

City of Milpitas Sewer Master Plan

City of Milpitas

Sewer Master Plan

Prepared by HydroScience Engineers, Inc.



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ABBREVIATIONS

| | |
|-----------|--|
| A | Amperes |
| ABS | Acrylonitrile-Butadiene-Styrene |
| AIC | Ampere Interrupting Capacity |
| BRE | Business Risk Exposure |
| BSF | Base sanitary flow |
| CCTV | Closed caption television |
| CEQA | California Environmental Quality Act |
| CIP | Capital Improvement Plan/Capital Improvement Program, Cast Iron Pipe |
| CIPP | Cured-in-Place Pipe |
| City | City of Milpitas |
| CoF | Consequence of failure |
| d | Wastewater depth |
| D | Pipe diameter |
| DEM | Digital elevation model |
| DIP | Ductile Iron Pipe |
| DU | Dwelling unit |
| DWF | Dry weather flow |
| ESDC | Engineering services during construction |
| FM | Flow meter |
| ft, ‘ | Foot, feet, linear feet |
| ft/s | Feet per second |
| FY | Fiscal year |
| GIS | Geographic Information Systems/ArcGIS geodatabase |
| GP | General Plan |
| gpd | Gallons per day |
| GWI | Groundwater infiltration |
| HDPE | High-Density Polyethylene |
| HGL | Hydraulic grade line |
| Hp | Horsepower |
| IAP | InfoAsset Planner by Innovyze® |
| in, “ | Inch, inches |
| InfoWorks | InfoWorks ICM by Innovyze® |
| kV | Kilovolt |
| kVA | Kilovolt-ampere |
| LAFCO | Local Agency Formation Commission |
| LoF | Likelihood of failure |
| Main LS | Milpitas Main Lift Station |
| MGD | Millions of gallons per day |
| MH | Manhole |
| NASSCO | National Association of Sewer Service Companies |

| | |
|--------------|---|
| NAVD 88 | North American Vertical Datum of 1988 |
| NEMA | National Electrical Manufacturers Association |
| NGVD 29 | National Geodetic Vertical Datum of 1929 |
| NOAA | National Oceanic and Atmospheric Administration |
| O&M | Operations & Maintenance |
| P | Pole |
| PACP | Pipeline Assessment Certification Program |
| ph | phase |
| PVC | Polyvinyl Chloride |
| QC | Quality control |
| RCP | Reinforced Concrete Pipe |
| RDI/I | Rainfall dependent inflow and infiltration |
| RG | Rain gauge |
| ROW | Right-of-way |
| RWF | San Jose-Santa Clara Regional Wastewater Facility |
| RWQCB | Regional Water Quality Control Board |
| SBWR | South Bay Water Recycling |
| SFPUC | San Francisco Public Utility Commission |
| SMP | Sewer Master Plan |
| SOI | Sphere of Influence |
| SSMP | Sanitary Sewer Management Plan |
| SSO | Sanitary sewer overflow |
| TASP | Transit Area Specific Plan |
| UF | Unit flow |
| UGB | Urban Growth Boundary |
| USA | Urban Service Area |
| USGS | United States Geological Survey |
| V | Volts |
| VCP | Vitrified Clay Pipe |
| Venus Way LS | Venus Way Lift Station |
| VFD | Variable frequency drive |
| W | Watts |
| WDR | RWQCB General Waste Discharge Requirements |
| WWF | Wet weather flow |

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EXECUTIVE SUMMARY

HydroScience Engineers, Inc. (HydroScience) was retained by the City of Milpitas (City), to prepare the City Sewer Master Plan (SMP) and develop a Capital Improvement Plan (CIP) based on the current (2020) and future (2040) planning horizons. This executive summary provides a concise discussion of the project elements including background information, analyses conducted, and recommendations.

Services and Service Area

The City is in Santa Clara County and is bounded by the cities of Fremont to the north, San Jose to the south and west, and unincorporated Santa Clara County to the east. The City encompasses 14 square miles and is approximately 45 miles southeast of San Francisco (see **Figure ES-1**). The City provides wastewater collection services to a population of 77,961 according to the Department of Finance.

The wastewater collection system consists of approximately 160 miles of gravity sewers, with pipe diameters ranging from 4- to 66-inches. The collection system generally flows from east to west and south to north towards the San Francisco Bay. Most of the collection system flows by gravity to the Milpitas Main Lift Station (Main LS) then is pumped to the San Jose-Santa Clara Regional Wastewater Facility (RWF) through dual force mains. The Venus Way Lift Station (Venus Way LS) pumps sewage from a small portion of the City that is at a lower elevation up to a higher elevation where it then flows by gravity to the Main LS. **Figure ES-2** provides an overview of the wastewater collection system.

The City's wastewater collection system includes pipelines and structures of varying age, size, and material. According to the City's ArcGIS geodatabase (GIS), most the City's wastewater collection system pipelines are vitrified clay pipe (VCP) and 4- to 12-inches in diameter, and approximately 70% of all pipelines were built before 1990. The collection system also includes almost 3,000 manholes, of which approximately 60% were built before 1990. Of these manholes, 177 were identified as flow splits – manholes that allow outflow via two or more pipes.

Condition Assessment

As part of the City's Master Plan project, a *Sewer Utility Asset Renewal and Replacement Study* (R&R Study) was conducted. The study documents the City's Business Risk Exposure (BRE) based on the physical condition and desktop assessment of the City's collection system applying a set of factors developed to determine the relative risk of failure for each pipeline segment.

The first element of the study involved performing a field investigation using closed-circuit television (CCTV) to assess the condition of key pipeline segments in the collection system. National Plant Services Inc. (NPS) successfully inspected 105,211 ft (approximately 20 miles) of pipeline. For each pipeline segment inspected, structural and operations and maintenance (O&M) related defects were identified and graded on a scale of one (least severe) to five (most severe) based on the type and severity of the defect in accordance with the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP).

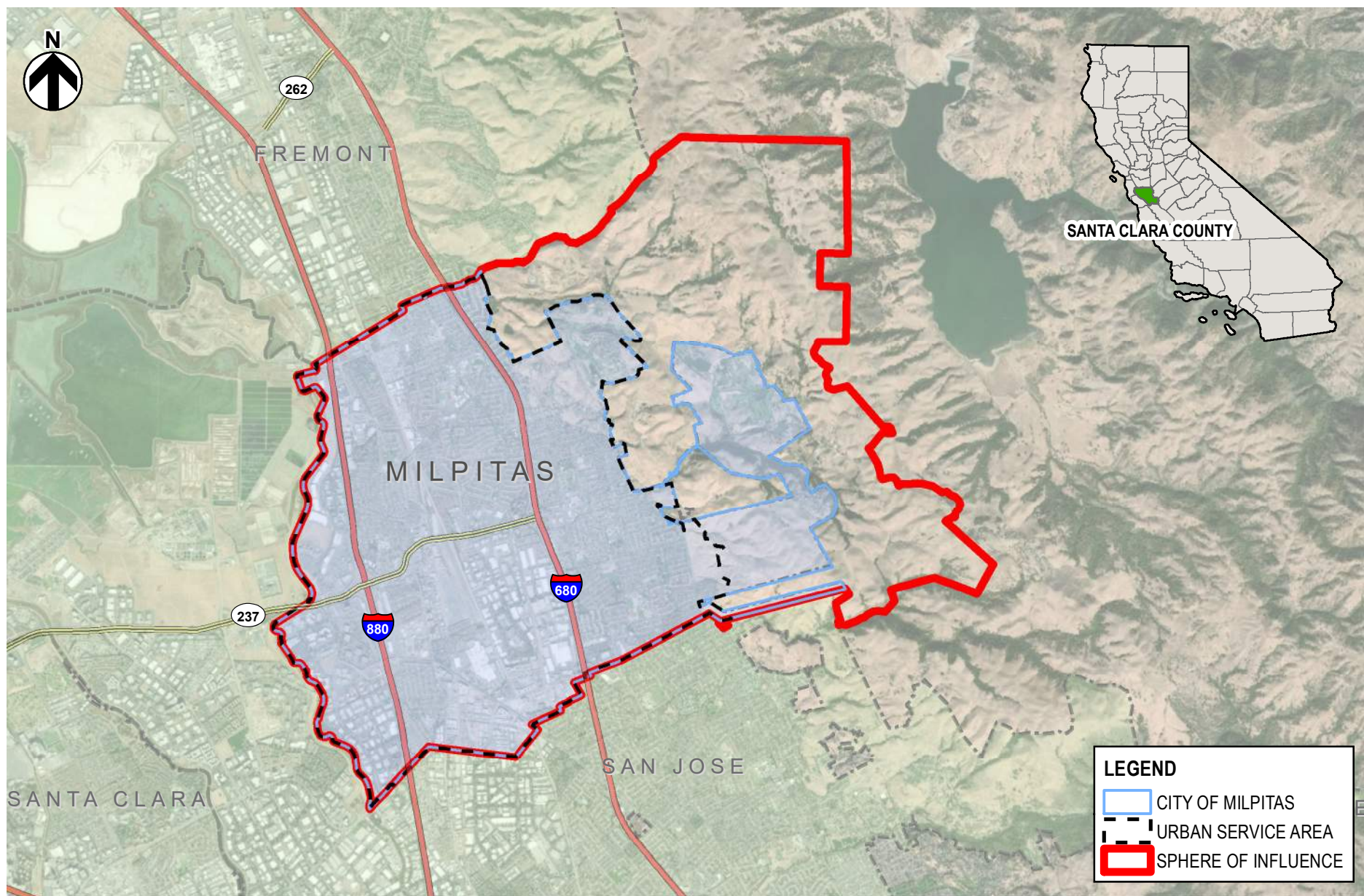


FIGURE ES-1
CITY OF MILPITAS
SEWER MASTER PLAN
PROJECT LOCATION MAP

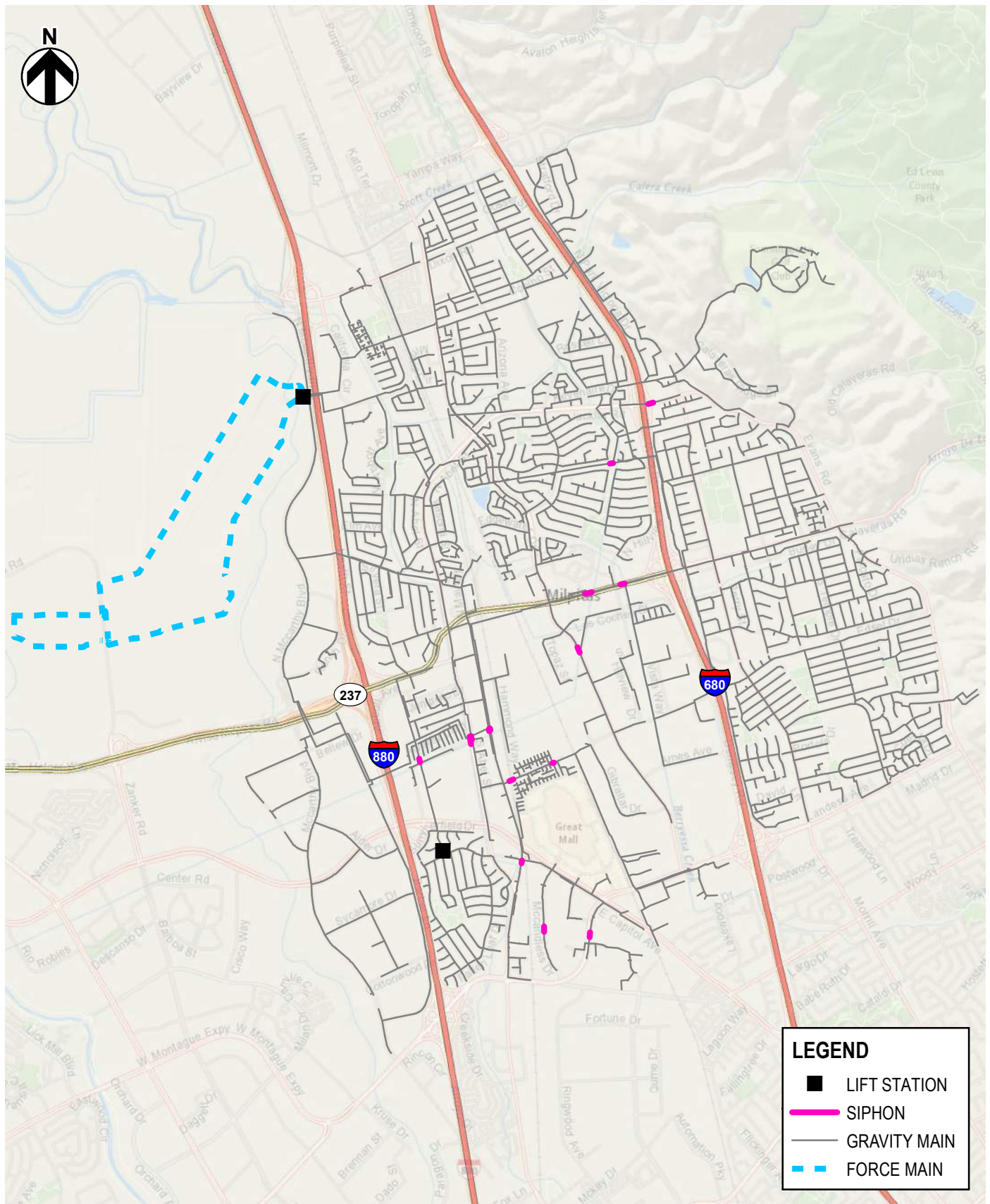


FIGURE ES-2
CITY OF MILPITAS
SEWER MASTER PLAN
WASTEWATER COLLECTION SYSTEM OVERVIEW

The second element of the study involved a desktop assessment of the entire collection system based on relative risk of failure of each pipeline segment. A pipeline's risk of failure is determined by a combination of the *likelihood* and the *consequence* of the failure of the segment.

Likelihood of failure (LoF) and consequence of failure (CoF) scores were assigned to each pipeline segment by considering various factor ratings with assigned factor weightings. Factor ratings were given on a scale of one (least likely to fail/least consequential) to five (most likely to fail/most consequential). The weighting of each factor was assigned based on the relative criticality of that factor, with higher weighting factors assigned to the most critical factors. The following factors, typical for sewer renewal/replacement, were selected for this Study:

LoF Factors:

- Pipe age
- Pipe material
- Structural condition
- Presence of pipe obstructions
- Required pipe cleaning
- Proximity to landslide zones
- Proximity to earthquake faults

Local geology (liquefaction)

CoF Factors:

- Sewer size (pipe diameter)
- Proximity to critical facilities
- Road type (impact to transit/traffic)
- Railroad proximity
- Easement (access restriction)
- Pipeline depth
- Proximity to waterway or waterbody

The following equations were used to calculate a risk score for each pipeline segment:

$$\text{Risk (BRE)} = \text{LoF Score} \times \text{CoF Score}$$

$$\text{LoF Score} = \sum (\text{LoF Rating} \times \text{LoF Weighting})$$

$$\text{CoF Score} = \sum (\text{CoF Rating} \times \text{CoF Weighting})$$

Figure ES-3 presents the resulting BRE scores for all pipelines in the entire city.

Hydraulic Model Land Use and Network Development

To develop base sanitary flows (BSF) – the flow directly contributed by the customer – wastewater flows were assigned to every contributing parcel in the City. For planning level analysis, parcels of similar land use types are estimated to have similar wastewater flow rates either on a per parcel basis (gpd/parcel) or per acre basis (gpd/acre) and similar diurnal patterns. City General Plan (GP) land use designations were reviewed for each parcel in the City. For modeling purposes, some modifications to the land uses were warranted to ensure relevance to the sewer analysis. Land use types expected to generate similar wastewater flows were consolidated into model-based land use designations to facilitate unit flow (UF) analysis (listed in **Table 5-1**). Land uses that have little to no contribution to the sewer system were excluded from further analysis. **Figure ES-4** presents the City according to the model-based land designations.

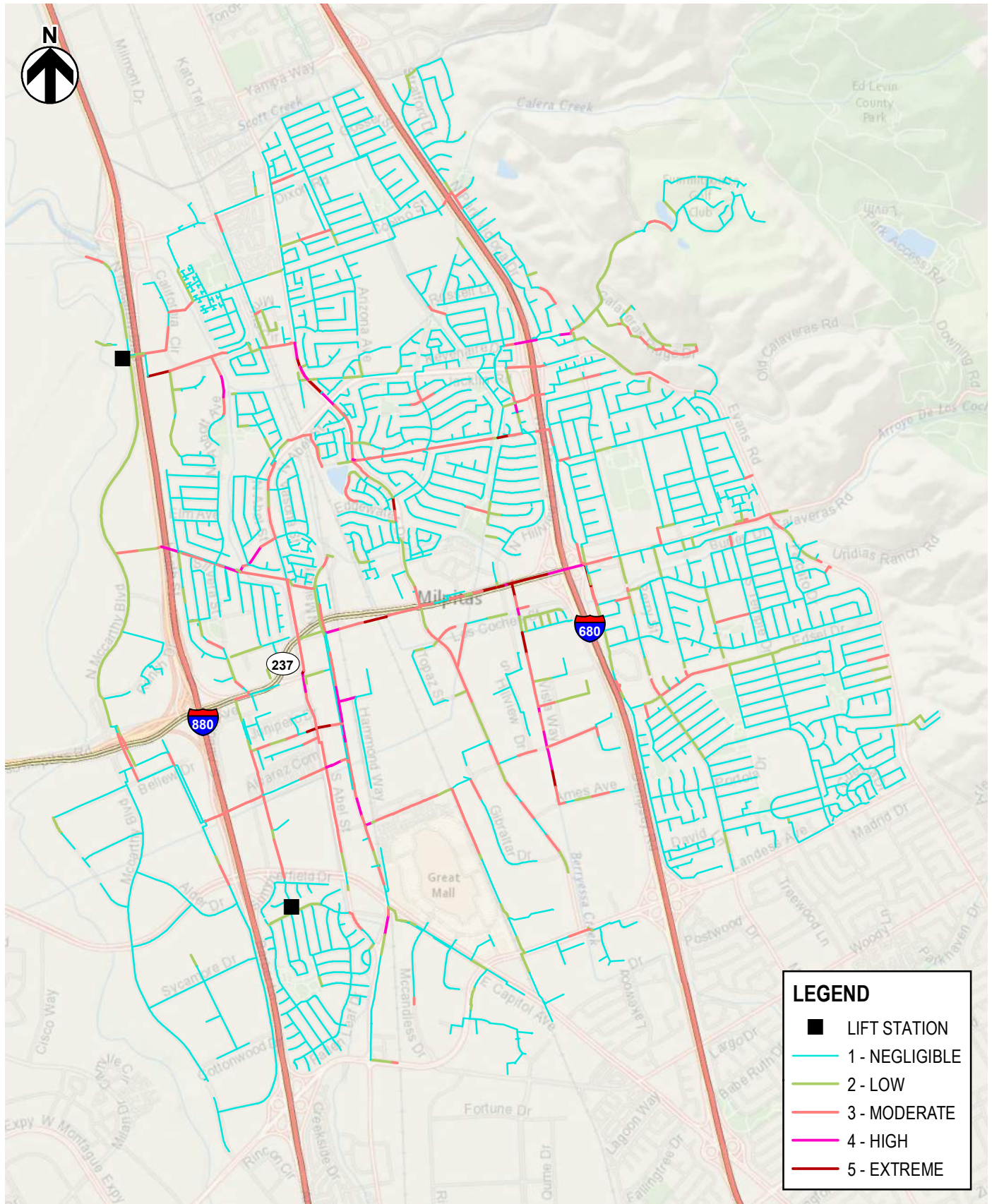


FIGURE ES-3
 CITY OF MILPITAS
 SEWER MASTER PLAN
 BUSINESS RISK EXPOSURE SCORE MAP

The City has identified “Opportunity Areas” which refers to parcels identified within the City that may be considered for future redevelopment. The future land uses identified in the “Opportunity Areas” were reviewed and assigned the model-based land use designations listed in **Table ES-1** according to the anticipated use, density, and wastewater flow rates.

Table ES-1: Model-Based Land Use Designations for Existing Conditions

| GP Land Use | Code | Model-Based Land Use | Code |
|---|-----------|---|-------|
| Hillside Very Low Density | HVL | Hillside Single-Family Low Density | HSFL |
| Hillside Low Density | HLD | | |
| Hillside Medium Density | HMD | Hillside Single Family Medium Density | HSFM |
| Valley Floor Single-Family Low Density | SFL | Valley Floor Single-Family Low Density | SFL |
| Valley Floor Single-Family Medium Density | SMD | Valley Floor Single-Family Medium Density | SFM |
| Multi-Family Medium Density | MFM | | |
| Multi-Family High Density | MFH | Valley Floor Multi-Family High Density | MFH |
| Multi-Family Very High Density | VHD | Valley Floor Multi-Family Very High Density | MFVH |
| Mobile Home Park | MHP | Mobile Home Park | MHP |
| Mixed Use | MXD | Mixed Use | MXD |
| Boulevard Very High-Density Mixed Use | BVMU | High Density Mixed Use | HDMU |
| Residential-Retail Mixed Use | RRMU | | |
| Professional & Administrative Offices | PAO | Professional & Administrative Offices | PAO |
| General Commercial | GNC | Commercial | COM |
| Retail Sub-Center | RSC | | |
| Industrial Park | INP | Industrial Park | INP |
| Manufacturing | MFG | Manufacturing | MFG |
| Public Facilities | PF | Public Facilities ¹ | PF |
| | | Elmwood Correctional Facility ² | COR |
| TWC, MXD, GNC, INP, HWS, RSC | | Hotels ³ | HOTEL |
| Park Open Space | POS | NF | |
| Waterways | WATERWAYS | NF | |
| Highway Services | HWS | Parcels reviewed and model-based land use designation assigned, as appropriate. | |
| Town Center | TWC | | |
| Urban Residential | URR | | |
| Parcels with no land use designation | - | | |

Notes:

1. Includes schools, churches, health facilities, libraries, and fire stations.
2. The correctional facility is categorized as PF in the GP. For modeling purposes, it was given a distinct code.
3. Hotels are categorized under various land uses in the GP. They were identified and assigned a distinct code.

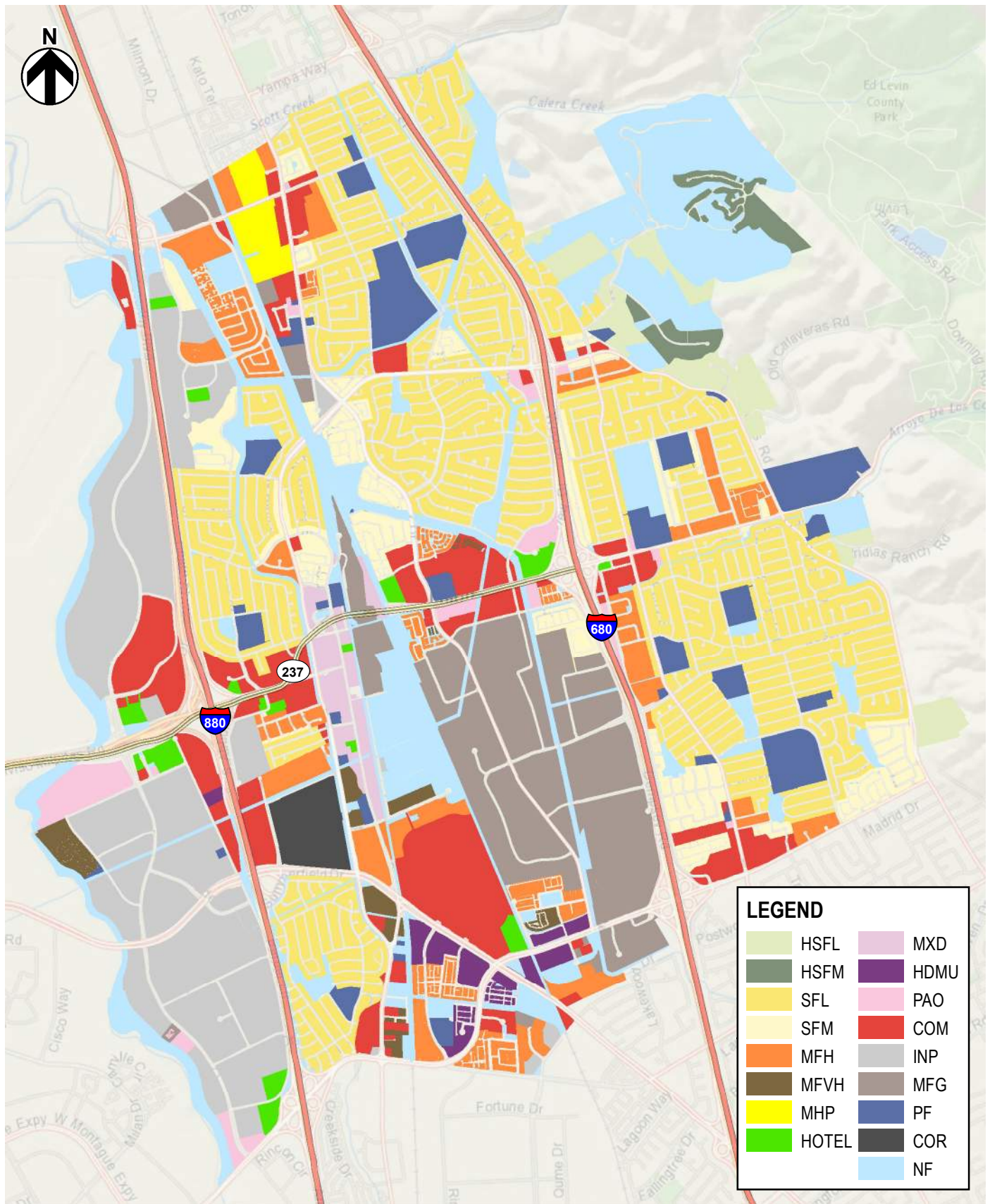


FIGURE ES-4
CITY OF MILPITAS
SEWER MASTER PLAN
MODEL-BASED LAND USE DESIGNATIONS - EXISTING

Wastewater Flow Analysis

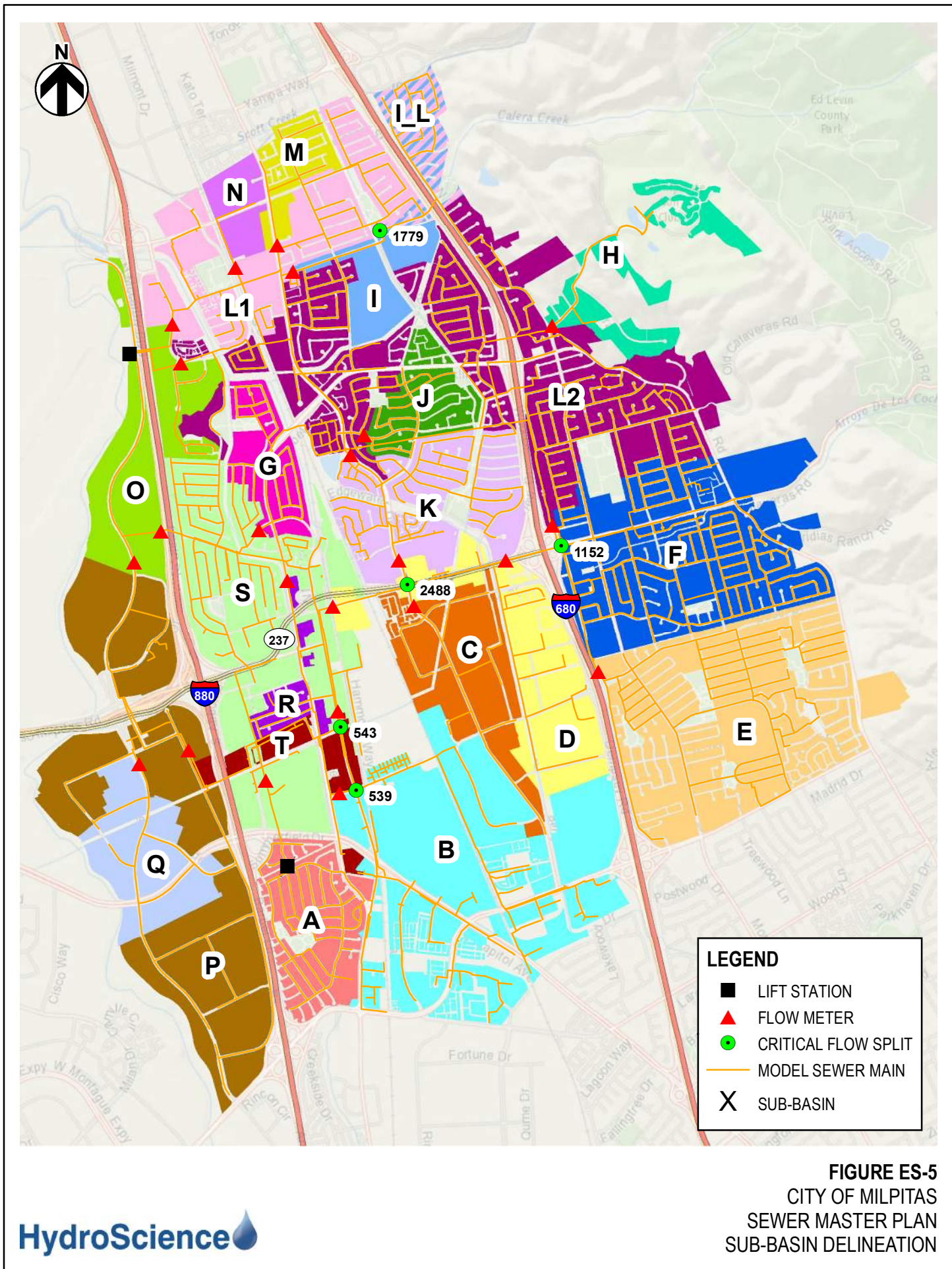
The City contracted with ADS Environmental Services (ADS) to perform dry and wet weather flow monitoring within the City collection system. ADS installed 23 FlowShark Triton flow meters throughout the City and monitored flow between November 16, 2019 and March 9, 2020. The collection system was divided into 21 sub-basins based on the location of the flow meters, and the data from the flow monitoring program was used to calibrate the hydraulic model. Dry weather flow data from the flow monitoring program was used to develop dry weather groundwater infiltration (GWI) for each sub-basin and BSF. For modeling purposes, this document defines GWI as any, and all sources of constant flow. GWI is comprised both of groundwater infiltration and any other constant flow that is generally detected during low flow periods. BSF is represented by a combination of UF factors and diurnal patterns for a given land use. The dry weather calibration involved comparing modeled flows to observed flows and iteratively adjusting GWI values, UF factors, and diurnal patterns until modeled flows were reflective of observed flows. **Table ES-2** summarizes the UF factors developed for each land use type and the total modeled dry weather flows for both existing and future conditions.

Table ES-2: UF Factor Summary by Land Use

| Land Use Designation | UF Factor (gpd) | Existing Quantity | Future Quantity | Quantity Units | Existing Model BSF (MGD) | Future Model BSF (MGD) |
|--------------------------------|-----------------|-------------------|-----------------|----------------|--------------------------|--------------------------|
| HSFL | 400 | 56 | 56 | Parcel | 0.022 | 0.022 |
| HSFM | 465 | 107 | 107 | Parcel | 0.050 | 0.050 |
| SFL | 200 | 9619 | 9677 | Parcel | 1.924 | 1.935 |
| SFM | 1200 | 266 | 264 | Acre | 0.319 | 0.316 |
| MFH | 1500 | 292 | 449 | Acre | 0.438 | 0.674 |
| MFVH | 2000 | 56 | 187 | Acre | 0.113 | 0.373 |
| MHP ¹ | - | - | - | Acre | - | - |
| HOTEL | 4000 | 60 | 24 | Acre | 0.244 | 0.095 |
| MXD | 1000 | 67 | 71 | Acre | 0.067 | 0.071 |
| HDMU | 2200 | 64 | 175 | Acre | 0.141 | 0.385 |
| PAO | 500 | 65 | 520 | Acre | 0.031 | 0.260 |
| COM | 900 | 467 | 367 | Acre | 0.420 | 0.330 |
| INP | 450 | 727 | 236 | Acre | 0.327 | 0.106 |
| MFG | 1500 | 550 | 499 | Acre | 0.825 | 0.748 |
| PF | 190 | 310 | 305 | Acre | 0.059 | 0.058 |
| COR ¹ | - | - | - | - | - | - |
| Large Dischargers ² | | 38 | 32 | Discharger | 1.176 | 1.006 |
| Total | - | - | - | - | 6.157³ | 6.249³ |

Notes:

1. Mobile home parks (3) and the correctional facility were considered large dischargers and assigned flows based on water use data.
2. Large dischargers are defined as those customers that discharge a disproportionately large volume of wastewater for the parcel size and use type. They were assigned a diurnal pattern based on the original parcel land use codes.
3. Represents the total BSF. The total BSF plus the total GWI is the total DWF.



The largest storm identified during the flow monitoring period occurred on December 7, 2019 (Storm event 1); this was used to estimate the extent of rainfall-dependent inflow and infiltration (RDI/I) in each sub-basin. RDI/I is characterized by an R-factor, which represents the percentage of rainfall volume that enters the sewer system. GWI also tends to fluctuate throughout the wet season as the groundwater table rises and falls. Modeled flows were compared to observed flows for Storm event 1, and wet weather GWI values and R-factors were iteratively adjusted until modeled flows were reflective of observed flows. **Table ES-3** summarizes the calibrated R-Factors for each of the 21 sub-basins.

Table ES-3: R-Factor Summary by Sub-Basin

| Sub-Basin | Total R-Factor |
|----------------|----------------|
| A | 1.48% |
| B | 1.59% |
| C | 0.30% |
| D | 1.90% |
| E | 0.60% |
| F | 0.86% |
| G | 3.40% |
| H | 0.24% |
| I | 0.42% |
| J | 2.17% |
| K | 0.81% |
| L1 | 0.40% |
| L2 | 0.31% |
| M | 1.39% |
| N | 2.06% |
| O ¹ | 1.50% |
| P | 1.26% |
| Q | 0.60% |
| R | 3.71% |
| S | 1.64% |
| T | 0.64% |

Notes:

1. There is no flow meter at the outfall for sub-basin O. Values were estimated based on surrounding sub-basins.

Capacity Analysis

To estimate wet weather wastewater flows, a design storm is applied to the model and wet weather flows are represented based on the calibrated R-factors for each sub-basin. Under this condition, the existing and future performance of the wastewater collection system can be evaluated. For this Study, the collection system performance was evaluated using the typical 10-year 24-hour storm with a peak hour coinciding with the peak of the typical diurnal curve.

The initial deficiency criteria used to evaluate the capacity of the modeled pipes under design flow conditions was the ratio of wastewater flow depth (d) to pipe diameter (D), or d/D. In InfoWorks, if d/D is greater than one, this means the pipe is flowing full under pressure and the hydraulic grade line (HGL) is higher than the crown of the pipe. InfoWorks reports a “surcharge state” for each pipe, which is defined in **Table ES-4**.

Table ES-4: InfoWorks Surcharge States

| Surcharge State | Definition | Deficiency if: |
|------------------|---|--|
| < 1 ¹ | When depth of flow is less than the diameter of the pipe | Not considered hydraulically deficient |
| = 1 | Pipe is surcharged due to backwater from a downstream deficiency. | Not considered hydraulically deficient |
| = 2 | Pipe is hydraulically under capacity and needs to be upsized. | Freeboard < 5 feet |

Notes:

1. Surcharge State = d/D

In the hydraulic model, the HGL reaching the ground surface indicates a potential SSO. Even for a pipe flowing under capacity or surcharged, if the freeboard – the distance between the ground surface and the HGL – is five feet or greater, the risk of SSO is minimal. Where pipes were shown as surcharged due to inadequate hydraulic capacity (surcharge state of “2”), a pipe was identified as deficient if the freeboard in these locations is also less than five feet.

There is a 6% increase from existing to future conditions, from 7.5 MGD to 7.9 MGD, in average dry weather flow at the outfall. **Table ES-5** presents the total system flows for all modeled conditions.

Table ES-5: Model Flow Summary

| Scenario | Average Dry Weather Flow (MGD) | Peak Dry Weather Flow (MGD) | Peak Wet Weather Flow (MGD) |
|----------|--------------------------------|-----------------------------|-----------------------------|
| Existing | 7.5 | 10.4 | 14.9 |
| Future | 7.9 | 11.0 | 18.5 |

There were no major capacity deficiencies identified as part of this analysis. There were six pipeline segments with a recorded surcharge state of “2” indicating that they are under capacity. Of these six segments, five of them have freeboard values greater than five feet, so they do not fulfill the criteria for a deficiency, and thus are not considered hydraulically deficient. There were no additional capacity deficiencies identified under future conditions that were not seen under existing conditions.

There is a single pipeline segment that has a freeboard of 4.7 ft., slightly less than the freeboard criteria; however, for a single pipe reach that is considered marginally deficient, replacement is not recommended without further cause. It is recommended that the City monitor this location for potential surcharging. This location (MH GID 1392) is a good candidate for installing a SmartCover to monitor the wastewater level to prevent SSOs.

Capital Improvement Plan

The City's capital improvement program (CIP) is intended to serve as a comprehensive planning tool for budgeting and carrying out capital projects. Capital projects are designed to adhere to the City Council goals and priorities; among them is to maintain a superior level of service to the community. To that end, a compilation of improvement projects was identified as part of the detailed risk and condition assessment. The PACP peak scores from the CCTV inspection and the risk scores calculated from the LoF/CoF desktop condition assessment drive the pipeline rehabilitation selection process. Using the defect coding assigned by NPS and the desktop assessment software, the pipe segments with defects were assigned a defect-level rehabilitation method.

With the rehabilitation method established for each defect code, a decision tree was established to determine the final overall rehabilitation method for the pipeline. This decision tree was prepared based on the following factors:

- CCTV structural peak score and overall peak score;
- Number of point repairs and lining recommendations by the defect-level rehabilitation methods module;
- Number of defects;
- Length of major (score of 4 or 5) and/or minor (score of 3) defects; and
- Presence of specific defects such as infiltration drippers (ID) or Reinforcement Corroded Chemical (SRCC).

Of the approximately 105,000 ft (449 segments) of sewer pipeline inspected, approximately 50,000 ft (178 segments) requires improvement. Recommended improvements include:

- Pipe Replacement
- Full Cured-In-Place Pipe (CIPP)
- Point Repair(s) by Excavation
- Sectional Liner(s)

It is noted that some pipeline segments include more than one recommended rehabilitation method.

For segments without CCTV inspection data, risk scores and diameter were used to develop a prioritized set of segments that are recommended for CCTV inspection and further analysis.

Projects are prioritized based on risk of failure along with consideration for type of proposed rehabilitation and project location. The general strategy is to address the highest risk/highest priority projects in the near-term (Years 1-5) with lower risk projects deferred to the medium- (Years 6-10) and long-term (Years 11-20).

Costs were developed to represent capital construction costs along with soft costs. Soft costs consisting of engineering design and consulting; permitting and obtaining right-of-way; and ESDC, construction management and inspection services are included in the capital project costs.

Provided below in **Table ES-6** is a proposed budget and schedule for the CIP and recommended projects over 20-years in 5-year increments. The most critical projects are scheduled for earlier implementation. It is noted that the timing of projects can be adjusted based on results of CCTV and future operating conditions. **Figure ES-6** presents the proposed improvement projects in 5-year increments.

Table ES-6: Proposed CIP Schedule and Budget

| Projects | 5-Year (2022-2026) | 10-Year (2027-2031) | 15-Year (2032-2036) | 20-Year (2037-2041) |
|--|------------------------|------------------------|------------------------|------------------------|
| Existing Projects | | | | |
| 6124 Pump Station Rehabilitation Program | \$200,000 ¹ | -- | -- | -- |
| 6126 Minor Sewer Projects | \$200,000 ² | -- | -- | -- |
| 6130 Main Lift Station Odor Emissions Control | \$200,000 | -- | -- | -- |
| 6131 Sanitary Sewer Cathodic Protection Improvements | \$500,000 | -- | -- | -- |
| 6134 On-Call Sewer Maintenance & Repair Services | \$98,000 | -- | -- | -- |
| Total Existing Projects | \$1,198,000 | -- | -- | -- |
| Proposed Projects | | | | |
| CCTV large diameter and high-risk assets | \$400,000 | -- | -- | -- |
| Highest Priority Improvements | \$1,562,000 | -- | -- | -- |
| Medium- to High- Priority Improvements | \$5,266,000 | \$6,424,000 | -- | -- |
| Low Priority Improvements | -- | -- | \$6,888,000 | \$1,240,000 |
| Allocation for improvements identified from ongoing CCTV | \$1,250,000 | \$1,250,000 | \$1,250,000 | \$1,250,000 |
| Total Proposed Projects | \$8,478,000 | \$7,674,000 | \$8,138,000 | \$2,490,000 |
| Existing and Proposed Projects | \$9,676,000 | \$7,674,000 | \$8,138,000 | \$2,490,000 |

Notes:

1. Original allocation is \$200,000 through 2023 with \$148,000 in prior year funding from Sewer Infrastructure Fund to be allocated for other projects in FY2020-21.
2. Original allocation is \$200,000 with \$37,000 in prior year funding from Sewer Infrastructure Fund to be allocated for other projects in FY2020-21.

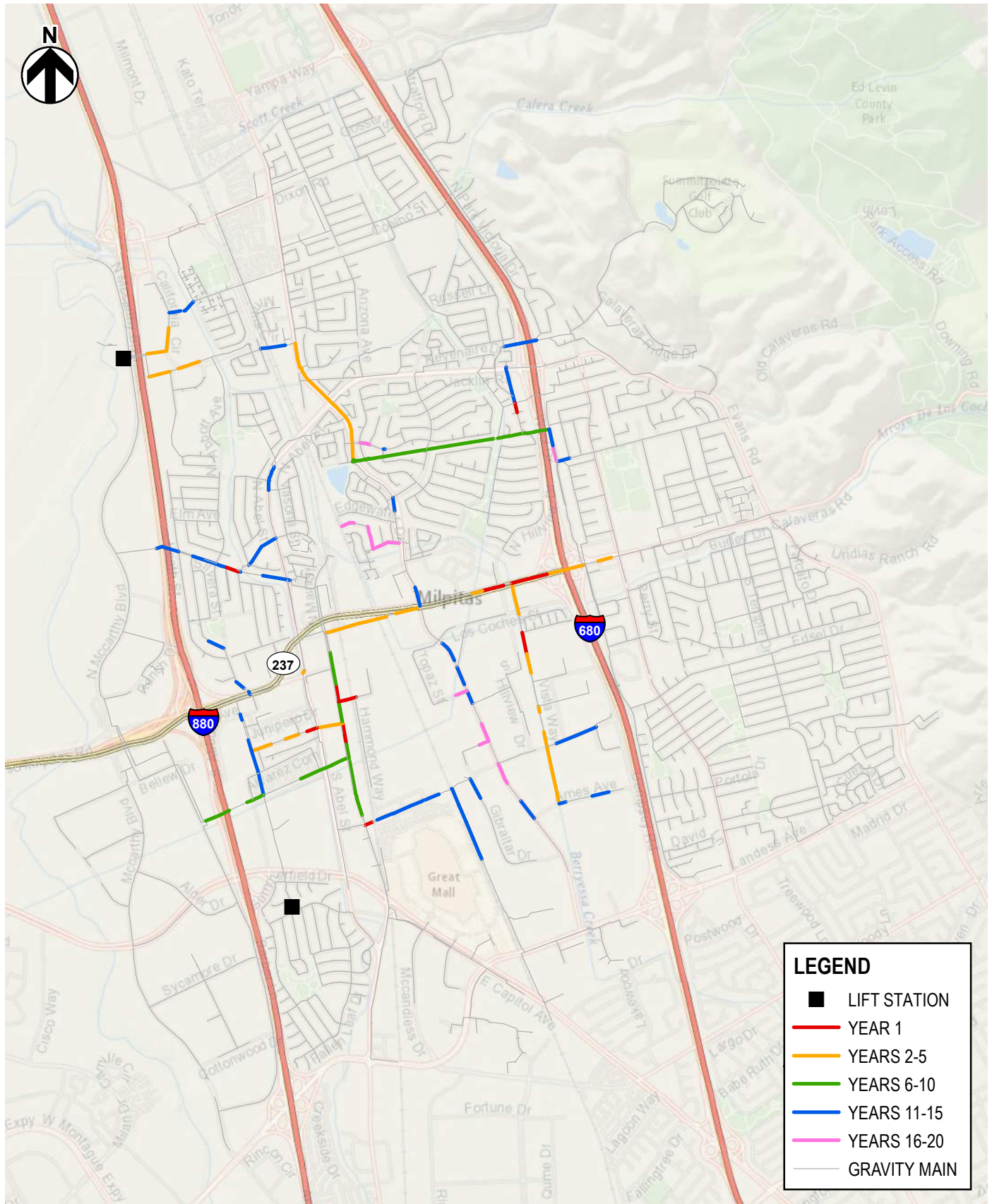


FIGURE ES-6
CITY OF MILPITAS
SEWER MASTER PLAN
CAPITAL IMPROVEMENT PROJECTS

SECTION 1 – INTRODUCTION AND PURPOSE

HydroScience Engineers (HydroScience) was retained by the City of Milpitas (City), to prepare the City Sewer Master Plan (SMP), which includes development of a Capital Improvement Plan (CIP) based on the current (2020) and future (2040) planning horizons. This section outlines the background and SMP objectives.

1.1 Background

The City's wastewater system infrastructure was constructed in the 1950s when the City was established, and it was expanded with the growth of the City. Today, the City is essentially built out. The most recent SMP was completed in 2002 with a revision completed in 2004 and an update completed in 2009.

1.1.1 Previous Studies/Existing Documents

The following is a brief description of previous studies and documents reviewed and used in the preparation of this SMP.

- **City of Milpitas Capital Improvement Program 2020-2025 Final Report, July 2020:** Every year the City prepares a five-year Capital Improvement Program (CIP) that provides the City Council, staff, and the public with a comprehensive planning tool for budgeting and carrying out a range of capital projects. Also known as a Capital Budget, this document enables the City to identify estimated costs, priorities and schedules, funding sources and financing methods necessary for delivering critical services to meet community demands. The CIP is a necessary first step for planning the implementation and construction of new capital assets including public facilities such as water, sewer, and storm, and for repairs and replacements of aging infrastructure. The CIP reflects Council's priorities and policies to ensure that the needs of the community are met. The CIP documents the existing planned sewer related projects and the allocated funding for each project.
- **City of Milpitas Sewer Master Plan Revision, RMC, August 2004:** This study assessed the capacity of the wastewater collection system as well as investigated the conditions of the system. The SMP Revision updated the 2002 SMP, also completed by RMC. It provided information required for the City planning and financial efforts and defined the sanitary sewer system improvements necessary to accommodate the City's future land use development plans to the year 2018. During this study, the hydraulic model built using Hydra for the 2002 SMP was updated based on a wet weather flow monitoring program.
- **City of Milpitas Sewer Master Plan Update, RMC, December 2009:** This study was an update to the 2004 SMP Revision to reevaluate the City's sewer system capacity needs as a result of several development projects that were not considered for the 2004 SMP Revision. The Hydra hydraulic model was updated using updated large discharger information as well as updated future land use conditions. A CIP was developed to address any projected capacity deficiencies based on this updated modeling analysis.
- **Sewer System Management Plan 2016 Update, City of Milpitas, December 2016:** In accordance with the requirements of the Regional Water Quality Control Board (RWQCB), public wastewater collection system agencies are required to develop a sanitary sewer management plan (SSMP) that designates sewer system management practice to minimize

sanitary sewer overflows (SSOs) and provide reliable sewer service to the public. The 2016 SSMP describes the City's specific maintenance protocols to meet and exceed all requirements and documentation of the requirements set forth by the RWQCB General Waste Discharge Requirements (WDR).

- **Milpitas General Plan Update – Land Use Alternatives Report, De Novo Planning Group, September 2018:** State law requires that every city and county in California prepare and maintain a general planning document. As part of the General Plan (GP) update process, the City must update its GP Land Use Map. This Land Use Alternatives Report was developed as a tool to identify and evaluate a range of geographic locations ("Opportunity Areas") within the City where some changes to existing land uses may be appropriate.

The following studies were completed in conjunction with the Master Plan Study and are incorporated as appendices to the Master Plan. Where appropriate, details and summaries of findings have been included in the body of the Master Plan Study. For additional detail, the reader is directed to the appendices.

- **Sewer Utility Asset Renewal and Replacement Study, Brown and Caldwell, August 2020 (R&R Study):** This study was conducted as part of this Master Plan Study to assess the current condition of the City's wastewater collection system. This includes CCTV inspection results, an assessment of the relative risk of failure of all pipe segments in the City, as well as lift station inspection results. The purpose of this study is to provide the City with a set of priorities for asset renewal and replacement. This study is included as **Appendix A**.
- **Main and Venus Way Lift Station Inspections Report, Brown and Caldwell, May 2020 (LS Report):** This study was conducted as part of the Master Plan Study to assess the current operations and condition of the Main Lift Station (Main LS) and Venus Way Lift Station (Venus Way LS). This study presents the results of the on-site inspection performed for these two facilities. It is included as part of **Appendix A** (R&R Study App. K [App. K]).
- **Milpitas Sewer Flow Monitoring Report 2019-2020, ADS Environmental Services, April 2020:** This program was completed for the months of November 2019 – March 2020 for the purposes of measuring wastewater flows in the City's collection system. Both wet weather and dry weather flows were captured, and the resulting data was used for the calibration of the hydraulic model for this Study. This report is included as **Appendix B**.

1.2 Objectives

The objectives of this Master Plan project are:

- To perform a condition assessment on the current state of the collection system;
- To evaluate the hydraulic performance of the system under current conditions and under projected future conditions;
- To identify any hydraulic capacity deficiencies or pipes in poor condition, and
- To develop a CIP to address physical and hydraulic deficiencies.

These objectives were developed in collaboration with City Staff through technical review of available asset data and development of a hydraulic model. Through these analyses, projects were identified to help maintain the City's collection system level of service standards..

1.3 Report Organization

This Master Plan consists of ten sections followed by appendices that provide supporting documentation for the analyses present in the body of the SMP. The sections are as follows:

- **SECTION 1 – Introduction and Purpose:** This section presents the background leading to the development of this SMP, a description of previous work, and objectives and organization of the SMP.
- **SECTION 2 – Service Area and Wastewater Services:** This section describes the City as well as the related wastewater services.
- **SECTION 3 – Existing Wastewater Collection System:** This section describes the existing wastewater collection system and the overall system operation within the service area.
- **SECTION 4 – Condition Assessment:** This section presents the results of the condition assessment performed as part of the SMP, including the results of the closed-circuit television (CCTV) inspections.
- **SECTION 5 – Analysis of Land Uses for Hydraulic Modeling:** This section outlines the land use categories identified by the GP and details the methodology for using these land use categories for the development and calibration of the hydraulic model.
- **SECTION 6 – Hydraulic Model Development:** This section presents the process and assumptions associated with building the hydraulic model infrastructure and filling in any existing data gaps.
- **SECTION 7 – Wastewater Flow Analysis:** This section presents the results of the flow monitoring program and analysis of that data. This section also presents the development of the wastewater flows used to develop and calibrate the hydraulic model and the results of the model calibration.
- **SECTION 8 – Capacity Analysis:** This section presents identified hydraulic capacity-related deficiencies under existing and future modeled conditions.
- **SECTION 9 – Project Development:** This section presents the recommended improvements resulting from the condition assessment and the basis for cost development.
- **SECTION 10 – Capital Improvement Plan:** This section presents the recommended capital improvement projects, costs, and timeline for implementation.

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SECTION 2 – SERVICE AREA AND WASTEWATER SERVICES

The City provides wastewater collection services to all customers within the City boundary. This section describes the service area and related wastewater services.

2.1 Service Area

The City is located along the northern boundary of Santa Clara County at the southern tip of the San Francisco Bay, approximately 45 miles southeast of San Francisco. It is bounded by the Cities of Fremont to the north, San Jose to the south and west, and unincorporated Santa Clara County to the east (see **Figure 2-1**).

Incorporated in 1954, the City encompassed 2.9 square miles and housed a population of 825. The Ford Motor Company assembly plant was built in 1955 and this brought the start of the City's rapid growth period; this growth was maintained by the high technology industry in the 1970s. By 1992, the City encompassed 13.6 square miles, which is approximately its current area. Today, the City is almost completely built out, so any future increases in wastewater flows would come from increases in density or changes in land use through redevelopment.

Today, the City encompasses 14 square miles and provides wastewater collection services to a population of 77,961 according to the Department of Finance. There are two distinct areas of the City referred to as the "valley floor," which is relatively flat, and the "hillside" on the eastern edge of the City limits. Elevations gently slope from west to east along the valley floor from approximately 10 ft to 120 ft and up to approximately 700 ft in the hillside area. The valley floor includes a mixture of industrial, manufacturing, commercial, and residential land uses, while the hillside is reserved solely for residential use. Parks and open spaces are scattered throughout the residential areas.

The following boundaries are identified on **Figure 2-1**:

- **City Limits:** The City Limits includes the area within the City's corporate boundary, over which the City exercises land use authority and provides public services.
- **Urban Service Area (USA):** In 1998, voters in the City established an Urban Growth Boundary (UGB) limiting development in its eastern hill areas. The initiative was set to expire in 2018 but was extended through the recent passage of Measure I by Milpitas voters in November 2016. Contiguous with the UGB the USA restricts the extension of public service and infrastructure to new development in eastern areas of the City Limits.
- **Sphere of Influence (SOI):** An SOI is the probable physical boundary and service area of a local agency, as adopted by a Local Agency Formation Commission (LAFCO). An SOI includes both incorporated and unincorporated areas within which a city or special district will have primary responsibility for the provision of public facilities and services. The SOI also coincides with the Planning Area – the area included in the analysis and planning for the 20-year horizon of the City's proposed GP.

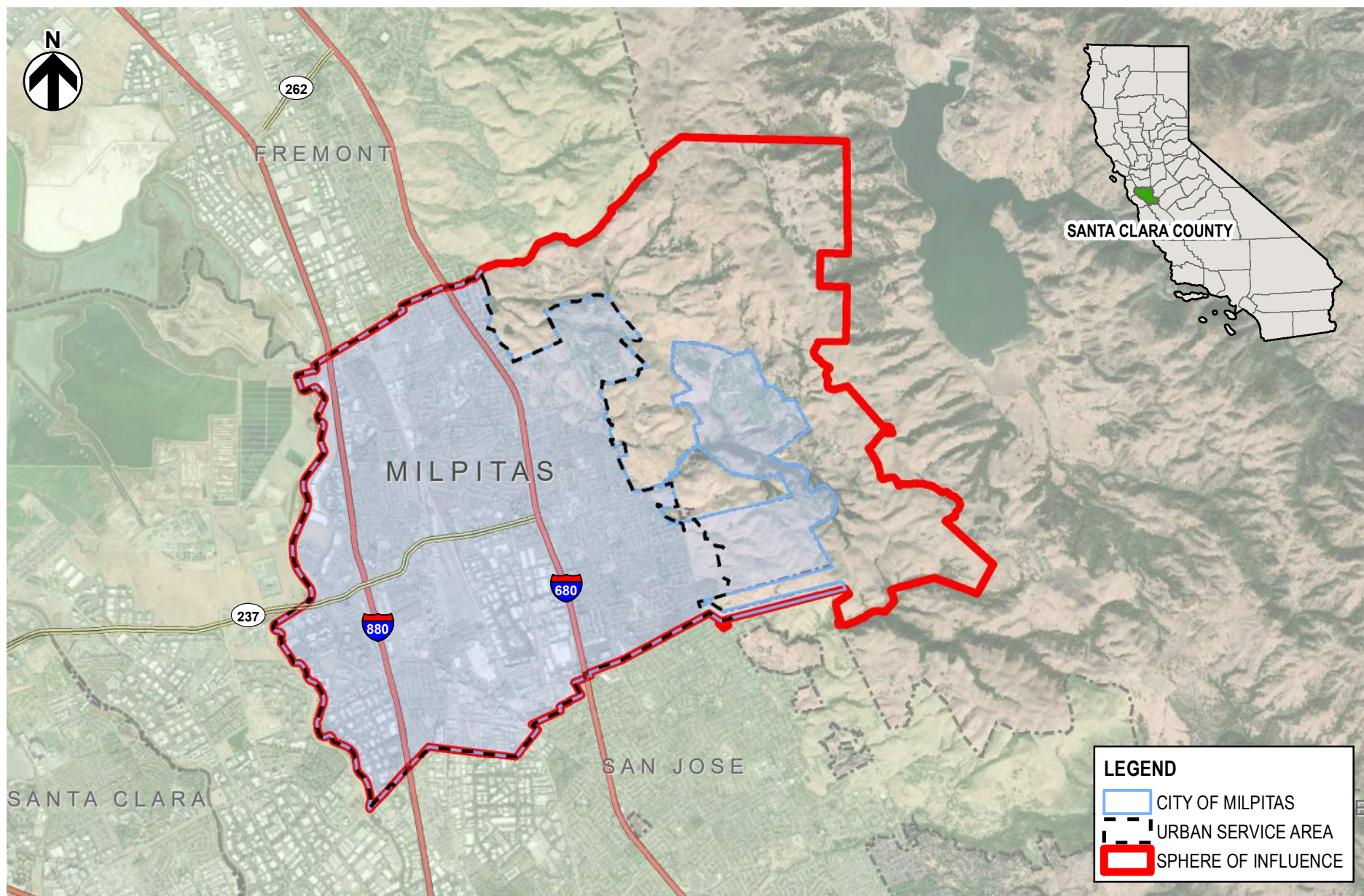


FIGURE 2-1
CITY OF MILPITAS
SEWER MASTER PLAN
PROJECT LOCATION MAP

2.1.1 Land Use

The City's current land uses, according to the GP, are listed in **Table 2-1** and displayed in **Figure 2-2**. These land uses served as the basis for the model-based land use designations and analysis, which are described in **SECTION 5**.

Table 2-1: General Plan Land Use Categories

| GP Land Use Categories | Land Use Code |
|---------------------------------------|---------------|
| Hillside Very Low Density | HVL |
| Hillside Low Density | HLD |
| Hillside Medium Density | HMD |
| Single-Family Low Density | SFL |
| Single-Family Medium Density | SMD |
| Multi-Family Medium Density | MFM |
| Multi-Family High Density | MFH |
| Multi-Family Very High Density | VHD |
| Mobile Home Park | MHP |
| Urban Residential | URR |
| Mixed Use | MXD |
| Boulevard Very High-Density Mixed Use | BVMU |
| Residential-Retail Mixed Use | RRMU |
| General Commercial | GNC |
| Retail Sub-Center | RSC |
| Highway Services | HWS |
| Town Center | TWC |
| Industrial Park | INP |
| Manufacturing | MFG |
| Professional & Administrative Offices | PAO |
| Public Facilities | PF |
| Park Open Space | POS |
| Waterways | WATERWAYS |

Source: Milpitas General Plan Update – Land Use Alternatives Report, September 2018

There are several “Opportunity Areas” identified throughout the City as areas of potential growth and/or redevelopment; these “Opportunity Areas” are identified on **Figure 2-2**. The Midtown Specific Plan and Metro Specific Plan are detailed below:

- **Midtown Specific Plan:** This plan, updated in 2010, provides a new vision for approximately 589 acres of land which is currently undergoing changes related to its growing role as a housing and employment center in Silicon Valley. This plan presents an opportunity to reinvigorate the “historic” commercial and industrial core of Milpitas and bring it into the life of the City. The overall strategy of the Midtown Specific Plan is to create a mixed-use community

that includes high-density, transit-oriented housing and a central community “gathering place,” while maintaining needed industrial, service, and commercial uses. This plan provides for up to 2,328 new dwelling units and supporting retail development, new office developments at key locations; bicycle and pedestrian trails linking the areas together and new parks to serve residential development.

- **Metro Specific Plan:** Of the 443 acres of the Metro Specific Plan, approximately 403 acres were previously included as part of the Midtown Specific Plan but have since been broken off into a new standalone specific plan. The goal of the Metro Specific Plan is to bring about an attractive and livable neighborhood that takes advantage of public investment in light rail and BART, and to transform an older light industrial district to meet high demand for housing, offices, and shopping in the Bay Area. The plan creates a structure for a walkable, transit-oriented area with a mix of land uses, which encourages walking, biking, and transit trips and minimizes vehicle trips. This type of development can accommodate substantial growth, minimize impacts on local roadways, and reduce urban sprawl at the periphery of the region.

2.2 Wastewater Treatment and Disposal

Wastewater from the City’s collection system is conveyed to and treated by the San Jose-Santa Clara Regional Wastewater Facility (RWF). Eight tributary agencies contribute flow to the RWF including the City of Santa Clara, Cupertino Sanitary District, West Valley Sanitation District, the City of San Jose, County Sanitation District 2-3, Burbank Sanitary District, and the City of Milpitas.

The City of Milpitas pays a share of the capital cost of the RWF, based on the City’s capacity rights in proportion to the 167 MGD total capacity of the RWF. The City also pays a share of the operating cost, based on the volume of wastewater discharged to RWF. The City has rights to discharge 14.25 MGD to the RWF under its current allotment.

To calculate dry weather flows from each agency, the RWF identifies the peak week – five-day period during June through October with the highest flows based on the plant’s influent data – and each tributary agency is asked to provide an estimate of their average flow for the peak week.

2.3 Recycled Water

The City purchases recycled water from the South Bay Water Recycling (SBWR) Program. The SBWR Program is an on-going, multi-year effort to use high quality recycled water produced at the RWF and distribute for irrigation, industrial, and other purposes. The SBWR Program is administered through the City of San José’s Environmental Services Division.

The City uses recycled water for irrigating public and private areas such as parks, medians, and industrial uses to supplement potable water use. The City’s existing recycled water pipeline system connects to the SBWR system near Technology Drive and Coyote Creek, southeast of the State Route 237/Interstate-880 interchange. Recycled water provided by the SBWR Program is delivered through an existing transmission line. It is then distributed through a series of mains that provide landscape irrigation to business/retail areas surrounding McCarthy Ranch and Oak Creek Industrial Park, and to central Milpitas. The City maintains and operates approximately 22.4 miles of SBWR-owned recycled water lines that serve approximately 224 service connections. The City has an agreement with SBWR to be reimbursed for its costs to operate and maintain the SBWR-owned system within the City.

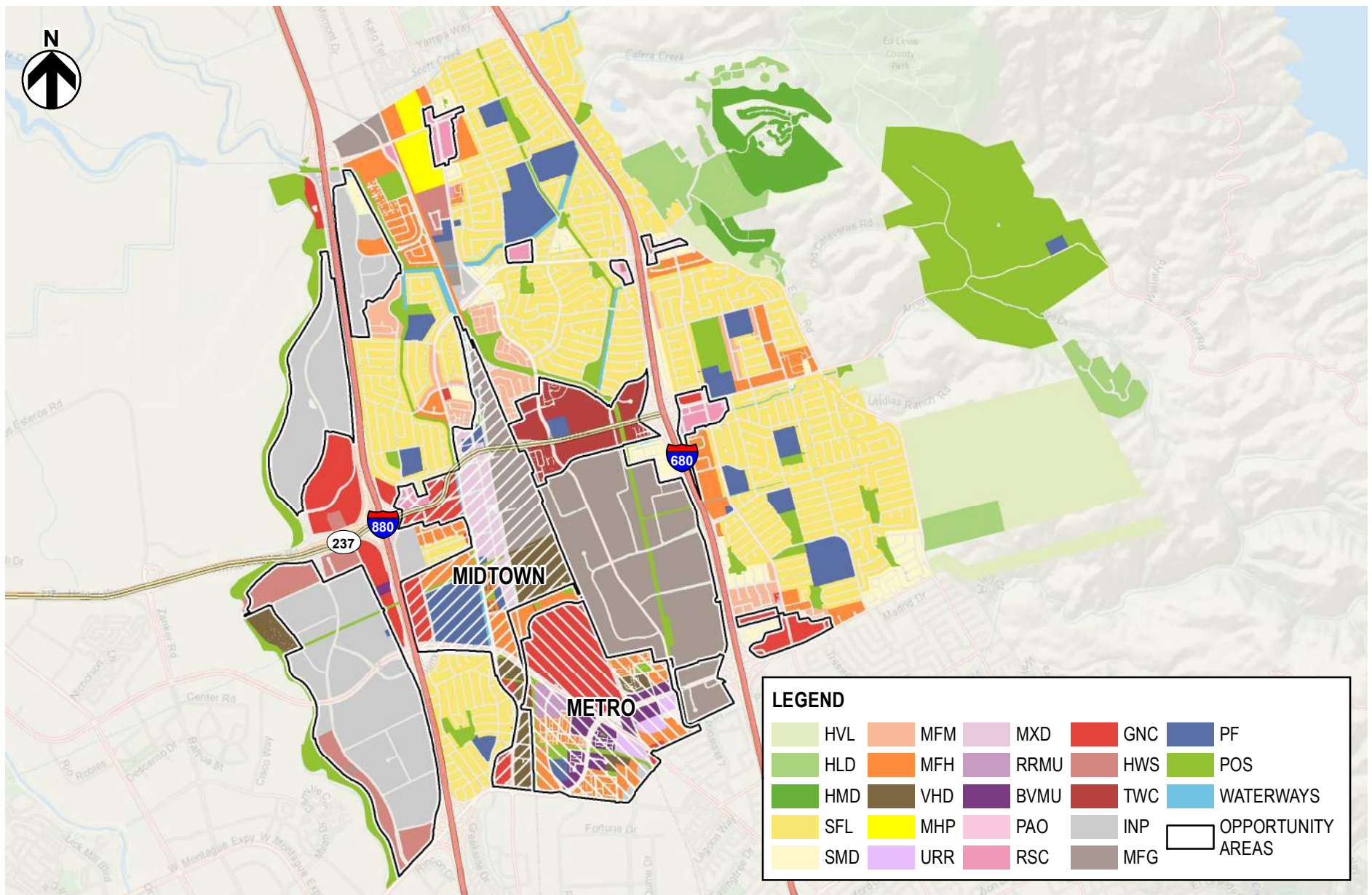


FIGURE 2-2
 CITY OF MILPITAS
 SEWER MASTER PLAN
 CITY GENERAL PLAN LAND USE

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SECTION 3 – EXISTING WASTEWATER COLLECTION SYSTEM

This section describes the City's existing wastewater collection and conveyance system. Information from previous studies, regulatory documentation, field investigation, and discussions with the City Planning Department Staff were compiled herein. A wholesale review and update of the City's ArcGIS geodatabase (GIS) was conducted using an extensive database of record drawings. A summary of the updates made to the GIS is included in **Appendix C**.

3.1 Wastewater Collection System

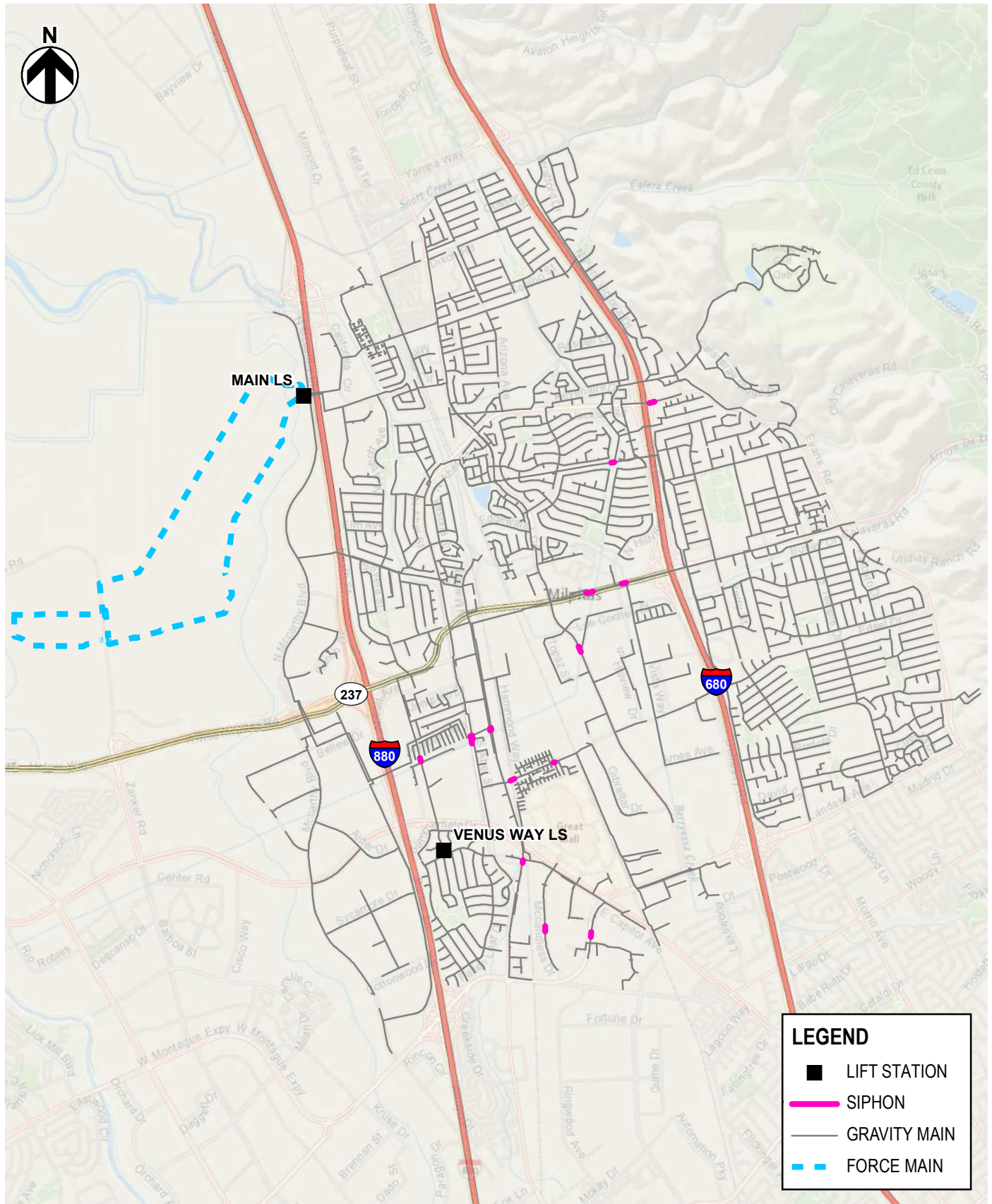
According to the updated GIS, the wastewater collection system consists of 844,114 feet (ft) (approximately 160 miles) of gravity sewers ranging from pipe diameters of 4- to 66-inches. The eastern side of the City has predominantly residential customers, with the western side of the City on the valley floor dominated by industrial and manufacturing. Commercial and mixed use are scattered throughout the valley floor as well. The topography is generally flat on the valley floor, with gradual elevation drops from the southeast to the northwest. The entire system flows to the Milpitas Main Lift Station (Main LS) in the northwestern corner of the City where it is pumped to the RWF through two force mains. An additional lift station, located on Venus Way, connects a small portion of low-elevation flow to the higher-elevation gravity system. **Figure 3-1** contains an overview of the City's wastewater collection system.

3.1.1 Pipelines and Manholes

The City's wastewater collection system includes pipelines and structures of varying age, size, and material. According to the City's GIS, the majority of the City's wastewater collection system pipelines are vitrified clay pipe (VCP) and 4- to 12-inches in diameter. Approximately 70% of the system was built before 1990. **Table 3-1**, **Table 3-2**, and **Table 3-3** provide breakdowns of the distribution of existing pipe material, size, and age according to the City's GIS, and are reflected in **Figure 3-2**, **Figure 3-3**, and **Figure 3-4**.

As part of the preventative maintenance program, City Staff schedule weekly cleaning for high problem areas of the system. Areas with a moderate frequency of problems receive cleaning on a monthly or biannual basis, and low problem areas including the remainder of the system are cleaned on a recurring 18-month basis.

Based on review of record drawings and existing GIS, 15 siphons were identified throughout the collection system that divert flow under the San Francisco Public Utility Commission (SFPUC) water supply pipeline, creeks, and highways. The siphons are shown in **Figure 3-1**. As part of the preventative maintenance schedule, one problem siphon is cleaned weekly, and the others are cleaned quarterly.



LEGEND

- LIFT STATION
- SIPHON
- GRAVITY MAIN
- - - FORCE MAIN

FIGURE 3-1
 CITY OF MILPITAS
 SEWER MASTER PLAN
 WASTEWATER COLLECTION SYSTEM OVERVIEW

Table 3-1: Collection System Pipeline Material

| Pipe Material | Total Length (ft) | Length as Percentage |
|---------------------------------------|-------------------|----------------------|
| Acrylonitrile-Butadiene-Styrene (ABS) | 13,812 | 1.64% |
| Cast Iron Pipe (CIP) | 2,027 | 0.24% |
| Ductile Iron Pipe (DIP) | 2,017 | 0.24% |
| High-Density Polyethylene (HDPE) | 15,898 | 1.88% |
| Polyvinyl Chloride (PVC) | 59,188 | 7.01% |
| Reinforced Concrete Pipe (RCP) | 36,414 | 4.32% |
| Vitrified Clay Pipe (VCP) | 650,411 | 77.05% |
| VCP/ABS | 14,337 | 1.70% |
| Unspecified | 50,011 | 5.92% |
| Total | 844,114 | 100.00% |

Table 3-2: Collection System Pipeline Diameter

| Pipe Diameter (in) | Total Length (ft) | Length as Percentage |
|--------------------|-------------------|----------------------|
| < 8 | 392,365 | 46.48% |
| 8-12 | 300,557 | 35.61% |
| 15-18 | 49,886 | 5.91% |
| 21-24 | 20,400 | 2.42% |
| 27-30 | 24,421 | 2.89% |
| 33-37 | 36,479 | 4.32% |
| 39-42 | 5,756 | 0.68% |
| 48-66 | 5,970 | 0.71% |
| Unspecified | 8,280 | 0.98% |
| Total | 844,114 | 100.00% |

Table 3-3: Collection System Pipeline Age

| Installation Date | Total Length (ft) | Length as Percentage |
|-------------------|-------------------|----------------------|
| 1951-1959 | 82,527 | 9.78% |
| 1960-1969 | 173,537 | 20.56% |
| 1970-1979 | 146,186 | 17.32% |
| 1980-1989 | 196,192 | 23.24% |
| 1990-1999 | 63,195 | 7.49% |
| 2000-2009 | 58,136 | 6.89% |
| 2010-2019 | 23,611 | 2.80% |
| Unspecified | 100,729 | 11.93% |
| Total | 844,114 | 100.00% |

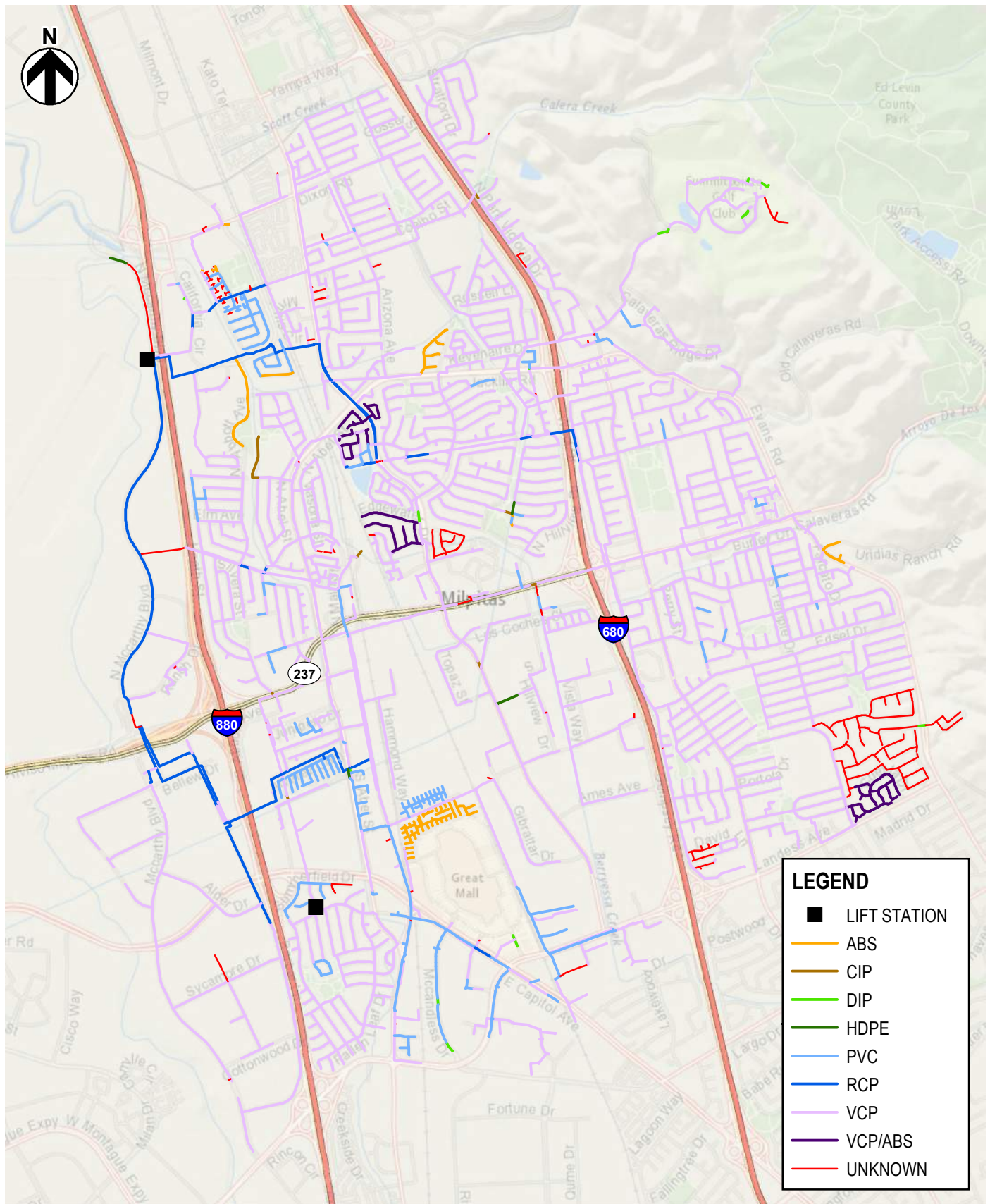


FIGURE 3-2
CITY OF MILPITAS
SEWER MASTER PLAN
COLLECTION SYSTEM PIPELINE MATERIAL

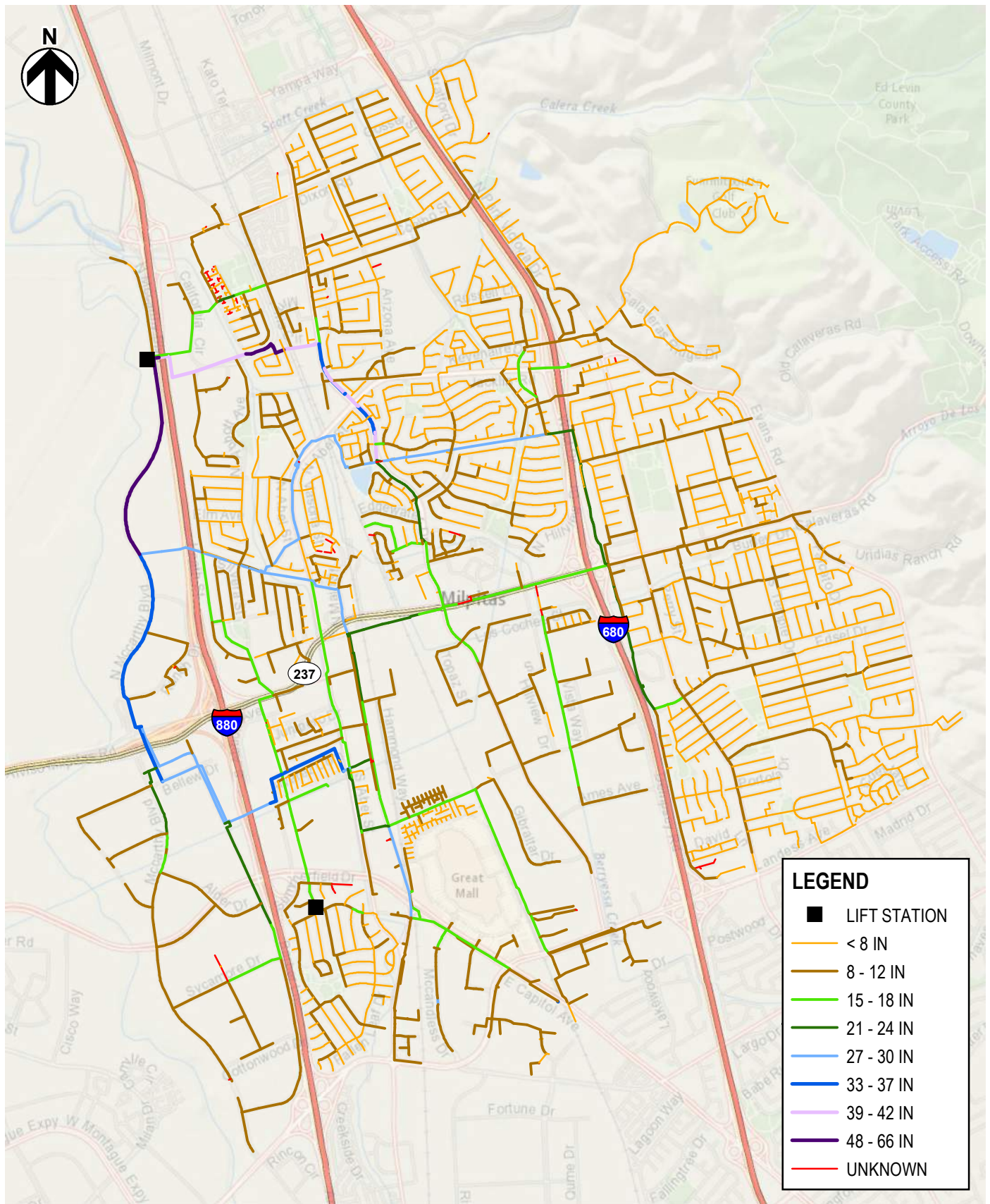


FIGURE 3-3
CITY OF MILPITAS
SEWER MASTER PLAN
COLLECTION SYSTEM PIPELINE DIAMETER

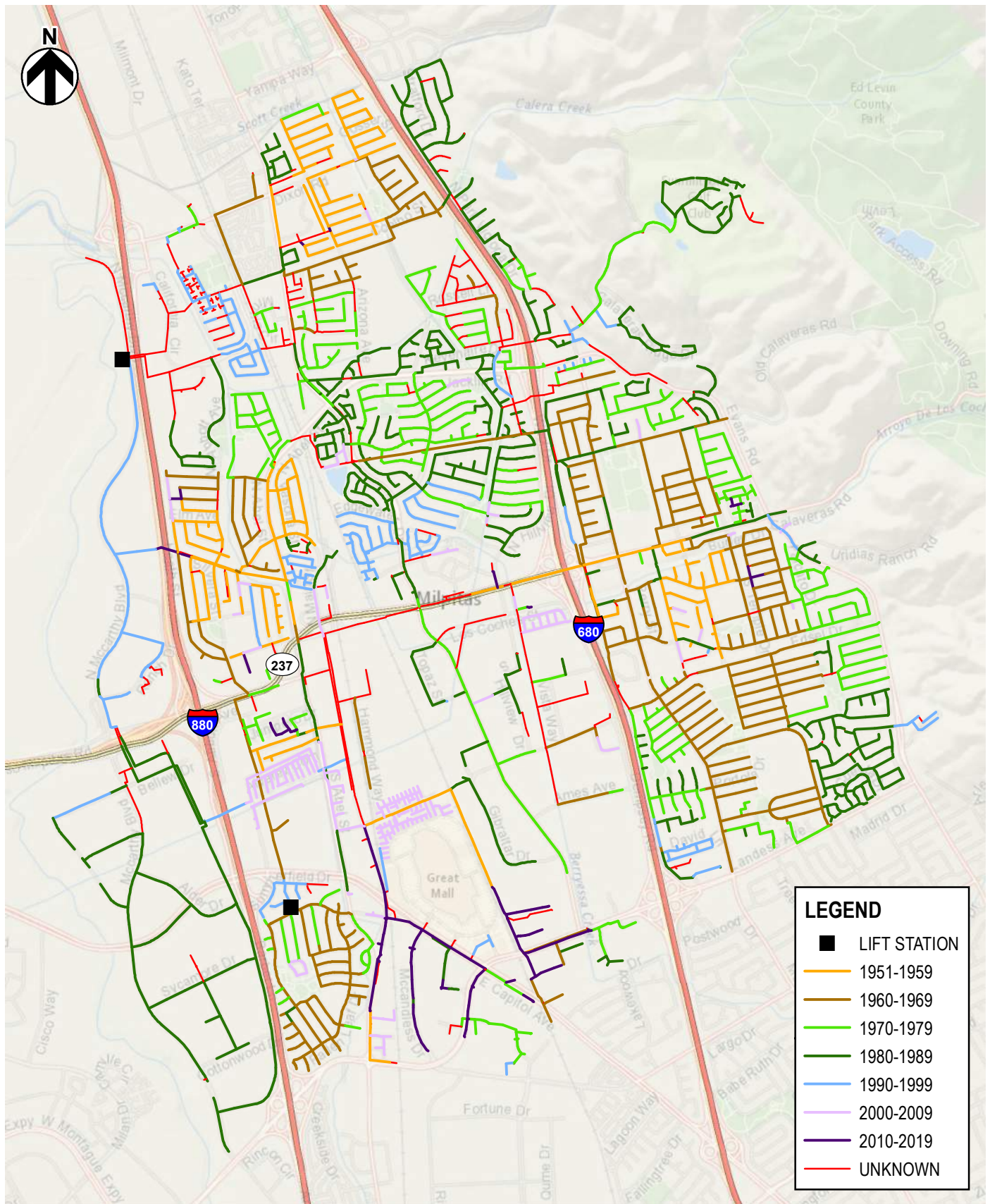


FIGURE 3-4
 CITY OF MILPITAS
 SEWER MASTER PLAN
 COLLECTION SYSTEM PIPELINE AGE

Based on the City's GIS, the collection system includes almost 3,000 manholes. Of these manholes, approximately 60% were built before 1990. **Table 3-4** provides a breakdown of the age distribution of the existing manholes based on the City's GIS.

Table 3-4: Collection System Manhole Age

| Installation Date | Total Count | Count as Percentage (%) |
|-------------------|--------------|-------------------------|
| 1951-1959 | 229 | 7.69% |
| 1960-1969 | 440 | 14.77% |
| 1970-1979 | 415 | 13.93% |
| 1980-1989 | 631 | 21.18% |
| 1990-1999 | 286 | 9.60% |
| 2000-2009 | 204 | 6.85% |
| 2010-2019 | 125 | 4.20% |
| Unspecified | 649 | 21.78% |
| Total | 2,979 | 100.00% |

To facilitate operations and maintenance and prevent SSOs, the City has implemented SmartCover technology to monitor the wastewater collection system. They have installed 33 SmartLevel™ Monitoring Systems in sewer manholes throughout the City to provide real-time remote level monitoring to operations staff. SmartCovers can be installed under any manhole lid and can be moved to monitor areas of concern, as needed.

Flow Splits

There are 177 identified flow splits throughout the City's collection system. Flow splits are manholes that allow outflow via two or more pipes. There are three types of flow splits within the City's collection system, including:

- **High point flow splits** – high points from which sewage flows in opposing directions (see **Figure 3-5**);
- **Even flow splits** – manholes where incoming flow is split proportionally in two (or more) directions where downstream pipes have matching inverts (see **Figure 3-6**); and
- **Overflow flow splits** – manhole flow splits with overflow. At an overflow split during normal flow conditions, the flow takes one path and during high flow conditions, if the manhole begins to surcharge and flow reaches a certain depth, there is an “overflow” pipeline that is activated and will carry flow (see **Figure 3-7**).

As part of the network review and hydraulic model calibration processes, three flow diversion structures (MH 1053, MH 2578, and MH 1152) were identified for inclusion in the hydraulic model. These were identified by reviewing record drawings and available CCTV information. They are described as follows:

- Flow diversion structure** – alters an existing even flow split to mimic an overflow flow split. A typical flow diversion structure is depicted in **Figure 3-8**. As can be seen in the figure, during normal dry weather operating conditions, all inflow is directed to one outflow pipe by the diversion structure. During higher flow conditions as the manhole begins to surcharge, the diversion structure is overtopped, and some flow is diverted to an overflow pipe. To represent these structures in the model, the height of the overflow pipe invert was adjusted to match the height of the diversion structure.

All identified flow splits and flow diversion structures are displayed on **Figure 3-9**.

Figure 3-5: Example High Point Flow Split

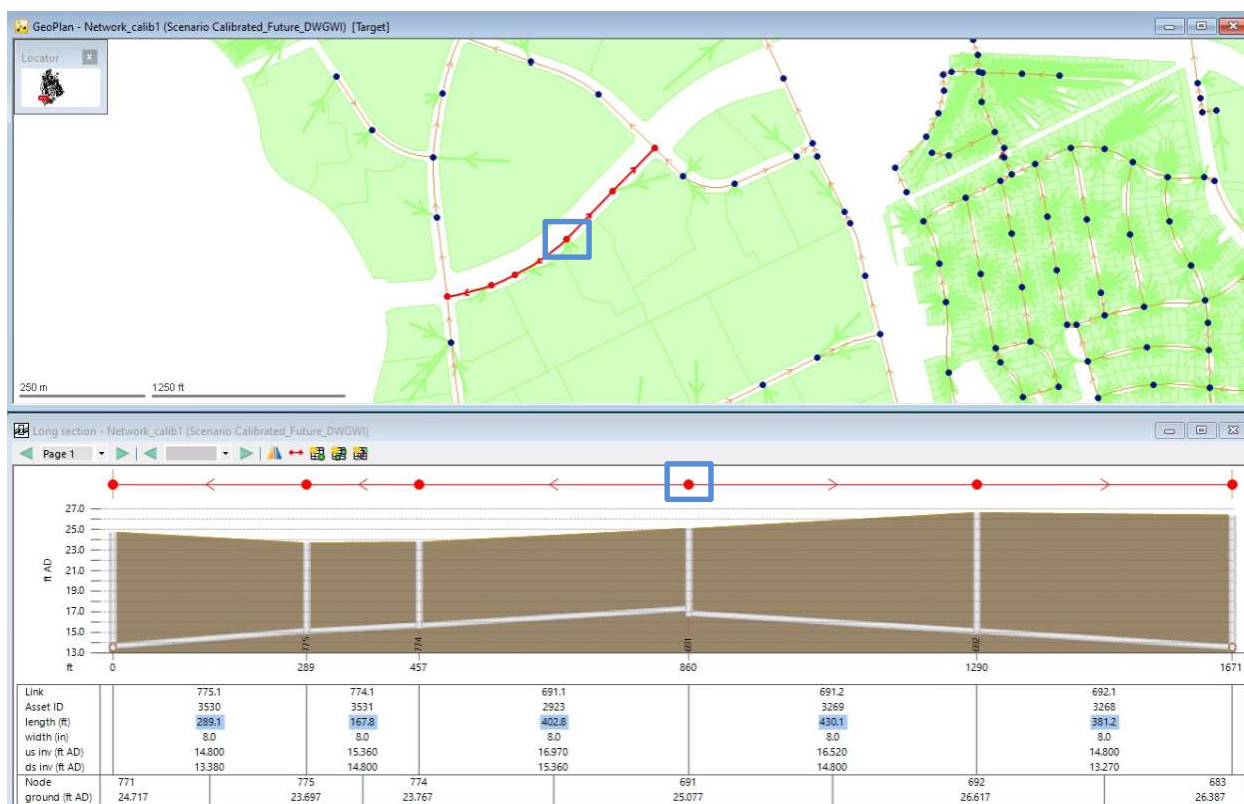


Figure 3-6: Example Even Flow Split

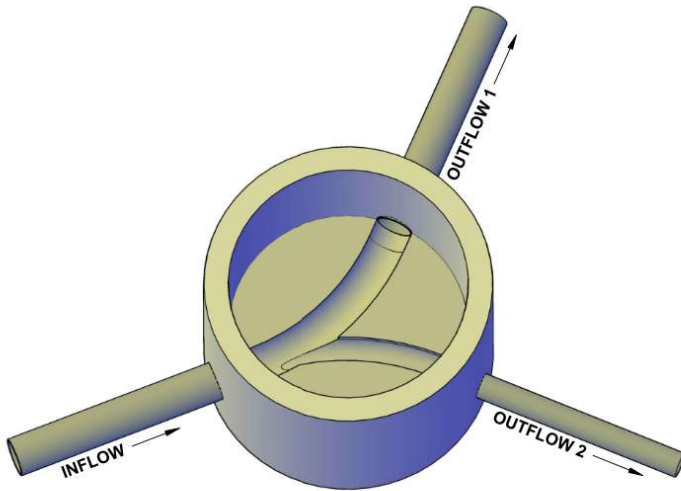


Figure 3-7: Example Overflow Flow Split

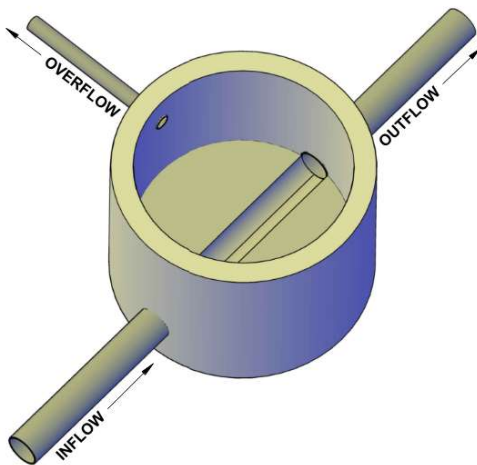
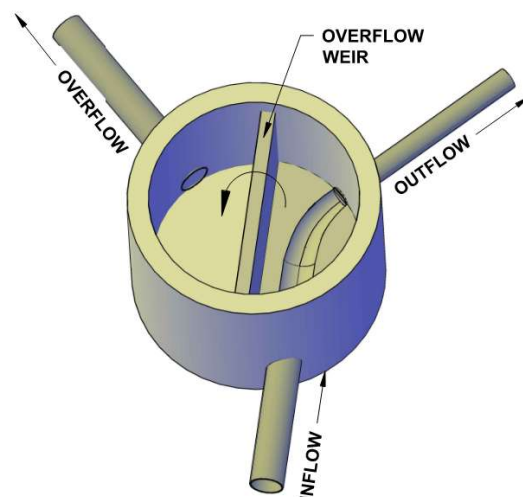


Figure 3-8: Example Flow Diversion Structure



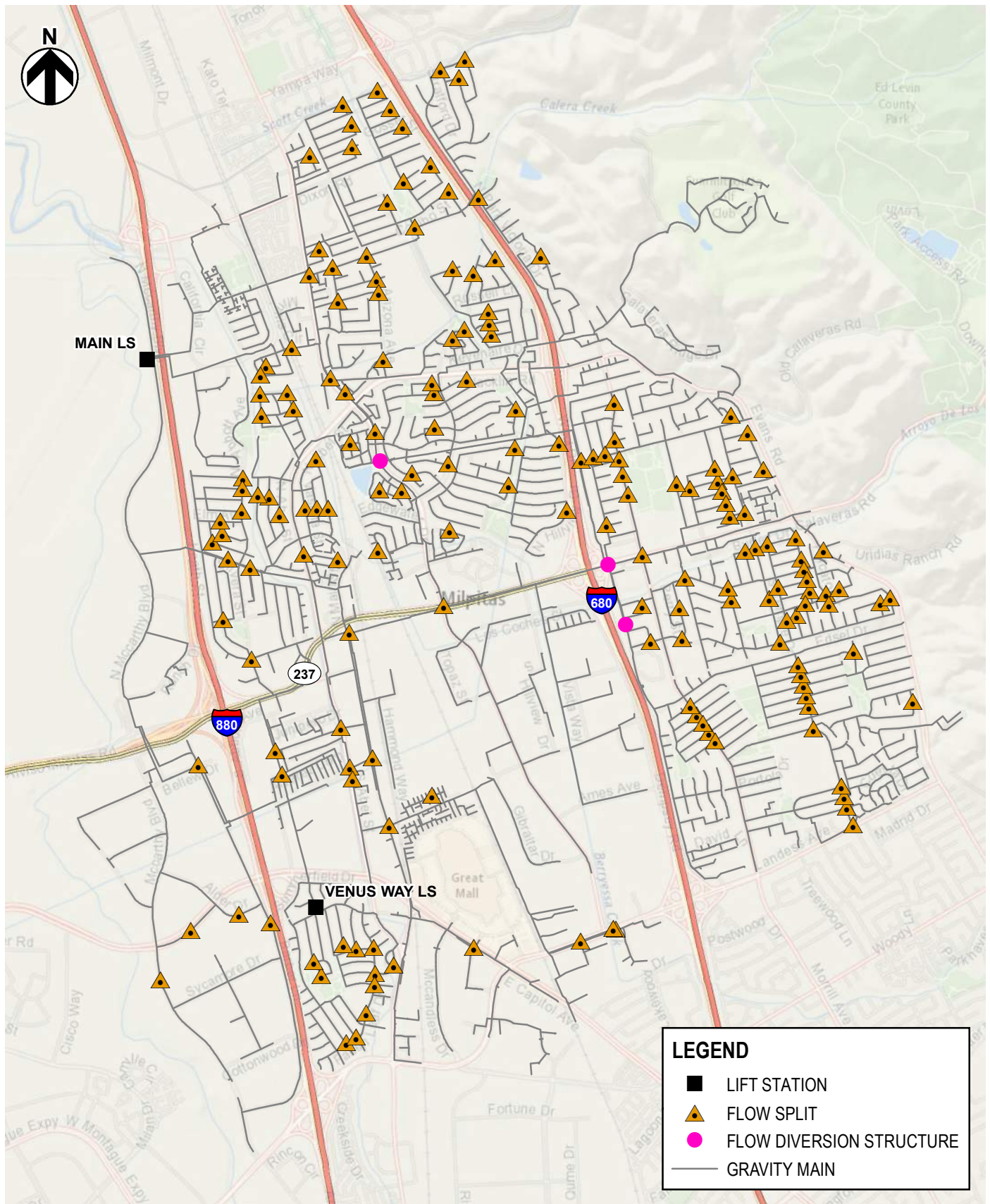


FIGURE 3-9
CITY OF MILPITAS
SEWER MASTER PLAN
FLOW SPLITS AND DIVERSION STRUCTURES

3.1.2 Lift Stations

In February and March 2020, a condition assessment of the two lift stations was conducted as part of the Master Plan effort. An inspection report detailing the assessment and a full asset inventory list of the lift stations are included as part of **Appendix A** (R&R Study App. K, LS Report).

The Venus Way Lift Station (Venus Way LS) serves approximately 1,200 single-family homes surrounding Pinewood Park in the southwestern corner of the City. It is designed to lift wastewater collected from the lower elevations and transmit it the collector main parallel to, and to the east of, Interstate 880. It is a single pump (with stand-by pump) lift station, equipped with two 5 hp 3-phase 540 gpm non-clog sewage pumps in a packaged dry-well plus wet-well configuration. The wet well is a 72-inch diameter RCP wet well equipped with an aluminum hatch and safety grate. The City rehabilitated this lift station during 2008. As part of the preventative maintenance program, the Venus Way LS is inspected annually. **Table 3-5** provides a summary of the asset inventory list for the Venus Way LS; a detailed asset inventory is provided in **Appendix A** (R&R Study App. K, LS Report Sections 2.2 and 4.1).

Table 3-5: Venus Way LS Asset Inventory List

| Asset Name | Asset Description | Asset Type | Year Installed |
|---------------------------------|--|--------------|----------------|
| Mechanical | | | |
| Pumps (2) #1 & #2 | FLYGT CP3102-441, 5 hp 3-PH 230 V Submersible Pump | Pump | 2008 |
| Pump Guide Rails | Reinstalled in 2008 | | 2008 |
| 8" Gate Valves (3), Pumps 1 & 2 | 8" Gate Valve, Pump 1 & 2 | Valve | 2008 |
| 8" Check Valves (2), Pump 1 & 2 | 8" Check Valve, Pump 1 & 2 | Valve | 2008 |
| 4" Flap Gate | 4' Flap Gate in Wet Well | Valve | 2008 |
| 2" Combo Air/Vacuum Valve | 2" Combo Air/Vacuum Valve | Valve | 2008 |
| Electrical | | | |
| Utility Transformer | 240/120 V, 3-Ph, 3 W | Transformer | 2000 |
| Service Pedestal | Service Disconnect and Metering | | 2008 |
| Pump Control Panel | Starter Panel for Pumps 1 & 2 (each 5 hp) | Panel | 2008 |
| Instrumentation | | | |
| Level Instrument | Wet Well Level Sensor | Level Switch | 2008 |
| Structural | | | |
| Wet Well | 72" Diameter RCP | Tank | 1964 |
| Valve Vault | | Vault | 1964 |
| Aluminum Hatch-Vault | Aluminum Hatch, slide-in | Vault | 2008 |
| Aluminum Hatch-Wet Well | Aluminum Hatch w/ safety grate | Vault | 2008 |

All wastewater is collected at the Main LS, the terminal point in the gravity collection system, where it is pumped to the RWF. The Main LS is located to the west of Interstate 880 between North McCarthy Blvd and Coyote Creek Trail. Flow enters the lift station site through a single 54-inch diameter RCP pipe.

The site consists of three buildings that house the lift station components. The Main LS consists of four grinders and four large submersible 170 hp 3 phase 705 rpm pumps with variable frequency drives (VFDs). Pumps #1 and #6 are slated for future installation though the base assembly, piping, and rail system were installed under Project 6103/2-1066. Grinders #5-8 are also slated for future installation. According to the City's 2016 SSMP, the Main LS has a wet weather capacity of 45 MGD. **Table 3-6** provides a summary of the asset inventory list for the Main LS; a detailed asset inventory is provided in **Appendix A** (R&R Study App. K, LS Report Sections 2.2 and 3.1).

Table 3-6: Main LS Asset Inventory Summary

| Asset Name | Asset Description | Asset Type | Year Installed |
|---|---|--------------|----------------|
| Mechanical | | | |
| Pig Launchers (2) A & B | 36" Pig Launcher | Pig Launcher | 2002 |
| Pinch Valves (3) 1-3 | 36" Pinch Valve | Valve | 2002 |
| Mag Meter (Flow Meter A) | 24" Magnetic Meter | Flow Meter | 2002 |
| Venturi Meter – Removed in 2008 | 36" Venturi Meter (taken out) | Flow Meter | 1975 |
| Butterfly Valve | 36" Butterfly Valve, FM interconnect | Valve | 1970 |
| Manifold Piping Butterfly Valve | 36" diameter BFV, middle of manifold | Valve | 2008 |
| Manifold Piping Plug Valve #1 | 36" diameter PV, pumps 1, 2, 3 | Valve | 2008 |
| Manifold PV #1 & #2 Actuators (2) | plug valve electric actuator | Actuator | 2008 |
| Manifold Piping Plug Valve #2 | 36" diameter PV, pumps 4, 5, 6 | Valve | 2008 |
| Pumps (3) #2-4 | FLYGT CP3531-775, 170 hp Submersible Pump | Pump | 2008 |
| Pumps (4) #2-5 Piping | 20" Ductile Iron Vertical Discharge Pipe, 20" Ductile Iron 90 Elbow, 20" Flanged Coupling Adapter | Piping | 2008 |
| Pumps (4) #2-5 Check Valves | 20" Diameter Spring Loaded Check Valve | Valve | 2008 |
| Pumps (4) #2-5 Plug Valves | 20" Diameter Plug Valve | Valve | 2008 |
| Pump #5 (not installed yet) | FLYGT CP3531-775, 170 hp Submersible Pump | Pump | |
| Main Head Gate | 54" sluice gate with manual actuator | Gate | 2008 |
| Head Gate (4) #1-4 | 48" sluice gate with electric actuator | Gate | 2008 |
| Grinder (2) #1 & #4 | 5-hp electric driven | Grinder | 2008 |
| Grinder (2) #2 & #3 | 10-hp electric driven | Grinder | 2008 |
| 2" combo air/vac valve | | | |
| Force Main A B Flow Recorder | | | |
| Flow Meter B | This is for force main B | | |
| Main Transformer | 1000 kVA, 12 kV-480 V, 3-ph (PG&E) | Transformer | 2000 |
| Outdoor Utility Disconnect and Metering Panel | Outdoor NEMA 3R Enclosure | Panel | 2000 |
| Main Switchgear | Located in Existing Generator Building | Switchgear | 2000 |

| Asset Name | Asset Description | Asset Type | Year Installed |
|---|--|--------------|----------------|
| Variable Frequency Drives (4) P2-P5 | VFD for Pump (170 hp) | VFD | 2008 |
| Local Disconnect for Engine Jacket Water Heater | 30A/3P | Switch | 2000 |
| Motor Control Center (2) 2 & 2A | 600 A, 480 V, 3-ph, 3W, 65000 AIC | MCC | 2000 |
| Dry Type Transformers (2) | 30 kVA, 480-208/120 V, Dry Type | Transformer | 2000 & 2008 |
| Lighting panel (LP-1) | | Panel | 2008 |
| Lighting panel (LA) | 100 A, 1-ph, 3 Wire | Panel | 2000 |
| Motor Control Center (2) A & B | 400 A, 480 V, 3-ph, 3W, 65000 AIC | MCC | 2008 |
| Dry Type Transformer | 10 kVA, 480-240/120 V, Dry Type | Transformer | 2008 |
| Distribution panels (2) (DP-1 & DP-2) | 125 A, NEMA Type 1 | Panel | 2008 |
| Dry Type Transformer | 75 kVA, 480-208/120 V, Dry Type | Transformer | 2008 |
| Local Control Panels (4) for Grinders #1-4 | LCP grinder 1 | Panel | 2008 |
| Local Disconnects (4) for CU-1 (for FC-1), EF-1 (for Control Room), HP-1 (for FC-2) & FC-1 (for Control Room) | 30A/3P | Switch | 2008 |
| Local Disconnects (2) for EF-5 & SF-1 (for Wet Well) | 60A/3P | Switch | 2008 |
| Generator | 1000 kVA, 480 V Diesel Driven Engine Generator | Generator | 2000 |
| Automatic Transfer Switch | ATS, 1600 A | Switch | 2000 |
| Instrumentation | | | |
| Level Switch | Level High High | Level Switch | 2008 |
| Level Switches (2) | Ultrasonic level | Level Switch | 2008 |
| Structural | | | |
| Pinch Valve Vaults (3) 1-3 | Pinch Valve Vault | Vault | 2002 |
| Mag Meter Vault | 24" Magnetic Meter Vault | Vault | 2002 |
| Venturi Meter Vault | 36" Venturi Meter Vault | Vault | 1975 |
| Butterfly Valve Vault | 36" Butterfly Valve Vault | Vault | 1997 |
| Fuel Tank (bulk) | 2,000-gal UL-2085 above ground vault tank | Tank | 2008 |
| Fuel Tank (day) | | Tank | 2000 |
| Grit Chamber/Inflow Structure | | Tank | 2008 |
| Wet Well | | Tank | 2008 |

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SECTION 4 – CONDITION ASSESSMENT

As mentioned in **Section 1.1.1**, as part of the City's Master Plan project, a *Sewer Utility Asset Renewal and Replacement Study* (R&R Study) was conducted. Included in this study is a condition assessment of the City's current collection system based on a set of factors developed to determine the relative risk of failure for each pipeline segment. This section describes the development of the factors established for the Business Risk Exposure (BRE) analysis and the results of the collection system condition assessment. The R&R Study is attached as **Appendix A**.

4.1 CCTV Condition Assessment

Part of evaluating the condition of the City's collection system is understanding the pipe condition based on the level of structural and/or operations and maintenance (O&M) related defects. For this part of the condition assessment, key segments of the system were selected for closed-circuit television (CCTV) investigation based on the following criteria:

- Diameter greater than 8-inches;
- Older pipe (pre-1990) and pipe materials susceptible to corrosion/failure (RCP, VCP);
- Located within high traffic areas; and
- Located within commercial/industrial areas.

Figure 4-1 presents the segments selected for CCTV inspection based on these criteria. The pipelines indicated as "Contract" were the priority for inspection while the "Misc" were completed as time and budget permitted.

National Plant Services Inc. (NPS) was contracted to complete the CCTV assessment (168,180 ft, 31 miles, approximately 20% of the entire system) and performed this inspection between March and May 2020. Additional details regarding the planned scope of the assessment can be found in the **Appendix A** (R&R Study Section 2.1). It is expected that additional CCTV assessment will be performed by City forces in the future as part of a City-wide CCTV program.

4.1.1 CCTV Inspection Results

As part of the assessment work performed by NPS, NPS inspected 105,221 ft. (approximately 20 miles) of pipeline. This constitutes approximately 12% of the entire system. **Figure 4-1** shows the pipelines fully inspected by NPS in green.

There were some pipe segments where NPS attempted inspection but was unable to conduct or complete inspection. NPS reported various reasons for not completing inspection of pipe segments including the presence of siphons; manholes that were paved over or did not exist; and obstructions such as root balls, grease, and rocks. These pipe segments are shown in **Figure 4-2** in red; this includes segments for which inspection was only partially completed. Where there were obstructions observed, the survey was attempted from the next manhole in the opposite direction.

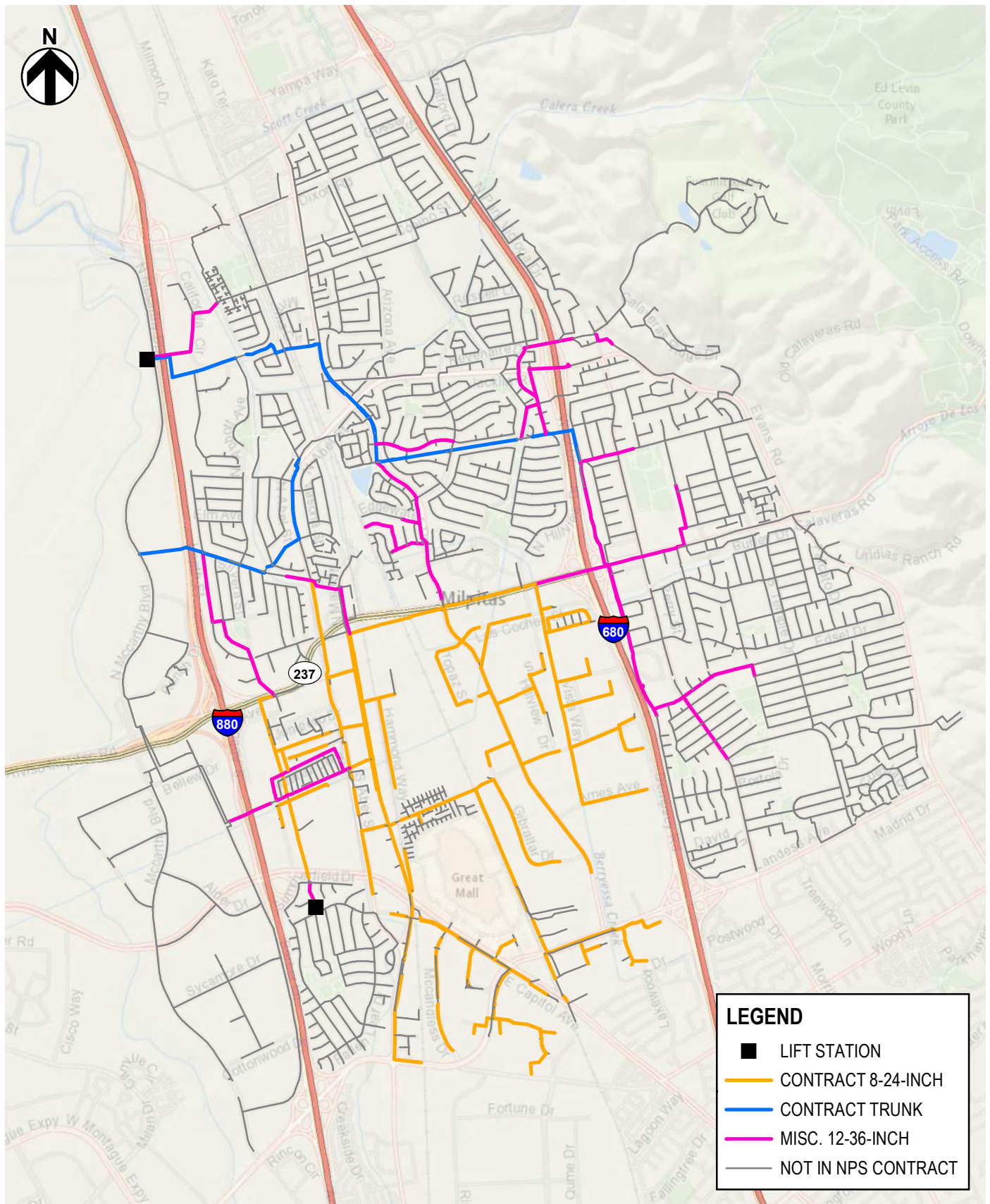


FIGURE 4-1
 CITY OF MILPITAS
 SEWER MASTER PLAN
 NPS CCTV INSPECTION PLAN

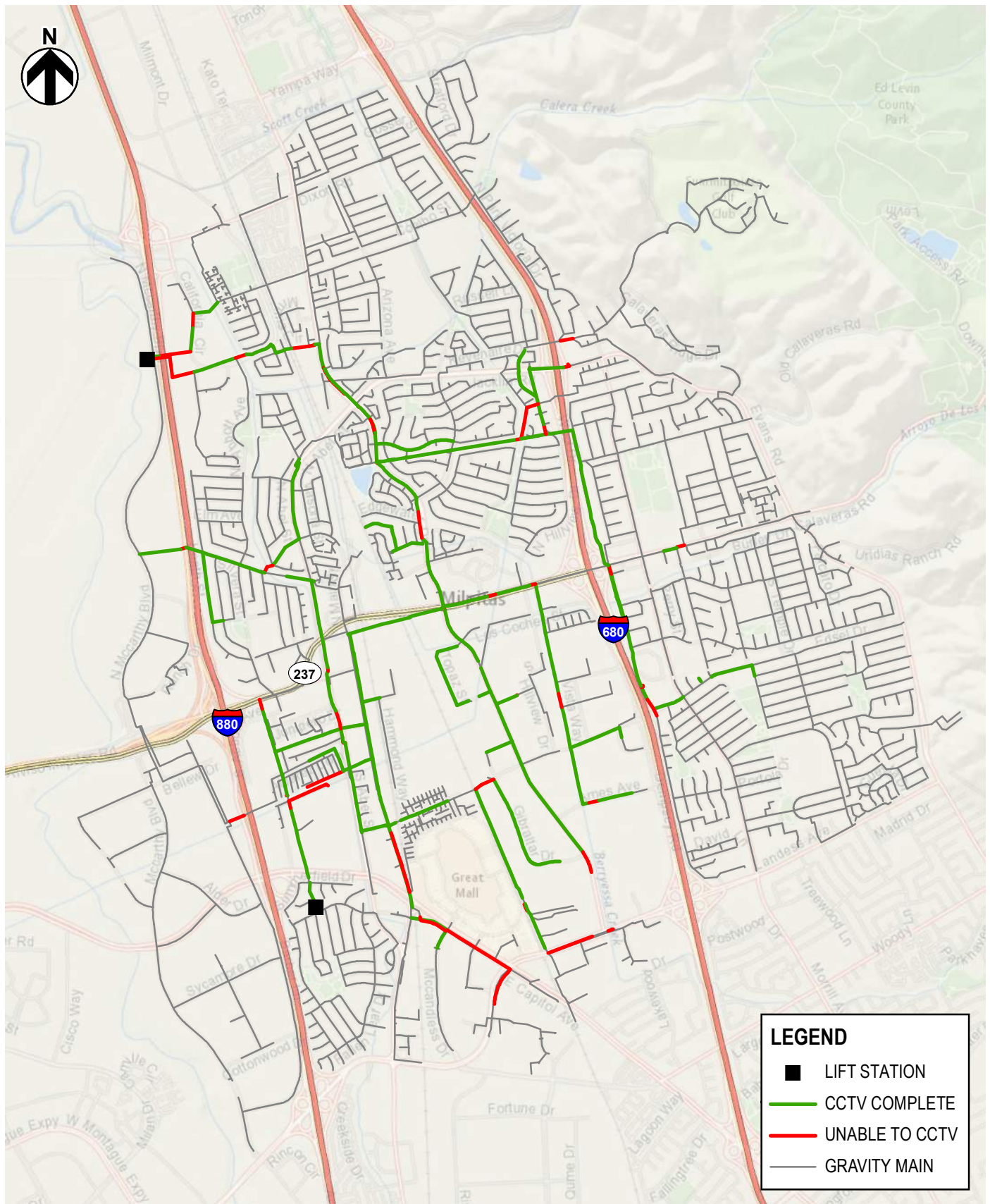


FIGURE 4-2
CITY OF MILPITAS
SEWER MASTER PLAN
COMPLETED CCTV INSPECTION

A breakdown of the completed segments by pipe diameter is presented in **Table 4-1**.

Table 4-1: Completed CCTV Inspection by Pipe Diameter

| Pipe Diameter (in) | Length Inspected (ft) |
|--------------------|-----------------------|
| 8 | 8,221 |
| 10 | 3,540 |
| 12 | 19,003 |
| 15 | 25,552 |
| 16 | 195 |
| 18 | 15,292 |
| 21 | 10,268 |
| 24 | 1,995 |
| 27 | 5,337 |
| 30 | 7,393 |
| 33 | 574 |
| 39 | 2,487 |
| 42 | 2,547 |
| 66 | 1,037 |
| Unspecified | 1,788 |
| Total | 105,221 |

Defect Coding

Defects were identified and sewer pipeline conditions were assessed according to the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP). PACP-certified NPS staff coded all inspected pipelines. As part of the quality control (QC) process, approximately 20% (89 out of 449 pipe segments) of inspection CCTV and PACP reports were additionally reviewed by PACP-certified staff. A detailed description of the QC process can be found in **Appendix A** (R&R Study Section 2.3).

For the condition assessment, the following steps were taken for each pipeline segment, which is defined from manhole to manhole:

1. Defects identified through review of CCTV footage.
2. Individual grade assigned based on the type and severity of defect(s).
3. Overall condition grade developed by assessing the type and number of defects along the segment.
4. Final condition rating assigned based on the condition grades and the potential for further deterioration and/or failure.

Per NASSCO PACP, each defect is categorized as either structural or O&M-related. Structural defects directly impair the structural condition of the pipe and are typically addressed through repairs, rehabilitation, or replacement. O&M-related conditions are those that directly affect the performance of the sewer or are indicative of potential future structural defects and are typically

addressed through maintenance, though some (such as infiltration) may require additional rehabilitation.

Both structural and O&M-related condition grades range from one to five. **Table 4-2** provides a description of each rating as well as some examples of structural and O&M-related defects at each rating.

Table 4-2: Condition Grade Definitions

| Condition Grade | Condition Rating | Structural Examples | O&M Examples |
|-----------------|--------------------------------|---|---|
| 1 | Minor defect grade | Circumferential crack; roughness increased due to surface damage; spalling of coating | Fine roots at lateral, connection, or joint; infiltration stains on barrel, lateral, connection, or joint; vermin cockroach |
| 2 | Minor to moderate defect grade | Spiral or longitudinal crack; circumferential fracture; aggregate visible due to surface damage | Factory tap intruding <10%; infiltration weeper on barrel, lateral, connection, or joint; vermin rat |
| 3 | Moderate defect grade | spiral or longitudinal fracture, lining feature blistered; medium joint offset | Deposits (grease, rags, gravel, etc.) attached 10-20%; medium roots at lateral, connection, or joint |
| 4 | Significant defect grade | Broken pipe; surface damage with aggregate missing; large joint offset | Deposits attached 20-30%; medium roots at barrel; infiltration runner at barrel, lateral, connection, or joint |
| 5 | Most significant defect grade | Broken pipe with visible void; flexible pipe deformed >10%; collapsed pipe | Deposits attached >30%; root ball at barrel; infiltration gusher at barrel, lateral, connection, or joint |

Each defect identified along a pipeline segment is categorized and rated according to **Table 4-2**. The condition of each pipeline segment is ultimately given the following three scores:

- **Structural Peak Score** – The most severe condition grade for structural defects present in a pipeline segment.
- **O&M Peak Score** – The most severe condition grade for O&M-related defects present in a pipeline segment.
- **Overall Peak Score** – The greater of the two peak scores, either the structural or O&M peak score.

The structural and O&M peak scores are used in the BRE analysis. The structural and overall peak scores developed from this CCTV condition assessment are used to develop project recommendations for the City's CIP (see **Section 9.1.1**).

Figure 4-3 presents the overall peak scores resulting from this PACP condition assessment. Additional detail including breakdown by pipe diameter of the structural and O&M peak scores and maps of the structural and O&M peak scores can be found in **Appendix A** (R&R Study Section 2.2.1 and Appendices D and E).

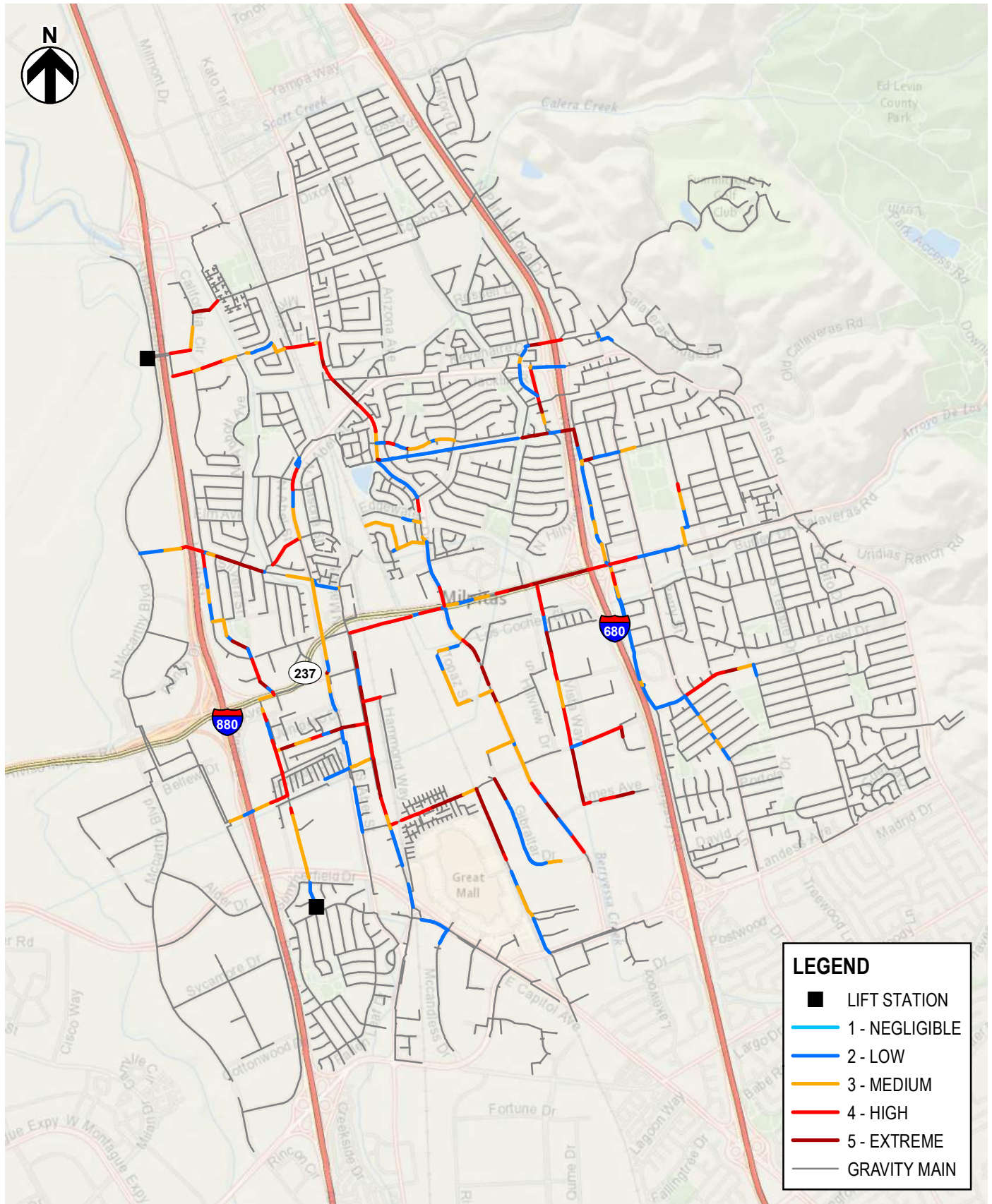


FIGURE 4-3
 CITY OF MILPITAS
 SEWER MASTER PLAN
 PACP OVERALL PEAK SCORES

4.2 Desktop Condition Assessment

In addition to the PACP condition assessment performed using the CCTV footage, a desktop condition assessment was performed to determine the relative risk of failure of each pipeline segment. A pipeline's risk of failure is determined by a combination of the *likelihood* and the *consequence* of the failure of the pipe segment. The results of this assessment represent the City's BRE.

Likelihood of failure (LoF) and consequence of failure (CoF) scores were assigned to each pipeline segment by considering various factor ratings with assigned factor weightings. LoF and CoF ratings were given on a scale of one (least likely to fail/least consequential) to five (most likely to fail/most consequential). The weighting of each factor was assigned based on the relative criticality of that factor, with higher weighting factors assigned to the most critical LoF/CoF factors.

Both the factors and the weightings were established by industry standard along with input from the City Staff through a workshop between BC, HydroScience, and City Staff in April 2020. A summary of the discussion at this workshop can be found in **Appendix A** (R&R Study Section 3.4).

The following equations were used to calculate a risk score for each pipeline segment:

$$\begin{array}{c} \text{Risk (BRE)} = \text{LoF Score} \times \text{CoF Score} \\ \hline \text{LoF Score} = \sum (\text{LoF Rating} \times \text{LoF Weighting}) \quad \text{CoF Score} = \sum (\text{CoF Rating} \times \text{CoF Weighting}) \end{array}$$

4.2.1 Likelihood of Failure (LoF)

The first factor in determining the relative risk of failure of a pipeline was the *likelihood* that the segment is unable to provide the function for which it was installed. This was determined by assigning LoF criteria and ratings based on characteristics, condition, and location of each pipeline. In cases where pipeline characteristics (age and material) were missing or unavailable, medium risk was assigned as this is the equivalent to "neutral." The following criteria were selected for this analysis and are typical for sewer renewal/replacement projects:

- **Pipe age** – In general, as a pipe ages, it has a higher likelihood to fail.
- **Pipe material** – Different pipe materials have different life expectancies and failure modes.
- **Structural condition** – Known structural defects based on 2020 CCTV inspection by NPS.
- **Presence of pipe obstructions** – Known O&M-related defects based on 2020 CCTV inspection by NPS.
- **Required pipe cleaning** – Pipe requiring more frequent cleaning are typically subject to chronic O&M issues (i.e., oil, grease, and roots) when not maintained. However, the act of cleaning with high pressure water jets can contribute to premature failure of older or compromised pipe and inadvertently remove the top layer of corroded concrete or metal pipe.

- **Proximity to landslide zones** – Landslides can pose a threat to pipe segments that are buried at a depth of three feet or less. This factor also accounts for the impact of smaller seismic events on pipe structural integrity.
- **Proximity to earthquake faults** – Pipes located in the Hayward Fault Zone are given a higher LoF rating. This factor also accounts for the impact of smaller seismic events on pipe structural integrity.
- **Local geology (liquefaction)** – A liquefaction layer from County GIS provides soil resiliency ratings to seismic events. This factor also accounts for the impact of smaller seismic events on pipe structural integrity.

Sources include the City's GIS; the City's collection system maintenance schedule; and landslide, fault, and liquefaction zoning provided by the County of Santa Clara Department of Planning and Development. The basis of scoring and weighting of each criteria is detailed in **Table 4-3**.

Table 4-3: LoF Criteria and Ratings

| Broad Category | Criteria | LoF Rating | | | | | Criteria Weighting |
|-----------------------|------------------------------------|----------------------------|--|---|---|---|--------------------|
| | | (← Least likely to fail | Most likely to fail →) | | | | |
| | | 1 | 2 | 3 | 4 | 5 | |
| Asset Characteristics | Installation Year | After 2000 | 1985 -1999 | 1970 – 1984 ¹ | 1955 – 1969 | Before 1954 | 2 |
| | Pipe Material | Force Main, HDPE, PVC | VCP ¹ | RCP, STL, DIP, ABS, PPR | - | ACP, CIP | 2 |
| Asset Condition | Structural PACP Grade/ Defect Type | Grade 2 defect(s) or lower | Grade 3 defect(s) (except hinge defects) | One Grade 4 defect (except hinge defects) OR Grade 3 hinge defect | One Grade 5 defect (except soil/void/collapse deformation >10%) OR multiple Grade 4 defects OR Grade 4 hinge defect | Multiple Grade 5 defects OR one Grade 5 defect (soil/void/ collapse deformation >10%) | 5 |
| | O&M PACP Grade | Grade 2 defect(s) or lower | Grade 3 defect(s) | One Grade 4 defect | One Grade 5 defect or multiple Grade 4 defects | Multiple Grade 5 defects | 5 |
| | Required Pipe Cleaning | - | Require annual cleaning | Requires quarterly cleaning | Requires monthly cleaning | Requires weekly cleaning | 5 |
| Asset Location | Proximity to Landslide Zone | Not within landslide zone | - | - | - | Within landslide zone | 3 |
| | Proximity to Earthquake Faults | Not within fault area | - | - | - | Crossing or within fault area | 3 |
| | Likelihood of Liquefaction | - | - | Prone to liquefaction | High likelihood of liquefaction | Very high likelihood of liquefaction | 3 |

Notes:

1. Unknown or unspecified characteristics were classified at this rating.

4.2.2 Consequence of Failure (CoF)

The second factor in calculating the relative risk of failure of a pipeline is the CoF, or the predicted impacts resulting from the failure of the segment. Similar to the LoF analysis, CoF criteria and ratings were assigned based on the following groups: service interruption potential, repair/overflow potential, impact to transportation/transit, response time to potential failure, cost of potential failure, and environmental impacts. The criteria were selected to align with City Council core values and priorities and are typical for sewer renewal/replacement projects.

