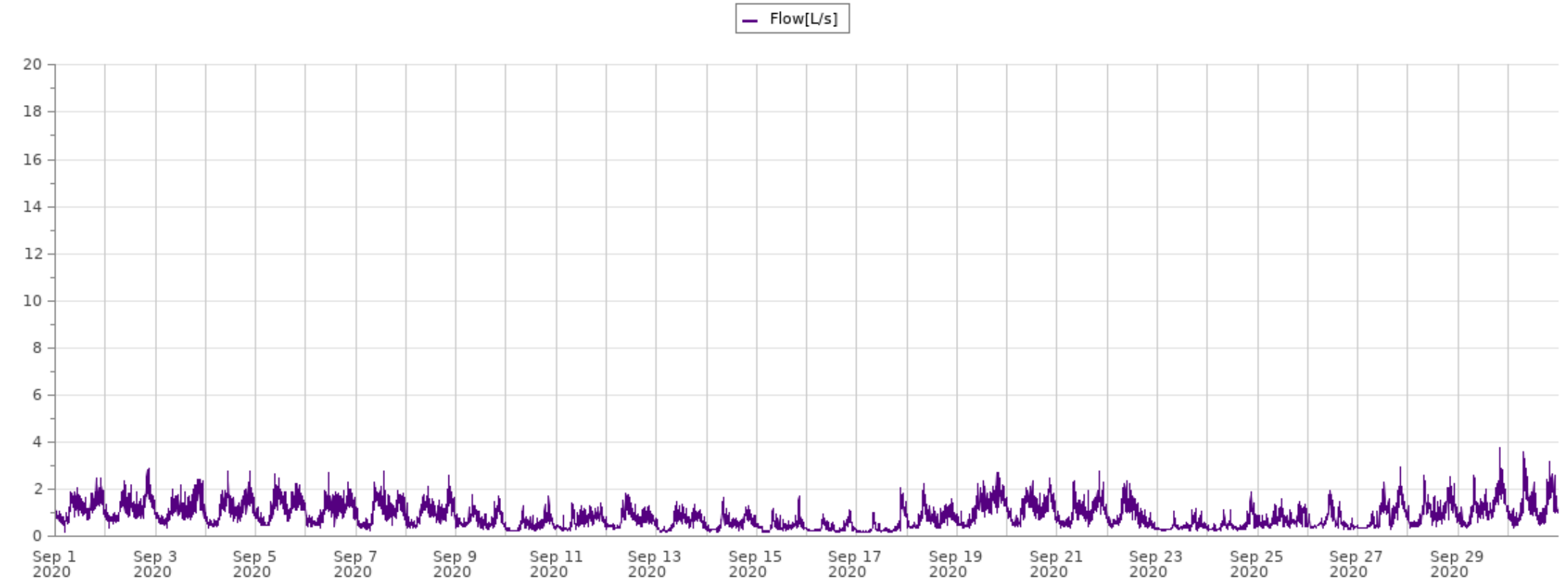




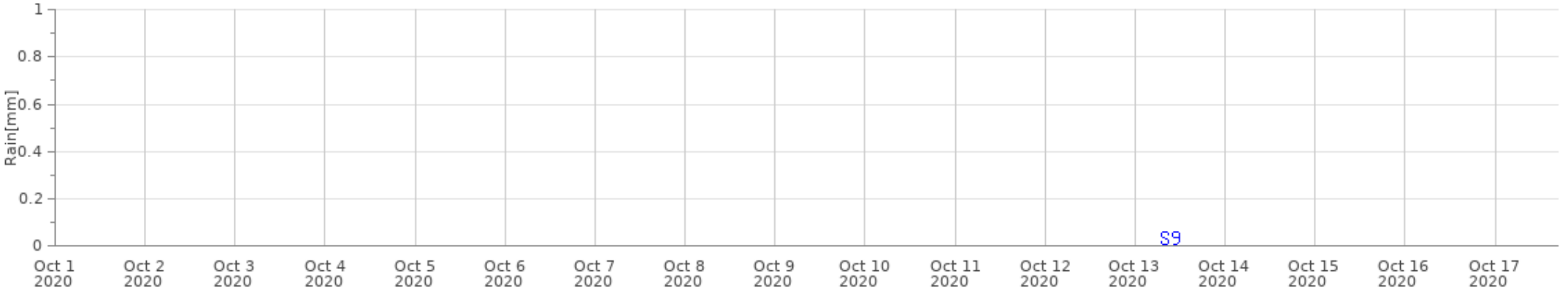


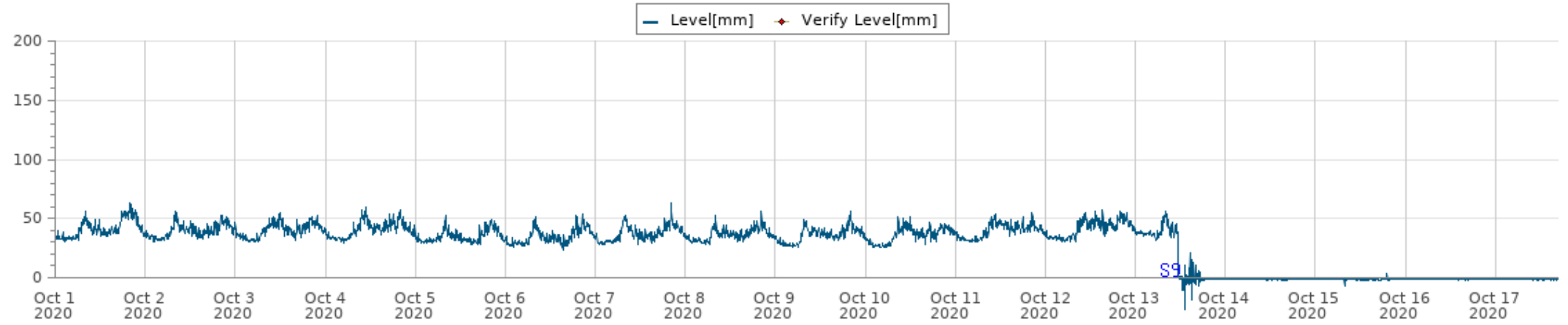
Monthly Data Report. 114-1008-006 / Site6
September, 2020

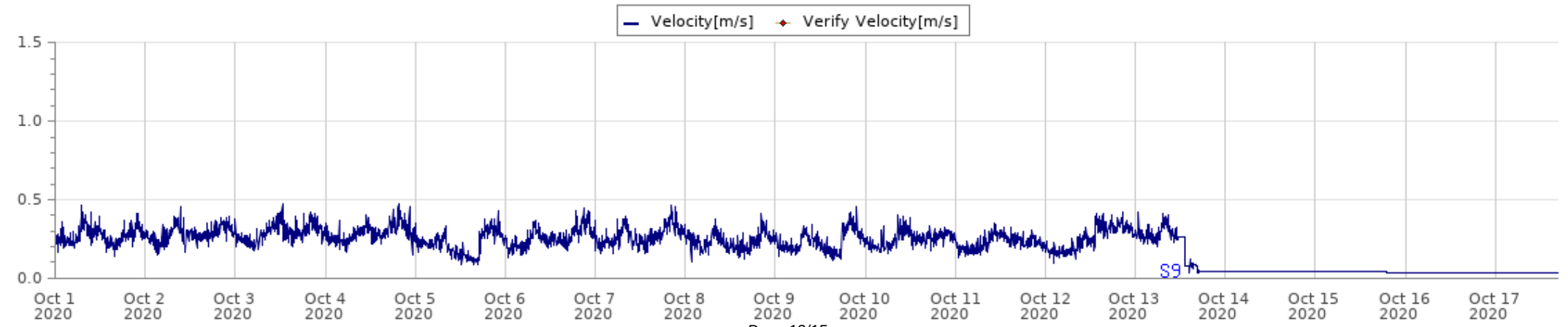




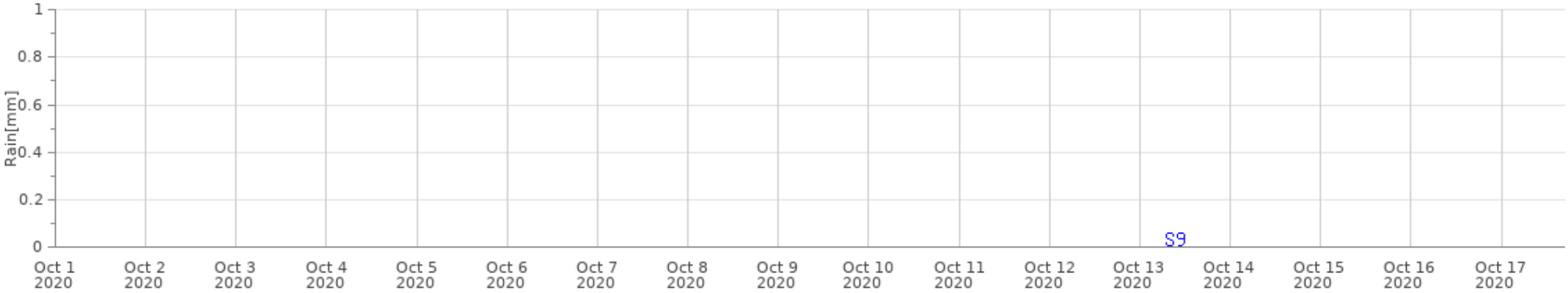
Monthly Data Report. 114-1008-006 / Site6
October, 2020

