SEWER UTILITY MASTER PLAN

Sierra Lakes County Water District

January 2024

Prepared for:

Sierra Lakes County Water District
7305 Short Road
Soda Springs, CA 95728

Prepared by:

5510 Longley Lane
Reno, NV 89511

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Sewer Utility Master Plan

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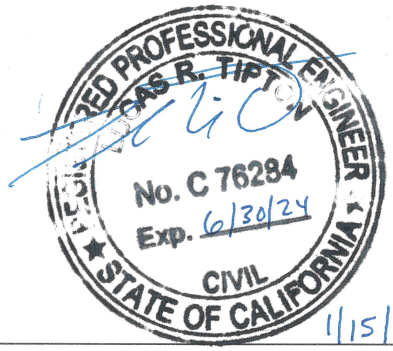

Luke Tipton, P.E.

DOWL

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EXECUTIVE SUMMARY

Sierra Lakes County Water District (SLCWD/the District) operates and maintains the sanitary sewer system serving the community located approximately one mile south of Soda Springs, California, an area of approximately 2,450 acres and contains 1,068 lots. This sewer system utility master plan (Plan) documents system trends and capacity, infrastructure condition and performance, and provides a plan for near and long-term capital improvement and replacement needs. This executive summary provides a snapshot of the key findings from each section of the Plan. In total, the Plan is comprised of five sections detailing the sewer flows and connection components of the sewer system.

SECTION 1.0 – HISTORICAL, CURRENT, AND FUTURE FLOWS

The District currently has 840 residential and commercial customer connections for sanitary sewer in the service area. SLCWD staff assigns each connection an equivalent dwelling unit (EDU) value in order to estimate sewer generation for each customer. Of the 840 connections, 836 are residential and assigned a single EDU. The remaining four connections are commercial and are cumulatively assigned 11 EDUs, for a total system EDU count of 847. While the system is comprised of 847 EDUs, the District population is highly transient, and it is estimated that between 73% and 90% of the customer connections are not contributing to sewer flows year-round. Additionally, there are 181 vacant residential parcels located within the District service area.

The District sewer system currently conveys sewer through a series of gravity mains and three pump stations to a final sewer pump station (SPS-01). SPS-01 then pumps the District sewer to the Donner Summit Public Utilities District (DSPUD) wastewater treatment plant (WWTP) for treatment. The monthly flow totals for the District recorded at the WWTP are shown in Figure ES-1. The sewer flow trend over the course of an average year is not in line with the expected behavior of a highly transient, vacation community. The system sees rapidly rising flows through the spring, and absolute peak flows in May. This is indicative of stormwater inflow and infiltration affecting total sewer flows.

Six months of sewer flow monitoring at four locations throughout the District system was performed as a part of the Plan. Peak volume and flow rate days at the monitoring locations are nearly all on days of known storm events (inflow), or during warmer days when it would be expected that there are higher groundwater levels present (infiltration). Additionally, the system sees average daily sewer volumes surpass the volume of water produced for the months of April and May. As these two months are peak months of snowmelt runoff and rising groundwater, this again indicates groundwater infiltration into the sewer system.

The sewer flow monitoring data was also used to calculate a system diurnal curve, by averaging the hourly flowrate for each individual timestep (1 AM, 2 AM, etc.). Figure ES-2 shows the average day, weekday, and weekend diurnal curves calculated. On average, system flows peak at 1.15 times the average daily flow rate.

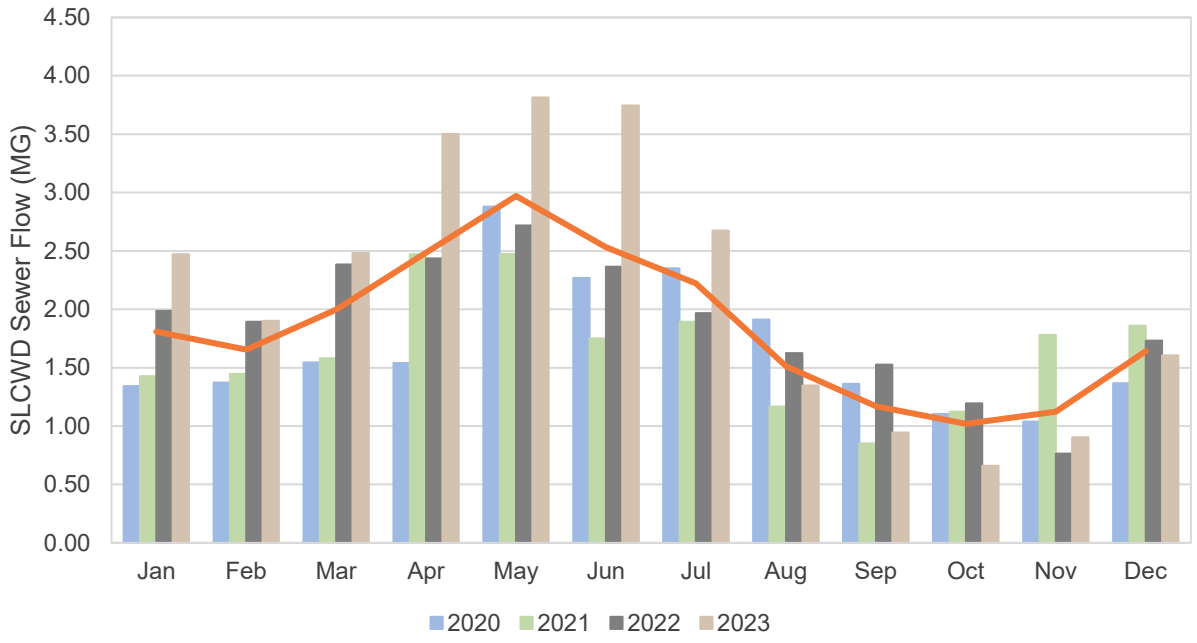

Figure ES-1: Average Monthly Sewer Flow at DSPUD WWTP (MG)

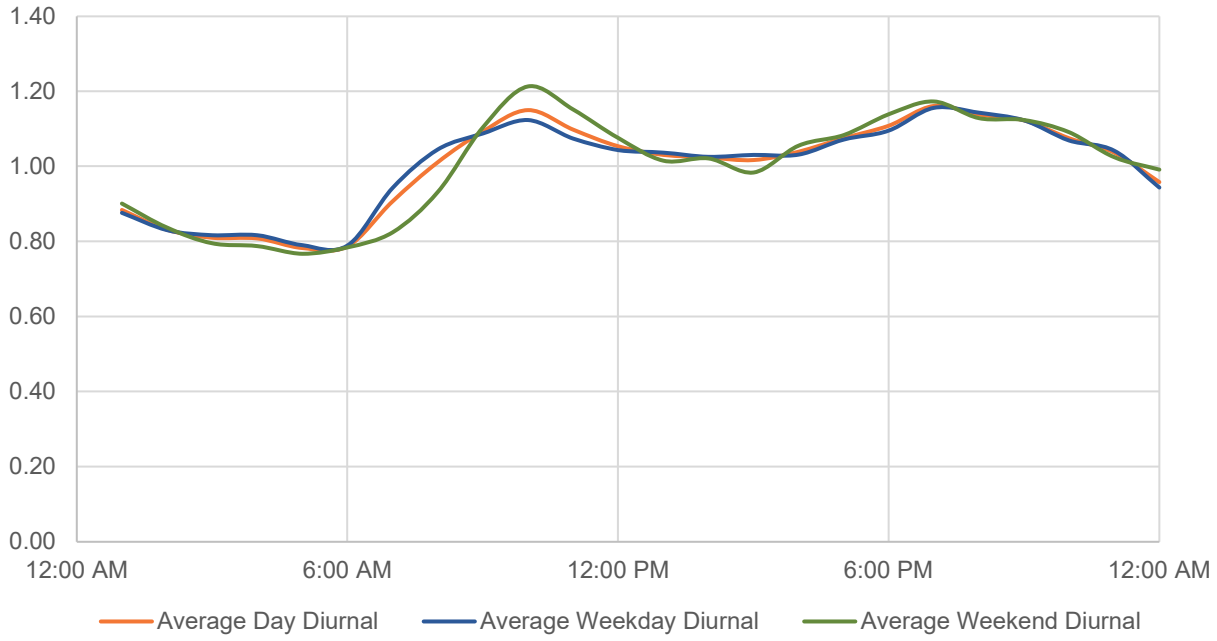

Figure ES-2: Average Diurnal Curves

To determine the overall peaking factor for the system, two different methodologies were used. The first examined the peak daily flow in million gallons per day (MGD) at each flow monitoring site and the DSPUD WWTP during the period of flow monitoring and compared it to the average flow recorded. The second method compared the average daily flow in gallons per minute (gpm) and compared it to the peak instantaneous flow recorded at each site. Ultimately, the first

method was chosen to represent the system overall peaking factor. Table ES-1 gives the calculated peaking factor for each flow monitoring site, and the system total. The system was determined to have an overall peaking factor of 2.83 and was used for all future flow projections.

Table ES-1: Daily Peaking Factor Summary

Flow Monitor ID	Average Daily Flow (MGD)	Peak Flow Daily (MGD)	Peaking Factor
SS_01	0.024	0.057	2.39
SS_02	0.062	0.199	3.24
SS_03	0.075	0.185	2.47
SS_04	0.012	0.041	3.44
Total System	**0.099**	**0.280**	**2.83**

At buildout, future sewer flows for the District were projected by assigning a calculated EDU value of 73 gallons per day (gpd) to each of the 181 vacant residential parcels. This addition of 181 EDUs to the system increases the wastewater flow in the District by approximately 20 percent based on the current average daily flow rate, with peak flows seeing an approximate 14 percent increase at buildout. Table ES-2 compares the existing sewer system flows to the projected buildout flows.

Table ES-2: Sewer Flow Summary

Flow Scenario	Average Daily Flow (MGD)	Peaking Factor	Peak Daily Flow (MGD)
Existing System	0.061	4.61	0.280
Additional Flow at Buildout	0.013	2.83	0.037
Total Buildout System	0.074	4.30	0.316

SECTION 2.0 – HYDRAULIC MODEL DEVELOPMENT

In order to perform an effective capacity analysis of the SLCWD sewer system a hydraulic model was developed. The model utilized existing AutoCAD data and field survey information collected of the system in order to build the model geometry and set model elevations.

Sewer flow allocation throughout the model was done per the values calculated during the flow monitoring process. The average flow allocated within the four main catchment areas of the system, and their corresponding diurnal curves are shown in Table ES-3 and Figure ES-3 respectively. Controls and setpoints for the four sewer pump stations in the system were provided by District staff.

Table ES-3: Unit Loading Rates for Model Allocation

Catchment Area	Average Flow/EDU (gpd)	# of EDUs	Average Flow (gpm)
SPS-1	213	500	123.9[1]
SPS-2	147	88	9.0
SPS-3	169	60	7.1
SPS-4	148	199	20.5
Future Buildout	73	181	9.18

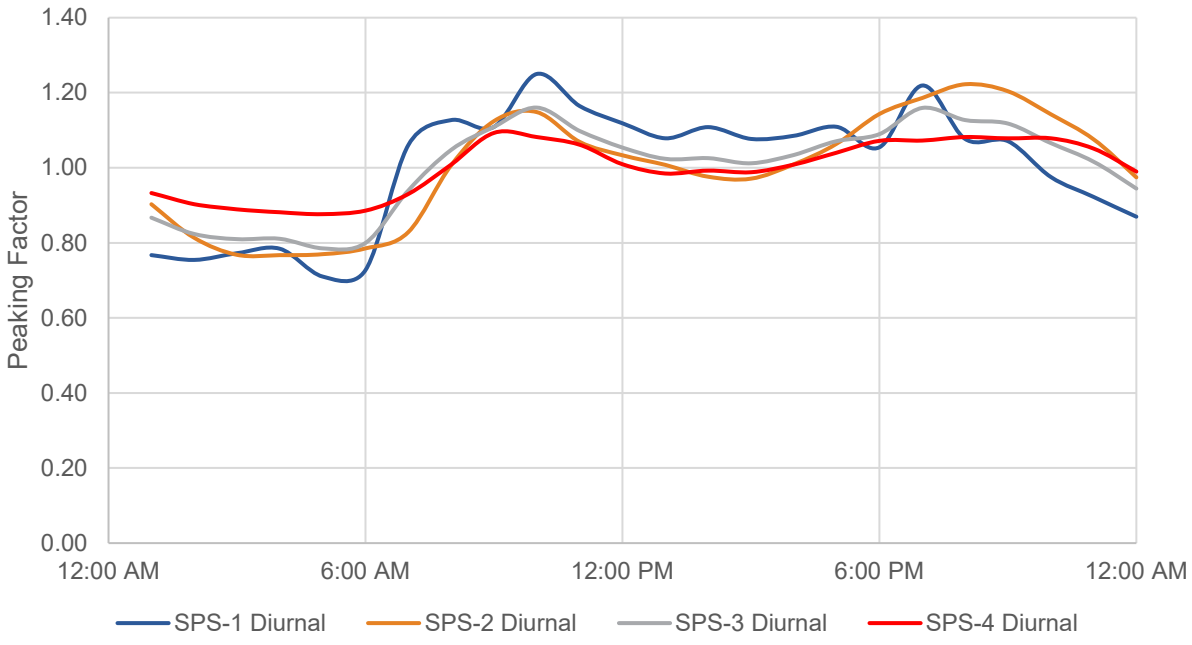

Figure ES-3: SPS Catchment Area Diurnal Curves

Upon completion of the model, the sewer model pipe roughness values were determined and calibrated against the sewer flow monitoring flow and velocity data collected at each site.

SECTION 3.0 – COLLECTION SYSTEM ANALYSIS

The collection system conveys sewer through a network of gravity mains and sewer pump stations to a terminal collection point of the DSPUD WWTP via SPS-01 which is owned and operated by the District. Three of the four sewersheds in the system pump into one another, creating a step ladder of pumping and gravity flow.

The capacity of the gravity collection system was assessed against the Placer County land Development Manual criteria for self-cleaning velocities and maximum flow depth. Per the

[1] *The average flow rate from the SPS-1 catchment area includes a 50 gpm demand from the water treatment plant backwash to mimic the peak flow rate from the backwash procedure.*

hydraulic model analysis, the collection system has no system pipes that exceed maximum flow depth during both existing and buildout scenarios. However, several system pipes do not meet a minimum self-cleaning velocity of 2 feet per second.

The largest issue facing the collection system is aging infrastructure. Per the analysis performed in earlier sections of the plan, stormwater inflow and infiltration are a massive problem to the collection system. This is especially relevant considering the District sends its sewer to the DSPUD WWTP for treatment. As the DSPUD has implemented capital improvement projects to reduce inflow and infiltration in their own system, the District's portion of the total sewer flow treated at the WWTP has increased. This has increased treatment costs for the District. The collection system is mostly comprised of vitrified clay or asbestos concrete pipe. These materials have reached the end of their useful life cycle and need to be replaced in order to reduce the impacts of stormwater on the system.

SECTION 4.0 – SEWER PUMP STATION ANALYSIS

The four sewer pump stations in the system were analyzed to determine the capacity remaining for each pump station. Each station element (pumps, wet wells, and force mains) was analyzed against the design criteria found within the Placer County Pump Station Design Manual. The existing capacity remaining for each station's pumps, wet well, and force main are shown in Table ES-4, Table ES-5, and Table ES-6 respectively.

While the some of the pump station sites do show capacity issues, it is believed that capital improvements to the collection system targeted to reduce stormwater inflow and infiltration will reduce these capacity deficiencies or eliminate them all together. However, several of the pump stations show considerable wear and are sources of stormwater inflow and infiltration themselves. As such, it has been recommended in the Plan to perform a rehabilitation program at these sites.

Table ES-4: Existing Pump Station Pump Capacity Summary

SPS ID	Peaking Factor	Pump Operating Point (gpm)	Peak Flow (gpm)	Capacity Remaining (EDUs)
SPS-1	2.47	350	307	299
SPS-2	3.44	140	122	127
SPS-3	2.77	150	73	536
SPS-4	2.39	316	50	1,856

Table ES-5: Existing Pump Station Emergency Storage Capacity Summary

SPS ID	Peaking Factor	Required Emergency Storage (gal)	Emergency Storage Available (gal)	Capacity Remaining (EDUs)
SPS-1	2.47	73,688	13,263	-3,510
SPS-2	3.44	58,480	16,297	-2,450
SPS-3	2.77	35,087	15,346	-1,147
SPS-4	2.39	23,900	7,193	-970

Table ES-6: Existing Force Main Capacity Summary

SPS ID	Existing Force Main Velocity (ft/s)	Maximum Flow Rate (gpm)	Capacity Remaining (EDUs)
SPS-1	2.23	1,253	6,297
SPS-2	0.89	1,253	7,761
SPS-3	0.96	1,253	7,691
SPS-4	2.02	1,253	6,534

SECTION 5.0 – CAPITAL IMPROVEMENT PROGRAM

In general, the sewer system is in need of several capital improvement projects in order to address the system deficiencies. Primarily, the replacement of aging sewer mains to reduce the extensive stormwater inflow and infiltration that is occurring. The findings and recommendations of this Plan have been compiled into six improvement projects or programs which will provide the District with a robust and resilient sewer system. The 10-year capital improvement program can be found in Table ES-7. The 10-year program totals $38,475,000.

It is recommended that this master plan be updated at least once every ten years so that the capital improvement program is representative of system needs.

Table ES-7: 10-year Capital Improvement Program

Project	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Sewer Main Replacement PER	$104,000									
SPS-4 Flow Meter SCADA Connect	$26,000									
Utility Rate Study	$26,000									
Sewer System GIS	$9,000									
System Condition Assessment	$78,000									
Sewer Main Replacement Phase 1		$3,151,000								
Sewer Main Replacement Phase 2			$3,271,000							
SPS-2 Rehabilitation			$2,072,000							
Sewer Main Replacement Phase 3				$3,395,000						
SPS-3 Rehabilitation				$2,795,000						
Sewer Main Replacement Phase 4					$3,524,000					
Sewer Main Replacement Phase 5						$3,658,000				
Sewer Main Replacement Phase 6							$3,797,000			
Sewer Main Replacement Phase 7								$3,941,000		
Sewer Main Replacement Phase 8									$4,091,000	
Sewer Main Replacement Phase 9										$4,247,000
Sewer System Master Plan Update										$290,000
Total Annual Capital Cost	**$243,000**	**$3,151,000**	**$5,343,000**	**$6,190,000**	**$3,524,000**	**$3,658,000**	**$3,797,000**	**$3,941,000**	**$4,091,000**	**$4,537,000**

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1.0 HISTORICAL, CURRENT, AND FUTURE FLOWS

1.1 Customer Profile

Sierra Lakes County Water District (SLCWD/the District) operates and maintains the sanitary sewer system serving the community located approximately one mile south of Soda Springs, California (CA). The District service area is 2,450 acres and contains 1,068 lots (Plan area). The SLCWD population is highly transient. The percentage of service connections considered transient within the system is estimated to be between 76 percent (per CA Drinking Water Watch) and 90 percent (per SLCWD staff). Water and sewer services are currently unmetered, so no accurate estimate of the number of transient connections can be made.

Of the 1,068 lots within the District service area, 840 are developed and connected to the District sewer system. Other lots in the District service area include vacant parcels, and land designated as “Other” or “Restricted” by SLCWD staff. These lots are primarily land owned by SLCWD, a maintenance yard owned by Placer County, land preserved by the Truckee Donner Land Trust, or other private parties.

The District assigns each existing sewer connection an equivalent dwelling unit (EDU) in order to estimate the sewer generation for each customer (i.e., a typical residential customer would be assigned 1 EDU and higher sewer generators assigned multiple EDUs). A breakdown of current sewer customers by land use and the corresponding number of EDUs assigned by the District can be found in Table 1. As shown, the system is primarily residential (making up over 99 percent of all customers), with commercial customers being the second largest customer base, and the only customer class with the EDU count higher than the customer count.

Table 1: Sewer Customer Land Use Summary

Land Use Type	Customer Counts	EDUs
Connected Property - Residential	836	836
Connected Property - Commercial	4	11
Other	11	0
Restricted	36	0
Vacant	181	0
Total	**1,068**	**847**

For the purposes of this Plan, it was assumed that SLCWD has 840 sewer customers and 847 EDUs, with the potential to increase by a count of 181. The 181 vacant parcels were all identified as having a residential land use and will be assigned one EDU for future projections.

1.2 System Flow Summary

The overall sewer flow for the District was analyzed using the daily total system sewer flows recorded at the Donner Summit Public Utilities District (DSPUD) wastewater treatment plant (WWTP) for the period of 2020 to 2023. The DSPUD WWTP is the point of treatment for all

District sewer flow. The total monthly sewer flows for the District are presented in Table 2. Based on the analysis, the SLCWD has an average daily sewer flow of 0.061 million gallons per day (MGD). The largest daily flow seen from SLCWD during this period was 0.280 MGD, for a system peaking factor of 4.61.

Table 2: Monthly Sewer Flows (Million Gallons [MG]), 2020-2023

Month	2020	2021	2022	2023	Average
January	1.34	1.43	1.99	2.47	1.81
February	1.37	1.45	1.89	1.90	1.65
March	1.54	1.58	2.38	2.48	2.00
April	1.54	2.47	2.43	3.50	2.49
May	2.88	2.48	2.72	3.81	2.97
June	2.27	1.75	2.36	3.74	2.53
July	2.35	1.89	1.97	2.67	2.22
August	1.91	1.17	1.62	1.35	1.51
September	1.36	0.85	1.53	0.94	1.17
October	1.10	1.12	1.19	0.66	1.02
November	1.04	1.78	0.77	0.91	1.12
December	1.37	1.86	1.73	1.60	1.64
Total	**20.08**	**19.83**	**22.59**	**26.05**	**22.14**

The overall trend of sewer flow does not follow the expected pattern for a transient heavy community. Figure 1 below shows the average monthly total sewer flow for the District for the period of 2020 to 2023. Considering the transient nature of the system, it would be expected to have peak sewer flows through the warmer summer months when the population is higher. However, peak sewer flow in the system is seen in the month of May, with sewer flows dramatically increasing from March to May, and then a decrease into the warmer summer months. This speaks to stormwater inflow and infiltration (I&I) affecting total sewer flows. A more detailed analysis of I&I within the District can be found in Section 1.6.

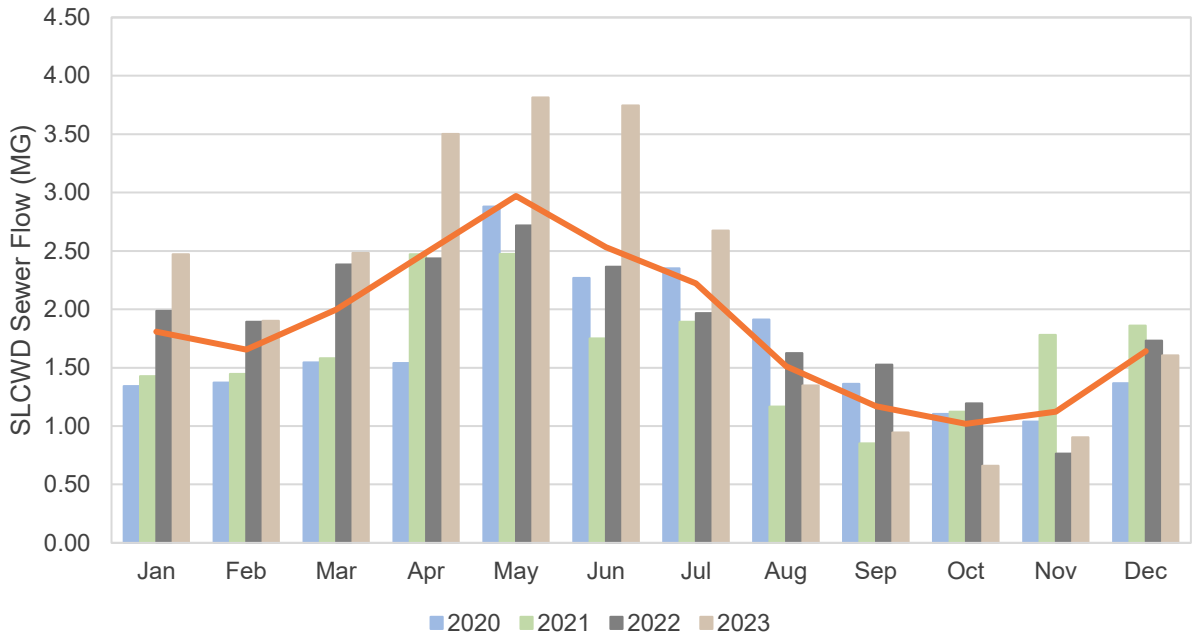

Figure 1: Average Monthly Sewer Flow at DSPUD WWTP (MG), 2020-2023

The sewer flow per EDU for the District was calculated using the total system sewer flows recorded at the DSPUD WWTP. The average total flow per year (22.47 MG) was divided among the existing number of allocated EDUs (847). Per this calculation, a single EDU accounts for 73 gallons per day (gpd) of flow.

This EDU value is much lower than typical EDUs seen in primarily residential communities. Residential communities typically have EDU values between 150 gpd and 250 gpd. The lower SLCWD EDU speaks to the transient nature of the population. It would not be appropriate to adjust the EDU value based on the fact that a smaller number of homes are occupied permanently throughout the year, as it is impossible to have accurate resident occupancy counts. Therefore, for the purpose of this Plan, future development will have an EDU of 73 gpd applied and assume that the current transient to permanent resident ratio will stay the same moving forward.

1.3 Sewer Flow Monitoring

DOWL entered into an agreement with ADS Environmental Services (ADS) to conduct six months of flow monitoring services at four locations throughout the SLCWD system. The collected data was used to determine system flow characteristics.

1.3.1 Site Selection and Monitoring Process

The four flow monitoring locations were selected by DOWL and workshopped with SLCWD to determine their suitability. Table 3 gives the flow monitor locations and their corresponding IDs used during the monitoring process and in the report. Figure 2 is a map of the selected locations. The flow meters were installed on December 21, 2022, and the flow monitoring data collection period occurred from December 22, 2022, through June 22, 2023. The flow

monitoring equipment recorded depth and velocity readings at five-minute intervals and the continuity equation was used to calculate flow rates.

ADS data analysts reviewed the data for completeness, outliers, and deviations in flow patterns and corrected the data, as necessary. ADS provided DOWL with a finalized excel spreadsheet of the flow monitoring data and a final report summarizing the collected information. The final ADS report can be found in Appendix A.

Table 3: Flow Monitoring Locations

Monitor Location	Flow Monitor ID
Frosty Way and Serene Road Intersection	SS_01
Upstream of SPS-1	SS_02
Along Yuba Drive	SS_03
Dulzura Road and Lake Drive Intersection	SS_04

It should be noted that due to the lack of cell service at the flow monitoring locations, ADS staff were not able to remotely monitor the battery life, equipment status, data collected, or any other oddities that may have occurred during the day-to-day operation of the flow meters. As a result, the flow monitoring equipment did not have 100 percent uptimes. Table 4 describes the percent uptime at each of the flow meters. While no location was able to achieve 100 percent uptime, the data provided was sufficient to perform key flow analyses for the District sewer system.

Table 4: Flow Meter Percent Uptime

Flow Monitor ID	Percent Uptime
SS_01	97.797%
SS_02	88.149%
SS_03	97.991%
SS_04	85.457%

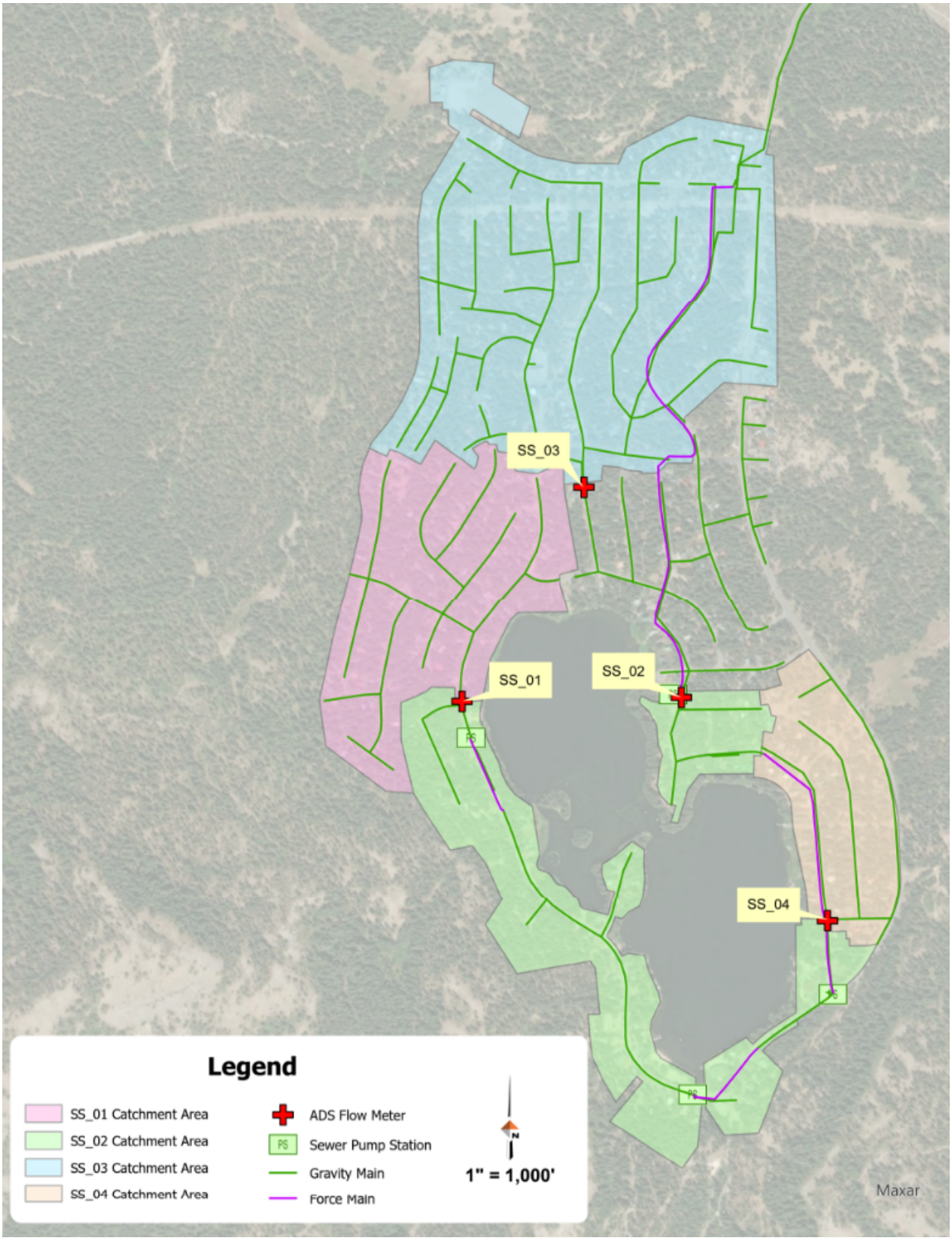

Figure 2: Flow Monitoring Locations and Catchment Areas

1.3.2 Flow Monitoring Results

Utilizing the data provided by ADS, the flow characteristics for each catchment area captured by the flow monitoring equipment was calculated. Table 5 provides a summary of the average flow rates, average weekday flow rates, and the average weekend flow rates in gallons per minute (gpm). Flow summary sheets that catalog each flow meter location, number of contributing customers, flow data, and diurnal curves can be found in Appendix B.

Table 5: Sewer Monitoring Flow Summary

Flow Monitor ID	Average Flow (gpm)	Weekday Flow (gpm)	Weekend Flow (gpm)
SS_01	16.9	16.5	17.6
SS_02	43.1	40.9	48.6
SS_03	52.3	52.3	52.3
SS_04	8.4	7.9	9.4

1.4 System Diurnal Curve

An average day, weekday, and weekend diurnal curve was computed for each of the flow monitoring catchment areas, as well as the entire SLCWD system. The diurnal curve was created by averaging the hourly flowrate for each individual timestep (1 am, 2 am, etc.). Figure 3 shows the average day, average weekday, and average weekend diurnal curves calculated for SLCWD system. Curves for the individual catchment areas can be found in Appendix B. Table 6 gives the peaking factors seen throughout the day for the three system wide curves calculated.

The system diurnal curves see a two peak pattern that is typical for primarily residential communities. Additionally, when comparing the absolute peaking factor between the three curves, the average weekend curve being higher than the other two aligns with the transient nature of the community, with homes more likely to be occupied during the weekend rather than the weekday. However, the true values of the peaking curves are much more muted than a typical residential community, with residential sewer peaking factors typically found to be between 2 and 4. There may be a variety of reasons for these lower peaking factors, but it does provide another indication of I&I in the system, as the flow monitoring period occurred during the winter and spring months.

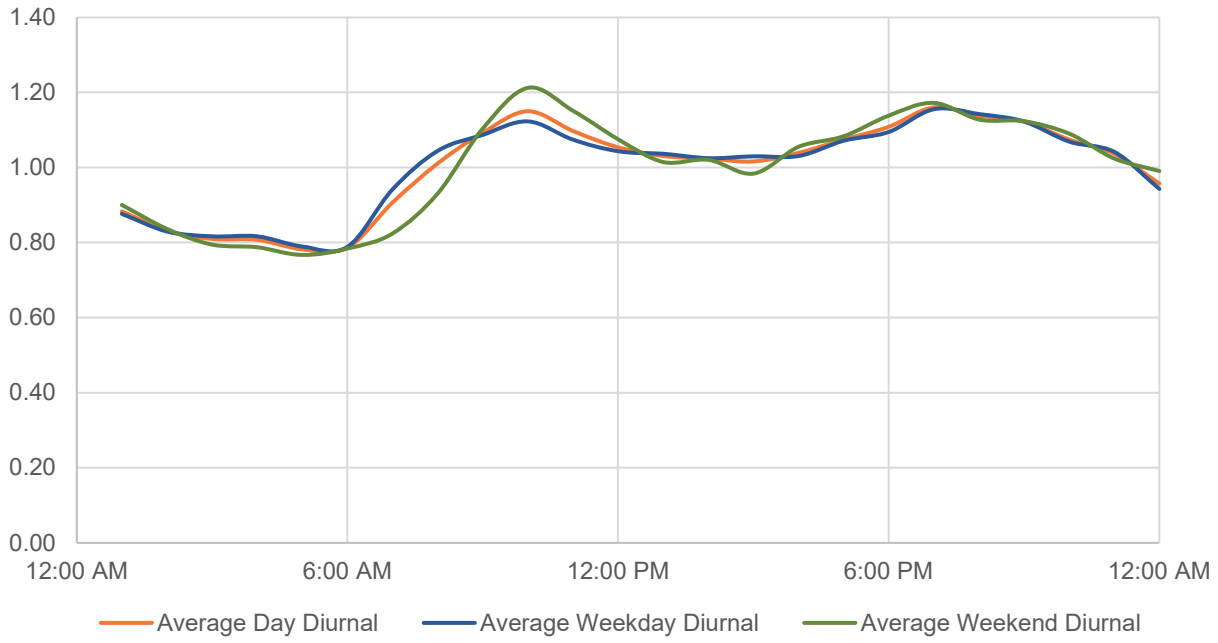

Figure 3: Average Diurnal Curves

Table 6: Peaking Factors for Average Diurnals

Diurnal	Peaking Factor
Average Day	1.15
Average Weekday	1.12
Average Weekend	1.21

1.5 System Peak Flows

To determine a true peaking factor for the flow monitoring catchment areas, the peak daily flow (in MGD) and the peak instantaneous flow (in gpm) were compared to the average daily flow. Table 7 is a summary of the peaking factor calculated for the flow monitoring catchment areas based on the daily flows, and Table 8 is the peaking factors calculated based on the peak instantaneous flows. The system total daily peaking factor shown in Table 7 does differ from that shown in Section 1.2, as the previous section analyzed data from 2020 to halfway through 2023, while this table only reviewed data during the flow monitoring period for a true comparison to the flow monitoring sites. It should also be noted that total system flows are not presented in Table 8 due to instantaneous flow data not being available from the DSPUD WWTP flow data.

Table 7: Daily Peaking Factor Summary

Flow Monitor ID	Average Daily Flow (MGD)	Peak Flow Daily (MGD)	Peaking Factor
SS_01	0.024	0.057	2.39
SS_02	0.062	0.199	3.24
SS_03	0.075	0.185	2.47
SS_04	0.012	0.041	3.44
Total System	**0.099**	**0.280**	**2.83**

Table 8: Instantaneous Peaking Factor Summary

Flow Monitor ID	Average Daily Flow (gpm)	Peak Instantaneous Flow (gpm)	Peaking Factor
SS_01	16.9	56.25	3.33
SS_02	43.1	301.39	6.99
SS_03	52.3	389.58	7.45
SS_04	8.4	141.67	16.87

Expected peaking factors during a peak flow scenario are anticipated to be anywhere from 2.0 to 4.0 for a sanitary sewer system. The District system for the flow monitoring period falls within the expected range. The peaking factors for instantaneous flows are much higher than expected. Table 9 describes the day where the maximum volume of sewerage was recorded as well as the day that the peak flow rate was recorded.

Table 9: Peak Volume and Flow Rate Days

Flow Monitor ID	Peak Volume (MG)	Day of Peak Volume	Peak Flow Rate (gpm)	Day of Peak Flow Rate
SS_01	0.057	6/13/2023	56.25	6/12/2023
SS_02	0.199	12/31/2022	301.39	12/30/2022
SS_03	0.185	12/31/2022	389.58	12/31/2022
SS_04	0.041	12/31/2022	141.67	6/20/2023

The days shown are nearly all days of known storm events or during warmer days when it would be expected that there is higher groundwater levels present. This is a large indication of system I&I. Therefore, for future flow projections, it is recommended that the system total peaking factor of 2.83 be used. This peaking factor will better reflect the current state of the system, and allow for the appropriate sizing of future sewer mains, and not installing larger than needed mains based on instantaneous flows that can be mitigated by reducing I&I.

1.6 Infiltration and Inflow Analysis

Sewer system infiltration is defined as the introduction of groundwater into the sewer system through leaks or cracks in system pipes and manholes. Inflow is the introduction of stormwater into the sewer system through sanitary sewer manholes, storm sewer cross connections, or other external holes in the sewer system. The SLCWD system showed extensive evidence of both infiltration and inflow.

Daily SLCWD influent flow numbers at the DSPUD WWTP were initially analyzed to see if the total system flow patterns agreed with the individual sewer flow monitoring results, but gave further evidence of system I&I. The daily flows during the flow monitoring period are shown in Figure 4. As shown, the SLCWD system had their highest peak flows during days with known storm events (inflow) and showed a steady increase of inflows as temperatures rose resulting in more snow melt and higher groundwater (infiltration).

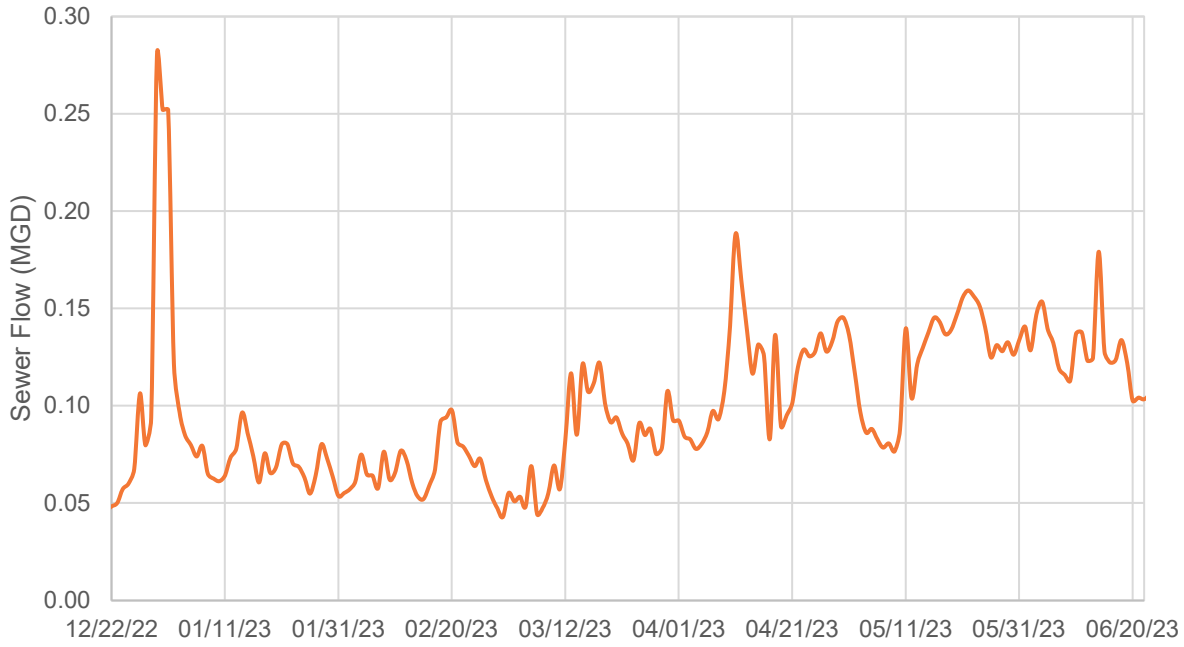

Figure 4: Influent Flow at DSPUD WWTP

1.6.1 Infiltration Analysis

As shown in Figure 4, the District total sewer flows saw gradual increases into the warmer months of the flow monitoring period. Table 10 below compares the average daily volume for the first three months of flow monitoring to the second three months for each flow monitoring site. The average daily volume doubles or nearly doubles at two of the four sites, with the other two sites seeing 10 percent to 15 percent increases in volume. This larger average in the warmer months speaks to infiltration as the groundwater table rises during these warmer months.

Table 10: First and Second 3 Month Average Daily Volume Comparison

Flow Monitor ID	First 3 Month Avg. Daily Volume (MG)	Second 3 Month Avg. Daily Volume (MG)
SS_01	0.016	0.032
SS_02	0.045	0.081
SS_03	0.070	0.080
SS_04	0.010	0.014

Additionally, a typical utility provider will see lower total sewer flows than total water usage due to the fact that all water produced for a system will not end up in the sewer (e.g., irrigation). SLCWD follows this typical pattern for only 10 months out of the year. However, it sees average daily sewer volumes surpass the volume of water produced for the months of April and May. Figure 5 compares the average daily sewer and water volumes for each month from 2020 to 2022. As seen, the peak water production months do not line up with the larger sewer flow months. This difference accounts for over 20,000 gpd of excess sewer in the month of April, and over 35,000 gpd of excess sewer in the month of May. As these two months are peak months of snowmelt runoff and rising groundwater, this again speaks to groundwater infiltration into the sewer system.

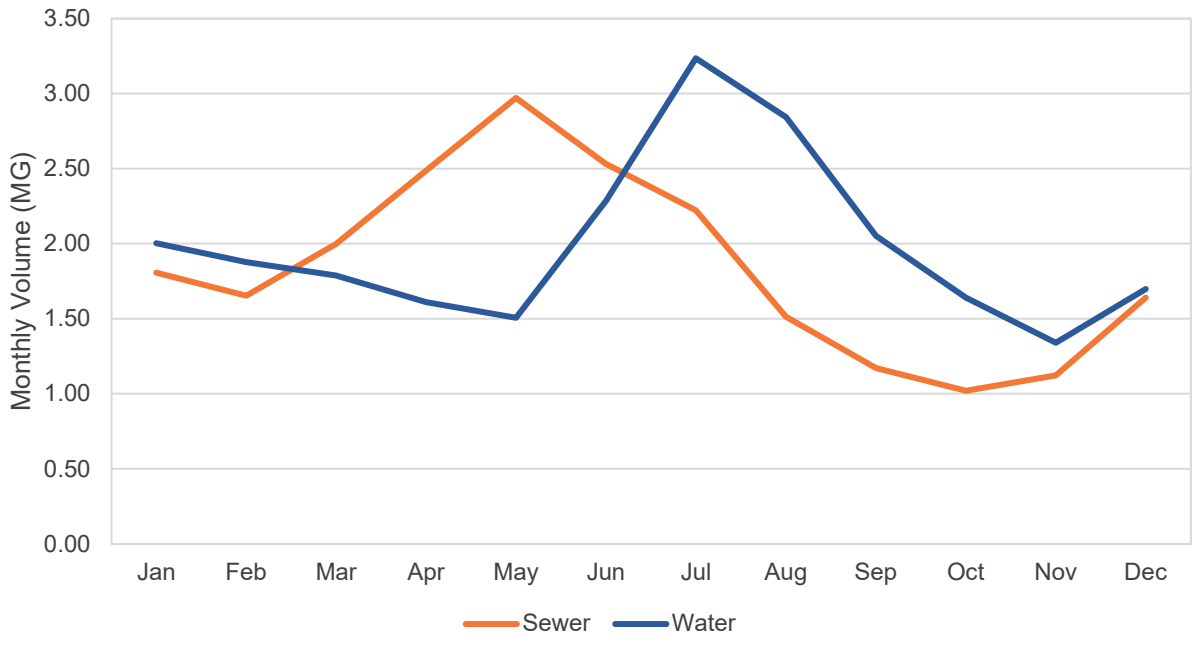

Figure 5: Average Monthly Sewer Flow and Water Production Comparison

1.6.2 Inflow Analysis

Stormwater inflow into the District sewer system was shown to be prevalent through both the sewer flow monitoring data, as well as the overall sewer flow data from the DSPUD WWTP. Inflow is typically signified by large individual peak days, or peak instantaneous flows, rather

than a rising average. Section 1.5 showed that the peak days and peak instantaneous flows typically occurred during known storm events.

A significant amount of sewer flow entered the DSPUD WWTP from December 30 through January 2. Figure 6 is a graph showing these flow rates as well as the precipitation and snowfall that occurred on these days. Snowfall depths were recorded at the WWTP by DSPUD staff. Precipitation depths were recorded at NOAA weather station USC00049040 located at the Truckee Tahoe Airport. Station USC00049040 was the closest station with a period of record that overlapped with the flow monitoring study period. Precipitation depths within the SLCWD service area could have been different than what was reported at the Truckee Tahoe Airport station.

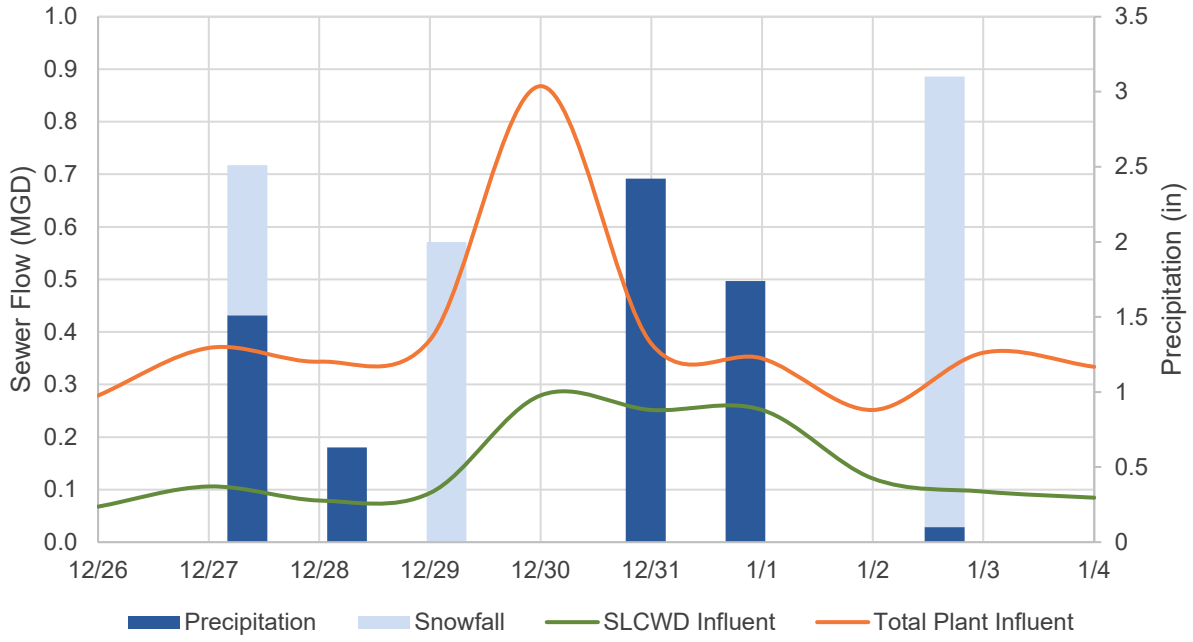

Figure 6: Influent Flow at DSPUD WWTP – December 2022

Figure 6 shows that significant inflow occurs within the SLCWD system. However, due to data availability, quantifying inflow volumes and pinpointing inflow locations throughout the system is extremely difficult. The only precipitation data that can be accessed is daily totals from the NOAA station. In order to fully understand the impact that inflow had on the system during the event, a 2D hydrologic model of the area would need to be produced to mimic the event, and the full storm hydrograph would need to be produced for the storm in question to calculate storm duration and intensity. Without this data, only daily flows can be compared to daily precipitation totals.

When comparing daily flows to daily precipitation totals, the impacts of the rain and snow events are very prominent. Figure 7 shows the flow at each flow monitoring location for the days surrounding this late December event.

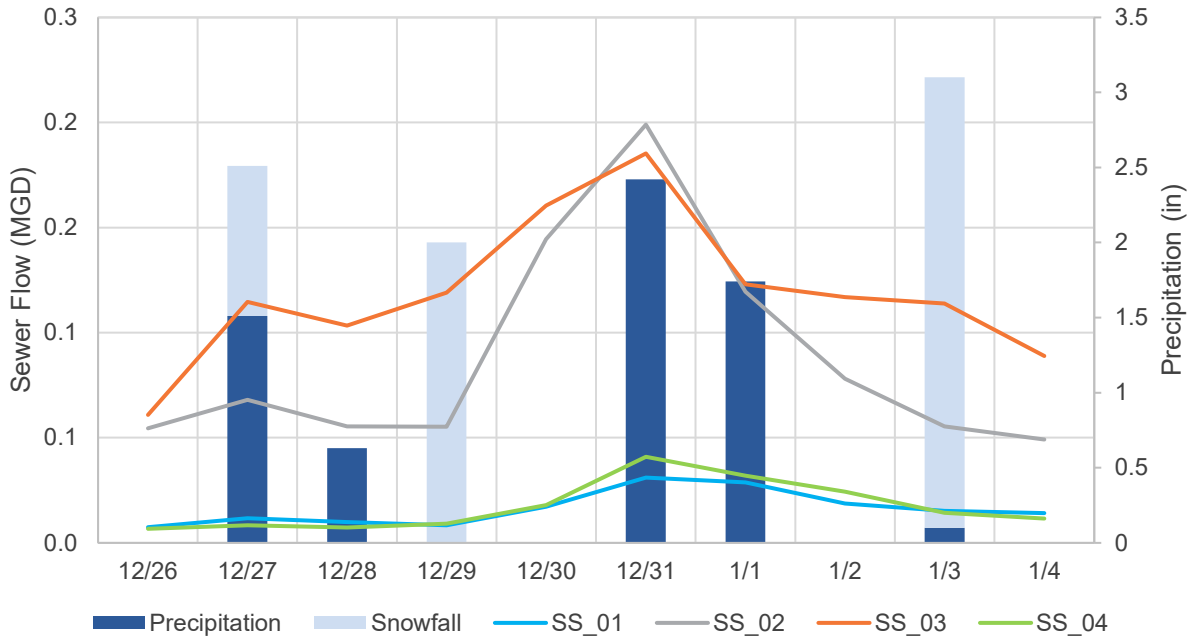

Figure 7: Flow at Flow Monitoring Locations – December 2022

All catchment areas see an increase in flow rate from this event. However, the catchment areas that contributed to the SS_02 and SS_03 flow meters see a significant increase in flow due to inflow whereas SS_01 and SS_04 see a smaller increase in flow.

I&I is an extreme issue for the District due to the fact that system sewers are treated at the DSPUD WWTP, and the District pays for that service based on the flow it provides. The rate paid is dependent on the percentage of total flow into the WWTP rather than the absolute value of flow. As DSPUD takes measures to decrease their own I&I, SLCWD is put in a position where their flow contribution will become a larger percentage of the total. It is recommended that SLCWD perform site assessments during storm events to identify areas where inflow could be occurring, and video their existing sewer system during the spring months to determine the locations of infiltration. Once these areas are identified, specific improvement projects can be completed in order to reduce the system I&I, and therefore reduce their sewer flow contribution to the DSPUD WWTP.

1.7 Future Sewer Flows

The buildout condition for SLCWD was created by assuming that the 181 vacant parcels would be developed at buildout. The vacant parcels were located within each system catchment area, identified by the sewer pump station that the area gravity flows into. As each vacant parcel was determined to be residential, each one was assigned one EDU. The total number of each EDUs was then multiplied by the determined EDU value of 73 gpd per EDU to determine the additional average flow within each catchment area and the total system can expect at buildout. The average flow was then multiplied by a peaking factor of 2.83 in order to determine the additional peak flow for the system and its catchment areas. Table 11 below summarizes the additional average and peak flow within each sewershed and the total system. It should be noted that the additional flow listed in Table 11 to each lift station is for gravity flow only. It does not include

flow seen from other lift stations. A deeper analysis on lift stations, capacities, and future flows can be found in Section 4.0.

Table 11: Additional Average and Peak Sewer Flow Rates

Catchment Area ID	Vacant Customer Count	Additional Average Flow Rate (gpd)	Additional Peak Flow Rate (gpd)
SPS-1	118	8,450	23,914
SPS-2	9	644	1,824
SPS-3	9	644	1,824
SPS-4	45	3,222	9,120
Total	**181**	**12,961**	**36,681**

1.8 Sewer Flow Summary

The buildout projections presented in Section 1.7 indicate that wastewater flows within the SLCWD system may increase by approximately 20 percent based on the current average daily flow rate, with peak flows seeing an approximate 14 percent increase at buildout. The Plan area is expected to see limited development of vacant parcels in the near to long term future. It is expected that sewer flows will remain near their current values with small variations as SLCWD grows. Table 12 summarizes the existing and potential buildout sewer flows for the Plan area.

Table 12: Sewer Flow Summary

Flow Scenario	Average Daily Flow (MGD)	Peaking Factor	Peak Daily Flow (MGD)
Existing System	0.061	4.61	0.280
Additional Flow at Buildout	0.013	2.83	0.037
Total Buildout System	0.074	4.30	0.316

2.0 HYDRAULIC MODEL DEVELOPMENT

In order to perform an effective capacity analysis of the SLCWD sewer system, as hydraulic model of the District system was created. The sewer model is comprised of three separate elements:

- Collection system geometry
- Sewer flows and allocation
- Collection system controls

The sewer model was developed using the best available data for each of the elements that comprise the model. SLCWD provided DOWL with as much information as possible to develop each element and was further supplemented from data acquired by DOWL through additional means such as survey, flow monitoring, and data collected from past projects.

2.1 Model Geometry

To develop the model geometry, existing AutoCAD data, provided by SLCWD, was used to construct the basic pipe and junction elements within the model. This data included pipe material, diameter, and connectivity. Information on manhole rim and invert elevations was sparse within the AutoCAD data. Record drawings and as-builts from previous projects were also utilized to determine key elevation data. DOWL performed a measure down survey of approximately 75 manholes within the system. The manholes selected were located on key sewer interceptors. The entire sewer system was not surveyed due to budgetary constraints. Figure 8 is an overview map showing the portions of the system that were able to be built into the model. Areas excluded from the hydraulic model represent areas where no elevation data was available.

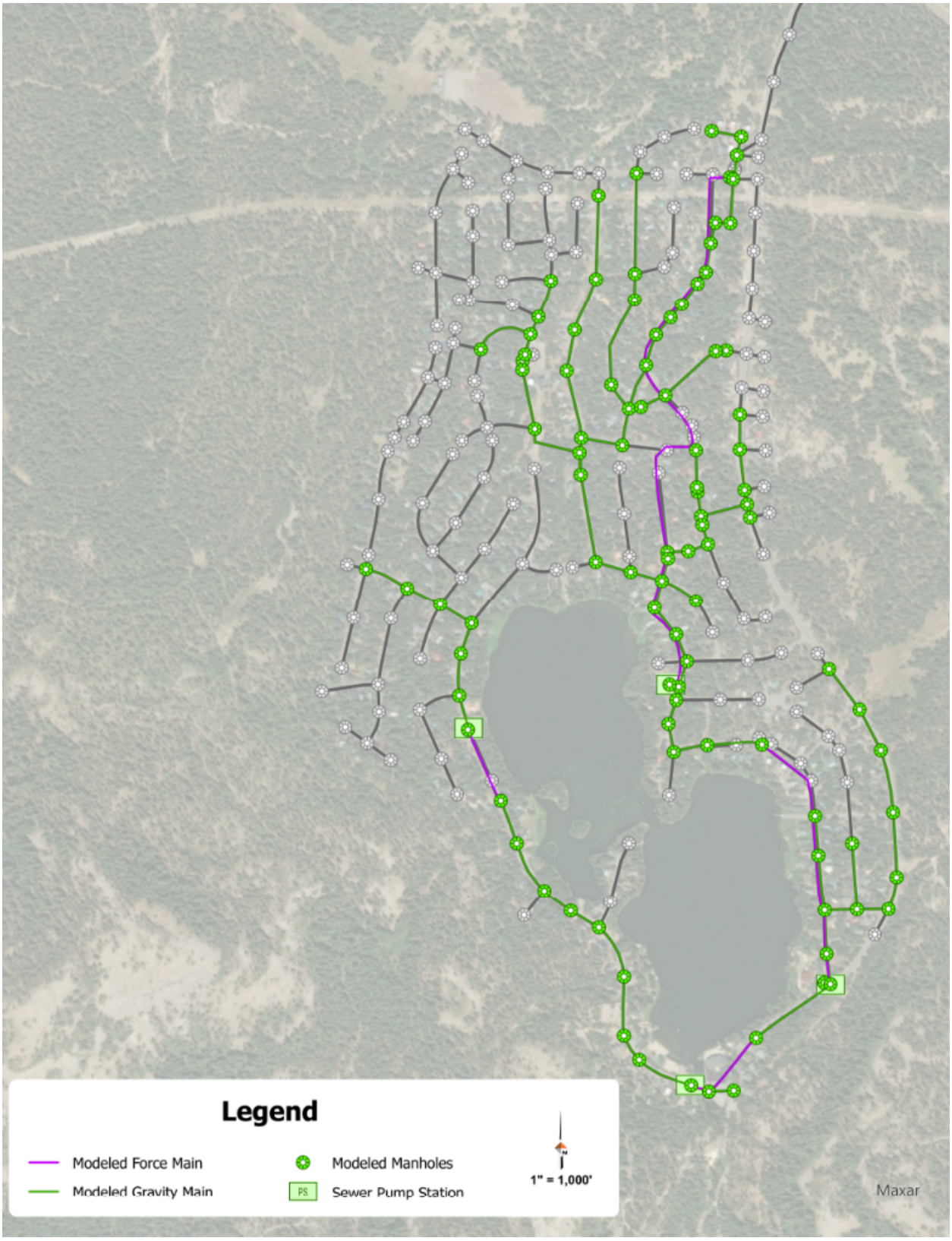

Figure 8: Sewer Model Geometry

2.2 Sewer Flow Rate Allocation

The data captured during the flow monitoring analysis was used to calculate an average flow per EDU. Since the average flow rates and diurnal curves were very similar for the average day, average weekday, and average weekend scenarios (discussed in Sections 1.3.2, 1.4, and 1.5); only one flow scenario was created for the model. The results from the average day scenario were used to allocate the model. Table 13 gives the unit loading rate at each of the flow monitoring locations.