The CoF criteria and the relationship to City Council core values and priorities are summarized in **Table 4-4**.

Table 4-4: Council Core Values/Priorities and Related CoF Criteria

| Council Core Value/Priority Area | Organization Category | Measure of Failure | CoF Criteria |
|----------------------------------|-----------------------|---|--|
| Superior Customer Service | Community | Sewer service interruptions to large areas | Pipe diameter |
| Integrity and Accountability | | Sewer service interruptions to critical and educational facilities | Critical facilities (proximity) |
| Trust and Respect | | Magnitude and method of public response (sewer size) | Pipe diameter |
| Transportation and Transit | | Public transit service and traffic interruptions | Road type |
| | | Railroad interruptions | Railroad proximity |
| Governance and Administration | Finance | Response time to restore an asset | Easement (access restriction), road type |
| | | Restoration costs or impact on utility rates | Pipe diameter and depth |
| Environment | Environment | State and Federal regulatory violations or public response (discharge to surface water) | Waterway/waterbody (proximity) |

Below is a more detailed description of the selected CoF criteria outlined in **Table 4-4**:

- **Sewer size (pipe diameter)** – Larger diameter pipes are more expensive to replace and provide service to a larger service area than smaller diameter pipes.
- **Proximity to critical facilities** – Pipe proximity to an educational, police, fire, or health facility was calculated and rated for CoF. Pipelines servicing critical facilities were approximated by using a buffer of 500 feet. For context, the facility addresses were plotted as a point, so the buffer of 500 feet accounts for building size and nearby critical pipes.
- **Road type** – Different road types such as arterial or highway will impact more people than a neighborhood street. Therefore, locations where pipe intersects with major traffic conveyance routes such as freeways, state routes, arterial streets, or major roads were identified.
- **Railroad proximity** – Impacts to railroad operations and repairs on railroad property have significant cost and permitting impacts.
- **Easement (access restriction)** – Access restrictions were determined by overlaying the City GIS over an aerial basemap and manually assigning pipes which appeared to be within easements through private property or restricted areas. For example, the parking lot of a shopping mall would be assigned private but not restricted. However, if a pipe is near a swale between a park and a neighborhood, or between two properties, it was assigned “restricted access.” In a further analysis, parcels with easement information could provide a more refined outcome.
- **Pipeline depth** – Pipes that are buried deeper require more time and effort to excavate and as a result can be more costly to repair or replace.
- **Proximity to waterway or waterbody** – There are significant permitting impacts for repair or cleanup of failed pipes that discharge into a waterway or waterbody.

Data sources include the City’s GIS, Google Maps, major road locations provided by the County of Santa Clara Department of Planning and Development, and railroad and waterbody locations provided by the United States Geological Survey (USGS).

For a more detailed explanation of the City Council core values and how each criterion was rated, see Appendix A (R&R Study Section 3.2). The basis of scoring and weighting of each criteria is summarized in **Table 4-5**.

Table 4-5: CoF Criteria and Ratings

| Organization Category | Group | CoF Rating | | | | | | Criteria Weighting |
|--------------------------|--|----------------------------------|--|--------------------------------------|--------------------------------------|-------------------------------------|--|--------------------|
| | | (← Negligible consequence | | | Critical consequence →) | | | |
| Community | Service Interruptions and Overflow Potential | Criteria | 1 | 2 | 3 | 4 | 5 | |
| | | Pipeline Diameter ^{1,2} | < 6 in | 8 – 12 in ⁴ | 14 – 18 in | 18 – 24 in | > 24 in | 1 |
| | Critical Facilities | - | - | School | Fire/Police | Hospital | 1 | |
| | Transportation/Transit | Road Type ^{1,3} | Neighborhood streets | Collector streets | Arterial streets | Expressway and state routes | Freeways | 1 |
| | | Railroad Proximity | Not crossing or within 50' of railroad | - | - | - | Crossing or within 50' of railroad | 1 |
| | Financial | Response Time | Access Restriction | Public right-of-way | - | Private property | - | Limited access |
| Road Type ^{1,3} | | | Neighborhood streets | Collector streets | Arterial streets | Expressway and state routes | Freeways | 2 |
| Pipeline Cost | | Pipeline Diameter ^{1,2} | < 6 in | 8 – 12 in ⁴ | 14 – 18 in | 18 – 24 in | > 24 in | 1 |
| | | Pipeline Depth | All others | - | - | - | Greater than 10' (or special configuration requiring substantial excavation) | 1 |
| Environment | Environment | Waterway or Waterbody | - | Within 250' of waterway or waterbody | Within 100' of waterway or waterbody | Within 50' of waterway or waterbody | Crossing waterway or waterbody | 3 |

Notes:

1. Pipe diameter and road type affect the CoF in both the broad community and financial categories.
2. Pipe Diameter weighting = 1+1 = 2; 1 (Service Interruptions and Overflow Potential) + 1 (Pipeline Cost) = 2 (overall Pipe Diameter weighting).
3. Road Type weighting = 1+2 = 3; 1 (Transportation/Transit) + 2 (Response Time) = 3 (overall Road Type weighting).
4. Unknown or unspecified characteristics were classified at this rating.

4.2.3 Business Risk Exposure (BRE, Risk of Failure)

The LoF and CoF scores, as described above, were automatically calculated based on the criteria and weightings laid out in **Table 4-3** and **Table 4-5** using the InfoAsset Planner (IAP) software by Innovyze, a GIS extension risk assessment tool. As described at the beginning of **Section 4.2**, the relative risk was given by the product of the LoF and CoF scores calculated by IAP. **Figure 4-4** illustrates the risk assignment for each LoF and CoF pairing.

Figure 4-4: Risk of Failure Assessment Matrix

| | Low LOF Score → High LOF Score | | | | |
|--------------------------------------|--------------------------------|------------|--------|---------|---------|
| High COF Score ↑ Low COF Score | Medium | Medium | High | Extreme | Extreme |
| | Medium | Medium | Medium | High | Extreme |
| | Low | Medium | Medium | Medium | High |
| | Negligible | Low | Medium | Medium | Medium |
| | Negligible | Negligible | Low | Medium | Medium |

Total risk scores were normalized within the dataset from one (negligible risk) to five (extreme risk). **Table 4-6** provides a breakdown of the distribution of risk scores as a portion of the total length of pipe; for a more detailed breakdown of the risk scores, see **Appendix A** (R&R Study Section 3.6). **Figure 4-5** presents a map of the resulting risk scores for the entire city, and these were used to provide CCTV recommendations (see **Section 9.1.2**).

Table 4-6: Business Risk Exposure Score Distribution by Length

| Risk Score | Length of Pipe (ft) | % of Total |
|------------------------|---------------------|------------|
| 1 – Negligible | 610,497 | 77 |
| 2 – Low | 77,844 | 10 |
| 3 – Medium | 80,247 | 10 |
| 4 – High | 9,674 | 1 |
| 5 – Extreme | 5,922 | 1 |
| Blank (no facility ID) | 4,935 | < 1 |
| Total | 789,119 | 100 |

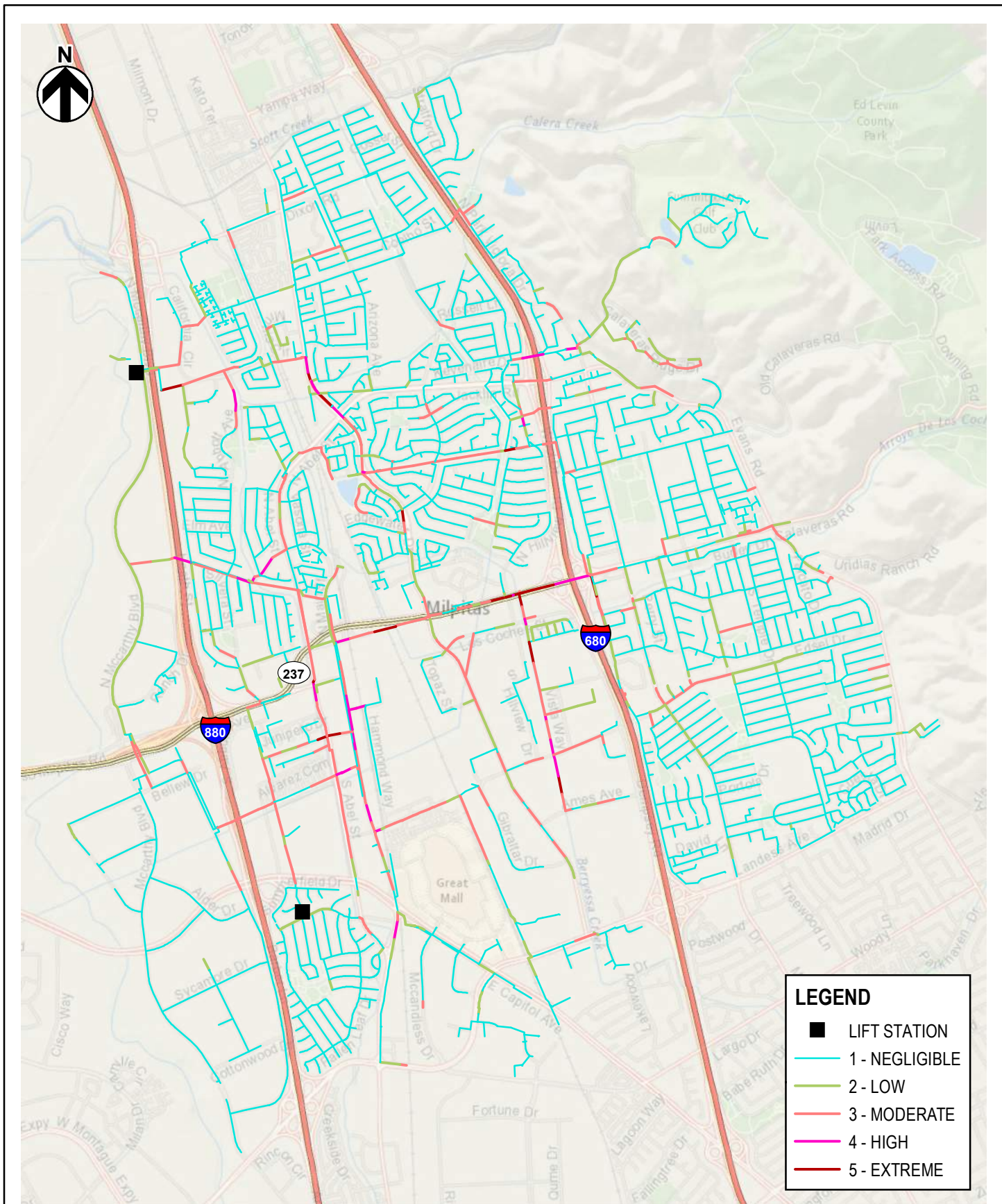


FIGURE 4-5
 CITY OF MILPITAS
 SEWER MASTER PLAN
 BUSINESS RISK EXPOSURE SCORE MAP

4.3 Lift Station Condition Assessment

As part of the R&R Study, BC also performed an on-site inspection of the collection system's two lift stations – the Main LS and Venus Way LS – described in **Section 3.1**. The results of this inspection are presented in the *Main and Venus Way Lift Station Inspections Report* (LS Report) which is included in **Appendix A** (R&R Study App. K). Assets in the following categories were evaluated during the inspection of these lift stations:

- Mechanical;
- Electrical;
- Instrumentation;
- Civil; and
- Structural.

Further breakdown of these categories and the specific assets evaluated are detailed in the LS Report.

Field inspections were completed on February 11 and March 11, 2020. Each asset inspected was reported with a condition score and a performance score from one to five; the breakdown of each score is summarized in **Table 4-7**.

Table 4-7: Condition and Performance Score Definitions

| Score | Description | Condition Score Meaning | Performance Score Meaning |
|-------|-------------------|--|--|
| 1 | Excellent/Good | No defects observed. | Functioning as intended. |
| 2 | Fair | Only minor defects observed. | In service, but higher than expected O&M. |
| 3 | Neutral | | |
| 4 | Poor | Major defects observed. Asset integrity may be compromised. | In service, but function is highly impaired. |
| 5 | Failing or Failed | Asset integrity is compromised. Asset may be out of service. | Not functioning as intended or out of service. |

4.3.1 Main LS Inspection

Table 4-8 presents the major deficiencies identified at the Main LS that require timely attention. A summary asset inventory list is provided in **Table 3-6**. A comprehensive list of the inspection notes and scoring for all Main LS components are included in **Appendix A** (R&R Study App. K, LS Report Section 3).

Table 4-8: Main LS Deficiencies

| Asset Name | Field Assessment/Comments | Condition Score | Performance Score |
|---------------------------------------|--|-----------------|-------------------|
| Mag Meter (Flow Meter A) ¹ | Not in operation | 4 | 4 |
| Manifold PV #2 Actuator | Does not work | 5 | 5 |
| Pump #3 | Has exceeded useful life ² | 4 | 4 |
| Grinder #1 | Excessive vibration and inadequate supports | 5 | 5 |
| 2" Combination Air/Vacuum Valve | None | 4 | 4 |
| Flow Meter B ¹ | Operable, but not accurate | 4 | 4 |
| Air Vacuum 1 to 15 | Cavitation, coating failure, and inadequate supports | 5 | 5 |
| Variable Frequency Drive P2 | No corrosion identified, arc flash labels missing | 4 | 2 |
| Variable Frequency Drive P3 | No corrosion identified, confirmed by City that IGBT was replaced in 2019, arc flash labels missing | 4 | 2 |
| Variable Frequency Drive P4 | No corrosion identified, arc flash labels missing | 4 | 2 |
| Variable Frequency Drive P5 | No corrosion identified, confirmed by City that cooling fans were replaced in 2019, arc flash labels missing | 4 | 2 |

Notes:

1. The City is replacing these meters as part of CIP Project 6131: Sanitary Sewer Cathodic Protection Improvements.
2. This pump has logged over 50,000 hours.

4.3.2 Venus Way LS Inspection

Condition and performance scores for all assets inspected were rated as 1 – no defects and functioning as intended. A summary asset inventory list is provided in **Table 3-5**. A comprehensive list of the inspection notes and scoring for the Venus Way LS can be found in **Appendix A** (R&R Study App. K, LS Report Section 4).

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SECTION 5 – ANALYSIS OF LAND USES FOR HYDRAULIC MODELING

To develop base sanitary flows (BSF) – the flow directly contributed by the customer – wastewater flows were assigned to every contributing parcel in the City. For planning level analysis, parcels of similar land use types are estimated to have similar wastewater flow rates either on a per parcel basis (gpd/parcel) or per acre basis (gpd/acre) and similar diurnal patterns. Thus, common land use types were consolidated, where appropriate. This section discusses the land use data used for planning level wastewater modeling.

5.1 Land Use Designations for Model Analysis – Existing Condition

City land use designations were available as a parcel GIS shapefile containing GP land use information for each parcel in the City. For modeling purposes, some modifications to the land uses are warranted to ensure relevance to the sewer analysis. Land use types expected to generate similar wastewater flows were consolidated into general categories to facilitate unit flow (UF) analysis. Land uses that have little to no contribution to the sewer system were excluded from further analysis.

It is noted that the consolidations made for the purpose of this Study might not correspond directly to the land use categories used for the Water Master Plan Study because these categories were established based on expected similar wastewater flow generation, which do not always directly correspond to water use.

Data cleaning was necessary to assure an accurate representation of wastewater flow from individual parcels/customers. Below is a description of the GP land use categories that required further review in order to assign the appropriate model-based land use designation (see **Table 2-1**):

- The following GP Land Use categories and parcel types were assigned as “NF” (no flow) and excluded from this analysis;
 - POS, WATERWAYS, parcels consisting of train tracks, streets, parking lots, or other open space; and parcels located in the City of San Jose or unincorporated areas not serviced by the City’s sewer system.
- All parcels with location specific land use codes (HWS, TWC, and URR) were reviewed using Google Earth Satellite and Street Views and assigned a model-based land use according to facilities present on each parcel as listed in **Table 5-1**.
- Some parcels with GP land use of BVMU were assigned to COM if commercial facilities appeared to be present;
- All hotels in the City were identified and parcels assigned to a new model-based land use code: HOTEL;
- Elmwood Correctional Facility was assigned to its own model-based land use code: COR; and
- All residential GP land use categories with parcels greater than one acre were reviewed to ensure the model-based land use designations were representative according to expected wastewater generation rates. Updated model-based land use designations were assigned, as appropriate.

Table 5-1 summarizes the GP land uses and associated codes included in the data set, and the model-based land uses developed for use in the model for this Study. **Figure 5-1** presents the City according to the model-based land use designations.

Table 5-1: Model-Based Land Use Designations for Existing Conditions

| GP Land Use | Code | Model-Based Land Use | Code |
|---|-----------|---|-------|
| Hillside Very Low Density | HVL | Hillside Single-Family Low Density | HSFL |
| Hillside Low Density | HLD | | |
| Hillside Medium Density | HMD | Hillside Single Family Medium Density | HSFM |
| Valley Floor Single-Family Low Density | SFL | Valley Floor Single-Family Low Density | SFL |
| Valley Floor Single-Family Medium Density | SMD | Valley Floor Single-Family Medium Density | SFM |
| Multi-Family Medium Density | MFM | | |
| Multi-Family High Density | MFH | Valley Floor Multi-Family High Density | MFH |
| Multi-Family Very High Density | VHD | Valley Floor Multi-Family Very High Density | MFVH |
| Mobile Home Park | MHP | Mobile Home Park | MHP |
| Mixed Use | MXD | Mixed Use | MXD |
| Boulevard Very High-Density Mixed Use | BVMU | High Density Mixed Use | HDMU |
| Residential-Retail Mixed Use | RRMU | | |
| Professional & Administrative Offices | PAO | Professional & Administrative Offices | PAO |
| General Commercial | GNC | Commercial | COM |
| Retail Sub-Center | RSC | | |
| Industrial Park | INP | Industrial Park | INP |
| Manufacturing | MFG | Manufacturing | MFG |
| Public Facilities | PF | Public Facilities ¹ | PF |
| | | Elmwood Correctional Facility ² | COR |
| TWC, MXD, GNC, INP, HWS, RSC | | Hotels ³ | HOTEL |
| Park Open Space | POS | NF | |
| Waterways | WATERWAYS | NF | |
| Highway Services | HWS | Parcels reviewed and model-based land use designation assigned, as appropriate. | |
| Town Center | TWC | | |
| Urban Residential | URR | | |
| Parcels with no land use designation | - | | |

Notes:

1. Includes schools, churches, health facilities, libraries, and fire stations.
2. The correctional facility is categorized as PF in the GP. For modeling purposes, it was given a distinct code.
3. Hotels are categorized under various land uses in the GP. They were identified and assigned a distinct code.

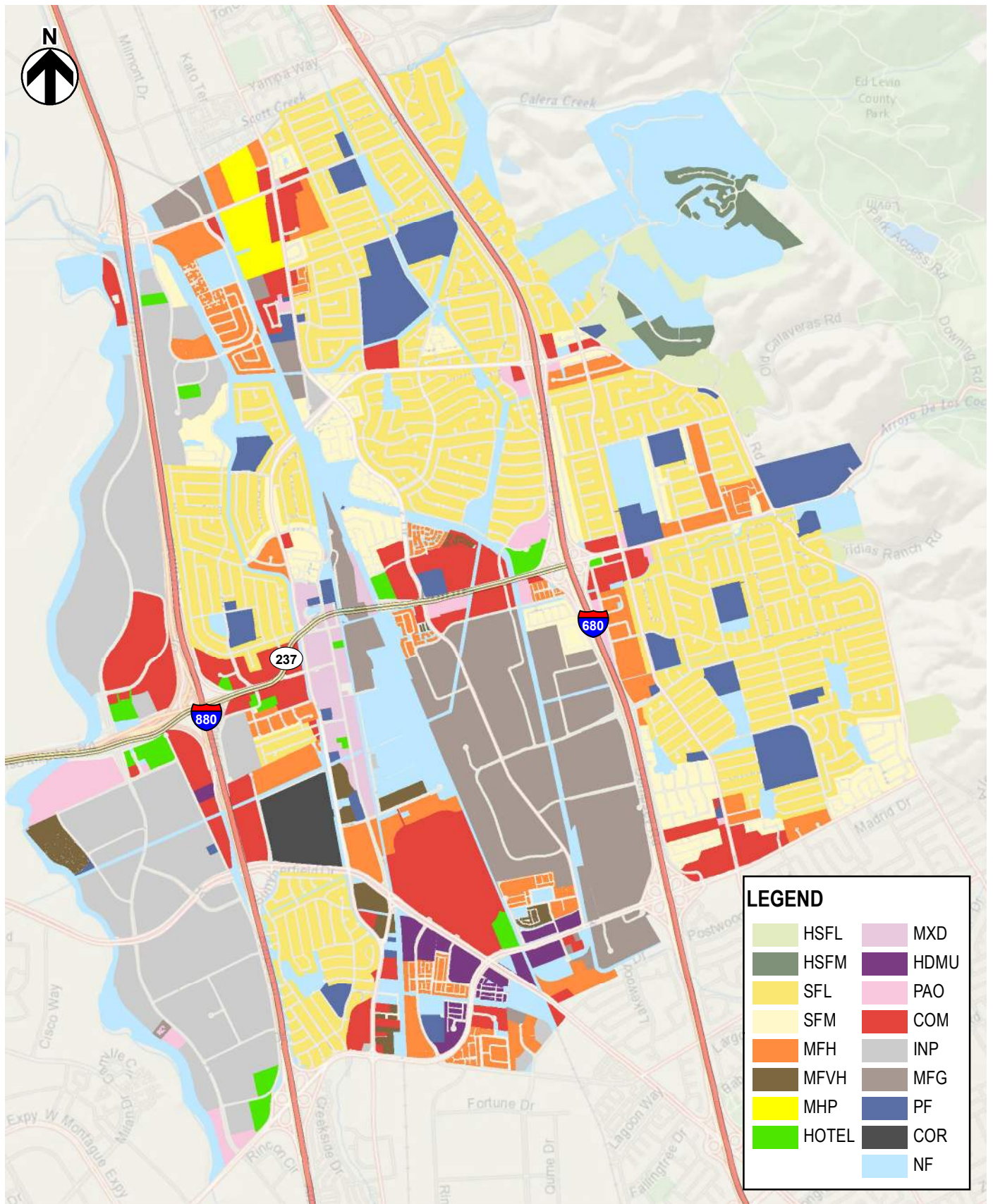


FIGURE 5-1
CITY OF MILPITAS
SEWER MASTER PLAN
MODEL-BASED LAND USE DESIGNATIONS - EXISTING

5.2 Land Use Designations for Model Analysis – Future Condition

The City has identified “Opportunity Areas” (see **Section 2.1.1**) which refers to parcels identified within the City that may be considered for future redevelopment (see **Figure 2-2**). For modeling and planning purposes, it is important to understand the potential impact redevelopment can have on the wastewater collection system. Not all “Opportunity Areas” had proposed changes in land use.

Similar to the existing condition described in **Section 5.1**, the objective is to assign the model-based land use designation to the parcel according to the type of redeveloped land uses planned/anticipated within the “Opportunity Areas”. The future land uses identified in the “Opportunity Areas” were reviewed and assigned the model-based land use designations listed in **Table 5-1** according to the anticipated use, density, and wastewater flow rates.

Table 5-2 summarizes the changes in land uses from the existing condition within “Opportunity Areas” that are proposed for redevelopment. The table identifies the redeveloped future land use, the assigned model-based land use designation, and the corresponding area. Areas listed represent the acreage within each opportunity area that is changing and does not include areas within “Opportunity Areas” where land use remains the same. **Figure 5-2** displays the identified “Opportunity Areas” where land use has changed, and the corresponding model-based land use designation within those areas.

Table 5-2: Summary of Future Land Use Updates

| “Opportunity Areas” | Proposed Future LU | Model-Based LU | Area (acres) |
|---|--------------------|----------------|--------------|
| Sunny Hills Neighborhood/Commercial Center | NCMU | HDMU | 19.9 |
| California Circle | NCMU | HDMU | 54.1 |
| | HDR | MFH | 18.3 |
| Landess Neighborhood/Commercial Center | NCMU | HDMU | 38.0 |
| Calaveras & North Park Neighborhood/Commercial Center | NCMU | HDMU | 28.3 |
| Milpitas Town Center | HDR | MFH | 38.1 |
| Southwestern Employment Area | BPR&D | PAO | 488.3 |
| Jacklin & 680 Neighborhood/Commercial Center East | NC | COM | 8.0 |
| Jacklin & 680 Neighborhood/Commercial Center West | NC | COM | 6.4 |
| Jacklin Neighborhood/Commercial Center | NC | COM | 9.8 |
| Midtown Specific Plan | Various | Various | 484.3 |
| Metro Specific Plan (aka TASP) | HDR | MFH | 212.5 |
| | NC | COM | 85.4 |

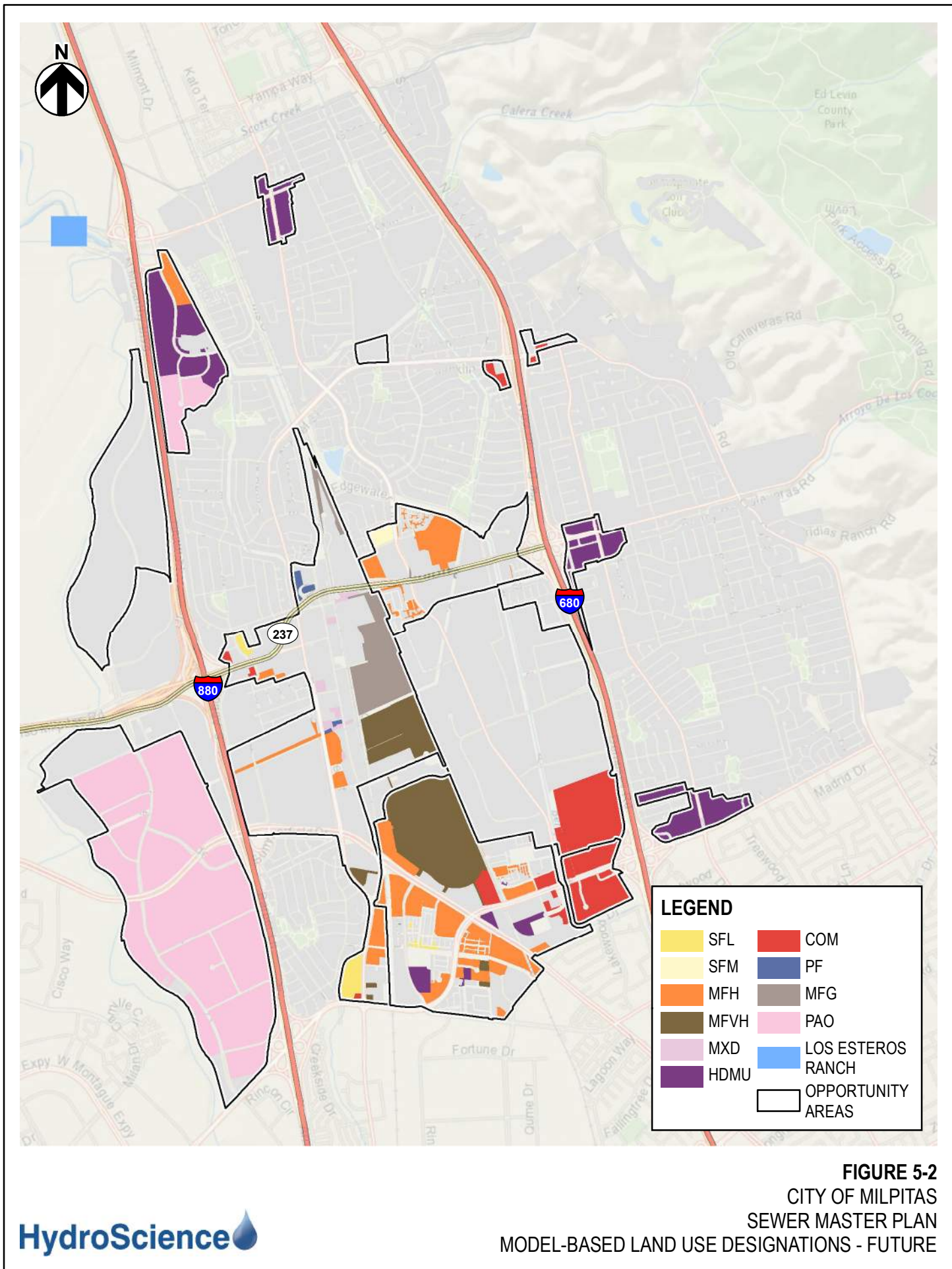


FIGURE 5-2
 CITY OF MILPITAS
 SEWER MASTER PLAN
 MODEL-BASED LAND USE DESIGNATIONS - FUTURE

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SECTION 6 – HYDRAULIC MODEL DEVELOPMENT

This section summarizes the history of the City's hydraulic model and describes the process of developing and building the most up-to-date version of the hydraulic model.

6.1 Model System Development

The City's original hydraulic model was built using SANSYS as part of the 1994 master planning effort. As part of the 2002 master planning effort, the hydraulic model was converted to Hydra[®] software version 6.0 by Pizer, Inc. The Hydra[®] model was subsequently reviewed, updated, and calibrated as part of the 2004 and 2009 Master Plan Updates.

For this Master Plan, HydroScience recommended InfoWorks ICM by Innovyze[®] (InfoWorks) to model the City's collection system because it is a fully dynamic software that uses the full set of St. Venant equations to model and evaluate complicated hydraulic systems. This recommendation was based on the knowledge that the City's collection system includes 177 flow splits, which significantly increases the complexity of the system and model.

As part of the model build, a review and update of the City's GIS was conducted using an extensive database of record drawings. A summary of the updates made to the GIS is included in **Appendix C**.

The updated GIS sewer system consists of 160 miles of gravity sewer main comprised of approximately 3,500 pipe segments and 3,000 manholes. For model development, the network was pared down to approximately 2,600 pipe segments and 2,400 manholes. All pipes 8-inches and larger were included, as well as all smaller pipes that included flow splits as they can affect the direction and quantity of flow downstream. The purpose of trimming the system is to reduce complexity of the system while maintaining all critical infrastructure. Smaller diameter pipes are generally less critical to the system operation. Including all pipe segments increases the complexity of the model but does not necessarily increase the value of the model and its analysis.

6.1.1 Model Network Development

The first step in developing the model network was to identify all pipelines for inclusion in the model. Using GIS, the pipe database was queried to select all pipes 8-inches and larger. To ensure the accuracy of flow representation, smaller pipelines downstream of flow splits were hand-selected where those flow splits would affect the direction and volume of downstream flow. Where there were unselected pipe segments between selected pipes, presenting potential gaps, those pipes were also hand selected for inclusion in the model to ensure network continuity. Pipes that had a listed diameter of "0" inch or an unknown diameter were the most common reason for unselected pipe segments.

The second step in developing the model network was to identify all manholes for inclusion in the model. Using GIS, all manholes that coincided with the selected pipelines were also selected. There were some instances where there was no manhole at the end of a terminal pipe segment

or at the junction between two pipe segments. These instances were most commonly one of the following two conditions:

1. Where a terminal pipe segment has a cleanout or flushing invert at its upstream end that was not represented in GIS; or
2. Where two pipe segments were built at different times and were directly connected without a manhole at the junction.

To remedy this, manhole placeholders were inserted at these locations for inclusion in the model network to prevent errors during the import into InfoWorks. These placeholders were given unique identification numbers to differentiate them from existing manholes.

The Venus Way LS was also included in the model network and the Main LS was modeled as the outfall. **Figure 6-1** shows the final model network that was imported into InfoWorks.

Approximately 63% of the manholes did not have rim elevations documented in the GIS. To reconcile this data gap, regional digital elevation model (DEM) data was downloaded from the USGS web database to obtain surface elevations at each manhole. Two separate DEM files were needed for coverage of the entire modeled collection system. The DEM resolution for most of the collection system (over 99% of manholes) was 1/9 arc-second (approximately 10 feet). For the remaining (~25) manholes, rim elevations were supplemented by a 1/3 arc-second (approximately 30 feet) resolution DEM. **Figure 6-2** shows the coverage for the 1/9 arc-second DEM data set.

DEM surface elevations were given in reference to the North American Vertical Datum of 1988 (NAVD 88). Most of the data in the City's existing GIS is based on the National Geodetic Vertical Datum of 1929 (NGVD 29) due to the age of the system. For consistency, NGVD 29 was established as the reference datum in the hydraulic model. To adjust from NAVD 88 to NGVD 29, the following conversion, referenced from City record drawing #2-1228, was applied:

$$\text{NGVD 29} = \text{NAVD 88} - 2.743 \text{ ft}$$

This equation is a simplified representation of conversion between the two datums but is generally representative within the bounds of the City. Small differences are not expected to affect the hydraulic model results as the relative elevation differences that affect inverts and slopes would be unchanged.

Generally, rim elevations contained in the GIS were used and supplemented by DEM where no rim elevation was documented. Existing rim elevations were compared to DEM elevations for confirmation. The average discrepancy between those listed in GIS and those calculated using the DEM data was approximately 0.8 ft. The cases that had the largest discrepancies were reviewed against record drawings and adjusted, as necessary.

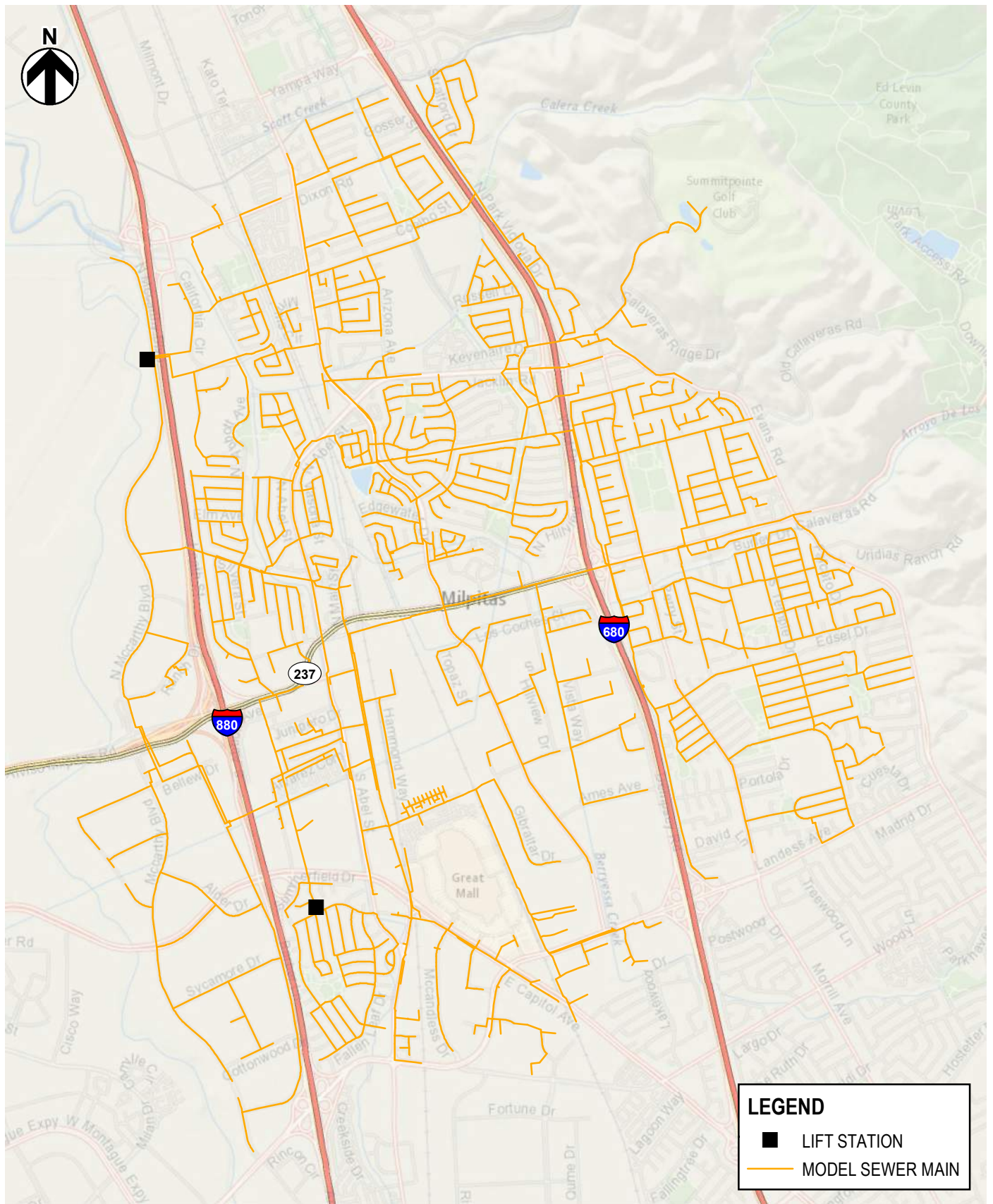


FIGURE 6-1
CITY OF MILPITAS
SEWER MASTER PLAN
MODEL NETWORK

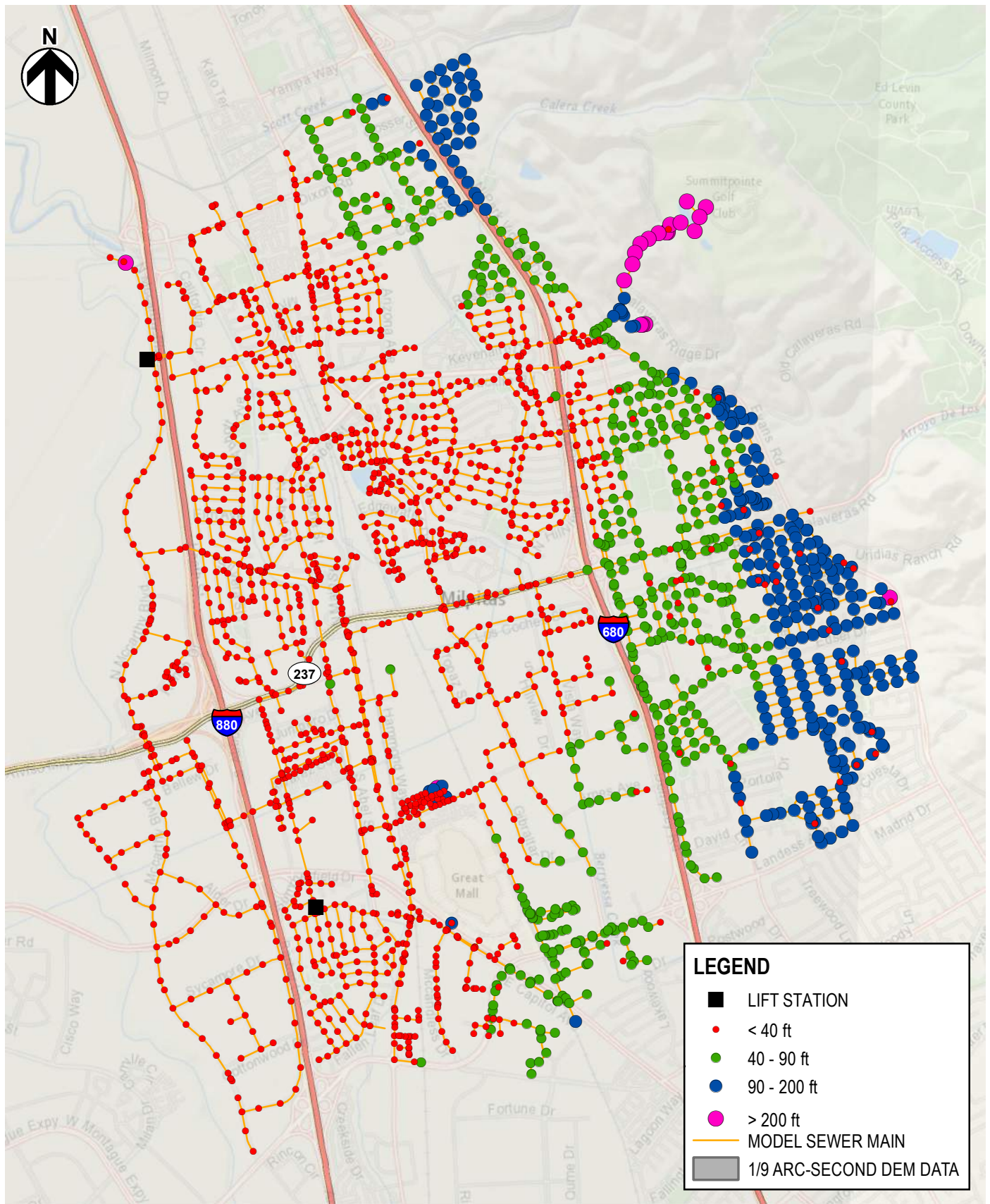


FIGURE 6-2
 CITY OF MILPITAS
 SEWER MASTER PLAN
 MANHOLE RIM ELEVATIONS

Figure 6-3: InfoWorks Profile View



Network Review

Selected elements were imported into InfoWorks to build the hydraulic model. It is noted that the element selection and import process was iterative as errors in network continuity were identified and resolved. Upon import, InfoWorks will detect any errors when validating the network. Most validation errors encountered were related to network discontinuity and elements with missing data. Where possible, missing data, such as invert elevations or pipe diameters, were interpolated using surrounding data and the *Inference Tool* in InfoWorks.

Once all validation errors were reconciled, the system was analyzed using the pipeline *Profile View* (see **Figure 6-3**). If additional analysis was required, record drawings or CCTV were reviewed, where available. Significant adjustments were made based on differing datums referenced in the record drawings. Each update to the model data was marked with a data flag and different flags were created to represent the varying reasons for the updates. **Figure 6-4** shows the various data flags that were developed and used during the model network review process.

6.1.2 Load Allocation

Parcel loads were initially assigned to the nearest manhole. Quality control was performed alongside the map of the sub-basins to verify that the load allocations matched the actual flow path; adjustments were made as necessary. **Figure 6-5** is a sample showing the load allocation from the parcel centroid to the corresponding receiving manhole.

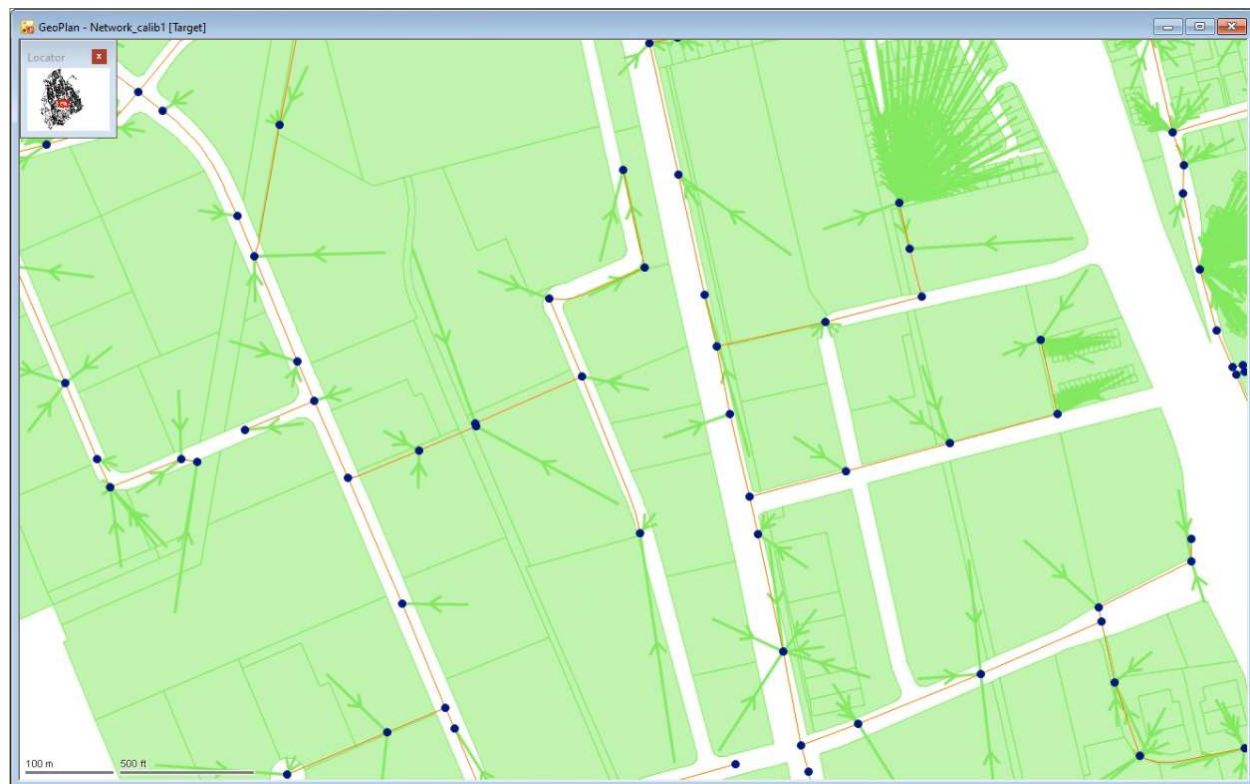
Figure 6-4: InfoWorks Data Flags

| Name | Display Colour | Obsolete | Description |
|------|----------------|--------------------------|--------------------------------------|
| #A | | <input type="checkbox"/> | Asset Data |
| #D | | <input type="checkbox"/> | System Default |
| #G | | <input type="checkbox"/> | Data From GeoPlan |
| #I | | <input type="checkbox"/> | Model Import |
| #S | | <input type="checkbox"/> | System Calculated |
| #V | | <input type="checkbox"/> | CSV Import |
| CCTV | | <input type="checkbox"/> | Estimated from CCTV footage |
| DEM | | <input type="checkbox"/> | DEM elevation source |
| DTM | | <input type="checkbox"/> | Datum adjustment |
| DWG | | <input type="checkbox"/> | Drawing elevation source |
| INT | | <input type="checkbox"/> | Interpolated elevation |
| NRBY | | <input type="checkbox"/> | Rim based on near-by rims |
| RLV | | <input type="checkbox"/> | Relative adjustment based on drawing |
| SIPH | | <input type="checkbox"/> | Siphon |
| SLP | | <input type="checkbox"/> | Calculated from slope |
| UPD | | <input type="checkbox"/> | Updated during calibration |

Notes:

1. Descriptions that are highlighted gray are system defaults.

Figure 6-5: Sample Load Allocation



6.2 Scenario Development

InfoWorks can create many different scenarios within the same model. The following scenarios were developed and analyzed:

1. **Existing Dry Weather:** Used to calibrate the hydraulic model to dry weather conditions and to evaluate hydraulic deficiencies under existing dry weather conditions. Two alternatives were evaluated under this scenario:
 - With obstructions: includes adjustments made to account for flow obstructions as described in **Section 7.3.4**. This scenario was used for dry weather calibration.
 - Design conditions: inverts at flow splits with obstructions returned to the elevations they are designed to operate at. This scenario assumes the flow obstructions have been removed/cleaned and the flow splits are operating as intended. This scenario was used to evaluate hydraulic deficiencies under existing dry weather conditions.
2. **Existing Wet Weather:** Used for calibration of wet weather conditions. This scenario accounts for an elevated water table and R-factors to model wet weather conditions and to evaluate hydraulic deficiencies under existing wet weather conditions. Two alternatives were evaluated under this scenario:
 - With obstructions: includes adjustments made to account for flow obstructions as described in **Section 7.3.4**. This scenario was used for wet weather calibration.
 - Design conditions: inverts at flow splits with obstructions returned to the elevations they are designed to operate at. This scenario assumes the flow obstructions have been removed/cleaned and the flow splits are operating as intended. This scenario was used to evaluate hydraulic deficiencies under existing wet weather conditions.
3. **Future Dry Weather:** Land use categories updated based on future planned land use changes in “Opportunity Areas” (see **Sections 2.1.1** and **5.2**) and dry weather GWI included. This scenario was used to evaluate hydraulic deficiencies under future dry weather conditions assuming flow obstructions are addressed and no longer present.
4. **Future Wet Weather:** Land use categories updated based on future planned land use changes in “Opportunity Areas” and GWI adjusted to match wet weather calibration. This scenario was used to evaluate hydraulic deficiencies under future design storm/wet weather conditions assuming flow obstructions are addressed and no longer present.

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SECTION 7 – WASTEWATER FLOW ANALYSIS

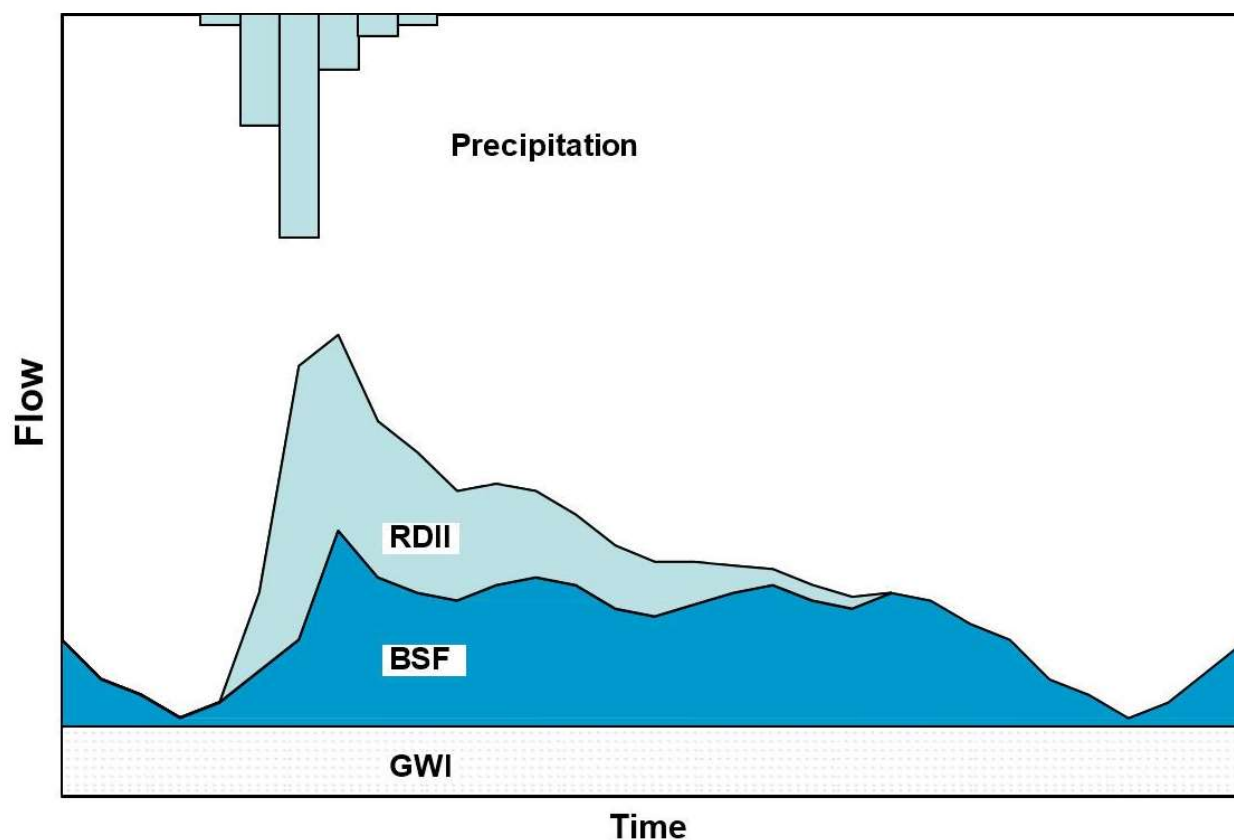
For this study, the flow monitoring data collected by the City was used for model calibration. This section summarizes typical wastewater flow components, summarizes the City's flow monitoring program, describes the basis for developing design wastewater flows used to model the City's collection system, and presents the results of the model calibration.

7.1 Typical Wastewater Flow Components

Wastewater flows consist of three primary flow components: groundwater infiltration (GWI), base sanitary flow (BSF), and rainfall dependent inflow and infiltration (RDI/I) as illustrated in **Figure 7-1**.

- **GWI** – For modeling purposes, this document defines GWI as any, and all sources of constant flow. GWI is comprised both of groundwater infiltration and any other constant flow that is generally detected during low flow periods. Constant flows can be associated with leaking faucets, running toilets, and/or manufacturing or industrial processes, etc. This can also capture any meter reading variance at extremely low flows. GWI is seasonal where dry

Figure 7-1: Typical Wastewater Flow Components



Source: Rainfall Dependent Inflow and Infiltration from the EPA SWMM 5 Hydrology Manual

weather GWI (summer) is typically less than wet weather GWI (winter) due to the elevated water table that occurs during the rainy season.

- **BSF** – This represents the direct diurnal flow contributions from customers. This is represented by a combination of unit flows and diurnal patterns, which is further detailed in **Section 7.3** below.
- **RDI/I** – This is the volume of rainfall that enters the wastewater collection system through various avenues (holes in manhole covers, elevated water table, etc.).

To understand hydraulic capacity of a wastewater collection system, both dry weather flow (DWF) and wet weather flow (WWF) conditions are evaluated. DWF includes both dry weather GWI and BSF while WWF includes wet weather GWI, BSF, and RDI/I.

The flow monitoring and rainfall data collected by the City was evaluated for each of the components, and this process is described in the following sections.

7.2 Flow Monitoring Program

The City contracted with ADS Environmental Services (ADS) to perform dry and wet weather flow monitoring within the City collection system. ADS installed 23 ADS FlowShark Triton flow meters throughout the City and monitored flow between November 16, 2019 and March 9, 2020. This type of meter is a velocity flow meter installed in collection system manholes to measure both depth and velocity at either a 5- or 15-minute intervals for the duration of the flow monitoring period. Depth, velocity, and flow (calculated using the Continuity Equation) were presented in the *Milpitas Sewer Flow Monitoring Report 2019-2020* (ADS Report) in the form of daily averages, and additional data was provided separately in the form of hourly averages. The ADS Report is included as **Appendix B**.

Rain gauges were also installed in two distinct locations for the duration of the monitoring period – one was placed on the valley floor at the Gibraltar Reservoir (RG01) and the other was placed on the hillside near the Summitpointe Golf Club (RG02). Depth of precipitation was presented in the ADS Report in the form of hourly averages to the nearest hundredth of an inch. The raw data was recorded in 5-minute increments to the nearest hundredth of an inch.

The locations of all flow meters and rain gauges are shown in **Figure 7-2**. Flow meters are identified according to the GID of the manhole in which they were installed.

Table 7-1 summarizes the recorded depths, velocities, and flows for each flow meter.

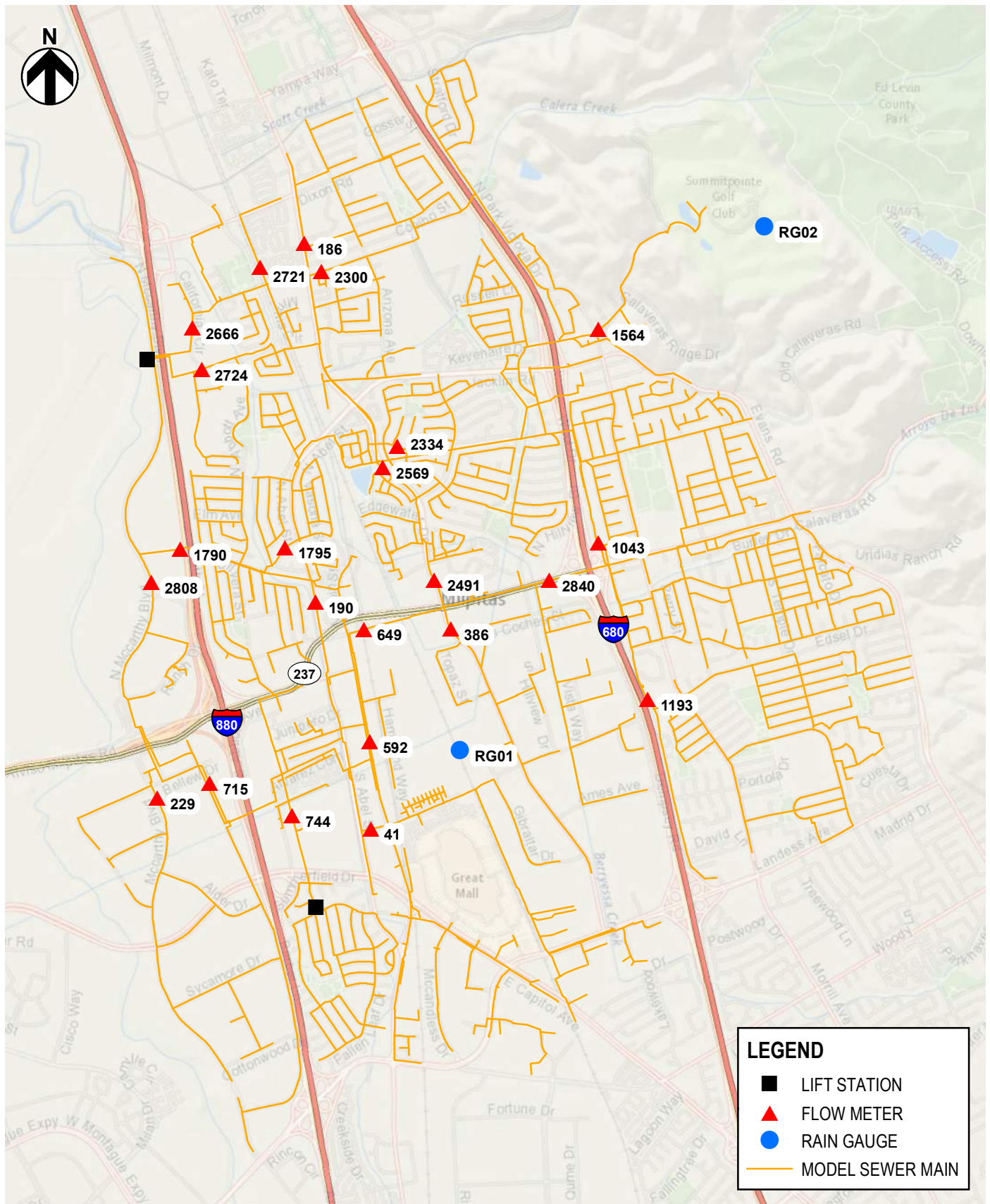


FIGURE 7-2
CITY OF MILPITAS
SEWER MASTER PLAN
FLOW MONITORS AND RAIN GAUGES

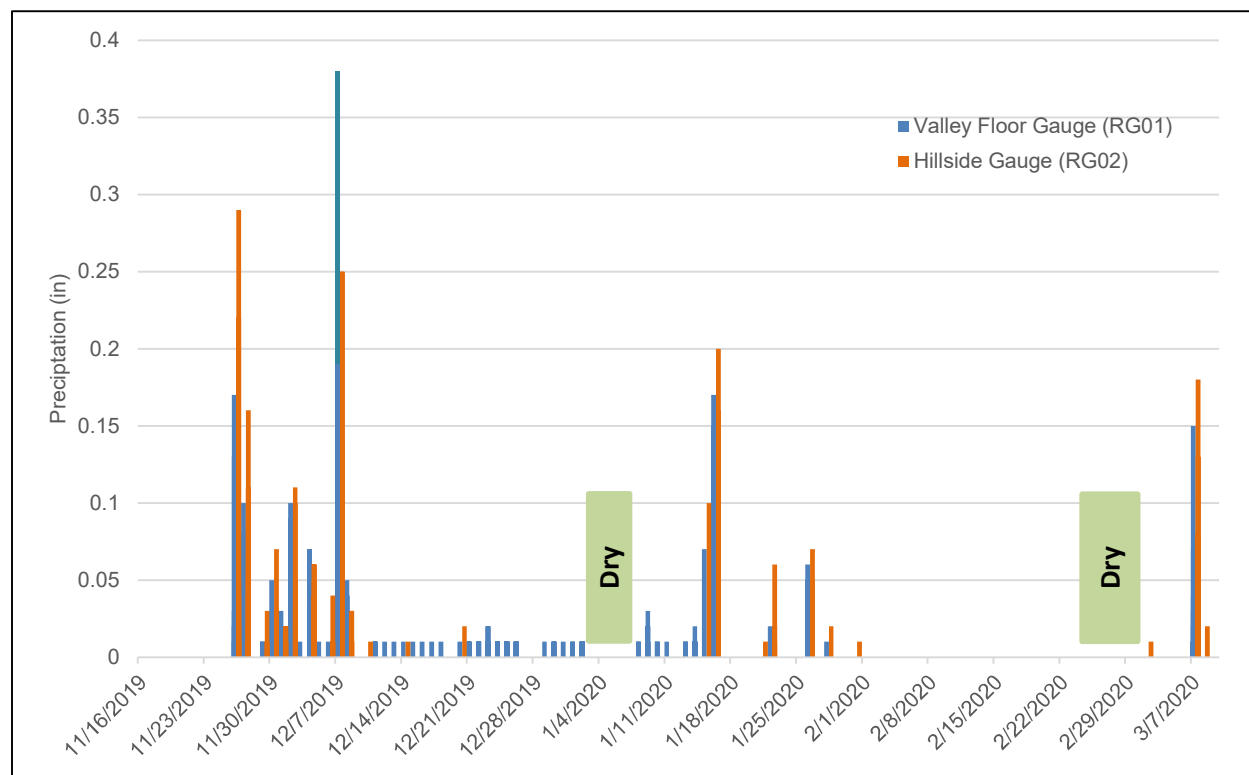
Table 7-1: Flow Monitoring Data Summary

| Flow Meter | Nominal Pipe Dia. (in) ¹ | Depth (in) ² | | | Velocity (ft/s) ² | | | Flow (MGD) ² | | |
|-------------------|-------------------------------------|-------------------------|---------|---------|------------------------------|---------|---------|-------------------------|---------|---------|
| | | Average | Minimum | Maximum | Average | Minimum | Maximum | Average | Minimum | Maximum |
| 41 | 24 | 6.515 | 4.000 | 9.340 | 1.543 | 0.780 | 2.060 | 0.708 | 0.189 | 1.310 |
| 186 | 8 | 1.540 | 0.780 | 2.060 | 1.540 | 0.780 | 2.060 | 1.540 | 0.780 | 2.060 |
| 190 | 18 | 2.465 | 1.820 | 3.200 | 0.959 | 0.500 | 1.320 | 0.093 | 0.031 | 0.160 |
| 226 | 21 | 3.466 | 1.810 | 5.100 | 0.591 | 0.240 | 0.840 | 0.103 | 0.021 | 0.232 |
| 386 | 16 | 6.427 | 5.190 | 9.000 | 1.375 | 1.060 | 1.880 | 0.511 | 0.291 | 1.071 |
| 592 ³ | 18 | 3.682 | 1.280 | 5.620 | 1.534 | 0.430 | 2.130 | 0.276 | 0.016 | 0.644 |
| 649 | 21 | 8.655 | 6.660 | 11.190 | 1.236 | 0.860 | 1.600 | 0.776 | 0.406 | 1.361 |
| 715 | 30 | 0.959 | 0.500 | 1.320 | 0.959 | 0.500 | 1.320 | 0.959 | 0.500 | 1.320 |
| 744 | 15 | 0.094 | 0.032 | 0.160 | 0.094 | 0.032 | 0.160 | 0.094 | 0.032 | 0.160 |
| 1043 | 21 | 5.252 | 3.420 | 7.270 | 3.999 | 2.220 | 4.800 | 1.263 | 0.378 | 2.277 |
| 1193 | 21 | 0.590 | 0.240 | 0.840 | 0.590 | 0.240 | 0.840 | 0.590 | 0.240 | 0.840 |
| 1564 | 8 | 0.590 | 0.240 | 0.840 | 0.590 | 0.240 | 0.840 | 0.590 | 0.240 | 0.840 |
| 1790 | 30 | 0.590 | 0.240 | 0.840 | 0.590 | 0.240 | 0.840 | 0.590 | 0.240 | 0.840 |
| 1795 | 27 | 9.483 | 6.360 | 12.140 | 0.399 | 0.220 | 0.510 | 0.300 | 0.091 | 0.460 |
| 2300 | 10 | 1.647 | 1.020 | 2.350 | 1.402 | 0.450 | 2.690 | 0.056 | 0.009 | 0.154 |
| 2334 | 12 | 2.123 | 1.620 | 2.580 | 2.770 | 1.460 | 3.460 | 0.175 | 0.063 | 0.263 |
| 2491 | 15 | 2.345 | 1.110 | 3.850 | 2.356 | 0.510 | 3.700 | 0.216 | 0.014 | 0.592 |
| 2569 | 21 | 6.434 | 4.390 | 8.470 | 1.051 | 0.540 | 1.600 | 0.441 | 0.148 | 0.828 |
| 2666 | 18 | 8.746 | 5.850 | 20.960 | 1.741 | 0.880 | 2.160 | 0.949 | 0.385 | 1.371 |
| 2721 | 8 | 6.229 | 3.950 | 7.900 | 1.053 | 0.590 | 1.420 | 0.198 | 0.091 | 0.312 |
| 2724 | 42 | 18.342 | 13.520 | 22.120 | 0.779 | 0.510 | 1.000 | 2.041 | 0.876 | 3.205 |
| 2808 | 36 | 8.737 | 5.860 | 11.120 | 2.257 | 1.320 | 2.920 | 2.007 | 0.643 | 3.438 |
| 2840 ⁴ | 15 | 1.995 | 1.810 | 2.250 | 1.384 | 1.080 | 1.660 | 0.087 | 0.060 | 0.120 |

Notes:

1. Pipe diameter listed in GIS. ADS measured internal pipe diameters in the field which are recorded in the ADS Report. Nominal pipe diameters listed in GIS were used in the hydraulic model.
2. These values are calculated using hourly averages. These may differ slightly from the ADS Report since those values are based on all field data collected.
3. Initially identified as FM 602 in the ADS Report, was placed further downstream in manhole GID 592.
4. FM 2840 was directly downstream of a flow diversion structure which diverts wastewater flows away from the flow meter, resulting in extremely low recorded flows at this site.

Figure 7-3: Rainfall during Monitoring Period



Rainfall measured by both rain gauges for the duration of the monitoring period is shown in **Figure 7-3**. The flow monitoring program was designed to capture both WWF and DWF, thus, the flow meters and rain gauges provided the data necessary to estimate both dry weather and wet weather GWI and RDI/I.

The following dry weather and wet weather periods, as shown on **Figure 7-3**, were identified and used for the model calibration and analysis. Dry weather period 1 and Storm event 1 were used primarily, unless there was insufficient data for the flow meter, then Dry weather period 2 or Storm event 2 was used:

- Dry weather period 1: February 24 – March 3, 2020
- Dry weather period 2: January 4 – 8, 2020
- Storm event 1: December 7, 2019
- Storm event 2: November 26, 2019

The maximum rainfall from either of these days are listed in **Table 7-2**, along with the National Oceanic and Atmospheric Administration (NOAA) precipitation frequency estimates for Milpitas, CA. The largest storms were between a 1- and 2-year storm or smaller than a 1-year storm frequency.

Table 7-2: NOAA Rainfall Frequency vs. Rain Gauge Data

| NOAA Frequency Estimates ¹ | | | | | Rain Gauge Data ² | |
|---------------------------------------|--------|--------|--------|---------|------------------------------|------|
| Duration | 1-year | 2-year | 5-year | 10-year | RG01 | RG02 |
| 1-hr: | 0.34 | 0.43 | 0.56 | 0.66 | 0.38 | 0.29 |
| 2-hr: | 0.50 | 0.63 | 0.80 | 0.95 | 0.57 | 0.51 |
| 6-hr: | 0.85 | 1.06 | 1.36 | 1.62 | 0.64 | 0.76 |
| 12-hr: | 1.10 | 1.40 | 1.82 | 2.18 | 0.66 | 0.92 |
| 24-hr: | 1.37 | 1.79 | 2.36 | 2.83 | 0.95 | 1.30 |

Notes:

1. NOAA Atlas 14 Volume 6 Version 2 precipitation frequency estimates for Milpitas, CA
2. Maximum Rain by Rain Gauge (Total Inches by Duration)

7.2.1 Flow Meter Sewer Sub-Basins

The flow meters served as the basis for the delineation of tributary sewer sub-basins in the City for calibration purposes. Generally, for sub-basins located at the most upstream ends of the collection system, all flow from the sub-basin is captured by a single flow meter which in turn flows to downstream sub-basins. Where there are flow splits, flow can be directed to more than one downstream sub-basin so it is important to understand the flow behavior at each flow split in order to properly delineate sub-basin boundaries.

The identification of all flow splits (see **Section 3.1.1**) was imperative to track the flow through the system. They were each reviewed and identified as either a “non-critical” or “critical” flow split, as follows:

- **Non-Critical Flow Split:** In these cases, the flow is split then returns to the same sub-basin or flow path before it reaches the downstream flow meter. These flows splits and flow are fully contained within a single subbasin.
- **Critical Flow Split:** These are flow splits that divert flow to two different downstream sub-basins (or flow meters). All critical flow splits were evaluated using the City’s most current GIS geodatabase and the City’s extensive library of as-built record drawings.

There are 177 identified flow splits, of which five are considered critical, as shown in **Figure 7-4**. For critical flow splits, the ratio of flow was estimated based on the slopes and diameters of the outgoing pipes.

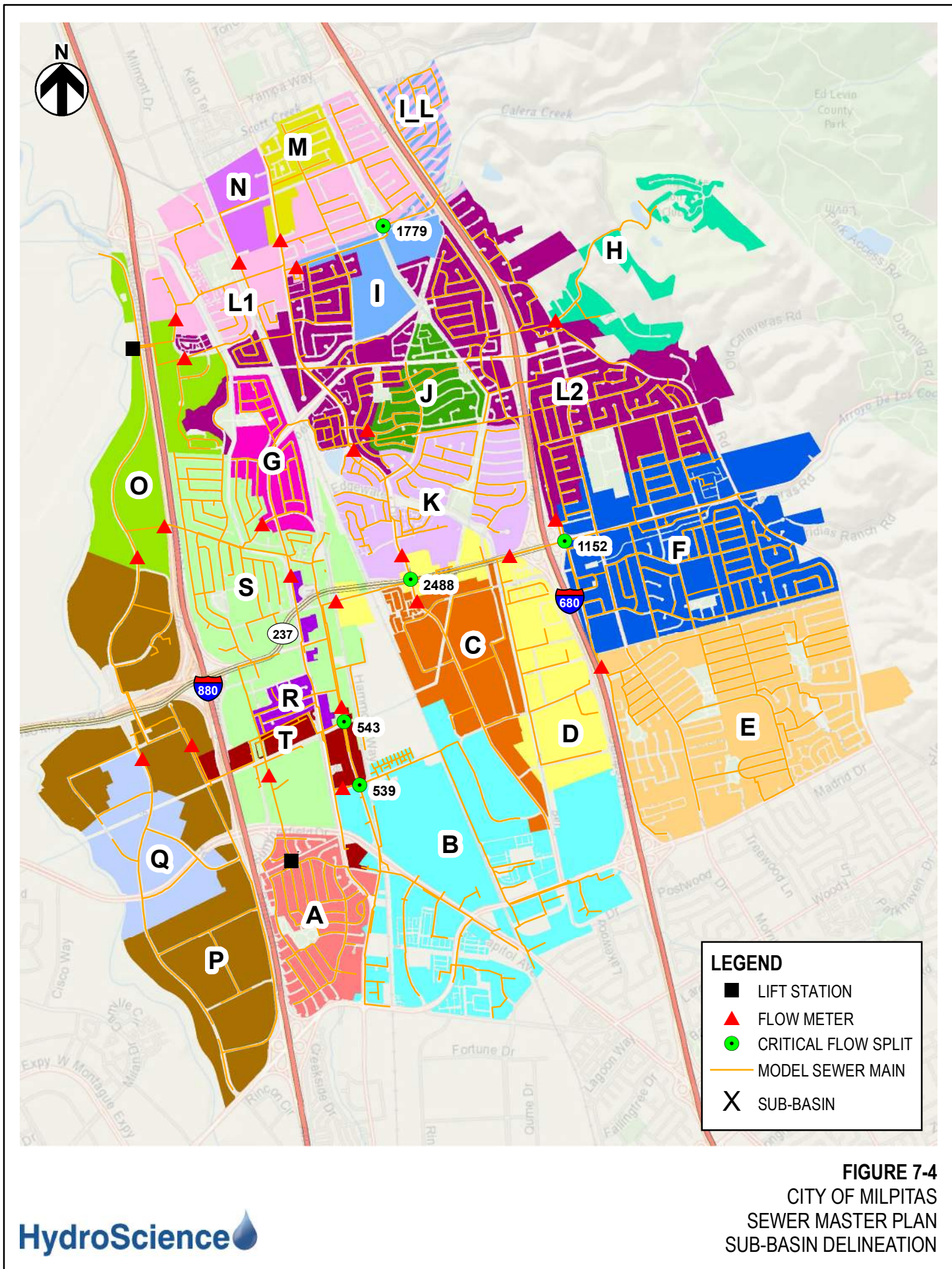


FIGURE 7-4
CITY OF MILPITAS
SEWER MASTER PLAN
SUB-BASIN DELINEATION

The results of the sub-basin delineation are displayed on **Figure 7-4**. The flow meters immediately upstream of each sub-basin and those that are capturing the flow of each sub-basin are listed in **Table 7-3**. **Figure 7-5** is a diagram summarizing flow through the sub-basins and the flow meters in the entire system, including all critical flow splits.

Table 7-3: Sub-Basins and Corresponding Flow Meters

| Sub-Basin | Upstream Flow Meters | Capturing Flow Meters |
|-----------------|--------------------------------|-----------------------|
| A | N/A | 744 |
| B ¹ | N/A | 41 |
| C | N/A | 386 |
| D | 386 & 2840 | 649 & 2491 |
| E | N/A | 1193 |
| F | 1193 | 1043 & 2840 |
| G | N/A | 1795 |
| H | N/A | 1564 |
| I ² | N/A | 2300 |
| J | N/A | 2334 |
| K | 2491 | 2569 |
| L1 ² | 186, 2721 | 2666 |
| L2 | 1043, 1564, 2300, 2334, & 2569 | 2724 |
| M | N/A | 186 |
| N | N/A | 2721 |
| O | 1790, 2666, 2724, & 2808 | OUTFALL |
| P | 229 & 715 | 2808 |
| Q | N/A | 229 |
| R | N/A | 190 |
| S | 190, 592, 649, 744, & 1795 | 1790 |
| T | 41 | 592 & 715 |

Notes:

1. Flow from sub-basin B splits at MH 539. FM 41 captures a portion of the flow from sub-basin B and the remainder continues downstream to sub-basin T.
2. Flow from parcels upstream of MH 1776 splits and flows to sub-basins I and L1 downstream.

A summary of the various contributing land uses within each sub-basin is shown in **Table 7-4**. The area of each parcel was calculated using the geometry calculator tool in GIS.

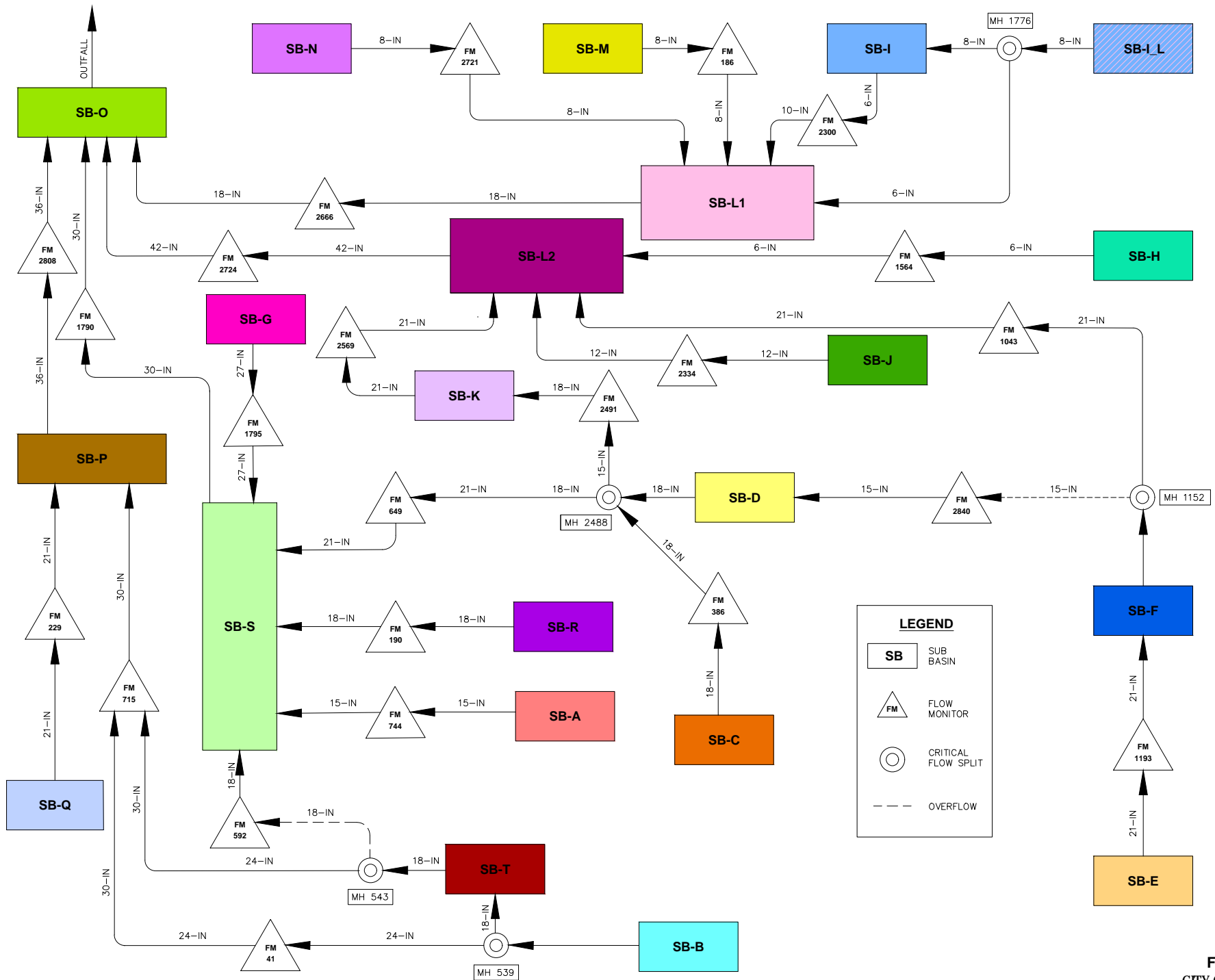


FIGURE 7-5
CITY OF MILPITAS
SEWER MASTER PLAN
SCHEMATIC FLOW DIAGRAM

Table 7-4: Total Acreage of Each Land Use by Sub-Basin

| LU Code | A | B ¹ | C | D | E | F | G | H | I ² | J | K | L1 ² | L2 | M | N | O | P | Q | R | S | T ¹ | Total |
|------------------------|------------|----------------|------------|------------|-------------|-------------|-----------|------------|----------------|-----------|------------|-----------------|-------------|-----------|-----------|------------|------------|------------|-----------|------------|----------------|---------------|
| HSFL (DU) ³ | - | - | - | - | 22 (17) | 9 (4) | - | 39 (8) | 3 (3) | - | - | 2 (2) | 71 (22) | - | - | - | - | - | - | - | - | 146 (56) |
| HSFM (DU) ³ | - | - | - | - | - | - | - | 67 (107) | - | - | - | - | - | - | - | - | - | - | - | - | - | 67 (107) |
| SFL (DU) ³ | 115 (982) | - | - | - | 227 (1,586) | 228 (1,500) | 50 (331) | 4 (9) | 42 (208) | 72 (490) | 86 (571) | 108 (716) | 320 (2,028) | 32 (229) | - | - | - | - | 12 (101) | 131 (868) | - | 1,427 (9,619) |
| SFM | - | - | - | 17 | 87 | 8 | 13 | - | - | 7 | 32 | 11 | 67 | 6 | - | 7 | - | - | 1 | 10 | - | 266 |
| MFH | - | 93 | 8 | 3 | 25 | 52 | 1 | - | - | - | 6 | 57 | 46 | - | 12 | - | - | - | 7 | 15 | 48 | 373 |
| MFVH | 3 | 20 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | - | - | 19 | 2 | - | - | 27 | 72 |
| MHP | - | - | - | - | - | - | - | - | - | - | - | 13 | - | - | 39 | - | - | - | - | - | - | 52 |
| HOTEL | - | 5 | - | - | - | 1 | - | - | - | - | 14 | 3 | - | - | - | 3 | 28 | - | - | 7 | 2 | 62 |
| MXD | - | - | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - | - | - | 12 | 45 | 10 | 67 |
| HDMU | - | 46 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 18 | 64 |
| PAO | - | - | - | 10 | 1 | 6 | - | - | - | - | 9 | 2 | 6 | - | - | - | 54 | - | - | - | - | 87 |
| COM | 13 | 108 | 12 | 17 | 39 | 21 | 2 | - | - | - | 38 | 15 | 18 | 16 | 4 | 9 | 86 | - | 1 | 59 | 45 | 502 |
| INP | - | 5 | - | - | - | - | - | - | - | - | - | 21 | 5 | - | - | 188 | 347 | 148 | - | 22 | 2 | 738 |
| MFG | - | 150 | 171 | 154 | - | - | - | - | - | - | - | 24 | 12 | - | - | - | 2 | - | - | 25 | 50 | 588 |
| PF | 7 | 6 | - | 7 | 54 | 89 | 12 | - | 36 | - | <1 | 10 | 62 | 3 | - | - | 1 | 1 | 1 | 17 | 5 | 311 |
| COR | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 62 | - | 62 |
| Total | 138 | 432 | 192 | 210 | 454 | 414 | 78 | 110 | 81 | 79 | 187 | 266 | 606 | 57 | 55 | 207 | 537 | 151 | 34 | 393 | 207 | 4,889 |

Notes:

1. Flow from sub-basin B splits at MH 539. Areas are based on the estimate that 75% of flow from sub-basin B parcels flow to meter 41, and 25% flow from these parcels downstream to sub-basin T.
2. Areas are based on the estimate that 60% of parcels upstream of flow split at MH 1776 flows to sub-basin I, and 40% flows to sub-basin L1.
3. HSFL, HSFM, and SFL are analyzed based on number of dwelling units in UF factor analysis with the assumption that there is one dwelling unit per parcel.
4. The City encompasses 8,680 acres. The area contributing sanitary flows is 4,884 acres. Non-contributing areas include park, streets, railroads, waterways, and other open spaces. Only parcels contributing sanitary flows are included in this table.

7.3 Dry Weather Flow (DWF)

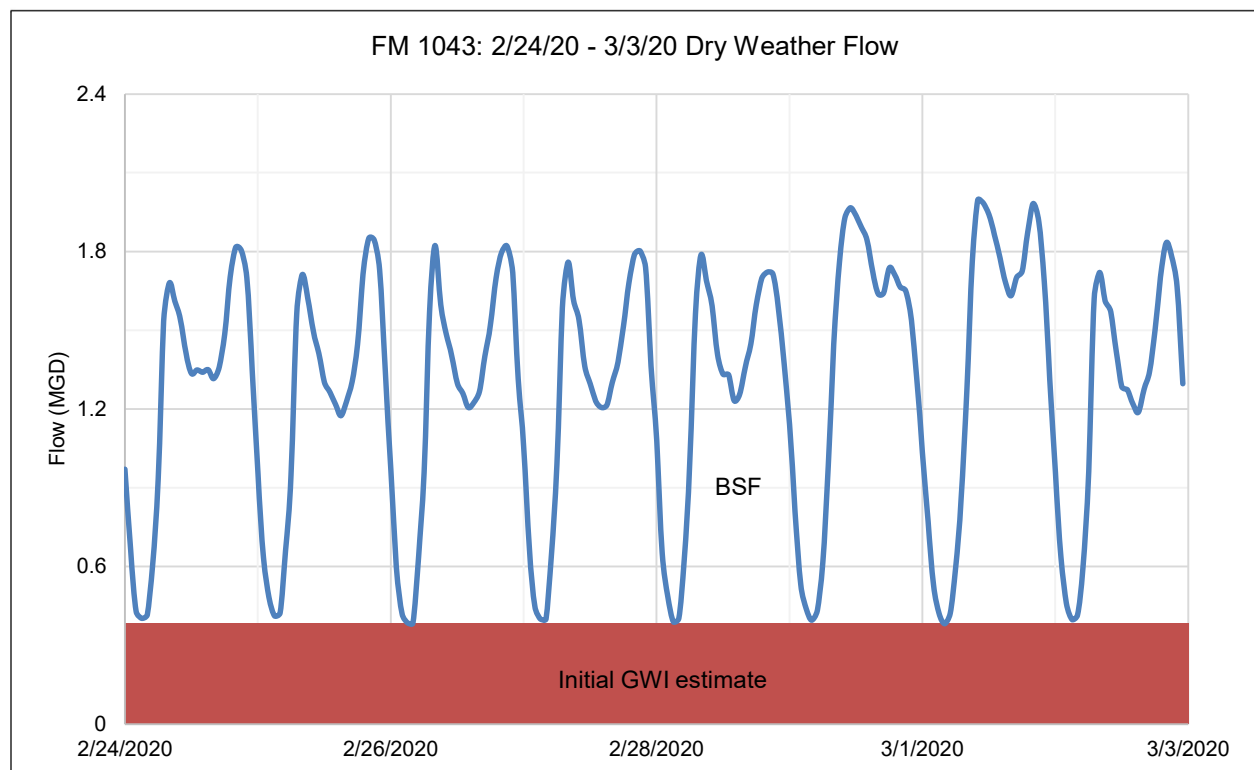
The dry weather periods were analyzed to establish dry weather GWI and BSF inclusive of the diurnal patterns for groups of land uses. The process for developing each of the components and the results are discussed below.

7.3.1 Dry Weather GWI

To isolate BSF, an estimate of GWI was developed. The daily minimum flow was calculated to serve as the initial basis for the GWI estimate. **Figure 7-6** presents an example of the DWF and corresponding estimated GWI for FM 1043. Once GWI estimates were developed for each flow meter, upstream contributing flow meters, outlined in **Table 7-3**, were subtracted to develop an estimate of dry weather GWI by sub-basin. Because GWI is not affected by human activity, and therefore should be the same for weekdays and weekend, there is only one value for GWI.

Using these initial values, a unique unit GWI (gpd/acre) was calculated for each sub-basin by dividing the total estimated GWI by the total contributing sub-basin acreage. This unit GWI was then applied to each parcel by multiplying the parcel area by the unit GWI for the respective sub-basin. These initial GWI estimates served as a starting point for model calibration and were further refined during the calibration using an iterative process, as described in **Section 7.3.4** below.

Figure 7-6: Dry Weather Flow



7.3.2 Base Sanitary Flow (BSF)

The GWI estimates developed for each sub-basin and estimated wastewater flows of identified large dischargers were subtracted from the total weekday DWF for the corresponding sub-basin. The remaining BSF was then used to estimate the UF factors for each land use category. These UF factors represent the average daily contribution to BSF by each parcel according to land use. The analysis was initiated in the most terminal/upstream sub-basins with the fewest land use types, and UF factors were iteratively adjusted until the calculated BSF matched the observed BSF at the corresponding flow meter. UF factors were calibrated to weekday flows; diurnal patterns were then adjusted to account for differences between weekday and weekend discharge patterns.

Large Dischargers

For this analysis, large dischargers are defined as those customers that discharge a disproportionately large volume of wastewater for the parcel size and use type. Large dischargers are typically treated as point sources for hydraulic modeling purposes. The City provided wintertime water use data for January thru March 2019 for non-single family residential, commercial, and industrial customers to estimate wastewater flows. It is preferable to use water data from the winter period to estimate wastewater flows as it is a closer representation of indoor water use, since less water is consumed for irrigation.

Wastewater flows were estimated at approximately 85% of winter water use. Estimated flows greater than 10,000 gpd were linked to a respective parcel, and a unit flow (gpd/acre) was calculated by dividing the total estimated wastewater flow by the total area of the contributing parcel(s). The gpd/acre for each flagged large discharger was compared to the respective land use based UF factor. Each flagged discharger was ultimately classified as a large discharger if the gpd/acre was at least twice the UF factor or more for its respective land use.

Table 7-5 lists the identified large dischargers and **Figure 7-7** shows the location of the associated parcels.

Table 7-5: Large Dischargers

| Rank | Location ¹ | Estimated Wastewater Flows (gpd) ¹ | Model-Based Land Use | Sub-Basin |
|-----------------|-----------------------|---|----------------------|-----------|
| 1 | Abel St. | 157,678 | COR | S |
| 2 | Hillview Dr | 148,562 | MFG | C |
| 3 | Ames Ave | 74,079 | MFG | D |
| 4 | Hillview Dr | 63,137 | MFG | C |
| 5 | Abel St | 49,821 | MFVH | T |
| 6 | Main St | 39,341 | MFH | B |
| 7 | Milmont Dr | 38,377 | MFH | L |
| 8 | Dixon Landing Rd | 35,426 | MFH | L |
| 9 ² | McCandless Dr | 32,594 | MFH | B |
| 10 ² | Poppylane Townhouses | 31,158 | MFH | F |
| 11 | Murphy Ranch Rd | 30,694 | MFVH | P |

| Rank | Location ¹ | Estimated Wastewater Flows (gpd) ¹ | Model-Based Land Use | Sub-Basin |
|-----------------|-----------------------|---|----------------------|-----------|
| 12 | Dixon Landing Rd | 30,134 | MHP | N |
| 13 | Main St | 28,747 | COM | B |
| 14 | Technology Dr | 27,964 | PAO | P |
| 15 | McCarthy Blvd | 26,312 | INP | P |
| 16 | Landess Ave | 24,423 | COM | E |
| 17 | Wilson Way | 23,433 | MHP | N |
| 18 | Milpitas Blvd | 23,142 | MFG | L |
| 19 | Milpitas Blvd | 20,737 | MFG | C |
| 20 | McCarthy Blvd | 20,566 | INP | P |
| 21 | Park Victoria Dr | 19,454 | MFH | E |
| 22 | Main St | 16,927 | MFVH | A |
| 23 | McCarthy Blvd | 16,610 | INP | P |
| 24 | Technology Dr | 16,467 | PAO | P |
| 25 | N Milpitas Blvd | 16,315 | MFH | N |
| 26 | Calaveras Blvd | 16,229 | COM | F |
| 27 | Barber Ln | 15,806 | COM | T |
| 28 | Amalfi Loop | 15,335 | MFH | B |
| 29 ² | Trento Loop | 15,036 | MFH | B |
| 30 | Turquoise St | 13,357 | MFG | C |
| 31 | Yosemite Rd | 11,858 | MFG | C |
| 32 | Trade Zone Blvd | 11,696 | MFH | B |
| 33 | Ames Ave | 11,181 | MFG | D |
| 34 | Milpitas Blvd | 11,044 | MHP | L |
| 35 | Cypress Dr | 10,928 | HOTEL | P |
| 36 | Park Victoria Dr | 10,795 | COM | F |
| 37 | Calaveras Blvd | 10,616 | COM | D |
| 38 | Milmont Dr | 9,664 | COM | L |
| Total | - | 1,175,643 | - | - |

Notes:

1. Source: January-March 2019 water meter customer billing data provided by the City multiplied by 85% - assumed portion of water use that contributes to wastewater flows.
2. One meter (or multiple meters) provides water to multiple parcels.

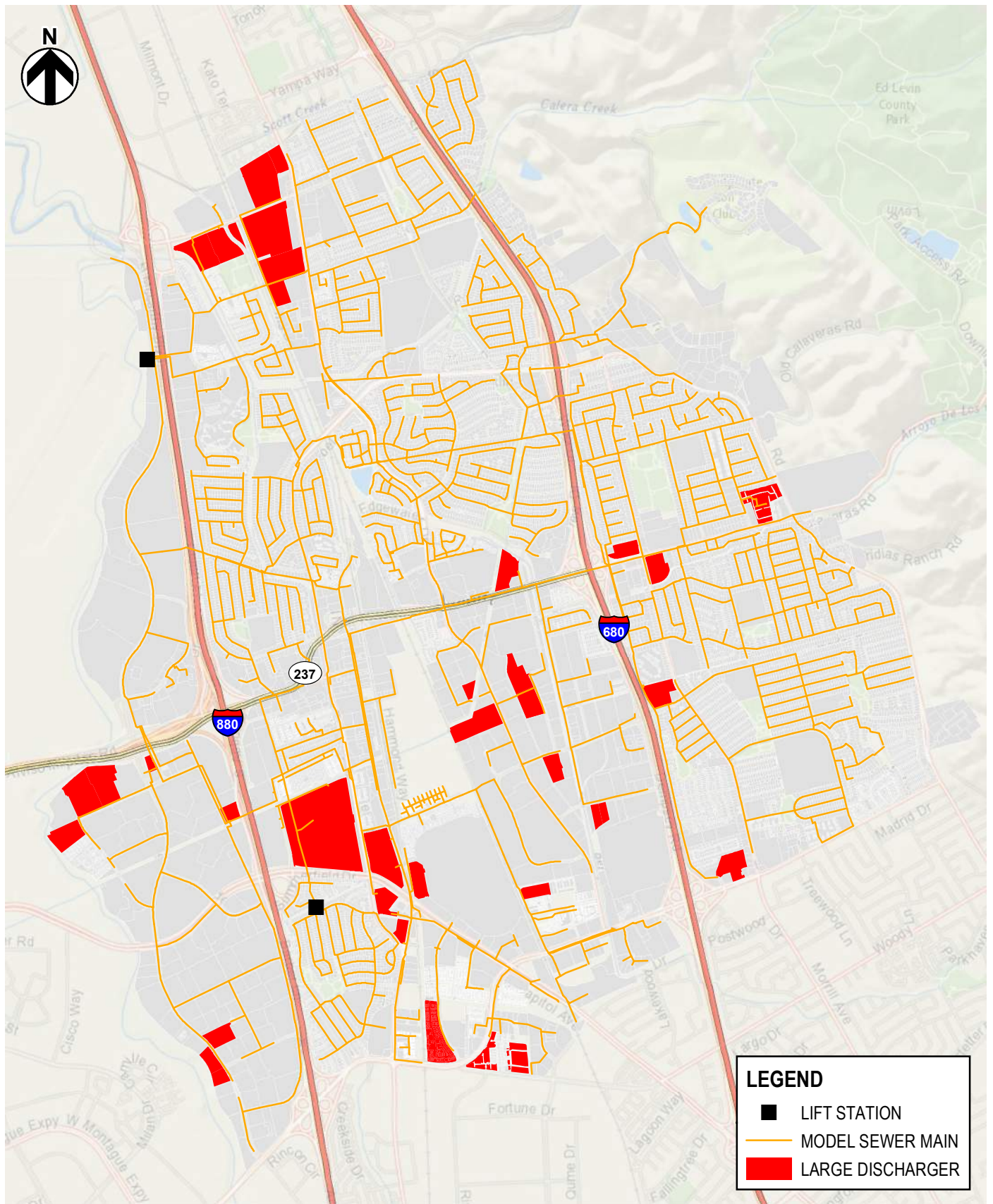


FIGURE 7-7
CITY OF MILPITAS
SEWER MASTER PLAN
LARGE DISCHARGERS

7.3.3 Diurnal Patterns

To account for hourly flow fluctuations, a set of diurnal flow patterns were established for different land use categories for both weekday and weekend conditions. To estimate these patterns, sub-basins with predominately residential, industrial, manufacturing, and commercial land uses were identified.

- **Residential:** Sub-basins H (valley floor) and J (hillside) are comprised of only residential land uses, so the average of these two sub-basins was used to develop the weekday residential diurnal pattern. Two separate weekend diurnal patterns were developed for valley floor and hillside residential land uses. No significant variation was observed during the weekday.
- **Industrial:** Flow in sub-basin Q is 95% industrial. This sub-basin was used to develop industrial diurnal patterns.
- **Manufacturing:** Sub-basin C is comprised of 95% manufacturing land use and was used to develop manufacturing diurnal patterns.
- **Commercial:** Sub-basin B has the highest portion of flow from commercial land uses, which is comprised of 32% commercial flow. It is noted that sub-basin B flow is comprised of approximately 1/3 commercial, 1/3 residential, and 1/3 manufacturing. Residential and manufacturing land use diurnal patterns were established using other sub-basins providing the basis for 2/3 of the flow contribution to the sub-basin. The remaining flow and pattern was used to develop the third diurnal pattern (commercial), accordingly.
- **Correctional Facility:** A diurnal pattern was developed for the correctional facility. The pattern is similar to the residential diurnal pattern but is slightly flattened and roughly based on FM 1790, which is downstream of the correctional facility. There is no variation in weekday and weekend patterns for the correctional facility.

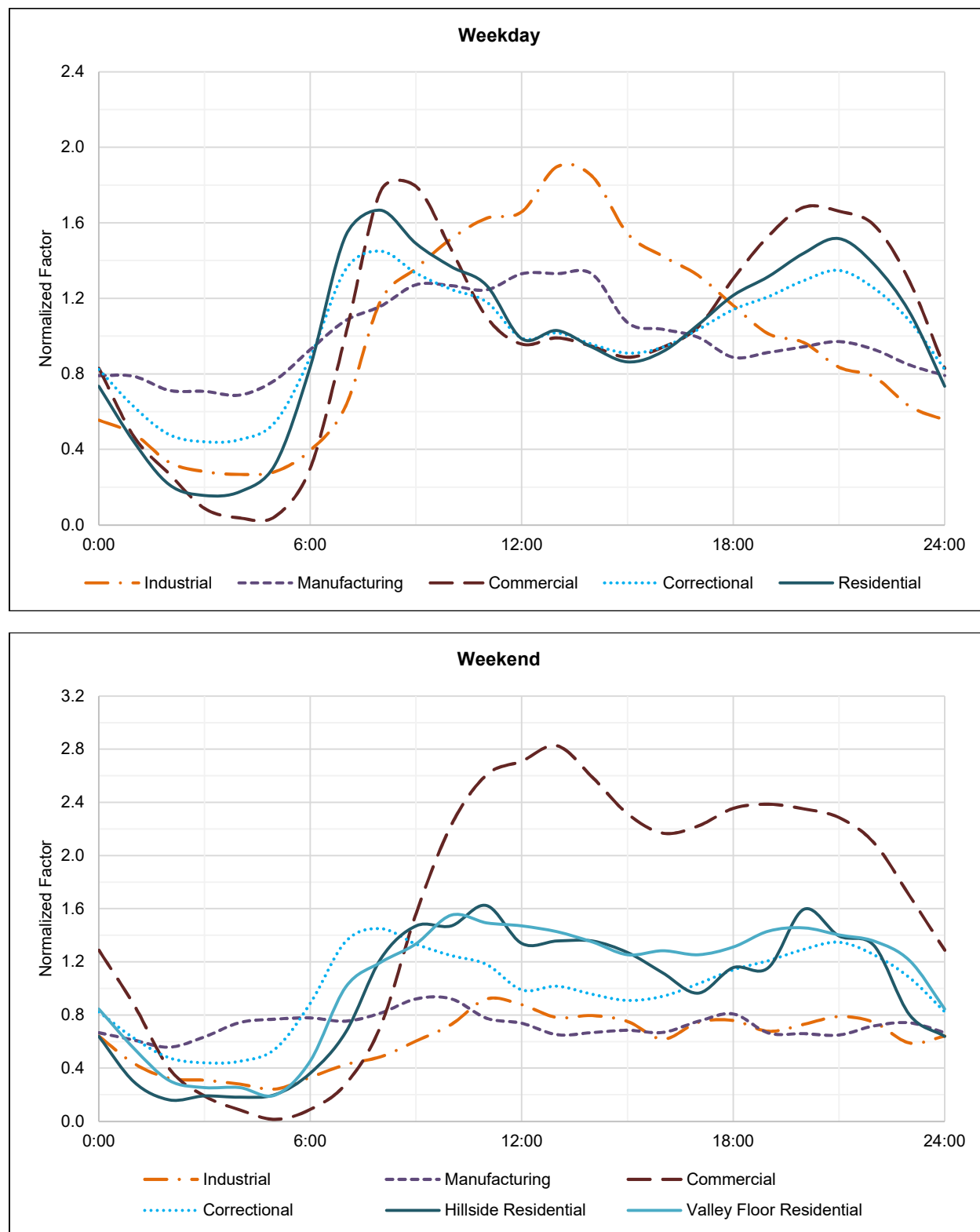
Diurnal patterns were adjusted iteratively for weekday and weekend to match measured flows during the calibration process discussed below.

Figure 7-8 displays the calibrated set of weekday and weekend diurnal patterns developed.

7.3.4 Dry Weather Calibration

Initial GWI and base flow estimates, along with diurnal patterns, were added to the model. Large dischargers were assigned the diurnal pattern that corresponds to the original land use listed in **Table 7-5**. After each model run, iterative adjustments were made while comparing the modeled versus the observed flow at each flow meter (see **Figure 7-10**). Adjustments were made to GWI for each sub-basin, UF factors, and diurnal patterns. The process is iteration intensive as one change to a sub-basin affects everything downstream. Thus, the focus was to start with the terminal sub-basins that are in the most upstream areas with the fewest land use types and unknowns, followed by downstream sub-basins.

Figure 7-8: Diurnal Patterns



Flow Obstructions

Where there were consistent discrepancies between modeled and observed flows, CCTV was reviewed to analyze upstream critical flow splits. It was discovered that four of the five critical flow splits were not operating as intended. The key findings and changes that were made in the model to represent these findings are described below and identified on **Figure 7-9**. These adjustments for obstructions were removed for the capacity analysis as detailed in **Section 8.3**.

1. MH 539 is a critical flow split at the intersection of Curtis Avenue and Main Street. There are two pipes flowing into the manhole from the south and the east. During dry weather conditions, all flow should exit the manhole to the west to FM 41 as part of sub-basin B. The outlet to the north is slightly elevated and serves as an overflow flow split flowing to sub-basin T. During CCTV review, a large grease buildup was identified at the manhole. The grease buildup diverts a large portion of the flow entering the manhole from the east to the north to sub-basin T instead of west to FM 41 as part of sub-basin B. To account for this in the model, the upstream pipe invert flowing to the north was adjusted until, as visually estimated using CCTV, approximately two-thirds of the peak flow entering the manhole from the east was flowing north.
2. MH 543 is a critical flow split located where Tom Evatt Park intersects Main Street just downstream of the critical flow split at MH 539. During review of the CCTV for MH 543, it was discovered that there is also a large obstruction here. Based on what was observed in the CCTV, under normal conditions, the flow entering this manhole from the south should flow exclusively to the west during dry weather and the pipe exiting to the north would function as an overflow flow split. Due to a large obstruction at this manhole, some of the flow is being diverted to the north, activating the flow split. To account for this obstruction in the model, the upstream pipe invert of the segment flowing to the north was adjusted to simulate the flow diversion by the obstruction. This invert was adjusted until the modeled flows at FM 592 and FM 715, which are capturing the flow of sub-basin T, approximately matched the observed flows.
3. MH 2488 is a critical flow split located in sub-basin D. After reviewing CCTV, a large obstruction was also observed at this manhole. Under normal conditions, based on the pipe inverts observed in the CCTV, all flow entering this manhole from the south and the east should flow to the north. However, due to the large buildup, a large proportion of the flow is diverted to the west. To account for this obstruction, the upstream pipe invert of the segment exiting this manhole to the north was adjusted until the modeled flows matched the observed flows at FM 649 and FM 2491, which are located just downstream of this flow split to the west and north, respectively.
4. MHs 1053, 1152, and 2578, as discussed in **Section 3.1.1**, are flow diversion structures, and MH 1152 is a critical flow split. As part of the calibration process, the inverts of the overflow segments exiting each of these manholes was adjusted to reflect the operation of the flow diversion structures in the field.

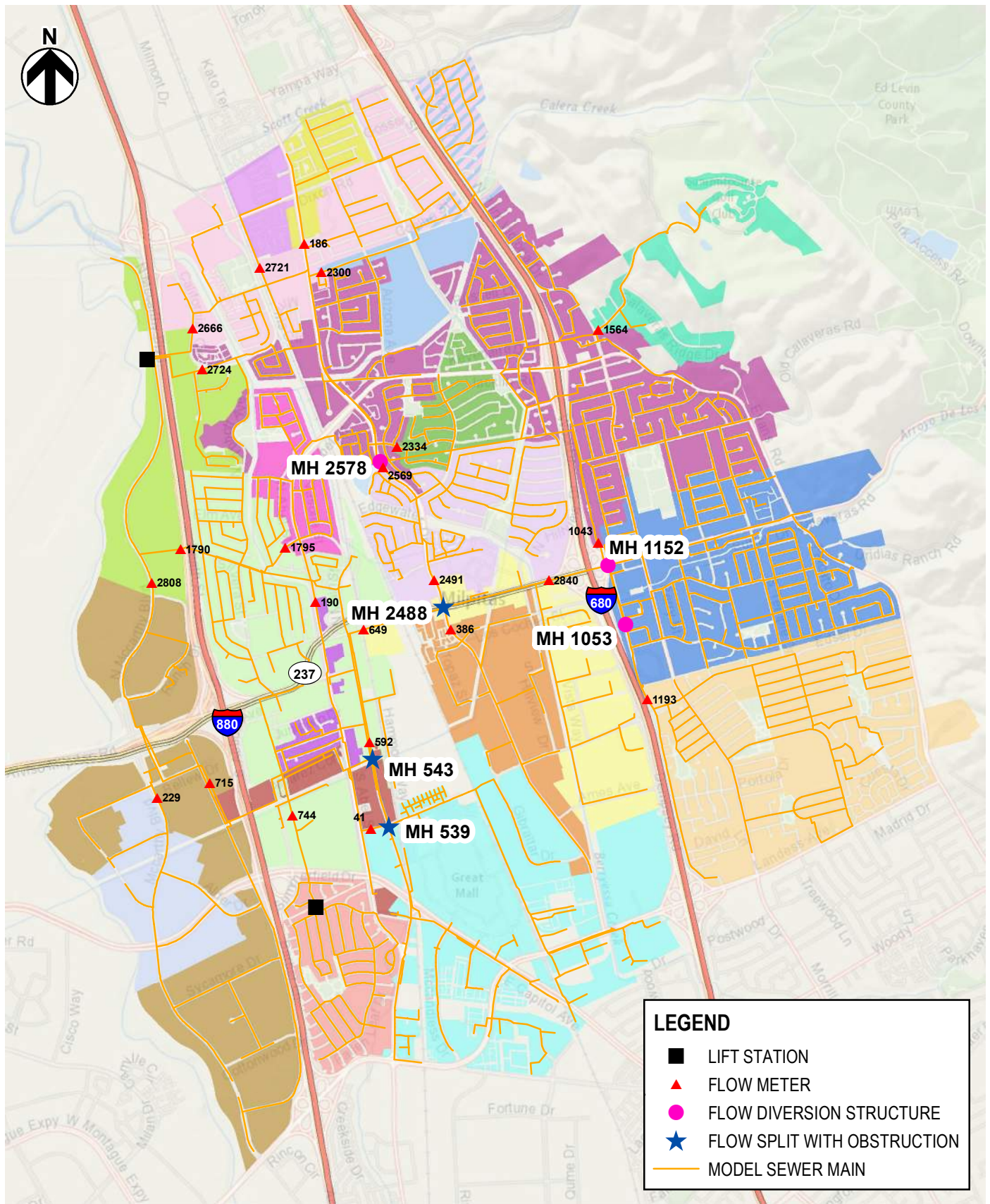


FIGURE 7-9
CITY OF MILPITAS
SEWER MASTER PLAN
FLOW DIVERSION AND OBSTRUCTION

After completing all UF factor and GWI adjustments, and adjusting inverts at flow splits/diversion structures, the modeled flows were determined to align as close to the observed flows as reasonably possible. **Table 7-6** presents the final calibrated UF factors.

The final modeled average DWF at the outfall is 7.55 MGD. The total modeled GWI, which represents both GWI and other continuous flow contributions, is 1.40 MGD. There is no reliable flow data for the outfall at the Main LS; thus, GWI values in sub-basin O were estimated based on the GWI of the nearby sub-basins.

Figure 7-10 presents a sample of the final modeled versus observed flows for dry weather. This chart includes Sunday and Monday, so both weekend and weekday dry weather calibration are represented. Calibration charts for all flow meters are included as **Appendix D**.

Table 7-6: Calibrated UF Factors

| Land Use Designation | UF Factor | Units | Quantity | Flow (MGD) | Diurnal Pattern |
|--------------------------------|-----------|------------|----------|--------------------------|--------------------------|
| HSFL | 400 | gpd/parcel | 56 | 0.022 | Hillside Residential |
| HSFM | 465 | gpd/parcel | 107 | 0.050 | Hillside Residential |
| SFL | 200 | gpd/parcel | 9619 | 1.924 | Valley Floor Residential |
| SFM | 1200 | gpd/acre | 266 | 0.319 | Valley Floor Residential |
| MFH | 1500 | gpd/acre | 292 | 0.438 | Valley Floor Residential |
| MFVH | 2000 | gpd/acre | 56 | 0.113 | Valley Floor Residential |
| MHP ¹ | - | - | - | - | Valley Floor Residential |
| HOTEL | 4000 | gpd/acre | 60 | 0.244 | Valley Floor Residential |
| MXD | 1000 | gpd/acre | 67 | 0.067 | Commercial |
| HDMU | 2200 | gpd/acre | 64 | 0.141 | Commercial |
| PAO | 500 | gpd/acre | 65 | 0.031 | Industrial |
| COM | 900 | gpd/acre | 467 | 0.420 | Commercial |
| INP | 450 | gpd/acre | 727 | 0.327 | Industrial |
| MFG | 1500 | gpd/acre | 550 | 0.825 | Manufacturing |
| PF | 190 | gpd/acre | 310 | 0.059 | Commercial |
| COR ¹ | - | - | - | - | Correctional |
| Large Dischargers ² | Various | - | - | 1.176 | Various |
| Total | - | - | - | 6.157³ | - |

Notes:

1. All three mobile home parks and the correctional facility were identified as large dischargers and assigned flows based on water use data as described in **Section 7.3.2**.
2. Large dischargers were assigned a diurnal pattern based on their original land use codes, which are listed in **Table 7-5**.
3. Represents the total BSF. The total BSF plus the total GWI is the total DWF.

Figure 7-10: Example of Dry Weather Model Calibration Charts

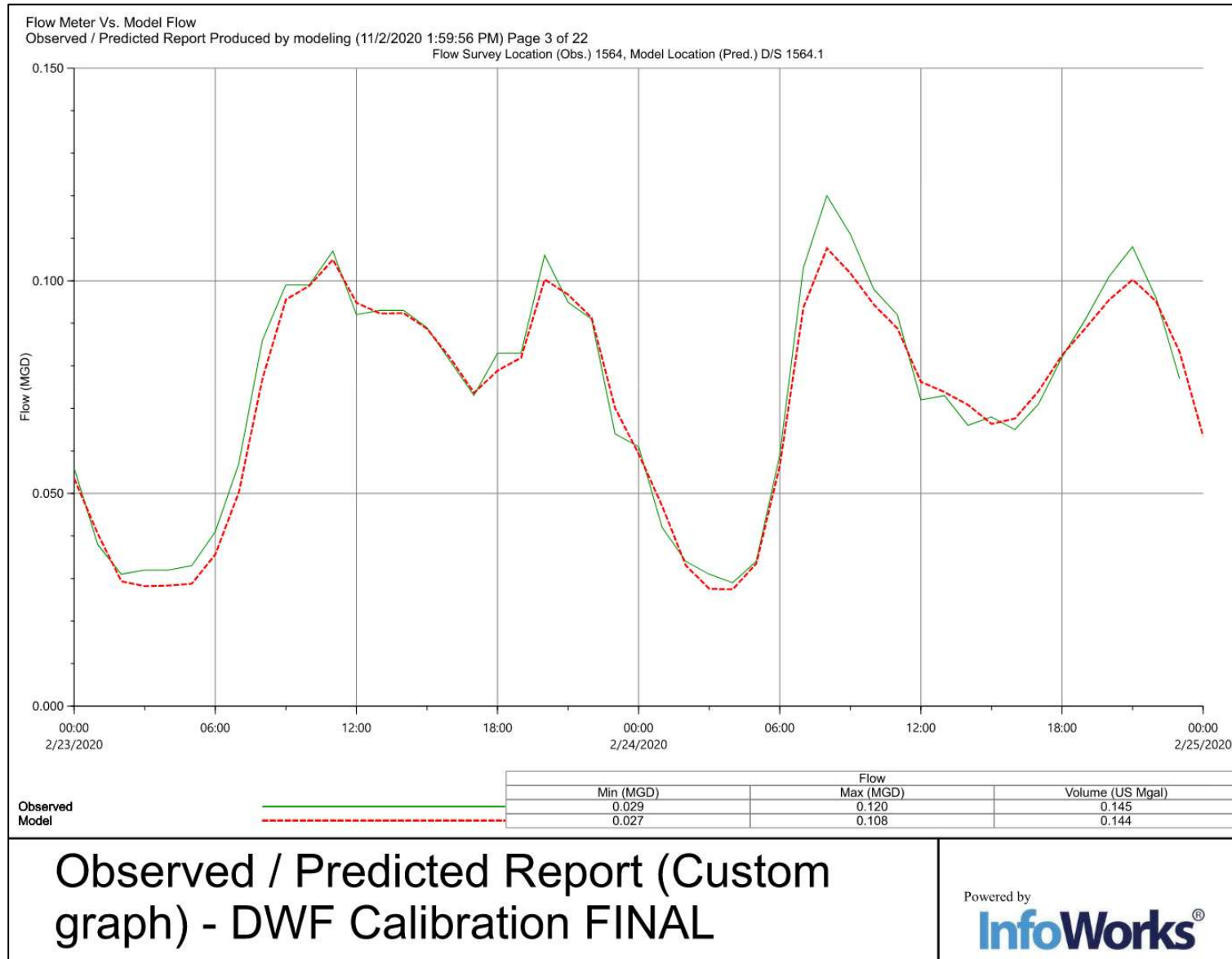


Figure 7-10 presents a comparison between modeled and observed dry weather weekday flows. For the overall system, modeled flows are 3.4% higher than the observed flows on an average dry weekday and are within 10% (higher) of the measured flows on the average dry weekend. A calibration within 5% is considered a good representation of actual conditions and having modeled flows higher than measured flows assures that the model is conservative in its representation of the collection system.

Table 7-7: Calibrated Model vs. Observed Weekday Dry Weather Flow Comparison

| Flow Meter | Sub-Basin | Model Avg Flow (MGD) | Observed Avg Flow (MGD) | % Difference |
|----------------------|----------------|----------------------|-------------------------|--------------|
| 744 | A | 0.273 | 0.270 | 1.2% |
| 41 ¹ | B | 0.540 | 0.565 | -4.4% |
| 386 | C | 0.566 | 0.576 | -1.8% |
| 649 ² | D | 0.892 | 0.862 | 3.5% |
| 2491 ² | D | 0.103 | 0.133 | -22.9% |
| | D Total | 0.995 | 0.995 | -0.1% |
| 1193 | E | 0.588 | 0.580 | 1.3% |
| 1043 | F | 1.219 | 1.248 | -2.4% |
| 1795 | G | 0.258 | 0.271 | -4.6% |
| 1564 | H | 0.073 | 0.074 | -2.3% |
| 2300 | I | 0.059 | 0.056 | 5.3% |
| 2334 | J | 0.163 | 0.167 | -2.2% |
| 2569 | K | 0.383 | 0.357 | 7.5% |
| 2666 | L1 | 0.867 | 0.889 | -2.5% |
| 2724 | L2 | 2.442 | 2.036 | 19.9% |
| 186 | M | 0.113 | 0.123 | -7.5% |
| 2721 | N | 0.198 | 0.199 | -0.7% |
| 2808 | P | 1.755 | 1.837 | -4.5% |
| 229 | Q | 0.091 | 0.086 | 6.2% |
| 190 | R | 0.081 | 0.087 | -7.1% |
| 1790 | S | 2.267 | 1.934 | 17.2% |
| 592 ^{1,3} | T | 0.194 | 0.191 | 1.5% |
| 715 ^{1,3} | T | 0.990 | 1.027 | -3.6% |
| | T Total | 1.184 | 1.219 | -2.8% |
| OUTFALL ⁴ | O | 7.492 | - | - |

Notes:

1. Flows are affected by the obstruction in MH 539 - a critical flow split.
2. Flows are affected by the obstruction in MH 2488 - a critical flow split.
3. Flows are affected by the obstruction in MH 543 - a critical flow split.
4. The flows of sub-basin O capture the entire system. There are not any measured flows at this location, so there is nothing to compare the modeled flows to.

7.4 Wet Weather Flow (WWF)

The remaining components of wastewater flow are additional wet weather GWI related to an elevated groundwater table and the RDI/I as illustrated in **Figure 7-1**. GWI levels typically fluctuate as the water table rises during the wet season and falls during the dry season; GWI values were adjusted to account for the seasonal variation. RDI/I is the flow that enters the system through manhole covers and through temporarily increased groundwater infiltration driven by rainfall.

7.4.1 RDI/I Volume

The volume of RDI/I is calculated by subtracting the volume of DWF in the system from the volume of total wet weather flow, as shown in **Figure 7-11**. For this study, the volume of RDI/I and corresponding R-factor was calculated for the 24-hour period following the start of Storm event 1. Because GWI tends to fluctuate over the course of the wet season as the water table rises and falls, dry weather data from just prior to the storm was used for RDI/I calculations. DWF prior to the storm was subtracted from the storm flow for RDI/I calculations.

Figure 7-11 is an example of the flows at FM 2724 during the storm period.

Figure 7-11: Wet Weather Flow

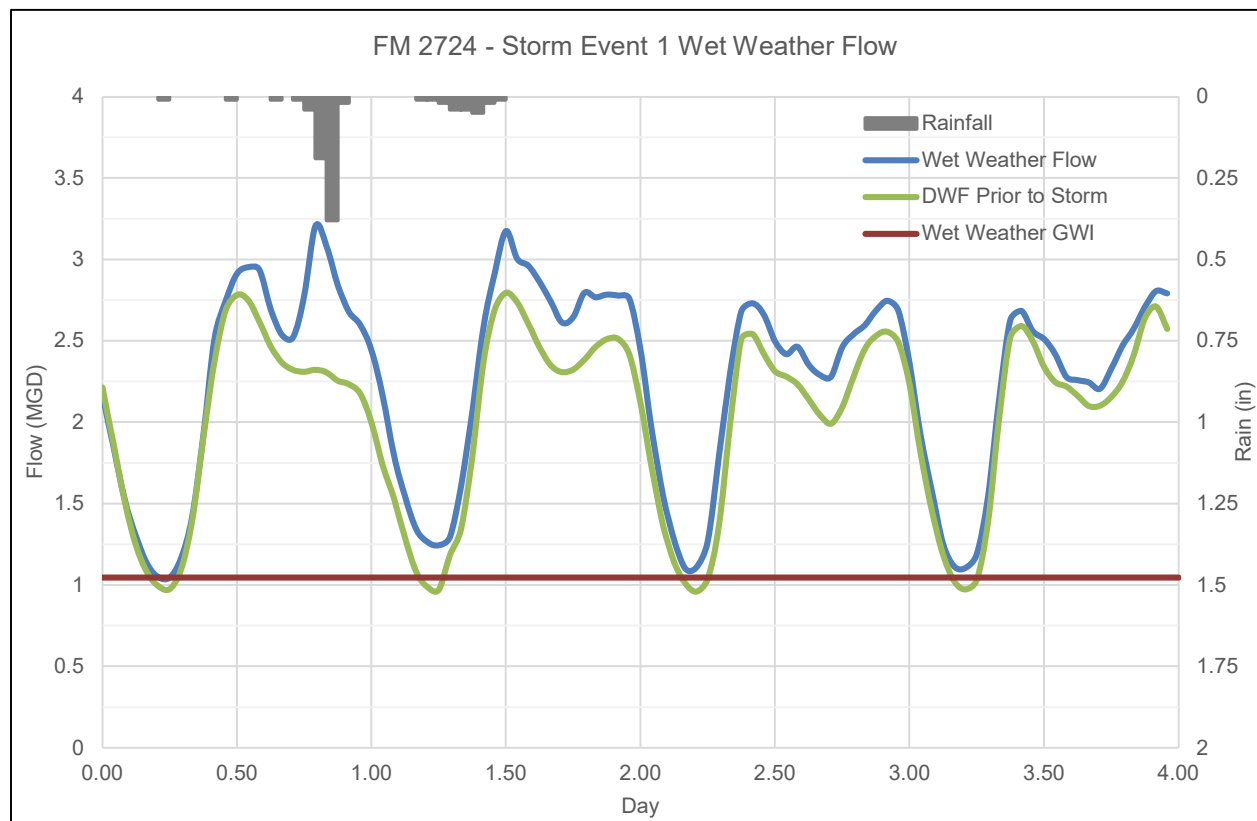
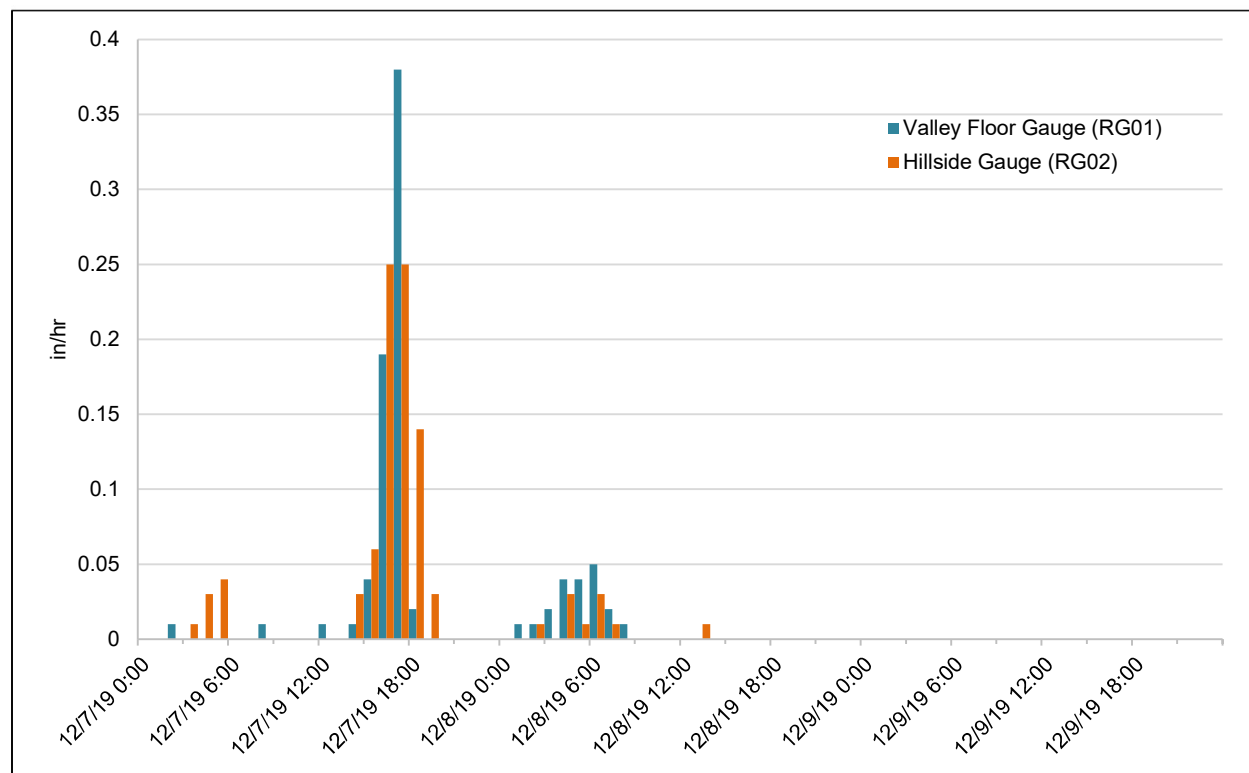


Figure 7-12: Storm Rainfall



7.4.2 Total Rainfall

The volume of rain that fell on each sub-basin is calculated by multiplying the depth of rain by the total area contributing sanitary flows in each respective sub-basin. The areas of each sub-basin are listed in **Table 7-4**. This acreage excludes parcels with no wastewater flows (NF designation – see **Figure 5-1**) such as streets and areas of open space. To calculate the rainfall volume for this initial analysis, each sub-basin was matched to a corresponding rain gauge (RG01 or RG02) based on proximity and elevation. Sub-basin H is the only sub-basin located on the hillside, so this was matched to RG02. The remainder of the sub-basins were matched with RG01 on the valley floor. **Figure 7-12** presents the rainfall for Storm event 1 for both rain gauges.

7.4.3 R-Factor Development

The R-factor represents the percentage of rainfall that enters the City's sewer system by volume: the ratio of RDI/I to total volume of rain. An initial R-factor was calculated for each sub-basin based on the flow data and was iteratively adjusted for the wet weather model calibration process.

There is no separate estimation of antecedent moisture conditions in the soil. It is best to use at least a 2-year storm to estimate R-factors, as it will more likely represent conditions similar to a large representative design storm. For this analysis, the storm selected for the R-factor calculation and calibration was Storm event 1, which was the largest storm available during the flow monitoring period. Storm event 1 was less than a 1-year 24-hour storm, but between a 1- and 2-year 2-hour storm.

Once the RDI/I and total volume of rainfall are calculated, the R-factor is a simple calculation of RDI/I volume divided by rainfall volume, resulting in the estimated portion of rainfall that enters the wastewater collection system. These values were also iteratively adjusted during the model calibration process.

7.4.4 Wet Weather Calibration

To initiate the wet weather calibration process, the observed rainfall collected at both rain gauges for Storm event 1 was added to the model (see **Figure 7-12**). During the calibration process, it was noted that the peak flows for all valley floor sub-basin meters occurred approximately three hours prior to the peak rainfall, which was clearly elevated related to rainfall as compared to dry weather flow. It appears that there may have been an error in the timestamps of RG01, so the rainfall was shifted three hours earlier.

Wet Weather GWI

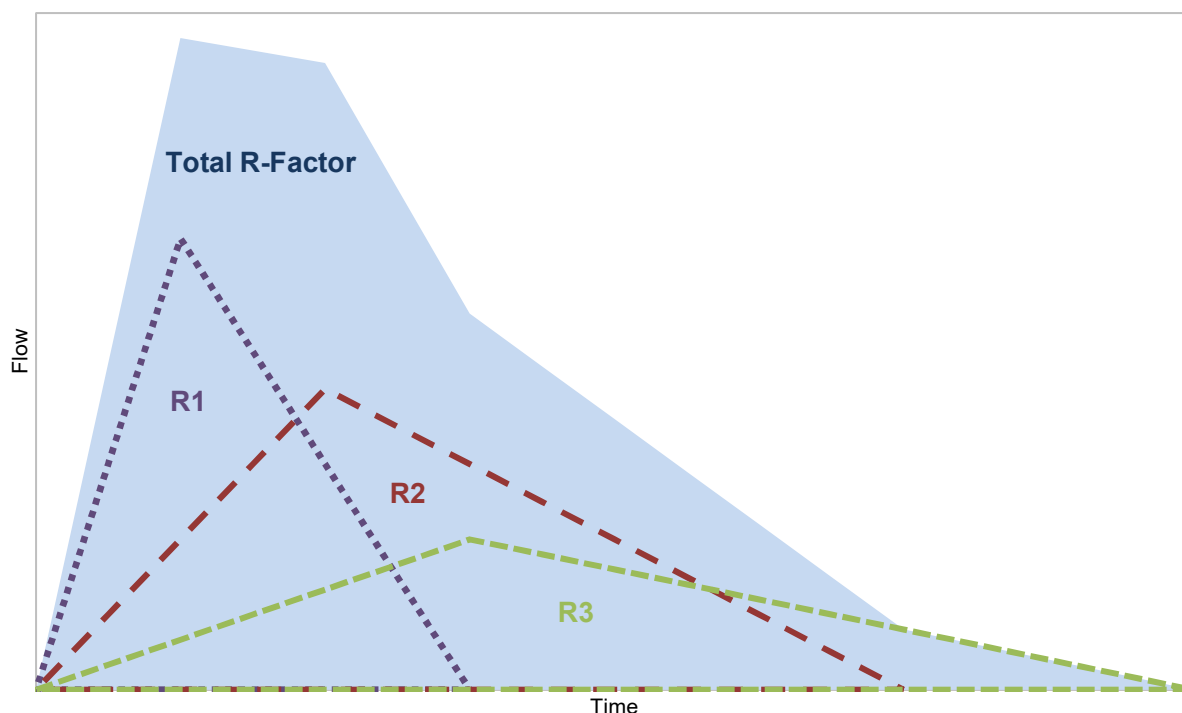
GWI fluctuates over the course of the year, increasing during the wet season as the water table rises. The extent that the water table rises and falls is site specific and can be affected by geology, surface water features, and tides. By extension, wet weather GWI changes are also site specific and can also depend on the condition of the pipelines. In the wet weather calibration scenarios of the model, GWI values established during the dry weather calibration process were iteratively increased to reflect the elevated water table more accurately during the wet season as displayed by an increase in the minimum flows.

RDI/I R-Factor

The RDI/I is estimated using the R-factor, or the percentage of rainfall that enters a sewer system as described in **Section 7.4.1**, and the Tri-Triangular Method. The Tri-Triangular Method, which is the industry standard for representing wet weather flows, involves summing three separate hydrographs to derive a single unit hydrograph. The total R-factor is divided into three separate values, represented as triangles (see **Figure 7-13**), based on the speed at which rainfall enters the sewer system, as described below:

- **Rapid (R1)** – Stormwater inflow that enters the sewer system most rapidly, typically through entry points such as holes in manhole covers. The peak of this triangle occurs one to three hours after the start of the rainfall.
- **Intermediate (R2)** – A combination of rapid stormwater inflow and slow rainfall-dependent infiltration.
- **Slow (R3)** – Long term delayed rainfall-dependent infiltration. The peak of this triangle occurs the longest time after the start of the rainfall, and the effects of this infiltration can continue long after the end of the rainfall.