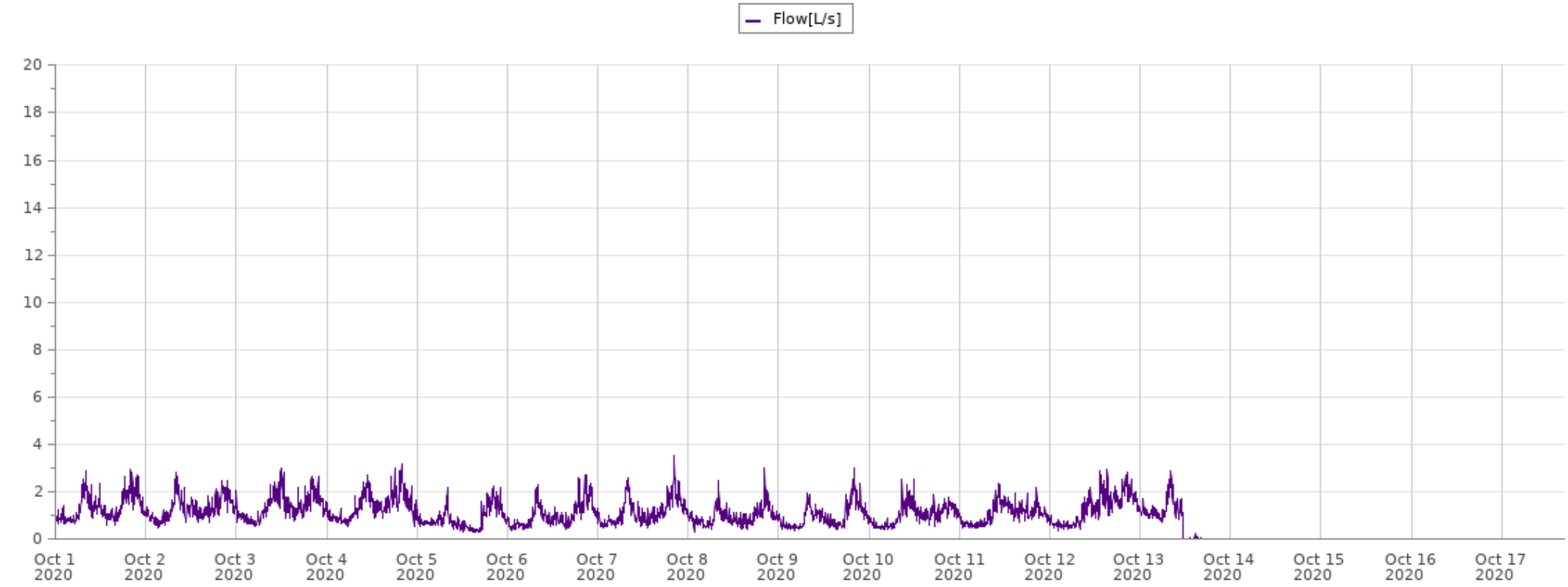






Monthly Data Report. 114-1008-006 / Site6
October, 2020





Monthly Data Report. 114-1008-006 / Site6
May, 2020 to October, 2020

Notes	
S3	**2020-05-09 18:30:00 to 2020-05-09 18:00:00 : Service Report** Install Report. Installed sensor in the target manhole.
S4	**2020-06-28 12:45:00 to 2020-06-28 12:30:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Battery is good.
S5	**2020-08-03 12:54:00 to 2020-08-03 12:54:00 : Service Report** Minor Report. Downloaded data and uploaded to server. Checked Battery
S6	**2020-09-05 15:30:00 to 2020-09-05 15:00:00 : Service Report** Minor Report. Downloaded data
S9	**2020-10-13 10:30:00 to 2020-10-13 10:15:00 : Service Report** Remove Report. We arrived to site, downloaded data and removed our equipment.

114-1008-006 - Site6

Tabular Report - May 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
May	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
9	30	77	40	0.22	0.4	0.3	0.7	3.6	1.4	28
10	19	56	32	0.16	0.41	0.26	0.2	2.9	0.9	81
11	16	54	30	0.17	0.41	0.26	0.2	2.8	0.8	70
12	17	48	28	0.17	0.39	0.25	0.2	2.1	0.7	63
13	16	46	28	0.13	0.37	0.24	0.2	2	0.7	60
14	14	56	30	0.14	0.42	0.26	0.1	2.8	0.9	76
15	17	43	28	0.17	0.4	0.23	0.2	1.6	0.7	58
16	15	48	26	0.13	0.32	0.19	0.1	1.8	0.5	43
17	14	48	26	0.12	0.32	0.2	0.1	1.8	0.5	46
18	13	49	25	0.13	0.35	0.21	0.1	2.1	0.5	47
19	13	47	25	0.13	0.34	0.21	0.1	2	0.5	43
20	13	37	22	0.13	0.31	0.2	0.1	1.2	0.4	35
21	13	56	25	0.13	0.42	0.21	0.1	3	0.5	46
22	14	35	22	0.13	0.29	0.19	0.1	1.1	0.4	32
23	12	35	22	0.13	0.29	0.19	0.1	1.1	0.4	34
24	11	37	21	0.11	0.3	0.18	0.1	1.2	0.4	32
25	12	48	23	0.11	0.38	0.19	0.1	1.9	0.4	38
26	12	44	26	0.12	0.39	0.22	0.1	1.9	0.6	53
27	11	44	26	0.12	0.42	0.24	0.1	2	0.7	59
28	11	47	28	0.15	0.39	0.26	0.1	2.2	0.8	66
29	13	48	27	0.17	0.41	0.26	0.1	2	0.7	64
30	14	52	29	0.17	0.42	0.26	0.2	2.7	0.8	68
31	17	49	31	0.16	0.42	0.28	0.2	2.3	0.9	80
Minimum	11	35	21	0.11	0.29	0.18	0.1	1.1	0.4	Total
Maximum	30	77	40	0.22	0.42	0.3	0.7	3.6	1.4	1,222
Average	15	48	27	0.14	0.37	0.23	0.2	2.1	0.7	

Shaded areas are weekends

114-1008-006 - Site6

Tabular Report - June 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
June	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	13	43	27	0.16	0.39	0.26	0.1	1.9	0.8	65
2	13	48	26	0.14	0.44	0.25	0.1	2.6	0.7	59
3	15	45	27	0.16	0.42	0.26	0.2	2.1	0.7	60
4	15	43	27	0.18	0.44	0.27	0.2	1.9	0.8	65
5	16	46	29	0.19	0.43	0.27	0.2	2.1	0.9	73
6	18	51	30	0.18	0.47	0.28	0.3	2.7	0.9	79
7	16	50	31	0.17	0.42	0.26	0.2	2.5	0.9	81
8	16	50	32	0.16	0.41	0.27	0.2	2.5	1	84
9	20	52	32	0.17	0.42	0.27	0.3	2.7	0.9	80
10	20	57	32	0.19	0.44	0.28	0.3	3.2	1	83
11	20	52	33	0.14	0.42	0.27	0.3	2.7	1	83
12	20	47	32	0.19	0.39	0.27	0.3	2.1	0.9	80
13	20	50	34	0.19	0.41	0.29	0.3	2.3	1.1	93
14	22	52	34	0.19	0.4	0.29	0.4	2.6	1.1	92
15	21	50	33	0.08	0.39	0.27	0.2	2.3	1	83
16	19	49	33	0.04	0.4	0.26	0.1	2.3	0.9	81
17	20	52	33	0.18	0.4	0.27	0.3	2.6	1	86
18	20	56	33	0.06	0.38	0.27	0.2	2.2	0.9	81
19	20	49	31	0.19	0.45	0.28	0.3	2.2	0.9	77
20	21	46	32	0.19	0.39	0.28	0.3	2.1	0.9	81
21	20	46	33	0.2	0.4	0.29	0.3	2.2	1	89
22	19	51	34	0.08	0.46	0.28	0.2	2.4	1	88
23	19	54	35	0.19	0.41	0.27	0.3	2.8	1.1	93
24	18	45	29	0.18	0.39	0.26	0.3	2	0.8	68
25	19	49	30	0.17	0.4	0.25	0.3	2.4	0.8	69
26	19	43	29	0.18	0.4	0.26	0.3	1.7	0.8	68
27	19	47	31	0.19	0.42	0.27	0.3	2.2	0.9	77
28	21	45	30	0.18	0.38	0.25	0.3	1.9	0.8	69
29	18	43	27	0.15	0.33	0.21	0.2	1.6	0.5	47
30	19	53	32	0.12	0.46	0.26	0.2	3.1	1	84
Minimum	13	43	26	0.04	0.33	0.21	0.1	1.6	0.5	Total
Maximum	22	57	35	0.2	0.47	0.29	0.4	3.2	1.1	2,319
Average	19	49	31	0.16	0.41	0.27	0.3	2.3	0.9	

Shaded areas are weekends

114-1008-006 - Site6

Tabular Report - July 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
July	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	22	51	32	0.1	0.47	0.25	0.3	2.4	0.8	73
2	21	50	31	0.15	0.41	0.26	0.3	2.5	0.9	75
3	20	48	30	0.15	0.35	0.23	0.3	1.8	0.7	63
4	23	48	33	0.14	0.4	0.27	0.3	2.4	1	83
5	19	45	30	0.17	0.39	0.26	0.3	2	0.8	73
6	16	50	28	0.08	0.42	0.23	0.2	2.3	0.7	60
7	21	51	30	0.14	0.49	0.23	0.3	2.9	0.7	62
8	27	49	35	0.16	0.44	0.26	0.4	2.3	1	86
9	22	47	33	0.16	0.38	0.27	0.4	2.1	0.9	81
10	22	42	30	0.15	0.36	0.23	0.4	1.8	0.7	60
11	21	44	29	0.12	0.34	0.22	0.3	1.7	0.7	57
12	22	49	33	0.16	0.4	0.25	0.3	2.2	0.9	79
13	24	46	31	0.13	0.33	0.21	0.3	1.8	0.7	59
14	23	38	27	0.13	0.26	0.18	0.3	1	0.5	40
15	22	49	32	0.14	0.44	0.25	0.3	2.3	0.9	77
16	21	49	32	0.16	0.41	0.27	0.3	2.4	1	83
17	21	45	31	0.12	0.36	0.23	0.3	1.8	0.7	64
18	21	39	28	0.1	0.53	0.22	0.2	1.6	0.6	54
19	16	36	24	0.12	0.44	0.22	0.2	1.4	0.5	43
20	14	35	22	0.11	0.3	0.16	0.1	1	0.3	27
21	15	37	24	0.11	0.34	0.15	0.1	1.4	0.3	29
22	16	37	25	0.1	0.37	0.14	0.1	1.3	0.3	29
23	17	88	31	0.1	0.52	0.22	0.1	6.9	0.8	72
24	21	48	33	0.15	0.45	0.26	0.3	2.2	0.9	80
25	19	47	31	0.16	0.42	0.24	0.2	2.1	0.8	66
26	20	50	31	0.11	0.37	0.23	0.3	2.3	0.8	67
27	20	46	31	0.15	0.4	0.23	0.3	2	0.8	65
28	20	43	30	0.15	0.33	0.23	0.3	1.6	0.7	62
29	22	46	31	0.16	0.4	0.23	0.3	2.1	0.8	66
30	24	52	33	0.12	0.35	0.22	0.3	2.2	0.8	67
31	22	47	33	0.11	0.27	0.18	0.2	1.5	0.6	55
Minimum	14	35	22	0.08	0.26	0.14	0.1	1	0.3	Total
Maximum	27	88	35	0.17	0.53	0.27	0.4	6.9	1	1,954
Average	20	47	30	0.13	0.39	0.23	0.3	2.1	0.7	