Table 13: Unit Loading Rate from Flow Monitoring Study

Catchment Area	Average Flow (gpd)	# of EDUs	Average Flow/EDU (gpd)
SS_01	24,336	164	148
SS_02	62,064	388	160
SS_03[2]	66,240	311	213
SS_04	12,096	82	147

The sewer model was allocated based on the catchment areas that contribute to each of the four pump stations. SS_01 was located upstream of SPS-4 and was therefore considered representative of the SPS-4 catchment area. Likewise, SS_03 was located upstream of SPS-1 and SS_04 was located upstream of SPS-2 and both were considered representative of their respective catchment areas. Results from SS_02 were not used for flow allocation of the sewer model because the results from SS_02 were influenced by SPS-4, SPS-3 and SPS-2. There was no flow monitor located within the SPS-3 catchment area and the unit loading rate for this area was calculated by averaging the unit loading rates from the SS_01, SS_03, and SS_04 catchment areas. Table 14 is a summary of the unit loading rates used to populate the sewer model as well as the average flow rates expected from the catchment areas.

[2] *Backwash water from the water treatment plant contributed to the SS_03 flow monitoring site. To calculate an accurate unit loading rate, the average backwash water usage (9,111 gpd or 6.3 gpm) was subtracted from the average flow rate (52.3 gpm) observed at the SS_03 flow monitoring site.*

Table 14:Unit Loading Rates for Model Allocation

Catchment Area	Average Flow/EDU (gpd)	# of EDUs	Average Flow (gpm)
SPS-1	213	500	123.9[3]
SPS-2	147	88	9.0
SPS-3	169	60	7.1
SPS-4	148	199	20.5
Future Buildout	73	181	9.18

Figure 9 shows the diurnal curves used within the model for each of the catchment areas, as described above. Future buildout parcels were assigned a unit loading rate of 73 gpd/EDU and the appropriate diurnal curve, Figure 9, was assigned based on the catchment area each vacant parcel was located within. Figure 10 is a map that shows the SPS catchment areas.

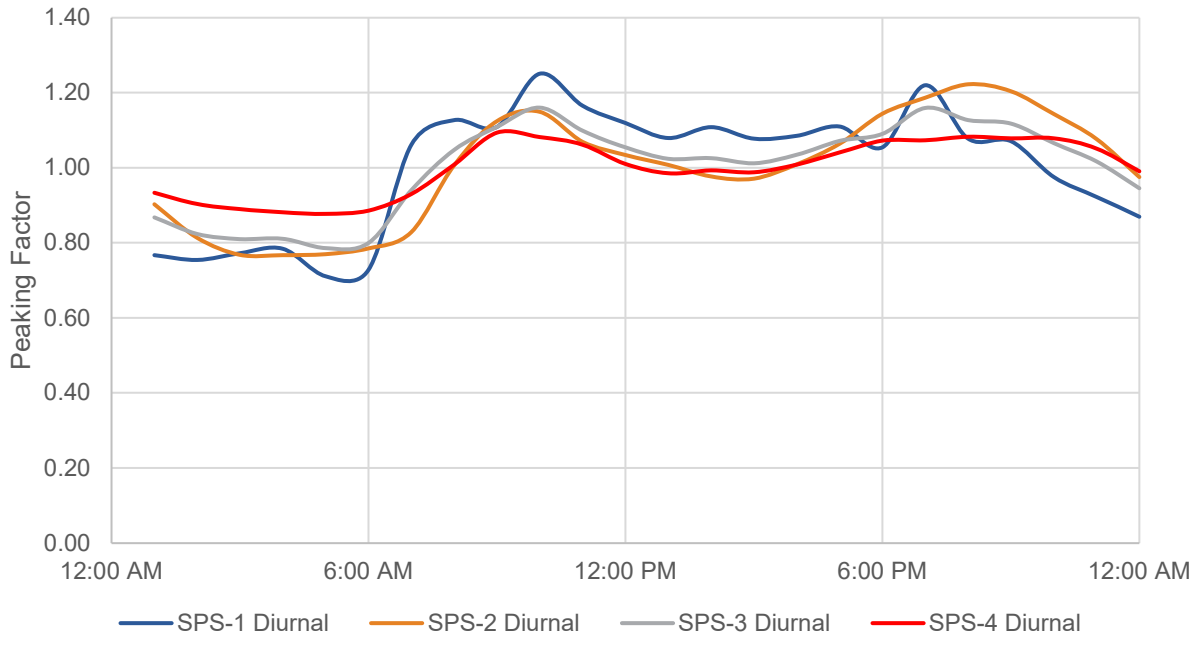

Figure 9: SPS Catchment Area Diurnal Curves

[3] *The average flow rate from the SPS-1 catchment area includes a 50 gpm demand from the water treatment plant backwash to mimic the peak flow rate from the backwash procedure.*

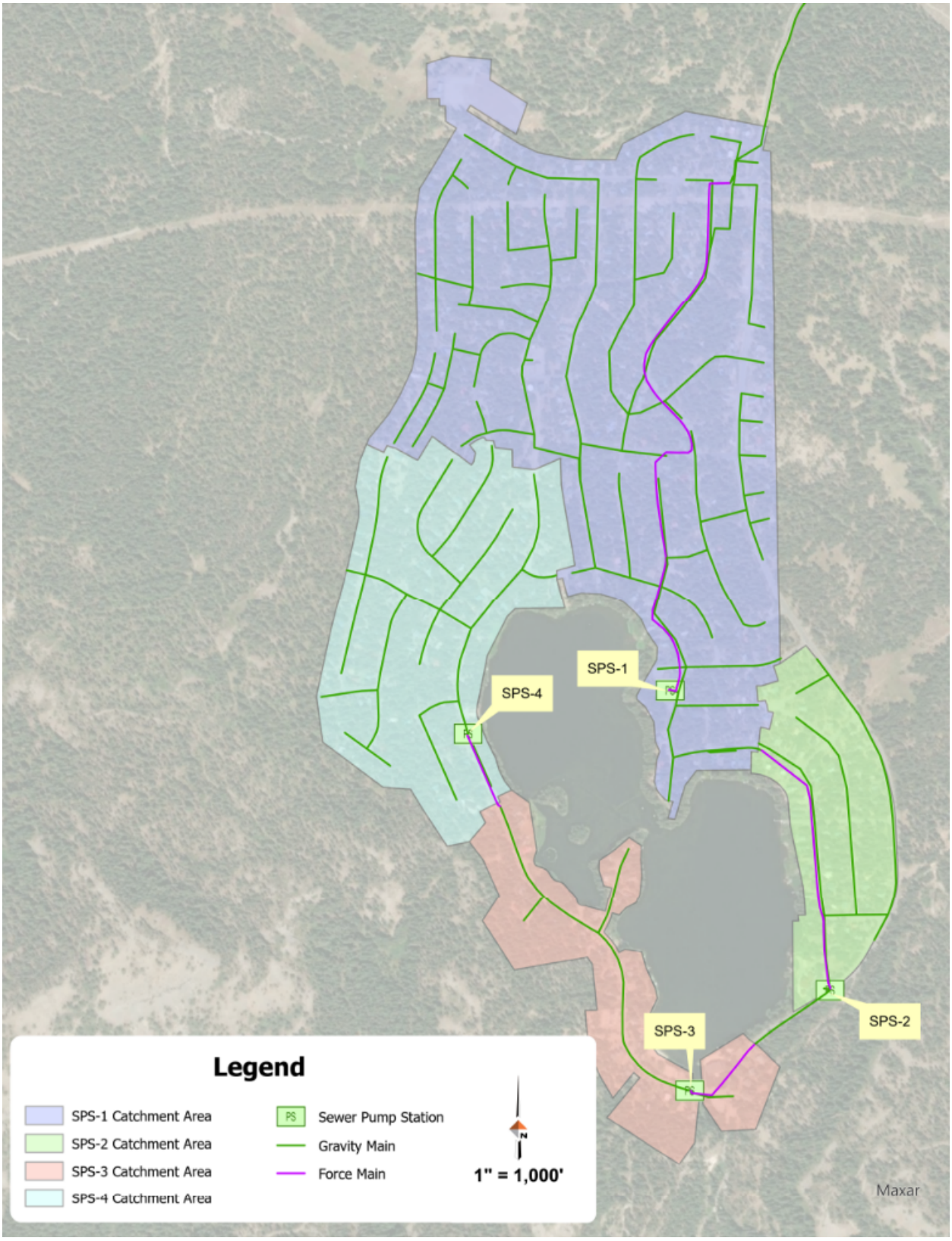

Figure 10: SPS Catchment Areas

2.3 Model Controls

Model elements that require specific control elements are limited to pump station wet wells and pumps. Minimum and maximum level setpoints for all wet wells were provided by SLCWD. The pump design operating points were provided by SLCWD, and actual design points were calculated using pump station runtime data in order to match current system operations and reflect changes to the pump design points through wear and tear or other factors. The operational point was determined to be the point on the pump curve that allowed the model to match the average pump runtime for each of the pump station pumps. It should be noted that SPS-1 does not record pump starts, therefore the pump operating point was assumed to match the design point of the pump provided by SLCWD. Table 15 gives the controls for each pump station in the model.

Table 15: Pump Station Controls

Pump Station ID	Pump Design Flow Rate (gpm)	Pump Operating Point in Model	Pump On Depth (feet [ft])	Pump Off Depth (ft)
SPS-1	350	350 gpm @ 100 ft	5.3	3.0
SPS-2	270	140 gpm @ 40 ft	4.0	2.1
SPS-3	270	150 gpm @ 30 ft	4.0	1.6
SPS-4	270	316 gpm @ 20 ft	4.0	2.5

2.4 Model Calibration

Calibration of the model occurred in two phases. The first phase ensured data accuracy and consistency in the model inputs. This was documented in Sections 2.1, 2.2, and 2.3 of this report. Accurate model development ensures that the model mimics the real-world system and is considered a “gross” calibration of the model. The second phase is considered the “fine” calibration of the model. For the pump station pumps and force mains, the pump operating point was calculated to match the average pump runtime observed over the course of the flow monitoring study (12/22/2022 to 6/22/2023) as described in Section 2.3. For the gravity mains, the flow monitoring data was used to calibrate the pipes to match sewer flow rates, depths, and velocities.

The InfoSWMM Calibrator tool was used to calibrate the gravity mains of the model to closely match flow, velocity, and depth data observed at each of the flow monitoring locations. The flow monitoring data was analyzed to determine the average weekly sewer flow and pattern for the system. This average week was then used to calibrate the gravity mains within the model. The Calibrator tool adjusted the Manning’s Roughness Coefficient, n, of the model pipes in order to match model outputs to the recorded field data as closely as possible. Roughness coefficients were assigned based on the model pipe material. Table 16 is a summary of the final, calibrated Manning’s Roughness Coefficient for each pipe group. It should be noted that the calibrated n values for the unknown pipe material indicate a much smoother pipe than would be expected for a system of this age. However, due to the unknown nature of these pipes, this is considered normal for a calibrated hydraulic model.

Table 16: Calibrated Manning's Roughness Coefficients

Pipe Material	Total Model Length (ft)	Calibrated n Values
Asbestos Cement Pipe (ACP)	18,302	0.0149
Polyvinyl Chloride (PVC)	758	0.0115
Vitrified Clay Pipe (VCP)	8,062	0.0109
Unknown	983	0.0071

Appendix C contains graphs of the calibrations which compare the flow monitoring data to the simulated model results. Similar to what was discussed in Section 2.2, flow monitoring data from SS_02 was not used to calibrate the model due to the complexities of the pump stations located upstream. However, model results at the SS_02 location were compared back to flow monitoring results to verify that the model was replicating real world operations as close as possible. Data from a dry weather, average flow day (June 17, 2023) was used to compare the model outputs to the flow monitoring data. As seen within the SS_02 graphs in Appendix C, the modeled flow rates, depths, and velocities do not match the flow monitoring data exactly, but the trends of the data do match up well. The trends of the data are described in more detail below.

- Flow Rate
  - When the SPS-2 pumps are offline, the flow rate at the SS_02 location is generally 5 to 20 gpm
  - When the SPS-2 Pumps are online, the flow rate at the SS_02 location is generally 110 to 150 gpm
- Depth
  - When the SPS-2 pumps are offline, the depth at the SS_02 location is generally 0.1 to 0.15 ft
  - When the SPS-2 pumps are online, the depth at the SS_02 location is generally 0.2 to 0.25 ft
- Velocity
  - When the SPS-2 pumps are offline, the velocity at the SS_02 location is generally 0.5 to 1 foot per second (fps)
  - When the SPS-2 pumps are online, the velocity at the SS_02 location is generally 2 to 3 fps

Additional analysis and studies of the specific pump station operations will be required to calibrate the model further.

3.0 COLLECTION SYSTEM ANALYSIS

3.1 System Overview

3.1.1 Hydraulic Profile and Catchment Areas

The SLCWD sewer collection system is broken up into four catchment areas and comprised of 4 sewer pump stations, 252 manholes, and approximately 11.5 miles of gravity main and 1.5

miles of force main. The collection system conveys sewer through a network of gravity sewer mains and pump stations to a terminal collection point at the DSPUD WWTP. Multiple catchment areas pump into one another, creating a step ladder of pumping and gravity flow conveying sewerage to the WWTP. Table 17 gives a summary of each catchment area. A hydraulic profile of the pressurized portion of the collection system is shown in Figure 11. It should be noted that in Figure 11 the elevation presented for each sewershed is representative of the highest manhole rim elevation within that sewershed.

Table 17: Catchment Area Summary

Catchment Area ID	Manhole Count	Outfall	SPS Path to WWTP
1	167	SPS-1	1
2	24	SPS-2	2-1
3	14	SPS-3	3-2-1
4	33	SPS-4	4-3-2-1
There are 14 manholes that lay outside of these catchment areas. These manholes convey sewerage by gravity from the SPS-1 force main discharge point to the WWTP.			

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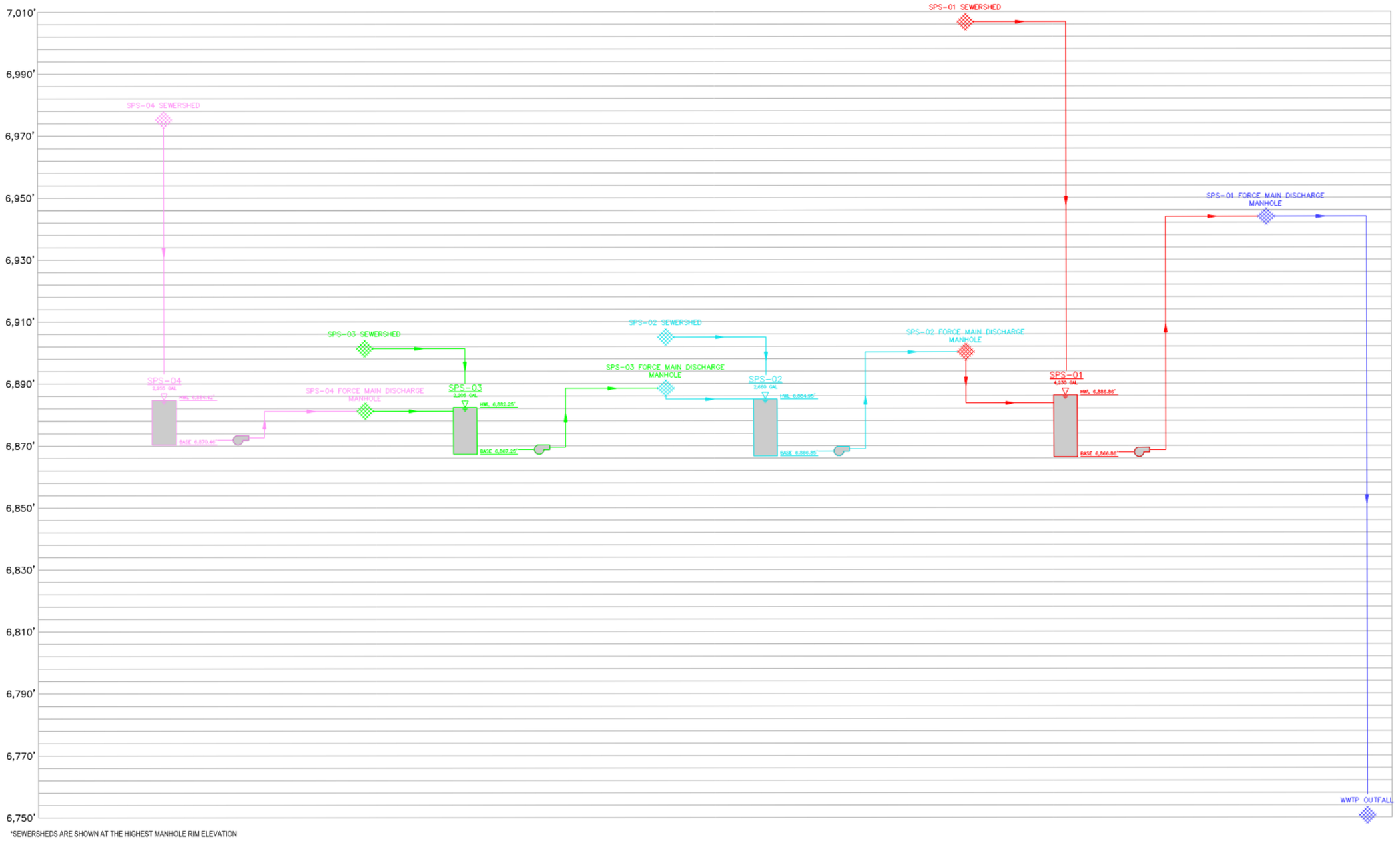

Figure 11: System Hydraulic Grade Line Profile

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3.1.2 Collection Mains and Manholes

The SLCWD sewer collection system is made of approximately 11.5 miles of gravity main and 1.5 miles of force main, with a varying range of pipe diameters and materials. The collection system also includes 252 manholes. Table 18 through Table 21 give summaries of the sewer main and force main diameters and material.

Table 22 summarizes the depth profiles of all manholes in the system. Figure 12 and Figure 13 are maps of the collection system pipe diameters and materials, respectively.

Table 18:System Gravity Main Diameter Summary

Pipe Diameter (in)	Length (ft)
6	42,683
8	6,932
10	4,970
12	59
Unknown	5,776
Total	**60,420**

Table 19: System Force Main Diameter Summary

Pipe Diameter (in)	Length (ft)
8	7,163

Table 20: System Gravity Main Material Summary

Pipe Material	Length (ft)
ACP	23,827
PVC	758
VCP	29,298
Unknown	6,537
Total	**60,420**

Table 21: System Force Main Material Summary

Pipe Material	Length (ft)
AC	6,543
Unknown	620
Total	**7,163**

Table 22: System Manhole Depth Summary

Depth (ft.)	# Of Manholes
0-5	16
5-10	66
10-15	18
Unknown	152
Total	**252**

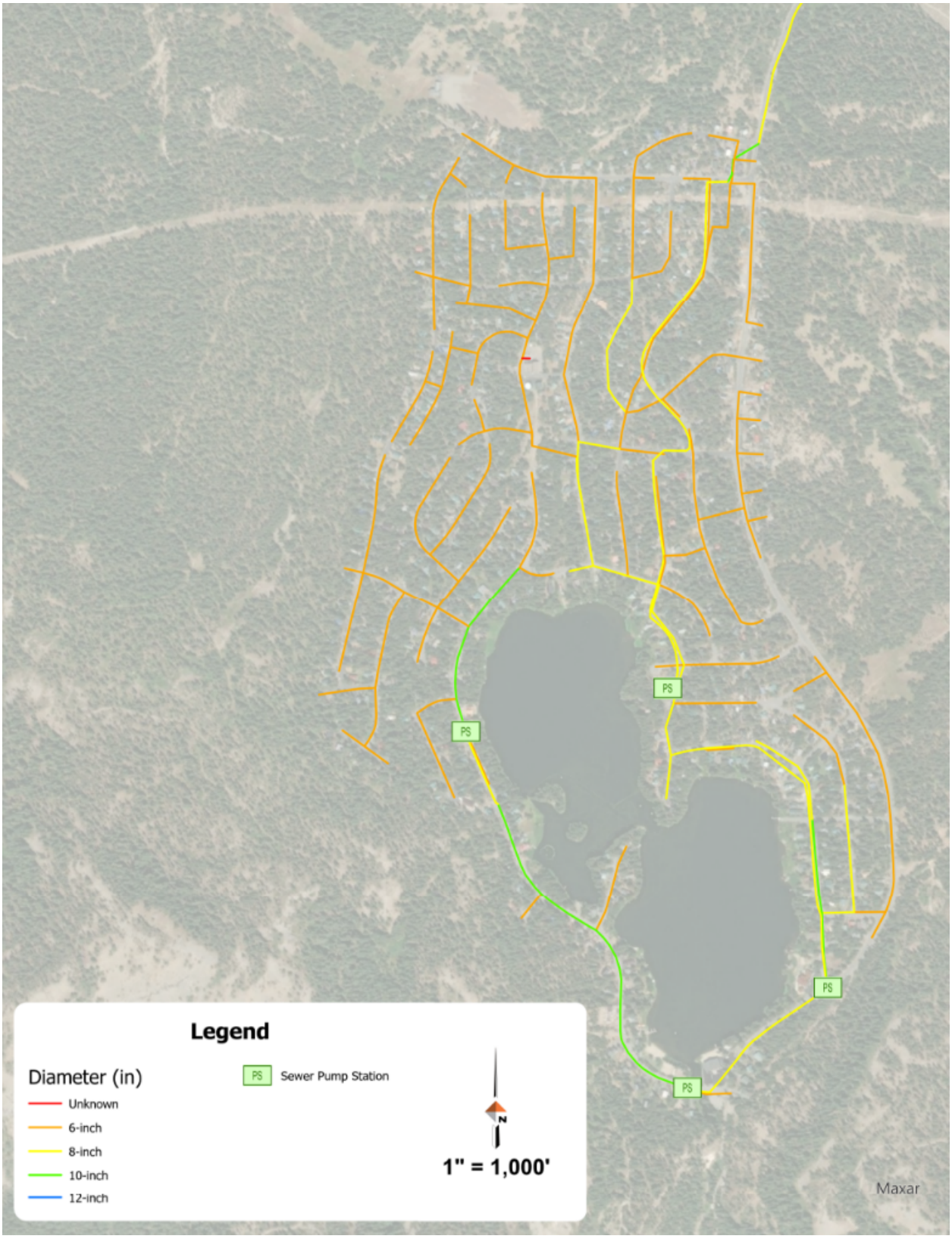

Figure 12: System Pipe Diameter

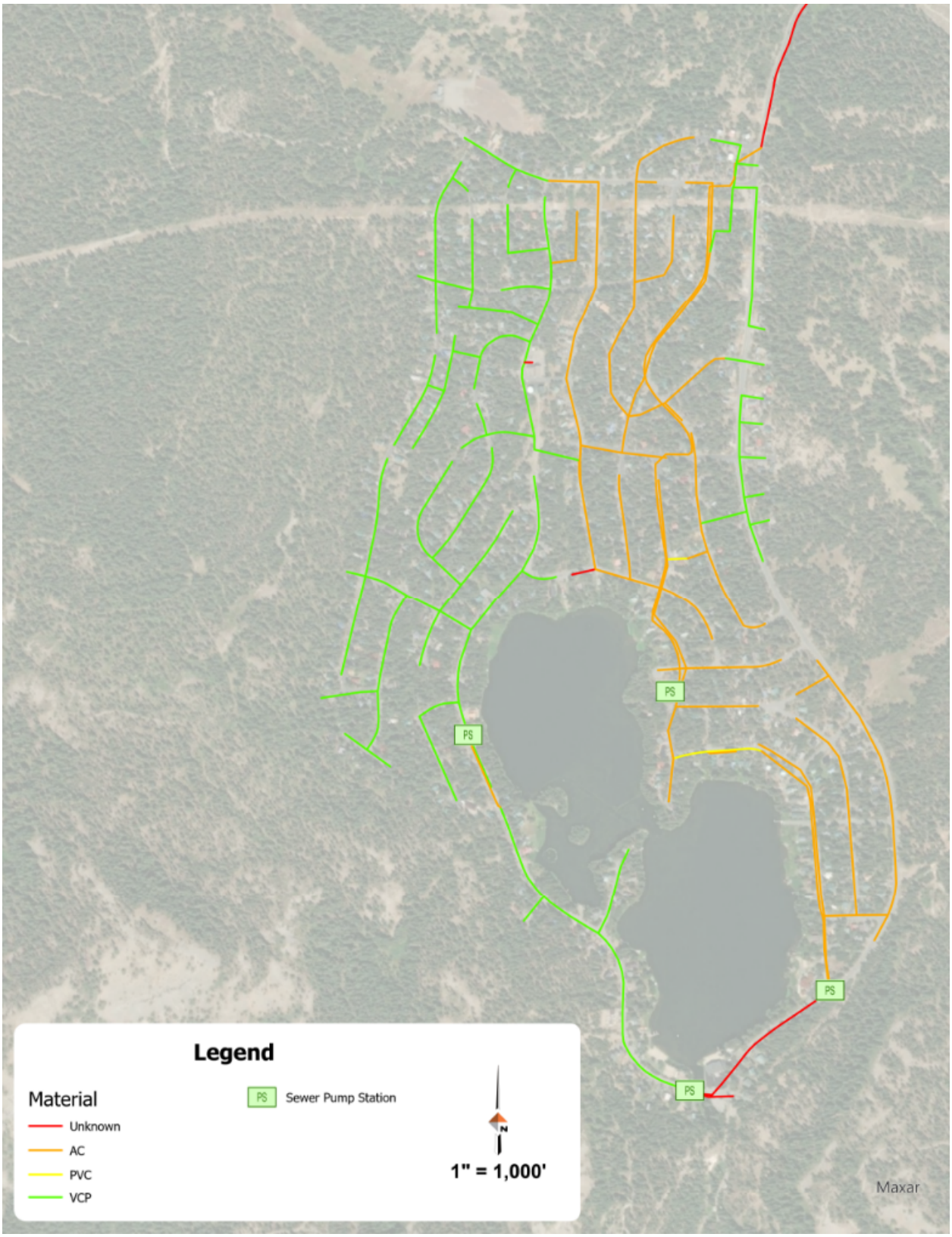

Figure 13: System Pipe Material

3.2 System Capacity

The capacity of the gravity collection system was assessed against the following discrete criteria within the Placer County Land Development Manual (PCLDM) and various industry standards.

- PCLDM Section 6-12(D) – Sewers shall be designed with a minimum self-cleaning velocity of 2 fps based on full flow conditions and shall not have design flows greater than 10 fps.
- PCLDM Section 6-12(D) – For capacity determination the maximum depth of flow for pipes 6-inches to 10-inches in diameter shall be based on 70 percent pipe diameter depth (d/D). Capacity for pipes 12-inches in diameter or larger can be based on full flow conditions. For this analysis, the capacity of the 12-inch pipe within the system was analyzed with a 0.70 d/D.
- No manholes in the system may surcharge
    - A manhole is considered surcharged if at any point the sewer flow line overtops the contributing pipes

To determine the capacity remaining in every modeled pipe, a value representing the additional number of EDUs that can contribute to the pipe was determined. This equates to the number of residential parcels that can be added to the flow in that pipe before it has reached capacity.

The number of EDUs remaining for each pipe segment was calculated by determining the flow rate of each pipe at a d/D of 0.70, then subtracting the peak flow rate determined from the hydraulic model. This difference in flow was then divided by the EDU value determined in Section 1.2 (73 gpd) multiplied by the peaking factor determined in Section 1.5 (2.83).

3.2.1 Existing System Capacity

Based on the model analysis, no manholes surcharge, and all gravity pipes within the system have a max d/D under 0.70. The maximum d/D observed within the model, not including the force mains, was 0.58. Table 23 is a summary of the five pipes with the highest d/D value within the model and Figure 14 is a map showing where these pipes are located. Figure 15 shows the max d/D across the entire model.

Table 23: Existing Collection System – Highest d/D Values

Pipe ID	Pipe Size (in)	d/D
CDT_287	6	0.58
CDT_539	8	0.57
CDT_537	8	0.54
CDT_439	8	0.54
CDT_75	8	0.46

Figure 14: Existing Collection System – Highest d/D Values

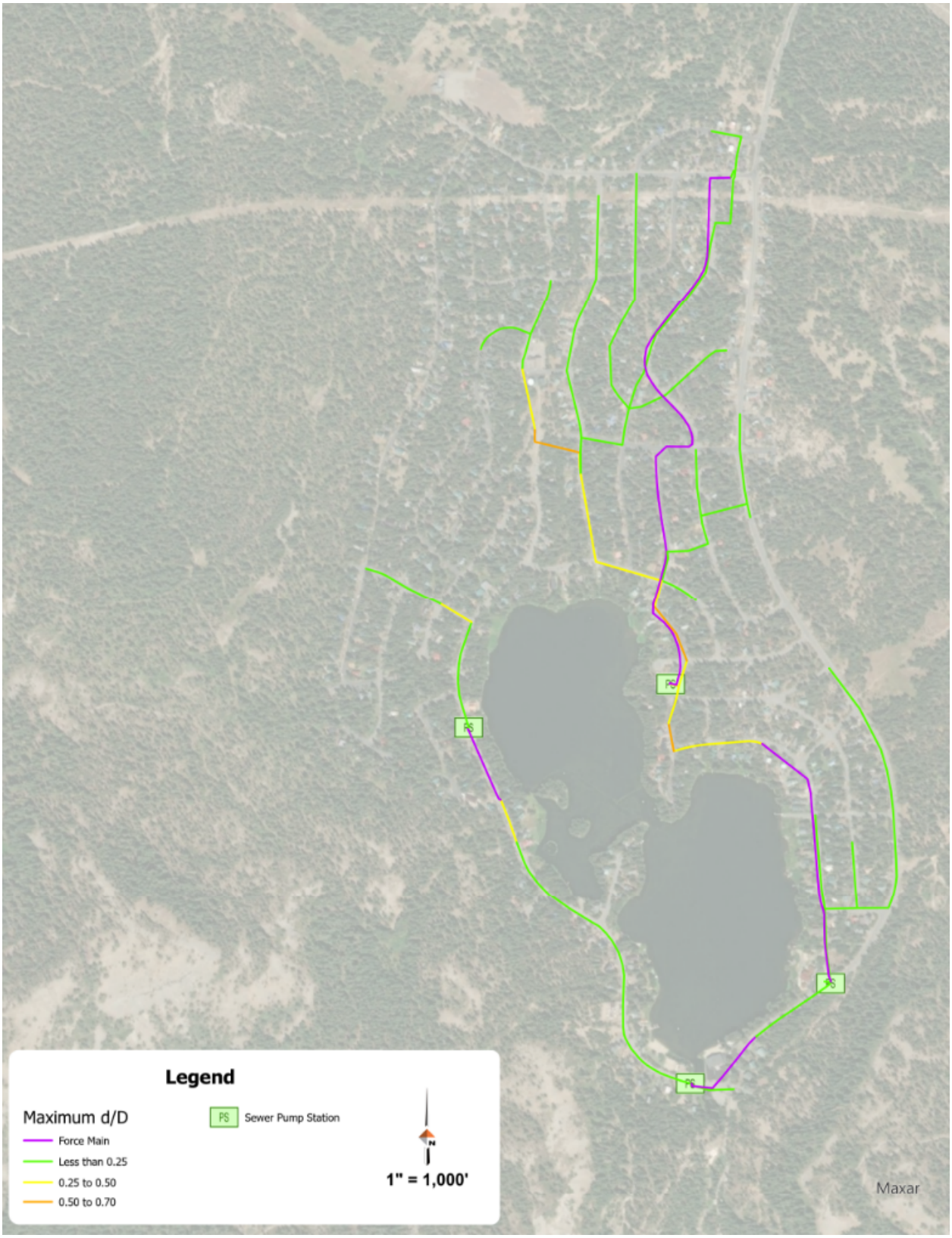

Figure 15: Existing Collection System - Maximum d/D

The minimum number of EDUs remaining within the model, not including the force mains, was zero at CDT_539. Although CDT_539 has a maximum d/D of 0.57 and does not exceed a d/D of 0.70, it is in exceedance of its capacity due to the flat nature of its slope, 0.091 percent. Within the model, the hydraulic grade line (HGL) at the inlet of CDT_539 is higher than the HGL at the outlet, 0.514 ft versus 0.250 ft. The model averages these two depths (0.382 ft) and compares it back to the pipe diameter of 0.67 to calculate the d/D value of 0.57. However, the d/D at the inlet of the pipe is 0.77 and violates the criteria described in Section 3.2. It is recommended that SLCWD verify the pipe slopes within this area to determine if an improvement project will be necessary. If the pipe slopes are similar to DOWL's manhole measure down survey, it is recommended that the pipes and manholes be reconstructed with adequate slope.

Table 24 is a summary of the three pipes with the lowest number of EDUs remaining within the model and Figure 16 is a map showing where these pipes are located. Figure 17 shows the remaining EDUs across the entire model.

Figure 18 shows the maximum velocity for the collection system mains. Several of the system pipes had maximum velocities under 2 ft/s. Velocity issues will be investigated within the future system capacity scenario. It will be determined if future developments in these areas will increase velocities before improvement projects are recommended.

Table 24: Existing Collection System – Lowest EDUs Remaining

Pipe ID	Pipe Size (in)	EDUs Remaining
CDT_539	8	0
CDT_287	6	89
CDT_439	8	280

Figure 16: Existing Collection System – Lowest EDUs Remaining

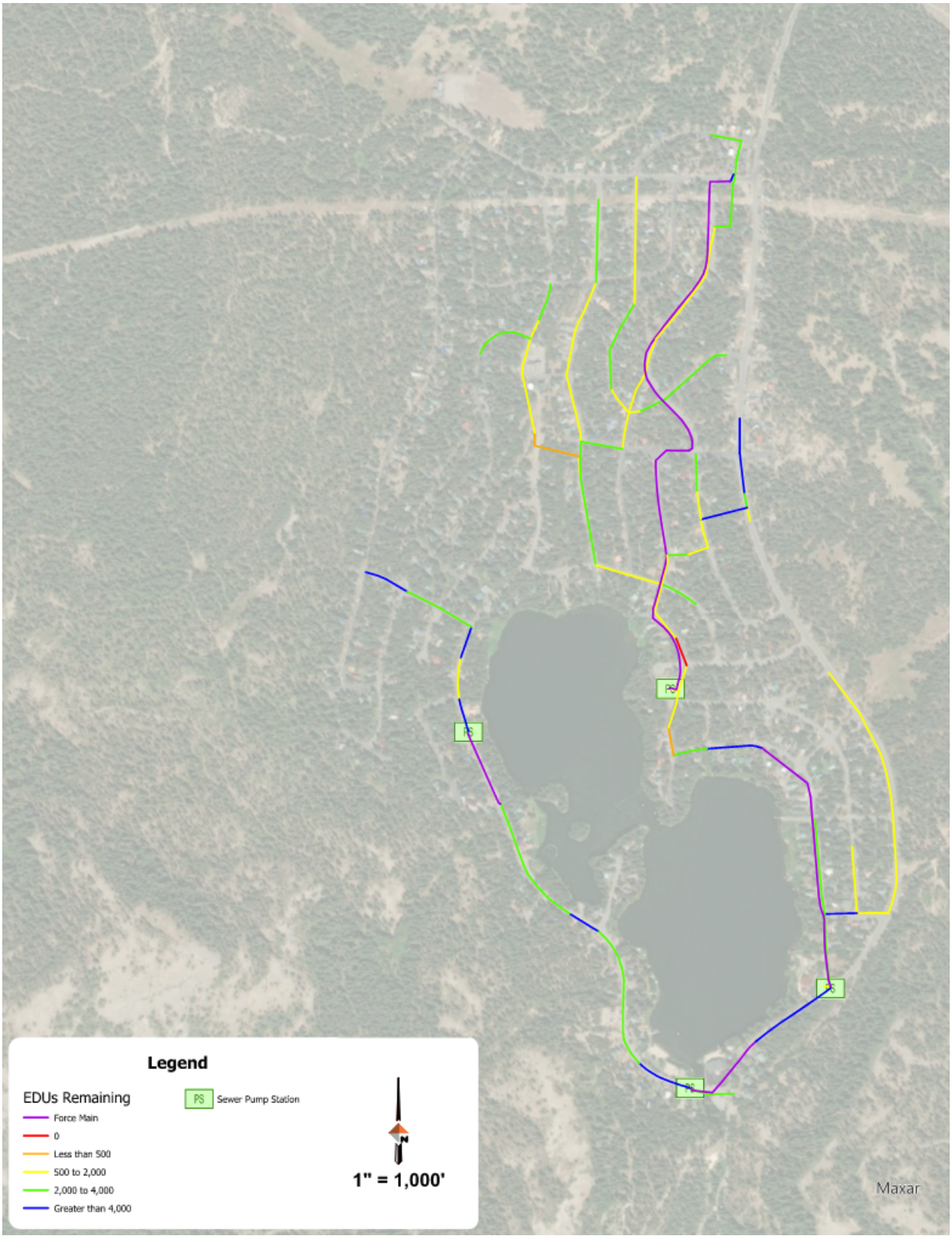

Figure 17: Existing Collection System – EDUs Remaining

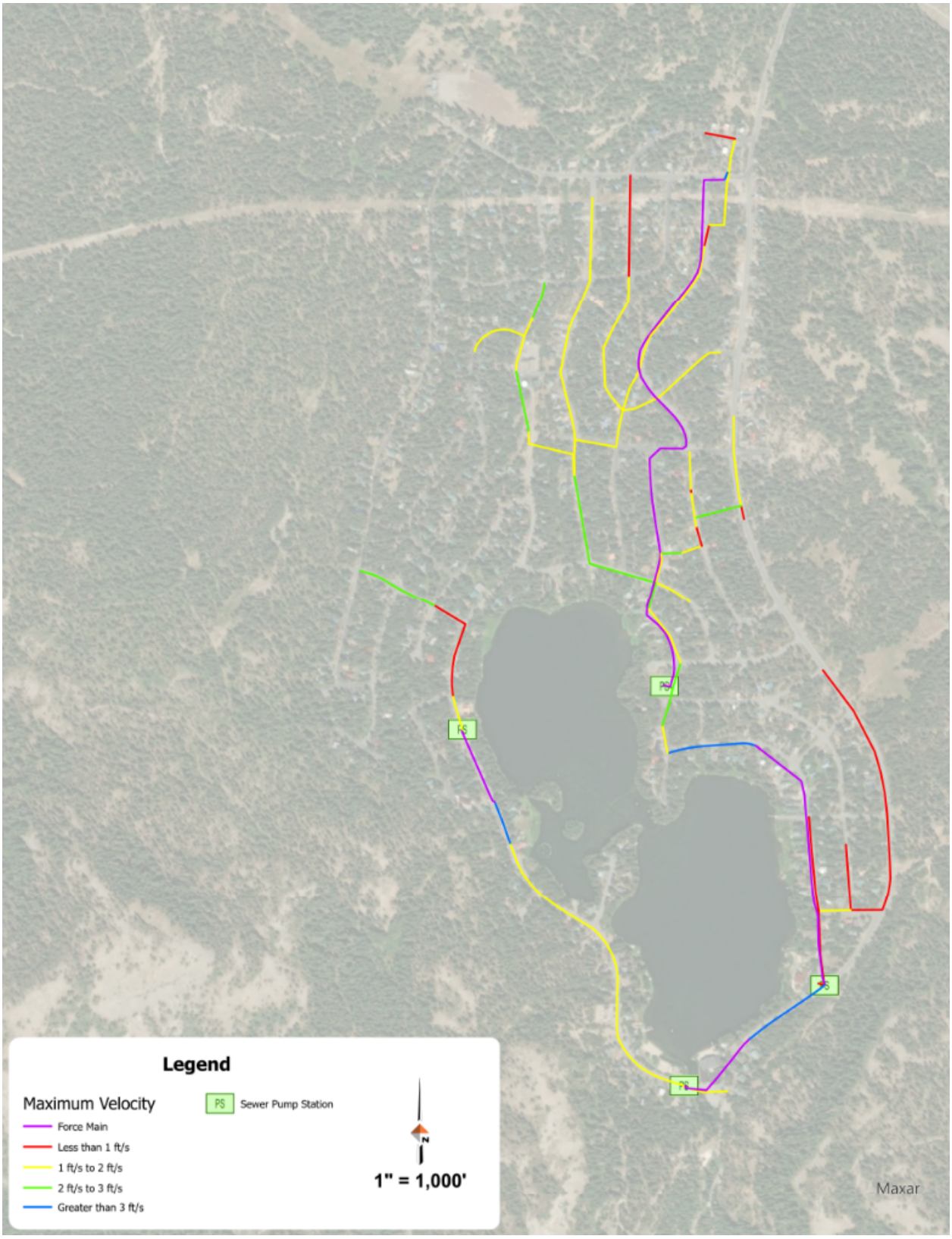

Figure 18: Existing Collection System – Maximum Velocity

3.2.2 Buildout System Capacity

Based on the model analysis, no manholes surcharge, and all gravity pipes within the system have a max d/D under 0.70. The maximum d/D observed within the model, not including the force mains, was 0.59. Table 25 is a summary of the five pipes with the highest d/D value within the model and Figure 14 is a map showing where these pipes are located. Figure 19 shows the max d/D across the entire model.

Table 25: Buildout Collection System – Highest d/D Values

Pipe ID	Pipe Size (in)	d/D
CDT_287	6	0.59
CDT_539	8	0.59
CDT_537	8	0.56
CDT_439	8	0.54
CDT_75	8	0.46

Table 26 is a summary of the three pipes with the lowest number of EDUs remaining within the model and Figure 16 is a map showing where these pipes are located. Figure 20 shows the remaining EDUs across the entire model.

Table 26: Buildout Collection System – Lowest EDUs Remaining

Pipe ID	Pipe Size (in)	EDUs Remaining
CDT_539	8	0
CDT_287	6	75
CDT_439	8	252

The minimum number of EDUs remaining within the model, not including the force mains, was zero at CDT_539. Although CDT_539 has a maximum d/D of 0.59 and does not exceed 0.70, it is in exceedance of its capacity due to the flat nature of its slope, 0.091 percent. Within the model, the HGL at the inlet of CDT_539 is higher than the HGL at the outlet, 0.529 ft versus 0.257 ft. The model averages these two depths (0.393 ft) and compares it back to the pipe diameter of 0.67 to calculate the d/D value of 0.59. However, the d/D at the inlet of the pipe is 0.79 and violates the criteria described in Section 3.2. It is recommended that SLCWD verify the pipe slopes within this area to determine if an improvement project will be necessary. If the pipe slopes are similar to DOWL's manhole measure down survey, it is recommended that the pipes be reconstructed with adequate slope.

Figure 21 shows the maximum velocity for the collection system mains. Several of the system pipes had maximum velocities under 2 ft/s. Velocity issues and recommendations to resolve them will be discussed in greater detail in Section 3.3.2.

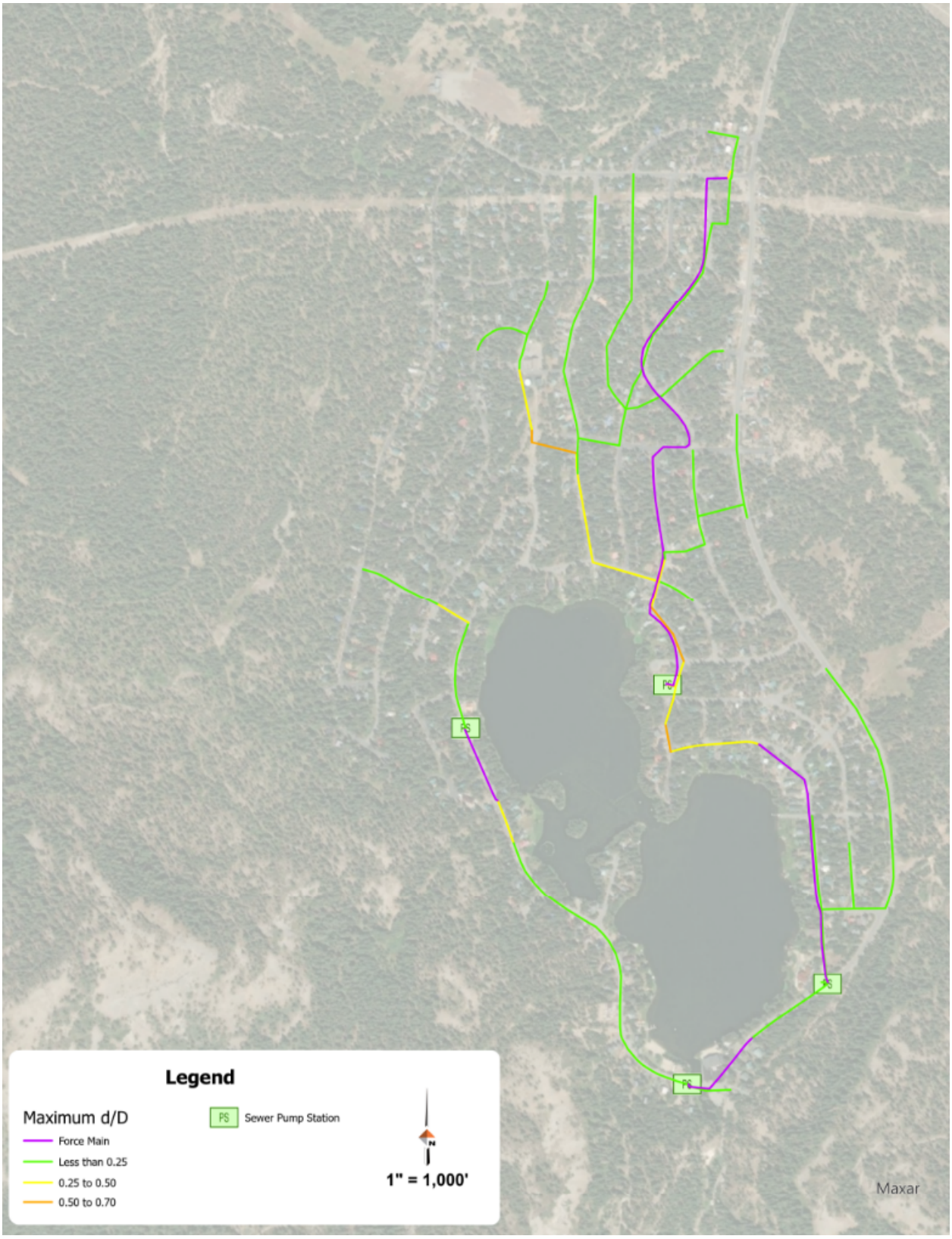

Figure 19: Buildout Collection System – Maximum d/D

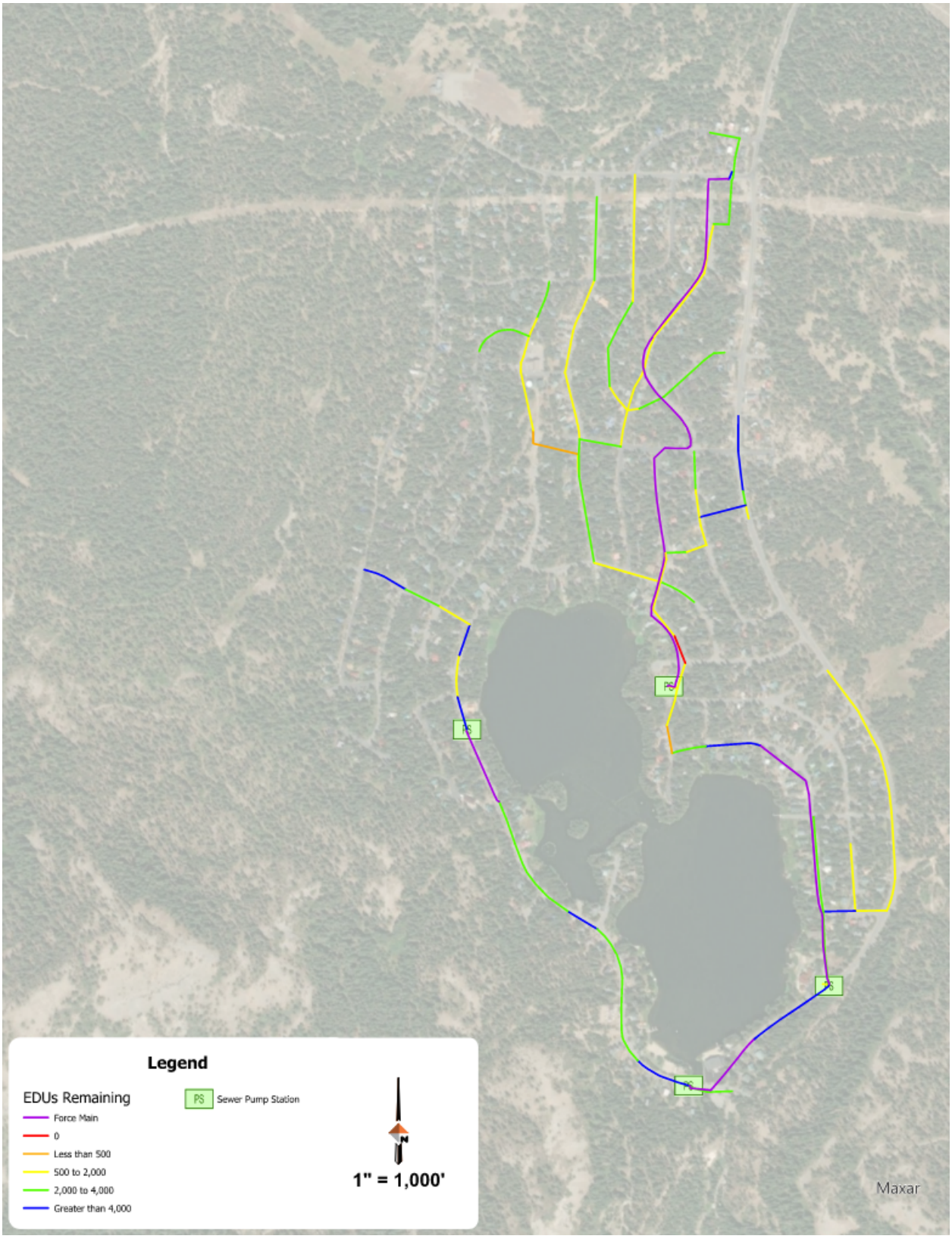

Figure 20: Buildout Collection System – EDUs Remaining

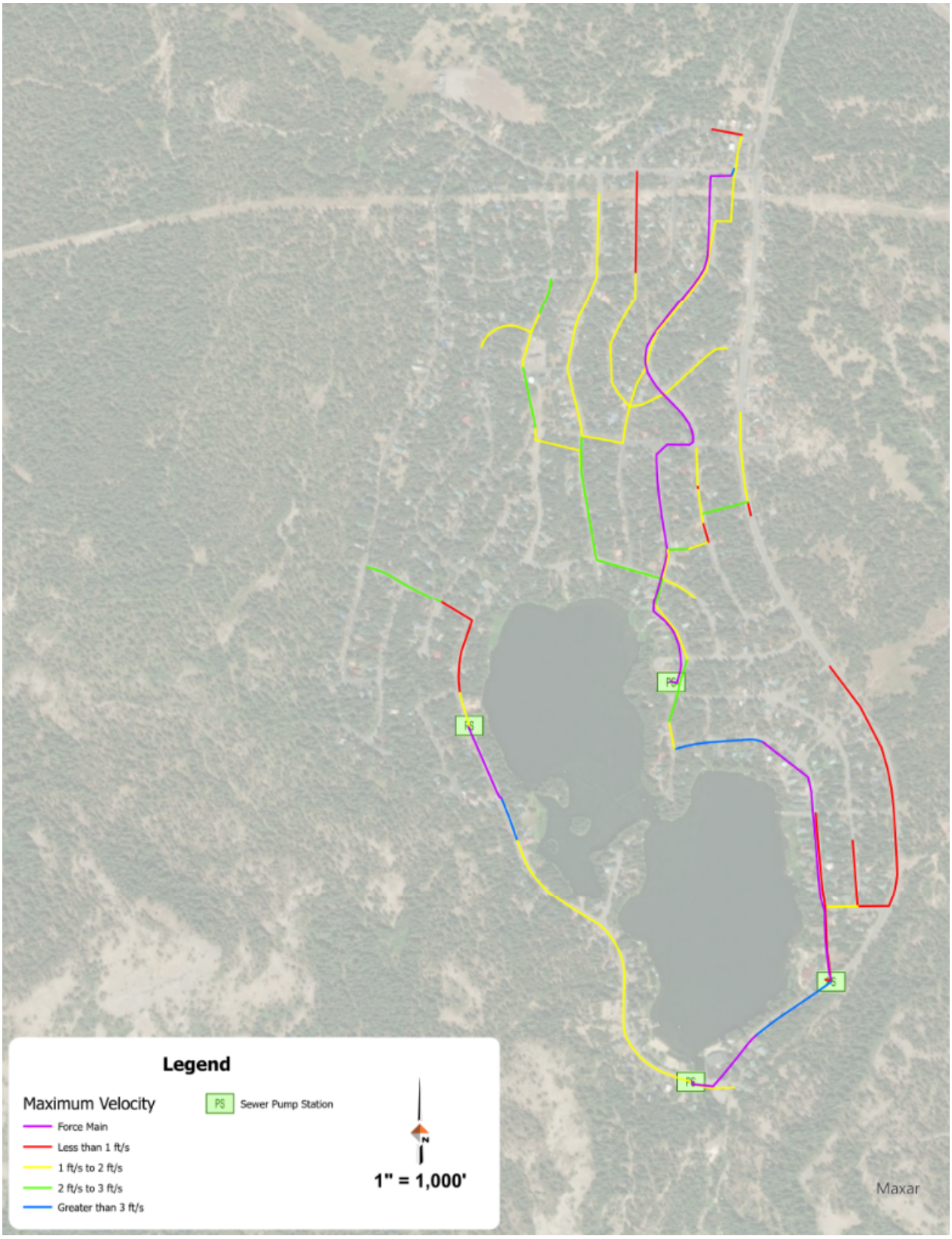

Figure 21: Buildout Collection System – Maximum Velocity

3.3 Collection System Deficiencies and Operational Challenges

3.3.1 Aging Sewer Mains

The largest problem facing the collection system is I&I. I&I is an extreme issue for the District due to the fact that system sewers are treated at the DSPUD WWTP, and the District pays for that service based on the flow it provides. The rate paid is dependent on the percentage of total flow into the WWTP rather than the absolute value of flow. Based on the analysis in Section 1.6.1, the sewer system can see more than 35,000 gpd of flow than is being produced by the District water treatment facilities. It is recommended that SLCWD perform a condition assessment of the entire sewer system. This would include targeting inspection of the system manholes during storm events to identify areas where inflow could be occurring, and video their existing sewer system during the spring months to determine the locations of infiltration.

Most of the system was constructed with VCP or ACP and it is recommended that these aging portions of the system be replaced with a more resilient pipe material. As stated within the PCLDM Section 6-12(C), the minimum sewer size for a collector pipe is 8-inches. Sewer lines 6-inches in diameter will be allowed in some residential instances with approval of the engineer, such as for end of system flows where 6-inch pipes are needed to maintain proper slopes or minimum velocities. It is recommended that these pipes be reconstructed with a minimum 8-inch diameter.

As a part of the sewer main replacement projects, manholes should also be replaced to help create a more waterproof system and reduce the amount of I&I that the system conveys and sends to the DSPUD WWTP. Generally, it is believed I&I issues can be reduced by implementing a large-scale sewer main and manhole replacement program.

3.3.2 Velocity Issues

The slope of the modeled pipes as well as their corresponding velocities within the future model scenario were analyzed and compared back to the PCLDM design criteria. Table 27 describes the minimum pipe slopes for gravity sewer mains as described in PCLDM Section 6-12(D), Table 6.3.

Table 27: PCLDM Minimum Pipe Slope Design Criteria

Pipe Diameter (in)	Slope (ft/ft)
6[4]	0.0050
8	0.0035
10	0.0025
12	0.0020

Figure 22 is a map showing the modeled pipes that meet both the velocity and slope design criteria, the modeled pipes that meet the slope criteria but not the velocity criteria, and the modeled pipes that meet neither of the design criteria. Typically, additional flow as a system

[4] *6-inch pipe allowed only with approval of engineer*

grows through development will allow low velocity areas to reach the 2 fps barrier. However, the District is expected to see a limited addition of EDUs in the near to long term future and the sewer flows will remain close to their current values. As Figure 22 displays the results from the buildout model scenario, future development cannot be relied upon to increase flow velocities. For the pipes that meet the minimum slope requirement but have velocities less than 2 fps, it is recommended that these gravity mains be inspected and flushed as necessary to clear any sediment or debris built up within the main. For the pipes that do not meet the minimum slope requirement and have velocities less than 2 fps, it is recommended that these areas are added to the large-scale sewer main and manhole replacement program, as discussed in Section 3.3.1.