Figure 7-13: Tri-Triangular R-Factor Method



The initial estimated R-factors (R1, R2, and R3) for each sub-basin were input into the model, which generated the total R-factors. Total R-factors are simply the sum of the individual R-factors ($R1 + R2 + R3$). The entered R-factors were iteratively adjusted for each sub-basin by comparing modeled flows to observed flows at each flow meter during the day of, and the two days following, the storm. During this part of the calibration process, it is critical to capture the peak flows as accurately as possible to avoid underestimating capacity deficiencies.

The final calibrated R-factors for each sub-basin are presented in **Table 7-8**.

For wet weather calibration of the system, average modeled flows representing Storm event 1 and one day following the storm are 3.3% higher than measured flows. Modeled peak WWF for Storm event 1 are 2.3% higher than measured peak flows. A calibration within 5% is considered a good representation of actual conditions and having modeled flows higher than measured flows assures that the model is conservative in its representation of the collection system.

A sample wet weather calibration chart is displayed in **Figure 7-14**. Wet weather calibration charts for all flow meters are attached as **Appendix E**.

Table 7-8: Final Calibrated R-Factors

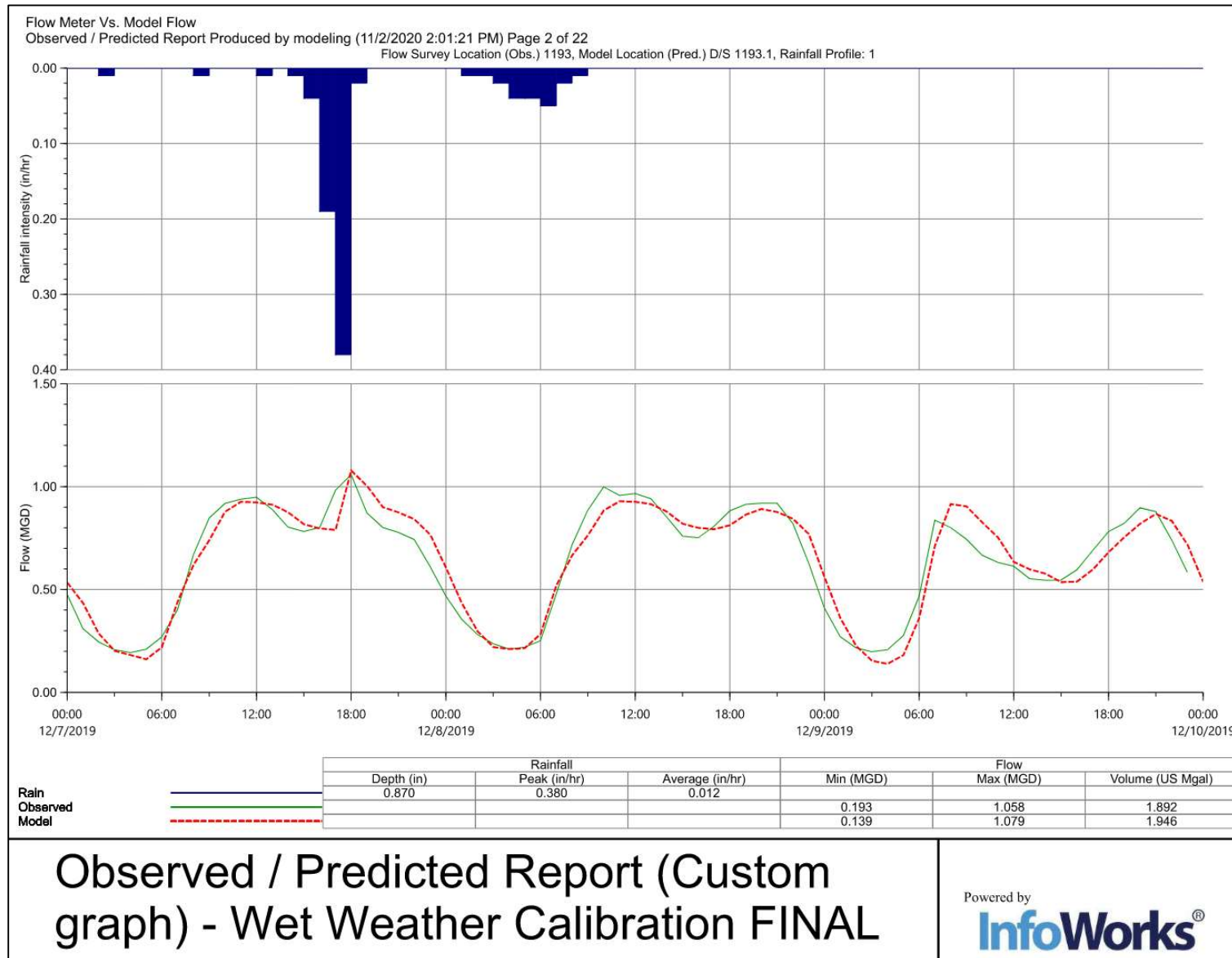
| Sub-Basin | Acreage | R1 | R2 | R3 | Total R-Factor |
|----------------------------|--------------|--------------|--------------|--------------|----------------|
| A | 138 | 0.40% | 0.85% | 0.23% | 1.48% |
| B | 433 | 0.80% | 0.66% | 0.13% | 1.59% |
| C | 192 | 0.27% | 0.00% | 0.02% | 0.30% |
| D | 208 | 0.26% | 1.64% | 0.00% | 1.90% |
| E | 455 | 0.53% | 0.00% | 0.07% | 0.60% |
| F | 414 | 0.67% | 0.00% | 0.19% | 0.86% |
| G | 78 | 1.27% | 2.14% | 0.00% | 3.40% |
| H | 110 | 0.24% | 0.00% | 0.00% | 0.24% |
| I | 81 | 0.08% | 0.35% | 0.00% | 0.42% |
| J | 79 | 0.00% | 0.67% | 1.50% | 2.17% |
| K | 187 | 0.10% | 0.56% | 0.15% | 0.81% |
| L1 | 266 | 0.09% | 0.17% | 0.14% | 0.40% |
| L2 | 607 | 0.09% | 0.17% | 0.05% | 0.31% |
| M | 57 | 1.07% | 0.26% | 0.07% | 1.39% |
| N | 55 | 0.55% | 1.17% | 0.34% | 2.06% |
| O ¹ | 207 | 0.70% | 0.40% | 0.40% | 1.50% |
| P | 537 | 0.59% | 0.30% | 0.37% | 1.26% |
| Q | 151 | 0.45% | 0.00% | 0.15% | 0.60% |
| R | 34 | 1.30% | 2.41% | 0.00% | 3.71% |
| S | 393 | 0.00% | 1.30% | 0.34% | 1.64% |
| T | 207 | 0.25% | 0.12% | 0.26% | 0.64% |
| Average² | 4,889 | 0.40% | 0.45% | 0.19% | 1.04% |

Notes:

1. There is no flow meter at the outfall for sub-basin O. Values were estimated based on surrounding sub-basins.
2. The average represents the weighted average by sub-basin area.

In summary, total R-factors for each subbasin ranges from 0.24% up to 3.71%, which represents the percentage of rainfall entering the collection system. A low R-factor would be less than 3% and 10% is considered high. The weighted average for the entire system is 1.04%; this is considered a relatively watertight system with limited rainfall entering the collection system.

Figure 7-14: Example of Wet Weather Model Calibration Charts



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SECTION 8 – CAPACITY ANALYSIS

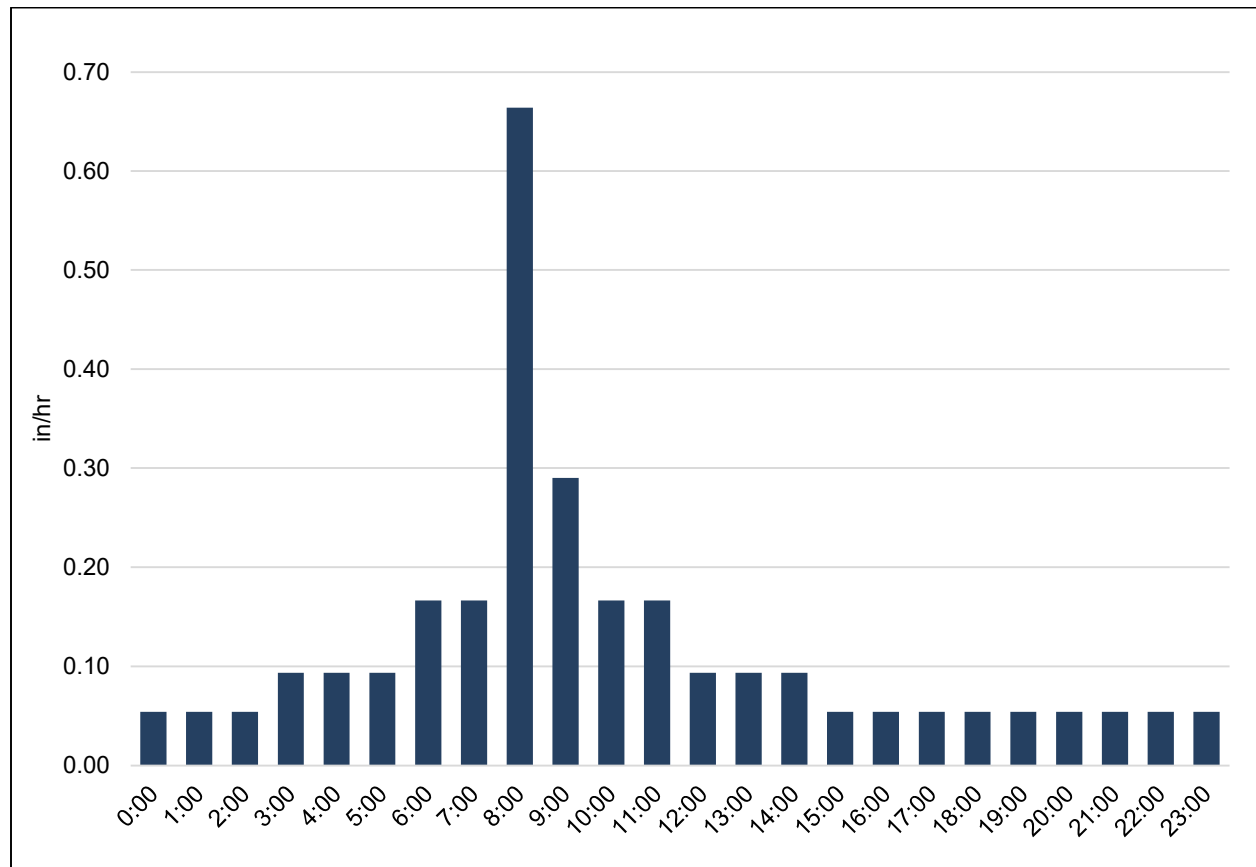
The hydraulic analysis for the collection system was evaluated under design storm for existing and future land use conditions. This section describes the analysis and the resulting deficiencies.

8.1 Design Storm

To estimate WWF, a design storm is applied to the model and wet weather flows are represented based on the calibrated R-factors for each sub-basin. A range of storms was considered for the design condition of this study. Both the 2002 and 2009 Master Plans used a 10-year, 4-hour constant distribution storm. Often, a 10-year 24-hour storm is used with a peak hour coinciding with the peak of the typical diurnal curve. A 5-year 24-hour storm was also available in the event that a 10-year 24-hour storm caused exceedingly large flows due to high rates of RDI/I.

For this study, the typical 10-year 24-hour storm with a peak hour coinciding with the peak of the typical diurnal curve was deemed appropriate.

Figure 8-1: 10-Year 24-Hour Design Storm



Source: NOAA Atlas 14 Volume 6 Version 2 precipitation frequency estimates in inches for Milpitas, California (<https://hdsc.nws.noaa.gov/hdsc/pfds>).

8.2 Deficiency Criteria

The initial deficiency criteria used to evaluate the capacity of the modeled pipes under design flow conditions was the ratio of wastewater flow depth (d) to pipe diameter (D), or d/D. In InfoWorks, if d/D is greater than one, this means the pipe is flowing full under pressure and the hydraulic grade line (HGL) is higher than the crown of the pipe. InfoWorks also reports a “surcharge state” for each pipe, and **Table 8-1** summarizes the definition of each surcharge state.

In the hydraulic model, the HGL reaching the ground surface indicates a potential SSO. Even for a pipe flowing under capacity or surcharged, if the freeboard – the distance between the ground surface and the HGL – is five feet or greater, the risk of SSO is minimal. Where pipes were shown as surcharged due to inadequate hydraulic capacity (surcharge state of “2”), a pipe was identified as deficient if the freeboard in these locations is also less than five feet.

Table 8-1: InfoWorks Surcharge States

| Surcharge State | Definition | Deficiency if: |
|------------------|---|--|
| < 1 ¹ | When depth of flow is less than the diameter of the pipe | Not considered hydraulically deficient |
| = 1 | Pipe is surcharged due to backwater from a downstream deficiency. | Not considered hydraulically deficient |
| = 2 | Pipe is hydraulically under capacity and needs to be upsized. | Freeboard < 5 feet |

Notes:

1. Surcharge State = d/D

8.3 Assumed Condition

As detailed in **Section 7.3.4**, there were three critical flow splits identified in the system as having major flow obstructions that drastically changed the flow path of wastewater – likely from grease buildup at MH 539, MH 543, and MH 2488. During the dry weather calibration process, these flow splits were modified in the model to match the wastewater flows observed in the system. For the hydraulic analysis, system performance was evaluated based on the assumption that these obstructions have been cleared and the system is operating as intended.

8.4 Future Condition

Section 5.2 presents the process used to update the land use for potential future redevelopment areas in the City to estimate future wastewater flows. For the hydraulic analysis of the system under future conditions, calibrated GWI, UF factors, and R-factors developed above were applied to the updated land uses for projected future buildout conditions. The same design storm was used for both existing and future conditions.

8.4.1 Large Dischargers

If parcels were identified as large dischargers under existing conditions and located within “Opportunity Areas” (see **Figure 2-2** and **Figure 5-2**), the existing land use was compared to the future land use; where the land uses differed, the future land use UF factor was applied. If there

was no change to the land use, then the large discharger wastewater flow (see **Table 7-5**) under existing conditions was maintained for the future scenario.

Table 8-2 lists the large dischargers that were removed from the future condition and replaced with the future land use UF factors.

Table 8-2: Summary of Large Discharger Sites Planned for Redevelopment

| Rank | Location ¹ | Existing Land Use | Future Land Use |
|------|-----------------------|-------------------|-----------------|
| 13 | Main St | COM | MFH |
| 15 | McCarthy Blvd | INP | PAO |
| 16 | Landess Ave | COM | HDMU |
| 20 | McCarthy Blvd | INP | PAO |
| 23 | McCarthy Blvd | INP | PAO |
| 26 | Calaveras Blvd | COM | HDMU |
| 36 | Park Victoria Dr | COM | HDMU |

Notes:

1. Source: January-March 2019 water meter customer billing data provided by the City multiplied by 85% - assumed portion of water use that contributes to wastewater flows.

Los Esteros Ranch, which is located at the intersection of McCarthy Blvd and Dixon Landing Road, is connected to the City collection system. This land use was added to the modeled system in accordance with the City's agreement with Los Esteros Ranch. The agreement between the City and Los Esteros Ranch, attached as **Appendix F**, states that they have a maximum allowable water usage of 50,000 gpd among the three parcels included in the agreement. Applying the same method identified for other large dischargers (see **Section 7.3.2**), it was assumed that wastewater flows constitute approximately 85% of water usage. Los Esteros Ranch was assigned a wastewater flow of 42,500 gpd and was added as a large discharger for the future condition. The area of the three contributing parcels was measured using the Measure tool in Bluebeam Revu 2016 and calibrated using the scale bar displayed on Exhibit "A" of the Los Esteros Ranch Agreement.

8.5 Hydraulic Capacity Deficiencies

Under dry weather conditions, **Table 8-3** shows a 6% increase to 7.9 MGD in average flow for future conditions at the outfall.

Table 8-3: Model Flow Summary

| Scenario | Average DWF (MGD) | Peak DWF (MGD) | Peak WWF (MGD) |
|----------|-------------------|----------------|----------------|
| Existing | 7.5 | 10.4 | 14.9 |
| Future | 7.9 | 11.0 | 18.5 |

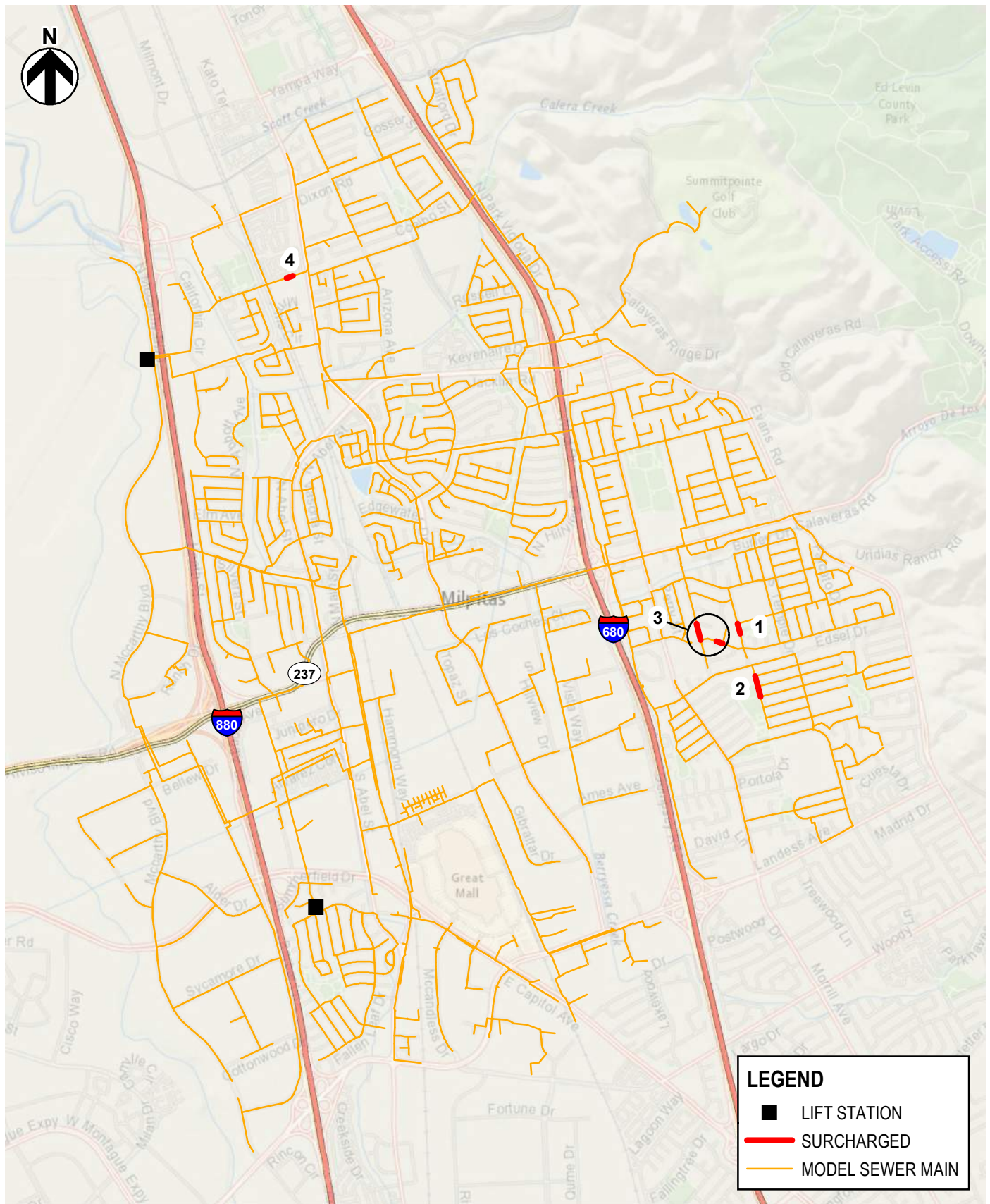


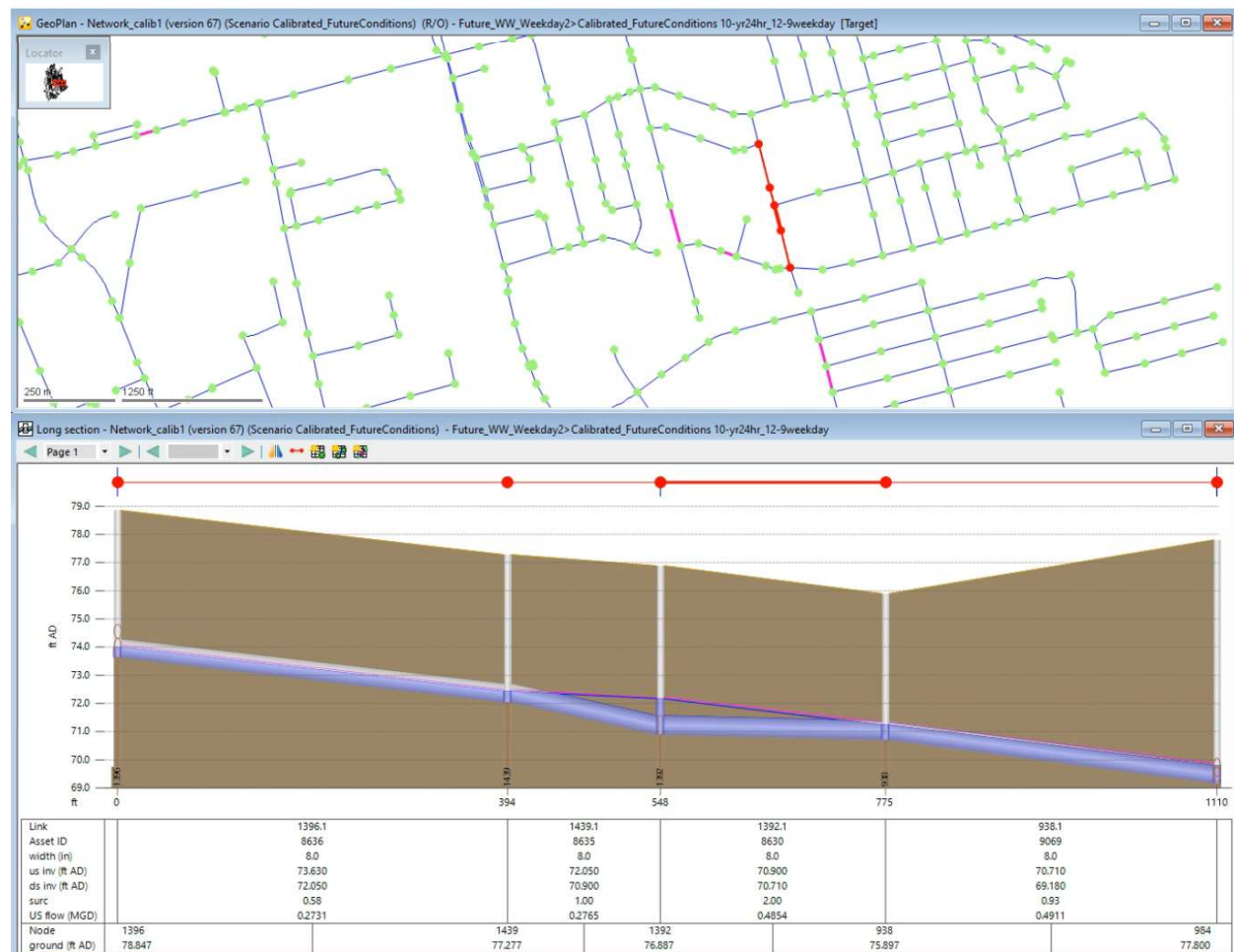
FIGURE 8-2
CITY OF MILPITAS
SEWER MASTER PLAN
SURCHARGED PIPELINE SEGMENTS

Under all scenarios, there were no additional surcharged segments identified under future conditions that were not seen under existing conditions. It is expected that this is because the City is largely built out and system improvements implemented with development have addressed potential deficiencies.

There were six pipe segments with a recorded surcharge state of “2” (see **Section 8.2**) under both existing and future conditions indicating that they are under capacity. These segments are displayed on **Figure 8-2**. Provided below is a description of each of these pipelines:

- **Surcharged Location 1:** This pipe segment drops below the minimum freeboard deficiency criteria (see **Table 8-1**) with a freeboard of 4.7 ft, shown in **Figure 8-3**. For a single pipe reach, replacement is not recommended without further cause. It is recommended that the City monitor this location for surcharging. This location (MH GID 1392) is a good candidate for installing a SmartCover to monitor the wastewater level and prevent SSOs.
- **Surcharged Location 2:** These two surcharged segments are 6-inch mains. Freeboard at these locations is greater than five feet, so they do not exceed the criteria for a capacity deficiency and therefore are not considered deficient. In general, it is recommended that all future sewer mains in the collection system are constructed with minimum diameters of 8-inches.

Figure 8-3: Surcharged Location 1 with 4.7 feet of Freeboard



- **Surcharged Location 3:** These two surcharged segments are 10-inch pipes. Freeboard at these locations is greater than five feet, so they do not exceed the criteria for a capacity deficiency and therefore are not considered deficient.
- **Surcharged Location 4:** This pipe, identified as under capacity (GID 17506), is located to the west of the intersection between N. Milpitas Blvd. and Washington Dr. In GIS, this segment was identified as an 8-inch pipe; however, both upstream and downstream pipes were identified as 12-inch pipes. During the review of record drawings, it was unclear if this pipe has been upsized to match the neighboring pipes. In the model, this segment experiences surcharging during wet weather as an 8-inch pipe, however, when this segment is upsized to 12-inches to match the neighboring pipe diameters, there is no longer surcharging. An improvement project is not recommended at this location as the freeboard is over ten feet and does not meet the threshold for deficiency identified in **Table 8-1**.

SECTION 9 – PROJECT DEVELOPMENT

Based on the condition assessment described in **SECTION 4**, projects were recommended to address prioritized defects identified in the collection system. This section describes the prioritization process and a summary of the project cost development. Results of this project development and selection translate into a prioritized CIP for the wastewater collection system.

9.1 Rehabilitation Selection Methodology

The PACP peak scores from the CCTV inspection and the risk scores calculated from the LoF/CoF desktop condition assessment drive the pipeline rehabilitation selection process. Below is a summary of the methodology implemented for both inspected and non-inspected pipe.

9.1.1 CCTV Inspected Segments

For segments with CCTV inspection data, a two-step process was used to determine the final rehabilitation recommendation. Using the defect coding assigned by NPS and the IAP software, the pipe segments with defects were assigned one of the following defect-level rehabilitation methods:

- Replace;
- Cured-in-place pipeline (CIPP);
- Point repair by excavation; or
- Sectional liner.

When the user assigns a rehabilitation method for each defect code, IAP assigns the respective rehabilitation method to each segment based on the associated defect coding.

Table 9-1 presents a sample of the assigned rehabilitation methods for all structural defects with a score of 5. A full list of all defect codes and associated rehabilitation methods can be found in **Appendix A** (R&R Study App. H).

With the rehabilitation method established for each defect code, a decision tree was established to determine the final overall rehabilitation method for the pipeline. This decision tree was prepared based on the following factors:

- CCTV structural peak score and overall peak score;
- Number of point repairs and lining recommendations by the defect-level rehabilitation methods module;
- Number of defects;
- Length of major (score of 4 or 5) and/or minor (score of 3) defects; and
- Presence of specific defects such as infiltration drippers (ID) or Reinforcement Corroded Chemical (SRCC).

Figure 9-1 presents a schematic of the established decision tree. Pipeline segments with CCTV inspection data are filtered by their PACP peak scores. Then, they are analyzed based on the number of point repairs and lining recommendations established by the defect-level rehabilitation methods module as well as the number of defects, length of defects, and presence of specified minor, but not negligible, defects. When multiple rehabilitation options were recommended, a cost analysis was performed to determine the best action. For example, if a segment was recommended to receive ten sectional liners, a full liner would be more cost-effective.

Table 9-1: Sample of Defect Codes with Associated Rehabilitation Methods

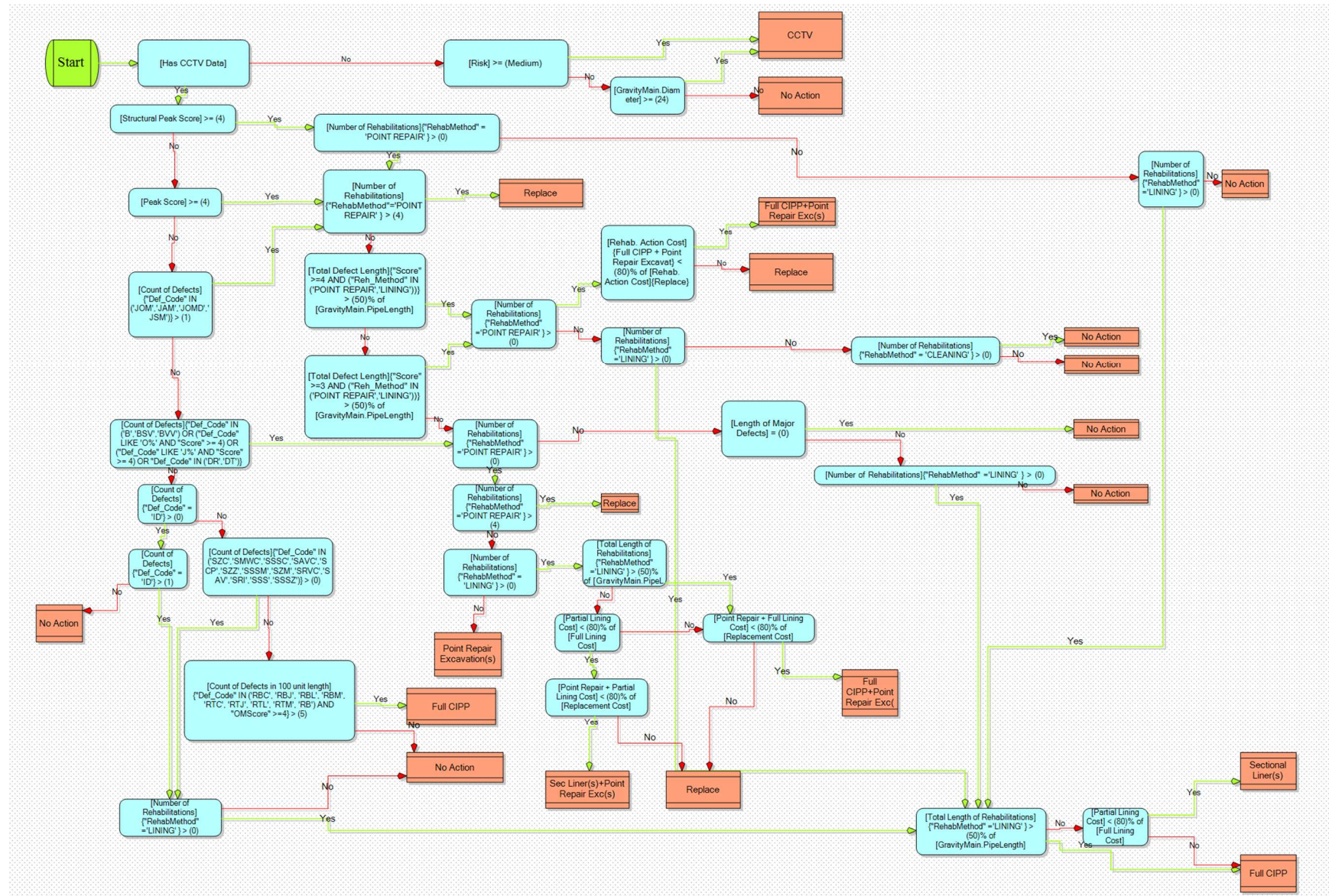
| Defect Code | Score | Defect Type | Description | Rehabilitation Method |
|-------------|-------|-------------|-----------------------------------|-----------------------|
| BSV | 5 | Structural | Broken Soil Visible | Point repair |
| BVV | 5 | Structural | Broken Void Visible | Point repair |
| DI | 5 | Structural | Dropped Invert | Point repair |
| DV | 5 | Structural | Deformed Vertical Brick | Point repair |
| HSV | 5 | Structural | Hole Soil Visible | Point repair |
| HVV | 5 | Structural | Hole Void Visible | Point repair |
| SMW | 5 | Structural | Missing Wall | Point repair |
| SMWC | 5 | Structural | Missing Wall Chemical | Point repair |
| SMWM | 5 | Structural | Missing Wall Chemical | Point repair |
| SMWZ | 5 | Structural | Missing Wall Unknown | Point repair |
| SRC | 5 | Structural | Reinforcement Corroded | Point repair |
| SRCC | 5 | Structural | Reinforcement Corroded Chemical | Point repair |
| SRCM | 5 | Structural | Reinforcement Corroded Mechanical | Point repair |
| SRCZ | 5 | Structural | Reinforcement Corroded Unknown | Point repair |
| SRP | 5 | Structural | Reinforcement Projecting | Lining |
| SRVM | 5 | Structural | Reinforcement Visible Mechanical | Lining |
| SRVZ | 5 | Structural | Reinforcement Visible Unknown | Lining |
| XB | 5 | Structural | Collapse Brick Sewer | Point repair |
| XP | 5 | Structural | Collapse Pipe Sewer | Point repair |

Figure 9-2 displays the final rehabilitation methods recommended for each segment based on the decision tree. For a table of the recommended rehabilitation method for each segment, see **Appendix A** (R&R Study App. A).

9.1.2 Segments without CCTV Inspection

For segments without CCTV inspection data, risk scores and diameter were used to develop a prioritized set of segments that are recommended for CCTV inspection and further analysis. Pipeline segments with a risk score of medium or higher (greater than or equal to three) – see **Section 4.2.3** – were included as part of this CCTV recommendation. Additionally, all pipelines with a diameter of 24-inches or greater are recommended for prioritized CCTV regardless of the associated risk rating. **Figure 9-3** presents the segments recommended to prioritize for CCTV.

Figure 9-1: Rehabilitation Decision Tree



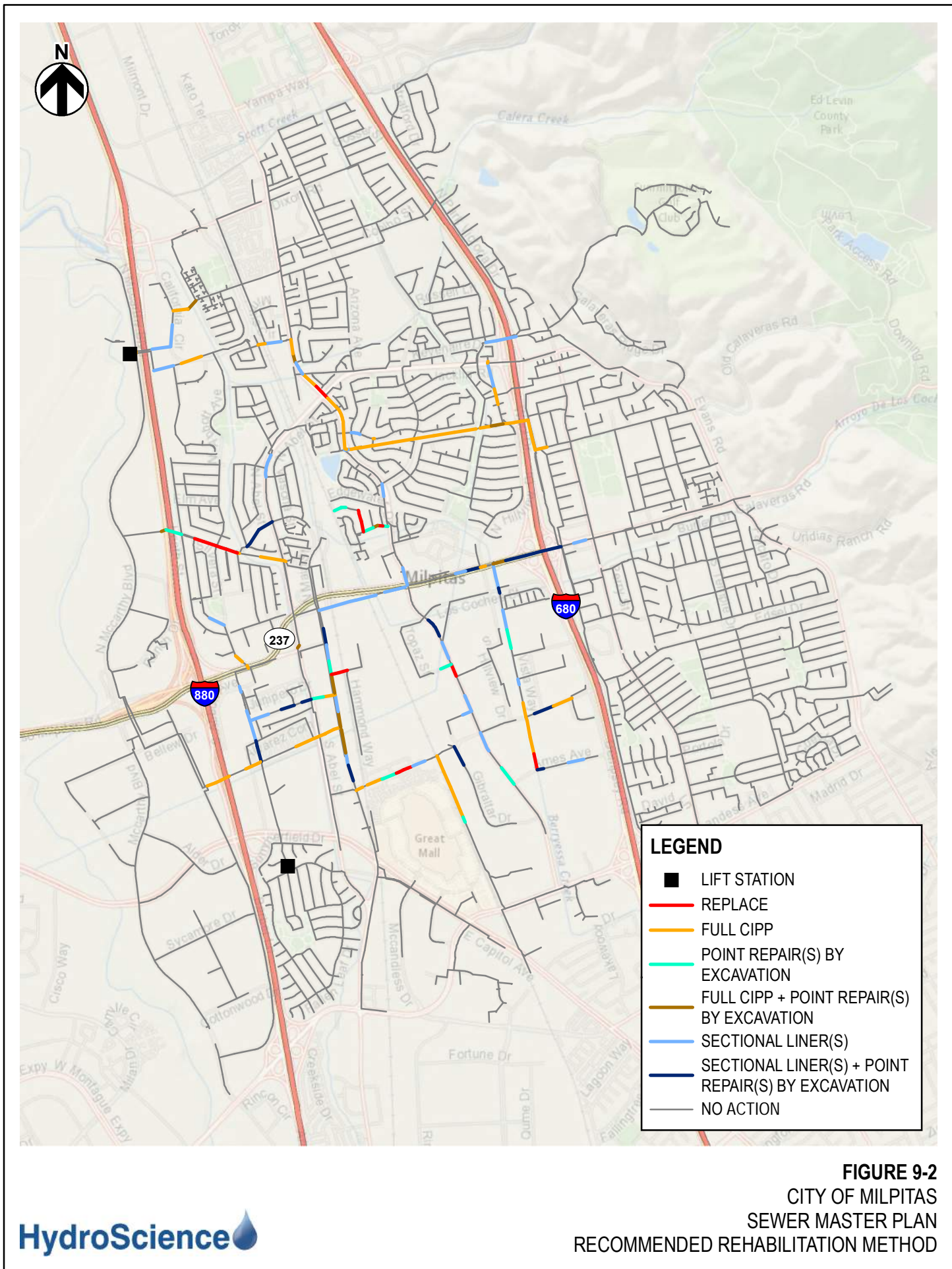


FIGURE 9-2
 CITY OF MILPITAS
 SEWER MASTER PLAN
 RECOMMENDED REHABILITATION METHOD

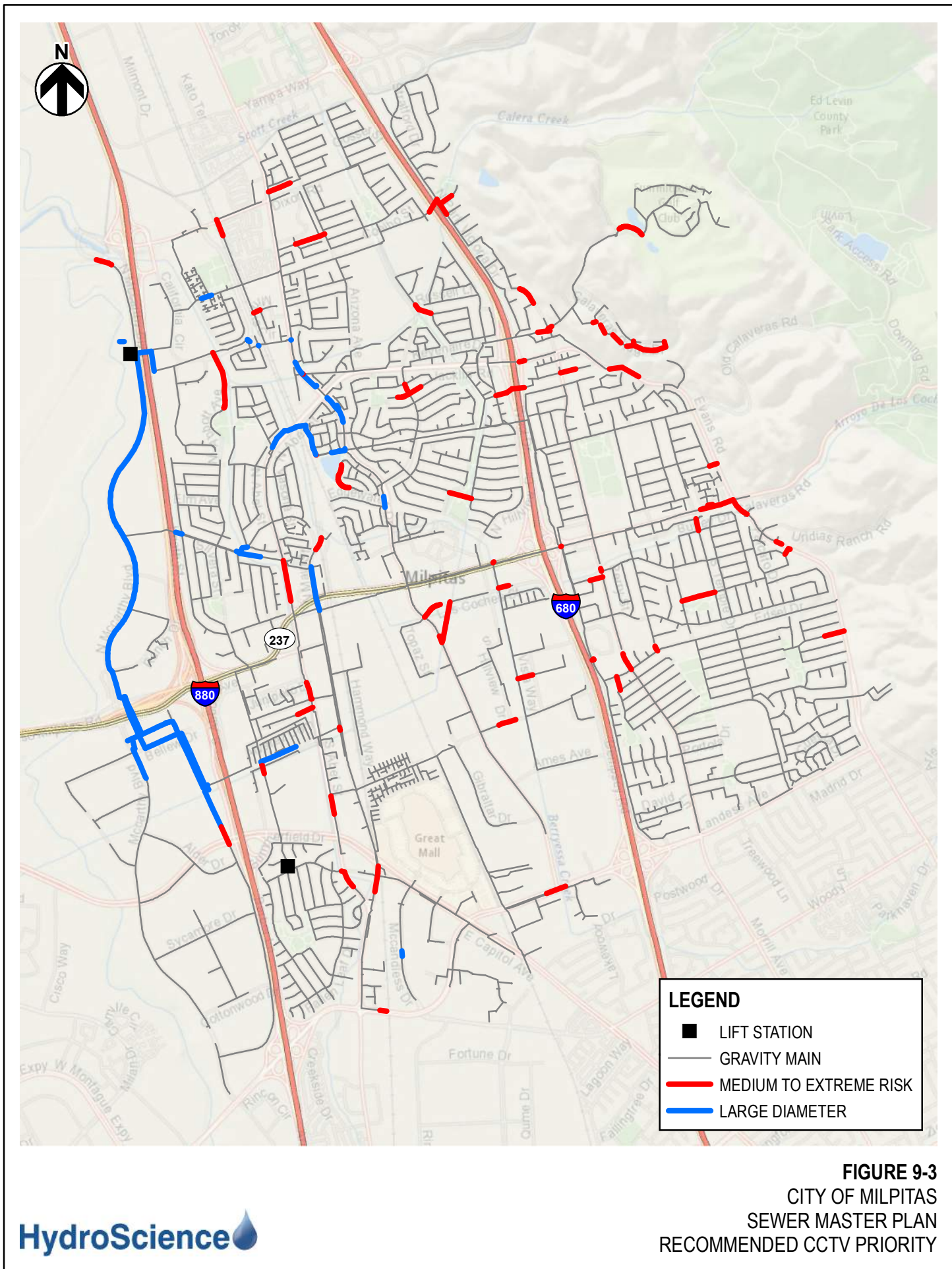


FIGURE 9-3
CITY OF MILPITAS
SEWER MASTER PLAN
RECOMMENDED CCTV PRIORITY

9.2 Basis of Cost Assumptions

A cost estimate was developed for each type of rehabilitation method. Provided is a description of the basis for unit cost development and associated project-specific costs for pipelines, resurfacing, manholes, pumping systems, structural rehabilitation, protective coatings, bypass and redundancy, and electrical equipment. The purpose of approximating construction costs is to appropriate a conservative level of funding for each identified rehabilitation project included within the proposed scope of the City's upcoming CIP. **Appendix A** (R&R Study App. J) contains details of the preliminary cost estimates for all projects analyzed as part of this SMP.

9.2.1 CCTV Costs

CCTV costs were estimated based on diameter and length. Unit costs are conservative to account for the added cost for specialized techniques, such as laser profiling for large diameter pipe, and general quality control review. Unit costs are provided in **Table 9-2**.

Table 9-2: CCTV Unit Costs

| Pipe Diameter (in) | Unit Cost (\$/ft) |
|--------------------|-------------------|
| Up to 18 | \$4 |
| 19 to 24 | \$5 |
| 25 to 36 | \$6 |
| 37 to 66 | \$8 |

9.2.2 Pipeline Costs

Pipeline construction costs were developed in coordination with the City according to the City's cost criteria.

9.2.3 Soft Costs

Soft costs are additional project costs that are not considered to be contractor construction costs. These costs include engineering design, permitting, construction administration, and construction management. Typical soft costs include the following:

- Engineering design and consulting is expected to also address California Environmental Quality Act (CEQA) requirements to identify significant environmental impacts, if any.
- Permitting, land acquisition and obtaining right-of-way (ROW) are dependent on the project. For existing City facilities, the cost is expected to be less than if an easement is needed to be obtained through a property. The cost is also expected to be a function of the total cost. A range of percentages were applied to each project.
- Engineering services during construction (ESDC) and construction management costs are those costs associated with the administration of the contract and management of the project, ensuring the project is constructed as designed.
- The annual inflation of cost that would occur over time for a future project.

Table 9-3 provides a summary of the parameters used for estimating the soft costs. Soft costs were applied to all projects.

Table 9-3: Soft Cost Estimating Parameters

| Cost Parameter | Cost | Applied to: |
|--|------|-----------------------|
| Engineering Design and Consulting Services | 15% | Construction Subtotal |
| Permitting, land acquisition, and obtaining ROW | 7% | Construction Subtotal |
| ESDC, Construction Management, & Inspection Services | 12% | Construction Subtotal |
| Annual Inflation | 3% | Project Total |

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SECTION 10 – CAPITAL IMPROVEMENT PLAN

This section presents a summary of the prioritized set of CIP projects developed as a culmination of the condition assessment (CCTV inspection, desktop inspection, and lift station inspection) presented in **SECTION 4** and the project development summarized in **SECTION 9**. Recommendations include budget estimates and targeted timelines for project implementation based on the prioritization laid out in **SECTION 9**.

10.1 Existing CIP Projects

Every year, the City prepares a five-year CIP that provides the City Council, staff, and public with a comprehensive planning tool for budgeting and carrying out a range of capital projects. To ensure that the recommendations provided as part of this Master Plan Study align with recent, ongoing, and planned projects, a review of the City's 2020-2025 CIP was conducted. **Table 10-1** presents recent and ongoing wastewater collection system and lift station improvement projects per the 2020-2025 CIP.

Table 10-1: Recent Sewer Improvement Projects

| Project ID | Project | Description | Status |
|------------|---|---|--|
| 6119 | Sanitary Sewer Condition Assessment Program | Citywide sanitary sewer condition assessment program to determine the condition of the City's sanitary sewer system. | This phase to be completed during FY 2020/21. |
| 6124 | Pump Station Rehabilitation Program | Rehabilitation or replacement of wastewater pumps at Main LS and Venus LS to safely discharge sewage. | Replacement of pump no. 3 and purchase of portable backup generator at the Main LS planned for FY 2020-21. |
| 6126 | Minor Sewer Projects | Ongoing analysis, engineering, and implementation of various minor modifications and improvements to existing sewer systems. | Transfer switch at Venus and pavement restoration at the Main LS are planned for FY 2020-21. |
| 6130 | Main LS Odor Emissions Control | Installation of odor emission controls at the Main LS to address concerns regarding elevated levels of hydrogen sulfide and other odorous compounds at the facility. | Design started in FY2018-19 and construction started during spring 2020. |
| 6131 | Sanitary Sewer Cathodic Protection Improvements | Assessment, design, and installation of cathodic protection system along City's steel sewer force main from the Main LS to the RWF. Includes replacement of two existing magnetic flow meters at the Main LS with proper isolation to prevent reading interference. | Assessment and design started in FY 2019-20. |
| 6134 | On-Call Sewer Maintenance & Repair Services | On-call repair and maintenance services at all City sewer infrastructure, assets, and appurtenances. | Ongoing |
| Plan | Sewer Line Replacement at E. Curtis | Design and construction of sanitary sewer main replacement/upgrade on E. Curtis Avenue from S. Main Street to the E. Curtis cul-de-sac. This project will be financed through TASP Impact Fees. | 2023-2024 |

Table 10-2 provides a summary of the 2020-2025 allocation for each of the projects and the sources of funding for each per the City's Capital Improvement Program 2020-2025 Final Report.

Table 10-2: Existing CIP Financing for 2020-2025

| Projects | Sewer Infrastructure Fund | Sewer Fund | Sewer Treatment Fund | Total |
|--|---------------------------|------------|----------------------|-----------|
| 6119 Sanitary Sewer Condition Assessment Prgm ¹ | (\$50,000) | (\$74,000) | \$0 | \$ 0 |
| 6124 Pump Station Rehabilitation Program ² | \$52,000 | \$0 | \$0 | \$52,000 |
| 6126 Minor Sewer Projects ³ | \$163,000 | \$0 | \$0 | \$163,000 |
| 6130 Main Lift Station Odor Emissions Control | \$0 | \$0 | \$200,000 | \$200,000 |
| 6131 Sanitary Sewer Cathodic Protection Improvements | \$500,000 | \$0 | \$0 | \$500,000 |
| 6134 On-Call Sewer Maintenance & Repair Services | \$24,000 | \$74,000 | \$0 | \$98,000 |
| Total Existing Projects | \$689,000 | \$0 | \$200,000 | \$889,000 |

Notes:

1. The total \$124,000 in prior year funding from Sewer Fund and Sewer Infrastructure Fund to be allocated for other projects in FY2020-21. There is no further allocation for this program according to the Capital Improvement Program 2020-2025 Final Report
2. This is the net allocation. Original allocation is \$200,000 with \$148,000 in prior year funding from Sewer Infrastructure Fund to be allocated for other projects in FY2020-21.
3. This is the net allocation. Original allocation is \$200,000 with \$37,000 in prior year funding from Sewer Infrastructure Fund to be allocated for other projects in FY2020-21.

Sewer CIP are largely funded by the Sewer Infrastructure Fund. Other funding sources include the Sewer Fund (user rate structure) and the Sewer Treatment Fund (sewer connection fees). The funds are described in the CIP 2020-2025 Final Report as follows:

- **Sewer Infrastructure Fund:** Monies set aside to replace aging infrastructure for sewer related projects.
- **Sewer Fund:** Enterprise fund which receives revenue from sewer rates for sewer related improvements.
- **Sewer Treatment Fund:** Funded from fees collected from developers connecting to the Sewer System. Funds restricted for sewer related projects.

10.2 Proposed CIP Projects

Three alternatives to project phasing were evaluated in developing the proposed CIP phases. The first alternative addresses CIP projects based on BRE grades without consideration of project location, prioritizing the highest risk projects. The second alternative approach groups projects geographically within the sewer basin. The third alternative, which was selected for implementation, was a hybrid approach where pipelines with significant defects were prioritized in the first year and each subsequent year considered risk, type of rehabilitation, and geographic location. The general strategy is to address the highest risk/highest priority projects in the near-term (Years 1-5) with lower risk projects deferred to the medium- (Years 6-10) and long-term (Years 11-20). The objective was to budget for approximately \$1.5M-\$2M annually. Depending on funding availability, projects can slide up or down CIP phases while maintaining project priority.

The detailed risk assessment, basis for selecting rehabilitation methods, prioritization of improvements, and the related construction costs (construction and contingency) are provided in **Appendix A** (R&R Study).

Soft costs, as described in **Section 9.2.3**, consisting of engineering design and consulting; permitting and ROW; and ESDC, construction management and inspection services are included in the capital project costs provided. The following sections present the recommended projects for implementation and the proposed timeframe.

10.2.1 CCTV Inspection

Approximately 105,000 ft (449 segments) of sewer main was inspected as part of the condition assessment. The remaining 685,000 ft was analyzed using the desktop assessment. Medium- to extreme-risk pipes and large diameter pipes are recommended for CCTV inspection. Large diameter pipe is defined as 24-inch diameter or greater. **Figure 9-3** presents the recommended CCTV inspection map of these highest priority areas. These inspections total 55,000 ft, with an estimated cost totaling approximately \$400,000 based on the unit costs provided in **Section 9.2.1**.

It is noted that the CCTV inspection work may generate additional improvement projects that may augment the proposed CIP. There is an existing CIP project (6126) that is intended to address minor sewer projects that currently allocates \$50,000 annually. It is recommended that the City increase the annual allowance to \$250,000 (\$1.25M every five years) to budget for improvements needed to address defects as they are discovered during new CCTV inspections.

10.2.2 Pipeline Improvements

Of the approximately 105,000 ft (449 segments) of sewer pipeline inspected, approximately 50,000 ft (178 segments, see **Figure 9-2**) requires improvement. Recommended improvements include:

- Pipe Replacement
- Full Cured-In-Place Pipe (CIPP)
- Point Repair(s) by Excavation
- Sectional Liner(s)

It is noted that some pipeline segments include more than one recommended rehabilitation method.

The highest priority improvements are those segments identified to have significant defects during the condition assessment and thus rated as highest risk of failure. These projects are proposed for immediate improvement (Year 1) to reduce the likelihood of a catastrophic failure and are summarized in **Table 10-3**. The proposed method of rehabilitation is provided along with the capital cost for the collective improvements.

Table 10-3: Highest Priority Pipe with Significant Defects (Year 1: 2022)

| Average Risk Grade | Street Name | Diameter (in) | Length (ft) | Material | Recommended Rehabilitation Method | Construction Cost |
|--|----------------------------|---------------|-------------|----------|--|--------------------|
| 5.0 | Coming Ave | 8 | 234 | VCP | Sectional Liner(s), Point Repair(s) | \$61,000 |
| 5.0 | E Calaveras Blvd | 15 | 1305 | VCP | Sectional Liner(s), Point Repair(s), Full CIPP | \$273,000 |
| 5.0 | Just East of S Hillview Dr | 15 | 491 | VCP | Sectional Liner(s), Full CIPP | \$103,000 |
| 4.0 | Curtis Ave | 18 | 172 | VCP | Sectional Liner(s) | \$39,000 |
| 4.0 | Marylinn Dr | 27 | 292 | VCP, RCP | Pipe Replacement, Full CIPP, Point Repair(s) | \$131,000 |
| 4.0 | N Hillview Dr | 12 | 218 | VCP | Sectional Liner(s) | \$44,000 |
| 4.0 | S Main St | 18, 21 | 733 | VCP | Sectional Liner(s), Point Repair(s) | \$147,000 |
| 4.0 | Sinnot Ln | 12 | 398 | VCP | Full CIPP, Point Repair(s) | \$139,000 |
| Construction Subtotal | | | | | | \$936,000 |
| Construction Contingency | | | | | 30% | \$281,000 |
| Engineering Design and Consulting Services | | | | | 15% | \$140,000 |
| Permitting and Right of Way (ROW) | | | | | 7% | \$66,000 |
| ESDC, Construction Management, & Inspection Services | | | | | 12% | \$112,000 |
| Total Year 1 Project Costs | | | | | | \$1,536,000 |

Additional high- and some medium-priority improvements are recommended for implementation in the first five years after addressing the highest risk improvements shown in **Table 10-3**. These improvements are listed in **Table 10-4** and include the next priority projects, which also combine pipes with rehabilitation needs (of any risk grading) along the same street for efficiency.

Table 10-4: Medium- to High-Priority Improvements (Years 2-5: 2023-2026)

| Average Risk Grade | Street Name | Diameter (in) | Length (ft) | Material | Recommended Rehabilitation Method | Construction Cost |
|--|---|----------------|-------------|----------|--|--------------------|
| 5.0 | S Abel St | 18 | 66 | VCP | Point Repair(s), Sectional Liner(s) | \$32,000 |
| 3.9 | Just East of S Hillview Dr ¹ | 12, 15 | 2,947 | VCP | Full CIPP, Point Repair(s), Sectional Liner(s) | \$503,000 |
| 3.7 | N Milpitas Blvd | 33, 39 | 3,062 | RCP | Full CIPP, Sectional Liner(s) | \$1,776,000 |
| 3.5 | Nimitz Fwy and California Cir | 18, 42 | 1,974 | VCP, RCP | Full CIPP, Sectional Liner(s) | \$474,000 |
| 3.3 | E Calaveras Blvd ¹ | 12, 15, 18, 21 | 3,336 | VCP | Full CIPP, Point Repair(s), Sectional Liner(s) | \$1,168,000 |
| 3.2 | Coming Ave ¹ | 8 | 1,374 | VCP | Full CIPP | \$358,000 |
| Construction Subtotal | | | | | | \$4,311,000 |
| Contingency | | | | | 30% | \$1,293,000 |
| Engineering Design and Consulting Services | | | | | 15% | \$647,000 |
| Permitting and Right of Way (ROW) | | | | | 7% | \$302,000 |
| ESDC, Construction Management, & Inspection Services | | | | | 12% | \$517,000 |
| Total Year 2-5 Project Costs | | | | | | \$7,070,000 |

Notes:

1. This street had some rehabilitation addressed in Year 1.

After addressing all high-priority, and some medium-priority, improvements in the first five years, the remaining medium-priority improvements are proposed for the next five-year period (Years 6-10). These improvements are listed in **Table 10-5**.

Table 10-5: Medium-Priority Improvements (Years 6-10: 2027-2031)

| Average Risk Grade | Street Name | Diameter (in) | Length (ft) | Material | Recommended Rehabilitation Method | Construction Cost |
|--|--------------------------------|---------------|-------------|----------|--|--------------------|
| 3.3 | S Main St ¹ | 18, 21 | 2,882 | VCP | Point Repair(s) and Sectional Liner(s) | \$576,000 |
| 2.9 | Machado Ave | 24, 30 | 2,939 | RCP, VCP | Full CIPP, Sectional Liner(s) | \$1,006,000 |
| 2.8 | B/w Tramway Dr & Los Pinos Ave | 24, 30 | 4,473 | VCP, RCP | Full CIPP, Sectional Liner(s) | \$2,484,000 |
| Construction Subtotal | | | | | | \$4,066,000 |
| Contingency | | | | | 30% | \$1,220,000 |
| Engineering Design and Consulting Services | | | | | 15% | \$610,000 |
| Permitting and Right of Way (ROW) | | | | | 7% | \$285,000 |
| ESDC, Construction Management, & Inspection Services | | | | | 12% | \$488,000 |
| Total Year 6-10 Project Costs | | | | | | \$6,669,000 |

Notes:

1. This street had some rehabilitation addressed in Year 1.

Low- and very low-priority improvements are proposed in the longer-term CIP (Years 11-20). The next two five-year increments are proposed in **Table 10-6** and **Table 10-7**. While these pipelines pose a small risk of failure, it is expected that they can continue to operate without significant likelihood of immediate failure.

Table 10-6: Low-Priority Improvements (Years 11-15: 2032-2036)

| Average Risk Grade | Street Name | Diameter (in) | Length (ft) | Material | Recommended Rehabilitation Method | Construction Cost |
|--|---|---------------|-------------|--------------|--|--------------------|
| 3.1 | Marylinn Dr | 27, 30 | 2,841 | RCP, VCP, SS | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s) | \$1,472,000 |
| 3.0 | Ames Ave | 12 | 533 | VCP | Point Repair(s), Sectional Liner(s) | \$107,000 |
| 3.0 | Connection b/w N Milpitas Blvd & Summerwind Way | 42 | 563 | RCP | Full CIPP, Sectional Liner(s) | \$176,000 |
| 3.0 | Curtis Ave | 15, 18 | 1,457 | VCP | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s) | \$572,000 |
| 3.0 | Gibraltar Dr | 12 | 502 | VCP | Point Repair(s), Sectional Liner(s) | \$100,000 |
| 3.0 | Kennedy Dr | 12 | 276 | VCP | Full CIPP | \$82,000 |
| 3.0 | N Abel St | 27 | 543 | VCP | Sectional Liner(s) | \$103,000 |
| 3.0 | N McCarthy Blvd | 18 | 44 | VCP | Sectional Liner(s) | \$31,000 |
| 3.0 | N Milpitas Blvd | 15 | 423 | VCP | Sectional Liner(s) | \$122,000 |
| 3.0 | River Rock Rd | 18 | 561 | VCP, RCP | Full CIPP | \$238,000 |
| 3.0 | S Abbott Ave | 15, 16 | 285 | VCP, CIP | Sectional Liner(s), Full CIPP | \$103,000 |
| 3.0 | S Milpitas Blvd | 8, 12, 18 | 1,695 | VCP | Point Repair(s), Sectional Liner(s) | \$339,000 |
| 3.0 | Fwy Crossing near Fox Hollow Ct | 12 | 748 | VCP | Sectional Liner(s) | \$150,000 |
| 3.0 | Smithwood St | 15 | 388 | VCP | Sectional Liner(s) | \$78,000 |
| 3.0 | Tramway Dr | 12 | 38 | VCP | Full CIPP | \$19,000 |
| 3.0 | Venus Way | 8 | 46 | VCP | Point Repair(s) | \$12,000 |
| 3.0 | Wool Dr | 24 | 368 | VCP | Full CIPP | \$168,000 |
| 3.0 | Yosemite Dr | 8 | 970 | VCP | Full CIPP, Pt Repair(s), Sectional Liner(s) | \$194,000 |
| 2.8 | Great Mall Dr | 15 | 1,724 | VCP | Full CIPP, Pt Repair(s), Sectional Liner(s) | \$448,000 |
| 2.7 | Connection to SW Community Starting from W Calaveras Blvd | 15 | 1,419 | VCP | Full CIPP, Pt Repair(s), Sectional Liner(s) | \$369,000 |
| 2.3 | N Hillview Dr | 12 | 833 | VCP, DIP | Full CIPP, Sectional Liner(s) | \$208,000 |
| Construction Subtotal | | | | | | \$5,090,000 |
| Contingency | | | | | 30% | \$1,527,000 |
| Engineering Design and Consulting Services | | | | | 15% | \$764,000 |
| Permitting and Right of Way (ROW) | | | | | 7% | \$356,000 |
| ESDC, Construction Management, & Inspection Services | | | | | 12% | \$611,000 |
| Total Year 11-15 Project Costs | | | | | | \$8,348,000 |

Table 10-7: Very Low-Priority Improvements (Years 16-20: 2037-2041)

| Average Risk Grade | Street Name | Diameter (in) | Length (ft) | Material | Recommended Rehabilitation Method | Construction Cost |
|--|---|---------------|-------------|----------|--------------------------------------|--------------------|
| 2.0 | S Milpitas Blvd | 8, 12 | 893 | VCP | Sectional Liner(s) | \$179,000 |
| 2.0 | Turquoise St | 10 | 275 | VCP | Point Repair(s) | \$55,000 |
| 2.0 | Tramway Dr | 12 | 220 | VCP | Sectional Liner(s) | \$44,000 |
| 1.0 | Connection b/w S Milpitas Blvd and Gibraltar Ct | 12 | 231 | VCP | Sectional Liner(s) | \$46,000 |
| 1.0 | Meadowland Dr | 15 | 816 | Unknown | Pipe Replacement and Point Repair(s) | \$354,000 |
| 1.0 | Silverlake Dr | 15 | 621 | Unknown | Full CIPP and Point Repair(s) | \$161,000 |
| 1.0 | Wool Dr | 24 | 368 | RCP | Full CIPP | \$169,000 |
| Construction Subtotal | | | | | | \$1,008,000 |
| Contingency | | | | | 30% | \$302,000 |
| Engineering Design and Consulting Services | | | | | 15% | \$151,000 |
| Permitting and Right of Way (ROW) | | | | | 7% | \$71,000 |
| ESDC, Construction Management, & Inspection Services | | | | | 12% | \$121,000 |
| Total Year 16-20 Project Costs | | | | | | \$1,653,000 |

10.2.3 Lift Station

The Main LS and Venus Way LS were inspected, and major deficiencies were catalogued in the LS Report, as summarized in **Section 4.3** and detailed in **Appendix A** (R&R Study App. K). There are no immediate needs for the Venus Way LS. For the Main LS, the highest scoring deficiencies are identified **Table 10-8** and presented in order of priority according to both the condition and performance scores for the specific asset. Per City's 2019-24 CIP, project 6124, an allowance of \$100,000 annual investment from FY 2019-20 through FY 2022-23 is planned to address these rehabilitation needs.

Table 10-8: Main LS Deficiencies

| Asset Name | Field Assessment/Comments | Condition Score | Performance Score |
|---------------------------------------|--|-----------------|-------------------|
| Manifold PV #2 Actuator | Does not work | 5 | 5 |
| Grinder #1 | Excessive vibration and inadequate supports | 5 | 5 |
| Air Vacuum 1 to 15 | Cavitation, coating failure, and inadequate supports | 5 | 5 |
| Mag Meter (Flow Meter A) ¹ | Not in operation | 4 | 4 |
| Pump #3 | Has exceeded useful life ² | 4 | 4 |
| 2" Combination Air/Vacuum Valve | None | 4 | 4 |
| Flow Meter B ¹ | Operable, but not accurate | 4 | 4 |
| Variable Frequency Drive P2 | No corrosion identified, arc flash labels missing | 4 | 2 |
| Variable Frequency Drive P3 | No corrosion identified, confirmed by City that IGBT was replaced in 2019, arc flash labels missing | 4 | 2 |
| Variable Frequency Drive P4 | No corrosion identified, arc flash labels missing | 4 | 2 |
| Variable Frequency Drive P5 | No corrosion identified, confirmed by City that cooling fans were replaced in 2019, arc flash labels missing | 4 | 2 |

Notes:

1. The City is replacing these meters as part of CIP Project 6131: Sanitary Sewer Cathodic Protection Improvements.
2. This pump has logged over 50,000 hours.

10.3 CIP Budget and Schedule

The sewer CIP is funded by the sewer enterprise fund which includes the user rate structure and sewer connection fees. Provided below in **Table 10-9** is a proposed budget and schedule for the CIP and recommended projects over 20-years in 5-year increments. The most critical projects are scheduled for earlier implementation. It is noted that the timing of projects can be adjusted based on results of CCTV and future operating conditions. **Figure 10-1** presents the proposed improvement projects in 5-year increments.

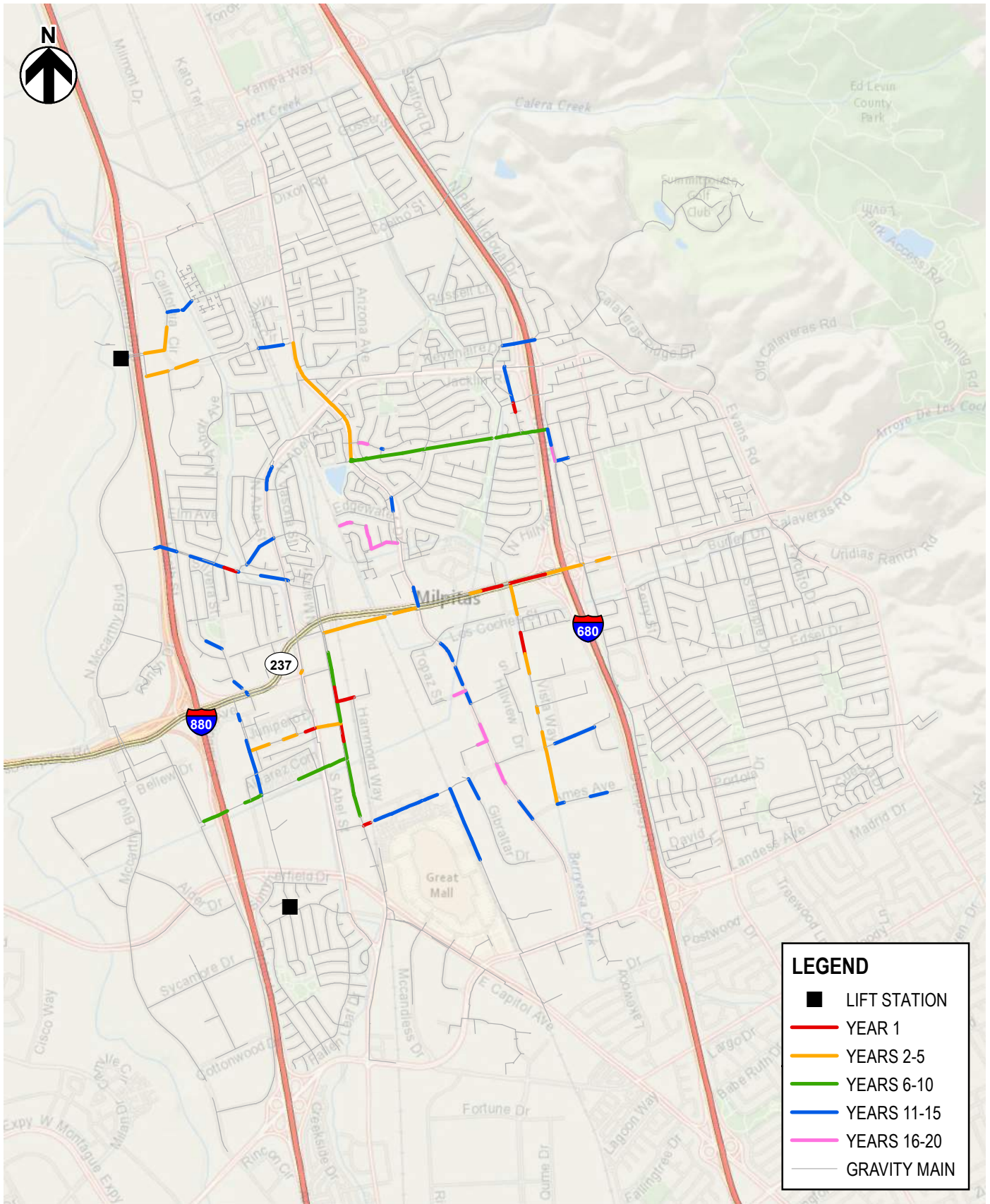


FIGURE 10-1
CITY OF MILPITAS
SEWER MASTER PLAN
CAPITAL IMPROVEMENT PROJECTS

Table 10-9: Proposed CIP Schedule and Budget

| Projects | 5-Year (2022-2026) | 10-Year (2027-2031) | 15-Year (2032-2036) | 20-Year (2037-2041) |
|--|------------------------|------------------------|------------------------|------------------------|
| Existing Projects | | | | |
| 6124 Pump Station Rehabilitation Program | \$200,000 ¹ | -- | -- | -- |
| 6126 Minor Sewer Projects | \$200,000 ² | -- | -- | -- |
| 6130 Main Lift Station Odor Emissions Control | \$200,000 | -- | -- | -- |
| 6131 Sanitary Sewer Cathodic Protection Improvements | \$500,000 | -- | -- | -- |
| 6134 On-Call Sewer Maintenance & Repair Services | \$98,000 | -- | -- | -- |
| Total Existing Projects | \$1,198,000 | -- | -- | -- |
| Proposed Projects | | | | |
| CCTV large diameter and high-risk assets | \$400,000 | -- | -- | -- |
| Highest Priority Improvements | \$1,536,000 | -- | -- | -- |
| Medium- to High- Priority Improvements | \$7,070,000 | \$6,669,000 | -- | -- |
| Low Priority Improvements | -- | -- | \$8,348,000 | \$1,653,000 |
| Allocation for improvements identified from ongoing CCTV | \$1,250,000 | \$1,250,000 | \$1,250,000 | \$1,250,000 |
| Total Proposed Projects | \$10,256,000 | \$7,919,000 | \$9,598,000 | \$2,903,000 |
| Existing and Proposed Projects | \$11,454,000 | \$7,919,000 | \$9,598,000 | \$2,903,000 |

Notes:

1. Original allocation is \$200,000 through 2023 with \$148,000 in prior year funding from Sewer Infrastructure Fund to be allocated for other projects in FY2020-21.
2. Original allocation is \$200,000 with \$37,000 in prior year funding from Sewer Infrastructure Fund to be allocated for other projects in FY2020-21.
3. It is noted that costs were reviewed and updated during 2022 to reflect recent cost increases associated with sewer infrastructure projects.

After the projects above were developed, the City contracted with the financial consulting firm Raftelis to develop fiscal impact models and to assess the financial feasibility of the Master Plan projects, beginning FY 2024 through FY 2040. The financial models are intended to evaluate the sewer utility fund revenues and expenses and analyze the impacts of the Master Plan projects on City funds. The Wastewater Financial Plan Options Report is attached as **Appendix G**.

10.4 Other Recommendations

During the CCTV inspection performed by NPS, there were instances of large grease buildup in various locations throughout the wastewater collection system. As explained previously, the presence of grease buildup and other blockages, particularly at, or near, critical flow splits, can significantly impact collection system operations, particularly at flow splits, which are generally intended to mitigate high flows and provide redundancy. This redundancy aids the system's ability to handle higher flows during wet weather events and as the water table rises during the wet season. When flow splits are not operating properly, this can drastically impact the system operation, particularly during wet weather events.

It is recommended that the City cleans the locations identified as having grease buildup. Locations should also be vacuumed to remove blockages from moving further downstream. In addition, stricter FOG Control Program guidelines and increased inspections may be necessary to prevent FOG discharges to the wastewater collection system.

It is expected that there will be additional O&M costs related to the following:

- In-house CCTV inspection;
- Additional cleaning related to the act of inspection and as a result of discovering blockages; and
- Implementing a stricter FOG Control Program/increased inspections of grease traps.

In addition to the projects summarized herein, the City is evaluating the need to rehabilitate or replace Force Main A (FM-A), which conveys wastewater from the Main LS to the RWF (see **Figure 3-1**). Built in 1974, FM-A was identified as requiring inspection because the soils surrounding the pipeline are very corrosive. The City contracted with a third party to perform cleaning and CCTV inspection of FM-A to determine the internal condition. The inspection was not fully completed due to unforeseen obstacles.

It is recommended that the City perform a complete condition assessment of FM-A to verify the internal condition of the pipeline and determine the best options for rehabilitation or replacement. The City's report generated by the engineering department is included as **Appendix H**.

Initial City estimates to rehabilitate or replace FM-A are approximately \$1M to complete the force main assessment and maintenance of the appurtenances and an additional \$25M to replace the force main. Both of these costs were included as capital projects requiring consideration for an upcoming CIP, in addition to the amounts specified in **Section 10.3**.

APPENDIX A
City of Milpitas
Sewer Master Plan Study
Sewer Utility Asset Renewal and Replacement Study

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11020 White Rock Road, Suite 200
Rancho Cordova, CA 95670

T: 916.444.0123

Final Report

Prepared for: HydroScience Engineers and City of Milpitas

Project Title: Milpitas Sewer Master Plan

Project No.: 154251

Final Report

Subject: Sewer Utility Asset Renewal and Replacement Study

Date: November 23, 2020

From: Brown and Caldwell

Prepared by: Elton DeSouza, PE (Non-CA)

Timothy Lee, EIT

Reviewed by: Lawrence Catalano, PE (Non-CA)

Sean Kilpatrick, PE (Non-CA)

Approved by: Manjit Saini, PE, C-61948, Exp 09-30-21

Limitations:

This document was prepared solely for HydroScience Engineers/City of Milpitas in accordance with professional standards at the time the services were performed and in accordance with the contract between HydroScience Engineers/City of Milpitas and Brown and Caldwell dated October 16, 2019. This document is governed by the specific scope of work authorized by HydroScience Engineers/City of Milpitas; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by HydroScience Engineers/City of Milpitas and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Executive Summary

As a part of the City of Milpitas' (City) Sewer Master Plan, Brown and Caldwell (BC) has been retained to develop a Sewer Utility Asset Renewal and Replacement (R&R) Study. The intent of the R&R Study is to provide the City with priorities for upcoming asset renewal and replacement projects given a fixed yearly budget.

Closed-circuit television (CCTV) was utilized to visually assess the sewer's condition. Resulting CCTV review was summarized and cataloged according to National Association of Sewer Service Company's (NASSCO) Pipeline Assessment and Certification Program (PACP) structural and operations and maintenance (O&M) grades in Section 2. Additionally, a desktop condition assessment was performed for all pipe segments using likelihood of failure (LOF) and consequence of failure (COF) criteria described in Section 3. This collective analysis revealed that of the approximately 105,000 linear feet (LF) (449 sewer segments) of sewer gravity pipeline inspected, approximately 50,000 LF (178 sewer segments) require system improvements totaling approximately \$17 million of construction costs. Of the remaining 685,000 LF segments with no inspection data, desktop risk assessment determined that 55,000 LF of medium to extreme risk pipes and/or large diameter pipes (24-inch diameter pipe or larger) require CCTV or sonar inspection totaling approximately \$400,000. System improvements and CCTV inspection recommendations total to \$17.4 million. These proposed improvements are illustrated on Figure ES-1.

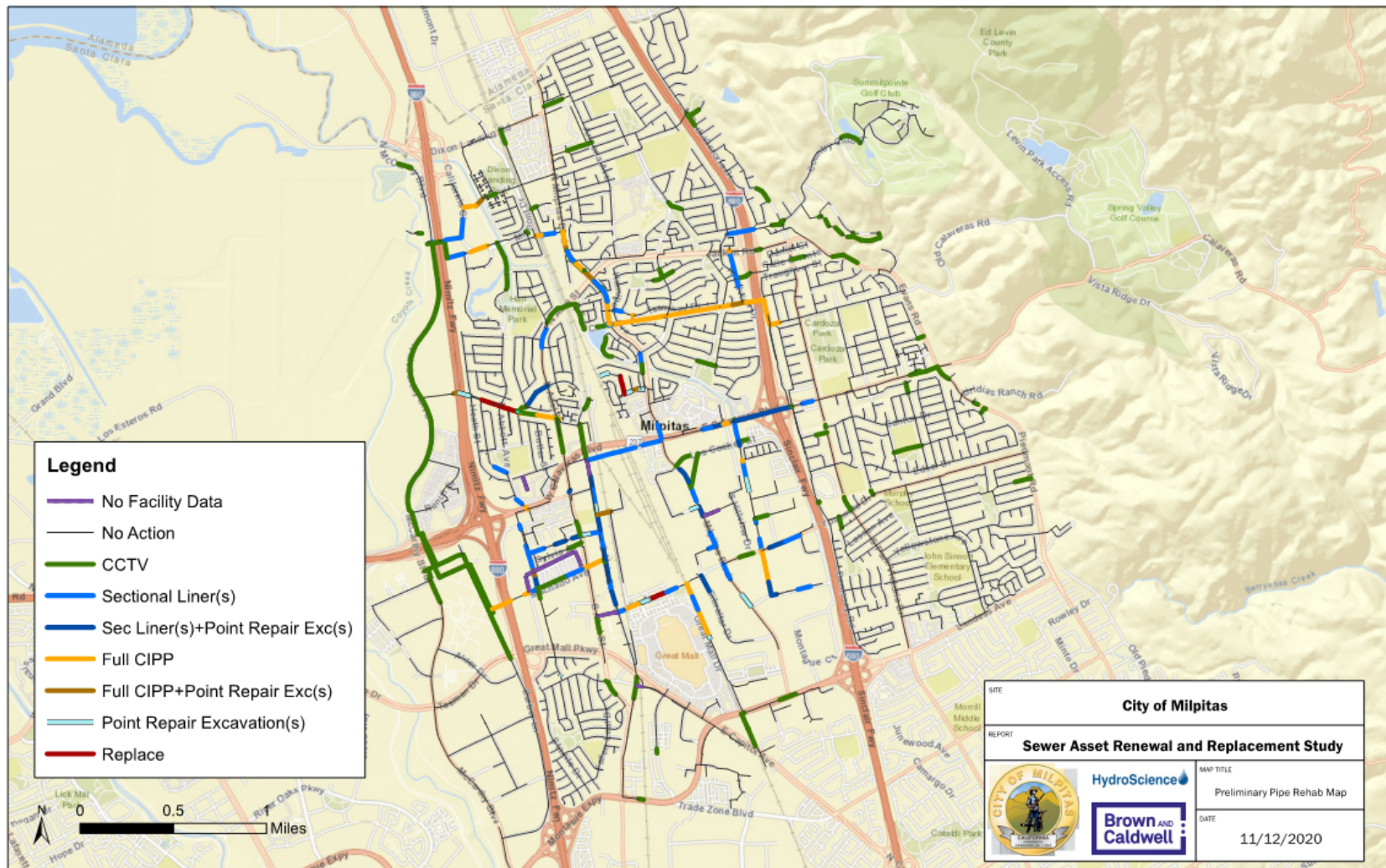


Figure ES-1: Preliminary Pipe Rehabilitation Recommendations Map

Table ES-1 presents a summary of the overall CCTV and rehabilitation recommendations with associated Association for the Advancement of Cost Engineering (AACE) Class 5 cost estimate. Note that the presented costs are budgetary construction costs and do not include engineering, permitting, legal, administrative, or other planning costs typical of budgetary capital improvement planning.

| Table ES-1. Detailed Rehabilitation Recommendations for Sewer Improvement | |
|--|--------------------------|
| Rehabilitation Action | Construction Cost |
| CCTV | \$400,000 |
| Full Cured-In-Place Pipe (CIPP) | \$8,900,000 |
| Full CIPP+Point Repair Exc(s) | \$1,400,000 |
| No Action | \$0 |
| Point Repair Excavation(s) | \$300,000 |
| Pipe Replacement ¹ | \$2,400,000 |
| Sec Liner(s)+Point Repair Exc(s) | \$1,400,000 |
| Sectional Liner(s) | \$2,600,000 |
| Total Construction Cost² (Class 5 Estimate) | \$17,400,000 |

¹Loaded cost including costs associated with earthwork, demolition, sheeting, shoring & bracing, paving, and testing and commissioning. Pavement repair assumes minimum four-foot-wide trench per running foot.

²Contingencies amounting to 45% are included in the estimate (5% Mobilization/Demobilization, 10% Sewer Bypassing, 30% Construction Cost and Market Contingency). Additionally, traffic control during construction amounting to \$10,000 to \$30,000 depending on roadway traffic rating was also assumed. Administrative, engineering, or other planning costs typical of CIP planning are not included.

These rehabilitation recommendations are divided into capital improvement program (CIP) phases below in Table ES-2 in correspondence with the City's \$2,000,000 annual rehabilitation budget when feasible. Although years 2 and 3 propose rehabilitations exceeding the budget, crucial rehabilitation of extreme and select high risk pipes help to minimize costly pipe failures. In addition, years 4 through 8 feature a rehabilitation plan requiring less budget to offset the previous expenditures.

| Table ES-2. Preliminary Sewer Pipeline Capital Improvement Plan | | | |
|--|--|--------------------------------------|-----------------------------------|
| Year | Description | Construction Cost¹ | Construction Cost Per Year |
| 1 | Rehabilitate Extreme and High Risk Pipes with Significant Defects | \$1,300,000 | \$3,000,000 |
| | CCTV Large Diameter and Medium to Extreme Risk Pipes | \$400,000 | |
| 1-3 | Rehabilitate Extreme Risk Pipes and Pipes Along the Same Street Requiring Rehabilitation | \$7,400,000 | |
| 4 | Rehabilitate High Risk Pipes and Pipes Along the Same Street | \$1,900,000 | - |
| 5-7 | Rehabilitate Medium Risk Pipes and Pipes Along the Same Street | \$5,400,000 | \$1,800,000 |
| 8 | Rehabilitate Low Risk Streets | \$1,000,000 | - |

¹Assets are rated from 1 (negligible) to 5 (extreme) based on available survey data and desktop condition assessment results.

²Contingencies amounting to 45% are included in the cost estimate (5% Mobilization/Demobilization, 10% Sewer Bypassing, 30% Construction Cost and Market Contingency). Additionally, traffic control during construction amounting to \$10,000 to \$30,000 depending on roadway traffic rating was also assumed. Administrative, engineering, or other planning costs typical of CIP planning are not included.

The CIP phases are described in more detail in Section 4.5. Additionally, the rehabilitation recommendations for each asset is included in graphic information system (GIS) and tabular format in Appendix A. Recommendations are subject to change depending on future discussions with operational staff to determine rehabilitation preferences of the various levels and types of defects. The methodology and rehabilitation selection process is detailed in Section 4.1. The cost assumptions and sources are listed in Section 4.2 and Appendix J; detailed cost estimates are recommended when further CIP budgeting and planning takes place.

Section 1: Introduction

The intent of this Sewer Utility Asset Renewal and Replacement (R&R) Study is to provide the City of Milpitas (City) with priorities for asset renewal and replacement. A part of the evaluation included developing an understanding of the relative risk of failure for the City's sewer gravity pipeline segments by performing a likelihood and consequence of failure analysis. Understanding the relative risk of failure for various sewer pipeline sections is critical to effectively plan sewer capital improvement projects by prioritizing the highest risk projects. Brown and Caldwell (BC) worked closely with City staff and HydroScience Engineers (HSE) to develop an appropriate failure ranking and weighting system to predict risk of failure. In general, overall risk of failure was determined by considering both pipe characteristics (age, material, depth, location, presence of obstructions, etc.) and internal pipe video inspection findings.

1.1 Background

The City of Milpitas is located within the San Francisco Bay Area, north of San Jose, California. All wastewater produced in the City is treated at the San Jose–Santa Clara Regional Wastewater Facility (RWF), the largest advanced wastewater treatment facility in the western United States. The City's sewer system serves over 77,000 customers and consists of 0.95 million linear feet (LF) of underground pipeline, including 26,400 LF of force main pipeline (Milpitas Wastewater Fact Sheet, Water and Sewer System Information). Wastewater is conveyed to RWF through two large pump stations, the Venus station and the Main Sewer pump station (Milpitas Wastewater Fact Sheet). A map of RWF's tributary agencies, provided by the City of San Jose, can be found in Figure 1-1 (City of San Jose). Recycled water, which is produced at RWF, is returned to the City for use in non-drinking water applications, such as irrigation of golf courses and agricultural land. Recycled water pipelines, shown as purple pipes in Figure 1-1, are not included in this analysis.

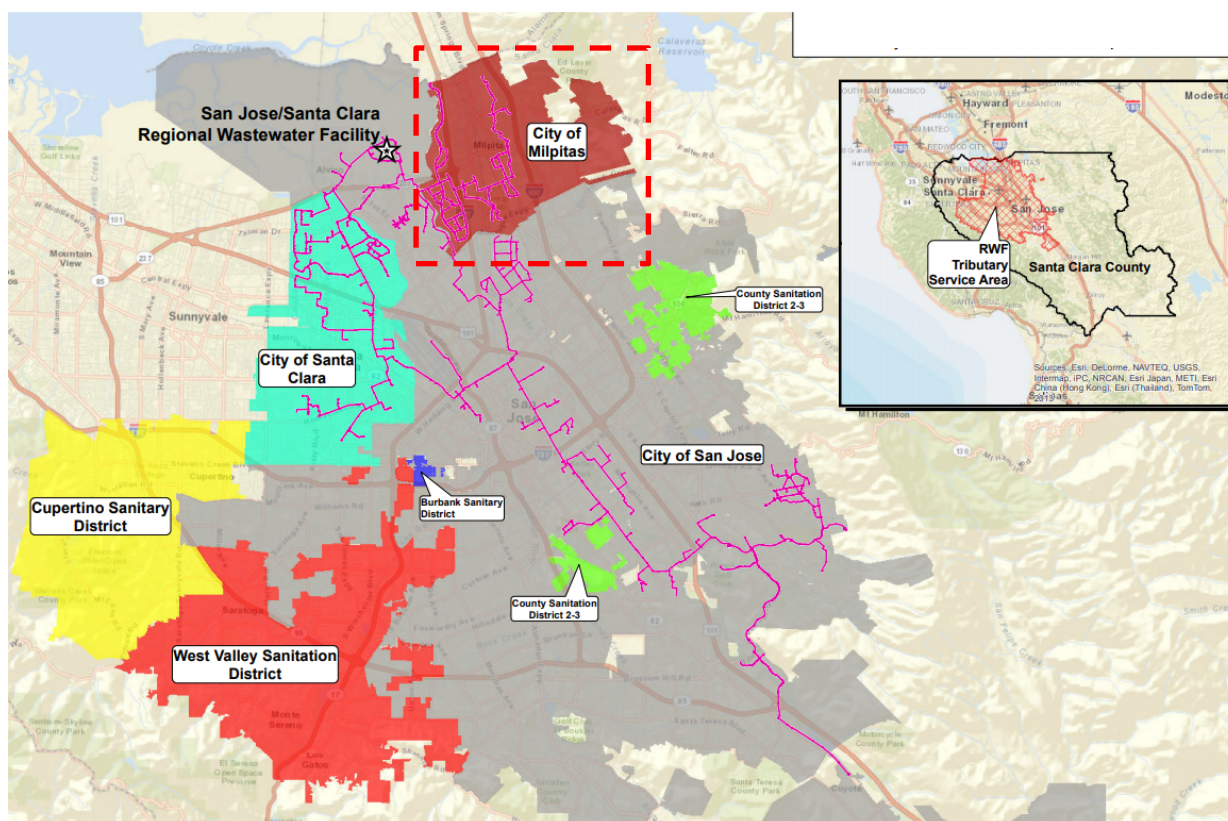
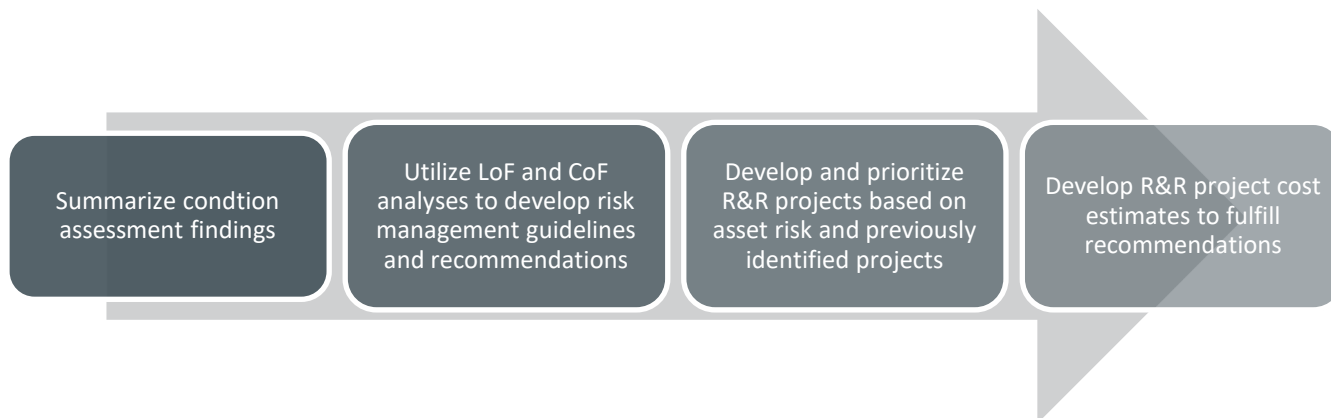


Figure 1-1: San Jose-Santa Clara Regional Wastewater Facility Tributary Service Area

1.2 Objectives

The objective of the Sewer Utility Asset R&R Study is to provide the City with applicable sewer condition and risk information to support prioritization of asset renewal and replacement. Core values and priority areas, established by City Council, guide the evaluation of risk and consequence in order to meet the City's mission and performance levels.

Objectives associated with this report are presented below.



Section 2: Inspection Condition Assessment

Understanding the internal pipe condition (presence of structural and operational & maintenance (O&M) defects) is critical to understanding asset condition and likelihood of failure. Closed-circuit television (CCTV) inspection was utilized to assess the internal condition of the key pipeline segments. Key pipeline segments were defined as follows:

- Diameters greater than 8 inches
- Located within traffic impacted areas
- Located within commercial/industrial areas.

Due to budget limitations, the CCTV efforts were divided between a subcontractor, National Plant Services, Inc (NPS), and the City. NPS completed their portion of CCTV inspections between March and May of 2020. The City was unable to complete its portion of the CCTV inspection due to Coronavirus restrictions, therefore that portion of the information was not available for this analysis. Approximately 105,000 LF of CCTV inspection data was collected by NPS.

2.1 Planned Segments and Scope

NPS' work was subdivided into six planned inspection contracts shown in Table 2-1. Figure 2-1 details the division of the contracts, as well as the sewer segments scheduled to be inspected by the City. The detailed planned CCTV inspection scope can be found in Appendix B.

| Table 2-1. CCTV Inspection Scope | | | | | |
|----------------------------------|---------------------|---------------|---|--------------------|--------------|
| Inspection Responsibility | Inspection Contract | Pipe Material | Pipe Diameter | Number of Segments | Total Length |
| NPS | Contract Trunk 1 | RCP | 33-inch, 36-inch, 39-inch, 42-inch, 54-inch and 66-inch | 37 | 8,830 LF |
| | Contract Trunk 2 | RCP and VCP | 27-inch and 33-inch | 24 | 5,760 LF |
| | Contract Trunk 3 | RCP and VCP | 24-inch and 30-inch | 15 | 4,850 LF |
| | Contract 16-24 Inch | Mostly VCP | 16-inch, 18-inch, 21-inch and 24-inch | 62 | 16,610 LF |
| | Contract 10-15 Inch | Mostly VCP | 10-inch, 12-inch and 15-inch | 119 | 34,930 LF |
| | Contract 8-Inch | Mostly VCP | 8-inch | 184 | 51,350 LF |
| | Subcontractor Total | | | 441 | 122,330 LF |
| City | N/A | VCP | Primarily 6-inch and 8-inch | 389 | 98,750 LF |

*RCP = reinforced concrete pipe

*VCP = vitrified clay pipe

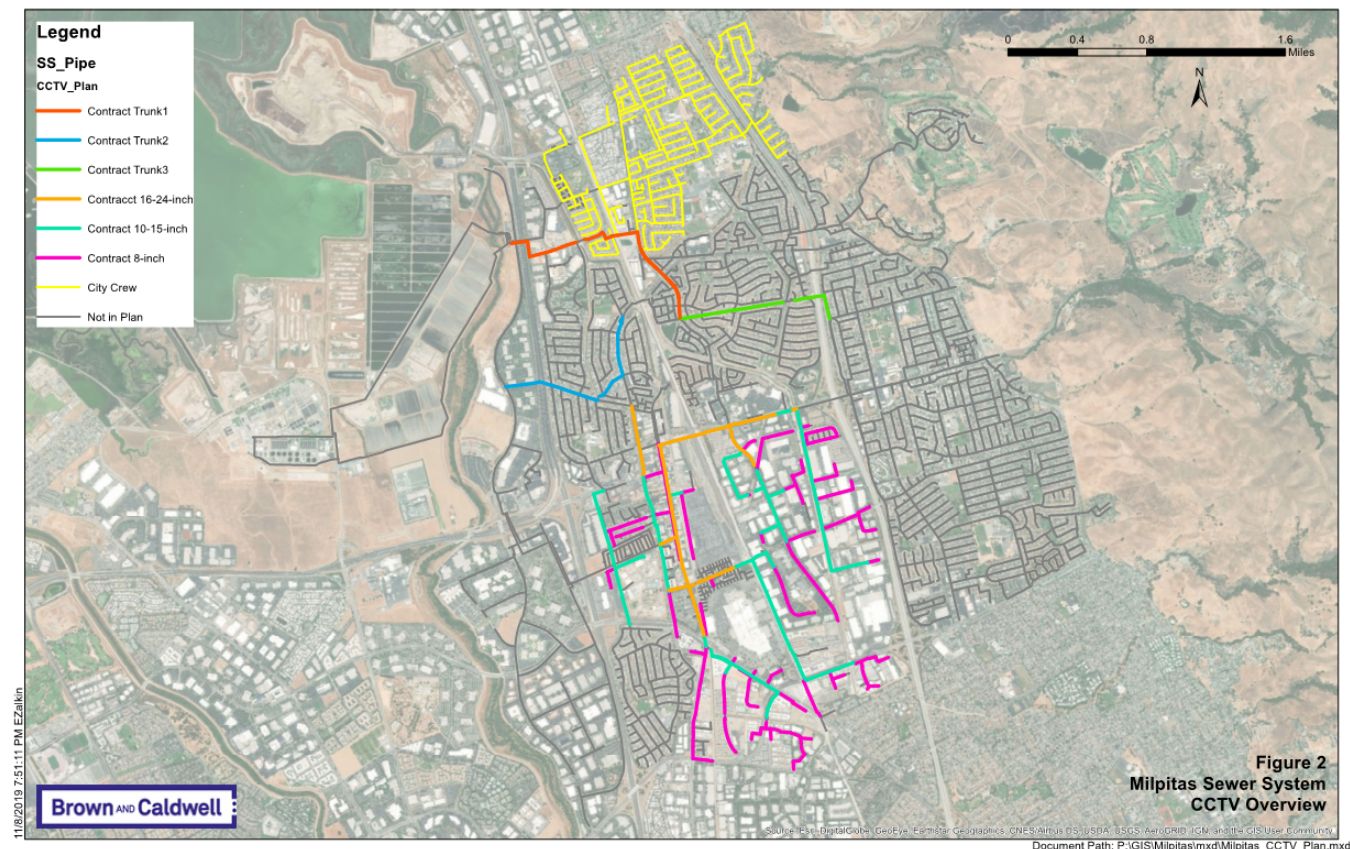


Figure 2-1: CCTV Inspection Map by Contract

In addition to CCTV, a two-dimensional laser and sonar inspection was to be performed as part of Contract Trunk 1. Due to scheduling conflicts, this work was not completed.

2.2 Inspection Results (NPS)

NPS successfully inspected 105,221 LF of their contracted 122,330 LF of sewer pipeline. NPS reported that pipes were unable to be completely inspected for multiple reasons, including presence of siphons (requiring extra equipment), root balls, grease, rocks, and other debris preventing complete inspection. The inspected segments are shown in green on Figure 2-2.

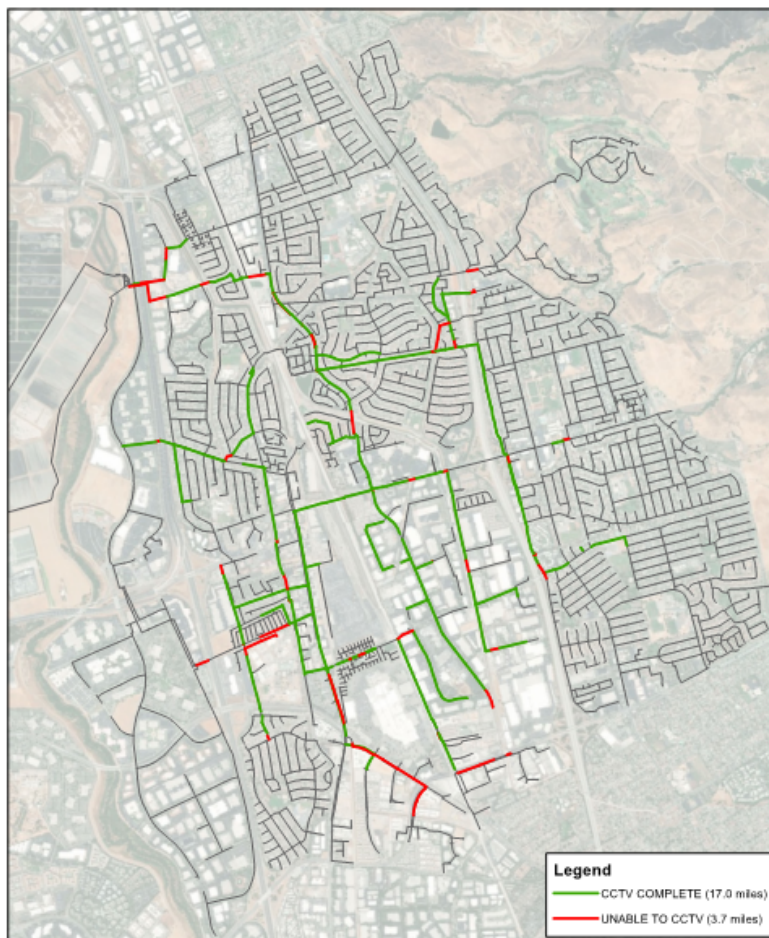


FIGURE 2
CITY OF MILPITAS SEWER SYSTEM
PIPELINES RECEIVING CCTV
MAY 28, 2020



Figure 2-2: NPS Completed CCTV Inspection

Details of the NPS CCTV inspection performed by pipe diameter are presented in Table 2-2.

| Table 2-2. NPS CCTV Inspection Results | |
|--|----------------------------------|
| Pipe Diameter | Distance of Inspection Performed |
| 6-Inch | N/A |
| 8-Inch | 8,211 LF |
| 10-Inch | 3,540 LF |
| 12-Inch | 19,003 LF |
| 15-Inch | 25,552 LF |
| 16-Inch | 195 LF |
| 18-Inch | 15,292 LF |
| 21-Inch | 10,268 LF |

| Table 2-2. NPS CCTV Inspection Results | |
|--|----------------------------------|
| Pipe Diameter | Distance of Inspection Performed |
| 24-Inch | 1,995 LF |
| 27-Inch | 5,337 LF |
| 30-Inch | 7,393 LF |
| 33-Inch | 574 LF |
| 36-Inch | 0 LF |
| 39-Inch | 2,487 LF |
| 42-Inch | 2,547 LF |
| 48-Inch | 0 LF |
| 54-Inch | 0 LF |
| 66-Inch | 1,037 LF |
| Size Unknown | 1,788 LF |
| Total Pipe Inspected | 105,221 LF |

2.2.1 Defect Coding

The National Association of Sewer Service Company's (NASSCO) Pipeline Assessment Certification Program (PACP) was utilized to assess sewer pipeline condition and identify defects. All pipeline segments were coded by NPS staff who had been PACP-certified. Additionally, approximately 20 percent of the pipe (89 out of 449 pipe segments) CCTV and PACP reports were reviewed by PACP-certified BC personnel, as part of BC's quality control (QC) process. BC noted minor issues with the condition assessment data collection or data review and forwarded summary of this review to HSE. Further details regarding the QC process can be found in Section 2.3.

The condition assessment of pipelines consists of:

- Identifying defects along each pipeline segment through visual inspection
- Assigning individual grades to each defect based on the type and severity
- Developing an overall Condition Grade for each pipeline segment by assessing type and number of defects along the pipeline segment
- Assigning a final Condition Rating to each pipeline segment based on the condition grades and the potential for further deterioration and/or failure

Under PACP, defects are categorized as either structural or O&M related. Structural defects are those that directly impair the structural condition of the pipeline, such as joint separation, joint deflections, cracks, fractures, broken and collapsed pipe or wall, corrosion, worn inverts, and sag conditions. Structural defects are those that are typically addressed through repairs, rehabilitation, or replacement. O&M defects include a range of conditions that can either directly affect the performance of the sewer or are indicators of potential future structural defects. O&M conditions include debris, grease, infiltration, intrusions (root or service laterals), and hydraulic problems. O&M defects are typically addressed through maintenance, although some (such as infiltration) may require additional rehabilitation.

In general, PACP grades range from 1 to 5, with 1 being a minor defect grade and 5 being the most significant defect grade. Table 2-3 provides a description of the defect related to the condition grade it receives.

Table 2-3. Structural Condition Grade Implications

| Condition Grade | Condition Rating | Defect Description |
|-----------------|------------------|---|
| 1 | Mild | Minor defects |
| 2 | | Defects that have not begun to deteriorate |
| 3 | Moderate | Moderate defects that will continue to deteriorate |
| 4 | Severe | Severe defects that will become Grade 5 defects within the foreseeable future |
| 5 | | Defects requiring attention soon |

When rating the condition of a pipe, three factors best characterize the inspection results.

- **Structural Peak Score** - The highest rated condition grade for structural defects present in a pipe
- **O&M Peak Score** - The highest rated condition grade for O&M defects present in a pipe
- **Peak Score** - The greater of structural peak score and O&M peak score

Table 2-4 presents the peak structural and O&M scores by pipe diameter.

Table 2-4. Peak Structural and O&M Scores by Pipe Diameter (NPS CCTV)

| Pipe Diameter | Structural Peak Score | Total Pipe Length (LF) | O&M Peak Score | Total Pipe Length (LF) | Pipe Diameter, Continued | Structural Peak Score | Total Pipe Length (LF) | O&M Peak Score | Total Pipe Length (LF) |
|---------------|-----------------------|------------------------|----------------|------------------------|--------------------------|-----------------------|------------------------|----------------|------------------------|
| 8-Inch | 0 | 514 | 0 | 0 | 27-Inch | 0 | 149 | 0 | 40 |
| | 1 | 0 | 1 | 340 | | 1 | 0 | 1 | 486 |
| | 2 | 5,177 | 2 | 3,541 | | 2 | 3,010 | 2 | 1,167 |
| | 3 | 1,915 | 3 | 860 | | 3 | 1,087 | 3 | 1,834 |
| | 4 | 46 | 4 | 2,415 | | 4 | 0 | 4 | 1,808 |
| | 5 | 560 | 5 | 1,055 | | 5 | 1,090 | 5 | 0 |
| 10-Inch | 0 | 117 | 0 | 511 | 30-Inch | 0 | 598 | 0 | 1,226 |
| | 1 | 0 | 1 | 0 | | 1 | 24 | 1 | 622 |
| | 2 | 1,769 | 2 | 2,095 | | 2 | 4,738 | 2 | 3,627 |
| | 3 | 1,654 | 3 | 934 | | 3 | 2,034 | 3 | 832 |
| | 4 | 0 | 4 | 0 | | 4 | 0 | 4 | 522 |
| | 5 | 0 | 5 | 0 | | 5 | 0 | 5 | 564 |
| 12-Inch | 0 | 2,047 | 0 | 367 | 33-Inch | 0 | 0 | 0 | 0 |
| | 1 | 0 | 1 | 347 | | 1 | 0 | 1 | 0 |
| | 2 | 11,782 | 2 | 7,766 | | 2 | 574 | 2 | 0 |
| | 3 | 2,956 | 3 | 3,339 | | 3 | 0 | 3 | 0 |
| | 4 | 1,692 | 4 | 4,262 | | 4 | 0 | 4 | 374 |
| | 5 | 526 | 5 | 2,922 | | 5 | 0 | 5 | 201 |

Table 2-4. Peak Structural and O&M Scores by Pipe Diameter (NPS CCTV)

| Pipe Diameter | Structural Peak Score | Total Pipe Length (LF) | O&M Peak Score | Total Pipe Length (LF) | Pipe Diameter, Continued | Structural Peak Score | Total Pipe Length (LF) | O&M Peak Score | Total Pipe Length (LF) |
|---------------|-----------------------|------------------------|----------------|------------------------|--------------------------|-----------------------|------------------------|----------------|------------------------|
| 15-Inch | 0 | 2,269 | 0 | 800 | 39-Inch | 0 | 0 | 0 | 0 |
| | 1 | 0 | 1 | 0 | | 1 | 0 | 1 | 0 |
| | 2 | 11,898 | 2 | 11,980 | | 2 | 1,073 | 2 | 0 |
| | 3 | 5,680 | 3 | 3,450 | | 3 | 1,415 | 3 | 634 |
| | 4 | 1,409 | 4 | 6,909 | | 4 | 0 | 4 | 1,049 |
| | 5 | 4,296 | 5 | 2,413 | | 5 | 0 | 5 | 805 |
| 16-Inch | 0 | 127 | 0 | 0 | 42-Inch | 0 | 399 | 0 | 268 |
| | 1 | 0 | 1 | 0 | | 1 | 0 | 1 | 0 |
| | 2 | 0 | 2 | 0 | | 2 | 977 | 2 | 0 |
| | 3 | 69 | 3 | 0 | | 3 | 1,171 | 3 | 569 |
| | 4 | 0 | 4 | 69 | | 4 | 0 | 4 | 1,709 |
| | 5 | 0 | 5 | 127 | | 5 | 0 | 5 | 0 |
| 18-Inch | 0 | 1,368 | 0 | 716 | 66-Inch | 0 | 609 | 0 | 0 |
| | 1 | 66 | 1 | 826 | | 1 | 0 | 1 | 0 |
| | 2 | 7,774 | 2 | 4,616 | | 2 | 0 | 2 | 917 |
| | 3 | 3,996 | 3 | 3,610 | | 3 | 428 | 3 | 120 |
| | 4 | 996 | 4 | 3,124 | | 4 | 0 | 4 | 0 |
| | 5 | 1,093 | 5 | 2,399 | | 5 | 0 | 5 | 0 |
| 21-Inch | 0 | 852 | 0 | 0 | Unknown Diameter | 0 | 169 | 0 | 106 |
| | 1 | 0 | 1 | 0 | | 1 | 0 | 1 | 124 |
| | 2 | 7,113 | 2 | 6,136 | | 2 | 1,274 | 2 | 672 |
| | 3 | 1,977 | 3 | 1,682 | | 3 | 346 | 3 | 7 |
| | 4 | 326 | 4 | 1,721 | | 4 | 0 | 4 | 824 |
| | 5 | 0 | 5 | 728 | | 5 | 0 | 5 | 55 |
| 24-Inch | 0 | 0 | 0 | 305 | Total | 0 | 9,218 | 0 | 4,339 |
| | 1 | 85 | 1 | 368 | | 1 | 175 | 1 | 3,113 |
| | 2 | 1,543 | 2 | 35 | | 2 | 58,702 | 2 | 42,552 |
| | 3 | 368 | 3 | 537 | | 3 | 25,096 | 3 | 18,408 |
| | 4 | 0 | 4 | 0 | | 4 | 4,469 | 4 | 24,786 |
| | 5 | 0 | 5 | 750 | | 5 | 7,565 | 5 | 12,019 |

A map of the overall peak score by pipe segment can be found in Figure 2-3. Appendices D and E provide Structural and O&M score maps, respectively.

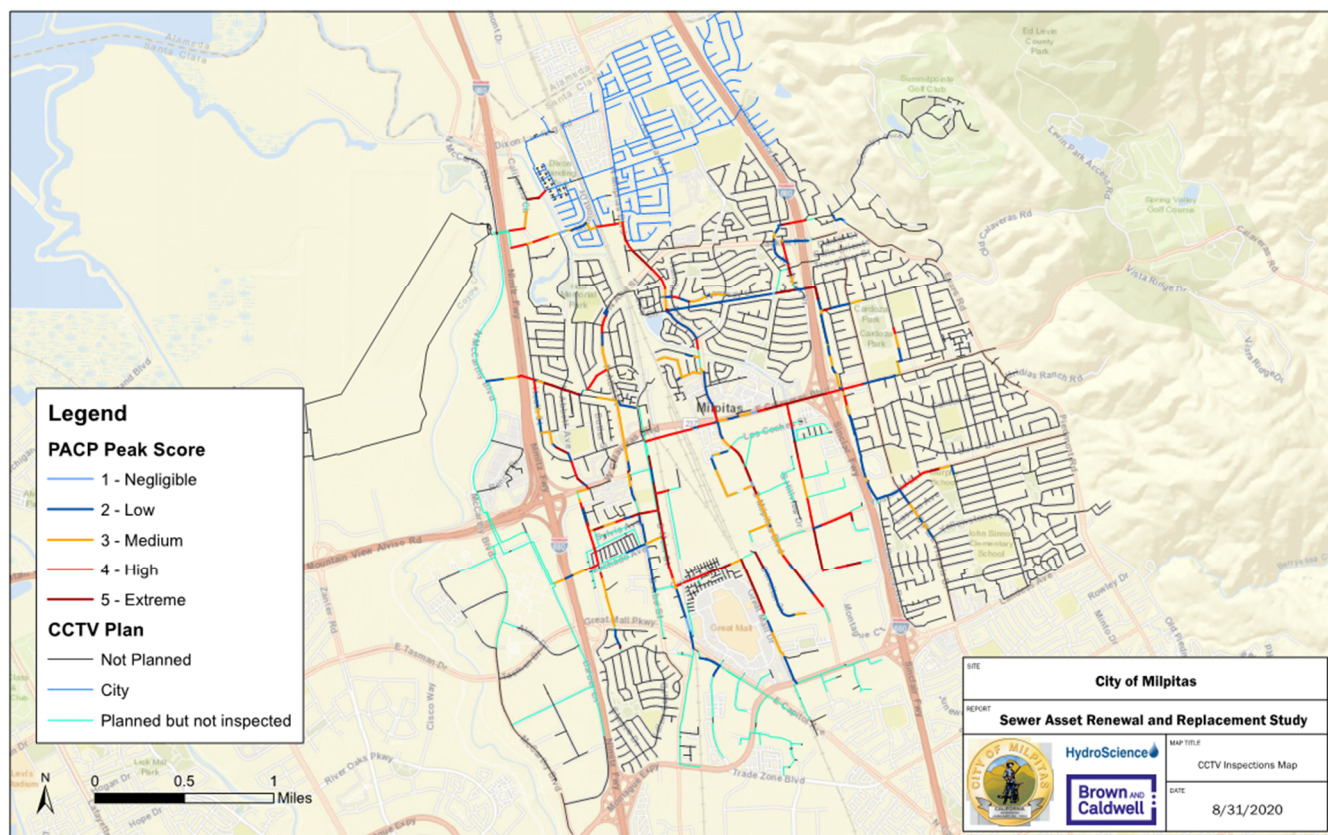


Figure 2-3: Overall PACP Peak Score

2.3 Quality Control Review

Following CCTV inspection, the CCTV database was imported into InfoAsset Manager (IAM) to compare CCTV data to existing geographic information system (GIS) data. After the import, several QC queries were performed to confirm that CCTV data was appropriately matched with existing GIS data. For example, a conflict between CCTV data and GIS data can occur when a new structure is found in the field, or when a structure in the GIS is verified to not exist on CCTV. Once QC in IAM was completed, the data with updated manhole and pipe connectivity (as confirmed by CCTV) was exported for use in InfoAsset Planner (IAP). Updated GIS data was made available for HSE to update their model and maps.

The QC review of CCTV and PACP reports was performed on approximately 20 percent of the pipe segments. In general, several videos were found to be blurry or unfocused. These were noted in the QC Comment Log, included as Appendix C. Primary QC efforts targeted pipe segments with structural peak grades of four or five because of the high likelihood of these segments requiring repair or improvements. Pipe wall loss due to corrosion, of varying severities, was found throughout the collection system, which is not unexpected in sanitary systems comprised of concrete pipes. Infiltration was observed in some locations, and a few pipe breaks and holes with visible voids were identified. Specific QC comments can be found in the QC Comment Log (Appendix C).

Section 3: Desktop Condition Assessment Task

For all pipe segments, a desktop condition assessment analysis was performed to assess asset risk. The overall risk of pipeline failure is determined by considering both the *likelihood* that an asset is unable to provide the function for which it was installed, as well as the *consequence* or impacts resulting from failure of the asset.

Overall likelihood of failure (LOF) and consequence of failure (COF) scores were determined by considering both **factor ratings** and **factor weightings**. The LOF factor rating predicts how likely an asset is to fail and the consequence factor rating predicts how consequential an asset failure would be. Assigned factor ratings range between one and five, with one being the least likely to fail/least consequential and five being the most likely to fail/most consequential.

The likelihood/consequence factor weighting is an assigned value which reflects the relative importance of a specific factor category compared to other factor categories. Critical factors are assigned greater weighting values than less critical factors.

The following equations provide basis for determining risk scores.

$$\text{Risk} = \text{LOF Score} \times \text{COF Score}$$

$$\text{LOF Score} = \sum (\text{LOF Rating} \times \text{LOF Weighting})$$

$$\text{COF Score} = \sum (\text{COF Rating} \times \text{COF Weighting})$$

3.1 Likelihood of Failure

The LOF analysis predicts the likelihood that an asset is unable to provide the function for which it was installed determined by assigned ratings and weightings. The factors selected for analysis are typical for sewer renewal/replacement projects.

Asset characteristics, asset condition and asset location were all considered during the LOF analysis. In all cases, unknown data was assigned medium risk. Specifically, the following factors were used (data sources included in parentheses):

- **Pipe Age** - In general, as a pipe ages, it has a higher likelihood to fail (pipe age provided by City GIS).
- **Pipe Material** – Different pipe material has different life expectancy and failure modes (pipe material provided by City GIS).
- **Structural Condition, if available** – Known structural defects based on 2020 CCTV survey performed by NPS.
- **Presence of Pipe Obstructions (roots, grease, debris, infiltration, etc.), if available** - Known O&M related defects based on 2020 CCTV survey performed by NPS.
- **Required Pipe Cleaning** – Pipes requiring higher cleaning frequency oftentimes experience problems when not maintained. However, the act of cleaning (with high pressure jets of water at a minimum) can cause premature failure and inadvertently remove the top layer of potentially corroded concrete or metal pipe (cleaning frequency provided by City).

- **Proximity to Landslide Zones** - Landslides can pose a threat to pipe segments which are surface pipelines or buried at a depth of three feet or less (Baum, 2008). This factor also accounts for the impact of smaller seismic events on pipe structural integrity ((Landslide Zone) County of Santa Clara Department of Planning and Development).
- **Proximity to Earthquake Faults** – Pipes located in the Hayward Fault zone are rated higher likelihood to fail. This factor also accounts for the impact of smaller seismic events on pipe structural integrity ((Fault Zone) County of Santa Clara Department of Planning and Development).
- **Local Geology (Liquefaction)** – A liquefaction layer from County GIS provides soil resiliency ratings to seismic events. This factor accounts for the impact of smaller seismic events on pipe structural integrity ((Liquefaction Rating) County of Santa Clara Department of Planning and Development).

Details and scoring basis for each factor are elaborated in Table 3-1.

| Table 3-1. LOF Factors and Ratings | | | | | | | |
|------------------------------------|-----------------------------------|-----------------------------|--|---|---|---|------------------|
| Broad Category | LOF Factor | LOF Rating | | | | | Factor Weighting |
| | | 1 (Least Likely to Fail) | 2 | 3 | 4 | 5 (Most Likely to Fail) | |
| Asset Characteristics | Age (Installation Year) | Installed after 2000 | Installed between 1985 and 1999 | Installed between 1970 and 1984 ¹ | Installed between 1955 and 1969 | Installed before 1954 | 2 |
| | Pipe Material | Force main, HDPE, PVC | VCP ¹ | RCP, STL, DIP, ABS, PPR | - | ACP, CIP | 2 |
| Asset Condition | Structural PACP Grade/Defect Type | Grade 2 defect(s) or lower | Grade 3 defect(s) (except hinge defects) | One Grade 4 defect (except hinge defects) or Grade 3 hinge defect | One Grade 5 defect (except soil/void/collapse deformation greater than 10%) or multiple Grade 4 defects or Grade 4 hinge defect | Multiple Grade 5 defects or one Grade 5 defects (soil/void/collapse deformation greater than 10%) | 5 |
| | O&M PACP Grade | Grade 2 defect(s) or lower | Grade 3 defect(s) | One Grade 4 defect | One Grade 5 defect or multiple Grade 4 defects | Multiple Grade 5 defects | 5 |
| | Required Pipe Cleaning | - | Requires annual cleaning | Requires quarterly cleaning | Requires monthly cleaning | Requires weekly cleaning | 5 |
| Asset Location | Proximity to Landslide Zone | Not within landslide zone | - | - | - | Within landslide zone | 3 |
| | Proximity to Earthquake Faults | Not within fault area | - | - | - | Crossing or within fault area | 3 |
| | Likelihood of Liquefaction | - | - | Prone to liquefaction | High likelihood of liquefaction | Very high likelihood of liquefaction | 3 |

¹If characteristic is unknown, classify as this rating.

ABS = Acrylonitrile Butadiene Styrene

ACP = Asbestos Cement Pipe

CIP = Cast Iron Pipe

DIP = Ductile Iron Pipe

HDPE = High-Density Polyethylene

PPR = Polypropylene Pipe

PVC = Polyvinyl Chloride

RCP = Reinforced Concrete Pipe

STL = Steel Pipe

VCP = Vitrified Clay Pipe

Figures 3-1 and 3-2 display the LOF Factors in relation with the sewer main pipelines. CCTV inspection data was previously shown in Section 2.2.

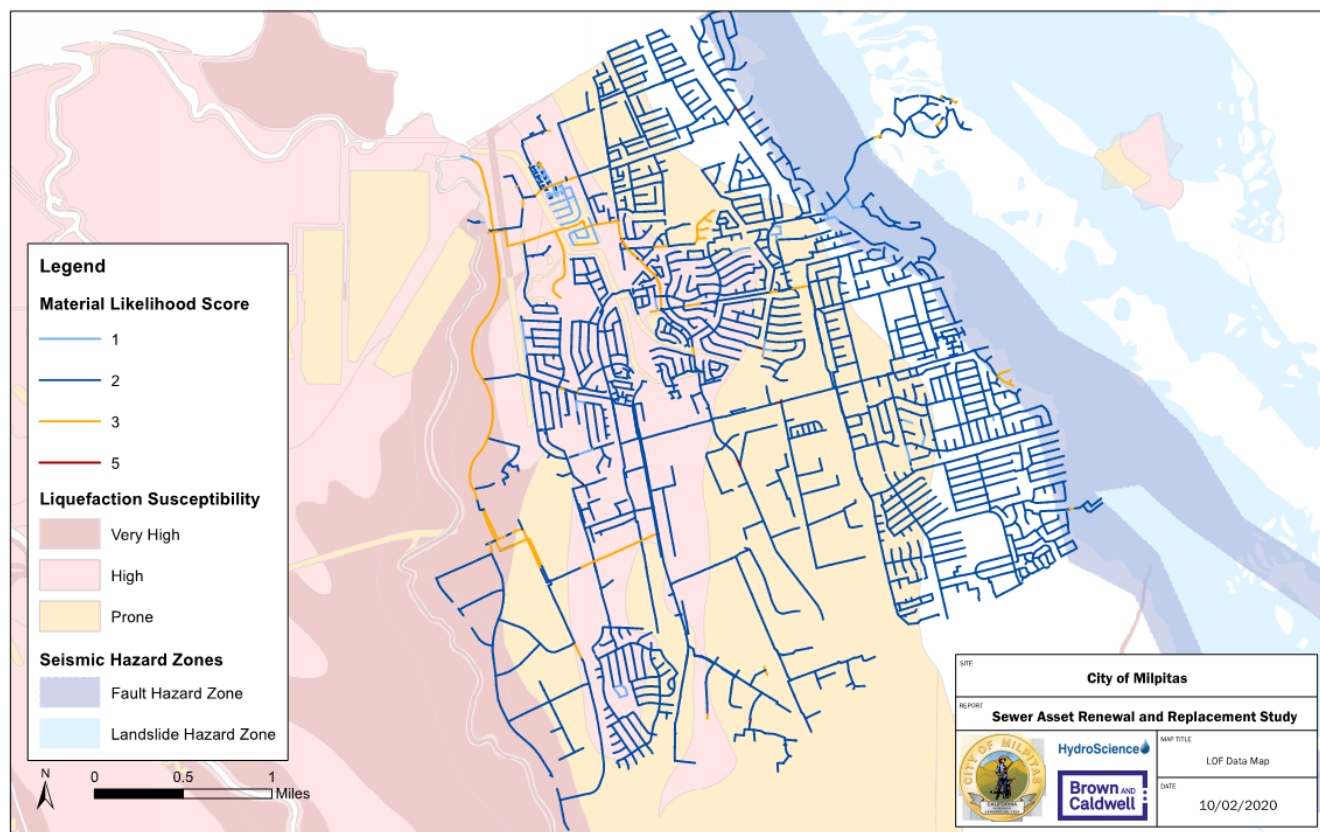


Figure 3-1: LOF Data Map – Material, Liquefaction, Seismic Hazard Zones

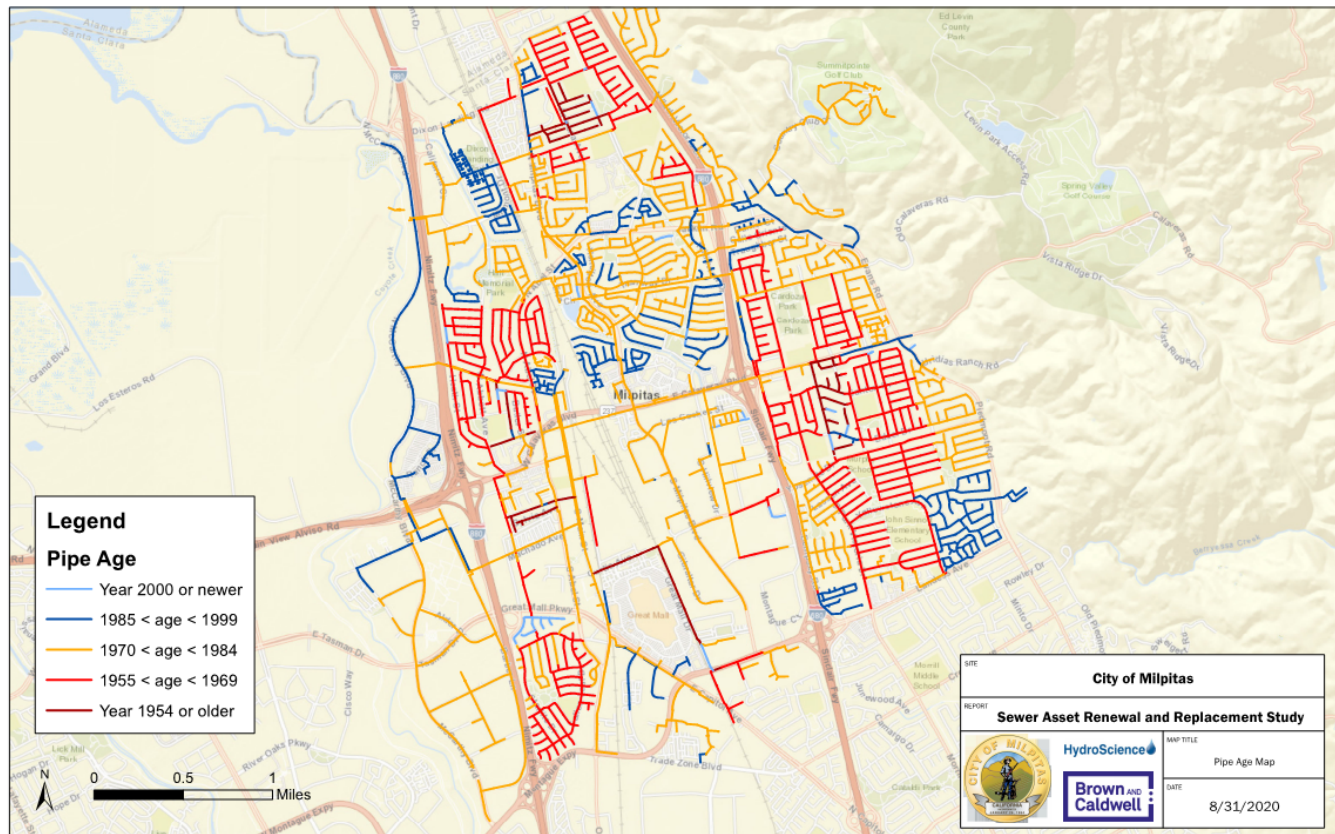


Figure 3-2: LOF Data Map – Pipe Age

Figure 3-3 provides the LOF scores.

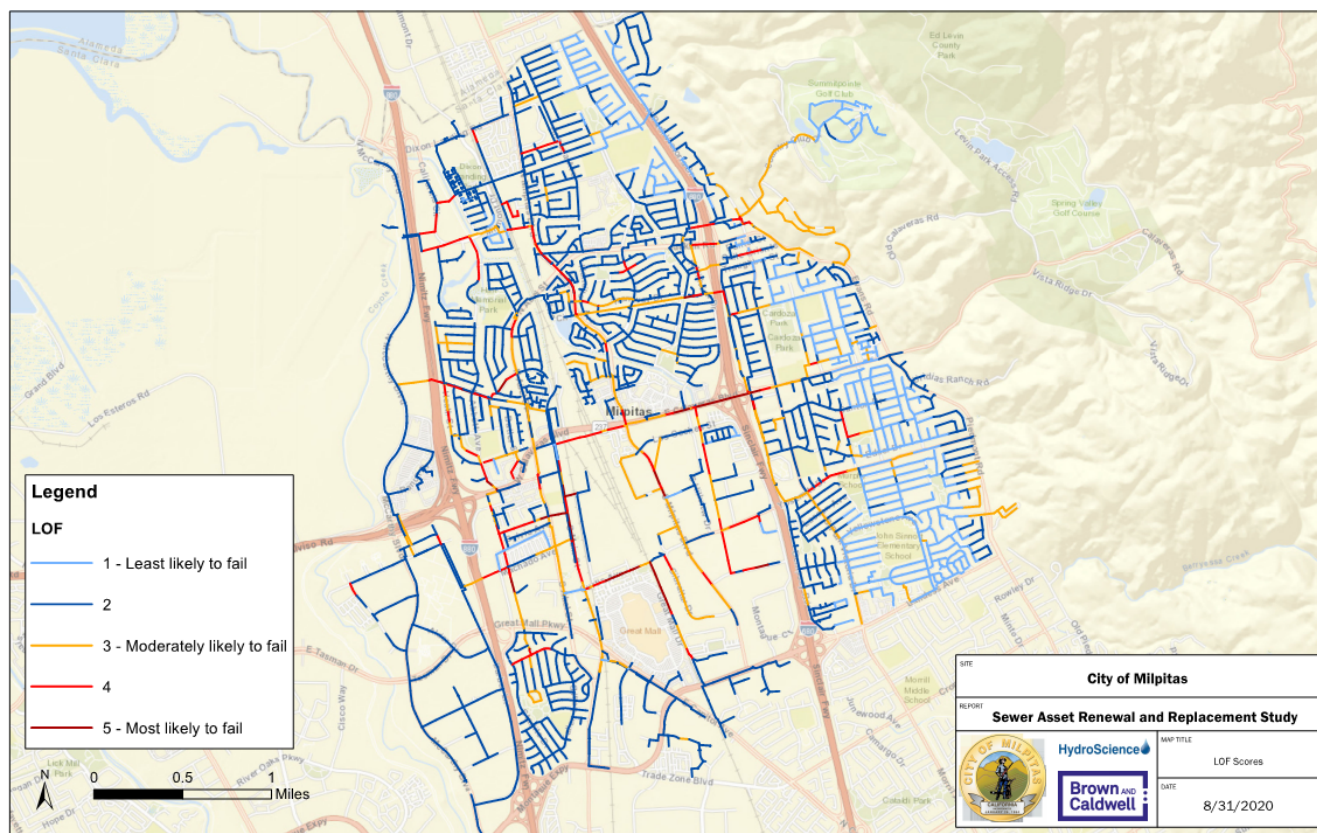


Figure 3-3: LOF Scores Map

3.2 Consequence of Failure

The COF analysis predicts the impact resulting from the failure of an asset by assigned ratings and weightings. Service interruptions, repair/overflow potential, transportation/transit, response time of potential failure, cost of potential failure, and environmental impacts were all considered during the COF analysis.