Shaded areas are weekends

114-1008-006 - Site6

Tabular Report - August 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
August	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	26	46	34	0.06	0.28	0.18	0.2	1.4	0.7	57
2	25	48	35	0.11	0.29	0.17	0.3	1.5	0.7	58
3	26	68	42	0.09	0.43	0.24	0.2	3.7	1.3	111
4	30	55	41	0.12	0.4	0.24	0.4	2.5	1.1	99
5	24	45	33	0.08	0.29	0.15	0.2	1.3	0.6	47
6	19	52	27	0.13	0.4	0.19	0.2	2.6	0.5	46
7	25	47	34	0.11	0.45	0.25	0.3	2.1	0.9	76
8	23	52	34	0.12	0.41	0.22	0.3	2.4	0.9	73
9	25	54	35	0.14	0.44	0.26	0.4	3	1	87
10	20	45	31	0.07	0.42	0.22	0.2	2	0.7	64
11	21	55	33	0.15	0.46	0.26	0.3	3.2	1	83
12	23	42	32	0.13	0.39	0.24	0.4	1.9	0.8	68
13	23	88	35	0.14	0.52	0.26	0.4	6.9	1.1	92
14	24	47	33	0.17	0.47	0.27	0.4	2.6	1	82
15	21	50	33	0.16	0.48	0.26	0.3	2.9	0.9	81
16	23	48	35	0.15	0.47	0.27	0.4	2.4	1.1	92
17	24	49	35	0.12	0.41	0.25	0.3	2.5	1	87
18	25	51	35	0.1	0.38	0.26	0.3	2.3	1	88
19	26	53	36	0.16	0.41	0.27	0.4	2.4	1.1	92
20	26	51	36	0.16	0.41	0.27	0.5	2.6	1.1	92
21	25	55	36	0.16	0.4	0.27	0.4	2.8	1	90
22	24	50	36	0.11	0.43	0.27	0.3	2.4	1.1	92
23	27	54	37	0.16	0.4	0.28	0.4	2.6	1.2	103
24	25	54	38	0.11	0.38	0.26	0.3	2.4	1.1	97
25	26	50	37	0.13	0.39	0.26	0.4	2.3	1.1	94
26	26	53	37	0.13	0.4	0.27	0.3	2.5	1.1	97
27	26	53	36	0.14	0.41	0.27	0.3	2.7	1.1	95
28	28	51	37	0.13	0.39	0.26	0.4	2.3	1.1	93
29	25	51	36	0.16	0.43	0.27	0.4	2.4	1.1	93
30	26	56	35	0.13	0.41	0.26	0.3	2.8	1	88
31	24	51	36	0.12	0.41	0.26	0.3	2.5	1.1	92
Minimum	19	42	27	0.06	0.28	0.15	0.2	1.3	0.5	Total
Maximum	30	88	42	0.17	0.52	0.28	0.5	6.9	1.3	2,609
Average	25	52	35	0.13	0.41	0.25	0.3	2.6	1	

Shaded areas are weekends

114-1008-006 - Site6

Tabular Report - September 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
September	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	27	51	38	0.08	0.4	0.29	0.2	2.4	1.2	104
2	28	55	38	0.13	0.41	0.28	0.4	2.8	1.2	105
3	26	51	37	0.12	0.41	0.28	0.3	2.4	1.2	99
4	24	51	35	0.16	0.5	0.29	0.4	2.8	1.1	97
5	24	53	37	0.19	0.51	0.28	0.4	2.6	1.2	102
6	28	52	38	0.11	0.42	0.25	0.4	2.7	1.1	94
7	25	54	37	0.1	0.41	0.25	0.2	2.8	1.1	90
8	26	49	35	0.14	0.46	0.25	0.3	2.6	1	85
9	24	48	32	0.11	0.31	0.2	0.3	1.8	0.7	60
10	23	53	31	0.09	0.29	0.15	0.2	1.7	0.5	42
11	25	50	38	0.07	0.28	0.15	0.2	1.4	0.7	57
12	27	54	39	0.07	0.27	0.16	0.3	1.8	0.7	63
13	26	50	38	0.07	0.24	0.14	0.2	1.5	0.6	53
14	27	49	35	0.05	0.28	0.14	0.2	1.7	0.5	47
15	22	52	31	0.07	0.27	0.14	0.2	1.7	0.4	38
16	20	44	28	0.08	0.22	0.13	0.2	1.1	0.4	30
17	18	46	25	0.08	0.37	0.15	0.1	2.1	0.4	34
18	22	48	31	0.13	0.39	0.23	0.3	2.2	0.8	66
19	25	58	39	0.14	0.41	0.25	0.3	2.7	1.2	101
20	26	51	39	0.14	0.42	0.26	0.4	2.4	1.2	100
21	27	57	37	0.12	0.44	0.24	0.3	2.8	1	90
22	23	48	33	0.11	0.41	0.23	0.3	2.3	0.8	71
23	21	48	27	0.09	0.27	0.16	0.2	1.2	0.4	36
24	21	46	29	0.08	0.4	0.16	0.2	1.9	0.5	42
25	24	45	32	0.1	0.42	0.21	0.3	1.6	0.7	59
26	20	42	28	0.12	0.44	0.22	0.3	1.9	0.6	52
27	21	51	32	0.09	0.46	0.25	0.3	2.9	0.9	74
28	22	52	35	0.16	0.42	0.26	0.4	2.6	1	87
29	25	62	39	0.16	0.45	0.27	0.4	3.7	1.2	104
30	30	65	41	0.1	0.5	0.26	0.3	3.5	1.3	109
Minimum	18	42	25	0.05	0.22	0.13	0.1	1.1	0.4	Total
Maximum	30	65	41	0.19	0.51	0.29	0.4	3.7	1.3	2,192
Average	24	51	34	0.11	0.38	0.22	0.3	2.3	0.9	

Shaded areas are weekends

114-1008-006 - Site6

Tabular Report - October 2020

	Level - mm			Velocity - m/s			Flow - L/s			Volume - m^3
October	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
1	31	63	42	0.14	0.47	0.27	0.6	2.9	1.3	114
2	30	57	40	0.15	0.46	0.28	0.5	2.8	1.3	111
3	30	55	40	0.18	0.47	0.29	0.5	3	1.3	116
4	30	59	41	0.14	0.48	0.29	0.5	3.2	1.4	118
5	28	53	35	0.09	0.43	0.22	0.3	2.2	0.8	73
6	23	54	35	0.13	0.45	0.26	0.4	2.7	1	86
7	28	63	37	0.16	0.46	0.27	0.4	3.5	1.2	100
8	28	56	36	0.11	0.41	0.23	0.3	3	0.9	81
9	26	56	36	0.11	0.46	0.23	0.4	3	0.9	81
10	25	52	36	0.16	0.4	0.25	0.4	2.5	1	86
11	30	55	40	0.13	0.35	0.23	0.4	2.3	1	90
12	30	57	42	0.1	0.42	0.25	0.3	2.9	1.3	111
13	-27	57	18	0.04	0.42	0.18	0	2.9	0.6	53
14	-2	0	-2	0.04	0.04	0.04	0	0	0	0
15	-7	4	-2	0.04	0.04	0.04	0	0	0	0
16	-2	0	-2	0.04	0.04	0.04	0	0	0	0
17	-2	0	-2	0.04	0.04	0.04	0	0	0	0
Minimum	-27	0	-2	0.04	0.04	0.04	0	0	0	Total
Maximum	31	63	42	0.18	0.48	0.29	0.6	3.5	1.4	1,219
Average	18	44	28	0.1	0.34	0.2	0.3	2.2	0.8	

Shaded areas are weekends

APPENDIX II

INSTALLATION REPORTS

Flow Monitoring Installation Report
114-1008-001 / Site 1

Project Information

Site ID: 114-1008-001
Site Name: Site 1
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Site Information

Site ID: 114-1008-001
Site Name: Site 1
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.309187, -116.976447

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 350 mm
Manhole Rungs: Yes

Site Map

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 207M01567
Sensor Serial Number: 208A00441

Flow Monitoring Installation Report
114-1008-001 / Site 1

Information

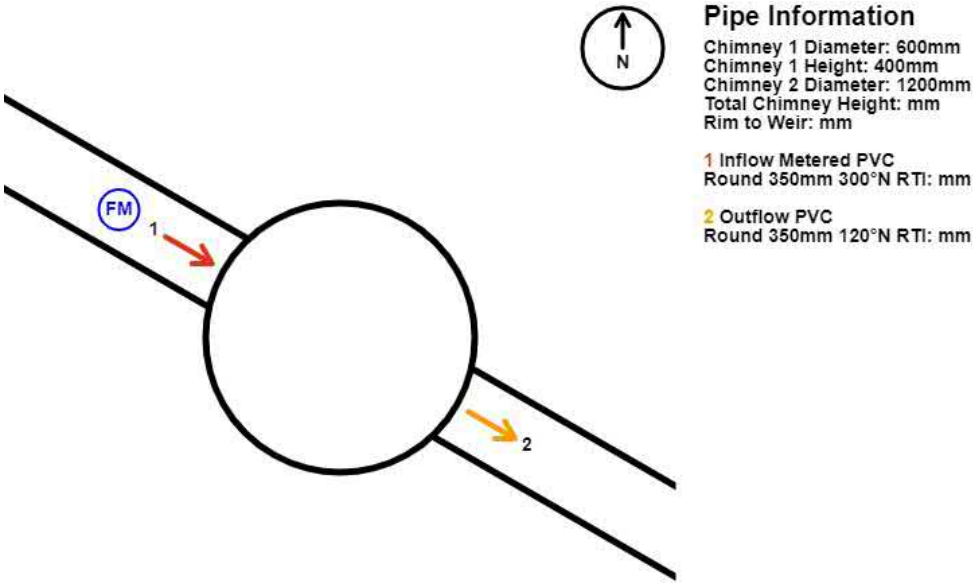
Date: 2020-05-09 20:00:00
Weather: Dry
Battery Voltage: 12.5
Silt Level: 0
Personal on site: David Malcolm Lennie, Brian Bot

Notes:

See notes below
The target manhole would not produce good data so we used the downstream manhole. The sensor was installed in the upstream pipe.