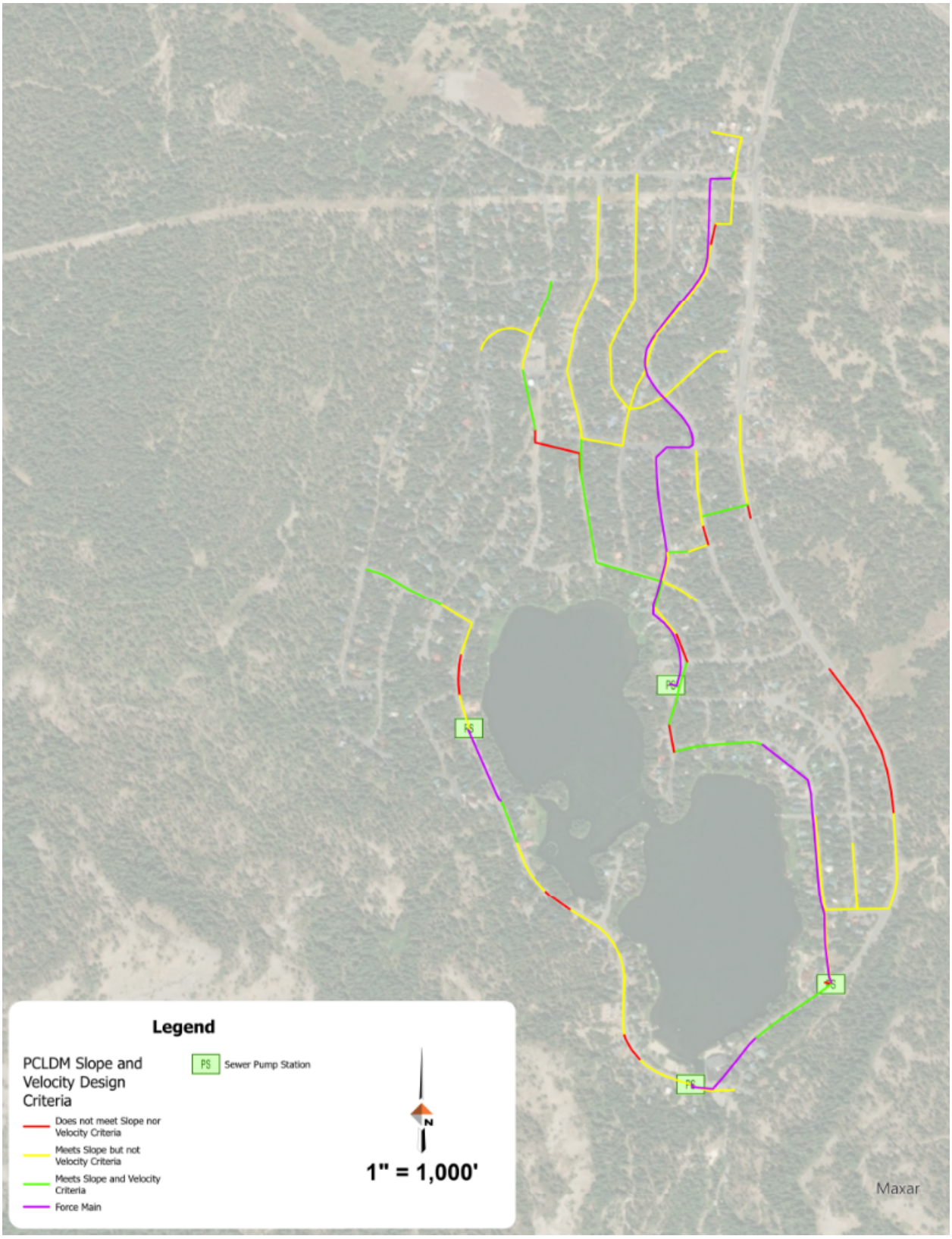

Figure 22: PCLDM Slope and Velocity Design Criteria

3.3.3 Utility Location Data

Currently, SLCWD staff utilize printed maps known as runbooks to locate all underground utilities within the District service area. Many of these maps are outdated and staff are becoming dependent on handwritten corrections of the maps. The District has begun bringing their utility information into a geographic information system database (GID) so that it can be easily accessed via web apps in the future. It is recommended that the District complete the GIS database project in the next year.

3.4 Summary of Findings

Several deficiencies have been identified in the SLCWD gravity sewer system. Table 28 is a list of recommended projects to address those deficiencies. Project cost estimates and a prioritized capital improvement plan (CIP) can be found in Section 5.0.

Table 28: Gravity Sewer System Recommended Projects

Project	Project Description
Sewer Main Condition Assessment	Perform a condition assessment of the sewer system to identify priority areas for rehabilitation or replacement measures
ACP and VCP Sewer Main Replacement	Replace all ACP and VCP sewer mains within the system
Sewer System GIS	Complete previous efforts to create a full system GIS for the District

4.0 SEWER PUMP STATION ANALYSIS

4.1 Pump Station Characteristics

Due to the mountainous/hilly terrain in the SLCWD service area, the collection system utilizes several sewer pump stations in order to convey sewage to the DSPUD WWTP. Of the four pump stations, SPS-1 is the largest and it ultimately collects sewer flow from the entire collection system before it is pumped to the DSPUD WWTP.A summary of each pump station wet well capacities and pump information can be found in Table 29 and Table 30 respectively.

Table 29: Pump Station Wet Well Summary

SPS ID	Wet Well Diameter (ft)	Wet Well Capacity (gal)
SPS-1[5]	6	4,230
SPS-2	5	2,660
SPS-3	5	2,205
SPS-4	6	2,955

[5] *The diameter and depth of SPS-1 was assumed to be 6 ft and 20 ft, respectively.*

Previously, the District relied on a WWTP, located to the south of SPS-3, that was owned and operated by the District. It has since been decommissioned but can be used for temporary storage during an emergency. There are valves on the SPS-3 force main that normally allow SPS-3 to pump into the gravity sewer system along Soda Springs Road and into SPS-2. However, the force main is configured in a way so that SPS-3 can directly pump into the old WWTP. The old WWTP contains 4 individual storage cells (two 8' x 12' cells and two 12' x 28' cells). The depth of these storage cells is unknown, but it is assumed that they are approximately 10 feet deep. Therefore, the temporary storage within the old WWTP is approximately 64,600 gallons.

Due to the unknown condition of the WWTP building, structure, and storage basins; it was not considered within the emergency storage capacity calculations for SPS-3. It should be noted that there is approximately 64,600 gallons of temporary storage within the old WWTP storage basins that could be used, if necessary.

Table 30: Pump Station Pump Summary

SPS ID	# Of Pumps	Pump Design Flow (gpm)	Pump TDH (ft)	Pump Type
SPS-1	2	350	100	Wet Pit Submersible Grinder
SPS-2	2	270	40	Wet Pit Submersible Grinder
SPS-3	2	270	30	Wet Pit Submersible Grinder
SPS-4	2	270	20	Wet Pit Submersible Grinder

All four pump stations in the system have access to an emergency power source. Two pump stations have direct access to emergency power via onsite generators. All pump stations have access to use portable generators owned by SLCWD and able to be transported and connected by staff. Two pump stations have access to power through automatic transfer switches. A summary of the pump station emergency power sources is found in Table 31.

Table 31: Pump Station Emergency Power Summary

SPS ID	Emergency Power Access	Emergency Power Type
SPS-1	Yes	Onsite generator & portable generator
SPS-2	Yes	Portable generator & can transfer power from SPS-3 to SPS-2
SPS-3	Yes	Onsite generator & portable generator
SPS-4	Yes	Portable generator & can transfer power from the water treatment plant to SPS-4

4.2 System Capacity

The capacity analysis for the pump stations and pressurized sewer looks at three main components of each pump station: pumps, wet wells, and force mains. The capacity for each component will be expressed in EDUs remaining for an even comparison. This value will equate

to the number of residential parcels, or EDUs, that can be added to the infrastructure before it has reached capacity.

The hydraulic capacity of the pump stations was determined using the design criteria found within the Placer County Pump Station Design Manual (PCPSDM). The PCPSDM lays out criteria concerning the pump operations and emergency storage required at each pump station. Below is the list of pertinent criteria for capacity assessment found in the PCPSDM:

- PCPSDM Section 4.9.1 – Wet well sizing criteria shall assume constant-speed pumps with a maximum six starts per hour at buildout
- PCPSDM Section 4.11 – Emergency storage requirements as shown in Table 32

Table 32: Emergency Storage Requirements

Force Main Layout	Emergency Storage Required
Dual redundant force main[6]	4 hours of peak wet weather flow (PWWF) at full buildout
No dual redundant force main	8 hours of PWWF at full buildout

Emergency storage capacity includes volumes in the wet well, collection system, and emergency storage containment which is above the high-water level of the wet well, but below the elevation which a spill would occur.

The emergency storage at each pump station, listed in Table 38, may not represent the true storage within the actual collection system. As described in Section 2.1, the model was skeletonized due to the lack of information. The pipes and manholes within these areas may provide additional emergency storage for the pump stations, dependent on their elevations.

The following industry best practices were also used to analyze the remainder of the components of each pump station:

- A minimum of 2 independent pumps are required and shall be sized so that the remaining pump can handle the expected peak flow with one pump out of service
- Force main velocities between 2 and 8 ft/s should be maintained

The lift station capacity calculations were calculated using both the average peaking factors for each catchment area, as well as the wet weather peaking factor calculated. Both peaking factors are shown in Table 33.

[6] *Pump stations with an average dry weather flow >0.5 MGD shall require dual redundant force mains and 4 hours of PWWF storage at full buildout. Exceptions to the requirement of dual force mains may be permitted by engineer under special circumstances. SPS-1 is the only lift station that has a dual redundant force main.*

Table 33: Pump Station Capacity Peaking Factors

Catchment Area	Peaking Factor	Wet Weather Peaking Factor
SPS-1	2.47	7.45
SPS-2	3.44	16.87
SPS-3	2.77	9.22
SPS-4	2.39	3.33

4.2.1 Existing System Capacity

For each pump station, average pump runtimes were calculated by dividing 24 hours less the total pump runtime in a day by number of starts in the model over a 24-hour period. Supervisory Control and Data Acquisition (SCADA) data describing pump station runtime was obtained from SLCWD and was used to compare back to the model to ensure a close match. Table 34 summarizes this effort for each pump station.

Table 34: Existing Pump Runtime Summary

SPS ID	Total Model Runtime (hr)	Model Pump Starts	Average Pump Runtime (min)	Pump Runtime from SCADA Data (min)
SPS-1	8.54	194	2.64	n/a[7]
SPS-2	6.01	83	4.34	4.38
SPS-3	4.24	83	3.07	3.12
SPS-4	1.56	74	1.26	1.08

Additionally, a pump cycle time figure for each pump station was created. This graph shows the total cycle time of the pump station pumps based on the flow rate into the pump station. This figure also allows a determination of the shortest pump cycle time at the pump station. Table 35 gives a summary of each pump stations average pump cycle time. The pump station pump cycle time figures can be found in Appendix D. Based on the calculations shown, SPS-1 total cycle time is less than 10 minutes, it is recommended that the pump on and off levels be adjusted to achieve a total cycle time of at least 10 minutes.

Table 35: Existing Pump Station Cycle Time

SPS ID	Average Inflow (gpm)	Total Cycle Time (min)
SPS-1	124	6
SPS-2	35	10
SPS-3	26	16
SPS-4	21	16

[7] *Data showing the number of pump starts per day was not provided for SPS-1*

Pump station pump capacity was determined by estimating the peak flow into the pump station and comparing it to the calculated pump operating point, with the difference being the remaining capacity. Table 36 gives a summary of the pump capacity at each pump station during normal day conditions, and Table 37 gives a summary of the pump capacity for each station during wet weather conditions.

Table 36: Existing Pump Station Pump Capacity Summary

SPS ID	Peaking Factor	Pump Operating Point (gpm)	Peak Flow (gpm)	Capacity Remaining (EDUs)
SPS-1	2.47	350	307	299
SPS-2	3.44	140	122	127
SPS-3	2.77	150	73	536
SPS-4	2.39	316	50	1,856

Table 37: Existing Pump Station Wet Weather Pump Capacity Summary

SPS ID	Peaking Factor	Pump Operating Point (gpm)	Peak Flow (gpm)	Capacity Remaining (EDUs)
SPS-1	7.45	350	926	-4,015
SPS-2	16.87	140	597	-3,189
SPS-3	9.22	150	243	-650
SPS-4	3.33	316	69	1,719

The pumps at SPS-1, 2, and 3 start to run into capacity issues when using the PWWF peaking factor. As stated in Section 3.3.1, it is believed I&I issues can be reduced by implementing a large-scale sewer main replacement program.

Emergency storage available at each pump station was calculated by adding two separate volumes:

1. The total volume the wet well can store before spilling
2. The volume of sewer that can be stored in the collection system up to the elevation before a spill occurs at the pump station

The total required emergency storage was calculated by using the model average flow and multiplying it by the peaking factor over an 8-hour duration (4-hour duration for SPS-1 due to the redundant force main). The emergency storage available and the required emergency storage numbers were compared, with the difference being the remaining wet well capacity. Table 38 gives a summary of the capacity remaining in each pump station wet well, and Table 39 shows the capacity remaining during wet weather conditions.

Table 38: Existing Pump Station Emergency Storage Capacity Summary

SPS ID	Peaking Factor	Required Emergency Storage (gal)	Emergency Storage Available (gal)	Capacity Remaining (EDUs)
SPS-1	2.47	73,688	13,263	-3,510
SPS-2	3.44	58,480	16,297	-2,450
SPS-3	2.77	35,087	15,346	-1,147
SPS-4	2.39	23,900	7,193	-970

Table 39: Existing Pump Station Wet Weather Emergency Storage Capacity Summary

SPS ID	Peaking Factor	Required Emergency Storage (gal)	Emergency Storage Available (gal)	Capacity Remaining (EDUs)
SPS-1	7.45	222,258	13,263	-12,140
SPS-2	16.87	286,790	16,297	-15,712
SPS-3	9.22	116,787	15,346	-5,892
SPS-4	3.33	33,300	7,193	-1,516

Force main capacity was calculated by comparing the existing pump flow rates and the corresponding pipe velocity to the max flow rate that the force main can achieve at a pipe velocity of 8 ft/s. As the pump operating point, and not inflow into the lift station, is the key to force main capacity, there is no difference in remaining capacity between average conditions and wet weather conditions. Table 40 gives a summary of the capacity remaining for each pump station force main.

Table 40: Existing Force Main Capacity Summary

SPS ID	Existing Force Main Velocity (ft/s)	Maximum Flow Rate (gpm)	Capacity Remaining (EDUs)
SPS-1	2.23	1,253	6,297
SPS-2	0.89	1,253	7,761
SPS-3	0.96	1,253	7,691
SPS-4	2.02	1,253	6,534

4.2.2 Buildout System Capacity

For each pump station, average pump runtimes were calculated by dividing 24 hours less the total pump runtime in a day by number of starts in the model over a 24-hour period. Table 41 summarizes the pump runtime for each lift station at buildout.

Table 41: Buildout Pump Runtime Summary

SPS ID	Total Model Runtime (hr)	Model Pump Starts	Average Pump Runtime (min)
SPS-1	9.23	199	2.78
SPS-2	6.55	89	4.42
SPS-3	4.60	90	3.10
SPS-4	1.72	79	1.31

Additionally, a pump cycle time figure for each pump station was created. This graph shows the total cycle time of the pump station pumps based on the flow rate into the pump station. This figure also allows a determination of the shortest pump cycle time at the pump station. Table 42 gives a summary of each pump stations average pump cycle time. The pump station pump cycle time figures can be found in Appendix D. Based on the calculations shown, SPS-1 total cycle time is less than 10 minutes, it is recommended that the pump on and off levels be adjusted to achieve a total cycle time of at least 10 minutes.

Table 42: Buildout Pump Station Cycle Time

SPS ID	Average Inflow (gpm)	Total Cycle Time (min)
SPS-1	135	5
SPS-2	38	10
SPS-3	29	15
SPS-4	23	14

Pump station pump capacity was determined by estimating the peak flow into the pump station and comparing it to the calculated pump operating point, with the difference being the remaining capacity. Table 43 gives a summary of the pump capacity at each pump station during average conditions, and Table 43 summarizes capacity during wet weather.

Table 43: Buildout Pump Station Pump Capacity Summary

SPS ID	Peaking Factor	Pump Operating Point (gpm)	Peak Flow (gpm)	Capacity Remaining (EDUs)
SPS-1	2.47	350	333	120
SPS-2	3.44	140	132	60
SPS-3	2.77	150	81	482
SPS-4	2.39	316	55	1,821

Table 44: Buildout Pump Station Wet Weather Pump Capacity

SPS ID	Peaking Factor	Pump Operating Point (gpm)	Peak Flow (gpm)	Capacity Remaining (EDUs)
SPS-1	7.45	350	1,004	-4,556
SPS-2	16.87	140	644	-3,515
SPS-3	9.22	150	269	-829
SPS-4	3.33	316	76	1,671

The pumps at SPS-1, 2, and 3 start to run into capacity issues when using the PWWF peaking factor. As stated in Section 3.3.1, it is believed I&I issues can be reduced by implementing a large-scale sewer main replacement program.

Emergency storage available at each pump station was calculated using the same methodology discussed previously. The emergency storage available and the required emergency storage at buildout numbers were compared, with the difference being the remaining wet well capacity. Table 45Table 46 gives a summary of the capacity remaining in each pump station wet well during average conditions, and Table 46 summarizes capacity during wet weather conditions.

Table 45: Buildout Pump Station Emergency Storage Capacity Summary

SPS ID	Peaking Factor	Required Emergency Storage (gal)	Emergency Storage Available (gal)	Capacity Remaining (EDUs)
SPS-1	2.47	79,863	13,263	-3,869
SPS-2	3.44	63,067	16,297	-2,717
SPS-3	2.77	38,780	15,346	-1,361
SPS-4	2.39	26,290	7,193	-1,109

Table 46: Buildout Pump Station Wet Weather Emergency Storage Capacity Summary

SPS ID	Peaking Factor	Required Emergency Storage (gal)	Emergency Storage Available (gal)	Capacity Remaining (EDUs)
SPS-1	7.45	240,883	13,263	-13,222
SPS-2	16.87	309,283	16,297	-17,018
SPS-3	9.22	129,080	15,346	-6,606
SPS-4	3.33	36,630	7,193	-1,710

Force main capacity was calculated by comparing the existing pump flow rates and the corresponding pipe velocity to the max flow rate that the force main can achieve at a pipe velocity of 8 ft/s. As with the existing demand condition, the pump operating point governs velocity through the force main for each pump station regardless of demands or conditions. The capacity remaining shown in Table 40 is the same then for existing and buildout.

4.3 Sewer Pump Station Deficiencies and Operational Challenges

4.3.1 Emergency Action Plan

All four of the SLCWD pump stations are equipped with backup power, and special provisions at some of the pump stations are in place to handle emergencies. These include that the old force main at SPS-1 is still operable if required, SPS-3 and SPS-4 are able to bypass flows if needed, and SPS-3, the site of the old WWTP, can be used for temporary storage. While these options are preferable to no options, these measures and operations are considered “institutional knowledge” and not documented in any way. It is recommended to prepare a sewer system emergency action plan that can be used in the case of failure at one or more of the District pump stations.

4.3.2 Odor Issues at SPS Discharge Manholes

SLCWD has received complaints from customers located near the SPS-1 and SPS-3 discharge manholes where the force main transitions from a pressurized system to a gravity system. It was identified by SLCWD staff that the SPS-1 discharge manhole has a relatively shallow depth (approximately 4 to 5 feet) which could impact and affect odors within the surrounding area. The manhole is also located directly adjacent to a residence. As there haven’t been any complaints in areas surrounding the SPS-2 and SPS-4 wet wells, it is recommended that the force mains for SPS-1 and SPS-3 be flushed out. Odors could arise if adequate cleaning velocities are not maintained within the SPS force mains, and as shown in this analysis, both force mains fail to achieve 2.5 fps. If adequate cleaning velocities are not maintained, sediment can build up within these pipes and become stagnant, leading to odor issues.

4.3.3 SPS-4 Flow Meter

A flow meter was installed on the SPS-4 force main during the 2022 sewer infrastructure replacement project. However, the flow meter was not integrated into the District’s SCADA system at the time of construction. It is recommended that the District integrate the SPS-4 flow meter into the SCADA system.

4.3.4 Pump Station Condition Assessments

It is recommended that the wet well structure and pumping components of SPS-1, 2, and 3 be inspected. Due to the age of the system, the wet well structures may allow groundwater infiltration into the collection system. A condition assessment should be performed by an outside party to verify if the structure or pumping infrastructure should be replaced. It is not necessary to perform a condition assessment for SPS-4 as that pump station and pumping infrastructure was replaced in 2022.

4.3.5 SPS-2 and SPS-3 Rehabilitations

When SPS-4 was replaced in 2022, the original design and bid called for significant improvements to the wet well and pumping infrastructure of SPS-2 and SPS-3. Using these previous designs, in addition to any deficiencies identified in the pump station condition assessment, both lift stations should be rehabilitated. This should include force main replacement.

Additionally, the decommissioned WWTP emergency storage location adjacent to SPS-3 is in need of rehabilitation. It is recommended that the site rehab be included in any work done to SPS-3. This additional work would include removal of the existing building, construction of a new housing building for the emergency storage basin, and construction of a small building to house the SPS-3 pump controls.

4.4 Summary of Findings

Several deficiencies have been identified in the SLCWD pressurized sewer system. Table 47 is a list of recommended projects to address those deficiencies. Project cost estimates and a prioritized CIP can be found in Section 5.0.

Table 47: Pressurized Sewer System Recommended Projects

Project	Project Description
Emergency Action Plan	Prepare an emergency action plan for operations in the event of failure at one or more of the District pump stations
SPS-4 Flow Meter SCADA Integration	Integrate the SPS-4 flow meter into the District's SCADA system
SPS Condition Assessment	Perform a condition assessment of all District pump stations to determine any required rehabilitation or replacement projects

5.0 CAPITAL IMPROVEMENT PLAN

This Plan has given several recommendations for capital improvements to the SLCWD sewer system in order to address identified deficiencies. This section will provide a short description and cost estimate for each recommended project. The recommended projects will then be presented in a 10-year CIP.

5.1 Basis of Estimate

The cost estimates provided in this CIP are in line with AACE Level 5 Estimates. A Level 5 estimate has an accuracy range of -50 percent to +100 percent. These estimates are considered planning level, and the final project cost can vary widely if taken to bid or construction due to factors outside of reasonable predictability. Cost estimates were developed by taking costs from similar projects constructed in the last two years in the area. Inflation factors have been applied to costs as applicable. The costs were calculated in 2023 dollars and then projected forward to the recommended year of the project at an inflation rate of 3.8 percent. A breakdown of each cost estimate in 2023 dollars and the projected costs can be found in Appendix E.

All soft costs associated with construction projects were calculated as a percentage of the construction total. Soft costs include the contingency, engineering services, permitting, construction observation and management, and administration. The percentage used for each soft cost was consistent across all estimates and are presented as percentages in Table 48.

Table 48: Percentage of Construction Total Used for Soft Costs

Soft Cost Description	Percentage of Construction Total
Contingency	20%
Engineering	15%
Permitting	5%
Construction Observation and Management	12%
Administration	5%

5.2 SLCWD Staff Projects

The following projects are recommended to be completed by SLCWD staff and are not included in the CIP.

5.2.1 Sewer Main Investigation

The current slope of the sewer main along Hemlock Drive causes capacity issues within the existing and future collection system. Approximately half, 53 percent, of existing EDUs contribute to this sewer main which conveys sewerage into SPS-1. As measured during DOWL's manhole measure down survey, it is believed that the slope of one pipe segment, located to the North of Allen Drive and Hemlock Drive, is 0.091 percent. SLCWD should perform measure downs within this area to verify pipe slopes. Since the pipe material within this area is asbestos concrete, the costs associated with this pipe and manhole replacement have been included within the sewer main replacement program cost estimate.

One manhole located near the intersection of Lake Drive and Soda Springs Road has never been found. This manhole is located within a meadow, and it is believed to be a large inflow source for water entering the sewer system. A sewer video survey was completed in September 2023 along this stretch of pipe. SLCWD staff had flushed and cleaned out this pipe segment before the video survey however, it was noted that there was a significant amount of sediment within the pipe during the video survey. Further investigation is required to determine where the sediment issues are coming from. Since the pipe material within this area is asbestos concrete, the costs associated with this pipe replacement have been included within the sewer main replacement program cost estimate.

5.2.2 Sewer Main Flushing Program

As described in Section 3.3.2, SLCWD staff should implement a refined sewer main flushing program based on Figure 22. Sewer main flushing will help clear any sediment or debris built up within the sewer main and will reduce odor throughout the system. Since the pipe material within these areas is asbestos concrete and vitrified clay, the costs associated with replacing manholes and pipes that do not meet minimum slope requirements have been included within the sewer main replacement program cost estimate.

5.2.3 Adjust SPS-1 Pump On Level

SLCWD staff should increase the amount of active storage within SPS-1 by raising the SPS-1 pump on float/control from 5.3 ft to 7 ft. Adjusting this level will allow SPS-1 to achieve a minimum cycle time of 10 minutes.

5.2.4 Force Main Flushing Program

Similar to the sewer main flushing program, SLCWD staff should implement a sewer force main flushing program. Sewer force main flushing will help clear any sediment or debris built up within the force mains and will reduce odor throughout the system and at the discharge manholes where the system transitions from pressurized sewer to gravity sewer.

5.3 Sewer Main and Manhole Replacement Program

The majority of the SLCWD sewer collection system is comprised of aging ACP and VCP. Due to the large amount of I&I within the system, it is recommended that the District begin a sewer main and manhole replacement program, replacing the older ACP and VCP pie with newer PVC pipe. The total cost of replacing all ACP and VCP in the system in 2023 dollars is $58,485,850.

Due to the current financial state of the District, future discussions and planning will be required to determine how much SLCWD can self-fund each year for this replacement program. As such, it is recommended that the District begin engaging with the SWRCB Division of Financial Assistance to determine possible funding sources. As this will be a long-term investment in the District infrastructure, utilizing state and federal loan and grant programs is beneficial in providing short- and long-term stability to the SLCWD sewer system, while allowing the cost of these improvements to be spread over a longer period of time. In order to account for all possible costs associated with this project, it is recommended that the District complete a Sewer Main Replacement Program Preliminary Engineering Report (PER) that can be used in funding applications. The PER is estimated to cost **$104,000** and should be completed in **2024**.

Whether self-funded or utilizing state and federal funding, the sewer main replacement program will need to be completed in phases. It is recommended that the first phase of the project target the catchment areas that contributed to the SS_02 and SS_03 flow monitoring locations. These catchment areas are influenced by inflow sources and the impacts of the rain and snow events are very prominent within these catchment areas. The pipes and manholes located to the North of the Allen Drive and Hemlock Drive intersection should also be prioritized within the first phase. Additionally, if the sewer condition assessment is performed, it will allow the District to identify precise areas to be targeted in all phases.

The subsequent phases of the project continue to build on the last, completing pipe and manhole replacement within the SS_03 catchment area and moving onto the SS_02 after the SS_03 catchment area is complete. The next priority will be the SS_04 catchment area as this catchment area appears to be influenced by infiltration. Lastly, the SS_01 catchment area should be replaced. A full phasing plan is recommended to be included in the PER.

Based on discussions with SLCWD staff, and the current financial state of the District, it is recommended that the sewer main replacement program take place over a 20-year period. The first nine phases of the project have been included in the CIP, beginning in 2025. The cost of each phase is 5 percent of the total cost, and then projected forward to the planned year of the

phase. Table 49 shows the full phasing and estimated cost of each phase over the 20-year period.

Table 49: Sewer Main Replacement Phasing

Phase	Year	Estimated Cost
1	2025	$3,151,000
2	2026	$3,271,000
3	2027	$3,395,000
4	2028	$3,524,000
5	2029	$3,658,000
6	2030	$3,797,000
7	2031	$3,941,000
8	2032	$4,091,000
9	2033	$4,247,000
10	2034	$4,408,000
11	2035	$4,575,000
12	2036	$4,749,000
13	2037	$4,930,000
14	2038	$5,117,000
15	2039	$5,312,000
16	2040	$5,513,000
17	2041	$5,723,000
18	2042	$5,940,000
19	2043	$6,166,000
20	2044	$6,400,000
Total		**$91,908,000**

5.4 SPS-4 Flow Meter Connection to SCADA System

A flow meter was installed on the SPS-4 force main during the 2022 sewer infrastructure replacement project but has not been integrated into the District's SCADA system. It is recommended that SLCWD coordinate with their SCADA operator about implementing this flow meter into the system. This effort is estimated to cost **$26,000** and should be completed in **2024**.

5.5 Utility Rate Study

With the large number of improvement projects required for the District, it is recommended that SLCWD staff engage with an outside party to perform a utility rate study. This rate study would include a revenue requirement analysis taking into consideration the CIP below. The rate study

should also include an equitable cost of service analysis that is in compliance with Proposition 218. This study will produce base charges for District customers that will ensure SLCWD infrastructure and improvements are funded correctly. The rate study is estimated to cost **$26,000** and should be completed in **2024**.

5.6 Sewer System GIS

The District has begun the process of converting their old utility drawings from an AutoCAD format to a GIS database. This project included updating the utility drawings and creating new runbooks for operations staff. It is recommended that the District complete the GIS database by updating all underground utility locations within the GIS and then purchase ESRI ArcGIS Online (AGOL) accounts to host the information. SLCWD staff will be able to access AGOL through a web app while in the field or in the office. It is expected that the completion of the underground utility GIS will be $18,000 in total, however the sewer system portion of that cost is only **$9,000**. It is recommended that the project be completed in **2024**. The District will also have to factor in an annual cost of $1,500 per year to ESRI for the AGOL licensing.

5.7 Sewer System Condition Assessment

It is recommended that the District perform a system wide condition assessment of the sewer gravity mains, as well as the pump station wet well structure and pumping components of SPS-1, 2, and 3. Due to the age of the system, the system infrastructure has proven to be greatly affected by I&I. The condition assessment would allow the District to identify the worst areas that should be targeted immediately for rehabilitation and replacement. The condition assessment should be performed by an outside party and should include videoing the entire gravity system and onsite inspections of the pump stations. It is not necessary to perform a condition assessment for SPS-4 as that pump station and pumping infrastructure was replaced in 2022. This effort is estimated to cost **$78,000** and should be completed in **2024**. Figure 23 is an overview map showing areas of the collection system that have been videoed in the past, as well as notes from the video operator calling out areas of significance.

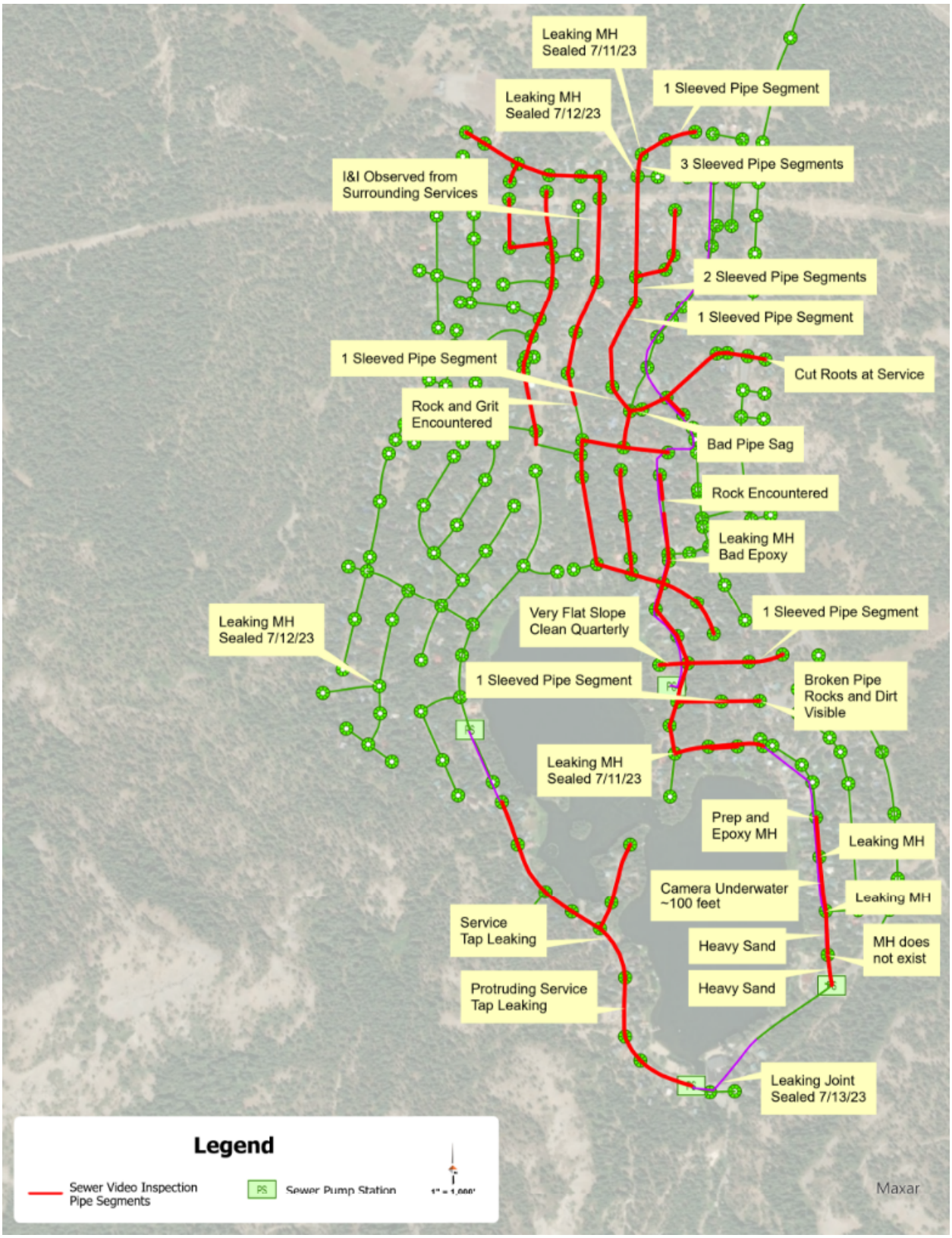

Figure 23: Sewer Video Areas and Operator Notes

5.8 SPS-2 and SPS-3 Rehabilitation

It is recommended that the District rehabilitate SPS-2 and SPS-3 utilizing the designs performed and bid in 2022, as well as any additional findings from the sewer condition assessment. This work should also include site rehabilitation of the decommissioned WWTP located adjacent to SPS-3. It is estimated that the total cost of the SPS-2 rehabilitation will be **$2,072,000** and should be completed in **2026**. The SPS-3 rehabilitation is estimated to be **$2,795,000** and should be completed in **2027**.

5.9 10-Year CIP

The total SLCWD sewer system CIP can be found below in Table 50. The projects are organized by the priority in which they are recommended to be implemented.

Table 50: SLCWD Sewer Utility 10-Year CIP

Project	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Sewer Main Replacement PER	$104,000									
SPS-4 Flow Meter SCADA Connect	$26,000									
Utility Rate Study	$26,000									
Sewer System GIS	$9,000									
System Condition Assessment	$78,000									
Sewer Main Replacement Phase 1		$3,151,000								
Sewer Main Replacement Phase 2			$3,271,000							
SPS-2 Rehabilitation			$2,072,000							
Sewer Main Replacement Phase 3				$3,395,000						
SPS-3 Rehabilitation				$2,795,000						
Sewer Main Replacement Phase 4					$3,524,000					
Sewer Main Replacement Phase 5						$3,658,000				
Sewer Main Replacement Phase 6							$3,797,000			
Sewer Main Replacement Phase 7								$3,941,000		
Sewer Main Replacement Phase 8									$4,091,000	
Sewer Main Replacement Phase 9										$4,247,000
Sewer System Master Plan Update										$290,000
Total Annual Capital Cost	**$243,000**	**$3,151,000**	**$5,343,000**	**$6,190,000**	**$3,524,000**	**$3,658,000**	**$3,797,000**	**$3,941,000**	**$4,091,000**	**$4,537,000**

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APPENDIX A:
ADS FLOW MONITORING REPORT

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Soda Springs 2022-2023 Sanitary Sewer Flow Monitoring

Final Report Submitted to **Farr West Engineering**
August 10, 2023

ADS ENVIRONMENTAL SERVICES

3447 Investment Blvd. Suite # 5
Hayward, CA 94545

800-633-7246
www.adsenv.com

August 8, 2023

Alex Stodtmeister, PE
Project Engineer
Farr West Engineering
(775) 851-4788 | office
(775) 853-7258 | direct
farrwestengineering.com

SUBJECT: Soda Springs 2022-2023 Sanitary Sewer Flow Monitoring

Dear Mr. Stodtmeister,

ADS is pleased to submit the report for the project referenced above completed on behalf of Farr West Engineering. The metering was conducted at four (4) locations. The study was conducted during the period of Thursday, 22 December 2022 to Thursday, 22 June 2023.

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

In addition, we would be happy to further explain any details about the report that may seem unclear. Should you have any questions or comments, you may contact the Project Manager, Sean Winder at 206.423.3453.

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

Sincerely,
ADS ENVIRONMENTAL SERVICES

Justin Hatch
Data Analyst

Soda Springs 2022-2023 Sanitary Sewer Flow Monitoring

Prepared For:

Alex Stodtmeister, PE
Project Engineer
Farr West Engineering
(775) 851-4788 | office
(775) 853-7258 | direct
farrwestengineering.com

Prepared By:

ADS, LLC
3447 Investment Blvd. Suite # 5
Hayward, CA 94545

Scope and Methodology

Introduction

Farr West Engineering entered into an agreement with ADS Environmental Services to conduct flow monitoring at (4) four locations in the Soda Springs Sanitary Collection System. The study was scheduled for a period of (183) one-hundred and eighty-three days. Once in place, the flow monitoring equipment was used to measure depth, velocity, and to quantify flows. Data obtained from the study will be used to help identify inflow and infiltration and create a hydraulic model to help development of Capitol Improvement Plans for the district for Sierra Lakes County Water District.

Project Scope

The scope of this study involved using a flow monitor to quantify wastewater flow at the designated locations for the 183-day time period. Specifically, the study included the following key components.

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

Equipment installation was completed on December 21, 2022. The monitoring began on December 22, 2022 and was completed on June 22, 2023. Upon completion of the study, equipment was removed from the system.

Flow Monitoring Equipment

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

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

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

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

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

sensor to calculate depth.

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

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

Installation

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

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

Data Collection, Confirmation, and Quality Assurance

Data collection was done remotely via wireless connect on a weekly basis via ADS Field Representatives. During the monitoring period, field crews visit each monitoring location to verify proper monitor operation and document field conditions. The following quality assurance steps are taken to assure the integrity of the collected data:

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

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

Confirm depth and velocity readings: Field crews descended into meter manholes to manually measure depths and velocities and compare them meter readings to confirm that they agreed. They also measured silt levels, if any, in the inverts of the pipes. Silt areas were subtracted from flow areas to compute true areas of flow.

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

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

Flow Quantification Methods

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

Continuity Equation

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

Q = A * V

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

Data Analysis and Presentation

Data Analysis

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

Velocity profiles and the line confirmation data developed by the field personnel are reviewed by the data analyst to identify inconsistencies and verify data integrity. Velocity profiles are reviewed and an average to peak velocity ratio is calculated for the site. This ratio is used in converting the peak velocity measured by the sensor to the average velocity used in the Continuity equation. The data analyst selects which depth sensor entity will be used to calculate the final depth information. Silt and/or debris are often present in sewer lines. When present, silt levels are measured at each site visit. They are reviewed by the data analyst and representative silt levels established. Silt reduces the cross sectional area of the flow where as debris causes depth to become deeper and slower. Calculated flow should remain consistent in both hydraulic conditions. Debris may result in reduced line capacity.

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

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

Data Presentation

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

DFINAL - Final calculated depth measurement (in inches)

QFINAL - Final calculated flow rate (in MGD)

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

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

SS_01

Site Commentary

SITE INFORMATION

Pipe	Round (10 in H)
Silt	0.00 (in)

OBSERVATIONS

Surcharge conditions were not experienced. Review of the scattergraph shows that free-flow conditions were experienced during the study. Backwater conditions were infrequently observed.

Average flow depth, velocity, and quantity data observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.66	0.61	0.024
Minimum	0.48	0.19	0.001
Maximum	2.54	1.31	0.073
Min Time	12/23/2022 5:00:00 AM	12/22/2022 5:00:00 AM	12/23/2022 5:00:00 AM
Max Time	01/28/2023 6:00:00 PM	06/12/2023 10:00:00 AM	06/12/2023 10:00:00 AM

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

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023** is provided in the following table. Data gap was experienced from **14 February, 2023 to 18 February 2023** due to equipment failure.

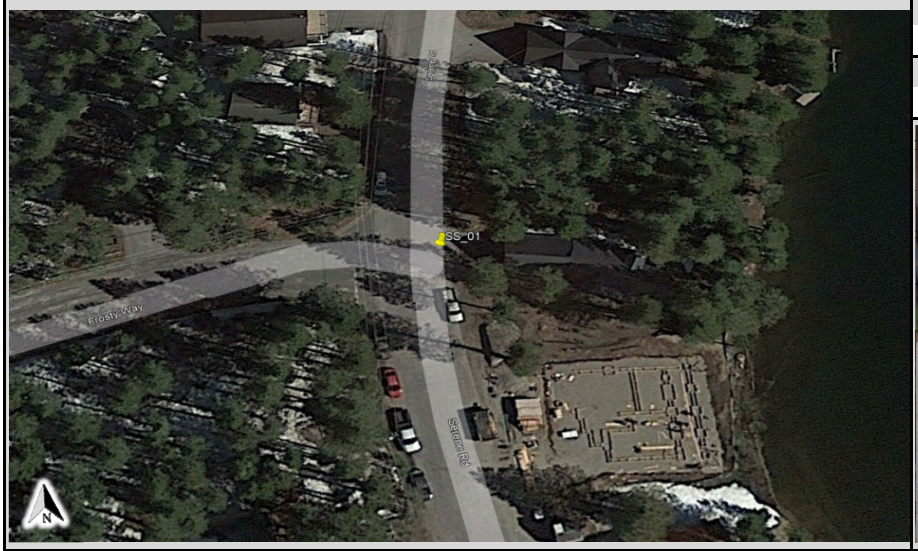
Percent Uptime	
DFINAL (in)	97.797
VFINAL (ft/s)	97.797
QFINAL (MGD - Total MG)	97.797

SodaSprings.FW.TFM.CA22

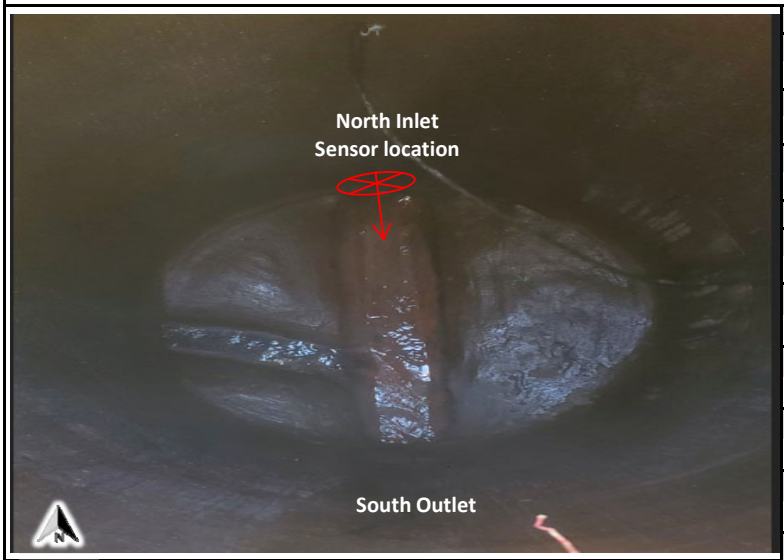
Flow Monitoring Site Report

Site Name SS_01

Site Address /Location:	2192 Serene Rd Soda Springs, CA 95728			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Drive, Site in Road	Latitude:	39.301974	Pipe Size (H x W): 10.00"x10.00"	Pipe Shape: Circular
		Longitude:	-120.389009		



Manhole #	System Characteristics
	Residential
Access	**Traffic**
Drive	Light



ADS Project Name:	SodaSprings.FW.TFM.CA22
ADS Project Number:	22874

Installation Information

Installation Date:	Installation Type:
Wednesday, December 21, 2022	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	**Monitor Location:**
Upstream 0-5 FT	Manhole
Sensors / Devices:	**Pressure Sensor Range (psi)**
Peak Combo (CS4)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
9:59:00 AM	10.00"x10.00"
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
1.38	N/A
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
N/A	0.25"
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
0.65	-
Silt (in)	**Silt Type**
-	None

Hydraulic Comments:
Low depth, slow velocity, smooth flow

Manhole / Pipe Information:

Manhole Depth (Approx. Ft):	Manhole Configuration
10ft	Single
Manhole Material:	**Manhole Condition:**
Concrete	Good
Manhole Opening Diameter (in.)	**Manhole Diameter (Approx. in):**
30"	54"
Manhole Cover	**Manhole Frame**
Unbolted	Normal
Active Drop Connections	**Air Quality:**
No	Good
Pipe Material	**Pipe Condition:**
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

Hydrograph Report

SS_01

Flow Monitor

SS_01

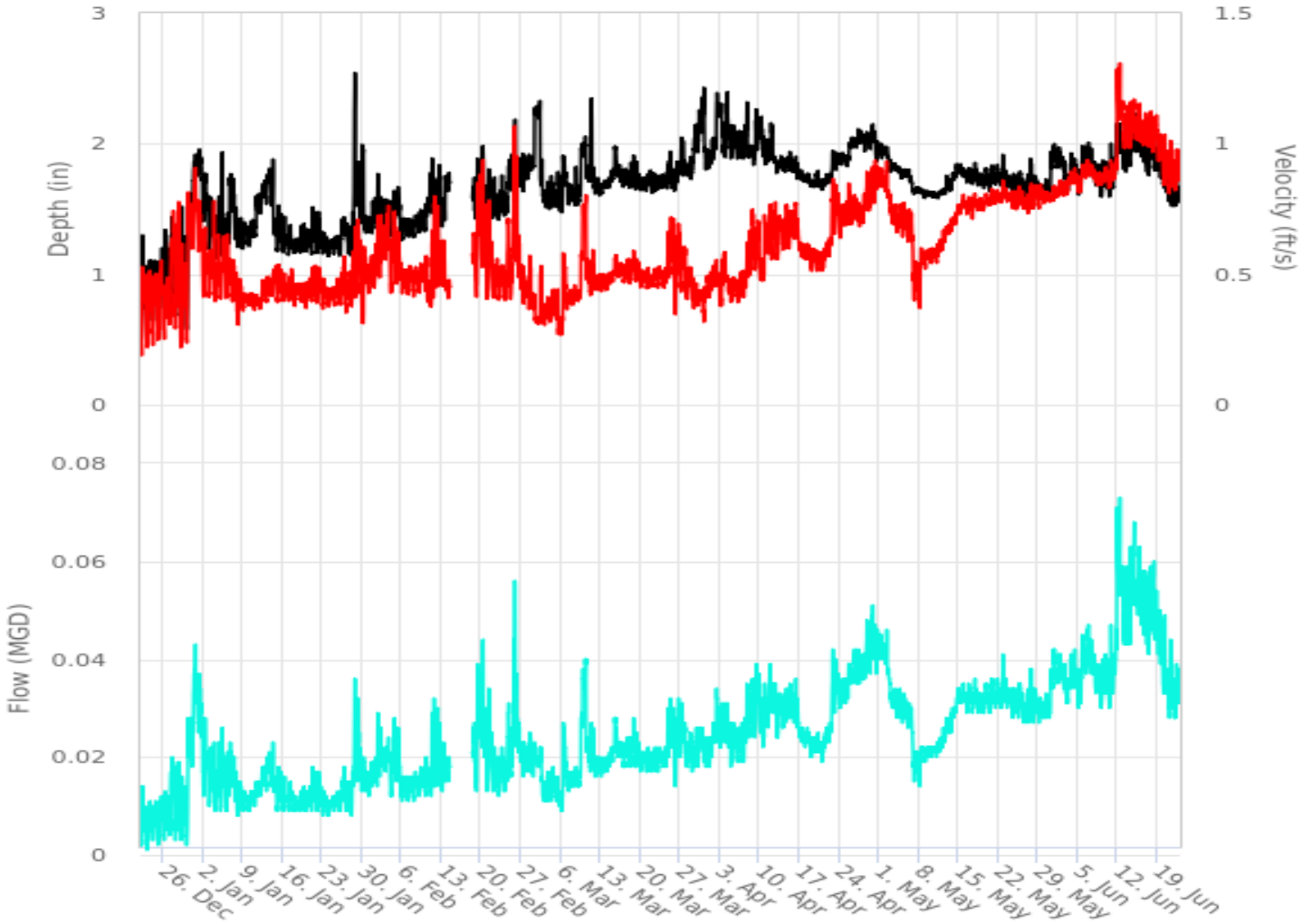
Pipe Height
10.00
in

Report Period

12/22/2022
To
06/22/2023

Legend

DFINAL
QFINAL
VFINAL



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Scattergraph Report

SS_01

Flow Monitor

SS_01

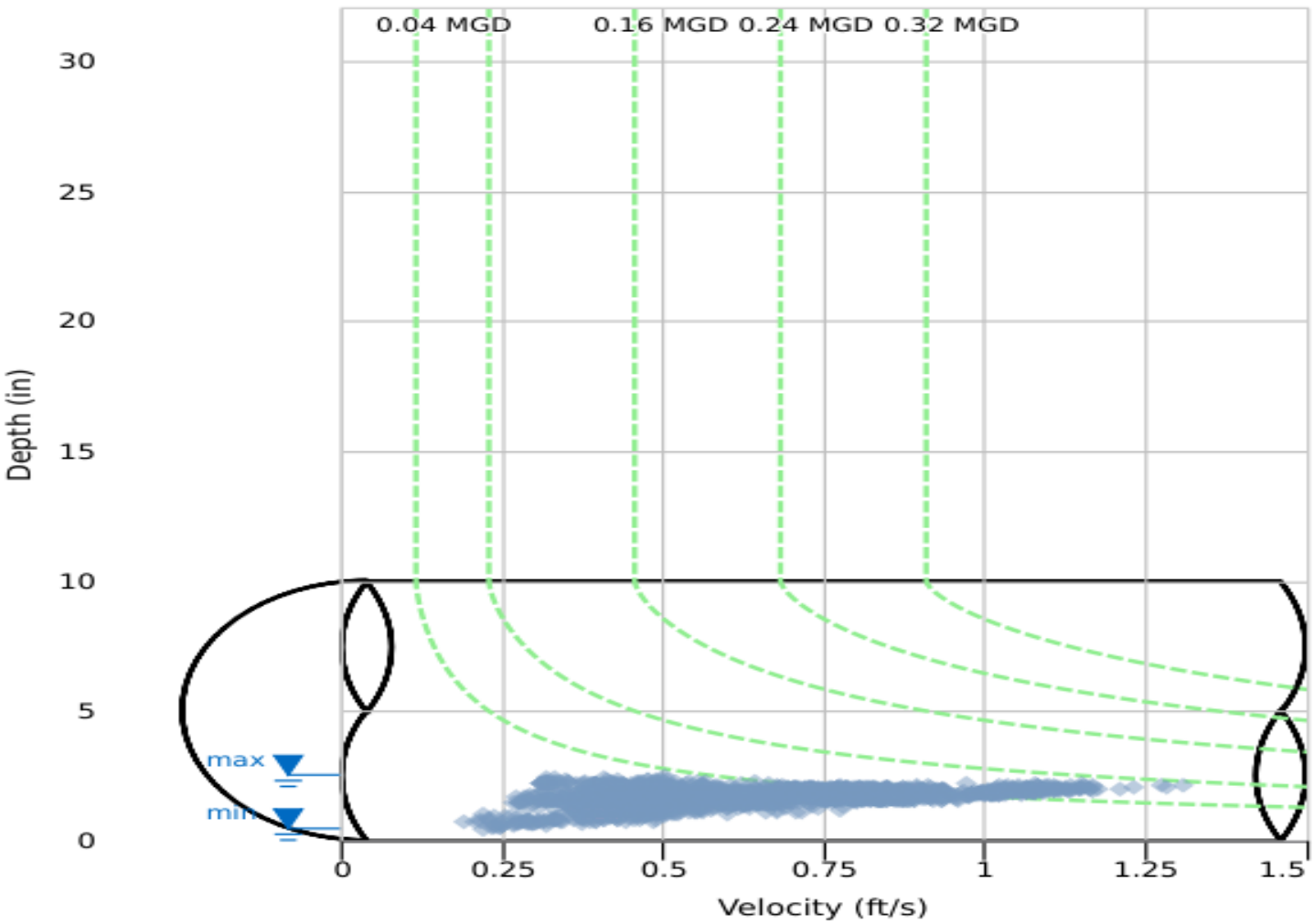
Pipe Height
10.00
in

Report Period

12/22/2022
To
06/22/2023

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



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Daily Tabular Report

12/22/2022 00:00 - 06/22/2023 23:59
SS_01Pipe: Round (10 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
12/22/2022	19:15	0.63	09:25	1.43	0.88	05:30	0.17	17:10	0.59	0.39	02:55	0.002	09:10	0.017	0.006	0.006
12/23/2022	02:40	0.46	07:40	1.34	0.80	02:30	0.19	08:05	0.67	0.38	02:40	0.001	16:25	0.014	0.006	0.006
12/24/2022	04:15	0.64	16:45	1.19	0.92	03:40	0.21	16:45	0.57	0.40	03:40	0.002	16:45	0.013	0.007	0.007
12/25/2022	02:10	0.63	19:30	1.54	0.95	02:30	0.23	09:00	0.64	0.42	02:35	0.002	09:00	0.018	0.008	0.008
12/26/2022	05:15	0.65	09:00	1.39	1.01	05:15	0.21	18:25	0.57	0.38	05:15	0.002	19:00	0.016	0.007	0.007
12/27/2022	00:10	0.69	13:45	1.57	1.09	02:20	0.24	19:45	0.82	0.52	02:20	0.003	13:50	0.024	0.012	0.012
12/28/2022	03:35	0.66	08:55	1.61	1.01	04:50	0.27	20:20	0.92	0.49	05:25	0.003	20:20	0.027	0.010	0.010
12/29/2022	23:55	0.75	08:45	1.58	1.07	03:10	0.19	09:20	0.69	0.40	03:10	0.003	08:55	0.020	0.008	0.008
12/30/2022	04:15	0.55	21:30	1.67	1.23	04:15	0.21	10:40	0.85	0.58	04:15	0.002	21:30	0.032	0.017	0.017
12/31/2022	00:55	1.36	17:25	1.98	1.73	02:25	0.56	17:25	0.99	0.75	02:25	0.017	17:25	0.049	0.031	0.031
01/01/2023	23:15	1.50	08:55	2.05	1.81	23:25	0.47	10:25	0.84	0.65	23:25	0.016	09:55	0.040	0.029	0.029
01/02/2023	23:55	1.32	08:05	1.82	1.56	03:05	0.39	09:55	0.76	0.52	03:05	0.012	09:55	0.032	0.019	0.019
01/03/2023	00:30	1.17	17:10	1.88	1.36	05:10	0.37	23:05	0.84	0.52	04:00	0.009	17:10	0.034	0.015	0.015
01/04/2023	02:20	1.10	20:20	1.69	1.32	03:55	0.38	00:00	0.77	0.50	03:55	0.008	18:50	0.027	0.014	0.014
01/05/2023	02:30	1.13	10:40	2.18	1.33	03:00	0.37	20:45	0.76	0.51	03:00	0.008	10:40	0.031	0.015	0.015
01/06/2023	04:00	1.11	22:15	1.89	1.39	02:15	0.35	09:05	0.79	0.50	02:15	0.008	12:30	0.028	0.015	0.015
01/07/2023	15:45	1.22	08:30	1.88	1.50	23:55	0.31	21:35	0.67	0.45	23:55	0.008	21:35	0.026	0.015	0.015
01/08/2023	04:10	1.18	17:15	1.61	1.31	05:15	0.29	17:15	0.57	0.41	05:15	0.007	17:15	0.021	0.011	0.011
01/09/2023	03:45	1.18	16:20	1.51	1.30	02:30	0.32	08:20	0.49	0.40	02:30	0.008	08:25	0.016	0.011	0.011
01/10/2023	01:15	1.20	20:50	1.66	1.31	23:20	0.33	10:15	0.48	0.40	00:20	0.009	10:15	0.016	0.011	0.011
01/11/2023	01:05	1.28	10:40	1.68	1.46	02:05	0.32	10:45	0.49	0.39	02:05	0.008	10:45	0.019	0.013	0.013
01/12/2023	02:20	1.45	18:00	1.82	1.61	01:00	0.35	18:00	0.54	0.42	02:15	0.011	18:00	0.024	0.015	0.015
01/13/2023	04:20	1.52	17:15	1.91	1.70	02:15	0.37	17:15	0.55	0.44	04:35	0.013	17:15	0.026	0.018	0.018
01/14/2023	20:55	1.22	08:20	1.91	1.47	11:55	0.39	12:30	0.59	0.47	23:55	0.010	09:05	0.026	0.015	0.015
01/15/2023	03:00	1.15	08:15	1.71	1.30	01:05	0.36	20:15	0.59	0.45	01:05	0.008	08:15	0.023	0.012	0.012
01/16/2023	00:25	1.14	09:30	1.51	1.26	04:10	0.38	08:35	0.56	0.44	04:10	0.009	09:30	0.019	0.011	0.011
01/17/2023	01:30	1.13	10:15	1.60	1.23	02:15	0.35	10:20	0.59	0.45	02:15	0.008	10:20	0.021	0.011	0.011
01/18/2023	02:35	1.15	12:10	1.32	1.22	02:35	0.33	07:20	0.53	0.43	02:35	0.007	07:20	0.014	0.011	0.011
01/19/2023	02:20	1.15	19:00	1.65	1.24	15:20	0.36	19:05	0.56	0.43	00:35	0.009	19:00	0.020	0.011	0.011
01/20/2023	03:40	1.16	19:45	1.50	1.25	00:40	0.35	19:50	0.55	0.43	01:40	0.008	19:45	0.018	0.011	0.011
01/21/2023	03:20	1.14	07:25	1.67	1.31	15:00	0.35	07:25	0.60	0.46	05:10	0.008	07:25	0.023	0.013	0.013
01/22/2023	21:55	1.15	11:10	1.65	1.28	02:25	0.35	11:15	0.59	0.45	02:25	0.008	11:10	0.022	0.012	0.012
01/23/2023	17:55	1.10	08:45	1.40	1.21	03:20	0.34	08:50	0.57	0.41	03:50	0.008	08:50	0.017	0.010	0.010
01/24/2023	02:50	1.12	19:55	1.32	1.21	01:15	0.36	08:40	0.49	0.41	03:35	0.008	08:40	0.013	0.010	0.010
01/25/2023	00:45	1.14	18:25	1.37	1.22	03:00	0.34	18:20	0.54	0.42	03:00	0.008	18:20	0.016	0.011	0.011
01/26/2023	00:05	1.13	13:55	1.62	1.30	02:40	0.33	18:05	0.65	0.45	02:40	0.007	18:05	0.021	0.012	0.012
01/27/2023	13:10	1.14	08:20	1.64	1.30	05:30	0.32	21:00	0.61	0.44	13:55	0.009	20:55	0.019	0.012	0.012
01/28/2023	01:05	1.12	18:10	2.71	1.58	05:50	0.34	20:15	0.93	0.49	05:50	0.008	18:10	0.052	0.018	0.018
01/29/2023	14:55	1.33	23:55	1.95	1.59	23:00	0.37	08:15	0.79	0.54	22:05	0.012	08:30	0.037	0.020	0.020
01/30/2023	16:00	1.29	00:20	2.02	1.56	05:25	0.28	07:40	0.70	0.47	12:40	0.012	07:40	0.025	0.016	0.016
01/31/2023	18:40	1.23	21:35	1.63	1.41	05:15	0.38	07:50	0.65	0.50	18:05	0.010	21:35	0.023	0.015	0.015
02/01/2023	14:20	1.32	19:45	1.84	1.48	06:00	0.39	20:10	0.81	0.55	08:25	0.012	19:50	0.034	0.018	0.018
02/02/2023	17:30	1.35	07:50	1.93	1.45	01:50	0.38	08:10	0.83	0.62	01:50	0.012	07:50	0.036	0.020	0.020
02/03/2023	08:50	1.30	17:50	1.98	1.46	04:05	0.43	16:30	0.83	0.63	23:55	0.014	17:50	0.029	0.020	0.020
02/04/2023	04:55	1.27	18:15	1.87	1.45	02:35	0.38	18:15	0.87	0.57	02:35	0.010	18:15	0.040	0.018	0.018
02/05/2023	19:15	1.22	08:20	1.77	1.48	02:05	0.43	08:25	0.81	0.53	19:15	0.011	08:25	0.034	0.017	0.017
02/06/2023	01:15	1.24	08:50	1.69	1.35	02:50	0.39	11:55	0.59	0.48	11:20	0.010	08:50	0.021	0.014	0.014
02/07/2023	04:05	1.26	09:20	1.49	1.35	04:40	0.38	09:25	0.59	0.48	04:40	0.010	09:25	0.019	0.014	0.014
02/08/2023	00:25	1.26	11:00	1.52	1.37	02:50	0.35	11:00	0.59	0.48	02:50	0.009	11:00	0.020	0.014	0.014
02/09/2023	15:15	1.30	08:30	1.53	1.41	04:20	0.39	09:10	0.59	0.49	11:05	0.011	09:10	0.020	0.015	0.015
02/10/2023	00:10	1.32	23:55	1.96	1.49	15:40	0.33	07:40	0.64	0.47	15:40	0.011	07:40	0.023	0.015	0.015
02/11/2023	20:05	1.33	00:10	2.10	1.59	03:00	0.34	19:15	0.86	0.58	04:20	0.011	08:50	0.038	0.021	0.021
02/12/2023	22:40	1.36	14:10	1.99	1.60	05:40	0.41	07:45	0.89	0.56	03:05	0.013	07:45	0.039	0.020	0.020
02/13/2023	15:20	1.33	18:25	1.81	1.53	03:05	0.42	08:35	0.73	0.50	03:05	0.012	08:35	0.028	0.017	0.017
02/14/2023	04:40	1.62	07:45	1.80	1.68	04:10	0.38	08:05	0.52	0.44	04:10	0.014	08:05	0.022	0.017	0.008
02/15/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/16/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/17/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/18/2023	20:20	1.43	16:15	1.80	1.60	15:40	0.46	19:45	0.71	0.59	23:35	0.016	19:45	0.030	0.021	0.012
02/19/2023	01:00	1.40	08:10	2.00	1.65	04:00	0.39	18:10	0.97	0.67	04:05	0.012	08:05	0.046	0.026	0.026
02/20/2023	22:05	1.45	07:00	2.04	1.70	23:15	0.39	08:00	1.04	0.61	23:25	0.013	08:00	0.052	0.025	0.025
02/21/2023	23:50	1.43	09:50	2.03	1.63	00:35	0.35	08:25	0.86	0.56	00:35	0.011	15:10	0.040	0.021	0.021
02/22/2023	00:15	1.41	08:05	1.83	1.54	05:15	0.39	08:05	0.59	0.48	01:35	0.012	08:05	0.026	0.017	0.017
02/23/2023	01:45	1.39	17:15	1.85	1.54	00:10	0.35	17:20	0.60	0.47	01:40	0.011	17:20	0.025	0.016	0.016
02/24/2023	01:15	1.43	22:30	1.98	1.61	06:20	0.36	17:45	0.83	0.53	06:20	0.012	19:25	0.037	0.020	0.020
02/25/2023	18:35	1.57	23:45	2.23	1.77	07:30	0.37	18:20	1.21	0.63	09:30	0.014	18:15	0.064	0.027	0.027
02/26/2023	06:50	1.51	00:15	2.28	1.76	07:45	0.43	06:40	1.08	0.64	10:40	0.017	00:00	0.056	0.027	0.027
02/27/2023	10:15	1.61	07:30	2.01	1.82	11:00	0.33	08:45	0.64	0.46	11:00	0.013	15:00	0.031	0.020	0.020
02/28/2023	01:15	1.71	10:15	1.96	1.81	08:55	0.33	13:35	0.63	0.45	08:55	0.015	13:35	0.028	0.019	0.019
03/01/2023	04:10	1.80	13:30	2.32	2.10	20:25	0.28	07:45	0.47	0.35	03:20	0.015	09:15	0.027	0.019	0.019
03/02/2023	23:50	1.55	08:55	2.37	1.89	06:25	0.29	10:50	0.64	0.37	19:45	0.011	10:50	0.028	0.017	0.017