In a similar fashion to the LOF analysis, the factors selected for analysis are typical for sewer renewal/replacement projects and were selected to ensure the pipe rehabilitation prioritization aligned with City Council core values and priorities. The COF and City Council core values and priorities are shown in Table 3-2. Certain consequence factors, such as pipe diameter or road type, quantify multiple council core values. As a result, these factors received a higher factor weighting value.

| Table 3-2. COF and Council Core Value/Priorities | | | |
|--|--------------------------|--|---------------------------------|
| Council Core Value/ Priority Area | Organization Category | Measure of Failure | Consequence Factor |
| Superior Customer Service | Community | (1) Sewer service interruptions to large areas | Pipe diameter |
| Integrity and Accountability | | (2) Sewer service interruptions to critical and educational facilities | Critical facilities (proximity) |
| Trust and Respect | | (3) Magnitude and method of public response (sewer size) | Pipe diameter |
| Transportation and Transit | | (4) Public transit service and traffic interruptions | Road type |

| Table 3-2. COF and Council Core Value/Priorities | | | |
|--|--------------------------|--|---|
| Council Core Value/ Priority Area | Organization Category | Measure of Failure | Consequence Factor |
| | | (5) Railroad interruptions | Railroad proximity |
| Governance and Administration | Financial | (6) Response time to restore an asset | Easement (access restriction), road type |
| | | (7) Restoration costs or impact on utility rates | Pipe diameter and depth |
| Environment | Environment | (8) State and Federal regulatory violations or public response (discharge to surface water) | Waterway/waterbody (proximity) |

Due to public health and environmental concerns, the potential for waterway/waterbody leaks and road type were weighted most heavily followed by pipe diameter and access restriction. Additional COF factor descriptions and data sources are provided below:

- **Sewer Size (Pipe Diameter)** – Larger diameter pipes are more expensive to replace and provide a greater service area than smaller diameter pipes (pipe diameter provided by City GIS).
- **Proximity to Critical Facilities** – Pipe proximity to an educational, police, fire, or health facility was calculated and rated for COF. Facilities were searched from Google Maps and geocoded onto the ArcGIS platform. Pipelines servicing critical facilities were approximated by using a buffer of 500 feet. For context, the facility addresses were plotted as a point, so the buffer of 500 feet accounts for building size and nearby critical pipes.
- **Road Type** – Different road types such as arterial or highway will impact more people than a neighborhood street. Therefore, pipe intersections with major traffic conveyance routes such as the Bay Area Rapid Transit Milpitas station, freeways, state routes, arterial streets, or major roads were determined. The GIS used for major roads was downloaded from County of Santa Clara ((Major Roads) County of Santa Clara Department of Planning and Development). The BART GIS was downloaded from BART website and a buffer of 800 feet was applied to the geocoded coordinate point to capture the frontage and segments adjacent to the frontage. A buffer of 35 feet was applied to the major roads layer to capture potential overflow impact and GIS alignment differences between the road type and pipe layers.
- **Railroad Proximity** – Impacts to railroad operations and repairs on railroad property have significant cost and permitting impacts (railroad GIS provided by United States Geological Survey (USGS) (USGS National Transportation Dataset for California)).
- **Easement (Access Restriction)** – Access restrictions were determined by overlaying the city GIS over an aerial base map and manually assigning pipes which appeared to be in private property or restricted areas. For example, the parking lot of a shopping mall would be assigned private but not restricted. However, if a pipe is near a swale between a park and a neighborhood, or between two properties, it was assigned “restricted access”. In a further analysis, parcels with easement information could provide a more refined outcome.
- **Pipeline Depth** – Calculated by subtracting pipe inverts from manhole rim elevations from City GIS.
- **Proximity to Waterway or Waterbody** – Significant permitting impacts for repair or cleanup of failed pipe (waterway/waterbody GIS provided by USGS (National Hydrography Dataset, 2019)).

Details and scoring basis for each factor are elaborated in Table 3-3.

| Table 3-3. COF Factors and Ratings | | | | | | | | |
|------------------------------------|---|----------------------------------|--|--------------------------------------|--------------------------------------|-------------------------------------|--|------------------|
| Broad Category | Group | COF Factor | COF Rating | | | | | Factor Weighting |
| | | | 1 (Negligible Consequence) | 2 (Minimal Consequence) | 3 (Moderate Consequence) | 4 (Severe Consequence) | 5 (Critical Consequence) | |
| Community | Service Interruptions and Over-flow Potential | Pipeline Diameter ^{1,3} | Less than 6-inches | 8- to 12-inches ⁴ | 14- to 18-inches | 18- to 24-inches | Greater than 24-inches | 1 |
| | | Critical Facilities | - | - | School | Fire/Police | Hospital | 1 |
| | Transportation/Transit | Road Type ^{1,2} | Neighborhood streets | Collector streets | Arterial streets | Expressway and state routes | Freeway or BART | 1 |
| | | Railroad Proximity | Not crossing or within 50 feet of railroad | - | - | - | Crossing or within 50 feet of railroad | 1 |
| Financial | Response Time | Access Restriction | Public ROW | - | Private property | - | Limited access | 2 |
| | | Road Type ^{1,2} | Neighborhood streets | Collector streets | Arterial streets | Expressway and state routes | Freeways | 2 |
| | Pipeline Cost | Pipeline Diameter ^{1,3} | Less than 6-inches | 8- to 12-inches ⁴ | 14- to 18-inches | 18- to 24-inches | Greater than 24-inches | 1 |
| | | Pipeline Depth | All others | - | - | - | Greater than 10 feet (or special configuration requiring substantial excavation) | 1 |
| Environment | Environment | Waterway or waterbody | - | Within 250' of waterway or waterbody | Within 100' of waterway or waterbody | Within 50' of waterway or waterbody | Crossing waterway or waterbody | 3 |

¹Pipe diameter and road type affect the consequence of a pipe failure in both the community and financial broad categories

²Road type weighting = 1+2 = 3; 1 (Transportation/transit) + 2 (Response Time) = 3 (Overall Road Type weighting).

³Pipe diameter weighting=1+1=2; 1 (Service Interruptions and Overflow Potential) + 1 (Pipeline Cost) = 2 (Overall Pipe Diameter weighting).

⁴If characteristic is unknown, classify as this rating.

ROW = right-of-way

Figure 3-4 shows COF factors on a map and Figure 3-5 provides COF Scores.

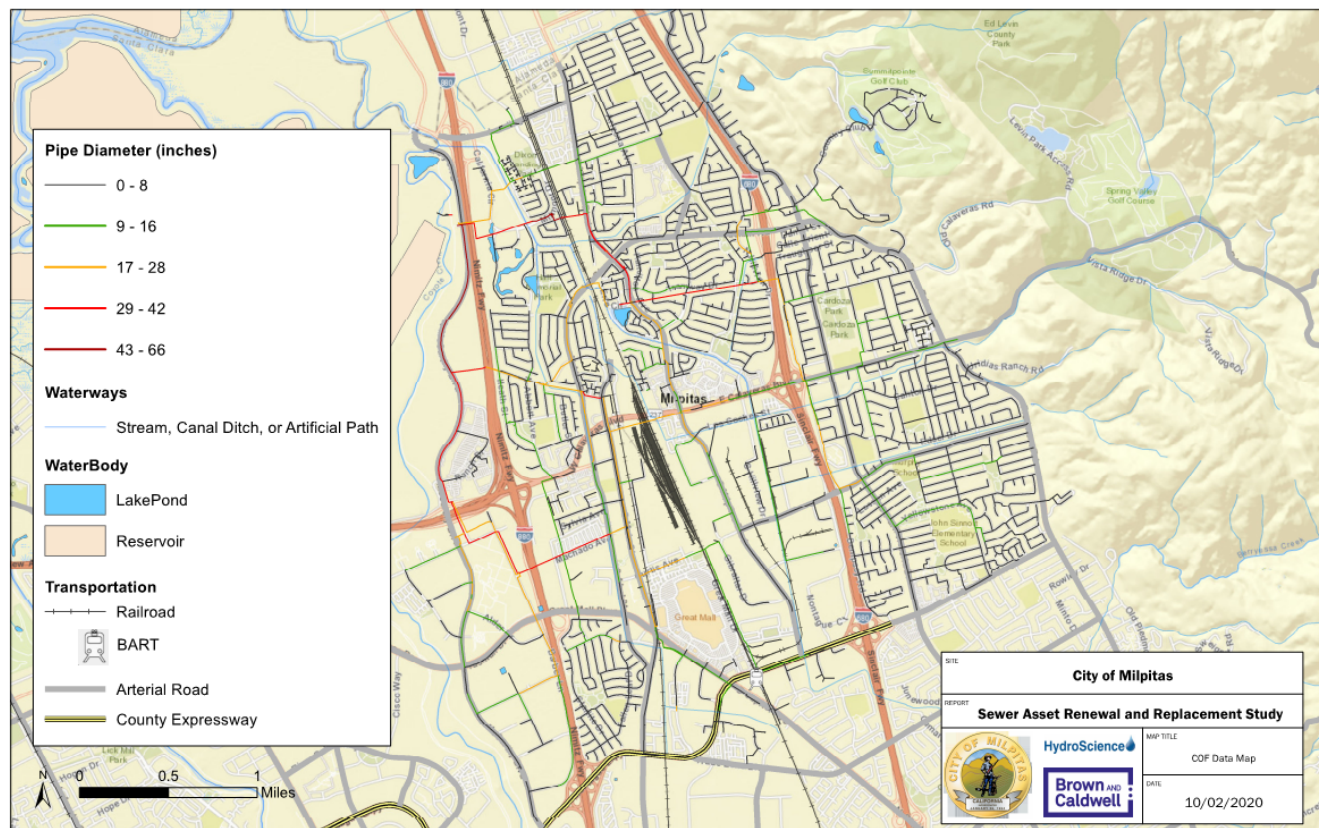


Figure 3-4: COF Data Map

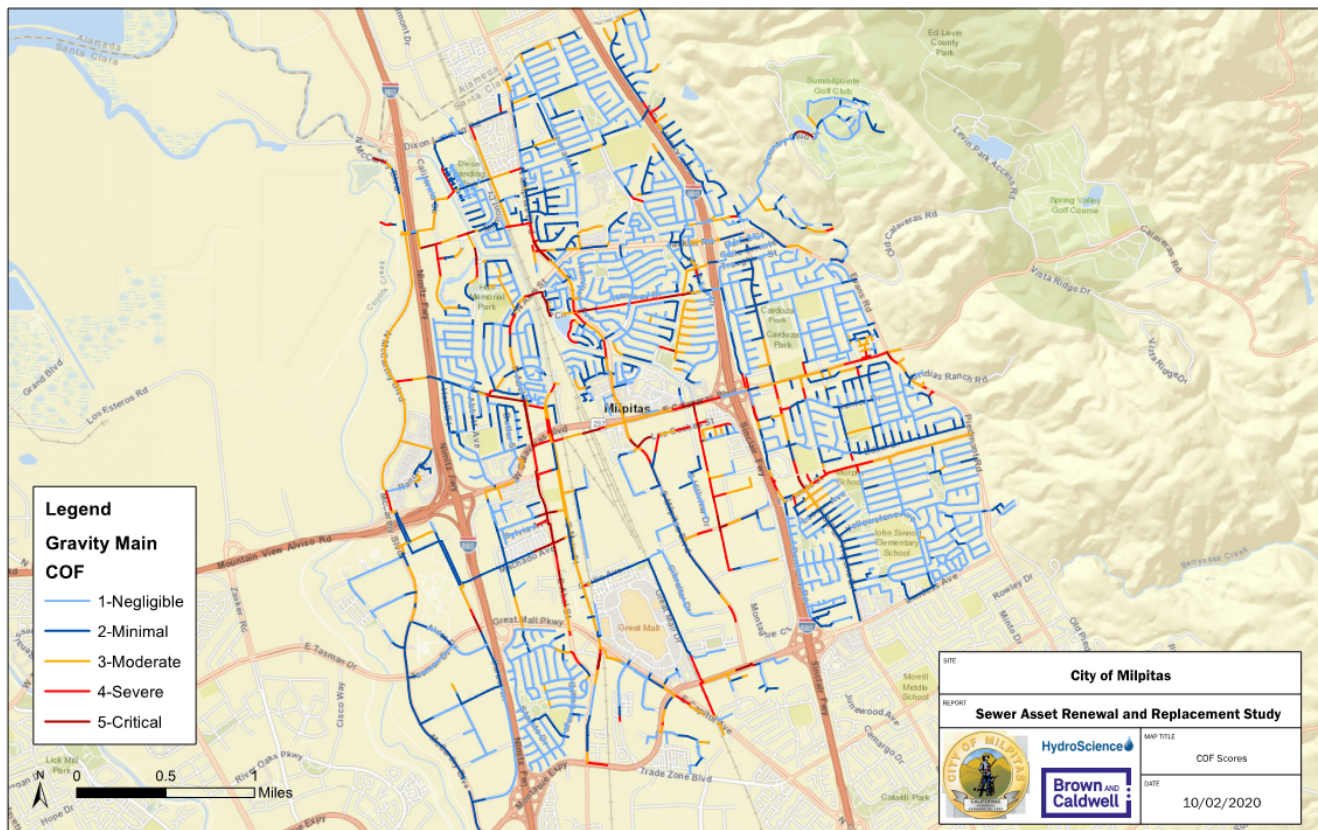


Figure 3-5: COF Scores

3.3 Asset Risk

Once the LOF and COF rating and weighting have been determined for individual factors, an overall LOF score and overall COF score can be determined by summing the factor scores. Multiplying the two overall scores determines the overall asset risk ($\text{Risk} = \text{LOF} \times \text{COF}$). Asset risk is considered negligible, low, medium, high or extreme based on the paired LOF and COF data. The matrix below illustrates the risk assignments for varying LOF and COF pairings.

| | | Low LOF Score → High LOF Score | | | | |
|--------------------------------------|--|--------------------------------|------------|--------|---------|---------|
| High COF Score ↑ Low COF Score | | Medium | Medium | High | Extreme | Extreme |
| | | Medium | Medium | Medium | High | Extreme |
| | | Low | Medium | Medium | Medium | High |
| | | Negligible | Low | Medium | Medium | Medium |
| | | Negligible | Negligible | Low | Medium | Medium |

3.4 Staff Input

A risk assessment workshop between HSE, BC and City staff was conducted on April 24, 2020. The purpose of this workshop was to provide an overview of the risk assessment approach and to receive City input regarding specific risk assessment criteria and weighting. At this workshop the final LOF and COF criteria and weighting were reviewed. Following the workshop, BC sent a proposed criteria and weighting document, to which the City agreed on. Key comments were summarized below:

- Seismic events are fairly unlikely; use caution to weigh the proximity to earthquake faults factor too highly.
 - Noted. City to confirm draft LOF and COF weighting shown in this draft report.
- Bay Area Rapid Transit (BART) is very critical. This is regarding discussion of “road type/transit” COF factor.
 - Draft report #1 comment - the addition of BART will be investigated in between draft and final report.
 - Final report - BART was added to the road type/transit COF factor and report content was revised accordingly.
- City confirmed that repairs to pipe on freeway/highway is challenging.
 - Action - Incorporated in criteria. Pipes within 35 feet of freeways are assigned the highest COF factor for the road type.
- Sewer pipelines are relatively new, so it may be hard to provide much input on historical data.
 - Noted. CCTV survey and other desktop condition assessment factors will drive pipe rehabilitation and inspection recommendations.
- City decided to rate pipes that would go directly to a waterway/waterbody higher.
 - Action - Incorporated in rating and weighting. Pipelines near waterway/waterbodies are rated by proximity. The factor measuring waterway/waterbody proximity was most highly weighted.

3.5 InfoAsset Planner (IAP)

A desktop risk assessment was performed using Innovyze’s IAP program, a GIS extension tool. Using the criteria described in Sections 3.1 and 3.2, LOF analysis predicts the probability that each asset could fail based on its GIS data and spatial interaction with other GIS layers. All assets, with or without CCTV data, were evaluated in detail using:

- 1) GIS data, such as age, material, and diameter
- 2) County or USGS GIS layers such as seismic hazards, soil stability, waterways, and other factors
- 3) Maintenance data - required pipe cleaning factor
- 4) CCTV data when available

For example, for the structural condition and presence of pipe obstruction LOF factors, CCTV data was analyzed to mass compute LOF for each of the approximate 3,200 pipes based on structural and O&M defects. Likewise, COF analysis determines the severity of each asset if it were to fail. The tool scores each pipe for COF based on asset data such as diameter and proximity to other GIS layers such as waterways or hospitals. Each LOF and COF factor is first set up in individual modules by choosing to use asset data, CCTV survey results, or spatial analysis with other GIS layers. Then, buffers and score criteria are defined. Once this is setup, the risk analysis takes user input for weighting of these factors relative to one another and

produces a holistic risk score for each pipe GIS asset. Screenshots of IAP modules can be found in Figures 3-6 to 3-8.

Consequence of Failure Wizard (Gravity Main - "Diameter")

Step2: Choose a Category

Category


☒ Pipe Attribute
 ☐ Inspection

☐ Population Density
 ☐ Work Order

☐ Critical Facilities
 ☐ Pipe Inventory

☐ Intersection
 ☐ Multi-Parameter

☐ Pavement



Description

Use Pipe attributes to estimate the consequence of failure. (e.g. Age, Material)

Consequence of Failure Wizard (Gravity Main - "Diameter")

Step3: Set Parameter (Facility Attributes)

Attributes

☐ Material
 ☐ Slope

☐ Install Date
 ☐ Depth

☒ Diameter
 ☐ Lifecycle Status

☐ Roughness
 ☐ Other

Choose a field




Figure 3-6: IAP LOF/COF Setup Example - Diameter (1 of 2)

Consequence of Failure Wizard (Gravity Main - "Diameter")

Step4: Calculate Value - Diameter

| Facility ID | Value | Normalize Value | Effective Value |
|-------------|-------|-----------------|-----------------|
| 12376-12375 | 6 | | |
| 10461-12493 | 8 | | |
| 10464-10461 | 8 | | |
| 10463-12494 | 24 | | |
| 10541-10575 | 15 | | |
| 11175-11173 | 6 | | |
| 10284-10289 | 8 | | |
| 12489-12373 | 8 | | |
| 12493-12489 | 8 | | |
| 12492-12376 | 6 | | |
| 10028-10026 | 27 | | |
| 10043-10045 | 27 | | |

☐ Normalize value by

Consequence of Failure Wizard (Gravity Main - "Diameter")

Step5: Set Score Range - Diameter

Scoring Range

| Breaker | Score | No. | Length (Miles) |
|---------|-------|-----|----------------|
| 0 | 2 | 134 | 3.12 |
| 10 | 2 | 143 | 7.51 |
| 12 | 2 | 122 | 5.83 |
| 15 | 3 | 107 | 5.46 |
| 16 | 3 | 3 | 0.06 |
| 18 | 3 | 71 | 3.87 |
| 21 | 4 | 50 | 2.46 |
| 23 | 4 | 1 | 0.00 |
| 24 | 4 | 28 | 1.15 |
| 27 | 5 | 55 | 2.33 |

☐ Normalize score by

Score Method

☐ Range
 ☒ Unique Values

Classes: 5

Figure 3-7: IAP LOF/COF Setup Example - Diameter (2 of 2)

Assess Risk

Facility Scope

☒ Full Network

☐ Selection

☐ Zone

Select Whole Network or choose a selection, consequences and likelihood of failures with the same selection will be listed on right side.

Then choose consequences and likelihood of failures which you want, and set weight and exponent.

Consequence of Failures

| ID | Weight | Exponent | Category | Parameter | Description | |
|---------------------------------------|--------------------------|----------|----------|---------------------|---|-------------------------------------|
| 1 <input checked="" type="checkbox"/> | Depth | 1 | 1 | Pipe Attribute | Depth | |
| 2 <input checked="" type="checkbox"/> | Waterbodies | 3 | 1 | Critical Facilities | Critical Facilities - NHDWaterBody_Clip | |
| 3 <input checked="" type="checkbox"/> | Easements | 2 | 1 | Pipe Inventory | Access_restrictions | Access Restrictions |
| 4 <input checked="" type="checkbox"/> | Waterway | 3 | 1 | Critical Facilities | Critical Facilities - Waterway | |
| 5 <input checked="" type="checkbox"/> | Facilities | 1 | 1 | Multi-Parameter | PoliceFire,Education,Hospitals | Combination of Hospitals, Edu, Poli |
| 6 <input checked="" type="checkbox"/> | Traffic | 3 | 1 | Intersection | Intersection - Roads_Major_Clip | |
| 7 <input checked="" type="checkbox"/> | Railroad | 1 | 1 | Intersection | Intersection - Trans_RailFeature_Clip | |
| 8 <input checked="" type="checkbox"/> | Diameter | 2 | 1 | Pipe Attribute | Diameter | |
| 9 <input type="checkbox"/> | Mode of Vertical Asset | 1 | 1 | | Mode of Vertical Asset COF | Mode of Vertical Asset COF |
| 10 <input type="checkbox"/> | Median of Vertical Asset | 1 | 1 | | Median of Vertical Asset COF | Median of Vertical Asset COF |
| 11 <input type="checkbox"/> | Avg of Vertical Asset | 1 | 1 | | Avg of Vertical Asset COF | Avg of Vertical Asset COF |

Likelihood of Failures

| ID | Weight | Exponent | Category | Parameter | |
|---------------------------------------|--------------------------|----------|----------|-----------------|---|
| 1 <input checked="" type="checkbox"/> | SEW_LOF2_Combined | 5 | 1 | Multi-Parameter | SEW_LOF2a,SEW_LOF2b,SEW_LOF2c,SEW_LOF2d,SEW_LOF2e,SEW |
| 2 <input checked="" type="checkbox"/> | SEW_LOF1_combined | 5 | 1 | Multi-Parameter | SEW_LOF1a,SEW_LOF1b,SEW_LOF1c,SEW_LOF1d,SEW_LOF1e,SEW |
| 3 <input checked="" type="checkbox"/> | HotSpots | 5 | 1 | Pipe Inventory | Repeat_period |
| 4 <input checked="" type="checkbox"/> | Liquefaction | 3 | 1 | Intersection | Intersection - LiquefactionHazardZone_Intersect |
| 5 <input checked="" type="checkbox"/> | Fault | 3 | 1 | Intersection | Intersection - FaultRuptureHazardZone_Clip |
| 6 <input checked="" type="checkbox"/> | SlideArea | 3 | 1 | Intersection | Intersection - LandslideHazrdZone_Clip |
| 7 <input checked="" type="checkbox"/> | Material | 2 | 1 | Pipe Attribute | Material |
| 8 <input checked="" type="checkbox"/> | Age | 2 | 1 | Pipe Attribute | InstallDate |
| 9 <input type="checkbox"/> | Mode of Vertical Asset | 1 | 1 | | Mode of Vertical Asset LOF |
| 10 <input type="checkbox"/> | Median of Vertical Asset | 1 | 1 | | Median of Vertical Asset LOF |
| 11 <input type="checkbox"/> | Avg of Vertical Asset | 1 | 1 | | Avg of Vertical Asset LOF |

< Back Finish Close

Figure 3-8: IAP LOF/COF Weighting and Risk Setup Example

3.6 Risk Assessment Results

Overall LOF and COF score assignments were determined for all pipe segments, based on the criteria outlined in Tables 3-1 and 3-3. A total risk score was then determined from the product of the overall LOF and COF scores, which was then normalized within the dataset from one (negligible risk) to five (extreme risk).

Figure 3-9 presents the risk scores for all gravity main pipelines.

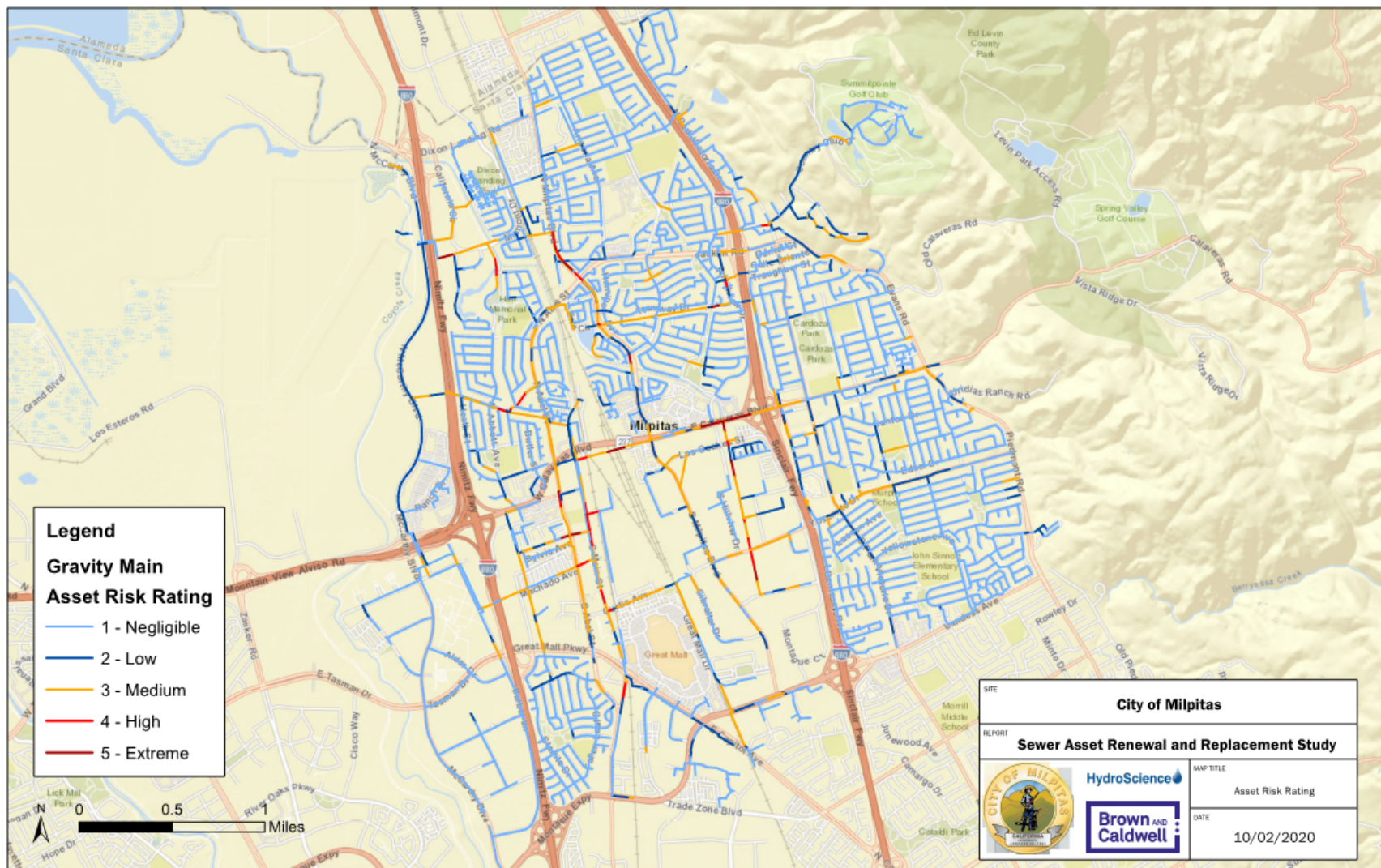


Figure 3-9: Asset Risk Rating

A risk matrix for the pipe segments is presented in Figure 3-10. The bottom left tile represents the subset of pipes with the least risk while the top right tile represents the subset of pipes with the most risk. Risk is colorized as follows:

- **Blue** – Negligible risk
- **Green** – Low risk
- **Peach** – Medium risk
- **Magenta** – High risk
- **Dark Red** – Extreme risk

| | LOF - Low | LOF - M. Low | LOF - Medium | LOF - M. High | LOF - High |
|---------------|-----------------------|----------------------|----------------------|----------------------|----------------------|
| COF - High | 32 Gravity Mains, ... | 19 Gravity Mains,... | 12 Gravity Mains,... | 6 Gravity Mains, ... | 7 Gravity Mains, ... |
| COF - M. High | 40 Gravity Mains, ... | 18 Gravity Mains,... | 16 Gravity Mains,... | 6 Gravity Mains, ... | 6 Gravity Mains, ... |
| COF - Medium | 165 Gravity Mains,... | 29 Gravity Mains,... | 28 Gravity Mains,... | 13 Gravity Mains,... | 15 Gravity Mains,... |
| COF - M. Low | 473 Gravity Mains,... | 73 Gravity Mains,... | 40 Gravity Mains,... | 10 Gravity Mains,... | 17 Gravity Mains,... |
| COF - Low | 1962 Gravity Main... | 96 Gravity Mains,... | 70 Gravity Mains,... | 13 Gravity Mains,... | 16 Gravity Mains,... |

Figure 3-10: Pipeline Risk LOF COF Matrix

Figure 3-11 provides the risk distribution for the pipe segments. The majority of the pipe segments are classified as negligible or low risk; twelve percent are medium to extreme risk pipe segments.

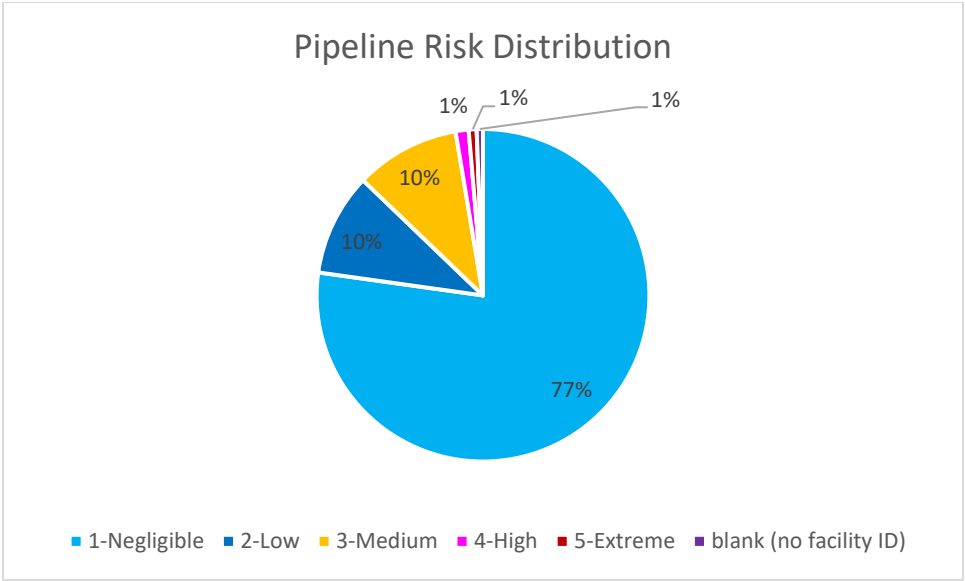


Figure 3-11: Pipeline Risk Distribution by Length

For the pipeline risk distribution figure, the “blank” category is attributed to 22 pipes whose GIS segments had blank facility ID, diameter, installation date, and material fields. Table 3-4 below shows the pipe segments with the highest risk scores. This includes all pipes with risk scores of 4 or 5. Appendix F provides the risk scores for all pipe segments. LOF and COF scores are calculated based on the equation figure at the beginning of Section 3 and the rating and weighting criteria described in Table 3-1 and 3-3 in previous sections. The risk score column is calculated by multiplying the LOF score and COF score, which is then normalized from 1 through 5 in the last column (1- negligible, 2-low, 3- medium, 4- high or 5- extreme). The table is sorted by descending risk score.

Table 3-4. At-Risk Pipes

| Segment ID | Street Name | Install Year | Pipe Diameter | Pipe Material | Segment Length (LF) | LOF Score | COF Score | Risk Score (LOF x COF) | Asset Risk (Normalized from 1 to 5) |
|--------------|-----------------------------------|--------------|---------------|---------------|---------------------|-----------|-----------|------------------------|-------------------------------------|
| 10395-10396 | Coming Ave | 1954 | 8 | VCP | 284 | 76 | 39 | 2964 | 5 - Extreme |
| 12717-12718 | E Calaveras Blvd | - | 15 | VCP | 312 | 59 | 43 | 2537 | 5 - Extreme |
| 12719-12720 | E Calaveras Blvd | - | 16 | CIP | 127 | 50 | 46 | 2300 | 5 - Extreme |
| 10012-10394 | Coming Ave | 1954 | 8 | VCP | 234 | 61 | 36 | 2196 | 5 - Extreme |
| 12721-12722 | E Calaveras Blvd | - | 15 | VCP | 116 | 59 | 37 | 2183 | 5 - Extreme |
| 12721-12722* | E Calaveras Blvd | - | 15 | VCP | 16 | 59 | 37 | 2183 | 5 - Extreme |
| 12043-12021 | Between Tramway & Los Pinos Ave | - | 30 | RCP | 258 | 56 | 36 | 2016 | 5 - Extreme |
| 12716-12719 | Slightly East of S Hillview Dr | - | 0 | UNK | 302 | 49 | 41 | 2009 | 5 - Extreme |
| 12232-12251 | N Milpitas Blvd | - | 39 | RCP | 434 | 54 | 36 | 1944 | 5 - Extreme |
| 12589-12601 | Cadillac Ct / Nimitz Fwy Crossing | - | 42 | RCP | 494 | 52 | 37 | 1924 | 5 - Extreme |
| 10395-10394 | Coming Ave | 1954 | 8 | VCP | 15 | 51 | 36 | 1836 | 5 - Extreme |
| 12722-12711 | E Calaveras Blvd | - | 15 | VCP | 362 | 59 | 31 | 1829 | 5 - Extreme |
| 12729-12717 | E Calaveras Blvd | - | 15 | VCP | 500 | 59 | 31 | 1829 | 5 - Extreme |
| 10176-10177 | Slightly East of S Hillview Dr | - | 15 | VCP | 408 | 54 | 33 | 1782 | 5 - Extreme |
| 12218-12522 | N Milpitas Blvd | - | 33 | RCP | 201 | 54 | 33 | 1782 | 5 - Extreme |
| 10185-10184 | Slightly East of S Hillview Dr | - | 15 | VCP | 448 | 54 | 33 | 1782 | 5 - Extreme |
| 10185-10184* | Slightly East of S Hillview Dr | - | 15 | VCP | 43 | 54 | 33 | 1782 | 5 - Extreme |
| 10883-10972 | Sinclair Fwy | 1965 | 21 | VCP | 495 | 56 | 31 | 1736 | 5 - Extreme |
| 10480-10481 | S Abel Ave | 1982 | 18 | VCP | 66 | 47 | 35 | 1645 | 5 - Extreme |
| 12488-12496 | E Calaveras Blvd | - | 21 | VCP | 501 | 47 | 35 | 1645 | 5 - Extreme |
| 12457-12154 | N Milpitas Blvd | 1981 | 21 | VCP | 310 | 47 | 34 | 1598 | 5 - Extreme |
| 10968-12729 | E Calaveras Blvd | - | 15 | VCP | 388 | 69 | 29 | 2001 | 4 - High |
| 11647-11695 | Marylinn Dr | 1959 | 27 | VCP | 500 | 74 | 27 | 1998 | 4 - High |
| 11781-12608 | Hall Memorial Park Connection | 1980 | 8 | ABS | 329 | 44 | 43 | 1892 | 4 - High |

Table 3-4. At-Risk Pipes

| | | | | | | | | | |
|--------------|--------------------------------------|------|----|-----|-----|----|----|------|----------|
| 11786-11781 | Hall Memorial Park Connection | 1980 | 8 | ABS | 144 | 44 | 43 | 1892 | 4 - High |
| 10972-10968 | E Calaveras Blvd | - | 15 | VCP | 482 | 64 | 29 | 1856 | 4 - High |
| 12251-12219 | N Milpitas Blvd | - | 39 | RCP | 319 | 44 | 42 | 1848 | 4 - High |
| 10404-10398 | S Main St | - | 18 | VCP | 407 | 67 | 26 | 1742 | 4 - High |
| 10179-10159 | Slightly East of S Hillview Dr | - | 15 | VCP | 349 | 44 | 39 | 1716 | 4 - High |
| 10178-10179 | Slightly East of S Hillview Dr | - | 15 | VCP | 100 | 44 | 39 | 1716 | 4 - High |
| 11661-11656 | Marylinn Dr | 1959 | 27 | RCP | 133 | 46 | 36 | 1656 | 4 - High |
| 12088-12081 | N Hillview Dr | - | 12 | VCP | 218 | 54 | 30 | 1620 | 4 - High |
| 12218-12219 | N Milpitas Blvd | - | 33 | RCP | 25 | 49 | 33 | 1617 | 4 - High |
| 10177-10178 | Slightly East of S Hillview Dr | - | 15 | VCP | 397 | 49 | 33 | 1617 | 4 - High |
| 10472-10467 | Sinnot Ln | - | 12 | VCP | 219 | 57 | 28 | 1596 | 4 - High |
| 10467-10474 | S Main St | - | 21 | VCP | 326 | 57 | 28 | 1596 | 4 - High |
| 10478-10480 | S Abel Ave | 1982 | 15 | VCP | 420 | 42 | 38 | 1596 | 4 - High |
| 10472-10467* | Sinnot Ln | - | 12 | VCP | 179 | 57 | 28 | 1596 | 4 - High |
| 10333-10347 | Curtis Ave | 1954 | 18 | VCP | 172 | 51 | 31 | 1581 | 4 - High |
| 12720-12721 | E Calaveras Blvd | - | 15 | VCP | 60 | 39 | 40 | 1560 | 4 - High |
| 11525-20134 | Marylinn Dr | 1981 | 27 | VCP | 393 | 47 | 33 | 1551 | 4 - High |
| 12706-12733 | Slightly East of S Hillview Dr | - | 0 | UNK | 118 | 44 | 35 | 1540 | 4 - High |
| 11389-11377 | Sinclair Crossing to Country Club Dr | 1988 | 8 | VCP | 250 | 53 | 29 | 1537 | 4 - High |
| 12522-12526 | N Milpitas Blvd | - | 33 | RCP | 349 | 49 | 31 | 1519 | 4 - High |
| 10462-10463 | E Calaveras Blvd | - | 21 | VCP | 334 | 52 | 29 | 1508 | 4 - High |
| 11657-11678 | Marylinn Dr | - | 27 | RCP | 19 | 54 | 27 | 1458 | 4 - High |
| 11936-11935 | Sinclair Crossing to Country Club Dr | 1983 | 12 | VCP | 489 | 54 | 27 | 1458 | 4 - High |
| 12248-12233 | N Milpitas Blvd | - | 39 | RCP | 370 | 54 | 27 | 1458 | 4 - High |
| 12439-12446 | N Milpitas Blvd | - | 24 | VCP | 42 | 47 | 31 | 1457 | 4 - High |
| 12439-12446* | N Milpitas Blvd | - | 24 | VCP | 42 | 47 | 31 | 1457 | 4 - High |

| Table 3-4. At-Risk Pipes | | | | | | | | | |
|--------------------------|--------------------------------|---|----|-----|-----|----|----|------|----------|
| 10403-10418 | Machado Ave | - | 24 | RCP | 260 | 39 | 37 | 1443 | 4 - High |
| 10403-10418* | Machado Ave | - | 24 | RCP | 138 | 39 | 37 | 1443 | 4 - High |
| 10284-10289 | S Main St | - | 8 | VCP | 438 | 39 | 36 | 1404 | 4 - High |
| 10188-10187 | Slightly East of S Hillview Dr | - | 15 | VCP | 141 | 39 | 36 | 1404 | 4 - High |
| 10331-10350 | S Main St | - | 18 | VCP | 398 | 52 | 27 | 1404 | 4 - High |
| 10284-10289* | S Main St | - | 8 | VCP | 438 | 39 | 36 | 1404 | 4 - High |
| 11678-11680 | Marylinn Dr | - | 27 | VCP | 273 | 52 | 27 | 1404 | 4 - High |
| 10399-10467 | S Main St | - | 18 | VCP | 451 | 52 | 26 | 1352 | 4 - High |

*Same facility ID, different GIS pipe segment.

Figure 3-12 provides the high and extreme risk pipelines shown in Table 3-4 in map format.

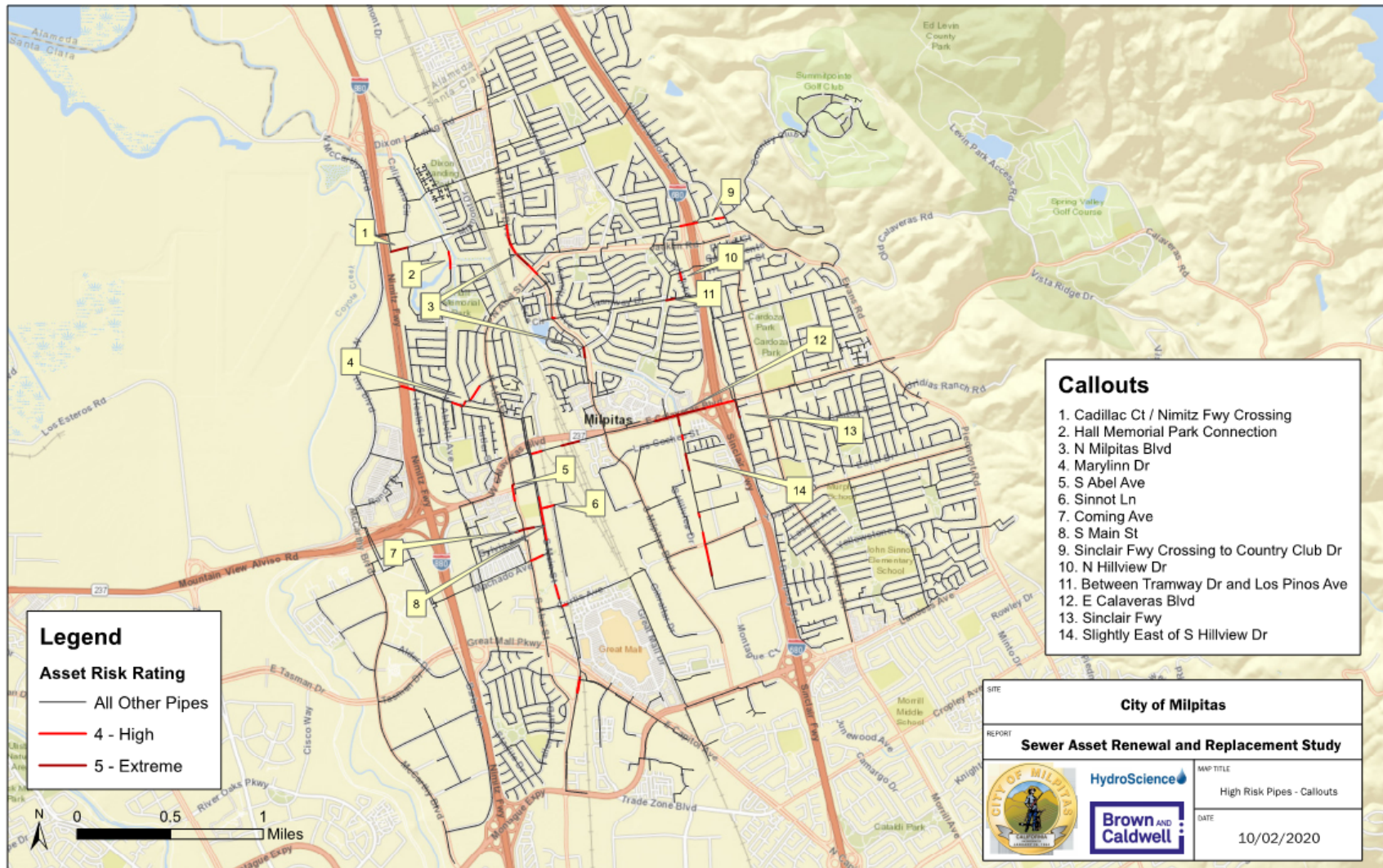


Figure 3-12: High Risk Pipes

Extreme risk pipes (21 segments) were further analyzed for drivers of high LOF and COF scores in Table 3-5. The top 3 (or 4 when tied) LOF and COF factors are noted for each pipe segment. The table is sorted alphabetically by street name

| Table 3-5. Extreme Risk Pipes – Drivers of High LOF and COF Scores | | | | | | | | | |
|--|-------------|--------------|---------------|---------------|---------------------|-----------|-----------|--|--|
| Street Name | Segment ID | Install Year | Pipe Diameter | Pipe Material | Segment Length (LF) | LOF Score | COF Score | LOF Drivers | COF Drivers |
| Between Tramway Dr and Los Pinos Ave | 12043-12021 | - | 30 | RCP | 258 | 56 | 36 | Pipe Obstruction Rating – 25/25 Structural Rating – 10/25 Liquefaction Susceptibility – 9/10 | Waterway – 15/15 Diameter – 10/10 Depth – 5/5 |
| Cadillac Ct / Nimitz Freeway Crossing | 12589-12601 | - | 42 | RCP | 494 | 52 | 37 | Pipe Obstruction Rating – 20/25 Liquefaction Susceptibility – 15/15 Age – 6/10 Material – 6/10 | Waterbodies – 12/15 Diameter – 10/10 Easement – 6/10 |
| Coming Ave | 10395-10396 | 1954 | 8 | VCP | 284 | 76 | 39 | Required Pipe Cleaning – 25/25 Pipe Obstruction Rating – 20/25 Liquefaction Susceptibility – 12/15 | Waterway – 15/15 Traffic – 9/15 Depth – 5/5 |
| | 10012-10394 | 1954 | 8 | VCP | 234 | 61 | 36 | Structural Rating – 25/25 Liquefaction Susceptibility – 12/15 Age – 10/10 Pipe Obstruction Rating – 10/25 | Waterway – 12/15 Traffic – 9/15 Depth – 5/5 |
| | 10395-10394 | 1954 | 8 | VCP | 15 | 51 | 36 | Required Pipe Cleaning – 25/25 Liquefaction Susceptibility – 12/15 Age – 10/10 | Waterway – 12/15 Traffic – 9/15 Depth – 5/5 |
| E Calaveras Blvd | 12717-12718 | - | 15 | VCP | 312 | 59 | 43 | Structural Rating – 25/25 Pipe Obstruction Rating – 15/25 Liquefaction Susceptibility – 9/15 | Traffic – 12/15 Waterway – 12/15 Diameter – 6/10 |
| | 12719-12720 | - | 16 | CIP | 127 | 50 | 46 | Pipe Obstruction Rating – 20/25 Material – 10/10 Liquefaction Susceptibility – 9/15 | Waterway – 15/15 Traffic – 12/15 Diameter – 6/10 |
| | 12721-12722 | - | 15 | VCP | 116 | 59 | 37 | Structural Rating – 25/25 Pipe Obstruction Rating – 15/25 Liquefaction Susceptibility – 9/15 | Traffic – 12/15 Waterway – 6/15 Diameter – 6/10 |
| | | | | | | | | | |

Table 3-5. Extreme Risk Pipes – Drivers of High LOF and COF Scores

| Street Name | Segment ID | Install Year | Pipe Diameter | Pipe Material | Segment Length (LF) | LOF Score | COF Score | LOF Drivers | COF Drivers |
|------------------|-------------|--------------|---------------|---------------|---------------------|-----------|-----------|---|--|
| | 12721-12722 | - | 15 | VCP | 16 | 59 | 37 | Same as above. Same Segment ID | Same as above. |
| | 12722-12711 | - | 15 | VCP | 362 | 59 | 31 | Structural Rating – 25/25 Pipe Obstruction Rating – 15/25 Liquefaction Susceptibility – 9/15 | Traffic – 12/15 Diameter – 6/10 Critical Facilities – 5/5 Depth – 5/5 |
| | 12729-12717 | - | 15 | VCP | 500 | 59 | 31 | Structural Rating – 20/25 Pipe Obstruction Rating – 20/25 Liquefaction Susceptibility – 9/15 | Traffic – 12/15 Diameter – 6/10 Critical Facilities – 5/5 Depth – 5/5 |
| | 12488-12496 | - | 21 | VCP | 501 | 47 | 35 | Pipe Obstruction Rating – 15/25 Liquefaction Susceptibility – 12/15 Structural Rating – 10/25 | Waterway – 12/15 Diameter – 8/10 Railroad – 5/5 Depth – 5/5 |
| N Milpitas Blvd | 12232-12251 | - | 39 | RCP | 434 | 54 | 36 | Pipe Obstruction Rating – 20/25 Liquefaction Susceptibility – 12/15 Structural Rating – 10/25 | Diameter – 10/10 Waterway – 9/15 Traffic – 9/15 |
| | 12218-12522 | - | 33 | RCP | 201 | 54 | 33 | Pipe Obstruction Rating – 25/25 Liquefaction Susceptibility – 12/15 Age – 6/10 Material – 6/10 | Diameter – 10/10 Traffic – 9/15 Waterway – 6/15 |
| | 12457-12154 | 1981 | 21 | VCP | 310 | 47 | 34 | Pipe Obstruction Rating – 15/25 Liquefaction Susceptibility – 12/15 Structural Rating – 10/25 | Waterway – 9/15 Traffic – 9/15 Diameter – 8/10 |
| S Abel Ave | 10480-10481 | 1982 | 18 | VCP | 66 | 47 | 35 | Pipe Obstruction Rating – 20/25 Liquefaction Susceptibility – 12/15 Age – 6/10 | Waterway – 12/15 Traffic – 9/15 Diameter – 6/10 |
| Sinclair Freeway | 10883-10972 | 1965 | 21 | VCP | 495 | 56 | 31 | Required Pipe Cleaning – 20/25 Pipe Obstruction Rating – 10/25 Liquefaction Susceptibility – 9/15 | Diameter – 8/10 Traffic – 9/15 Waterway – 6/15 |

Table 3-5. Extreme Risk Pipes – Drivers of High LOF and COF Scores

| Street Name | Segment ID | Install Year | Pipe Diameter | Pipe Material | Segment Length (LF) | LOF Score | COF Score | LOF Drivers | COF Drivers |
|--------------------------------|-------------|--------------|---------------|---------------|---------------------|-----------|-----------|--|---|
| Slightly East of S Hillview Dr | 12716-12719 | - | 0 | UNK | 302 | 49 | 41 | Pipe Obstruction Rating – 20/25 Structural Rating – 10/25 Liquefaction Susceptibility – 9/15 | Waterway – 12/15 Traffic – 12/15 Critical Facilities – 5/5 Depth – 5/5 |
| | 10176-10177 | - | 15 | VCP | 408 | 54 | 33 | Pipe Obstruction Rating – 25/25 Structural Rating – 10/25 Liquefaction Susceptibility – 9/15 | Waterway – 12/15 Diameter – 6/10 Railroad – 5/5 Depth – 5/5 |
| | 10185-10184 | - | 15 | VCP | 448 | 54 | 33 | Structural Rating – 20/25 Pipe Obstruction Rating – 15/25 Liquefaction Susceptibility – 9/15 | Waterway – 12/15 Diameter – 6/10 Railroad – 5/5 Depth – 5/5 |
| | 10185-10184 | - | 15 | VCP | 43 | 54 | 33 | Same as above. Same Segment ID | Same as above. |

Figures 3-13 and 3-14 summarize the LOF and COF drivers previously presented in Table 3-5.

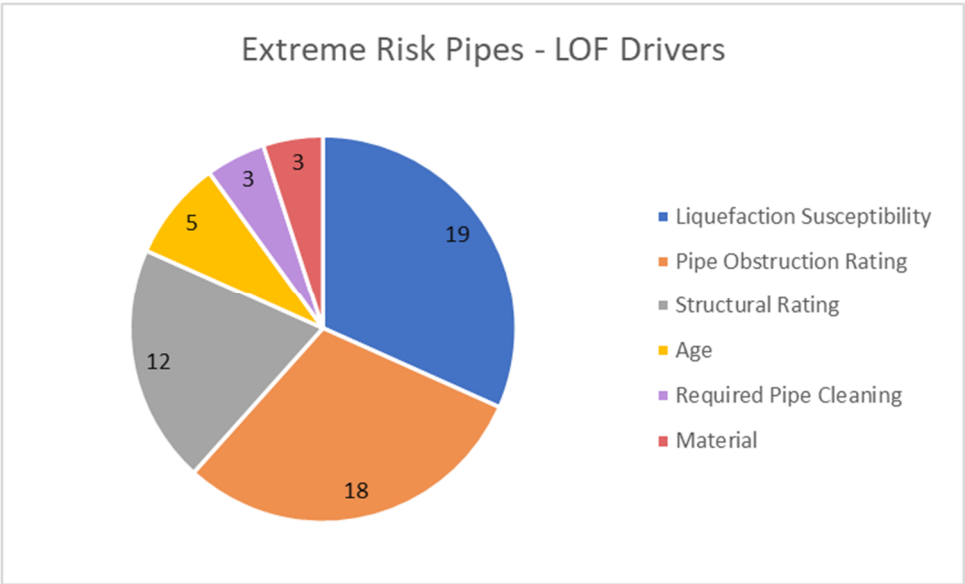


Figure 3-13: Extreme Risk Pipes – LOF Drivers

Liquefaction susceptibility, pipe obstruction rating, and structural rating are among the most common LOF drivers of extreme risk pipes. That is, of the extreme risk pipes, these LOF factors reoccur most often.

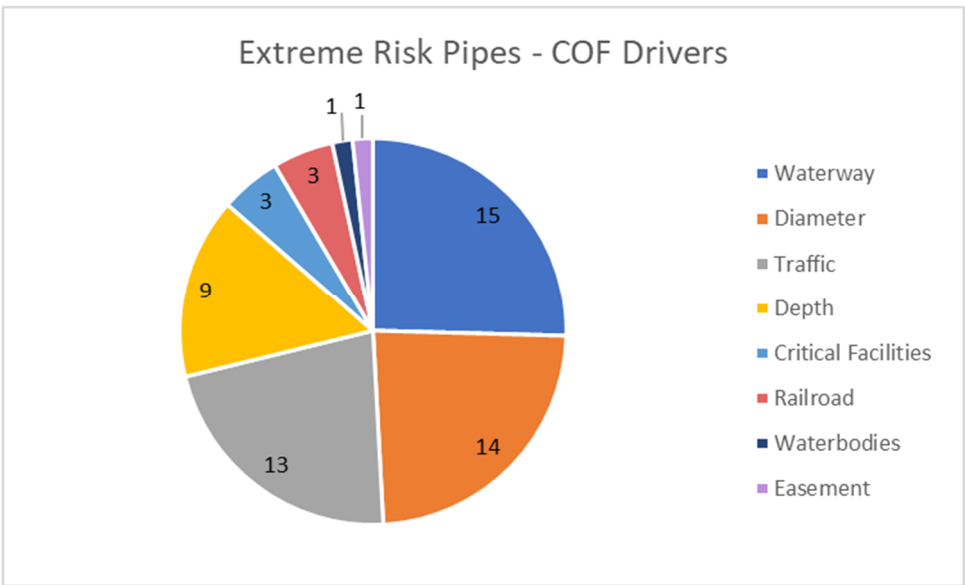


Figure 3-14: Extreme Risk Pipes – COF Drivers

Proximity to waterways, large pipe diameter, and proximity to high traffic flow areas are among the most common COF drivers of extreme risk pipes.

In summary, a desktop risk analysis of all pipe segments revealed that pipe mains located along E Calaveras Blvd, N Milpitas Blvd, S Main St, I-680 (crossing), Machado Ave, Sylvia Ave, Cadillac Ct, S Abel Ave, Coming Ave, Sinclair Freeway, S Hillview Drive, Sinnot Ln, and Tramway Dr were rated to be high or extreme risk. Pipe segments considered high or extreme risk are at the greatest likelihood of deterioration and/or have the highest consequence of failing. As such, pipe rehabilitation and inspection for these pipelines are prioritized in the R&R Plan (Section 4). The most common LOF drivers of high risk rating were liquefaction susceptibility, pipe obstruction rating, and structural rating. On the other hand, the most common COF drivers of high risk rating were proximity to waterways, large pipe diameter, and proximity to high traffic flow areas. Appendix F provides the risk rating for all pipes in shapefile and excel format for the City GIS department's use. See the "Risk column" located in the last few columns.

Section 4: Renewal and Replacement Plan

Based on desktop condition assessment and CCTV inspection results, sewer segments were analyzed for required system improvements and recommended CCTV surveys. The Renewal and Replacement Plan involves a discussion of methodology and costs, a review of the recent projects from the current CIP to ensure recommended improvements and inspections were aligned with the current efforts, a summary of the major deficiencies present in the Main and Venus Way Lift Stations, and a summary of project recommendations.

4.1 Rehabilitation Selection Methodology

For pipe segments without inspection data, risk and diameter was evaluated for CCTV prioritization. Pipe segments with a risk rating of medium or greater (three of five or greater) were recommended to be surveyed. In addition, large diameter pipes (24-inch diameter pipe or larger) of any risk rating were recommended to be surveyed. Figure 4-1 illustrates this risk and large diameter data consideration. While the initial plan was to CCTV high and extreme risk pipes outputted from the desktop risk analysis, further evaluation revealed that the budget allowed for medium risk pipelines to be included in the CCTV recommendations. Note that the CCTV prioritization map does not distinguish inspection data availability, and as such will differ from the rehabilitation recommendation map where pipe condition data (CCTV survey) allows for more fine-tuned rehabilitation recommendations.

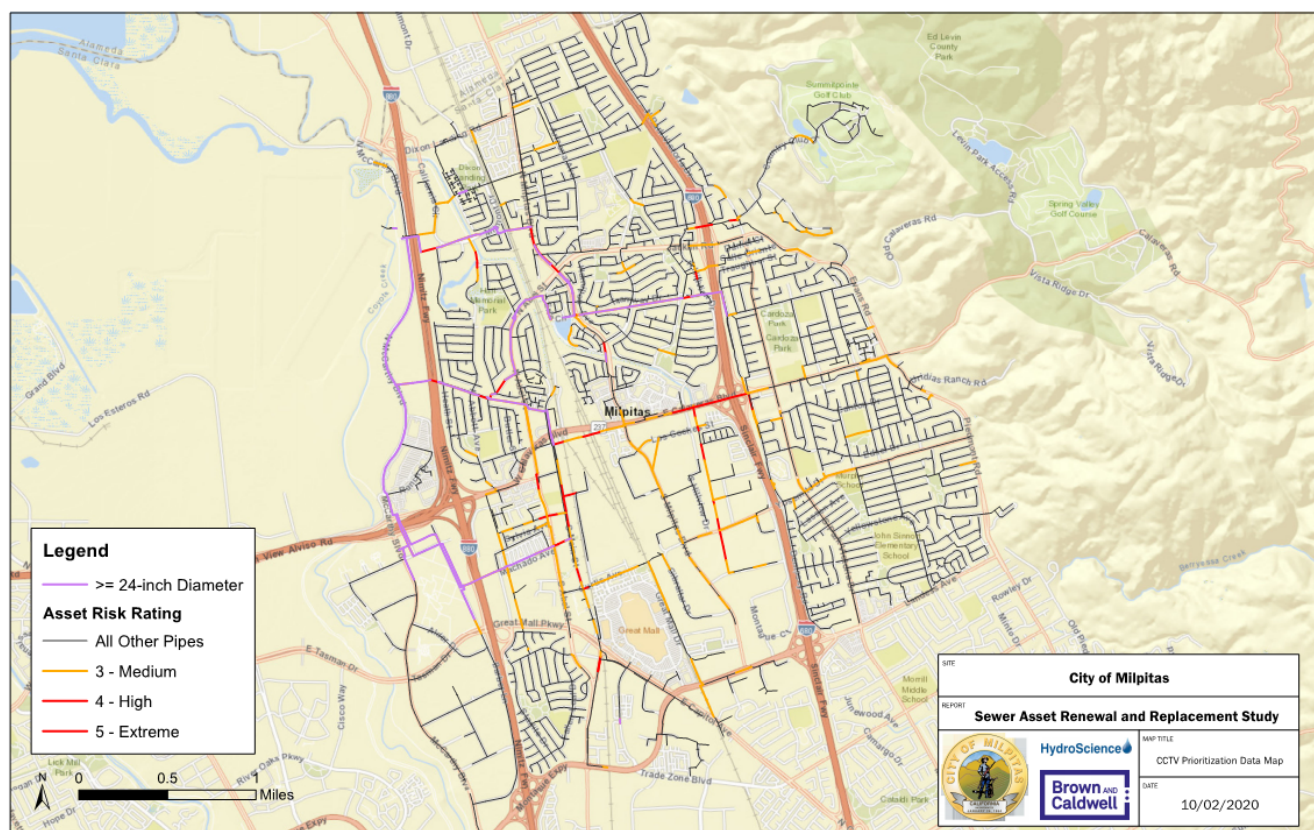


Figure 4-1: CCTV Prioritization Data Map

For pipe segments with survey data, a two-part process determined a pipe's final rehabilitation recommendation. First, defect-level rehabilitation methods such as point repair, lining, or no action (blank) are selected for each defect in the "defect codes" module. Second, a decision tree was prepared that determines the pipe rehabilitation recommendation by analyzing the following:

- CCTV structural peak score and overall peak score
- Number of point repairs and lining recommendations (output) by the defect-level rehabilitation methods or "defect codes" module
- Number of defects
- Length of major (score of four or five) and/or minor defects (score of three)
- Presence of specific defects such as ID (infiltration drippers) or SRCC (Reinforcement Corroded Chemical)

4.1.1 Defect Codes

Defect-level rehabilitation methods were selected and imported into the "Defect Codes" input window of the IAP program. Appendix H provides a full list of defect-level rehabilitation methods assigned for defects of all scores and all types. Table 4-1 presents a sample of the rehabilitation methods assigned for structural defects with a score of five.

| Defect Code | Default Score | Defect Type | Description | Rehabilitation Method |
|--------------------|----------------------|--------------------|-----------------------------------|------------------------------|
| BSV | 5 | Structural | Broken Soil Visible | Point Repair |
| BVV | 5 | Structural | Broken Void Visible | Point Repair |
| DI | 5 | Structural | Dropped Invert | Point Repair |
| DV | 5 | Structural | Deformed Vertical Brick | Point Repair |
| HSV | 5 | Structural | Hole Soil Visible | Point Repair |
| HVV | 5 | Structural | Hole Void Visible | Point Repair |
| SMW | 5 | Structural | Missing Wall | Point Repair |
| SMWC | 5 | Structural | Missing Wall Chemical | Point Repair |
| SMWM | 5 | Structural | Missing Wall Mechanical | Point Repair |
| SMWZ | 5 | Structural | Missing Wall Unknown | Point Repair |
| SRC | 5 | Structural | Reinforcement Corroded | Point Repair |
| SRCC | 5 | Structural | Reinforcement Corroded Chemical | Point Repair |
| SRCM | 5 | Structural | Reinforcement Corroded Mechanical | Point Repair |
| SRCZ | 5 | Structural | Reinforcement Corroded Unknown | Point Repair |
| SRP | 5 | Structural | Reinforcement Projecting | Lining |
| SRVM | 5 | Structural | Reinforcement Visible Mechanical | Lining |
| SRVZ | 5 | Structural | Reinforcement Visible Unknown | Lining |
| XB | 5 | Structural | Collapse Brick Sewer | Point Repair |
| XP | 5 | Structural | Collapse Pipe Sewer | Point Repair |

4.1.2 Rehabilitation Decision Tree

Figure 4-2 illustrates the rehabilitation selection process. First, survey data availability is checked in the “[Has CCTV Data]” condition box. Pipes without survey data are then evaluated for risk and large diameter pipes. Pipes with survey data are then screened for inspection score. As the decision tree progresses, each pipe is analyzed for its number of point repairs and lining recommendations outputted by the “defect codes” module, number of defects, length of defects, and presence of specific minor but not negligible defects. When multiple rehabilitation options are present, a cost comparison is done to determine the best action. This is to ensure that a pipe would not be recommended to have 10 sectional liners when a full liner would be more cost efficient. In another example, when multiple point repair(s) by excavation or sectional liner(s) are present, the cost to replace or cost to perform a “full liner + point repair(s) by excavation” is compared to ensure the best action is recommended.

4.1.3 Analysis Quality Check

For each decision tree branch, spot checks were performed to see if the rehabilitation recommendations matched engineering expectations. For example, Figure 4-3 illustrates a pipe which was recommended to be replaced. Using the IAP program, defects present in the pipe and suggested rehab methods were reviewed and validated. At least 20 percent of each decision tree branch was reviewed for each rehabilitation type except pipes with “No Action” which have received a risk score of one (negligible) or two (low).

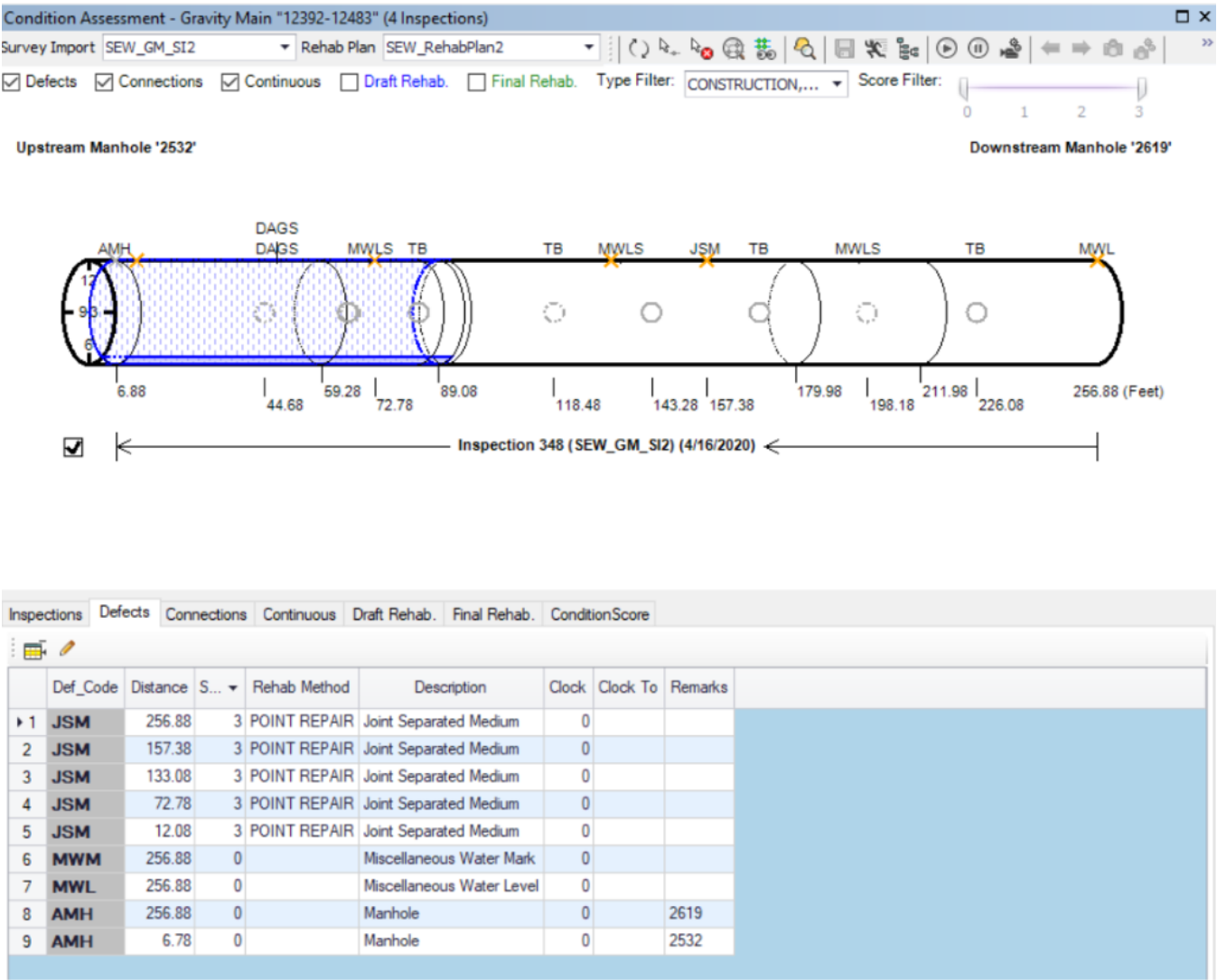


Figure 4-3: Example Analysis Quality Check in IAP

4.1.4 Staff Input

Prior to draft report submission, a preliminary rehabilitation decision tree was sent to the City in July 2020 in the event that preliminary staff input was desired. At the time, review was deferred until after draft report submission. Thus, recommendations are currently based on prior condition assessment projects and

engineering experience. Defect-level rehabilitation methods and decision tree can be adjusted to best suit City operational preferences.

4.2 Basis of Cost Assumptions

Detailed unit costs for the rehabilitation items used in the Class 5 cost estimate can be found in Appendix J. The cost per foot is specified by pipe size. Unit costs are provided for the following:

- CCTV
- Pipe Replacement
- Point Repair(s) by Excavation
- Sectional Liner(s)
- Full Pipe Length Cured in Place Pipe (Full CIPP)

In general, material costs were provided by vendor quotations and labor costs were estimated using RSMeans construction cost database. For pipes with unknown diameters, the average pipe diameter of nine inches was used for costing. For pipes with unknown depths, the average pipe depth of 11 feet was assumed. The unit costs used to develop rehabilitation recommendations are budgetary construction costs and do not include engineering, permitting, legal, administrative, or other planning costs typical of budgetary capital improvement planning. City input for CIP planning level costs either in the form of percentage breakdown or recent bid tabulations would further calibrate the model to ensure the best recommendations are made.

4.3 Review of Recent Projects

As a part of this renewal and replacement study, a review of recent City projects was performed to ensure our recommendations are aligned with recent and planned projects.

Table 4-2 presents recent or ongoing sewer utility and lift station improvement projects from the City's 2019-24 CIP.

| Table 4-2. Recent Sewer Utility Improvement Projects | | | |
|--|---|--|--|
| Project ID | Project | Description | Status |
| 6119 | Sanitary Sewer Condition Assessment Program | Citywide CCTV | Ongoing. Summary of recommendations for CCTV are described in Section 4.5. For a full list of CCTV recommendations, see Appendix A |
| 6123 | Sanitary Sewer Overflow Improvements | Smart manholes | Ongoing |
| 6124 | Sewer Pump Station Rehabilitation Program | In Fiscal Year (FY)2018-19 and FY2019-20 Pump 3 replacement at Main Lift Station and assessment of Pumps 4 and 5 | Per 2020 Lift Station Inspections (Task 2 submittal to HSE and briefly described in next section): <ul style="list-style-type: none"> • Pump 3 is in poor condition and requires replacement • Pumps 4 and 5 are in good condition |
| 6126 | Minor Sewer Projects | In FY 2018-19, replace Pump 2 at Main Lift Station and one pump at Venus Station | To be determined |

Table 4-2. Recent Sewer Utility Improvement Projects

| Project ID | Project | Description | Status |
|--------------|---|---|--|
| 6131 | Sanitary Sewer Cathodic Protection Improvements | Two magnetic flow meters at the Main Sewer Pump Station will to be replaced and isolated from cathodic protection to prevent reading interference. Design to start in FY2019-20 | To be determined |
| 6132 | Sewer Master Plan 2019 | This update will identify deficiencies in the collection system and recommend corrective actions. Funding is added to FY2019-20 to include assessment of City's main sewer pipes. | Ongoing. Summary of deficiencies and recommendations are reflected in this report. |
| Not Provided | Sewer Line Replacement at E. Curtis | This line is at full capacity and requires replacement/upgrades. | To be determined |

4.4 Lift Station Rehabilitation

In early 2020, an inspection of the Main Lift Station and Venus Way Lift Station was completed, and deficiencies were catalogued. Table 4-3 summarizes the major lift station deficiencies that require attention. The *Main and Venus Way Lift Station Inspections Report* submitted to City in May 2020 (Appendix K) provides a more comprehensive scoring and inspection notes for lift station assets.

Table 4-3. Main Lift Station Deficiencies

| Asset Name | Field Assessment/Comments | Condition Score | Performance Score |
|---------------------------------|--|---|---|
| Mag Meter (Flow Meter A) | Not in Operation | 4 - Poor Condition Major defects observed, asset integrity may be compromised. | 4 - Poor Performance In service, but function is highly impaired. |
| Manifold PV #2 Actuator | Does not work | 5 - Failing or Failed Asset integrity is compromised, asset may be out of service. | 5 - Failing or Failed Asset is not functioning as intended or is out of service. |
| Pump #3 | Has exceeded useful life | 4 - Poor Condition Major defects observed, asset integrity may be compromised. | 4 - Poor Performance In service, but function is highly impaired. |
| Grinder #1 | Excessive vibration and inadequate supports | 5 - Failing or Failed Asset integrity is compromised, asset may be out of service. | 5 - Failing or Failed Asset is not functioning as intended or is out of service. |
| 2" Combination Air/Vacuum Valve | N/A | 4 - Poor Condition Major defects observed, asset integrity may be compromised. | 4 - Poor Performance In service, but function is highly impaired. |
| Flow Meter B | Operable, but no accurate | 4 - Poor Condition Major defects observed, asset integrity may be compromised. | 4 - Poor Performance In service, but function is highly impaired. |
| Air Vacuum 1 to 15 | Cavitation, coating failure, and inadequate supports | 5 - Failing or Failed Asset integrity is compromised, asset may be out of service. | 5 - Failing or Failed Asset is not functioning as intended or is out of service. |
| Variable Frequency | No corrosion identified, arc flash labels | 4 - Poor Condition | 2 - In service |

Table 4-3. Main Lift Station Deficiencies

| Asset Name | Field Assessment/Comments | Condition Score | Performance Score |
|-----------------------------|--|--|---|
| Drive P2 | missing | Asset integrity may be moderately compromised. | Higher than expected O&M. |
| Variable Frequency Drive P3 | No corrosion identified, understood from City that IGBT was replaced a year ago, arc flash labels missing | 4 - Poor Condition Asset integrity may be moderately compromised. | 2 - In service Higher than expected O&M. |
| Variable Frequency Drive P4 | No corrosion identified, arc flash labels missing | 4 - Poor Condition Asset integrity may be moderately compromised. | 2 - In service Higher than expected O&M. |
| Variable Frequency Drive P5 | No corrosion identified, understood from City that cooling fans were replaced a year ago, arc flash labels missing | 4 - Poor Condition Asset integrity may be moderately compromised. | 2 - In service Higher than expected O&M. |

4.5 Summary of Recommendations

Recommendations of system improvements and CCTV inspections total \$17.4 million in construction costs. Asset renewal and replacement priorities were assessed based on inspection data, desktop risk evaluation, and rehabilitation selection methodology described in previous sections. The results are presented below.

4.5.1 Sewer Main Pipelines

Of the approximately 105,000 LF (449 segments) of sewer inspected, about 50,000 LF (178 segments) require improvement. The construction cost of system improvements is estimated at approximately \$17 million. Of the remaining 685,000 LF segments with no inspection data, it is recommended that 55,000 LF of medium to extreme risk pipes and/or large diameter pipes receive CCTV inspection, with an estimated cost totaling approximately \$400,000. Recommendations of system improvements and CCTV inspections total \$17.4 million in construction costs. Large diameter pipe is currently defined as 24-inch diameter and can be adjusted. Recommended improvements include:

- Additional CCTV
- Pipe Replacement
- Full Cured-In-Place Pipe (CIPP)
- Full CIPP + Point Repair(s) by Excavation
- Point Repair(s) by Excavation
- Sectional Liner(s)
- Sectional Liner(s) + Point Repair(s) by Excavation

Figure 4-4 provides the sewer main pipeline rehabilitation recommendations. The capital improvement program (CIP) recommendations for each asset is also included in GIS and tabular format in Appendix A. Note that these recommendations are subject to change depending on future discussions with operational staff prefers to determine rehabilitation preferences of the various levels and types of defects. The Class 5 cost estimates are high level (1-2% planning level) and will be refined as project scopes are further defined. Detailed cost estimates are recommended when further CIP budgeting and planning takes place.

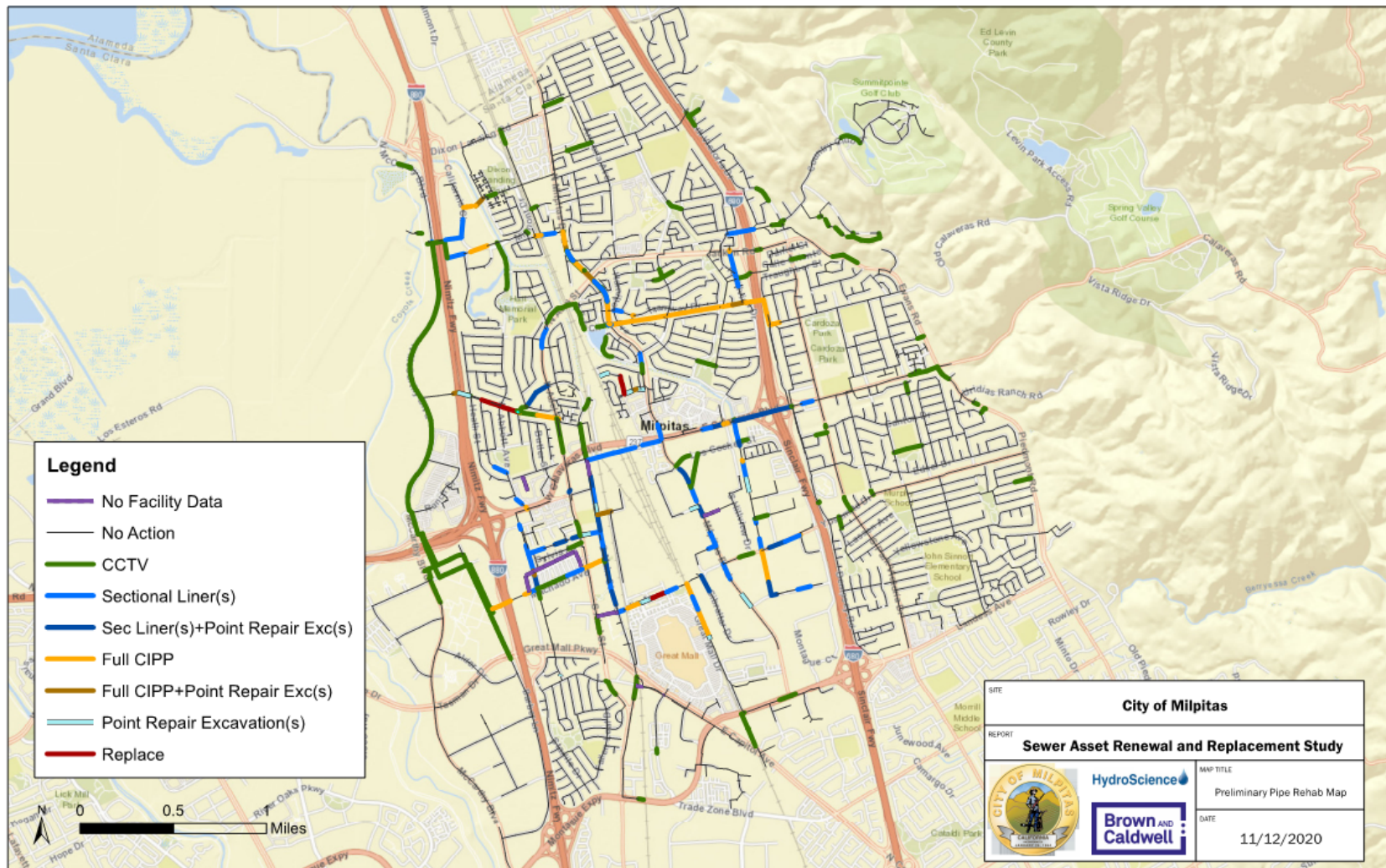


Figure 4-4: Preliminary Pipe Rehabilitation Recommendations Map

4.5.2 CCTV Inspection

Medium to extreme risk pipes and large diameter pipes are recommended for CCTV inspection. Large diameter pipe is currently defined as 24-inch diameter and can be adjusted. Figure 4-5 presents the CCTV inspection map of these highest priority areas. As shown on the figure, CCTV inspections include the long west-side pipeline stretch starting from Barber Lane through N McCarthy Boulevard and throughout the City. These inspections total 55,000 LF, with an estimated cost totaling approximately \$400,000.

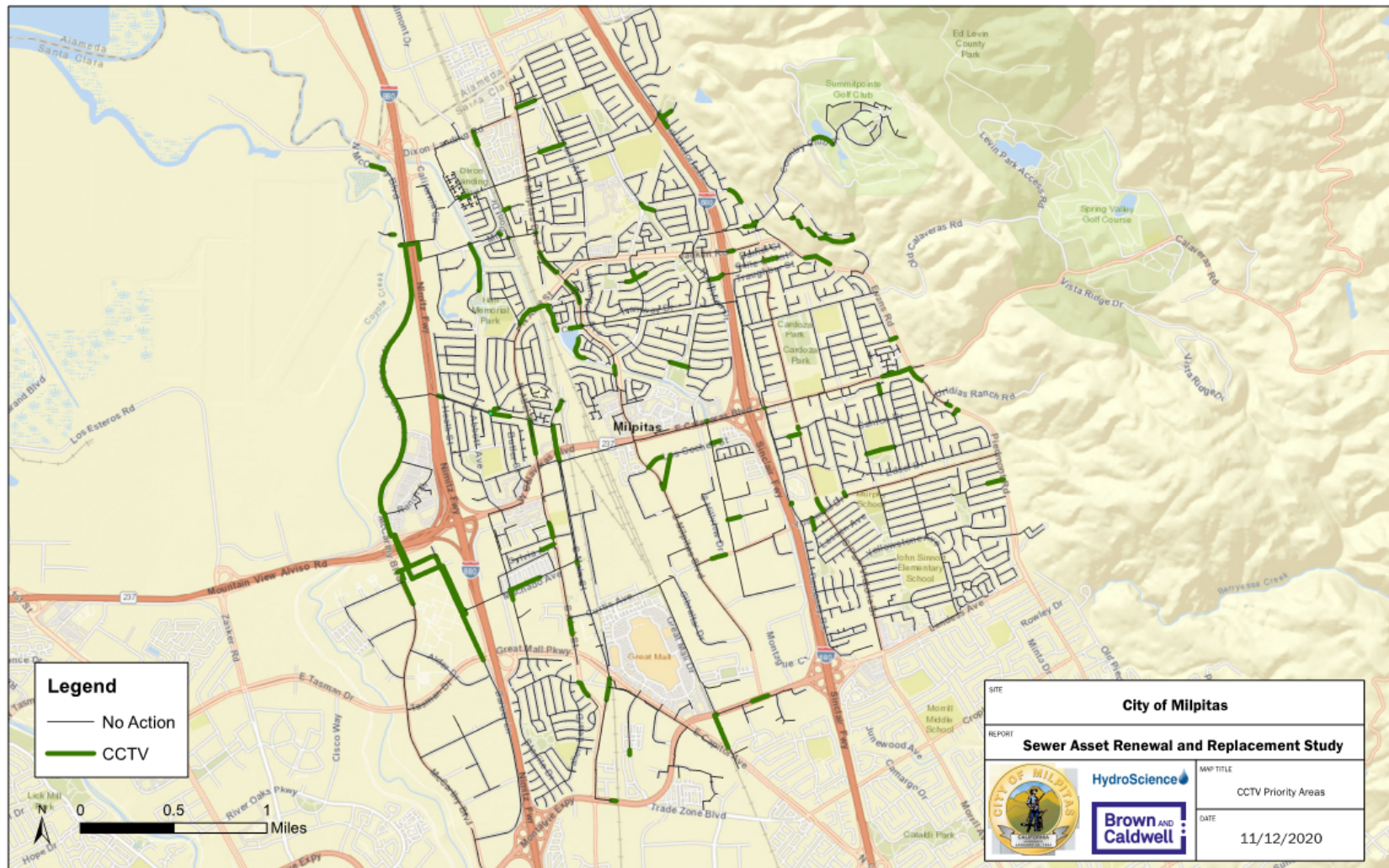


Figure 4-5: Priority CCTV Areas

4.5.3 Preliminary Capital Improvement Plan Alternatives Summary

BC has developed three distinct Capital Improvement Plan (CIP) alternatives to phase out the necessary rehabilitation efforts. Alternative A presents CIP grouping based on risk grades. Alternative B focuses rehabilitation geographically within the sewer basin. Alternative C is a hybrid approach wherein pipes with risk and significant defects are prioritized in the first year and after which a geographic approach is applied for ease of construction. With the given data, Alternative C is recommended among the three alternatives explored here.

However, note that the CIP grouping presented in Alternatives A, B, and C serve as preliminary groupings of sewer pipe rehabilitations. The alternatives presented at this stage are not exhaustive of other possibilities and modifications. Within Appendix A, you will find a “Preliminary Rehab Recommendation.shp” shapefile and excel export results to help facilitate further development of the CIP. The shapefile attribute table contains column “CIP_Phase” which match up with the 4 phases in Alternative A and B. The table also includes column “CIP_ST” which allows sorting of pipes along the same street to facilitate the development of visuals or further analysis of risk and rehabilitation data for CIP development.

4.5.4 Preliminary Sewer Pipeline Capital Improvement Plan – Alternative A

Alternative A presents CIP grouping based on risk grades. Table 4-4 provides an overview of Alternative A. Note that the same street may have GIS segments of various risk grades and may thus be split in this alternative.

Table 4-4. Preliminary Sewer Pipeline Capital Improvement Plan - Alternative A Summary

| Year | Description | Construction Cost ¹ | Construction Cost Per Year |
|------------|---|--------------------------------|----------------------------|
| 1 | Rehabilitate Extreme Risk Assets | \$1,700,000 | - |
| | CCTV Large Diameter and Medium to Extreme Risk Assets | \$400,000 | - |
| 2 | Rehabilitate High Risk Assets | \$2,600,000 | - |
| 3-7 | Rehabilitate Medium Risk Assets | \$10,900,000 | \$2,200,000 |
| 8 | Rehabilitate Low Risk Assets | \$1,800,000 | - |
| Total Cost | | \$17,400,000 | \$2,175,000 |

¹Contingencies amounting to 45% are included in the cost estimate (5% Mobilization/Demobilization, 10% Sewer Bypassing, 30% Construction Cost and Market Contingency). Additionally, traffic control during construction amounting to \$10,000 to \$30,000 depending on roadway traffic rating was also assumed. Administrative, engineering, or other planning costs typical of CIP planning are not included.

Year 1

The first year includes rehabilitating extreme risk assets (grade 5 out of 5) and CCTV inspection of the most critical assets as described in Section 4.5.2 involving the long west-side pipeline stretch starting from Barber Lane through N McCarthy Boulevard and throughout City. Table 4-5 presents the pipe rehabilitation details for year 1.

| Table 4-5. Alternative A CIP – Year 1, Extreme Risk Pipes | | | | | |
|---|-------------|----------|-------------------|--|---|
| Street Name | Size (inch) | Material | Construction Cost | Facility ID(s) | Notes |
| Between Tramway Dr and Los Pinos Ave | 30 | RCP | \$200,000 | 12043-12021 | Full CIPP 250 ft |
| Coming Ave | 8 | VCP | \$70,000 | 10395-10396 10012-10394 | Full CIPP 500 ft |
| E Calaveras Blvd | 15, 21 | VCP | \$400,000 | 12717-12718 12721-12722 12722-12711 12488-12496 12729-12717 12721-12722 | Full CIPP, Point Repair(s), Sectional Liner(s) 1,800 ft |
| Just East of S Hillview Dr | 15 | VCP | \$300,000 | 10176-10177 12716-12719 10185-10184 10185-10184 | Full CIPP, Sectional Liner(s) 1,200 ft |
| N Milpitas Blvd | 33, 39 | RCP | \$600,000 | 12232-12251 12218-12522 | Full CIPP, Point Repair(s) 600 ft |
| Nimitz Freeway and California Cir | 42 | RCP) | \$34,000 | 12589-12601 | Sectional Liner(s) 500 ft |
| S Abel St | 18 | VCP | \$42,000 | 10480-10481 | Point Repair(s), Sectional Liner(s). 65 feet, 1 pipe segment |

Year 2

The second year consists of various rehabilitation of high risk (grade 4 out of 5) assets.

Table 4-6. Alternative A CIP – Year 2, High Risk Pipes

| Street Name | Size (inch) | Material | Construction Cost | Facility ID (s) | Notes |
|--------------------------------------|-------------|----------|-------------------|---|---|
| Between Tramway Dr and Los Pinos Ave | 24 | VCP | \$100,000 | 12439-12446 12439-12446 | Full CIPP 85 ft |
| Curtis Ave | 18 | VCP | \$50,000 | 10333-10347 | Sectional Liner(s) 170 ft |
| E Calaveras Blvd* | 21 | VCP | \$70,000 | 10462-10463 | Sectional Liner(s) 330 ft |
| Just East of S Hillview Dr* | 15 | VCP | \$335,000 | 12706-12733 10188-10187 10179-10159 10177-10178 10178-10179 | Full CIPP, Point Repair(s), Sectional Liner(s) 1,100 ft |
| Machado Ave | 24 | RCP | \$280,000 | 10403-10418 10403-10418 | Full CIPP 400 ft |
| Marylinn Dr | 27 | VCP | \$500,000 | 11647-11695 11678-11680 | Pipe Replacement, Point Repair(s), Sectional Liner(s) 770 ft |
| N Hillview Dr | 12 | VCP | \$40,000 | 12088-12081 | Sectional Liner(s) 220 ft |
| N Milpitas Blvd* | 33, 39 | RCP | \$800,000 | 12218-12219 12522-12526 12251-12219 12248-12233 | Full CIPP, Point Repair(s), Sectional Liner(s) 1,060 ft |
| S Main St | 18, 21 | VCP | \$250,000 | 10331-10350 10404-10398 10399-10467 10467-10474 | Point Repair(s) and Sectional Liner(s) 1,600 ft |
| Sinnot Ln | 12 | VCP | \$180,000 | 10472-10467 10472-10467 | Full CIPP 400 ft |

Note:

*: This street also has a GIS segment requiring rehabilitation in Year 1.

Years 3-7

Years 3-7 feature rehabilitation of medium risk assets (grade 3 out of 5) as described in Table 4-7.

| Table 4-7. Alternative A CIP – Years 3-7, Medium Risk Pipes | |
|--|--|
| Street Name | Rehabilitation Action |
| Ames Ave | Sectional Liner(s) |
| Between Tramway and Los Pinos Ave* | Full CIPP, Sectional Liner(s) |
| Coming Ave* | Point Repair(s), Sectional Liner(s) |
| Connection between N Milpitas Blvd and Summerwind Way**** | Full CIPP, Sectional Liner(s) |
| Connection to Southwest Community Starting from W Calaveras Blvd**** | Full CIPP, Point Repair(s), Sectional Liner(s) |
| Curtis Ave** | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s) |
| E Calaveras Blvd* | Point Repair(s), Sectional Liner(s) |
| Gibraitar Dr | Point Repair(s), Sectional Liner(s) |
| Great Mall Dr | Full CIPP, Sectional Liner(s) |
| Just east of S Hillview Dr* | Point Repair(s), Sectional Liner(s) |
| Kennedy Dr | Full CIPP |
| Machado Ave** | Sectional Liner(s), Full CIPP |
| Marylinn Dr** | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s) |
| N Abel St | Sectional Liner(s) |
| N Hillview Dr** | Sectional Liner(s) |
| N McCarthy Blvd | Sectional Liner(s) |
| N Milpitas Blvd* | Full CIPP, Sectional Liner(s) |
| Nimitz Freeway and California Cir* | 2 Crossings near - Sectional Liner(s), Full CIPP |
| River Rock Rd | Full CIPP |
| S Abbot Ave | Sectional Liner(s) |
| S Main St** | Point Repair(s), Sectional Liner(s) |
| S Milpitas Blvd | Point Repair(s), Sectional Liner(s) |
| Sinclair Freeway Crossing near Fox Hollow Ct | Sectional Liner(s) |
| Smithwood St | Sectional Liner(s) |
| Wool Dr | Full CIPP |
| Yosemite Dr | Full CIPP, Point Repair(s), Sectional Liner(s) |

Notes:

*: the street also has repairs in year 1.

**: the street also has repairs in year 2.

****: the street also has repairs in year 8.

Year 8

Year 8 of Alternative A includes rehabilitation of low risk assets (grade 1 or 2) as described in Table 4-8. The 2020 CCTV inspections included several lower risk assets which identified defects requiring rehabilitation.

| Table 4-8. Alternative A CIP – Year 8, Low Risk Pipes | |
|---|--------------------------------------|
| Street Name | Rehabilitation Action |
| Between Tramway and Los Pinos Dr* | Full CIPP |
| Coming Ave* | Sectional Liner(s) |
| Connection to SW Community Starting from W Calaveras Blvd*** | Sectional Liner(s) |
| Great Mall Dr*** | Point Repair(s) |
| Machado Ave** | Full CIPP |
| N Hillview Dr** | Sectional Liner(s) |
| Silverlake Dr | Full CIPP and Point Repair |
| Sinclair Freeway | Full CIPP |
| Turquoise St | Point Repair |
| Tramway Dr | Sectional Liner(s) |
| Meadowland Dr | Pipe Replacement and Point Repair(s) |

Notes:

*: the street also has repairs in year 1.

**: the street also has repairs in year 2.

***: the street also has repairs in years 3-7.

4.5.5 Preliminary Sewer Pipeline Capital Improvement Plan – Alternative B

Alternative B presents CIP grouping based on risk while grouping pipes on the same street that have a rehabilitation action associated with it. Table 4-9 provides an overview of Alternative B.

| Table 4-9. Preliminary Sewer Pipeline Capital Improvement Plan - Alternative B Summary | | | |
|--|---|--------------------------------|----------------------------|
| Year | Description | Construction Cost ¹ | Construction Cost Per Year |
| 1-4 | Rehabilitate Extreme Risk Pipes and Other Pipes Along the Same Street With Rehabilitation Needs | \$7,800,000 | \$2,050,000 |
| | CCTV Large Diameter and Medium to Extreme Risk Pipes | \$400,000 | |
| 5-6 | Rehabilitate High Risk Pipes and Pipes Along the Same Street | \$5,400,000 | \$2,700,000 |
| 7-8 | Rehabilitate Medium Risk Pipes and Pipes Along the Same Street | \$2,800,000 | - |
| 8 | Rehabilitate Low Risk Streets | \$1,000,000 | - |
| Total Cost | | \$17,400,000 | \$2,175,000 |

¹Contingencies amounting to 45% are included in the cost estimate (5% Mobilization/Demobilization, 10% Sewer Bypassing, 30% Construction Cost and Market Contingency). Additionally, traffic control during construction amounting to \$10,000 to \$30,000 depending on roadway traffic rating was also assumed. Administrative, engineering, or other planning costs typical of CIP planning are not included.

Years 1-4

Years 1-4 include rehabilitating extreme risk pipes and pipes with rehabilitation needs (of any risk grading) along the same street and CCTV inspection of the most critical assets as described in Section 4.5.2 involving the long west-side pipeline stretch starting from Barber Lane through N McCarthy Boulevard and throughout City. Table 4-10 provides the list of pipes requiring rehabilitation in more detail.

Table 4-10. Alternative B CIP – Years 1-4, Streets With Extreme Risk Segments

| Risk Grade Average | Street Name | Size (inch) | Material | Total Construction Cost of Street | Cost of Rehabilitating Grade 4 or 5 GIS Segments Only | Notes |
|--------------------|--------------------------------------|----------------|-------------------------|-----------------------------------|---|--|
| 5.0 | S Abel St | 18 | VCP | \$42,000 | - | Point Repair(s), Sectional Liner(s). 65 feet, 1 pipe segment |
| 4.1 | Just East of S Hillview Dr | 12, 15 | VCP | \$720,000 | \$615,000 | Full CIPP, Point Repair(s), Sectional Liner(s) 2,300/3,450 ft of high/extreme risk pipe |
| 3.9 | E Calaveras Blvd | 12, 15, 18, 21 | VCP | \$727,000 | \$450,000 | Full CIPP, Point Repair(s), Sectional Liner(s) 2,150/4,650 ft of high/extreme risk pipe |
| 3.7 | N Milpitas Blvd | 33, 39 | RCP | \$2,300,000 | \$1,400,000 | Full CIPP, Sectional Liner(s) 1,700/3,050 ft of high/extreme risk pipe |
| 3.5 | Coming Ave | 8 | VCP | \$220,000 | \$70,000 | Full CIPP 500/1,600 ft of extreme risk pipe |
| 3.5 | Nimitz Freeway and California Cir | 18, 42 | VCP, RCP (respectively) | \$615,000 | \$34,000 | Full CIPP, Sectional Liner(s) 500/2000 ft of extreme risk pipe |
| 2.8 | Between Tramway Dr and Los Pinos Ave | 24, 30 | VCP, RCP | \$3,200,000 | \$300,000 | Full CIPP, Sectional Liner(s) 350/4,500 ft of high/extreme risk pipe |

Years 5-6

The 5th and 6th year consist of various rehabilitation of high risk (grade 4 out of 5) pipes and pipes along the same street which require rehabilitation of any risk rating. Table 4-11 presents the list of pipes

Table 4-11. Alternative B CIP – Years 5-6, Streets with High Risk Segments

| Risk Grade Average | Street Name | Size (inch) | Material | Total Construction Cost of Street | Cost of Rehabilitating Grade 4 Pipes Only | Notes |
|--------------------|---------------|-------------|----------|-----------------------------------|---|--|
| 4.0 | Sinnot Ln | 12 | VCP | \$180,000 | - | Full CIPP 400 feet, 2 pipes |
| 3.44 | S Main St | 18, 21 | VCP | \$650,000 | \$250,000 | Point Repair(s) and Sectional Liner(s) 1,600/3,600 ft of high risk pipes |
| 3.17 | Marylinn Dr | 27, 30 | RCP, VCP | \$2,300,000 | \$500,000 | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s) 750/3,100 ft of high risk pipes |
| 3.08 | Curtis Ave | 15, 18 | VCP | \$800,000 | \$50,000 | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s), 200/1,600 ft of high risk pipes |
| 2.92 | Machado Ave | 24, 30 | RCP, VCP | \$1,300,000 | \$280,000 | Full CIPP, Sectional Liner(s) 400/2,150 ft of high risk pipes |
| 2.6 | N Hillview Dr | 12 | DIP, CIP | \$170,000 | \$40,000 | Sectional Liner(s) 200/1,050 ft of high risk pipes |

Years 7-8, Medium Risk Pipes

Years 7-8 include rehabilitating medium risk pipes as detailed in Table 4-12

| Table 4-12. Alternative B CIP – Years 7-8, Medium Risk Pipes | |
|---|--|
| Street Name | Rehabilitation Action |
| Ames Ave | Sectional Liner(s) |
| Connection to Southwest Community Starting from W Calaveras Blvd | Full CIPP, Point Repair(s), Sectional Liner(s) |
| Connection Between N Milpitas Blvd and Summerwind Way | Full CIPP, Sectional Liner(s) |
| Gibraltar Dr | Point Repair(s), Sectional Liner(s) |
| Great Mall Dr | Full CIPP, Sectional Liner(s) |
| Kennedy Dr | Full CIPP |
| N Abel St | Sectional Liner(s) |
| N McCarthy Blvd | Sectional Liner(s) |
| River Rock Rd | Full CIPP |
| S Abbot Ave | Sectional Liner(s) |
| S Milpitas Blvd | Point Repair(s), Sectional Liner(s) |
| Sinclair Freeway Crossing near Fox Hollow Ct | Sectional Liner(s) |
| Smithwood St | Sectional Liner(s) |
| Wool Dr | Full CIPP |
| Yosemite Dr | Full CIPP, Point Repair(s), Sectional Liner(s) |

Year 8, Low Risk Pipes

Year 8 also includes rehabilitating low risk pipes as detailed in Table 4-13.

| Table 4-13. Alternative B CIP – Year 8, Low Risk Pipes | |
|--|--------------------------------------|
| Street Name | Rehabilitation Action |
| Silverlake Dr | Full CIPP and Point Repair |
| Sinclair Freeway | Full CIPP |
| Turquoise St | Point Repair |
| Tramway Dr | Sectional Liner(s) |
| Meadowland Dr | Pipe Replacement and Point Repair(s) |

4.5.6 Preliminary Sewer Pipeline Capital Improvement Plan – Alternative C (Recommended)

Alternative C presents a hybrid approach of Alternative A and B. The most pressing defects within the high and extreme risk pipe subset are addressed in the first year to reduce the likelihood of catastrophic failures. Following this, street by street rehabilitation (sorted by risk) similar to Alternative B is recommended for ease of construction.

Table 4-14. Preliminary Sewer Pipeline Capital Improvement Plan - Alternative C Summary

| Year | Description | Construction Cost ¹ | Construction Cost Per Year |
|------------|--|--------------------------------|----------------------------|
| 1 | Rehabilitate Extreme and High Risk Pipes with Significant Defects | \$1,300,000 | \$3,000,000 |
| | CCTV Large Diameter and Medium to Extreme Risk Pipes | \$400,000 | |
| 1-3 | Rehabilitate Extreme Risk Pipes and Pipes Along the Same Street Requiring Rehabilitation | \$7,400,000 | |
| 4 | Rehabilitate High Risk Pipes and Pipes Along the Same Street | \$1,900,000 | - |
| 5-7 | Rehabilitate Medium Risk Pipes and Pipes Along the Same Street | \$5,400,000 | \$1,800,000 |
| 8 | Rehabilitate Low Risk Streets | \$1,000,000 | - |
| Total Cost | | \$17,400,000 | \$2,175,000 |

¹Contingencies amounting to 45% are included in the cost estimate (5% Mobilization/Demobilization, 10% Sewer Bypassing, 30% Construction Cost and Market Contingency). Additionally, traffic control during construction amounting to \$10,000 to \$30,000 depending on roadway traffic rating was also assumed. Administrative, engineering, or other planning costs typical of CIP planning are not included.

Year 1

In year 1, extreme and high risk pipes with significant defects are addressed. Table 4-15 provides the list of extreme risk pipes with significant defects. Additionally, CCTV inspection of the most critical assets involving the long west-side pipeline stretch starting from Barber Lane through N McCarthy Boulevard and throughout City as depicted in Figure 4-4 is recommended (Section 4.5.2).

Table 4-15. Alternative C CIP – Year 1, Extreme Risk Pipes With Significant Defects

| Street Name | Size | Material | Significant Defects Observed | Rehab Recommendation | Construction Cost | Facility ID |
|--------------------------------|------|----------|--|-------------------------------------|-------------------|-------------|
| Coming Ave | 8 | VCP | Broken Soil Visible Surface Corrosion Metal Pipe | Sectional Liner(s), Point Repair(s) | \$40,000 | 10012-10394 |
| E Calaveras Blvd | 15 | VCP | Broken | Sectional Liner(s), Point Repair(s) | \$85,000 | 12717-12718 |
| E Calaveras Blvd | 15 | VCP | Broken | Full CIPP | \$75,000 | 12721-12722 |
| E Calaveras Blvd | 15 | VCP | Hole Soil Visible Broken (3) Broken Soil Visible | Full CIPP | \$40,000 | 12721-12722 |
| E Calaveras Blvd | 15 | VCP | Broken (3) | Sectional Liner(s), Point Repair(s) | \$70,000 | 12722-12711 |
| E Calaveras Blvd | 15 | VCP | Broken (3) | Sectional Liner(s), Point Repair(s) | \$80,000 | 12729-12717 |
| Just East of S Hillview Dr | 15 | VCP | Broken (2) | Sectional Liner(s) | \$35,000 | 10185-10184 |
| Just East of S Hillview Dr | 15 | VCP | Broken | Full CIPP | \$30,000 | 10185-10184 |
| Total Construction Cost | | | | | \$500,000 | |

Table 4-16 provides the list of high risk pipes with significant defects.

Table 4-16. Alternative C CIP – Year 1, High Risk Pipes With Significant Defects

| Street Name | Size | Material | Significant Defects Observed | Rehab Recommendation | Construction Cost | Facility ID |
|--------------------------------|------|----------|--|----------------------------|-------------------|-------------|
| Curtis Ave | 18 | VCP | Broken | Sectional Liner(s) | \$50,000 | 10333-10347 |
| Marylinn Dr | 27 | VCP | Broken (3) | Pipe Replacement | \$390,000 | 11678-11680 |
| Marylinn Dr | 27 | RCP | Broken (2) | Full CIPP, Point Repair(s) | \$30,000 | 11657-11678 |
| N Hillview Dr | 12 | VCP | Obstruction Intruding Through Wall | Sectional Liner(s) | \$40,000 | 12088-12081 |
| S Main St | 18 | VCP | Broken (2) | Sectional Liner(s) | \$50,000 | 10404-10398 |
| S Main St | 21 | VCP | Broken (2) | Point Repair(s) | \$35,000 | 10467-10474 |
| Sinnot Ln | 12 | VCP | Surface Damage Reinforcement Visible | Full CIPP, Point Repair(s) | \$95,000 | 10472-10467 |
| Sinnot Ln | 12 | VCP | Surface Damage Reinforcement Projecting | Full CIPP, Point Repair(s) | \$85,000 | 10472-10467 |
| Total Construction Cost | | | | | \$800,000 | |

Years 1-3

In years 1-3, extreme risk pipes and pipes with rehabilitation needs (of any risk grading) along the same street which were not addressed in year 1 are recommended at this stage. Table 4-17 provides the list of pipes requiring rehabilitation in more detail.

| Table 4-17. Alternative C CIP – Years 1-3, Streets with Extreme Risk Segments | | | | | | |
|---|--------------------------------------|----------------|-------------------------|-----------------------------------|---|--|
| Risk Grade Average | Street Name | Size (inch) | Material | Total Construction Cost of Street | Cost of Rehabilitating Grade 4 or 5 GIS Segments Only | Notes |
| 5.0 | S Abel St | 18 | VCP | \$42,000 | - | Point Repair(s), Sectional Liner(s). 65 feet, 1 pipe segment |
| 3.9 | Just East of S Hillview Dr* | 12, 15 | VCP | \$655,000 | \$550,000 | Full CIPP, Point Repair(s), Sectional Liner(s) 2,300/3,450 ft of high/extreme risk pipe |
| 3.7 | N Milpitas Blvd | 33, 39 | RCP | \$2,300,000 | \$1,400,000 | Full CIPP, Sectional Liner(s) 1,700/3,050 ft of high/extreme risk pipe |
| 3.5 | Nimitz Freeway and California Cir | 18, 42 | VCP, RCP (respectively) | \$615,000 | \$34,000 | Full CIPP, Sectional Liner(s) 500/2000 ft of extreme risk pipe |
| 3.3 | E Calaveras Blvd* | 12, 15, 18, 21 | VCP | \$370,000 | \$95,000 | Full CIPP, Point Repair(s), Sectional Liner(s) 2,150/4,650 ft of high/extreme risk pipe |
| 3.2 | Coming Ave* | 8 | VCP | \$180,000 | \$30,000 | Full CIPP 500/1,600 ft of extreme risk pipe |
| 2.8 | Between Tramway Dr and Los Pinos Ave | 24, 30 | VCP, RCP | \$3,200,000 | \$300,000 | Full CIPP, Sectional Liner(s) 350/4,500 ft of high/extreme risk pipe |
| Total Construction Cost | | | | | \$7,400,000 | |

Note:

*: This street had some rehabilitation done in year 1.

Year 4

The 4th year consist of various rehabilitation of high risk (grade 4 out of 5) pipes and other pipes requiring rehabilitation along the same street. Table 4-18 presents the list of pipes.

| Table 4-18. Alternative C CIP – Year 4, Streets with High Risk Segments | | | | | | |
|---|-------------|-------------|----------|-----------------------------------|---|---|
| Risk Grade Average | Street Name | Size (inch) | Material | Total Construction Cost of Street | Cost of Rehabilitating Grade 4 Pipes Only | Notes |
| 3.3 | S Main St* | 18, 21 | VCP | \$570,000 | \$170,000 | Point Repair(s) and Sectional Liner(s) 1,600/3,600 ft of high risk pipes |
| 2.9 | Machado Ave | 24, 30 | RCP, VCP | \$1,300,000 | \$280,000 | Full CIPP, Sectional Liner(s) 400/2,150 ft of high risk pipes |
| Total Construction Cost | | | | | \$1,900,000 | |

Note:

*: This street had some rehabilitation done in year 1.

Years 5-7, Medium Risk Pipes

Years 5-7 include rehabilitating medium risk pipes as detailed in Table 4-19.

| Table 4-19. Alternative C CIP – Years 5-7, Medium Risk Pipes | |
|--|--|
| Street Name | Rehabilitation Action |
| Ames Ave | Sectional Liner(s) |
| Connection to Southwest Community Starting from W Calaveras Blvd | Full CIPP, Point Repair(s), Sectional Liner(s) |
| Connection Between N Milpitas Blvd and Summerwind Way | Full CIPP, Sectional Liner(s) |
| Curtis Ave | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s) |
| Gibraltar Dr | Point Repair(s), Sectional Liner(s) |
| Great Mall Dr | Full CIPP, Sectional Liner(s) |
| Kennedy Dr | Full CIPP |
| Marylinn Dr | Full CIPP, Pipe Replacement, Point Repair(s), Sectional Liner(s) |
| N Abel St | Sectional Liner(s) |
| N Hillview Dr | Full CIPP, Sectional Liner(s) |
| N McCarthy Blvd | Sectional Liner(s) |
| River Rock Rd | Full CIPP |
| S Abbot Ave | Sectional Liner(s) |
| S Milpitas Blvd | Point Repair(s), Sectional Liner(s) |
| Sinclair Freeway Crossing near Fox Hollow Ct | Sectional Liner(s) |
| Smithwood St | Sectional Liner(s) |
| Wool Dr | Full CIPP |
| Yosemite Dr | Full CIPP, Point Repair(s), Sectional Liner(s) |

Year 8, Low Risk Pipes

Year 8 also includes rehabilitating low risk pipes as detailed in Table 4-20.

| Table 4-20. Alternative C CIP – Year 8, Low Risk Pipes | |
|--|--------------------------------------|
| Street Name | Rehabilitation Action |
| Silverlake Dr | Full CIPP and Point Repair |
| Sinclair Freeway | Full CIPP |
| Turquoise St | Point Repair |
| Tramway Dr | Sectional Liner(s) |
| Meadowland Dr | Pipe Replacement and Point Repair(s) |

4.5.7 Sewer Lift Station Rehabilitation

The Main Lift Station and Venus Way Lift Station were inspected, and major deficiencies were catalogued (refer to Table 4-3). The variable frequency drives (VFDs), pump #3, and grinder are the main items requiring rehabilitation. The detailed score for each inventory item is provided in Appendix K, *Main and Venus Way Lift Station Inspections Report*. Per City's 2019-24 CIP, project 6124, an allowance of \$100,000 annual investment from FY 2019-20 through 2022-23 is planned to address these rehabilitation needs.

4.5.8 Estimated Construction Cost

The Association for the Advancement of Cost Engineering (AACE) Class 5 Estimate is a rough order-of-magnitude estimate typically used to evaluate alternatives and is the class of estimate used in this report. Standard unit prices were developed for the primary components in each proposed construction contract. Scope items were parametrically estimated using cost data from similar projects in scope and size and adjusted to suit the specific requirements of this project. The estimated construction costs presented are considered conceptual and include a 45 percent contingency factor. Additionally, the presented costs are budgetary construction costs and do not include engineering, permitting, legal, administrative, or other planning costs typical of budgetary capital improvement planning.

References

- City of San Jose Environmental Services Department, "Tributary Agencies," *City of San Jose Government*, June 2015, <https://www.sanjoseca.gov/home/showdocument?id=32063>.
- County of Santa Clara Department of Planning and Development, "Geological Maps and Data", *County of Santa Clara Government*, <https://www.sccgov.org/sites/dpd/OrdinancesCodes/GeoHazards/Pages/GeoMaps.aspx>
- Municipal and Financial Services Group, "City of Milpitas Sewer Rate Study Draft Report," *City of Milpitas Government*, November 2018, <http://www.ci.milpitas.ca.gov/wp-content/uploads/2019/01/Sewer-Rate-Study-2018.pdf>.
- "Milpitas Wastewater Fact Sheet," *Critical Information You Need to Know About the State of Milpitas' Sewer System*, <http://www.ci.milpitas.ca.gov/wp-content/uploads/2018/12/MilpitasWastewaterFactSheet.pdf>.
- Rex L. Baum et al., "Landslide and Land Subsidence Hazards to Pipeline", *USGS Publications Warehouse*, 2008, https://pubs.usgs.gov/of/2008/1164/pdf/OF08-1164_508.pdf
- "USGS National Hydrography Dataset", *The National Map – Data Delivery*, 2019, <https://www.usgs.gov/core-science-systems/ngp/tnm-delivery/>
- "USGS National Transportation Dataset for California 20170822", *Data Catalog*, 2017, <https://catalog.data.gov/dataset/usgs-national-transportation-dataset-ntd-for-california-20140908-state-or-territory-shapefile>
- "Water and Sewer System Information," *City of Milpitas Government*, <http://www.ci.milpitas.ca.gov/milpitas/departments/public-works-department-home-page/watersewer2018/#1546465747578-cb3b6f17-70cd>.

Appendix A: Rehabilitation Table, GIS, and Figures

This Appendix is a file export from Microsoft Excel.

Appendix B: Planned CCTV Inspection Scope

**City of Milpitas
CCTV Inspection Scope
November 14, 2019**

Scope of Work

HydroScience Engineers (HSE) plans to contract with National Plant (Contractor) to inspect portions of the City of Milpitas' large-diameter trunk sewers and other local collector sewers with high-definition CCTV equipment. For large-diameter trunk sewers in the Trunk A grouping below, provide an option to collect 2D laser and sonar data in addition to CCTV. CCTV inspections shall be NASSCO PACP compliant. The actual length to be inspected and inspection methods will be determined later based on pricing, field production, and available budget. During contracting, HSE and Contractor will determine the inspection equipment specifications.

Each "Priority" group below contains groupings of reaches, also listed in order of priority. We expect the Contractor will be able to inspect all the Priority 1 reaches. For Priority 2 reaches, the Contractor should inspect the first grouping and then move onto the second grouping, starting with the largest diameters reaches and working towards the smaller diameters. Within the grouping, the inspection Contractor will be allowed to select the order in which to inspect the reaches based on ease of access, traffic control, and other factors; however, the inspected reaches shall be contiguous as much as possible.

See the attached figures and spreadsheet for the candidate list of reaches planned for inspection. Also provided are shapefiles of the sewer pipes and manholes. The two fields in the sewer pipes attribute table, [CCTV_Plan] and [Diam_CCTV], contain the designated grouping and the expected pipe diameters, respectively. Lengths are based off of the [MEASUREDLE] field. Groupings below have the same names as the inspection maps, with GIS attribute label [CCTV_Plan] in parentheses.

PRIORITY 1

Trunk A_P1 (Trunk1)

Reinforced concrete pipe (RCP), diameters of 33, 36, 39, 42, 54, and 66 inches. 37 reaches, total length 8,830 linear feet (lf). Provide option to perform 2D laser and sonar inspection on a portion of the pipeline.

Trunk B_P1 (Trunk2)

RCP and vitrified clay pipe (VCP), diameters of 27 and 33 inches. 24 reaches, total length 5,760 lf.

Trunk C_P1 (Trunk3)

RCP and VCP, diameters of 24 and 30 inches. 15 reaches, total length 4,850 lf.

SW Area 21-24_P1 (Sub_21-24)

Mostly VCP, diameters of 21 and 24 inches. 19 reaches, total length 4,520 lf.

SW Area 10-18_P1 (Sub_10-18)

Mostly VCP, diameters of 10, 12, 15, and 18 inches. 162 reaches, total length 46,720 lf.

SW Area 8_P1 (Sub_8)

Mostly VCP, 8-inch-diameter, 26 reaches, total length 8,660 lf.

PRIORITY 2

Misc 21-36_P2 (Sub_21-36_P2)

Mostly VCP, some RCP, diameters of 21, 24, 27, 30, 36 inches. 66 reaches, total length 16,890 lf.

Misc 12-18_P2 (Sub_12-18_P2)

Mostly VCP, diameters of 12, 15, and 18 inches. 141 reaches, total length 31,000 lf.

CITY INSPECTIONS

To be inspected by City of Milpitas forces using City-owned equipment (WinCan). Mostly 6- and 8-inch-diameter VCP pipes. 389 reaches, total length 98,750 lf.

Manholes

There is no plan to perform MACP inspections on manholes; however, during CCTV inspection, the inspection Contractor shall capture video footage in each manhole to allow a basic assessment of manhole conditions.

Cleaning

Cleaning is not anticipated for sewers 15-inch-diameter and larger, and only targeted cleaning is anticipated for 8-inch- to 12-inch-diameter sewers. The Contractor shall attempt to inspect each sewer reach without cleaning. If unable to complete an inspection, mark the record "MSA" per NASSCO PACP, and alert the City immediately. Depending on availability, City forces may be dispatched to clean the pipe at that time, or may clean the pipe later for potential reinspection.