Install Pictures

Pipe and Chimney Drawings



Pipe Information

Chimney 1 Diameter: 600mm
Chimney 1 Height: 400mm
Chimney 2 Diameter: 1200mm
Total Chimney Height: mm
Rim to Weir: mm

1 Inflow Metered PVC
Round 350mm 300°N RTI: mm

2 Outflow PVC
Round 350mm 120°N RTI: mm

Flow Monitoring Installation Report
114-1008-001 / Site 1

Verification

Manually Measured Velocity Profile

0	0	0.37	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-05-09 20:16
Manually Measured Average Velocity[m/s]:	0.37
Manually Measured Level:	60
Monitor(ISCO 2150) Velocity[m/s]:	0.35
Monitor(ISCO 2150) Level:	60
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-05-09
Instrument Serial Number:	NULL

Flow Monitoring Installation Report
114-1008-002 / Site2

Project Information

Site ID: 114-1008-002
Site Name: Site2
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Site Information

Site ID: 114-1008-002
Site Name: Site2
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.301307, -116.972314

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 300 mm
Manhole Rungs: Yes

Site Map

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: NULL
Sensor Serial Number: NULL

Information

Date: 2020-05-09 19:30:00
Weather: Dry
Battery Voltage: 12.5
Silt Level: 0
Personal on site: David Malcolm Lennie, Brian Bot

Notes:

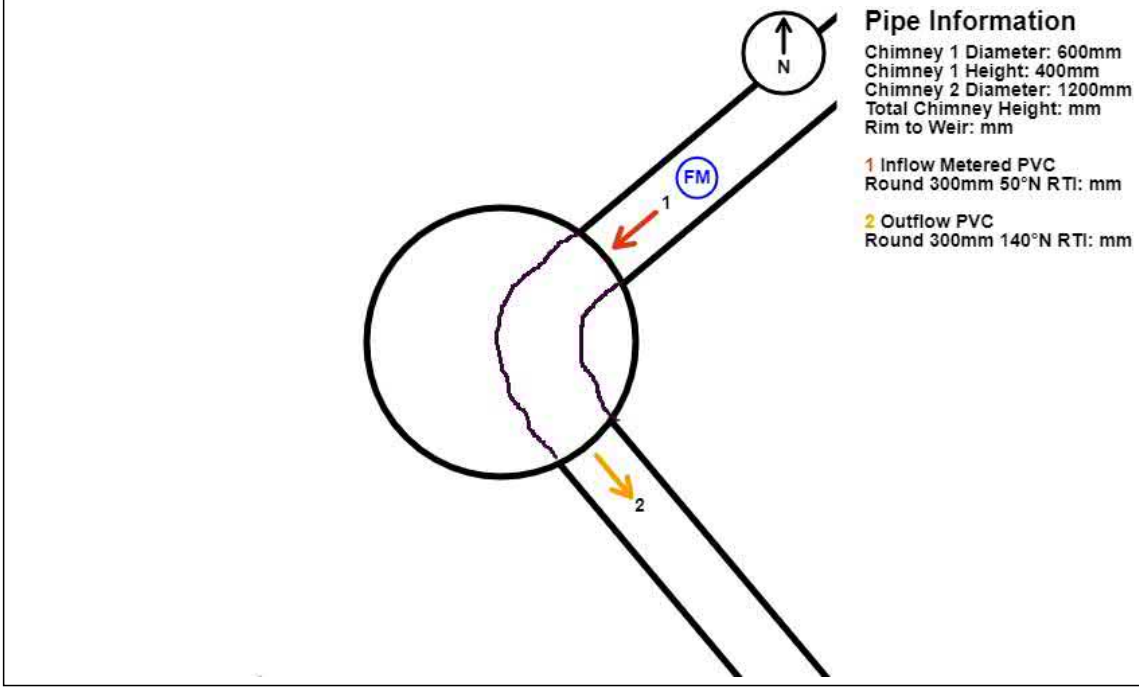
See notes below

Installed sensor in the upstream pipe of the target manhole.

Flow Monitoring Installation Report
114-1008-002 / Site2

Install Pictures

Pipe and Chimney Drawings



Pipe Information

Chimney 1 Diameter: 600mm
Chimney 1 Height: 400mm
Chimney 2 Diameter: 1200mm
Total Chimney Height: mm
Rim to Weir: mm

1 Inflow Metered PVC
Round 300mm 50°N RTI: mm

2 Outflow PVC
Round 300mm 140°N RTI: mm

Verification

Manually Measured Velocity Profile

0	0	0.3	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-05-09 19:45
Manually Measured Average Velocity[m/s]:	0.3
Manually Measured Level:	40
Monitor(ISCO 2150) Velocity[m/s]:	0.32
Monitor(ISCO 2150) Level:	40
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-05-09
Instrument Serial Number:	NULL

Flow Monitoring Installation Report
114-1008-003 / Site3

Project Information

Site ID: 114-1008-003
Site Name: Site3
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Site Information

Site ID: 114-1008-003
Site Name: Site3
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.29519, -116.97742

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 200 mm
Manhole Rungs: Yes

Site Map

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: xxxxxxxx
Sensor Serial Number: 208B00863

Flow Monitoring Installation Report
114-1008-003 / Site3

Information

Date:	2020-05-09 17:00:00
Weather:	Dry
Battery Voltage:	12.5
Silt Level:	0
Personal on site:	David Malcolm Lennie, Brian Bot

Notes:

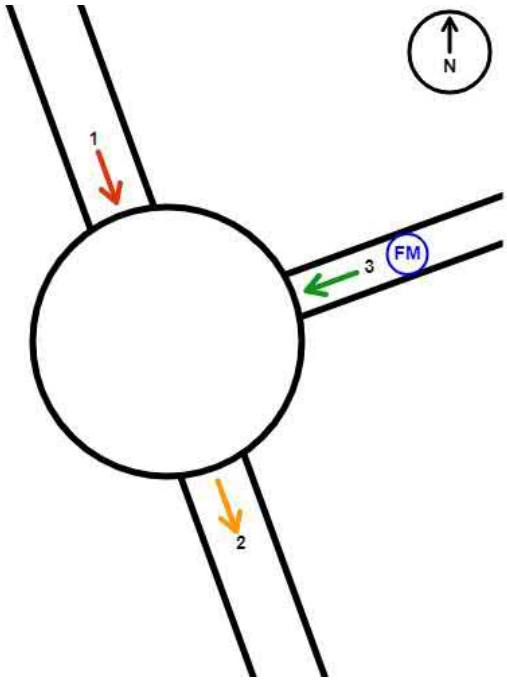
See notes below

Installed sensor in the 200mm pipe from 10th street (see drawing) of the target manhole.

Site has low flow but markings on the pipe suggest the flow will increase.

Install Pictures

Pipe and Chimney Drawings



Pipe Information

Chimney 1 Diameter: 600mm
Chimney 1 Height: 400mm
Chimney 2 Diameter: 1200mm
Total Chimney Height: 3380mm
Rim to Weir: mm

1 Inflow Concrete
Round 300mm 340°N RTI: 3380mm

2 Outflow Concrete
Round 300mm 160°N RTI: 3380mm

3 Inflow Metered Concrete
Round 200mm 70°N RTI: 3380mm

Flow Monitoring Installation Report
114-1008-003 / Site3

Verification

Manually Measured Velocity Profile

0	0	0.1	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-05-09 17:50
Manually Measured Average Velocity[m/s]:	0.1
Manually Measured Level:	20
Monitor(ISCO 2150) Velocity[m/s]:	0.1
Monitor(ISCO 2150) Level:	20
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-05-09
Instrument Serial Number:	NULL

Flow Monitoring Installation Report
114-1008-004 / Site4

Project Information

Site ID: 114-1008-004
Site Name: Site4
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Site Information

Site ID: 114-1008-004
Site Name: Site4
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.30286, -116.96634

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 250 mm
Manhole Rungs: Yes

Site Map

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 207M01608
Sensor Serial Number: xxxxxxxx

Information

Date: 2020-05-09 19:00:00
Weather: Dry
Battery Voltage: 12.5
Silt Level: 0
Personal on site: David Malcolm Lennie, Brian Bot

Notes:

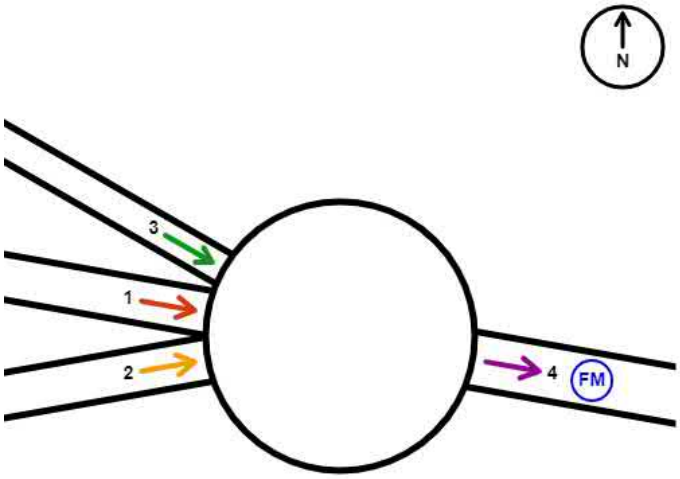
See notes below

Installed sensor in the downstream pipe of the target manhole.