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
03/03/2023	10:55	1.49	19:45	1.93	1.58	01:05	0.29	16:15	0.51	0.35	04:05	0.010	16:20	0.024	0.013	0.013
03/04/2023	00:40	1.48	16:15	1.90	1.57	06:55	0.30	16:15	0.51	0.37	06:55	0.010	16:15	0.024	0.013	0.013
03/05/2023	22:20	1.44	11:40	2.14	1.60	12:25	0.24	09:50	0.50	0.33	22:55	0.009	11:40	0.025	0.012	0.012
03/06/2023	02:15	1.46	09:50	2.39	1.70	01:10	0.24	09:50	1.05	0.43	01:10	0.008	09:50	0.068	0.018	0.018
03/07/2023	10:45	1.51	19:45	1.73	1.63	02:00	0.33	06:05	0.48	0.41	10:40	0.011	19:50	0.019	0.015	0.015
03/08/2023	13:05	1.50	16:35	1.97	1.62	02:30	0.37	07:35	0.57	0.41	21:40	0.013	07:35	0.026	0.015	0.015
03/09/2023	01:00	1.50	20:15	2.11	1.76	01:45	0.38	22:05	0.84	0.52	01:00	0.013	20:20	0.043	0.022	0.022
03/10/2023	12:50	1.67	07:55	2.09	1.87	15:45	0.41	10:45	0.85	0.63	22:20	0.017	10:45	0.044	0.029	0.029
03/11/2023	20:45	1.61	11:35	2.44	1.80	11:10	0.37	15:40	0.70	0.48	23:00	0.016	10:05	0.034	0.021	0.021
03/12/2023	19:40	1.46	19:15	1.83	1.66	06:35	0.41	19:20	0.56	0.47	19:40	0.015	19:15	0.024	0.018	0.018
03/13/2023	03:40	1.60	20:05	1.77	1.66	04:30	0.41	19:25	0.54	0.46	06:55	0.015	20:05	0.023	0.018	0.018
03/14/2023	03:40	1.64	22:05	1.84	1.70	04:45	0.40	22:10	0.57	0.48	04:45	0.016	22:10	0.025	0.019	0.019
03/15/2023	02:10	1.71	12:10	1.99	1.82	01:15	0.46	14:40	0.59	0.52	01:15	0.019	14:40	0.029	0.023	0.023
03/16/2023	13:05	1.67	12:00	1.91	1.76	07:25	0.43	08:30	0.60	0.52	13:05	0.018	08:30	0.028	0.022	0.022
03/17/2023	17:30	1.62	21:25	1.89	1.73	04:55	0.44	21:25	0.62	0.51	04:55	0.017	21:25	0.029	0.021	0.021
03/18/2023	15:45	1.64	19:35	2.02	1.75	17:15	0.41	19:35	0.65	0.52	05:45	0.017	19:35	0.033	0.022	0.022
03/19/2023	05:00	1.63	08:50	1.90	1.71	06:30	0.43	09:20	0.60	0.51	06:30	0.017	08:50	0.028	0.020	0.020
03/20/2023	02:45	1.62	14:50	1.83	1.69	14:05	0.42	09:20	0.57	0.48	14:05	0.016	09:20	0.024	0.019	0.019
03/21/2023	23:55	1.56	18:55	1.90	1.71	13:45	0.36	09:45	0.59	0.48	13:45	0.014	09:45	0.027	0.019	0.019
03/22/2023	00:00	1.56	07:50	1.95	1.70	06:10	0.40	07:50	0.57	0.49	00:55	0.015	07:50	0.028	0.019	0.019
03/23/2023	10:40	1.60	09:05	1.80	1.70	02:45	0.40	09:05	0.58	0.49	02:45	0.015	09:05	0.025	0.019	0.019
03/24/2023	18:25	1.61	19:45	1.94	1.72	15:05	0.40	22:45	0.76	0.50	15:05	0.016	22:45	0.036	0.020	0.020
03/25/2023	19:40	1.58	07:30	2.05	1.76	23:45	0.44	11:25	0.95	0.60	23:45	0.016	11:25	0.041	0.025	0.025
03/26/2023	03:10	1.63	17:10	2.03	1.77	05:10	0.31	11:05	0.89	0.54	05:10	0.013	17:10	0.045	0.023	0.023
03/27/2023	13:40	1.68	13:05	2.28	1.87	04:35	0.34	23:05	0.75	0.54	15:05	0.017	13:10	0.037	0.024	0.024
03/28/2023	20:40	1.64	20:05	2.05	1.80	02:50	0.39	19:25	0.60	0.47	14:50	0.017	20:05	0.028	0.020	0.020
03/29/2023	00:40	1.74	21:00	2.24	1.95	10:25	0.32	09:00	0.59	0.43	10:25	0.016	21:00	0.032	0.021	0.021
03/30/2023	00:00	1.91	21:45	2.50	2.13	04:35	0.36	11:15	0.49	0.41	00:00	0.018	22:00	0.033	0.023	0.023
03/31/2023	12:00	1.75	04:05	2.45	2.00	04:50	0.30	06:35	0.53	0.42	12:15	0.016	06:40	0.029	0.021	0.021
04/01/2023	17:35	1.77	19:45	2.15	1.90	11:55	0.36	17:45	0.57	0.47	11:55	0.016	19:45	0.031	0.022	0.022
04/02/2023	07:30	1.92	12:15	2.43	2.18	23:35	0.37	09:05	0.59	0.48	07:10	0.021	10:35	0.037	0.027	0.027
04/03/2023	17:25	1.83	08:10	2.46	2.08	07:30	0.36	21:50	0.72	0.48	22:45	0.021	21:45	0.039	0.025	0.025
04/04/2023	22:05	1.84	08:15	2.45	2.07	21:30	0.34	00:10	0.55	0.46	21:30	0.016	07:50	0.036	0.024	0.024
04/05/2023	00:15	1.87	09:15	2.20	1.99	05:30	0.36	09:15	0.56	0.44	05:30	0.017	09:15	0.032	0.022	0.022
04/06/2023	02:10	1.85	08:50	2.18	2.00	04:25	0.34	07:55	0.57	0.46	06:05	0.017	21:35	0.032	0.023	0.023
04/07/2023	00:20	1.86	19:15	2.38	2.03	02:00	0.38	22:15	0.70	0.49	02:00	0.017	18:45	0.039	0.025	0.025
04/08/2023	22:20	1.76	19:25	2.08	1.93	04:40	0.44	18:35	0.87	0.61	04:40	0.021	18:35	0.044	0.029	0.029
04/09/2023	00:40	1.85	10:45	2.34	2.05	07:35	0.48	15:55	0.78	0.61	02:00	0.023	11:55	0.048	0.032	0.032
04/10/2023	23:35	1.81	08:55	2.32	2.01	01:45	0.45	20:20	0.83	0.53	14:20	0.021	20:20	0.042	0.027	0.027
04/11/2023	00:00	1.82	11:50	2.14	1.92	12:00	0.52	21:30	0.88	0.65	12:05	0.024	21:30	0.047	0.031	0.031
04/12/2023	23:20	1.76	00:30	2.18	1.95	02:00	0.54	19:35	0.84	0.67	23:15	0.025	07:25	0.039	0.032	0.032
04/13/2023	00:10	1.77	18:20	1.99	1.84	02:35	0.53	13:10	0.79	0.65	02:35	0.023	18:30	0.038	0.029	0.029
04/14/2023	18:10	1.75	17:40	1.96	1.83	13:05	0.56	17:45	0.85	0.67	13:05	0.024	17:45	0.041	0.030	0.030
04/15/2023	09:35	1.76	18:20	1.99	1.85	19:00	0.49	14:45	0.82	0.67	19:00	0.021	08:25	0.038	0.030	0.030
04/16/2023	15:40	1.65	09:40	1.98	1.81	23:35	0.57	08:45	0.87	0.67	15:40	0.023	09:45	0.043	0.029	0.029
04/17/2023	12:50	1.69	16:05	1.83	1.75	12:35	0.48	00:00	0.66	0.59	12:35	0.019	07:30	0.028	0.024	0.024
04/18/2023	10:45	1.64	09:50	1.95	1.72	16:55	0.51	09:40	0.68	0.58	10:25	0.020	09:40	0.029	0.023	0.023
04/19/2023	16:05	1.63	21:55	1.80	1.69	04:05	0.47	19:45	0.68	0.56	04:05	0.018	19:45	0.029	0.022	0.022
04/20/2023	23:25	1.63	07:10	1.83	1.71	19:35	0.47	07:10	0.66	0.55	23:30	0.018	07:10	0.029	0.022	0.022
04/21/2023	00:30	1.64	20:40	1.84	1.70	05:05	0.49	20:20	0.68	0.57	05:05	0.019	23:30	0.030	0.023	0.023
04/22/2023	00:20	1.67	21:20	2.03	1.76	06:55	0.49	21:25	0.95	0.66	06:55	0.020	21:25	0.048	0.028	0.028
04/23/2023	10:05	1.75	11:45	2.08	1.87	03:30	0.62	09:45	0.98	0.75	01:20	0.027	09:45	0.050	0.034	0.034
04/24/2023	11:25	1.80	15:05	1.98	1.90	06:15	0.59	16:00	0.86	0.71	06:15	0.028	16:00	0.042	0.033	0.033
04/25/2023	10:15	1.79	20:40	2.04	1.91	10:50	0.62	16:25	0.96	0.74	10:50	0.028	16:25	0.045	0.035	0.035
04/26/2023	09:45	1.94	20:20	2.08	2.01	08:45	0.64	08:55	0.87	0.74	04:15	0.032	08:55	0.046	0.037	0.037
04/27/2023	01:30	1.94	08:45	2.23	2.03	01:20	0.62	08:05	0.88	0.73	01:20	0.030	08:05	0.045	0.038	0.038
04/28/2023	11:05	1.89	20:30	2.21	2.04	06:50	0.64	21:15	0.95	0.77	06:50	0.033	21:15	0.051	0.040	0.040
04/29/2023	11:20	1.95	22:15	2.22	2.04	05:15	0.67	10:40	0.97	0.82	05:15	0.034	22:20	0.056	0.042	0.042
04/30/2023	11:50	1.85	01:30	2.12	1.99	03:30	0.72	08:55	1.00	0.86	12:05	0.035	18:55	0.051	0.043	0.043
05/01/2023	12:15	1.85	08:40	2.03	1.95	07:15	0.73	09:05	0.97	0.87	12:15	0.035	09:05	0.049	0.042	0.042
05/02/2023	23:55	1.77	09:55	2.04	1.91	21:25	0.72	09:45	0.97	0.82	23:55	0.030	10:10	0.050	0.039	0.039
05/03/2023	00:30	1.75	08:55	1.91	1.82	11:05	0.62	02:35	0.84	0.73	11:05	0.027	06:40	0.039	0.032	0.032
05/04/2023	23:20	1.72	16:40	1.90	1.79	04:20	0.59	18:00	0.85	0.71	04:20	0.025	18:00	0.038	0.030	0.030
05/05/2023	13:40	1.71	14:10	1.85	1.77	04:15	0.60	14:10	0.88	0.70	03:45	0.025	14:10	0.039	0.029	0.029
05/06/2023	23:30	1.62	12:50	1.87	1.73	22:15	0.52	09:05	0.81	0.67	22:15	0.019	08:05	0.034	0.027	0.027
05/07/2023	02:40	1.60	16:15	1.69	1.64	08:20	0.34	12:25	0.68	0.49	04:35	0.013	12:25	0.026	0.018	0.018
05/08/2023	08:40	1.59	07:50	1.71	1.63	03:45	0.31	07:55	0.63	0.52	03:45	0.011	07:55	0.025	0.019	0.019
05/09/2023	01:25	1.56	10:40	1.66	1.61	04:40	0.50	17:00	0.65	0.57	04:50	0.018	17:00	0.025	0.021	0.021
05/10/2023	10:20	1.56	13:55	1.67	1.61	02:30	0.51	22:15	0.67	0.57	10:20	0.019	22:15	0.026	0.021	0.021
05/11/2023	09:05	1.54	13:40	1.69	1.61	04:05	0.49	08:10	0.68	0.59	04:05	0.018	22:15	0.026	0.022	0.022
05/12/2023	16:55	1.57	21:35	1.83	1.64	05:50	0.54	08:00	0.72	0.64	05:50	0.020	21:50	0.030	0.024	0.024
05/13/2023	09:25	1.61	23:30	1.80	1.69	11:55	0.59	03:25	0.75	0.68	01:15	0.023	15:30	0.031	0.027	0.027
05/14/2023	02:40	1.70	16:05	1.95	1.78	10:50	0.62	14:45	0.78	0.72	10:45	0.026	21:20	0.035	0.030	0.030
05/15/2023	16:55	1.69	08:40	1.87	1.79	04:45	0.66	20:45	0.82	0.76	04:45	0.028	01:30	0.036	0.033	0.033
05/16/2023	11:40	1.68	20:00	1.86	1.76	11:45	0.66	19:15	0.85	0.77	11:45	0.026	19:15	0.037	0.032	0.032

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
05/17/2023	13:40	1.66	19:45	1.99	1.76	11:25	0.66	21:40	0.86	0.77	11:25	0.027	19:45	0.040	0.032	0.032
05/18/2023	08:15	1.65	09:00	1.91	1.74	09:25	0.66	22:35	0.85	0.77	09:25	0.027	22:35	0.036	0.032	0.032
05/19/2023	12:20	1.63	23:50	1.89	1.74	08:25	0.70	02:00	0.83	0.77	11:55	0.027	23:50	0.037	0.032	0.032
05/20/2023	12:10	1.61	23:20	1.92	1.74	08:45	0.71	19:00	0.86	0.79	12:35	0.028	23:20	0.039	0.032	0.032
05/21/2023	10:05	1.63	21:00	1.88	1.76	08:25	0.73	21:00	0.87	0.79	10:05	0.028	21:00	0.040	0.033	0.033
05/22/2023	11:30	1.66	19:35	2.01	1.75	12:50	0.72	19:25	0.92	0.80	12:50	0.028	19:35	0.044	0.033	0.033
05/23/2023	13:00	1.63	09:55	1.84	1.72	15:20	0.72	03:05	0.87	0.80	13:35	0.028	09:30	0.038	0.032	0.032
05/24/2023	13:00	1.61	16:50	1.98	1.70	08:05	0.72	07:25	0.87	0.79	13:05	0.027	09:50	0.041	0.032	0.032
05/25/2023	10:25	1.55	20:35	1.82	1.69	04:35	0.71	14:35	0.87	0.79	10:20	0.025	20:40	0.036	0.031	0.031
05/26/2023	12:00	1.57	14:20	1.90	1.67	10:50	0.70	07:20	0.87	0.77	10:50	0.026	21:00	0.036	0.030	0.030
05/27/2023	12:40	1.58	16:25	2.06	1.69	06:45	0.70	17:25	0.91	0.78	11:00	0.026	16:25	0.043	0.031	0.031
05/28/2023	13:15	1.53	16:55	1.88	1.66	04:30	0.72	10:00	0.90	0.80	13:50	0.026	09:20	0.039	0.030	0.030
05/29/2023	17:25	1.51	11:45	1.91	1.62	04:40	0.71	11:00	0.89	0.80	04:40	0.025	11:45	0.041	0.030	0.030
05/30/2023	09:30	1.55	10:30	1.94	1.62	00:30	0.74	20:00	0.86	0.80	11:55	0.027	10:30	0.041	0.029	0.029
05/31/2023	01:00	1.56	18:50	2.13	1.82	10:20	0.74	22:35	0.87	0.80	00:30	0.027	19:00	0.047	0.035	0.035
06/01/2023	10:30	1.78	09:20	2.02	1.89	08:15	0.75	23:15	0.88	0.82	11:00	0.032	17:45	0.044	0.038	0.038
06/02/2023	21:15	1.66	18:10	2.13	1.82	04:55	0.75	18:10	0.94	0.83	21:05	0.032	18:10	0.052	0.036	0.036
06/03/2023	06:30	1.62	20:25	2.11	1.75	02:55	0.76	17:25	0.96	0.85	02:55	0.029	17:25	0.050	0.035	0.035
06/04/2023	20:50	1.66	11:25	2.05	1.76	15:45	0.80	11:35	0.97	0.87	06:25	0.032	11:30	0.050	0.037	0.037
06/05/2023	03:15	1.58	20:35	2.18	1.73	11:50	0.78	22:40	0.95	0.86	04:45	0.029	20:35	0.052	0.035	0.035
06/06/2023	12:15	1.73	20:55	2.17	1.87	09:05	0.82	22:55	0.99	0.90	05:00	0.035	22:55	0.055	0.041	0.041
06/07/2023	16:55	1.72	08:00	2.18	1.83	20:30	0.81	07:50	0.99	0.89	23:30	0.034	07:55	0.053	0.040	0.040
06/08/2023	19:00	1.60	14:50	2.00	1.75	12:20	0.80	14:45	0.95	0.87	19:00	0.031	14:45	0.047	0.036	0.036
06/09/2023	00:20	1.55	21:20	2.06	1.71	03:30	0.81	21:40	0.95	0.87	03:30	0.029	21:20	0.048	0.035	0.035
06/10/2023	14:10	1.55	20:20	2.12	1.75	11:20	0.77	20:25	0.98	0.88	14:00	0.028	20:25	0.052	0.036	0.036
06/11/2023	04:35	1.62	21:40	2.30	1.82	10:15	0.80	23:20	1.40	0.93	04:10	0.031	22:25	0.080	0.041	0.041
06/12/2023	23:20	1.80	10:15	2.23	1.99	23:50	0.97	10:10	1.38	1.15	23:50	0.042	10:15	0.081	0.058	0.058
06/13/2023	11:25	1.74	20:30	2.19	1.90	14:25	0.87	21:15	1.23	1.05	05:00	0.037	21:15	0.067	0.049	0.049
06/14/2023	03:40	1.78	22:25	2.37	2.02	04:35	0.90	21:45	1.24	1.07	04:35	0.039	22:45	0.075	0.054	0.054
06/15/2023	05:10	1.86	09:50	2.34	2.03	12:45	0.90	21:05	1.23	1.06	14:45	0.043	21:10	0.072	0.055	0.055
06/16/2023	13:35	1.77	19:35	2.24	1.98	11:55	0.89	21:50	1.18	1.04	13:35	0.039	21:50	0.065	0.052	0.052
06/17/2023	12:10	1.72	10:20	2.20	1.88	06:45	0.91	21:35	1.24	1.05	12:55	0.037	21:30	0.066	0.049	0.049
06/18/2023	15:25	1.71	10:10	2.27	1.94	04:30	0.90	10:45	1.17	1.05	15:00	0.039	10:45	0.064	0.050	0.050
06/19/2023	15:00	1.68	09:50	2.09	1.82	23:55	0.85	10:35	1.14	0.99	23:55	0.034	09:50	0.060	0.043	0.043
06/20/2023	19:20	1.53	19:40	2.08	1.70	17:20	0.77	08:30	1.10	0.91	17:20	0.028	19:40	0.051	0.036	0.036
06/21/2023	19:55	1.44	09:40	2.17	1.60	03:40	0.76	08:15	1.13	0.89	23:55	0.026	08:15	0.054	0.032	0.032
06/22/2023	00:50	1.48	08:35	1.81	1.60	02:10	0.73	09:40	1.06	0.89	02:20	0.025	09:40	0.045	0.032	0.032

12/22/2022 00:00 - 06/22/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)
Total			4.345
Average	1.66	0.61	0.024

SS_02

Site Commentary

SITE INFORMATION

Pipe	Round (8 in H)
Silt	0.00 (in)

OBSERVATIONS

Surcharge conditions were not experienced. Review of the scattergraph shows that free-flow conditions were experienced during the study. Backwater conditions were frequently observed. This site was influenced by pump station activity.

Average flow depth, velocity, and quantity data observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.90	1.26	0.062
Minimum	1.23	0.26	0.008
Maximum	5.53	2.89	0.290
Min Time	12/22/2022 6:00:00 AM	02/22/2023 1:00:00 AM	02/22/2023 1:00:00 AM
Max Time	06/14/2023 4:00:00 PM	12/31/2022 12:00:00 PM	12/30/2022 6:00:00 PM

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

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023** is provided in the following table. This site experienced downtime from **22 March 2023 to 12 April 2023** due to battery failure.

Percent Uptime	
DFINAL (in)	88.16
VFINAL (ft/s)	88.149
QFINAL (MGD - Total MG)	88.149

SodaSprings.FW.TFM.CA22

Flow Monitoring Site Report

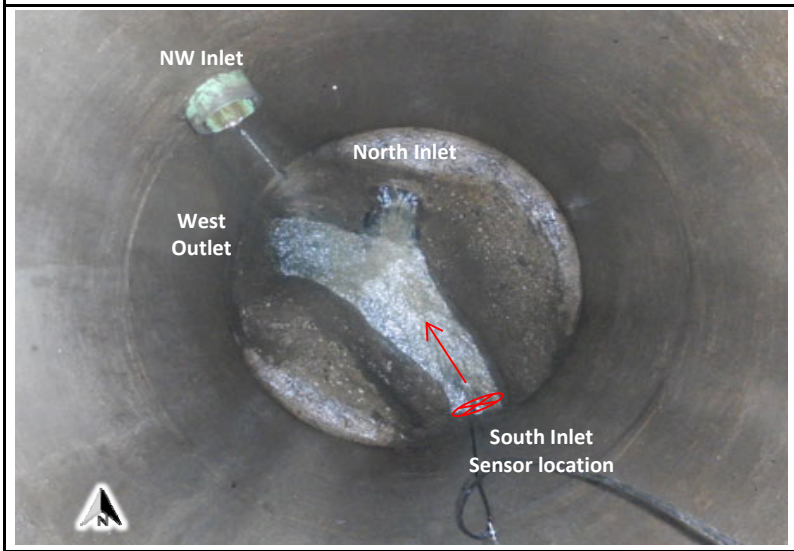
ADS ENVIRONMENTAL SERVICES®

Site Name

SS_02

Site Address /Location:	5415 Hemlock Dr Soda Springs, CA 95728			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Drive, Site in Road	Latitude:	39.302052	Pipe Size (H x W)	Pipe Shape
		Longitude:	-120.383654	8.00"x8.00"	Circular

Manhole #	System Characteristics
	Residential
Access	Traffic
Drive	Light



ADS Project Name:	SodaSprings.FW.TFM.CA22
ADS Project Number:	22874

Installation Information

Installation Date:	Installation Type:
Wednesday, December 21, 2022	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 5-10 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
12:20:00 PM	8.00"x8.00"
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
0.25	N/A
Downlooker Physical Offset (in)	Measurement Confidence (in)
N/A	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
depth too low to get reading at time of install	-
Silt (in)	Silt Type
-	None

Hydraulic Comments:
low depth, slow velocity, small waves

Manhole / Pipe Information:

Manhole Depth (Approx. Ft):	Manhole Configuration
13ft	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in.)	Manhole Diameter (Approx. in):
30"	54"
Manhole Cover	Manhole Frame
Unbolted	Normal
Active Drop Connections	Air Quality:
Yes, Outside	Good
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

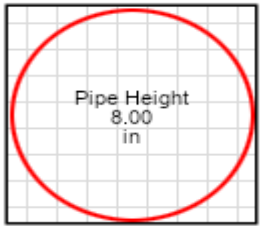
Additional Site Info. / Comments:

Hydrograph Report

SS_02

Flow Monitor

SS_02

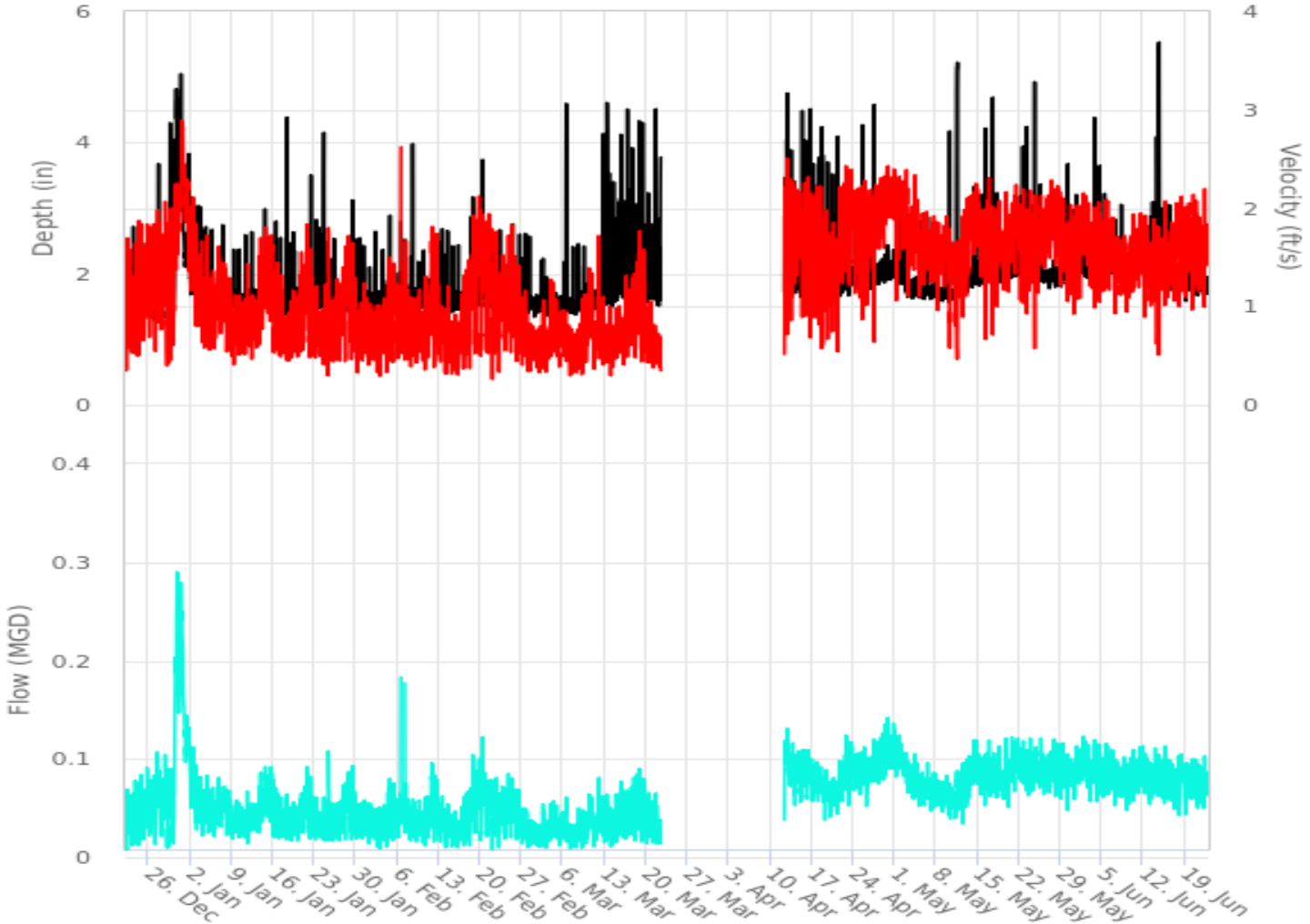


Report Period

12/22/2022
To
06/22/2023

Legend

DFINAL
QFINAL
VFINAL



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Hayward, CA 94545

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Scattergraph Report

SS_02

Flow Monitor

SS_02

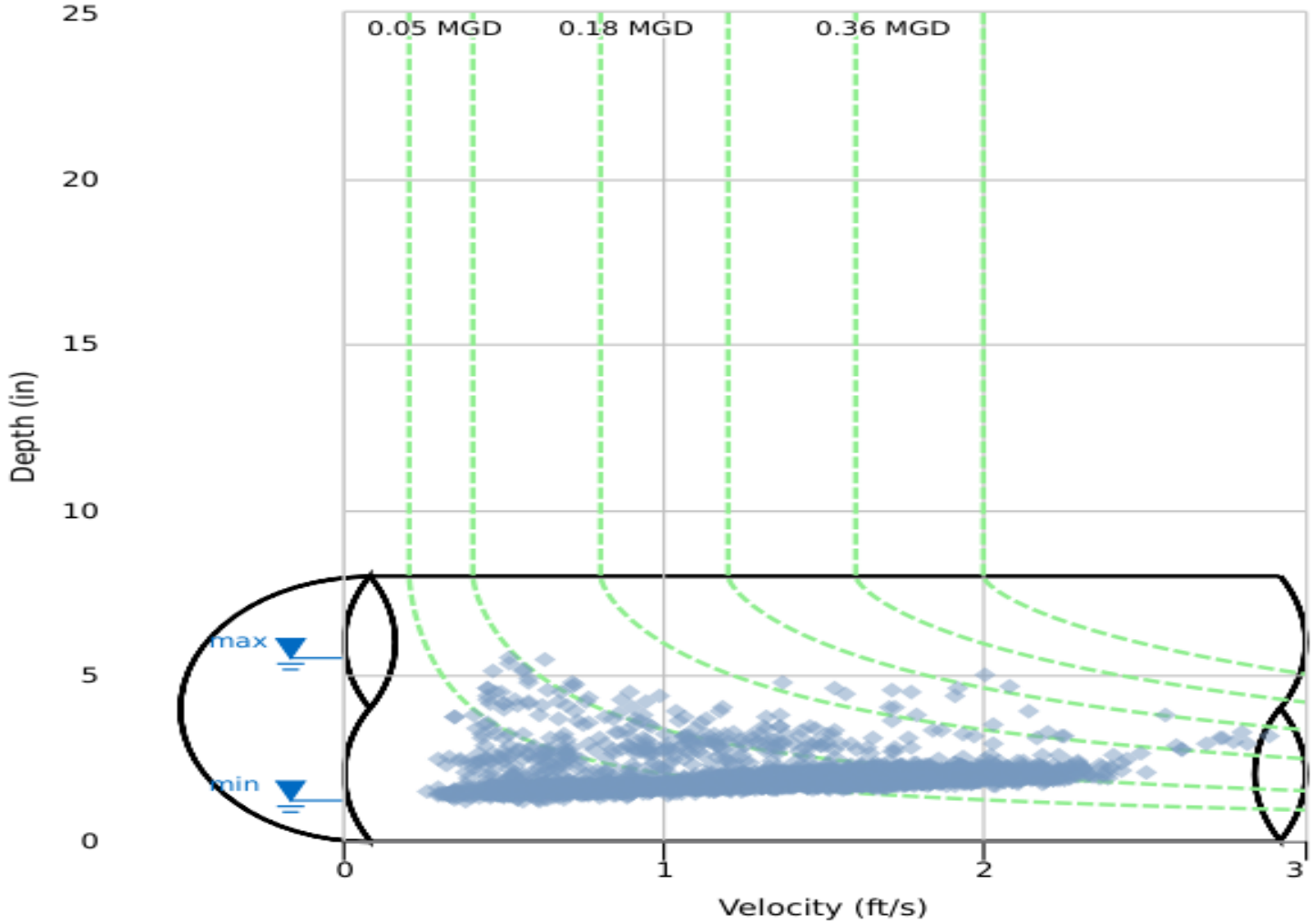
Pipe Height
8.00
in

Report Period

12/22/2022
To
06/22/2023

Legend

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



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Hayward, CA 94545

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Daily Tabular Report

12/22/2022 00:00 - 06/22/2023 23:59
SS_02Pipe: Round (8 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
12/22/2022	01:05	1.19	08:05	3.76	1.58	21:15	0.20	19:25	2.70	1.00	21:15	0.005	19:25	0.191	0.039	0.039
12/23/2022	07:05	1.08	09:40	4.04	1.62	14:40	0.28	08:15	2.76	1.02	14:50	0.006	19:05	0.207	0.041	0.041
12/24/2022	03:00	1.18	15:40	3.80	1.61	02:25	0.25	11:20	2.73	1.17	02:20	0.007	20:20	0.196	0.046	0.046
12/25/2022	03:25	1.17	14:55	4.48	1.65	15:15	0.28	17:25	2.73	1.20	19:20	0.008	20:15	0.191	0.049	0.049
12/26/2022	06:05	1.17	10:05	2.86	1.64	10:00	0.34	13:40	2.78	1.37	10:00	0.009	10:05	0.200	0.054	0.054
12/27/2022	01:40	1.17	14:45	4.96	1.97	07:55	0.23	17:25	2.79	1.41	07:55	0.006	10:15	0.208	0.068	0.068
12/28/2022	07:20	1.21	07:00	4.09	1.69	13:55	0.22	20:25	2.83	1.30	13:55	0.005	20:05	0.219	0.055	0.055
12/29/2022	04:30	1.17	15:25	5.04	1.93	11:15	0.12	21:10	2.82	1.18	11:15	0.003	13:55	0.224	0.055	0.055
12/30/2022	02:40	1.20	15:15	6.10	3.07	08:15	0.32	13:25	2.86	1.54	08:15	0.008	18:00	0.434	0.144	0.144
12/31/2022	23:45	1.79	10:40	6.49	3.23	22:10	0.49	13:20	3.15	2.33	22:10	0.024	14:10	0.344	0.199	0.199
01/01/2023	23:30	1.28	18:20	5.47	2.34	23:55	0.38	10:50	2.94	2.04	23:55	0.009	10:50	0.242	0.120	0.120
01/02/2023	01:05	1.26	09:50	5.74	2.00	17:50	0.16	10:40	2.85	1.53	17:50	0.006	09:50	0.248	0.078	0.078
01/03/2023	23:30	1.23	16:30	5.22	1.85	10:35	0.20	17:25	2.78	1.17	17:20	0.005	16:55	0.236	0.055	0.055
01/04/2023	21:30	1.23	09:10	5.06	1.75	09:00	0.24	23:20	2.81	1.05	11:45	0.006	09:10	0.221	0.049	0.049
01/05/2023	22:50	1.22	07:25	4.07	1.71	19:05	0.24	01:55	2.74	0.97	23:25	0.006	16:30	0.213	0.045	0.045
01/06/2023	06:00	1.20	18:50	2.88	1.66	02:25	0.26	18:50	2.81	1.04	05:55	0.006	18:50	0.205	0.049	0.049
01/07/2023	00:35	1.23	11:15	4.76	1.71	02:30	0.25	22:25	2.80	1.13	04:55	0.006	11:15	0.224	0.052	0.052
01/08/2023	04:05	1.23	13:25	3.00	1.60	10:30	0.21	13:25	2.77	0.93	20:15	0.005	13:25	0.214	0.042	0.042
01/09/2023	10:00	1.21	08:20	4.43	1.62	06:40	0.18	16:35	2.71	0.76	06:40	0.004	16:35	0.195	0.035	0.035
01/10/2023	14:35	1.22	07:45	3.60	1.62	07:10	0.25	09:10	2.71	0.83	07:10	0.006	08:00	0.206	0.039	0.039
01/11/2023	16:25	1.17	07:05	3.75	1.61	05:25	0.24	09:20	2.72	0.83	05:25	0.005	09:20	0.203	0.038	0.038
01/12/2023	01:35	1.22	09:10	4.70	1.67	21:40	0.16	22:45	2.72	0.86	21:40	0.004	22:45	0.203	0.041	0.041
01/13/2023	02:20	1.22	21:00	3.03	1.65	09:55	0.20	20:10	2.77	1.00	09:55	0.005	21:00	0.215	0.047	0.047
01/14/2023	23:30	1.24	15:25	4.97	1.82	08:55	0.27	15:45	2.75	1.28	12:20	0.007	06:50	0.209	0.062	0.062
01/15/2023	01:10	1.21	19:00	2.99	1.75	16:25	0.28	19:00	2.79	1.22	23:10	0.007	19:00	0.215	0.058	0.058
01/16/2023	06:15	1.21	12:45	4.08	1.66	10:55	0.20	17:40	2.72	0.96	22:35	0.006	12:45	0.237	0.043	0.043
01/17/2023	11:25	1.22	07:30	3.85	1.60	22:55	0.22	08:05	2.74	0.85	22:55	0.005	08:05	0.201	0.037	0.037
01/18/2023	05:15	1.21	09:10	5.15	1.79	15:45	0.21	03:40	2.64	0.68	15:45	0.005	07:45	0.190	0.033	0.033
01/19/2023	05:00	1.22	14:55	3.77	1.66	01:50	0.22	08:20	2.67	0.79	17:20	0.005	18:00	0.194	0.035	0.035
01/20/2023	01:35	1.21	00:50	2.91	1.60	01:30	0.21	20:45	2.69	0.89	01:30	0.005	00:50	0.198	0.039	0.039
01/21/2023	23:35	1.21	08:35	2.95	1.70	05:50	0.20	16:30	2.71	1.10	07:20	0.005	08:35	0.202	0.051	0.051
01/22/2023	16:35	1.22	09:20	5.12	1.72	04:05	0.18	08:05	2.72	1.01	04:05	0.004	08:05	0.201	0.046	0.046
01/23/2023	01:25	1.22	16:35	4.84	1.72	00:55	0.18	19:45	2.70	0.80	04:10	0.004	20:25	0.200	0.037	0.037
01/24/2023	16:05	1.22	14:05	5.07	1.81	01:55	0.15	22:40	2.68	0.72	04:35	0.004	14:50	0.200	0.034	0.034
01/25/2023	07:40	1.20	14:05	4.39	1.71	16:05	0.15	08:25	2.72	0.82	23:10	0.004	08:25	0.215	0.040	0.040
01/26/2023	06:55	1.21	07:55	3.92	1.60	04:25	0.17	19:00	2.70	0.77	06:55	0.004	07:55	0.240	0.034	0.034
01/27/2023	21:15	1.21	12:05	3.02	1.62	02:05	0.16	17:55	2.70	0.89	01:20	0.004	12:05	0.209	0.040	0.040
01/28/2023	04:00	1.21	16:25	3.21	1.70	03:55	0.16	16:25	2.78	1.19	03:55	0.003	16:25	0.235	0.056	0.056
01/29/2023	06:45	1.21	10:25	5.28	1.72	18:50	0.14	00:45	2.72	1.04	18:50	0.003	10:25	0.231	0.050	0.050
01/30/2023	16:35	1.21	15:35	4.52	1.68	02:20	0.14	18:35	2.67	0.72	05:30	0.003	08:00	0.200	0.035	0.035
01/31/2023	02:15	1.13	06:50	4.61	1.64	16:20	0.13	11:10	2.67	0.79	19:50	0.003	09:40	0.198	0.038	0.038
02/01/2023	13:50	1.21	07:50	4.86	1.62	01:40	0.12	09:30	2.63	0.69	01:40	0.003	07:50	0.204	0.033	0.033
02/02/2023	02:10	1.22	07:25	3.73	1.61	19:30	0.10	23:25	2.67	0.73	19:30	0.002	08:25	0.196	0.033	0.033
02/03/2023	16:55	1.21	13:55	4.75	1.66	02:45	0.11	16:05	2.67	0.77	02:45	0.003	13:55	0.207	0.036	0.036
02/04/2023	16:05	1.21	18:10	4.99	1.72	01:30	0.15	14:25	2.68	0.92	03:25	0.004	18:55	0.207	0.045	0.045
02/05/2023	03:45	1.21	09:00	2.91	1.67	03:05	0.15	09:00	2.70	0.96	03:45	0.003	09:00	0.200	0.046	0.046
02/06/2023	02:25	1.19	13:30	4.24	1.72	06:30	0.15	10:25	2.63	0.74	06:30	0.003	13:30	0.193	0.037	0.022
02/07/2023	16:55	1.22	06:55	4.26	1.71	09:15	0.12	11:00	2.64	0.88	09:20	0.003	11:00	0.200	0.041	0.030
02/08/2023	17:50	1.20	15:05	4.67	1.89	07:45	0.10	16:50	2.65	0.72	07:45	0.002	21:50	0.197	0.036	0.036
02/09/2023	12:30	1.23	14:00	4.45	1.71	04:35	0.12	00:55	2.66	0.79	04:35	0.003	17:05	0.204	0.037	0.037
02/10/2023	08:05	1.21	10:10	4.18	1.69	06:50	0.13	19:30	2.68	0.76	07:05	0.003	19:30	0.199	0.036	0.036
02/11/2023	01:20	1.21	21:25	3.01	1.74	01:20	0.10	19:15	2.71	1.11	01:20	0.002	21:25	0.210	0.054	0.054
02/12/2023	01:15	1.20	09:35	2.97	1.68	05:10	0.10	09:35	2.70	1.05	05:10	0.002	09:35	0.206	0.048	0.048
02/13/2023	21:15	1.21	14:40	3.82	1.72	01:40	0.13	12:25	2.67	0.78	01:40	0.003	14:40	0.231	0.037	0.037
02/14/2023	04:50	1.20	06:45	4.25	1.66	07:55	0.14	12:35	2.66	0.66	07:55	0.003	11:25	0.215	0.030	0.030
02/15/2023	17:25	1.21	07:40	4.49	1.62	06:40	0.12	18:00	2.69	0.56	06:40	0.003	12:15	0.187	0.024	0.024
02/16/2023	03:20	1.20	07:05	3.71	1.62	15:15	0.12	16:30	2.80	0.63	17:20	0.000	14:10	0.187	0.026	0.026
02/17/2023	07:15	1.20	22:00	2.94	1.66	02:10	0.13	22:00	2.85	0.95	11:30	0.000	22:00	0.214	0.041	0.041
02/18/2023	03:35	1.21	17:00	5.55	1.83	05:55	0.12	17:35	2.85	1.21	04:40	0.000	17:00	0.246	0.055	0.055
02/19/2023	00:45	1.22	12:30	2.76	1.76	02:00	0.14	20:15	2.84	1.41	02:00	0.004	12:30	0.195	0.064	0.064
02/20/2023	12:45	1.21	09:20	5.36	1.85	04:55	0.11	20:35	2.83	1.31	06:50	0.003	09:35	0.249	0.061	0.061
02/21/2023	04:30	1.23	13:30	4.60	1.74	02:20	0.11	11:10	2.83	1.17	21:55	0.000	19:15	0.193	0.050	0.050
02/22/2023	14:15	1.22	13:35	4.16	1.73	02:45	0.14	07:50	2.79	1.06	05:45	0.003	16:30	0.182	0.046	0.046
02/23/2023	01:30	1.21	07:10	3.72	1.66	02:10	0.12	07:35	2.82	1.04	02:15	0.003	17:55	0.192	0.044	0.044
02/24/2023	01:05	1.23	11:30	2.74	1.65	04:05	0.14	18:10	2.85	1.05	03:15	0.004	18:10	0.195	0.046	0.046
02/25/2023	01:10	1.19	12:20	4.00	1.67	04:00	0.09	07:50	2.82	1.07	04:00	0.002	09:00	0.189	0.046	0.046
02/26/2023	11:05	1.21	16:20	3.77	1.61	03:15	0.07	06:25	2.83	0.82	03:15	0.002	09:10	0.187	0.036	0.036
02/27/2023	21:20	1.19	14:20	4.32	1.61	20:10	0.10	18:20	2.79	0.67	10:15	0.002	18:20	0.175	0.028	0.028
02/28/2023	21:30	1.20	07:35	3.67	1.59	09:35	0.10	08:55	2.80	0.61	09:35	0.002	08:55	0.179	0.026	0.026
03/01/2023	19:25	1.20	07:25	2.50	1.52	04:35	0.13	08:55	2.75	0.60	16:15	0.003	07:25	0.164	0.024	0.024
03/02/2023	06:05	1.22	14:05	4.20	1.64	00:15	0.13	15:20	2.81	0.66	18:25	0.003	15:20	0.184	0.029	0.029

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
03/03/2023	23:25	1.04	04:25	6.47	1.56	06:55	0.07	23:00	2.80	0.67	06:55	0.002	23:00	0.187	0.028	0.028
03/04/2023	04:10	1.21	09:05	2.79	1.58	00:40	0.08	09:05	2.83	0.79	12:10	0.000	09:05	0.198	0.034	0.034
03/05/2023	22:25	1.18	10:05	2.65	1.53	06:35	0.07	15:55	2.79	0.69	06:35	0.002	10:05	0.181	0.029	0.029
03/06/2023	04:10	1.18	12:35	5.26	1.85	14:20	0.07	09:40	2.77	0.62	14:20	0.002	09:40	0.181	0.030	0.030
03/07/2023	02:30	1.22	15:20	3.63	1.54	10:50	0.14	16:25	2.79	0.52	06:50	0.000	16:25	0.176	0.021	0.021
03/08/2023	16:05	1.11	15:35	7.06	1.59	04:20	0.06	02:45	2.76	0.59	04:20	0.001	15:35	0.295	0.026	0.026
03/09/2023	05:55	1.21	12:15	3.63	1.62	11:10	0.06	15:25	2.81	0.66	11:10	0.001	08:45	0.181	0.028	0.028
03/10/2023	10:55	1.21	20:35	2.80	1.67	03:40	0.11	09:55	2.84	0.87	03:40	0.003	20:35	0.197	0.038	0.038
03/11/2023	16:05	1.20	00:30	2.80	1.66	02:35	0.17	18:55	2.80	0.80	02:35	0.004	00:30	0.196	0.035	0.035
03/12/2023	04:10	1.23	19:30	4.94	1.93	14:50	0.16	03:30	2.80	0.71	10:25	0.004	13:45	0.205	0.035	0.035
03/13/2023	16:05	1.23	09:40	5.48	2.36	04:50	0.16	19:10	2.79	0.58	04:50	0.004	02:50	0.190	0.035	0.035
03/14/2023	14:40	1.23	18:15	4.91	1.86	07:00	0.15	16:00	2.72	0.60	07:00	0.003	12:15	0.206	0.028	0.028
03/15/2023	05:50	1.19	18:55	5.72	2.19	19:30	0.12	00:25	2.71	0.72	05:30	0.005	15:55	0.234	0.040	0.040
03/16/2023	19:15	1.23	12:00	5.18	2.16	06:30	0.18	21:35	2.73	0.74	14:10	0.007	12:00	0.213	0.041	0.041
03/17/2023	04:50	1.23	16:30	5.19	2.07	13:15	0.17	22:05	2.75	0.80	13:15	0.004	22:50	0.239	0.042	0.042
03/18/2023	02:00	1.21	20:20	5.65	2.14	16:10	0.23	21:40	2.77	0.97	05:00	0.007	20:40	0.228	0.053	0.053
03/19/2023	06:40	1.25	12:00	5.41	1.97	12:20	0.24	13:35	2.80	0.94	05:10	0.006	13:35	0.196	0.048	0.048
03/20/2023	11:50	1.27	17:35	4.89	1.98	21:15	0.18	01:55	2.69	0.74	06:45	0.006	08:25	0.205	0.037	0.037
03/21/2023	18:15	1.22	16:25	5.34	2.02	10:20	0.18	11:00	2.64	0.59	06:15	0.000	15:55	0.183	0.031	0.031
03/22/2023	00:50	1.22	06:10	4.39	1.74	06:25	0.14	04:25	2.61	0.54	06:25	0.005	06:10	0.183	0.023	0.010
03/23/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/24/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/25/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/26/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/27/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/28/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/29/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/30/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/31/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/01/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/02/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/03/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/04/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/05/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/06/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/07/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/08/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/09/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/10/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/11/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/12/2023	09:50	1.06	21:35	5.77	2.73	11:40	0.33	16:05	3.04	1.78	09:55	0.010	12:05	0.286	0.105	0.064
04/13/2023	07:45	1.37	19:00	5.57	2.31	10:00	0.33	02:50	3.04	1.86	07:15	0.027	19:25	0.250	0.092	0.092
04/14/2023	11:05	1.34	17:50	5.52	2.08	18:05	0.34	00:30	3.03	1.75	12:00	0.012	09:25	0.312	0.083	0.083
04/15/2023	06:40	1.34	20:55	5.80	2.18	15:15	0.33	22:00	3.02	1.71	04:50	0.013	15:20	0.236	0.083	0.083
04/16/2023	07:40	1.36	18:40	5.45	2.08	12:40	0.37	12:20	2.98	1.78	04:55	0.010	19:00	0.220	0.084	0.084
04/17/2023	17:15	1.35	07:20	5.19	2.03	12:20	0.29	10:05	2.98	1.69	06:50	0.012	17:40	0.211	0.078	0.078
04/18/2023	01:00	1.29	07:30	5.11	2.06	20:05	0.34	13:05	2.96	1.55	06:05	0.010	09:55	0.204	0.074	0.074
04/19/2023	00:10	1.32	16:45	5.22	1.88	16:35	0.35	17:10	2.95	1.47	20:45	0.010	16:45	0.225	0.066	0.066
04/20/2023	10:30	1.28	11:30	5.06	1.90	06:55	0.30	13:55	2.93	1.37	18:50	0.010	06:40	0.244	0.063	0.063
04/21/2023	08:00	1.30	09:10	4.96	1.84	09:30	0.37	22:00	3.00	1.56	04:40	0.010	22:00	0.216	0.069	0.069
04/22/2023	11:05	1.31	09:05	4.95	1.96	08:35	0.29	20:10	3.03	1.84	05:35	0.011	23:40	0.226	0.086	0.086
04/23/2023	07:55	1.31	09:45	5.27	2.02	10:00	0.38	20:10	3.03	1.98	06:45	0.010	10:05	0.224	0.094	0.094
04/24/2023	13:15	1.34	14:10	4.71	2.05	06:45	0.36	10:00	3.04	1.80	01:45	0.010	14:10	0.228	0.088	0.088
04/25/2023	01:25	1.33	13:25	5.09	2.05	06:45	0.35	07:20	3.06	1.81	05:35	0.011	17:55	0.221	0.089	0.089
04/26/2023	00:15	1.33	06:55	4.47	1.99	13:25	0.35	10:30	3.05	1.77	05:35	0.011	13:30	0.232	0.084	0.084
04/27/2023	03:55	1.30	13:30	5.32	2.15	06:45	0.39	04:05	3.06	1.86	04:50	0.010	06:50	0.241	0.093	0.093
04/28/2023	10:25	1.31	09:10	2.88	2.00	11:10	0.55	20:10	3.07	1.93	11:10	0.016	18:50	0.222	0.096	0.096
04/29/2023	05:20	1.32	19:30	4.17	2.08	04:40	0.49	20:05	3.08	2.08	04:40	0.014	19:30	0.335	0.108	0.108
04/30/2023	04:35	1.29	19:15	2.92	2.08	05:40	0.50	15:45	3.08	2.11	06:05	0.014	19:15	0.226	0.108	0.108
05/01/2023	05:45	1.34	06:35	5.30	2.15	06:25	0.30	16:30	3.10	1.98	05:50	0.020	06:35	0.252	0.103	0.103
05/02/2023	05:40	1.08	09:55	5.29	1.98	09:50	0.40	05:00	3.09	2.06	12:55	0.027	10:15	0.262	0.097	0.097
05/03/2023	09:15	1.29	07:20	4.06	1.84	14:35	0.36	03:20	3.06	1.78	14:35	0.009	19:40	0.210	0.079	0.079
05/04/2023	00:15	1.30	13:05	2.73	1.78	02:15	0.42	17:35	3.13	1.77	02:15	0.011	13:05	0.207	0.077	0.077
05/05/2023	05:55	1.28	11:35	5.04	1.79	23:55	0.35	16:25	3.06	1.50	23:55	0.009	11:35	0.237	0.067	0.067
05/06/2023	15:00	1.29	13:25	4.89	1.78	00:25	0.32	17:15	3.03	1.64	02:30	0.008	13:25	0.218	0.071	0.071
05/07/2023	06:25	1.29	11:40	2.77	1.73	01:25	0.37	15:10	3.01	1.59	01:25	0.009	11:40	0.206	0.066	0.066
05/08/2023	12:30	1.29	06:45	4.75	1.77	07:40	0.29	08:55	3.00	1.60	14:15	0.010	06:45	0.225	0.066	0.066
05/09/2023	15:00	1.30	07:00	4.30	1.73	07:15	0.36	09:05	2.98	1.61	12:25	0.018	09:05	0.202	0.064	0.064
05/10/2023	00:25	1.28	07:25	4.99	1.84	07:10	0.35	02:55	2.96	1.41	23:45	0.010	07:55	0.219	0.058	0.058
05/11/2023	01:05	1.33	12:25	6.02	2.51	08:25	0.31	22:20	3.02	1.17	08:25	0.008	10:25	0.233	0.065	0.065
05/12/2023	01:55	1.28	15:15	2.79	1.80	07:55	0.35	20:25	3.01	1.47	02:25	0.009	15:15	0.210	0.066	0.066
05/13/2023	05:50	1.35	20:50	2.89	1.92	02:55	0.32	16:30	3.06	1.75	02:55	0.009	20:50	0.223	0.082	0.082
05/14/2023	01:35	1.41	09:25	5.33	2.00	18:10	0.38	17:30	3.06	1.90	18:10	0.012	09:45	0.249	0.091	0.091
05/15/2023	03:20	1.40	07:50	4.80	2.10	08:05	0.35	14:00	3.04	1.76	12:50	0.011	23:35	0.258	0.089	0.089
05/16/2023	05:05	1.45	08:15	5.39	2.18	07:25	0.39	19:30	3.08	1.69	05:35	0.012	08:15	0.260	0.087	0.087

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
05/17/2023	06:20	1.36	14:10	5.63	2.16	13:45	0.42	23:20	3.08	1.61	06:25	0.013	14:10	0.249	0.083	0.083
05/18/2023	06:00	1.39	07:20	4.99	2.05	07:35	0.39	07:40	3.09	1.60	13:30	0.013	07:40	0.226	0.081	0.081
05/19/2023	08:55	1.39	18:10	2.96	2.03	11:25	0.38	21:50	3.07	1.64	11:25	0.011	20:35	0.229	0.083	0.083
05/20/2023	06:10	1.45	22:05	3.76	2.12	10:25	0.41	20:50	3.06	1.76	02:40	0.012	22:05	0.262	0.093	0.093
05/21/2023	07:20	1.46	09:50	5.30	2.19	09:40	0.34	17:50	3.05	1.82	04:30	0.011	10:10	0.326	0.097	0.097
05/22/2023	04:50	1.45	15:50	5.61	2.29	06:35	0.43	00:00	3.04	1.71	06:15	0.015	06:45	0.270	0.094	0.094
05/23/2023	12:30	1.41	07:25	5.42	2.35	15:55	0.29	04:30	3.02	1.60	01:00	0.016	10:30	0.310	0.088	0.088
05/24/2023	03:20	1.41	14:55	5.59	2.29	06:45	0.33	05:40	3.02	1.62	01:30	0.013	06:50	0.240	0.087	0.087
05/25/2023	22:00	1.10	06:40	5.02	2.13	15:15	0.32	18:15	3.02	1.76	07:20	0.013	15:45	0.245	0.091	0.091
05/26/2023	06:50	1.42	06:30	2.93	1.98	16:25	0.45	19:25	3.01	1.79	16:25	0.013	06:30	0.223	0.087	0.087
05/27/2023	01:30	1.39	08:55	2.99	1.99	04:15	0.42	00:25	3.05	1.87	04:15	0.012	08:55	0.232	0.091	0.091
05/28/2023	02:15	1.42	19:55	2.96	2.00	18:50	0.40	12:05	3.04	1.86	22:40	0.011	17:15	0.229	0.092	0.092
05/29/2023	11:50	1.10	15:45	5.22	2.02	16:50	0.38	08:20	3.04	1.69	02:00	0.010	15:45	0.247	0.085	0.085
05/30/2023	05:55	1.39	06:50	5.36	2.08	08:50	0.23	03:00	3.01	1.58	07:35	0.009	07:15	0.296	0.081	0.081
05/31/2023	12:55	1.34	06:40	5.01	2.09	06:25	0.33	00:15	3.01	1.64	09:10	0.011	06:40	0.251	0.084	0.084
06/01/2023	04:40	1.47	07:30	4.75	2.16	07:45	0.39	23:45	3.04	1.79	06:25	0.013	23:45	0.238	0.098	0.098
06/02/2023	06:15	1.51	23:30	3.05	2.11	22:00	0.32	03:35	3.02	1.79	22:00	0.012	23:30	0.237	0.097	0.097
06/03/2023	08:25	1.13	18:05	5.47	2.24	10:50	0.35	04:40	3.01	1.57	03:00	0.013	18:45	0.301	0.089	0.089
06/04/2023	05:35	1.47	11:30	5.12	2.38	15:15	0.33	21:30	2.99	1.57	22:55	0.011	14:35	0.278	0.093	0.093
06/05/2023	21:15	1.40	11:30	4.35	2.16	11:20	0.34	18:35	3.00	1.60	02:25	0.011	11:30	0.244	0.089	0.089
06/06/2023	07:45	1.15	07:00	4.74	2.13	13:25	0.37	08:55	3.00	1.60	13:25	0.012	19:05	0.242	0.088	0.088
06/07/2023	08:25	1.50	06:45	4.76	2.10	20:50	0.34	20:30	2.97	1.43	20:50	0.010	12:20	0.235	0.080	0.080
06/08/2023	09:15	1.45	06:35	4.56	2.08	08:45	0.34	22:45	3.03	1.36	08:45	0.011	06:30	0.254	0.076	0.076
06/09/2023	06:00	1.46	16:15	3.12	2.07	21:15	0.36	16:15	3.08	1.40	14:00	0.011	16:15	0.251	0.078	0.078
06/10/2023	14:15	1.34	19:05	3.15	2.12	16:05	0.32	02:45	2.96	1.52	16:05	0.010	19:05	0.240	0.084	0.084
06/11/2023	05:35	1.55	20:55	3.28	2.15	01:35	0.39	17:25	2.92	1.54	05:35	0.012	16:20	0.239	0.087	0.087
06/12/2023	05:20	1.56	06:40	5.04	2.16	07:00	0.33	13:45	2.93	1.41	18:25	0.011	06:40	0.253	0.081	0.081
06/13/2023	00:50	1.52	07:00	4.56	2.15	14:40	0.34	00:00	2.91	1.34	00:50	0.011	21:20	0.234	0.076	0.076
06/14/2023	22:35	1.44	16:45	5.92	2.82	19:05	0.32	21:30	2.90	1.26	19:05	0.010	08:35	0.251	0.085	0.085
06/15/2023	03:35	1.39	07:50	4.75	2.12	08:40	0.32	16:45	2.89	1.47	14:30	0.009	15:55	0.238	0.081	0.081
06/16/2023	11:40	1.37	09:30	4.55	2.01	03:15	0.35	22:25	2.94	1.44	06:00	0.010	09:25	0.229	0.078	0.078
06/17/2023	05:20	1.34	08:35	2.96	1.92	15:30	0.31	20:55	2.97	1.54	03:10	0.009	20:55	0.225	0.077	0.077
06/18/2023	04:40	1.33	08:40	5.63	1.95	08:55	0.34	14:40	3.03	1.63	04:40	0.010	09:00	0.265	0.080	0.080
06/19/2023	05:55	1.35	14:45	4.97	1.95	09:15	0.33	21:30	3.02	1.63	05:55	0.010	14:45	0.249	0.078	0.078
06/20/2023	02:30	1.35	06:35	4.63	1.89	06:30	0.33	11:15	3.07	1.69	06:30	0.008	11:15	0.230	0.079	0.079
06/21/2023	15:55	1.33	08:00	4.51	1.87	09:35	0.36	11:40	3.00	1.46	14:30	0.009	11:40	0.214	0.068	0.068
06/22/2023	10:00	1.20	07:05	4.96	1.86	01:40	0.33	09:40	3.00	1.55	01:40	0.009	10:25	0.239	0.073	0.073

12/22/2022 00:00 - 06/22/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)
Total			10.013
Average	1.90	1.26	0.062

SS_03

Site Commentary

SITE INFORMATION

Pipe	Round (8 in H)
Silt	0.00 (in)

OBSERVATIONS

Surcharge conditions were not experienced. Review of the scattergraph shows that free-flow conditions were maintained throughout the study. Backwater conditions were not observed.