Estimated Pricing (based on communication with National Plant in November 2019)

| Diameter | CCTV, per lf | 2D Laser + Sonar, per lf |
|--------------------|---------------------|---------------------------------|
| 8-inch to 18-inch | \$1.61 | n/a |
| 21-inch | \$1.61 - \$2.11 | n/a |
| 24-inch to 66-inch | \$2.11 - 2.40 | \$6.00 |

Attachments:

1. Pipe reach summary tables (count and total length by diameter)
2. Inspection plan maps

City of Milpitas Inspection Plan
Pipe Reach Count

| Count of FID * | Column Labels | | | | | | | | | | | | | | | | | | |
|--------------------|---------------|------------|------------|-----------|------------|------------|----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|----------|-----------|----------|----------|-------------|
| Row Labels | 0 | 6 | 8 | 10 | 12 | 15 | 16 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 54 | 66 | Grand Total |
| City | 10 | 220 | 114 | 22 | 13 | 7 | | | | 2 | | | | | | 1 | | | 389 |
| Trunk1 | | | | | | | | | | | | | 5 | 4 | 9 | 12 | 2 | 5 | 37 |
| Trunk2 | | | | | | | | | | | 21 | 3 | | | | | | | 24 |
| Trunk3 | | | | | | | | | | 6 | | 9 | | | | | | | 15 |
| Sub_21-24 | | | | | | | | | 11 | 8 | | | | | | | | | 19 |
| Sub_10-18 | | | | 28 | 23 | 68 | 1 | 42 | | | | | | | | | | | 162 |
| Sub_8 | | | 26 | | | | | | | | | | | | | | | | 26 |
| Sub_21-36_P2 | | | | | | | | | 35 | 5 | 4 | 13 | | 9 | | | | | 66 |
| Sub_12-18_P2 | | | 1 | | 72 | 43 | 1 | 24 | | | | | | | | | | | 141 |
| Grand Total | 10 | 220 | 141 | 50 | 108 | 118 | 2 | 66 | 46 | 21 | 25 | 25 | 5 | 13 | 9 | 13 | 2 | 5 | 879 |

City of Milpitas Inspection Plan
Pipe Reach Length

| Sum of MEASUREDLE | Column Labels | | | | | | | | | | | | | | | | | | |
|-------------------|---------------|--------|--------|--------|--------|--------|-----|--------|--------|-------|-------|-------|-------|-------|-------|-------|-----|-------|-------------|
| Row Labels | 0 | 6 | 8 | 10 | 12 | 15 | 16 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 54 | 66 | Grand Total |
| City | 1,198 | 59,521 | 28,690 | 5,158 | 2,785 | 1,123 | | | | 250 | | | | | | 11 | | | 98,736 |
| Trunk1 | | | | | | | | | | | | | 1,334 | 729 | 2,485 | 2,995 | 251 | 1,035 | 8,829 |
| Trunk2 | | | | | | | | | | 4,716 | 1,045 | | | | | | | | 5,761 |
| Trunk3 | | | | | | | | | | 1,422 | | 3,427 | | | | | | | 4,849 |
| Sub_21-24 | | | | | | | | | 3,205 | 1,311 | | | | | | | | | 4,516 |
| Sub_10-18 | | | | 8,321 | 6,673 | 19,933 | 126 | 11,667 | | | | | | | | | | | 46,720 |
| Sub_8 | | | 8,663 | | | | | | | | | | | | | | | | 8,663 |
| Sub_21-36_P2 | | | | | | | | | 7,897 | 1,368 | 781 | 4,242 | | 2,599 | | | | | 16,887 |
| Sub_12-18_P2 | | | 134 | | 15,803 | 9,972 | 68 | 5,024 | | | | | | | | | | | 31,001 |
| Grand Total | 1,198 | 59,521 | 37,487 | 13,479 | 25,261 | 31,028 | 194 | 16,691 | 11,102 | 4,351 | 5,497 | 8,714 | 1,334 | 3,328 | 2,485 | 3,006 | 251 | 1,035 | 225,962 |

Legend

SS_Pipe

DIAMETER

- <=6-inch
- 8-inch
- 10-15
- 16-23
- 24-36
- >=39-inch
- Unknown

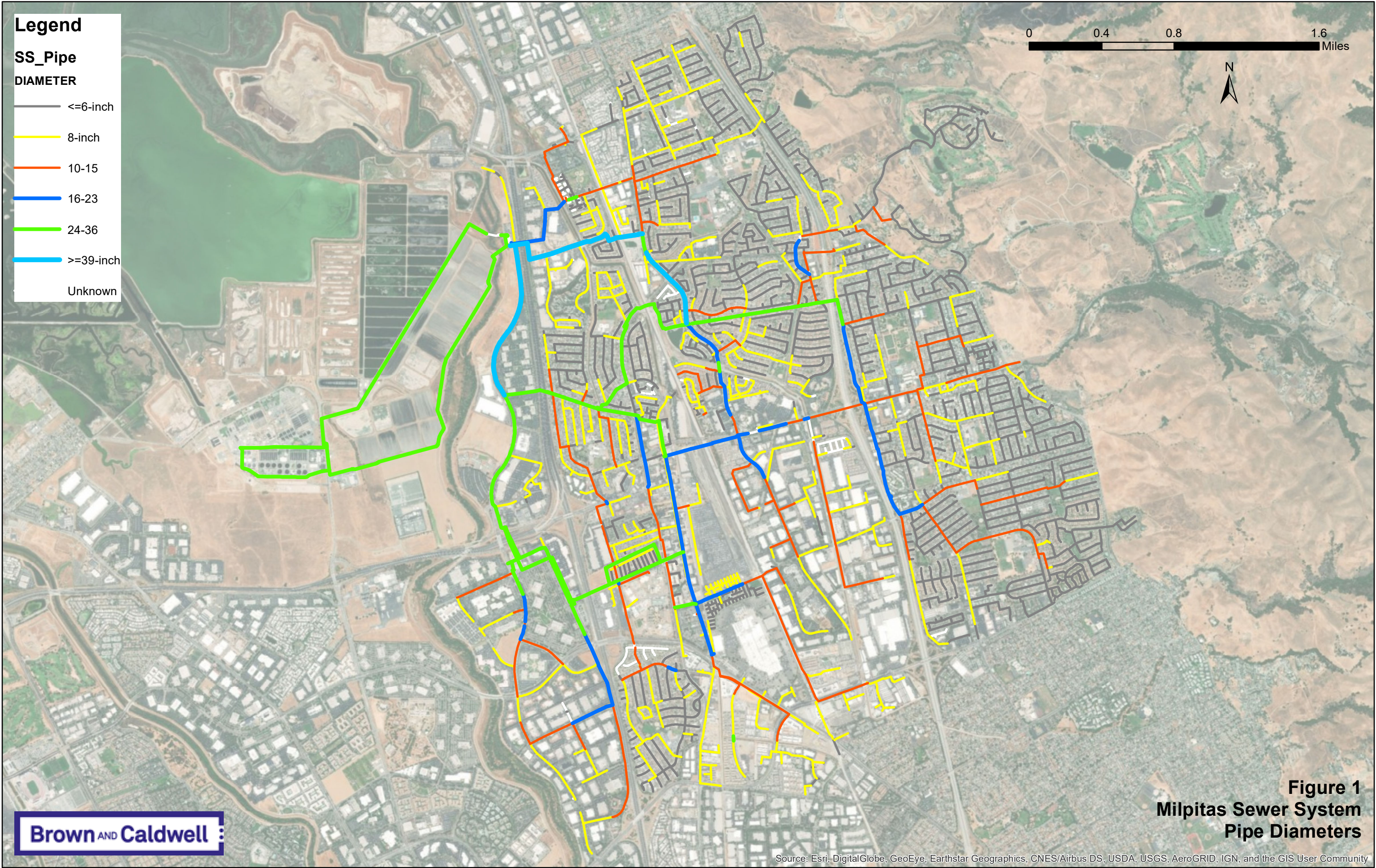


Figure 1
Milpitas Sewer System
Pipe Diameters

Legend

SS_Pipe

CCTV_Plan

Trunk A_P1

Trunk B_P1

Trunk C_P1

SW Area 21-24_P1

SW Area 10-18_P1

SW Area 8_P1

Misc 21-36_P2

Misc12-18_P2

City Crew

Not in Year 1 Plan

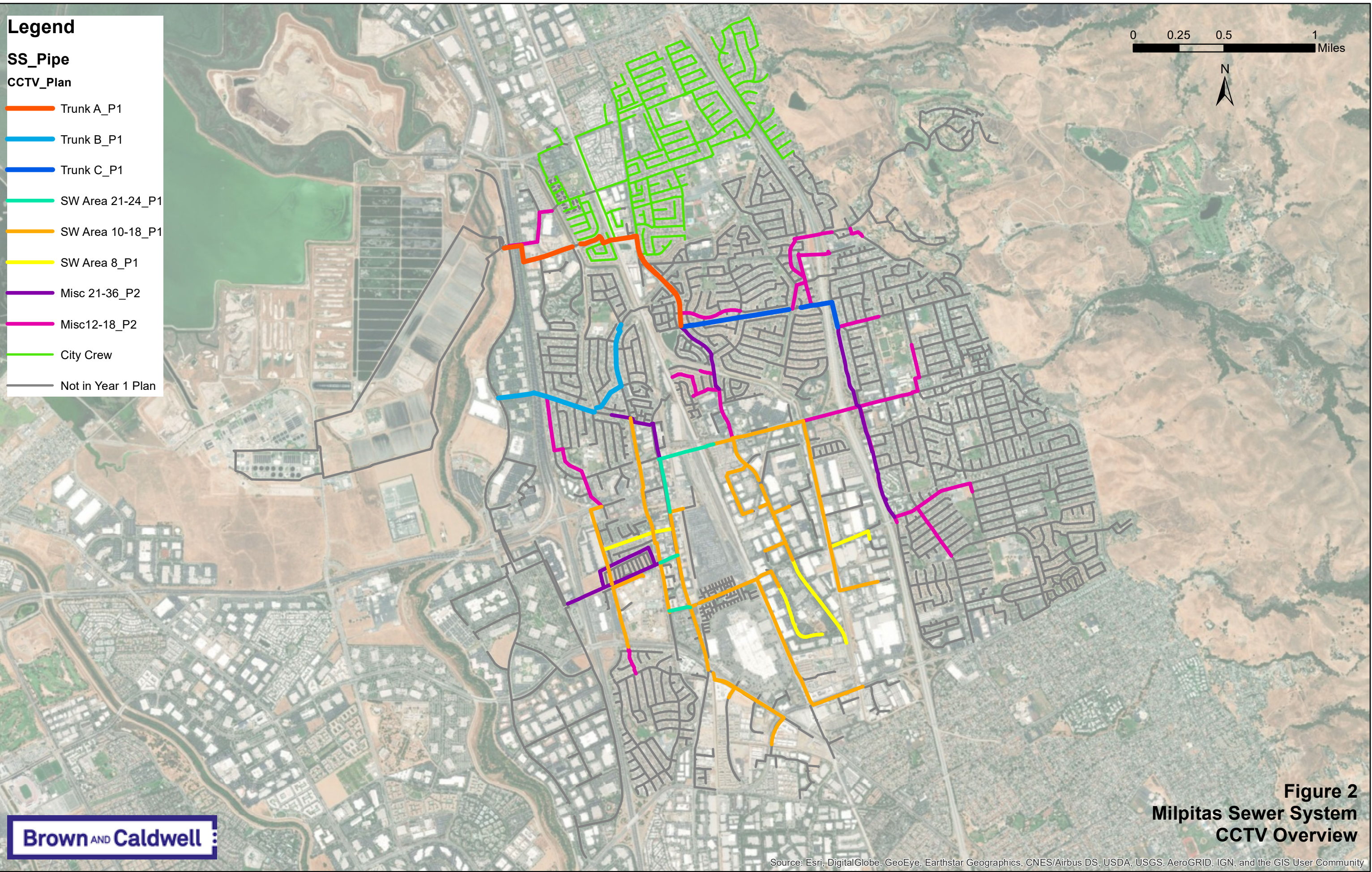
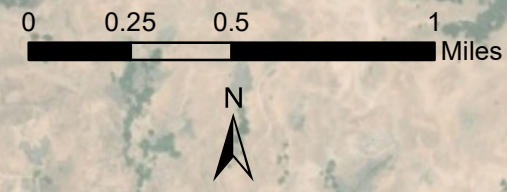


Figure 2
Milpitas Sewer System
CCTV Overview

Legend

SS_Pipe

CCTV_Plan

Trunk A_P1

Trunk B_P1

Trunk C_P1

SW Area 21-24_P1

SW Area 10-18_P1

SW Area 8_P1

Misc 21-36_P2

Misc12-18_P2

City Crew

Not in Year 1 Plan

0 0.125 0.25 0.5 Miles



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Figure 3
Milpitas Sewer System
Trunk CCTV

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

11/14/2019 11:52:11 AM EZalkin

- Legend
- SS_Pipe
- CCTV_Plan
- Trunk A_P1
- Trunk B_P1
- Trunk C_P1
- SW Area 21-24_P1
- SW Area 10-18_P1
- SW Area 8_P1
- Misc 21-36_P2
- Misc 12-18_P2
- City Crew
- Not in Year 1 Plan

0 0.125 0.25 0.5 Miles



Figure 4
Milpitas Sewer System
SW Area CCTV

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

- Legend
- SS_Pipe
- CCTV_Plan
- Trunk A_P1
- Trunk B_P1
- Trunk C_P1
- SW Area 21-24_P1
- SW Area 10-18_P1
- SW Area 8_P1
- Misc 21-36_P2
- Misc 12-18_P2
- City Crew
- Not in Year 1 Plan

0 0.125 0.25 0.5 Miles



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Figure 5
Milpitas Sewer System
City Crew CCTV

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Document Path: P:\GIS\Milpitas\mxd\Milpitas_CCTV_Plan_Expanded.mxd

Appendix C: QC Comments Log

| City of Milpitas - CCTV Review Summary | | | | | | | | | | | | |
|--|------------|------------------------|-------------|---------------------------------|------------------|---|----------------------|---------------------|-------------|----------|----------------------|------------------|
| US node ID | DS node ID | Structure quick rating | Reviewed by | QC Header Information (UT26) | QC Coding (UT27) | QC General Comments (UT28) | Inspection ID | Direction of survey | Height (in) | Material | Length surveyed (ft) | Pipe length (ft) |
| 1148 | 2852 | 5341 | DSkipper | Header information is accurate. | | From 276-282 there are multiple cracks. The one that was coded was a continuous crack at 12 oclock but the camera doesnt look up to clarify where this crack actually ends? And the pipe is broken at 6 oclock, grade 5, at 276 | 1148_D_20200501_0315 | D | 15 | VCP | 388.3 | 388 |
| 1417 | 979 | 4A31 | DSkipper | Header information is accurate. | | Significant fractures from 30-90ft. Coded correctly,. | 1417_D_20200423_0239 | D | 12 | VCP | 344.3 | 343 |
| 210 | 582 | 5134 | DSkipper | Header information is accurate. | | Hole Soil Visible at 177, scored correctly as 5. Survey incomplete, crawler unable to proceed after 198 feet due to Slphon | 210_D_20200421_2304 | D | 8 | VCP | 198.8 | 233 |
| 2229 | 2222 | 5141 | DSkipper | Header information is accurate. | | Broken VCP in two locations, coded correctly. | 2229_D_20200422_0512 | D | 12 | VCP | 218.7 | 218 |
| 2290 | 2652 | 3H2D | DSkipper | Header information is accurate. | | Corrected pipe material and shape to 66" RCP per defect log. | 2290_U_20200415_0447 | U | 66 | RCP | 193.6 | 200 |
| 2321 | 2317 | 3N2F | DSkipper | Header information is accurate. | | no additional comments | 2321_D_20200409_0528 | D | 39 | RCP | 236.1 | 238 |
| 2373 | 2391 | 3R00 | DSkipper | Header information is accurate. | | DS MH does not exist. Geoplan indicates it should have been at 415 feet. They continued on until 430 feet and declared it nonexistent. | 2373_D_20200413_0537 | D | 39 | RCP | 430.1 | 415 |
| 2388 | 2373 | 3Y2G | DSkipper | Header information is accurate. | | No comments, operator was thorough | 2388_D_20200413_0500 | D | 39 | RCP | 374.3 | 370 |
| 2584 | 2321 | 3M2J | DSkipper | Header information is accurate. | | no additional comments | 2584_U_20200409_0435 | U | 39 | RCP | 367.7 | 372 |
| 2652 | 2650 | 3F00 | DSkipper | Header information is accurate. | | Pipe material is marked as unknown. Pipe appears to be lined | 2652_U_20200409_2343 | U | 62 | XXX | 148.8 | 157 |
| 2723 | 2735 | 3H2H | DSkipper | Header information is accurate. | | Changed pipe length to 493 per the geoplan. Inspection only made it part way to 231 ft due to water level | 2723_D_20200410_0454 | D | 40 | RCP | 231.7 | 493 |
| 2724 | 2723 | 3G2F | DSkipper | Header information is accurate. | | Corrected pipe size to 40" per comment in the defect log. | 2724_D_20200410_0420 | D | 42 | RCP | 182.6 | 187 |

| US node ID | DS node ID | Structure quick rating | Reviewed by | QC Header Information (UT26) | QC Coding (UT27) | QC General Comments (UT28) | Inspection ID | Direction of survey | Height (in) | Material | Length surveyed (ft) | Pipe length (ft) |
|------------|------------|------------------------|-------------|---------------------------------|------------------|---|----------------------|---------------------|-------------|----------|----------------------|------------------|
| 2725 | 2724 | 3Z00 | DSkipper | Header information is accurate. | | Why is unknown debris a continuous defect for the entire pipe? There is enough flow to obscure the bottom of pipe so not clear what debris is being referenced. | 2725_D_20200410_0309 | D | 42 | ZZZ | 518.1 | 507 |
| 2726 | 2725 | 3W00 | DSkipper | Header information is accurate. | | Unable to discern pipe material due to liner. | 2726_D_20200410_0249 | D | 42 | ZZZ | 281.5 | 292 |
| 2840 | 2842 | 5B41 | DSkipper | Header information is accurate. | | Coded correctly, several continuous cracks at 12 oclock, graded as a 5 | 2840_D_20200501_0439 | D | 15 | VCP | 311.9 | 302 |
| 2852 | 2840 | 5142 | DSkipper | Header information is accurate. | | No additional comments, coded correctly | 2852_D_20200501_0356 | D | 15 | VCP | 500.3 | 499 |
| 340 | 352 | 5241 | DSkipper | Header information is accurate. | | no additional comments | 340_D_20200403_0613 | D | 15 | VCP | 398.4 | 422 |
| 346 | 346A | 412K | DSkipper | Header information is accurate. | | Changed the fractures multiple at 4 feet to broken. the VCP is definitely broken, not merely fractured. | 346_D_20200403_0456 | D | 15 | VCP | 399.5 | 239.331 |
| 356A | 356 | 4131 | DSkipper | Header information is accurate. | | In IAM the survey direction was marked incorrectly | 356_U_20200406_0016 | U | 15 | VCP | 6.6 | 14.314 |
| 374 | 142 | 5126 | DSkipper | Header information is accurate. | | 142 is an undocumented manhole. downstream survey was done beginning at 142 and continuing on to 373. | 374_D_20200428_0521 | D | 15 | VCP | 217.9 | |
| 525 | 539 | 412D | DSkipper | Header information is accurate. | | inspection incomplete due to water level | 525_D_20200407_0517 | D | 18 | VCP | 152.6 | 168 |
| 558 | 551 | 5233 | DSkipper | Header information is accurate. | | Changed structural grade from 3 to 4 at 154 feet. Broken pipe later on in pipe scored as 5. | 558_D_20200429_0306 | D | 15 | VCP | 226.5 | 216 |
| 572 | 570 | 512F | DSkipper | Header information is accurate. | | Broken pipe at 333. Coded correctly as a five. No other comments, looks properly coded. | 572_D_20200429_0020 | D | 15 | VCP | 385.5 | 388 |
| 659 | 659A | 432F | DSkipper | Header information is accurate. | | 659A- new uncharted manhole found. | 659_D_20200408_0203 | D | 12 | VCP | 213.8 | 244.97 |
| 723 | 743 | 3P2R | DSkipper | Header information is accurate. | | Video header indicates RCP but defect comment log indicates could be Asbestos pipe. Changed in infoasset to Asbestos Cement as pipe material. | 723_D_20200417_0019 | D | 30 | AC | 433.1 | 432 |

| US node ID | DS node ID | Structure quick rating | Reviewed by | QC Header Information (UT26) | QC Coding (UT27) | QC General Comments (UT28) | Inspection ID | Direction of survey | Height (in) | Material | Length surveyed (ft) | Pipe length (ft) |
|------------|------------|------------------------|-------------|--|------------------|--|----------------------|---------------------|-------------|----------|----------------------|------------------|
| 727 | 65 | 412M | DSkipper | Header information is accurate. | | Looks good, he stopped at all the taps. | 727_D_20200430_0808 | D | 15 | VCP | 384.7 | |
| 742A | 738 | 3G2G | DSkipper | 742 should be changed to 742A in the video header. | | Video file labeled just as 742_738, not 742A | 742A_U_20200420_0208 | U | 30 | RCP | 220.7 | 135.744 |
| 743 | 742 | 3F2F | DSkipper | Header information is accurate. | | Pipe material marked as unknown but comment says possibly asbestos. MSA at 185ft - unable to continue with survey. Incomplete Survey | 743_D_20200417_0102 | D | 30 | XXX | 185.1 | 224 |
| 1019 | 2195 | 3A2O | DSkipper | Header information is accurate. | | The SRI, SAV, and SSS codes seem to be used concurrently and interchangeably. SSS used for entire pipe but SAV and SRI used for just smaller sections? Not clear what the difference is and why codes were used like that. | 1 | D | 24 | VCP | 370.5 | 368 |
| 1673 | 20134 | 442A | DSkipper | Header information is accurate. | | No additional comments | 24 | D | 27 | ZZZ | 382 | 392 |
| 1805 | 1826 | 5232 | DSkipper | Header information is accurate. | | US survey only 18 feet. Everything looks good. | 29 | U | 27 | RCP | 18.7 | 18 |
| 1826 | 1828 | 5H3J | DSkipper | Header information is accurate. | | Video says VCP but recorded as RCP here in infoasset (Correction Noted in Video starting after 0.00 ft) | 17 | D | 27 | RCP | 271.2 | 273 |
| 1828 | 1830 | 5D3D | DSkipper | Header information is accurate. | | no additional comments | 18 | D | 27 | RCP | 146.7 | 142 |
| 1830 | 1831 | 5D3C | DSkipper | Header information is accurate. | | SRC and SAV at 8.04: Defect Wanders? I don't see what they mean. | 19 | D | 27 | RCP | 110.3 | 109 |
| 1831 | 1846 | 5P3K | DSkipper | Header information is accurate. | | at249.9 Is it TBD? Why defective? Correct to another tap code? | 20 | D | 27 | RCP | 318 | 319 |
| 1846 | 1847 | 5I3G | DSkipper | Header information is accurate. | | 60.60 is this actually TB? Or correct to TF? Same for 99.3 - TBA or TBA? | 21 | D | 27 | RCP | 222.2 | 225 |
| 2168 | 2181 | 3J2I | DSkipper | Header information is accurate. | | MH 2391 Not Found. Pipe length was supposed to be 415 ft and they continued to 430 ft before indicating it was NF. Much of the video is sideways or underwater but no fault of the operator, flow was pretty high | 3 | D | 24 | RCP | 299.2 | 297 |

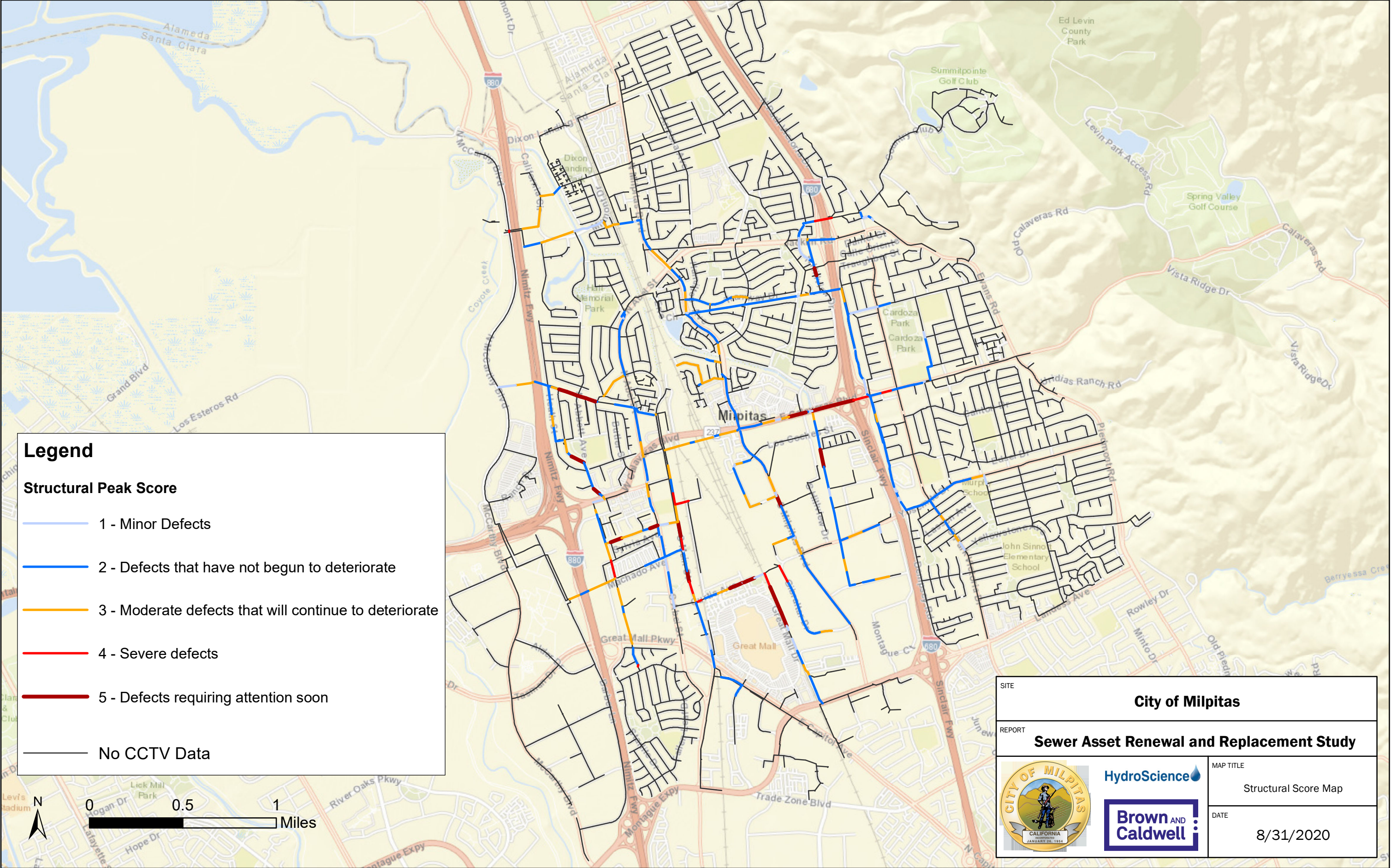
| US node ID | DS node ID | Structure quick rating | Reviewed by | QC Header Information (UT26) | QC Coding (UT27) | QC General Comments (UT28) | Inspection ID | Direction of survey | Height (in) | Material | Length surveyed (ft) | Pipe length (ft) |
|------------|------------|------------------------|-------------|---------------------------------|------------------|---|---------------|---------------------|-------------|----------|----------------------|------------------|
| 2195 | 2168 | 3T2P | DSkipper | Header information is accurate. | | No additional comments | 2 | D | 24 | RCP | 365.4 | 368 |
| 2237 | 2240 | 3S2Z | DSkipper | Header information is accurate. | | Video is really blurry. SSS and SAV used concurrently/interchangeably for entirety of pipe. Two SAV scores added for continuous sections with significant wall loss | 11 | D | 30 | XXX | 502.4 | 500 |
| 2240 | 2241 | 3R2Z | DSkipper | Header information is accurate. | | Video is unfocused | 16 | D | 30 | XXX | 497.5 | 497 |
| 2241 | 2592 | 3S2R | DSkipper | Header information is accurate. | | Video is unfocused | 13 | U | 30 | XXX | 505.7 | 505 |
| 2284 | 2237 | 3E2Z | DSkipper | Header information is accurate. | | No additional comments | 10 | D | 30 | ZZZ | 519.2 | 519 |
| 2487 | 2634 | 2R11 | DSkipper | Header information is accurate. | | unclear why there is a comment about not being able to find the upstream MH. It was found near where it was supposed to be, pipe length indicated as 505 feet. | 94 | U | 18 | VCP | 498.5 | 505 |
| 2589 | 2577 | 3R2Y | DSkipper | Header information is accurate. | | Video is blurry due to steam. Unfocused but still viewable | 14 | D | 30 | XXX | 501.4 | 520 |
| 2592 | 2589 | 3R2Q | DSkipper | Header information is accurate. | | No additional comments | 12 | U | 30 | XXX | 501 | 502 |
| 2837 | 2838 | 3K29 | DSkipper | Header information is accurate. | | No additional comments. | 90 | D | 18 | VCP | 368.4 | 363 |
| 2844 | 2845A | 5346 | DSkipper | Header information is accurate. | | No additional comments | 125 | D | 15 | VCP | 117.2 | 76.827 |
| 2845 | 2834 | 5233 | DSkipper | Header information is accurate. | | Everything looks accurate | 124 | D | 15 | VCP | 362.3 | 361 |
| 377 | 376A | 512N | DSkipper | Header information is accurate. | | Why did they end at uncharted MH 376A and not continue to 376? | 135 | D | 15 | VCP | 449.4 | 342.098 |
| 389 | 390 | 2911 | DSkipper | Header information is accurate. | | Pipe lined. nothing much of interest. Deposits throughout and one tap | 114 | D | 10 | PE | 300.5 | 302 |

| US node ID | DS node ID | Structure quick rating | Reviewed by | QC Header Information (UT26) | QC Coding (UT27) | QC General Comments (UT28) | Inspection ID | Direction of survey | Height (in) | Material | Length surveyed (ft) | Pipe length (ft) |
|------------|------------|------------------------|-------------|---------------------------------|--------------------------------------|--|----------------------|---------------------|-------------|----------|----------------------|------------------|
| 393 | 401 | 5131 | DSkipper | Header information is accurate. | | no additional comments | 104 | D | 12 | VCP | 302.3 | 307 |
| 404 | 378 | 0 | DSkipper | Header information is accurate. | | US MH found via CCTV but not found above ground. Paved over. | 133 | U | 15 | VCP | 258.7 | 254 |
| 523 | 542 | 4131 | DSkipper | Header information is accurate. | | no additional comments | 64 | D | 18 | VCP | 398.9 | 423 |
| 542 | 602 | 5146 | DSkipper | Header information is accurate. | | no additional comments | 65 | D | 18 | VCP | 299.4 | 275 |
| 543 | 592 | 4131 | DSkipper | Header information is accurate. | | Looks good - Survey stopped due to crawler unable to get over rock | 61 | D | 18 | VCP | 277.1 | 378 |
| 543 | 592 | 422A | DSkipper | Header information is accurate. | | No additional comments | 62 | U | 18 | VCP | 93.4 | 378 |
| 592 | 586 | 544A | DSkipper | Header information is accurate. | | no additional comments | 63 | D | 18 | VCP | 412 | 410 |
| 605 | 607 | 2J00 | DSkipper | Header information is accurate. | | Pipe is lined all the way through. | 49 | D | 12 | ZZZ | 578.3 | 578 |
| 725 | 732 | 5131 | DSkipper | Header information is accurate. | | No additional comments | 131 | D | 8 | VCP | 325.2 | 325 |
| 1045 | 1037 | 2D00 | DHill | Header information is accurate. | | No additional comments | 1045_D_20200504_0220 | D | 12 | VCP | 169.5 | 157 |
| 1060 | 1145 | 2I11 | DHill | Header information is accurate | | No additional comments | 1060_D_20200505_0006 | D | 12 | VCP | 293.9 | 292 |
| 1113 | 1149 | 5531 | DHill | Header information is accurate | Changed broken to fractures multiple | No additional comments | 1113_D_20200504_0347 | D | 12 | VCP | 302.5 | 303 |
| 1149 | 1151 | 2500 | DHill | Header information is accurate | | No additional comments | 1149_D_20200504_0410 | D | 12 | VCP | 296.3 | 295 |

| US node ID | DS node ID | Structure quick rating | Reviewed by | QC Header Information (UT26) | QC Coding (UT27) | QC General Comments (UT28) | Inspection ID | Direction of survey | Height (in) | Material | Length surveyed (ft) | Pipe length (ft) |
|------------|------------|------------------------|-------------|---------------------------------|-------------------------------------|----------------------------|----------------------|---------------------|-------------|----------|----------------------|------------------|
| 1152 | 1148 | 522C | DHill | Header information is accurate | Changed broken to fracture multiple | No additional comments | 1152_U_20200504_0501 | U | 15 | VCP | 479.2 | 481 |
| 1165 | 1143 | 2H00 | DHill | Header information is accurate. | | No additional comments | 1165_D_20200504_2301 | D | 12 | VCP | 299.5 | 294 |
| 157 | 527 | 5100 | DHill | Header information is accurate | | Camera blocked by debris | 157_D_20200506_0601 | D | 18 | VCP | 46.6 | |
| 2015 | 2743 | 4131 | DHill | Header information is accurate | | No additional comments | 2015_D_20200515_0132 | D | 18 | VCP | 44.2 | 45 |
| 2076 | 2088 | 2400 | DHill | Header information is accurate | | No additional comments | 2076_U_20200512_0415 | U | 12 | VCP | 252.1 | 288 |
| 2078 | 2076 | 512G | DHill | Header information is accurate | Changed broken to factures multiple | No additional comments | 2078_U_20200512_0444 | U | 12 | VCP | 496.7 | 364 |
| 2089 | 2093 | 2900 | DHill | header information is accurate | | No additional comments | 2089_D_20200507_0027 | D | 18 | VCP | 65.4 | 64 |
| 2094 | 2205 | 2G00 | DHill | header information is accurate | | No additional comments | 2094_D_20200507_0053 | D | 18 | VCP | 218.6 | 217 |
| 2219 | 2204 | 2B00 | DHill | Header information is accurate | | No additional comments | 2219_D_20200507_2352 | D | 15 | VCP | 370 | 397 |
| 2358 | 2658 | 3G2F | DHill | Header information is accurate | | No additional comments | 2358_D_20200514_0437 | D | 33 | RCP | 199.4 | 200 |
| 2359 | 2358 | 3400 | DHill | Header information is accurate | | No additional comments | 2359_D_20200514_0425 | D | 33 | RCP | 21.7 | 24 |
| 2391 | 2359 | 3722 | DHill | Header information is accurate | | No additional comments | 2391_U_20200514_0326 | U | 39 | RCP | 313.2 | 318 |
| 2529 | 2602 | 2F00 | DHill | Header information is accurate | | No additional comments | 2529_D_20200512_0020 | D | 12 | PE | 240.5 | 251 |

| US node ID | DS node ID | Structure quick rating | Reviewed by | QC Header Information (UT26) | QC Coding (UT27) | QC General Comments (UT28) | Inspection ID | Direction of survey | Height (in) | Material | Length surveyed (ft) | Pipe length (ft) |
|------------|------------|------------------------|-------------|----------------------------------|------------------|---|-----------------------|---------------------|-------------|----------|----------------------|------------------|
| 2534 | 2533 | 2F14 | DHill | Header information is accurate | | no additional comments | 2534_U_20200515_0018 | U | 15 | PE | 287.3 | 292 |
| 2602 | 2593 | 3D26 | DHill | Header information is accurate | | No additional comments | 2602_D_20200512_0048 | D | 12 | PE | 165.5 | 161 |
| 2638 | 2736 | 352F | DHill | Header information is accurate | | Camera is blocked by debris | 2638_D_20200511_0002 | D | 18 | VCP | 230.6 | 446 |
| 2658 | 2661 | 3H2H | DHill | Header information is accurate | | No additional comments | 2658_D_20200514_0456 | D | 33 | RCP | 231.5 | 349 |
| 2658 | 2661 | 3525 | DHill | Header information is accurate | | Camera is blocked by debris | 2658_U_20200514_0549 | U | 33 | RCP | 24.8 | 349 |
| 2666 | 2638 | 3A2M | DHill | Header information is accurate | | No additional comments | 2666_D_20200511_0131 | D | 18 | VCP | 526.4 | 524 |
| 2714 | 2718 | 3321 | DHill | Header information is accurate | | Camera is blocked by debris | 2714_U_20200514_0051 | U | 42 | RCP | 21.2 | 392 |
| 2753 | 2759 | 3I2I | DHill | Changed pipe material to RCP | | No additional comments | 2753_U_20200515_0319 | U | 18 | DIP | 274.8 | 272 |
| 2760C | 2760D | 1200 | DHill | MH numbers do not match GIS | | Need contractor map to match to GIS | 2760C_D_20200515_0432 | D | 18 | PVC | 148.4 | |
| 372 | 152 | 0 | DHill | Manhole numbers do not match GIS | | Need contractor map to match to GIS | 372_D_20200506_0507 | D | 18 | VCP | 87 | |
| 547 | 681 | 3C00 | DHill | Header information is accurate | | No additional comments | 547_D_20200507_2242 | D | 15 | VCP | 126.9 | 136 |
| 604 | 605 | 0 | DHill | Header information is accurate | | No additional comments | 604_D_20200507_2136 | D | 15 | VCP | 0 | 102 |
| 160 | 161 | 342B | DHill | Manhole numbers do not match GIS | | Need info from contractor to associate with GIS | 160_D_20200506_0646 | D | 18 | VCP | 253.6 | |




Appendix D: CCTV Structural Scores Map



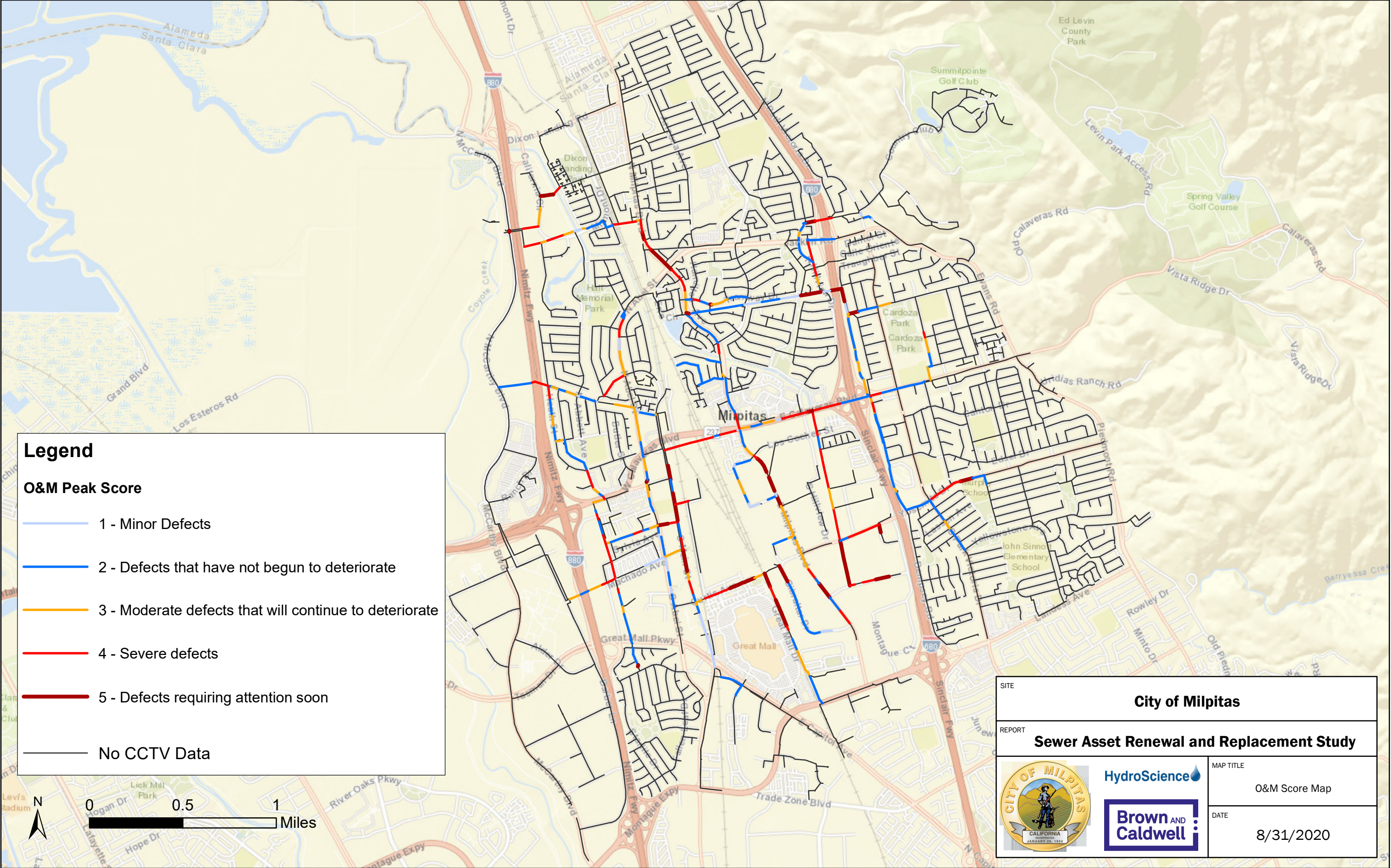
Legend

Structural Peak Score

- 1 - Minor Defects
- 2 - Defects that have not begun to deteriorate
- 3 - Moderate defects that will continue to deteriorate
- 4 - Severe defects
- 5 - Defects requiring attention soon
- No CCTV Data

| | | | |
|---|---|--|----------------------|
| SITE | | City of Milpitas | |
| REPORT | | Sewer Asset Renewal and Replacement Study | |
|  |  | | MAP TITLE |
| |  | | Structural Score Map |
| | | DATE | 8/31/2020 |

Appendix E: CCTV O&M Scores Map



Appendix F: Risk Table and GIS

This Appendix is a file export from Microsoft Excel.

Appendix G: Risk Maps

This Appendix is not used.

Appendix H: Defect-Level Rehabilitation Methods

| Defect Code | Default Score | Type | Description | Rehab. Method | Alternative Method | Comments | Clock Pos. Grade1 | Clock Pos. Grade2 | Clock Pos. Grade3 | Clock Pos. Grade4 | Value % Grade1 | Value % Grade2 | Value % Grade3 | Value % Grade4 | Alter. Rehab. Cutoff |
|-------------|---------------|---------------|---|---------------|--------------------|----------|-------------------|-------------------|-------------------|-------------------|----------------|----------------|----------------|----------------|----------------------|
| D | 0 | MISCELLANEOUS | Deformed | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| DAE | 0 | SERVICE | Deposits Attached Encrustation | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DAGS | 0 | SERVICE | Deposits Attached Grease | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DAR | 0 | SERVICE | Deposits Attached Ragging | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DAZ | 0 | MISCELLANEOUS | Deposits Attached Other | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DB | 3 | STRUCTURAL | Displaced Brick | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DBFI | 5 | MISCELLANEOUS | Deformed Flexible Bulging Inverse Curvature | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DC | 0 | MISCELLANEOUS | Change in Sewer Dimension | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DE | 0 | MISCELLANEOUS | Debris | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DFBR | 0 | MISCELLANEOUS | Deformed Flexible Bulging Round | | | | 0 | 0 | 5 | 10 | 0 | 0 | 0 | 0 | |
| DFC | 5 | MISCELLANEOUS | Deformed Flexible Bulging Creasing | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DFE | 3 | MISCELLANEOUS | Deformed Flexible Elliptical | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DG | 0 | MISCELLANEOUS | Debris Grease | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DH | 5 | MISCELLANEOUS | Deformed Horizontal Brick | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DI | 5 | STRUCTURAL | Dropped Invert | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DNF | 0 | SERVICE | Deposits Ingressed Fine | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DNGV | 0 | SERVICE | Deposits Ingressed Gravel | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DNZ | 0 | SERVICE | Deposits Ingressed Other | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DR | 0 | MISCELLANEOUS | Deformed Rigid | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | |
| DS | 0 | MISCELLANEOUS | Debris Silt | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DSC | 0 | SERVICE | Deposits Settled Compacted | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DSF | 0 | SERVICE | Deposits Settled Fine | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| DSGV | 0 | SERVICE | Deposits Settled Gravel | CLEANING | CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |

| Defect Code | Default Score | Type | Description | Rehab. Method | Alternative Method | Comments | Clock Pos. Grade1 | Clock Pos. Grade2 | Clock Pos. Grade3 | Clock Pos. Grade4 | Value % Grade1 | Value % Grade2 | Value % Grade3 | Value % Grade4 | Alter. Rehab. Cutoff |
|-------------|---------------|---------------|--|----------------|--------------------|----------|-------------------|-------------------|-------------------|-------------------|----------------|----------------|----------------|----------------|----------------------|
| IDL | 3 | SERVICE | Infiltration Dripper Lateral | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IG | 5 | MISCELLANEOUS | Infil Gusher | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IGB | 5 | SERVICE | Infiltration Gusher Barrel | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IGC | 5 | SERVICE | Infiltration Gusher Connection | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IGJ | 5 | SERVICE | Infiltration Gusher Joint | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IGL | 5 | SERVICE | Infiltration Gusher Lateral | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IR | 4 | SERVICE | Infil Runner | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IRB | 4 | SERVICE | Infiltration Runner Barrel | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IRC | 4 | SERVICE | Infiltration Runner Connection | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IRJ | 4 | SERVICE | Infiltration Runner Joint | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IRL | 4 | SERVICE | Infiltration Runner Lateral | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| IS | 1 | SERVICE | Infil Stain | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ISB | 1 | SERVICE | Infiltration Stain Barrel | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ISC | 1 | SERVICE | Infiltration Stain Connection | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ISGT | 0 | CONSTRUCTION | Intruding Sealing Material Grout | HEAVY CLEANING | HEAVY CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| ISJ | 1 | SERVICE | Infiltration Stain Joint | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ISL | 1 | SERVICE | Infiltration Stain Lateral | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ISSR | 0 | CONSTRUCTION | Intruding Sealing Material Sealing Ring | HEAVY CLEANING | HEAVY CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| ISSRB | 0 | CONSTRUCTION | Intruding Sealing Material Sealing Ring Broken | HEAVY CLEANING | HEAVY CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| ISSRH | 0 | CONSTRUCTION | Intruding Sealing Material Sealing Ring Hanging | HEAVY CLEANING | HEAVY CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| ISSRL | 0 | CONSTRUCTION | Intruding Sealing Material Sealing Ring Loose/Poor | HEAVY CLEANING | HEAVY CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| ISZ | 0 | CONSTRUCTION | Intruding Sealing Material Other | HEAVY CLEANING | HEAVY CLEANING | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |

| Defect Code | Default Score | Type | Description | Rehab. Method | Alternative Method | Comments | Clock Pos. Grade1 | Clock Pos. Grade2 | Clock Pos. Grade3 | Clock Pos. Grade4 | Value % Grade1 | Value % Grade2 | Value % Grade3 | Value % Grade4 | Alter. Rehab. Cutoff |
|-------------|---------------|---------------|------------------------------|---------------|--------------------|----------|-------------------|-------------------|-------------------|-------------------|----------------|----------------|----------------|----------------|----------------------|
| TFA | 0 | CONSTRUCTION | Tap Factory Activity | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TFB | 0 | CONSTRUCTION | Tap Factory Abandoned | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TFC | 0 | CONSTRUCTION | Tap Factory Capped | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TFD | 2 | CONSTRUCTION | Tap Factory Defective | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TFI | 0 | CONSTRUCTION | Tap Factory Intruding | | | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| TR | 0 | CONSTRUCTION | Tap Rehabilitated | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TRA | 0 | MISCELLANEOUS | Tap Rehabilitated Activity | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TRB | 0 | MISCELLANEOUS | Tap Rehabilitated Abandoned | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TRC | 0 | MISCELLANEOUS | Tap Rehabilitated Capped | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TRD | 2 | CONSTRUCTION | Tap Rehabilitated Defective | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TRI | 0 | CONSTRUCTION | Tap Rehabilitated Intruding | | | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| TS | 0 | CONSTRUCTION | Tap Saddle | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TSA | 0 | CONSTRUCTION | Tap Saddle Activity | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TSB | 0 | CONSTRUCTION | Tap Saddle Abandoned | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TSC | 0 | CONSTRUCTION | Tap Saddle Capped | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TSD | 2 | CONSTRUCTION | Tap Saddle Defective | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| TSI | 0 | CONSTRUCTION | Tap Saddle Intruding | POINT REPAIR | POINT REPAIR | | 0 | 0 | 0 | 0 | 0 | 10 | 20 | 30 | |
| VC | 1 | SERVICE | Vermin Cockroach | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| VR | 2 | SERVICE | Vermin Rat | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| VZ | 1 | SERVICE | Vermin Other | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WFC | 2 | STRUCTURAL | Weld Feature Circumferential | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WFL | 2 | STRUCTURAL | Weld Feature Longitudinal | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WFM | 3 | STRUCTURAL | Weld Feature Multiple | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WFS | 2 | STRUCTURAL | Weld Feature Spiral | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WFZ | 0 | STRUCTURAL | Weld Feature Other | LINING | LINING | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WL | 0 | MISCELLANEOUS | Water Level | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| X | 0 | STRUCTURAL | Collapse | POINT REPAIR | POINT REPAIR | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

[illegible]

Appendix I: GIS Updates

See section below and see 2 GIS shapefiles attached related to the Appendix I sub-section “GIS fixes”

- Appx I_duplicate_pipes.zip
- Appx I_before_rehab_adjustments.zip.

Appendix I

GIS Updates

GIS Data Received

A copy of the City GIS was provided in the Fall of 2019. There are 17,880 assets where 3240 are sewer pipes and 14,640 are laterals. On June 17, 2020, HSE provided GIS updates with revisions to drawing number, shape length, elevations, material, year, abandoned tag, diameter, private ownership tag, and added GIS segments.

GIS Updates

In the process of the desktop condition assessment task and renewal and replacement plan, two updated GIS shapefiles were created – risk GIS (Appendix F) and rehabilitation GIS (Appendix A). To both updates GIS shapefiles, the City GIS was updated based upon results of the CCTV and modeling efforts. It was then joined with CCTV inspection score data, rough pavement presence was determined, and depth was calculated by subtracting pipe inverts from known manhole rim elevations. Then, this was joined with risk updates (first shapefile) or rehabilitation updates (second shapefile).

Risk GIS

The first GIS shapefile involves the risk updates (desktop condition assessment). The attribute table provides the risk scores (normalized from 1-5, normalized from 1-100, and total mathematical score) as well as LOF COF scores and their constituents. Each LOF and COF factor has their own column where the number shown is the rating multiplied by the weighting described earlier in this report.

Rehabilitation GIS

The second GIS shapefile involves renewal and replacement fields. Important fields added to the City GIS in this version includes rehabilitation recommendation for each asset, number of rehabilitations (point repair(s), section liner(s), full lining), and flow chart branch (the decision tree path that led to the recommendation). The “total cost” column was the default name by InfoAsset and factors in traffic control and a 45% markup for sewer bypassing, mobilization/demobilization, and construction cost and market contingency. However, the cost does not include planning costs such as engineering, permitting, legal, administrative, or other items as stated in summary tables throughout the report.

GIS Fixes

Some minor post rehabilitation analysis fixes had to be made. These edited pipes were exported as shapefiles and provided as attachments in this appendix - (duplicate pipes.zip and before rehabilitation adjustments.zip). The first issue involved duplicate GIS pipes. These were reviewed and removed. Facility IDs with more than 1 pipe were exported into the “Appx I_duplicate pipes.zip”. The second issue involved the choice of “Facility ID” as the unique identifier for CCTV surveys. Upon further review, this identifier is not unique for around 50 of the 3240 pipes with Facility ID. For around 50 pipes, 2 to 4 pipes had identical facility ID but spatially different GIS segments along the same path. As a result, a rehabilitation cost was attributed to the first of many pipes with the same facility ID and the other pipes of different lengths was then assigned the exact same rehabilitation, rehabilitation length, and associated cost. For example, the 2 pipe GIS segments with Facility ID “10160-10164” were each assigned a “Full CIPP” rehabilitation recommendation with a cost of \$36,000 of each with the rehab length assumption of 393 feet. However, one of the GIS segments had a pipe length of 10 feet. This resulted in a vastly greater cost than it should have. In addition, the number of

rehabilitation items was attributed to each GIS segment. Other identifiers were searched in the attribute table, but ultimately because this identifier was used for the CCTV surveys, this is the identifier we had to stick with. Resolution: for these 50 pipes, BC edited this GIS version to fix the planning cost and properly assign the number of rehab and rehab length. These 50 pipes were exported into “Appx I_before_rehab_adjustments.zip”. In future GIS updates, City staff should consider generating a new and unique facility ID field.

Appendix J: Basis of Cost Estimate Details

Appendix J: Basis of Cost Assumptions

J.1 Basis of cost assumptions

This section describes the cost basis for rehabilitation items. Items related to quotes from manufacturers only include material and installation costs. These do not include labor or agency costs used for master planning such as administrative, permitting, or other costs. For pipes with unknown diameters, the average pipe diameter of nine inches was used for costing. For pipes with unknown depths, the average pipe depth of 11 feet was assumed.

J.1.1 CCTV Costs

Table J-1 presents CCTV costs used in the analysis.

| Table J-1. CCTV Cost By Pipe Diameter | |
|---------------------------------------|--------------|
| Pipe Diameter (inch) ^{1, 2} | Cost (\$/LF) |
| Up to 18 | 4 |
| 19 to 24 | 5 |
| 25 to 36 | 6 |
| 37 to 66 ² | 8 |

¹CCTV bids are from City of Bloomington FY 2017 CCTV Inspections PROJECT NO. # 50-18-53007-17-00. CITY BID NO. 2017-16. The costs shown here are an average of the bids from Michels Pipe Services, National Power Rodding Corp., and Bloomington City engineer estimate. G.A. Rich & Sons, Inc. was excluded due to low bids.

²CCTV cost for pipe diameters between 37-inch and 66-inch was extrapolated.

J.1.2 Pipe Replacement

Table J-2 and J-3 presents pipe replacement costs for pipes located under pavement and not under pavement, respectively. The cost shown on the tables below reflect pipe material, installation, backfill, and excavation costs. Since GIS data did not provide pavement information, the presence of pavement was determined by the “select by location” and intersecting pipes with the USGS transportation and road segments layer. Of 3254 pipes, 90% of the pipes (2937 pipes) were under pavement.

| Table J-2. Pipe Replacement, Pavement Present | | | | |
|---|-------------------------|--------------------------|---------------------------|-----------------------------|
| Pipe Diameter (inch) ¹ | Cost (\$/LF) | | | |
| | 0-8 Feet Below Grade | 8-12 Feet Below Grade | 12-16 Feet Below Grade | Over 16 Feet Below Grade |
| 6 | \$195 | \$210 | \$225 | \$260 |
| 8 | \$265 | \$280 | \$295 | \$330 |
| 10 | \$335 | \$350 | \$365 | \$400 |
| 12 | \$405 | \$420 | \$435 | \$475 |
| 15 | \$505 | \$525 | \$545 | \$585 |
| 18 | \$610 | \$630 | \$650 | \$695 |
| 21 | \$715 | \$735 | \$755 | \$805 |
| 24 | \$815 | \$840 | \$865 | \$915 |
| 27 | \$920 | \$945 | \$970 | \$1,025 |
| 30 | \$1,025 | \$1,050 | \$1,075 | \$1,130 |
| 33 | \$1,125 | \$1,155 | \$1,185 | \$1,245 |
| 36 | \$1,230 | \$1,260 | \$1,290 | \$1,350 |
| 39 | \$1,330 | \$1,365 | \$1,400 | \$1,465 |
| 42 | \$1,435 | \$1,470 | \$1,505 | \$1,575 |
| 48 | \$1,645 | \$1,680 | \$1,715 | \$1,790 |
| 54 | \$1,850 | \$1,890 | \$1,930 | \$2,010 |
| 66 | \$2,265 | \$2,310 | \$2,355 | \$2,450 |

¹Pipe material costs are provided by 2020 quotes from Northern Pipe (RCP Pipe) and Mission Clay Products (VCP Pipe)

²Backfill, Excavation, and pavement are provided by RSMeans construction cost database

| Table J-3. Pipe Replacement, No Pavement | | | | |
|--|-------------------------|--------------------------|---------------------------|-----------------------------|
| Pipe Diameter (inch) ⁽¹⁾ | Cost (\$/LF) | | | |
| | 0-8 Feet Below Grade | 8-12 Feet Below Grade | 12-16 Feet Below Grade | Over 16 Feet Below Grade |
| 6 | \$165 | \$180 | \$195 | \$230 |
| 8 | \$225 | \$240 | \$255 | \$290 |
| 10 | \$285 | \$300 | \$315 | \$350 |
| 12 | \$345 | \$360 | \$375 | \$415 |
| 15 | \$430 | \$450 | \$470 | \$510 |
| 18 | \$520 | \$540 | \$560 | \$605 |
| 21 | \$610 | \$630 | \$650 | \$700 |
| 24 | \$695 | \$720 | \$745 | \$795 |
| 27 | \$785 | \$810 | \$835 | \$890 |
| 30 | \$875 | \$900 | \$925 | \$980 |
| 33 | \$960 | \$990 | \$1,020 | \$1,080 |
| 36 | \$1,050 | \$1,080 | \$1,110 | \$1,170 |
| 39 | \$1,135 | \$1,170 | \$1,205 | \$1,270 |
| 42 | \$1,225 | \$1,260 | \$1,295 | \$1,365 |
| 48 | \$1,405 | \$1,440 | \$1,475 | \$1,550 |
| 54 | \$1,580 | \$1,620 | \$1,660 | \$1,740 |
| 66 | \$1,935 | \$1,980 | \$2,025 | \$2,120 |

¹Pipe material costs are provided by 2020 quotes from Northern Pipe (RCP Pipe) and Mission Clay Products (VCP Pipe)

²Backfill, Excavation, and pavement are provided by RSMeans construction cost database

J.1.3 Point Repair(s) by Excavation

Table X-X and X-X presents point repair(s) by excavation costs used in the analysis. The costs presented are per point repair. A pipe assigned the rehabilitation recommendation “point repair(s)” or a combination of lining and “point repair(s)” may have more than one point repair. The excavation cost assumes 10 feet sections. The unit costs (\$/LF) are taken from pipe replacement section and multiplied by 10. No additional multiplier was applied at the moment. This may result in a lower end of cost estimation. Typically, a point repair compared to a full pipe replacement will have a much greater unit cost due to similar equipment, machine rental, and labor costs.

| Table J-4. Point Repair by Excavation, Pavement Present | | | | |
|---|-------------------------|--------------------------|---------------------------|-----------------------------|
| Pipe Diameter (inch) ⁽¹⁾ | Cost (\$/LF) | | | |
| | 0-8 Feet Below Grade | 8-12 Feet Below Grade | 12-16 Feet Below Grade | Over 16 Feet Below Grade |
| 6 | \$600 | \$800 | \$1,000 | \$1,300 |
| 8 | \$700 | \$900 | \$1,000 | \$1,400 |
| 10 | \$800 | \$1,000 | \$1,200 | \$1,500 |
| 12 | \$900 | \$1,100 | \$1,300 | \$1,600 |
| 15 | \$1,100 | \$1,400 | \$1,600 | \$2,000 |
| 18 | \$1,400 | \$1,600 | \$1,800 | \$2,200 |
| 21 | \$1,700 | \$1,900 | \$2,200 | \$2,600 |
| 24 | \$2,000 | \$2,300 | \$2,500 | \$3,000 |
| 27 | \$2,400 | \$2,700 | \$2,900 | \$3,500 |
| 30 | \$2,700 | \$3,000 | \$3,300 | \$3,800 |
| 33 | \$3,500 | \$3,800 | \$4,100 | \$4,700 |
| 36 | \$3,700 | \$4,000 | \$4,300 | \$5,000 |
| 39 | \$3,400 | \$3,800 | \$4,100 | \$4,700 |
| 42 | \$3,900 | \$4,200 | \$4,600 | \$5,300 |
| 48 | \$5,000 | \$5,400 | \$5,700 | \$6,500 |
| 54 | \$6,200 | \$6,600 | \$7,000 | \$7,800 |
| 66 | \$8,600 | \$9,100 | \$9,600 | \$10,500 |

¹Pipe material costs are provided by 2020 quotes from Northern Pipe (RCP Pipe) and Mission Clay Products (VCP Pipe)

²Backfill, Excavation, and pavement are provided by RSMeans construction cost database

| Table J-5. Point Repair by Excavation, No Pavement | | | | |
|--|-------------------------|--------------------------|---------------------------|-----------------------------|
| Pipe Diameter (inch) ⁽¹⁾ | Cost (\$/LF) | | | |
| | 0-8 Feet Below Grade | 8-12 Feet Below Grade | 12-16 Feet Below Grade | Over 16 Feet Below Grade |
| 6 | \$400 | \$600 | \$800 | \$1,100 |
| 8 | \$400 | \$600 | \$800 | \$1,100 |
| 10 | \$500 | \$700 | \$900 | \$1,200 |
| 12 | \$600 | \$800 | \$900 | \$1,300 |
| 15 | \$800 | \$1,000 | \$1,200 | \$1,600 |
| 18 | \$900 | \$1,100 | \$1,300 | \$1,700 |
| 21 | \$1,100 | \$1,400 | \$1,600 | \$2,100 |
| 24 | \$1,300 | \$1,600 | \$1,800 | \$2,300 |
| 27 | \$1,600 | \$1,900 | \$2,100 | \$2,700 |
| 30 | \$1,800 | \$2,000 | \$2,300 | \$2,900 |
| 33 | \$2,400 | \$2,700 | \$3,000 | \$3,600 |
| 36 | \$2,400 | \$2,700 | \$3,000 | \$3,600 |
| 39 | \$1,900 | \$2,200 | \$2,500 | \$3,200 |
| 42 | \$2,100 | \$2,400 | \$2,800 | \$3,400 |
| 48 | \$2,800 | \$3,100 | \$3,500 | \$4,300 |
| 54 | \$3,400 | \$3,800 | \$4,200 | \$5,000 |
| 66 | \$4,800 | \$5,200 | \$5,700 | \$6,600 |

¹Pipe material costs are provided by 2020 quotes from Northern Pipe (RCP Pipe) and Mission Clay Products (VCP Pipe)

²Backfill, Excavation, and pavement are provided by RSMeans construction cost database

J.1.4 Sectional Liner(s)

Table J-6 presents sectional liner(s) costs used in the analysis.

| Table J-6. Sectional Lining Costs | |
|-------------------------------------|--------------|
| Pipe Diameter (inch) ⁽¹⁾ | Cost (\$/LF) |
| 6 ² | 3,000 |
| 8 | 3,000 |
| 10 ² | 4,500 |
| 12 ² | 6,000 |
| 15 ² | 7,500 |
| 18 ² | 7,500 |
| 21 ² | 9,000 |
| 24 ² | 9,000 |
| 27 ² | 10,500 |
| 30 ² | 10,500 |
| 33 ² | 12,000 |
| 36 ² | 12,000 |
| 39 ² | 13,500 |
| 42 ² | 13,500 |
| 48 ² | 13,500 |
| 54 ² | 13,500 |
| 66 ² | 15,000 |

¹Prices from Virginia Beach Annual Services Construction Contract #17 bid tab

²Medium to large diameter sectional lining based on extrapolation.

J.1.5 Full Pipe Length Cured in Place Pipe (Full CIPP)

Table J-7 presents full CIPP costs used in the analysis.

| Table J-7. Full CIPP Costs | |
|-------------------------------------|--------------|
| Pipe Diameter (inch) ⁽¹⁾ | Cost (\$/LF) |
| 6 | 96 |
| 8 | 128 |
| 10 | 160 |
| 12 | 192 |
| 15 | 240 |
| 18 | 288 |
| 21 | 336 |
| 24 | 384 |
| 27 | 432 |
| 30 | 480 |
| 33 | 528 |
| 36 | 576 |
| 39 | 624 |
| 42 | 672 |
| 48 | 768 |
| 54 | 864 |
| 66 | 1056 |

¹Based on evaluations of North Davis Sewer District Bid Tabs, Project 3 through Project 7, escalated to 2020 dollars

Costs do not include bypass pumping or traffic control. Unit Diameter Costs are based on 200 ft lateral spacing and 2000 ft project length

²Larger diameter (36-inch to 66-inch) full CIPP based on Salt Lake City BODR

Appendix K: Main and Venus Way Lift Station Inspections Draft Report, May 2020

DRAFT

Main and Venus Way Lift Station Inspections Report

Prepared for
City of Milpitas – Sewer Master Plan
Milpitas, CA
May 14, 2020

DRAFT

Main and Venus Way Lift Station Inspections Report

Prepared for
City of Milpitas – Sewer Master Plan
Milpitas, California
May 14, 2020

This is a draft and is not intended to be a final representation
of the work done or recommendations made by Brown and Caldwell.
It should not be relied upon; consult the final report.



201 North Civic Dr, Suite 300
Walnut Creek, CA 94596

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List of Abbreviations

| | |
|------|---|
| A | ampere (amp) |
| AIC | ampere interrupting capacity |
| ARV | air release valve |
| ATS | automatic transfer switch |
| BFV | butterfly valve |
| CAV | combination air valve |
| FM | force main |
| kV | kilovolt |
| kVA | kilovolt-ampere |
| HP | horsepower |
| LCP | local control panel |
| MAS | multi-agent system |
| MCC | motor control center |
| NEMA | National Electrical Manufacturers Association |
| PG&E | Pacific Gas & Electric |
| ph | phase |
| PLC | programmable logic controller |
| PV | plug valve |
| PVC | polyvinyl chloride |
| SME | subject matter expert |
| SS | stainless steel |
| SSMH | sanitary sewer manhole |
| V | volt |
| VFD | variable frequency drive |
| W | watt |

Section 1

Introduction

City of Milpitas (City) and HydroScience Engineers, Inc. (HydroScience) entered into an agreement dated October 18, 2019 for professional services for the following project: City of Milpitas – Sewer Master Plan (Project). Brown and Caldwell is performing work on the Project as a subconsultant to HydroScience. The purpose of this report is to document the visual investigations performed by Brown and Caldwell at two sewer facilities, Main Lift Station and Venus Way Lift Station, as part of the Project scope of work, Task 2. Data Collection/Preliminary Research/System Review/Field Inspection. The facility locations are shown on Figure 1.

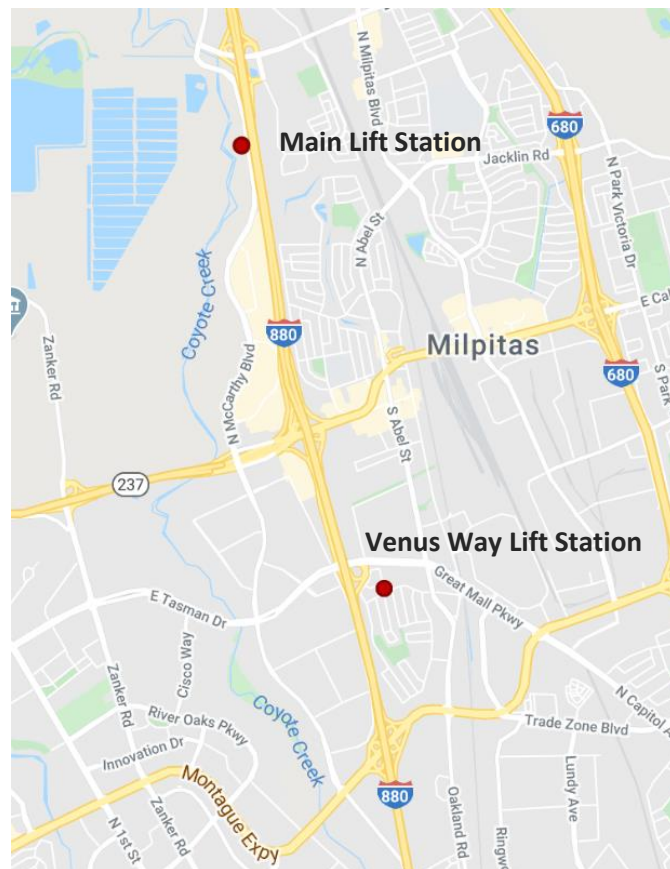


Figure 1. Facility Locations Map

The inspection information in this report is organized in the following sections:

Section 2 - System Information and Data

Section 3 – Main Lift Station Inspections

Section 4 – Venus Way Lift Station Inspections

Appendix A through Appendix F – Main Lift Station Inspection Records

Appendix G through Appendix K – Venus Way Lift Station Inspections

Section 2

System Information and Data

Review of the available system information and data, and the selection of the asset inventory to be used to perform field inspections are summarized in this section.

2.1 Existing Reports and Information

Existing reports and information provided by the City and reviewed for the Main Lift Station and Venus Way Lift Station are included in Table 2-1.

Table 2-1. Lift Station Existing Reports and Information

| Document Title | Type | Project Number | Drawing Reference | Pages | Description/Notes | Date(s) |
|---|------------------|----------------|-------------------|-------|--|----------------------------------|
| Main and Venus Lift Stations | | | | | | |
| Sewer Inventory Master | Spreadsheet | | | | | – |
| Main Lift Station | | | | | | |
| Main Sewage Pump Station Improvements Project Project No. 6103 | Record Drawing | 6103 | 2-1066 | 95 | Prepared by Winzler & Kelly Consulting Engineers | Nov 2008 |
| Letter Anthony Petroccitto, Winzler & Kelly to Tom Yousch, City of Milpitas Subject: Milpitas Main Sewage Pump Station Capacity – Existing Station and New Station Under Construction | Letter | 6103 | | 3 | New pump station capacity including system head curves | Undated, 2008 |
| Project No. 6078 Plans for the Construction of Parallel Force Main Project 2000 | Record Drawing | 6078 | 2-1031 | 32 | Prepared by Kennedy/Jenks Consultants Sheets 18-19 revised May 2020 Sheet 30 revised June 2004 | Oct 2002 Jun 2004 May 2020 |
| Main Sewage Pump Station Improvements Project November 1997 Project No. 6071 Volume 4 - Contract Drawings | Record Drawing | 6071 | 2-986 | 32 | Prepared by Carollo Engineers Final revision per owner comments | Apr 2001 |
| Venus Way Lift Station | | | | | | |
| Venus Pump Station Improvement Project No. 6101 Project Drawings June 2008 | As-Built Drawing | 6101 | 2-1107 | 21 | Prepared by Dodson Psomas | Feb 2009 |
| Approved Submittal 01a from Anderson Pacific Engineering Construction, Inc. Project No. 6101 Section 11130, Submersible Pumps | Submittal | 6101 | | 25 | Flygt pumps, motors, accessories | Sep 2008 |

2.2 Asset Inventory for Inspections

The existing reports and information for the lift stations were reviewed by a team of subject matter experts (SMEs) covering the following disciplines:

- Mechanical
- Electrical
- Instrumentation
- Civil
- Structural

The SMEs identified the assets to be inspected, and the assets were entered into Fulcrum for field inspection data collection and condition assessment by asset. The asset types used for the inspections are included in Table 2-2. Specific assets are discussed in Section 3 for the Main Lift Station and Section 4 for the Venus Way Lift Station.

Table 2-2. Asset Types for Inspections

| Mechanical Asset Type | | Electrical Asset Type | Instrumentation Asset Type | Structure Asset Type |
|-----------------------|-----------|------------------------------|----------------------------|----------------------|
| Actuator | | Battery | Flow Transmitter | Basin |
| Air Compressor | | Battery Bank | Level Switch | Building |
| Controller | | Building | Panel | Clarifier |
| Crane | | Buss Duct | Remote Telemetry Unit | Crane |
| Discharge Pipes | | Circuit Breaker | Radio (Transceiver) | Tank |
| Fan | | Generator | | Tank Cover |
| Fish Screen Rake | | Motor | | Roof |
| Flow Meter | | Motor Control Center | | Slab |
| Gate | Bulkhead | Motor Starter | | Vault |
| | Slide | Panel | | |
| | Sluice | PLC | | |
| | N/A | Protective Relay | | |
| Grinder | | Rectifier | | |
| Pig Launcher | | Switch | | |
| Piping | | Switchgear | | |
| Pump | | Transformer | | |
| Screens | | Uninterruptable Power Supply | | |
| Stoplog | | Variable Freq Drive | | |
| Tank | | | | |
| Valve | ARV/CAV | | | |
| | Butterfly | | | |
| | Check | | | |
| | Diaphragm | | | |
| | Gate | | | |
| | Pinch | | | |
| | Plug | | | |

Assets that were reviewed but not included in the final asset inventory for inspections, and the reasons, are included in Table 2-3. All of these assets were identified from information found in the Sewer Inventory Master spreadsheet.

Table 2-3. Assets Not Included in the Inventory for Inspections

| Asset Names/Types | Reason Not Included | Asset Types | Project/ Drawing Reference | Year of Construction |
|--|--|----------------------------------|----------------------------------|-------------------------|
| Main Lift Station | | | | |
| Pump #1 and Pump #6 pumps, piping, valves | Future per Sewer Inventory Master. Base assembly, piping, and rail system installed under Project 6103/2-1066 Drawing Number M-101 | Pump Piping Valves | | |
| Grinders #5, #6, #7, #8 | Future per Sewer Inventory Master | Grinder | | |
| Venus Way Lift Station | | | | |
| 8" Bypass Line | Unknown ¹ | Piping | 6101/2-1107 | 2008 |
| Seal holes in slab, valve vault | Assess with valve vault | | 6101/2-1107 | 2008 |
| Vertical Pipe Supports | Assess under Miscellaneous | | 6101/2-1107 | 2008 |
| Pumps, electrical, valves, vaults, piping, vents | Replaced in/updated with Project 6101 | Various | 6064/2-849 | 1994 |
| Cathodic protection, bubbler piping, electrical service | Replaced in/updated with Project 6101 | Various | 6040/2-660 | 1984 |
| Piping, valves, covers, manholes, electroliers, luminaires, electrical, fire hydrants and valves | Replaced in/updated with Project 6101 | Various | 2-161 | 1965 |
| Existing SSMH 1-2 and 15" Gravity Sewer | Different asset class On Sheet C-1 of Project 6101 (2-1107) | Gravity Sewer | | 1965 |
| Dry Well | Replaced in/updated with Project 6101 | Tank | | 1964 |
| Other | | | | |
| Force Main A, venturi meter and vault | Force main, not lift station asset | Force main, flow meter and vault | 2-343 | 1975 |
| Butterfly Valve | Force main, not lift station asset | Valve and vault | 2-986 | 1997 |

¹ Piping in Venus Way station was all in good condition

Section 3

Main Lift Station Inspections

3.1 Assets

The assets for Main Lift Station inspections are included in Table 3-1 (Mechanical), Table 3-2 (Electrical), Table 3-3 (Instrumentation), Table 3-4 (Civil), and Table 3-5 (Structural).

| Table 3-1. Mechanical Assets | | | | |
|---------------------------------|--|----------|--------------|----------------|
| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
| Pig Launcher A | 36" Pig Launcher | PIG-A | Pig Launcher | 2002 |
| Pig Launcher B | 36" Pig Launcher | PIG-B | Pig Launcher | 2002 |
| Pinch Valve 1 | 36" Pinch Valve (1 of 3) | | Valve | 2002 |
| Pinch Valve 2 | 36" Pinch Valve (2 of 3) | | Valve | 2002 |
| Pinch Valve 3 | 36" Pinch Valve (3 of 3) | | Valve | 2002 |
| Mag Meter (flow meter A) | 24" Magnetic Meter | | Flow Meter | 2002 |
| Venturi Meter- Removed in 2008 | 36" Venturi Meter (taken out) | | Flow Meter | 1975 |
| Butterfly Valve | 36" Butterfly Valve, FM interconnect | | Valve | 1970 |
| Manifold Piping | 36-inch flanged coupling adapter. 36-inch ductile iron 45' MJ x MJ bend. 20-inch or 36-inch FLxPE spool through sleeve with link seal. 36" x 20" x 36" ductile iron tee (force main A) | | Piping | 2008 |
| Manifold Piping Butterfly Valve | 36-inch diameter BFV, middle of manifold | | Valve | 2008 |
| Manifold Piping Plug Valve #1 | 36-inch diameter PV, pumps 1, 2, 3 | | Valve | 2008 |
| Manifold PV #1 Actuator | plug valve #1 electric actuator | | Actuator | 2008 |
| Manifold Piping Plug Valve #2 | 36-inch diameter PV, pumps 4, 5, 6 | | Valve | 2008 |
| Manifold PV #2 Actuator | plug valve #2 electric actuator | | Actuator | 2008 |
| Pump #2 | FLYGT CP3531-775, 170HP Submersible Pump | | Pump | 2008 |
| Pump #2 Piping | 20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter | | Piping | 2008 |
| Pump #2 Check Valve | 20-Inch Diameter Spring Loaded Check Valve | | Valve | 2008 |
| Pump #2 Plug Valve | 20-Inch Diameter Plug Valve | | Valve | 2008 |
| Pump #3 | FLYGT CP3531-775, 170HP Submersible Pump | | Pump | 2008 |
| Pump #3 Piping | 20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter | | Piping | 2008 |
| Pump #3 Check Valve | 20-Inch Diameter Spring Loaded Check Valve | | Valve | 2008 |

Table 3-1. Mechanical Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|------------------------------|--|----------|------------|----------------|
| Pump #3 Plug Valve | 20-Inch Diameter Plug Valve | | Valve | 2008 |
| Pump #4 | FLYGT CP3531-775, 170HP Submersible Pump | | Pump | 2008 |
| Pump #4 Piping | 20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter | | Piping | 2008 |
| Pump #4 Check Valve | 20-Inch Diameter Spring Loaded Check Valve | | Valve | 2008 |
| Pump #4 Plug Valve | 20-Inch Diameter Plug Valve | | Valve | 2008 |
| Pump #5 (not installed yet) | FLYGT CP3531-775, 170HP Submersible Pump | | Pump | |
| Pump #5 Piping | 20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter | | Piping | 2008 |
| Pump #5 Check Valve | 20-Inch Diameter Spring Loaded Check Valve | | Valve | 2008 |
| Pump #5 Plug Valve | 20-Inch Diameter Plug Valve | | Valve | 2008 |
| Main Head Gate | 54-inch sluice gate with manual actuator | | Gate | 2008 |
| Head Gate #1 | 48-inch sluice gate with electric actuator | | Gate | 2008 |
| Head Gate #2 | 48-inch sluice gate with electric actuator | | Gate | 2008 |
| Head Gate #3 | 48-inch sluice gate with electric actuator | | Gate | 2008 |
| Head Gate #4 | 48-inch sluice gate with electric actuator | | Gate | 2008 |
| Grinder #1 | 5-hp electric driven | | Grinder | 2008 |
| Grinder #2 | 10-hp electric driven | | Grinder | 2008 |
| Grinder #3 | 10-hp electric driven | | Grinder | 2008 |
| Grinder #4 | 5-hp electric driven | | Grinder | 2008 |
| Air Supply Fan | PS ventilation system | | Fan | 2008 |
| Exhaust Fan & Stack | PS ventilation system | | Fan | 2008 |
| Miscellaneous | Pipe support, 5' x 7' aluminum hatch, galv grating, 3'' SS guide rail, 4-inch diameter PVC drain, pipe wall anchor bracket | | | |
| 2" combo air/vac valve | | | | |
| Force Main A B Flow Recorder | | | | |
| Eye wash | | | | |
| Flow Meter B | This is for force main B | | | |
| Air vac 1 to 15 | All across the pump station. | | | |

Table 3-2. Electrical Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|---|--|----------|----------------------|----------------|
| Main Transformer | 1000 kVA, 12 kV-480 V, 3-ph (PG&E) | | Transformer | 2000 |
| Outdoor Utility Disconnect and Metering Panel | Outdoor NEMA 3R Enclosure | | Panel | 2000 |
| Main Switchgear | Located in Existing Generator Building | | Switchgear | 2000 |
| Variable Frequency Drive P2 | VFD for Pump 2 (170 HP) | | Variable Freq Drive | 2008 |
| Variable Frequency Drive P3 | VFD for Pump 3 (170 HP) | | Variable Freq Drive | 2008 |
| Variable Frequency Drive P4 | VFD for Pump 4 (170 HP) | | Variable Freq Drive | 2008 |
| Variable Frequency Drive P5 | VFD for Pump 5 (170 HP) | | Variable Freq Drive | 2008 |
| Local Disconnect for Engine Jacket Water Heater | 30A/3P | | Switch | 2000 |
| Motor Control Center 2 | 600 A, 480 V, 3-ph, 3W, 65000 AIC | MCC-2 | Motor Control Center | 2000 |
| Motor Control Center 2A | 600 A, 480 V, 3-ph, 3W, 65000 AIC | MCC-2A | Motor Control Center | 2000 |
| Dry Type Transformer | 30 kVA, 480-208/120 V, Dry Type | | Transformer | 2008 |
| Lighting panel (LP-1) | | LA | Panel | 2008 |
| Dry Type Transformer | 30 kVA, 480-208/120 V, Dry Type | | Transformer | 2000 |
| Lighting panel (LA) | 100 A, 1-Ph, 3 Wire | LP-1 | Panel | 2000 |
| Electrical/Generator Building-Electrical | | | Building | 2000 |
| Motor Control Center A | 400 A, 480 V, 3-ph, 3W, 65000 AIC | MCC-A | Motor Control Center | 2008 |
| Motor Control Center B | 400 A, 480 V, 3-ph, 3W, 65000 AIC | MCC-B | Motor Control Center | 2008 |
| Dry Type Transformer | 10 kVA, 480-240/120 V, Dry Type | | Transformer | 2008 |
| Distribution panel(DP-1) | 125 A, NEMA Type 1 | DP-1 | Panel | 2008 |
| Dry Type Transformer | 75 kVA, 480-208/120 V, Dry Type | | Transformer | 2008 |
| Distribution Panel (DP-2) | 125 A, NEMA Type 1 | DP-2 | Panel | 2008 |
| Local Control Panel for Grinder#1 | LCP grinder1 | | Panel | 2008 |
| Local Control Panel for Grinder#2 | LCP grinder2 | | Panel | 2008 |
| Local Control Panel for Grinder#3 | LCP grinder3 | | Panel | 2008 |
| Local Control Panel for Grinder#4 | LCP grinder4 | | Panel | 2008 |
| Local Disconnect for CU-1 (for FC-1) | 30A/3P | | Switch | 2008 |
| Local Disconnect for EF-1 (for Control Room) | 30A/3P | | Switch | 2008 |
| Local Disconnect for EF-5 (for wetwell) | 60A/3P | | Switch | 2008 |
| Local Disconnect for SF-1 (for Wet Well) | 60A/3P | | Switch | 2008 |
| Local Disconnect for HP-1 (for FC-2) | 30A/3P | | Switch | 2008 |
| Local Disconnect for FC-1 (for Control Room) | 30A/3P | | Switch | 2008 |
| Generator | 1000 kVA, 480 V Diesel Driven Engine Generator | | Generator | 2000 |
| Automatic Transfer Switch | ATS, 1600 A | | Switch | 2000 |

Table 3-3. Instrumentation Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|--|---------------------|----------|--------------|----------------|
| MAS Enclosure and Pump Motor Monitor Panel | MAS | MAS 711 | Panel | 2008 |
| Level Switch | Level High High | LSHH-201 | Level Switch | 2008 |
| Level Switch | Ultrasonic level | LE-202 | Level Switch | 2008 |
| Level Switch | Ultrasonic level | LE-203 | Level Switch | 2008 |
| Generator and Fuel System Control Panel | Local Control Panel | | Panel | 2000 |

Table 3-4. Civil Assets

| Asset Name | Asset Description | Asset Type | Year Installed |
|---------------------|-------------------|------------------|----------------|
| Electrical building | | Building | |
| Control building | | Building | |
| Site civil | | Asphalt Pavement | |

Table 3-5. Structural Assets

| Asset Name | Asset Description | Asset Type | Year Installed |
|--|---|------------|----------------|
| Pinch Valve Vault 1 | Pinch Valve Vault (1 of 3) | Vault | 2002 |
| Pinch Valve Vault 2 | Pinch Valve Vault (2 of 3) | Vault | 2002 |
| Pinch Valve Vault 3 | Pinch Valve Vault (3 of 3) | Vault | 2002 |
| Mag Meter Vault | 24'' Magnetic Meter Vault | Vault | 2002 |
| Venturi Meter Vault | 36'' Venturi Meter Vault | Vault | 1975 |
| Butterfly Valve Vault | 36'' Butterfly Valve Vault | Vault | 1997 |
| Electrical/Generator Building-Structural | | Building | 2000 |
| Fuel Tank (bulk) | 2,000-gal UL-2085 above ground vault tank | Tank | 2008 |
| Fuel Tank (day) | | Tank | 2000 |
| Control Building | | Building | 2008 |
| Grit Chamber/Inflow Structure | | Tank | 2008 |
| Wet Well | | Tank | 2008 |
| Garage | | Building | 2008 |

3.2 Condition Data

Field inspections were completed on February 11, 2020 and March 11, 2020. The condition data and scores for Main Lift Station inspections are included in Table 3-6 (Mechanical), Table 3-7 (Electrical), Table 3-8 (Instrumentation), Table 3-9 (Civil), and Table 3-10 (Structural). Condition and performance scores for instrumentation, civil, and structure were 1 (no defects and asset functioning as intended) or 2 (minor defects, higher than expected O&M). Mechanical and electrical components received scores of 4 (major defects, function highly impaired) and mechanical components received scores of 5 (failing/failed, not functioning as intended), see Tables 3-6 and 3-7.

Table 3-6. Mechanical Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|---------------------------------|------------------|-------------------|--|--|
| Pig Launcher A | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pig Launcher B | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pinch Valve 1 | | | NA - Not enough information available. | NA - Not enough information available. |
| Pinch Valve 2 | | | NA - Not enough information available. | NA - Not enough information available. |
| Pinch Valve 3 | | | NA - Not enough information available. | NA - Not enough information available. |
| Mag Meter (flow meter A) | Not in Operation | | 4 - Poor – Major defects observed. Asset integrity may be compromised. | 4 - Poor – In service, but function is highly impaired. |
| Venturi Meter- Removed in 2008 | | | NA - Not enough information available. | NA - Not enough information available. |
| Butterfly Valve | | | NA - Not enough information available. | NA - Not enough information available. |
| Manifold Piping | None | | 2 - Fair – Only minor defects observed. | 2 - Fair – In service, but higher than expected O&M. |
| Manifold Piping Butterfly Valve | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Manifold Piping Plug Valve #1 | | | 1 - Good – No defects observed. | NA - Not enough information available. |
| Manifold PV #1 Actuator | None | | 1 - Good – No defects observed. | NA - Not enough information available. |
| Manifold Piping Plug Valve #2 | None | | 2 - Fair – Only minor defects observed. | 2 - Fair – In service, but higher than expected O&M. |
| Manifold PV #2 Actuator | | Does not work. | 5 - Failing or Failed – Asset integrity is compromised. Asset may be out of service. | 5 - Failing or Failed – Asset is not functioning as intended or is out of service. |
| Pump #2 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #2 Piping | None | | 2 - Fair – Only minor defects observed. | 2 - Fair – In service, but higher than expected O&M. |
| Pump #2 Check Valve | None | | 2 - Fair – Only minor defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #2 Plug Valve | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #3 | | passed life limit | 4 - Poor – Major defects observed. Asset integrity may be compromised. | 4 - Poor – In service, but function is highly impaired. |
| Pump #3 Piping | None | | 2 - Fair – Only minor defects observed. | 2 - Fair – In service, but higher than expected O&M. |
| Pump #3 Check Valve | None | | 2 - Fair – Only minor defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #3 Plug Valve | | | 2 - Fair – Only minor defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #4 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #4 Piping | None | | 2 - Fair – Only minor defects observed. | 2 - Fair – In service, but higher than expected O&M. |

Table 3-6. Mechanical Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|------------------------------|--|---|--|--|
| Pump #4 Check Valve | None | | 2 - Fair – Only minor defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #4 Plug Valve | | | 2 - Fair – Only minor defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #5 (not installed yet) | | | N/A | N/A |
| Pump #5 Piping | None | | 1 - Good – No defects observed. | NA - Not enough information available. |
| Pump #5 Check Valve | | | 1 - Good – No defects observed. | NA - Not enough information available. |
| Pump #5 Plug Valve | | | 1 - Good – No defects observed. | NA - Not enough information available. |
| Main Head Gate | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Head Gate #1 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Head Gate #2 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Head Gate #3 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Head Gate #4 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Grinder #1 | Excessive Vibration,Inadequate Supports | | 5 - Failing or Failed – Asset integrity is compromised. Asset may be out of service. | 5 - Failing or Failed – Asset is not functioning as intended or is out of service. |
| Grinder #2 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Grinder #3 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Grinder #4 | None | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Air Supply Fan | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Exhaust Fan & Stack | | | 1 - Good – No defects observed. | 2 - Fair – In service, but higher than expected O&M. |
| Miscellaneous | | | | |
| 2" combo air/vac valve | | | 4 - Poor – Major defects observed. Asset integrity may be compromised. | 4 - Poor – In service, but function is highly impaired. |
| Force Main A B Flow Recorder | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Eye wash | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Flow Meter B | | It works but the operation is not accurate. | 4 - Poor – Major defects observed. Asset integrity may be compromised. | 4 - Poor – In service, but function is highly impaired. |
| Air vac 1 to 15 | Cavitation,Coating Failure,Inadequate Supports | | 5 - Failing or Failed – Asset integrity is compromised. Asset may be out of service. | 5 - Failing or Failed – Asset is not functioning as intended or is out of service. |

Table 3-7. Electrical Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|---|---|--------------------------------|---|--|
| Main Transformer | No defects noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Outdoor Utility Disconnect and Metering Panel | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Main Switchgear | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Variable Frequency Drive P2 | No Corrosion Noted | ArcFlash labels missing | 4 - Integrity of Component Moderately Compromised | 2 - In-Service, but Higher than Expected O&M |
| Variable Frequency Drive P3 | No Corrosion Noted. Understood from City that IGBT was replaced a year ago. | ArcFlash labels missing | 4 - Integrity of Component Moderately Compromised | 2 - In-Service, but Higher than Expected O&M |
| Variable Frequency Drive P4 | No Corrosion Noted | ArcFlash labels missing | 4 - Integrity of Component Moderately Compromised | 2 - In-Service, but Higher than Expected O&M |
| Variable Frequency Drive P5 | No Corrosion Noted. Understood from City that Cooling Fans were replaced year ago | ArcFlash labels missing | 4 - Integrity of Component Moderately Compromised | 2 - In-Service, but Higher than Expected O&M |
| Local Disconnect for Engine Jacket Water Heater | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Motor Control Center 2 | No Corrosion Noted. | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Motor Control Center 2A | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Dry Type Transformer | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Lighting panel (LP-1) | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Dry Type Transformer | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Lighting panel (LA) | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Electrical/Generator Building-Electrical | | Lighting – Outdated technology | 1 - Excellent | 1 - Component Functioning as Intended |
| Motor Control Center A | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Motor Control Center B | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Dry Type Transformer | No corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Distribution panel(DP-1) | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |

Table 3-7. Electrical Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|--|--------------------|-------------------------|-----------------|---------------------------------------|
| Dry Type Transformer | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Distribution Panel (DP-2) | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Control Panel for Grinder#1 | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Control Panel for Grinder#2 | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Control Panel for Grinder#3 | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Control Panel for Grinder#4 | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Disconnect for CU-1 (for FC-1) | | | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Disconnect for EF-1 (for Control Room) | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Disconnect for EF-5 (for wetwell) | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Disconnect for SF-1 (for Wet Well) | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Disconnect for HP-1 (for FC-2) | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Local Disconnect for FC-1 (for Control Room) | No Corrosion Noted | | 1 - Excellent | 1 - Component Functioning as Intended |
| Generator | Good condition | | 1 - Excellent | 1 - Component Functioning as Intended |
| Automatic Transfer Switch | No Corrosion Noted | ArcFlash labels missing | 1 - Excellent | 1 - Component Functioning as Intended |

Table 3-8. Instrumentation Condition Data

| Asset Name | Asset ID | Field Assessment | Condition Score | Performance Score |
|--|----------|--------------------|---------------------------------|---|
| MAS Enclosure and Pump Motor Monitor Panel | MAS 711 | No Corrosion Noted | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Level Switch | LSHH-201 | In Good Condition | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Level Switch | LE-202 | In Good Condition | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Level Switch | LE-203 | Not accessible | N/A | N/A |
| Generator and Fuel System Control Panel | | No Corrosion Noted | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |

Table 3-9. Civil Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|---------------------|------------------|----------|---------------------------------|---|
| Electrical building | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Control building | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Site civil | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |

Table 3-10. Structural Condition Data

| Asset Name | Material | Field Assessment | Comments | Condition Score | Performance Score |
|--|----------|---------------------------------|--|---|---|
| Pinch Valve Vault 1 | Concrete | Corrosion of metal walls | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pinch Valve Vault 2 | Concrete | | Exposed aggregates | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pinch Valve Vault 3 | Concrete | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Mag Meter Vault | Concrete | Corrosion of metal walls | Corroded metal at hatch opening | 2 - Fair – Only minor defects observed. | 1 - Good – Asset functioning as intended. |
| Venturi Meter Vault | Concrete | Cracks in walls | No cracking inside, surface cracks on outside, coating still present on inside | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Butterfly Valve Vault | Concrete | | No visible cracks besides on curb outside | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Electrical/Generator Building-Structural | Masonry | Cracks in walls,Moisture issues | Some cracks inside and outside, cosmetic cracks | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Fuel Tank (bulk) | Metal | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Fuel Tank (day) | Metal | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Control Building | Masonry | Cracks in walls | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Grit Chamber/Inflow Structure | Concrete | | Poor lighting | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Wet Well | Concrete | Paint issues | Coating appears to be deteriorating towards bottom, tanks were in operation, no inspection of walls and slab below liquid line | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Garage | Concrete | Corrosion of metal walls | Water accumulation inside when it's raining, water seeps thru slab | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |

Section 4

Venus Way Lift Station Inspections

4.1 Assets

The assets for Venus Way Lift Station inspections are included in Table 4-1 (Mechanical), Table 4-2 (Electrical), Table 4-3 (Instrumentation), Table 4-4 (Civil), and Table 4-5 (Structural).

Table 4-1. Mechanical Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|-----------------------------|---|----------|------------|----------------|
| Pump #1 | FLYGT CP3102-441, 5HP 3ph 230V Submersible Pump | | Pump | 2008 |
| Pump #2 | FLYGT CP3102-441, 5HP 3ph 230V Submersible Pump | | Pump | 2008 |
| Pump Guide Rails | Reinstalled in 2008 | | | 2008 |
| 8" Gate Valve, Pump 1 and 2 | 8" Gate Valve, Pump 1 and 2 | | Valve | 2008 |
| 8" Gate Valve, Pump 2 | 8" Gate Valve, Pump 2 | | Valve | 2008 |
| 8" Gate Valve, Pump 1 and 2 | 8" Gate Valve, Pump 1 and 2 | | Valve | 2008 |
| 8" Check Valve, Pump 1 | 8" Check Valve, Pump 1 | | Valve | 2008 |
| 8" Check Valve, Pump 2 | 8" Check Valve, Pump 2 | | Valve | 2008 |
| 4" Flap Gate | 4" Flap Gate in wet well | | Valve | 2008 |
| 2" Combo Air/vacuum valve | 2" Combo Air/vacuum valve | | Valve | 2008 |

Table 4-2. Electrical Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|---------------------|--|----------|-------------|----------------|
| Utility Transformer | 240/120 V, 3-Ph, 3 W | XFMR T-1 | Transformer | 2000 |
| Service Pedestal | Service Disconnect and Metering | | | 2008 |
| Pump Control Panel | Starter panel for Pumps #1 and 2 (Each 5 HP) | | Panel | 2008 |

Table 4-3. Instrumentation Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|------------------|-----------------------|----------|--------------|----------------|
| Level Instrument | Wet Well Level Sensor | LSHH-01 | Level Switch | 2008 |

Table 4-4. Civil Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|------------|-------------------|----------|------------|----------------|
| Site civil | | | | |

Table 4-5. Structural Assets

| Asset Name | Asset Description | Asset ID | Asset Type | Year Installed |
|-------------------------|---------------------------------------|----------|------------|----------------|
| Wet Well | 72" Diameter Reinforced Concrete Pipe | | Tank | 1964 |
| Valve Vault | | | Vault | 1994 |
| Aluminum Hatch-Vault | Aluminum Hatch, slide-in | | Vault | 2008 |
| Aluminum Hatch-Wet Well | Aluminum Hatch w/ safety grate | | Vault | 2008 |

4.2 Condition Data

Field inspections were completed on February 11, 2020 and March 11, 2020. The condition data and scores for Venus Way Lift Station inspections are included in Table 4-6 (Mechanical), Table 4-7 (Electrical), Table 4-8 (Instrumentation), Table 4-9 (Civil), and Table 4-10 (Structural). Condition and performance scores were all 1 (no defects and asset functioning as intended).

Table 4-6. Mechanical Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|-----------------------------|------------------|----------|--|---|
| Pump #1 | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pump #2 | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Pump Guide Rails | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| 8" Gate Valve, Pump 1 and 2 | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| 8" Gate Valve, Pump 2 | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| 8" Gate Valve, Pump 1 and 2 | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| 8" Check Valve, Pump 1 | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| 8" Check Valve, Pump 2 | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| 4" Flap Gate | Could not find | None | NA - Not enough information available. | NA - Not enough information available. |
| 2" Combo Air/vacuum valve | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |

Table 4-7. Electrical Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|---------------------|------------------|--------------------|-----------------|---------------------------------------|
| Utility Transformer | | No Corrosion Noted | 1 - Excellent | 1 - Component Functioning as Intended |
| Service Pedestal | | | 1 - Excellent | 1 - Component Functioning as Intended |
| Pump Control Panel | | No Corrosion Noted | 1 - Excellent | 1 - Component Functioning as Intended |

Table 4-8. Instrumentation Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|------------------|------------------|---------------------|---------------------------------|---|
| Level Instrument | | See wet well photos | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |

Table 4-9. Civil Condition Data

| Asset Name | Field Assessment | Comments | Condition Score | Performance Score |
|------------|------------------|----------|---------------------------------|---|
| Site civil | | | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |

Table 4-10. Structural Condition Data

| Asset Name | Material | Field Assessment | Comments | Condition Score | Performance Score |
|-------------------------|----------|------------------|----------|---------------------------------|---|
| Wet Well | Concrete | Oxidation | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Valve Vault | Concrete | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Aluminum Hatch-Vault | | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |
| Aluminum Hatch-Wet Well | Metal | | None | 1 - Good – No defects observed. | 1 - Good – Asset functioning as intended. |

Section 5

Limitations

This document was prepared solely for City of Milpitas in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Milpitas and HydroScience Engineers, Inc., dated October 18, 2019. This document is governed by the specific scope of work authorized by City of Milpitas; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Milpitas and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Further, Brown and Caldwell makes no warranties, express or implied, with respect to this document, except for those, if any, contained in the agreement pursuant to which the document was prepared.

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Appendix A: Main Lift Station – Mechanical

Main Pump Station-Mech

| | |
|----------------|---|
| Created | 2020-02-07 16:28:52 PST by Erik Zalkin |
| Updated | 2020-02-20 17:14:36 PST by Hamed Hakimelahi |
| Location | 37.4476, -121.922806 |
| Asset Location | Main Pump Station-Mech |

Pig Launcher A, PIG-A

Equipment Data

| | |
|------------------------------|---|
| Mechanical Asset Name | Pig Launcher A |
| Mechanical Asset Description | 36" Pig Launcher |
| Asset ID | PIG-A |
| Asset Type | Pig Launcher |
| Year Installed | 2002 |
| Size/Diameter | 36 |
| Coated? | Yes |
| Mechanical Field Assessment | None |
| Coating Condition | In tact |
| Mechanical Equipment Photos |  |



Mechanical Observation Comments

Has never been used

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pig Launcher B, PIG-B

Equipment Data

| | |
|------------------------------|------------------|
| Mechanical Asset Name | Pig Launcher B |
| Mechanical Asset Description | 36" Pig Launcher |
| Asset ID | PIG-B |
| Asset Type | Pig Launcher |
| Year Installed | 2002 |
| Size/Diameter | 36 |
| Coated? | Yes |
| Mechanical Field Assessment | None |
| Coating Condition | In tact |
| Mechanical Equipment Photos | |





| | |
|---------------------------------|-----------------|
| Mechanical Observation Comments | Never been used |
|---------------------------------|-----------------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pinch Valve 1

Equipment Data

| | |
|---------------------------------|--------------------------|
| Mechanical Asset Name | Pinch Valve 1 |
| Mechanical Asset Description | 36" Pinch Valve (1 of 3) |
| Asset Type | Valve |
| Year Installed | 2002 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | NA - Not enough information available. |
|----------------------------|--|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Pinch Valve 2

Equipment Data

| | |
|---------------------------------|--------------------------|
| Mechanical Asset Name | Pinch Valve 2 |
| Mechanical Asset Description | 36" Pinch Valve (2 of 3) |
| Asset Type | Valve |
| Year Installed | 2002 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | NA - Not enough information available. |
|----------------------------|--|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Pinch Valve 3

Equipment Data

| | |
|---------------------------------|--------------------------|
| Mechanical Asset Name | Pinch Valve 3 |
| Mechanical Asset Description | 36" Pinch Valve (3 of 3) |
| Asset Type | Valve |
| Year Installed | 2002 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | NA - Not enough information available. |
|----------------------------|--|


Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Mag Meter (flow meter A)

Equipment Data

| | |
|------------------------------|--------------------------|
| Mechanical Asset Name | Mag Meter (flow meter A) |
| Mechanical Asset Description | 24" Magnetic Meter |

| | |
|-----------------------------|---|
| Asset Type | Flow Meter |
| Year Installed | 2002 |
| Flow Meter Type | Magnetic |
| Size/Diameter | 24" |
| Coated? | No |
| Mechanical Field Assessment | Not in Operation |
| Mechanical Equipment Photos |  |



Mechanical Observation Comments

None

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | 4 - Poor – Major defects observed. Asset integrity may be compromised. |
|----------------------------|--|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 4 - Poor – In service, but function is highly impaired. |
|------------------------------|---|

Venturi Meter- Removed in 2008

Equipment Data

| | |
|---------------------------------|--------------------------------|
| Mechanical Asset Name | Venturi Meter- Removed in 2008 |
| Mechanical Asset Description | 36" Venturi Meter (taken out) |
| Asset Type | Flow Meter |
| Year Installed | 1975 |
| Flow Meter Type | Venturi |
| Size/Diameter | 36 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | NA - Not enough information available. |
|----------------------------|--|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Butterfly Valve

Equipment Data

| | |
|---------------------------------|--------------------------------------|
| Mechanical Asset Name | Butterfly Valve |
| Mechanical Asset Description | 36" Butterfly Valve, FM interconnect |
| Asset Type | Valve |
| Year Installed | 1970 |
| Mechanical Field Assessment | |
| Mechanical Observation Comments | Could not find it in the field |

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | NA - Not enough information available. |
|----------------------------|--|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Manifold Piping

Equipment Data

| | |
|------------------------------|--|
| Mechanical Asset Name | Manifold Piping |
| Mechanical Asset Description | 36-inch flanged coupling adapter. 36-inch ductile iron 45' MJ x MJ bend. 20-inch or 36-inch FLxPE spool through sleeve with link seal. 36" x 20" x 36" ductile iron tee (force main A) |
| Asset Type | Piping |
| Year Installed | 2008 |
| Size/Diameter | 36 |
| Coated? | Yes |

Mechanical Field Assessment

None

Coating Condition

Blistered

Mechanical Equipment Photos







| | |
|---------------------------------|---|
| Mechanical Observation Comments | According to staff, the pipes operate well. |
|---------------------------------|---|

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

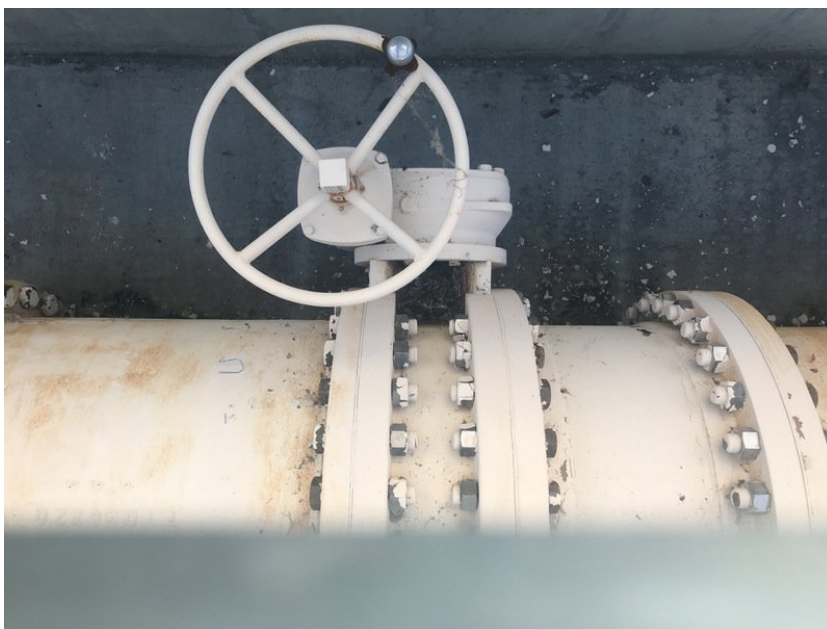
| | |
|------------------------------|--|
| Mechanical Performance Score | 2 - Fair – In service, but higher than expected O&M. |
|------------------------------|--|

Manifold Piping Butterfly Valve

Equipment Data

| | |
|------------------------------|--|
| Mechanical Asset Name | Manifold Piping Butterfly Valve |
| Mechanical Asset Description | 36-inch diameter BFV, middle of manifold |
| Asset Type | Valve |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Manual |
| Valve Type | Butterfly |
| Size/Diameter | 36 |
| Mechanical Field Assessment | None |
| Mechanical Equipment Photos | |





| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

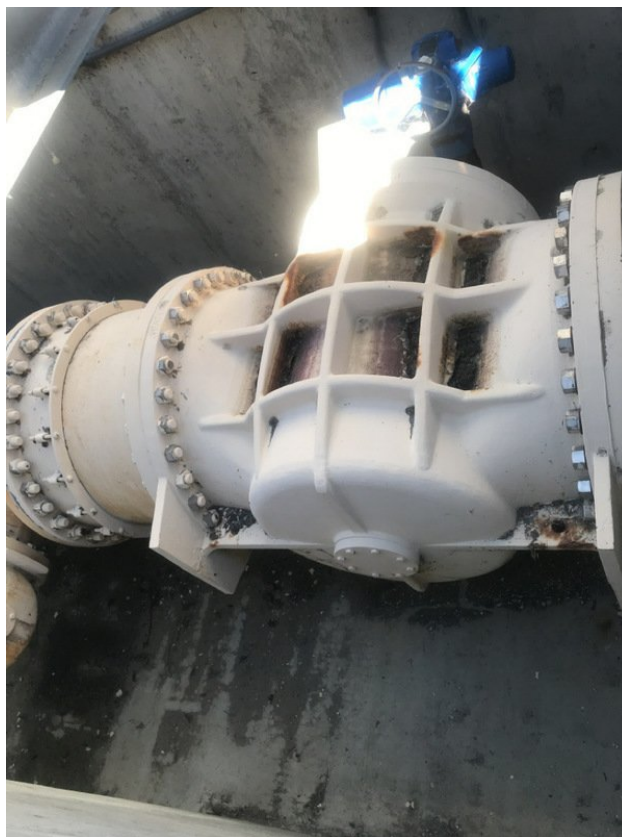
| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Manifold Piping Plug Valve #1

Equipment Data

| | |
|------------------------------|------------------------------------|
| Mechanical Asset Name | Manifold Piping Plug Valve #1 |
| Mechanical Asset Description | 36-inch diameter PV, pumps 1, 2, 3 |
| Asset Type | Valve |
| Year Installed | 2008 |
| Drive Type | Manual |
| Valve Type | Plug |
| Size/Diameter | 36 |
| Mechanical Field Assessment | |

Mechanical Equipment Photos



| | |
|---------------------------------|-----------------------------------|
| Mechanical Observation Comments | Pump 1 has not been installed yet |
|---------------------------------|-----------------------------------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Manifold PV #1 Actuator

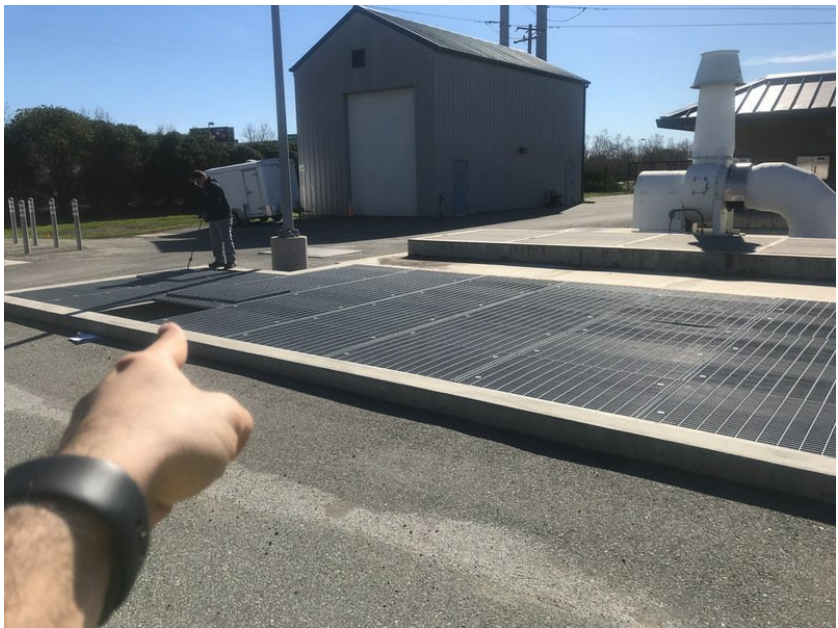
Equipment Data

| | |
|------------------------------|---------------------------------|
| Mechanical Asset Name | Manifold PV #1 Actuator |
| Mechanical Asset Description | plug valve #1 electric actuator |
| Asset Type | Actuator |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Mechanical Field Assessment | None |
| Mechanical Equipment Photos | |









| | |
|---------------------------------|---|
| Mechanical Observation Comments | operator has never used this. The operator dont know if the actuator works. |
|---------------------------------|---|

| | |
|------------------|--|
| Condition | |
|------------------|--|

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

| | |
|--------------------|--|
| Performance | |
|--------------------|--|

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

| | |
|--------------------------------------|--|
| Manifold Piping Plug Valve #2 | |
|--------------------------------------|--|

| | |
|-----------------------|--|
| Equipment Data | |
|-----------------------|--|

| | |
|------------------------------|------------------------------------|
| Mechanical Asset Name | Manifold Piping Plug Valve #2 |
| Mechanical Asset Description | 36-inch diameter PV, pumps 4, 5, 6 |
| Asset Type | Valve |

| | |
|-----------------------------|------|
| Year Installed | 2008 |
| Valve Type | Plug |
| Size/Diameter | 36 |
| Mechanical Field Assessment | None |
| Mechanical Equipment Photos | |



| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | 2 - Fair – In service, but higher than expected O&M. |
|------------------------------|--|

Manifold PV #2 Actuator

Equipment Data

| | |
|------------------------------|---------------------------------|
| Mechanical Asset Name | Manifold PV #2 Actuator |
| Mechanical Asset Description | plug valve #2 electric actuator |
| Asset Type | Actuator |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Mechanical Field Assessment | Does not work. |
| Mechanical Equipment Photos | |







| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | 5 - Failing or Failed – Asset integrity is compromised. Asset may be out of service. |
|----------------------------|--|

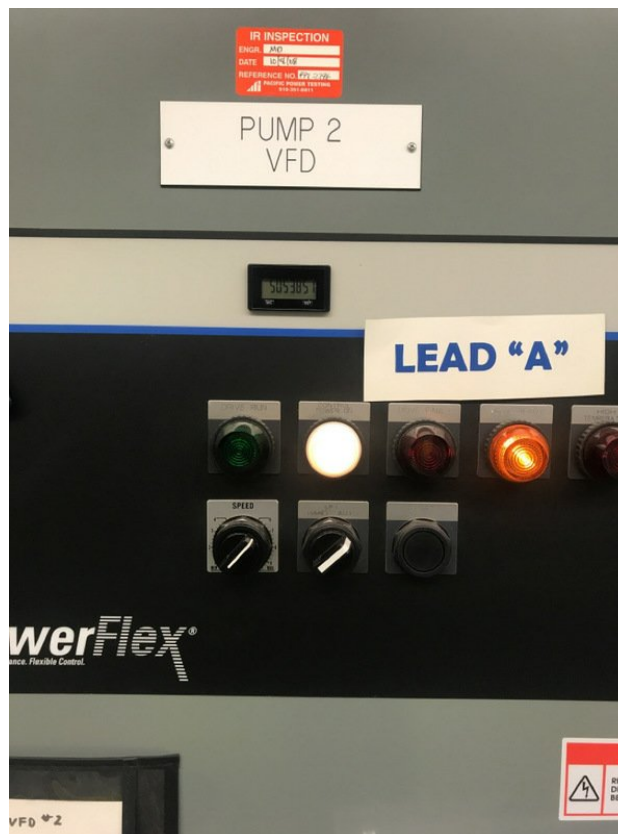
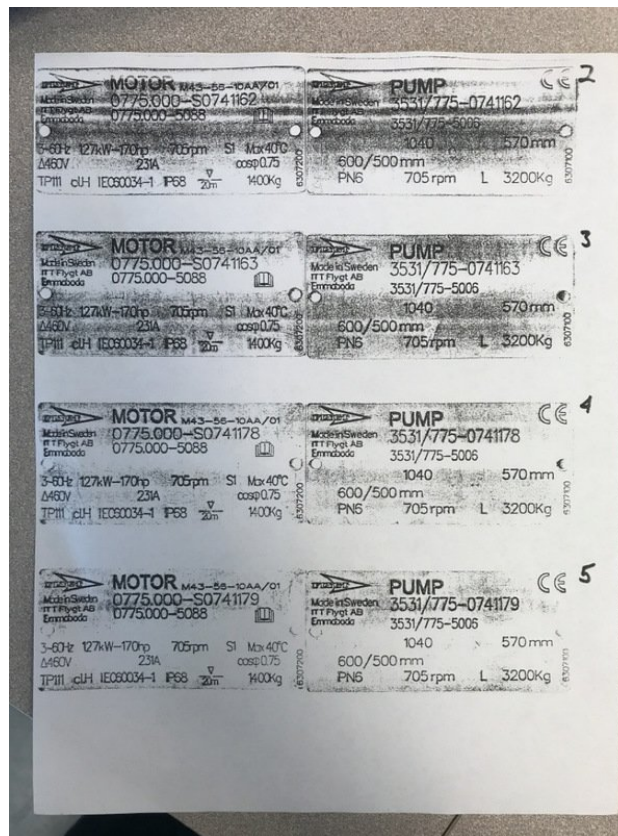
Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | 5 - Failing or Failed – Asset is not functioning as intended or is out of service. |
|------------------------------|--|

Pump #2

Equipment Data

| | |
|------------------------------|--|
| Mechanical Asset Name | Pump #2 |
| Mechanical Asset Description | FLYGT CP3531-775, 170HP Submersible Pump |
| Asset Type | Pump |
| Year Installed | 2008 |
| Pump Type | Submersible |
| Mechanical Field Assessment | None |
| Mechanical Equipment Photos | |











| | |
|---------------------------------|-----------------------|
| Mechanical Observation Comments | Rebuilt 1.5 years ago |
|---------------------------------|-----------------------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #2 Piping

Equipment Data

| | |
|---------------------------------|---|
| Mechanical Asset Name | Pump #2 Piping |
| Mechanical Asset Description | 20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter |
| Asset Type | Piping |
| Year Installed | 2008 |
| Size/Diameter | 20" |
| Coated? | Yes |
| Mechanical Field Assessment | None |
| Coating Condition | In tact |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | 2 - Fair – In service, but higher than expected O&M. |
|------------------------------|--|

Pump #2 Check Valve

Equipment Data

| | |
|-----------------------|---------------------|
| Mechanical Asset Name | Pump #2 Check Valve |
|-----------------------|---------------------|

| | |
|------------------------------|--|
| Mechanical Asset Description | 20-Inch Diameter Spring Loaded Check Valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Valve Type | Check |
| Size/Diameter | 20 |
| Mechanical Field Assessment | None |

Mechanical Equipment Photos







| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #2 Plug Valve

Equipment Data

| | |
|------------------------------|-----------------------------|
| Mechanical Asset Name | Pump #2 Plug Valve |
| Mechanical Asset Description | 20-Inch Diameter Plug Valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Control Type | Local |
| Valve Type | Plug |
| Size/Diameter | 20 |

Mechanical Equipment Photos



Mechanical Observation Comments

None

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #3

Equipment Data

| | |
|------------------------------|--|
| Mechanical Asset Name | Pump #3 |
| Mechanical Asset Description | FLYGT CP3531-775, 170HP Submersible Pump |
| Asset Type | Pump |
| Year Installed | 2008 |
| Pump Type | Submersible |
| Mechanical Field Assessment | passed life limit |

Mechanical Equipment Photos





Mechanical Observation Comments

It has 50,000 hours on it. Should be replaced.

Condition

Mechanical Condition Score

4 - Poor – Major defects observed. Asset integrity may be compromised.

Performance

Mechanical Performance Score

4 - Poor – In service, but function is highly impaired.

Pump #3 Piping

Equipment Data

Mechanical Asset Name

Pump #3 Piping

Mechanical Asset Description

20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter

Asset Type

Piping

Year Installed

2008

Size/Diameter

20"

Coated?

Yes

Mechanical Field Assessment

None

Coating Condition

In tact

Mechanical Equipment Photos



Mechanical Observation Comments

None

Condition

Mechanical Condition Score

2 - Fair – Only minor defects observed.

Performance

Mechanical Performance Score

2 - Fair – In service, but higher than expected O&M.

Pump #3 Check Valve

Equipment Data

Mechanical Asset Name

Pump #3 Check Valve

Mechanical Asset Description

20-Inch Diameter Spring Loaded Check Valve

Asset Type

Valve

Year Installed

2008

Size/Diameter

20"

Mechanical Field Assessment

None

Mechanical Equipment Photos





| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #3 Plug Valve

Equipment Data

| | |
|------------------------------|-----------------------------|
| Mechanical Asset Name | Pump #3 Plug Valve |
| Mechanical Asset Description | 20-Inch Diameter Plug Valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Valve Type | Plug |
| Size/Diameter | 20" |

Mechanical Equipment Photos



| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #4

Equipment Data


| | |
|------------------------------|--|
| Mechanical Asset Name | Pump #4 |
| Mechanical Asset Description | FLYGT CP3531-775, 170HP Submersible Pump |
| Asset Type | Pump |
| Year Installed | 2008 |
| Pump Type | Submersible |
| Mechanical Field Assessment | None |

Mechanical Equipment Photos



| | |
|---------------------------------|---|
| Mechanical Observation Comments | None |
| Condition | |
| Mechanical Condition Score | 1 - Good – No defects observed. |
| Performance | |
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
| Pump #4 Piping | |

Equipment Data

| | |
|------------------------------|---|
| Mechanical Asset Name | Pump #4 Piping |
| Mechanical Asset Description | 20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter |
| Asset Type | Piping |
| Year Installed | 2008 |
| Size/Diameter | 20" |
| Coated? | Yes |
| Mechanical Field Assessment | None |
| Coating Condition | In tact |
| Mechanical Equipment Photos |  |

| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | 2 - Fair – In service, but higher than expected O&M. |
|------------------------------|--|

Pump #4 Check Valve

Equipment Data

| | |
|---------------------------------|--|
| Mechanical Asset Name | Pump #4 Check Valve |
| Mechanical Asset Description | 20-Inch Diameter Spring Loaded Check Valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Valve Type | Check |
| Size/Diameter | 20" |
| Mechanical Field Assessment | None |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #4 Plug Valve

Equipment Data

| | |
|---------------------------------|-----------------------------|
| Mechanical Asset Name | Pump #4 Plug Valve |
| Mechanical Asset Description | 20-Inch Diameter Plug Valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Valve Type | Plug |
| Size/Diameter | 20 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---|
| Mechanical Condition Score | 2 - Fair – Only minor defects observed. |
|----------------------------|---|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #5 (not installed yet)

Equipment Data

| | |
|------------------------------|--|
| Mechanical Asset Name | Pump #5 (not installed yet) |
| Mechanical Asset Description | FLYGT CP3531-775, 170HP Submersible Pump |
| Asset Type | Pump |
| Mechanical Equipment Photos | |



Mechanical Observation Comments

None

Pump #5 Piping

Equipment Data

Mechanical Asset Name

Pump #5 Piping

Mechanical Asset Description

20-Inch Ductile Iron Vertical Discharge Pipe, 20-Inch Ductile Iron 90 Elbow, 20-Inch Flanged Coupling Adapter

Asset Type

Piping

| | |
|---------------------------------|-------------------------------|
| Year Installed | 2008 |
| Mechanical Field Assessment | None |
| Mechanical Observation Comments | The piping is not being used, |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Pump #5 Check Valve

Equipment Data

| | |
|---------------------------------|--|
| Mechanical Asset Name | Pump #5 Check Valve |
| Mechanical Asset Description | 20-Inch Diameter Spring Loaded Check Valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Mechanical Observation Comments | Not being used, |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

Pump #5 Plug Valve

Equipment Data

| | |
|---------------------------------|-----------------------------|
| Mechanical Asset Name | Pump #5 Plug Valve |
| Mechanical Asset Description | 20-Inch Diameter Plug Valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Mechanical Observation Comments | Not being used |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

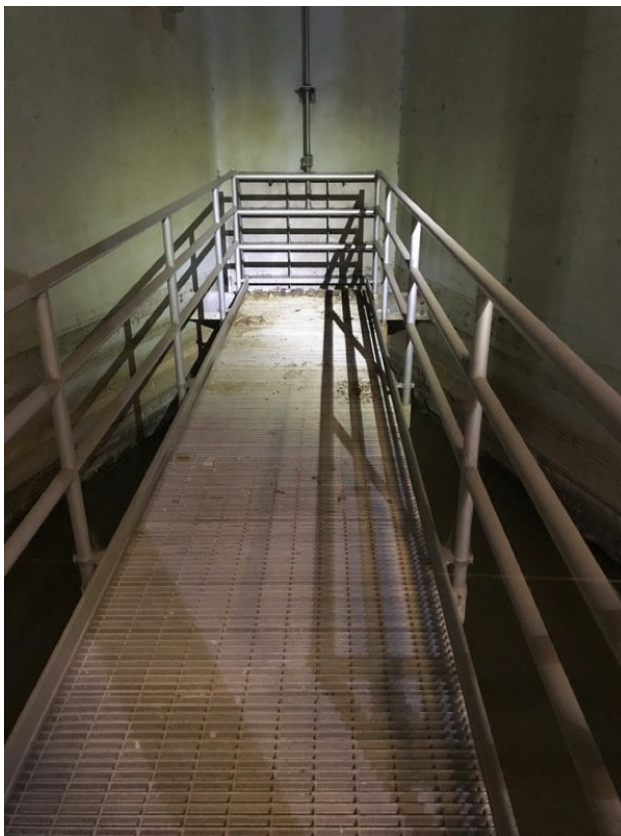
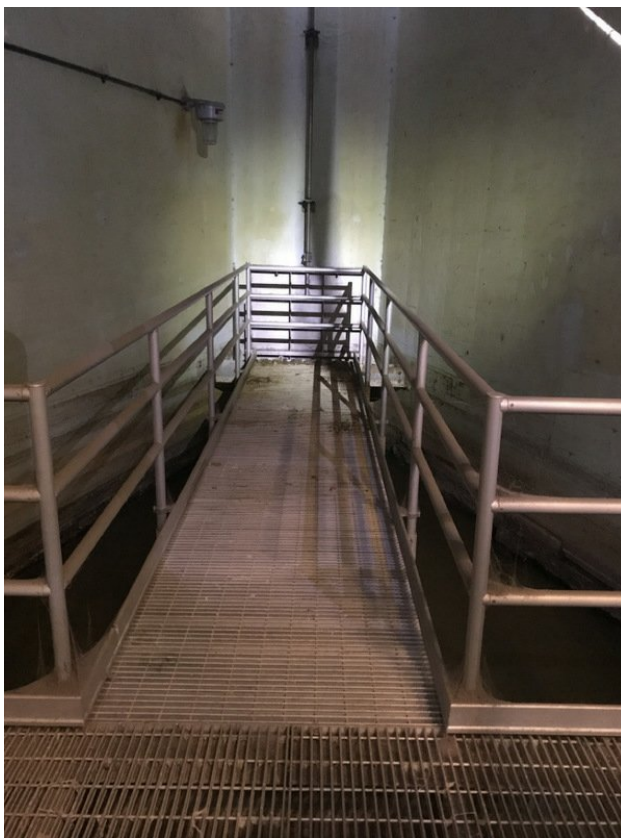
Main Head Gate

Equipment Data

| | |
|------------------------------|--|
| Mechanical Asset Name | Main Head Gate |
| Mechanical Asset Description | 54-inch sluice gate with manual actuator |
| Asset Type | Gate |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Manual |

| | |
|-----------------------------|--------|
| Gate Type | Sluice |
| Size/Diameter | 54" |
| Mechanical Field Assessment | None |
| Mechanical Equipment Photos | |







Mechanical Observation Comments

None

Condition


| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

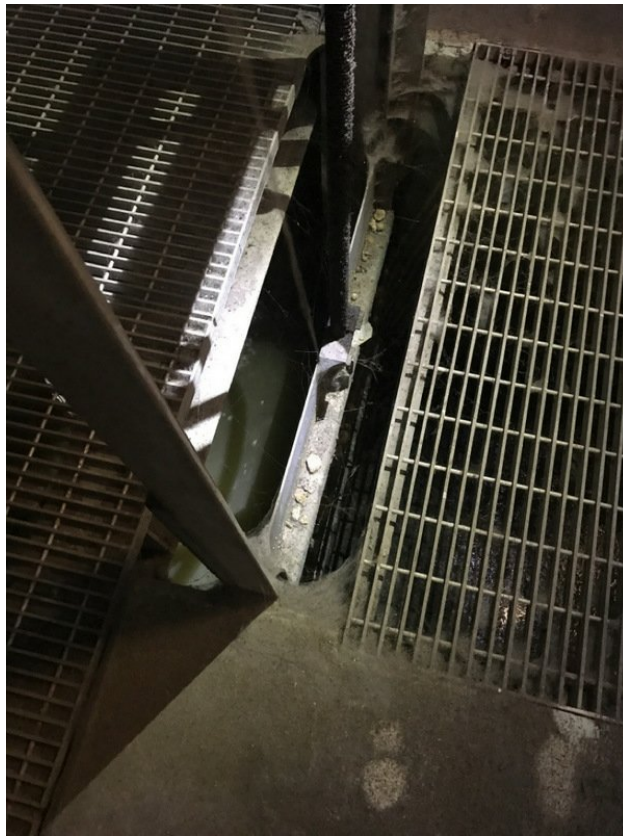
Head Gate #1

Equipment Data

| | |
|------------------------------|---|
| Mechanical Asset Name | Head Gate #1 |
| Mechanical Asset Description | 48-inch sluice gate with electric actuator |
| Asset Type | Gate |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Gate Type | Sluice |
| Size/Diameter | 48" |
| Mechanical Field Assessment | None |
| Mechanical Equipment Photos |  |









Mechanical Observation Comments

None

Condition


| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Head Gate #2

Equipment Data

| | |
|------------------------------|---|
| Mechanical Asset Name | Head Gate #2 |
| Mechanical Asset Description | 48-inch sluice gate with electric actuator |
| Asset Type | Gate |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Gate Type | Sluice |
| Size/Diameter | 48 |
| Mechanical Field Assessment | None |
| Mechanical Equipment Photos |  |

| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Head Gate #3

Equipment Data

| | |
|---------------------------------|--|
| Mechanical Asset Name | Head Gate #3 |
| Mechanical Asset Description | 48-inch sluice gate with electric actuator |
| Asset Type | Gate |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Gate Type | Sluice |
| Size/Diameter | 48 |
| Mechanical Field Assessment | None |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Head Gate #4

Equipment Data


| | |
|------------------------------|--|
| Mechanical Asset Name | Head Gate #4 |
| Mechanical Asset Description | 48-inch sluice gate with electric actuator |
| Asset Type | Gate |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Gate Type | Sluice |
| Size/Diameter | 48 |
| Mechanical Field Assessment | None |

Mechanical Equipment Photos



| | |
|---------------------------------|---|
| Mechanical Observation Comments | None |
| Condition | |
| Mechanical Condition Score | 1 - Good – No defects observed. |
| Performance | |
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
| Grinder #1 | |

Equipment Data

| | |
|------------------------------|---|
| Mechanical Asset Name | Grinder #1 |
| Mechanical Asset Description | 5-hp electric driven |
| Asset Type | Grinder |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Mechanical Field Assessment | Excessive Vibration, Inadequate Supports |
| Mechanical Equipment Photos |  |





| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | 5 - Failing or Failed – Asset integrity is compromised. Asset may be out of service. |
|----------------------------|--|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | 5 - Failing or Failed – Asset is not functioning as intended or is out of service. |
|------------------------------|--|

Grinder #2

Equipment Data

| | |
|------------------------------|-----------------------|
| Mechanical Asset Name | Grinder #2 |
| Mechanical Asset Description | 10-hp electric driven |
| Asset Type | Grinder |

| | |
|-----------------------------|----------|
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Mechanical Field Assessment | None |

Mechanical Equipment Photos



Mechanical Observation Comments

None

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Grinder #3

Equipment Data

| | |
|---------------------------------|-----------------------|
| Mechanical Asset Name | Grinder #3 |
| Mechanical Asset Description | 10-hp electric driven |
| Asset Type | Grinder |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Mechanical Field Assessment | None |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Grinder #4

Equipment Data

| | |
|---------------------------------|----------------------|
| Mechanical Asset Name | Grinder #4 |
| Mechanical Asset Description | 5-hp electric driven |
| Asset Type | Grinder |
| Year Installed | 2008 |
| Control Type | Local |
| Drive Type | Electric |
| Mechanical Field Assessment | None |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Air Supply Fan

Equipment Data

| | |
|------------------------------|-----------------------|
| Mechanical Asset Name | Air Supply Fan |
| Mechanical Asset Description | PS ventilation system |
| Asset Type | Fan |
| Year Installed | 2008 |

Mechanical Equipment Photos













Mechanical Observation Comments

None

Condition

Mechanical Condition Score

1 - Good – No defects observed.

Performance

Mechanical Performance Score

2 - Fair – In service, but higher than expected O&M.

Miscellaneous

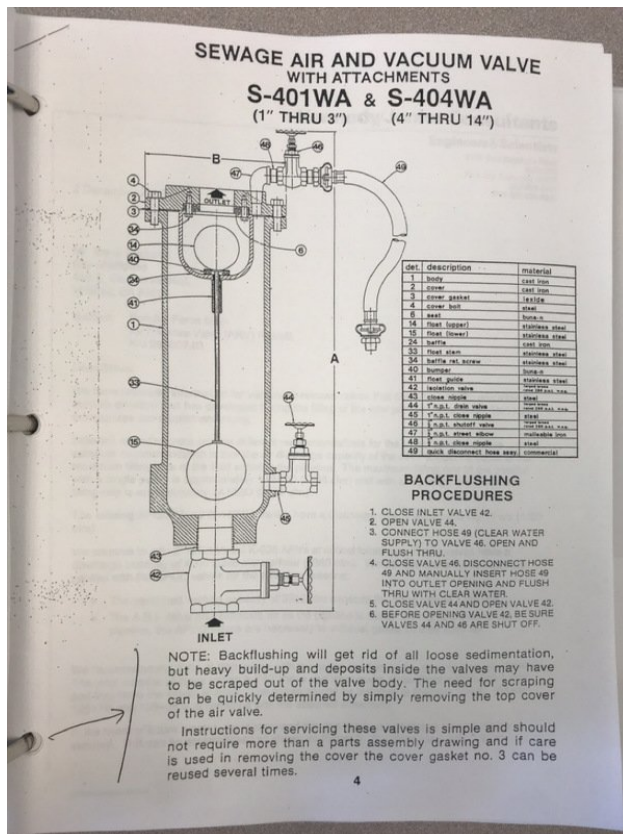
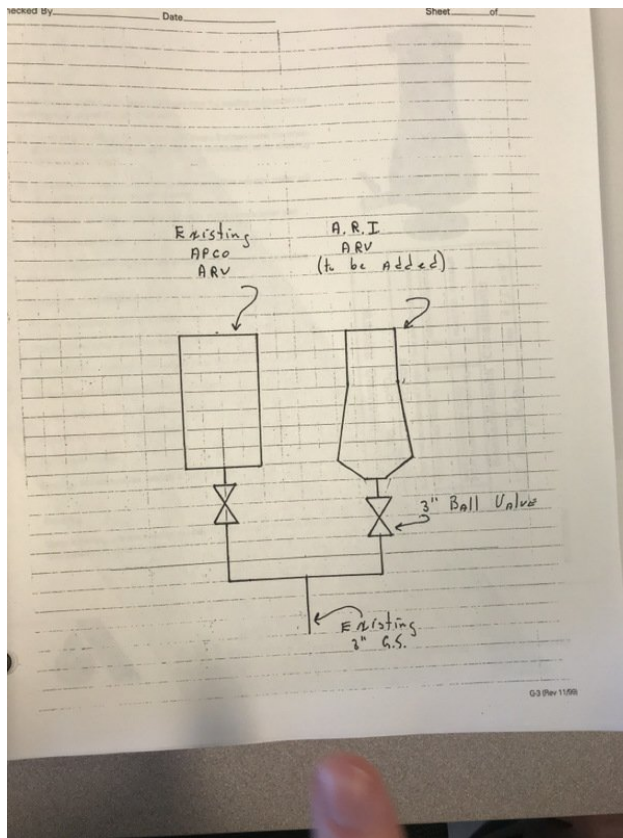
Equipment Data

| | |
|---------------------------------|---|
| Mechanical Asset Name | Miscellaneous |
| Mechanical Asset Description | Pipe support, 5' x 7' aluminum hatch, galv grating, 3" SS guide rail, 4-inch diameter PVC drain, pipe wall anchor bracket |
| Mechanical Observation Comments | None |

2" combo air/vac valve

Equipment Data

| | |
|-----------------------------|---|
| Mechanical Asset Name | 2" combo air/vac valve |
| Mechanical Equipment Photos |  |



Mechanical Observation Comments

None

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | 4 - Poor – Major defects observed. Asset integrity may be compromised. |
|----------------------------|--|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 4 - Poor – In service, but function is highly impaired. |
|------------------------------|---|

Force Main A B Flow Recorder

Equipment Data

| | |
|-----------------------|------------------------------|
| Mechanical Asset Name | Force Main A B Flow Recorder |
|-----------------------|------------------------------|



| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Eye wash

Equipment Data

| | |
|-----------------------|----------|
| Mechanical Asset Name | Eye wash |
|-----------------------|----------|

| | |
|-----------------------------|--|
| Mechanical Equipment Photos | |
|-----------------------------|--|



Mechanical Observation Comments

None

Condition


| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Flow Meter B

Equipment Data

| | |
|------------------------------|---|
| Mechanical Asset Name | Flow Meter B |
| Mechanical Asset Description | This is for force main B |
| Mechanical Field Assessment | It works but the operation is not accurate. |
| Mechanical Equipment Photos |  |





Mechanical Observation Comments

None

Condition

Mechanical Condition Score

4 - Poor – Major defects observed. Asset integrity may be compromised.

Performance

Mechanical Performance Score

4 - Poor – In service, but function is highly impaired.

Air vac 1 to 15

Equipment Data

Mechanical Asset Name

Air vac 1 to 15

Mechanical Asset Description

All across the pump station.