Flow Monitoring Installation Report
114-1008-004 / Site4

Install Pictures

Pipe and Chimney Drawings



Pipe Information

Chimney 1 Diameter: 600mm
Chimney 1 Height: 400mm
Chimney 2 Diameter: 1200mm
Total Chimney Height: mm
Rim to Weir: mm

1 Inflow Concrete
Round 200mm 280°N RTI: mm

2 Inflow Concrete
Round 200mm 260°N RTI: mm

3 Inflow Concrete
Round 150mm 300°N RTI: mm

4 Outflow Metered Concrete
Round 250mm 100°N RTI: mm

Verification

Manually Measured Velocity Profile

0	0	0.35	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-05-09 19:05
Manually Measured Average Velocity[m/s]:	0.35
Manually Measured Level:	40
Monitor(ISCO 2150) Velocity[m/s]:	0.39
Monitor(ISCO 2150) Level:	40
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-05-09
Instrument Serial Number:	NULL

Flow Monitoring Installation Report
114-1008-005 / Site5

Project Information

Site ID: 114-1008-005
Site Name: Site5
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Site Information

Site ID: 114-1008-005
Site Name: Site5
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.29615, -116.95576

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 200 mm
Manhole Rungs: Yes

Site Map

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 215F01253
Sensor Serial Number: 216C00048

Flow Monitoring Installation Report
114-1008-005 / Site5

Information	
Date:	2020-05-09 18:30:00
Weather:	Dry
Battery Voltage:	12.5
Silt Level:	0
Personal on site:	David Malcolm Lennie, Brian Bot

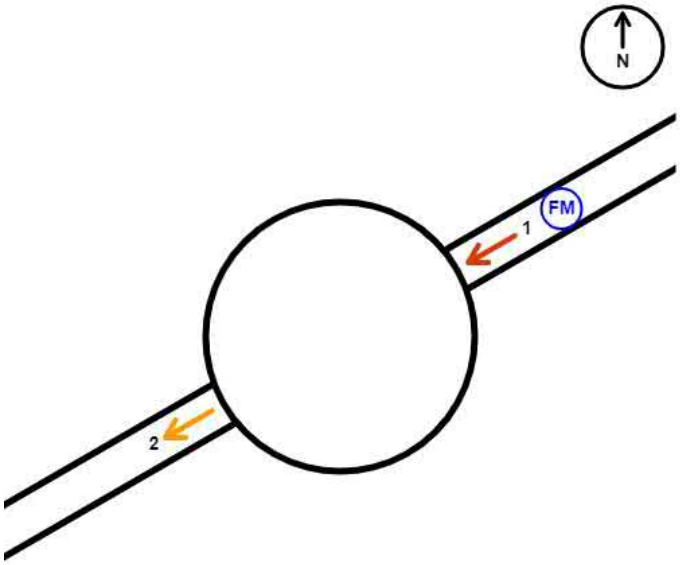
Notes:

See notes below

Installed sensor in target manhole. There was no flow at the time of installation. We presumed it was tied to a pump station.

Install Pictures

Pipe and Chimney Drawings



Pipe Information

Chimney 1 Diameter: 600mm
Chimney 1 Height: 400mm
Chimney 2 Diameter: 1200mm
Total Chimney Height: 2930mm
Rim to Weir: mm

1 Inflow Metered Concrete
Round 200mm 60°N RTI: 2930mm

2 Outflow Concrete
Round 200mm 240°N RTI: 2930mm

Flow Monitoring Installation Report
114-1008-005 / Site5

Verification

Manually Measured Velocity Profile

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-05-09 18:36
Manually Measured Average Velocity[m/s]:	0
Manually Measured Level:	3
Monitor(ISCO 2150) Velocity[m/s]:	0
Monitor(ISCO 2150) Level:	3
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-05-09
Instrument Serial Number:	NULL

Flow Monitoring Installation Report
114-1008-006 / Site6

Project Information

Site ID: 114-1008-006
Site Name: Site6
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Site Information

Site ID: 114-1008-006
Site Name: Site6
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.29036, -116.95939

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 200 mm
Manhole Rungs: Yes

Site Map

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 207M01560
Sensor Serial Number: 216C01433

Information

Date: 2020-05-09 18:00:00
Weather: Dry
Battery Voltage: 12.5
Silt Level: 0
Personal on site: David Malcolm Lennie, Brian Bot

Notes:
See notes below
Installed sensor in the target manhole.

Flow Monitoring Installation Report
114-1008-006 / Site6

Install Pictures

Verification

Manually Measured Velocity Profile

0	0	0.32	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-05-09 18:15
Manually Measured Average Velocity[m/s]:	0.32
Manually Measured Level:	50
Monitor(ISCO 2150) Velocity[m/s]:	0.34
Monitor(ISCO 2150) Level:	50
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-05-09
Instrument Serial Number:	NULL

APPENDIX III

REMOVAL REPORTS

Flow Monitoring Removal Report
114-1008-001 / Site 1

Site Information

Site ID: 114-1008-001
Site Name: Site 1
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.309187, -116.976447

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 350 mm
Manhole Rungs: Yes

Project Information

Site ID: 114-1008-001
Site Name: Site 1
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 207M01567
Sensor Serial Number: 208A00441

Information

Date: 2020-10-13 05:00:00
Weather: Dry
Battery Voltage: 0
Silt Level: 0
Personal on site: Andreas Tietbohl, Brian Bot, NULL
Notes:
See notes below
We arrived to site downloaded data and removed our equipment.

Additional Pictures

Flow Monitoring Removal Report
114-1008-001 / Site 1

Verification				
Manually Measured Velocity Profile				
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-10-13 10:32
Manually Measured Average Velocity[m/s]:	
Manually Measured Level:	
Monitor(ISCO 2150) Velocity[m/s]:	
Monitor(ISCO 2150) Level:	
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-10-13
Instrument Serial Number:	NULL

Flow Monitoring Removal Report
114-1008-002 / Site2

Site Information

Site ID: 114-1008-002
Site Name: Site2
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.301307, -116.972314

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 300 mm
Manhole Rungs: Yes

Project Information

Site ID: 114-1008-002
Site Name: Site2
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: NULL
Sensor Serial Number: NULL

Information

Date: 2020-10-13 09:30:00
Weather: Dry
Battery Voltage: 0
Silt Level: 0
Personal on site: Andreas Tietbohl, Brian Bot, NULL

Notes:

See notes below
We arrived to site downloaded data and removed our equipment.

Additional Pictures

Flow Monitoring Removal Report
114-1008-002 / Site2

Verification				
Manually Measured Velocity Profile				
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-10-13 10:46
Manually Measured Average Velocity[m/s]:	
Manually Measured Level:	
Monitor(ISCO 2150) Velocity[m/s]:	
Monitor(ISCO 2150) Level:	
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-10-13
Instrument Serial Number:	NULL

Flow Monitoring Removal Report
114-1008-003 / Site3

Site Information

Site ID: 114-1008-003
Site Name: Site3
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.29519, -116.97742

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 200 mm
Manhole Rungs: Yes

Project Information

Site ID: 114-1008-003
Site Name: Site3
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: xxxxxxxx
Sensor Serial Number: 208B00863

Information

Date: 2020-10-13 10:00:00
Weather: Dry
Battery Voltage: 0
Silt Level: 0
Personal on site: Andreas Tietbohl, Brian Bot, NULL

Notes:

See notes below
We arrived to site, downloaded data and removed our equipment.

Additional Pictures

Flow Monitoring Removal Report
114-1008-003 / Site3

Verification				
Manually Measured Velocity Profile				
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-10-13 11:06
Manually Measured Average Velocity[m/s]:	
Manually Measured Level:	
Monitor(ISCO 2150) Velocity[m/s]:	
Monitor(ISCO 2150) Level:	
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-10-13
Instrument Serial Number:	NULL

Flow Monitoring Removal Report
114-1008-004 / Site4

Site Information

Site ID: 114-1008-004
Site Name: Site4
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.30286, -116.96634

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 250 mm
Manhole Rungs: Yes

Project Information

Site ID: 114-1008-004
Site Name: Site4
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 207M01608
Sensor Serial Number: xxxxxxxx

Information

Date: 2020-10-13 09:45:00
Weather: Dry
Battery Voltage: 0
Silt Level: 0
Personal on site: Andreas Tietbohl, Brian Bot, NULL

Notes:

See notes below
We arrived to site, downloaded data and removed our equipment.

Additional Pictures

Flow Monitoring Removal Report
114-1008-004 / Site4

Verification				
Manually Measured Velocity Profile				
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-10-13 10:52
Manually Measured Average Velocity[m/s]:	
Manually Measured Level:	
Monitor(ISCO 2150) Velocity[m/s]:	
Monitor(ISCO 2150) Level:	
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-10-13
Instrument Serial Number:	NULL

Flow Monitoring Removal Report
114-1008-005 / Site5

Site Information

Site ID: 114-1008-005
Site Name: Site5
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.29615, -116.95576

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 200 mm
Manhole Rungs: Yes

Project Information

Site ID: 114-1008-005
Site Name: Site5
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 215F01253
Sensor Serial Number: 216C00048

Information

Date: 2020-10-13 10:30:00
Weather: Dry
Battery Voltage: 0
Silt Level: 0
Personal on site: Andreas Tietbohl, Brian Bot, NULL

Notes:

See notes below
We arrived to site downloaded data and removed are equipment.

Additional Pictures

Flow Monitoring Removal Report
114-1008-005 / Site5

Verification				
Manually Measured Velocity Profile				
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-10-13 19:39
Manually Measured Average Velocity[m/s]:	
Manually Measured Level:	
Monitor(ISCO 2150) Velocity[m/s]:	
Monitor(ISCO 2150) Level:	
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-10-13
Instrument Serial Number:	NULL

Flow Monitoring Removal Report
114-1008-006 / Site6

Site Information

Site ID: 114-1008-006
Site Name: Site6
Site Address:
Traffic Control Req: No
GPS Coordinates: 51.29036, -116.95939

Manhole Information
Manhole Number: 999
Pipe Material: Concrete
Channel Type: Sanitary
Rim to Invert: 0 mm
Pipe Dimensions: Round, Diameter: 200 mm
Manhole Rungs: Yes

Project Information

Site ID: 114-1008-006
Site Name: Site6
Client Name: Urban Systems
Client Contact: Tim Lutic
Project Name: Town of Golden
Contact Name: Tim Lutic

Equipment

Monitor Manufacturer/Model: ISCO 2150
Monitor Serial Number: 207M01560
Sensor Serial Number: 216C01433

Information

Date: 2020-10-13 10:15:00
Weather: Dry
Battery Voltage: 0
Silt Level: 0
Personal on site: Andreas Tietbohl, Brian Bot, NULL

Notes:

See notes below
We arrived to site, downloaded data and removed our equipment.