Average flow depth, velocity, and quantity data observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.63	2.09	0.075
Minimum	0.67	0.92	0.010
Maximum	4.32	3.62	0.435
Min Time	12/26/2022 3:00:00 AM	12/22/2022 4:00:00 AM	12/26/2022 3:00:00 AM
Max Time	03/15/2023 6:00:00 PM	03/06/2023 12:00:00 PM	03/15/2023 6:00:00 PM

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

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023** is provided in the following table. Downtime was experienced from **8 April 2023 to 12 April 2023** due to equipment failure.

Percent Uptime	
DFINAL (in)	97.991
VFINAL (ft/s)	97.996
QFINAL (MGD - Total MG)	97.991

SodaSprings.FW.TFM.CA22

Flow Monitoring Site Report

Site Name

SS_03

Site Address /Location:	5669 Yuba Dr Soda Springs, CA 95728			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Drive, Site in Road	Latitude:	39.305947	Pipe Size (H x W)	Pipe Shape
		Longitude:	-120.385962	8.00"x8.00"	Circular

Manhole #	System Characteristics
	Residential
Access	Traffic
Drive	Light

ADS Project Name:	SodaSprings.FW.TFM.CA22
ADS Project Number:	22874

Installation Information

Installation Date:	Installation Type:
Wednesday, December 21, 2022	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Downstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
11:14:00 AM	8.00"x8.00"
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
1.50	N/A
Downlooker Physical Offset (in)	Measurement Confidence (in)
N/A	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2	-
Silt (in)	Silt Type
-	None

Hydraulic Comments:

Low depth, moderate velocity, small waves

Manhole / Pipe Information:

Manhole Depth (Approx. Ft):	Manhole Configuration
4.5ft	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in.)	Manhole Diameter (Approx. in):
30"	54"
Manhole Cover	Manhole Frame
Unbolted	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

Hydrograph Report

SS_03

Flow Monitor

SS_03

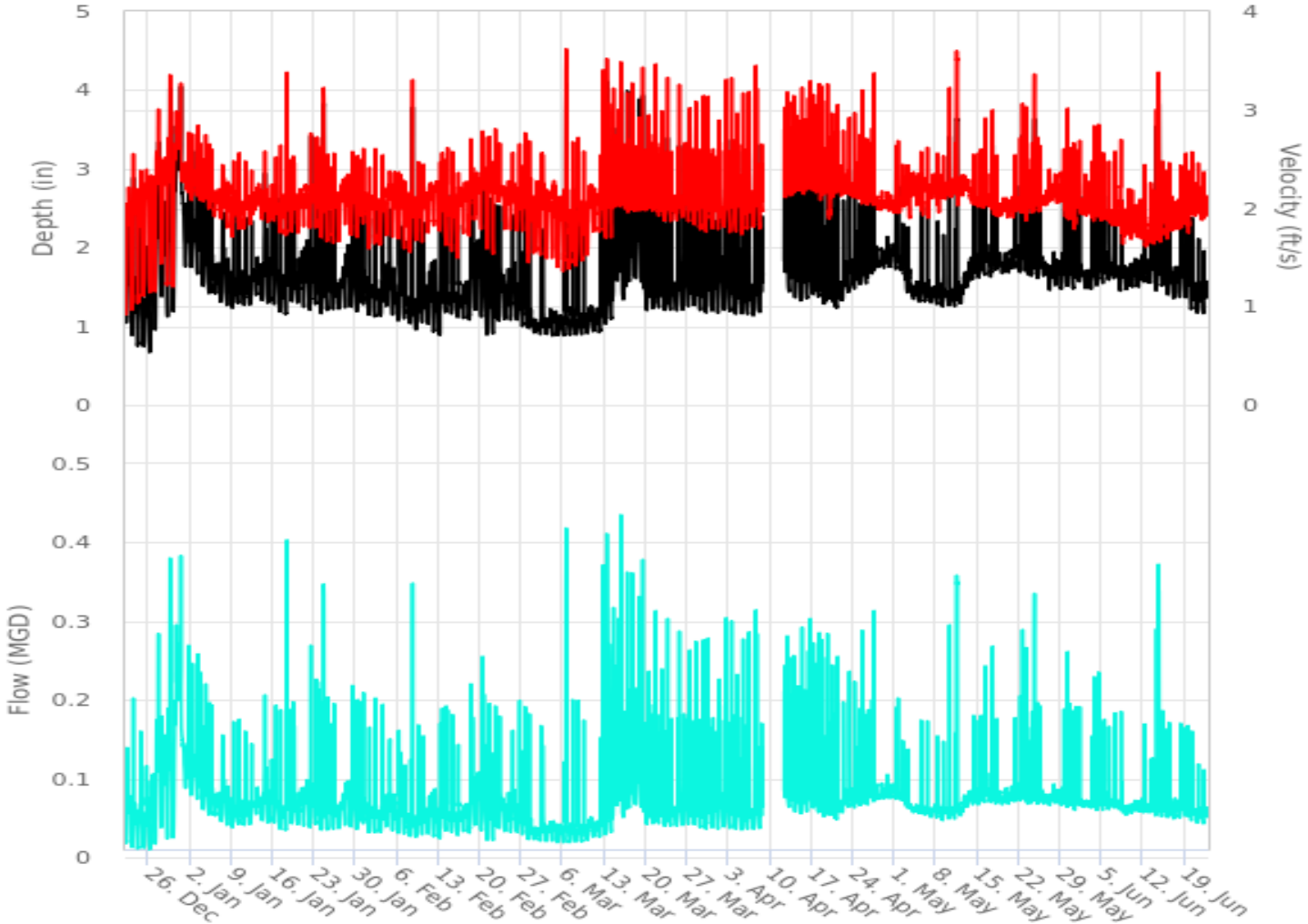
Pipe Height
8.00
in

Report Period

12/22/2022
To
06/22/2023

Legend

DFINAL
QFINAL
VFINAL



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Scattergraph Report

SS_03

Flow Monitor

SS_03

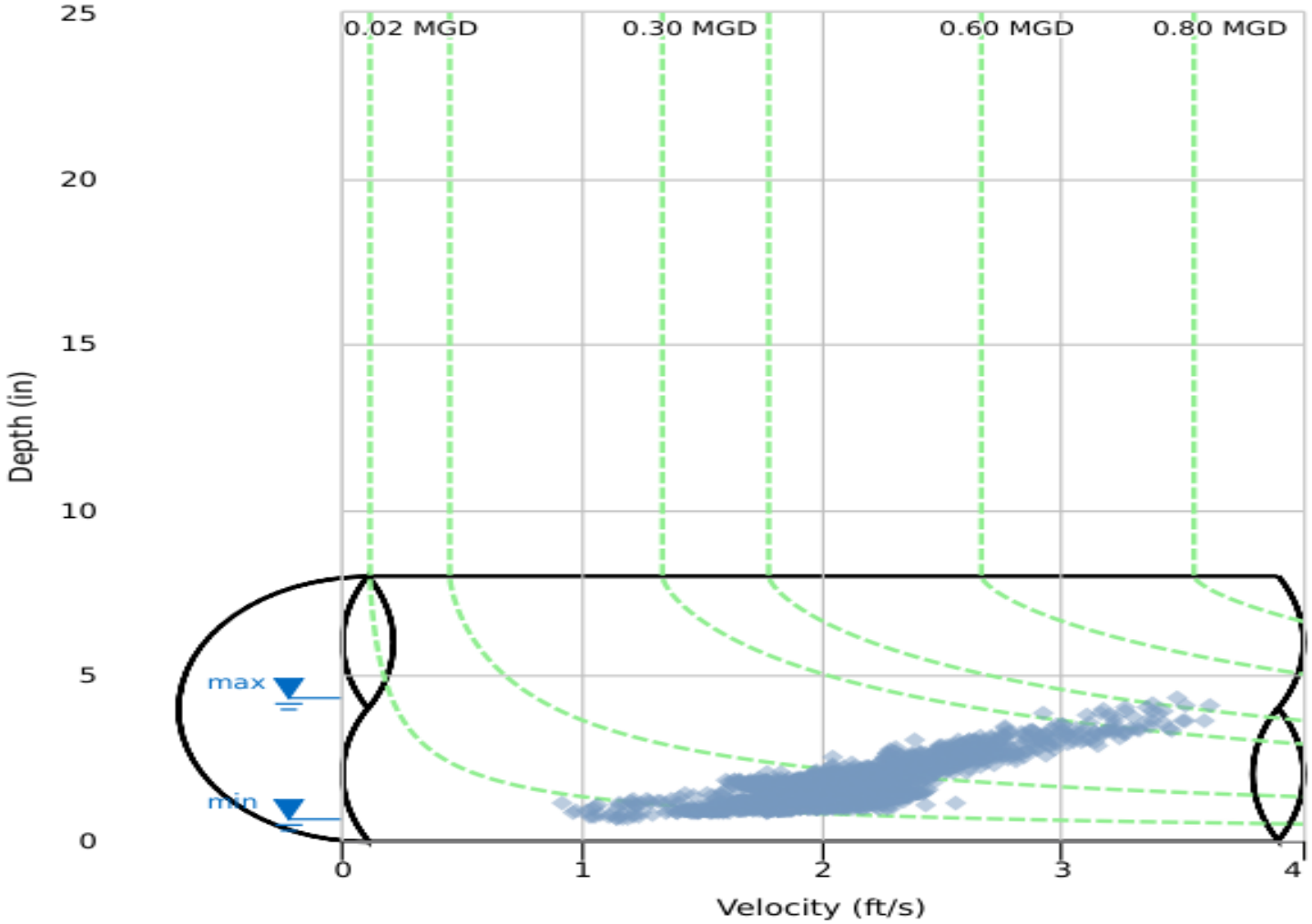
Pipe Height
8.00
in

Report Period

12/22/2022
To
06/22/2023

Legend

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



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Hayward, CA 94545

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Daily Tabular Report

12/22/2022 00:00 - 06/22/2023 23:59
SS_03Pipe: Round (8 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
12/22/2022	04:20	0.89	07:55	4.13	1.56	04:20	0.43	07:55	3.05	1.73	04:20	0.006	07:55	0.358	0.060	0.060
12/23/2022	03:55	0.86	09:20	4.11	1.30	01:00	0.92	09:30	3.06	1.76	04:05	0.012	09:25	0.342	0.047	0.047
12/24/2022	03:10	0.73	15:25	3.57	1.25	03:20	0.97	15:30	3.07	1.76	03:20	0.010	15:30	0.292	0.045	0.045
12/25/2022	03:30	0.73	15:00	3.51	1.21	02:00	0.82	14:55	3.14	1.90	03:35	0.011	15:00	0.286	0.046	0.046
12/26/2022	02:55	0.66	17:05	2.31	1.45	03:40	1.10	16:25	2.46	1.89	03:40	0.010	17:05	0.121	0.061	0.061
12/27/2022	02:25	0.94	15:05	4.40	2.06	02:25	1.08	15:10	3.67	2.21	02:25	0.016	15:10	0.455	0.115	0.115
12/28/2022	04:20	1.37	06:45	4.00	2.02	23:55	1.26	06:50	3.43	2.18	05:20	0.034	06:50	0.382	0.103	0.103
12/29/2022	05:50	1.10	07:45	4.35	2.08	02:10	1.13	07:50	3.51	2.17	03:20	0.022	07:50	0.436	0.119	0.119
12/30/2022	04:15	1.15	14:55	4.62	2.50	00:30	0.85	15:05	3.50	2.34	02:45	0.022	15:05	0.453	0.160	0.160
12/31/2022	23:25	2.06	10:30	5.02	2.87	18:25	2.17	10:40	3.78	2.50	23:25	0.113	10:30	0.561	0.185	0.185
01/01/2023	04:55	1.74	18:10	4.45	2.25	23:45	2.07	18:05	3.39	2.33	05:00	0.086	18:05	0.434	0.123	0.123
01/02/2023	03:25	1.73	09:45	4.26	2.18	06:05	2.02	09:50	3.36	2.29	03:20	0.076	09:50	0.409	0.117	0.117
01/03/2023	23:55	1.64	16:20	4.26	2.12	16:05	2.01	06:50	3.48	2.27	23:55	0.071	08:15	0.409	0.114	0.114
01/04/2023	04:40	1.50	09:00	4.03	1.83	02:35	2.02	15:15	3.25	2.19	04:40	0.059	09:00	0.368	0.089	0.089
01/05/2023	04:15	1.41	16:00	3.80	1.74	02:40	1.87	07:30	3.33	2.14	02:40	0.052	16:10	0.334	0.081	0.081
01/06/2023	06:15	1.38	17:55	2.01	1.61	03:40	1.84	21:00	2.50	2.07	06:20	0.050	21:00	0.097	0.067	0.067
01/07/2023	05:20	1.30	10:50	3.86	1.70	05:45	1.81	10:55	3.22	2.09	05:20	0.044	10:55	0.338	0.076	0.076
01/08/2023	02:50	1.26	10:10	2.17	1.52	06:00	1.71	10:45	2.53	2.04	06:00	0.039	10:10	0.121	0.061	0.061
01/09/2023	04:45	1.16	08:15	3.64	1.46	04:45	1.51	08:10	3.04	1.98	04:45	0.031	08:15	0.300	0.058	0.058
01/10/2023	01:40	1.28	07:40	3.59	1.51	05:05	1.72	07:35	3.21	2.00	05:05	0.041	07:35	0.313	0.061	0.061
01/11/2023	03:40	1.26	07:05	3.74	1.49	01:35	1.71	07:00	3.42	2.01	01:35	0.039	07:00	0.353	0.061	0.061
01/12/2023	02:20	1.25	08:55	3.92	1.58	03:10	1.75	09:00	3.11	2.01	02:20	0.040	08:55	0.329	0.065	0.065
01/13/2023	03:40	1.38	09:40	2.01	1.59	19:05	1.81	13:40	2.54	2.12	05:00	0.052	09:40	0.103	0.068	0.068
01/14/2023	05:35	1.29	15:05	3.89	1.75	05:35	1.74	15:15	3.14	2.07	05:35	0.041	15:15	0.340	0.078	0.078
01/15/2023	02:30	1.28	19:05	2.59	1.69	02:30	1.77	18:35	2.38	2.03	02:30	0.041	19:05	0.146	0.072	0.072
01/16/2023	04:50	1.22	12:20	3.90	1.63	04:10	1.70	12:15	3.03	2.02	04:50	0.038	12:20	0.329	0.069	0.069
01/17/2023	04:25	1.17	07:20	3.68	1.46	04:25	1.70	07:30	3.25	1.96	04:25	0.035	07:30	0.328	0.058	0.058
01/18/2023	01:20	1.15	08:30	4.38	1.70	03:30	1.66	08:15	3.53	2.09	03:30	0.033	08:30	0.442	0.086	0.086
01/19/2023	04:20	1.31	10:10	3.86	1.61	04:35	1.69	14:40	3.20	2.03	04:35	0.041	14:45	0.344	0.071	0.071
01/20/2023	03:10	1.28	21:50	2.03	1.59	03:50	1.70	15:15	2.36	2.01	03:00	0.040	19:55	0.095	0.065	0.065
01/21/2023	04:25	1.23	17:15	2.26	1.68	04:55	1.73	12:00	2.42	2.08	04:55	0.038	18:35	0.110	0.072	0.072
01/22/2023	05:25	1.20	09:00	4.57	1.72	05:10	1.72	09:05	3.31	2.12	05:10	0.037	09:00	0.424	0.080	0.080
01/23/2023	23:40	1.23	16:25	4.03	1.66	23:35	1.69	07:25	3.40	2.10	23:35	0.038	07:25	0.376	0.079	0.079
01/24/2023	02:25	1.16	14:15	4.15	1.67	04:10	1.62	13:30	3.53	2.10	03:35	0.033	13:50	0.415	0.085	0.085
01/25/2023	03:30	1.19	13:45	4.20	1.53	06:00	1.59	06:35	3.39	1.99	02:35	0.035	13:45	0.374	0.066	0.066
01/26/2023	04:40	1.20	07:25	3.90	1.48	04:55	1.53	07:30	3.16	1.98	22:40	0.000	07:25	0.335	0.059	0.059
01/27/2023	04:20	1.21	21:50	2.12	1.49	02:35	1.60	18:40	2.50	2.06	04:35	0.035	21:55	0.099	0.061	0.061
01/28/2023	03:25	1.23	09:10	2.31	1.65	05:10	1.74	16:00	2.50	2.14	04:25	0.039	09:10	0.123	0.073	0.073
01/29/2023	03:45	1.23	10:25	4.09	1.62	04:45	1.65	10:20	3.07	2.08	04:45	0.037	10:25	0.350	0.071	0.071
01/30/2023	03:30	1.17	07:25	4.21	1.54	03:25	1.56	07:25	3.22	2.02	03:30	0.032	07:25	0.387	0.067	0.067
01/31/2023	05:50	1.23	06:35	3.98	1.53	05:40	1.70	06:40	3.32	2.05	05:50	0.038	06:35	0.362	0.065	0.065
02/01/2023	02:55	1.10	07:45	4.22	1.43	02:55	1.47	07:45	3.10	1.97	02:55	0.027	07:45	0.374	0.057	0.057
02/02/2023	03:10	1.11	07:15	3.91	1.42	06:20	1.44	07:10	3.22	1.95	06:20	0.028	07:15	0.348	0.056	0.056
02/03/2023	03:25	1.12	13:30	4.00	1.48	02:55	1.56	13:35	3.03	1.96	02:55	0.030	13:35	0.337	0.060	0.060
02/04/2023	03:55	1.23	17:55	3.96	1.62	03:20	1.67	17:55	3.09	2.11	03:25	0.037	17:55	0.344	0.071	0.071
02/05/2023	04:00	1.14	10:50	1.86	1.38	04:25	1.66	12:50	2.46	2.06	04:25	0.033	10:50	0.088	0.055	0.055
02/06/2023	04:55	1.06	06:40	3.72	1.49	01:45	1.64	06:40	3.10	2.02	05:00	0.029	06:40	0.319	0.063	0.063
02/07/2023	03:40	1.08	06:45	3.80	1.32	02:35	1.51	06:55	3.10	1.93	04:35	0.028	06:55	0.326	0.050	0.050
02/08/2023	04:55	1.02	14:55	4.18	1.51	01:50	1.46	14:55	3.62	2.03	01:50	0.025	14:55	0.432	0.074	0.074
02/09/2023	04:40	0.94	13:40	3.73	1.27	04:05	1.60	13:40	3.29	1.95	04:05	0.025	13:40	0.339	0.048	0.048
02/10/2023	04:20	1.04	09:40	3.95	1.33	04:45	1.60	09:50	3.26	1.99	04:45	0.028	09:55	0.326	0.052	0.052
02/11/2023	04:10	1.01	20:25	2.04	1.41	03:45	1.65	15:15	2.46	2.08	04:55	0.028	20:25	0.101	0.057	0.057
02/12/2023	02:35	0.90	09:10	2.06	1.26	06:10	1.54	21:10	2.60	2.10	06:10	0.025	08:55	0.098	0.049	0.049
02/13/2023	04:20	0.87	14:05	3.78	1.40	01:10	1.67	14:15	3.19	2.06	04:20	0.023	06:25	0.321	0.060	0.060
02/14/2023	02:10	1.17	06:25	4.02	1.44	05:05	1.42	06:25	3.22	2.02	05:05	0.029	06:25	0.366	0.061	0.061
02/15/2023	04:15	1.13	07:30	3.77	1.37	04:25	1.38	07:35	3.26	1.96	04:25	0.027	07:30	0.339	0.053	0.053
02/16/2023	02:10	1.11	06:55	4.23	1.36	03:55	1.31	06:55	3.30	1.99	03:55	0.025	06:55	0.399	0.054	0.054
02/17/2023	05:20	1.08	09:10	1.77	1.32	05:10	1.60	19:20	2.41	2.07	05:20	0.030	19:55	0.079	0.051	0.051
02/18/2023	04:50	1.06	10:30	4.29	1.69	06:50	1.47	16:50	3.24	2.15	08:30	0.000	16:50	0.392	0.081	0.081
02/19/2023	05:25	1.14	20:25	2.35	1.66	05:25	1.62	11:10	2.55	2.17	00:50	0.000	20:25	0.138	0.075	0.075
02/20/2023	23:00	1.09	09:05	4.45	1.59	02:15	1.71	14:40	3.42	2.20	04:55	0.032	09:05	0.440	0.077	0.077
02/21/2023	03:45	0.88	13:10	3.68	1.31	05:50	1.39	13:20	3.44	2.13	05:50	0.020	13:15	0.335	0.058	0.058
02/22/2023	04:00	0.89	13:30	3.72	1.31	06:05	1.31	07:05	3.39	2.10	06:05	0.020	13:30	0.342	0.057	0.057
02/23/2023	03:50	1.05	07:00	3.69	1.47	00:40	1.12	07:00	3.37	2.18	00:40	0.020	07:00	0.343	0.065	0.065
02/24/2023	03:55	1.07	18:25	1.93	1.35	06:00	1.69	11:45	2.43	2.05	15:40	0.000	18:25	0.098	0.052	0.052
02/25/2023	03:15	1.06	11:55	3.49	1.44	03:20	1.73	12:00	3.28	2.09	03:20	0.031	12:05	0.300	0.061	0.061
02/26/2023	05:05	1.07	16:05	3.93	1.32	05:00	1.74	16:15	3.17	2.06	05:20	0.031	16:10	0.336	0.053	0.053
02/27/2023	02:15	0.99	14:30	3.49	1.29	23:30	1.59	06:55	3.56	2.04	23:30	0.027	06:55	0.319	0.054	0.054
02/28/2023	01:55	0.96	07:25	3.47	1.10	03:05	1.35	07:25	3.57	1.93	03:05	0.022	07:25	0.335	0.040	0.040
03/01/2023	04:35	0.91	09:20	1.23	0.98	22:20	1.38	12:15	2.57	1.86	04:55	0.022	09:20	0.048	0.030	0.030
03/02/2023	04:40	0.88	06:30	3.56	1.17	05:45	1.41	06:45	3.46	2.05	05:45	0.020	06:45	0.310	0.048	0.048

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
03/03/2023	03:35	0.89	20:40	1.30	1.03	18:00	1.27	11:55	2.54	1.92	05:45	0.019	20:50	0.049	0.033	0.033
03/04/2023	05:25	0.85	18:20	1.39	1.04	03:05	1.36	14:55	2.63	1.92	03:05	0.019	18:20	0.065	0.034	0.034
03/05/2023	03:45	0.87	19:55	1.26	1.00	00:30	1.26	12:10	2.42	1.84	00:55	0.018	12:05	0.052	0.031	0.031
03/06/2023	03:35	0.87	13:05	4.40	1.39	01:05	1.21	12:45	3.78	2.03	01:05	0.017	13:05	0.468	0.073	0.073
03/07/2023	02:35	0.88	15:10	3.71	1.12	06:35	1.26	15:10	3.27	1.77	06:35	0.018	15:10	0.335	0.038	0.038
03/08/2023	02:45	0.89	13:05	3.77	1.10	23:25	1.27	13:20	3.50	1.84	03:50	0.019	13:20	0.341	0.038	0.038
03/09/2023	03:20	0.88	12:00	3.70	1.08	07:40	1.38	12:20	3.29	1.85	03:05	0.019	12:10	0.314	0.037	0.037
03/10/2023	02:45	0.90	15:40	1.48	1.08	00:25	1.46	17:10	2.39	1.97	02:45	0.021	17:45	0.058	0.037	0.037
03/11/2023	02:40	0.92	16:55	1.40	1.06	10:10	1.46	08:00	2.52	2.03	03:15	0.025	18:30	0.053	0.036	0.036
03/12/2023	01:45	0.92	18:00	4.19	1.48	03:40	1.70	18:20	3.50	2.14	03:45	0.024	18:00	0.417	0.077	0.077
03/13/2023	04:30	1.02	09:45	4.28	2.09	06:05	1.62	09:25	3.69	2.37	04:25	0.028	09:40	0.446	0.140	0.140
03/14/2023	04:25	1.08	20:55	4.20	1.75	02:05	1.67	12:05	3.58	2.11	04:25	0.031	18:15	0.400	0.090	0.090
03/15/2023	23:55	1.51	18:10	4.57	2.20	13:55	1.92	18:30	3.75	2.30	23:50	0.061	18:30	0.482	0.132	0.132
03/16/2023	03:40	1.32	20:20	4.60	1.96	21:50	1.89	05:50	3.62	2.26	05:20	0.049	20:20	0.470	0.111	0.111
03/17/2023	05:20	1.56	16:30	4.06	2.12	00:05	1.90	16:45	3.59	2.23	04:00	0.061	16:45	0.409	0.118	0.118
03/18/2023	06:00	1.57	20:15	4.99	2.28	12:45	1.89	19:55	3.75	2.23	06:20	0.062	19:55	0.513	0.128	0.128
03/19/2023	23:50	1.27	11:10	5.07	1.82	21:10	1.90	11:20	3.56	2.17	23:55	0.046	11:10	0.519	0.092	0.092
03/20/2023	04:30	1.18	12:25	3.51	1.66	01:25	1.89	12:30	3.55	2.19	04:40	0.040	12:30	0.336	0.085	0.085
03/21/2023	05:20	1.18	16:30	3.44	1.71	03:40	1.89	15:45	3.73	2.23	03:40	0.042	16:30	0.339	0.092	0.092
03/22/2023	04:50	1.21	10:00	3.51	1.66	04:55	1.83	17:30	3.45	2.15	04:50	0.040	10:05	0.321	0.083	0.083
03/23/2023	05:55	1.19	16:45	3.48	1.56	03:20	1.80	16:20	3.49	2.13	03:30	0.038	16:35	0.321	0.075	0.075
03/24/2023	04:20	1.19	08:30	3.46	1.44	04:35	1.78	08:30	3.19	2.04	04:20	0.038	08:30	0.298	0.059	0.059
03/25/2023	05:35	1.18	11:05	3.50	1.63	07:00	1.75	15:25	3.54	2.09	07:00	0.038	15:25	0.328	0.075	0.075
03/26/2023	04:40	1.20	10:10	3.51	1.62	05:55	1.82	10:05	3.29	2.11	05:55	0.039	10:10	0.311	0.073	0.073
03/27/2023	03:50	1.24	10:00	3.51	1.66	04:15	1.78	06:40	3.45	2.13	04:15	0.040	06:40	0.324	0.082	0.082
03/28/2023	05:35	1.25	10:15	3.51	1.61	06:15	1.75	10:10	3.47	2.10	06:15	0.039	10:10	0.329	0.076	0.076
03/29/2023	04:45	1.18	17:55	3.51	1.59	04:25	1.68	15:30	3.53	2.10	11:20	0.000	15:30	0.329	0.076	0.076
03/30/2023	04:15	1.16	12:35	3.51	1.87	04:20	1.69	12:30	3.49	2.21	04:20	0.034	12:35	0.317	0.104	0.104
03/31/2023	03:10	1.19	08:10	3.47	1.53	05:25	1.73	11:45	3.37	2.05	05:25	0.036	08:05	0.310	0.066	0.066
04/01/2023	04:15	1.16	09:45	3.51	1.63	03:40	1.69	09:50	3.54	2.04	03:40	0.035	09:45	0.331	0.074	0.074
04/02/2023	05:00	1.19	13:40	3.64	1.61	00:40	1.72	13:20	3.45	2.10	04:20	0.037	13:40	0.334	0.075	0.075
04/03/2023	03:50	1.18	06:40	3.49	1.56	03:30	1.65	11:40	3.50	2.11	03:50	0.035	06:40	0.325	0.074	0.074
04/04/2023	02:15	1.14	15:40	3.51	1.53	05:15	1.67	10:10	3.52	2.08	02:15	0.033	15:40	0.319	0.070	0.070
04/05/2023	05:50	1.15	06:45	3.49	1.54	05:10	1.68	10:25	3.35	2.08	05:10	0.034	10:25	0.314	0.072	0.072
04/06/2023	04:15	1.14	09:40	3.50	1.58	02:10	1.71	11:10	3.58	2.12	04:15	0.034	11:10	0.337	0.078	0.078
04/07/2023	03:15	1.13	14:25	3.53	1.66	03:40	1.75	14:15	3.67	2.19	03:40	0.034	14:25	0.348	0.087	0.087
04/08/2023	05:35	1.16	10:05	3.50	1.50	04:35	1.72	10:00	3.31	2.09	12:40	0.000	10:05	0.302	0.066	0.047
04/09/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/10/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/11/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/12/2023	23:55	1.63	21:15	3.58	2.26	23:25	2.00	17:50	3.61	2.48	23:15	0.072	14:45	0.346	0.143	0.092
04/13/2023	04:50	1.42	18:35	3.57	1.96	13:00	2.03	23:40	3.62	2.42	04:50	0.060	18:40	0.344	0.115	0.115
04/14/2023	05:35	1.35	13:00	3.51	1.77	00:50	2.04	12:40	3.67	2.33	04:20	0.056	12:40	0.335	0.093	0.093
04/15/2023	02:20	1.31	14:35	3.51	1.84	16:15	2.04	14:55	3.60	2.40	04:00	0.054	14:55	0.343	0.103	0.103
04/16/2023	04:40	1.33	12:35	3.63	1.76	21:45	2.09	12:50	3.59	2.39	05:20	0.057	12:35	0.333	0.094	0.094
04/17/2023	05:10	1.39	07:15	3.53	1.70	11:20	2.01	07:40	3.55	2.38	04:45	0.061	07:20	0.329	0.090	0.090
04/18/2023	02:40	1.36	07:25	3.50	1.70	21:15	1.98	16:20	3.69	2.36	22:35	0.056	16:20	0.348	0.092	0.092
04/19/2023	00:30	1.27	07:00	3.43	1.55	22:55	1.79	16:25	3.67	2.27	04:55	0.050	16:25	0.321	0.075	0.075
04/20/2023	06:15	1.25	06:40	3.51	1.58	01:05	1.87	16:30	3.48	2.25	06:15	0.047	11:10	0.321	0.077	0.077
04/21/2023	05:35	1.22	09:10	3.51	1.49	10:10	1.99	09:20	3.42	2.30	05:15	0.047	09:10	0.325	0.070	0.070
04/22/2023	04:15	1.31	08:45	3.42	1.64	00:10	2.04	08:50	3.39	2.27	02:10	0.055	08:50	0.311	0.078	0.078
04/23/2023	04:35	1.42	09:40	3.57	1.73	17:25	2.01	09:40	3.31	2.25	05:45	0.062	09:40	0.322	0.083	0.083
04/24/2023	05:25	1.46	07:00	3.51	1.78	14:35	1.99	06:55	3.59	2.24	05:45	0.061	06:55	0.339	0.088	0.088
04/25/2023	04:30	1.52	13:15	3.61	1.81	14:35	1.99	13:15	3.49	2.22	04:45	0.063	13:15	0.345	0.090	0.090
04/26/2023	06:15	1.52	06:25	3.50	1.81	23:05	1.95	13:15	3.37	2.17	11:45	0.063	13:15	0.320	0.086	0.086
04/27/2023	12:35	1.62	12:55	3.54	1.96	11:25	1.95	13:15	3.56	2.21	12:35	0.068	13:15	0.339	0.100	0.100
04/28/2023	12:15	1.67	18:30	2.05	1.85	12:00	1.89	21:20	2.31	2.05	14:40	0.070	18:30	0.103	0.081	0.081
04/29/2023	11:45	1.67	19:20	2.26	1.90	13:15	1.92	11:45	2.26	2.06	07:00	0.069	19:20	0.116	0.085	0.085
04/30/2023	05:45	1.72	17:45	2.19	1.91	23:20	1.88	09:55	2.47	2.02	04:35	0.073	09:55	0.110	0.084	0.084
05/01/2023	06:00	1.70	14:45	3.51	1.91	07:00	1.86	14:35	3.32	2.05	06:00	0.071	14:35	0.313	0.088	0.088
05/02/2023	23:20	1.55	09:55	3.51	1.74	22:20	1.84	10:05	3.20	2.12	22:20	0.062	09:50	0.302	0.078	0.078
05/03/2023	23:55	1.38	06:55	3.41	1.58	11:10	1.78	07:00	3.30	2.18	10:50	0.058	07:00	0.300	0.070	0.070
05/04/2023	04:55	1.32	16:45	1.75	1.44	18:25	1.87	05:50	2.48	2.25	04:35	0.056	16:45	0.073	0.062	0.062
05/05/2023	06:30	1.29	11:25	3.45	1.49	14:55	1.82	11:30	3.09	2.19	03:50	0.053	11:35	0.285	0.065	0.065
05/06/2023	01:40	1.30	13:30	3.48	1.47	16:35	1.71	13:25	3.32	2.18	22:25	0.051	13:25	0.291	0.063	0.063
05/07/2023	01:05	1.29	19:45	1.61	1.39	16:00	1.90	22:25	2.43	2.23	01:20	0.049	19:55	0.075	0.058	0.058
05/08/2023	06:10	1.25	06:35	3.50	1.48	10:10	1.83	06:45	3.21	2.20	06:15	0.048	06:45	0.305	0.066	0.066
05/09/2023	04:15	1.22	06:55	3.51	1.43	18:00	1.88	07:00	3.41	2.20	04:00	0.046	06:55	0.317	0.062	0.062
05/10/2023	03:50	1.26	07:25	3.53	1.52	09:15	1.94	07:25	3.40	2.26	04:30	0.048	07:25	0.326	0.073	0.073
05/11/2023	04:25	1.24	12:15	3.78	1.95	15:55	1.85	12:45	3.93	2.49	02:45	0.047	12:45	0.388	0.126	0.126
05/12/2023	06:25	1.27	21:50	1.85	1.47	11:25	1.95	20:50	2.53	2.27	06:00	0.051	21:50	0.087	0.065	0.065
05/13/2023	03:05	1.46	15:45	2.02	1.67	20:40	2.02	07:50	2.38	2.19	06:25	0.062	15:45	0.099	0.075	0.075
05/14/2023	05:45	1.52	09:10	3.46	1.79	09:50	1.94	09:15	3.02	2.11	05:55	0.065	09:10	0.281	0.081	0.081
05/15/2023	05:40	1.58	07:50	3.50	1.84	04:30	1.91	15:10	3.26	2.11	04:30	0.065	07:50	0.296	0.085	0.085
05/16/2023	04:35	1.63	07:05	3.48	1.94	11:55	1.85	07:55	3.25	2.16	07:00	0.065	07:25	0.303	0.095	0.095

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
05/17/2023	10:20	1.59	14:05	3.54	1.89	03:40	1.87	14:00	3.27	2.11	03:40	0.066	14:00	0.314	0.090	0.090
05/18/2023	06:15	1.68	07:00	3.47	1.85	13:25	1.82	07:15	3.23	2.00	02:35	0.066	07:00	0.294	0.081	0.081
05/19/2023	05:15	1.63	21:05	1.96	1.78	12:55	1.85	09:25	2.23	2.02	05:15	0.064	21:05	0.095	0.075	0.075
05/20/2023	09:25	1.65	14:55	2.04	1.84	01:55	1.82	09:25	2.33	2.04	06:50	0.065	18:50	0.097	0.080	0.080
05/21/2023	07:00	1.68	09:35	3.44	1.92	01:35	1.80	09:40	3.12	2.04	06:55	0.067	09:40	0.287	0.086	0.086
05/22/2023	04:45	1.68	15:20	3.73	2.01	17:45	1.85	15:45	3.35	2.12	05:10	0.068	15:35	0.326	0.100	0.100
05/23/2023	00:15	1.63	07:15	3.67	2.03	03:55	1.83	07:00	3.54	2.18	12:25	0.067	07:00	0.354	0.107	0.107
05/24/2023	06:05	1.62	15:45	3.75	1.95	07:25	1.86	15:20	3.51	2.19	12:25	0.067	15:45	0.357	0.101	0.101
05/25/2023	04:50	1.59	15:05	3.50	1.86	08:55	1.86	06:30	3.33	2.11	04:50	0.065	06:40	0.305	0.087	0.087
05/26/2023	21:55	1.60	15:55	1.88	1.72	14:15	1.87	18:40	2.29	2.10	14:15	0.064	15:55	0.092	0.075	0.075
05/27/2023	05:25	1.45	21:45	2.05	1.70	00:55	1.78	04:40	2.60	2.20	00:55	0.061	22:10	0.102	0.077	0.077
05/28/2023	05:20	1.50	14:35	2.13	1.71	10:55	1.92	03:50	2.45	2.18	04:50	0.067	14:35	0.118	0.077	0.077
05/29/2023	04:30	1.46	15:30	3.50	1.73	22:45	1.81	15:45	3.18	2.18	06:10	0.064	15:40	0.298	0.079	0.079
05/30/2023	05:10	1.49	06:40	3.56	1.79	11:40	1.69	06:40	3.30	2.10	20:50	0.061	06:40	0.320	0.083	0.083
05/31/2023	03:45	1.47	06:35	3.51	1.76	13:05	1.66	06:30	3.39	2.09	13:05	0.056	06:30	0.322	0.080	0.080
06/01/2023	04:50	1.54	07:40	3.50	1.72	22:20	1.82	07:25	3.27	2.06	05:35	0.061	07:40	0.308	0.075	0.075
06/02/2023	04:40	1.46	11:10	1.90	1.60	09:40	1.73	05:10	2.43	2.12	00:35	0.061	11:10	0.091	0.068	0.068
06/03/2023	04:35	1.46	17:55	3.69	1.80	12:35	1.77	18:00	3.42	2.14	03:10	0.059	17:55	0.345	0.086	0.086
06/04/2023	04:00	1.51	13:10	3.51	1.96	01:20	1.76	15:05	3.40	2.14	03:15	0.056	15:05	0.324	0.101	0.101
06/05/2023	03:50	1.52	11:00	3.49	1.82	07:40	1.75	06:35	3.11	1.99	04:05	0.056	11:00	0.287	0.080	0.080
06/06/2023	05:15	1.56	06:50	3.50	1.77	07:45	1.71	06:40	3.20	1.93	04:20	0.057	06:50	0.302	0.074	0.074
06/07/2023	02:30	1.47	06:30	3.47	1.71	10:25	1.67	06:40	3.22	1.94	10:20	0.058	06:40	0.301	0.070	0.070
06/08/2023	03:10	1.43	06:25	3.50	1.70	13:50	1.57	06:35	3.32	1.92	13:50	0.054	06:25	0.293	0.069	0.069
06/09/2023	05:20	1.43	21:00	1.90	1.61	21:30	1.59	14:10	2.44	1.88	12:55	0.052	22:30	0.073	0.061	0.061
06/10/2023	04:35	1.46	11:10	1.96	1.70	01:00	1.57	03:25	2.25	1.87	05:55	0.050	16:00	0.079	0.065	0.065
06/11/2023	04:40	1.48	14:10	1.96	1.71	11:40	1.60	12:30	2.19	1.87	06:25	0.053	14:05	0.087	0.066	0.066
06/12/2023	19:05	1.54	06:30	3.50	1.76	11:15	1.52	06:35	3.06	1.74	02:55	0.053	06:30	0.283	0.066	0.066
06/13/2023	06:35	1.46	14:05	3.48	1.81	08:05	1.51	06:55	3.13	1.82	06:15	0.051	06:55	0.283	0.073	0.073
06/14/2023	04:45	1.43	14:30	4.40	2.18	19:25	1.56	14:20	3.58	2.13	02:35	0.051	14:30	0.425	0.127	0.127
06/15/2023	04:50	1.49	07:35	3.45	1.73	00:10	1.58	07:55	3.11	1.93	06:30	0.049	07:55	0.287	0.073	0.073
06/16/2023	05:00	1.35	09:35	3.50	1.60	12:00	1.61	09:25	2.94	1.93	03:55	0.048	09:35	0.277	0.064	0.064
06/17/2023	04:00	1.34	20:35	1.85	1.59	06:25	1.60	18:40	2.24	1.96	04:05	0.047	09:45	0.080	0.062	0.062
06/18/2023	04:35	1.35	08:40	3.43	1.66	00:20	1.65	08:30	2.94	1.98	04:50	0.048	08:30	0.260	0.069	0.069
06/19/2023	05:15	1.33	06:45	3.51	1.65	16:15	1.63	06:50	3.14	2.03	16:15	0.048	06:45	0.297	0.071	0.071
06/20/2023	02:10	1.20	06:25	3.51	1.46	07:20	1.77	06:45	3.14	2.08	02:20	0.044	06:40	0.278	0.060	0.060
06/21/2023	02:00	1.16	07:55	3.42	1.41	14:25	1.73	08:00	3.05	2.11	02:30	0.043	07:55	0.278	0.058	0.058
06/22/2023	04:30	1.15	06:45	3.46	1.44	08:00	1.68	07:05	2.90	2.04	05:40	0.041	06:45	0.256	0.058	0.058

12/22/2022 00:00 - 06/22/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)
Total			13.510
Average	1.63	2.09	0.075

SS_04

Site Commentary

SITE INFORMATION

Pipe	Round (10 in H)
Silt	0.00 (in)

OBSERVATIONS

Surcharge conditions were not experienced. Review of the scattergraph shows that free-flow conditions were experienced during the study. Backwater conditions were infrequently observed.

Average flow depth, velocity, and quantity data observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.02	0.61	0.012
Minimum	0.16	0.20	0.000
Maximum	2.51	1.28	0.057
Min Time	02/25/2023 3:00:00 AM	12/27/2022 2:00:00 AM	02/25/2023 2:00:00 AM
Max Time	12/29/2022 4:00:00 PM	01/01/2023 6:00:00 PM	12/31/2022 3:00:00 PM

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

Values in the Observed Flow Conditions and data on the graphical reports are based on the one hour average.

DATA UPTIME

Data uptime observed during **Thursday, 22 December 2022 to Thursday, 22 June 2023** is provided in the following table. Downtime was experienced from **3 March 2023 to 13 April 2023 and 22 April 2023 to 28 April 2023** due to equipment failure.

Percent Uptime	
DFINAL (in)	85.457
VFINAL (ft/s)	85.457
QFINAL (MGD - Total MG)	85.457

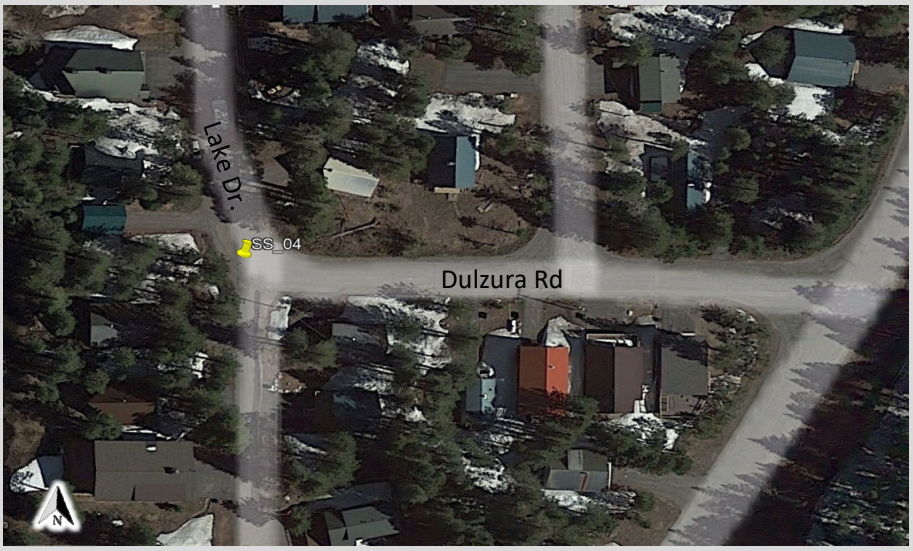
SodaSprings.FW.TFM.CA22

Flow Monitoring Site Report

Site Name

SS_04

Site Address /Location:	2258 Lake Dr Soda Springs, CA 95728			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Drive, Site in Road	Latitude:	39.2978	Pipe Size (H x W)	Pipe Shape
		Longitude:	-120.380235	10.00"x10.00"	Circular



Manhole #	System Characteristics
	Residential
Access	Traffic
Drive	Light

ADS Project Name:	SodaSprings.FW.TFM.CA22
ADS Project Number:	22874.11.325

Installation Information

Installation Date:	Installation Type:
Wednesday, December 21, 2022	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Downstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 5 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
1:10:00 PM	10.00"x10.00"
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
1.13	N/A
Downlooker Physical Offset (in)	Measurement Confidence (in)
N/A	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.4	-
Silt (in)	Silt Type
-	None

Hydraulic Comments:
Low depth, slow velocity, smooth flow

Manhole / Pipe Information:

Manhole Depth (Approx. Ft):	Manhole Configuration
10ft	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in.)	Manhole Diameter (Approx. in):
30"	54"
Manhole Cover	Manhole Frame
Unbolted	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Drilled Pavement / Concrete

Additional Site Info. / Comments:

Hydrograph Report

SS_04

Flow Monitor

SS_04

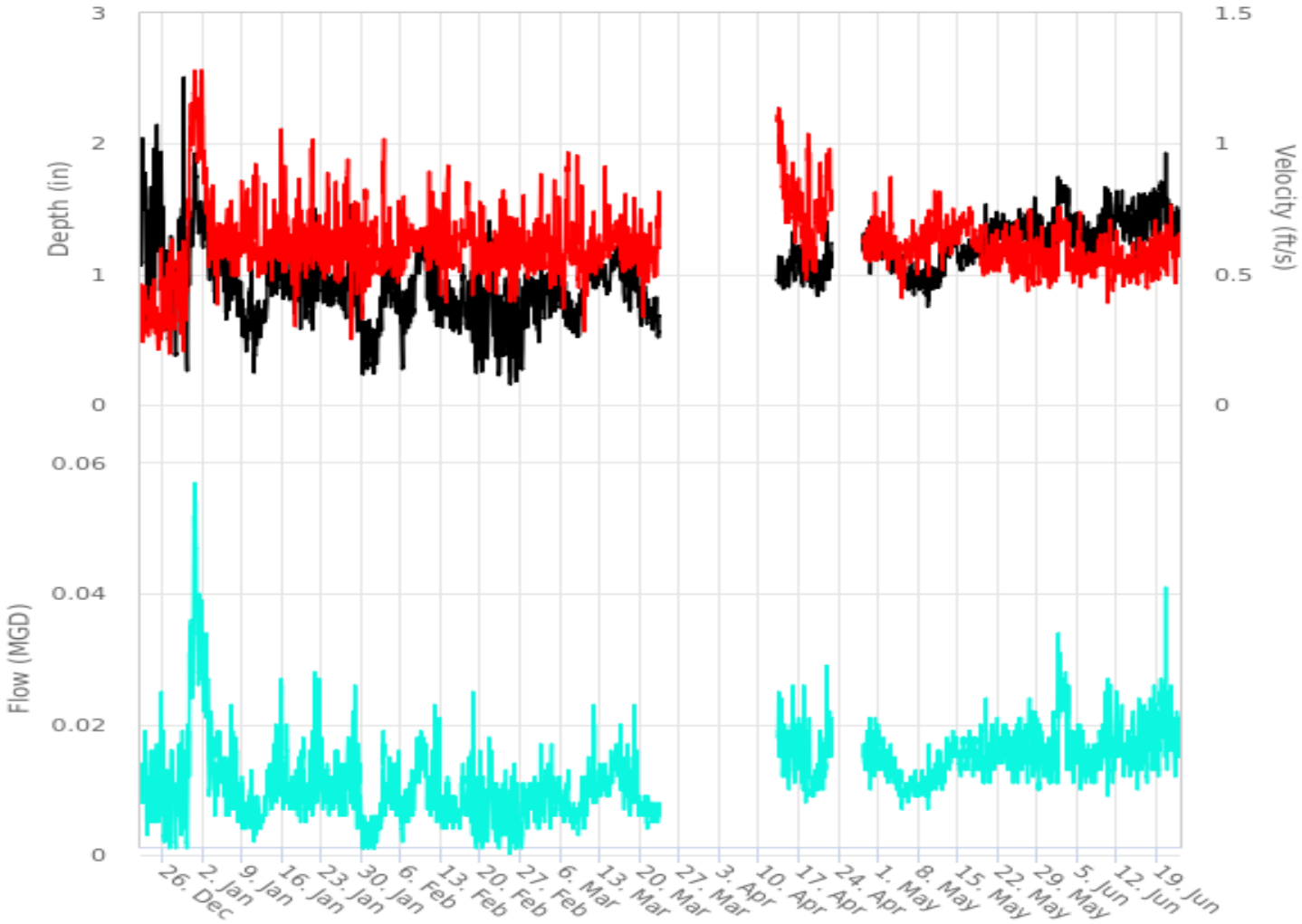
Pipe Height
10.00
in

Report Period

12/22/2022
To
06/22/2023

Legend

DFINAL
QFINAL
VFINAL



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Hayward, CA 94545

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Scattergraph Report

SS_04

Flow Monitor

SS_04

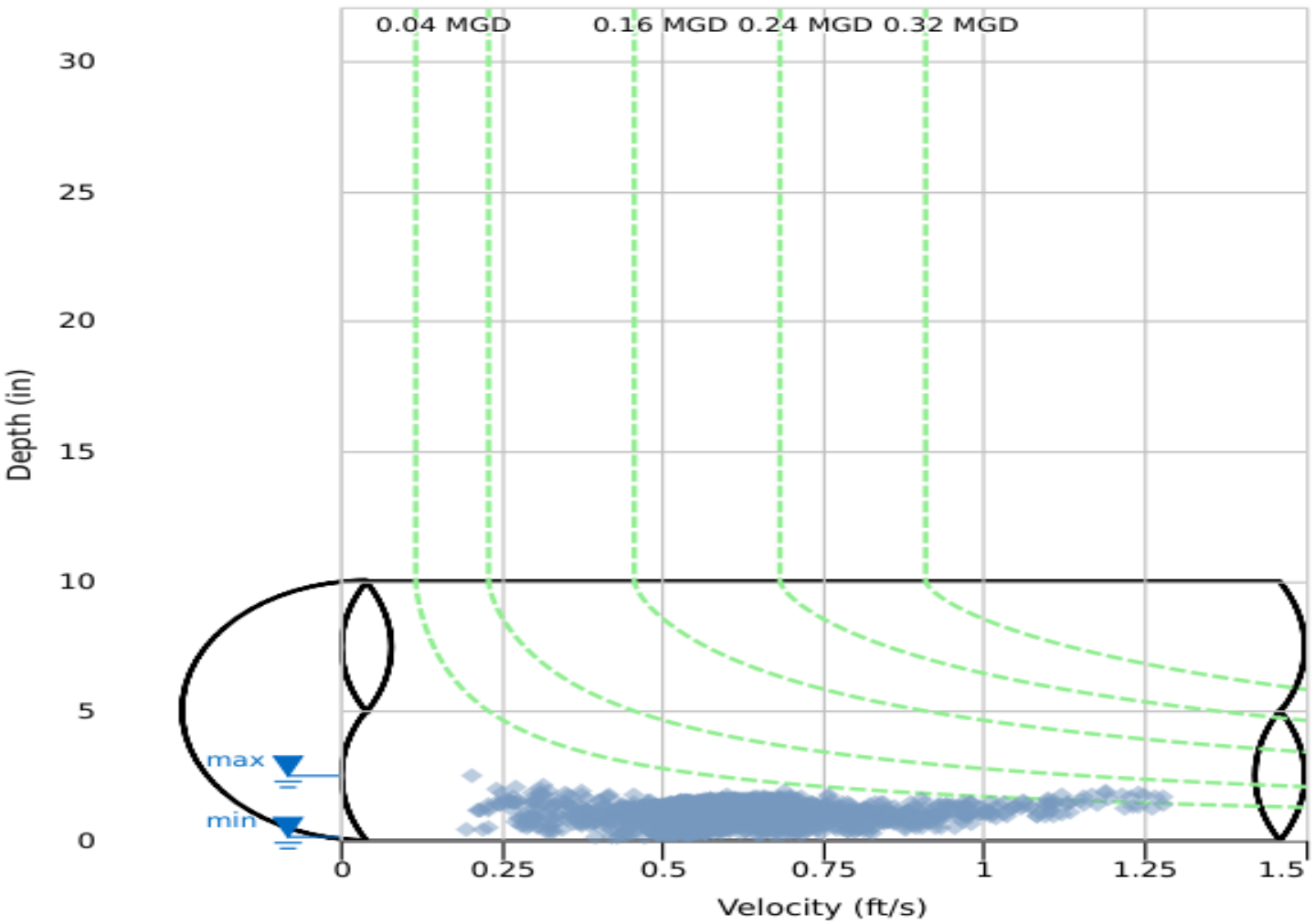
Pipe Height
10.00
in

Report Period

12/22/2022
To
06/22/2023

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth



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Hayward, CA 94545

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Daily Tabular Report

12/22/2022 00:00 - 06/22/2023 23:59
SS_04Pipe: Round (10 in H), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
12/22/2022	03:20	1.05	08:40	2.40	1.52	15:35	0.18	21:00	0.64	0.36	15:35	0.005	21:00	0.027	0.012	0.012
12/23/2022	06:40	0.60	21:50	2.37	1.20	19:00	0.22	19:25	0.61	0.34	06:35	0.002	21:50	0.038	0.008	0.008
12/24/2022	11:50	0.37	08:15	2.74	1.24	12:30	0.20	09:20	0.98	0.36	11:50	0.001	09:50	0.053	0.009	0.009
12/25/2022	22:40	0.91	15:55	2.33	1.48	09:20	0.19	17:20	0.67	0.32	22:40	0.004	21:25	0.038	0.011	0.011
12/26/2022	08:05	0.42	00:10	3.82	0.86	16:00	0.20	11:00	0.84	0.40	08:05	0.001	00:10	0.077	0.007	0.007
12/27/2022	02:30	0.43	16:30	2.28	0.90	02:05	0.18	16:30	0.85	0.45	02:30	0.001	16:30	0.051	0.008	0.008
12/28/2022	06:20	0.34	18:50	2.12	0.87	01:50	0.25	18:50	0.92	0.42	06:30	0.001	18:50	0.050	0.007	0.007
12/29/2022	23:55	0.54	16:55	3.03	1.16	16:25	0.18	13:10	0.75	0.39	23:55	0.002	09:10	0.026	0.009	0.009
12/30/2022	05:15	0.16	09:45	2.15	1.02	00:05	0.23	22:25	1.26	0.76	05:15	0.000	09:45	0.060	0.018	0.018
12/31/2022	02:05	1.21	15:10	2.27	1.57	02:15	0.92	17:55	1.44	1.14	02:15	0.022	15:15	0.075	0.041	0.041
01/01/2023	22:10	1.18	15:15	1.98	1.39	14:55	0.82	21:30	1.41	1.08	14:55	0.021	15:15	0.055	0.032	0.032
01/02/2023	23:50	1.04	13:20	1.74	1.36	22:10	0.60	00:00	1.26	0.84	23:50	0.012	13:20	0.043	0.024	0.024
01/03/2023	23:45	0.85	13:05	1.46	1.10	21:05	0.48	16:45	1.03	0.67	03:10	0.009	13:10	0.027	0.014	0.014
01/04/2023	06:35	0.75	17:40	1.51	1.05	13:55	0.32	17:40	0.90	0.58	03:05	0.005	17:40	0.030	0.012	0.012
01/05/2023	23:55	0.80	20:55	1.34	1.05	07:55	0.43	23:10	0.92	0.62	23:45	0.007	20:55	0.021	0.012	0.012
01/06/2023	01:00	0.65	16:40	1.44	0.84	00:40	0.46	08:10	0.89	0.66	00:40	0.005	20:35	0.021	0.010	0.010
01/07/2023	10:45	0.75	05:25	3.09	1.04	13:50	0.44	00:05	1.01	0.60	05:00	0.006	05:25	0.054	0.012	0.012
01/08/2023	23:20	0.53	14:10	1.11	0.77	02:15	0.38	19:05	0.94	0.62	12:10	0.004	17:25	0.015	0.008	0.008
01/09/2023	15:45	0.38	10:40	0.80	0.57	23:55	0.49	18:25	0.94	0.71	01:30	0.003	08:55	0.010	0.006	0.006
01/10/2023	23:55	0.27	12:25	1.25	0.70	07:40	0.43	21:30	0.99	0.62	23:55	0.002	08:50	0.019	0.007	0.007
01/11/2023	00:50	0.22	20:25	1.02	0.55	17:55	0.43	07:30	1.12	0.70	00:50	0.001	16:00	0.015	0.005	0.005
01/12/2023	01:20	0.47	22:30	0.93	0.64	01:25	0.36	21:35	0.90	0.58	01:25	0.003	22:30	0.012	0.006	0.006
01/13/2023	02:30	0.65	20:50	1.27	0.92	00:10	0.41	17:50	0.86	0.60	02:10	0.005	20:50	0.020	0.010	0.010
01/14/2023	02:25	0.82	23:15	2.46	1.06	12:00	0.41	23:15	1.04	0.61	04:20	0.006	23:15	0.070	0.013	0.013
01/15/2023	01:15	0.77	01:25	1.96	1.07	10:45	0.44	18:20	1.23	0.72	01:05	0.007	01:25	0.049	0.015	0.015
01/16/2023	06:15	0.77	17:20	1.53	0.97	05:30	0.41	08:55	1.05	0.65	05:30	0.006	17:20	0.030	0.011	0.011
01/17/2023	23:35	0.76	08:40	1.17	0.90	19:30	0.37	15:05	0.90	0.58	19:30	0.006	21:45	0.017	0.009	0.009
01/18/2023	03:00	0.69	05:55	1.53	0.92	06:15	0.28	21:50	0.90	0.62	17:50	0.006	08:30	0.020	0.010	0.010
01/19/2023	05:25	0.53	05:35	2.09	0.97	01:40	0.43	07:35	1.20	0.63	05:30	0.004	05:35	0.057	0.011	0.011
01/20/2023	02:25	0.64	19:35	1.39	0.86	07:25	0.37	18:25	1.00	0.60	03:30	0.004	18:25	0.027	0.009	0.009
01/21/2023	06:55	0.55	17:40	3.10	0.95	14:40	0.40	17:40	1.25	0.72	14:45	0.005	17:40	0.116	0.013	0.013
01/22/2023	03:15	0.78	11:05	3.28	1.03	15:35	0.42	11:05	1.01	0.61	23:50	0.007	11:05	0.102	0.012	0.012
01/23/2023	17:55	0.74	08:30	1.26	0.92	14:15	0.37	21:40	0.94	0.60	01:05	0.006	08:35	0.018	0.010	0.010
01/24/2023	17:20	0.70	08:05	1.19	0.85	23:35	0.41	01:30	0.90	0.63	17:25	0.005	21:40	0.015	0.009	0.009
01/25/2023	02:20	0.76	19:50	1.26	0.94	20:10	0.37	10:20	1.00	0.61	02:20	0.005	16:20	0.023	0.010	0.010
01/26/2023	17:10	0.66	12:35	1.30	0.87	04:25	0.41	23:15	1.10	0.59	17:00	0.005	12:35	0.023	0.009	0.009
01/27/2023	06:20	0.62	13:45	1.45	0.95	06:30	0.45	12:20	1.14	0.69	06:20	0.005	13:45	0.025	0.012	0.012
01/28/2023	23:35	0.48	13:20	2.35	1.24	02:05	0.20	13:20	1.11	0.55	23:55	0.004	13:20	0.070	0.013	0.013
01/29/2023	00:10	0.50	00:20	1.69	0.86	03:00	0.19	10:05	0.91	0.55	23:45	0.002	00:25	0.025	0.009	0.009
01/30/2023	05:55	0.22	11:55	0.92	0.43	12:05	0.22	00:30	1.13	0.62	05:55	0.001	08:35	0.009	0.003	0.003
01/31/2023	02:15	0.21	11:15	0.85	0.42	06:50	0.39	17:25	0.85	0.56	02:15	0.001	18:25	0.009	0.003	0.003
02/01/2023	02:30	0.22	18:55	0.83	0.43	02:25	0.43	09:35	0.87	0.58	02:30	0.001	06:25	0.009	0.003	0.003
02/02/2023	02:55	0.49	22:50	1.73	0.77	13:50	0.39	21:10	1.14	0.63	03:00	0.003	22:45	0.026	0.009	0.009
02/03/2023	03:25	0.73	19:45	1.20	0.91	17:35	0.41	19:55	0.87	0.59	02:15	0.006	19:55	0.020	0.009	0.009
02/04/2023	02:30	0.73	14:20	1.62	0.94	10:50	0.33	14:20	0.87	0.56	01:40	0.005	14:20	0.032	0.010	0.010
02/05/2023	23:05	0.47	10:20	1.28	0.79	08:30	0.39	11:05	0.99	0.59	23:10	0.003	10:20	0.018	0.008	0.008
02/06/2023	02:30	0.26	19:00	1.14	0.61	00:35	0.42	09:10	0.83	0.63	01:45	0.001	19:00	0.015	0.006	0.006
02/07/2023	01:35	0.54	17:25	1.11	0.71	05:10	0.52	17:40	0.77	0.63	05:10	0.004	17:40	0.015	0.007	0.007
02/08/2023	00:15	0.66	18:50	1.38	0.99	11:50	0.54	09:25	0.77	0.63	00:10	0.006	18:50	0.019	0.012	0.012
02/09/2023	02:10	1.00	09:45	1.46	1.16	01:35	0.50	08:05	0.78	0.63	01:35	0.010	08:05	0.024	0.015	0.015
02/10/2023	23:20	0.72	08:20	1.31	1.03	22:05	0.40	20:15	0.99	0.61	11:20	0.005	09:45	0.021	0.012	0.012
02/11/2023	18:35	0.65	19:15	3.39	0.92	18:45	0.36	19:15	1.46	0.63	22:45	0.005	19:15	0.154	0.011	0.011
02/12/2023	05:30	0.59	13:40	3.05	0.82	20:30	0.26	15:05	1.34	0.59	20:30	0.004	16:00	0.091	0.009	0.009
02/13/2023	10:10	0.50	18:25	1.05	0.73	21:20	0.29	08:55	0.91	0.59	10:10	0.003	19:05	0.014	0.007	0.007
02/14/2023	14:45	0.49	07:00	1.35	0.75	22:10	0.34	03:05	0.95	0.67	14:45	0.003	07:00	0.018	0.008	0.008
02/15/2023	00:00	0.55	19:45	1.02	0.69	20:20	0.39	09:25	0.84	0.59	00:00	0.003	09:00	0.013	0.006	0.006
02/16/2023	02:40	0.54	19:20	1.24	0.79	08:25	0.44	11:20	0.84	0.61	02:40	0.003	19:25	0.018	0.008	0.008
02/17/2023	12:55	0.57	21:45	2.64	0.72	05:20	0.51	16:40	0.96	0.70	20:30	0.005	21:45	0.063	0.008	0.008
02/18/2023	10:45	0.32	12:00	2.86	0.74	11:45	0.31	12:15	1.23	0.62	10:45	0.002	12:00	0.098	0.008	0.008
02/19/2023	03:40	0.22	17:45	1.51	0.59	14:10	0.43	17:30	0.94	0.58	04:00	0.001	17:45	0.030	0.005	0.005
02/20/2023	02:20	0.24	20:25	1.15	0.54	17:00	0.34	09:35	0.94	0.58	02:25	0.001	08:45	0.015	0.005	0.005
02/21/2023	02:00	0.33	14:35	2.50	0.89	08:40	0.36	14:35	1.09	0.55	02:15	0.001	14:35	0.075	0.009	0.009
02/22/2023	15:40	0.30	17:55	2.11	0.62	17:20	0.32	18:20	0.91	0.57	15:40	0.002	17:55	0.040	0.005	0.005
02/23/2023	14:30	0.19	10:30	1.44	0.49	20:05	0.41	22:10	0.96	0.60	02:05	0.001	10:30	0.017	0.004	0.004
02/24/2023	23:55	0.23	08:15	1.46	0.58	23:20	0.41	08:00	0.98	0.63	23:55	0.001	08:15	0.025	0.005	0.005
02/25/2023	02:55	0.14	20:15	3.19	0.60	22:40	0.25	20:30	1.02	0.55	02:55	0.000	20:15	0.055	0.006	0.006
02/26/2023	02:00	0.16	06:00	1.70	0.49	05:00	0.38	06:00	1.12	0.56	05:35	0.001	06:00	0.045	0.004	0.004
02/27/2023	07:45	0.24	09:00	1.67	0.60	08:45	0.42	09:00	0.98	0.59	07:45	0.001	09:00	0.038	0.006	0.006
02/28/2023	02:25	0.58	14:30	1.20	0.83	06:10	0.40	08:20	0.83	0.56	06:10	0.003	09:35	0.017	0.008	0.008
03/01/2023	23:45	0.49	13:00	1.38	0.78	21:05	0.29	10:25	0.86	0.59	23:45	0.003	10:25	0.017	0.008	0.008
03/02/2023	03:05	0.47	10:45	1.91	0.74	00:10	0.46	10:45	1.25	0.68	00:10	0.003	10:45	0.059	0.008	0.008

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
03/03/2023	04:45	0.64	13:35	1.15	0.87	23:30	0.42	16:15	0.82	0.62	04:55	0.004	09:35	0.017	0.010	0.010
03/04/2023	02:45	0.66	07:50	2.00	0.89	16:50	0.38	04:10	1.08	0.58	05:00	0.004	04:10	0.052	0.009	0.009
03/05/2023	08:00	0.68	09:40	1.22	0.85	01:00	0.39	15:35	0.94	0.59	00:55	0.004	12:15	0.016	0.009	0.009
03/06/2023	22:50	0.59	10:35	1.11	0.80	10:50	0.32	20:25	0.89	0.55	13:50	0.004	07:15	0.013	0.007	0.007
03/07/2023	01:30	0.54	22:15	1.57	0.70	23:00	0.40	07:05	1.03	0.68	23:00	0.003	22:15	0.019	0.008	0.008
03/08/2023	20:45	0.44	21:00	1.14	0.63	03:25	0.44	20:05	1.10	0.63	03:25	0.004	21:00	0.014	0.006	0.006
03/09/2023	00:40	0.50	23:15	1.12	0.73	23:35	0.31	16:25	0.92	0.56	01:10	0.003	16:40	0.015	0.007	0.007
03/10/2023	06:15	0.75	17:25	1.35	0.98	00:20	0.26	17:30	0.68	0.50	00:20	0.004	17:25	0.019	0.009	0.009
03/11/2023	17:10	0.83	19:25	2.70	1.01	17:20	0.42	21:00	1.31	0.56	17:20	0.006	19:25	0.097	0.011	0.011
03/12/2023	03:00	0.87	20:40	1.31	0.98	04:05	0.46	18:30	1.00	0.56	03:05	0.007	18:30	0.019	0.010	0.010
03/13/2023	19:50	0.80	08:55	1.21	0.99	01:35	0.46	18:50	0.98	0.63	11:35	0.008	19:55	0.018	0.011	0.011
03/14/2023	13:35	0.81	19:05	1.33	0.95	13:55	0.53	19:10	0.81	0.65	01:45	0.008	19:10	0.022	0.011	0.011
03/15/2023	06:55	0.98	14:50	1.23	1.11	02:10	0.55	19:35	0.86	0.64	09:40	0.010	19:35	0.021	0.014	0.014
03/16/2023	15:20	0.91	12:15	1.45	1.07	18:25	0.50	12:15	0.87	0.61	00:15	0.000	12:15	0.027	0.012	0.012
03/17/2023	10:25	0.73	21:35	1.54	0.97	08:25	0.41	09:10	1.00	0.61	05:25	0.006	21:35	0.027	0.011	0.011
03/18/2023	05:30	0.69	22:30	1.43	0.95	03:55	0.39	22:05	0.87	0.61	03:55	0.004	22:05	0.025	0.011	0.011
03/19/2023	23:25	0.62	11:15	1.79	0.90	10:55	0.41	11:20	0.93	0.60	10:55	0.004	11:15	0.039	0.010	0.010
03/20/2023	04:10	0.60	09:20	1.12	0.78	12:10	0.29	13:25	0.92	0.58	10:45	0.005	18:10	0.012	0.007	0.007
03/21/2023	17:25	0.59	09:40	1.02	0.69	08:30	0.37	20:15	0.77	0.58	06:20	0.004	09:45	0.013	0.006	0.006
03/22/2023	23:55	0.54	11:15	1.05	0.69	08:15	0.37	21:50	0.81	0.58	02:50	0.004	11:15	0.013	0.006	0.006
03/23/2023	03:55	0.50	07:05	0.71	0.55	07:35	0.60	05:40	0.93	0.72	03:35	0.004	07:05	0.010	0.005	0.002
03/24/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/25/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/26/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/27/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/28/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/29/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/30/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/31/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/01/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/02/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/03/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/04/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/05/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/06/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/07/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/08/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/09/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/10/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/11/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/12/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/13/2023	12:00	0.84	08:15	1.26	1.01	12:00	0.75	07:25	1.32	1.01	12:00	0.011	15:15	0.032	0.019	0.016
04/14/2023	00:45	0.88	21:55	1.25	1.00	12:40	0.63	07:20	1.23	0.82	01:40	0.000	07:20	0.028	0.015	0.015
04/15/2023	06:15	0.84	19:55	1.41	1.07	09:25	0.59	10:55	1.02	0.77	04:20	0.000	20:15	0.029	0.016	0.016
04/16/2023	02:30	0.94	11:40	1.39	1.10	11:25	0.58	09:55	1.01	0.75	03:40	0.000	09:55	0.027	0.016	0.016
04/17/2023	13:40	0.86	17:05	2.47	1.07	14:30	0.43	17:05	1.06	0.67	15:55	0.008	17:05	0.072	0.014	0.014
04/18/2023	10:50	0.84	18:30	1.31	1.01	02:05	0.40	14:55	1.19	0.74	02:05	0.007	18:30	0.028	0.014	0.014
04/19/2023	23:45	0.85	09:15	1.24	0.97	18:00	0.41	22:50	0.91	0.61	14:25	0.007	21:50	0.019	0.011	0.011
04/20/2023	11:25	0.78	16:35	1.29	0.97	11:30	0.54	16:35	1.07	0.77	11:30	0.007	16:35	0.028	0.014	0.014
04/21/2023	01:20	0.86	09:00	1.52	1.04	04:05	0.56	19:15	1.04	0.74	04:05	0.009	19:15	0.033	0.015	0.015
04/22/2023	01:25	0.95	14:00	1.24	1.04	12:30	0.69	08:30	1.05	0.88	12:30	0.013	09:05	0.025	0.017	0.010
04/23/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/24/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/25/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/26/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/27/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/28/2023	18:00	1.08	11:05	1.46	1.24	18:00	0.44	07:10	0.70	0.62	18:00	0.009	21:05	0.021	0.016	0.011
04/29/2023	12:25	0.98	09:50	1.52	1.23	12:10	0.49	19:35	0.76	0.62	12:30	0.009	09:50	0.024	0.015	0.015
04/30/2023	07:05	0.99	11:20	1.56	1.23	07:05	0.40	08:20	0.89	0.64	07:05	0.007	11:20	0.030	0.016	0.016
05/01/2023	13:45	1.06	08:10	1.43	1.18	05:45	0.52	17:25	0.80	0.63	05:45	0.012	19:05	0.019	0.015	0.015
05/02/2023	23:30	1.04	09:45	1.29	1.14	13:20	0.49	23:55	0.85	0.61	13:55	0.010	09:55	0.018	0.013	0.013
05/03/2023	04:40	1.00	19:05	1.40	1.06	23:30	0.50	02:15	0.91	0.64	23:30	0.010	19:05	0.019	0.013	0.013
05/04/2023	10:45	0.96	10:50	1.34	1.07	02:40	0.44	17:05	0.65	0.54	02:45	0.008	10:50	0.018	0.011	0.011
05/05/2023	04:35	0.80	14:50	1.24	0.98	00:15	0.38	15:55	0.66	0.53	02:45	0.006	14:55	0.013	0.009	0.009
05/06/2023	02:55	0.87	19:45	1.23	0.95	08:35	0.50	22:10	0.72	0.60	05:20	0.008	19:50	0.014	0.010	0.010
05/07/2023	04:15	0.81	20:45	1.16	0.94	20:00	0.46	11:20	0.70	0.60	05:25	0.008	11:20	0.015	0.010	0.010
05/08/2023	06:20	0.86	19:15	1.16	0.94	06:00	0.44	15:30	0.74	0.62	03:50	0.008	15:10	0.014	0.010	0.010
05/09/2023	15:10	0.72	16:25	2.20	0.93	19:20	0.44	16:25	0.93	0.63	16:20	0.006	16:25	0.053	0.011	0.011
05/10/2023	11:25	0.88	20:10	1.15	0.96	09:55	0.58	19:55	0.89	0.69	03:00	0.009	20:00	0.018	0.012	0.012
05/11/2023	05:30	0.89	19:55	1.35	0.98	20:30	0.52	15:40	0.86	0.71	03:30	0.010	19:55	0.019	0.013	0.013
05/12/2023	11:00	0.97	22:00	1.23	1.09	01:20	0.47	22:05	0.78	0.63	01:20	0.009	22:05	0.019	0.013	0.013
05/13/2023	09:20	1.10	17:25	1.44	1.23	14:15	0.55	23:55	0.76	0.63	13:15	0.013	23:55	0.020	0.016	0.016
05/14/2023	18:50	1.07	06:55	1.43	1.23	14:05	0.58	00:05	0.80	0.67	18:45	0.014	17:00	0.021	0.017	0.017
05/15/2023	11:35	0.95	20:25	1.36	1.11	03:15	0.60	22:10	0.76	0.69	11:35	0.012	20:25	0.021	0.015	0.015
05/16/2023	06:15	0.99	20:10	1.31	1.16	11:25	0.62	21:55	0.79	0.70	11:25	0.013	20:15	0.019	0.016	0.016

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total
05/17/2023	13:40	0.91	21:00	1.35	1.16	13:35	0.59	01:05	0.78	0.67	13:40	0.009	05:55	0.020	0.015	0.015
05/18/2023	15:00	1.12	20:25	1.50	1.21	13:45	0.56	20:20	0.71	0.62	13:45	0.012	20:25	0.024	0.015	0.015
05/19/2023	11:20	1.03	20:35	1.59	1.26	11:20	0.41	20:50	0.74	0.56	11:20	0.008	20:35	0.026	0.015	0.015
05/20/2023	13:35	1.08	08:30	1.57	1.31	06:30	0.49	21:40	0.71	0.57	12:40	0.011	08:25	0.024	0.016	0.016
05/21/2023	12:40	1.10	13:00	1.52	1.33	11:50	0.48	20:25	0.70	0.59	11:50	0.012	21:15	0.023	0.017	0.017
05/22/2023	09:35	1.19	10:20	1.54	1.36	15:55	0.49	23:30	0.71	0.57	06:40	0.013	19:50	0.023	0.017	0.017
05/23/2023	13:45	1.20	12:15	1.58	1.32	13:50	0.49	07:20	0.75	0.62	13:50	0.012	12:20	0.025	0.017	0.017
05/24/2023	14:25	1.18	12:45	1.54	1.29	14:00	0.44	21:25	0.73	0.58	14:30	0.011	21:30	0.023	0.016	0.016
05/25/2023	09:45	1.09	22:25	1.71	1.29	05:55	0.45	08:40	0.75	0.57	10:45	0.010	20:00	0.027	0.016	0.016
05/26/2023	13:00	1.20	08:05	1.68	1.34	12:40	0.45	16:25	0.69	0.56	12:45	0.011	16:25	0.024	0.016	0.016
05/27/2023	04:50	1.20	18:55	1.68	1.37	07:25	0.40	11:20	0.80	0.61	04:25	0.010	12:25	0.027	0.018	0.018
05/28/2023	13:00	1.04	08:55	1.71	1.34	05:25	0.44	18:00	0.97	0.56	13:00	0.010	18:00	0.038	0.016	0.016
05/29/2023	08:45	1.07	09:15	1.82	1.27	03:40	0.42	09:15	0.88	0.55	03:40	0.009	09:15	0.039	0.015	0.015
05/30/2023	10:10	1.15	09:00	1.54	1.27	17:05	0.43	09:10	0.67	0.54	02:05	0.010	09:00	0.022	0.014	0.014
05/31/2023	05:45	1.18	19:30	1.87	1.31	13:00	0.41	19:20	0.74	0.55	13:00	0.010	19:30	0.034	0.015	0.015
06/01/2023	13:05	0.87	14:05	2.93	1.39	12:40	0.38	14:05	1.14	0.58	11:40	0.006	14:05	0.098	0.018	0.018
06/02/2023	23:40	1.33	07:50	1.75	1.61	23:40	0.49	07:45	0.74	0.66	23:40	0.014	07:50	0.030	0.024	0.024
06/03/2023	13:05	1.05	22:10	1.85	1.41	13:55	0.46	22:10	0.74	0.58	13:05	0.009	22:10	0.033	0.018	0.018
06/04/2023	07:15	1.14	12:35	2.14	1.31	04:20	0.46	19:35	0.74	0.53	07:15	0.011	12:35	0.038	0.015	0.015
06/05/2023	12:30	1.08	09:00	1.72	1.27	12:55	0.41	08:40	0.77	0.59	12:55	0.009	09:00	0.029	0.016	0.016
06/06/2023	13:20	1.12	09:15	1.44	1.26	02:40	0.48	08:45	0.62	0.54	10:45	0.011	08:50	0.019	0.014	0.014
06/07/2023	14:50	1.08	22:40	1.60	1.25	11:45	0.45	22:40	0.69	0.54	11:45	0.010	22:40	0.025	0.014	0.014
06/08/2023	13:10	1.12	19:35	1.69	1.26	01:35	0.46	19:35	0.68	0.57	03:00	0.011	19:35	0.027	0.015	0.015
06/09/2023	01:40	1.16	20:20	1.80	1.38	03:25	0.48	20:25	0.71	0.59	03:25	0.012	20:25	0.031	0.017	0.017
06/10/2023	05:00	1.08	07:05	2.72	1.43	04:55	0.35	07:40	0.98	0.57	04:55	0.007	07:05	0.071	0.018	0.018
06/11/2023	04:30	1.22	18:30	1.71	1.44	04:15	0.43	20:15	0.71	0.54	04:25	0.011	20:15	0.028	0.017	0.017
06/12/2023	16:25	1.28	12:15	1.82	1.44	05:10	0.49	12:15	0.73	0.55	16:25	0.014	12:15	0.032	0.017	0.017
06/13/2023	16:10	1.16	19:55	1.68	1.37	04:20	0.44	18:50	0.63	0.51	04:20	0.011	19:55	0.024	0.015	0.015
06/14/2023	11:50	1.20	10:50	1.75	1.39	13:10	0.45	18:25	0.66	0.54	04:50	0.011	10:50	0.025	0.016	0.016
06/15/2023	13:50	1.07	16:40	2.54	1.41	14:50	0.41	16:55	0.96	0.54	14:55	0.009	16:40	0.062	0.017	0.017
06/16/2023	13:00	1.14	17:15	1.93	1.41	04:35	0.46	17:15	0.77	0.55	04:35	0.012	17:15	0.037	0.017	0.017
06/17/2023	03:15	1.24	17:30	1.99	1.45	03:15	0.41	17:30	0.80	0.53	03:15	0.010	17:30	0.040	0.017	0.017
06/18/2023	05:30	1.28	08:50	1.81	1.46	13:55	0.43	11:00	0.79	0.56	13:55	0.012	11:00	0.034	0.018	0.018
06/19/2023	07:30	1.23	15:30	1.78	1.48	05:40	0.45	15:20	0.69	0.56	08:20	0.012	15:30	0.029	0.019	0.019
06/20/2023	19:30	0.95	11:00	4.58	1.49	19:35	0.39	11:00	1.30	0.56	19:35	0.007	11:00	0.204	0.019	0.019
06/21/2023	08:05	1.21	14:00	2.03	1.38	23:45	0.49	09:40	0.81	0.62	23:50	0.013	14:00	0.036	0.018	0.018
06/22/2023	18:25	0.82	18:40	2.53	1.36	02:05	0.45	18:40	0.92	0.57	18:20	0.007	18:40	0.064	0.017	0.017

12/22/2022 00:00 - 06/22/2023 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)
Total			1.884
Average	1.02	0.61	0.012

APPENDIX B:
SEWER MONITORING SITE SUMMARY SHEETS

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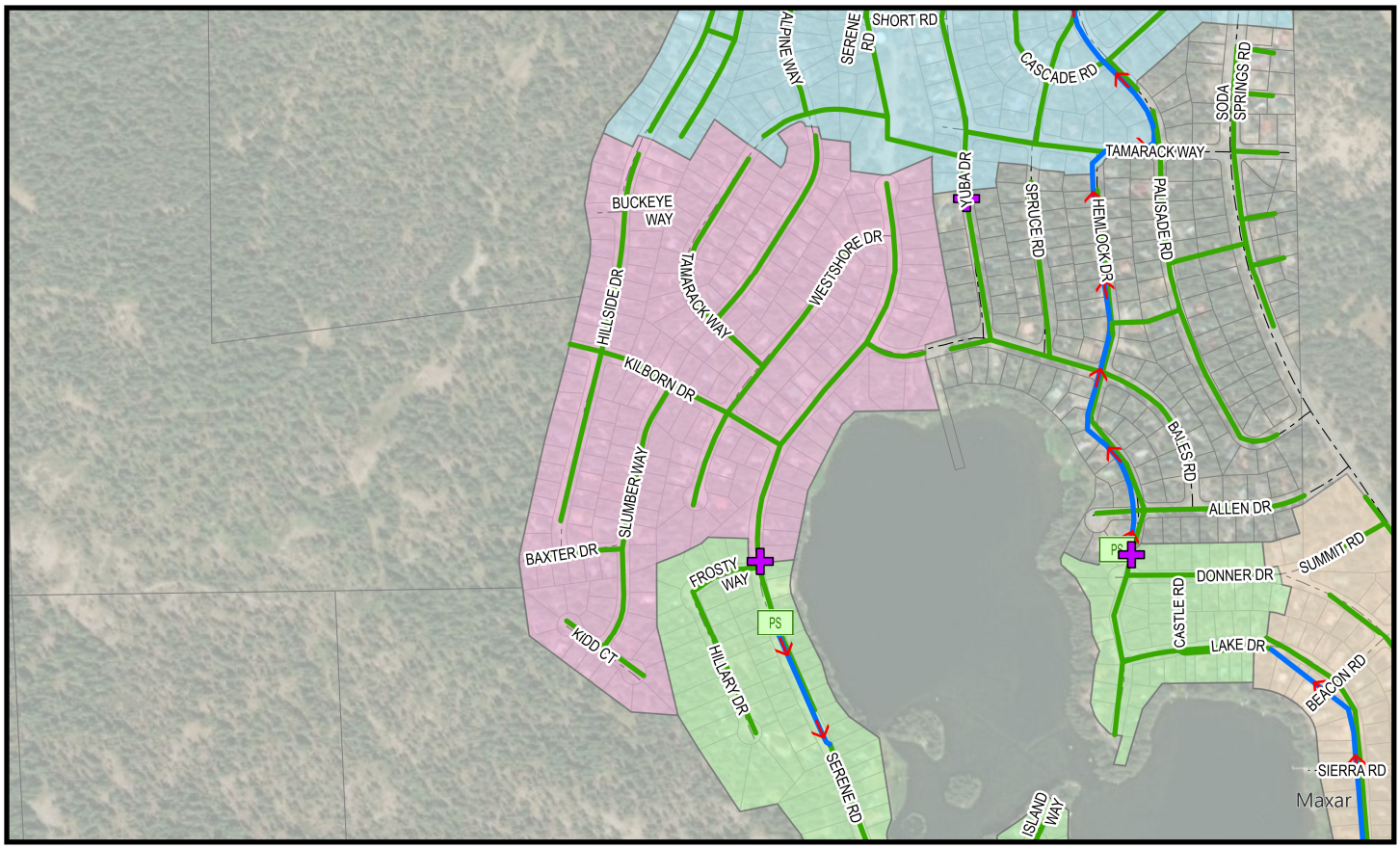
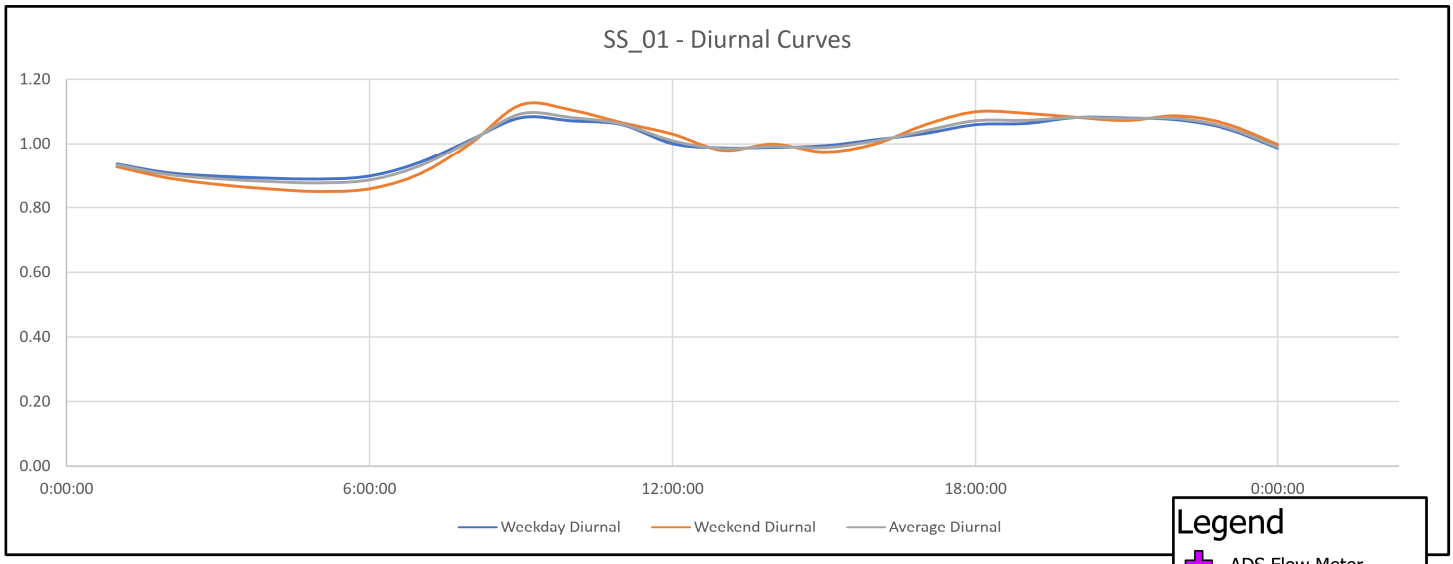




Measurement Period: December 22, 2022 - June 22, 2023
Contributing EDUs: 164

SS_01		
Model Scenario	**Average Flow (gpm)**	**Peaking Factor**
Average Day	16.9	1.09
Average Weekday	16.5	1.08
Average Weekend	17.6	1.12

Legend
- ADS Flow Meter
- Sewer Pump Station
- Force Main
- Gravity Main
- SS_01 Catchment Area
- SS_02 Catchment Area
- SS_03 Catchment Area
- SS_04 Catchment Area

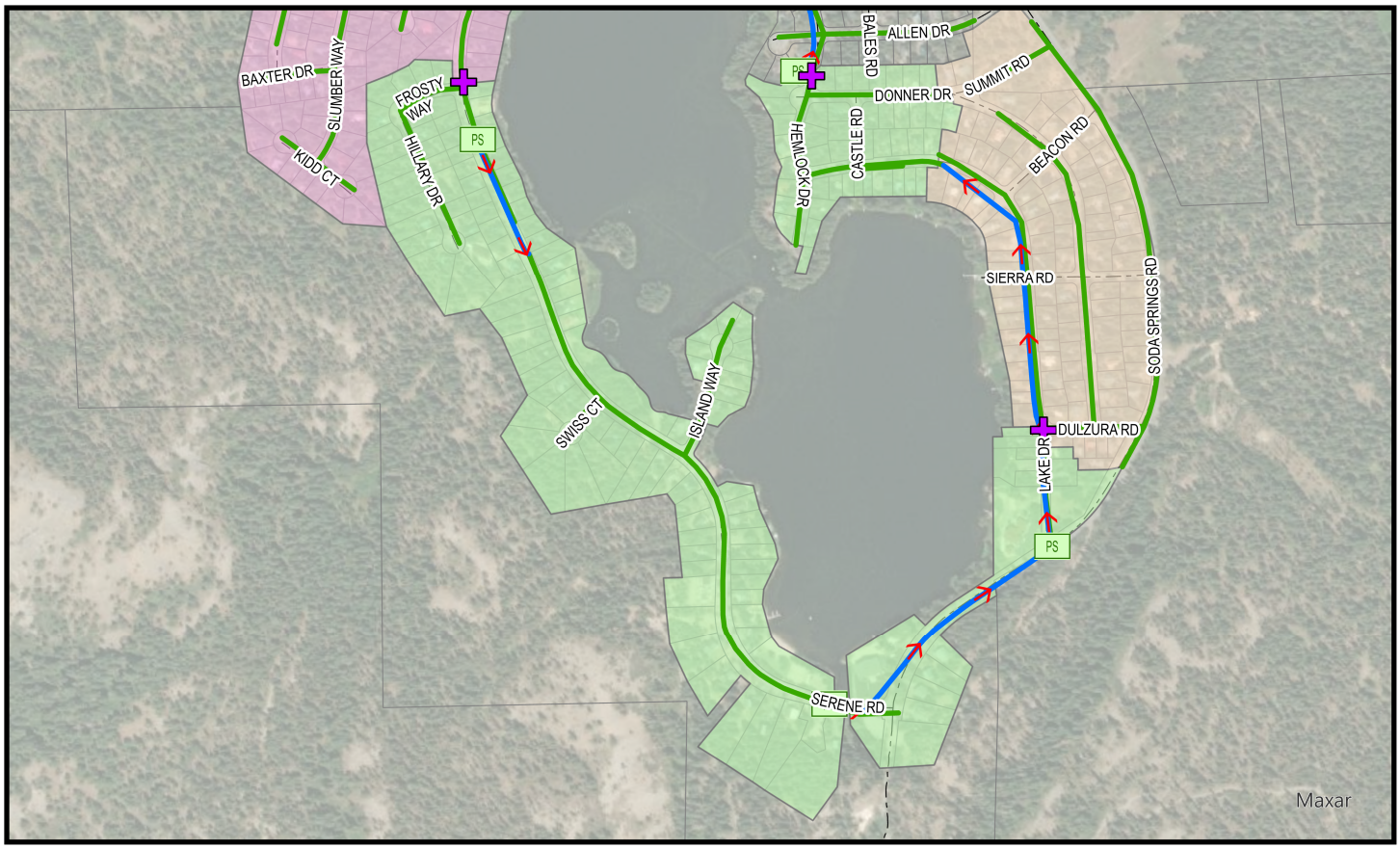
DOWL
https://www.dowl.com

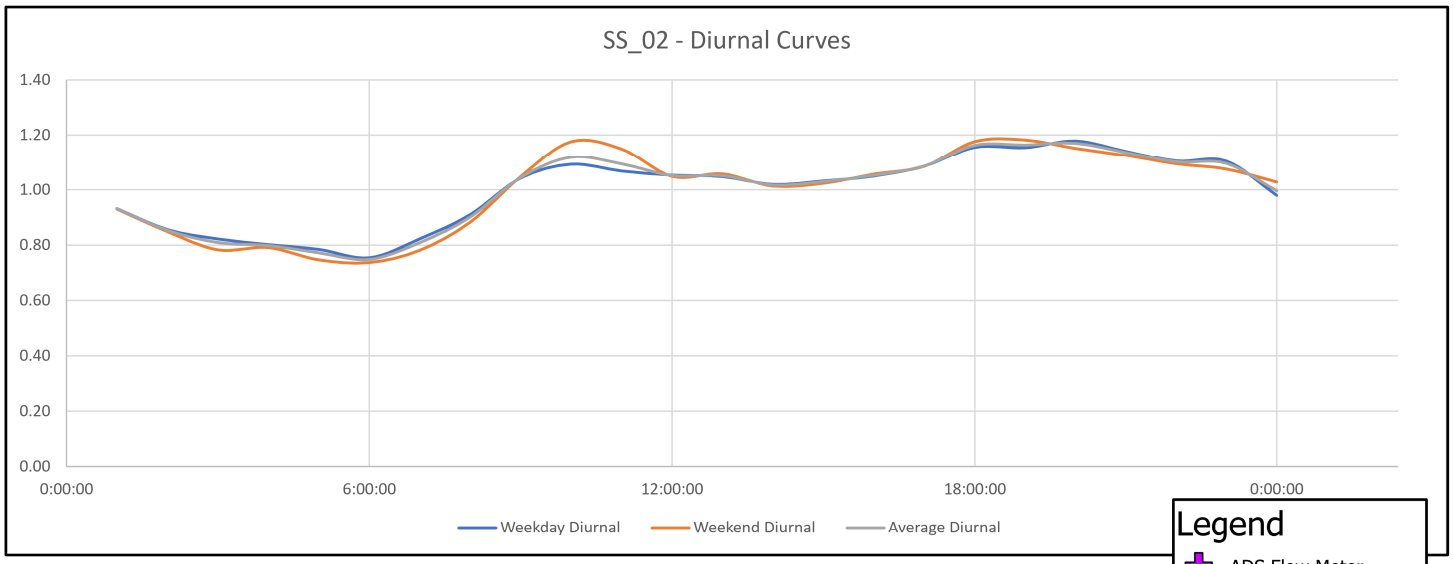
SLCWD Sewer System Catchment Area - SS_01

1" = 750'

The data contained herein does not represent survey delineation and should not be construed as a replacement for the authoritative source. No liability is assumed by DOWL as to the sufficiency or accuracy of the data.

P:\Client Projects\Sierra Lakes County Water District 653\2502 Utility Master Plan\3.0 Studies_Reports\3.4 Dwg_Figs\For Master Plan Report\Figure Creation Map_Sewer1.aprx, Editor: DJones, Printed: 9/15/2023





Measurement Period: December 22, 2022 - June 22, 2023
Contributing EDUs: 388

SS_02		
Model Scenario	**Average Flow (gpm)**	**Peaking Factor**
Average Day	43.1	1.17
Average Weekday	40.9	1.18
Average Weekend	48.6	1.18

Legend
- ADS Flow Meter
- PS — Sewer Pump Station
- Force Main
- Gravity Main
- SS_01 Catchment Area
- SS_02 Catchment Area
- SS_03 Catchment Area
- SS_04 Catchment Area

DOWL
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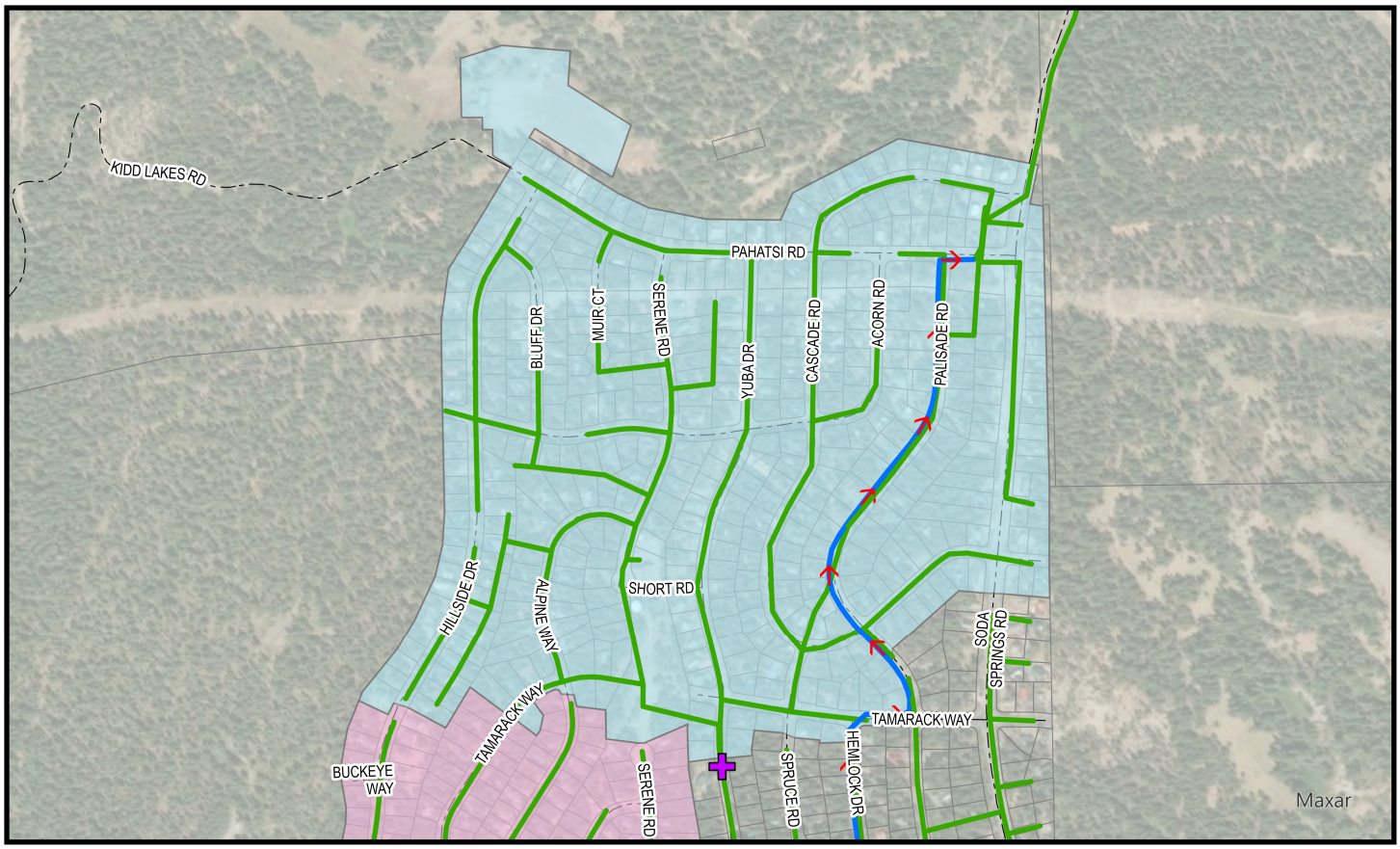
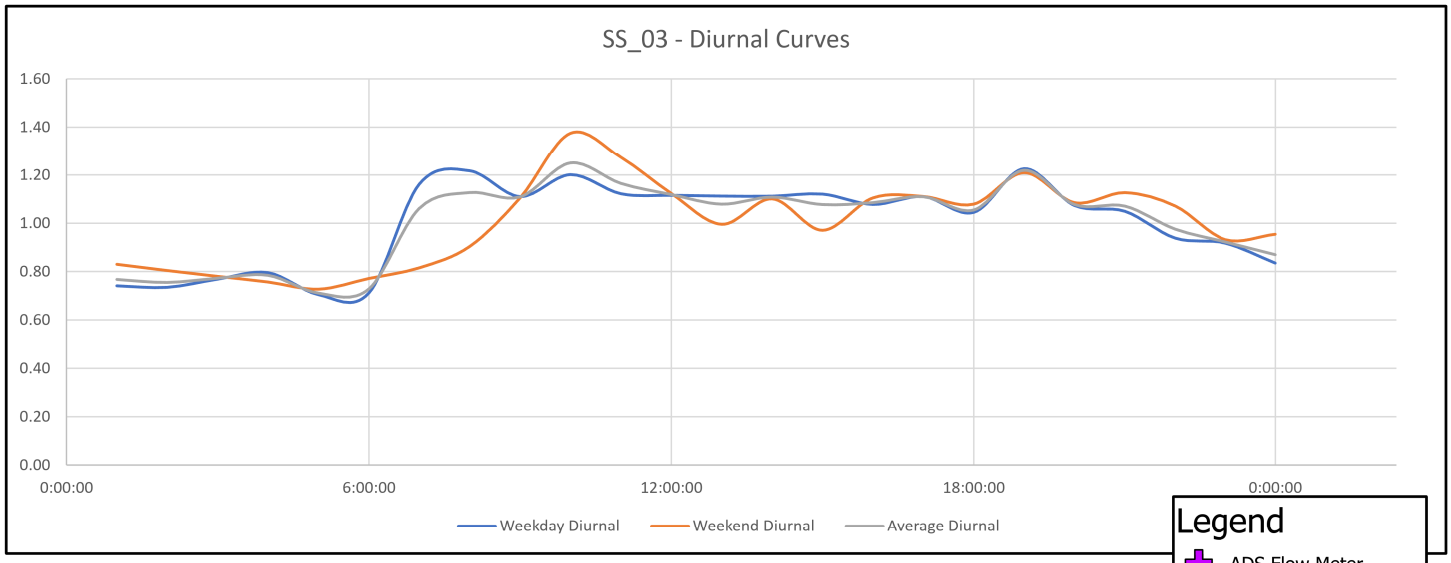
SLCWD Sewer System Catchment Area - SS_02

1" = 800'

The data contained herein does not represent survey delineation and should not be construed as a replacement for the authoritative source. No liability is assumed by DOWL as to the sufficiency or accuracy of the data.





Measurement Period: December 22, 2022 - June 22, 2023
Contributing EDUs: 311

SS_03		
Model Scenario	**Average Flow (gpm)**	**Peaking Factor**
Average Day	52.3	1.25
Average Weekday	52.3	1.23
Average Weekend	52.3	1.37

Legend
- ADS Flow Meter
- PS Sewer Pump Station
- Force Main
- Gravity Main
- SS_01 Catchment Area
- SS_02 Catchment Area
- SS_03 Catchment Area
- SS_04 Catchment Area

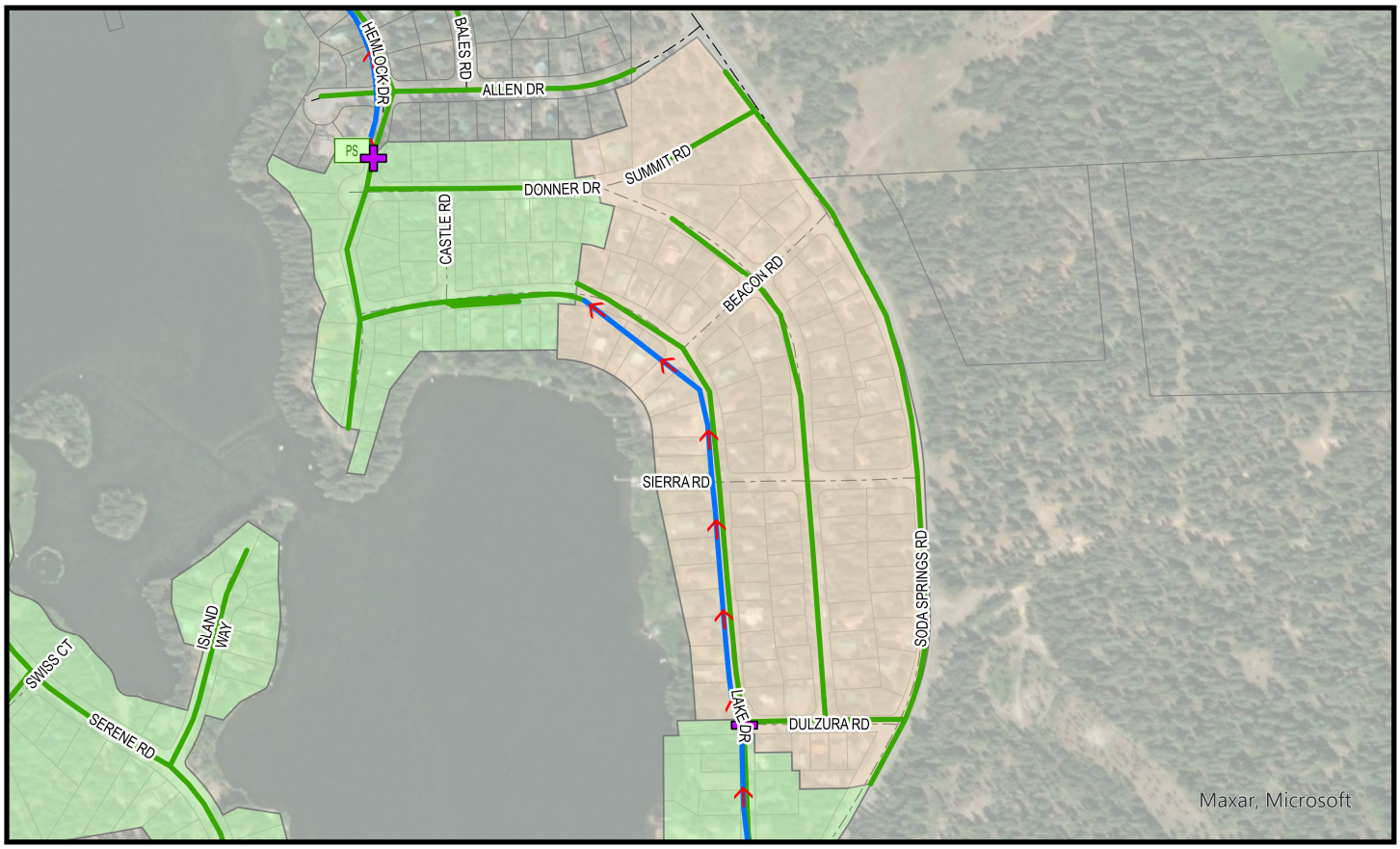
DOWL
https://www.dowl.com

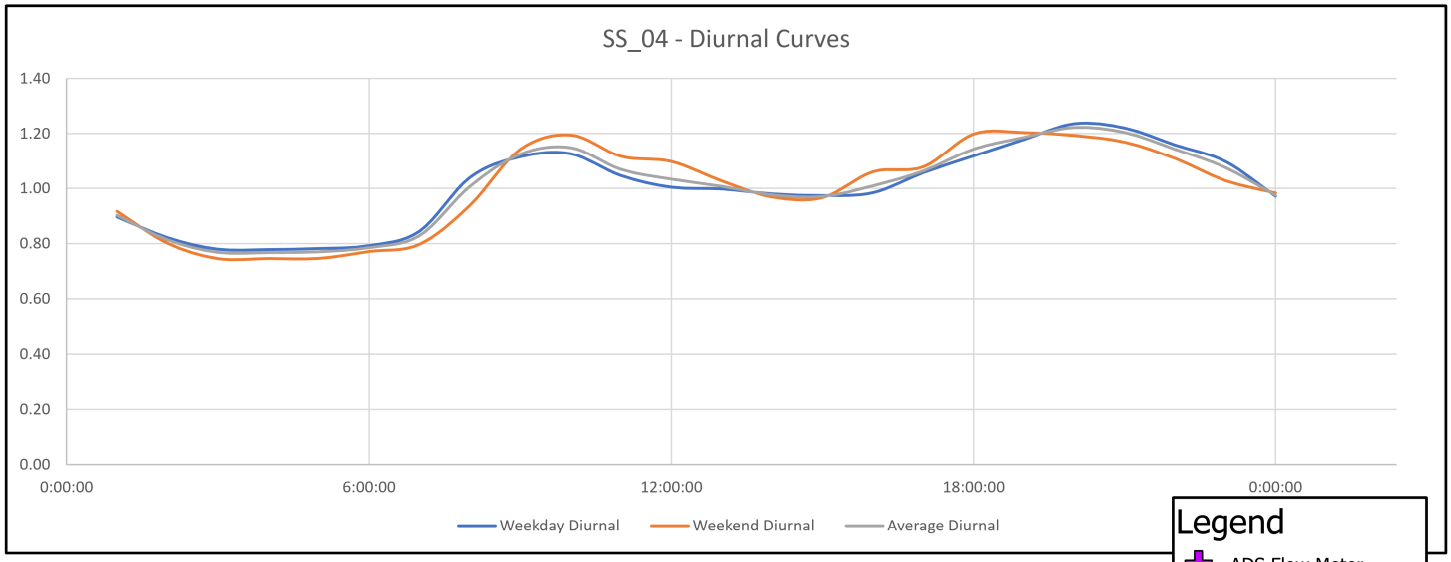
SLCWD Sewer System Catchment Area - SS_03

1" = 750'

The data contained herein does not represent survey delineation and should not be construed as a replacement for the authoritative source. No liability is assumed by DOWL as to the sufficiency or accuracy of the data.

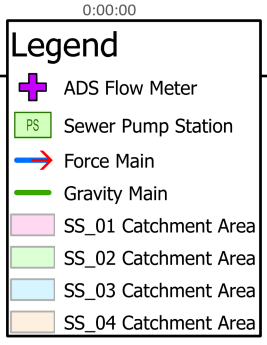
P:\Client Projects\Sierra Lakes County Water District 653\2502 Utility Master Plan\3.0 Studies_Reports\3.4 Dwg_Figs\For Master Plan Report\Figure Creation Map_Sewer1.aprx, Editor: DJones, Printed: 9/15/2023





Measurement Period: December 22, 2022 - June 22, 2023
Contributing EDUs: 82

SS_04		
Model Scenario	**Average Flow (gpm)**	**Peaking Factor**
Average Day	8.4	1.22
Average Weekday	7.9	1.24
Average Weekend	9.4	1.20



DOWL
https://www.dowl.com

SLCWD Sewer System Catchment Area - SS_04

N
1" = 500'

The data contained herein does not represent survey delineation and should not be construed as a replacement for the authoritative source. No liability is assumed by DOWL as to the sufficiency or accuracy of the data.