Mechanical Field Assessment

Cavitation, Coating Failure, Inadequate Supports

Mechanical Equipment Photos





Mechanical Observation Comments

None

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | 5 - Failing or Failed – Asset integrity is compromised. Asset may be out of service. |
|----------------------------|--|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | 5 - Failing or Failed – Asset is not functioning as intended or is out of service. |
|------------------------------|--|

Appendix B: Main Lift Station – Electrical

Main Pump Station-Elec

| | |
|----------------|---|
| Created | 2020-02-07 23:14:55 UTC by Erik Zalkin |
| Updated | 2020-02-22 00:03:47 UTC by Sundara Palani |
| Location | 37.44755, -121.922864 |
| Asset Location | Main Pump Station-Elec |

Main Transformer

| | |
|------------------------------|------------------------------------|
| Electrical Asset Name | Main Transformer |
| Electrical Asset Description | 1000 kVA, 12 kV-480 V, 3-ph (PG&E) |
| Electrical Asset Type | Transformer |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--------------------------------|----------------|
| Age | 20 |
| Manufacturer | PG&E |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | N/A |

Electrical Equipment Photos







| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No defects noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Outdoor Utility Disconnect and Metering Panel

| | |
|------------------------------|---|
| Electrical Asset Name | Outdoor Utility Disconnect and Metering Panel |
| Electrical Asset Description | Outdoor NEMA 3R Enclosure |
| Electrical Asset Type | Panel |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--------------------------------|----------------|
| Age | 20 Years |
| Manufacturer | Eaton |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Electrical Equipment Photos | |







| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Main Switchgear

| | |
|------------------------------|--|
| Electrical Asset Name | Main Switchgear |
| Electrical Asset Description | Located in Existing Generator Building |
| Electrical Asset Type | Switchgear |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|---------------------|
| Age | 20 Years |
| Manufacturer | RSE- SIERRA |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | Two Space available |

Electrical Equipment Photos





| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Variable Frequency Drive P2

| | |
|------------------------------|-----------------------------|
| Electrical Asset Name | Variable Frequency Drive P2 |
| Electrical Asset Description | VFD for Pump 2 (170 HP) |
| Electrical Asset Type | Variable Freq Drive |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--------------------------------|-----------------------|
| Age | 12 years |
| Manufacturer | Allen Bradley |
| Model | Power Flex 700 Series |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Electrical Equipment Photos | |







| | |
|--|---|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 4 - Integrity of Component Moderately Compromised |
| Electrical Equipment Performance Score | 2 - In-Service, but Higher than Expected O&M |

Variable Frequency Drive P3

| | |
|------------------------------|-----------------------------|
| Electrical Asset Name | Variable Frequency Drive P3 |
| Electrical Asset Description | VFD for Pump 3 (170 HP) |
| Electrical Asset Type | Variable Freq Drive |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--|---|
| Age | 12 Years |
| Manufacturer | Allen Bradley |
| Model | Power Flex 700 Series |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | Not Applicable |
| Electrical Equipment Observations | No Corrosion Noted. Understood from City that IGBT was replaced a year ago. |
| Electrical Equipment Condition Score | 4 - Integrity of Component Moderately Compromised |
| Electrical Equipment Performance Score | 2 - In-Service, but Higher than Expected O&M |

Variable Frequency Drive P4

| | |
|------------------------------|-----------------------------|
| Electrical Asset Name | Variable Frequency Drive P4 |
| Electrical Asset Description | VFD for Pump 4 (170 HP) |
| Electrical Asset Type | Variable Freq Drive |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--|---|
| Age | 12 Years |
| Manufacturer | Allen Bradley |
| Model | Power Flex 700 Series |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 4 - Integrity of Component Moderately Compromised |
| Electrical Equipment Performance Score | 2 - In-Service, but Higher than Expected O&M |

Variable Frequency Drive P5

| | |
|------------------------------|-----------------------------|
| Electrical Asset Name | Variable Frequency Drive P5 |
| Electrical Asset Description | VFD for Pump 5 (170 HP) |
| Electrical Asset Type | Variable Freq Drive |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--|---|
| Age | 12 Years |
| Manufacturer | Allen Bradley |
| Model | Power Flex 700 Series |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Observations | No Corrosion Noted. Understood from City that Cooling Fans were replaced year ago |
| Electrical Equipment Condition Score | 4 - Integrity of Component Moderately Compromised |
| Electrical Equipment Performance Score | 2 - In-Service, but Higher than Expected O&M |

Local Disconnect for Engine Jacket Water Heater

| | |
|------------------------------|---|
| Electrical Asset Name | Local Disconnect for Engine Jacket Water Heater |
| Electrical Asset Description | 30A/3P |
| Electrical Asset Type | Switch |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 20 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Motor Control Center 2

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Motor Control Center 2 |
| Electrical Asset Description | 600 A, 480 V, 3-ph, 3W, 65000 AIC |
| Asset ID | MCC-2 |
| Electrical Asset Type | Motor Control Center |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|---------------------|
| Age | 20 Years |
| Manufacturer | Eaton |
| Model | Freedom Series 2100 |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | Spaces available |

Electrical Equipment Photos



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted. |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Motor Control Center 2A

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Motor Control Center 2A |
| Electrical Asset Description | 600 A, 480 V, 3-ph, 3W, 65000 AIC |
| Asset ID | MCC-2A |
| Electrical Asset Type | Motor Control Center |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|---------------------|
| Age | 20 Years |
| Manufacturer | Eaton |
| Model | Freedom 2100 Series |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | Spaces Available |
| Electrical Equipment Photos | |



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Dry Type Transformer

| | |
|------------------------------|---------------------------------|
| Electrical Asset Name | Dry Type Transformer |
| Electrical Asset Description | 30 kVA, 480-208/120 V, Dry Type |
| Electrical Asset Type | Transformer |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Lighting panel (LP-1)

| | |
|-----------------------|-----------------------|
| Electrical Asset Name | Lighting panel (LP-1) |
| Asset ID | LA |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|---------------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | 10 Spares available |
| Electrical Equipment Photos | |



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Dry Type Transformer

| | |
|------------------------------|---------------------------------|
| Electrical Asset Name | Dry Type Transformer |
| Electrical Asset Description | 30 kVA, 480-208/120 V, Dry Type |
| Electrical Asset Type | Transformer |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--------------|----------|
| Age | 20 Years |
| Manufacturer | GE |

| | |
|---------------------------------------|----------------|
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Photos | |



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Lighting panel (LA)

| | |
|------------------------------|---------------------|
| Electrical Asset Name | Lighting panel (LA) |
| Electrical Asset Description | 100 A, 1-Ph, 3 Wire |
| Asset ID | LP-1 |
| Electrical Asset Type | Panel |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|---------------------|
| Age | 20 Years |
| Manufacturer | GE |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | 10 Spares available |

Electrical Equipment Photos



Electrical Equipment Observations

No Corrosion Noted

Electrical Equipment Condition Score

1 - Excellent

Electrical/Generator Building-Electrical

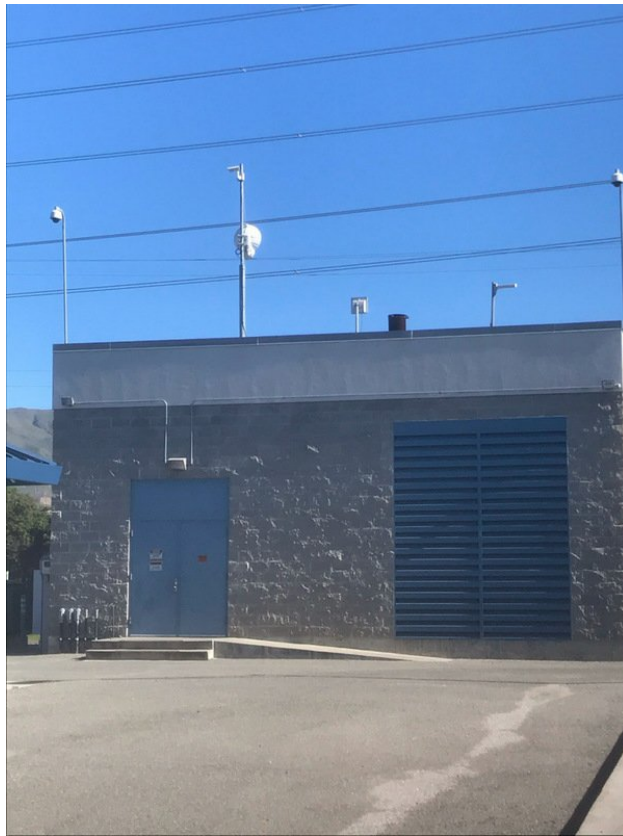
| | |
|-----------------------|--|
| Electrical Asset Name | Electrical/Generator Building-Electrical |
| Electrical Asset Type | Building |
| Year Installed | 2000 |

Electrical Building

Electrical Building Observations

| | |
|------------------------------------|---------------------|
| Electrical Conduits | Good Condition |
| Electrical Pull and Junction Boxes | Good Condition |
| Electrical Lighting | Outdated Technology |
| Electrical Building Photos | |





| | |
|---------------------------------------|---|
| Electrical Building Observations | No Corrosion Noted on Conduits and Pull Boxes |
| Electrical Building Condition Score | 1 - Excellent |
| Electrical Building Performance Score | 1 - Component Functioning as Intended |

Motor Control Center A

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Motor Control Center A |
| Electrical Asset Description | 400 A, 480 V, 3-ph, 3W, 65000 AIC |
| Asset ID | MCC-A |
| Electrical Asset Type | Motor Control Center |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|---------------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Model | Freedom 2000 Series |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | 2 Space available |
| Electrical Equipment Photos | |



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Motor Control Center B

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Motor Control Center B |
| Electrical Asset Description | 400 A, 480 V, 3-ph, 3W, 65000 AIC |
| Asset ID | MCC-B |
| Electrical Asset Type | Motor Control Center |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|---------------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Model | Freedom 2000 Series |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | 3 Spaces available |

Electrical Equipment Photos



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Dry Type Transformer

| | |
|------------------------------|---------------------------------|
| Electrical Asset Name | Dry Type Transformer |
| Electrical Asset Description | 10 kVA, 480-240/120 V, Dry Type |

| | |
|-----------------------|-------------|
| Electrical Asset Type | Transformer |
| Year Installed | 2008 |

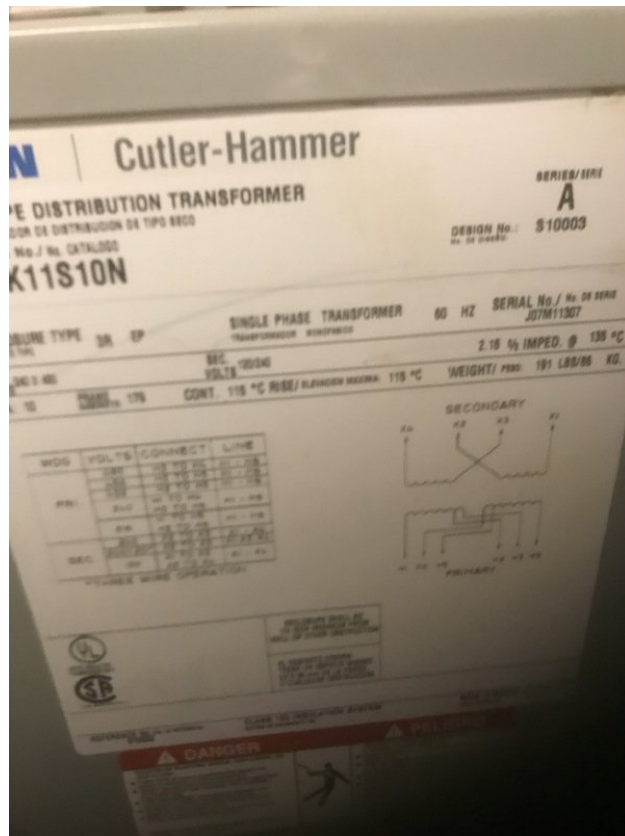
Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos





| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Distribution panel(DP-1)

| | |
|------------------------------|--------------------------|
| Electrical Asset Name | Distribution panel(DP-1) |
| Electrical Asset Description | 125 A, NEMA Type 1 |
| Asset ID | DP-1 |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|-----------------------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | 15 Spare Breakers available |
| Electrical Equipment Photos | |



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Dry Type Transformer

| | |
|------------------------------|---------------------------------|
| Electrical Asset Name | Dry Type Transformer |
| Electrical Asset Description | 75 kVA, 480-208/120 V, Dry Type |
| Electrical Asset Type | Transformer |
| Year Installed | 2008 |

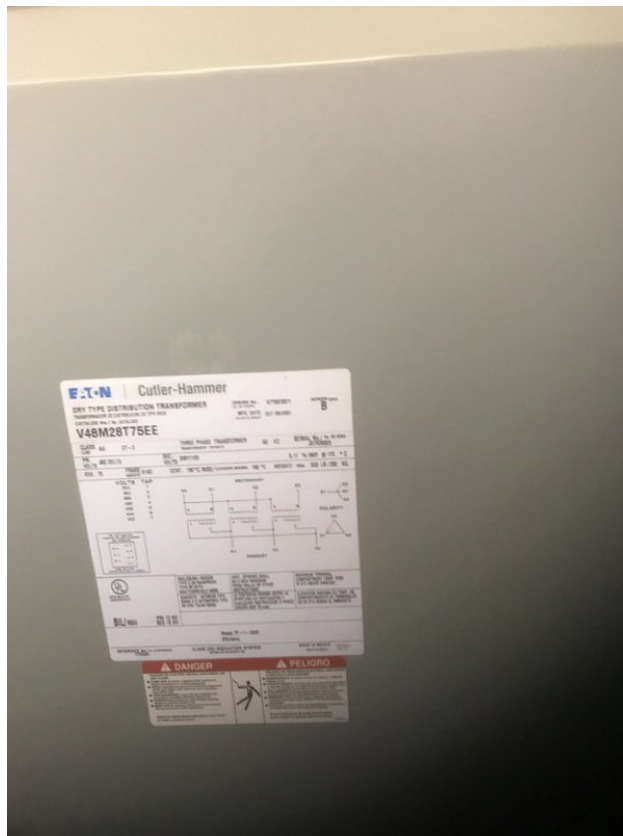
Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos





| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Distribution Panel (DP-2)

| | |
|------------------------------|---------------------------|
| Electrical Asset Name | Distribution Panel (DP-2) |
| Electrical Asset Description | 125 A, NEMA Type 1 |
| Asset ID | DP-2 |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

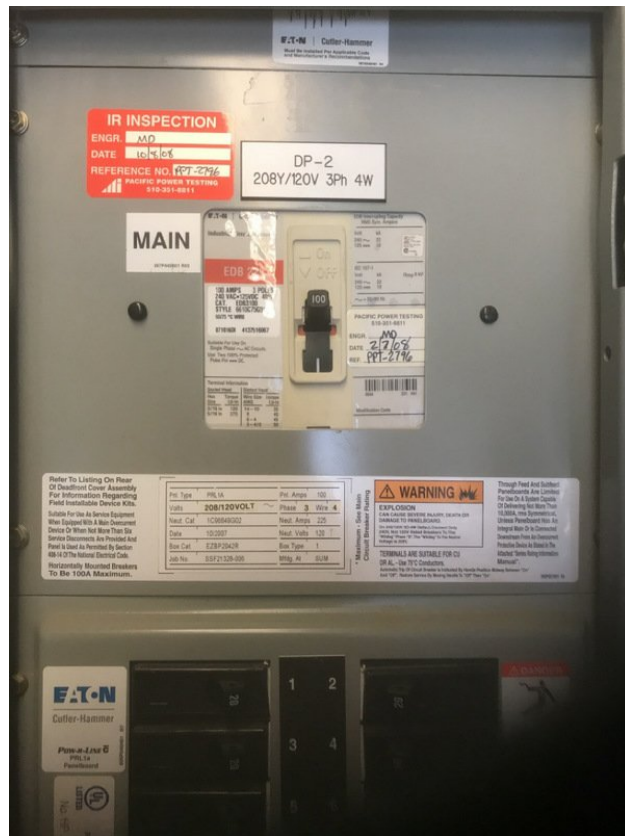
Electrical Equipment Observations

| | |
|---------------------------------------|--------------------|
| Age | 12 Years |
| Manufacturer | Eaton |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | 6 Spares available |

Electrical Equipment Photos







| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Control Panel for Grinder#1

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Local Control Panel for Grinder#1 |
| Electrical Asset Description | LCP grinder1 |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Control Panel for Grinder#2

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Local Control Panel for Grinder#2 |
| Electrical Asset Description | LCP grinder2 |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Control Panel for Grinder#3

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Local Control Panel for Grinder#3 |
| Electrical Asset Description | LCP grinder3 |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Control Panel for Grinder#4

| | |
|------------------------------|-----------------------------------|
| Electrical Asset Name | Local Control Panel for Grinder#4 |
| Electrical Asset Description | LCP grinder4 |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Photos | |





| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Disconnect for CU-1 (for FC-1)

| | |
|------------------------------|--------------------------------------|
| Electrical Asset Name | Local Disconnect for CU-1 (for FC-1) |
| Electrical Asset Description | 30A/3P |
| Electrical Asset Type | Switch |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations



Local Disconnect for EF-1 (for Control Room)

| | |
|------------------------------|--|
| Electrical Asset Name | Local Disconnect for EF-1 (for Control Room) |
| Electrical Asset Description | 30A/3P |
| Electrical Asset Type | Switch |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--|---------------------------------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Disconnect for EF-5 (for wetwell)

| | |
|------------------------------|---|
| Electrical Asset Name | Local Disconnect for EF-5 (for wetwell) |
| Electrical Asset Description | 60A/3P |
| Electrical Asset Type | Switch |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--|---------------------------------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Disconnect for SF-1 (for Wet Well)

| | |
|------------------------------|--|
| Electrical Asset Name | Local Disconnect for SF-1 (for Wet Well) |
| Electrical Asset Description | 60A/3P |
| Electrical Asset Type | Switch |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--|---------------------------------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Disconnect for HP-1 (for FC-2)

| | |
|------------------------------|--------------------------------------|
| Electrical Asset Name | Local Disconnect for HP-1 (for FC-2) |
| Electrical Asset Description | 30A/3P |
| Electrical Asset Type | Switch |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--------------------------------|----------------|
| Age | 12 Years |
| Manufacturer | Square D |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |

Electrical Equipment Photos



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Local Disconnect for FC-1 (for Control Room)

| | |
|------------------------------|--|
| Electrical Asset Name | Local Disconnect for FC-1 (for Control Room) |
| Electrical Asset Description | 30A/3P |
| Electrical Asset Type | Switch |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

| | |
|--|---------------------------------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Generator

| | |
|------------------------------|--|
| Electrical Asset Name | Generator |
| Electrical Asset Description | 1000 kVA, 480 V Diesel Driven Engine Generator |

| | |
|-----------------------|-----------|
| Electrical Asset Type | Generator |
| Year Installed | 2000 |

Electrical Motor or Generator

Electrical Motor or Generator Observations

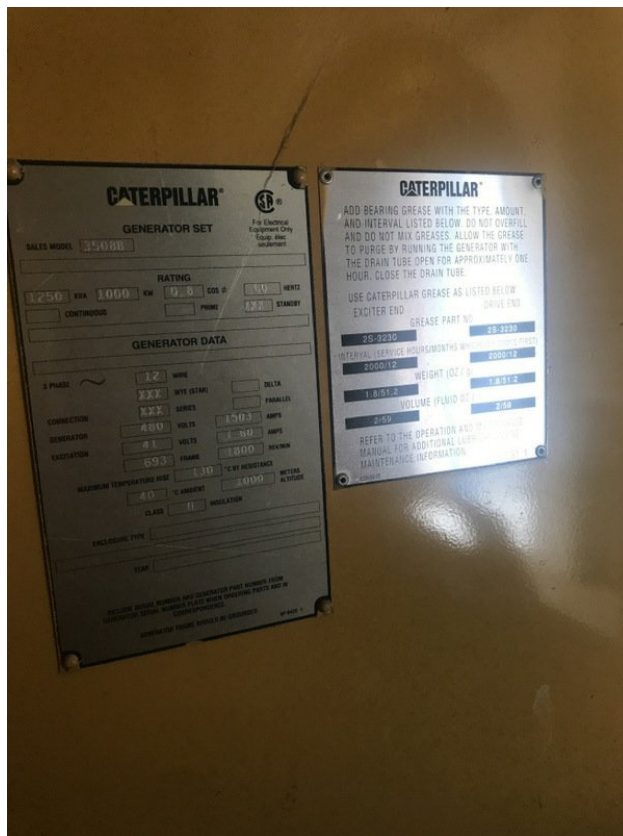
| | |
|------------------------------------|----------------|
| Age | 20 Years |
| Manufacturer | Caterpillar |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Visible Motor Monitoring Equipment | Good Condition |

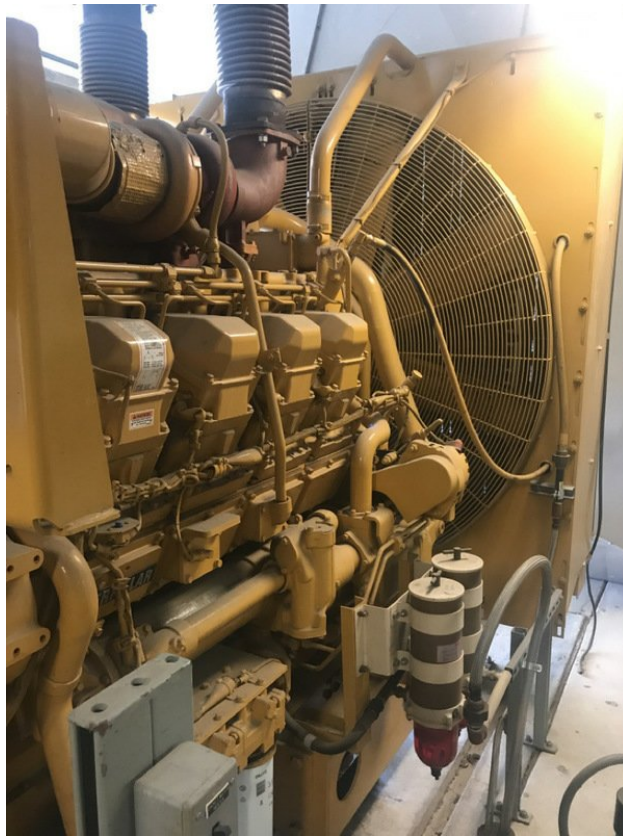
Electrical Motor Photos

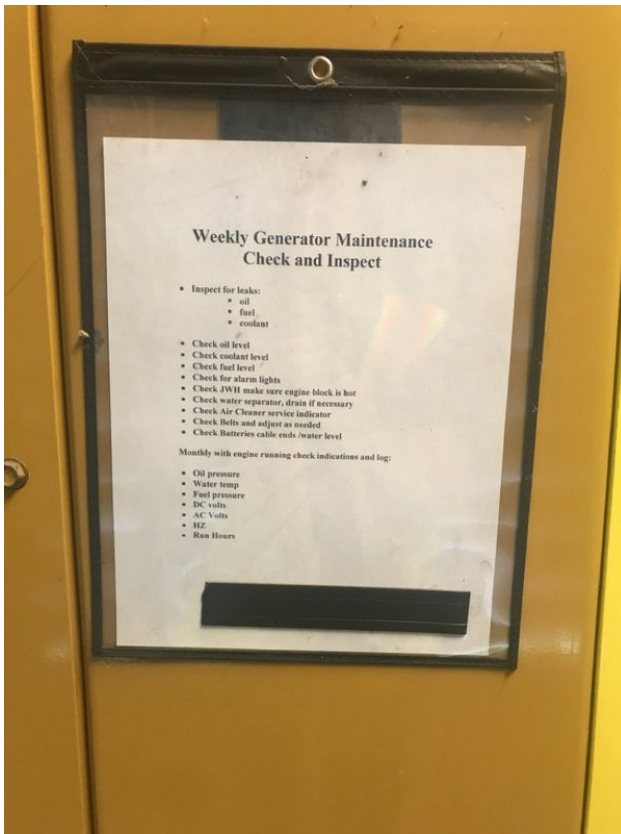


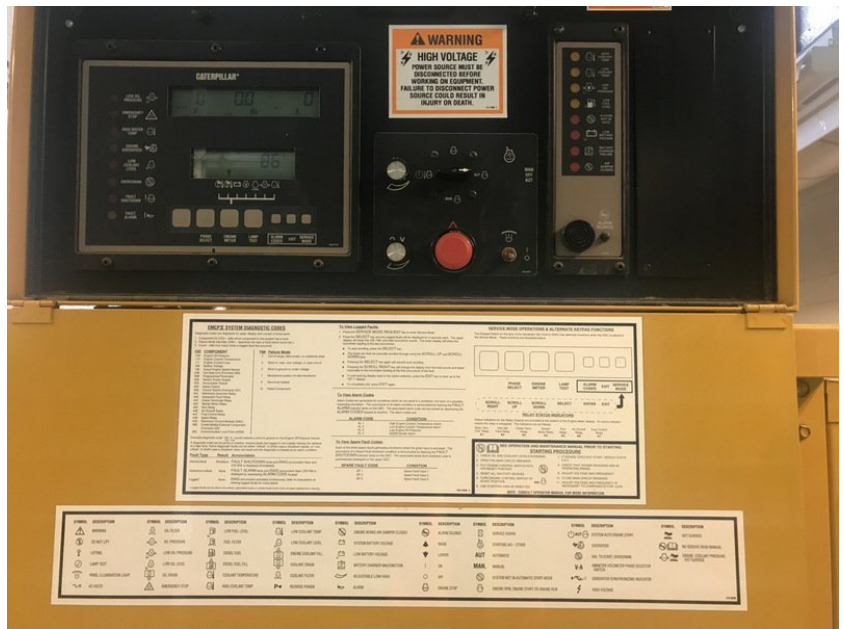


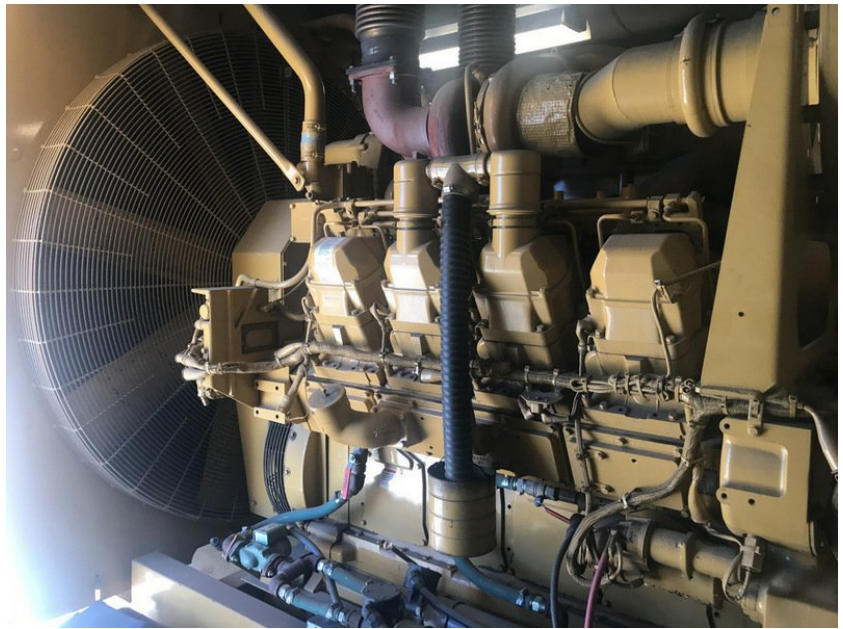


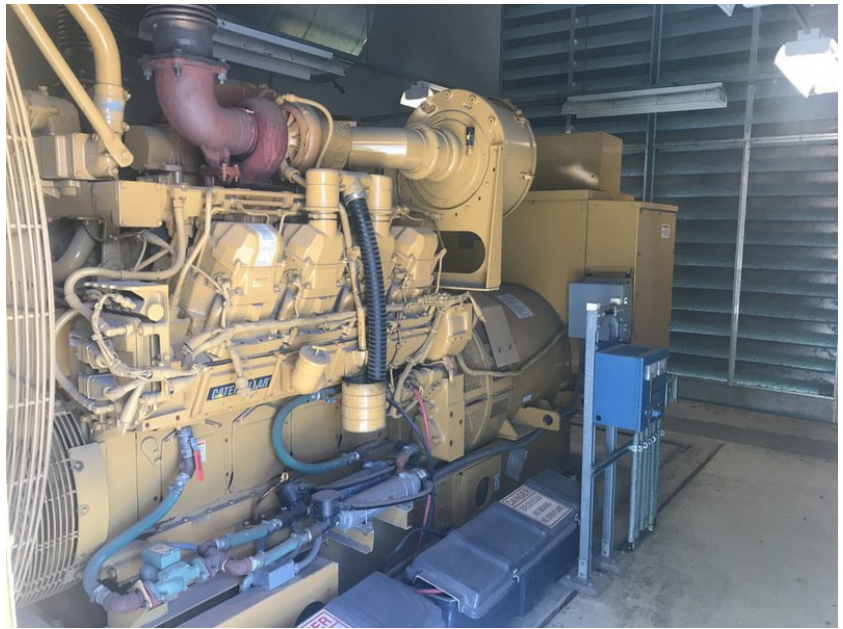














| | |
|------------------------------------|---------------------------------------|
| Electrical Motor Observations | No Corrosion Noted |
| Electrical Motor Condition Score | 1 - Excellent |
| Electrical Motor Performance Score | 1 - Component Functioning as Intended |

Automatic Transfer Switch

| | |
|------------------------------|---------------------------|
| Electrical Asset Name | Automatic Transfer Switch |
| Electrical Asset Description | ATS, 1600 A |
| Electrical Asset Type | Switch |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 20 Years |
| Manufacturer | ASCO |
| Model | ASCO 7 Series |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |
| Electrical Equipment Photos | |



| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Appendix C: Main Lift Station – Instrumentation

Main Pump Station-Instr

| | |
|----------------|---|
| Created | 2020-02-08 00:28:37 UTC by Erik Zalkin |
| Updated | 2020-02-19 17:40:26 UTC by Sundara Palani |
| Location | 37.447504, -121.922779 |
| Asset Location | Main Pump Station-Instr |

MAS Enclosure and Pump Motor Monitor Panel, MAS 711

| | |
|-------------------|--|
| Asset Name | MAS Enclosure and Pump Motor Monitor Panel |
| Asset Description | MAS |
| Asset ID | MAS 711 |
| Asset Type | Panel |
| Year Installed | 2008 |

Instrumentation Photos





Instrumentation Observation Comments

No Corrosion Noted

Condition

Instrumentation Condition Score

1 - Good – No defects observed.

Performance

Instrumentation Performance Score

1 - Good – Asset functioning as intended.

Level Switch, LSHH-201

Asset Name

Level Switch

Asset Description

Level High High

Asset ID

LSHH-201

Asset Type

Level Switch

Year Installed

2008

Instrumentation Observation Comments

In Good Condition

Condition

Instrumentation Condition Score

1 - Good – No defects observed.

Performance

Instrumentation Performance Score

1 - Good – Asset functioning as intended.

Level Switch, LE-202

Asset Name

Level Switch

Asset Description

Ultrasonic level

Asset ID

LE-202

| | |
|--------------------------------------|-------------------|
| Asset Type | Level Switch |
| Year Installed | 2008 |
| Instrumentation Observation Comments | In Good Condition |

Condition

| | |
|---------------------------------|---------------------------------|
| Instrumentation Condition Score | 1 - Good – No defects observed. |
|---------------------------------|---------------------------------|

Performance

| | |
|-----------------------------------|---|
| Instrumentation Performance Score | 1 - Good – Asset functioning as intended. |
|-----------------------------------|---|

Level Switch, LE-203

| | |
|-------------------|------------------|
| Asset Name | Level Switch |
| Asset Description | Ultrasonic level |
| Asset ID | LE-203 |
| Asset Type | Level Switch |
| Year Installed | 2008 |

Generator and Fuel System Control Panel

| | |
|-------------------|---|
| Asset Name | Generator and Fuel System Control Panel |
| Asset Description | Local Control Panel |
| Asset Type | Panel |
| Year Installed | 2000 |

Instrumentation Photos





| | |
|--------------------------------------|--------------------|
| Instrumentation Observation Comments | No Corrosion Noted |
|--------------------------------------|--------------------|

Condition

| | |
|---------------------------------|---------------------------------|
| Instrumentation Condition Score | 1 - Good – No defects observed. |
|---------------------------------|---------------------------------|

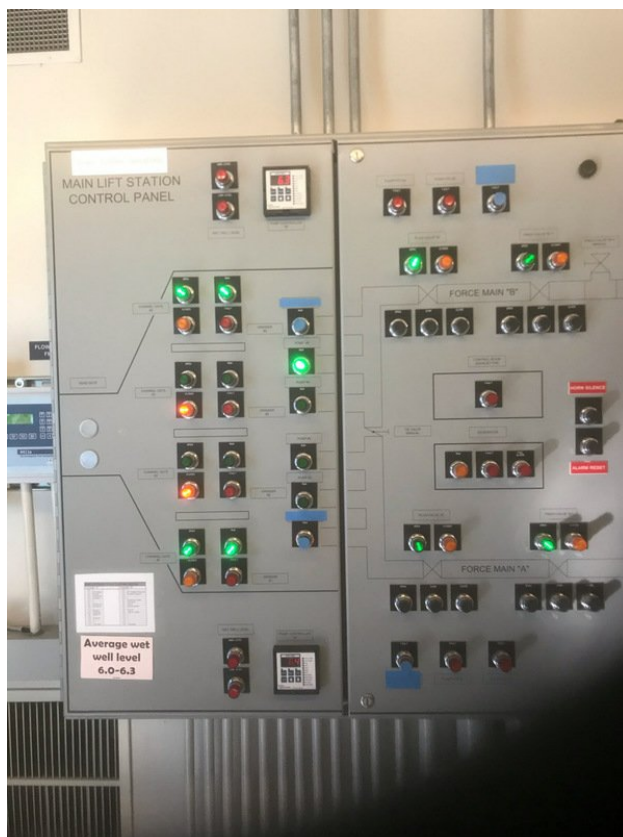
Performance

| | |
|-----------------------------------|---|
| Instrumentation Performance Score | 1 - Good – Asset functioning as intended. |
|-----------------------------------|---|

Main Lift Station Control Panel

| | |
|-------------------|---------------------------------|
| Asset Name | Main Lift Station Control Panel |
| Asset Description | Local Control Panel |
| Asset Type | Panel |
| Year Installed | 2008 |

Instrumentation Photos



Condition

| | |
|---------------------------------|---------------------------------|
| Instrumentation Condition Score | 1 - Good - No defects observed. |
|---------------------------------|---------------------------------|

Performance

| | |
|-----------------------------------|---|
| Instrumentation Performance Score | 1 - Good - Asset functioning as intended. |
|-----------------------------------|---|

Appendix D: Main Lift Station – Civil

Main Pump Station-Civil

| | |
|----------------|---|
| Created | 2020-02-07 16:28:25 PST by Erik Zalkin |
| Updated | 2020-02-11 11:12:14 PST by Hamed Hakimelahi |
| Location | 37.447588, -121.922757 |
| Asset Location | Main Pump Station-Civil |

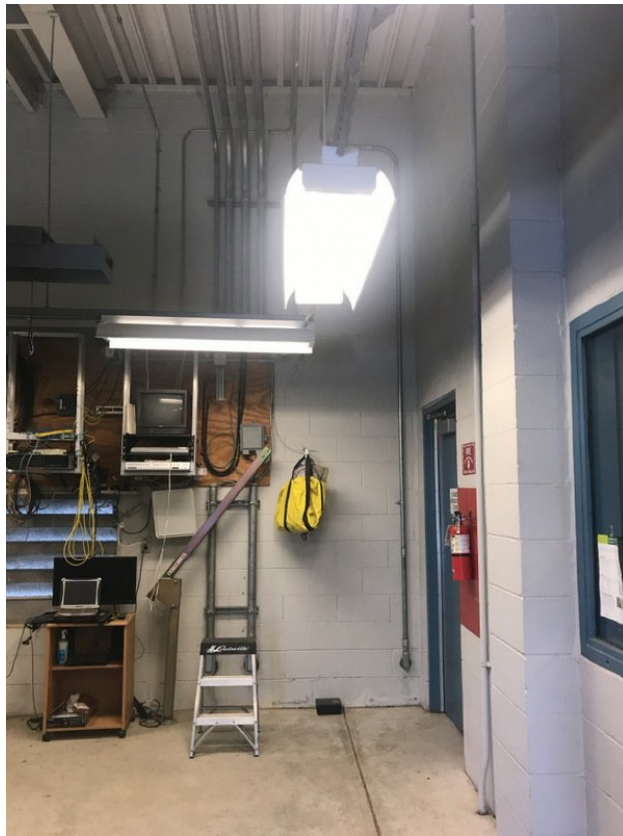
Electrical building

Grounds/Site Improvements

| | |
|------------|---------------------|
| Asset Name | Electrical building |
|------------|---------------------|

Civil Photos













Control building

Grounds/Site Improvements

Asset Name

Control building

Civil Photos





Condition

| | |
|-----------------------|---------------------------------|
| Civil Condition Score | 1 - Good – No defects observed. |
|-----------------------|---------------------------------|

Performance

| | |
|-------------------------|---|
| Civil Performance Score | 1 - Good – Asset functioning as intended. |
|-------------------------|---|

Site civil

Grounds/Site Improvements

| | |
|------------|------------|
| Asset Name | Site civil |
|------------|------------|

Civil Field Assessment

Road/Driveway

| | |
|----------------------------|------------------|
| Road/Driveway Type | Asphalt Pavement |
| Road/Driveway Observations | Fine |

Grading

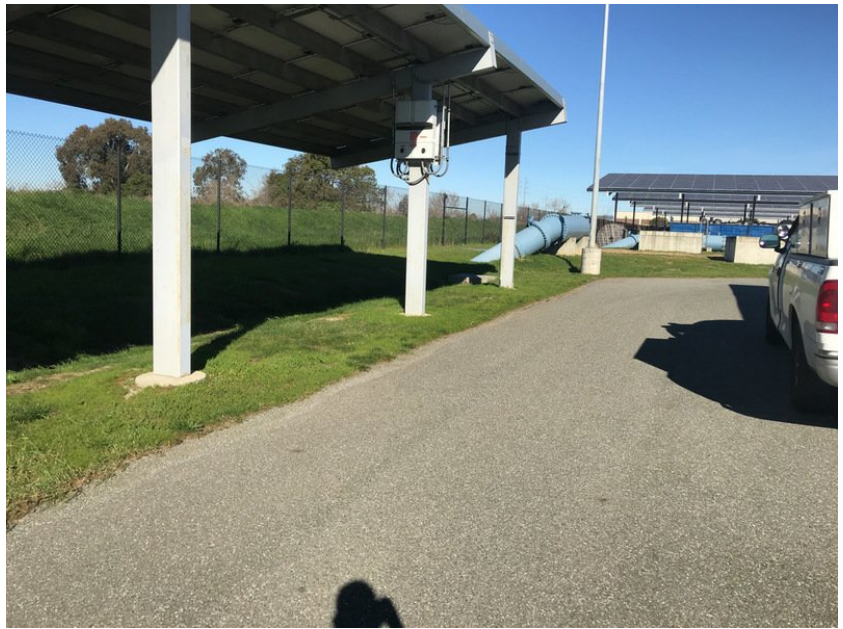
| | |
|-------------|-----|
| Erosion | No |
| Landscaping | Yes |

Drainage

| | |
|-----------------------|--------------|
| Drainage Type | Storm Drains |
| Drainage Observations | All fine |

Civil Photos





















Condition

Civil Condition Score

1 - Good – No defects observed.

Performance

Civil Performance Score

1 - Good – Asset functioning as intended.

Appendix E: Main Lift Station – Structural

Main Pump Station-Struct

| | |
|----------------|---|
| Created | 2020-02-08 00:29:05 UTC by Erik Zalkin |
| Updated | 2020-03-12 16:27:27 UTC by Dwight Evans |
| Location | 37.447546, -121.9228 |
| Asset Location | Main Pump Station-Struct |

Pinch Valve Vault 1

Structural Equipment

| | |
|-----------------------------|----------------------------|
| Asset Name | Pinch Valve Vault 1 |
| Asset Description | Pinch Valve Vault (1 of 3) |
| Type of Structure | Vault |
| Year Installed | 2002 |
| Material | Concrete |
| Structural Field Assessment | Corrosion of metal walls |

Structural Photos

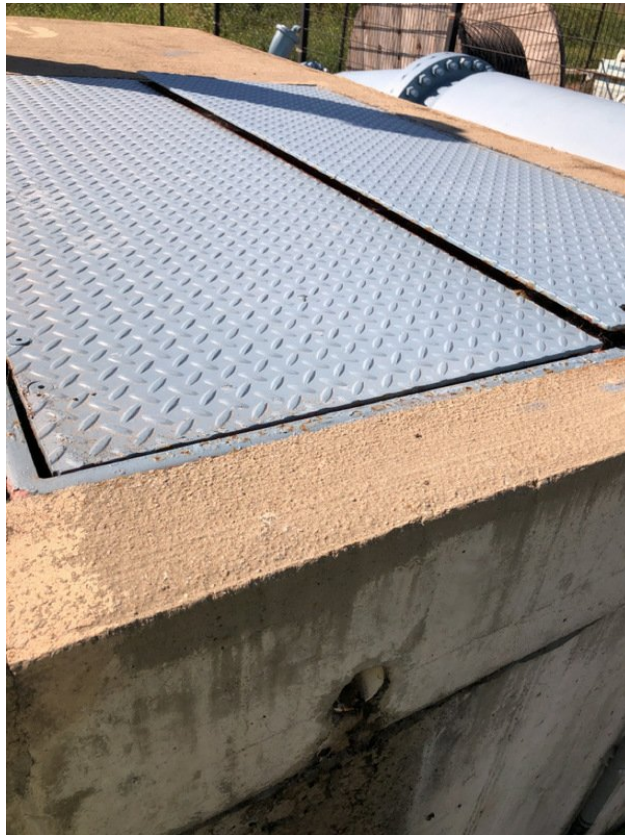




Cold joint



Exposed rebar



Corroded lid

Structural Observation Comments

None

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pinch Valve Vault 2

Structural Equipment

| | |
|-------------------|----------------------------|
| Asset Name | Pinch Valve Vault 2 |
| Asset Description | Pinch Valve Vault (2 of 3) |
| Type of Structure | Vault |
| Year Installed | 2002 |
| Material | Concrete |

| | |
|-------------------|---|
| Structural Photos |  |
|-------------------|---|



Exposed aggregates

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

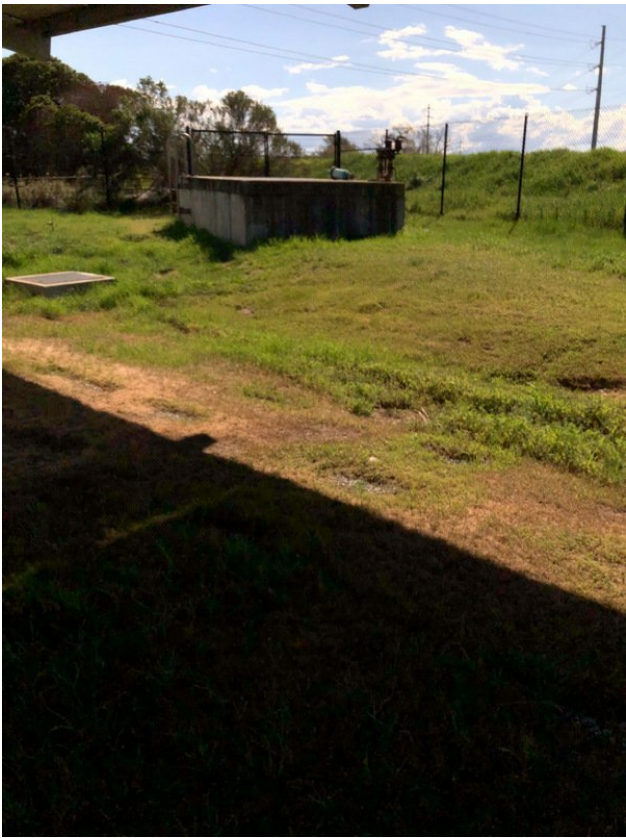
| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pinch Valve Vault 3

Structural Equipment

| | |
|-------------------|----------------------------|
| Asset Name | Pinch Valve Vault 3 |
| Asset Description | Pinch Valve Vault (3 of 3) |
| Type of Structure | Vault |
| Year Installed | 2002 |
| Material | Concrete |

Structural Photos





Exposed aggregates, sim to 2



Corroded metal attachment



Spalling concrete



Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Mag Meter Vault

Structural Equipment

| | |
|-----------------------------|--------------------------|
| Asset Name | Mag Meter Vault |
| Asset Description | 24" Magnetic Meter Vault |
| Type of Structure | Vault |
| Year Installed | 2002 |
| Material | Concrete |
| Structural Field Assessment | Corrosion of metal walls |





Corroded metal



Corroded metal



Does not close All the way due to expansion from corrosion

Structural Observation Comments

Corroded metal at hatch opening

Condition

Structural Condition Score

2 - Fair – Only minor defects observed.

Performance

Structural Performance Score

1 - Good – Asset functioning as intended.

Venturi Meter Vault

Structural Equipment

| | |
|-----------------------------|-------------------------|
| Asset Name | Venturi Meter Vault |
| Asset Description | 36" Venturi Meter Vault |
| Type of Structure | Vault |
| Year Installed | 1975 |
| Material | Concrete |
| Structural Field Assessment | Cracks in walls |
| Structural Photos | |





Structural Observation Comments

No cracking inside, surface cracks on outside, coating still present on inside

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Butterfly Valve Vault

Structural Equipment

| | |
|-------------------|---------------------------|
| Asset Name | Butterfly Valve Vault |
| Asset Description | 36" Butterfly Valve Vault |
| Type of Structure | Vault |
| Year Installed | 1997 |
| Material | Concrete |

Structural Photos





No visible cracks on inside



No visible cracks besides on curb outside

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Electrical/Generator Building-Structural

Structural Equipment

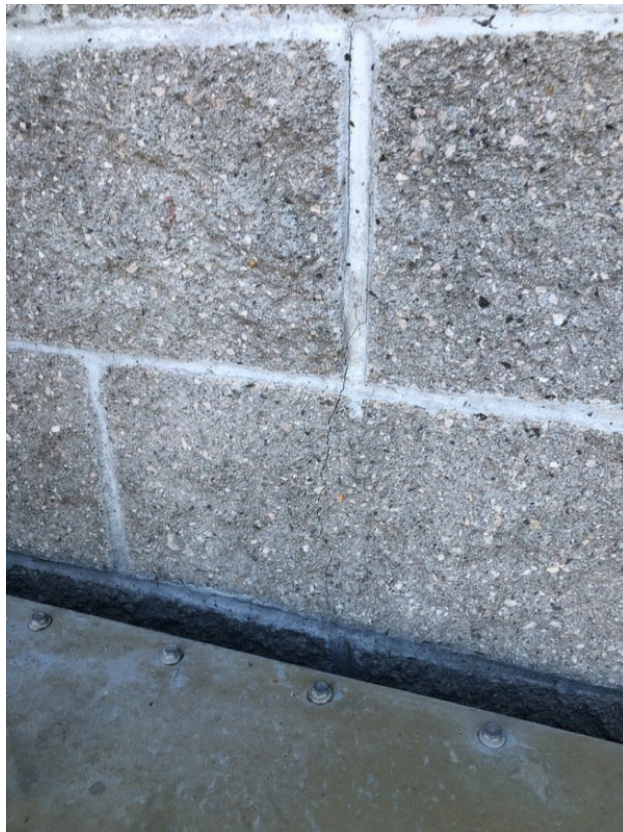
| | |
|-----------------------------|--|
| Asset Name | Electrical/Generator Building-Structural |
| Type of Structure | Building |
| Year Installed | 2000 |
| Material | Masonry |
| Structural Field Assessment | Cracks in walls, Moisture issues |



Outside, front entrance



Outside, left of entrance



Cracks on left side of building, next to equipment cabinet



Back side



Cracks, back side



Right side of building



Cracks inside, right side of building



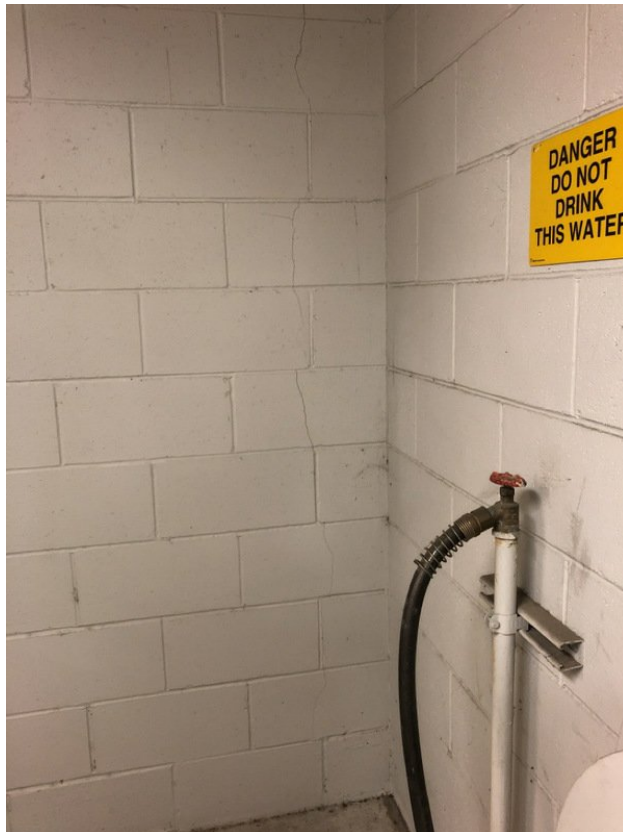
Moisture inside, right side of building



TYP wall to roof connection



TYP wall to roof connection



Vertical crack in corner, crack starts from bottom and goes to the top



Electrical equipment supposedly anchored, though not visible outside





Roof beams

| | |
|---------------------------------|---|
| Structural Observation Comments | Some cracks inside and outside, cosmetic cracks |
|---------------------------------|---|

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Fuel Tank (bulk)

Structural Equipment

| | |
|-------------------|---|
| Asset Name | Fuel Tank (bulk) |
| Asset Description | 2,000-gal UL-2085 above ground vault tank |
| Type of Structure | Tank |
| Year Installed | 2008 |
| Material | Metal |

Structural Photos



Stainless steel anchors



Not flexible



Pipe continues inside building, underneath Grating/cover plate



Connects to day tank, flexible coupling here

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

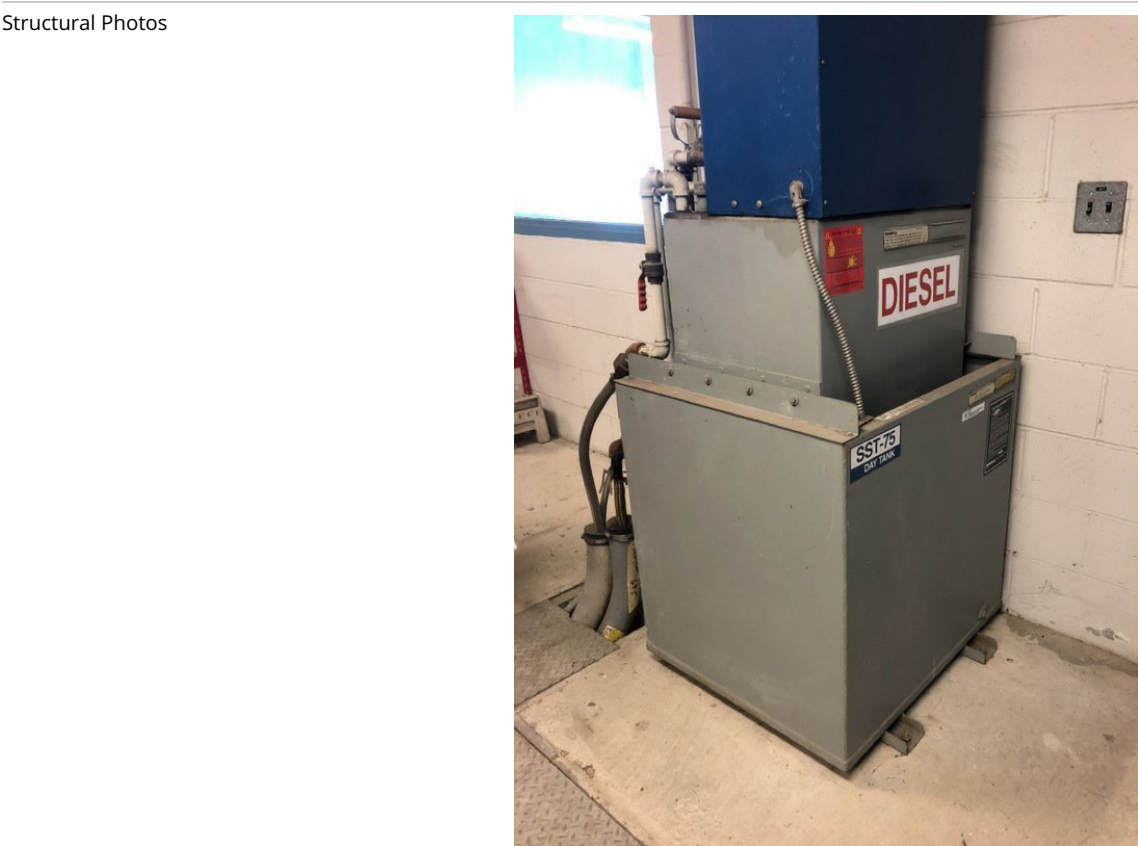
Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Fuel Tank (day)

Structural Equipment

| | |
|-------------------|-----------------|
| Asset Name | Fuel Tank (day) |
| Type of Structure | Tank |
| Year Installed | 2000 |
| Material | Metal |



4 anchors



Piping on one side, piping attached to wall, flexible connection for 2 lines only (2 gray pipes coming out of slab), 4 red shutoff valves



No flexible coupling here

Structural Observation Comments

None

Condition

Structural Condition Score

1 - Good – No defects observed.

Performance

Structural Performance Score

1 - Good – Asset functioning as intended.

Control Building

Structural Equipment

Asset Name

Control Building

Type of Structure

Building

Year Installed

2008

Material

Masonry

Structural Field Assessment

Cracks in walls

Structural Photos



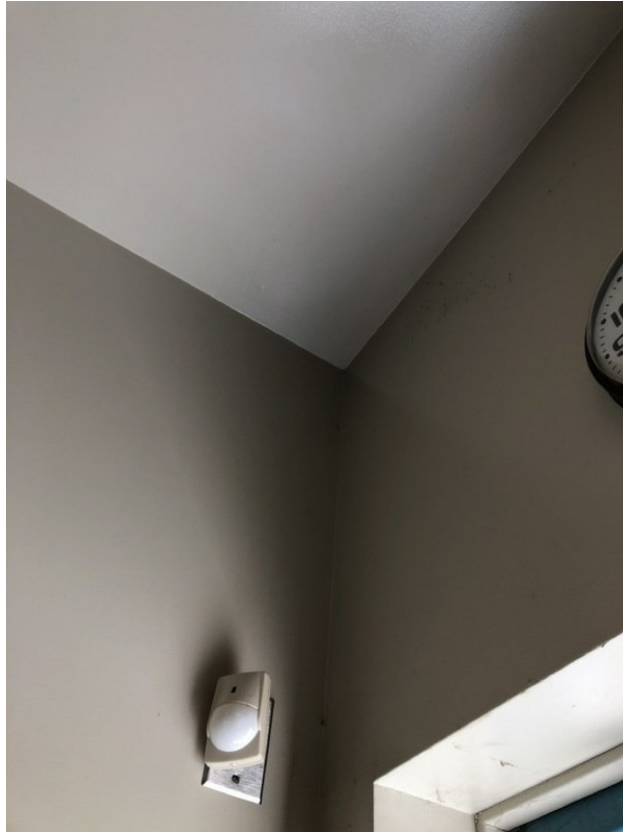
Front



Connection to roof, from outside, vertical blocking different than what is shown on drawing



Flexible coupling



Concealed finished ceiling, have to peep thru hatch to see roof to wall connection from inside

Structural Observation Comments

None

Condition

Structural Condition Score

1 - Good – No defects observed.

Performance

Structural Performance Score

1 - Good – Asset functioning as intended.

Grit Chamber/Inflow Structure

Structural Equipment

Asset Name

Grit Chamber/Inflow Structure

Type of Structure

Tank

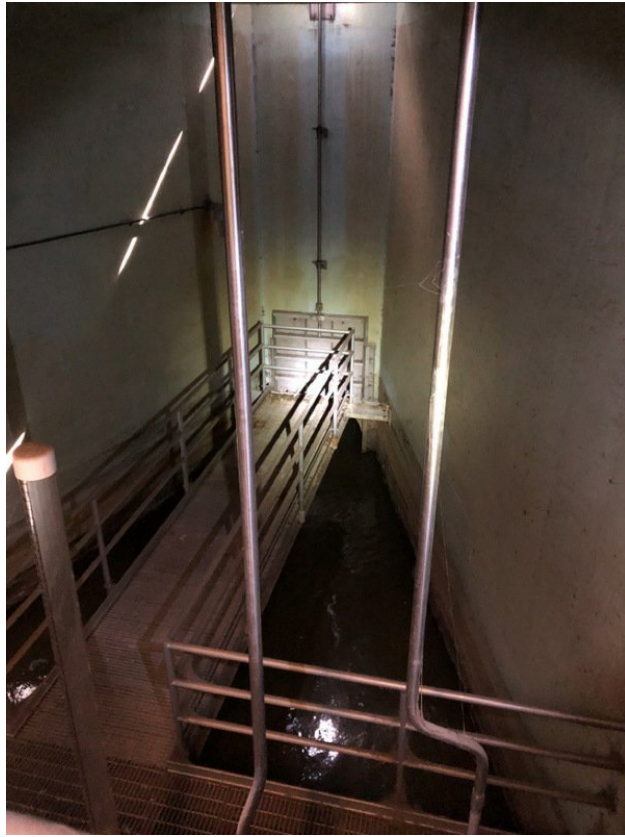
Year Installed

2008

Material

Concrete

Structural Photos



Eroding of coating and concrete, color change at bottom



Dirt on steel not corrosion



Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Wet Well

Structural Equipment

| | |
|-----------------------------|--------------|
| Asset Name | Wet Well |
| Type of Structure | Tank |
| Year Installed | 2008 |
| Material | Concrete |
| Structural Field Assessment | Paint issues |

| | |
|-------------------|---|
| Structural Photos |  |
|-------------------|---|

Building on top of wet well, entrance to wet well



Stair knee brace connection









Penetration on opposite side of grit chamber



Compromised coating

| | |
|---------------------------------|--|
| Structural Observation Comments | Coating appears to be deteriorating towards bottom, tanks were in operation, no inspection of walls and slab below liquid line |
|---------------------------------|--|

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Garage

Structural Equipment

| | |
|-------------------|----------|
| Asset Name | Garage |
| Type of Structure | Building |
| Year Installed | 2008 |

| | |
|-------------------|---|
| Structural Photos |  |
|-------------------|---|

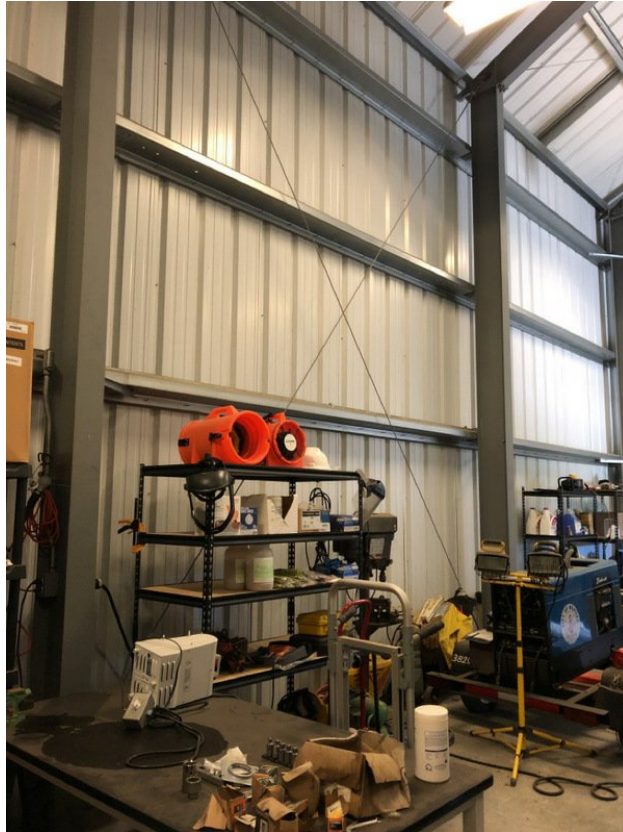
Outside, PEMB



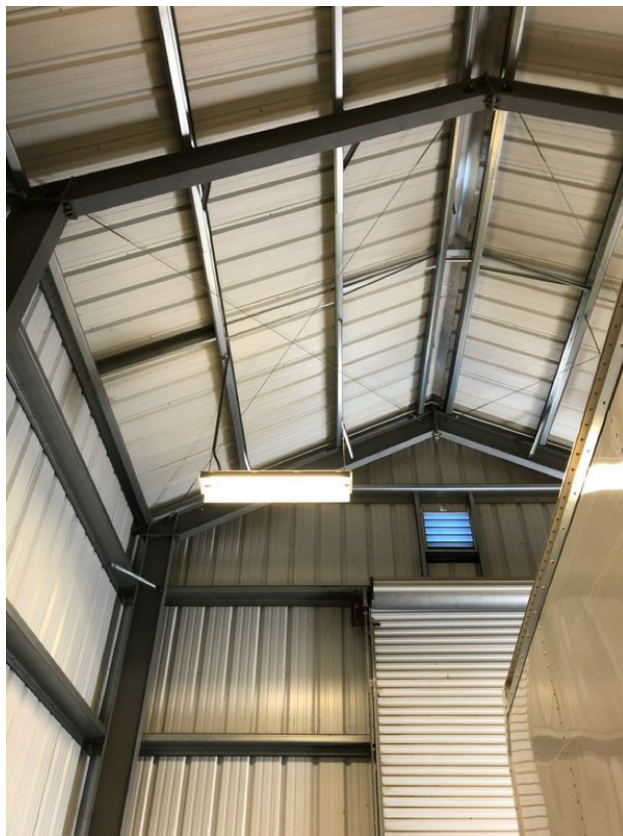
Cracks in slab, inside view, when it rains, water propagation follows cracks (water may have come up through cracks)



TYP wind girts



Tension brace, middle bay only



Tension brace in roof, end bay only, 3 bays total



Structural Observation Comments

Water accumulation inside when it's raining, water seeps thru slab

Condition

Structural Condition Score

1 - Good – No defects observed.

Performance

Structural Performance Score

1 - Good – Asset functioning as intended.

Appendix F: Venus Way Lift Station – Mechanical

Venus Way-Mech

| | |
|----------------|---|
| Created | 2020-02-07 16:27:36 PST by Erik Zalkin |
| Updated | 2020-02-11 12:30:18 PST by Hamed Hakimelahi |
| Location | 37.413692, -121.909061 |
| Asset Location | Venus Way-Mech |

Pump #1

Equipment Data

| | |
|---------------------------------|---|
| Mechanical Asset Name | Pump #1 |
| Mechanical Asset Description | FLYGT CP3102-441, 5HP 3ph 230V Submersible Pump |
| Asset Type | Pump |
| Year Installed | 2008 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump #2

Equipment Data

| | |
|---------------------------------|---|
| Mechanical Asset Name | Pump #2 |
| Mechanical Asset Description | FLYGT CP3102-441, 5HP 3ph 230V Submersible Pump |
| Asset Type | Pump |
| Year Installed | 2008 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Pump Guide Rails

Equipment Data

| | |
|---------------------------------|---------------------|
| Mechanical Asset Name | Pump Guide Rails |
| Mechanical Asset Description | Reinstalled in 2008 |
| Year Installed | 2008 |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

8" Gate Valve, Pump 1 and 2

Equipment Data

| | |
|------------------------------|-----------------------------|
| Mechanical Asset Name | 8" Gate Valve, Pump 1 and 2 |
| Mechanical Asset Description | 8" Gate Valve, Pump 1 and 2 |
| Asset Type | Valve |
| Year Installed | 2008 |
| Mechanical Equipment Photos | |



| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

8" Gate Valve, Pump 2

Equipment Data

| | |
|------------------------------|-----------------------|
| Mechanical Asset Name | 8" Gate Valve, Pump 2 |
| Mechanical Asset Description | 8" Gate Valve, Pump 2 |
| Asset Type | Valve |
| Year Installed | 2008 |

Mechanical Equipment Photos



| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

8" Gate Valve, Pump 1 and 2

Equipment Data

| | |
|------------------------------|-----------------------------|
| Mechanical Asset Name | 8" Gate Valve, Pump 1 and 2 |
| Mechanical Asset Description | 8" Gate Valve, Pump 1 and 2 |
| Asset Type | Valve |
| Year Installed | 2008 |
| Mechanical Equipment Photos | |



Mechanical Observation Comments

None

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

8" Check Valve, Pump 1

Equipment Data

| | |
|------------------------------|------------------------|
| Mechanical Asset Name | 8" Check Valve, Pump 1 |
| Mechanical Asset Description | 8" Check Valve, Pump 1 |
| Asset Type | Valve |
| Year Installed | 2008 |

Mechanical Equipment Photos



Mechanical Observation Comments

None

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

8" Check Valve, Pump 2

Equipment Data

| | |
|------------------------------|------------------------|
| Mechanical Asset Name | 8" Check Valve, Pump 2 |
| Mechanical Asset Description | 8" Check Valve, Pump 2 |
| Asset Type | Valve |
| Year Installed | 2008 |
| Mechanical Equipment Photos | |



| | |
|---------------------------------|------|
| Mechanical Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Mechanical Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

4" Flap Gate

Equipment Data

| | |
|------------------------------|--------------------------|
| Mechanical Asset Name | 4" Flap Gate |
| Mechanical Asset Description | 4" Flap Gate in wet well |
| Asset Type | Valve |

| | |
|---------------------------------|----------------|
| Year Installed | 2008 |
| Mechanical Field Assessment | Could bot find |
| Mechanical Observation Comments | None |

Condition

| | |
|----------------------------|--|
| Mechanical Condition Score | NA - Not enough information available. |
|----------------------------|--|

Performance

| | |
|------------------------------|--|
| Mechanical Performance Score | NA - Not enough information available. |
|------------------------------|--|

2" Combo Air/vacuum valve

Equipment Data

| | |
|------------------------------|---------------------------|
| Mechanical Asset Name | 2" Combo Air/vacuum valve |
| Mechanical Asset Description | 2" Combo Air/vacuum valve |
| Asset Type | Valve |
| Year Installed | 2008 |
| Mechanical Equipment Photos | |





| | |
|---------------------------------|---|
| Mechanical Observation Comments | None |
| Condition | |
| Mechanical Condition Score | 1 - Good – No defects observed. |
| Performance | |
| Mechanical Performance Score | 1 - Good – Asset functioning as intended. |

Appendix G: Venus Way Lift Station – Electrical

Venus Way-Elec

| | |
|----------------|---|
| Created | 2020-02-08 00:26:11 UTC by Erik Zalkin |
| Updated | 2020-02-22 00:00:26 UTC by Sundara Palani |
| Location | 37.413686, -121.909069 |
| Asset Location | Venus Way-Elec |

Utility Transformer

| | |
|------------------------------|----------------------|
| Electrical Asset Name | Utility Transformer |
| Electrical Asset Description | 240/120 V, 3-Ph, 3 W |
| Asset ID | XFMR T-1 |
| Electrical Asset Type | Transformer |
| Year Installed | 2000 |

Electrical Equipment

Electrical Equipment Observations

| | |
|---------------------------------------|----------------|
| Age | 20 Years |
| Manufacturer | PG&E Owned |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | NA |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos



| | |
|--------------------------------------|--------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |

Service Pedestal

| | |
|------------------------------|---------------------------------|
| Electrical Asset Name | Service Pedestal |
| Electrical Asset Description | Service Disconnect and Metering |
| Year Installed | 2008 |

Pump Control Panel

| | |
|------------------------------|--|
| Electrical Asset Name | Pump Control Panel |
| Electrical Asset Description | Starter panel for Pumps #1 and 2 (Each 5 HP) |
| Electrical Asset Type | Panel |
| Year Installed | 2008 |

Electrical Equipment

Electrical Equipment Observations

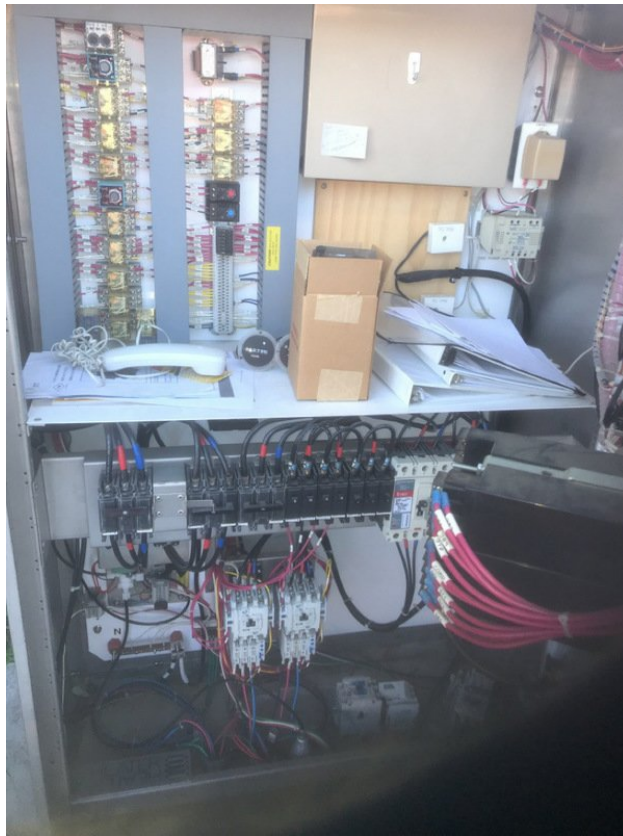
| | |
|---------------------------------------|----------------|
| Age | 12 Years |
| Electrical Enclosure Condition | Good Condition |
| Electrical Heat Release | Normal |
| Electrical Arcflash Labels | Missing |
| Number of Available Spares and Spaces | NA |

Electrical Equipment Photos









| | |
|--|---------------------------------------|
| Electrical Equipment Observations | No Corrosion Noted |
| Electrical Equipment Condition Score | 1 - Excellent |
| Electrical Equipment Performance Score | 1 - Component Functioning as Intended |

Appendix H: Venus Way Lift Station – Instrumentation

Venus Way-Instr

| | |
|----------------|--|
| Created | 2020-02-07 16:27:21 PST by Erik Zalkin |
| Updated | 2020-02-14 15:32:15 PST by Erik Zalkin |
| Location | 37.413684, -121.909056 |
| Asset Location | Venus Way-Instr |

Level Instrument, LSHH-01

| | |
|--------------------------------------|--|
| Asset Name | Level Instrument |
| Asset Description | Wet Well Level Sensor |
| Asset ID | LSHH-01 |
| Asset Type | Level Switch |
| Year Installed | 2008 |
| Instrumentation Observation Comments | Did not obtain photo; see wet well photos (mechanical) |

Condition

| | |
|---------------------------------|---------------------------------|
| Instrumentation Condition Score | 1 - Good – No defects observed. |
|---------------------------------|---------------------------------|

Performance

| | |
|-----------------------------------|---|
| Instrumentation Performance Score | 1 - Good – Asset functioning as intended. |
|-----------------------------------|---|

Appendix I: Venus Way Lift Station – Civil

Venus Way-Civil

| | |
|----------------|---|
| Created | 2020-02-07 16:26:57 PST by Erik Zalkin |
| Updated | 2020-02-11 12:30:21 PST by Hamed Hakimelahi |
| Location | 37.413677, -121.909062 |
| Asset Location | Venus Way-Civil |

Site civil

Grounds/Site Improvements

| | |
|------------|------------|
| Asset Name | Site civil |
|------------|------------|

Civil Photos









Condition

Civil Condition Score

1 - Good - No defects observed.

Performance

Civil Performance Score

1 - Good – Asset functioning as intended.

Appendix J: Venus Way Lift Station – Structural

Venus Way-Struct

| | |
|----------------|--|
| Created | 2020-02-07 16:27:46 PST by Erik Zalkin |
| Updated | 2020-03-12 14:47:14 PDT by Erik Zalkin |
| Location | 37.413696, -121.909065 |
| Asset Location | Venus Way-Struct |

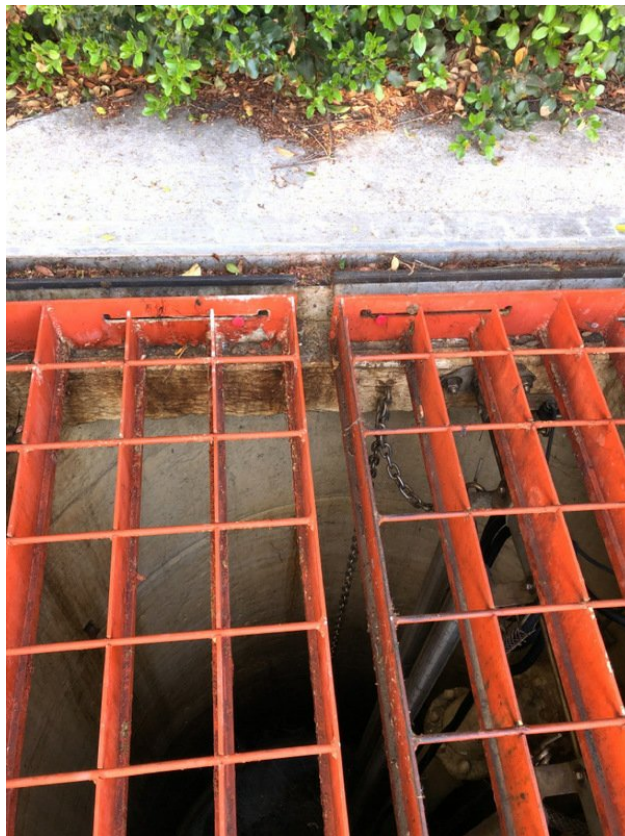
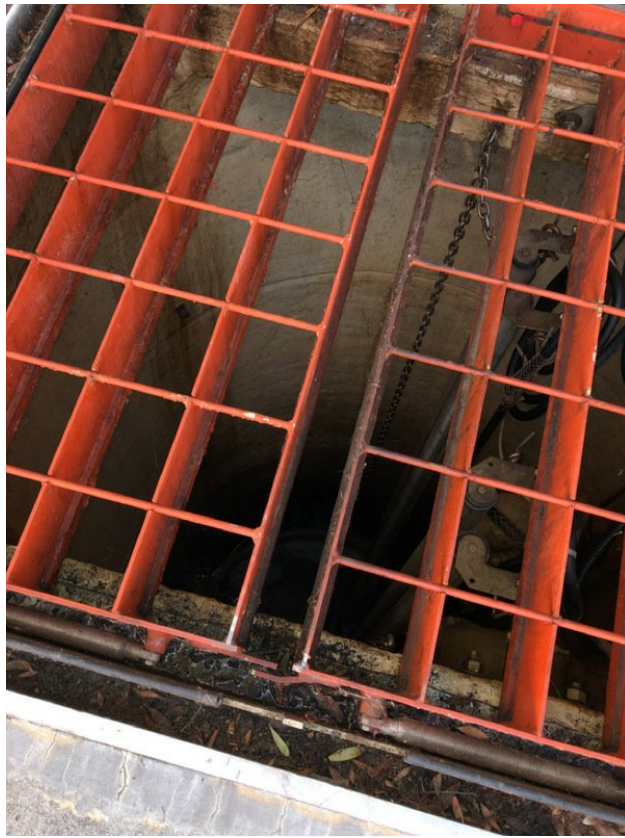
Wet Well

Structural Equipment

| | |
|-------------------|---------------------------------------|
| Asset Name | Wet Well |
| Asset Description | 72" Diameter Reinforced Concrete Pipe |
| Type of Structure | Tank |
| Year Installed | 1964 |
| Material | Concrete |

Structural Photos





Oxidation

Structural Observation Comments

None

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

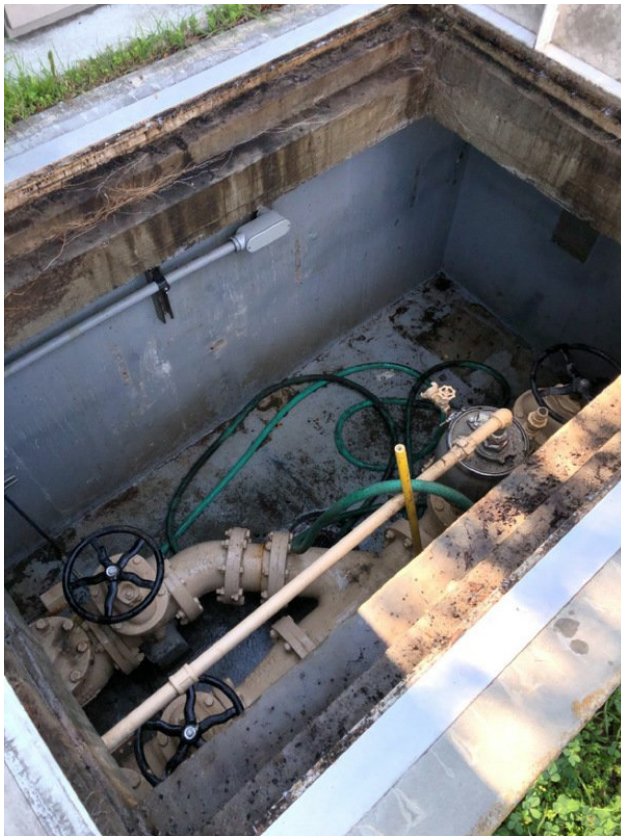
Valve Vault

Structural Equipment

| | |
|-------------------|-------------|
| Asset Name | Valve Vault |
| Type of Structure | Vault |
| Year Installed | 1994 |
| Material | Concrete |

Structural Photos





| | |
|---------------------------------|------|
| Structural Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Aluminum Hatch-Vault

Structural Equipment

| | |
|-------------------|--------------------------|
| Asset Name | Aluminum Hatch-Vault |
| Asset Description | Aluminum Hatch, slide-in |
| Type of Structure | Vault |
| Year Installed | 2008 |

Structural Photos



| | |
|---------------------------------|------|
| Structural Observation Comments | None |
|---------------------------------|------|

Condition

| | |
|----------------------------|---------------------------------|
| Structural Condition Score | 1 - Good – No defects observed. |
|----------------------------|---------------------------------|

Performance

| | |
|------------------------------|---|
| Structural Performance Score | 1 - Good – Asset functioning as intended. |
|------------------------------|---|

Aluminum Hatch-Wet Well

Structural Equipment

| | |
|-------------------|--------------------------------|
| Asset Name | Aluminum Hatch-Wet Well |
| Asset Description | Aluminum Hatch w/ safety grate |
| Type of Structure | Vault |
| Year Installed | 2008 |
| Material | Metal |

Structural Photos



Structural Observation Comments

None

Condition

Structural Condition Score

1 - Good – No defects observed.

Performance

Structural Performance Score

1 - Good – Asset functioning as intended.

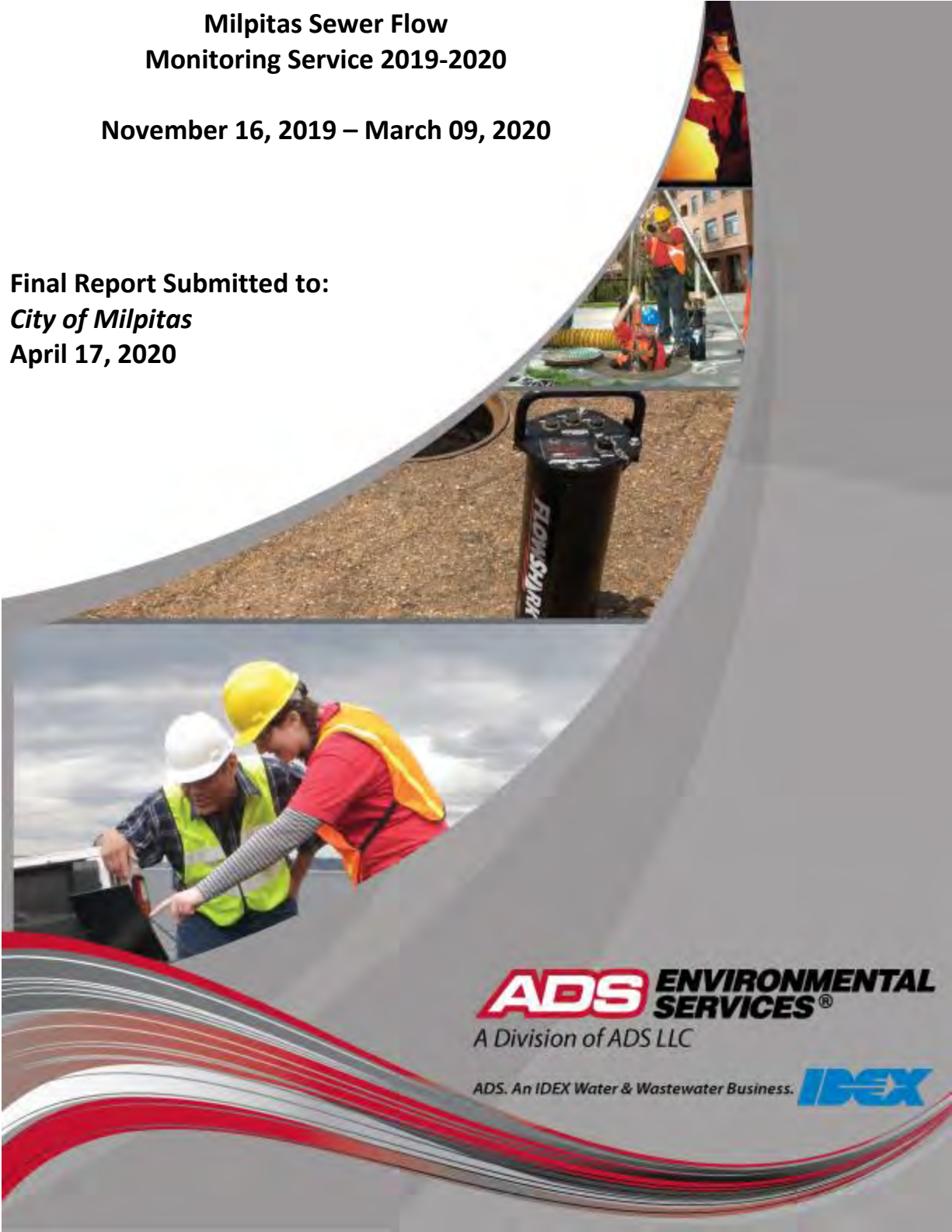
APPENDIX B
City of Milpitas
Sewer Master Plan Study
Milpitas Sewer Flow Monitoring Report 2019-2020

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**Milpitas Sewer Flow
Monitoring Service 2019-2020**

November 16, 2019 – March 09, 2020

Final Report Submitted to:
City of Milpitas
April 17, 2020



**ADS ENVIRONMENTAL
SERVICES®**

A Division of ADS LLC

ADS. An IDEX Water & Wastewater Business.



Milpitas Sewer Flow Monitoring Service 2019 - 2020

Prepared for:

**Theodore Alicante
City of Milpitas
455 E. Calaveras Boulevard
Milpitas, CA 95035**

Prepared by:

ADS, LLC
**15201 Springdale Street
Huntington Beach, CA 92649**



April 17, 2020

Theodore Alicante
City of Milpitas
455 E. Calaveras Boulevard
Milpitas, CA 95035

SUBJECT: Milpitas Sewer Flow Monitoring Service 2019 - 2020

Dear Theodore,

ADS is pleased to submit the report for the Milpitas Sewer Flow Monitoring Service 2019 - 2020 conducted on behalf of the City of Milpitas. The metering was contracted for ninety (90) days at twenty-three (23) flow monitor and two (2) rain gauge locations. The study period is November 16, 2019 - March 09, 2020. All available data has been provided.

The report contains hourly averaged depth, velocity, and quantity hydrographs as well as daily long tables for the metering period in pdf format. Depth, quantity, and velocity entities for each monitoring location have been provided on Prism.

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, Paul Mitchell at (714) 379-9778 ext 223.

It has been our pleasure to serve 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

Mackenzie Michaud
Data Analyst

Introduction

City of Milpitas entered into an agreement with ADS Environmental Services to conduct flow monitoring at twenty-three (23) metering points in the City of Milpitas Collection System. The study was conducted over a ninety (90) day period. The study period is November 16, 2019 - March 09, 2020. The primary objective of the monitoring was to determine current flows for wet weather planning purposes.

Project Scope

The scope of this study involved using flow monitors to quantify wastewater flows at the designated locations. 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 November 15, 2019. The study period began on November 16, 2019 and was completed on March 09, 2020 .

Flow Monitoring Equipment



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

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

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

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

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

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

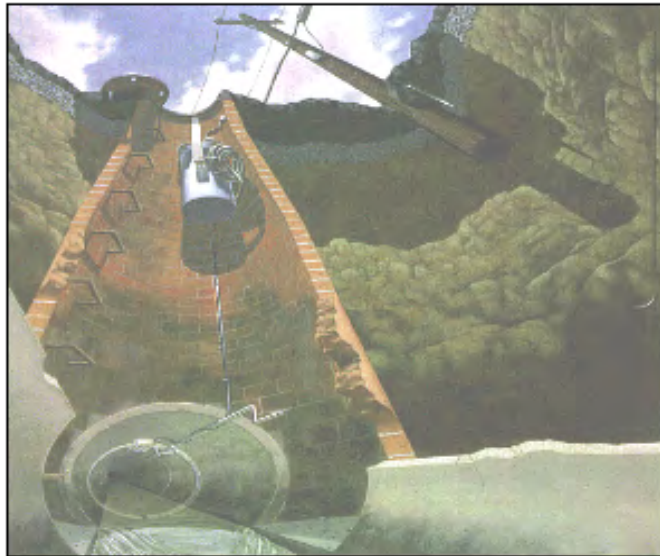
desiccant filled breather tube.

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

Installation

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

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



Data Collection, Confirmation, and Quality Assurance

Data collects were done remotely via wireless connect on a weekly basis 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 either 15-minute or 5-minute intervals throughout the monitoring period. The monitor stores raw data consisting of (1) the ultrasonic depth, (2) the peak velocity and (3) the pressure depth. The data is imported into ADS's proprietary software and is examined by a data analyst to verify its integrity. The data analyst also reviews the daily field reports and site visit records to identify conditions that would affect the collected data.

Velocity profiles and the line confirmation data developed by the field personnel are reviewed by the data analyst to

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

Occasionally the velocity sensor's performance may be compromised resulting in invalid readings sporadically during the monitoring period. This is generally caused by excessive debris (silt) blocking the sensor's crystals, shallow flows ($\sim < 1"$) 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 5-minute 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.

DEPTH - Final calculated depth measurement (in inches)

QUANTITY - Final calculated flow rate (in MGD)

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

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

Site Commentary

Site Information

| MIL_0041 | |
|-----------------|-------|
| Pipe Dimensions | 23 |
| Silt Level | 0.00" |

Overview

Site MIL_0041 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that both free flow and mild backwater flows were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|-------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 6.51 | 1.54 | 0.709 |
| Minimum | 3.96 | 0.73 | 0.178 |
| Maximum | 9.42 | 2.30 | 1.647 |
| Time of Minimum | 2/1/2020 5:05 AM | 3/2/2020 3:25 AM | 1/7/2020 5:20 AM |
| Time of Maximum | 2/26/2020 8:40 AM | 2/1/2020 12:40 PM | 2/1/2020 12:40 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0041

Site Address /Location: S Abel St and Curtis Ave, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.418531°

Longitude:

-121.904896°

Pipe Size (H x W)

23.00"x23.50"

Pipe Shape

Circular

Manhole #

#0041

System Characteristics

Residential/Commercial

Access

Traffic

Drive

Medium



Installation Information

Installation Date:

Thursday, November 14, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

5:37:00 AM

Pipe Size (HxW)

23.00"x23.50"

Depth of Flow (Wet DOF) (in)

5.50"

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.40'

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Smooth flow with medium depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

7'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_0041

Flow Monitor

MIL_0041

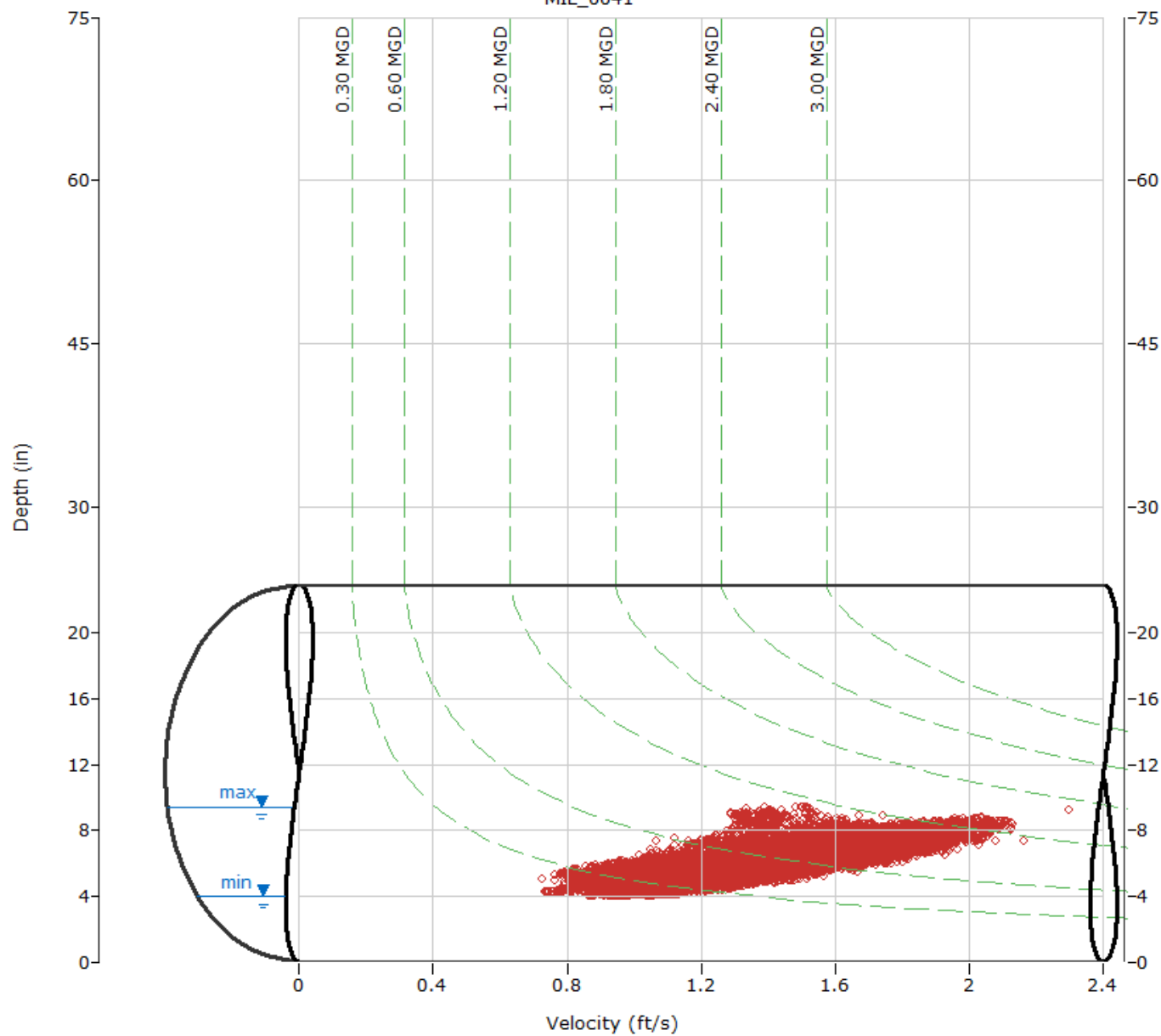
Pipe Height
23.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

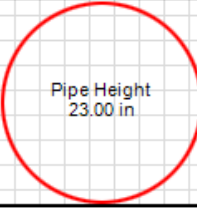


ADS ENVIRONMENTAL
SERVICES

HYDROGRAPH REPORT

MIL_0041

Flow Monitor
MIL_0041

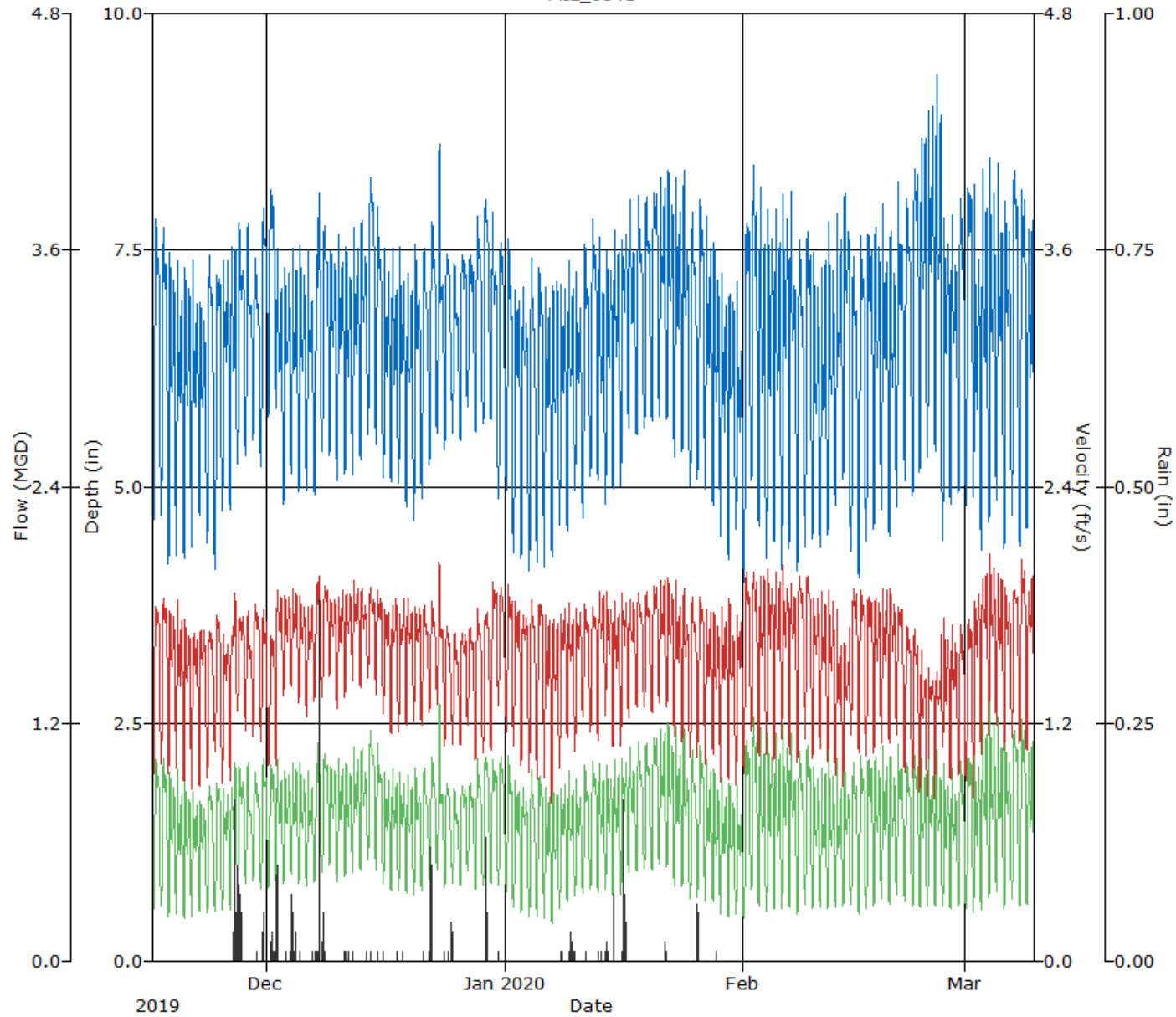


Pipe Height
23.00 in

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0041, Pipe Height: 23.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 05:15 | 4.62 | 12:05 | 7.88 | 6.62 | 05:25 | 0.88 | 11:25 | 1.93 | 1.52 | 05:25 | 0.241 | 11:25 | 1.094 | 0.726 | 0.726 | |
| 11/17/2019 | 05:20 | 4.67 | 11:25 | 8.34 | 6.52 | 05:20 | 0.97 | 11:25 | 1.95 | 1.56 | 05:20 | 0.270 | 11:25 | 1.217 | 0.723 | 0.723 | |
| 11/18/2019 | 04:15 | 4.15 | 08:30 | 7.55 | 6.01 | 03:05 | 0.85 | 08:15 | 1.83 | 1.47 | 04:05 | 0.210 | 08:15 | 0.985 | 0.608 | 0.608 | |
| 11/19/2019 | 04:55 | 4.19 | 08:20 | 7.48 | 5.96 | 04:55 | 0.88 | 08:15 | 1.91 | 1.46 | 04:55 | 0.208 | 08:15 | 1.027 | 0.596 | 0.596 | |
| 11/20/2019 | 04:15 | 4.19 | 08:35 | 7.39 | 5.98 | 05:40 | 0.79 | 08:30 | 1.81 | 1.40 | 04:35 | 0.196 | 08:30 | 0.954 | 0.575 | 0.575 | |
| 11/21/2019 | 04:25 | 4.31 | 08:30 | 7.43 | 6.00 | 05:10 | 0.80 | 11:05 | 1.80 | 1.40 | 05:10 | 0.205 | 08:30 | 0.900 | 0.575 | 0.575 | |
| 11/22/2019 | 05:15 | 4.66 | 08:55 | 7.07 | 5.95 | 03:35 | 0.81 | 08:40 | 1.78 | 1.43 | 03:35 | 0.226 | 08:40 | 0.879 | 0.576 | 0.576 | |
| 11/23/2019 | 05:00 | 4.37 | 11:55 | 7.48 | 6.29 | 04:45 | 0.88 | 10:40 | 1.81 | 1.43 | 04:45 | 0.225 | 12:10 | 0.942 | 0.630 | 0.630 | |
| 11/24/2019 | 04:45 | 4.02 | 12:40 | 7.30 | 6.19 | 06:05 | 1.01 | 17:25 | 1.81 | 1.48 | 04:45 | 0.232 | 12:30 | 0.935 | 0.644 | 0.644 | |
| 11/25/2019 | 05:15 | 4.66 | 09:10 | 7.50 | 6.34 | 05:15 | 0.79 | 20:50 | 1.71 | 1.39 | 05:15 | 0.219 | 09:15 | 0.919 | 0.616 | 0.616 | |
| 11/26/2019 | 04:20 | 4.70 | 12:15 | 8.19 | 6.41 | 04:20 | 0.81 | 20:35 | 1.95 | 1.52 | 04:20 | 0.227 | 12:20 | 1.088 | 0.682 | 0.682 | 0.36 |
| 11/27/2019 | 05:15 | 5.22 | 09:50 | 7.91 | 6.72 | 02:25 | 1.16 | 10:15 | 1.83 | 1.58 | 05:15 | 0.388 | 10:10 | 1.047 | 0.746 | 0.746 | 0.63 |
| 11/28/2019 | 06:40 | 5.31 | 12:10 | 7.83 | 6.58 | 05:05 | 1.05 | 10:45 | 1.87 | 1.52 | 05:05 | 0.353 | 12:05 | 1.052 | 0.699 | 0.699 | |
| 11/29/2019 | 05:00 | 5.46 | 12:00 | 7.46 | 6.63 | 04:45 | 1.08 | 11:35 | 1.88 | 1.57 | 04:45 | 0.375 | 11:35 | 0.998 | 0.729 | 0.729 | 0.02 |
| 11/30/2019 | 05:40 | 5.20 | 13:30 | 7.97 | 6.83 | 05:10 | 0.99 | 12:35 | 1.83 | 1.51 | 05:10 | 0.320 | 12:35 | 1.066 | 0.737 | 0.737 | 0.10 |
| 12/01/2019 | 05:40 | 5.70 | 11:20 | 8.27 | 7.25 | 05:30 | 0.95 | 13:35 | 1.81 | 1.37 | 05:40 | 0.349 | 13:35 | 1.088 | 0.725 | 0.725 | 0.06 |
| 12/02/2019 | 04:40 | 5.80 | 09:10 | 7.62 | 6.59 | 05:10 | 0.94 | 08:45 | 2.00 | 1.57 | 05:10 | 0.357 | 08:45 | 1.080 | 0.719 | 0.719 | 0.30 |
| 12/03/2019 | 04:55 | 4.79 | 08:35 | 7.45 | 6.30 | 04:15 | 1.31 | 22:25 | 1.94 | 1.66 | 04:15 | 0.380 | 08:45 | 1.018 | 0.719 | 0.719 | 0.01 |
| 12/04/2019 | 03:10 | 5.10 | 08:40 | 7.65 | 6.44 | 03:15 | 1.34 | 08:45 | 1.96 | 1.69 | 03:15 | 0.420 | 08:45 | 1.089 | 0.749 | 0.749 | 0.39 |
| 12/05/2019 | 04:55 | 4.93 | 08:35 | 7.69 | 6.41 | 02:40 | 1.25 | 08:15 | 1.91 | 1.63 | 04:50 | 0.384 | 09:10 | 1.046 | 0.723 | 0.723 | 0.01 |
| 12/06/2019 | 04:20 | 4.94 | 09:00 | 7.58 | 6.37 | 05:10 | 1.17 | 20:00 | 1.87 | 1.61 | 05:10 | 0.351 | 08:45 | 1.014 | 0.705 | 0.705 | 0.01 |
| 12/07/2019 | 05:10 | 4.91 | 18:40 | 8.25 | 6.63 | 04:30 | 1.25 | 12:05 | 2.08 | 1.70 | 04:30 | 0.376 | 18:40 | 1.266 | 0.795 | 0.795 | 0.67 |
| 12/08/2019 | 06:00 | 5.35 | 12:25 | 7.84 | 6.84 | 05:25 | 1.28 | 13:35 | 1.97 | 1.70 | 05:25 | 0.433 | 13:35 | 1.083 | 0.822 | 0.822 | 0.20 |
| 12/09/2019 | 04:55 | 5.30 | 08:50 | 7.64 | 6.59 | 02:20 | 1.35 | 23:05 | 1.92 | 1.68 | 04:45 | 0.468 | 23:05 | 1.041 | 0.767 | 0.767 | |
| 12/10/2019 | 04:10 | 5.03 | 09:05 | 7.79 | 6.55 | 04:05 | 1.22 | 23:30 | 2.03 | 1.64 | 04:10 | 0.377 | 08:40 | 1.086 | 0.747 | 0.747 | |
| 12/11/2019 | 04:45 | 5.11 | 08:45 | 7.68 | 6.43 | 04:20 | 1.32 | 12:20 | 1.93 | 1.67 | 04:45 | 0.418 | 08:50 | 1.060 | 0.740 | 0.740 | 0.03 |
| 12/12/2019 | 04:20 | 5.10 | 08:45 | 7.84 | 6.55 | 04:10 | 1.39 | 20:55 | 2.03 | 1.72 | 04:20 | 0.438 | 08:55 | 1.152 | 0.782 | 0.782 | 0.01 |
| 12/13/2019 | 05:05 | 5.27 | 08:45 | 7.93 | 6.72 | 04:45 | 1.32 | 09:40 | 2.01 | 1.68 | 04:45 | 0.437 | 09:40 | 1.150 | 0.791 | 0.791 | 0.01 |
| 12/14/2019 | 05:00 | 5.51 | 13:30 | 8.30 | 7.22 | 05:00 | 1.42 | 10:45 | 2.05 | 1.70 | 05:00 | 0.498 | 10:45 | 1.202 | 0.890 | 0.890 | 0.01 |
| 12/15/2019 | 05:20 | 5.43 | 11:10 | 8.56 | 6.91 | 04:35 | 1.32 | 11:15 | 2.01 | 1.69 | 05:20 | 0.455 | 11:15 | 1.269 | 0.830 | 0.830 | 0.01 |
| 12/16/2019 | 04:40 | 5.08 | 08:35 | 7.61 | 6.38 | 05:10 | 1.19 | 10:10 | 1.85 | 1.61 | 05:10 | 0.372 | 08:30 | 0.990 | 0.705 | 0.705 | 0.01 |
| 12/17/2019 | 04:25 | 5.04 | 08:50 | 7.62 | 6.40 | 03:35 | 1.11 | 21:45 | 1.90 | 1.58 | 03:55 | 0.345 | 09:05 | 0.993 | 0.698 | 0.698 | 0.01 |
| 12/18/2019 | 04:45 | 5.02 | 09:00 | 7.65 | 6.39 | 05:00 | 1.11 | 22:00 | 1.89 | 1.57 | 05:00 | 0.343 | 08:55 | 1.001 | 0.694 | 0.694 | 0.01 |
| 12/19/2019 | 04:30 | 4.75 | 09:05 | 7.28 | 6.19 | 04:20 | 1.11 | 08:55 | 1.93 | 1.60 | 04:20 | 0.318 | 08:55 | 0.997 | 0.677 | 0.677 | |
| 12/20/2019 | 04:55 | 4.61 | 09:35 | 7.61 | 6.29 | 03:30 | 1.15 | 09:30 | 1.83 | 1.59 | 04:50 | 0.323 | 09:30 | 1.004 | 0.690 | 0.690 | |
| 12/21/2019 | 05:25 | 4.85 | 12:10 | 7.56 | 6.46 | 04:20 | 1.17 | 11:15 | 1.91 | 1.57 | 05:20 | 0.346 | 11:15 | 1.012 | 0.708 | 0.708 | 0.01 |
| 12/22/2019 | 04:25 | 5.21 | 13:25 | 7.83 | 6.75 | 04:20 | 1.23 | 13:10 | 1.87 | 1.58 | 04:20 | 0.400 | 13:10 | 1.067 | 0.754 | 0.754 | 0.41 |
| 12/23/2019 | 06:15 | 5.50 | 13:10 | 8.75 | 6.92 | 06:30 | 1.23 | 14:40 | 2.11 | 1.64 | 06:15 | 0.433 | 13:10 | 1.357 | 0.814 | 0.814 | |
| 12/24/2019 | 04:55 | 5.36 | 11:55 | 7.50 | 6.69 | 04:50 | 1.06 | 13:55 | 1.77 | 1.47 | 04:55 | 0.358 | 13:05 | 0.945 | 0.691 | 0.691 | 0.02 |
| 12/25/2019 | 04:45 | 5.54 | 11:35 | 7.38 | 6.52 | 05:10 | 1.06 | 11:35 | 1.74 | 1.42 | 05:10 | 0.375 | 11:35 | 0.916 | 0.642 | 0.642 | 0.08 |
| 12/26/2019 | 04:45 | 5.46 | 12:50 | 7.47 | 6.76 | 04:10 | 1.06 | 12:05 | 1.81 | 1.46 | 05:25 | 0.373 | 12:05 | 0.966 | 0.698 | 0.698 | |
| 12/27/2019 | 04:05 | 5.79 | 12:25 | 7.49 | 6.84 | 04:05 | 1.17 | 12:10 | 1.79 | 1.50 | 04:05 | 0.442 | 12:10 | 0.954 | 0.722 | 0.722 | |
| 12/28/2019 | 05:00 | 5.54 | 12:20 | 7.94 | 6.87 | 04:25 | 0.97 | 12:25 | 1.85 | 1.47 | 04:25 | 0.348 | 12:25 | 1.076 | 0.723 | 0.723 | |
| 12/29/2019 | 06:10 | 5.64 | 12:40 | 8.04 | 7.02 | 05:10 | 1.00 | 12:10 | 1.83 | 1.49 | 05:10 | 0.364 | 12:10 | 1.083 | 0.759 | 0.759 | 0.22 |
| 12/30/2019 | 05:15 | 5.67 | 10:50 | 7.96 | 6.85 | 05:05 | 1.00 | 12:00 | 2.04 | 1.61 | 05:05 | 0.365 | 12:00 | 1.086 | 0.785 | 0.785 | |
| 12/31/2019 | 04:25 | 4.83 | 11:15 | 7.71 | 6.53 | 03:55 | 1.16 | 11:10 | 1.97 | 1.67 | 04:20 | 0.345 | 11:10 | 1.102 | 0.763 | 0.763 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 06:25 | 4.93 | 13:00 | 7.65 | 6.43 | 06:00 | 1.10 | 13:00 | 1.96 | 1.60 | 06:20 | 0.332 | 13:00 | 1.088 | 0.719 | 0.719 | | |
| 01/02/2020 | 05:05 | 4.24 | 09:50 | 7.29 | 5.99 | 05:05 | 1.03 | 09:35 | 1.93 | 1.56 | 05:05 | 0.250 | 09:40 | 0.995 | 0.637 | 0.637 | | |
| 01/03/2020 | 04:10 | 4.22 | 09:55 | 7.20 | 5.95 | 05:00 | 0.92 | 09:50 | 1.86 | 1.52 | 05:00 | 0.220 | 09:50 | 0.943 | 0.618 | 0.618 | | |
| 01/04/2020 | 05:30 | 4.08 | 13:20 | 7.48 | 5.97 | 05:45 | 0.93 | 13:35 | 1.90 | 1.49 | 05:30 | 0.213 | 13:35 | 1.021 | 0.617 | 0.617 | | |
| 01/05/2020 | 05:25 | 4.14 | 11:15 | 7.37 | 6.08 | 05:30 | 0.83 | 20:35 | 1.94 | 1.51 | 05:30 | 0.196 | 12:55 | 0.981 | 0.645 | 0.645 | | |
| 01/06/2020 | 05:15 | 4.07 | 08:45 | 7.21 | 5.83 | 04:25 | 0.90 | 08:50 | 1.85 | 1.43 | 05:15 | 0.204 | 08:50 | 0.938 | 0.566 | 0.566 | | |
| 01/07/2020 | 04:30 | 4.21 | 08:50 | 7.25 | 5.93 | 05:20 | 0.73 | 09:20 | 1.82 | 1.38 | 05:20 | 0.178 | 09:00 | 0.918 | 0.564 | 0.564 | | |
| 01/08/2020 | 03:55 | 4.51 | 08:45 | 7.34 | 6.12 | 03:55 | 0.95 | 08:30 | 1.91 | 1.51 | 03:55 | 0.249 | 08:35 | 0.988 | 0.635 | 0.635 | | 0.02 |
| 01/09/2020 | 04:50 | 4.53 | 08:50 | 7.52 | 6.14 | 03:55 | 1.07 | 08:25 | 1.90 | 1.54 | 03:55 | 0.286 | 08:50 | 1.022 | 0.647 | 0.647 | | 0.18 |
| 01/10/2020 | 05:05 | 4.95 | 08:40 | 7.35 | 6.21 | 04:05 | 1.01 | 08:40 | 1.85 | 1.54 | 05:05 | 0.305 | 08:40 | 0.969 | 0.655 | 0.655 | 0.02 | |
| 01/11/2020 | 05:30 | 4.65 | 12:40 | 7.60 | 6.39 | 05:15 | 1.13 | 11:45 | 1.92 | 1.58 | 05:15 | 0.314 | 11:45 | 1.033 | 0.706 | 0.706 | 0.01 | |
| 01/12/2020 | 05:10 | 5.10 | 13:25 | 7.90 | 6.73 | 05:40 | 1.07 | 12:45 | 1.91 | 1.57 | 05:40 | 0.336 | 12:45 | 1.082 | 0.753 | 0.753 | | |
| 01/13/2020 | 04:10 | 5.05 | 08:15 | 7.91 | 6.33 | 05:00 | 1.05 | 09:10 | 1.99 | 1.62 | 05:00 | 0.328 | 09:10 | 1.077 | 0.703 | 0.703 | | 0.02 |
| 01/14/2020 | 05:10 | 4.78 | 08:55 | 7.56 | 6.29 | 04:50 | 1.17 | 08:00 | 1.94 | 1.60 | 04:50 | 0.338 | 08:55 | 1.044 | 0.690 | 0.690 | | 0.11 |
| 01/15/2020 | 04:20 | 4.96 | 08:50 | 7.82 | 6.52 | 04:00 | 1.01 | 08:10 | 1.90 | 1.52 | 04:00 | 0.308 | 08:40 | 1.061 | 0.696 | 0.696 | 0.07 | |
| 01/16/2020 | 05:15 | 4.98 | 21:30 | 7.71 | 6.70 | 03:10 | 1.04 | 08:20 | 2.00 | 1.57 | 04:05 | 0.320 | 08:20 | 1.102 | 0.747 | 0.747 | 0.66 | |
| 01/17/2020 | 05:10 | 5.60 | 08:45 | 8.05 | 6.90 | 04:25 | 1.19 | 09:15 | 1.87 | 1.60 | 04:25 | 0.431 | 09:15 | 1.109 | 0.785 | 0.785 | | |
| 01/18/2020 | 05:10 | 5.54 | 11:35 | 8.13 | 6.95 | 05:00 | 1.19 | 10:30 | 1.93 | 1.64 | 05:00 | 0.423 | 11:35 | 1.137 | 0.815 | 0.815 | | |
| 01/19/2020 | 05:20 | 5.61 | 12:45 | 8.09 | 7.03 | 05:00 | 1.20 | 12:25 | 1.97 | 1.64 | 05:00 | 0.435 | 12:25 | 1.175 | 0.827 | 0.827 | | |
| 01/20/2020 | 05:15 | 5.67 | 16:15 | 8.32 | 7.24 | 05:10 | 1.21 | 20:05 | 2.02 | 1.67 | 05:10 | 0.443 | 20:05 | 1.214 | 0.878 | 0.878 | | |
| 01/21/2020 | 04:25 | 5.72 | 08:50 | 8.43 | 7.21 | 02:55 | 1.24 | 10:25 | 2.05 | 1.68 | 04:20 | 0.470 | 09:00 | 1.224 | 0.877 | 0.877 | | |
| 01/22/2020 | 05:10 | 5.69 | 08:55 | 8.40 | 7.11 | 04:00 | 1.19 | 08:55 | 2.00 | 1.65 | 04:00 | 0.441 | 08:55 | 1.261 | 0.843 | 0.843 | | 0.03 |
| 01/23/2020 | 04:15 | 5.29 | 08:45 | 8.43 | 6.88 | 03:55 | 1.08 | 08:40 | 2.00 | 1.57 | 03:55 | 0.358 | 08:40 | 1.264 | 0.771 | 0.771 | | |
| 01/24/2020 | 04:50 | 5.32 | 09:45 | 8.45 | 6.87 | 03:50 | 1.08 | 09:35 | 1.98 | 1.54 | 05:00 | 0.364 | 09:35 | 1.247 | 0.755 | 0.755 | | |
| 01/25/2020 | 05:50 | 4.98 | 11:50 | 7.98 | 6.71 | 05:45 | 0.97 | 11:45 | 1.98 | 1.53 | 05:45 | 0.297 | 11:45 | 1.162 | 0.736 | 0.736 | | |
| 01/26/2020 | 04:55 | 4.98 | 12:10 | 8.07 | 6.83 | 04:50 | 1.00 | 12:40 | 1.91 | 1.55 | 04:50 | 0.303 | 12:40 | 1.125 | 0.765 | 0.765 | 0.16 | |
| 01/27/2020 | 04:20 | 4.95 | 08:40 | 7.98 | 6.44 | 05:20 | 0.95 | 09:10 | 1.90 | 1.46 | 05:20 | 0.288 | 09:10 | 1.098 | 0.659 | 0.659 | | |
| 01/28/2020 | 04:00 | 4.76 | 08:50 | 7.68 | 6.20 | 04:10 | 0.95 | 08:45 | 1.86 | 1.45 | 04:05 | 0.273 | 08:45 | 1.037 | 0.618 | 0.618 | | 0.01 |
| 01/29/2020 | 04:20 | 4.40 | 08:40 | 7.37 | 5.94 | 04:25 | 0.81 | 08:35 | 1.87 | 1.44 | 04:25 | 0.205 | 08:35 | 0.985 | 0.584 | 0.584 | | |
| 01/30/2020 | 05:05 | 4.11 | 09:00 | 7.30 | 5.92 | 05:05 | 0.87 | 08:25 | 1.93 | 1.41 | 05:05 | 0.201 | 09:15 | 0.966 | 0.572 | 0.572 | | |
| 01/31/2020 | 05:15 | 4.48 | 08:30 | 7.35 | 5.81 | 05:10 | 0.86 | 08:35 | 1.88 | 1.45 | 05:10 | 0.224 | 08:35 | 0.985 | 0.566 | 0.566 | | |
| 02/01/2020 | 05:05 | 3.96 | 12:40 | 9.25 | 6.29 | 04:40 | 0.87 | 12:40 | 2.30 | 1.56 | 04:55 | 0.191 | 12:40 | 1.647 | 0.714 | 0.714 | | |
| 02/02/2020 | 06:00 | 5.04 | 12:40 | 8.45 | 6.90 | 04:50 | 1.11 | 20:10 | 2.04 | 1.65 | 04:50 | 0.343 | 12:00 | 1.266 | 0.828 | 0.828 | | |
| 02/03/2020 | 04:10 | 4.56 | 08:40 | 8.31 | 6.47 | 05:00 | 0.96 | 08:50 | 2.02 | 1.58 | 05:00 | 0.264 | 08:50 | 1.250 | 0.728 | 0.728 | | |
| 02/04/2020 | 04:05 | 4.23 | 09:00 | 8.06 | 6.25 | 04:50 | 0.97 | 09:20 | 2.06 | 1.61 | 04:50 | 0.236 | 08:40 | 1.214 | 0.707 | 0.707 | | |
| 02/05/2020 | 03:45 | 4.37 | 08:55 | 8.14 | 6.26 | 05:00 | 0.96 | 08:45 | 2.13 | 1.58 | 05:00 | 0.243 | 08:50 | 1.279 | 0.694 | 0.694 | | |
| 02/06/2020 | 03:45 | 4.08 | 08:40 | 8.23 | 6.35 | 04:35 | 1.08 | 08:15 | 2.08 | 1.61 | 03:45 | 0.248 | 08:25 | 1.262 | 0.725 | 0.725 | | |
| 02/07/2020 | 03:50 | 4.23 | 08:55 | 8.30 | 6.39 | 04:00 | 0.98 | 08:30 | 1.96 | 1.60 | 04:00 | 0.250 | 08:55 | 1.202 | 0.722 | 0.722 | | |
| 02/08/2020 | 05:15 | 4.07 | 13:00 | 7.64 | 6.20 | 05:35 | 0.97 | 12:45 | 2.06 | 1.62 | 05:35 | 0.224 | 12:50 | 1.128 | 0.709 | 0.709 | | |
| 02/09/2020 | 04:45 | 4.30 | 12:15 | 7.75 | 6.34 | 07:10 | 1.02 | 12:25 | 2.01 | 1.65 | 04:45 | 0.263 | 12:25 | 1.137 | 0.741 | 0.741 | | |
| 02/10/2020 | 04:05 | 4.43 | 08:35 | 7.57 | 6.02 | 05:00 | 0.98 | 08:25 | 2.01 | 1.55 | 05:00 | 0.252 | 08:25 | 1.095 | 0.638 | 0.638 | | |
| 02/11/2020 | 04:35 | 4.33 | 10:30 | 7.60 | 6.03 | 04:10 | 1.02 | 10:30 | 2.02 | 1.54 | 04:10 | 0.260 | 10:30 | 1.108 | 0.639 | 0.639 | | |
| 02/12/2020 | 04:50 | 4.48 | 08:35 | 8.01 | 6.15 | 04:15 | 0.96 | 08:05 | 1.91 | 1.50 | 04:15 | 0.252 | 08:40 | 1.117 | 0.642 | 0.642 | | |
| 02/13/2020 | 04:30 | 4.78 | 09:00 | 7.96 | 6.47 | 04:10 | 0.84 | 08:10 | 1.90 | 1.37 | 04:10 | 0.242 | 08:10 | 1.090 | 0.627 | 0.627 | | |
| 02/14/2020 | 05:10 | 5.02 | 08:45 | 8.19 | 6.87 | 04:15 | 0.83 | 09:00 | 1.68 | 1.31 | 04:15 | 0.258 | 09:00 | 1.020 | 0.645 | 0.645 | | |
| 02/15/2020 | 04:35 | 4.27 | 12:35 | 7.50 | 6.23 | 06:00 | 1.02 | 12:15 | 2.02 | 1.64 | 06:00 | 0.257 | 12:15 | 1.063 | 0.712 | 0.712 | | |
| 02/16/2020 | 05:10 | 3.99 | 12:10 | 7.74 | 6.22 | 06:05 | 1.02 | 12:00 | 2.00 | 1.59 | 05:10 | 0.231 | 12:00 | 1.121 | 0.699 | 0.699 | | |
| 02/17/2020 | 05:10 | 4.39 | 11:35 | 7.68 | 6.46 | 04:40 | 1.00 | 10:05 | 1.96 | 1.58 | 04:40 | 0.257 | 10:05 | 1.088 | 0.728 | 0.728 | | |
| 02/18/2020 | 05:00 | 4.52 | 09:15 | 7.87 | 6.33 | 04:55 | 1.02 | 09:15 | 1.96 | 1.54 | 04:55 | 0.269 | 09:15 | 1.128 | 0.681 | 0.681 | | |
| 02/19/2020 | 04:10 | 4.73 | 08:55 | 8.11 | 6.40 | 05:10 | 1.04 | 08:45 | 1.93 | 1.55 | 05:10 | 0.297 | 08:50 | 1.151 | 0.695 | 0.695 | | |
| 02/20/2020 | 05:00 | 4.46 | 09:05 | 7.88 | 6.20 | 04:00 | 1.05 | 08:30 | 2.01 | 1.58 | 04:00 | 0.276 | 09:00 | 1.142 | 0.680 | 0.680 | | |
| 02/21/2020 | 04:15 | 4.77 | 09:25 | 8.37 | 6.69 | 03:45 | 1.05 | 09:30 | 1.85 | 1.60 | 03:45 | 0.304 | 09:30 | 1.155 | 0.761 | 0.761 | | |
| 02/22/2020 | 05:40 | 5.03 | 11:25 | 8.11 | 6.88 | 04:40 | 0.88 | 11:20 | 1.80 | 1.41 | 04:40 | 0.273 | 11:20 | 1.077 | 0.702 | 0.702 | | |
| 02/23/2020 | 05:40 | 4.84 | 12:55 | 8.41 | 7.11 | 04:25 | 0.86 | 12:45 | 1.77 | 1.37 | 04:25 | 0.260 | 12:45 | 1.114 | 0.720 | 0.720 | | |
| 02/24/2020 | 03:40 | 5.07 | 09:00 | 8.91 | 7.24 | 04:15 | 0.80 | 09:05 | 1.74 | 1.24 | 04:15 | 0.253 | 09:05 | 1.182 | 0.663 | 0.663 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 04:15 | 5.23 | 08:45 | 9.10 | 7.45 | 05:00 | 0.76 | 08:45 | 1.54 | 1.25 | 05:00 | 0.250 | 08:45 | 1.083 | 0.695 | 0.695 | |
| 02/26/2020 | 04:25 | 5.32 | 08:40 | 9.42 | 7.39 | 04:30 | 0.78 | 22:50 | 1.78 | 1.28 | 04:30 | 0.261 | 08:15 | 1.106 | 0.696 | 0.696 | |
| 02/27/2020 | 04:40 | 4.39 | 08:40 | 7.99 | 6.36 | 03:10 | 0.93 | 08:10 | 1.87 | 1.41 | 03:10 | 0.249 | 08:35 | 1.082 | 0.624 | 0.624 | |
| 02/28/2020 | 04:35 | 4.79 | 08:50 | 8.04 | 6.54 | 03:40 | 0.86 | 08:20 | 1.78 | 1.37 | 03:40 | 0.252 | 08:45 | 1.045 | 0.633 | 0.633 | |
| 02/29/2020 | 05:15 | 4.88 | 11:55 | 8.11 | 6.79 | 06:10 | 0.86 | 11:55 | 1.77 | 1.39 | 06:10 | 0.255 | 11:55 | 1.061 | 0.682 | 0.682 | |
| 03/01/2020 | 05:35 | 4.76 | 11:05 | 8.19 | 6.93 | 04:55 | 0.79 | 11:00 | 1.80 | 1.40 | 04:55 | 0.232 | 11:00 | 1.089 | 0.715 | 0.715 | |
| 03/02/2020 | 04:50 | 4.86 | 08:40 | 8.48 | 6.34 | 03:25 | 0.73 | 09:00 | 1.95 | 1.47 | 03:25 | 0.222 | 09:00 | 1.101 | 0.650 | 0.650 | |
| 03/03/2020 | 04:30 | 4.29 | 09:00 | 8.65 | 6.46 | 04:50 | 0.96 | 21:30 | 2.03 | 1.64 | 04:50 | 0.243 | 09:05 | 1.319 | 0.759 | 0.759 | |
| 03/04/2020 | 04:45 | 4.59 | 08:20 | 8.56 | 6.65 | 03:50 | 1.10 | 08:10 | 2.13 | 1.68 | 03:50 | 0.302 | 08:25 | 1.362 | 0.802 | 0.802 | |
| 03/05/2020 | 04:30 | 4.80 | 08:45 | 8.55 | 6.71 | 04:25 | 1.14 | 08:45 | 2.07 | 1.66 | 04:25 | 0.328 | 08:45 | 1.333 | 0.791 | 0.791 | |
| 03/06/2020 | 04:55 | 4.29 | 08:50 | 8.10 | 6.52 | 04:45 | 1.01 | 08:45 | 1.96 | 1.59 | 04:50 | 0.248 | 08:45 | 1.174 | 0.740 | 0.740 | |
| 03/07/2020 | 05:10 | 4.64 | 12:15 | 8.39 | 6.91 | 05:10 | 1.10 | 12:50 | 1.95 | 1.64 | 05:10 | 0.304 | 12:50 | 1.214 | 0.829 | 0.829 | |
| 03/08/2020 | 05:15 | 4.36 | 11:20 | 8.18 | 6.66 | 04:40 | 1.00 | 11:20 | 2.12 | 1.67 | 04:40 | 0.252 | 11:20 | 1.286 | 0.812 | 0.812 | |
| 03/09/2020 | 04:00 | 4.54 | 20:30 | 7.88 | 6.40 | 04:05 | 1.00 | 20:40 | 1.98 | 1.61 | 04:05 | 0.266 | 20:30 | 1.140 | 0.728 | 0.727 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 81.489 | 4.90 |
| Avg | 6.51 | 1.54 | 0.709 | |

Site Commentary

Site Information

| MIL_0186 | |
|-----------------|-------|
| Pipe Dimensions | 8 |
| Silt Level | 1.63" |

Overview

Site MIL_0186 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Surge conditions were experienced at this location. Review of the scattergraph shows free flow conditions during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location. Data confidence is less than typical due to sediment. A data gap also occurs beginning February 02, 2020 through February 14, 2020 and another data gap on March 02, 2020 through March 05, 2020 resulting from a meter malfunction.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 4.25 | 1.45 | 0.133 |
| Minimum | 2.64 | 0.71 | 0.030 |
| Maximum | 8.80 | 2.50 | 0.482 |
| Time of Minimum | 2/23/2020 3:35 AM | 11/18/2019 3:25 AM | 11/18/2019 3:25 AM |
| Time of Maximum | 3/6/2020 2:15 PM | 12/4/2019 5:30 AM | 12/4/2019 5:30 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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. 90 days of data provided.

| Percent Uptime | |
|-----------------|----|
| Depth (in) | 88 |
| Velocity (ft/s) | 88 |
| Quantity (MGD) | 88 |

Milpitas Temp Study 2019-20

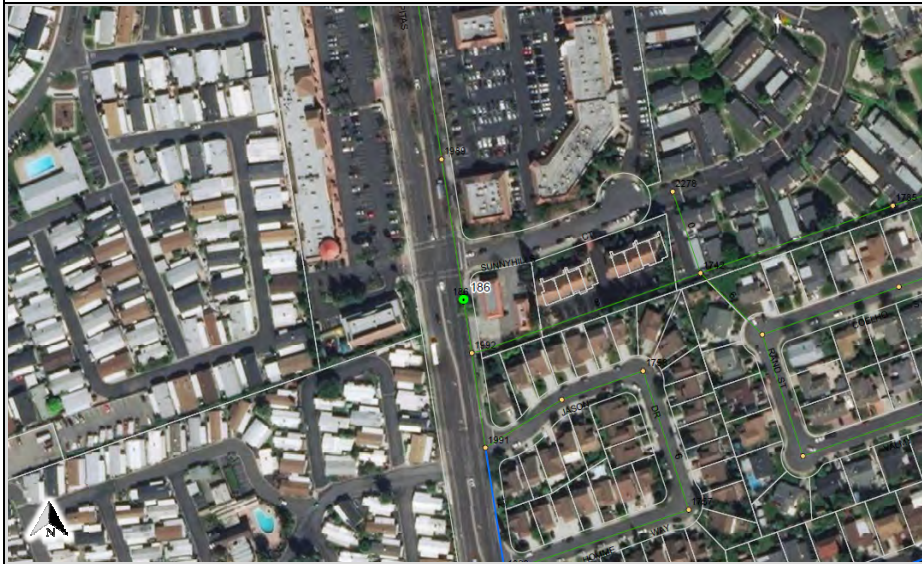
Flow Monitoring Site Report



Site Name

MIL_0186

| | | | | | |
|-------------------------|-----------------------------------|------------|--------------|-------------------|---------------|
| Site Address /Location: | N Milpitas Blvd and Sunnyhills Ct | | | Monitor Series | Location Type |
| Site Access Details: | Drive | Latitude: | 37.454452° | TRITON+ | Temporary |
| | | Longitude: | -121.910707° | Pipe Size (H x W) | Pipe Shape |
| | | | | 8.0" x 8.0" | Circular |



Installation Information

| | |
|--------------------------------|---------------------------------|
| Installation Date: | Installation Type: |
| Tuesday, November 12, 2019 | 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) |
| 3:47:18 AM | 8.0" x 8.0" |
| Depth of Flow (Wet DOF) (in) | Range (Air DOF) (in) |
| 3.75 | 0.00" |
| Downlooker Physical Offset (in) | Measurement Confidence (in) |
| NA | 0.25" |
| Peak Velocity (fps) | Velocity Sensor Offset (in) |
| 0.91 | 0" |
| Silt (in) | Silt Type |
| 1.63 | |

Hydraulic Comments:

Medium depth with moderate velocity

Manhole / Pipe Information:

| | |
|-------------------------------|-----------------------------|
| Manhole Depth (Approx. FT): | Manhole Configuration |
| 7' | Single |
| Manhole Material: | Manhole Condition: |
| Concrete | Good |
| Manhole Opening Diameter (in) | Manhole Diameter (Approx.): |
| 26" | 54" |
| Manhole Cover | Manhole Frame |
| Unbolted | Normal |
| Active Drop Connections | Air Quality: |
| No | Normal |
| Pipe Material | Pipe Condition: |
| PVC | Good |

Communication Information:

| | |
|--------------------|--------------------------|
| Communication Type | Antenna Location |
| Wireless | Manhole Pick / Vent Hole |

Additional Site Info. / Comments:

| | |
|---------------------|------------------------|
| ADS Project Name: | Milpitas.WWTFM.CA19-20 |
| ADS Project Number: | 22431.11.325 |

SCATTERGRAPH REPORT

MIL_0186

Flow Monitor

MIL_0186

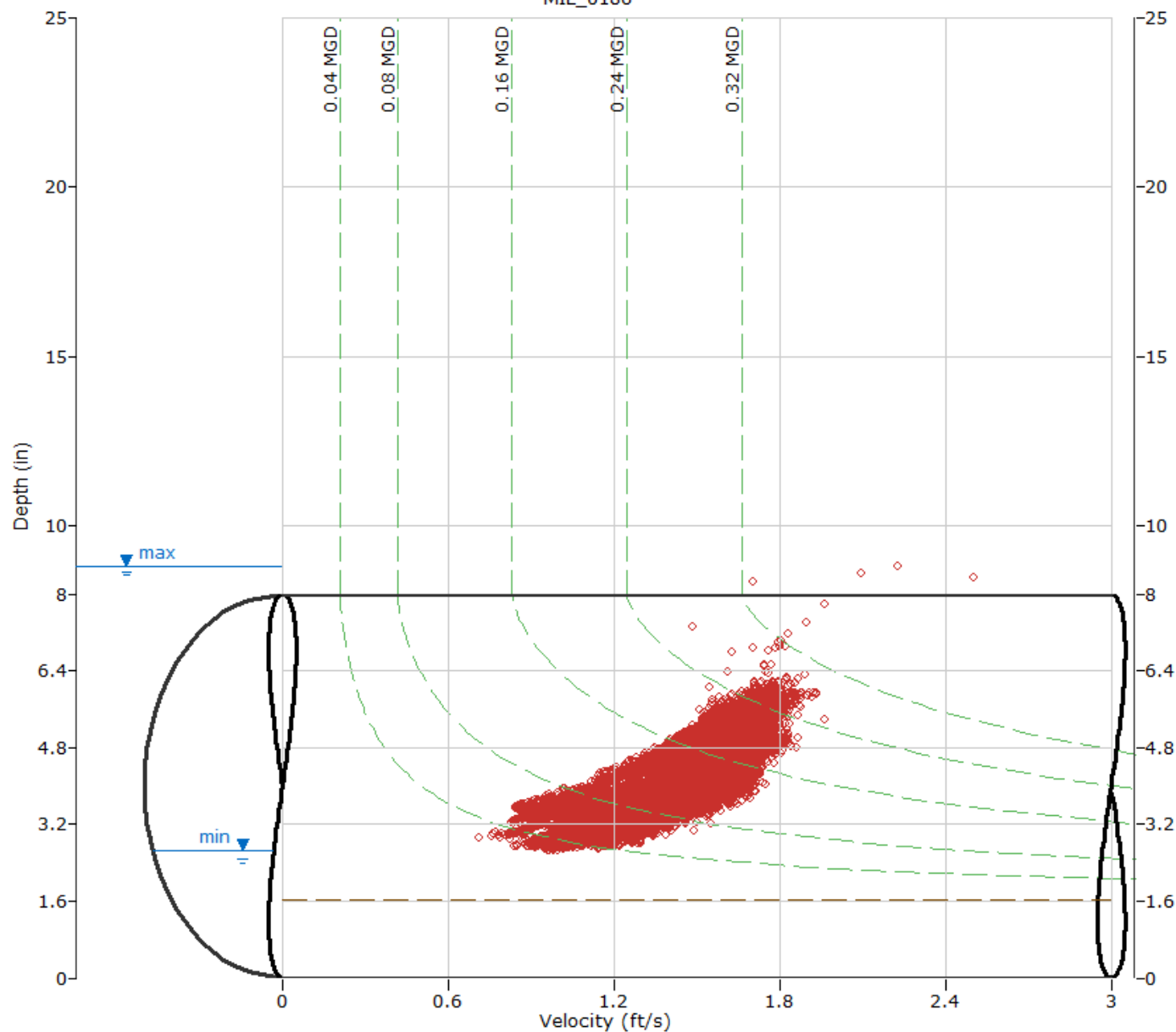
Pipe Height
8.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

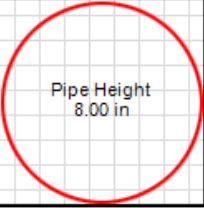
- Depth - Velocity
- Iso-Q™
- - - Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_0186