Additional Pictures

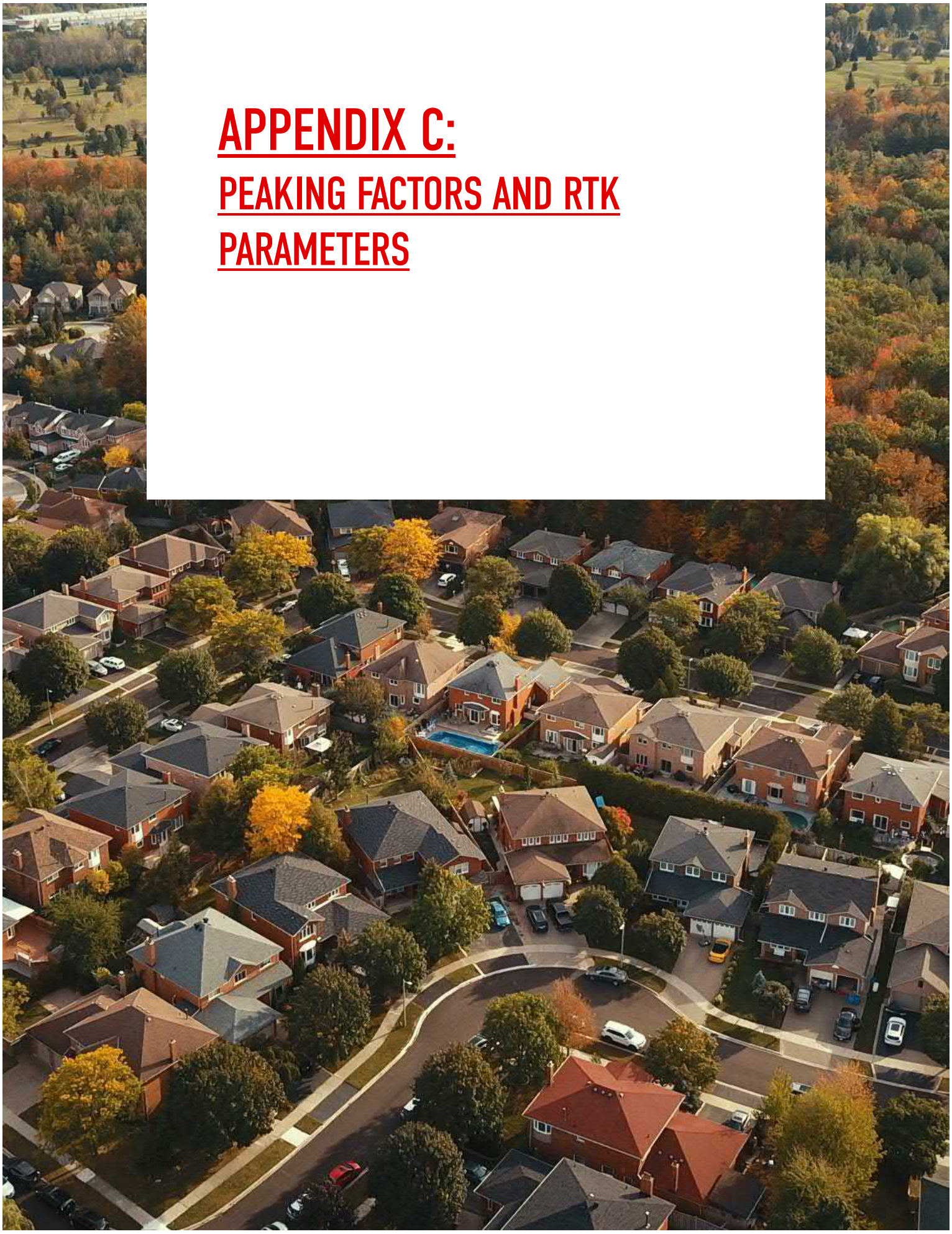
Flow Monitoring Removal Report
114-1008-006 / Site6

Verification				
Manually Measured Velocity Profile				
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Time:	2020-10-13 11:14
Manually Measured Average Velocity[m/s]:	
Manually Measured Level:	
Monitor(ISCO 2150) Velocity[m/s]:	
Monitor(ISCO 2150) Level:	
Instrument Manufacturer:	NULL
Instrument Calibration Due Date:	2020-10-13
Instrument Serial Number:	NULL

APPENDIX C:

PEAKING FACTORS AND RTK PARAMETERS



APPENDIX C: PEAKING FACTORS AND RTK PARAMETERS

PEAKING FACTORS

Site 1

Hour	Peaking Factor
0	0.62
1	0.55
2	0.55
3	0.53
4	0.57
5	0.59
6	0.62
7	0.84
8	1.09
9	1.29
10	1.35
11	1.40
12	1.33
13	1.27
14	1.20
15	1.20
16	1.14
17	1.17
18	1.14
19	1.20
20	1.14
21	1.27
22	1.07
23	0.88

Site 2

Hour	Peaking Factor
0	0.61
1	0.55
2	0.45
3	0.35
4	0.39
5	0.41
6	0.55
7	0.90
8	0.89
9	1.25
10	1.62
11	1.49
12	1.43
13	1.37
14	1.61
15	1.30
16	1.18
17	1.09
18	1.21
19	1.19
20	1.23
21	1.11
22	0.98
23	0.83

Site 3

Hour	Peaking Factor
0	0.80
1	0.62
2	0.46
3	0.41
4	0.41
5	0.40
6	0.61
7	0.46
8	0.93
9	1.27
10	1.48
11	1.35
12	1.46
13	1.54
14	1.34
15	1.37
16	1.20
17	1.40
18	1.10
19	1.17
20	1.35
21	0.99
22	0.96
23	0.90

Site 4

Hour	Peaking Factor
0	0.96
1	0.77
2	0.61
3	0.50
4	0.50
5	0.62
6	0.86
7	1.13
8	1.14
9	1.25
10	1.13
11	1.26
12	1.13
13	1.16
14	1.09
15	1.15
16	1.03
17	1.05
18	1.07
19	1.15
20	1.13
21	1.11
22	1.20
23	0.99

Site 5

Hour	Peaking Factor
0	0.57
1	0.54
2	0.49
3	0.96
4	1.30
5	0.86
6	0.58
7	1.13
8	1.04
9	0.90
10	1.10
11	1.37
12	1.31
13	0.74
14	1.22
15	1.47
16	1.80
17	1.30
18	0.81
19	1.04
20	1.28
21	0.78
22	0.54
23	0.88

Site 6

Hour	Peaking Factor
0	0.74
1	0.62
2	0.50
3	0.45
4	0.47
5	0.42
6	0.56
7	0.78
8	0.91
9	1.16
10	1.34
11	1.14
12	1.11
13	1.24
14	1.24
15	1.20
16	1.02
17	1.24
18	1.14
19	1.37
20	1.72
21	1.51
22	1.24
23	0.89

RTK PARAMETERS

Site 1

	R	T	K
Fast	0.00655	0.55	1
Medium	0.0046	0.85	1.8
Slow	0.0012	0.8	3

Site 2

	R	T	K
Fast	0.0162	1.3	1.54
Medium	0.00488	1.6	1.8
Slow	0.00376	1.56	3.02

Site 3

	R	T	K
Fast	0.008	0.85	0.65
Medium	0.0026	0.95	1.15
Slow	0.0012	1.5	0.8

Site 4

	R	T	K
Fast	0.0047	0.675	1.775
Medium	0.0021	1.475	0.95
Slow	0.000975	1.5	1.225

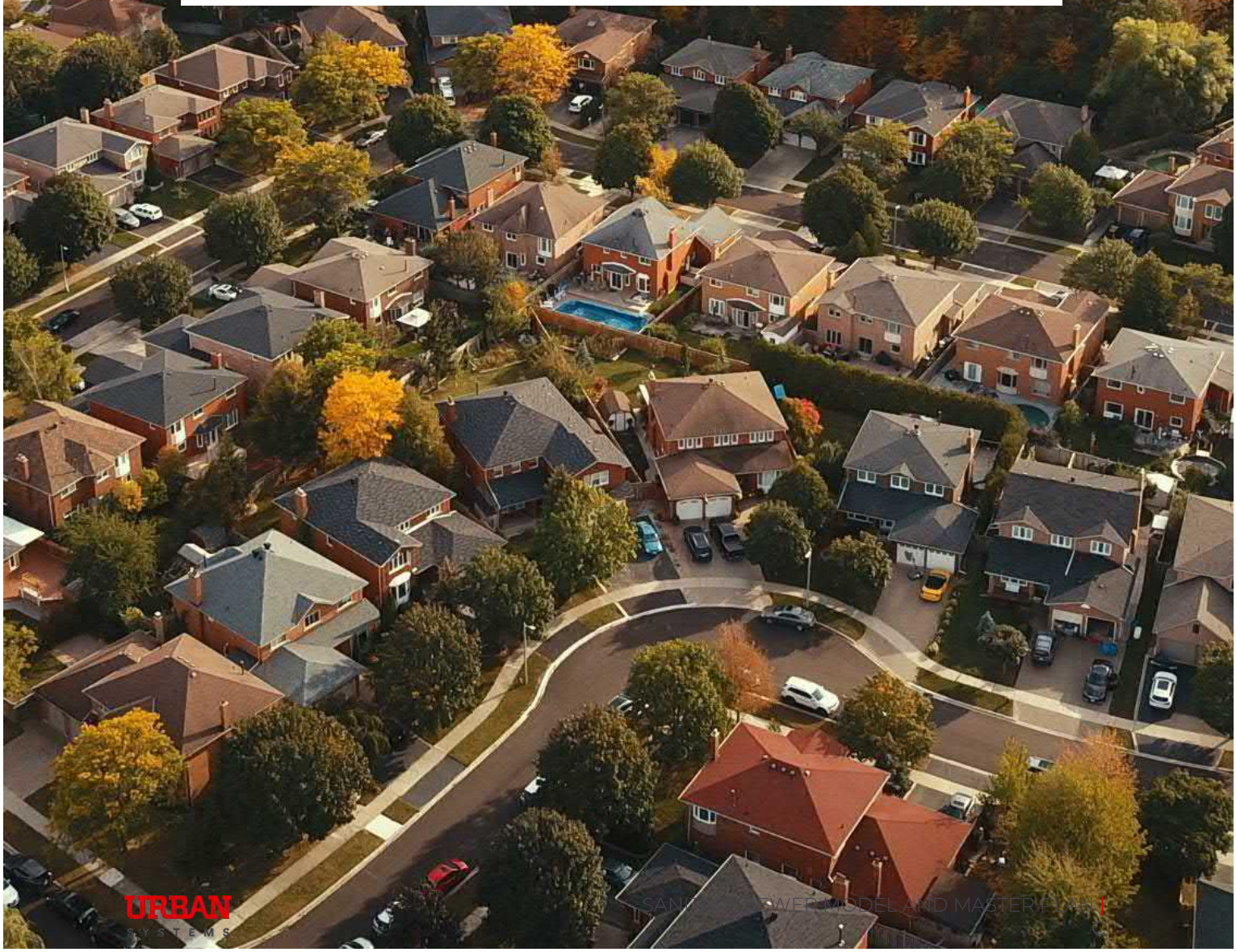
Site 5

	R	T	K
Fast	0.013667	0.566667	1.166667
Medium	0.001733	1.766667	1
Slow	0.000967	2.033333	0.966667