APPENDIX C:
MODEL CALIBRATION GRAPHS

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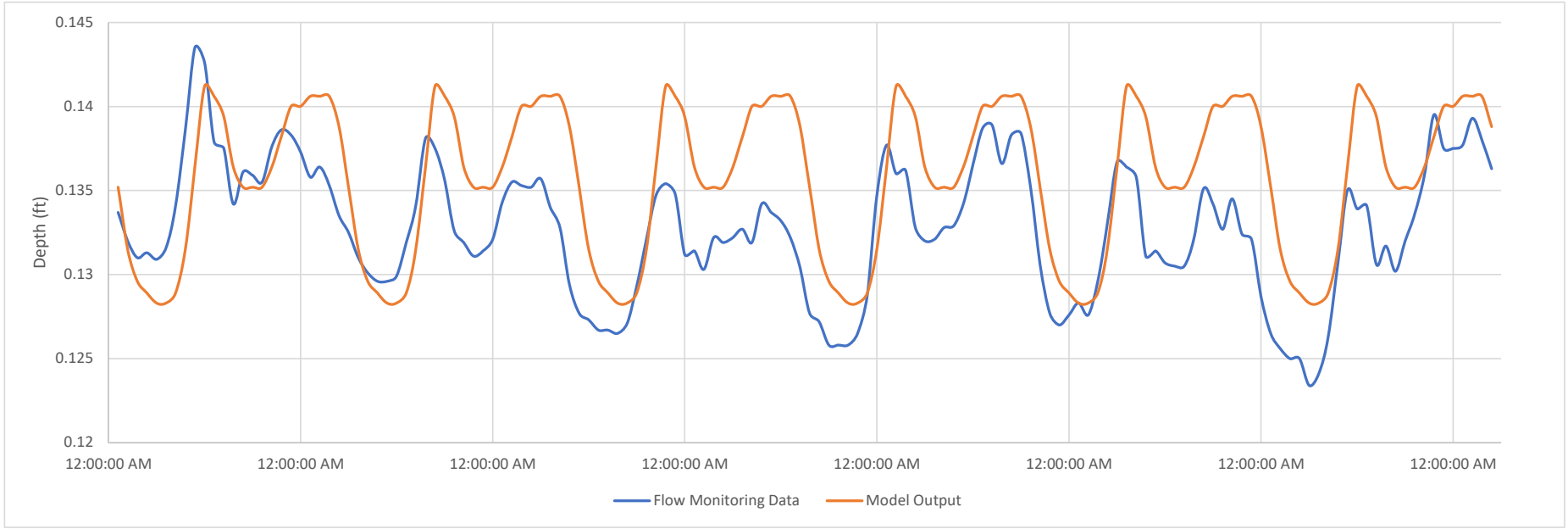
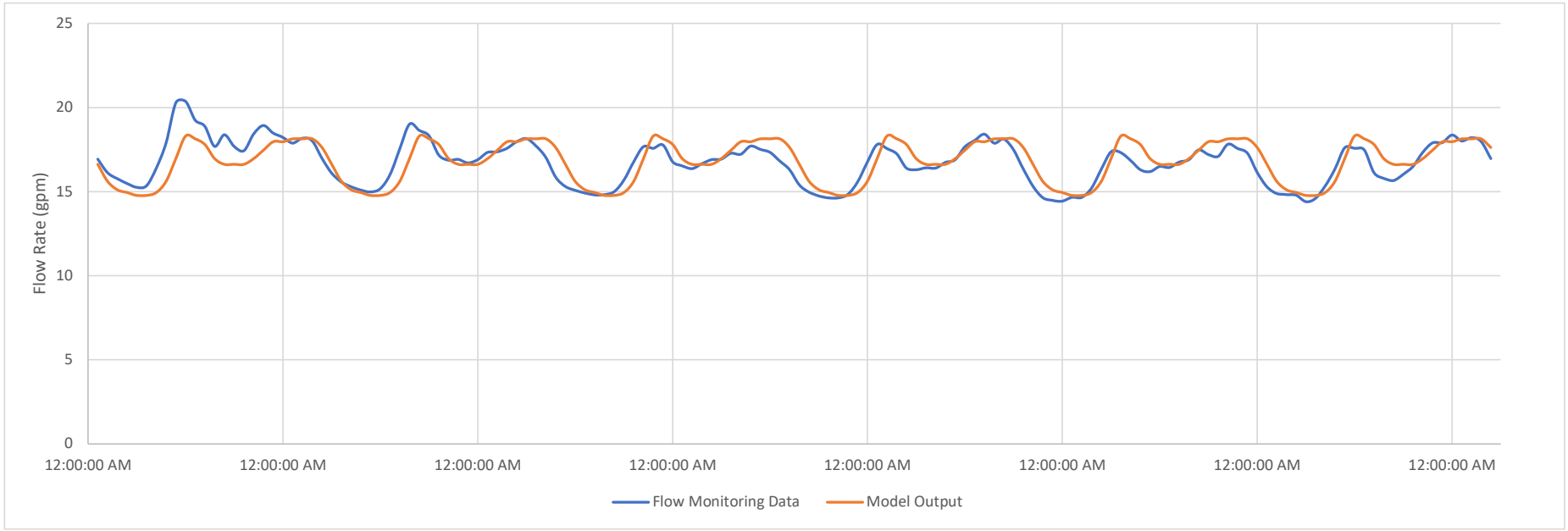
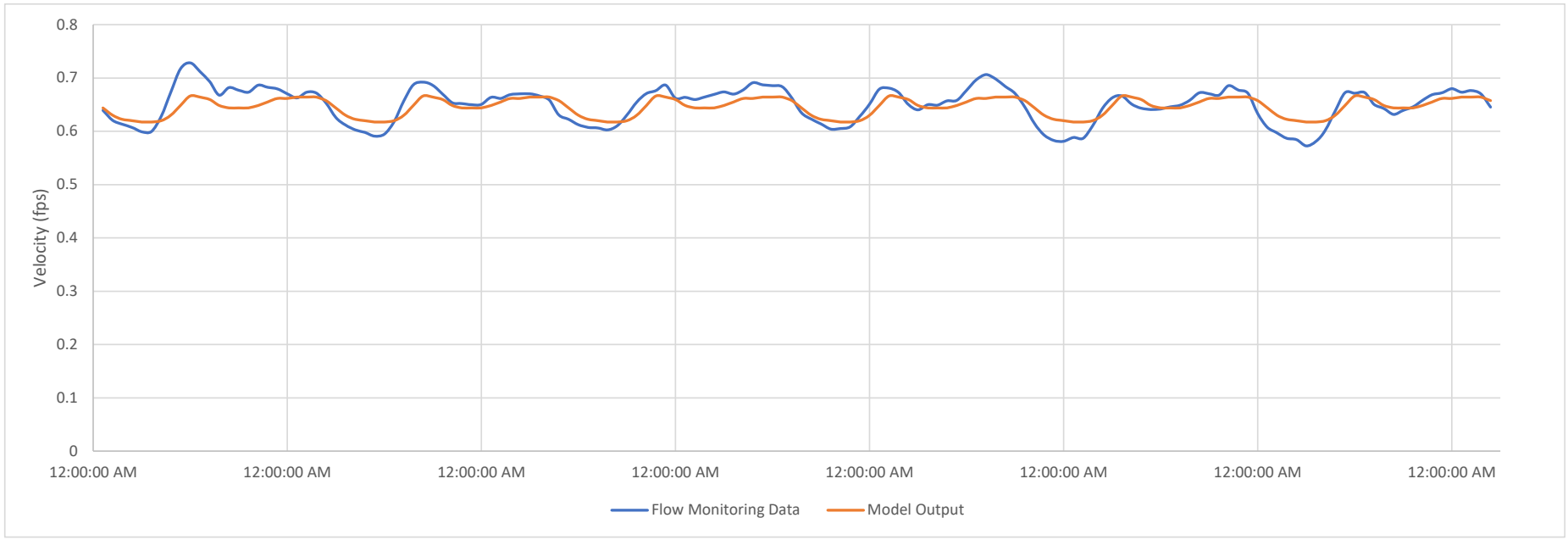
SS_01


0.145
0.14
0.135
0.13
0.125
0.12
Depth (ft)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

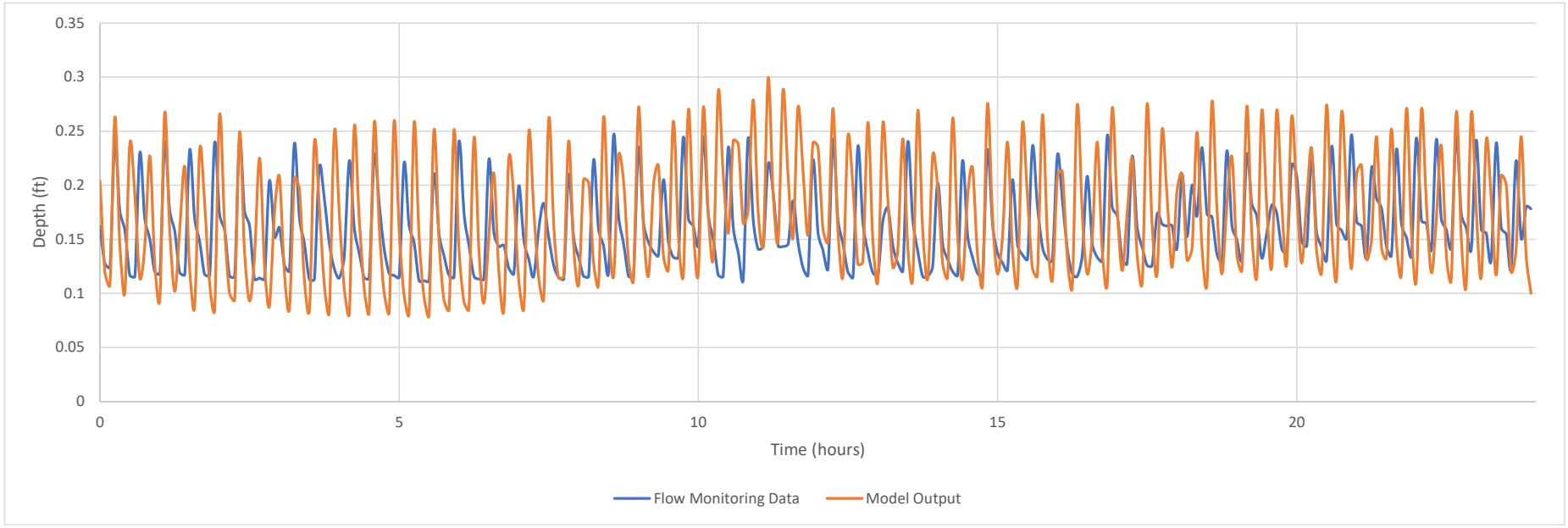
SS_01


25
20
15
10
5
0
Flow Rate (gpm)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

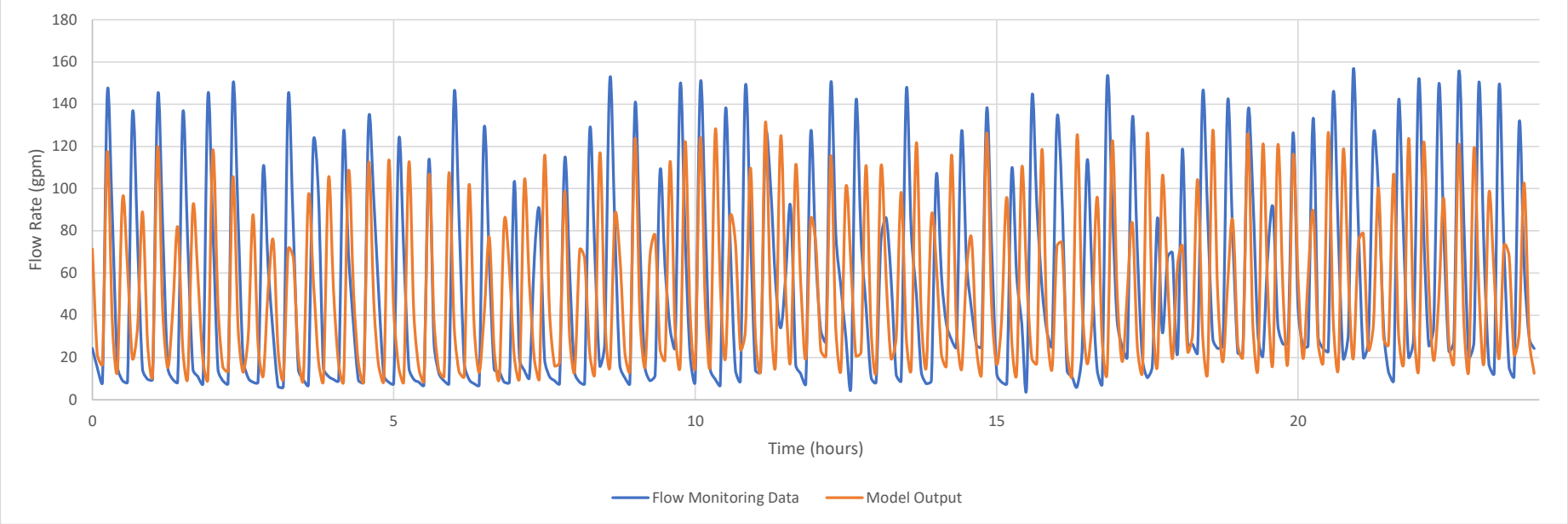
SS_01


0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Velocity (fps)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

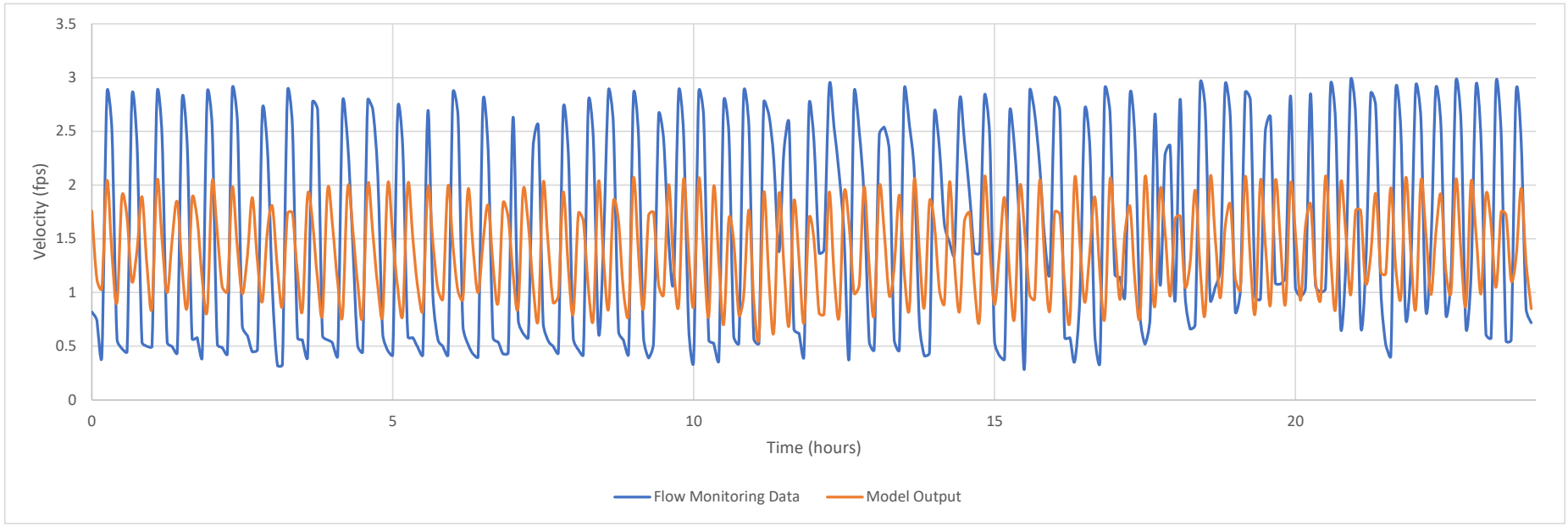
SS_02


0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Depth (ft)
0
5
10
15
20
Time (hours)
Flow Monitoring Data
Model Output

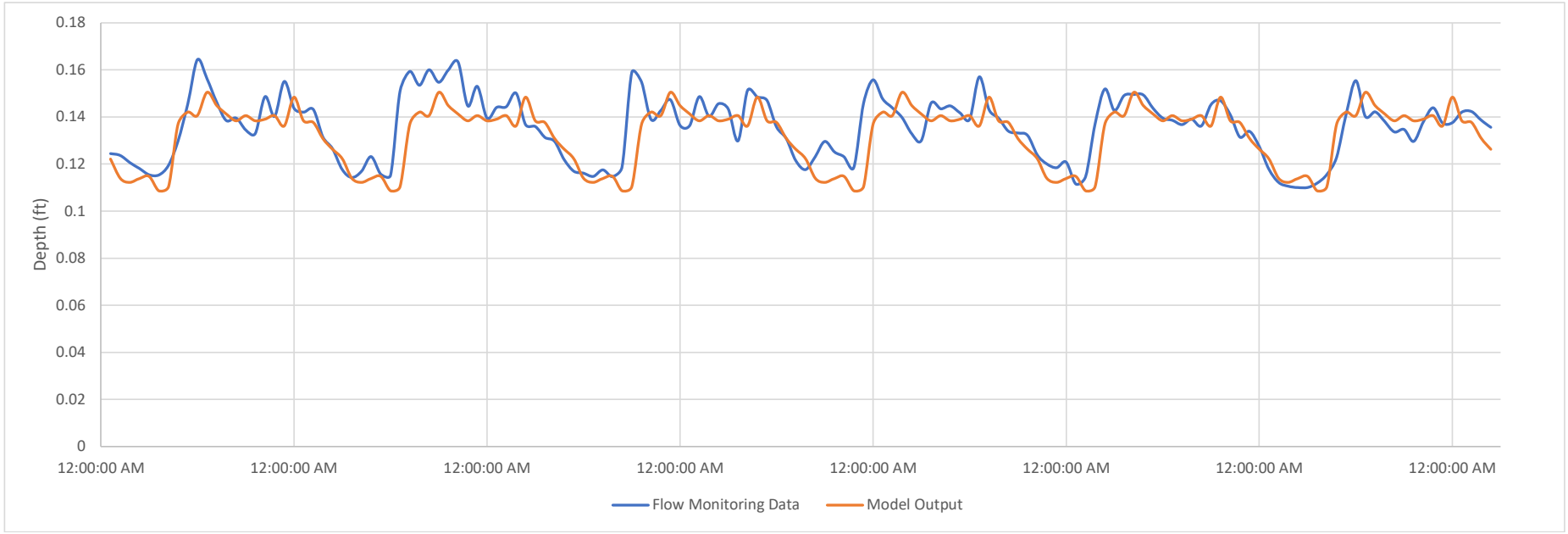
SS_02


180
160
140
120
100
80
60
40
20
0
Flow Rate (gpm)
0
5
10
15
20
Time (hours)
Flow Monitoring Data
Model Output

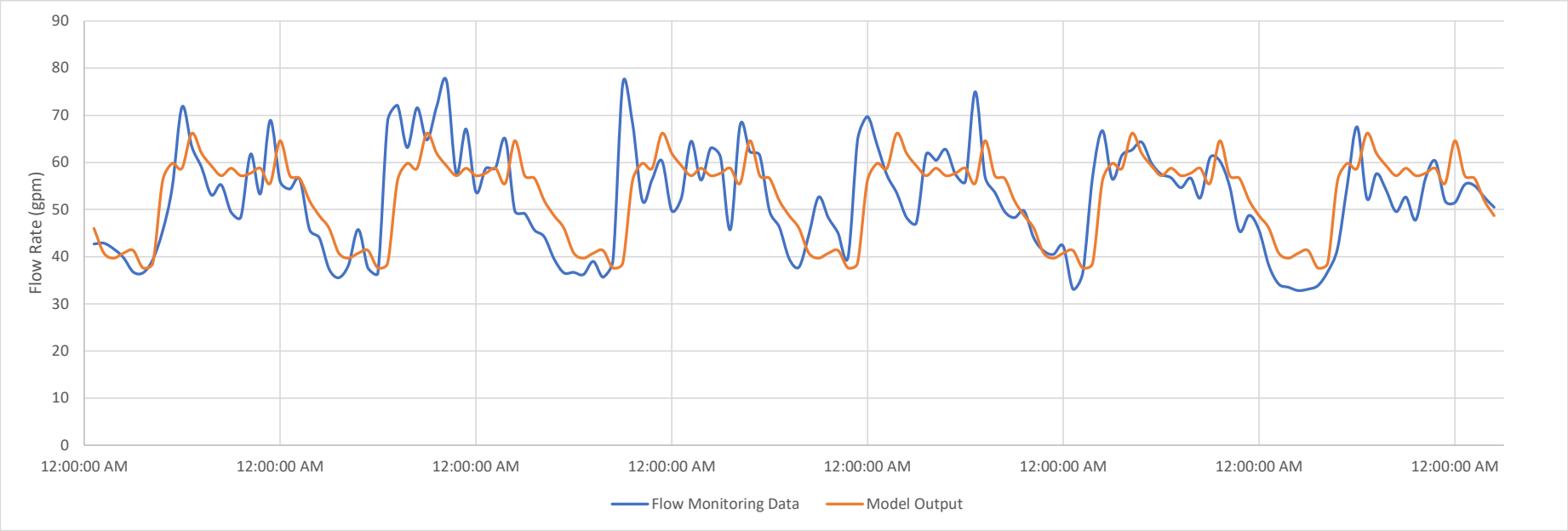
SS_02


3.5
3
2.5
2
1.5
1
0.5
0
Velocity (fps)
0
5
10
15
20
Time (hours)
Flow Monitoring Data
Model Output

SS_03


0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Depth (ft)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

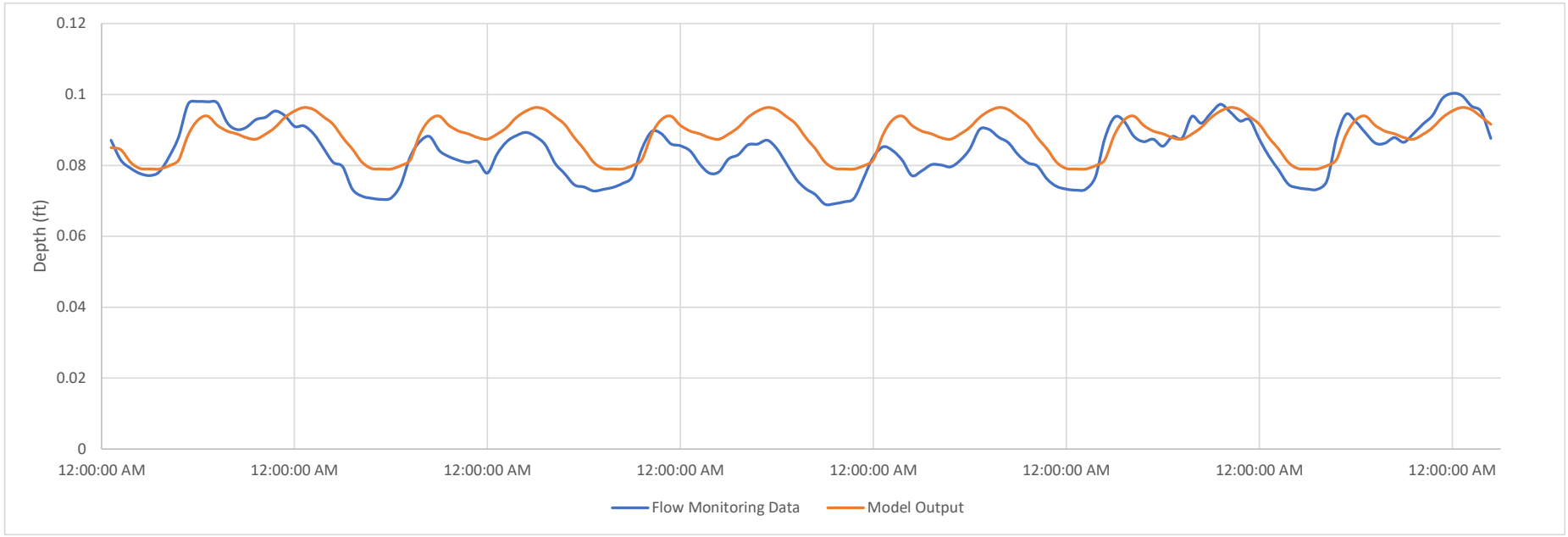
SS_03


90
80
70
60
50
40
30
20
10
0
Flow Rate (gpm)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

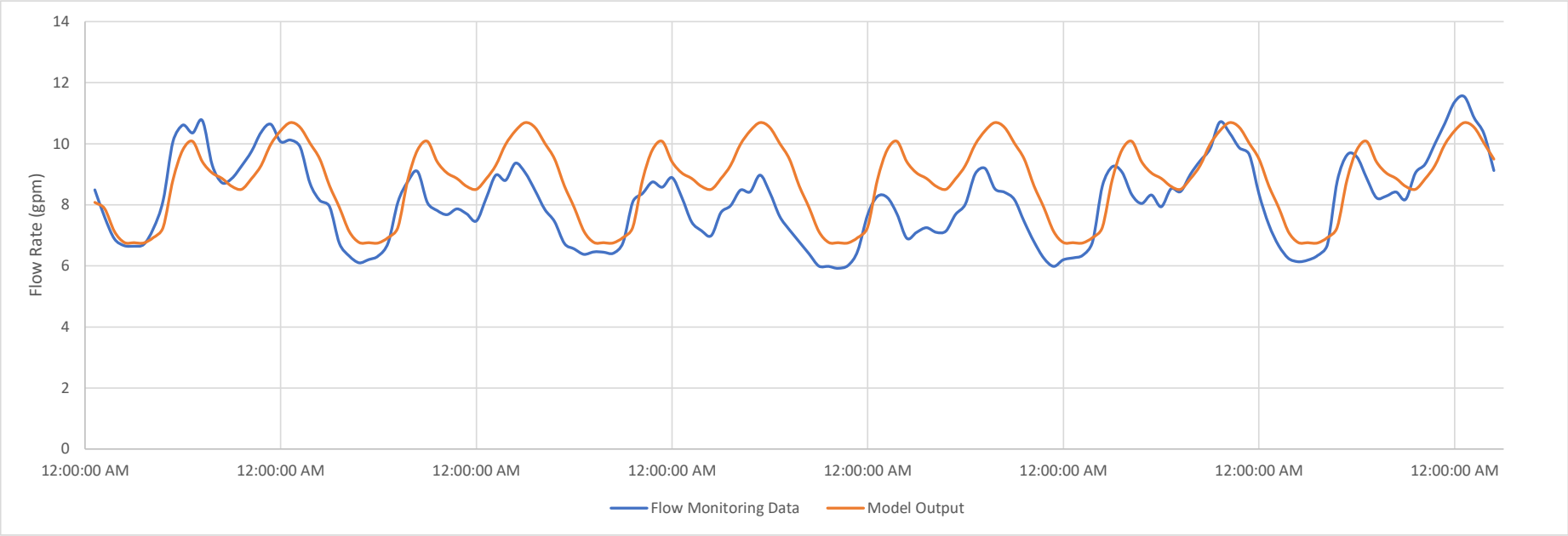
SS_03


3
2.5
2
1.5
1
0.5
0
Velocity (fps)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

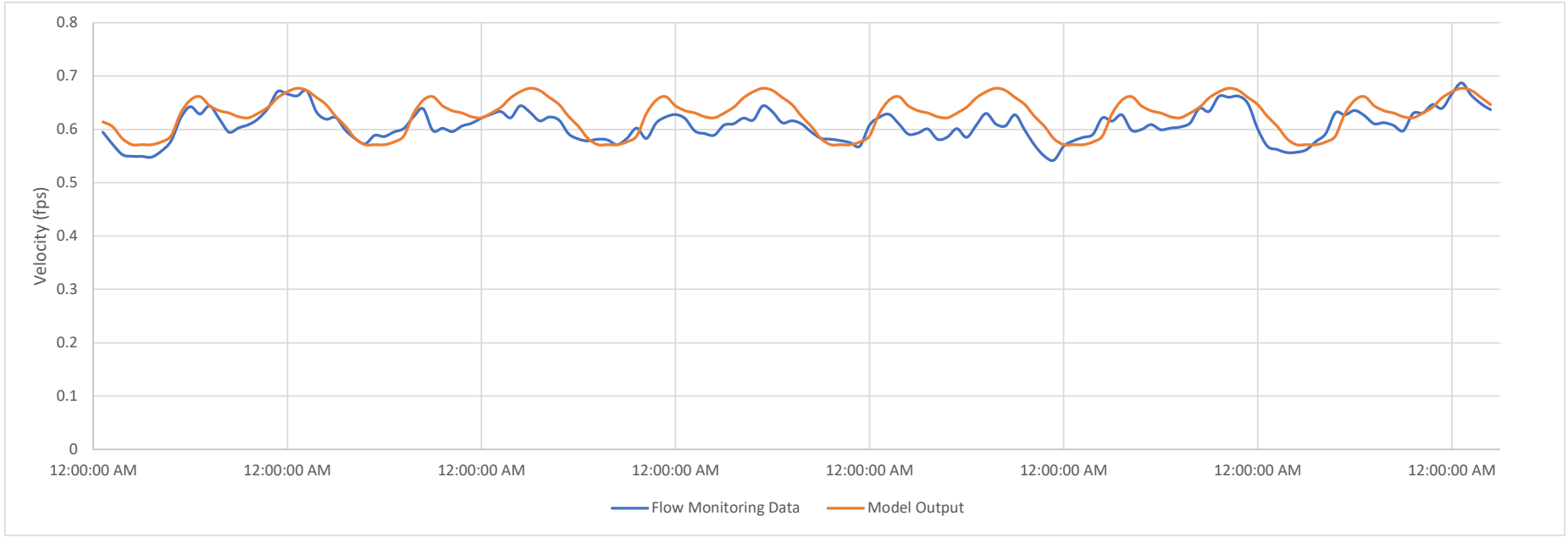
SS_04


0.12
0.1
0.08
0.06
0.04
0.02
0
Depth (ft)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

SS_04


14
12
10
8
6
4
2
0
Flow Rate (gpm)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

SS_04


0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Velocity (fps)
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
12:00:00 AM
Flow Monitoring Data
Model Output

APPENDIX D:
WET WELL CYCLE TIME GRAPHS

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SPS-1 Existing - Average

Sump Depth =			Input Cell
Pump Off Level =	3		Calculation Cell
Pump On Level =	5.3		
Wet Well Spill Level =	20.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	**85**	cu.ft.	**635** gallons
Active Storage Volume =	**65**	cu.ft.	**486** gallons
Emergency Storage Volume =	**416**	cu.ft.	**3,109** gallons
Total Volume =	**565**	cu.ft.	**4,230** gallons

Inflow Conditions

Qaverage =	124.31	gpm	**2,452** EDUs
Qpeak =	307.03	gpm	**2,140** EDUs

Pump Operating Point

Q =	350.00	gpm
TDH =	100	ft.

		Pump Down Time	**Fill Time**	**Total Cycle Time**	
	Q_{in} (gpm)	Time (min)	Time (min)	Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	7	1.42	69.50	70.92	7
4%	14	1.45	34.75	36.20	14
6%	21	1.48	23.17	24.65	21
8%	28	1.51	17.37	18.89	28
10%	35	1.54	13.90	15.44	35
12%	42	1.58	11.58	13.16	42
14%	49	1.62	9.93	11.54	49
16%	56	1.65	8.69	10.34	56
18%	63	1.70	7.72	9.42	63
20%	70	1.74	6.95	8.69	70
22%	77	1.78	6.32	8.10	77
24%	84	1.83	5.79	7.62	84
26%	91	1.88	5.35	7.22	91
28%	98	1.93	4.96	6.89	98
30%	105	1.99	4.63	6.62	105
32%	112	2.04	4.34	6.39	112
34%	119	2.11	4.09	6.19	119
36%	126	2.17	3.86	6.03	126
38%	133	2.24	3.66	5.90	133
40%	140	2.32	3.47	5.79	140
42%	147	2.40	3.31	5.71	147
44%	154	2.48	3.16	5.64	154
46%	161	2.57	3.02	5.60	161
48%	168	2.67	2.90	5.57	168
50%	175	2.78	2.78	5.56	175
52%	182	2.90	2.67	5.57	182
54%	189	3.02	2.57	5.60	189
56%	196	3.16	2.48	5.64	196
58%	203	3.31	2.40	5.71	203
60%	210	3.47	2.32	5.79	210
62%	217	3.66	2.24	5.90	217
64%	224	3.86	2.17	6.03	224
66%	231	4.09	2.11	6.19	231
68%	238	4.34	2.04	6.39	238
70%	245	4.63	1.99	6.62	245
72%	252	4.96	1.93	6.89	252
74%	259	5.35	1.88	7.22	259
76%	266	5.79	1.83	7.62	266
78%	273	6.32	1.78	8.10	273
80%	280	6.95	1.74	8.69	280
82%	287	7.72	1.70	9.42	287
84%	294	8.69	1.65	10.34	294
86%	301	9.93	1.62	11.54	301
88%	308	11.58	1.58	13.16	308
90%	315	13.90	1.54	15.44	315
92%	322	17.37	1.51	18.89	322
94%	329	23.17	1.48	24.64	329
96%	336	34.73	1.45	36.18	336
98%	343	67.74	1.42	69.16	343
100%	350	1440.00	1.39	1441.39	350
102%	357	1440.00	1.36	1441.36	357
104%	364	1440.00	1.34	1441.34	364

Peaking Factor =		2.83	
Wastewater Generation Rate =		73	gpd/EDU
Minimum Cycle Time =		**5.56**	min.
Worst Case Flow Rate =		**175**	gpm **1,220** EDUs
Maximum Flow Rate =		**350**	gpm **2,440** EDUs

Pump EDU Analysis

Remaining EDUs	=	**299**

Force Main Capacity

Force Main Diameter	=	8	inches
Existing Velocity	=	**2.23**	fps
Maximum Velocity	=	8.00	fps
Maximum Flow Rate	=	**1,253**	gpm

Force Main EDU Analysis

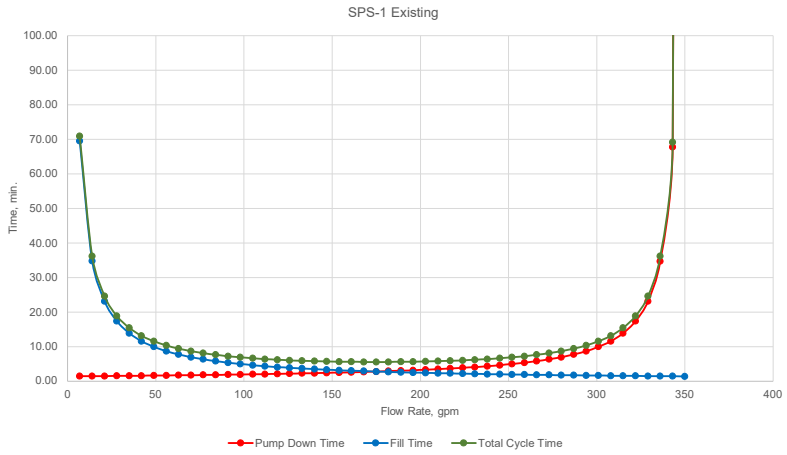
Remaining flow rate	=	**903**	gpm
Remaining EDUs	=	**6,297**	

Emergency Storage Volume Calcs

Wet Well	=	3,109.35	Gallons
Collection System	=	10,153.98	Gallons
Total	=	13,263.33	Gallons
2,452 EDUs	=	**73,688**	Gallons
1,220 EDUs	=	**58,696**	Gallons
2,440 EDUs	=	**73,537**	Gallons

Emergency Storage Analysis

Required Emergency Storage	=	**73,688**	gallons
Current Emergency Storage	=	**13,263**	gallons
Remaining Emergency Storage	=	**-60,425**	gallons
Remaining EDUs	=	**-3,510**	



SPS-1 Existing - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	3		Calculation Cell
Pump On Level =	5.3		
Wet Well Spill Level =	20.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	**85**	cu.ft.	**635** gallons
Active Storage Volume =	**65**	cu.ft.	**486** gallons
Emergency Storage Volume =	**416**	cu.ft.	**3,109** gallons
Total Volume =	**565**	cu.ft.	**4,230** gallons

Inflow Conditions

Qaverage =	124.31	gpm	**2,452** EDUs
Qpeak =	926.08	gpm	**6,455** EDUs

Pump Operating Point

Q =	350.00	gpm
TDH =	100	ft.

		Pump Down Time	**Fill Time**	**Total Cycle Time**		
	Q_{in} (gpm)	Time (min)	Time (min)	Time (min)	Q_{repeat}	
0%	0	0.00	0	0	0	
2%	7	1.42	69.50	70.92	7	
4%	14	1.45	34.75	36.20	14	
6%	21	1.48	23.17	24.65	21	
8%	28	1.51	17.37	18.89	28	
10%	35	1.54	13.90	15.44	35	
12%	42	1.58	11.58	13.16	42	
14%	49	1.62	9.93	11.54	49	
16%	56	1.65	8.69	10.34	56	
18%	63	1.70	7.72	9.42	63	
20%	70	1.74	6.95	8.69	70	
22%	77	1.78	6.32	8.10	77	
24%	84	1.83	5.79	7.62	84	
26%	91	1.88	5.35	7.22	91	
28%	98	1.93	4.96	6.89	98	
30%	105	1.99	4.63	6.62	105	
32%	112	2.04	4.34	6.39	112	
34%	119	2.11	4.09	6.19	119	
36%	126	2.17	3.86	6.03	126	
38%	133	2.24	3.66	5.90	133	
40%	140	2.32	3.47	5.79	140	
42%	147	2.40	3.31	5.71	147	
44%	154	2.48	3.16	5.64	154	
46%	161	2.57	3.02	5.60	161	
48%	168	2.67	2.90	5.57	168	
50%	175	2.78	2.78	5.56	175	
52%	182	2.90	2.67	5.57	182	
54%	189	3.02	2.57	5.60	189	
56%	196	3.16	2.48	5.64	196	
58%	203	3.31	2.40	5.71	203	
60%	210	3.47	2.32	5.79	210	
62%	217	3.66	2.24	5.90	217	
64%	224	3.86	2.17	6.03	224	
66%	231	4.09	2.11	6.19	231	
68%	238	4.34	2.04	6.39	238	
70%	245	4.63	1.99	6.62	245	
72%	252	4.96	1.93	6.89	252	
74%	259	5.35	1.88	7.22	259	
76%	266	5.79	1.83	7.62	266	
78%	273	6.32	1.78	8.10	273	
80%	280	6.95	1.74	8.69	280	
82%	287	7.72	1.70	9.42	287	
84%	294	8.69	1.65	10.34	294	
86%	301	9.93	1.62	11.54	301	
88%	308	11.58	1.58	13.16	308	
90%	315	13.90	1.54	15.44	315	
92%	322	17.37	1.51	18.89	322	
94%	329	23.17	1.48	24.64	329	
96%	336	34.73	1.45	36.18	336	
98%	343	67.74	1.42	69.16	343	
100%	350	1440.00	1.39	1441.39	350	
102%	357	1440.00	1.36	1441.36	357	
104%	364	1440.00	1.34	1441.34	364	

Peaking Factor =		2.83	
Wastewater Generation Rate =		73	gpd/EDU
Minimum Cycle Time =		**5.56**	min.
Worst Case Flow Rate =		**175**	gpm **1,220** EDUs
Maximum Flow Rate =		**350**	gpm **2,440** EDUs

Pump EDU Analysis

Remaining EDUs	=	**-4,015**

Force Main Capacity

Force Main Diameter	=	8	inches
Existing Velocity	=	**2.23**	fps
Maximum Velocity	=	8.00	fps
Maximum Flow Rate	=	**1,253**	gpm

Force Main EDU Analysis

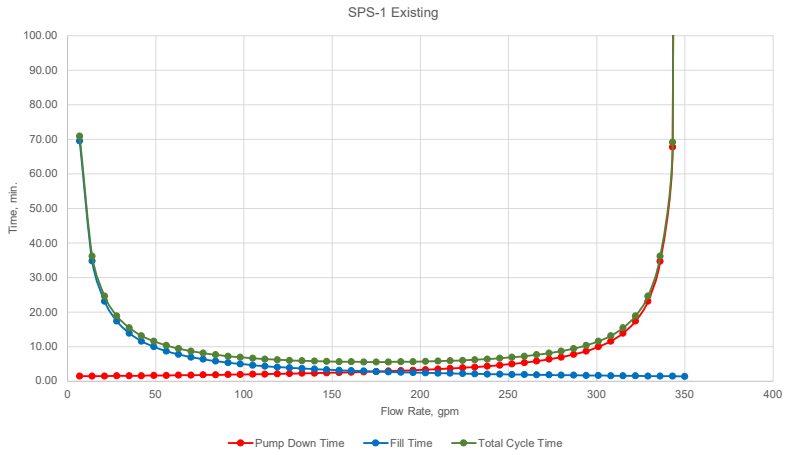
Remaining flow rate	=	**903**	gpm
Remaining EDUs	=	**6,297**	

Emergency Storage Volume Calcs

Wet Well	=	3,109.35	Gallons
Collection System	=	10,153.98	Gallons
Total	=	13,263.33	Gallons
2,452 EDUs	=	**222,258**	Gallons
1,220 EDUs	=	**207,266**	Gallons
2,440 EDUs	=	**222,107**	Gallons

Emergency Storage Analysis

Required Emergency Storage	=	**222,258**	gallons
Current Emergency Storage	=	**13,263**	gallons
Remaining Emergency Storage	=	**-208,995**	gallons
Remaining EDUs	=	**-12,140**	



SPS-1 Future - Average

Sump Depth =			Input Cell
Pump Off Level =	3		Calculation Cell
Pump On Level =	5.3		
Wet Well Spill Level =	20.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	**85**	cu.ft.	**635** gallons
Active Storage Volume =	**65**	cu.ft.	**486** gallons
Emergency Storage Volume =	**416**	cu.ft.	**3,109** gallons
Total Volume =	**565**	cu.ft.	**4,230** gallons

Inflow Conditions

Qaverage =	134.72	gpm	**2,658** EDUs
Qpeak =	332.76	gpm	**2,319** EDUs

Pump Operating Point

Q =	350.00	gpm
TDH =	100	ft.

			Pump Down Time	**Fill Time**	**Total Cycle Time**	
	Q_{in} (gpm)		Time (min)	Time (min)	Time (min)	Q_{repeat}
0%	0		0.00	0	0	0
2%	7		1.42	69.50	70.92	7
4%	14		1.45	34.75	36.20	14
6%	21		1.48	23.17	24.65	21
8%	28		1.51	17.37	18.89	28
10%	35		1.54	13.90	15.44	35
12%	42		1.58	11.58	13.16	42
14%	49		1.62	9.93	11.54	49
16%	56		1.65	8.69	10.34	56
18%	63		1.70	7.72	9.42	63
20%	70		1.74	6.95	8.69	70
22%	77		1.78	6.32	8.10	77
24%	84		1.83	5.79	7.62	84
26%	91		1.88	5.35	7.22	91
28%	98		1.93	4.96	6.89	98
30%	105		1.99	4.63	6.62	105
32%	112		2.04	4.34	6.39	112
34%	119		2.11	4.09	6.19	119
36%	126		2.17	3.86	6.03	126
38%	133		2.24	3.66	5.90	133
40%	140		2.32	3.47	5.79	140
42%	147		2.40	3.31	5.71	147
44%	154		2.48	3.16	5.64	154
46%	161		2.57	3.02	5.60	161
48%	168		2.67	2.90	5.57	168
50%	175		2.78	2.78	5.56	175
52%	182		2.90	2.67	5.57	182
54%	189		3.02	2.57	5.60	189
56%	196		3.16	2.48	5.64	196
58%	203		3.31	2.40	5.71	203
60%	210		3.47	2.32	5.79	210
62%	217		3.66	2.24	5.90	217
64%	224		3.86	2.17	6.03	224
66%	231		4.09	2.11	6.19	231
68%	238		4.34	2.04	6.39	238
70%	245		4.63	1.99	6.62	245
72%	252		4.96	1.93	6.89	252
74%	259		5.35	1.88	7.22	259
76%	266		5.79	1.83	7.62	266
78%	273		6.32	1.78	8.10	273
80%	280		6.95	1.74	8.69	280
82%	287		7.72	1.70	9.42	287
84%	294		8.69	1.65	10.34	294
86%	301		9.93	1.62	11.54	301
88%	308		11.58	1.58	13.16	308
90%	315		13.90	1.54	15.44	315
92%	322		17.37	1.51	18.89	322
94%	329		23.17	1.48	24.64	329
96%	336		34.73	1.45	36.18	336
98%	343		67.74	1.42	69.16	343
100%	350		1440.00	1.39	1441.39	350
102%	357		1440.00	1.36	1441.36	357
104%	364		1440.00	1.34	1441.34	364

Peaking Factor =	2.83		
Wastewater Generation Rate =	73	gpd/EDU	
Minimum Cycle Time =	**5.56**	min.	
Worst Case Flow Rate =	**175**	gpm	**1,220** EDUs
Maximum Flow Rate =	**350**	gpm	**2,440** EDUs

Pump EDU Analysis

Remaining EDUs	=	**120**

Force Main Capacity

Force Main Diameter	=	8	inches
Existing Velocity	=	**2.23**	fps
Maximum Velocity	=	8.00	fps
Maximum Flow Rate	=	**1,253**	gpm

Force Main EDU Analysis

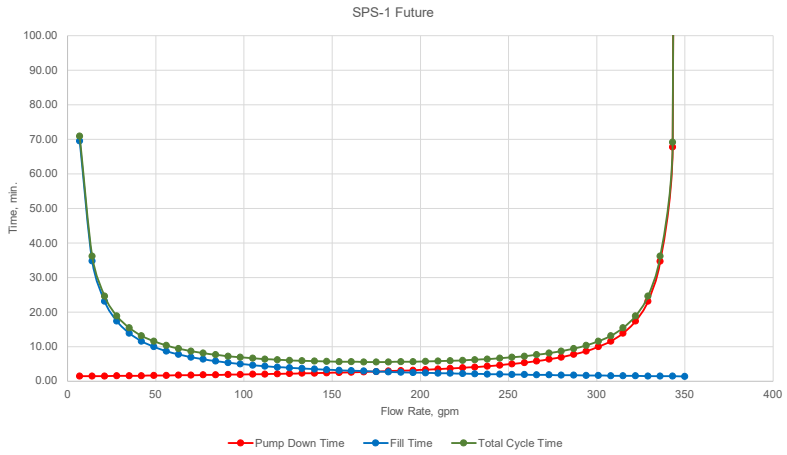
Remaining flow rate	=	**903**	gpm
Remaining EDUs	=	**6,297**	

Emergency Storage Volume Calcs

Wet Well	=	3,109.35	Gallons
Collection System	=	10,153.98	Gallons
Total	=	13,263.33	Gallons
2,658 EDUs	=	**79,863**	Gallons
1,220 EDUs	=	**62,371**	Gallons
2,440 EDUs	=	**77,212**	Gallons

Emergency Storage Analysis

Required Emergency Storage	=	**79,863**	gallons
Current Emergency Storage	=	**13,263**	gallons
Remaining Emergency Storage	=	**-66,600**	gallons
Remaining EDUs	=	**-3,869**	



SPS-1 Future - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	3		Calculation Cell
Pump On Level =	5.3		
Wet Well Spill Level =	20.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	85	cu.ft.	635 gallons
Active Storage Volume =	65	cu.ft.	486 gallons
Emergency Storage Volume =	416	cu.ft.	3,109 gallons
Total Volume =	565	cu.ft.	4,230 gallons

Inflow Conditions

Qaverage =	134.72	gpm	2,658 EDUs
Qpeak =	1003.68	gpm	6,996 EDUs

Pump Operating Point

Q =	350.00	gpm
TDH =	100	ft.

		Pump Down Time	Fill Time	Total Cycle Time	
	Q_{in} (gpm)	Time (min)	Time (min)	Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	7	1.42	69.50	70.92	7
4%	14	1.45	34.75	36.20	14
6%	21	1.48	23.17	24.65	21
8%	28	1.51	17.37	18.89	28
10%	35	1.54	13.90	15.44	35
12%	42	1.58	11.58	13.16	42
14%	49	1.62	9.93	11.54	49
16%	56	1.65	8.69	10.34	56
18%	63	1.70	7.72	9.42	63
20%	70	1.74	6.95	8.69	70
22%	77	1.78	6.32	8.10	77
24%	84	1.83	5.79	7.62	84
26%	91	1.88	5.35	7.22	91
28%	98	1.93	4.96	6.89	98
30%	105	1.99	4.63	6.62	105
32%	112	2.04	4.34	6.39	112
34%	119	2.11	4.09	6.19	119
36%	126	2.17	3.86	6.03	126
38%	133	2.24	3.66	5.90	133
40%	140	2.32	3.47	5.79	140
42%	147	2.40	3.31	5.71	147
44%	154	2.48	3.16	5.64	154
46%	161	2.57	3.02	5.60	161
48%	168	2.67	2.90	5.57	168
50%	175	2.78	2.78	5.56	175
52%	182	2.90	2.67	5.57	182
54%	189	3.02	2.57	5.60	189
56%	196	3.16	2.48	5.64	196
58%	203	3.31	2.40	5.71	203
60%	210	3.47	2.32	5.79	210
62%	217	3.66	2.24	5.90	217
64%	224	3.86	2.17	6.03	224
66%	231	4.09	2.11	6.19	231
68%	238	4.34	2.04	6.39	238
70%	245	4.63	1.99	6.62	245
72%	252	4.96	1.93	6.89	252
74%	259	5.35	1.88	7.22	259
76%	266	5.79	1.83	7.62	266
78%	273	6.32	1.78	8.10	273
80%	280	6.95	1.74	8.69	280
82%	287	7.72	1.70	9.42	287
84%	294	8.69	1.65	10.34	294
86%	301	9.93	1.62	11.54	301
88%	308	11.58	1.58	13.16	308
90%	315	13.90	1.54	15.44	315
92%	322	17.37	1.51	18.89	322
94%	329	23.17	1.48	24.64	329
96%	336	34.73	1.45	36.18	336
98%	343	67.74	1.42	69.16	343
100%	350	1440.00	1.39	1441.39	350
102%	357	1440.00	1.36	1441.36	357
104%	364	1440.00	1.34	1441.34	364

Peaking Factor =	2.83			
Wastewater Generation Rate =	73	gpd/EDU		
Minimum Cycle Time =	5.56	min.		
Worst Case Flow Rate =	175	gpm	1,220	EDUs
Maximum Flow Rate =	350	gpm	2,440	EDUs

Pump EDU Analysis

Remaining EDUs	=	-4,556

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	2.23 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

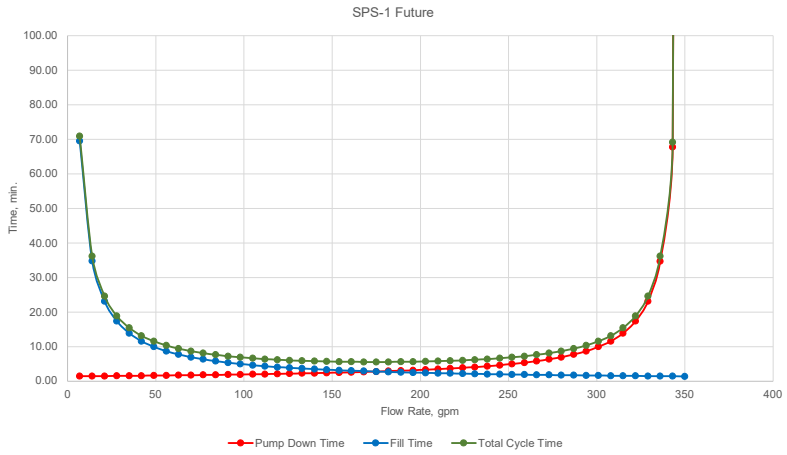
Remaining flow rate	=	903 gpm
Remaining EDUs	=	6,297

Emergency Storage Volume Calcs

Wet Well	=	3,109.35	Gallons
Collection System	=	10,153.98	Gallons
Total	=	13,263.33	Gallons
2,658 EDUs	=	240,883	Gallons
1,220 EDUs	=	223,391	Gallons
2,440 EDUs	=	238,232	Gallons

Emergency Storage Analysis

Required Emergency Storage	=	240,883 gallons
Current Emergency Storage	=	13,263 gallons
Remaining Emergency Storage	=	-227,620 gallons
Remaining EDUs	=	-13,222



SPS-2 Existing - Average

Sump Depth =			Input Cell
Pump Off Level =	2.1		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	18.1		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	41	cu.ft.	308 gallons
Active Storage Volume =	37	cu.ft.	279 gallons
Emergency Storage Volume =	277	cu.ft.	2,071 gallons
Total Volume =	355	cu.ft.	2,659 gallons

Inflow Conditions

Qaverage =	35.42	gpm	699 EDUs
Qpeak =	121.83	gpm	849 EDUs

Pump Operating Point

Q =	140.00	gpm
TDH =	40	ft.

Peaking Factor =	2.83	
Wastewater Generation Rate =	73	gpd/EDU
Minimum Cycle Time =	7.97	min.
Worst Case Flow Rate =	70	gpm 488 EDUs
Maximum Flow Rate =	140	gpm 976 EDUs

Pump EDU Analysis

Remaining EDUs	=	127

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	0.89 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	1,113 gpm
Remaining EDUs	=	7,761

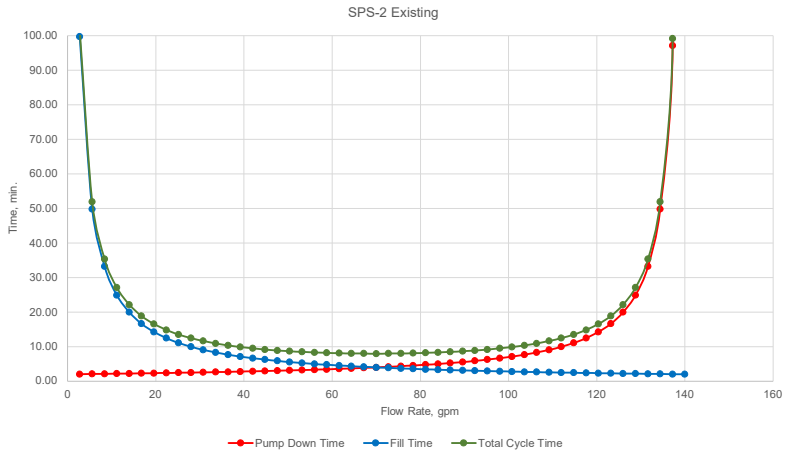
Emergency Storage Volume Calcs

Wet Well	=	2,071.14 Gallons
Collection System	=	14,226.04 Gallons
Total	=	16,297.18 Gallons
699 EDUs	=	58,480 Gallons
488 EDUs	=	53,353 Gallons
976 EDUs	=	65,226 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	58,480 gallons
Current Emergency Storage	=	16,297 gallons
Remaining Emergency Storage	=	-42,183 gallons
Remaining EDUs	=	-2,450

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	2.8	2.03	99.67	101.71	2.8
4%	5.6	2.08	49.84	51.91	5.6
6%	8.4	2.12	33.22	35.35	8.4
8%	11.2	2.17	24.92	27.09	11.2
10%	14	2.21	19.93	22.15	14
12%	16.8	2.27	16.61	18.88	16.8
14%	19.6	2.32	14.24	16.56	19.6
16%	22.4	2.37	12.46	14.83	22.4
18%	25.2	2.43	11.07	13.51	25.2
20%	28	2.49	9.97	12.46	28
22%	30.8	2.56	9.06	11.62	30.8
24%	33.6	2.62	8.31	10.93	33.6
26%	36.4	2.69	7.67	10.36	36.4
28%	39.2	2.77	7.12	9.89	39.2
30%	42	2.85	6.64	9.49	42
32%	44.8	2.93	6.23	9.16	44.8
34%	47.6	3.02	5.86	8.88	47.6
36%	50.4	3.11	5.54	8.65	50.4
38%	53.2	3.22	5.25	8.46	53.2
40%	56	3.32	4.98	8.31	56
42%	58.8	3.44	4.75	8.18	58.8
44%	61.6	3.56	4.53	8.09	61.6
46%	64.4	3.69	4.33	8.03	64.4
48%	67.2	3.83	4.15	7.99	67.2
50%	70	3.99	3.99	7.97	70
52%	72.8	4.15	3.83	7.99	72.8
54%	75.6	4.33	3.69	8.03	75.6
56%	78.4	4.53	3.56	8.09	78.4
58%	81.2	4.75	3.44	8.18	81.2
60%	84	4.98	3.32	8.31	84
62%	86.8	5.25	3.22	8.46	86.8
64%	89.6	5.54	3.11	8.65	89.6
66%	92.4	5.86	3.02	8.88	92.4
68%	95.2	6.23	2.93	9.16	95.2
70%	98	6.64	2.85	9.49	98
72%	100.8	7.12	2.77	9.89	100.8
74%	103.6	7.67	2.69	10.36	103.6
76%	106.4	8.31	2.62	10.93	106.4
78%	109.2	9.06	2.56	11.62	109.2
80%	112	9.97	2.49	12.46	112
82%	114.8	11.07	2.43	13.51	114.8
84%	117.6	12.46	2.37	14.83	117.6
86%	120.4	14.24	2.32	16.56	120.4
88%	123.2	16.61	2.27	18.88	123.2
90%	126	19.93	2.21	22.15	126
92%	128.8	24.92	2.17	27.09	128.8
94%	131.6	33.22	2.12	35.35	131.6
96%	134.4	49.81	2.08	51.88	134.4
98%	137.2	97.15	2.03	99.19	137.2
100%	140	1440.00	1.99	1441.99	140
102%	142.8	1440.00	1.95	1441.95	142.8
104%	145.6	1440.00	1.92	1441.92	145.6



SPS-2 Existing - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	2.1		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	18.1		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	41	cu.ft.	308 gallons
Active Storage Volume =	37	cu.ft.	279 gallons
Emergency Storage Volume =	277	cu.ft.	2,071 gallons
Total Volume =	355	cu.ft.	2,659 gallons

Inflow Conditions

Qaverage =	35.42	gpm	699 EDUs
Qpeak =	597.48	gpm	4,165 EDUs

Pump Operating Point

Q =	140.00	gpm
TDH =	40	ft.

Peaking Factor =	2.83	
Wastewater Generation Rate =	73	gpd/EDU
Minimum Cycle Time =	7.97	min.
Worst Case Flow Rate =	70	gpm 488 EDUs
Maximum Flow Rate =	140	gpm 976 EDUs

Pump EDU Analysis

Remaining EDUs	=	-3,189

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	0.89 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	1,113 gpm
Remaining EDUs	=	7,761

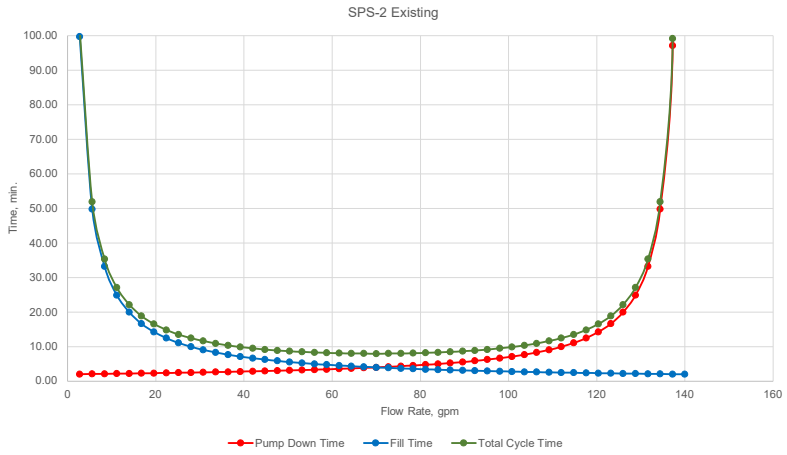
Emergency Storage Volume Calcs

Wet Well	=	2,071.14 Gallons
Collection System	=	14,226.04 Gallons
Total	=	16,297.18 Gallons
699 EDUs	=	286,790 Gallons
488 EDUs	=	281,663 Gallons
976 EDUs	=	293,536 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	286,790 gallons
Current Emergency Storage	=	16,297 gallons
Remaining Emergency Storage	=	-270,493 gallons
Remaining EDUs	=	-15,712

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	2.8	2.03	99.67	101.71	2.8
4%	5.6	2.08	49.84	51.91	5.6
6%	8.4	2.12	33.22	35.35	8.4
8%	11.2	2.17	24.92	27.09	11.2
10%	14	2.21	19.93	22.15	14
12%	16.8	2.27	16.61	18.88	16.8
14%	19.6	2.32	14.24	16.56	19.6
16%	22.4	2.37	12.46	14.83	22.4
18%	25.2	2.43	11.07	13.51	25.2
20%	28	2.49	9.97	12.46	28
22%	30.8	2.56	9.06	11.62	30.8
24%	33.6	2.62	8.31	10.93	33.6
26%	36.4	2.69	7.67	10.36	36.4
28%	39.2	2.77	7.12	9.89	39.2
30%	42	2.85	6.64	9.49	42
32%	44.8	2.93	6.23	9.16	44.8
34%	47.6	3.02	5.86	8.88	47.6
36%	50.4	3.11	5.54	8.65	50.4
38%	53.2	3.22	5.25	8.46	53.2
40%	56	3.32	4.98	8.31	56
42%	58.8	3.44	4.75	8.18	58.8
44%	61.6	3.56	4.53	8.09	61.6
46%	64.4	3.69	4.33	8.03	64.4
48%	67.2	3.83	4.15	7.99	67.2
50%	70	3.99	3.99	7.97	70
52%	72.8	4.15	3.83	7.99	72.8
54%	75.6	4.33	3.69	8.03	75.6
56%	78.4	4.53	3.56	8.09	78.4
58%	81.2	4.75	3.44	8.18	81.2
60%	84	4.98	3.32	8.31	84
62%	86.8	5.25	3.22	8.46	86.8
64%	89.6	5.54	3.11	8.65	89.6
66%	92.4	5.86	3.02	8.88	92.4
68%	95.2	6.23	2.93	9.16	95.2
70%	98	6.64	2.85	9.49	98
72%	100.8	7.12	2.77	9.89	100.8
74%	103.6	7.67	2.69	10.36	103.6
76%	106.4	8.31	2.62	10.93	106.4
78%	109.2	9.06	2.56	11.62	109.2
80%	112	9.97	2.49	12.46	112
82%	114.8	11.07	2.43	13.51	114.8
84%	117.6	12.46	2.37	14.83	117.6
86%	120.4	14.24	2.32	16.56	120.4
88%	123.2	16.61	2.27	18.88	123.2
90%	126	19.93	2.21	22.15	126
92%	128.8	24.92	2.17	27.09	128.8
94%	131.6	33.22	2.12	35.35	131.6
96%	134.4	49.81	2.08	51.88	134.4
98%	137.2	97.15	2.03	99.19	137.2
100%	140	1440.00	1.99	1441.99	140
102%	142.8	1440.00	1.95	1441.95	142.8
104%	145.6	1440.00	1.92	1441.92	145.6



SPS-2 Future - Average

Sump Depth =			Input Cell
Pump Off Level =	2.1		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	18.1		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	41	cu.ft.	308 gallons
Active Storage Volume =	37	cu.ft.	279 gallons
Emergency Storage Volume =	277	cu.ft.	2,071 gallons
Total Volume =	355	cu.ft.	2,659 gallons

Inflow Conditions

Qaverage =	38.19	gpm	753 EDUs
Qpeak =	131.39	gpm	916 EDUs

Pump Operating Point

Q =	140.00	gpm
TDH =	40	ft.