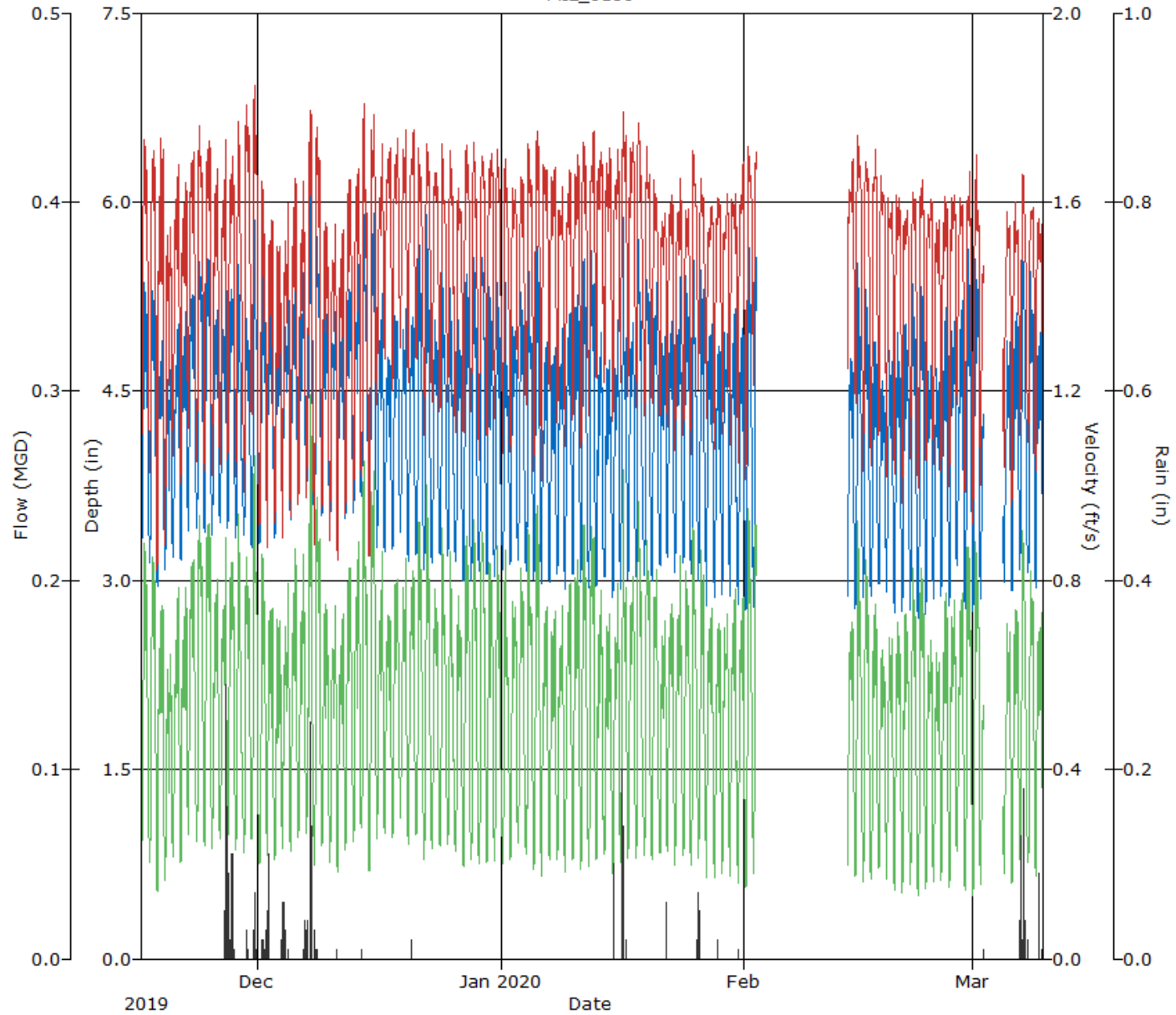
Flow Monitor
MIL_0186



Pipe Height
8.00 in

Report Period
11/16/2019
To
3/9/2020

Legend
— Depth
— Velocity
— Quantity
— Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0186, Pipe Height: 8.00 in, Silt: 1.63 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 05:15 | 3.20 | 12:20 | 5.64 | 4.37 | 05:55 | 1.05 | 10:50 | 1.77 | 1.48 | 05:15 | 0.057 | 12:20 | 0.237 | 0.143 | 0.143 | |
| 11/17/2019 | 03:40 | 3.11 | 11:25 | 5.54 | 4.33 | 04:25 | 0.98 | 10:45 | 1.76 | 1.44 | 04:25 | 0.048 | 11:30 | 0.230 | 0.139 | 0.139 | |
| 11/18/2019 | 03:05 | 2.88 | 18:05 | 5.00 | 4.10 | 03:25 | 0.71 | 18:20 | 1.84 | 1.40 | 03:25 | 0.030 | 17:35 | 0.203 | 0.123 | 0.123 | |
| 11/19/2019 | 04:00 | 3.00 | 19:00 | 4.98 | 3.98 | 04:00 | 0.83 | 17:40 | 1.69 | 1.32 | 04:00 | 0.037 | 19:00 | 0.187 | 0.108 | 0.108 | |
| 11/20/2019 | 03:45 | 3.15 | 20:10 | 5.37 | 4.22 | 03:25 | 1.00 | 19:40 | 1.74 | 1.44 | 03:25 | 0.051 | 20:10 | 0.223 | 0.130 | 0.130 | |
| 11/21/2019 | 03:05 | 3.12 | 18:15 | 5.37 | 4.27 | 03:55 | 0.95 | 19:15 | 1.70 | 1.41 | 03:55 | 0.047 | 19:15 | 0.216 | 0.130 | 0.130 | |
| 11/22/2019 | 01:50 | 3.18 | 14:25 | 6.22 | 4.64 | 01:50 | 0.96 | 14:25 | 1.87 | 1.51 | 01:50 | 0.049 | 14:25 | 0.289 | 0.159 | 0.159 | |
| 11/23/2019 | 04:40 | 3.36 | 17:35 | 5.69 | 4.62 | 04:40 | 1.02 | 14:05 | 1.87 | 1.48 | 04:40 | 0.058 | 14:05 | 0.246 | 0.156 | 0.156 | |
| 11/24/2019 | 04:05 | 3.32 | 14:10 | 6.25 | 4.65 | 04:05 | 0.93 | 14:10 | 1.83 | 1.47 | 04:05 | 0.052 | 14:10 | 0.285 | 0.157 | 0.157 | |
| 11/25/2019 | 03:40 | 3.31 | 18:30 | 5.37 | 4.41 | 04:00 | 1.00 | 18:30 | 1.71 | 1.42 | 03:40 | 0.055 | 18:30 | 0.219 | 0.138 | 0.138 | |
| 11/26/2019 | 02:20 | 3.39 | 20:15 | 5.60 | 4.41 | 02:20 | 0.99 | 19:20 | 1.77 | 1.43 | 02:20 | 0.057 | 20:15 | 0.238 | 0.139 | 0.139 | 0.63 |
| 11/27/2019 | 03:15 | 3.37 | 20:10 | 5.55 | 4.51 | 03:25 | 0.97 | 20:10 | 1.73 | 1.45 | 03:25 | 0.057 | 20:10 | 0.232 | 0.147 | 0.147 | 0.77 |
| 11/28/2019 | 04:25 | 3.27 | 11:00 | 5.69 | 4.34 | 05:15 | 0.99 | 11:00 | 1.85 | 1.43 | 04:25 | 0.054 | 11:00 | 0.256 | 0.137 | 0.137 | |
| 11/29/2019 | 03:55 | 3.29 | 17:40 | 5.39 | 4.24 | 03:50 | 0.91 | 17:40 | 1.97 | 1.48 | 03:50 | 0.050 | 17:40 | 0.253 | 0.136 | 0.136 | 0.05 |
| 11/30/2019 | 04:10 | 3.20 | 11:50 | 6.33 | 4.48 | 03:00 | 1.06 | 13:00 | 1.90 | 1.52 | 03:00 | 0.057 | 11:50 | 0.300 | 0.154 | 0.154 | 0.14 |
| 12/01/2019 | 05:10 | 3.23 | 13:35 | 5.79 | 4.46 | 02:25 | 0.87 | 13:35 | 1.68 | 1.32 | 05:05 | 0.046 | 13:35 | 0.239 | 0.133 | 0.133 | 0.06 |
| 12/02/2019 | 04:35 | 3.51 | 12:00 | 5.39 | 4.47 | 04:10 | 0.85 | 18:40 | 1.66 | 1.30 | 04:10 | 0.053 | 12:00 | 0.210 | 0.130 | 0.130 | 0.36 |
| 12/03/2019 | 03:55 | 3.30 | 11:25 | 5.34 | 4.34 | 03:55 | 0.87 | 11:15 | 1.65 | 1.25 | 03:55 | 0.048 | 11:25 | 0.195 | 0.119 | 0.119 | |
| 12/04/2019 | 02:35 | 3.53 | 05:30 | 8.48 | 4.49 | 02:35 | 0.84 | 05:30 | 2.50 | 1.32 | 02:35 | 0.053 | 05:30 | 0.482 | 0.132 | 0.132 | 0.44 |
| 12/05/2019 | 02:15 | 3.42 | 18:15 | 6.88 | 4.50 | 02:15 | 0.91 | 18:45 | 1.83 | 1.34 | 02:15 | 0.053 | 18:15 | 0.295 | 0.136 | 0.136 | |
| 12/06/2019 | 05:05 | 3.53 | 17:50 | 6.03 | 4.54 | 03:25 | 0.87 | 17:50 | 1.79 | 1.34 | 03:25 | 0.057 | 17:50 | 0.268 | 0.137 | 0.137 | 0.06 |
| 12/07/2019 | 04:25 | 3.57 | 06:55 | 8.34 | 4.79 | 02:55 | 0.87 | 18:40 | 1.91 | 1.42 | 02:55 | 0.057 | 17:25 | 0.330 | 0.160 | 0.160 | 0.84 |
| 12/08/2019 | 03:40 | 3.32 | 10:55 | 5.95 | 4.65 | 03:40 | 0.86 | 11:20 | 1.86 | 1.39 | 03:40 | 0.048 | 10:55 | 0.269 | 0.151 | 0.151 | 0.10 |
| 12/09/2019 | 02:55 | 3.49 | 12:55 | 5.47 | 4.43 | 02:55 | 0.94 | 12:55 | 1.65 | 1.31 | 02:55 | 0.057 | 12:55 | 0.217 | 0.128 | 0.128 | |
| 12/10/2019 | 03:10 | 3.34 | 19:00 | 5.46 | 4.38 | 03:10 | 0.87 | 19:00 | 1.65 | 1.29 | 03:10 | 0.049 | 19:00 | 0.217 | 0.124 | 0.124 | 0.01 |
| 12/11/2019 | 03:40 | 3.25 | 20:05 | 5.32 | 4.32 | 03:40 | 0.83 | 20:05 | 1.61 | 1.26 | 03:40 | 0.044 | 20:05 | 0.204 | 0.120 | 0.120 | 0.00 |
| 12/12/2019 | 03:45 | 3.45 | 12:40 | 5.53 | 4.52 | 03:45 | 0.92 | 19:15 | 1.75 | 1.37 | 03:45 | 0.055 | 19:15 | 0.233 | 0.140 | 0.140 | |
| 12/13/2019 | 04:10 | 3.49 | 18:25 | 7.77 | 4.54 | 04:10 | 0.94 | 18:25 | 1.96 | 1.38 | 04:10 | 0.058 | 18:25 | 0.374 | 0.142 | 0.142 | |
| 12/14/2019 | 03:10 | 3.61 | 11:45 | 6.10 | 4.71 | 03:10 | 0.99 | 10:50 | 1.93 | 1.40 | 03:10 | 0.065 | 10:50 | 0.282 | 0.154 | 0.154 | 0.01 |
| 12/15/2019 | 05:15 | 3.26 | 18:30 | 6.35 | 4.70 | 05:15 | 0.83 | 19:50 | 1.82 | 1.40 | 05:15 | 0.045 | 18:30 | 0.280 | 0.158 | 0.158 | |
| 12/16/2019 | 03:15 | 3.25 | 19:00 | 5.69 | 4.33 | 02:40 | 1.14 | 18:50 | 1.76 | 1.50 | 03:05 | 0.061 | 19:00 | 0.242 | 0.141 | 0.141 | |
| 12/17/2019 | 03:35 | 3.17 | 11:35 | 5.00 | 4.15 | 04:55 | 1.21 | 19:10 | 1.76 | 1.55 | 04:55 | 0.063 | 11:30 | 0.201 | 0.135 | 0.135 | |
| 12/18/2019 | 03:35 | 3.19 | 13:25 | 5.40 | 4.28 | 02:05 | 1.10 | 14:15 | 1.80 | 1.54 | 03:35 | 0.059 | 13:25 | 0.223 | 0.142 | 0.142 | |
| 12/19/2019 | 04:20 | 3.32 | 20:25 | 5.64 | 4.29 | 04:20 | 1.26 | 20:25 | 1.80 | 1.55 | 04:20 | 0.070 | 20:25 | 0.247 | 0.143 | 0.143 | |
| 12/20/2019 | 03:25 | 3.07 | 18:50 | 5.49 | 4.24 | 03:25 | 1.14 | 20:50 | 1.79 | 1.55 | 03:25 | 0.053 | 18:50 | 0.234 | 0.141 | 0.141 | 0.02 |
| 12/21/2019 | 03:40 | 3.16 | 10:30 | 6.15 | 4.39 | 05:15 | 1.14 | 13:25 | 1.77 | 1.51 | 05:15 | 0.061 | 11:10 | 0.267 | 0.146 | 0.146 | |
| 12/22/2019 | 04:00 | 3.03 | 13:10 | 6.16 | 4.35 | 05:20 | 1.03 | 13:10 | 1.80 | 1.48 | 05:20 | 0.047 | 13:10 | 0.276 | 0.143 | 0.143 | |
| 12/23/2019 | 03:55 | 3.10 | 15:05 | 5.78 | 4.20 | 03:55 | 1.16 | 11:40 | 1.79 | 1.50 | 03:55 | 0.055 | 15:05 | 0.244 | 0.135 | 0.135 | |
| 12/24/2019 | 03:20 | 3.16 | 12:15 | 5.83 | 4.29 | 04:35 | 1.07 | 12:25 | 1.80 | 1.48 | 03:20 | 0.054 | 12:30 | 0.247 | 0.138 | 0.138 | |
| 12/25/2019 | 05:30 | 3.14 | 11:35 | 5.87 | 4.13 | 03:25 | 1.12 | 11:35 | 1.81 | 1.49 | 05:35 | 0.057 | 11:35 | 0.261 | 0.129 | 0.129 | |
| 12/26/2019 | 05:35 | 3.10 | 11:45 | 5.49 | 4.14 | 03:30 | 1.07 | 11:45 | 1.69 | 1.44 | 05:25 | 0.053 | 11:45 | 0.223 | 0.126 | 0.126 | |
| 12/27/2019 | 04:30 | 2.92 | 13:50 | 5.86 | 4.20 | 04:30 | 1.07 | 13:20 | 1.75 | 1.49 | 04:30 | 0.044 | 13:50 | 0.250 | 0.135 | 0.135 | |
| 12/28/2019 | 04:10 | 2.96 | 10:50 | 6.81 | 4.29 | 03:15 | 1.09 | 10:45 | 1.79 | 1.48 | 03:10 | 0.049 | 10:50 | 0.302 | 0.139 | 0.139 | |
| 12/29/2019 | 04:05 | 2.99 | 12:00 | 5.94 | 4.37 | 05:10 | 0.99 | 18:35 | 1.78 | 1.47 | 05:05 | 0.046 | 12:00 | 0.250 | 0.144 | 0.144 | |
| 12/30/2019 | 04:00 | 3.00 | 11:20 | 5.74 | 4.19 | 04:05 | 1.00 | 17:30 | 1.74 | 1.50 | 04:05 | 0.044 | 11:20 | 0.229 | 0.135 | 0.135 | |
| 12/31/2019 | 04:20 | 2.98 | 12:55 | 5.49 | 4.20 | 02:00 | 1.08 | 11:10 | 1.74 | 1.50 | 04:20 | 0.048 | 12:55 | 0.230 | 0.135 | 0.135 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 05:30 | 3.00 | 12:40 | 5.79 | 4.11 | 05:20 | 0.99 | 12:55 | 1.73 | 1.45 | 05:20 | 0.045 | 12:40 | 0.243 | 0.126 | 0.126 | 0.10 | |
| 01/02/2020 | 02:55 | 3.05 | 05:20 | 8.60 | 4.21 | 02:55 | 1.03 | 05:20 | 2.10 | 1.45 | 02:55 | 0.047 | 05:20 | 0.404 | 0.131 | 0.131 | | |
| 01/03/2020 | 03:40 | 3.15 | 11:25 | 5.54 | 4.28 | 04:05 | 1.13 | 11:25 | 1.69 | 1.48 | 03:40 | 0.061 | 11:25 | 0.226 | 0.136 | 0.136 | | |
| 01/04/2020 | 04:25 | 2.98 | 11:45 | 5.85 | 4.27 | 04:30 | 1.02 | 10:25 | 1.79 | 1.49 | 04:30 | 0.046 | 11:45 | 0.252 | 0.139 | 0.139 | | |
| 01/05/2020 | 04:30 | 2.96 | 13:05 | 6.15 | 4.33 | 03:30 | 0.97 | 13:05 | 1.78 | 1.46 | 04:30 | 0.042 | 13:05 | 0.272 | 0.142 | 0.142 | | |
| 01/06/2020 | 03:10 | 2.93 | 19:00 | 5.10 | 4.06 | 03:10 | 0.94 | 10:05 | 1.73 | 1.51 | 03:10 | 0.039 | 19:00 | 0.203 | 0.128 | 0.128 | | |
| 01/07/2020 | 02:00 | 2.91 | 18:45 | 5.29 | 3.99 | 03:25 | 1.06 | 19:15 | 1.76 | 1.51 | 02:00 | 0.047 | 18:45 | 0.214 | 0.123 | 0.123 | | |
| 01/08/2020 | 04:25 | 3.01 | 18:15 | 5.36 | 4.12 | 04:20 | 1.09 | 20:40 | 1.69 | 1.47 | 04:20 | 0.049 | 18:15 | 0.209 | 0.127 | 0.127 | | |
| 01/09/2020 | 03:20 | 2.91 | 19:10 | 5.53 | 4.21 | 03:35 | 1.03 | 18:55 | 1.75 | 1.47 | 03:35 | 0.042 | 19:15 | 0.226 | 0.133 | 0.133 | | |
| 01/10/2020 | 03:40 | 2.97 | 12:00 | 5.53 | 4.22 | 04:35 | 1.12 | 13:50 | 1.74 | 1.49 | 03:40 | 0.048 | 19:25 | 0.227 | 0.135 | 0.135 | | |
| 01/11/2020 | 03:30 | 2.94 | 10:45 | 6.03 | 4.34 | 03:35 | 1.01 | 10:50 | 1.79 | 1.49 | 03:35 | 0.043 | 10:45 | 0.267 | 0.144 | 0.144 | | |
| 01/12/2020 | 04:15 | 2.91 | 18:55 | 5.99 | 4.35 | 04:55 | 1.08 | 18:50 | 1.82 | 1.53 | 04:10 | 0.045 | 18:55 | 0.268 | 0.147 | 0.147 | | |
| 01/13/2020 | 02:50 | 2.91 | 18:30 | 5.22 | 3.96 | 02:50 | 1.09 | 20:00 | 1.74 | 1.54 | 02:50 | 0.045 | 18:30 | 0.213 | 0.124 | 0.124 | | |
| 01/14/2020 | 04:55 | 2.96 | 21:00 | 4.97 | 4.01 | 05:10 | 1.12 | 20:50 | 1.74 | 1.54 | 05:10 | 0.048 | 21:00 | 0.198 | 0.127 | 0.106 | | |
| 01/15/2020 | 05:10 | 2.84 | 21:15 | 5.56 | 4.02 | 06:00 | 1.09 | 21:05 | 1.79 | 1.52 | 05:35 | 0.044 | 21:20 | 0.227 | 0.126 | 0.126 | | |
| 01/16/2020 | 05:40 | 2.91 | 13:55 | 6.07 | 4.18 | 06:00 | 1.15 | 12:45 | 1.83 | 1.57 | 05:30 | 0.048 | 13:45 | 0.269 | 0.140 | 0.140 | | |
| 01/17/2020 | 04:10 | 2.98 | 21:15 | 5.31 | 4.18 | 04:10 | 1.13 | 12:30 | 1.80 | 1.55 | 04:10 | 0.049 | 19:25 | 0.224 | 0.138 | 0.138 | | |
| 01/18/2020 | 05:20 | 2.98 | 14:10 | 6.16 | 4.32 | 05:20 | 1.13 | 14:30 | 1.81 | 1.53 | 05:20 | 0.049 | 14:10 | 0.272 | 0.145 | 0.145 | | |
| 01/19/2020 | 06:55 | 3.01 | 13:40 | 5.86 | 4.31 | 08:00 | 1.08 | 13:05 | 1.79 | 1.49 | 06:55 | 0.050 | 13:40 | 0.253 | 0.141 | 0.141 | | |
| 01/20/2020 | 05:35 | 2.93 | 18:50 | 5.77 | 4.29 | 04:50 | 1.13 | 17:50 | 1.77 | 1.47 | 05:35 | 0.048 | 18:50 | 0.236 | 0.136 | 0.136 | | |
| 01/21/2020 | 06:15 | 3.05 | 13:10 | 5.09 | 4.12 | 07:00 | 1.08 | 20:30 | 1.66 | 1.43 | 06:15 | 0.052 | 20:30 | 0.189 | 0.124 | 0.124 | | |
| 01/22/2020 | 05:15 | 3.12 | 13:45 | 5.34 | 4.22 | 05:20 | 1.04 | 21:00 | 1.69 | 1.45 | 05:20 | 0.051 | 20:35 | 0.208 | 0.130 | 0.130 | | |
| 01/23/2020 | 02:55 | 3.04 | 19:40 | 5.66 | 4.29 | 02:40 | 1.04 | 19:20 | 1.70 | 1.44 | 03:30 | 0.048 | 20:25 | 0.231 | 0.134 | 0.123 | | |
| 01/24/2020 | 05:30 | 3.10 | 13:25 | 6.38 | 4.33 | 05:00 | 1.08 | 12:15 | 1.71 | 1.42 | 05:30 | 0.052 | 13:25 | 0.258 | 0.135 | 0.135 | | |
| 01/25/2020 | 05:40 | 3.02 | 12:20 | 5.91 | 4.20 | 05:30 | 1.03 | 11:00 | 1.84 | 1.47 | 05:40 | 0.047 | 12:20 | 0.257 | 0.133 | 0.133 | | |
| 01/26/2020 | 03:30 | 2.97 | 11:15 | 5.69 | 4.25 | 03:05 | 1.14 | 11:05 | 1.68 | 1.49 | 03:25 | 0.050 | 11:15 | 0.227 | 0.136 | 0.136 | | |
| 01/27/2020 | 04:50 | 2.78 | 11:25 | 5.34 | 4.09 | 05:10 | 1.07 | 08:05 | 1.67 | 1.44 | 03:50 | 0.041 | 20:15 | 0.206 | 0.124 | 0.113 | | |
| 01/28/2020 | 04:45 | 2.79 | 22:10 | 5.13 | 4.03 | 04:00 | 1.04 | 19:25 | 1.66 | 1.47 | 04:45 | 0.039 | 20:15 | 0.193 | 0.123 | 0.123 | | |
| 01/29/2020 | 03:55 | 2.83 | 20:40 | 5.37 | 4.11 | 03:35 | 1.05 | 21:40 | 1.66 | 1.46 | 03:35 | 0.042 | 20:40 | 0.211 | 0.125 | 0.125 | | |
| 01/30/2020 | 03:40 | 2.84 | 19:55 | 5.43 | 4.09 | 03:20 | 1.03 | 16:15 | 1.70 | 1.47 | 03:40 | 0.042 | 19:50 | 0.214 | 0.126 | 0.126 | | |
| 01/31/2020 | 05:10 | 2.77 | 19:25 | 5.28 | 4.05 | 04:05 | 0.95 | 20:05 | 1.77 | 1.50 | 04:05 | 0.036 | 21:50 | 0.213 | 0.127 | 0.127 | | |
| 02/01/2020 | 04:45 | 2.73 | 14:55 | 6.17 | 4.26 | 02:50 | 0.94 | 12:20 | 1.76 | 1.46 | 04:55 | 0.035 | 11:35 | 0.266 | 0.138 | 0.138 | | |
| 02/02/2020 | 04:45 | 2.75 | 10:30 | 6.14 | 4.00 | 04:20 | 1.15 | 12:20 | 1.75 | 1.49 | 04:45 | 0.041 | 10:30 | 0.261 | 0.125 | 0.076 | | |
| 02/03/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/04/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/05/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/06/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/07/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/08/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/09/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/10/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/11/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/12/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/13/2020 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | | |
| 02/14/2020 | 05:00 | 2.84 | 19:35 | 5.05 | 4.19 | 05:00 | 1.10 | 20:30 | 1.78 | 1.60 | 05:00 | 0.043 | 19:35 | 0.199 | 0.140 | 0.112 | | |
| 02/15/2020 | 05:15 | 2.69 | 11:50 | 5.78 | 4.08 | 05:50 | 1.13 | 11:50 | 1.77 | 1.54 | 05:15 | 0.039 | 11:50 | 0.251 | 0.133 | 0.133 | | |
| 02/16/2020 | 04:55 | 2.81 | 11:05 | 5.62 | 4.11 | 03:10 | 0.97 | 16:55 | 1.78 | 1.47 | 05:05 | 0.037 | 11:05 | 0.232 | 0.129 | 0.129 | | |
| 02/17/2020 | 04:05 | 2.85 | 19:40 | 5.43 | 3.94 | 04:20 | 0.98 | 17:20 | 1.76 | 1.46 | 04:15 | 0.039 | 19:40 | 0.218 | 0.119 | 0.119 | | |
| 02/18/2020 | 04:15 | 2.90 | 13:20 | 4.65 | 3.87 | 02:40 | 1.03 | 14:10 | 1.75 | 1.48 | 04:15 | 0.043 | 13:40 | 0.167 | 0.115 | 0.115 | | |
| 02/19/2020 | 02:50 | 2.87 | 12:50 | 5.24 | 3.98 | 02:35 | 0.97 | 08:50 | 1.76 | 1.44 | 02:35 | 0.039 | 12:50 | 0.200 | 0.118 | 0.118 | | |
| 02/20/2020 | 03:15 | 2.71 | 11:45 | 5.28 | 3.99 | 03:15 | 0.95 | 18:45 | 1.66 | 1.44 | 03:15 | 0.033 | 11:45 | 0.201 | 0.119 | 0.119 | | |
| 02/21/2020 | 02:55 | 2.68 | 18:20 | 5.48 | 4.01 | 03:00 | 0.92 | 18:45 | 1.68 | 1.41 | 02:55 | 0.032 | 18:20 | 0.211 | 0.118 | 0.118 | | |
| 02/22/2020 | 04:25 | 2.70 | 13:40 | 5.70 | 4.10 | 04:20 | 0.96 | 13:40 | 1.67 | 1.42 | 04:25 | 0.033 | 13:40 | 0.232 | 0.124 | 0.124 | | |
| 02/23/2020 | 03:35 | 2.64 | 12:40 | 5.61 | 4.16 | 03:30 | 0.96 | 17:35 | 1.73 | 1.42 | 03:30 | 0.031 | 13:35 | 0.232 | 0.129 | 0.129 | | |
| 02/24/2020 | 03:50 | 2.70 | 11:45 | 6.05 | 3.94 | 03:45 | 0.99 | 21:25 | 1.69 | 1.43 | 03:50 | 0.034 | 11:45 | 0.232 | 0.115 | 0.115 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 03:40 | 2.82 | 21:00 | 5.11 | 3.95 | 04:50 | 1.01 | 21:00 | 1.62 | 1.40 | 03:40 | 0.039 | 21:00 | 0.192 | 0.113 | 0.113 | 0.01 |
| 02/26/2020 | 02:45 | 2.74 | 19:15 | 5.58 | 4.13 | 02:35 | 0.95 | 19:05 | 1.64 | 1.43 | 02:45 | 0.034 | 19:15 | 0.219 | 0.125 | 0.125 | |
| 02/27/2020 | 02:45 | 2.70 | 11:45 | 5.42 | 4.14 | 03:10 | 0.91 | 16:35 | 1.62 | 1.44 | 03:10 | 0.032 | 11:40 | 0.206 | 0.127 | 0.127 | |
| 02/28/2020 | 04:20 | 3.05 | 18:30 | 5.46 | 4.24 | 04:20 | 1.14 | 19:50 | 1.64 | 1.46 | 04:20 | 0.052 | 19:50 | 0.212 | 0.133 | 0.133 | |
| 02/29/2020 | 04:15 | 2.72 | 10:40 | 5.87 | 4.28 | 04:35 | 0.90 | 18:10 | 1.70 | 1.41 | 04:35 | 0.032 | 10:40 | 0.235 | 0.134 | 0.134 | |
| 03/01/2020 | 05:15 | 2.73 | 11:45 | 5.96 | 4.27 | 04:20 | 0.84 | 13:25 | 1.72 | 1.40 | 04:20 | 0.030 | 11:45 | 0.245 | 0.133 | 0.133 | 0.02 |
| 03/02/2020 | 03:30 | 2.82 | 07:45 | 4.60 | 3.48 | 02:50 | 0.95 | 07:30 | 1.52 | 1.24 | 03:25 | 0.037 | 07:45 | 0.148 | 0.079 | 0.034 | |
| 03/03/2020 | | | | | | | | | | | | | | | | | |
| 03/04/2020 | | | | | | | | | | | | | | | | | |
| 03/05/2020 | 03:40 | 2.93 | 12:45 | 5.21 | 4.10 | 02:30 | 0.94 | 12:45 | 1.60 | 1.41 | 02:30 | 0.039 | 12:45 | 0.196 | 0.121 | 0.121 | |
| 03/06/2020 | 04:20 | 2.85 | 14:15 | 8.80 | 4.14 | 04:05 | 0.92 | 14:15 | 2.23 | 1.40 | 04:05 | 0.036 | 14:15 | 0.429 | 0.123 | 0.123 | 0.58 |
| 03/07/2020 | 05:05 | 3.01 | 14:15 | 5.90 | 4.41 | 05:05 | 1.07 | 15:10 | 1.77 | 1.44 | 05:05 | 0.048 | 15:10 | 0.257 | 0.141 | 0.141 | |
| 03/08/2020 | 04:30 | 2.96 | 12:35 | 5.73 | 4.30 | 04:30 | 1.04 | 14:05 | 1.63 | 1.42 | 04:30 | 0.045 | 12:35 | 0.227 | 0.133 | 0.133 | |
| 03/09/2020 | 04:05 | 2.91 | 20:05 | 5.34 | 4.08 | 04:05 | 1.01 | 12:40 | 1.60 | 1.39 | 04:05 | 0.041 | 20:00 | 0.202 | 0.119 | 0.119 | |
| | | | | | | | | | | | | | | | | | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 13.410 | 5.26 |
| Avg | 4.25 | 1.45 | 0.133 | |

Site Commentary

Site Information

| MIL_0190 | |
|-----------------|-------|
| Pipe Dimensions | 18 |
| Silt Level | 0.00" |

Overview

Site MIL_0190 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed upstream of site MIL_1790. (See MIL_1790 Site Commentary for More Details)

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 2.47 | 0.96 | 0.093 |
| Minimum | 1.80 | 0.41 | 0.024 |
| Maximum | 3.29 | 1.47 | 0.198 |
| Time of Minimum | 11/22/2019 4:00 AM | 11/22/2019 3:50 AM | 11/22/2019 3:50 AM |
| Time of Maximum | 12/12/2019 1:55 PM | 3/6/2020 9:10 AM | 3/6/2020 9:10 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0190

Site Address /Location: N Abel St and Weller Ln

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: middle of N bound lanes

Latitude:

37.432482°

Longitude:

-121.909452°

Pipe Size (H x W)

18.0" x 18.0"

Pipe Shape

Circular

Manhole #

190

System Characteristics

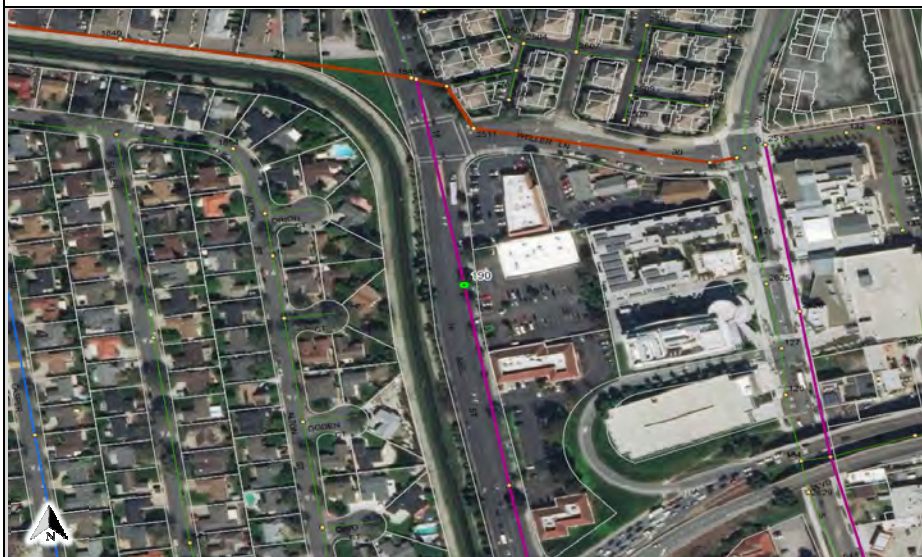
Residential

Access

Traffic

Drive

Heavy



Installation Information

Installation Date:

Wednesday, November 13, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

10:04:15 AM

Pipe Size (HxW)

18.0" x 18.0"

Depth of Flow (Wet DOF) (in)

3.00

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

0.97

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Smooth shallow flow with moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

8'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Vitrified Clay Pipe

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_0190

Flow Monitor

MIL_0190

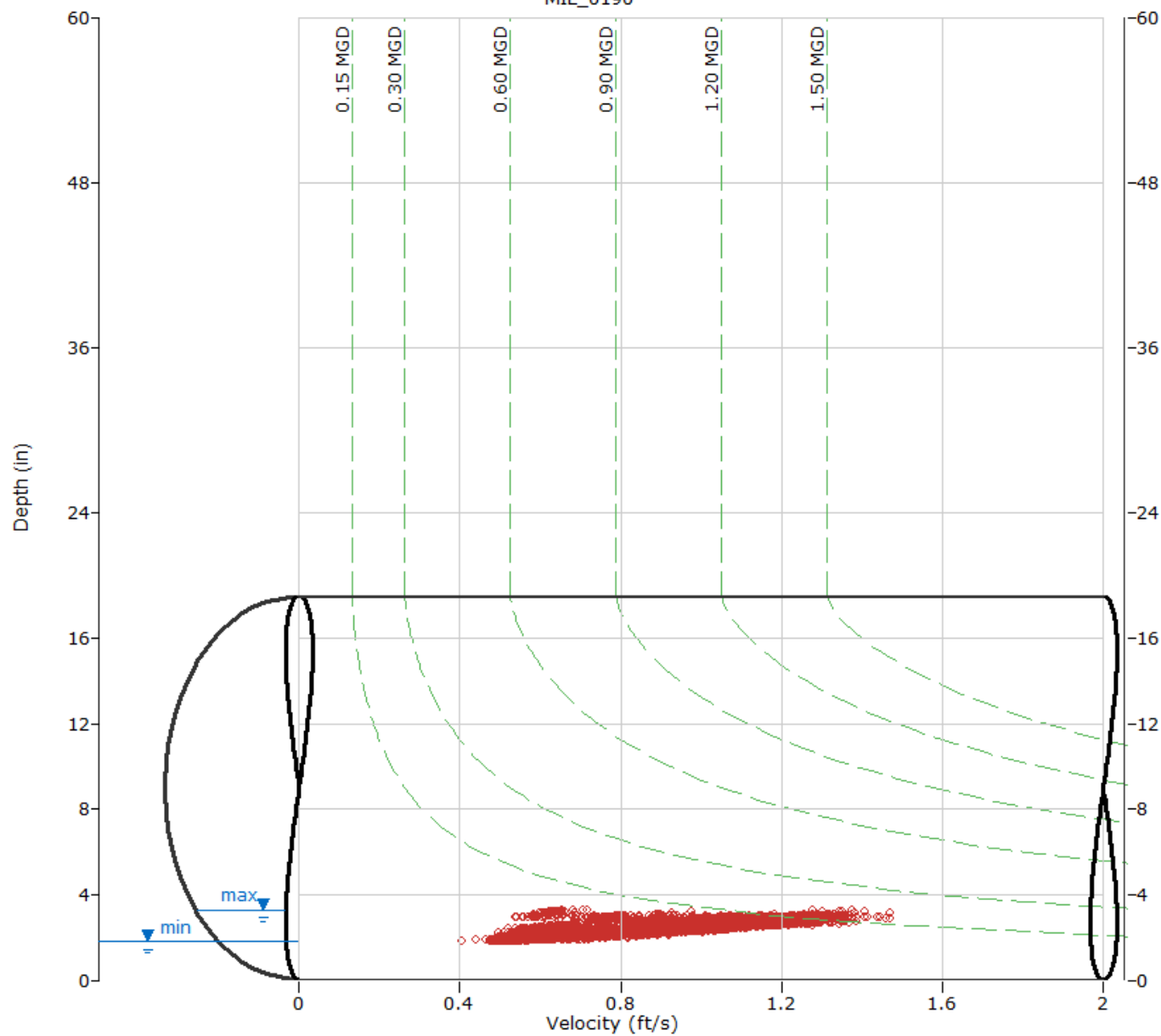
Pipe Height
18.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

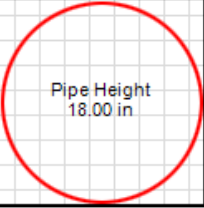


ADS ENVIRONMENTAL
SERVICES

HYDROGRAPH REPORT

MIL_0190

Flow Monitor
MIL_0190

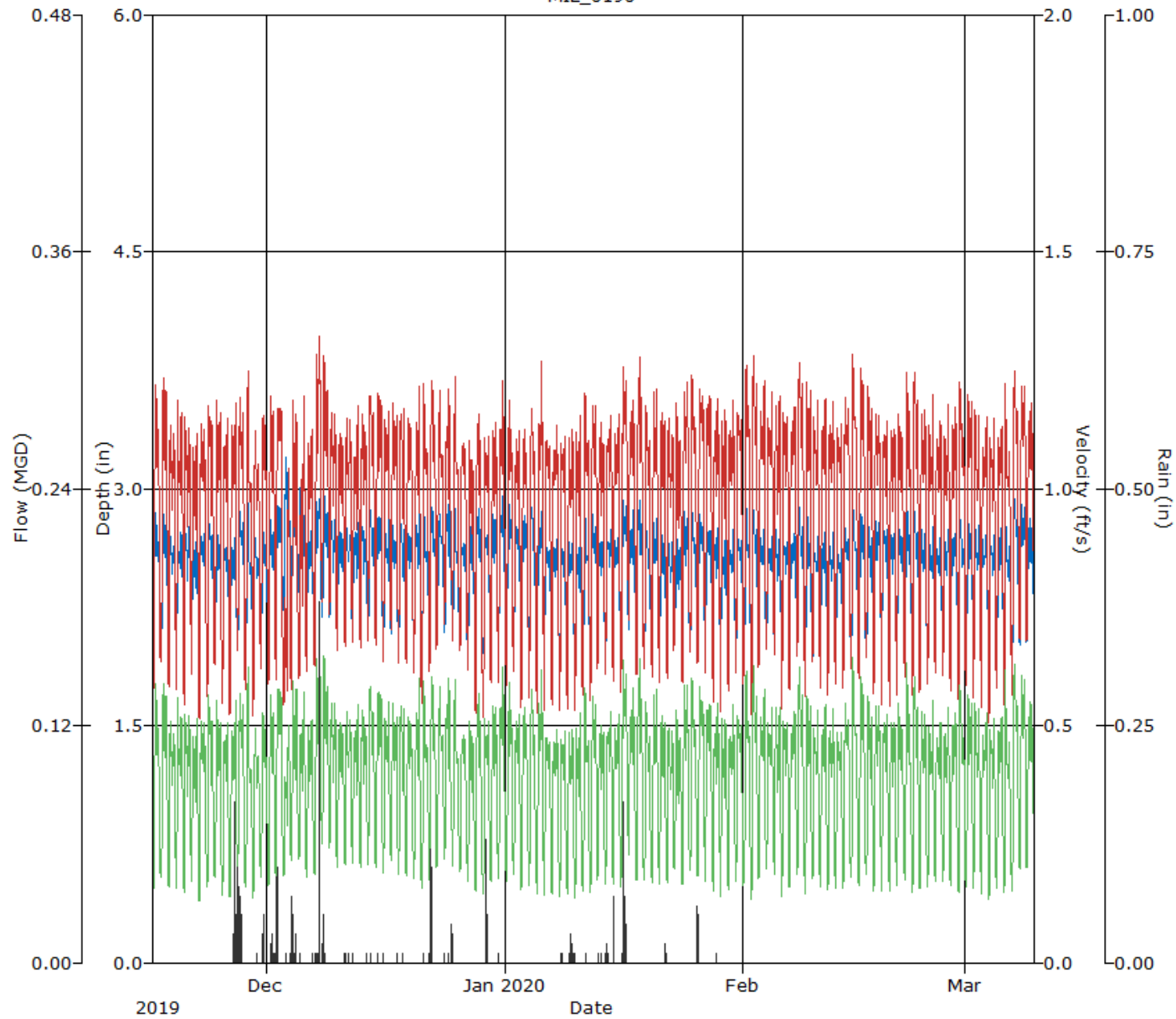


Pipe Height
18.00 in.

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0190, Pipe Height: 18.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 05:40 | 1.91 | 11:20 | 2.88 | 2.45 | 05:30 | 0.55 | 12:55 | 1.35 | 0.96 | 05:30 | 0.036 | 13:00 | 0.155 | 0.093 | 0.093 | |
| 11/17/2019 | 05:05 | 1.95 | 11:00 | 3.02 | 2.48 | 04:10 | 0.58 | 10:55 | 1.36 | 0.98 | 04:10 | 0.040 | 10:55 | 0.172 | 0.097 | 0.097 | |
| 11/18/2019 | 03:55 | 1.91 | 11:05 | 2.74 | 2.42 | 03:45 | 0.53 | 20:00 | 1.23 | 0.94 | 03:45 | 0.034 | 11:10 | 0.130 | 0.089 | 0.089 | |
| 11/19/2019 | 05:35 | 1.89 | 09:05 | 2.81 | 2.44 | 05:35 | 0.54 | 18:45 | 1.38 | 0.95 | 05:35 | 0.034 | 18:45 | 0.150 | 0.091 | 0.091 | |
| 11/20/2019 | 04:35 | 1.91 | 19:10 | 2.80 | 2.46 | 04:25 | 0.49 | 08:35 | 1.25 | 0.94 | 04:25 | 0.032 | 19:05 | 0.137 | 0.091 | 0.091 | |
| 11/21/2019 | 04:40 | 1.95 | 21:10 | 2.88 | 2.41 | 04:40 | 0.55 | 18:35 | 1.19 | 0.92 | 04:40 | 0.037 | 21:15 | 0.138 | 0.086 | 0.086 | |
| 11/22/2019 | 04:00 | 1.80 | 10:45 | 2.76 | 2.41 | 03:50 | 0.41 | 10:25 | 1.23 | 0.93 | 03:50 | 0.024 | 10:35 | 0.134 | 0.088 | 0.088 | |
| 11/23/2019 | 03:20 | 1.96 | 10:15 | 2.91 | 2.46 | 05:00 | 0.54 | 11:15 | 1.30 | 0.94 | 05:00 | 0.037 | 10:15 | 0.150 | 0.092 | 0.092 | |
| 11/24/2019 | 03:40 | 1.98 | 12:35 | 2.81 | 2.44 | 03:35 | 0.57 | 21:55 | 1.25 | 0.96 | 03:35 | 0.039 | 22:00 | 0.141 | 0.092 | 0.092 | |
| 11/25/2019 | 05:35 | 1.83 | 21:30 | 2.69 | 2.38 | 04:20 | 0.53 | 20:30 | 1.20 | 0.93 | 05:35 | 0.032 | 18:50 | 0.126 | 0.087 | 0.087 | |
| 11/26/2019 | 05:40 | 1.84 | 21:15 | 2.87 | 2.39 | 03:50 | 0.44 | 12:50 | 1.28 | 0.93 | 03:50 | 0.027 | 21:15 | 0.147 | 0.088 | 0.088 | 0.36 |
| 11/27/2019 | 05:25 | 2.00 | 12:45 | 2.95 | 2.52 | 05:10 | 0.61 | 12:40 | 1.29 | 0.98 | 05:10 | 0.043 | 12:40 | 0.157 | 0.099 | 0.099 | 0.63 |
| 11/28/2019 | 05:25 | 1.92 | 12:45 | 3.00 | 2.41 | 06:25 | 0.52 | 12:50 | 1.30 | 0.93 | 06:25 | 0.034 | 12:50 | 0.160 | 0.088 | 0.088 | |
| 11/29/2019 | 05:40 | 1.85 | 10:35 | 2.74 | 2.35 | 04:40 | 0.50 | 12:25 | 1.24 | 0.90 | 05:50 | 0.031 | 10:35 | 0.135 | 0.082 | 0.082 | 0.02 |
| 11/30/2019 | 05:35 | 1.99 | 11:05 | 2.78 | 2.42 | 05:15 | 0.58 | 14:20 | 1.22 | 0.94 | 05:15 | 0.040 | 11:05 | 0.135 | 0.089 | 0.089 | 0.10 |
| 12/01/2019 | 06:25 | 1.92 | 11:30 | 2.84 | 2.43 | 06:25 | 0.55 | 11:30 | 1.29 | 0.94 | 06:25 | 0.036 | 11:30 | 0.150 | 0.091 | 0.091 | 0.06 |
| 12/02/2019 | 05:15 | 1.92 | 09:00 | 2.95 | 2.56 | 04:10 | 0.55 | 09:00 | 1.20 | 1.00 | 04:10 | 0.037 | 09:00 | 0.147 | 0.104 | 0.104 | 0.30 |
| 12/03/2019 | 06:05 | 2.19 | 13:25 | 3.24 | 2.75 | 03:50 | 0.50 | 18:45 | 1.12 | 0.74 | 03:50 | 0.041 | 20:10 | 0.130 | 0.082 | 0.082 | 0.01 |
| 12/04/2019 | 02:15 | 2.36 | 11:10 | 2.98 | 2.72 | 05:15 | 0.52 | 09:10 | 1.26 | 0.91 | 04:00 | 0.048 | 09:10 | 0.153 | 0.101 | 0.101 | 0.39 |
| 12/05/2019 | 04:45 | 2.33 | 15:10 | 3.18 | 2.67 | 04:55 | 0.57 | 21:45 | 1.25 | 0.87 | 04:55 | 0.050 | 15:15 | 0.152 | 0.094 | 0.094 | 0.01 |
| 12/06/2019 | 03:50 | 2.01 | 19:25 | 2.89 | 2.49 | 05:20 | 0.58 | 19:25 | 1.28 | 0.95 | 03:20 | 0.041 | 19:25 | 0.152 | 0.094 | 0.094 | 0.01 |
| 12/07/2019 | 05:25 | 2.01 | 21:05 | 2.98 | 2.58 | 05:15 | 0.59 | 12:50 | 1.44 | 1.03 | 05:15 | 0.042 | 12:50 | 0.174 | 0.108 | 0.108 | 0.67 |
| 12/08/2019 | 04:25 | 2.18 | 10:50 | 2.99 | 2.63 | 05:15 | 0.72 | 10:55 | 1.37 | 1.07 | 05:15 | 0.056 | 10:55 | 0.170 | 0.113 | 0.113 | 0.20 |
| 12/09/2019 | 03:50 | 2.16 | 21:25 | 2.84 | 2.55 | 04:05 | 0.65 | 22:00 | 1.28 | 1.00 | 04:05 | 0.050 | 11:30 | 0.144 | 0.101 | 0.101 | |
| 12/10/2019 | 04:35 | 2.05 | 19:00 | 2.77 | 2.50 | 03:40 | 0.61 | 11:00 | 1.23 | 0.96 | 03:40 | 0.044 | 11:00 | 0.134 | 0.094 | 0.094 | |
| 12/11/2019 | 03:45 | 2.07 | 09:10 | 2.79 | 2.50 | 05:00 | 0.64 | 20:55 | 1.25 | 0.97 | 05:00 | 0.047 | 20:00 | 0.137 | 0.095 | 0.095 | 0.03 |
| 12/12/2019 | 03:45 | 2.08 | 13:55 | 3.29 | 2.50 | 03:55 | 0.63 | 13:50 | 1.38 | 0.97 | 03:55 | 0.047 | 13:55 | 0.196 | 0.095 | 0.095 | 0.01 |
| 12/13/2019 | 05:00 | 2.02 | 14:00 | 2.87 | 2.49 | 05:10 | 0.62 | 13:50 | 1.25 | 0.97 | 05:10 | 0.044 | 10:40 | 0.144 | 0.095 | 0.095 | 0.01 |
| 12/14/2019 | 05:35 | 2.05 | 11:05 | 2.90 | 2.53 | 04:55 | 0.66 | 12:05 | 1.30 | 1.01 | 05:35 | 0.048 | 11:00 | 0.150 | 0.102 | 0.102 | 0.01 |
| 12/15/2019 | 04:20 | 2.04 | 20:50 | 2.85 | 2.53 | 05:20 | 0.64 | 13:45 | 1.29 | 1.00 | 05:20 | 0.046 | 13:45 | 0.149 | 0.101 | 0.101 | 0.01 |
| 12/16/2019 | 04:10 | 2.01 | 21:15 | 2.89 | 2.48 | 03:50 | 0.59 | 11:25 | 1.27 | 0.98 | 03:50 | 0.042 | 21:15 | 0.145 | 0.096 | 0.096 | 0.01 |
| 12/17/2019 | 04:45 | 2.05 | 10:10 | 2.80 | 2.49 | 05:20 | 0.62 | 20:55 | 1.33 | 1.00 | 05:20 | 0.045 | 20:55 | 0.142 | 0.098 | 0.098 | 0.01 |
| 12/18/2019 | 04:45 | 1.99 | 14:30 | 2.81 | 2.48 | 05:30 | 0.58 | 22:00 | 1.36 | 0.98 | 05:30 | 0.040 | 22:00 | 0.148 | 0.096 | 0.096 | 0.01 |
| 12/19/2019 | 03:50 | 1.98 | 13:05 | 2.77 | 2.47 | 04:50 | 0.57 | 09:30 | 1.24 | 0.97 | 04:50 | 0.040 | 09:10 | 0.138 | 0.094 | 0.094 | |
| 12/20/2019 | 04:20 | 1.98 | 20:55 | 2.92 | 2.49 | 04:00 | 0.54 | 20:55 | 1.29 | 0.95 | 04:00 | 0.038 | 20:55 | 0.155 | 0.093 | 0.093 | |
| 12/21/2019 | 05:40 | 1.97 | 11:05 | 2.92 | 2.46 | 05:30 | 0.49 | 11:05 | 1.35 | 0.94 | 05:30 | 0.034 | 11:05 | 0.162 | 0.092 | 0.092 | 0.01 |
| 12/22/2019 | 06:25 | 1.94 | 11:10 | 2.91 | 2.50 | 05:15 | 0.52 | 11:00 | 1.38 | 0.99 | 05:15 | 0.035 | 11:00 | 0.163 | 0.099 | 0.099 | 0.41 |
| 12/23/2019 | 05:10 | 2.04 | 13:40 | 2.91 | 2.52 | 03:40 | 0.63 | 10:45 | 1.32 | 0.97 | 03:40 | 0.045 | 13:40 | 0.154 | 0.097 | 0.097 | |
| 12/24/2019 | 05:25 | 2.07 | 18:25 | 2.95 | 2.54 | 04:55 | 0.64 | 20:25 | 1.25 | 0.98 | 04:55 | 0.047 | 18:30 | 0.150 | 0.099 | 0.099 | 0.02 |
| 12/25/2019 | 06:00 | 2.02 | 12:30 | 2.94 | 2.47 | 05:30 | 0.65 | 14:30 | 1.47 | 0.96 | 05:55 | 0.047 | 14:30 | 0.174 | 0.093 | 0.093 | 0.08 |
| 12/26/2019 | 04:55 | 2.00 | 10:40 | 2.70 | 2.42 | 05:10 | 0.63 | 19:45 | 1.20 | 0.94 | 04:55 | 0.044 | 19:45 | 0.128 | 0.088 | 0.088 | |
| 12/27/2019 | 04:50 | 1.94 | 13:05 | 2.82 | 2.44 | 04:45 | 0.53 | 19:35 | 1.17 | 0.91 | 04:45 | 0.035 | 13:05 | 0.134 | 0.087 | 0.087 | |
| 12/28/2019 | 06:30 | 1.95 | 14:20 | 2.93 | 2.48 | 06:20 | 0.49 | 14:30 | 1.22 | 0.91 | 06:20 | 0.033 | 14:30 | 0.145 | 0.090 | 0.090 | |
| 12/29/2019 | 06:05 | 1.94 | 10:30 | 2.84 | 2.45 | 05:40 | 0.50 | 21:30 | 1.19 | 0.89 | 05:50 | 0.033 | 20:05 | 0.133 | 0.087 | 0.087 | 0.22 |
| 12/30/2019 | 04:45 | 1.99 | 12:55 | 2.91 | 2.50 | 05:45 | 0.56 | 12:55 | 1.21 | 0.92 | 05:45 | 0.039 | 12:55 | 0.145 | 0.092 | 0.092 | |
| 12/31/2019 | 05:15 | 2.01 | 19:25 | 3.00 | 2.56 | 04:20 | 0.54 | 19:00 | 1.26 | 0.95 | 05:05 | 0.039 | 19:25 | 0.157 | 0.098 | 0.098 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 06:05 | 2.01 | 17:10 | 3.07 | 2.51 | 06:15 | 0.56 | 17:10 | 1.31 | 0.93 | 06:15 | 0.039 | 17:10 | 0.170 | 0.093 | 0.093 | | |
| 01/02/2020 | 05:30 | 2.04 | 21:25 | 2.85 | 2.50 | 04:45 | 0.59 | 15:10 | 1.19 | 0.92 | 04:45 | 0.042 | 21:20 | 0.134 | 0.091 | 0.091 | | |
| 01/03/2020 | 05:20 | 1.96 | 13:10 | 2.87 | 2.48 | 04:25 | 0.50 | 12:40 | 1.19 | 0.90 | 04:25 | 0.035 | 13:05 | 0.138 | 0.089 | 0.089 | | |
| 01/04/2020 | 05:50 | 2.01 | 13:20 | 2.91 | 2.50 | 05:15 | 0.54 | 12:40 | 1.21 | 0.92 | 05:15 | 0.038 | 12:40 | 0.144 | 0.092 | 0.092 | | |
| 01/05/2020 | 05:55 | 1.93 | 21:00 | 3.01 | 2.47 | 05:40 | 0.50 | 21:00 | 1.34 | 0.93 | 05:40 | 0.033 | 21:00 | 0.168 | 0.093 | 0.093 | | |
| 01/06/2020 | 05:00 | 1.86 | 20:55 | 2.72 | 2.40 | 04:45 | 0.46 | 11:20 | 1.22 | 0.93 | 04:45 | 0.029 | 12:05 | 0.128 | 0.087 | 0.087 | | |
| 01/07/2020 | 04:55 | 1.85 | 21:00 | 2.80 | 2.38 | 04:55 | 0.50 | 20:55 | 1.30 | 0.92 | 04:55 | 0.031 | 20:55 | 0.148 | 0.086 | 0.086 | | |
| 01/08/2020 | 05:30 | 1.84 | 21:25 | 2.77 | 2.39 | 05:20 | 0.50 | 21:15 | 1.20 | 0.92 | 05:30 | 0.031 | 21:15 | 0.131 | 0.086 | 0.086 | | |
| 01/09/2020 | 05:00 | 1.88 | 08:55 | 2.71 | 2.41 | 04:45 | 0.51 | 21:15 | 1.19 | 0.92 | 04:55 | 0.033 | 21:15 | 0.127 | 0.087 | 0.087 | 0.02 | |
| 01/10/2020 | 05:10 | 1.82 | 20:40 | 2.78 | 2.38 | 04:55 | 0.50 | 09:35 | 1.26 | 0.93 | 05:10 | 0.030 | 09:35 | 0.135 | 0.086 | 0.086 | 0.18 | |
| 01/11/2020 | 05:25 | 1.87 | 11:10 | 2.93 | 2.43 | 05:05 | 0.52 | 12:40 | 1.32 | 0.94 | 05:05 | 0.033 | 12:40 | 0.154 | 0.091 | 0.091 | 0.02 | |
| 01/12/2020 | 05:10 | 1.88 | 11:15 | 2.92 | 2.46 | 05:35 | 0.54 | 19:05 | 1.29 | 0.96 | 05:35 | 0.034 | 11:15 | 0.147 | 0.094 | 0.094 | 0.01 | |
| 01/13/2020 | 03:45 | 1.94 | 20:45 | 2.81 | 2.43 | 04:25 | 0.58 | 20:45 | 1.18 | 0.95 | 04:25 | 0.040 | 20:45 | 0.134 | 0.091 | 0.091 | | |
| 01/14/2020 | 03:35 | 1.90 | 19:45 | 2.82 | 2.44 | 02:25 | 0.57 | 19:40 | 1.31 | 0.96 | 03:25 | 0.038 | 19:40 | 0.149 | 0.092 | 0.092 | | |
| 01/15/2020 | 04:55 | 1.91 | 21:10 | 2.77 | 2.44 | 04:45 | 0.56 | 19:35 | 1.23 | 0.95 | 04:45 | 0.037 | 21:10 | 0.137 | 0.091 | 0.091 | | |
| 01/16/2020 | 04:30 | 1.93 | 12:40 | 3.22 | 2.52 | 03:20 | 0.54 | 12:50 | 1.38 | 1.00 | 03:50 | 0.036 | 12:40 | 0.186 | 0.102 | 0.102 | | |
| 01/17/2020 | 04:40 | 2.08 | 19:05 | 2.90 | 2.54 | 04:45 | 0.71 | 10:55 | 1.29 | 1.03 | 04:45 | 0.052 | 19:00 | 0.149 | 0.103 | 0.103 | 0.66 | |
| 01/18/2020 | 05:40 | 1.98 | 14:40 | 3.02 | 2.51 | 03:40 | 0.55 | 14:40 | 1.35 | 0.99 | 03:40 | 0.040 | 14:40 | 0.170 | 0.099 | 0.099 | | |
| 01/19/2020 | 04:35 | 1.95 | 10:40 | 2.84 | 2.43 | 04:10 | 0.58 | 14:00 | 1.32 | 0.95 | 04:10 | 0.039 | 14:00 | 0.146 | 0.090 | 0.090 | | |
| 01/20/2020 | 05:20 | 1.95 | 20:05 | 2.85 | 2.44 | 06:10 | 0.55 | 11:00 | 1.35 | 0.97 | 06:10 | 0.038 | 11:00 | 0.149 | 0.093 | 0.093 | | |
| 01/21/2020 | 04:55 | 1.94 | 21:00 | 2.85 | 2.45 | 05:10 | 0.57 | 21:05 | 1.27 | 0.97 | 05:10 | 0.038 | 21:05 | 0.147 | 0.094 | 0.094 | | |
| 01/22/2020 | 05:25 | 1.92 | 09:10 | 2.74 | 2.41 | 05:30 | 0.55 | 08:55 | 1.25 | 0.96 | 05:25 | 0.036 | 09:00 | 0.135 | 0.090 | 0.090 | 0.03 | |
| 01/23/2020 | 05:20 | 2.01 | 09:20 | 2.76 | 2.42 | 02:45 | 0.59 | 09:00 | 1.29 | 0.96 | 02:45 | 0.042 | 11:55 | 0.138 | 0.090 | 0.090 | | |
| 01/24/2020 | 05:05 | 1.92 | 19:45 | 3.01 | 2.49 | 05:10 | 0.54 | 19:45 | 1.32 | 1.00 | 05:10 | 0.035 | 19:45 | 0.165 | 0.099 | 0.099 | | |
| 01/25/2020 | 06:20 | 2.00 | 10:45 | 2.93 | 2.49 | 06:05 | 0.55 | 10:25 | 1.32 | 1.00 | 06:05 | 0.039 | 10:25 | 0.157 | 0.099 | 0.099 | | |
| 01/26/2020 | 04:15 | 1.97 | 11:55 | 2.87 | 2.49 | 03:45 | 0.58 | 11:55 | 1.30 | 1.00 | 03:45 | 0.040 | 11:55 | 0.152 | 0.099 | 0.099 | | |
| 01/27/2020 | 04:40 | 1.97 | 19:45 | 2.78 | 2.48 | 04:20 | 0.55 | 08:35 | 1.30 | 1.00 | 04:20 | 0.037 | 21:05 | 0.139 | 0.098 | 0.098 | 0.16 | |
| 01/28/2020 | 04:50 | 1.91 | 20:30 | 2.83 | 2.44 | 04:40 | 0.51 | 20:25 | 1.27 | 0.97 | 04:50 | 0.033 | 20:25 | 0.145 | 0.092 | 0.092 | 0.01 | |
| 01/29/2020 | 05:25 | 1.83 | 09:15 | 2.79 | 2.39 | 05:10 | 0.48 | 19:20 | 1.28 | 0.94 | 05:10 | 0.029 | 09:10 | 0.136 | 0.088 | 0.088 | | |
| 01/30/2020 | 05:15 | 1.90 | 19:40 | 2.79 | 2.40 | 04:50 | 0.54 | 19:35 | 1.27 | 0.96 | 04:50 | 0.035 | 19:40 | 0.143 | 0.090 | 0.090 | | |
| 01/31/2020 | 04:00 | 1.95 | 09:05 | 2.74 | 2.46 | 04:40 | 0.57 | 13:50 | 1.25 | 1.00 | 04:40 | 0.039 | 13:50 | 0.135 | 0.096 | 0.096 | | |
| 02/01/2020 | 04:10 | 1.90 | 14:10 | 2.91 | 2.45 | 03:50 | 0.54 | 20:10 | 1.37 | 0.99 | 03:50 | 0.035 | 14:10 | 0.157 | 0.097 | 0.097 | | |
| 02/02/2020 | 05:35 | 1.83 | 12:15 | 2.88 | 2.45 | 05:30 | 0.50 | 12:35 | 1.46 | 0.99 | 05:30 | 0.031 | 12:35 | 0.171 | 0.097 | 0.097 | | |
| 02/03/2020 | 03:55 | 1.95 | 21:05 | 2.87 | 2.45 | 04:05 | 0.56 | 21:00 | 1.33 | 0.99 | 04:05 | 0.037 | 21:00 | 0.157 | 0.096 | 0.096 | | |
| 02/04/2020 | 04:00 | 2.02 | 20:05 | 2.74 | 2.45 | 03:10 | 0.63 | 22:10 | 1.28 | 1.00 | 04:00 | 0.046 | 20:20 | 0.139 | 0.096 | 0.096 | | |
| 02/05/2020 | 05:30 | 1.98 | 10:20 | 2.82 | 2.45 | 06:00 | 0.60 | 20:55 | 1.37 | 0.99 | 06:00 | 0.041 | 20:55 | 0.145 | 0.094 | 0.094 | | |
| 02/06/2020 | 04:20 | 1.84 | 10:55 | 2.70 | 2.41 | 03:20 | 0.51 | 21:25 | 1.23 | 0.96 | 03:00 | 0.033 | 21:25 | 0.130 | 0.091 | 0.091 | | |
| 02/07/2020 | 05:15 | 1.88 | 20:35 | 2.75 | 2.42 | 05:05 | 0.50 | 20:35 | 1.28 | 0.97 | 05:05 | 0.033 | 20:35 | 0.141 | 0.092 | 0.092 | | |
| 02/08/2020 | 05:20 | 1.98 | 09:45 | 3.01 | 2.47 | 04:05 | 0.61 | 09:40 | 1.41 | 1.02 | 05:05 | 0.042 | 09:40 | 0.173 | 0.099 | 0.099 | | |
| 02/09/2020 | 06:10 | 1.83 | 13:15 | 2.90 | 2.40 | 06:10 | 0.52 | 10:50 | 1.30 | 0.96 | 06:10 | 0.032 | 10:50 | 0.149 | 0.091 | 0.091 | | |
| 02/10/2020 | 05:20 | 1.91 | 21:15 | 2.76 | 2.41 | 03:50 | 0.60 | 07:55 | 1.34 | 0.98 | 03:50 | 0.039 | 07:55 | 0.136 | 0.092 | 0.092 | | |
| 02/11/2020 | 04:35 | 1.91 | 21:25 | 2.82 | 2.42 | 04:25 | 0.53 | 21:20 | 1.27 | 0.97 | 04:25 | 0.035 | 21:20 | 0.144 | 0.092 | 0.092 | | |
| 02/12/2020 | 04:05 | 1.87 | 21:25 | 2.76 | 2.42 | 03:45 | 0.51 | 20:00 | 1.21 | 0.98 | 03:45 | 0.033 | 21:25 | 0.133 | 0.093 | 0.093 | | |
| 02/13/2020 | 04:50 | 1.88 | 08:50 | 2.75 | 2.40 | 04:20 | 0.55 | 22:45 | 1.22 | 0.97 | 05:00 | 0.035 | 09:00 | 0.129 | 0.090 | 0.090 | | |
| 02/14/2020 | 05:05 | 1.88 | 11:05 | 2.77 | 2.44 | 03:20 | 0.53 | 20:40 | 1.32 | 0.99 | 03:20 | 0.034 | 20:40 | 0.141 | 0.095 | 0.095 | | |
| 02/15/2020 | 03:25 | 1.99 | 09:30 | 2.99 | 2.48 | 04:20 | 0.60 | 09:20 | 1.44 | 1.01 | 04:20 | 0.042 | 09:20 | 0.176 | 0.100 | 0.100 | | |
| 02/16/2020 | 05:15 | 1.90 | 13:40 | 2.88 | 2.45 | 05:25 | 0.57 | 14:10 | 1.28 | 0.99 | 05:25 | 0.037 | 13:45 | 0.151 | 0.097 | 0.097 | | |
| 02/17/2020 | 05:05 | 1.94 | 10:50 | 2.86 | 2.43 | 04:50 | 0.55 | 12:35 | 1.29 | 0.98 | 04:50 | 0.037 | 10:45 | 0.148 | 0.094 | 0.094 | | |
| 02/18/2020 | 03:35 | 1.87 | 18:10 | 2.84 | 2.45 | 03:45 | 0.54 | 18:10 | 1.20 | 0.95 | 03:30 | 0.034 | 18:10 | 0.139 | 0.092 | 0.092 | | |
| 02/19/2020 | 04:10 | 1.95 | 12:05 | 2.82 | 2.47 | 04:15 | 0.53 | 20:45 | 1.21 | 0.94 | 04:10 | 0.035 | 20:45 | 0.137 | 0.092 | 0.092 | | |
| 02/20/2020 | 04:55 | 1.91 | 12:45 | 2.77 | 2.45 | 05:05 | 0.51 | 18:45 | 1.22 | 0.93 | 05:05 | 0.033 | 20:30 | 0.131 | 0.090 | 0.090 | | |
| 02/21/2020 | 05:15 | 1.97 | 09:30 | 2.86 | 2.48 | 04:35 | 0.53 | 18:45 | 1.27 | 0.95 | 04:35 | 0.036 | 09:30 | 0.140 | 0.093 | 0.093 | | |
| 02/22/2020 | 06:10 | 1.97 | 11:10 | 3.00 | 2.48 | 05:55 | 0.56 | 11:50 | 1.27 | 0.96 | 05:55 | 0.038 | 11:10 | 0.158 | 0.095 | 0.095 | | |
| 02/23/2020 | 05:15 | 1.87 | 11:25 | 2.87 | 2.45 | 06:00 | 0.54 | 10:10 | 1.35 | 0.98 | 06:00 | 0.034 | 10:10 | 0.152 | 0.096 | 0.096 | | |
| 02/24/2020 | 03:55 | 1.89 | 19:50 | 2.81 | 2.43 | 04:05 | 0.48 | 19:40 | 1.25 | 0.97 | 04:05 | 0.031 | 19:40 | 0.142 | 0.093 | 0.093 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 04:55 | 1.88 | 21:15 | 2.81 | 2.42 | 04:40 | 0.52 | 19:55 | 1.26 | 0.95 | 04:40 | 0.034 | 21:10 | 0.139 | 0.090 | 0.090 | |
| 02/26/2020 | 05:05 | 1.92 | 21:15 | 2.74 | 2.42 | 04:50 | 0.55 | 20:30 | 1.27 | 0.96 | 04:55 | 0.036 | 20:30 | 0.135 | 0.091 | 0.091 | |
| 02/27/2020 | 04:55 | 1.94 | 20:55 | 2.78 | 2.44 | 05:00 | 0.57 | 08:50 | 1.26 | 0.96 | 05:00 | 0.038 | 20:30 | 0.138 | 0.091 | 0.091 | |
| 02/28/2020 | 05:10 | 1.91 | 20:35 | 2.75 | 2.44 | 05:05 | 0.51 | 20:45 | 1.21 | 0.95 | 05:05 | 0.033 | 21:20 | 0.132 | 0.091 | 0.091 | |
| 02/29/2020 | 06:15 | 1.89 | 09:35 | 2.93 | 2.43 | 06:10 | 0.52 | 09:30 | 1.29 | 0.95 | 06:15 | 0.033 | 09:35 | 0.156 | 0.091 | 0.091 | |
| 03/01/2020 | 05:00 | 1.90 | 21:10 | 2.84 | 2.44 | 06:10 | 0.55 | 12:30 | 1.33 | 0.96 | 06:10 | 0.036 | 12:30 | 0.148 | 0.093 | 0.093 | |
| 03/02/2020 | 04:30 | 1.93 | 09:15 | 2.85 | 2.46 | 04:20 | 0.54 | 09:10 | 1.30 | 0.95 | 04:20 | 0.036 | 09:10 | 0.149 | 0.092 | 0.092 | |
| 03/03/2020 | 05:40 | 1.90 | 21:40 | 2.79 | 2.44 | 05:20 | 0.52 | 19:10 | 1.22 | 0.93 | 05:20 | 0.034 | 19:10 | 0.136 | 0.089 | 0.089 | |
| 03/04/2020 | 04:55 | 1.86 | 21:10 | 2.77 | 2.41 | 05:05 | 0.48 | 21:05 | 1.21 | 0.92 | 05:05 | 0.030 | 21:05 | 0.135 | 0.088 | 0.088 | |
| 03/05/2020 | 04:10 | 1.91 | 20:55 | 2.78 | 2.44 | 03:30 | 0.55 | 18:55 | 1.16 | 0.94 | 03:35 | 0.036 | 21:10 | 0.129 | 0.091 | 0.091 | |
| 03/06/2020 | 04:50 | 1.89 | 09:25 | 3.19 | 2.42 | 04:45 | 0.51 | 09:10 | 1.47 | 0.93 | 04:45 | 0.033 | 09:10 | 0.198 | 0.088 | 0.088 | |
| 03/07/2020 | 05:30 | 1.88 | 13:55 | 3.03 | 2.52 | 05:10 | 0.54 | 16:10 | 1.31 | 1.00 | 05:25 | 0.034 | 13:55 | 0.166 | 0.102 | 0.102 | |
| 03/08/2020 | 05:30 | 1.98 | 17:50 | 3.10 | 2.56 | 05:30 | 0.66 | 13:35 | 1.33 | 1.03 | 05:30 | 0.045 | 17:50 | 0.173 | 0.105 | 0.105 | |
| 03/09/2020 | 03:50 | 2.01 | 11:50 | 2.91 | 2.49 | 03:45 | 0.63 | 11:40 | 1.24 | 0.99 | 03:45 | 0.044 | 11:50 | 0.145 | 0.098 | 0.098 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 10.748 | 4.90 |
| Avg | 2.47 | 0.96 | 0.093 | |

Site Commentary

Site Information

| MIL_0229 | |
|-----------------|-------|
| Pipe Dimensions | 21 |
| Silt Level | 0.00" |

Overview

Site MIL_0229 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed upstream of site MIL_2808. (See MIL_2808 Site Commentary for More Details)

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 3.46 | 0.59 | 0.103 |
| Minimum | 1.78 | 0.19 | 0.021 |
| Maximum | 5.18 | 0.94 | 0.253 |
| Time of Minimum | 11/29/2019 7:00 AM | 2/26/2020 4:00 AM | 11/29/2019 7:05 AM |
| Time of Maximum | 12/6/2019 3:20 PM | 11/21/2019 9:05 AM | 1/21/2020 1:55 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0229

Site Address /Location:

Bellew Dr and McCarthy Blvd

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details:

In right lane of road

Latitude:

37.420574°

Longitude:

-121.921605°

Pipe Size (H x W)

21.0" x 21.0"

Pipe Shape

Circular

Manhole #

229

System Characteristics

Residential/Commercial

Access

Drive

Traffic

Medium



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

4:21:29 AM

Pipe Size (HxW)

21.0" x 21.0"

Depth of Flow (Wet DOF) (in)

2.25

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

0.25

Velocity Sensor Offset (in)

0"

Silt (in)

0.25"

Silt Type

Soft / Loose

Hydraulic Comments:

Shallow depth with slow velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

15'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name:

Milpitas.WWTFM.CA19-20

ADS Project Number:

22431

SCATTERGRAPH REPORT

MIL_0229

Flow Monitor

MIL_0229

Pipe Height
21.00 in

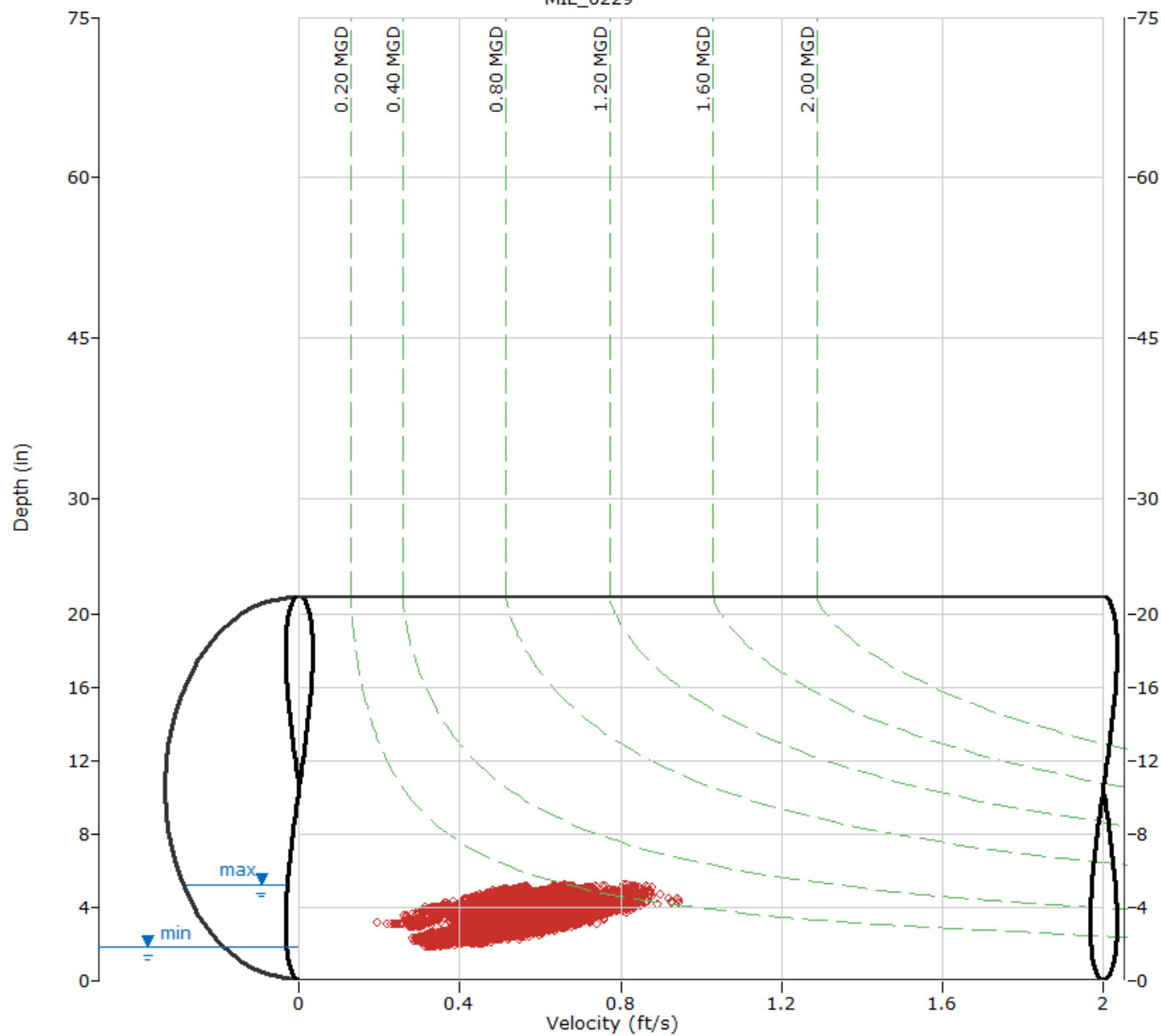
Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

ADS ENVIRONMENTAL
SERVICES



HYDROGRAPH REPORT

MIL_0229

Flow Monitor

MIL_0229

Pipe Height

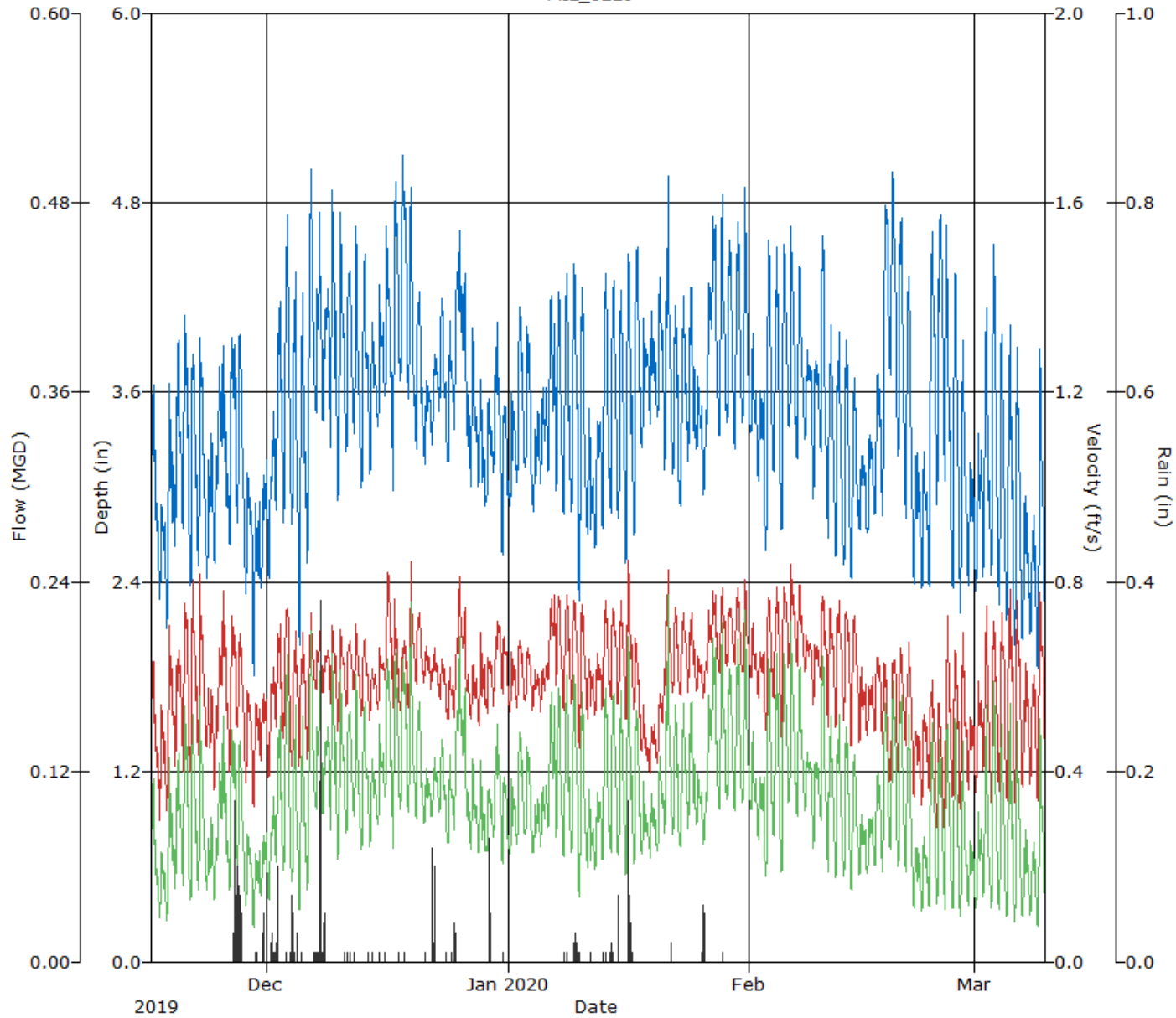
21.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0229, Pipe Height: 21.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 21:15 | 2.61 | 10:30 | 4.06 | 3.16 | 23:25 | 0.39 | 10:30 | 0.75 | 0.52 | 20:50 | 0.044 | 10:30 | 0.157 | 0.079 | 0.079 | |
| 11/17/2019 | 07:10 | 2.27 | 10:00 | 3.04 | 2.63 | 05:30 | 0.28 | 09:55 | 0.62 | 0.43 | 05:30 | 0.026 | 09:55 | 0.085 | 0.050 | 0.050 | |
| 11/18/2019 | 03:25 | 2.07 | 10:15 | 3.89 | 2.91 | 02:45 | 0.29 | 10:10 | 0.78 | 0.52 | 03:15 | 0.023 | 10:15 | 0.153 | 0.072 | 0.072 | |
| 11/19/2019 | 05:55 | 2.56 | 15:45 | 4.10 | 3.30 | 05:45 | 0.35 | 15:55 | 0.74 | 0.57 | 05:55 | 0.038 | 15:55 | 0.155 | 0.091 | 0.091 | |
| 11/20/2019 | 03:35 | 2.72 | 09:40 | 4.27 | 3.35 | 03:40 | 0.37 | 09:40 | 0.82 | 0.59 | 03:40 | 0.044 | 09:40 | 0.185 | 0.099 | 0.099 | |
| 11/21/2019 | 03:55 | 2.34 | 09:10 | 4.19 | 3.17 | 03:30 | 0.39 | 09:05 | 0.94 | 0.58 | 03:30 | 0.037 | 09:05 | 0.208 | 0.091 | 0.091 | |
| 11/22/2019 | 04:40 | 2.46 | 09:15 | 4.42 | 3.20 | 04:00 | 0.40 | 09:20 | 0.94 | 0.60 | 04:00 | 0.041 | 09:15 | 0.225 | 0.093 | 0.093 | |
| 11/23/2019 | 07:30 | 2.40 | 21:55 | 3.38 | 2.90 | 15:45 | 0.42 | 08:25 | 0.61 | 0.50 | 07:35 | 0.043 | 22:00 | 0.095 | 0.066 | 0.066 | |
| 11/24/2019 | 07:05 | 2.49 | 21:15 | 3.92 | 3.07 | 06:50 | 0.34 | 20:55 | 0.68 | 0.50 | 07:05 | 0.036 | 21:15 | 0.134 | 0.073 | 0.073 | |
| 11/25/2019 | 20:45 | 2.82 | 08:30 | 3.95 | 3.32 | 23:50 | 0.48 | 08:40 | 0.83 | 0.62 | 23:55 | 0.063 | 08:25 | 0.168 | 0.098 | 0.098 | |
| 11/26/2019 | 06:05 | 2.61 | 21:05 | 4.22 | 3.37 | 04:05 | 0.38 | 21:05 | 0.79 | 0.59 | 04:05 | 0.044 | 21:05 | 0.176 | 0.099 | 0.099 | 0.36 |
| 11/27/2019 | 05:55 | 2.73 | 10:00 | 4.09 | 3.37 | 02:35 | 0.46 | 12:50 | 0.78 | 0.60 | 06:00 | 0.057 | 10:00 | 0.154 | 0.099 | 0.099 | 0.63 |
| 11/28/2019 | 05:35 | 2.21 | 12:00 | 3.37 | 2.75 | 05:40 | 0.34 | 12:00 | 0.63 | 0.49 | 05:40 | 0.030 | 12:00 | 0.101 | 0.060 | 0.060 | |
| 11/29/2019 | 07:00 | 1.78 | 14:15 | 3.10 | 2.51 | 06:00 | 0.31 | 17:20 | 0.64 | 0.46 | 07:05 | 0.021 | 14:15 | 0.084 | 0.050 | 0.050 | 0.02 |
| 11/30/2019 | 06:05 | 2.34 | 22:05 | 3.32 | 2.79 | 04:10 | 0.41 | 12:45 | 0.63 | 0.51 | 04:10 | 0.040 | 12:45 | 0.096 | 0.063 | 0.063 | 0.10 |
| 12/01/2019 | 05:55 | 2.39 | 20:25 | 3.57 | 2.95 | 07:50 | 0.37 | 21:50 | 0.63 | 0.51 | 07:50 | 0.037 | 20:25 | 0.110 | 0.070 | 0.070 | 0.06 |
| 12/02/2019 | 04:25 | 2.82 | 18:10 | 4.36 | 3.59 | 23:55 | 0.47 | 10:05 | 0.76 | 0.61 | 04:25 | 0.060 | 18:10 | 0.169 | 0.110 | 0.110 | 0.30 |
| 12/03/2019 | 04:05 | 2.73 | 14:55 | 4.79 | 3.72 | 04:05 | 0.43 | 14:00 | 0.80 | 0.62 | 04:05 | 0.051 | 14:00 | 0.212 | 0.120 | 0.120 | 0.01 |
| 12/04/2019 | 23:55 | 2.51 | 16:25 | 4.47 | 3.40 | 03:00 | 0.39 | 16:40 | 0.74 | 0.56 | 05:00 | 0.048 | 16:40 | 0.174 | 0.095 | 0.095 | 0.39 |
| 12/05/2019 | 05:30 | 1.98 | 13:15 | 4.45 | 3.16 | 03:55 | 0.39 | 13:15 | 0.76 | 0.57 | 03:55 | 0.030 | 13:15 | 0.182 | 0.088 | 0.088 | 0.01 |
| 12/06/2019 | 03:25 | 2.50 | 15:20 | 5.18 | 3.79 | 04:55 | 0.41 | 15:20 | 0.82 | 0.59 | 04:15 | 0.043 | 15:20 | 0.243 | 0.121 | 0.121 | 0.01 |
| 12/07/2019 | 06:10 | 3.39 | 18:20 | 4.95 | 3.99 | 06:10 | 0.56 | 18:20 | 0.71 | 0.63 | 06:10 | 0.092 | 18:20 | 0.199 | 0.130 | 0.130 | 0.67 |
| 12/08/2019 | 05:50 | 3.37 | 21:05 | 4.61 | 3.89 | 05:50 | 0.56 | 21:05 | 0.69 | 0.62 | 05:50 | 0.091 | 21:05 | 0.173 | 0.124 | 0.124 | 0.20 |
| 12/09/2019 | 03:15 | 3.25 | 09:30 | 5.02 | 4.05 | 03:15 | 0.54 | 09:30 | 0.72 | 0.63 | 03:15 | 0.083 | 09:30 | 0.205 | 0.134 | 0.134 | |
| 12/10/2019 | 03:25 | 2.87 | 13:45 | 5.11 | 3.81 | 02:15 | 0.47 | 13:45 | 0.75 | 0.60 | 02:45 | 0.063 | 13:45 | 0.221 | 0.119 | 0.119 | |
| 12/11/2019 | 04:20 | 3.21 | 14:25 | 4.50 | 3.86 | 04:20 | 0.54 | 17:30 | 0.71 | 0.62 | 04:20 | 0.081 | 14:25 | 0.166 | 0.123 | 0.123 | 0.03 |
| 12/12/2019 | 04:15 | 3.32 | 13:55 | 4.71 | 3.81 | 01:45 | 0.54 | 14:00 | 0.74 | 0.62 | 23:30 | 0.088 | 14:00 | 0.191 | 0.122 | 0.122 | 0.01 |
| 12/13/2019 | 03:50 | 2.97 | 14:50 | 4.64 | 3.73 | 04:25 | 0.48 | 15:10 | 0.72 | 0.61 | 04:25 | 0.065 | 14:50 | 0.177 | 0.116 | 0.116 | 0.01 |
| 12/14/2019 | 06:50 | 3.07 | 14:40 | 4.17 | 3.59 | 05:55 | 0.50 | 12:25 | 0.67 | 0.57 | 06:20 | 0.070 | 12:25 | 0.138 | 0.102 | 0.102 | 0.01 |
| 12/15/2019 | 06:05 | 3.37 | 11:10 | 4.31 | 3.78 | 07:05 | 0.52 | 11:10 | 0.66 | 0.60 | 07:05 | 0.085 | 11:10 | 0.153 | 0.115 | 0.115 | 0.01 |
| 12/16/2019 | 03:35 | 3.55 | 10:00 | 4.86 | 4.00 | 03:35 | 0.52 | 10:05 | 0.86 | 0.70 | 03:35 | 0.090 | 10:05 | 0.216 | 0.146 | 0.146 | 0.01 |
| 12/17/2019 | 04:05 | 2.95 | 13:35 | 5.04 | 4.10 | 05:40 | 0.51 | 09:35 | 0.83 | 0.64 | 04:05 | 0.069 | 13:40 | 0.217 | 0.140 | 0.140 | 0.01 |
| 12/18/2019 | 03:35 | 3.66 | 11:45 | 5.16 | 4.41 | 03:35 | 0.53 | 14:10 | 0.69 | 0.61 | 03:35 | 0.096 | 10:15 | 0.199 | 0.148 | 0.148 | 0.01 |
| 12/19/2019 | 22:35 | 3.46 | 11:05 | 4.99 | 4.03 | 03:45 | 0.52 | 12:15 | 0.87 | 0.66 | 04:20 | 0.092 | 12:15 | 0.235 | 0.141 | 0.141 | |
| 12/20/2019 | 05:40 | 3.22 | 15:45 | 4.28 | 3.76 | 04:25 | 0.55 | 14:55 | 0.79 | 0.66 | 04:25 | 0.085 | 14:55 | 0.177 | 0.126 | 0.126 | |
| 12/21/2019 | 07:00 | 3.12 | 11:35 | 3.79 | 3.44 | 04:35 | 0.58 | 11:30 | 0.71 | 0.62 | 04:35 | 0.086 | 11:30 | 0.135 | 0.104 | 0.104 | 0.01 |
| 12/22/2019 | 06:25 | 3.24 | 14:30 | 3.92 | 3.60 | 02:15 | 0.55 | 14:30 | 0.72 | 0.62 | 02:15 | 0.088 | 14:30 | 0.143 | 0.110 | 0.110 | 0.41 |
| 12/23/2019 | 03:30 | 3.46 | 11:30 | 4.27 | 3.78 | 06:05 | 0.52 | 04:20 | 0.71 | 0.59 | 06:20 | 0.090 | 14:05 | 0.148 | 0.113 | 0.113 | |
| 12/24/2019 | 06:35 | 3.14 | 12:15 | 4.13 | 3.58 | 04:45 | 0.49 | 12:30 | 0.65 | 0.56 | 07:15 | 0.072 | 12:30 | 0.139 | 0.099 | 0.099 | 0.02 |
| 12/25/2019 | 05:00 | 3.34 | 18:30 | 4.66 | 4.10 | 03:10 | 0.50 | 18:25 | 0.84 | 0.66 | 04:45 | 0.080 | 18:25 | 0.215 | 0.145 | 0.145 | 0.08 |
| 12/26/2019 | 19:55 | 3.21 | 01:00 | 4.41 | 3.84 | 23:00 | 0.51 | 12:05 | 0.76 | 0.65 | 18:55 | 0.085 | 12:25 | 0.178 | 0.128 | 0.128 | |
| 12/27/2019 | 05:45 | 2.99 | 11:20 | 4.07 | 3.50 | 04:00 | 0.47 | 12:10 | 0.64 | 0.57 | 04:00 | 0.066 | 11:25 | 0.132 | 0.098 | 0.098 | |
| 12/28/2019 | 05:00 | 2.98 | 12:50 | 4.09 | 3.21 | 06:45 | 0.48 | 13:00 | 0.74 | 0.57 | 06:45 | 0.066 | 12:50 | 0.151 | 0.086 | 0.086 | |
| 12/29/2019 | 02:10 | 2.86 | 12:15 | 3.60 | 3.21 | 07:20 | 0.50 | 17:45 | 0.76 | 0.59 | 07:20 | 0.066 | 12:15 | 0.123 | 0.090 | 0.090 | 0.22 |
| 12/30/2019 | 02:20 | 3.07 | 11:20 | 4.08 | 3.53 | 02:55 | 0.52 | 18:35 | 0.76 | 0.65 | 02:55 | 0.074 | 14:50 | 0.155 | 0.113 | 0.113 | |
| 12/31/2019 | 06:45 | 2.53 | 11:50 | 3.64 | 3.15 | 04:55 | 0.54 | 00:55 | 0.71 | 0.64 | 06:40 | 0.058 | 11:50 | 0.122 | 0.094 | 0.094 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 05:40 | 2.87 | 12:50 | 3.74 | 3.21 | 03:45 | 0.49 | 16:50 | 0.70 | 0.59 | 05:40 | 0.064 | 12:50 | 0.126 | 0.089 | 0.089 | |
| 01/02/2020 | 03:20 | 2.99 | 13:10 | 4.21 | 3.60 | 04:30 | 0.51 | 09:45 | 0.72 | 0.62 | 04:30 | 0.070 | 13:10 | 0.157 | 0.111 | 0.111 | |
| 01/03/2020 | 07:15 | 3.10 | 10:40 | 4.07 | 3.56 | 02:45 | 0.52 | 12:35 | 0.68 | 0.61 | 02:45 | 0.075 | 10:15 | 0.143 | 0.107 | 0.107 | |
| 01/04/2020 | 07:10 | 2.81 | 11:55 | 3.54 | 3.16 | 06:05 | 0.52 | 22:35 | 0.64 | 0.58 | 07:40 | 0.066 | 19:35 | 0.109 | 0.085 | 0.085 | |
| 01/05/2020 | 04:40 | 3.01 | 21:40 | 3.76 | 3.35 | 04:40 | 0.51 | 10:30 | 0.68 | 0.58 | 04:40 | 0.070 | 21:35 | 0.120 | 0.094 | 0.094 | |
| 01/06/2020 | 04:15 | 3.08 | 13:40 | 4.30 | 3.70 | 04:15 | 0.59 | 22:15 | 0.81 | 0.68 | 04:15 | 0.084 | 13:35 | 0.181 | 0.128 | 0.128 | |
| 01/07/2020 | 05:35 | 2.96 | 12:10 | 4.45 | 3.63 | 05:35 | 0.54 | 12:10 | 0.84 | 0.69 | 05:35 | 0.072 | 12:10 | 0.202 | 0.126 | 0.126 | |
| 01/08/2020 | 03:05 | 2.81 | 13:30 | 4.50 | 3.56 | 03:10 | 0.51 | 13:30 | 0.82 | 0.66 | 03:10 | 0.063 | 13:30 | 0.199 | 0.119 | 0.119 | 0.02 |
| 01/09/2020 | 04:00 | 2.82 | 13:40 | 4.58 | 3.63 | 04:25 | 0.53 | 11:40 | 0.79 | 0.66 | 04:25 | 0.066 | 11:40 | 0.197 | 0.122 | 0.122 | 0.18 |
| 01/10/2020 | 04:45 | 2.27 | 12:25 | 4.52 | 3.35 | 04:45 | 0.44 | 14:40 | 0.79 | 0.62 | 04:45 | 0.040 | 12:25 | 0.193 | 0.105 | 0.105 | 0.02 |
| 01/11/2020 | 06:05 | 2.68 | 12:20 | 3.62 | 2.96 | 05:55 | 0.49 | 10:40 | 0.68 | 0.58 | 05:55 | 0.057 | 12:20 | 0.118 | 0.078 | 0.078 | 0.01 |
| 01/12/2020 | 05:25 | 2.59 | 11:35 | 3.55 | 3.08 | 02:45 | 0.51 | 18:50 | 0.67 | 0.59 | 03:15 | 0.057 | 11:30 | 0.115 | 0.084 | 0.084 | |
| 01/13/2020 | 04:15 | 2.71 | 13:30 | 4.56 | 3.56 | 03:50 | 0.50 | 14:10 | 0.79 | 0.65 | 03:50 | 0.060 | 13:30 | 0.190 | 0.117 | 0.117 | 0.02 |
| 01/14/2020 | 05:50 | 2.81 | 14:20 | 4.47 | 3.55 | 05:45 | 0.54 | 13:30 | 0.82 | 0.66 | 05:45 | 0.067 | 13:30 | 0.191 | 0.117 | 0.117 | 0.11 |
| 01/15/2020 | 04:35 | 2.78 | 13:35 | 4.31 | 3.52 | 05:30 | 0.52 | 13:55 | 0.78 | 0.65 | 05:30 | 0.063 | 13:30 | 0.175 | 0.115 | 0.115 | 0.07 |
| 01/16/2020 | 03:10 | 2.52 | 12:35 | 4.66 | 3.47 | 04:30 | 0.49 | 12:35 | 0.90 | 0.65 | 04:30 | 0.053 | 12:35 | 0.231 | 0.114 | 0.114 | 0.66 |
| 01/17/2020 | 05:45 | 2.65 | 13:50 | 4.59 | 3.69 | 23:15 | 0.47 | 10:25 | 0.75 | 0.59 | 05:45 | 0.059 | 13:35 | 0.173 | 0.111 | 0.111 | |
| 01/18/2020 | 05:55 | 3.23 | 10:25 | 4.08 | 3.64 | 19:50 | 0.41 | 00:50 | 0.61 | 0.47 | 05:40 | 0.064 | 10:00 | 0.120 | 0.085 | 0.085 | |
| 01/19/2020 | 05:45 | 3.37 | 10:50 | 4.21 | 3.74 | 05:50 | 0.38 | 04:35 | 0.59 | 0.45 | 05:50 | 0.061 | 19:50 | 0.112 | 0.085 | 0.085 | |
| 01/20/2020 | 05:40 | 3.43 | 13:15 | 4.39 | 3.86 | 04:10 | 0.41 | 18:20 | 0.69 | 0.49 | 04:40 | 0.068 | 13:20 | 0.139 | 0.098 | 0.098 | |
| 01/21/2020 | 03:25 | 3.10 | 13:55 | 5.06 | 3.86 | 03:25 | 0.57 | 13:55 | 0.88 | 0.67 | 03:25 | 0.081 | 13:55 | 0.253 | 0.135 | 0.135 | |
| 01/22/2020 | 23:55 | 3.01 | 13:50 | 4.24 | 3.57 | 04:10 | 0.55 | 13:40 | 0.77 | 0.65 | 04:10 | 0.077 | 13:40 | 0.172 | 0.116 | 0.116 | 0.03 |
| 01/23/2020 | 04:35 | 2.88 | 14:10 | 4.30 | 3.56 | 02:45 | 0.54 | 14:15 | 0.76 | 0.66 | 04:40 | 0.070 | 14:15 | 0.175 | 0.117 | 0.117 | |
| 01/24/2020 | 03:30 | 3.15 | 14:25 | 4.33 | 3.69 | 03:20 | 0.54 | 16:10 | 0.76 | 0.66 | 03:20 | 0.080 | 14:30 | 0.174 | 0.122 | 0.122 | |
| 01/25/2020 | 06:55 | 3.23 | 01:30 | 4.08 | 3.46 | 06:45 | 0.56 | 01:30 | 0.71 | 0.61 | 06:55 | 0.085 | 01:30 | 0.150 | 0.103 | 0.103 | |
| 01/26/2020 | 04:55 | 2.91 | 22:05 | 4.36 | 3.51 | 04:10 | 0.54 | 19:10 | 0.76 | 0.63 | 04:10 | 0.072 | 20:45 | 0.173 | 0.110 | 0.110 | 0.16 |
| 01/27/2020 | 23:55 | 3.53 | 09:20 | 4.87 | 4.19 | 23:45 | 0.63 | 09:15 | 0.82 | 0.71 | 23:55 | 0.108 | 09:15 | 0.224 | 0.157 | 0.157 | |
| 01/28/2020 | 03:35 | 3.31 | 13:25 | 4.91 | 3.99 | 04:45 | 0.59 | 13:30 | 0.81 | 0.69 | 04:45 | 0.094 | 13:30 | 0.223 | 0.145 | 0.145 | 0.01 |
| 01/29/2020 | 02:50 | 3.38 | 10:05 | 4.68 | 3.96 | 01:55 | 0.59 | 17:05 | 0.79 | 0.70 | 23:55 | 0.098 | 10:05 | 0.197 | 0.143 | 0.143 | |
| 01/30/2020 | 03:25 | 3.22 | 13:50 | 4.74 | 3.94 | 05:45 | 0.60 | 13:10 | 0.83 | 0.70 | 05:45 | 0.092 | 13:10 | 0.215 | 0.143 | 0.143 | |
| 01/31/2020 | 04:05 | 3.39 | 11:00 | 5.13 | 3.96 | 03:05 | 0.58 | 10:50 | 0.87 | 0.69 | 03:05 | 0.097 | 10:55 | 0.252 | 0.142 | 0.142 | |
| 02/01/2020 | 07:20 | 3.33 | 13:00 | 3.99 | 3.55 | 07:25 | 0.59 | 11:00 | 0.77 | 0.64 | 07:25 | 0.093 | 11:00 | 0.151 | 0.113 | 0.113 | |
| 02/02/2020 | 23:30 | 2.95 | 21:20 | 3.84 | 3.32 | 23:30 | 0.51 | 21:20 | 0.70 | 0.61 | 23:30 | 0.068 | 21:20 | 0.135 | 0.096 | 0.096 | |
| 02/03/2020 | 04:15 | 2.57 | 13:55 | 4.66 | 3.59 | 04:15 | 0.48 | 13:30 | 0.78 | 0.65 | 04:15 | 0.053 | 13:45 | 0.197 | 0.120 | 0.120 | |
| 02/04/2020 | 03:25 | 3.07 | 13:20 | 4.65 | 3.72 | 23:30 | 0.54 | 13:15 | 0.84 | 0.67 | 23:30 | 0.077 | 13:15 | 0.215 | 0.129 | 0.129 | |
| 02/05/2020 | 04:05 | 2.71 | 13:35 | 4.61 | 3.69 | 03:55 | 0.45 | 16:10 | 0.81 | 0.67 | 04:00 | 0.054 | 13:35 | 0.200 | 0.129 | 0.129 | |
| 02/06/2020 | 23:50 | 3.35 | 09:30 | 4.84 | 3.89 | 02:45 | 0.60 | 09:20 | 0.87 | 0.72 | 02:45 | 0.097 | 09:20 | 0.234 | 0.145 | 0.145 | |
| 02/07/2020 | 04:05 | 3.17 | 09:45 | 4.60 | 3.77 | 06:20 | 0.60 | 12:40 | 0.87 | 0.70 | 05:30 | 0.091 | 09:40 | 0.207 | 0.135 | 0.135 | |
| 02/08/2020 | 04:15 | 3.30 | 13:25 | 3.92 | 3.61 | 04:05 | 0.59 | 08:40 | 0.72 | 0.65 | 04:05 | 0.093 | 13:25 | 0.139 | 0.117 | 0.117 | |
| 02/09/2020 | 06:10 | 2.89 | 14:05 | 3.93 | 3.50 | 06:05 | 0.52 | 11:40 | 0.70 | 0.63 | 06:05 | 0.067 | 14:05 | 0.138 | 0.107 | 0.107 | |
| 02/10/2020 | 05:00 | 3.09 | 13:25 | 4.69 | 3.75 | 05:15 | 0.56 | 14:20 | 0.81 | 0.68 | 05:15 | 0.083 | 13:25 | 0.207 | 0.130 | 0.130 | |
| 02/11/2020 | 05:30 | 2.66 | 13:35 | 4.19 | 3.33 | 05:35 | 0.48 | 07:35 | 0.83 | 0.64 | 05:35 | 0.055 | 07:35 | 0.176 | 0.104 | 0.104 | |
| 02/12/2020 | 04:55 | 2.56 | 14:15 | 4.22 | 3.24 | 05:00 | 0.47 | 14:15 | 0.79 | 0.64 | 05:00 | 0.051 | 14:15 | 0.177 | 0.101 | 0.101 | |
| 02/13/2020 | 03:10 | 2.49 | 13:35 | 4.09 | 3.16 | 04:35 | 0.50 | 15:40 | 0.79 | 0.65 | 04:35 | 0.053 | 13:35 | 0.167 | 0.098 | 0.098 | |
| 02/14/2020 | 04:10 | 2.41 | 13:35 | 3.78 | 3.07 | 04:30 | 0.45 | 12:20 | 0.75 | 0.62 | 04:35 | 0.045 | 13:35 | 0.139 | 0.090 | 0.090 | |
| 02/15/2020 | 05:55 | 2.73 | 14:00 | 3.40 | 2.99 | 04:55 | 0.45 | 00:55 | 0.65 | 0.54 | 04:55 | 0.054 | 14:00 | 0.100 | 0.074 | 0.074 | |
| 02/16/2020 | 04:50 | 2.69 | 11:55 | 3.61 | 3.05 | 04:45 | 0.46 | 19:55 | 0.67 | 0.55 | 04:45 | 0.054 | 11:55 | 0.117 | 0.077 | 0.077 | |
| 02/17/2020 | 03:15 | 2.81 | 12:15 | 3.90 | 3.31 | 04:10 | 0.46 | 13:30 | 0.70 | 0.57 | 03:40 | 0.058 | 12:00 | 0.132 | 0.092 | 0.092 | |
| 02/18/2020 | 03:45 | 2.79 | 13:45 | 4.86 | 3.99 | 23:45 | 0.41 | 13:55 | 0.70 | 0.54 | 03:45 | 0.055 | 13:55 | 0.188 | 0.113 | 0.113 | |
| 02/19/2020 | 05:35 | 3.69 | 11:30 | 5.10 | 4.33 | 02:45 | 0.37 | 11:55 | 0.68 | 0.53 | 05:35 | 0.069 | 13:55 | 0.185 | 0.125 | 0.125 | |
| 02/20/2020 | 06:00 | 3.18 | 14:20 | 4.75 | 3.93 | 04:00 | 0.37 | 10:25 | 0.79 | 0.54 | 04:00 | 0.056 | 10:25 | 0.203 | 0.113 | 0.113 | |
| 02/21/2020 | 03:55 | 2.76 | 13:25 | 4.48 | 3.53 | 03:50 | 0.43 | 14:10 | 0.70 | 0.55 | 03:50 | 0.052 | 13:30 | 0.169 | 0.099 | 0.099 | |
| 02/22/2020 | 03:05 | 2.35 | 20:25 | 3.40 | 2.84 | 03:00 | 0.31 | 09:55 | 0.55 | 0.44 | 03:00 | 0.029 | 09:55 | 0.087 | 0.056 | 0.056 | |
| 02/23/2020 | 06:35 | 2.34 | 14:10 | 3.39 | 2.80 | 05:10 | 0.32 | 20:05 | 0.55 | 0.44 | 06:30 | 0.030 | 14:10 | 0.088 | 0.055 | 0.055 | |
| 02/24/2020 | 04:10 | 2.34 | 14:15 | 4.75 | 3.60 | 02:05 | 0.31 | 13:15 | 0.64 | 0.47 | 02:05 | 0.031 | 13:25 | 0.164 | 0.088 | 0.088 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 04:30 | 2.86 | 16:30 | 4.82 | 3.96 | 04:40 | 0.27 | 10:00 | 0.60 | 0.42 | 04:40 | 0.035 | 13:30 | 0.153 | 0.089 | 0.089 | |
| 02/26/2020 | 22:40 | 2.73 | 11:10 | 4.73 | 3.60 | 04:00 | 0.19 | 12:05 | 0.80 | 0.48 | 04:00 | 0.028 | 14:30 | 0.180 | 0.089 | 0.089 | |
| 02/27/2020 | 04:45 | 2.33 | 13:30 | 4.55 | 3.32 | 03:45 | 0.33 | 13:30 | 0.70 | 0.51 | 03:45 | 0.031 | 13:30 | 0.173 | 0.086 | 0.086 | |
| 02/28/2020 | 05:50 | 2.14 | 11:45 | 4.13 | 3.06 | 05:55 | 0.29 | 14:40 | 0.77 | 0.50 | 05:55 | 0.024 | 14:40 | 0.156 | 0.075 | 0.075 | |
| 02/29/2020 | 05:40 | 2.37 | 18:55 | 3.32 | 2.80 | 05:20 | 0.34 | 15:20 | 0.57 | 0.45 | 05:20 | 0.033 | 15:20 | 0.086 | 0.057 | 0.057 | |
| 03/01/2020 | 05:20 | 2.33 | 11:40 | 3.68 | 2.83 | 05:35 | 0.34 | 11:35 | 0.71 | 0.48 | 05:35 | 0.032 | 11:35 | 0.127 | 0.062 | 0.062 | |
| 03/02/2020 | 03:20 | 2.42 | 13:20 | 4.39 | 3.20 | 03:30 | 0.39 | 13:50 | 0.80 | 0.55 | 03:30 | 0.039 | 13:20 | 0.181 | 0.087 | 0.087 | |
| 03/03/2020 | 03:40 | 2.43 | 13:25 | 4.60 | 3.34 | 02:45 | 0.32 | 10:10 | 0.75 | 0.54 | 03:35 | 0.032 | 13:15 | 0.188 | 0.093 | 0.093 | |
| 03/04/2020 | 04:00 | 2.24 | 10:50 | 4.19 | 3.06 | 03:50 | 0.34 | 13:50 | 0.85 | 0.55 | 03:50 | 0.030 | 13:50 | 0.180 | 0.082 | 0.082 | |
| 03/05/2020 | 03:45 | 2.14 | 13:05 | 4.09 | 2.97 | 05:00 | 0.31 | 13:50 | 0.80 | 0.56 | 05:00 | 0.027 | 14:00 | 0.168 | 0.081 | 0.081 | |
| 03/06/2020 | 03:20 | 1.98 | 13:30 | 4.29 | 2.83 | 03:20 | 0.32 | 13:25 | 0.86 | 0.55 | 03:20 | 0.024 | 13:25 | 0.189 | 0.075 | 0.075 | |
| 03/07/2020 | 03:55 | 2.01 | 16:15 | 3.02 | 2.48 | 03:50 | 0.34 | 16:35 | 0.66 | 0.49 | 03:50 | 0.026 | 16:35 | 0.089 | 0.052 | 0.052 | |
| 03/08/2020 | 05:25 | 2.03 | 14:05 | 3.00 | 2.40 | 04:35 | 0.35 | 14:05 | 0.67 | 0.49 | 04:35 | 0.028 | 14:05 | 0.091 | 0.050 | 0.050 | |
| 03/09/2020 | 03:00 | 1.84 | 10:50 | 3.95 | 2.82 | 05:15 | 0.32 | 10:30 | 0.82 | 0.58 | 03:25 | 0.022 | 10:30 | 0.161 | 0.079 | 0.079 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 11.840 | 4.90 |
| Avg | 3.46 | 0.59 | 0.103 | |

Site Commentary

Site Information

| MIL_0386 | |
|-----------------|-------|
| Pipe Dimensions | 18 |
| Silt Level | 0.00" |

Overview

Site MIL_0386 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows free flow conditions during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed upstream of sites MIL_0649 and MIL_2491. (See MIL_0649 and MIL_2491 Site Commentary for More Details)

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 6.43 | 1.38 | 0.512 |
| Minimum | 5.11 | 0.93 | 0.262 |
| Maximum | 9.17 | 2.04 | 1.187 |
| Time of Minimum | 2/9/2020 4:10 AM | 12/26/2019 2:40 AM | 12/26/2019 2:40 AM |
| Time of Maximum | 2/6/2020 1:35 PM | 1/16/2020 10:45 AM | 2/6/2020 1:35 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0386

Site Address /Location: Milpitas Blvd and Los Coches St, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.430913°

Longitude:

-121.898992°

Pipe Size (H x W)

18.00"x18.00"

Pipe Shape

Circular

Manhole #

#0386

System Characteristics

Residential/Commercial

Access

Traffic

Drive

Medium



Installation Information

Installation Date:

Friday, November 15, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

8:54:00 AM

Pipe Size (HxW)

18.00"x18.00"

Depth of Flow (Wet DOF) (in)

7.25"

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.76'

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Smooth flow with medium depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

14'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_0386

Flow Monitor

MIL_0386

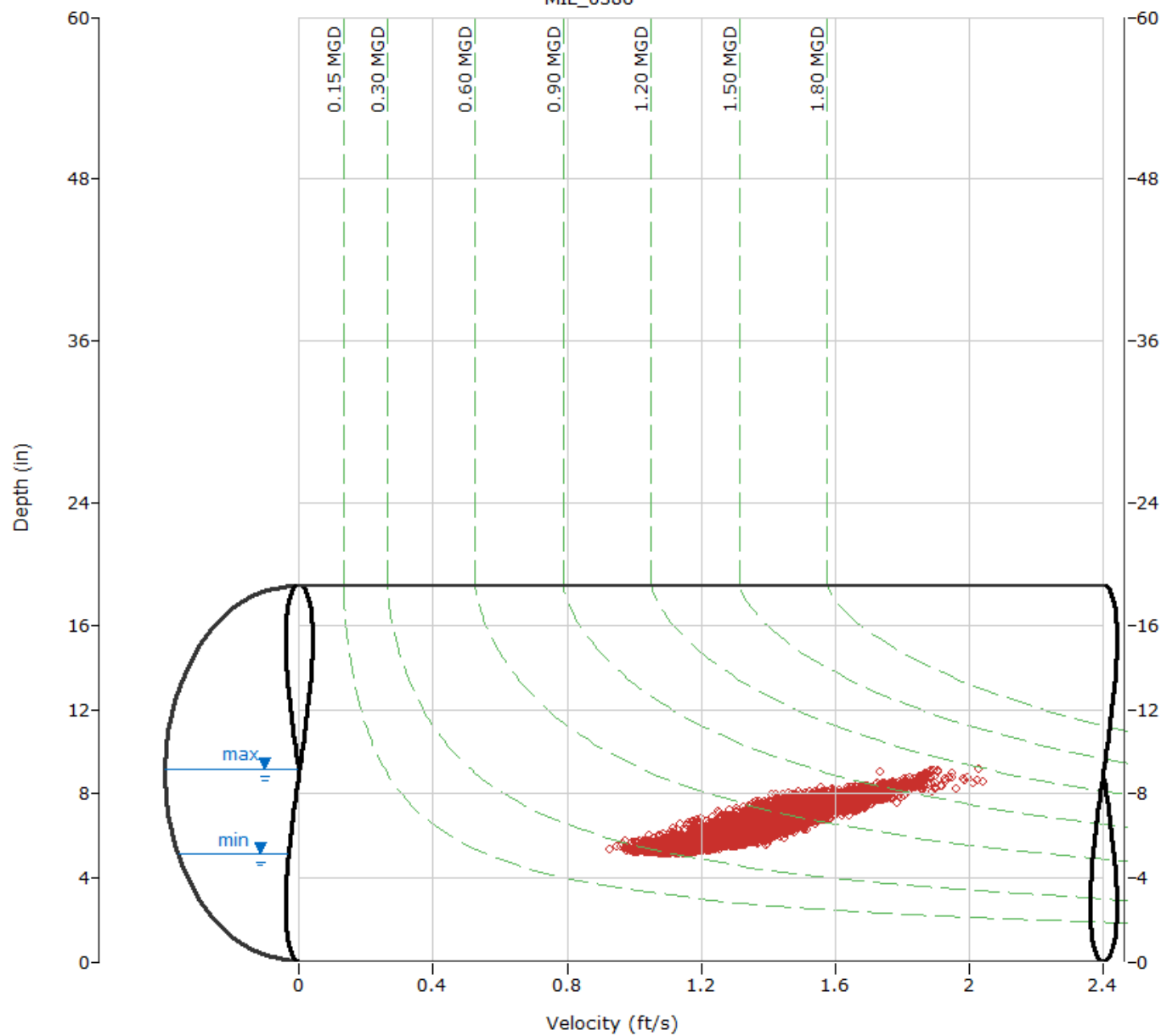
Pipe Height
18.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



ADS ENVIRONMENTAL
SERVICES

HYDROGRAPH REPORT

MIL_0386

Flow Monitor

MIL_0386

Pipe Height

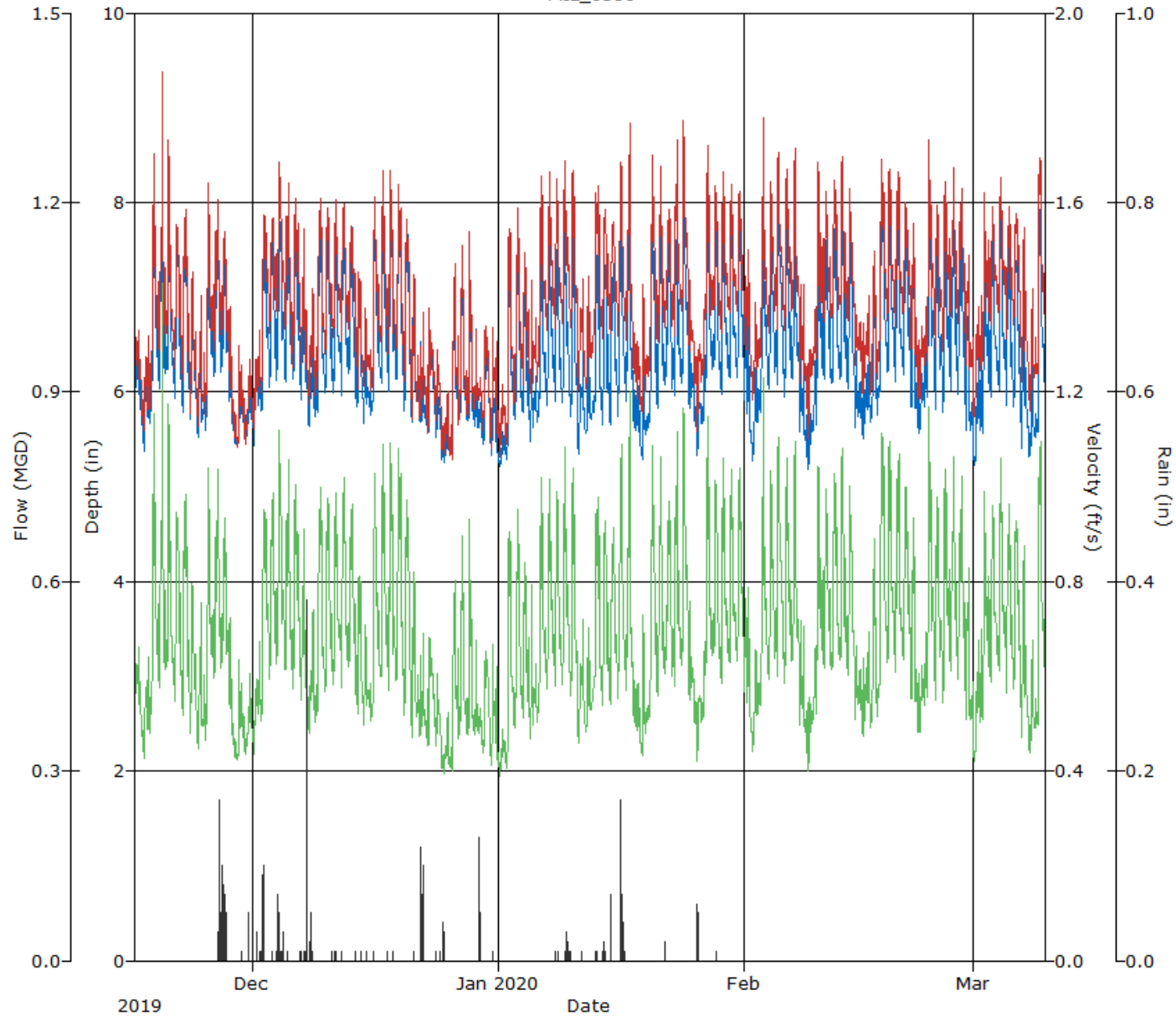
18.00 in.