Site 6

	R	T	K
Fast	0.0038	0.55	3.6
Medium	0.00175	1.75	2.9
Slow	0.0009	2.7	2

APPENDIX D:
COST ESTIMATES



Kickinghorse Drive - Sanitary Main Replacement - Class C Cost Estimate

Remove existing sanitary mains and replace with 375mm in Kickinghorse Drive

Road: Kickinghorse Drive **Length:** 427 l.m.

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL
SCHEDULE "A" - EARTHWORKS					
A.1	Remove and Dispose of Existing Asphalt	s.m.	270	$ 31.00	$ 8,370.00
A.2	Subgrade Preparation	s.m.	270	$ 5.90	$ 1,593.00
A.3	Granular Sub-base and Base Placement				
a)	75mm Minus Granular Sub-base - 400mm depth	s.m.	270	$ 42.00	$ 11,340.00
b)	25mm Minus Granular Base - 125 mm depth	s.m.	270	$ 26.00	$ 7,020.00
A.4	Gravel Road Restoration - Sub-base and Base Gravel	s.m.	2400	$ 68.00	$ 163,200.00
A.5	Remove Gravel Stockpile to Temporary Stock Pile	c.m.	14000	$ 7.80	$ 109,200.00
	Subtotal Schedule "A"				**$ 301,000.00**
SCHEDULE "B" - SURFACE WORKS					
B.1	Prime Coat	s.m.	270	$ 7.00	$ 1,890.00
B.2	Tack Coat	s.m.	270	$ 7.00	$ 1,890.00
B.3	Asphalt Pavement Placement				
a)	Lower Course - 60mm depth	s.m.	270	$ 52.00	$ 14,040.00
b)	Upper Course - 40mm depth	s.m.	270	$ 42.00	$ 11,340.00
B.4	Paint Marking Placement	l.s.	1	$ 2,000.00	$ 2,000.00
	Subtotal Schedule "B"				**$ 32,000.00**
SCHEDULE "C" - SANITARY					
C.1	Remove Existing Mains	l.m.	427	$ 20.00	$ 8,547.00
C.2	Supply and install 375mm PVC DR 35 Main				
a)	2-3m Depth	l.m.	112	$ 816.00	$ 91,392.00
b)	3-4m Depth	l.m.	213	$ 916.00	$ 195,108.00
c)	4-5m Depth	l.m.	102	$ 1,016.00	$ 103,987.60
C.3	Remove and Replace Existing Manhole	ea.	5	$ 18,315.00	$ 91,575.00
C.4	Sanitary Tie-in to existing manhole	ea.	1	$ 4,500.00	$ 4,500.00
C.5	Sanitary Tie-in to Existing Lift Station	ea.	1	$ 4,420.00	$ 4,420.00
C.6	Temporary Sanitary Bypass	l.s.	1	$ 39,000.00	$ 39,000.00
	Subtotal Schedule "C"				**$ 539,000.00**
	SCHEDULE "A" - EARTHWORKS				$ 301,000.00
	SCHEDULE "B" - SURFACE WORKS				$ 32,000.00
	SCHEDULE "C" - SANITARY				$ 539,000.00
	SUBTOTAL (NOT INCL. GST)				**$ 872,000.00**
	Contingency (35%)				$ 305,200.00
	Engineering (15%)				$ 176,580.00
	TOTAL				**$ 1,354,000.00**

Note:

1. This estimate is for 'order of magnitude' purposes only and is based on 2024 unit rates.
2. GST not included.
3. Legal and survey services and costs are not included.
4. Engineering fees (15%) and contingency (35%) are included.
5. Total costs are rounded up to the nearest thousand.

12th Street S to 13th Street S - Sanitary Main Replacement - Class C Cost Estimate

Remove existing 250 and 300mm sanitary main and replace with 300 and 375mm from 12th Street to 13th Street

Road: 12th Street S to 13th Street S **Length:** 689.00 l.m.

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL
SCHEDULE "A" - EARTHWORKS					
A.1	Remove and Dispose of Existing Asphalt	s.m.	4823	$ 31.00	$ 149,513.00
A.2	Subgrade Preparation	s.m.	4823	$ 5.90	$ 28,455.70
A.3	Granular Sub-base and Base Placement				
a)	75mm Minus Granular Sub-base - 400mm depth	s.m.	4823	$ 42.00	$ 202,566.00
b)	25mm Minus Granular Base - 125 mm depth	s.m.	4823	$ 26.00	$ 125,398.00
A.4	Pole Holds on Power Poles and Street Lamps	ea.	4	$ 3,600.00	$ 14,400.00
A.5	Reconstruct Existing Driveways - Granular Base 100 mm	s.m.	396	$ 25.00	$ 9,900.00
	Subtotal Schedule "A"				**$ 531,000.00**
SCHEDULE "B" - SURFACE WORKS					
B.1	Prime Coat	s.m.	4823	$ 7.00	$ 33,761.00
B.2	Tack Coat	s.m.	4823	$ 7.00	$ 33,761.00
B.3	Asphalt Pavement Placement				
a)	Lower Course - 60mm depth	s.m.	4823	$ 52.00	$ 250,796.00
b)	Upper Course - 40mm depth	s.m.	4823	$ 42.00	$ 202,566.00
B.4	Driveway Pavement Restoration	s.m.	396	$ 84.00	$ 33,264.00
	Subtotal Schedule "B"				**$ 555,000.00**
SCHEDULE "C" - SANITARY					
C.1	Remove Existing Mains	l.m.	689.00	$ 20.00	$ 13,780.00
C.2	Supply and install 300mm PVC DR 35 Main				
a)	2-3m Depth	l.m.	447.00	$ 587.00	$ 262,389.00
C.3	Supply and install 375mm PVC DR 35 Main	l.m.			
b)	3-4m Depth	l.m.	242	$ 916.00	$ 221,672.00
C.4	Remove and Replace Existing Manhole	ea.	8	$ 15,392.00	$ 123,136.00
C.5	Sanitary Tie-in to existing manhole	ea.	2	$ 4,500.00	$ 9,000.00
C.6	Temporary Sanitary Bypass	l.s.	1	$ 62,062.00	$ 62,062.00
C.7	Remove and Replace Existing Sanitary Services	ea.	33	$ 3,900.00	$ 128,700.00
	Subtotal Schedule "C"				**$ 821,000.00**
	SCHEDULE "A" - EARTHWORKS				$ 531,000.00
	SCHEDULE "B" - SURFACE WORKS				$ 555,000.00
	SCHEDULE "C" - SANITARY				$ 821,000.00
	SUBTOTAL (NOT INCL. GST)				**$ 1,907,000.00**
	Contingency (35%)				$ 667,450.00
	Engineering (15%)				$ 386,167.50
	TOTAL				**$ 2,961,000.00**

Note:

1. This estimate is for 'order of magnitude' purposes only and is based on 2024 unit rates.
2. GST not included.
3. Legal and survey services and costs are not included.
4. Engineering fees (15%) and contingency (35%) are included.
5. Total costs are rounded up to the nearest thousand.

5th Ave S - Sanitary Main Replacement - Class C Cost Estimate

Remove existing 300mm sanitary main on east side of road and replace with 375mm in 5th Ave S (from 9th St to 11th St)

Road: 5th Ave S **Length:** 224.00 l.m.