Peaking Factor =	2.83
Wastewater Generation Rate =	73 gpd/EDU
Minimum Cycle Time =	7.97 min.
Worst Case Flow Rate =	70 gpm 488 EDUs
Maximum Flow Rate =	140 gpm 976 EDUs

Pump EDU Analysis

Remaining EDUs	=	60

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	0.89 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	1,113 gpm
Remaining EDUs	=	7,761

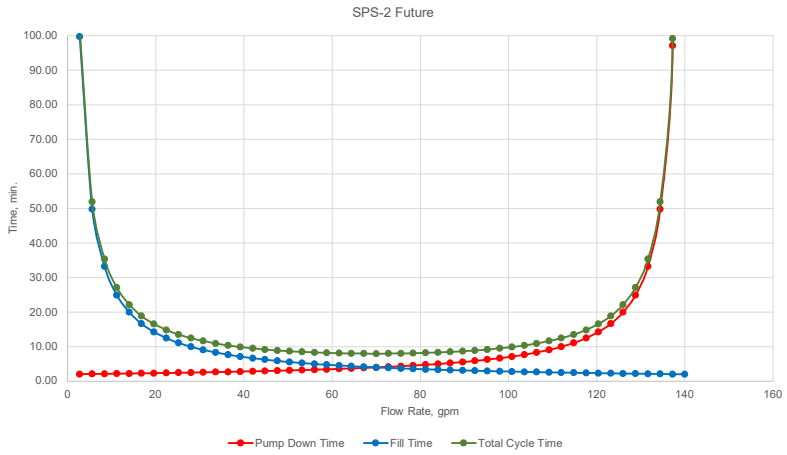
Emergency Storage Volume Calcs

Wet Well	=	2,071.14 Gallons
Collection System	=	14,226.04 Gallons
Total	=	16,297.18 Gallons
753 EDUs	=	63,067 Gallons
488 EDUs	=	56,606 Gallons
976 EDUs	=	68,479 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	63,067 gallons
Current Emergency Storage	=	16,297 gallons
Remaining Emergency Storage	=	-46,769 gallons
Remaining EDUs	=	-2,717

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	2.8	2.03	99.67	101.71	2.8
4%	5.6	2.08	49.84	51.91	5.6
6%	8.4	2.12	33.22	35.35	8.4
8%	11.2	2.17	24.92	27.09	11.2
10%	14	2.21	19.93	22.15	14
12%	16.8	2.27	16.61	18.88	16.8
14%	19.6	2.32	14.24	16.56	19.6
16%	22.4	2.37	12.46	14.83	22.4
18%	25.2	2.43	11.07	13.51	25.2
20%	28	2.49	9.97	12.46	28
22%	30.8	2.56	9.06	11.62	30.8
24%	33.6	2.62	8.31	10.93	33.6
26%	36.4	2.69	7.67	10.36	36.4
28%	39.2	2.77	7.12	9.89	39.2
30%	42	2.85	6.64	9.49	42
32%	44.8	2.93	6.23	9.16	44.8
34%	47.6	3.02	5.86	8.88	47.6
36%	50.4	3.11	5.54	8.65	50.4
38%	53.2	3.22	5.25	8.46	53.2
40%	56	3.32	4.98	8.31	56
42%	58.8	3.44	4.75	8.18	58.8
44%	61.6	3.56	4.53	8.09	61.6
46%	64.4	3.69	4.33	8.03	64.4
48%	67.2	3.83	4.15	7.99	67.2
50%	70	3.99	3.99	7.97	70
52%	72.8	4.15	3.83	7.99	72.8
54%	75.6	4.33	3.69	8.03	75.6
56%	78.4	4.53	3.56	8.09	78.4
58%	81.2	4.75	3.44	8.18	81.2
60%	84	4.98	3.32	8.31	84
62%	86.8	5.25	3.22	8.46	86.8
64%	89.6	5.54	3.11	8.65	89.6
66%	92.4	5.86	3.02	8.88	92.4
68%	95.2	6.23	2.93	9.16	95.2
70%	98	6.64	2.85	9.49	98
72%	100.8	7.12	2.77	9.89	100.8
74%	103.6	7.67	2.69	10.36	103.6
76%	106.4	8.31	2.62	10.93	106.4
78%	109.2	9.06	2.56	11.62	109.2
80%	112	9.97	2.49	12.46	112
82%	114.8	11.07	2.43	13.51	114.8
84%	117.6	12.46	2.37	14.83	117.6
86%	120.4	14.24	2.32	16.56	120.4
88%	123.2	16.61	2.27	18.88	123.2
90%	126	19.93	2.21	22.15	126
92%	128.8	24.92	2.17	27.09	128.8
94%	131.6	33.22	2.12	35.35	131.6
96%	134.4	49.81	2.08	51.88	134.4
98%	137.2	97.15	2.03	99.19	137.2
100%	140	1440.00	1.99	1441.99	140
102%	142.8	1440.00	1.95	1441.95	142.8
104%	145.6	1440.00	1.92	1441.92	145.6



SPS-2 Future - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	2.1		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	18.1		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	41	cu.ft.	308 gallons
Active Storage Volume =	37	cu.ft.	279 gallons
Emergency Storage Volume =	277	cu.ft.	2,071 gallons
Total Volume =	355	cu.ft.	2,659 gallons

Inflow Conditions

Qaverage =	38.19	gpm	753 EDUs
Qpeak =	644.34	gpm	4,491 EDUs

Pump Operating Point

Q =	140.00	gpm
TDH =	40	ft.

	Peaking Factor =	2.83		
	Wastewater Generation Rate =	73	gpd/EDU	
	Minimum Cycle Time =	7.97	min.	
	Worst Case Flow Rate =	70	gpm	488 EDUs
	Maximum Flow Rate =	140	gpm	976 EDUs

Pump EDU Analysis

Remaining EDUs	=	-3,515

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	0.89 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	1,113 gpm
Remaining EDUs	=	7,761

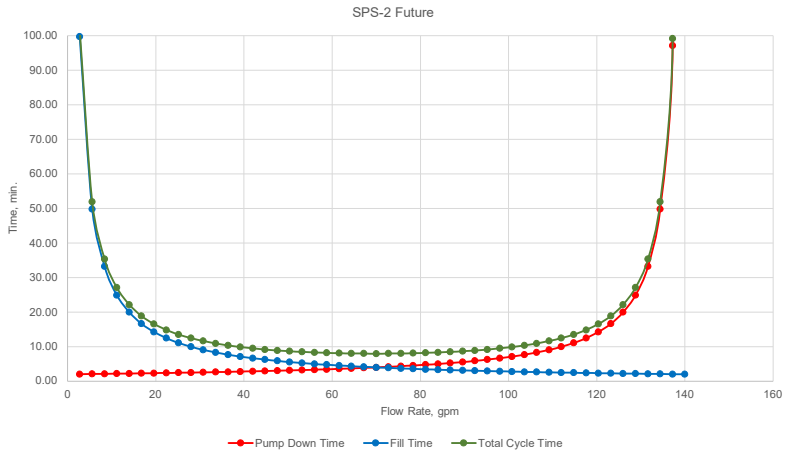
Emergency Storage Volume Calcs

Wet Well	=	2,071.14	Gallons
Collection System	=	14,226.04	Gallons
Total	=	16,297.18	Gallons
753 EDUs	=	309,283	Gallons
488 EDUs	=	302,823	Gallons
976 EDUs	=	314,696	Gallons

Emergency Storage Analysis

Required Emergency Storage	=	309,283 gallons
Current Emergency Storage	=	16,297 gallons
Remaining Emergency Storage	=	-292,986 gallons
Remaining EDUs	=	-17,018

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	2.8	2.03	99.67	101.71	2.8
4%	5.6	2.08	49.84	51.91	5.6
6%	8.4	2.12	33.22	35.35	8.4
8%	11.2	2.17	24.92	27.09	11.2
10%	14	2.21	19.93	22.15	14
12%	16.8	2.27	16.61	18.88	16.8
14%	19.6	2.32	14.24	16.56	19.6
16%	22.4	2.37	12.46	14.83	22.4
18%	25.2	2.43	11.07	13.51	25.2
20%	28	2.49	9.97	12.46	28
22%	30.8	2.56	9.06	11.62	30.8
24%	33.6	2.62	8.31	10.93	33.6
26%	36.4	2.69	7.67	10.36	36.4
28%	39.2	2.77	7.12	9.89	39.2
30%	42	2.85	6.64	9.49	42
32%	44.8	2.93	6.23	9.16	44.8
34%	47.6	3.02	5.86	8.88	47.6
36%	50.4	3.11	5.54	8.65	50.4
38%	53.2	3.22	5.25	8.46	53.2
40%	56	3.32	4.98	8.31	56
42%	58.8	3.44	4.75	8.18	58.8
44%	61.6	3.56	4.53	8.09	61.6
46%	64.4	3.69	4.33	8.03	64.4
48%	67.2	3.83	4.15	7.99	67.2
50%	70	3.99	3.99	7.97	70
52%	72.8	4.15	3.83	7.99	72.8
54%	75.6	4.33	3.69	8.03	75.6
56%	78.4	4.53	3.56	8.09	78.4
58%	81.2	4.75	3.44	8.18	81.2
60%	84	4.98	3.32	8.31	84
62%	86.8	5.25	3.22	8.46	86.8
64%	89.6	5.54	3.11	8.65	89.6
66%	92.4	5.86	3.02	8.88	92.4
68%	95.2	6.23	2.93	9.16	95.2
70%	98	6.64	2.85	9.49	98
72%	100.8	7.12	2.77	9.89	100.8
74%	103.6	7.67	2.69	10.36	103.6
76%	106.4	8.31	2.62	10.93	106.4
78%	109.2	9.06	2.56	11.62	109.2
80%	112	9.97	2.49	12.46	112
82%	114.8	11.07	2.43	13.51	114.8
84%	117.6	12.46	2.37	14.83	117.6
86%	120.4	14.24	2.32	16.56	120.4
88%	123.2	16.61	2.27	18.88	123.2
90%	126	19.93	2.21	22.15	126
92%	128.8	24.92	2.17	27.09	128.8
94%	131.6	33.22	2.12	35.35	131.6
96%	134.4	49.81	2.08	51.88	134.4
98%	137.2	97.15	2.03	99.19	137.2
100%	140	1440.00	1.99	1441.99	140
102%	142.8	1440.00	1.95	1441.95	142.8
104%	145.6	1440.00	1.92	1441.92	145.6



SPS-3 Existing - Average

Sump Depth =			Input Cell
Pump Off Level =	1.6		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	15.0		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	31	cu.ft.	235 gallons
Active Storage Volume =	47	cu.ft.	353 gallons
Emergency Storage Volume =	216	cu.ft.	1,616 gallons
Total Volume =	295	cu.ft.	2,203 gallons

Inflow Conditions

Qaverage =	26.39	gpm	521 EDUs
Qpeak =	73.10	gpm	510 EDUs

Pump Operating Point

Q =	150.00	gpm
TDH =	30	ft.

Peaking Factor =	2.83
Wastewater Generation Rate =	73 gpd/EDU
Minimum Cycle Time =	9.40 min.
Worst Case Flow Rate =	75 gpm 523 EDUs
Maximum Flow Rate =	150 gpm 1,046 EDUs

Pump EDU Analysis

Remaining EDUs	=	536

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	0.96 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	1,103 gpm
Remaining EDUs	=	7,691

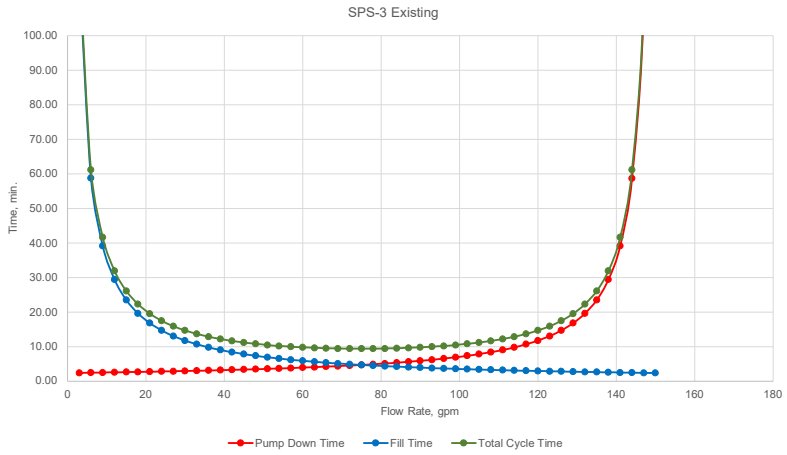
Emergency Storage Volume Calcs

Wet Well	=	1,615.78 Gallons
Collection System	=	13,730.26 Gallons
Total	=	15,346.04 Gallons
521 EDUs	=	35,087 Gallons
523 EDUs	=	35,141 Gallons
1,046 EDUs	=	47,862 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	35,087 gallons
Current Emergency Storage	=	15,346 gallons
Remaining Emergency Storage	=	-19,741 gallons
Remaining EDUs	=	-1,147

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	3	2.40	117.51	119.91	3
4%	6	2.45	58.76	61.20	6
6%	9	2.50	39.17	41.67	9
8%	12	2.55	29.38	31.93	12
10%	15	2.61	23.50	26.11	15
12%	18	2.67	19.59	22.26	18
14%	21	2.73	16.79	19.52	21
16%	24	2.80	14.69	17.49	24
18%	27	2.87	13.06	15.92	27
20%	30	2.94	11.75	14.69	30
22%	33	3.01	10.68	13.70	33
24%	36	3.09	9.79	12.89	36
26%	39	3.18	9.04	12.22	39
28%	42	3.26	8.39	11.66	42
30%	45	3.36	7.83	11.19	45
32%	48	3.46	7.34	10.80	48
34%	51	3.56	6.91	10.47	51
36%	54	3.67	6.53	10.20	54
38%	57	3.79	6.18	9.98	57
40%	60	3.92	5.88	9.79	60
42%	63	4.05	5.60	9.65	63
44%	66	4.20	5.34	9.54	66
46%	69	4.35	5.11	9.46	69
48%	72	4.52	4.90	9.42	72
50%	75	4.70	4.70	9.40	75
52%	78	4.90	4.52	9.42	78
54%	81	5.11	4.35	9.46	81
56%	84	5.34	4.20	9.54	84
58%	87	5.60	4.05	9.65	87
60%	90	5.88	3.92	9.79	90
62%	93	6.18	3.79	9.98	93
64%	96	6.53	3.67	10.20	96
66%	99	6.91	3.56	10.47	99
68%	102	7.34	3.46	10.80	102
70%	105	7.83	3.36	11.19	105
72%	108	8.39	3.26	11.66	108
74%	111	9.04	3.18	12.22	111
76%	114	9.79	3.09	12.89	114
78%	117	10.68	3.01	13.70	117
80%	120	11.75	2.94	14.69	120
82%	123	13.06	2.87	15.92	123
84%	126	14.69	2.80	17.49	126
86%	129	16.79	2.73	19.52	129
88%	132	19.59	2.67	22.26	132
90%	135	23.50	2.61	26.11	135
92%	138	29.38	2.55	31.93	138
94%	141	39.17	2.50	41.67	141
96%	144	58.72	2.45	61.17	144
98%	147	114.54	2.40	116.94	147
100%	150	1440.00	2.35	1442.35	150
102%	153	1440.00	2.30	1442.30	153
104%	156	1440.00	2.26	1442.26	156



SPS-3 Existing - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	1.6		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	15.0		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	31	cu.ft.	235 gallons
Active Storage Volume =	47	cu.ft.	353 gallons
Emergency Storage Volume =	216	cu.ft.	1,616 gallons
Total Volume =	295	cu.ft.	2,203 gallons

Inflow Conditions

Qaverage =	26.39	gpm	521 EDUs
Qpeak =	243.31	gpm	1,696 EDUs

Pump Operating Point

Q =	150.00	gpm
TDH =	30	ft.

Peaking Factor =	2.83	
Wastewater Generation Rate =	73	gpd/EDU
Minimum Cycle Time =	9.40	min.
Worst Case Flow Rate =	75	gpm 523 EDUs
Maximum Flow Rate =	150	gpm 1,046 EDUs

Pump EDU Analysis

Remaining EDUs	=	-650

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	0.96 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	1,103 gpm
Remaining EDUs	=	7,691

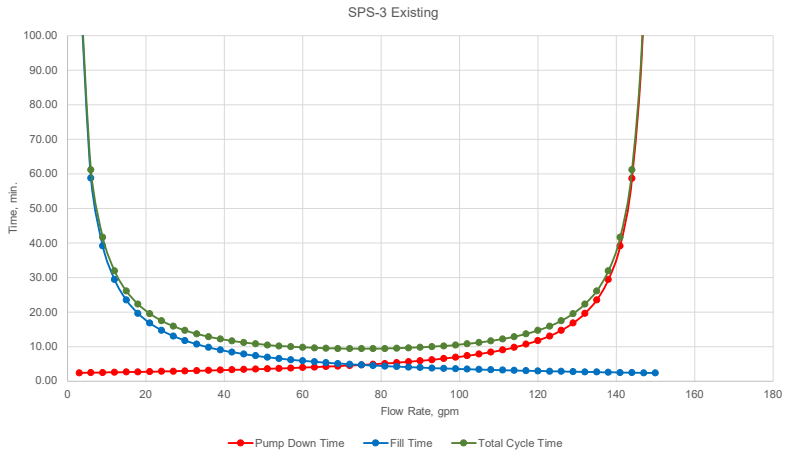
Emergency Storage Volume Calcs

Wet Well	=	1,615.78 Gallons
Collection System	=	13,730.26 Gallons
Total	=	15,346.04 Gallons
521 EDUs	=	116,787 Gallons
523 EDUs	=	116,841 Gallons
1,046 EDUs	=	129,562 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	116,787 gallons
Current Emergency Storage	=	15,346 gallons
Remaining Emergency Storage	=	-101,441 gallons
Remaining EDUs	=	-5,892

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	3	2.40	117.51	119.91	3
4%	6	2.45	58.76	61.20	6
6%	9	2.50	39.17	41.67	9
8%	12	2.55	29.38	31.93	12
10%	15	2.61	23.50	26.11	15
12%	18	2.67	19.59	22.26	18
14%	21	2.73	16.79	19.52	21
16%	24	2.80	14.69	17.49	24
18%	27	2.87	13.06	15.92	27
20%	30	2.94	11.75	14.69	30
22%	33	3.01	10.68	13.70	33
24%	36	3.09	9.79	12.89	36
26%	39	3.18	9.04	12.22	39
28%	42	3.26	8.39	11.66	42
30%	45	3.36	7.83	11.19	45
32%	48	3.46	7.34	10.80	48
34%	51	3.56	6.91	10.47	51
36%	54	3.67	6.53	10.20	54
38%	57	3.79	6.18	9.98	57
40%	60	3.92	5.88	9.79	60
42%	63	4.05	5.60	9.65	63
44%	66	4.20	5.34	9.54	66
46%	69	4.35	5.11	9.46	69
48%	72	4.52	4.90	9.42	72
50%	75	4.70	4.70	9.40	75
52%	78	4.90	4.52	9.42	78
54%	81	5.11	4.35	9.46	81
56%	84	5.34	4.20	9.54	84
58%	87	5.60	4.05	9.65	87
60%	90	5.88	3.92	9.79	90
62%	93	6.18	3.79	9.98	93
64%	96	6.53	3.67	10.20	96
66%	99	6.91	3.56	10.47	99
68%	102	7.34	3.46	10.80	102
70%	105	7.83	3.36	11.19	105
72%	108	8.39	3.26	11.66	108
74%	111	9.04	3.18	12.22	111
76%	114	9.79	3.09	12.89	114
78%	117	10.68	3.01	13.70	117
80%	120	11.75	2.94	14.69	120
82%	123	13.06	2.87	15.92	123
84%	126	14.69	2.80	17.49	126
86%	129	16.79	2.73	19.52	129
88%	132	19.59	2.67	22.26	132
90%	135	23.50	2.61	26.11	135
92%	138	29.38	2.55	31.93	138
94%	141	39.17	2.50	41.67	141
96%	144	58.72	2.45	61.17	144
98%	147	114.54	2.40	116.94	147
100%	150	1440.00	2.35	1442.35	150
102%	153	1440.00	2.30	1442.30	153
104%	156	1440.00	2.26	1442.26	156



SPS-3 Future - Average

Sump Depth =			Input Cell
Pump Off Level =	1.6		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	15.0		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	31	cu.ft.	235 gallons
Active Storage Volume =	47	cu.ft.	353 gallons
Emergency Storage Volume =	216	cu.ft.	1,616 gallons
Total Volume =	295	cu.ft.	2,203 gallons

Inflow Conditions

Qaverage =	29.17	gpm	575 EDUs
Qpeak =	80.79	gpm	563 EDUs

Pump Operating Point

Q =	150.00	gpm
TDH =	30	ft.

Peaking Factor =	2.83
Wastewater Generation Rate =	73 gpd/EDU
Minimum Cycle Time =	9.40 min.
Worst Case Flow Rate =	75 gpm 523 EDUs
Maximum Flow Rate =	150 gpm 1,046 EDUs

Pump EDU Analysis

Remaining EDUs	=	482

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	0.96 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	1,103 gpm
Remaining EDUs	=	7,691

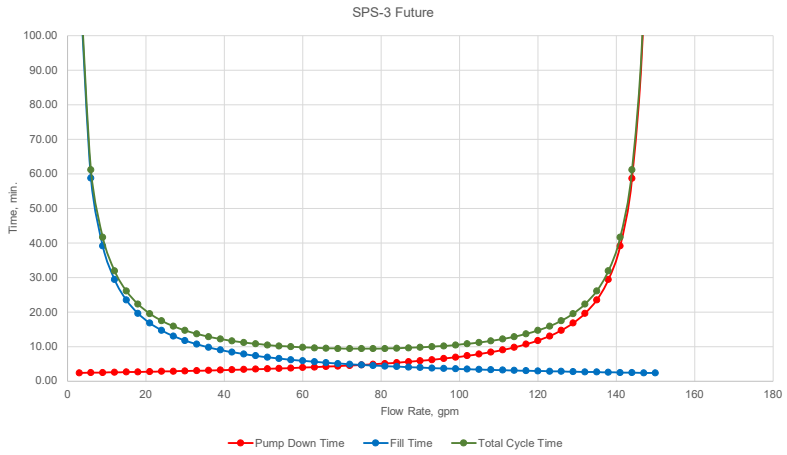
Emergency Storage Volume Calcs

Wet Well	=	1,615.78 Gallons
Collection System	=	13,730.26 Gallons
Total	=	15,346.04 Gallons
575 EDUs	=	38,780 Gallons
523 EDUs	=	37,501 Gallons
1,046 EDUs	=	50,222 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	38,780 gallons
Current Emergency Storage	=	15,346 gallons
Remaining Emergency Storage	=	-23,434 gallons
Remaining EDUs	=	-1,361

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	3	2.40	117.51	119.91	3
4%	6	2.45	58.76	61.20	6
6%	9	2.50	39.17	41.67	9
8%	12	2.55	29.38	31.93	12
10%	15	2.61	23.50	26.11	15
12%	18	2.67	19.59	22.26	18
14%	21	2.73	16.79	19.52	21
16%	24	2.80	14.69	17.49	24
18%	27	2.87	13.06	15.92	27
20%	30	2.94	11.75	14.69	30
22%	33	3.01	10.68	13.70	33
24%	36	3.09	9.79	12.89	36
26%	39	3.18	9.04	12.22	39
28%	42	3.26	8.39	11.66	42
30%	45	3.36	7.83	11.19	45
32%	48	3.46	7.34	10.80	48
34%	51	3.56	6.91	10.47	51
36%	54	3.67	6.53	10.20	54
38%	57	3.79	6.18	9.98	57
40%	60	3.92	5.88	9.79	60
42%	63	4.05	5.60	9.65	63
44%	66	4.20	5.34	9.54	66
46%	69	4.35	5.11	9.46	69
48%	72	4.52	4.90	9.42	72
50%	75	4.70	4.70	9.40	75
52%	78	4.90	4.52	9.42	78
54%	81	5.11	4.35	9.46	81
56%	84	5.34	4.20	9.54	84
58%	87	5.60	4.05	9.65	87
60%	90	5.88	3.92	9.79	90
62%	93	6.18	3.79	9.98	93
64%	96	6.53	3.67	10.20	96
66%	99	6.91	3.56	10.47	99
68%	102	7.34	3.46	10.80	102
70%	105	7.83	3.36	11.19	105
72%	108	8.39	3.26	11.66	108
74%	111	9.04	3.18	12.22	111
76%	114	9.79	3.09	12.89	114
78%	117	10.68	3.01	13.70	117
80%	120	11.75	2.94	14.69	120
82%	123	13.06	2.87	15.92	123
84%	126	14.69	2.80	17.49	126
86%	129	16.79	2.73	19.52	129
88%	132	19.59	2.67	22.26	132
90%	135	23.50	2.61	26.11	135
92%	138	29.38	2.55	31.93	138
94%	141	39.17	2.50	41.67	141
96%	144	58.72	2.45	61.17	144
98%	147	114.54	2.40	116.94	147
100%	150	1440.00	2.35	1442.35	150
102%	153	1440.00	2.30	1442.30	153
104%	156	1440.00	2.26	1442.26	156



SPS-3 Future - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	1.6		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	15.0		
Wet Well Diameter =	5	ft.	
Wet Well Area =	19.63	sq.ft.	
Sump Volume =	**31**	cu.ft.	**235** gallons
Active Storage Volume =	**47**	cu.ft.	**353** gallons
Emergency Storage Volume =	**216**	cu.ft.	**1,616** gallons
Total Volume =	**295**	cu.ft.	**2,203** gallons

Inflow Conditions

Qaverage =	29.17	gpm	**575** EDUs
Qpeak =	268.92	gpm	**1,874** EDUs

Pump Operating Point

Q =	150.00	gpm
TDH =	30	ft.

	Peaking Factor =	2.83		
	Wastewater Generation Rate =	73	gpd/EDU	
	Minimum Cycle Time =	**9.40**	min.	
	Worst Case Flow Rate =	**75**	gpm	**523** EDUs
	Maximum Flow Rate =	**150**	gpm	**1,046** EDUs

Pump EDU Analysis

Remaining EDUs	=	**-829**

Force Main Capacity

Force Main Diameter	=	8	inches
Existing Velocity	=	**0.96**	fps
Maximum Velocity	=	8.00	fps
Maximum Flow Rate	=	**1,253**	gpm

Force Main EDU Analysis

Remaining flow rate	=	**1,103**	gpm
Remaining EDUs	=	**7,691**	

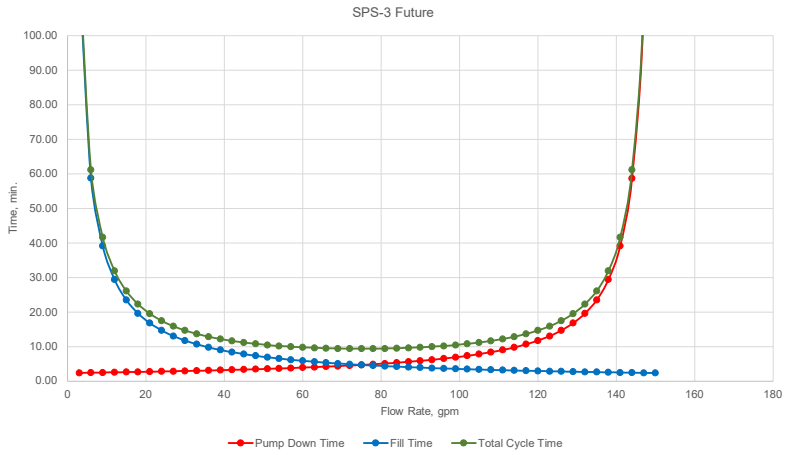
Emergency Storage Volume Calcs

Wet Well	=	1,615.78	Gallons
Collection System	=	13,730.26	Gallons
Total	=	15,346.04	Gallons
575 EDUs	=	**129,080**	Gallons
523 EDUs	=	**127,801**	Gallons
1,046 EDUs	=	**140,522**	Gallons

Emergency Storage Analysis

Required Emergency Storage	=	**129,080**	gallons
Current Emergency Storage	=	**15,346**	gallons
Remaining Emergency Storage	=	**-113,734**	gallons
Remaining EDUs	=	**-6,606**	

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	3	2.40	117.51	119.91	3
4%	6	2.45	58.76	61.20	6
6%	9	2.50	39.17	41.67	9
8%	12	2.55	29.38	31.93	12
10%	15	2.61	23.50	26.11	15
12%	18	2.67	19.59	22.26	18
14%	21	2.73	16.79	19.52	21
16%	24	2.80	14.69	17.49	24
18%	27	2.87	13.06	15.92	27
20%	30	2.94	11.75	14.69	30
22%	33	3.01	10.68	13.70	33
24%	36	3.09	9.79	12.89	36
26%	39	3.18	9.04	12.22	39
28%	42	3.26	8.39	11.66	42
30%	45	3.36	7.83	11.19	45
32%	48	3.46	7.34	10.80	48
34%	51	3.56	6.91	10.47	51
36%	54	3.67	6.53	10.20	54
38%	57	3.79	6.18	9.98	57
40%	60	3.92	5.88	9.79	60
42%	63	4.05	5.60	9.65	63
44%	66	4.20	5.34	9.54	66
46%	69	4.35	5.11	9.46	69
48%	72	4.52	4.90	9.42	72
50%	75	4.70	4.70	9.40	75
52%	78	4.90	4.52	9.42	78
54%	81	5.11	4.35	9.46	81
56%	84	5.34	4.20	9.54	84
58%	87	5.60	4.05	9.65	87
60%	90	5.88	3.92	9.79	90
62%	93	6.18	3.79	9.98	93
64%	96	6.53	3.67	10.20	96
66%	99	6.91	3.56	10.47	99
68%	102	7.34	3.46	10.80	102
70%	105	7.83	3.36	11.19	105
72%	108	8.39	3.26	11.66	108
74%	111	9.04	3.18	12.22	111
76%	114	9.79	3.09	12.89	114
78%	117	10.68	3.01	13.70	117
80%	120	11.75	2.94	14.69	120
82%	123	13.06	2.87	15.92	123
84%	126	14.69	2.80	17.49	126
86%	129	16.79	2.73	19.52	129
88%	132	19.59	2.67	22.26	132
90%	135	23.50	2.61	26.11	135
92%	138	29.38	2.55	31.93	138
94%	141	39.17	2.50	41.67	141
96%	144	58.72	2.45	61.17	144
98%	147	114.54	2.40	116.94	147
100%	150	1440.00	2.35	1442.35	150
102%	153	1440.00	2.30	1442.30	153
104%	156	1440.00	2.26	1442.26	156



SPS-4 Existing - Average

Sump Depth =			Input Cell
Pump Off Level =	2.5		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	14.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	71	cu.ft.	529 gallons
Active Storage Volume =	42	cu.ft.	317 gallons
Emergency Storage Volume =	282	cu.ft.	2,107 gallons
Total Volume =	395	cu.ft.	2,953 gallons

Inflow Conditions

Qaverage =	20.83	gpm	411 EDUs
Qpeak =	49.79	gpm	347 EDUs

Pump Operating Point

Q =	316.00	gpm
TDH =	20	ft.

Peaking Factor =	2.83	
Wastewater Generation Rate =	73	gpd/EDU
Minimum Cycle Time =	4.02	min.
Worst Case Flow Rate =	158	gpm 1,101 EDUs
Maximum Flow Rate =	316	gpm 2,203 EDUs

Pump EDU Analysis

Remaining EDUs	=	1,856

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	2.02 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	937 gpm
Remaining EDUs	=	6,534

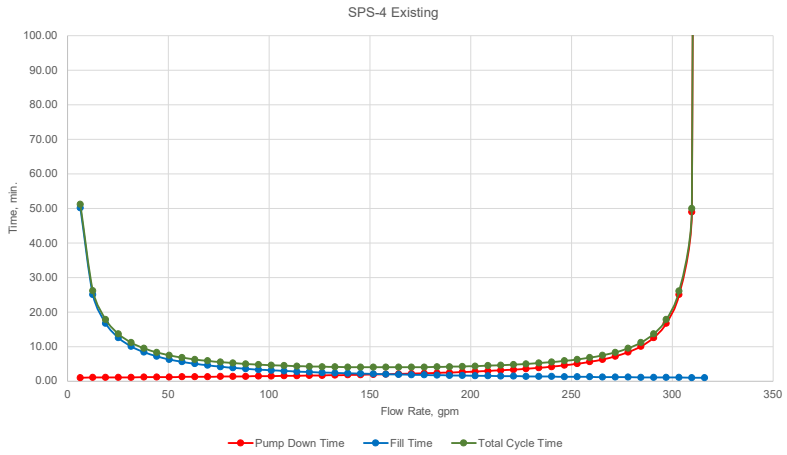
Emergency Storage Volume Calcs

Wet Well	=	2,106.74 Gallons
Collection System	=	5,085.78 Gallons
Total	=	7,192.53 Gallons
411 EDUs	=	23,900 Gallons
1,101 EDUs	=	40,699 Gallons
2,203 EDUs	=	67,497 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	23,900 gallons
Current Emergency Storage	=	7,193 gallons
Remaining Emergency Storage	=	-16,707 gallons
Remaining EDUs	=	-970

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	6.32	1.02	50.20	51.23	6.32
4%	12.64	1.05	25.10	26.15	12.64
6%	18.96	1.07	16.73	17.80	18.96
8%	25.28	1.09	12.55	13.64	25.28
10%	31.6	1.12	10.04	11.16	31.6
12%	37.92	1.14	8.37	9.51	37.92
14%	44.24	1.17	7.17	8.34	44.24
16%	50.56	1.20	6.28	7.47	50.56
18%	56.88	1.22	5.58	6.80	56.88
20%	63.2	1.26	5.02	6.28	63.2
22%	69.52	1.29	4.56	5.85	69.52
24%	75.84	1.32	4.18	5.50	75.84
26%	82.16	1.36	3.86	5.22	82.16
28%	88.48	1.39	3.59	4.98	88.48
30%	94.8	1.43	3.35	4.78	94.8
32%	101.12	1.48	3.14	4.61	101.12
34%	107.44	1.52	2.95	4.47	107.44
36%	113.76	1.57	2.79	4.36	113.76
38%	120.08	1.62	2.64	4.26	120.08
40%	126.4	1.67	2.51	4.18	126.4
42%	132.72	1.73	2.39	4.12	132.72
44%	139.04	1.79	2.28	4.07	139.04
46%	145.36	1.86	2.18	4.04	145.36
48%	151.68	1.93	2.09	4.02	151.68
50%	158	2.01	2.01	4.02	158
52%	164.32	2.09	1.93	4.02	164.32
54%	170.64	2.18	1.86	4.04	170.64
56%	176.96	2.28	1.79	4.07	176.96
58%	183.28	2.39	1.73	4.12	183.28
60%	189.6	2.51	1.67	4.18	189.6
62%	195.92	2.64	1.62	4.26	195.92
64%	202.24	2.79	1.57	4.36	202.24
66%	208.56	2.95	1.52	4.47	208.56
68%	214.88	3.14	1.48	4.61	214.88
70%	221.2	3.35	1.43	4.78	221.2
72%	227.52	3.59	1.39	4.98	227.52
74%	233.84	3.86	1.36	5.22	233.84
76%	240.16	4.18	1.32	5.50	240.16
78%	246.48	4.56	1.29	5.85	246.48
80%	252.8	5.02	1.26	6.28	252.8
82%	259.12	5.58	1.22	6.80	259.12
84%	265.44	6.28	1.20	7.47	265.44
86%	271.76	7.17	1.17	8.34	271.76
88%	278.08	8.37	1.14	9.51	278.08
90%	284.4	10.04	1.12	11.16	284.4
92%	290.72	12.55	1.09	13.64	290.72
94%	297.04	16.73	1.07	17.80	297.04
96%	303.36	25.09	1.05	26.13	303.36
98%	309.68	48.93	1.02	49.96	309.68
100%	316	1440.00	1.00	1441.00	316
102%	322.32	1440.00	0.98	1440.98	322.32
104%	328.64	1440.00	0.97	1440.97	328.64



SPS-4 Existing - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	2.5		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	14.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	71	cu.ft.	529 gallons
Active Storage Volume =	42	cu.ft.	317 gallons
Emergency Storage Volume =	282	cu.ft.	2,107 gallons
Total Volume =	395	cu.ft.	2,953 gallons

Inflow Conditions

Qaverage =	20.83	gpm	411 EDUs
Qpeak =	69.38	gpm	484 EDUs

Pump Operating Point

Q =	316.00	gpm
TDH =	20	ft.

Peaking Factor =	2.83	
Wastewater Generation Rate =	73	gpd/EDU
Minimum Cycle Time =	4.02	min.
Worst Case Flow Rate =	158	gpm 1,101 EDUs
Maximum Flow Rate =	316	gpm 2,203 EDUs

Pump EDU Analysis

Remaining EDUs	=	1,719

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	2.02 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	937 gpm
Remaining EDUs	=	6,534

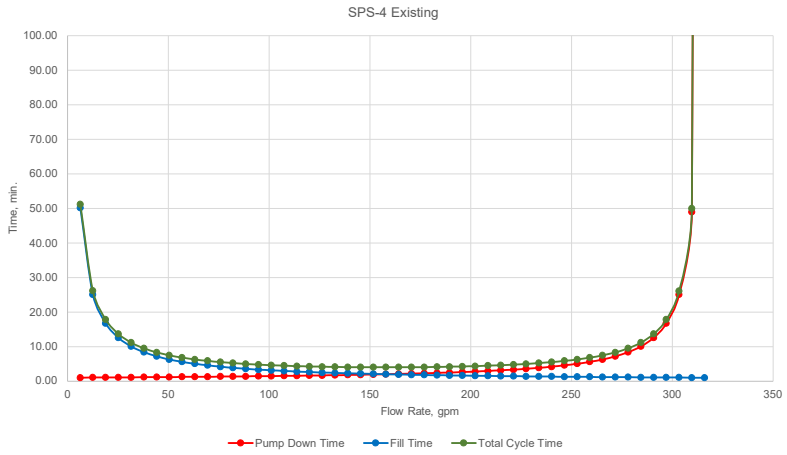
Emergency Storage Volume Calcs

Wet Well	=	2,106.74 Gallons
Collection System	=	5,085.78 Gallons
Total	=	7,192.53 Gallons
411 EDUs	=	33,300 Gallons
1,101 EDUs	=	50,099 Gallons
2,203 EDUs	=	76,897 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	33,300 gallons
Current Emergency Storage	=	7,193 gallons
Remaining Emergency Storage	=	-26,107 gallons
Remaining EDUs	=	-1,516

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	6.32	1.02	50.20	51.23	6.32
4%	12.64	1.05	25.10	26.15	12.64
6%	18.96	1.07	16.73	17.80	18.96
8%	25.28	1.09	12.55	13.64	25.28
10%	31.6	1.12	10.04	11.16	31.6
12%	37.92	1.14	8.37	9.51	37.92
14%	44.24	1.17	7.17	8.34	44.24
16%	50.56	1.20	6.28	7.47	50.56
18%	56.88	1.22	5.58	6.80	56.88
20%	63.2	1.26	5.02	6.28	63.2
22%	69.52	1.29	4.56	5.85	69.52
24%	75.84	1.32	4.18	5.50	75.84
26%	82.16	1.36	3.86	5.22	82.16
28%	88.48	1.39	3.59	4.98	88.48
30%	94.8	1.43	3.35	4.78	94.8
32%	101.12	1.48	3.14	4.61	101.12
34%	107.44	1.52	2.95	4.47	107.44
36%	113.76	1.57	2.79	4.36	113.76
38%	120.08	1.62	2.64	4.26	120.08
40%	126.4	1.67	2.51	4.18	126.4
42%	132.72	1.73	2.39	4.12	132.72
44%	139.04	1.79	2.28	4.07	139.04
46%	145.36	1.86	2.18	4.04	145.36
48%	151.68	1.93	2.09	4.02	151.68
50%	158	2.01	2.01	4.02	158
52%	164.32	2.09	1.93	4.02	164.32
54%	170.64	2.18	1.86	4.04	170.64
56%	176.96	2.28	1.79	4.07	176.96
58%	183.28	2.39	1.73	4.12	183.28
60%	189.6	2.51	1.67	4.18	189.6
62%	195.92	2.64	1.62	4.26	195.92
64%	202.24	2.79	1.57	4.36	202.24
66%	208.56	2.95	1.52	4.47	208.56
68%	214.88	3.14	1.48	4.61	214.88
70%	221.2	3.35	1.43	4.78	221.2
72%	227.52	3.59	1.39	4.98	227.52
74%	233.84	3.86	1.36	5.22	233.84
76%	240.16	4.18	1.32	5.50	240.16
78%	246.48	4.56	1.29	5.85	246.48
80%	252.8	5.02	1.26	6.28	252.8
82%	259.12	5.58	1.22	6.80	259.12
84%	265.44	6.28	1.20	7.47	265.44
86%	271.76	7.17	1.17	8.34	271.76
88%	278.08	8.37	1.14	9.51	278.08
90%	284.4	10.04	1.12	11.16	284.4
92%	290.72	12.55	1.09	13.64	290.72
94%	297.04	16.73	1.07	17.80	297.04
96%	303.36	25.09	1.05	26.13	303.36
98%	309.68	48.93	1.02	49.96	309.68
100%	316	1440.00	1.00	1441.00	316
102%	322.32	1440.00	0.98	1440.98	322.32
104%	328.64	1440.00	0.97	1440.97	328.64



SPS-4 Future - Average

Sump Depth =			Input Cell
Pump Off Level =	2.5		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	14.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	71	cu.ft.	529 gallons
Active Storage Volume =	42	cu.ft.	317 gallons
Emergency Storage Volume =	282	cu.ft.	2,107 gallons
Total Volume =	395	cu.ft.	2,953 gallons

Inflow Conditions

Qaverage =	22.92	gpm	452 EDUs
Qpeak =	54.77	gpm	382 EDUs

Pump Operating Point

Q =	316.00	gpm
TDH =	20	ft.

		Pump Down Time	**Fill Time**	**Total Cycle Time**	
	Q_{in} (gpm)	Time (min)	Time (min)	Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	6.32	1.02	50.20	51.23	6.32
4%	12.64	1.05	25.10	26.15	12.64
6%	18.96	1.07	16.73	17.80	18.96
8%	25.28	1.09	12.55	13.64	25.28
10%	31.6	1.12	10.04	11.16	31.6
12%	37.92	1.14	8.37	9.51	37.92
14%	44.24	1.17	7.17	8.34	44.24
16%	50.56	1.20	6.28	7.47	50.56
18%	56.88	1.22	5.58	6.80	56.88
20%	63.2	1.26	5.02	6.28	63.2
22%	69.52	1.29	4.56	5.85	69.52
24%	75.84	1.32	4.18	5.50	75.84
26%	82.16	1.36	3.86	5.22	82.16
28%	88.48	1.39	3.59	4.98	88.48
30%	94.8	1.43	3.35	4.78	94.8
32%	101.12	1.48	3.14	4.61	101.12
34%	107.44	1.52	2.95	4.47	107.44
36%	113.76	1.57	2.79	4.36	113.76
38%	120.08	1.62	2.64	4.26	120.08
40%	126.4	1.67	2.51	4.18	126.4
42%	132.72	1.73	2.39	4.12	132.72
44%	139.04	1.79	2.28	4.07	139.04
46%	145.36	1.86	2.18	4.04	145.36
48%	151.68	1.93	2.09	4.02	151.68
50%	158	2.01	2.01	4.02	158
52%	164.32	2.09	1.93	4.02	164.32
54%	170.64	2.18	1.86	4.04	170.64
56%	176.96	2.28	1.79	4.07	176.96
58%	183.28	2.39	1.73	4.12	183.28
60%	189.6	2.51	1.67	4.18	189.6
62%	195.92	2.64	1.62	4.26	195.92
64%	202.24	2.79	1.57	4.36	202.24
66%	208.56	2.95	1.52	4.47	208.56
68%	214.88	3.14	1.48	4.61	214.88
70%	221.2	3.35	1.43	4.78	221.2
72%	227.52	3.59	1.39	4.98	227.52
74%	233.84	3.86	1.36	5.22	233.84
76%	240.16	4.18	1.32	5.50	240.16
78%	246.48	4.56	1.29	5.85	246.48
80%	252.8	5.02	1.26	6.28	252.8
82%	259.12	5.58	1.22	6.80	259.12
84%	265.44	6.28	1.20	7.47	265.44
86%	271.76	7.17	1.17	8.34	271.76
88%	278.08	8.37	1.14	9.51	278.08
90%	284.4	10.04	1.12	11.16	284.4
92%	290.72	12.55	1.09	13.64	290.72
94%	297.04	16.73	1.07	17.80	297.04
96%	303.36	25.09	1.05	26.13	303.36
98%	309.68	48.93	1.02	49.96	309.68
100%	316	1440.00	1.00	1441.00	316
102%	322.32	1440.00	0.98	1440.98	322.32
104%	328.64	1440.00	0.97	1440.97	328.64

Peaking Factor =	2.83			
Wastewater Generation Rate =	73	gpd/EDU		
Minimum Cycle Time =	4.02	min.		
Worst Case Flow Rate =	158	gpm	1,101	EDUs
Maximum Flow Rate =	316	gpm	2,203	EDUs

Pump EDU Analysis

Remaining EDUs	=	1,821

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	2.02 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

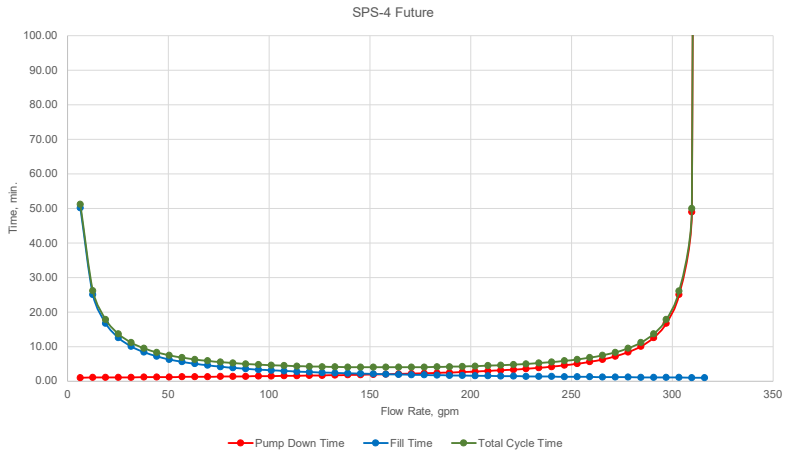
Remaining flow rate	=	937 gpm
Remaining EDUs	=	6,534

Emergency Storage Volume Calcs

Wet Well	=	2,106.74	Gallons
Collection System	=	5,085.78	Gallons
Total	=	7,192.53	Gallons
452 EDUs	=	26,290	Gallons
1,101 EDUs	=	42,089	Gallons
2,203 EDUs	=	68,887	Gallons

Emergency Storage Analysis

Required Emergency Storage	=	26,290 gallons
Current Emergency Storage	=	7,193 gallons
Remaining Emergency Storage	=	-19,097 gallons
Remaining EDUs	=	-1,109



SPS-4 Future - Wet Weather

Sump Depth =			Input Cell
Pump Off Level =	2.5		Calculation Cell
Pump On Level =	4		
Wet Well Spill Level =	14.0		
Wet Well Diameter =	6	ft.	
Wet Well Area =	28.27	sq.ft.	
Sump Volume =	71	cu.ft.	529 gallons
Active Storage Volume =	42	cu.ft.	317 gallons
Emergency Storage Volume =	282	cu.ft.	2,107 gallons
Total Volume =	395	cu.ft.	2,953 gallons

Inflow Conditions

Qaverage =	22.92	gpm	452 EDUs
Qpeak =	76.31	gpm	532 EDUs

Pump Operating Point

Q =	316.00	gpm
TDH =	20	ft.

Peaking Factor =	2.83
Wastewater Generation Rate =	73 gpd/EDU
Minimum Cycle Time =	4.02 min.
Worst Case Flow Rate =	158 gpm 1,101 EDUs
Maximum Flow Rate =	316 gpm 2,203 EDUs

Pump EDU Analysis

Remaining EDUs	=	1,671

Force Main Capacity

Force Main Diameter	=	8 inches
Existing Velocity	=	2.02 fps
Maximum Velocity	=	8.00 fps
Maximum Flow Rate	=	1,253 gpm

Force Main EDU Analysis

Remaining flow rate	=	937 gpm
Remaining EDUs	=	6,534

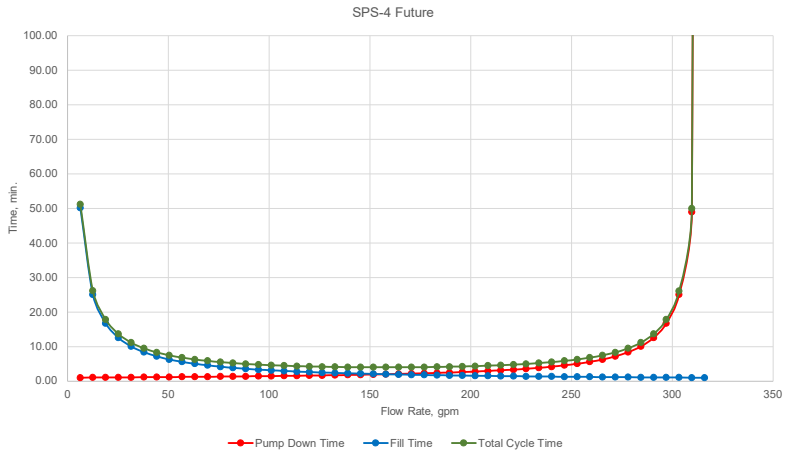
Emergency Storage Volume Calcs

Wet Well	=	2,106.74 Gallons
Collection System	=	5,085.78 Gallons
Total	=	7,192.53 Gallons
452 EDUs	=	36,630 Gallons
1,101 EDUs	=	52,429 Gallons
2,203 EDUs	=	79,227 Gallons

Emergency Storage Analysis

Required Emergency Storage	=	36,630 gallons
Current Emergency Storage	=	7,193 gallons
Remaining Emergency Storage	=	-29,437 gallons
Remaining EDUs	=	-1,710

	Q_{in} (gpm)	Pump Down Time (min)	Fill Time (min)	Total Cycle Time (min)	Q_{repeat}
0%	0	0.00	0	0	0
2%	6.32	1.02	50.20	51.23	6.32
4%	12.64	1.05	25.10	26.15	12.64
6%	18.96	1.07	16.73	17.80	18.96
8%	25.28	1.09	12.55	13.64	25.28
10%	31.6	1.12	10.04	11.16	31.6
12%	37.92	1.14	8.37	9.51	37.92
14%	44.24	1.17	7.17	8.34	44.24
16%	50.56	1.20	6.28	7.47	50.56
18%	56.88	1.22	5.58	6.80	56.88
20%	63.2	1.26	5.02	6.28	63.2
22%	69.52	1.29	4.56	5.85	69.52
24%	75.84	1.32	4.18	5.50	75.84
26%	82.16	1.36	3.86	5.22	82.16
28%	88.48	1.39	3.59	4.98	88.48
30%	94.8	1.43	3.35	4.78	94.8
32%	101.12	1.48	3.14	4.61	101.12
34%	107.44	1.52	2.95	4.47	107.44
36%	113.76	1.57	2.79	4.36	113.76
38%	120.08	1.62	2.64	4.26	120.08
40%	126.4	1.67	2.51	4.18	126.4
42%	132.72	1.73	2.39	4.12	132.72
44%	139.04	1.79	2.28	4.07	139.04
46%	145.36	1.86	2.18	4.04	145.36
48%	151.68	1.93	2.09	4.02	151.68
50%	158	2.01	2.01	4.02	158
52%	164.32	2.09	1.93	4.02	164.32
54%	170.64	2.18	1.86	4.04	170.64
56%	176.96	2.28	1.79	4.07	176.96
58%	183.28	2.39	1.73	4.12	183.28
60%	189.6	2.51	1.67	4.18	189.6
62%	195.92	2.64	1.62	4.26	195.92
64%	202.24	2.79	1.57	4.36	202.24
66%	208.56	2.95	1.52	4.47	208.56
68%	214.88	3.14	1.48	4.61	214.88
70%	221.2	3.35	1.43	4.78	221.2
72%	227.52	3.59	1.39	4.98	227.52
74%	233.84	3.86	1.36	5.22	233.84
76%	240.16	4.18	1.32	5.50	240.16
78%	246.48	4.56	1.29	5.85	246.48
80%	252.8	5.02	1.26	6.28	252.8
82%	259.12	5.58	1.22	6.80	259.12
84%	265.44	6.28	1.20	7.47	265.44
86%	271.76	7.17	1.17	8.34	271.76
88%	278.08	8.37	1.14	9.51	278.08
90%	284.4	10.04	1.12	11.16	284.4
92%	290.72	12.55	1.09	13.64	290.72
94%	297.04	16.73	1.07	17.80	297.04
96%	303.36	25.09	1.05	26.13	303.36
98%	309.68	48.93	1.02	49.96	309.68
100%	316	1440.00	1.00	1441.00	316
102%	322.32	1440.00	0.98	1440.98	322.32
104%	328.64	1440.00	0.97	1440.97	328.64



APPENDIX E:
COST ESTIMATES

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Estimate by:	Dallas Jones, P.E.	**Project Maturity:**	0%	
Project Name:	SLCWD Utility Master Plan	**Expected Accuracy Range:**	-50% 100%	Low High
Project No.	2502	**Expected Date of Construction:**		January 1, 2026
Date of Estimate:	12/28/23	**Future Cost Inflation Rate:**		3.8%
Estimate Class:	5	**Current ENRCCI:**	13514.8	
QC Check by:	Alex Stodtmeister, P.E.	**Version:**	1.0	
Date of Review:	12/29/23			

Class 5 Opinion of Probable Cost - ACP & VCP Sewer Main Replacement

Bid Item	Description	Quantity	Unit	Unit Cost	Total Amount
1	Mobilization/Demobilization	1	LS	$ 53,000	**$ 53,000**
2	Traffic Control	1	LS	$ 22,000	**$ 22,000**
3	Erosion Control	1	LS	$ 53,000	**$ 53,000**
4	6-inch Sewer Forcemain (C900 PVC)	405	LF	$ 400	**$ 162,000**
5	Creek Crossing (Horizontal Directional Drill)	1	LS	$ 513,000	**$ 513,000**
6	Pump Station 2 Improvements	1	LS	$ 370,000	**$ 370,000**
7	Sewer Infrastructure Abandonment	1	LS	$ 7,000	**$ 7,000**
				Construction SubTotal:	**$ 1,180,000**
				Construction Low Estimate:	$ 590,000
				Construction High Estimate:	$ 2,360,000
				Soft Costs	
				Contingency (20%)	$ 236,000
				Engineering (15%)	$ 177,000
				Permitting (5%)	$ 59,000
				Construction Observation and Management (12%)	$ 142,000
				Administration (5%)	$ 59,000
				Soft Costs SubTotal:	**$ 673,000**
				2023 Project Total:	**$ 1,853,000**
				2026 Projected Project Total:	**$ 2,072,000**

Existing PVC

Estimate by:	Dallas Jones, P.E.	**Project Maturity:**	0%	
Project Name:	SLCWD Utility Master Plan	**Expected Accuracy Range:**	-50% 100%	Low High
Project No.	2502	**Expected Date of Construction:**		January 1, 2027
Date of Estimate:	12/28/23	**Future Cost Inflation Rate:**		3.8%
Estimate Class:	5	**Current ENRCCI:**	13514.8	
QC Check by:	Alex Stodtmeister, P.E.	**Version:**	1.0	
Date of Review:	12/29/23			

Class 5 Opinion of Probable Cost - ACP & VCP Sewer Main Replacement

Bid Item	Description	Quantity	Unit	Unit Cost	Total Amount
1	Mobilization/Demobilization	1	LS	$ 69,000	**$ 69,000**
2	Traffic Control	1	LS	$ 28,000	**$ 28,000**
3	Erosion Control	1	LS	$ 69,000	**$ 69,000**
4	6-inch Sewer Forcemain (C900 PVC)	245	LF	$ 400	**$ 98,000**
5	Creek Crossing (Horizontal Directional Drill)	1	LS	$ 476,000	**$ 476,000**
6	Pump Station 3 Improvements	1	LS	$ 336,000	**$ 336,000**
7	Sewer Infrastructure Abandonment	1	LS	$ 7,000	**$ 7,000**
8	Emergency Storage Building	1	LS	$ 350,000	**$ 350,000**
9	WWTP Site Work	1	LS	$ 100,000	**$ 100,000**
				Construction SubTotal:	**$ 1,533,000**
				Construction Low Estimate:	$ 766,500
				Construction High Estimate:	$ 3,066,000
				Soft Costs	
				Contingency (20%)	$ 307,000
				Engineering (15%)	$ 230,000
				Permitting (5%)	$ 77,000
				Construction Observation and Management (12%)	$ 184,000
				Administration (5%)	$ 77,000
				Soft Costs SubTotal:	**$ 875,000**
				2023 Project Total:	**$ 2,408,000**
				2027 Projected Project Total:	**$ 2,795,000**

Existing PVC

Estimate by:	Dallas Jones, P.E.	**Project Maturity:**	0%	
Project Name:	SLCWD Utility Master Plan	**Expected Accuracy Range:**	-50% 100%	Low High
Project No.	2502	**Expected Date of Construction:**		January 1, 2043
Date of Estimate:	11/10/23	**Future Cost Inflation Rate:**		3.8%
Estimate Class:	5	**Current ENRCCI:**	13498	
QC Check by:	Alex Stodtmeister, P.E.	**Version:**	1.0	
Date of Review:	11/10/23			

Class 5 Opinion of Probable Cost - ACP & VCP Sewer Main Replacement

Bid Item	Description	Quantity	Unit	Unit Cost	Total Amount
1	Mobilization/Demobilization	1	LS	$ 1,709,000	**$ 1,709,000**
2	Traffic Control	1	LS	$ 684,000	**$ 684,000**
3	Erosion Control	1	LS	$ 684,000	**$ 684,000**
4	48-inch Dia. Manhole	229	EA	$ 14,000	**$ 3,206,000**
5	8-inch SDR35 PVC Sewer Main	48,856	LF	$ 430	**$ 21,008,080**
6	10-inch SDR35 PVC Sewer Main	4,970	LF	$ 480	**$ 2,385,600**
7	12-inch SDR35 PVC Sewer Main	59	LF	$ 530	**$ 31,270**
8	3-inch Patch Paving	53,885	LF	$ 140	**$ 7,543,900**
				Construction SubTotal:	**$ 37,251,850**
				Construction Low Estimate:	$ 18,625,925
				Construction High Estimate:	$ 74,503,700
				Soft Costs	
				Contingency (20%)	$ 7,450,000
				Engineering (15%)	$ 5,588,000
				Permitting (5%)	$ 1,863,000
				Construction Observation and Management (12%)	$ 4,470,000
				Administration (5%)	$ 1,863,000
				Soft Costs SubTotal:	**$ 21,234,000**
				2023 Project Total:	**$ 58,485,850**
				2043 Projected Project Total:	**$ 123,310,000**

Existing PVC