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL
SCHEDULE "A" - EARTHWORKS					
A.1	Remove and Dispose of Existing Asphalt	s.m.	1344	$ 31.00	$ 41,664.00
A.2	Subgrade Preparation	s.m.	1344	$ 5.90	$ 7,929.60
A.3	Granular Sub-base and Base Placement				
a)	75mm Minus Granular Sub-base - 400mm depth	s.m.	1344	$ 42.00	$ 56,448.00
b)	25mm Minus Granular Base - 125 mm depth	s.m.	1344	$ 26.00	$ 34,944.00
A.4	Pole Holds on Power Poles and Street Lamps	ea.	4	$ 3,600.00	$ 14,400.00
A.5	Reconstruct Existing Driveways - Granular Base 100 mm	s.m.	96	$ 25.00	$ 2,400.00
	Subtotal Schedule "A"				**$ 158,000.00**
SCHEDULE "B" - SURFACE WORKS					
B.1	Prime Coat	s.m.	1344	$ 7.00	$ 9,408.00
B.2	Tack Coat	s.m.	1344	$ 7.00	$ 9,408.00
B.3	Asphalt Pavement Placement				
a)	Lower Course - 60mm depth	s.m.	1344	$ 52.00	$ 69,888.00
b)	Upper Course - 40mm depth	s.m.	1344	$ 42.00	$ 56,448.00
B.4	Paint Marking Placement	l.s.	1	$ 17,000.00	$ 17,000.00
B.5	Driveway Pavement Restoration	s.m.	96	$ 84.00	$ 8,064.00
	Subtotal Schedule "B"				**$ 171,000.00**
SCHEDULE "C" - CONCRETE WORKS					
C.1	Remove and Replace Curb	l.m.	130	$ 120.00	$ 15,600.00
	Subtotal Schedule "C"				**$ 16,000.00**
SCHEDULE "D" - SANITARY					
D.1	Remove Existing 300mm Main	l.m.	224	$ 20.00	$ 4,480.00
D.2	Supply and install 375mm PVC DR 35 Main				
a)	3-4m Depth	l.m.	224	$ 916.00	$ 205,184.00
D.3	Remove and Replace Existing Manhole	ea.	4	$ 15,392.00	$ 61,568.00
D.4	Sanitary Tie-in to existing manhole	ea.	2	$ 4,500.00	$ 9,000.00
D.5	Tie Existing Sanitary Main to New Manhole	ea.	4	$ 4,500.00	$ 18,000.00
D.6	Temporary Sanitary Bypass	l.m.	1	$ 20,965.00	$ 20,965.00
D.7	Remove and Replace Existing Sanitary Services	ea.	3	$ 3,900.00	$ 11,700.00
	Subtotal Schedule "D"				**$ 331,000.00**
	SCHEDULE "A" - EARTHWORKS				$ 158,000.00
	SCHEDULE "B" - SURFACE WORKS				$ 171,000.00
	SCHEDULE "C" - CONCRETE WORKS				$ 16,000.00
	SCHEDULE "D" - SANITARY				$ 331,000.00
	SUBTOTAL (NOT INCL. GST)				**$ 676,000.00**
	Contingency (35%)				$ 236,600.00
	Engineering (15%)				$ 136,890.00
	TOTAL				**$ 1,050,000.00**

Note:

1. This estimate is for 'order of magnitude' purposes only and is based on 2024 unit rates.
2. GST not included.
3. Legal and survey services and costs are not included.
4. Engineering fees (15%) and contingency (35%) are included.
5. Total costs are rounded up to the nearest thousand.
6. Assuming houses on the west side of 5th Ave S have house services tied to the western sanitary main, and are therefore not replaced

Mains upstream of 12th St. Lift Station - Sanitary Main Replacement - Class C Cost Estimate

Remove existing 450mm sanitary main and replace with 525mm from the mains upstream of 12th St. Lift Station (from 11th St to 12th St Lift Station)

Road: 5th Ave S and 12th St S **Length:** 166.00 l.m.

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL
SCHEDULE "A" - EARTHWORKS					
A.1	Clearing, Grubbing	l.s.	1	$ 20,000.00	$ 20,000.00
A.2	Top Soil Stripping for re-use	c.m.	581.00	$ 30.00	$ 17,430.00
A.3	Landscape				
a)	Topsoil placement	c.m.	581.00	$ 30.00	$ 17,430.00
b)	Hydro Seeding (two applications)	s.m.	3,873.33	$ 8.00	$ 30,986.67
c)	Tree Planting Allowance	ea.	40	$ 3,000.00	$ 120,000.00
A.4	Pole Holds on Power Poles and Street Lamps	ea.	2	$ 3,600.00	$ 7,200.00
	Subtotal Schedule "A"				**$ 214,000.00**
SCHEDULE "B" - SURFACE WORKS					
B.1	Gravel Road Restoration	s.m.	400	$ 68.00	$ 27,200.00
	Subtotal Schedule "B"				**$ 28,000.00**
SCHEDULE "C" - SANITARY					
C.1	Remove Existing 450mm Main	l.m.	126	$ 20.00	$ 2,520.00
C.2	Abandon Existing Main under Railtracks	l.s.	1	$ 10,000.00	$ 10,000.00
C.3	Supply and install 525mm PVC SDR 35 Main				
a)	3-4m Depth	l.m.	96	$ 1,101.00	$ 105,696.00
b)	4-5m Depth	l.m.	18	$ 1,201.00	$ 21,618.00
c)	5-6m Depth	l.m.	12	$ 1,401.00	$ 16,812.00
C.4	Remove and Replace Existing Manhole	ea.	5	$ 19,240.00	$ 96,200.00
C.5	Sanitary Tie-in to existing manhole	ea.	1	$ 5,000.00	$ 5,000.00
C.6	Sanitary Tie-in to existing Lift Station	ea.	1	$ 8,840.00	$ 8,840.00
C.7	Temporary Sanitary Bypass	l.m.	1	$ 88,665.00	$ 88,665.00
C.8	Horizontal Directional Drilling Under Railtracks	l.m.	40	$ 2,286.00	$ 91,440.00
C.9	750mm Steel Encasement pipe under Railtracks	l.m.	40	$ 6,185.00	$ 247,400.00
	Subtotal Schedule "C"				**$ 695,000.00**
	SCHEDULE "A" - EARTHWORKS				$ 214,000.00
	SCHEDULE "B" - SURFACE WORKS				$ 28,000.00
	SCHEDULE "C" - SANITARY				$ 695,000.00
	SUBTOTAL (NOT INCL. GST)				**$ 937,000.00**
	Contingency (35%)				$ 327,950.00
	Engineering (15%)				$ 189,742.50
	TOTAL				**$ 1,455,000.00**

Note:

1. This estimate is for 'order of magnitude' purposes only and is based on 2024 unit rates.
2. GST not included.
3. Legal and survey services and costs are not included.
4. Engineering fees (15%) and contingency (35%) are included.
5. Total costs are rounded up to the nearest thousand.

12th St. Lift Station Pump Station - Pump Replacement - Class D Cost Estimate

Replace existing pumps with larger pumps and associated electrical upgrades at the 12th St. Lift Station

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL
SCHEDULE "A" - PROCESS					
A.1	Removal and Disposal of Existing Pumps	ea	3	10,000.00	$ 30,000.00
A.2	Supply and Install New Pumps and Associated Electrical Upgrades	ea	3	250,000.00	$ 750,000.00
	Subtotal Schedule "A"				**$ 780,000.00**
	SCHEDULE "A" - PROCESS				$ 780,000.00
	SUBTOTAL (NOT INCL. GST)				**$ 780,000.00**
	Contingency (50%)				$ 390,000.00
	Engineering (15%)				$ 175,500.00
	TOTAL				**$ 1,346,000.00**

Note:

1. This estimate is for 'order of magnitude' purposes only and is based on 2024 unit rates.
2. GST not included.
3. Legal and survey services and costs are not included.
4. Engineering fees (15%) and contingency (50%) are included.
5. Total costs are rounded up to the nearest thousand.
6. Preliminary study should be conducted to confirm extents of required upgrades and estimated costs

Highway 95 Crossing - Sanitary Main Replacement - Class C Cost Estimate

Remove existing sanitary main and replace with 300mm from Station Ave to 10th Ave N

Road: Station Ave and 7th St N **Length:** 162.00 l.m.

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL
SCHEDULE "A" - EARTHWORKS					
A.1	Remove and Dispose of Existing Asphalt	s.m.	990	$ 31.00	$ 30,690.00
A.2	Subgrade Preparation	s.m.	990	$ 5.90	$ 5,841.00
A.3	Granular Sub-base and Base Placement				
a)	75mm Minus Granular Sub-base - 400mm depth	s.m.	990	$ 42.00	$ 41,580.00
b)	25mm Minus Granular Base - 125 mm depth	s.m.	990	$ 26.00	$ 25,740.00
A.4	Pole Holds on Power Poles and Street Lamps	ea.	1	$ 30,000.00	$ 30,000.00
A.5	Clearing, Grubbing	l.s	1	$ 20,000.00	$ 20,000.00
A.6	Top Soil Stripping for re-use	c.m.	715	$ 30.00	$ 21,450.00
A.7	Landscape	s.m.			
a)	Topsoil placement	c.m.	715	$ 30.00	$ 21,450.00
b)	Hydro Seeding (two applications)	s.m.	4767	$ 8.00	$ 38,133.33
c)	Tree Planting Allowance	ea.	20	$ 3,000.00	$ 60,000.00
	Subtotal Schedule "A"				**$ 295,000.00**
SCHEDULE "B" - SURFACE WORKS					
B.1	Prime Coat	s.m.	990	$ 7.00	$ 6,930.00
B.2	Tack Coat	s.m.	990	$ 7.00	$ 6,930.00
B.3	Asphalt Pavement Placement				
a)	Lower Course - 60mm depth	s.m.	990	$ 52.00	$ 51,480.00
b)	Upper Course - 40mm depth	s.m.	990	$ 42.00	$ 41,580.00
	Subtotal Schedule "B"				**$ 107,000.00**
SCHEDULE "C" - SANITARY					
C.1	Remove Existing Main	l.m.	107	$ 20.00	$ 2,140.00
C.2	Abandon Existing Main under Railtracks	l.s.	1	$ 10,000.00	$ 10,000.00
C.3	Supply and install 300mm PVC SDR 35 Main				
a)	3-4m Depth	l.m.	162	$ 587.00	$ 95,094.00
C.4	Remove and Replace Existing Manhole	ea.	4	$ 19,240.00	$ 76,960.00
C.5	Sanitary Tie-in to existing manhole	ea.	1	$ 5,000.00	$ 5,000.00
C.7	Temporary Sanitary Bypass	l.m.	1	$ 15,485.00	$ 15,485.00
C.8	Horizontal Directional Drilling Under Railtracks	l.m.	55	$ 2,286.00	$ 125,730.00
C.9	525mm Steel Encasement pipe under Railtracks	l.m.	55	$ 4,824.00	$ 265,320.00
	Subtotal Schedule "C"				**$ 596,000.00**
	SCHEDULE "A" - EARTHWORKS				$ 295,000.00
	SCHEDULE "B" - SURFACE WORKS				$ 107,000.00
	SCHEDULE "C" - SANITARY				$ 596,000.00
	SUBTOTAL (NOT INCL. GST)				**$ 998,000.00**
	Contingency (35%)				$ 349,300.00
	Engineering (15%)				$ 202,095.00
	TOTAL				**$ 1,550,000.00**

Note:

1. This estimate is for 'order of magnitude' purposes only and is based on 2024 unit rates.
2. GST not included.
3. Legal and survey services and costs are not included.
4. Engineering fees (15%) and contingency (35%) are included.
5. Total costs are rounded up to the nearest thousand.