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0386, Pipe Height: 18.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 22:30 | 5.72 | 14:55 | 6.75 | 6.11 | 16:20 | 1.11 | 14:55 | 1.42 | 1.27 | 16:20 | 0.360 | 14:55 | 0.557 | 0.434 | 0.434 | |
| 11/17/2019 | 06:15 | 5.34 | 19:25 | 6.81 | 5.80 | 16:55 | 0.97 | 19:15 | 1.42 | 1.20 | 16:55 | 0.295 | 19:20 | 0.560 | 0.382 | 0.382 | |
| 11/18/2019 | 00:35 | 5.50 | 13:15 | 8.86 | 6.79 | 02:55 | 1.09 | 13:10 | 1.87 | 1.40 | 00:35 | 0.334 | 13:15 | 1.046 | 0.564 | 0.564 | |
| 11/19/2019 | 04:35 | 5.95 | 15:20 | 9.13 | 6.85 | 02:55 | 1.23 | 15:00 | 1.95 | 1.44 | 04:30 | 0.415 | 15:00 | 1.109 | 0.581 | 0.581 | |
| 11/20/2019 | 23:25 | 5.95 | 09:30 | 8.58 | 6.73 | 15:40 | 1.19 | 10:15 | 1.83 | 1.41 | 03:15 | 0.417 | 10:15 | 0.976 | 0.557 | 0.557 | |
| 11/21/2019 | 04:40 | 5.86 | 09:45 | 7.84 | 6.69 | 04:40 | 1.22 | 09:45 | 1.65 | 1.40 | 04:40 | 0.392 | 09:45 | 0.790 | 0.545 | 0.545 | |
| 11/22/2019 | 04:10 | 5.75 | 14:35 | 7.98 | 6.74 | 11:50 | 1.18 | 10:00 | 1.68 | 1.39 | 04:25 | 0.384 | 08:05 | 0.813 | 0.550 | 0.550 | |
| 11/23/2019 | 04:40 | 5.58 | 06:50 | 7.14 | 6.26 | 04:40 | 1.11 | 08:40 | 1.50 | 1.29 | 04:40 | 0.336 | 08:40 | 0.630 | 0.458 | 0.458 | |
| 11/24/2019 | 03:10 | 5.42 | 11:05 | 7.13 | 5.97 | 00:45 | 1.00 | 11:05 | 1.50 | 1.23 | 00:45 | 0.310 | 11:05 | 0.632 | 0.409 | 0.409 | |
| 11/25/2019 | 00:00 | 5.54 | 08:40 | 8.17 | 6.61 | 01:45 | 1.12 | 08:40 | 1.77 | 1.38 | 00:15 | 0.338 | 08:40 | 0.890 | 0.532 | 0.532 | |
| 11/26/2019 | 04:00 | 6.11 | 16:30 | 8.15 | 6.84 | 03:30 | 1.12 | 16:30 | 1.70 | 1.43 | 03:30 | 0.402 | 16:30 | 0.854 | 0.572 | 0.572 | 0.36 |
| 11/27/2019 | 00:10 | 6.10 | 09:50 | 7.64 | 6.78 | 20:50 | 1.16 | 08:35 | 1.62 | 1.41 | 20:50 | 0.430 | 09:45 | 0.745 | 0.557 | 0.557 | 0.63 |
| 11/28/2019 | 20:00 | 5.34 | 02:55 | 6.98 | 5.85 | 10:45 | 0.98 | 02:50 | 1.41 | 1.20 | 20:00 | 0.299 | 02:50 | 0.578 | 0.388 | 0.388 | |
| 11/29/2019 | 04:00 | 5.43 | 07:10 | 6.91 | 5.81 | 03:10 | 0.96 | 07:05 | 1.47 | 1.17 | 03:10 | 0.282 | 07:05 | 0.593 | 0.375 | 0.375 | 0.02 |
| 11/30/2019 | 06:15 | 5.40 | 17:30 | 6.70 | 5.75 | 01:20 | 0.95 | 10:45 | 1.38 | 1.17 | 01:20 | 0.277 | 17:30 | 0.516 | 0.370 | 0.370 | 0.10 |
| 12/01/2019 | 03:10 | 5.38 | 21:20 | 7.14 | 5.92 | 13:30 | 1.05 | 21:25 | 1.46 | 1.21 | 04:30 | 0.311 | 21:20 | 0.613 | 0.398 | 0.398 | 0.06 |
| 12/02/2019 | 03:55 | 5.70 | 11:10 | 7.83 | 6.72 | 00:30 | 1.12 | 11:05 | 1.67 | 1.42 | 00:30 | 0.348 | 11:10 | 0.792 | 0.559 | 0.559 | 0.30 |
| 12/03/2019 | 03:55 | 5.96 | 09:55 | 7.99 | 6.80 | 04:00 | 1.28 | 13:05 | 1.64 | 1.45 | 04:00 | 0.422 | 10:00 | 0.792 | 0.578 | 0.578 | 0.01 |
| 12/04/2019 | 00:15 | 6.04 | 09:35 | 8.27 | 6.96 | 16:00 | 1.29 | 09:25 | 1.75 | 1.50 | 00:10 | 0.455 | 09:25 | 0.893 | 0.614 | 0.614 | 0.39 |
| 12/05/2019 | 03:40 | 6.08 | 13:35 | 8.08 | 6.90 | 23:55 | 1.26 | 14:50 | 1.67 | 1.45 | 02:15 | 0.446 | 13:40 | 0.828 | 0.590 | 0.590 | 0.01 |
| 12/06/2019 | 00:35 | 6.08 | 09:20 | 8.26 | 6.83 | 01:05 | 1.24 | 09:15 | 1.72 | 1.44 | 00:30 | 0.422 | 09:15 | 0.875 | 0.576 | 0.576 | 0.01 |
| 12/07/2019 | 23:55 | 5.61 | 12:25 | 7.69 | 6.39 | 13:30 | 1.12 | 12:05 | 1.61 | 1.34 | 23:55 | 0.357 | 12:25 | 0.745 | 0.491 | 0.491 | 0.67 |
| 12/08/2019 | 03:35 | 5.56 | 15:40 | 7.18 | 5.97 | 21:05 | 1.09 | 14:10 | 1.52 | 1.26 | 03:35 | 0.338 | 15:40 | 0.605 | 0.418 | 0.418 | 0.20 |
| 12/09/2019 | 04:45 | 5.68 | 13:15 | 7.99 | 6.74 | 01:10 | 1.14 | 13:15 | 1.71 | 1.43 | 01:10 | 0.368 | 13:15 | 0.835 | 0.564 | 0.564 | |
| 12/10/2019 | 04:45 | 5.93 | 15:10 | 7.90 | 6.78 | 04:25 | 1.25 | 16:30 | 1.70 | 1.44 | 04:25 | 0.416 | 15:10 | 0.813 | 0.571 | 0.571 | |
| 12/11/2019 | 04:50 | 5.88 | 11:05 | 7.72 | 6.69 | 05:00 | 1.27 | 12:50 | 1.78 | 1.43 | 04:45 | 0.411 | 12:50 | 0.811 | 0.559 | 0.559 | 0.03 |
| 12/12/2019 | 05:00 | 5.92 | 12:10 | 7.98 | 6.82 | 03:50 | 1.28 | 10:30 | 1.69 | 1.44 | 03:55 | 0.423 | 12:20 | 0.824 | 0.577 | 0.577 | 0.01 |
| 12/13/2019 | 04:40 | 5.97 | 14:10 | 7.87 | 6.79 | 01:25 | 1.29 | 14:00 | 1.61 | 1.44 | 04:35 | 0.432 | 14:00 | 0.765 | 0.570 | 0.570 | 0.01 |
| 12/14/2019 | 06:10 | 5.72 | 12:55 | 7.28 | 6.39 | 06:10 | 1.18 | 12:55 | 1.60 | 1.32 | 06:10 | 0.368 | 12:55 | 0.693 | 0.483 | 0.483 | 0.01 |
| 12/15/2019 | 06:05 | 5.55 | 06:35 | 7.19 | 6.04 | 11:40 | 1.08 | 06:40 | 1.53 | 1.27 | 06:05 | 0.338 | 06:40 | 0.644 | 0.428 | 0.428 | 0.01 |
| 12/16/2019 | 03:25 | 5.72 | 11:10 | 8.53 | 6.73 | 00:50 | 1.17 | 11:10 | 1.75 | 1.41 | 03:25 | 0.372 | 11:10 | 0.931 | 0.557 | 0.557 | 0.01 |
| 12/17/2019 | 05:00 | 6.01 | 10:35 | 8.28 | 6.93 | 00:10 | 1.25 | 10:35 | 1.76 | 1.45 | 05:15 | 0.432 | 10:35 | 0.900 | 0.593 | 0.593 | 0.01 |
| 12/18/2019 | 03:15 | 5.93 | 09:20 | 8.48 | 6.89 | 03:10 | 1.26 | 09:20 | 1.80 | 1.43 | 03:10 | 0.414 | 09:20 | 0.952 | 0.583 | 0.583 | 0.01 |
| 12/19/2019 | 05:55 | 6.04 | 10:30 | 8.31 | 6.93 | 05:55 | 1.25 | 10:25 | 1.71 | 1.42 | 05:55 | 0.419 | 10:30 | 0.880 | 0.584 | 0.584 | |
| 12/20/2019 | 04:05 | 5.76 | 12:50 | 8.05 | 6.74 | 21:10 | 1.13 | 17:00 | 1.68 | 1.39 | 04:05 | 0.381 | 17:05 | 0.822 | 0.550 | 0.550 | |
| 12/21/2019 | 04:15 | 5.60 | 09:25 | 7.29 | 6.25 | 03:00 | 1.02 | 11:10 | 1.52 | 1.27 | 03:00 | 0.319 | 09:30 | 0.657 | 0.452 | 0.452 | 0.01 |
| 12/22/2019 | 03:20 | 5.43 | 14:25 | 7.01 | 5.93 | 23:25 | 1.04 | 14:20 | 1.49 | 1.22 | 03:25 | 0.313 | 14:25 | 0.607 | 0.402 | 0.402 | 0.41 |
| 12/23/2019 | 05:50 | 5.50 | 09:50 | 6.95 | 6.12 | 04:50 | 1.00 | 07:30 | 1.53 | 1.25 | 04:50 | 0.308 | 07:30 | 0.604 | 0.429 | 0.429 | |
| 12/24/2019 | 20:20 | 5.23 | 07:10 | 6.67 | 5.68 | 22:25 | 0.98 | 07:05 | 1.38 | 1.18 | 22:25 | 0.275 | 07:05 | 0.531 | 0.367 | 0.367 | 0.02 |
| 12/25/2019 | 03:55 | 5.20 | 15:55 | 6.31 | 5.42 | 21:25 | 1.01 | 15:55 | 1.31 | 1.11 | 05:40 | 0.279 | 15:55 | 0.469 | 0.323 | 0.323 | 0.08 |
| 12/26/2019 | 04:40 | 5.26 | 13:20 | 7.15 | 6.15 | 02:40 | 0.93 | 11:10 | 1.51 | 1.25 | 02:40 | 0.262 | 11:10 | 0.636 | 0.437 | 0.437 | |
| 12/27/2019 | 00:40 | 5.66 | 11:05 | 8.06 | 6.27 | 03:25 | 1.07 | 11:05 | 1.64 | 1.27 | 03:25 | 0.328 | 11:05 | 0.812 | 0.457 | 0.457 | |
| 12/28/2019 | 05:55 | 5.64 | 10:20 | 8.01 | 6.18 | 23:05 | 1.00 | 10:10 | 1.68 | 1.26 | 23:05 | 0.312 | 10:20 | 0.817 | 0.442 | 0.442 | |
| 12/29/2019 | 23:55 | 5.46 | 05:15 | 6.77 | 5.83 | 09:50 | 1.03 | 06:00 | 1.44 | 1.21 | 09:50 | 0.311 | 05:10 | 0.542 | 0.388 | 0.388 | 0.22 |
| 12/30/2019 | 04:40 | 5.38 | 10:10 | 6.95 | 5.96 | 02:30 | 1.05 | 08:45 | 1.46 | 1.23 | 04:35 | 0.304 | 10:10 | 0.586 | 0.407 | 0.407 | |
| 12/31/2019 | 04:55 | 5.30 | 08:40 | 7.04 | 5.71 | 22:00 | 0.98 | 07:25 | 1.46 | 1.20 | 22:00 | 0.280 | 08:35 | 0.583 | 0.375 | 0.375 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 06:25 | 5.16 | 13:40 | 5.66 | 5.37 | 05:50 | 0.99 | 13:40 | 1.26 | 1.14 | 05:50 | 0.274 | 13:40 | 0.388 | 0.326 | 0.326 | | |
| 01/02/2020 | 03:20 | 5.20 | 07:15 | 8.56 | 6.25 | 03:10 | 1.01 | 07:20 | 1.85 | 1.31 | 03:10 | 0.278 | 07:15 | 0.988 | 0.471 | 0.471 | | |
| 01/03/2020 | 01:45 | 5.66 | 12:30 | 7.75 | 6.41 | 00:40 | 1.13 | 12:20 | 1.71 | 1.35 | 04:55 | 0.354 | 12:20 | 0.799 | 0.501 | 0.501 | | |
| 01/04/2020 | 23:55 | 5.63 | 10:30 | 7.39 | 6.34 | 03:55 | 1.18 | 10:25 | 1.57 | 1.35 | 03:55 | 0.370 | 10:25 | 0.694 | 0.489 | 0.489 | | |
| 01/05/2020 | 03:25 | 5.43 | 07:05 | 7.24 | 5.90 | 22:50 | 1.07 | 05:45 | 1.59 | 1.28 | 22:50 | 0.335 | 07:05 | 0.666 | 0.419 | 0.419 | | |
| 01/06/2020 | 01:05 | 5.58 | 13:00 | 7.78 | 6.56 | 01:15 | 1.22 | 12:50 | 1.77 | 1.45 | 01:15 | 0.370 | 12:50 | 0.831 | 0.550 | 0.550 | | |
| 01/07/2020 | 03:45 | 5.76 | 14:20 | 7.85 | 6.63 | 00:35 | 1.31 | 14:20 | 1.80 | 1.47 | 03:40 | 0.413 | 14:20 | 0.860 | 0.566 | 0.566 | | |
| 01/08/2020 | 05:45 | 5.81 | 15:05 | 7.66 | 6.58 | 05:45 | 1.31 | 10:30 | 1.70 | 1.46 | 05:45 | 0.419 | 10:35 | 0.779 | 0.557 | 0.557 | | 0.02 |
| 01/09/2020 | 03:30 | 5.78 | 10:00 | 7.94 | 6.64 | 15:40 | 1.30 | 10:45 | 1.75 | 1.49 | 03:30 | 0.416 | 10:45 | 0.848 | 0.574 | 0.574 | 0.18 | |
| 01/10/2020 | 05:30 | 5.65 | 10:35 | 7.90 | 6.48 | 20:30 | 1.30 | 10:25 | 1.80 | 1.46 | 05:30 | 0.404 | 10:30 | 0.864 | 0.548 | 0.548 | 0.02 | |
| 01/11/2020 | 03:45 | 5.31 | 18:00 | 7.01 | 5.83 | 23:55 | 1.16 | 17:45 | 1.55 | 1.31 | 04:45 | 0.331 | 17:55 | 0.632 | 0.421 | 0.421 | 0.01 | |
| 01/12/2020 | 03:35 | 5.53 | 09:00 | 6.88 | 5.83 | 10:50 | 1.07 | 08:45 | 1.53 | 1.29 | 01:30 | 0.334 | 09:00 | 0.612 | 0.416 | 0.416 | | |
| 01/13/2020 | 04:30 | 5.74 | 17:35 | 7.65 | 6.56 | 00:00 | 1.27 | 13:00 | 1.69 | 1.47 | 00:05 | 0.400 | 13:00 | 0.778 | 0.557 | 0.557 | | 0.02 |
| 01/14/2020 | 04:55 | 5.59 | 13:05 | 7.67 | 6.46 | 16:25 | 1.16 | 10:05 | 1.69 | 1.45 | 04:50 | 0.390 | 13:05 | 0.771 | 0.538 | 0.538 | | 0.11 |
| 01/15/2020 | 04:55 | 5.62 | 12:15 | 7.56 | 6.48 | 04:20 | 1.31 | 11:45 | 1.68 | 1.45 | 04:55 | 0.400 | 11:45 | 0.746 | 0.539 | 0.539 | | 0.07 |
| 01/16/2020 | 04:00 | 5.69 | 14:00 | 8.78 | 6.74 | 04:10 | 1.31 | 10:45 | 2.04 | 1.49 | 04:00 | 0.406 | 13:50 | 1.097 | 0.588 | 0.588 | 0.66 | |
| 01/17/2020 | 04:30 | 5.83 | 15:00 | 8.83 | 6.72 | 04:30 | 1.29 | 15:00 | 1.90 | 1.46 | 04:30 | 0.414 | 15:00 | 1.058 | 0.574 | 0.574 | | |
| 01/18/2020 | 22:45 | 5.41 | 16:05 | 6.86 | 5.76 | 22:45 | 1.15 | 16:10 | 1.45 | 1.25 | 22:45 | 0.332 | 16:10 | 0.580 | 0.396 | 0.396 | | |
| 01/19/2020 | 04:40 | 5.20 | 08:45 | 6.94 | 5.66 | 04:35 | 1.12 | 08:45 | 1.50 | 1.24 | 04:35 | 0.307 | 08:45 | 0.609 | 0.384 | 0.384 | | |
| 01/20/2020 | 00:05 | 5.56 | 12:25 | 8.11 | 6.65 | 04:35 | 1.21 | 12:20 | 1.77 | 1.45 | 00:25 | 0.371 | 12:25 | 0.881 | 0.562 | 0.562 | | |
| 01/21/2020 | 05:20 | 5.67 | 12:40 | 8.18 | 6.61 | 05:20 | 1.26 | 14:00 | 1.89 | 1.44 | 05:20 | 0.389 | 14:00 | 0.938 | 0.552 | 0.552 | | |
| 01/22/2020 | 00:45 | 5.95 | 17:00 | 7.99 | 6.74 | 00:45 | 1.30 | 17:00 | 1.75 | 1.46 | 00:45 | 0.427 | 17:00 | 0.855 | 0.574 | 0.574 | | 0.03 |
| 01/23/2020 | 00:30 | 5.86 | 14:55 | 8.36 | 6.79 | 05:55 | 1.31 | 14:50 | 1.96 | 1.49 | 06:00 | 0.424 | 14:50 | 1.004 | 0.593 | 0.593 | | |
| 01/24/2020 | 01:40 | 6.04 | 11:00 | 8.67 | 6.90 | 03:15 | 1.31 | 10:50 | 2.01 | 1.52 | 01:40 | 0.450 | 10:55 | 1.078 | 0.617 | 0.617 | | |
| 01/25/2020 | 22:30 | 5.50 | 07:00 | 6.85 | 6.08 | 22:20 | 1.04 | 06:20 | 1.50 | 1.31 | 22:20 | 0.313 | 06:20 | 0.594 | 0.447 | 0.447 | | |
| 01/26/2020 | 05:05 | 5.29 | 00:15 | 6.25 | 5.71 | 02:25 | 1.09 | 00:10 | 1.40 | 1.25 | 04:50 | 0.310 | 00:10 | 0.494 | 0.389 | 0.389 | | 0.16 |
| 01/27/2020 | 00:40 | 5.84 | 10:40 | 8.42 | 6.83 | 00:20 | 1.27 | 10:35 | 1.86 | 1.46 | 00:40 | 0.413 | 10:35 | 0.974 | 0.588 | 0.588 | | |
| 01/28/2020 | 04:50 | 6.06 | 13:10 | 7.91 | 6.83 | 04:40 | 1.32 | 13:10 | 1.71 | 1.47 | 04:45 | 0.449 | 13:10 | 0.828 | 0.590 | 0.590 | | 0.01 |
| 01/29/2020 | 04:40 | 5.93 | 08:15 | 8.02 | 6.76 | 03:20 | 1.24 | 08:00 | 1.74 | 1.46 | 03:20 | 0.422 | 08:20 | 0.848 | 0.578 | 0.578 | | |
| 01/30/2020 | 04:55 | 6.08 | 11:05 | 8.09 | 6.81 | 11:45 | 1.33 | 11:00 | 1.72 | 1.47 | 05:00 | 0.456 | 11:00 | 0.851 | 0.588 | 0.588 | | |
| 01/31/2020 | 05:05 | 6.06 | 12:30 | 8.18 | 6.84 | 05:00 | 1.33 | 12:30 | 1.74 | 1.48 | 05:05 | 0.450 | 12:30 | 0.876 | 0.593 | 0.593 | | |
| 02/01/2020 | 23:55 | 5.46 | 14:15 | 7.17 | 6.12 | 23:50 | 1.20 | 14:15 | 1.58 | 1.36 | 23:50 | 0.352 | 14:15 | 0.670 | 0.470 | 0.470 | | |
| 02/02/2020 | 02:25 | 5.23 | 15:15 | 6.83 | 5.73 | 03:20 | 1.11 | 15:05 | 1.50 | 1.27 | 03:20 | 0.312 | 15:10 | 0.591 | 0.398 | 0.398 | | |
| 02/03/2020 | 02:20 | 5.74 | 13:10 | 8.54 | 6.79 | 22:45 | 1.20 | 13:05 | 1.90 | 1.46 | 02:25 | 0.394 | 13:05 | 1.010 | 0.585 | 0.585 | | |
| 02/04/2020 | 03:55 | 5.94 | 11:05 | 7.86 | 6.77 | 22:10 | 1.27 | 10:25 | 1.69 | 1.46 | 03:50 | 0.430 | 10:25 | 0.797 | 0.580 | 0.580 | | |
| 02/05/2020 | 06:40 | 6.04 | 09:45 | 8.07 | 6.90 | 17:45 | 1.30 | 08:25 | 1.77 | 1.49 | 06:20 | 0.442 | 09:40 | 0.875 | 0.604 | 0.604 | | |
| 02/06/2020 | 04:40 | 5.87 | 13:35 | 9.17 | 6.75 | 04:40 | 1.29 | 13:35 | 2.03 | 1.48 | 04:40 | 0.416 | 13:35 | 1.187 | 0.584 | 0.584 | | |
| 02/07/2020 | 02:05 | 5.99 | 11:25 | 7.98 | 6.73 | 15:35 | 1.31 | 11:15 | 1.78 | 1.48 | 02:10 | 0.445 | 11:15 | 0.855 | 0.580 | 0.580 | | |
| 02/08/2020 | 23:50 | 5.25 | 14:35 | 6.79 | 5.85 | 23:50 | 1.13 | 14:40 | 1.47 | 1.29 | 23:50 | 0.313 | 14:35 | 0.579 | 0.418 | 0.418 | | |
| 02/09/2020 | 04:10 | 5.11 | 01:40 | 6.27 | 5.62 | 03:30 | 1.00 | 00:20 | 1.38 | 1.24 | 03:30 | 0.280 | 01:40 | 0.477 | 0.378 | 0.378 | | |
| 02/10/2020 | 04:55 | 5.33 | 09:00 | 7.84 | 6.66 | 04:55 | 1.20 | 11:30 | 1.77 | 1.45 | 04:55 | 0.340 | 11:30 | 0.841 | 0.563 | 0.563 | | |
| 02/11/2020 | 06:05 | 6.04 | 11:35 | 7.73 | 6.80 | 04:50 | 1.31 | 10:15 | 1.67 | 1.47 | 04:55 | 0.442 | 11:35 | 0.779 | 0.584 | 0.584 | | |
| 02/12/2020 | 04:00 | 5.95 | 09:35 | 7.82 | 6.82 | 04:15 | 1.31 | 11:50 | 1.72 | 1.49 | 04:15 | 0.431 | 11:50 | 0.817 | 0.593 | 0.593 | | |
| 02/13/2020 | 05:20 | 6.07 | 10:20 | 7.93 | 6.83 | 01:50 | 1.34 | 10:05 | 1.75 | 1.48 | 01:50 | 0.462 | 10:15 | 0.838 | 0.593 | 0.593 | | |
| 02/14/2020 | 06:05 | 5.96 | 13:15 | 7.72 | 6.75 | 16:25 | 1.25 | 10:25 | 1.67 | 1.46 | 06:00 | 0.430 | 10:25 | 0.777 | 0.577 | 0.577 | | |
| 02/15/2020 | 23:05 | 5.56 | 17:10 | 6.63 | 5.93 | 22:35 | 1.15 | 17:05 | 1.44 | 1.30 | 22:35 | 0.349 | 17:05 | 0.548 | 0.428 | 0.428 | | |
| 02/16/2020 | 01:55 | 5.41 | 18:55 | 6.93 | 5.89 | 00:40 | 1.10 | 18:55 | 1.50 | 1.28 | 00:40 | 0.328 | 18:55 | 0.608 | 0.418 | 0.418 | | |
| 02/17/2020 | 01:35 | 5.60 | 13:45 | 7.68 | 6.25 | 03:35 | 1.09 | 13:45 | 1.55 | 1.31 | 03:35 | 0.337 | 13:45 | 0.719 | 0.467 | 0.467 | | |
| 02/18/2020 | 00:00 | 5.81 | 12:10 | 8.37 | 6.96 | 00:00 | 1.21 | 08:45 | 1.73 | 1.47 | 00:00 | 0.387 | 12:15 | 0.883 | 0.607 | 0.607 | | |
| 02/19/2020 | 05:40 | 6.09 | 09:40 | 8.43 | 6.98 | 02:25 | 1.33 | 09:35 | 1.78 | 1.49 | 02:25 | 0.454 | 09:35 | 0.933 | 0.614 | 0.614 | | |
| 02/20/2020 | 02:30 | 5.95 | 16:25 | 8.21 | 6.95 | 02:35 | 1.31 | 16:30 | 1.74 | 1.49 | 02:30 | 0.431 | 16:30 | 0.880 | 0.612 | 0.612 | | |
| 02/21/2020 | 07:10 | 6.09 | 13:20 | 7.89 | 6.86 | 00:35 | 1.33 | 12:30 | 1.71 | 1.47 | 07:10 | 0.461 | 12:30 | 0.813 | 0.592 | 0.592 | | |
| 02/22/2020 | 23:10 | 5.58 | 12:30 | 8.05 | 6.34 | 23:45 | 1.01 | 12:30 | 1.69 | 1.35 | 23:45 | 0.312 | 12:30 | 0.838 | 0.491 | 0.491 | | |
| 02/23/2020 | 03:50 | 5.50 | 23:25 | 6.61 | 5.93 | 06:35 | 1.11 | 02:05 | 1.39 | 1.27 | 03:50 | 0.338 | 02:25 | 0.514 | 0.418 | 0.418 | | |
| 02/24/2020 | 04:45 | 5.87 | 10:55 | 8.81 | 6.87 | 02:20 | 1.24 | 10:45 | 1.87 | 1.45 | 04:40 | 0.404 | 10:50 | 1.032 | 0.589 | 0.589 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 04:35 | 5.79 | 09:30 | 7.84 | 6.74 | 04:30 | 1.27 | 09:20 | 1.71 | 1.45 | 04:30 | 0.405 | 09:25 | 0.814 | 0.569 | 0.569 | |
| 02/26/2020 | 04:35 | 5.77 | 14:20 | 7.91 | 6.76 | 04:00 | 1.25 | 13:15 | 1.66 | 1.47 | 04:00 | 0.395 | 13:30 | 0.789 | 0.580 | 0.580 | |
| 02/27/2020 | 02:05 | 5.82 | 12:25 | 8.09 | 6.76 | 17:40 | 1.25 | 12:25 | 1.79 | 1.48 | 02:05 | 0.424 | 12:25 | 0.893 | 0.583 | 0.583 | |
| 02/28/2020 | 00:35 | 5.92 | 14:45 | 7.85 | 6.79 | 00:40 | 1.32 | 12:40 | 1.68 | 1.48 | 00:35 | 0.432 | 14:45 | 0.792 | 0.589 | 0.589 | |
| 02/29/2020 | 02:50 | 5.53 | 10:10 | 7.26 | 6.08 | 22:55 | 1.12 | 10:00 | 1.56 | 1.33 | 20:50 | 0.358 | 10:10 | 0.673 | 0.454 | 0.454 | |
| 03/01/2020 | 03:20 | 5.20 | 18:05 | 7.05 | 5.66 | 03:00 | 1.00 | 18:05 | 1.53 | 1.25 | 03:00 | 0.273 | 18:05 | 0.636 | 0.387 | 0.387 | |
| 03/02/2020 | 03:25 | 5.55 | 09:20 | 7.66 | 6.56 | 02:50 | 1.22 | 09:05 | 1.68 | 1.43 | 02:55 | 0.366 | 09:15 | 0.770 | 0.545 | 0.545 | |
| 03/03/2020 | 04:45 | 5.92 | 11:35 | 7.83 | 6.68 | 04:35 | 1.32 | 11:35 | 1.73 | 1.46 | 04:35 | 0.432 | 11:35 | 0.827 | 0.566 | 0.566 | |
| 03/04/2020 | 06:10 | 5.93 | 12:10 | 8.10 | 6.75 | 03:20 | 1.32 | 12:10 | 1.77 | 1.48 | 03:20 | 0.434 | 12:10 | 0.882 | 0.582 | 0.582 | |
| 03/05/2020 | 04:20 | 5.83 | 12:00 | 7.83 | 6.69 | 04:40 | 1.27 | 10:50 | 1.65 | 1.47 | 04:40 | 0.409 | 12:05 | 0.769 | 0.572 | 0.572 | |
| 03/06/2020 | 01:55 | 5.48 | 08:45 | 7.65 | 6.65 | 01:55 | 1.28 | 08:25 | 1.66 | 1.47 | 01:55 | 0.376 | 08:25 | 0.744 | 0.566 | 0.566 | |
| 03/07/2020 | 02:00 | 5.39 | 08:00 | 7.36 | 6.06 | 01:45 | 1.17 | 08:00 | 1.62 | 1.35 | 01:45 | 0.341 | 08:00 | 0.709 | 0.459 | 0.459 | |
| 03/08/2020 | 02:00 | 5.24 | 13:35 | 6.52 | 5.65 | 18:20 | 1.10 | 13:35 | 1.46 | 1.26 | 03:50 | 0.316 | 13:35 | 0.544 | 0.390 | 0.390 | |
| 03/09/2020 | 04:00 | 5.52 | 12:25 | 8.08 | 6.66 | 01:15 | 1.20 | 09:05 | 1.77 | 1.46 | 03:50 | 0.361 | 12:20 | 0.875 | 0.570 | 0.569 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 58.839 | 4.90 |
| Avg | 6.43 | 1.38 | 0.512 | |

Site Commentary

Site Information

| MIL_0602 | |
|-----------------|-------|
| Pipe Dimensions | 18 |
| Silt Level | 0.00" |

Overview

Site MIL_0602 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows free flow conditions during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|------------------|------------------|------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 3.67 | 1.53 | 0.274 |
| Minimum | 1.21 | 0.39 | 0.014 |
| Maximum | 6.31 | 2.37 | 0.844 |
| Time of Minimum | 3/7/2020 5:50 AM | 3/9/2020 4:30 AM | 3/9/2020 5:55 AM |
| Time of Maximum | 1/7/2020 8:40 AM | 1/7/2020 8:40 AM | 1/7/2020 8:40 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0602

Site Address /Location: Main St and Curtis Ave

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: Parking lane

Latitude:

37.424137°

Longitude:

-121.905174°

Pipe Size (H x W)

18.0" x 18.0"

Pipe Shape

Circular

Manhole #

602

System Characteristics

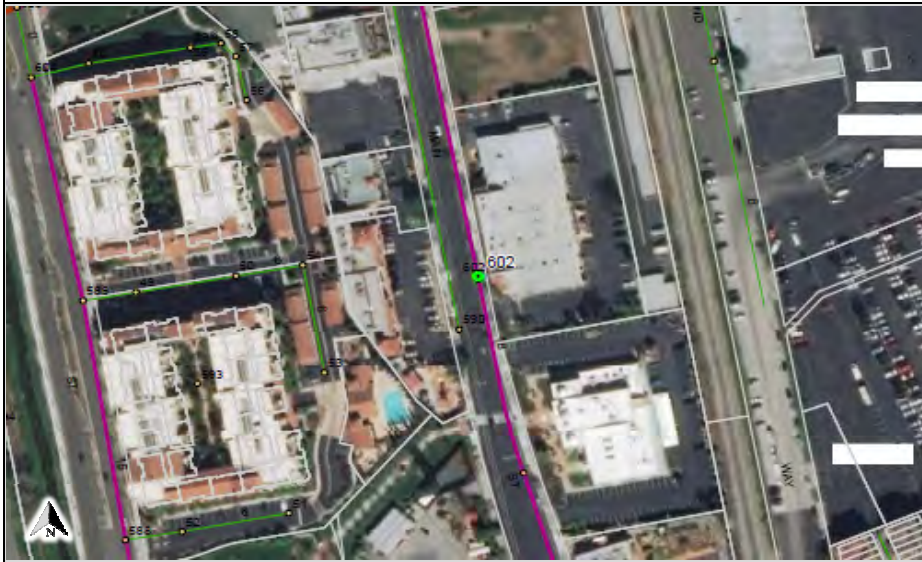
Residential/Commercial

Access

Drive

Traffic

Light



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

9:11:40 AM

Pipe Size (HxW)

18.0" x 18.0"

Depth of Flow (Wet DOF) (in)

6.25

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.52

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Smooth flow with medium depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

7'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_0602

Flow Monitor

MIL_0602

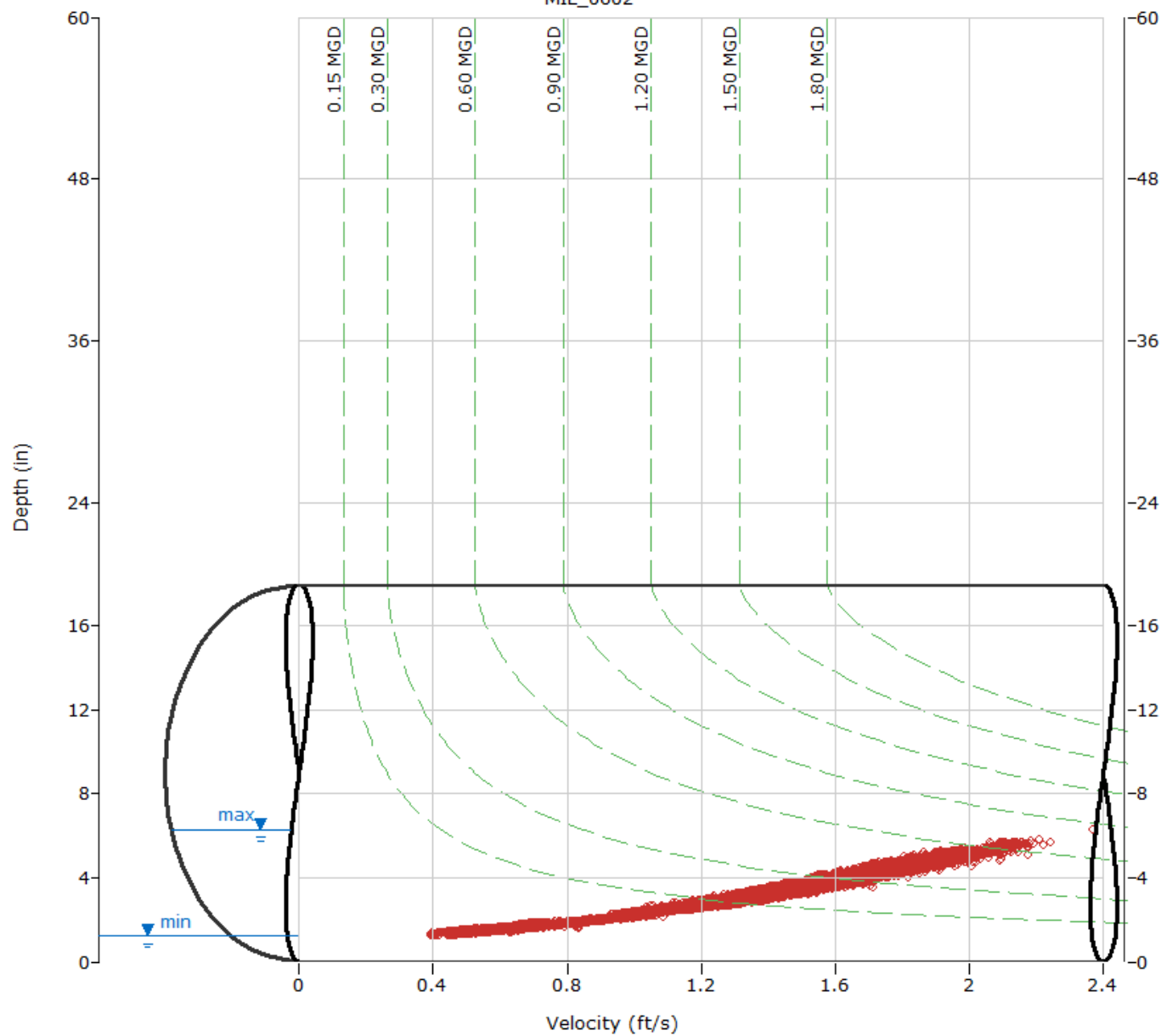
Pipe Height
18.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_0602

Flow Monitor

MIL_0602

Pipe Height

18.00 in.

Report Period

11/16/2019
To
3/9/2020

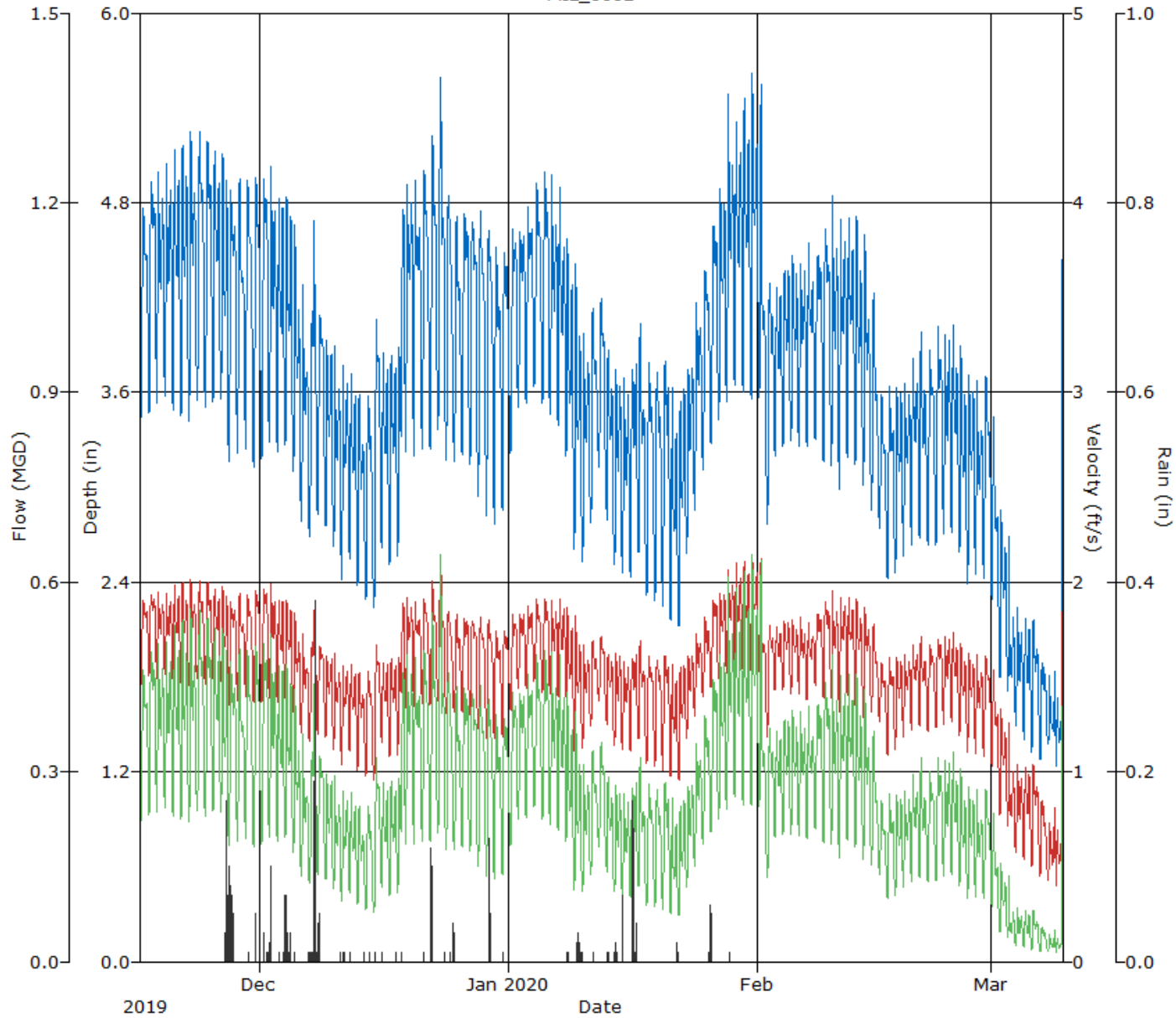
Legend

Depth

Velocity

Quantity

Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0602, Pipe Height: 18.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 03:55 | 3.43 | 12:05 | 4.79 | 4.22 | 05:55 | 1.45 | 12:35 | 1.95 | 1.74 | 05:55 | 0.222 | 11:55 | 0.473 | 0.361 | 0.361 | |
| 11/17/2019 | 06:00 | 3.44 | 13:00 | 4.96 | 4.37 | 05:00 | 1.48 | 15:05 | 2.01 | 1.78 | 06:05 | 0.226 | 11:20 | 0.502 | 0.388 | 0.388 | |
| 11/18/2019 | 04:40 | 3.52 | 08:45 | 5.09 | 4.35 | 03:50 | 1.47 | 08:30 | 1.99 | 1.75 | 04:40 | 0.233 | 08:30 | 0.527 | 0.379 | 0.379 | |
| 11/19/2019 | 04:25 | 3.57 | 08:55 | 5.11 | 4.40 | 04:35 | 1.49 | 08:45 | 2.00 | 1.76 | 04:35 | 0.240 | 08:45 | 0.531 | 0.386 | 0.386 | |
| 11/20/2019 | 04:20 | 3.46 | 08:55 | 5.21 | 4.41 | 03:10 | 1.44 | 09:15 | 2.05 | 1.76 | 04:20 | 0.225 | 09:15 | 0.557 | 0.387 | 0.387 | |
| 11/21/2019 | 04:35 | 3.44 | 09:05 | 5.26 | 4.42 | 04:25 | 1.45 | 08:55 | 2.07 | 1.76 | 04:25 | 0.222 | 08:55 | 0.571 | 0.390 | 0.390 | |
| 11/22/2019 | 03:55 | 3.41 | 08:45 | 5.30 | 4.43 | 05:10 | 1.44 | 09:00 | 2.06 | 1.76 | 05:10 | 0.217 | 09:00 | 0.578 | 0.392 | 0.392 | |
| 11/23/2019 | 05:00 | 3.54 | 12:50 | 5.29 | 4.53 | 03:30 | 1.47 | 12:20 | 2.03 | 1.78 | 05:05 | 0.236 | 12:20 | 0.565 | 0.410 | 0.410 | |
| 11/24/2019 | 05:40 | 3.48 | 12:15 | 5.21 | 4.51 | 04:45 | 1.45 | 12:05 | 2.05 | 1.78 | 05:40 | 0.225 | 12:05 | 0.560 | 0.407 | 0.407 | |
| 11/25/2019 | 04:40 | 3.53 | 09:20 | 5.17 | 4.44 | 04:35 | 1.48 | 09:25 | 2.01 | 1.76 | 04:40 | 0.234 | 09:25 | 0.545 | 0.391 | 0.391 | |
| 11/26/2019 | 05:00 | 3.53 | 10:05 | 5.16 | 4.34 | 04:55 | 1.45 | 20:50 | 2.03 | 1.73 | 04:55 | 0.229 | 20:50 | 0.540 | 0.373 | 0.373 | 0.36 |
| 11/27/2019 | 05:25 | 3.13 | 09:50 | 5.00 | 4.24 | 05:30 | 1.33 | 09:25 | 1.93 | 1.71 | 05:30 | 0.176 | 10:00 | 0.495 | 0.358 | 0.358 | 0.63 |
| 11/28/2019 | 06:30 | 3.20 | 12:15 | 4.99 | 4.12 | 05:45 | 1.36 | 12:45 | 1.99 | 1.68 | 05:45 | 0.188 | 12:45 | 0.508 | 0.339 | 0.339 | |
| 11/29/2019 | 05:25 | 3.23 | 12:05 | 4.96 | 4.26 | 05:10 | 1.38 | 11:30 | 1.94 | 1.73 | 05:10 | 0.192 | 12:10 | 0.495 | 0.364 | 0.364 | 0.02 |
| 11/30/2019 | 05:50 | 3.11 | 12:45 | 4.98 | 4.20 | 05:35 | 1.34 | 12:25 | 2.09 | 1.72 | 05:40 | 0.178 | 12:25 | 0.523 | 0.359 | 0.359 | 0.10 |
| 12/01/2019 | 05:50 | 3.16 | 12:50 | 4.97 | 4.26 | 05:35 | 1.35 | 11:35 | 2.09 | 1.74 | 05:35 | 0.184 | 11:35 | 0.512 | 0.371 | 0.371 | 0.06 |
| 12/02/2019 | 04:45 | 3.27 | 09:20 | 5.08 | 4.22 | 03:55 | 1.38 | 09:25 | 2.18 | 1.72 | 04:50 | 0.195 | 09:25 | 0.574 | 0.358 | 0.358 | 0.30 |
| 12/03/2019 | 05:05 | 3.20 | 08:45 | 4.86 | 4.12 | 05:05 | 1.35 | 20:10 | 2.02 | 1.68 | 05:05 | 0.185 | 20:10 | 0.484 | 0.339 | 0.339 | 0.01 |
| 12/04/2019 | 03:20 | 3.25 | 08:55 | 4.96 | 4.11 | 02:30 | 1.35 | 08:40 | 1.93 | 1.67 | 03:15 | 0.192 | 08:45 | 0.491 | 0.335 | 0.335 | 0.39 |
| 12/05/2019 | 05:05 | 3.07 | 08:40 | 4.79 | 3.83 | 04:45 | 1.30 | 08:35 | 1.88 | 1.58 | 05:05 | 0.169 | 08:35 | 0.458 | 0.286 | 0.286 | 0.01 |
| 12/06/2019 | 04:30 | 2.77 | 09:00 | 4.35 | 3.49 | 02:55 | 1.19 | 08:55 | 1.77 | 1.46 | 04:35 | 0.133 | 08:55 | 0.375 | 0.232 | 0.232 | 0.01 |
| 12/07/2019 | 05:55 | 2.67 | 18:50 | 4.84 | 3.62 | 05:40 | 1.14 | 18:45 | 1.96 | 1.50 | 05:40 | 0.121 | 18:45 | 0.483 | 0.256 | 0.256 | 0.67 |
| 12/08/2019 | 06:10 | 2.80 | 12:25 | 4.12 | 3.61 | 05:30 | 1.19 | 13:10 | 1.69 | 1.50 | 06:25 | 0.136 | 13:10 | 0.329 | 0.250 | 0.250 | 0.20 |
| 12/09/2019 | 05:20 | 2.74 | 09:00 | 4.03 | 3.40 | 05:15 | 1.17 | 08:55 | 1.66 | 1.44 | 05:15 | 0.129 | 08:55 | 0.315 | 0.219 | 0.219 | |
| 12/10/2019 | 05:10 | 2.61 | 09:05 | 3.96 | 3.26 | 04:15 | 1.08 | 08:10 | 1.70 | 1.39 | 04:15 | 0.112 | 08:40 | 0.304 | 0.200 | 0.200 | |
| 12/11/2019 | 05:00 | 2.40 | 08:50 | 3.89 | 3.18 | 04:20 | 1.02 | 08:45 | 1.63 | 1.35 | 05:05 | 0.093 | 08:45 | 0.296 | 0.189 | 0.189 | 0.03 |
| 12/12/2019 | 05:35 | 2.53 | 08:40 | 3.78 | 3.16 | 05:30 | 1.10 | 08:40 | 1.60 | 1.36 | 05:30 | 0.107 | 08:40 | 0.279 | 0.187 | 0.187 | 0.01 |
| 12/13/2019 | 04:30 | 2.37 | 09:00 | 3.63 | 3.04 | 04:10 | 1.00 | 09:45 | 1.55 | 1.31 | 04:25 | 0.089 | 08:45 | 0.252 | 0.170 | 0.170 | 0.01 |
| 12/14/2019 | 05:25 | 2.28 | 13:30 | 3.62 | 3.03 | 05:45 | 0.97 | 11:45 | 1.57 | 1.30 | 05:45 | 0.081 | 11:45 | 0.253 | 0.170 | 0.170 | 0.01 |
| 12/15/2019 | 06:05 | 2.23 | 11:20 | 4.43 | 3.25 | 06:40 | 0.93 | 11:20 | 1.80 | 1.37 | 05:55 | 0.077 | 11:20 | 0.393 | 0.205 | 0.205 | 0.01 |
| 12/16/2019 | 05:20 | 2.60 | 09:40 | 3.87 | 3.28 | 05:10 | 1.04 | 08:45 | 1.61 | 1.39 | 05:10 | 0.105 | 09:40 | 0.288 | 0.202 | 0.202 | 0.01 |
| 12/17/2019 | 05:10 | 2.51 | 09:20 | 3.86 | 3.28 | 05:00 | 1.07 | 09:25 | 1.61 | 1.39 | 05:00 | 0.103 | 09:25 | 0.288 | 0.202 | 0.202 | 0.01 |
| 12/18/2019 | 04:50 | 2.55 | 21:45 | 4.78 | 3.68 | 04:15 | 1.08 | 21:40 | 1.92 | 1.52 | 04:55 | 0.107 | 21:45 | 0.467 | 0.270 | 0.270 | 0.01 |
| 12/19/2019 | 04:40 | 3.19 | 09:10 | 4.95 | 4.25 | 04:40 | 1.32 | 08:55 | 1.99 | 1.69 | 04:40 | 0.181 | 09:00 | 0.506 | 0.355 | 0.355 | |
| 12/20/2019 | 05:05 | 3.16 | 09:40 | 4.98 | 4.25 | 03:45 | 1.32 | 09:40 | 1.98 | 1.68 | 05:10 | 0.179 | 09:40 | 0.511 | 0.354 | 0.354 | |
| 12/21/2019 | 05:25 | 3.23 | 12:20 | 5.04 | 4.32 | 05:30 | 1.35 | 11:35 | 1.96 | 1.70 | 05:30 | 0.188 | 11:40 | 0.508 | 0.368 | 0.368 | 0.01 |
| 12/22/2019 | 06:00 | 3.22 | 13:30 | 5.28 | 4.35 | 04:30 | 1.34 | 13:35 | 2.05 | 1.71 | 04:35 | 0.186 | 13:35 | 0.573 | 0.374 | 0.374 | 0.41 |
| 12/23/2019 | 05:35 | 3.32 | 13:15 | 5.71 | 4.47 | 05:30 | 1.35 | 12:15 | 2.19 | 1.73 | 05:30 | 0.195 | 12:15 | 0.666 | 0.396 | 0.396 | |
| 12/24/2019 | 05:05 | 3.16 | 12:05 | 4.87 | 4.19 | 04:55 | 1.27 | 10:40 | 1.88 | 1.64 | 04:55 | 0.173 | 12:05 | 0.467 | 0.339 | 0.339 | 0.02 |
| 12/25/2019 | 04:55 | 3.15 | 12:25 | 4.75 | 4.00 | 05:00 | 1.29 | 19:25 | 1.87 | 1.59 | 04:55 | 0.173 | 12:20 | 0.444 | 0.308 | 0.308 | 0.08 |
| 12/26/2019 | 05:00 | 3.18 | 12:05 | 4.75 | 4.18 | 05:10 | 1.30 | 22:50 | 1.87 | 1.64 | 04:55 | 0.177 | 10:55 | 0.440 | 0.337 | 0.337 | |
| 12/27/2019 | 04:20 | 3.10 | 13:20 | 4.71 | 4.11 | 04:15 | 1.28 | 09:45 | 1.96 | 1.62 | 04:15 | 0.168 | 09:45 | 0.443 | 0.326 | 0.326 | |
| 12/28/2019 | 04:35 | 2.91 | 12:30 | 4.79 | 4.00 | 04:30 | 1.21 | 12:20 | 1.88 | 1.59 | 04:30 | 0.145 | 12:25 | 0.455 | 0.309 | 0.309 | |
| 12/29/2019 | 06:25 | 2.81 | 13:25 | 4.65 | 3.93 | 06:20 | 1.17 | 13:55 | 1.84 | 1.57 | 06:20 | 0.133 | 13:25 | 0.422 | 0.298 | 0.298 | 0.22 |
| 12/30/2019 | 05:55 | 2.75 | 11:10 | 4.54 | 3.81 | 05:30 | 1.15 | 11:20 | 1.81 | 1.53 | 05:30 | 0.128 | 11:20 | 0.408 | 0.278 | 0.278 | |
| 12/31/2019 | 04:45 | 2.84 | 11:20 | 4.53 | 3.89 | 05:15 | 1.17 | 12:40 | 1.91 | 1.55 | 05:15 | 0.136 | 12:40 | 0.419 | 0.290 | 0.290 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 05:40 | 3.20 | 12:25 | 4.65 | 4.06 | 06:35 | 1.30 | 12:05 | 1.88 | 1.62 | 06:35 | 0.181 | 19:10 | 0.436 | 0.321 | 0.321 | |
| 01/02/2020 | 04:35 | 3.49 | 10:25 | 4.64 | 4.23 | 04:05 | 1.42 | 21:00 | 1.86 | 1.69 | 04:05 | 0.223 | 10:35 | 0.431 | 0.351 | 0.351 | |
| 01/03/2020 | 04:25 | 3.50 | 10:10 | 4.83 | 4.30 | 04:55 | 1.43 | 10:05 | 1.89 | 1.71 | 04:20 | 0.223 | 10:10 | 0.465 | 0.363 | 0.363 | |
| 01/04/2020 | 04:10 | 3.61 | 11:55 | 4.94 | 4.36 | 04:20 | 1.45 | 16:40 | 2.01 | 1.72 | 04:20 | 0.238 | 12:15 | 0.500 | 0.373 | 0.373 | |
| 01/05/2020 | 04:45 | 3.52 | 12:10 | 5.06 | 4.38 | 05:25 | 1.40 | 13:50 | 2.06 | 1.72 | 05:25 | 0.221 | 13:50 | 0.525 | 0.376 | 0.376 | |
| 01/06/2020 | 04:35 | 3.46 | 08:55 | 5.05 | 4.25 | 05:15 | 1.40 | 08:50 | 1.94 | 1.69 | 05:05 | 0.216 | 08:50 | 0.508 | 0.353 | 0.353 | |
| 01/07/2020 | 04:50 | 3.38 | 08:40 | 6.31 | 4.14 | 04:25 | 1.36 | 08:40 | 2.37 | 1.68 | 04:25 | 0.204 | 08:40 | 0.844 | 0.339 | 0.339 | |
| 01/08/2020 | 04:45 | 3.16 | 08:35 | 4.79 | 3.81 | 04:40 | 1.36 | 08:35 | 1.94 | 1.59 | 04:40 | 0.183 | 08:35 | 0.471 | 0.285 | 0.285 | 0.02 |
| 01/09/2020 | 05:05 | 2.58 | 08:50 | 4.57 | 3.44 | 05:00 | 1.09 | 08:35 | 1.90 | 1.46 | 05:00 | 0.110 | 08:35 | 0.425 | 0.230 | 0.230 | 0.18 |
| 01/10/2020 | 04:15 | 2.51 | 08:40 | 4.12 | 3.33 | 05:20 | 1.11 | 08:40 | 1.70 | 1.44 | 04:55 | 0.108 | 08:40 | 0.334 | 0.215 | 0.215 | 0.02 |
| 01/11/2020 | 05:40 | 2.76 | 12:55 | 4.14 | 3.54 | 05:40 | 1.23 | 12:55 | 1.70 | 1.50 | 05:40 | 0.137 | 12:55 | 0.337 | 0.243 | 0.243 | 0.01 |
| 01/12/2020 | 06:00 | 3.09 | 12:45 | 4.22 | 3.73 | 06:00 | 1.36 | 12:45 | 1.72 | 1.57 | 06:00 | 0.178 | 12:45 | 0.350 | 0.271 | 0.271 | |
| 01/13/2020 | 05:20 | 2.74 | 09:00 | 3.91 | 3.36 | 05:20 | 1.23 | 09:00 | 1.63 | 1.46 | 05:20 | 0.135 | 09:00 | 0.298 | 0.218 | 0.218 | 0.02 |
| 01/14/2020 | 05:20 | 2.49 | 09:05 | 3.78 | 3.17 | 05:20 | 1.12 | 09:00 | 1.67 | 1.41 | 05:20 | 0.107 | 09:00 | 0.292 | 0.195 | 0.195 | 0.11 |
| 01/15/2020 | 04:30 | 2.45 | 09:05 | 3.71 | 3.12 | 05:10 | 1.11 | 08:55 | 1.60 | 1.39 | 03:55 | 0.104 | 09:05 | 0.271 | 0.188 | 0.188 | 0.07 |
| 01/16/2020 | 05:30 | 2.42 | 21:40 | 3.82 | 3.26 | 05:25 | 1.08 | 21:40 | 1.64 | 1.43 | 05:25 | 0.099 | 21:40 | 0.289 | 0.208 | 0.208 | 0.66 |
| 01/17/2020 | 05:25 | 2.58 | 09:20 | 4.05 | 3.27 | 05:15 | 1.15 | 09:30 | 1.72 | 1.44 | 05:15 | 0.116 | 09:30 | 0.329 | 0.209 | 0.209 | |
| 01/18/2020 | 05:25 | 2.31 | 11:10 | 3.83 | 3.14 | 05:25 | 1.02 | 11:25 | 1.63 | 1.38 | 05:25 | 0.087 | 11:45 | 0.287 | 0.192 | 0.192 | |
| 01/19/2020 | 05:25 | 2.28 | 12:55 | 3.75 | 3.11 | 05:15 | 0.98 | 12:30 | 1.60 | 1.37 | 05:15 | 0.083 | 12:55 | 0.274 | 0.188 | 0.188 | |
| 01/20/2020 | 05:30 | 2.23 | 12:00 | 3.81 | 3.16 | 04:30 | 1.00 | 13:05 | 1.65 | 1.38 | 05:30 | 0.081 | 13:05 | 0.289 | 0.195 | 0.195 | |
| 01/21/2020 | 04:40 | 2.14 | 09:00 | 3.72 | 2.87 | 04:40 | 0.95 | 09:05 | 1.60 | 1.28 | 04:40 | 0.073 | 08:55 | 0.272 | 0.155 | 0.155 | |
| 01/22/2020 | 04:25 | 2.11 | 21:30 | 3.63 | 2.93 | 04:55 | 0.95 | 09:10 | 1.71 | 1.30 | 05:20 | 0.071 | 09:10 | 0.278 | 0.165 | 0.165 | 0.03 |
| 01/23/2020 | 04:20 | 2.57 | 09:00 | 3.80 | 3.28 | 04:50 | 1.15 | 08:55 | 1.71 | 1.44 | 04:50 | 0.116 | 08:55 | 0.301 | 0.209 | 0.209 | |
| 01/24/2020 | 05:00 | 2.84 | 09:05 | 4.18 | 3.62 | 05:15 | 1.27 | 09:05 | 1.76 | 1.55 | 05:15 | 0.148 | 09:05 | 0.355 | 0.259 | 0.259 | |
| 01/25/2020 | 05:05 | 3.09 | 11:50 | 4.39 | 3.89 | 05:05 | 1.37 | 13:55 | 1.85 | 1.63 | 05:05 | 0.179 | 11:50 | 0.394 | 0.302 | 0.302 | |
| 01/26/2020 | 05:00 | 3.27 | 12:50 | 4.69 | 4.12 | 05:25 | 1.43 | 13:00 | 1.93 | 1.73 | 05:25 | 0.202 | 12:50 | 0.457 | 0.347 | 0.347 | 0.16 |
| 01/27/2020 | 05:10 | 3.40 | 08:50 | 4.98 | 4.26 | 05:10 | 1.47 | 09:20 | 2.02 | 1.76 | 05:10 | 0.221 | 09:20 | 0.509 | 0.368 | 0.368 | |
| 01/28/2020 | 04:25 | 3.53 | 09:10 | 5.57 | 4.53 | 02:45 | 1.50 | 09:10 | 2.09 | 1.82 | 04:25 | 0.239 | 09:10 | 0.630 | 0.418 | 0.418 | 0.01 |
| 01/29/2020 | 04:50 | 3.63 | 09:05 | 5.41 | 4.54 | 04:10 | 1.54 | 09:05 | 2.18 | 1.83 | 04:55 | 0.255 | 09:05 | 0.628 | 0.422 | 0.422 | |
| 01/30/2020 | 04:35 | 3.58 | 08:55 | 5.55 | 4.62 | 04:10 | 1.52 | 09:20 | 2.16 | 1.85 | 04:35 | 0.245 | 09:00 | 0.640 | 0.437 | 0.437 | |
| 01/31/2020 | 05:25 | 3.53 | 08:55 | 5.72 | 4.67 | 04:20 | 1.50 | 08:55 | 2.18 | 1.87 | 05:30 | 0.242 | 08:55 | 0.682 | 0.448 | 0.448 | |
| 02/01/2020 | 12:50 | 2.55 | 12:05 | 5.81 | 4.22 | 12:50 | 1.17 | 11:15 | 2.22 | 1.72 | 12:50 | 0.115 | 12:05 | 0.706 | 0.359 | 0.359 | |
| 02/02/2020 | 05:00 | 2.76 | 12:55 | 4.30 | 3.71 | 05:50 | 1.15 | 12:30 | 1.80 | 1.55 | 05:50 | 0.127 | 12:30 | 0.377 | 0.271 | 0.271 | |
| 02/03/2020 | 04:35 | 3.18 | 08:55 | 4.30 | 3.82 | 05:15 | 1.40 | 08:45 | 1.80 | 1.62 | 04:35 | 0.194 | 08:50 | 0.375 | 0.290 | 0.290 | |
| 02/04/2020 | 04:35 | 3.25 | 08:50 | 4.45 | 3.93 | 04:35 | 1.42 | 08:40 | 1.85 | 1.65 | 04:35 | 0.199 | 08:40 | 0.404 | 0.309 | 0.309 | |
| 02/05/2020 | 04:40 | 3.27 | 09:05 | 4.53 | 3.96 | 05:20 | 1.40 | 09:00 | 1.83 | 1.64 | 04:40 | 0.199 | 09:00 | 0.412 | 0.309 | 0.309 | |
| 02/06/2020 | 04:20 | 3.24 | 08:45 | 4.50 | 3.96 | 04:20 | 1.39 | 08:40 | 1.91 | 1.64 | 04:20 | 0.194 | 08:40 | 0.426 | 0.310 | 0.310 | |
| 02/07/2020 | 03:50 | 3.25 | 09:00 | 4.58 | 3.97 | 03:55 | 1.35 | 09:05 | 1.83 | 1.61 | 03:55 | 0.189 | 09:05 | 0.418 | 0.304 | 0.304 | |
| 02/08/2020 | 06:10 | 3.25 | 13:30 | 4.48 | 4.03 | 06:10 | 1.44 | 13:20 | 1.87 | 1.69 | 06:10 | 0.202 | 13:20 | 0.412 | 0.328 | 0.328 | |
| 02/09/2020 | 06:00 | 3.13 | 12:30 | 4.65 | 4.07 | 06:25 | 1.36 | 12:35 | 1.93 | 1.71 | 06:25 | 0.182 | 12:35 | 0.452 | 0.338 | 0.338 | |
| 02/10/2020 | 05:00 | 3.07 | 08:15 | 5.65 | 4.03 | 05:00 | 1.37 | 08:15 | 2.24 | 1.69 | 05:00 | 0.177 | 08:15 | 0.688 | 0.328 | 0.328 | |
| 02/11/2020 | 04:10 | 2.98 | 08:40 | 4.80 | 4.01 | 04:40 | 1.27 | 08:55 | 1.99 | 1.69 | 04:40 | 0.157 | 08:55 | 0.482 | 0.329 | 0.329 | |
| 02/12/2020 | 04:50 | 3.17 | 08:40 | 4.84 | 4.07 | 05:20 | 1.39 | 08:50 | 1.96 | 1.70 | 04:55 | 0.188 | 08:50 | 0.483 | 0.335 | 0.335 | |
| 02/13/2020 | 04:30 | 3.12 | 08:40 | 4.81 | 3.95 | 04:25 | 1.32 | 09:00 | 1.95 | 1.67 | 04:35 | 0.176 | 09:00 | 0.472 | 0.315 | 0.315 | |
| 02/14/2020 | 04:40 | 3.00 | 08:55 | 4.67 | 3.80 | 03:55 | 1.27 | 09:25 | 1.89 | 1.62 | 04:40 | 0.159 | 08:55 | 0.442 | 0.289 | 0.289 | |
| 02/15/2020 | 05:50 | 2.83 | 11:30 | 4.28 | 3.54 | 04:50 | 1.29 | 11:20 | 1.80 | 1.56 | 05:40 | 0.150 | 11:20 | 0.373 | 0.251 | 0.251 | |
| 02/16/2020 | 04:55 | 2.73 | 11:35 | 3.61 | 3.19 | 04:55 | 1.24 | 11:00 | 1.59 | 1.44 | 04:55 | 0.135 | 12:20 | 0.259 | 0.198 | 0.198 | |
| 02/17/2020 | 04:55 | 2.42 | 10:05 | 3.66 | 3.10 | 05:00 | 1.05 | 10:00 | 1.62 | 1.40 | 05:00 | 0.096 | 10:00 | 0.268 | 0.188 | 0.188 | |
| 02/18/2020 | 04:30 | 2.45 | 09:00 | 3.64 | 3.11 | 04:25 | 1.10 | 09:50 | 1.62 | 1.41 | 04:25 | 0.103 | 08:55 | 0.267 | 0.190 | 0.190 | |
| 02/19/2020 | 04:55 | 2.54 | 09:10 | 3.69 | 3.18 | 05:40 | 1.17 | 09:35 | 1.62 | 1.44 | 05:05 | 0.116 | 09:10 | 0.273 | 0.199 | 0.199 | |
| 02/20/2020 | 05:10 | 2.62 | 10:10 | 3.89 | 3.31 | 03:50 | 1.19 | 10:10 | 1.69 | 1.49 | 03:50 | 0.124 | 10:10 | 0.308 | 0.218 | 0.218 | |
| 02/21/2020 | 04:40 | 2.67 | 09:40 | 4.02 | 3.32 | 05:05 | 1.22 | 09:35 | 1.75 | 1.49 | 04:55 | 0.130 | 09:35 | 0.332 | 0.220 | 0.220 | |
| 02/22/2020 | 05:30 | 2.62 | 11:30 | 3.89 | 3.37 | 04:45 | 1.18 | 11:30 | 1.70 | 1.50 | 04:45 | 0.123 | 11:30 | 0.308 | 0.227 | 0.227 | |
| 02/23/2020 | 05:40 | 2.60 | 12:40 | 4.05 | 3.45 | 06:05 | 1.20 | 12:35 | 1.72 | 1.53 | 06:05 | 0.123 | 12:35 | 0.330 | 0.240 | 0.240 | |
| 02/24/2020 | 05:00 | 2.68 | 08:45 | 4.05 | 3.40 | 05:05 | 1.24 | 08:35 | 1.73 | 1.52 | 04:55 | 0.132 | 08:35 | 0.331 | 0.232 | 0.232 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 04:55 | 2.69 | 08:50 | 4.14 | 3.41 | 05:20 | 1.20 | 08:50 | 1.79 | 1.52 | 05:20 | 0.129 | 08:50 | 0.356 | 0.233 | 0.233 | |
| 02/26/2020 | 04:50 | 2.56 | 08:30 | 3.94 | 3.22 | 04:30 | 1.18 | 08:40 | 1.69 | 1.45 | 04:50 | 0.118 | 08:40 | 0.312 | 0.205 | 0.205 | |
| 02/27/2020 | 04:55 | 2.38 | 08:30 | 3.75 | 3.15 | 04:55 | 1.10 | 08:40 | 1.66 | 1.42 | 04:55 | 0.098 | 08:40 | 0.287 | 0.195 | 0.195 | |
| 02/28/2020 | 04:55 | 2.43 | 08:55 | 3.71 | 3.09 | 04:25 | 1.09 | 08:55 | 1.63 | 1.38 | 04:55 | 0.101 | 08:55 | 0.277 | 0.184 | 0.184 | |
| 02/29/2020 | 05:35 | 2.41 | 11:10 | 3.72 | 3.17 | 05:35 | 1.06 | 13:15 | 1.64 | 1.41 | 05:35 | 0.097 | 11:10 | 0.278 | 0.196 | 0.196 | |
| 03/01/2020 | 05:45 | 2.27 | 11:15 | 3.47 | 2.79 | 05:40 | 1.00 | 11:10 | 1.55 | 1.27 | 05:40 | 0.084 | 11:15 | 0.238 | 0.145 | 0.145 | |
| 03/02/2020 | 05:05 | 1.78 | 08:40 | 2.97 | 2.36 | 04:45 | 0.77 | 08:40 | 1.39 | 1.07 | 04:50 | 0.045 | 08:40 | 0.171 | 0.098 | 0.098 | |
| 03/03/2020 | 04:30 | 1.69 | 08:55 | 2.80 | 2.00 | 04:50 | 0.70 | 08:55 | 1.32 | 0.88 | 04:30 | 0.039 | 08:55 | 0.149 | 0.063 | 0.063 | |
| 03/04/2020 | 05:30 | 1.46 | 08:50 | 2.30 | 1.87 | 03:35 | 0.56 | 09:10 | 1.07 | 0.81 | 05:30 | 0.025 | 08:55 | 0.091 | 0.053 | 0.053 | |
| 03/05/2020 | 05:30 | 1.38 | 21:00 | 2.29 | 1.83 | 04:35 | 0.52 | 09:10 | 1.06 | 0.81 | 05:15 | 0.022 | 21:00 | 0.087 | 0.051 | 0.051 | |
| 03/06/2020 | 04:45 | 1.31 | 09:00 | 2.19 | 1.82 | 04:00 | 0.49 | 08:10 | 1.09 | 0.81 | 04:45 | 0.019 | 08:20 | 0.084 | 0.051 | 0.051 | |
| 03/07/2020 | 05:50 | 1.21 | 13:40 | 1.92 | 1.67 | 05:00 | 0.45 | 13:45 | 0.88 | 0.69 | 05:50 | 0.015 | 13:45 | 0.058 | 0.038 | 0.038 | |
| 03/08/2020 | 06:00 | 1.37 | 10:30 | 1.89 | 1.51 | 05:20 | 0.42 | 08:50 | 0.83 | 0.58 | 05:20 | 0.017 | 10:30 | 0.050 | 0.027 | 0.027 | |
| 03/09/2020 | 06:35 | 1.23 | 21:50 | 5.37 | 1.75 | 04:30 | 0.39 | 21:50 | 2.13 | 0.70 | 05:55 | 0.014 | 21:50 | 0.608 | 0.060 | 0.060 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 31.478 | 4.90 |
| Avg | 3.67 | 1.53 | 0.274 | |

Site Commentary

Site Information

| MIL_0649 | |
|-----------------|-------|
| Pipe Dimensions | 21.5 |
| Silt Level | 0.00" |

Overview

Site MIL_0649 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed upstream of site MIL_1790 and downstream of the combined flows of sites MIL_0386 and MIL_2840. A review of balancing with the combined flows of MIL_0386 and MIL_2840 into MIL_0649 and MIL_2491 shows a net flow between the sites of 0.426 MGD.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|-------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 8.66 | 1.24 | 0.777 |
| Minimum | 6.64 | 0.82 | 0.386 |
| Maximum | 11.63 | 1.64 | 1.448 |
| Time of Minimum | 3/1/2020 3:15 AM | 2/1/2020 11:40 PM | 2/17/2020 1:55 AM |
| Time of Maximum | 2/18/2020 11:55 AM | 12/5/2019 2:35 PM | 1/9/2020 10:45 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0649

Site Address /Location: 79 Railroad Avenue

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details:

Drive

Latitude:

37.430840°

Longitude:

-121.905657

Pipe Size (H x W)

21.50" x 21.50"

Pipe Shape

Circular

Manhole #

649

System Characteristics

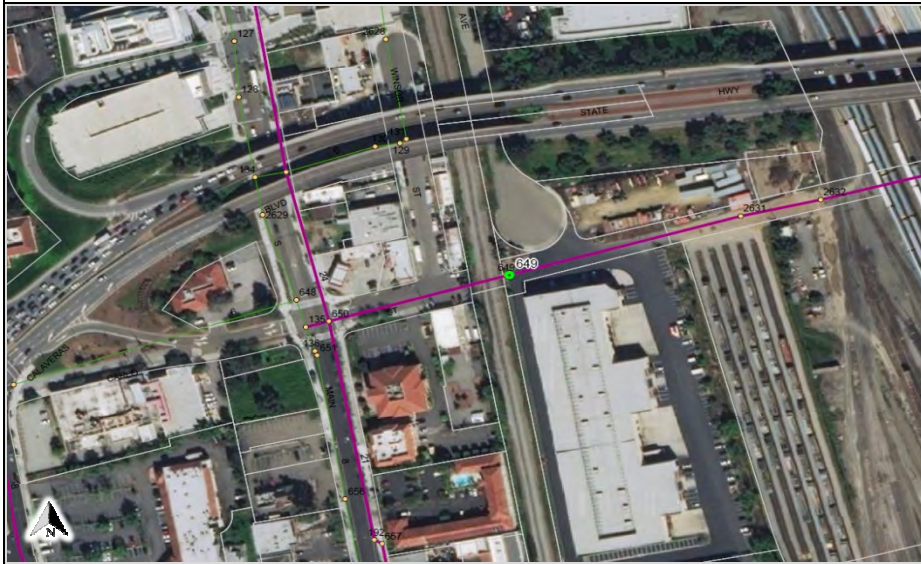
Residential/Commercial

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

10:22:26 AM

Pipe Size (HxW)

21.50" x 21.50"

Depth of Flow (Wet DOF) (in)

10.50

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.61

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Smooth deep flow with moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

10'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_0649

Flow Monitor

MIL_0649

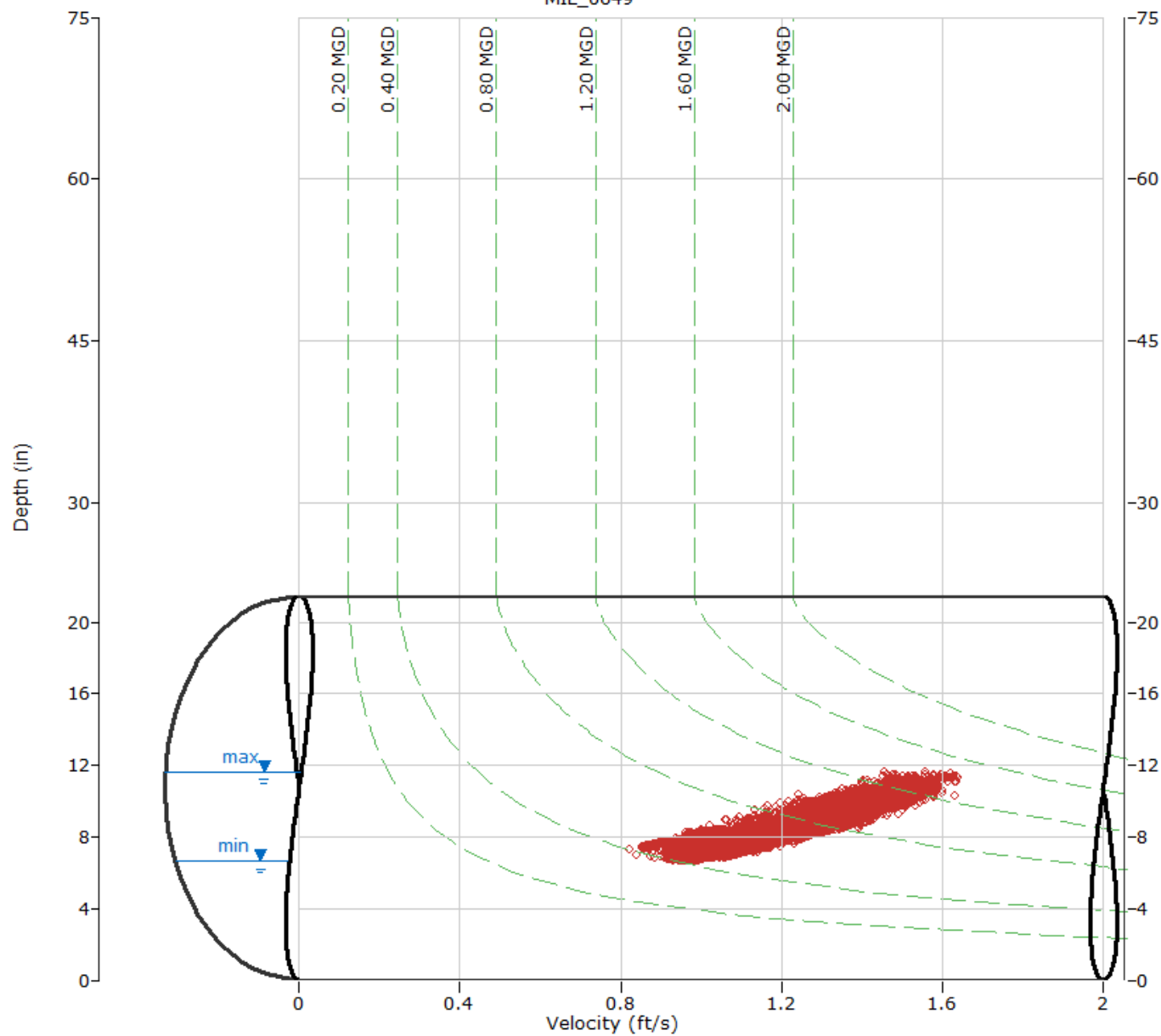
Pipe Height
21.50 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

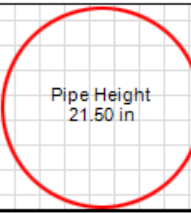


HYDROGRAPH REPORT

MIL_0649

Flow Monitor

MIL_0649



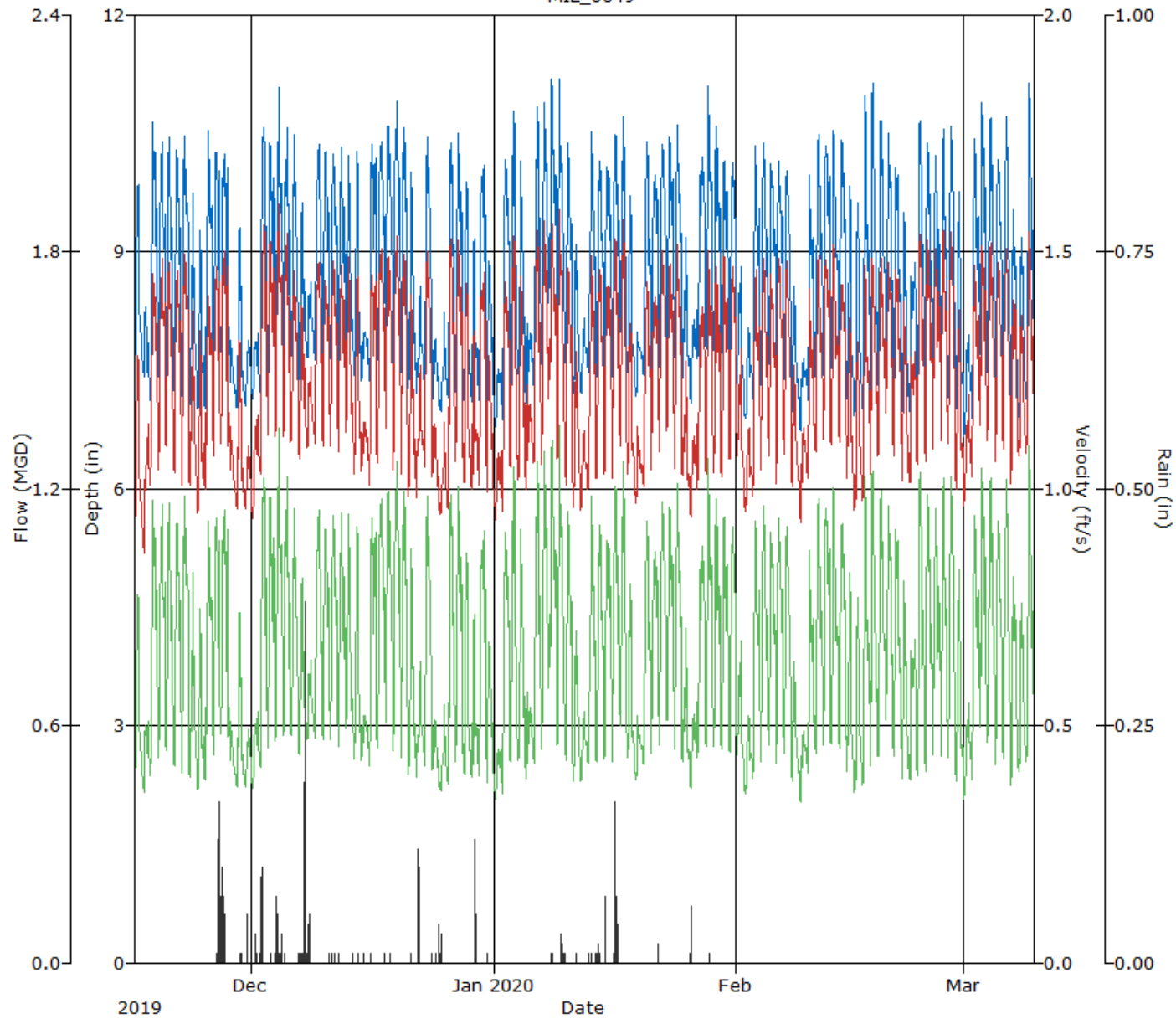
Pipe Height
21.50 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0649, Pipe Height: 21.50 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 04:20 | 7.62 | 12:25 | 10.26 | 8.49 | 04:45 | 0.93 | 12:30 | 1.34 | 1.07 | 04:00 | 0.480 | 12:30 | 1.024 | 0.648 | 0.648 | |
| 11/17/2019 | 23:55 | 7.22 | 15:05 | 8.57 | 7.75 | 06:20 | 0.85 | 15:05 | 1.24 | 0.99 | 06:20 | 0.423 | 15:05 | 0.748 | 0.527 | 0.527 | |
| 11/18/2019 | 00:55 | 7.00 | 10:15 | 11.13 | 9.05 | 03:35 | 1.00 | 10:15 | 1.54 | 1.27 | 00:55 | 0.462 | 10:15 | 1.311 | 0.848 | 0.848 | |
| 11/19/2019 | 04:50 | 7.37 | 15:50 | 10.61 | 9.09 | 05:15 | 1.01 | 15:50 | 1.55 | 1.30 | 05:15 | 0.504 | 15:50 | 1.244 | 0.865 | 0.865 | |
| 11/20/2019 | 03:30 | 7.27 | 12:30 | 10.87 | 8.85 | 03:30 | 1.06 | 12:30 | 1.54 | 1.28 | 03:30 | 0.514 | 12:30 | 1.273 | 0.823 | 0.823 | |
| 11/21/2019 | 04:20 | 7.18 | 11:05 | 10.80 | 9.00 | 04:25 | 1.03 | 11:00 | 1.53 | 1.30 | 04:20 | 0.489 | 11:00 | 1.251 | 0.854 | 0.854 | |
| 11/22/2019 | 04:40 | 7.12 | 11:40 | 11.16 | 9.10 | 04:40 | 0.99 | 11:35 | 1.63 | 1.32 | 04:40 | 0.464 | 11:35 | 1.382 | 0.879 | 0.879 | |
| 11/23/2019 | 05:05 | 7.01 | 12:10 | 9.90 | 8.01 | 04:55 | 1.00 | 12:45 | 1.41 | 1.13 | 05:00 | 0.459 | 12:10 | 1.014 | 0.633 | 0.633 | |
| 11/24/2019 | 03:25 | 6.97 | 13:00 | 9.71 | 7.79 | 03:20 | 0.93 | 12:05 | 1.39 | 1.09 | 03:25 | 0.425 | 13:00 | 0.984 | 0.587 | 0.587 | |
| 11/25/2019 | 03:50 | 6.96 | 12:35 | 10.77 | 8.89 | 02:10 | 0.97 | 12:30 | 1.45 | 1.24 | 02:10 | 0.443 | 12:30 | 1.184 | 0.803 | 0.803 | |
| 11/26/2019 | 04:20 | 7.31 | 09:40 | 10.62 | 9.16 | 04:10 | 1.05 | 10:10 | 1.52 | 1.32 | 04:20 | 0.518 | 10:10 | 1.212 | 0.883 | 0.883 | 0.36 |
| 11/27/2019 | 03:20 | 7.70 | 10:05 | 10.48 | 9.23 | 03:15 | 1.09 | 13:05 | 1.54 | 1.34 | 03:15 | 0.569 | 13:10 | 1.198 | 0.906 | 0.906 | 0.63 |
| 11/28/2019 | 20:20 | 7.16 | 00:00 | 8.75 | 7.60 | 23:50 | 0.90 | 00:00 | 1.26 | 1.07 | 23:50 | 0.433 | 00:00 | 0.787 | 0.555 | 0.555 | |
| 11/29/2019 | 04:20 | 7.00 | 14:10 | 9.99 | 7.88 | 22:45 | 0.92 | 13:55 | 1.42 | 1.10 | 04:15 | 0.435 | 09:15 | 1.034 | 0.603 | 0.603 | 0.02 |
| 11/30/2019 | 06:30 | 6.97 | 17:45 | 8.05 | 7.47 | 06:25 | 0.93 | 17:35 | 1.13 | 1.02 | 06:25 | 0.427 | 17:45 | 0.627 | 0.513 | 0.513 | 0.10 |
| 12/01/2019 | 06:05 | 7.08 | 21:35 | 8.27 | 7.55 | 06:05 | 0.91 | 21:40 | 1.20 | 1.05 | 06:05 | 0.427 | 21:40 | 0.695 | 0.537 | 0.537 | 0.06 |
| 12/02/2019 | 04:15 | 7.16 | 13:35 | 10.70 | 9.14 | 04:10 | 1.02 | 10:40 | 1.63 | 1.34 | 04:10 | 0.483 | 10:40 | 1.255 | 0.905 | 0.905 | 0.30 |
| 12/03/2019 | 04:20 | 7.30 | 10:05 | 10.72 | 8.96 | 04:10 | 1.10 | 10:10 | 1.56 | 1.34 | 04:10 | 0.536 | 10:10 | 1.261 | 0.870 | 0.870 | 0.01 |
| 12/04/2019 | 02:45 | 7.45 | 12:15 | 11.41 | 9.35 | 02:20 | 1.11 | 12:10 | 1.64 | 1.39 | 02:45 | 0.557 | 12:10 | 1.436 | 0.957 | 0.957 | 0.39 |
| 12/05/2019 | 03:30 | 7.61 | 14:40 | 11.30 | 9.20 | 03:35 | 1.10 | 14:35 | 1.64 | 1.35 | 03:35 | 0.569 | 14:35 | 1.418 | 0.908 | 0.908 | 0.01 |
| 12/06/2019 | 02:15 | 7.60 | 12:40 | 10.59 | 9.00 | 01:40 | 1.02 | 17:50 | 1.48 | 1.29 | 01:40 | 0.536 | 12:55 | 1.173 | 0.843 | 0.843 | 0.01 |
| 12/07/2019 | 06:00 | 7.33 | 11:50 | 9.77 | 8.30 | 06:05 | 1.05 | 11:45 | 1.49 | 1.21 | 06:05 | 0.516 | 11:50 | 1.068 | 0.710 | 0.710 | 0.67 |
| 12/08/2019 | 04:15 | 7.64 | 07:45 | 9.62 | 8.11 | 05:40 | 1.08 | 07:45 | 1.43 | 1.17 | 04:15 | 0.562 | 07:45 | 1.008 | 0.659 | 0.659 | 0.20 |
| 12/09/2019 | 04:40 | 7.53 | 16:50 | 10.46 | 9.15 | 04:35 | 1.08 | 13:35 | 1.53 | 1.32 | 04:35 | 0.549 | 13:35 | 1.179 | 0.887 | 0.887 | |
| 12/10/2019 | 05:10 | 7.57 | 12:00 | 10.57 | 9.13 | 04:00 | 1.08 | 10:35 | 1.49 | 1.31 | 05:00 | 0.557 | 11:55 | 1.179 | 0.872 | 0.872 | |
| 12/11/2019 | 04:20 | 7.58 | 13:20 | 10.40 | 9.07 | 04:05 | 1.08 | 12:35 | 1.51 | 1.31 | 04:00 | 0.554 | 13:20 | 1.173 | 0.867 | 0.867 | 0.03 |
| 12/12/2019 | 04:30 | 7.49 | 12:45 | 10.46 | 9.06 | 04:20 | 1.07 | 13:25 | 1.50 | 1.31 | 04:20 | 0.539 | 12:40 | 1.173 | 0.865 | 0.865 | 0.01 |
| 12/13/2019 | 01:50 | 7.61 | 12:20 | 10.35 | 8.74 | 01:55 | 1.09 | 12:20 | 1.52 | 1.27 | 01:55 | 0.564 | 12:20 | 1.180 | 0.796 | 0.796 | 0.01 |
| 12/14/2019 | 04:10 | 7.39 | 13:25 | 10.37 | 8.35 | 03:45 | 1.01 | 13:50 | 1.48 | 1.19 | 03:45 | 0.506 | 13:25 | 1.129 | 0.707 | 0.707 | 0.01 |
| 12/15/2019 | 03:10 | 7.25 | 06:55 | 8.09 | 7.78 | 09:10 | 1.00 | 06:50 | 1.17 | 1.10 | 06:20 | 0.487 | 06:50 | 0.655 | 0.584 | 0.584 | 0.01 |
| 12/16/2019 | 03:45 | 7.35 | 08:25 | 10.48 | 9.18 | 03:40 | 1.00 | 12:55 | 1.49 | 1.29 | 03:45 | 0.493 | 12:50 | 1.171 | 0.875 | 0.875 | 0.01 |
| 12/17/2019 | 05:15 | 7.52 | 16:55 | 10.65 | 9.38 | 03:55 | 1.04 | 16:50 | 1.56 | 1.34 | 05:15 | 0.528 | 16:50 | 1.256 | 0.934 | 0.934 | 0.01 |
| 12/18/2019 | 04:20 | 7.59 | 12:50 | 10.77 | 9.53 | 04:20 | 1.07 | 12:45 | 1.51 | 1.36 | 04:20 | 0.549 | 12:45 | 1.232 | 0.953 | 0.953 | 0.01 |
| 12/19/2019 | 04:35 | 7.56 | 13:25 | 11.00 | 9.49 | 04:35 | 1.02 | 13:05 | 1.56 | 1.34 | 04:35 | 0.522 | 13:05 | 1.299 | 0.945 | 0.945 | |
| 12/20/2019 | 05:05 | 7.32 | 14:20 | 10.74 | 9.30 | 05:00 | 1.00 | 14:20 | 1.53 | 1.32 | 05:00 | 0.489 | 14:20 | 1.247 | 0.902 | 0.902 | |
| 12/21/2019 | 04:25 | 7.24 | 11:25 | 10.10 | 8.35 | 05:40 | 0.97 | 11:20 | 1.46 | 1.16 | 04:30 | 0.472 | 11:20 | 1.095 | 0.688 | 0.688 | 0.01 |
| 12/22/2019 | 03:25 | 7.15 | 14:35 | 8.70 | 7.74 | 03:25 | 0.97 | 14:35 | 1.29 | 1.10 | 03:25 | 0.457 | 14:35 | 0.795 | 0.584 | 0.584 | 0.41 |
| 12/23/2019 | 04:40 | 7.12 | 11:35 | 10.73 | 9.01 | 04:05 | 1.04 | 11:35 | 1.53 | 1.31 | 04:45 | 0.491 | 11:35 | 1.244 | 0.867 | 0.867 | |
| 12/24/2019 | 03:10 | 7.11 | 00:10 | 8.79 | 7.55 | 18:30 | 0.96 | 00:10 | 1.31 | 1.07 | 23:40 | 0.478 | 00:10 | 0.821 | 0.548 | 0.548 | 0.02 |
| 12/25/2019 | 06:00 | 6.95 | 16:10 | 8.45 | 7.42 | 01:20 | 0.93 | 16:10 | 1.19 | 1.02 | 05:45 | 0.426 | 16:10 | 0.706 | 0.509 | 0.509 | 0.08 |
| 12/26/2019 | 03:10 | 7.13 | 13:20 | 10.47 | 8.91 | 01:20 | 0.90 | 13:30 | 1.60 | 1.28 | 01:55 | 0.445 | 13:30 | 1.254 | 0.842 | 0.842 | |
| 12/27/2019 | 02:50 | 7.15 | 11:00 | 10.96 | 9.02 | 02:50 | 1.04 | 10:50 | 1.56 | 1.32 | 02:50 | 0.491 | 11:00 | 1.290 | 0.873 | 0.873 | |
| 12/28/2019 | 06:15 | 7.08 | 13:50 | 10.07 | 8.28 | 06:10 | 0.99 | 14:15 | 1.47 | 1.20 | 06:10 | 0.466 | 14:15 | 1.097 | 0.708 | 0.708 | |
| 12/29/2019 | 07:30 | 7.01 | 09:20 | 9.47 | 7.84 | 01:55 | 0.94 | 10:10 | 1.37 | 1.12 | 01:55 | 0.451 | 09:20 | 0.945 | 0.609 | 0.609 | 0.22 |
| 12/30/2019 | 03:35 | 7.11 | 18:55 | 10.29 | 8.95 | 02:50 | 1.00 | 18:40 | 1.58 | 1.28 | 03:00 | 0.473 | 18:40 | 1.199 | 0.839 | 0.839 | |
| 12/31/2019 | 05:10 | 6.91 | 08:50 | 9.14 | 7.96 | 05:10 | 0.97 | 08:50 | 1.34 | 1.14 | 05:10 | 0.441 | 08:50 | 0.885 | 0.631 | 0.631 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 06:35 | 6.75 | 14:05 | 7.61 | 7.22 | 06:10 | 0.89 | 02:20 | 1.10 | 1.02 | 06:10 | 0.393 | 13:55 | 0.564 | 0.489 | 0.489 | | |
| 01/02/2020 | 03:35 | 6.84 | 07:40 | 10.59 | 8.94 | 04:15 | 0.87 | 07:35 | 1.58 | 1.26 | 04:15 | 0.396 | 07:35 | 1.263 | 0.828 | 0.828 | | |
| 01/03/2020 | 03:05 | 7.23 | 15:20 | 10.97 | 8.90 | 22:35 | 0.94 | 15:15 | 1.57 | 1.28 | 05:05 | 0.482 | 15:15 | 1.297 | 0.835 | 0.835 | | |
| 01/04/2020 | 03:30 | 7.42 | 11:35 | 10.41 | 8.44 | 03:30 | 1.01 | 11:10 | 1.58 | 1.21 | 03:30 | 0.503 | 11:10 | 1.209 | 0.729 | 0.729 | | |
| 01/05/2020 | 03:35 | 7.06 | 07:20 | 8.31 | 7.67 | 03:35 | 0.98 | 07:15 | 1.27 | 1.12 | 03:35 | 0.457 | 07:15 | 0.736 | 0.585 | 0.585 | | |
| 01/06/2020 | 04:35 | 7.15 | 13:10 | 11.00 | 9.07 | 01:25 | 1.03 | 12:20 | 1.59 | 1.31 | 04:35 | 0.493 | 15:35 | 1.322 | 0.876 | 0.876 | | |
| 01/07/2020 | 04:00 | 7.48 | 12:40 | 11.07 | 9.28 | 03:50 | 1.03 | 12:35 | 1.60 | 1.32 | 03:55 | 0.522 | 12:35 | 1.349 | 0.907 | 0.907 | | |
| 01/08/2020 | 04:30 | 7.94 | 12:35 | 11.43 | 9.75 | 00:55 | 1.10 | 12:35 | 1.60 | 1.38 | 04:30 | 0.617 | 12:35 | 1.405 | 1.002 | 1.002 | | |
| 01/09/2020 | 03:50 | 7.55 | 10:45 | 11.57 | 9.35 | 03:45 | 1.04 | 10:50 | 1.62 | 1.33 | 03:45 | 0.531 | 10:45 | 1.448 | 0.919 | 0.919 | 0.18 | |
| 01/10/2020 | 05:15 | 7.50 | 12:35 | 10.49 | 9.02 | 05:40 | 1.00 | 12:30 | 1.49 | 1.27 | 05:40 | 0.507 | 12:30 | 1.177 | 0.839 | 0.839 | 0.02 | |
| 01/11/2020 | 06:15 | 7.15 | 13:55 | 9.43 | 8.01 | 03:25 | 0.92 | 13:55 | 1.35 | 1.12 | 03:25 | 0.438 | 13:55 | 0.925 | 0.625 | 0.625 | 0.01 | |
| 01/12/2020 | 04:00 | 7.19 | 14:20 | 8.26 | 7.67 | 03:00 | 0.86 | 15:30 | 1.16 | 1.04 | 03:00 | 0.416 | 15:30 | 0.668 | 0.546 | 0.546 | | |
| 01/13/2020 | 04:40 | 7.37 | 13:15 | 10.57 | 8.93 | 01:20 | 0.98 | 13:15 | 1.52 | 1.25 | 04:35 | 0.487 | 13:15 | 1.212 | 0.816 | 0.816 | | |
| 01/14/2020 | 04:55 | 7.37 | 13:10 | 10.29 | 8.99 | 04:55 | 1.01 | 15:05 | 1.50 | 1.28 | 04:55 | 0.499 | 15:15 | 1.148 | 0.839 | 0.839 | | |
| 01/15/2020 | 04:40 | 7.36 | 12:15 | 10.21 | 9.12 | 04:35 | 1.02 | 12:10 | 1.45 | 1.30 | 04:35 | 0.502 | 12:05 | 1.107 | 0.865 | 0.865 | | |
| 01/16/2020 | 04:30 | 7.39 | 14:05 | 10.85 | 9.26 | 04:10 | 1.01 | 14:05 | 1.57 | 1.33 | 04:10 | 0.505 | 14:05 | 1.293 | 0.904 | 0.904 | 0.66 | |
| 01/17/2020 | 04:55 | 7.83 | 15:35 | 10.79 | 9.11 | 04:50 | 1.06 | 15:05 | 1.58 | 1.31 | 04:50 | 0.570 | 15:30 | 1.292 | 0.874 | 0.874 | | |
| 01/18/2020 | 06:25 | 7.42 | 12:35 | 9.73 | 8.13 | 04:05 | 0.98 | 11:50 | 1.42 | 1.14 | 04:05 | 0.487 | 11:50 | 0.989 | 0.653 | 0.653 | | |
| 01/19/2020 | 05:00 | 7.11 | 09:00 | 8.23 | 7.62 | 00:20 | 0.95 | 09:00 | 1.20 | 1.05 | 05:10 | 0.448 | 09:00 | 0.690 | 0.543 | 0.543 | | |
| 01/20/2020 | 05:00 | 7.38 | 14:50 | 10.46 | 8.94 | 05:00 | 0.98 | 15:20 | 1.47 | 1.24 | 05:00 | 0.484 | 15:20 | 1.148 | 0.814 | 0.814 | | |
| 01/21/2020 | 04:10 | 7.42 | 12:45 | 10.15 | 9.18 | 04:10 | 1.01 | 09:40 | 1.45 | 1.29 | 04:10 | 0.503 | 12:45 | 1.099 | 0.866 | 0.866 | | |
| 01/22/2020 | 04:15 | 7.49 | 12:50 | 10.51 | 9.24 | 04:15 | 1.06 | 12:45 | 1.56 | 1.33 | 04:15 | 0.536 | 12:45 | 1.232 | 0.903 | 0.903 | | |
| 01/23/2020 | 04:20 | 7.68 | 09:05 | 10.54 | 9.36 | 03:50 | 1.10 | 15:30 | 1.49 | 1.32 | 04:20 | 0.578 | 09:05 | 1.179 | 0.910 | 0.910 | | |
| 01/24/2020 | 04:55 | 7.63 | 12:40 | 10.83 | 9.25 | 04:50 | 1.03 | 11:00 | 1.56 | 1.30 | 04:50 | 0.534 | 11:15 | 1.267 | 0.887 | 0.887 | | |
| 01/25/2020 | 03:30 | 7.34 | 15:05 | 9.45 | 8.02 | 20:55 | 0.93 | 15:00 | 1.33 | 1.10 | 20:55 | 0.482 | 15:05 | 0.912 | 0.611 | 0.611 | | |
| 01/26/2020 | 05:20 | 7.02 | 21:40 | 8.97 | 7.69 | 08:45 | 0.92 | 21:35 | 1.26 | 1.03 | 05:20 | 0.431 | 21:40 | 0.807 | 0.543 | 0.543 | | |
| 01/27/2020 | 00:55 | 7.55 | 15:45 | 10.43 | 9.27 | 00:25 | 0.95 | 15:35 | 1.43 | 1.25 | 00:25 | 0.492 | 15:40 | 1.120 | 0.852 | 0.852 | | |
| 01/28/2020 | 05:05 | 7.64 | 10:00 | 11.35 | 9.43 | 05:05 | 1.00 | 10:35 | 1.52 | 1.28 | 05:05 | 0.520 | 10:05 | 1.324 | 0.897 | 0.897 | | |
| 01/29/2020 | 04:35 | 7.60 | 09:45 | 10.80 | 9.18 | 04:35 | 1.01 | 09:40 | 1.53 | 1.26 | 04:35 | 0.520 | 09:40 | 1.250 | 0.848 | 0.848 | | |
| 01/30/2020 | 02:15 | 7.68 | 11:20 | 10.28 | 9.06 | 02:10 | 1.01 | 11:15 | 1.53 | 1.28 | 02:10 | 0.529 | 11:15 | 1.176 | 0.849 | 0.849 | | |
| 01/31/2020 | 05:10 | 7.40 | 12:30 | 10.35 | 9.01 | 03:55 | 1.01 | 14:20 | 1.51 | 1.30 | 03:55 | 0.512 | 12:35 | 1.150 | 0.856 | 0.856 | | |
| 02/01/2020 | 03:45 | 7.26 | 14:45 | 9.12 | 7.86 | 23:40 | 0.82 | 08:45 | 1.35 | 1.13 | 23:40 | 0.399 | 14:45 | 0.878 | 0.614 | 0.614 | | |
| 02/02/2020 | 02:45 | 6.88 | 15:30 | 8.12 | 7.40 | 21:05 | 0.92 | 12:25 | 1.18 | 1.03 | 06:15 | 0.425 | 12:25 | 0.663 | 0.514 | 0.514 | | |
| 02/03/2020 | 02:35 | 7.10 | 10:35 | 10.44 | 8.94 | 00:55 | 0.97 | 10:30 | 1.51 | 1.26 | 02:40 | 0.462 | 10:30 | 1.182 | 0.822 | 0.822 | | |
| 02/04/2020 | 04:10 | 7.26 | 13:20 | 10.51 | 8.97 | 03:55 | 1.02 | 13:00 | 1.53 | 1.28 | 04:20 | 0.498 | 13:00 | 1.203 | 0.840 | 0.840 | | |
| 02/05/2020 | 04:20 | 7.46 | 10:00 | 10.20 | 9.12 | 04:30 | 1.03 | 09:35 | 1.48 | 1.30 | 04:30 | 0.521 | 09:35 | 1.121 | 0.863 | 0.863 | | |
| 02/06/2020 | 04:50 | 7.38 | 13:50 | 10.35 | 9.07 | 04:50 | 0.99 | 13:45 | 1.55 | 1.30 | 04:50 | 0.492 | 13:45 | 1.202 | 0.863 | 0.863 | | |
| 02/07/2020 | 02:25 | 7.30 | 11:00 | 10.23 | 8.93 | 02:20 | 1.05 | 10:55 | 1.55 | 1.30 | 02:20 | 0.512 | 10:55 | 1.181 | 0.842 | 0.842 | | |
| 02/08/2020 | 04:05 | 6.92 | 11:30 | 8.67 | 7.59 | 22:20 | 0.95 | 11:35 | 1.28 | 1.10 | 04:05 | 0.452 | 11:35 | 0.789 | 0.569 | 0.569 | | |
| 02/09/2020 | 04:35 | 6.70 | 13:35 | 7.72 | 7.29 | 05:20 | 0.91 | 11:55 | 1.16 | 1.05 | 05:05 | 0.398 | 11:55 | 0.606 | 0.513 | 0.513 | | |
| 02/10/2020 | 04:30 | 7.08 | 08:10 | 10.11 | 8.52 | 00:45 | 0.92 | 08:10 | 1.46 | 1.21 | 00:50 | 0.462 | 08:10 | 1.095 | 0.739 | 0.739 | | |
| 02/11/2020 | 04:30 | 7.26 | 13:00 | 10.71 | 9.08 | 04:10 | 1.05 | 13:05 | 1.54 | 1.31 | 04:30 | 0.519 | 13:05 | 1.248 | 0.868 | 0.868 | | |
| 02/12/2020 | 04:30 | 7.23 | 12:05 | 10.47 | 9.29 | 04:25 | 1.06 | 09:55 | 1.53 | 1.34 | 04:25 | 0.510 | 12:05 | 1.199 | 0.914 | 0.914 | | |
| 02/13/2020 | 02:15 | 7.42 | 10:40 | 10.69 | 9.06 | 02:15 | 1.07 | 10:30 | 1.55 | 1.31 | 02:15 | 0.535 | 10:35 | 1.254 | 0.869 | 0.869 | | |
| 02/14/2020 | 04:35 | 7.35 | 13:10 | 10.56 | 9.17 | 05:05 | 1.08 | 10:35 | 1.47 | 1.31 | 05:05 | 0.536 | 13:10 | 1.165 | 0.879 | 0.879 | | |
| 02/15/2020 | 03:25 | 6.97 | 11:50 | 10.38 | 8.15 | 02:10 | 0.90 | 11:45 | 1.44 | 1.16 | 02:10 | 0.432 | 11:45 | 1.117 | 0.669 | 0.669 | | |
| 02/16/2020 | 02:15 | 6.86 | 12:30 | 10.02 | 7.96 | 04:30 | 0.88 | 12:35 | 1.41 | 1.10 | 02:55 | 0.417 | 12:35 | 1.046 | 0.614 | 0.614 | | |
| 02/17/2020 | 04:45 | 6.98 | 12:30 | 11.07 | 8.66 | 01:55 | 0.84 | 12:25 | 1.50 | 1.20 | 01:55 | 0.386 | 12:25 | 1.265 | 0.756 | 0.756 | | |
| 02/18/2020 | 04:00 | 7.08 | 11:55 | 11.63 | 9.17 | 03:35 | 0.97 | 11:55 | 1.56 | 1.28 | 03:35 | 0.465 | 11:55 | 1.399 | 0.861 | 0.861 | | |
| 02/19/2020 | 04:35 | 7.26 | 11:20 | 10.90 | 9.04 | 02:05 | 1.04 | 13:45 | 1.53 | 1.29 | 02:05 | 0.503 | 11:25 | 1.236 | 0.857 | 0.857 | | |
| 02/20/2020 | 04:30 | 7.37 | 12:45 | 10.65 | 9.14 | 03:00 | 1.09 | 16:20 | 1.52 | 1.33 | 04:25 | 0.546 | 12:30 | 1.208 | 0.886 | 0.886 | | |
| 02/21/2020 | 03:25 | 7.27 | 10:10 | 10.24 | 8.74 | 03:10 | 1.05 | 14:50 | 1.52 | 1.29 | 03:10 | 0.508 | 10:10 | 1.156 | 0.813 | 0.813 | | |
| 02/22/2020 | 04:45 | 6.91 | 13:15 | 9.92 | 8.12 | 06:40 | 0.90 | 10:55 | 1.47 | 1.20 | 06:40 | 0.407 | 13:15 | 1.064 | 0.686 | 0.686 | | |
| 02/23/2020 | 06:05 | 6.85 | 20:15 | 9.05 | 7.96 | 05:50 | 0.94 | 19:55 | 1.36 | 1.16 | 05:50 | 0.426 | 19:55 | 0.872 | 0.643 | 0.643 | | |
| 02/24/2020 | 04:30 | 6.86 | 10:45 | 11.18 | 8.92 | 04:20 | 0.93 | 11:05 | 1.60 | 1.33 | 04:20 | 0.419 | 11:05 | 1.364 | 0.867 | 0.867 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 02/25/2020 | 04:55 | 6.92 | 14:00 | 10.51 | 8.85 | 04:35 | 1.04 | 12:30 | 1.56 | 1.32 | 04:55 | 0.472 | 13:55 | 1.234 | 0.849 | 0.849 | | |
| 02/26/2020 | 04:35 | 6.97 | 10:25 | 10.67 | 8.86 | 04:30 | 1.03 | 13:30 | 1.56 | 1.34 | 04:30 | 0.472 | 10:20 | 1.228 | 0.856 | 0.856 | | |
| 02/27/2020 | 04:45 | 7.05 | 12:40 | 10.71 | 9.02 | 04:40 | 1.07 | 12:45 | 1.57 | 1.36 | 04:40 | 0.498 | 12:45 | 1.274 | 0.896 | 0.896 | | |
| 02/28/2020 | 02:20 | 7.09 | 10:35 | 10.78 | 8.92 | 00:30 | 1.07 | 11:40 | 1.58 | 1.33 | 02:20 | 0.509 | 10:30 | 1.286 | 0.868 | 0.868 | | |
| 02/29/2020 | 03:05 | 6.92 | 11:00 | 10.62 | 7.97 | 02:50 | 0.98 | 11:00 | 1.51 | 1.15 | 03:00 | 0.444 | 11:00 | 1.208 | 0.642 | 0.642 | | |
| 03/01/2020 | 03:15 | 6.64 | 18:20 | 8.11 | 7.30 | 03:05 | 0.93 | 18:25 | 1.24 | 1.07 | 03:05 | 0.400 | 18:25 | 0.696 | 0.524 | 0.524 | | |
| 03/02/2020 | 03:20 | 6.85 | 10:35 | 10.66 | 8.91 | 03:10 | 1.01 | 10:40 | 1.55 | 1.28 | 03:15 | 0.453 | 10:40 | 1.249 | 0.836 | 0.836 | | |
| 03/03/2020 | 05:20 | 7.40 | 10:05 | 11.11 | 9.27 | 03:20 | 1.07 | 10:10 | 1.61 | 1.33 | 05:15 | 0.539 | 10:10 | 1.364 | 0.909 | 0.909 | | |
| 03/04/2020 | 03:30 | 7.22 | 09:10 | 11.00 | 9.17 | 03:10 | 1.05 | 12:20 | 1.54 | 1.33 | 03:10 | 0.506 | 09:05 | 1.285 | 0.899 | 0.899 | | |
| 03/05/2020 | 04:40 | 7.10 | 13:30 | 10.54 | 9.04 | 04:30 | 1.04 | 13:25 | 1.57 | 1.32 | 04:35 | 0.490 | 13:30 | 1.242 | 0.868 | 0.868 | | |
| 03/06/2020 | 02:10 | 6.88 | 15:40 | 10.99 | 8.95 | 02:10 | 1.03 | 14:15 | 1.55 | 1.32 | 02:10 | 0.462 | 15:35 | 1.273 | 0.863 | 0.863 | | |
| 03/07/2020 | 02:25 | 6.80 | 11:35 | 10.26 | 8.12 | 02:45 | 0.91 | 17:45 | 1.49 | 1.23 | 02:45 | 0.404 | 11:35 | 1.111 | 0.706 | 0.706 | | |
| 03/08/2020 | 02:15 | 6.84 | 10:40 | 9.79 | 7.88 | 02:20 | 1.06 | 10:40 | 1.42 | 1.20 | 02:15 | 0.472 | 10:40 | 1.029 | 0.655 | 0.655 | | |
| 03/09/2020 | 03:25 | 7.04 | 12:00 | 11.45 | 9.16 | 01:50 | 1.06 | 13:30 | 1.59 | 1.32 | 03:25 | 0.495 | 13:30 | 1.388 | 0.895 | 0.895 | | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 89.337 | 4.90 |
| Avg | 8.66 | 1.24 | 0.777 | |

Site Commentary

Site Information

| MIL_0715 | |
|-----------------|-------|
| Pipe Dimensions | 30.5 |
| Silt Level | 0.00" |

Overview

Site MIL_0715 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location. Due to meter malfunction, data confidence is less than typical during January 27, 2020 through February 04, 2020. Also a data gap occurred beginning January 05, 2020 through January 09, 2020.

This location was installed upstream of site MIL_2808. (See MIL_2808 Site Commentary for More Details)

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|-------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 7.53 | 1.46 | 0.969 |
| Minimum | 4.42 | 0.41 | 0.120 |
| Maximum | 10.33 | 2.18 | 2.069 |
| Time of Minimum | 1/30/2020 5:55 AM | 1/30/2020 5:40 AM | 1/30/2020 5:40 AM |
| Time of Maximum | 3/8/2020 1:30 PM | 3/3/2020 9:20 AM | 3/8/2020 1:45 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|----|
| Depth (in) | 96 |
| Velocity (ft/s) | 96 |
| Quantity (MGD) | 96 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0715

Site Address /Location: Barber Ln and Bellew Dr

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: In Parking Lot

Latitude:

37.421203°

Longitude:

-121.917399

Pipe Size (H x W)

30.5" x 30.0"

Pipe Shape

Circular

Manhole #

715

System Characteristics

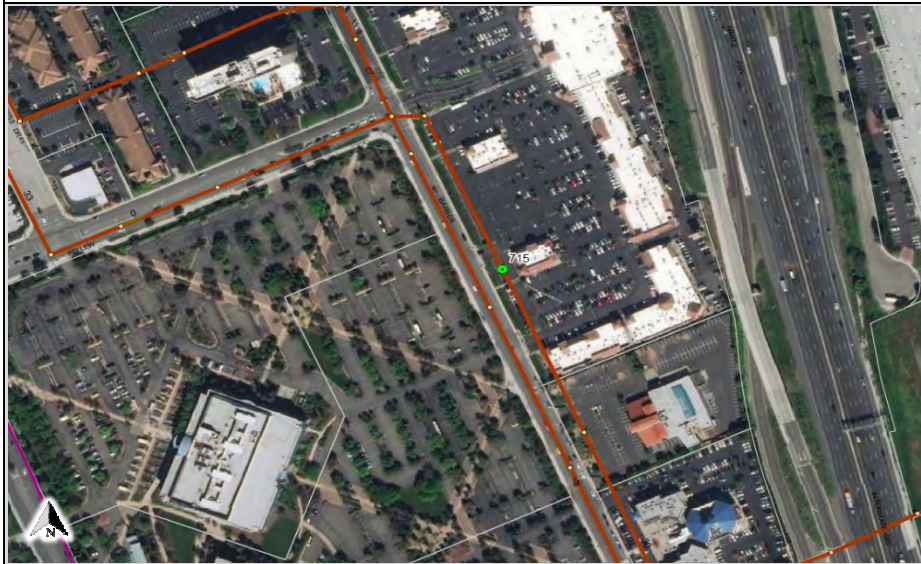
Residential/Commercial

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

5:47:56 AM

Pipe Size (HxW)

30.5" x 30.0"

Depth of Flow (Wet DOF) (in)

5.63

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.03

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Smooth flow with medium depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

5'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_0715

Flow Monitor

MIL_0715

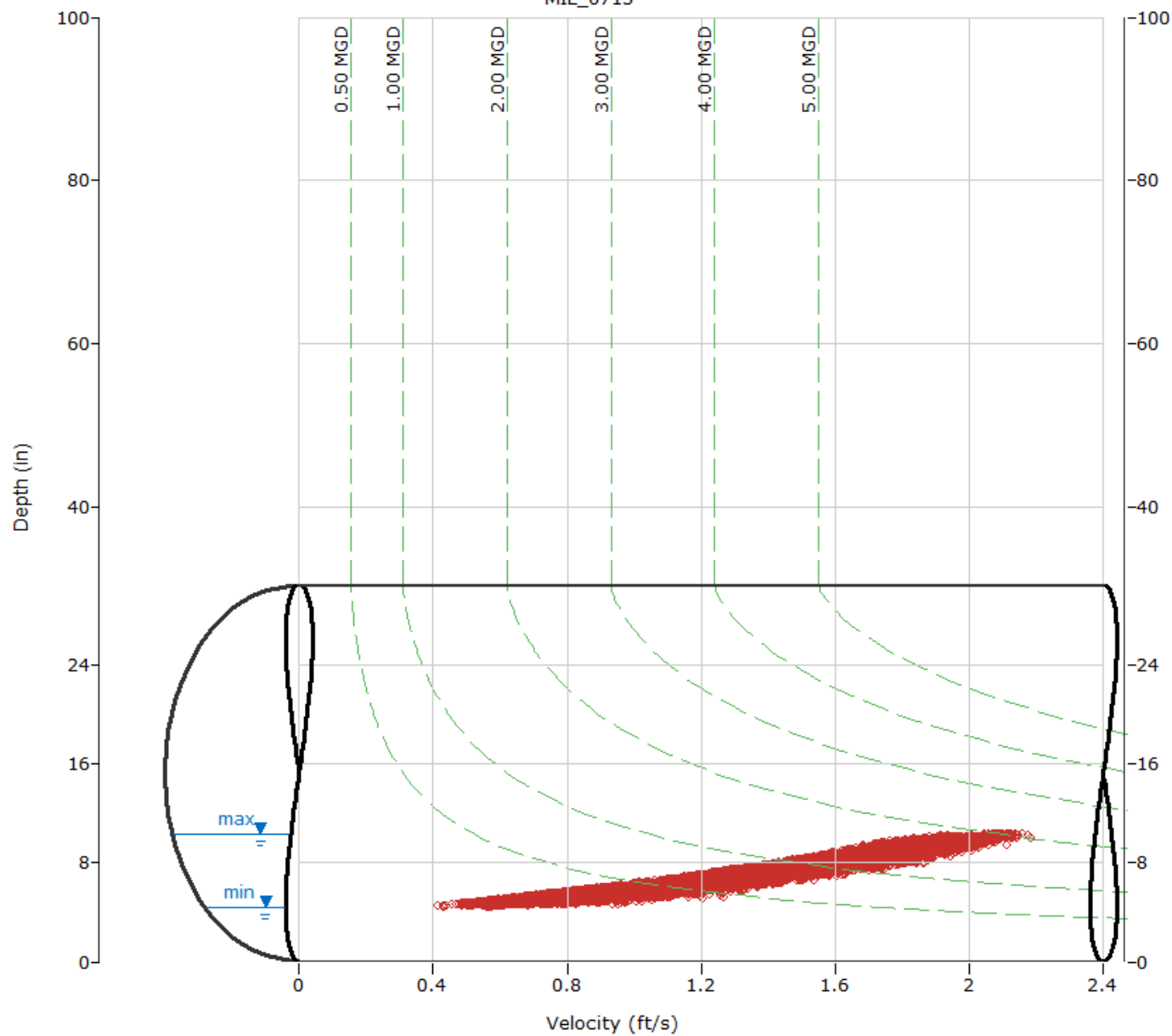
Pipe Height
30.50 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_0715

Flow Monitor

MIL_0715

Pipe Height

30.50 in

Report Period

11/16/2019
To
3/9/2020

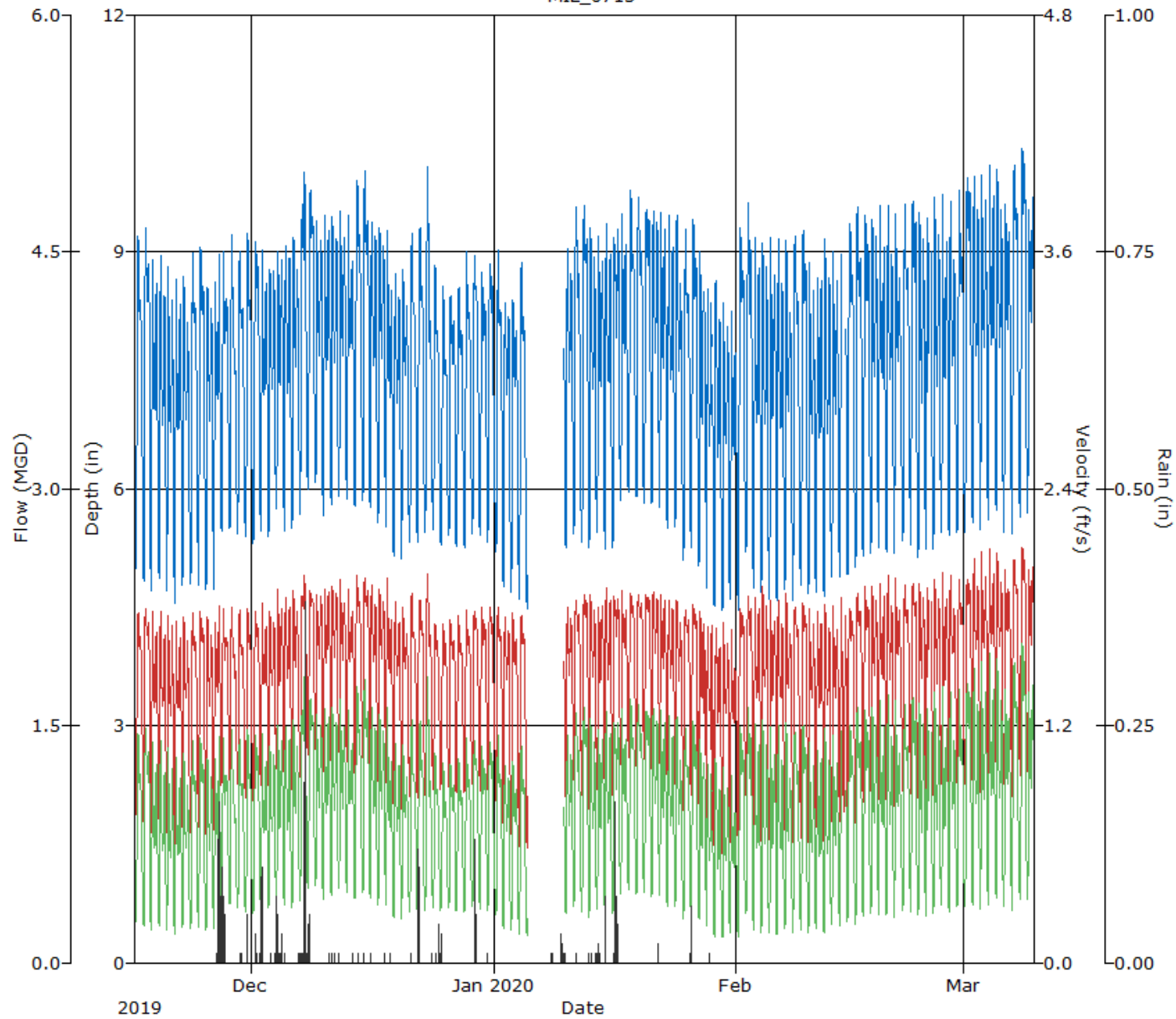
Legend

Depth

Velocity

Quantity

Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0715, Pipe Height: 30.50 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 06:25 | 4.95 | 11:55 | 9.20 | 7.43 | 05:00 | 0.66 | 13:45 | 1.88 | 1.39 | 05:00 | 0.225 | 13:45 | 1.517 | 0.912 | 0.912 | |
| 11/17/2019 | 06:10 | 4.81 | 12:15 | 9.36 | 7.49 | 04:55 | 0.58 | 11:45 | 1.87 | 1.40 | 04:55 | 0.196 | 12:40 | 1.544 | 0.939 | 0.939 | |
| 11/18/2019 | 05:25 | 4.68 | 09:20 | 8.94 | 7.09 | 03:45 | 0.61 | 09:05 | 1.84 | 1.31 | 05:25 | 0.204 | 09:10 | 1.436 | 0.802 | 0.802 | |
| 11/19/2019 | 05:55 | 4.84 | 09:30 | 8.99 | 7.09 | 05:10 | 0.56 | 08:40 | 1.87 | 1.32 | 05:10 | 0.185 | 09:35 | 1.465 | 0.803 | 0.803 | |
| 11/20/2019 | 05:15 | 4.68 | 09:20 | 8.90 | 6.97 | 04:00 | 0.65 | 09:00 | 1.92 | 1.31 | 05:15 | 0.204 | 09:00 | 1.464 | 0.777 | 0.777 | |
| 11/21/2019 | 05:25 | 4.52 | 09:15 | 8.71 | 6.93 | 03:50 | 0.56 | 09:15 | 1.80 | 1.29 | 05:25 | 0.178 | 09:15 | 1.368 | 0.764 | 0.764 | |
| 11/22/2019 | 05:20 | 4.76 | 09:35 | 8.75 | 6.99 | 06:40 | 0.61 | 09:05 | 1.81 | 1.32 | 04:25 | 0.206 | 09:05 | 1.353 | 0.781 | 0.781 | |
| 11/23/2019 | 06:05 | 4.77 | 13:05 | 9.03 | 7.27 | 06:10 | 0.51 | 12:00 | 1.84 | 1.37 | 06:10 | 0.165 | 12:05 | 1.445 | 0.871 | 0.871 | |
| 11/24/2019 | 05:50 | 4.75 | 13:20 | 9.10 | 7.35 | 05:25 | 0.57 | 11:00 | 1.93 | 1.39 | 05:25 | 0.188 | 11:55 | 1.492 | 0.907 | 0.907 | |
| 11/25/2019 | 05:15 | 4.71 | 09:55 | 8.66 | 6.99 | 04:40 | 0.54 | 09:40 | 1.87 | 1.31 | 04:40 | 0.174 | 09:40 | 1.400 | 0.782 | 0.782 | |
| 11/26/2019 | 05:25 | 4.71 | 21:35 | 9.03 | 7.16 | 04:35 | 0.58 | 21:35 | 1.94 | 1.36 | 04:35 | 0.189 | 21:35 | 1.553 | 0.845 | 0.845 | 0.36 |
| 11/27/2019 | 05:35 | 5.44 | 10:30 | 9.06 | 7.54 | 06:10 | 0.76 | 09:30 | 1.89 | 1.45 | 06:10 | 0.301 | 10:35 | 1.493 | 0.942 | 0.942 | 0.63 |
| 11/28/2019 | 05:35 | 5.48 | 13:20 | 9.29 | 7.36 | 06:45 | 0.76 | 13:10 | 1.86 | 1.40 | 06:45 | 0.304 | 13:10 | 1.546 | 0.882 | 0.882 | |
| 11/29/2019 | 06:20 | 5.39 | 12:55 | 9.04 | 7.47 | 06:10 | 0.80 | 14:10 | 1.90 | 1.43 | 06:10 | 0.309 | 14:10 | 1.487 | 0.916 | 0.916 | 0.02 |
| 11/30/2019 | 06:40 | 5.38 | 13:25 | 9.28 | 7.49 | 06:10 | 0.72 | 13:45 | 1.86 | 1.41 | 06:10 | 0.278 | 13:45 | 1.535 | 0.918 | 0.918 | 0.10 |
| 12/01/2019 | 06:05 | 5.30 | 13:40 | 9.13 | 7.59 | 06:25 | 0.69 | 14:35 | 1.85 | 1.42 | 06:25 | 0.260 | 14:35 | 1.504 | 0.946 | 0.946 | 0.06 |
| 12/02/2019 | 05:50 | 5.43 | 09:50 | 9.15 | 7.45 | 04:10 | 0.81 | 09:45 | 1.89 | 1.43 | 05:55 | 0.316 | 09:50 | 1.538 | 0.914 | 0.914 | 0.30 |
| 12/03/2019 | 05:40 | 5.38 | 09:35 | 8.83 | 7.41 | 05:55 | 0.72 | 09:50 | 1.84 | 1.44 | 05:55 | 0.276 | 09:50 | 1.422 | 0.909 | 0.909 | 0.01 |
| 12/04/2019 | 04:05 | 5.72 | 09:30 | 9.05 | 7.58 | 04:20 | 0.84 | 09:50 | 1.98 | 1.50 | 04:20 | 0.351 | 09:50 | 1.582 | 0.972 | 0.972 | 0.39 |
| 12/05/2019 | 05:15 | 5.46 | 09:35 | 9.13 | 7.59 | 05:15 | 0.81 | 09:10 | 1.90 | 1.48 | 05:15 | 0.317 | 09:40 | 1.541 | 0.974 | 0.974 | 0.01 |
| 12/06/2019 | 05:20 | 5.48 | 09:35 | 9.24 | 7.69 | 04:50 | 0.76 | 09:40 | 1.94 | 1.50 | 04:50 | 0.305 | 09:40 | 1.596 | 0.997 | 0.997 | 0.01 |
| 12/07/2019 | 06:20 | 5.65 | 19:20 | 10.08 | 8.16 | 06:00 | 0.81 | 18:50 | 2.02 | 1.57 | 06:00 | 0.336 | 19:15 | 1.862 | 1.156 | 1.156 | 0.67 |
| 12/08/2019 | 06:20 | 5.97 | 13:30 | 9.78 | 8.36 | 07:00 | 0.94 | 11:20 | 1.98 | 1.61 | 07:00 | 0.421 | 11:20 | 1.737 | 1.209 | 1.209 | 0.20 |
| 12/09/2019 | 05:40 | 6.05 | 09:35 | 9.47 | 7.99 | 05:20 | 0.95 | 09:40 | 1.93 | 1.58 | 05:20 | 0.436 | 09:40 | 1.642 | 1.093 | 1.093 | |
| 12/10/2019 | 05:05 | 5.65 | 09:40 | 9.52 | 7.86 | 05:05 | 0.81 | 09:15 | 2.02 | 1.57 | 05:05 | 0.333 | 09:15 | 1.711 | 1.079 | 1.079 | |
| 12/11/2019 | 05:30 | 5.79 | 09:30 | 9.50 | 7.89 | 04:45 | 0.88 | 11:20 | 1.98 | 1.59 | 04:45 | 0.383 | 09:20 | 1.675 | 1.091 | 1.091 | 0.03 |
| 12/12/2019 | 05:15 | 5.89 | 09:25 | 9.54 | 7.94 | 04:55 | 0.89 | 09:10 | 2.01 | 1.59 | 04:55 | 0.395 | 10:00 | 1.723 | 1.096 | 1.096 | 0.01 |
| 12/13/2019 | 05:10 | 5.86 | 09:30 | 9.52 | 7.91 | 05:15 | 0.86 | 10:10 | 1.95 | 1.54 | 05:15 | 0.375 | 10:10 | 1.667 | 1.061 | 1.061 | 0.01 |
| 12/14/2019 | 05:55 | 5.74 | 13:40 | 9.92 | 8.18 | 05:15 | 0.85 | 12:35 | 2.02 | 1.59 | 05:15 | 0.367 | 12:35 | 1.810 | 1.164 | 1.164 | 0.01 |
| 12/15/2019 | 06:15 | 5.82 | 12:05 | 10.12 | 8.29 | 05:30 | 0.93 | 12:35 | 2.00 | 1.62 | 06:50 | 0.406 | 12:15 | 1.842 | 1.209 | 1.209 | 0.01 |
| 12/16/2019 | 05:25 | 5.74 | 09:25 | 9.43 | 7.88 | 06:15 | 0.87 | 08:55 | 2.01 | 1.56 | 05:45 | 0.373 | 09:20 | 1.665 | 1.069 | 1.069 | 0.01 |
| 12/17/2019 | 05:10 | 5.54 | 09:30 | 9.36 | 7.81 | 05:10 | 0.78 | 10:10 | 1.94 | 1.54 | 05:10 | 0.313 | 10:10 | 1.616 | 1.049 | 1.049 | 0.01 |
| 12/18/2019 | 05:25 | 5.50 | 09:35 | 9.34 | 7.55 | 05:15 | 0.77 | 09:30 | 2.01 | 1.51 | 05:15 | 0.307 | 09:30 | 1.678 | 0.982 | 0.982 | 0.01 |
| 12/19/2019 | 05:30 | 5.13 | 10:15 | 8.79 | 7.25 | 05:50 | 0.64 | 08:50 | 1.89 | 1.44 | 05:50 | 0.229 | 09:25 | 1.436 | 0.889 | 0.889 | |
| 12/20/2019 | 05:55 | 5.08 | 10:25 | 8.81 | 7.33 | 05:50 | 0.66 | 10:40 | 1.98 | 1.44 | 05:50 | 0.233 | 10:40 | 1.522 | 0.899 | 0.899 | |
| 12/21/2019 | 06:00 | 5.31 | 12:50 | 9.30 | 7.52 | 06:20 | 0.71 | 13:35 | 1.94 | 1.46 | 06:20 | 0.268 | 13:35 | 1.597 | 0.958 | 0.958 | 0.01 |
| 12/22/2019 | 05:40 | 5.29 | 14:10 | 9.35 | 7.61 | 06:40 | 0.71 | 12:35 | 1.91 | 1.47 | 06:40 | 0.270 | 14:05 | 1.590 | 0.984 | 0.984 | 0.41 |
| 12/23/2019 | 05:20 | 5.43 | 13:45 | 10.14 | 7.69 | 05:50 | 0.75 | 12:40 | 2.04 | 1.50 | 05:50 | 0.292 | 12:40 | 1.875 | 1.018 | 1.018 | |
| 12/24/2019 | 05:50 | 5.47 | 12:45 | 8.86 | 7.36 | 06:20 | 0.76 | 12:45 | 1.79 | 1.42 | 06:20 | 0.300 | 12:45 | 1.394 | 0.891 | 0.891 | 0.02 |
| 12/25/2019 | 05:55 | 5.28 | 13:15 | 8.66 | 7.00 | 05:55 | 0.76 | 14:20 | 1.80 | 1.38 | 05:55 | 0.286 | 13:20 | 1.330 | 0.806 | 0.806 | 0.08 |
| 12/26/2019 | 05:45 | 5.37 | 12:50 | 8.46 | 7.23 | 06:20 | 0.75 | 11:25 | 1.83 | 1.43 | 06:20 | 0.290 | 11:25 | 1.327 | 0.877 | 0.877 | |
| 12/27/2019 | 04:50 | 5.23 | 11:35 | 8.59 | 7.23 | 06:50 | 0.73 | 11:45 | 1.80 | 1.42 | 06:50 | 0.280 | 11:45 | 1.339 | 0.873 | 0.873 | |
| 12/28/2019 | 06:00 | 5.24 | 13:05 | 9.09 | 7.34 | 07:00 | 0.71 | 13:05 | 1.84 | 1.42 | 07:00 | 0.265 | 13:05 | 1.481 | 0.900 | 0.900 | |
| 12/29/2019 | 06:05 | 5.41 | 13:05 | 8.96 | 7.45 | 05:05 | 0.74 | 19:05 | 1.85 | 1.44 | 05:05 | 0.288 | 13:55 | 1.445 | 0.933 | 0.933 | 0.22 |
| 12/30/2019 | 05:55 | 5.39 | 12:15 | 8.77 | 7.44 | 06:05 | 0.74 | 11:50 | 1.88 | 1.48 | 06:05 | 0.285 | 11:55 | 1.436 | 0.947 | 0.947 | |
| 12/31/2019 | 05:45 | 5.30 | 13:50 | 8.87 | 7.44 | 06:30 | 0.73 | 13:10 | 1.85 | 1.47 | 06:30 | 0.276 | 13:10 | 1.431 | 0.941 | 0.941 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 07:15 | 5.16 | 13:40 | 9.05 | 7.28 | 05:45 | 0.70 | 12:50 | 1.87 | 1.43 | 07:35 | 0.256 | 12:50 | 1.471 | 0.897 | 0.897 | |
| 01/02/2020 | 06:05 | 4.74 | 11:00 | 8.50 | 7.00 | 04:45 | 0.55 | 10:05 | 1.84 | 1.37 | 06:20 | 0.180 | 10:35 | 1.303 | 0.816 | 0.816 | |
| 01/03/2020 | 05:25 | 4.67 | 11:00 | 8.44 | 6.97 | 05:35 | 0.49 | 10:05 | 1.86 | 1.36 | 05:35 | 0.152 | 10:05 | 1.315 | 0.805 | 0.805 | |
| 01/04/2020 | 05:25 | 4.58 | 13:10 | 8.88 | 7.03 | 05:50 | 0.46 | 11:30 | 1.86 | 1.36 | 05:50 | 0.140 | 13:15 | 1.431 | 0.838 | 0.838 | |
| 01/05/2020 | 06:30 | 4.46 | 00:00 | 7.34 | 5.48 | 05:25 | 0.49 | 00:00 | 1.48 | 0.92 | 05:25 | 0.151 | 00:00 | 0.882 | 0.395 | 0.136 | |
| 01/06/2020 | | | | | | | | | | | | | | | | | |
| 01/07/2020 | | | | | | | | | | | | | | | | | |
| 01/08/2020 | 00:00 | | 00:00 | | | | | | | | | | | | | | 0.02 |
| 01/09/2020 | 00:00 | | 00:00 | | | | | | | | | | | | | | 0.18 |
| 01/10/2020 | 05:00 | 5.24 | 09:25 | 9.13 | 7.53 | 04:35 | 0.69 | 09:25 | 1.92 | 1.46 | 04:35 | 0.259 | 09:25 | 1.555 | 0.954 | 0.950 | 0.02 |
| 01/11/2020 | 06:25 | 5.41 | 12:05 | 9.62 | 7.81 | 06:25 | 0.79 | 13:55 | 1.95 | 1.52 | 06:25 | 0.306 | 13:55 | 1.677 | 1.044 | 1.044 | 0.01 |
| 01/12/2020 | 05:55 | 5.29 | 13:55 | 9.60 | 7.87 | 06:55 | 0.71 | 13:35 | 1.95 | 1.54 | 06:55 | 0.271 | 13:35 | 1.696 | 1.079 | 1.079 | |
| 01/13/2020 | 05:15 | 5.24 | 09:30 | 9.35 | 7.51 | 05:15 | 0.67 | 08:55 | 1.91 | 1.49 | 05:15 | 0.249 | 09:25 | 1.598 | 0.966 | 0.966 | 0.02 |
| 01/14/2020 | 05:30 | 5.42 | 09:30 | 9.25 | 7.54 | 05:45 | 0.76 | 21:20 | 1.90 | 1.47 | 05:45 | 0.293 | 09:30 | 1.517 | 0.957 | 0.957 | 0.11 |
| 01/15/2020 | 05:20 | 5.23 | 09:25 | 9.38 | 7.55 | 05:35 | 0.68 | 09:15 | 1.95 | 1.49 | 05:35 | 0.253 | 09:40 | 1.645 | 0.981 | 0.981 | 0.07 |
| 01/16/2020 | 05:10 | 5.23 | 21:20 | 9.32 | 7.82 | 05:50 | 0.69 | 09:40 | 1.91 | 1.55 | 05:50 | 0.260 | 22:05 | 1.571 | 1.069 | 1.069 | 0.66 |
| 01/17/2020 | 04:40 | 5.84 | 09:20 | 9.49 | 7.97 | 05:10 | 0.89 | 09:45 | 2.01 | 1.57 | 05:10 | 0.385 | 09:45 | 1.716 | 1.095 | 1.095 | |
| 01/18/2020 | 05:40 | 5.93 | 12:00 | 9.83 | 8.11 | 05:25 | 0.89 | 12:10 | 1.93 | 1.59 | 05:25 | 0.395 | 12:10 | 1.726 | 1.141 | 1.141 | |
| 01/19/2020 | 05:25 | 5.87 | 13:15 | 9.72 | 8.09 | 05:40 | 0.88 | 11:05 | 1.96 | 1.58 | 05:40 | 0.385 | 11:05 | 1.684 | 1.133 | 1.133 | |
| 01/20/2020 | 05:45 | 5.79 | 13:15 | 9.57 | 8.16 | 04:55 | 0.86 | 12:00 | 1.96 | 1.61 | 04:55 | 0.373 | 12:00 | 1.687 | 1.172 | 1.172 | |
| 01/21/2020 | 04:50 | 5.78 | 09:05 | 9.62 | 7.96 | 04:55 | 0.86 | 08:55 | 2.04 | 1.59 | 04:55 | 0.367 | 08:55 | 1.767 | 1.103 | 1.103 | |
| 01/22/2020 | 04:45 | 5.74 | 09:10 | 9.55 | 7.85 | 05:40 | 0.85 | 21:10 | 2.00 | 1.55 | 05:40 | 0.364 | 21:10 | 1.668 | 1.056 | 1.056 | 0.03 |
| 01/23/2020 | 04:35 | 5.47 | 08:55 | 9.59 | 7.70 | 05:05 | 0.81 | 08:55 | 1.93 | 1.50 | 05:05 | 0.321 | 08:55 | 1.673 | 1.002 | 1.002 | |
| 01/24/2020 | 05:35 | 5.49 | 10:20 | 9.49 | 7.61 | 05:15 | 0.78 | 09:40 | 1.89 | 1.47 | 05:15 | 0.312 | 10:35 | 1.616 | 0.967 | 0.967 | |
| 01/25/2020 | 05:35 | 5.07 | 12:40 | 9.33 | 7.53 | 05:45 | 0.62 | 12:05 | 1.85 | 1.46 | 05:45 | 0.220 | 12:05 | 1.520 | 0.968 | 0.968 | |
| 01/26/2020 | 05:15 | 5.13 | 12:55 | 9.46 | 7.67 | 04:35 | 0.72 | 11:50 | 1.92 | 1.49 | 05:00 | 0.260 | 11:50 | 1.591 | 1.006 | 1.006 | 0.16 |
| 01/27/2020 | 05:30 | 4.99 | 09:20 | 9.06 | 7.08 | 06:35 | 0.62 | 20:30 | 1.85 | 1.35 | 05:25 | 0.217 | 09:25 | 1.467 | 0.831 | 0.658 | |
| 01/28/2020 | 05:50 | 4.73 | 09:00 | 8.68 | 6.92 | 20:00 | 0.44 | 08:55 | 1.82 | 1.31 | 06:10 | 0.167 | 08:55 | 1.371 | 0.779 | 0.649 | 0.01 |
| 01/29/2020 | 04:55 | 4.47 | 08:25 | 8.63 | 6.70 | 05:00 | 0.44 | 08:15 | 1.79 | 1.31 | 05:00 | 0.129 | 08:20 | 1.341 | 0.713 | 0.609 | |
| 01/30/2020 | 05:55 | 4.42 | 09:45 | 8.51 | 6.66 | 05:40 | 0.41 | 10:10 | 1.80 | 1.26 | 05:40 | 0.120 | 09:45 | 1.298 | 0.705 | 0.705 | |
| 01/31/2020 | 05:10 | 4.58 | 09:35 | 8.37 | 6.64 | 05:45 | 0.50 | 09:40 | 1.76 | 1.25 | 05:45 | 0.155 | 09:40 | 1.268 | 0.688 | 0.688 | |
| 02/01/2020 | 05:55 | 4.44 | 13:35 | 9.49 | 7.23 | 06:15 | 0.43 | 13:20 | 1.85 | 1.36 | 06:15 | 0.126 | 13:20 | 1.566 | 0.886 | 0.886 | |
| 02/02/2020 | 05:45 | 5.17 | 13:00 | 9.69 | 7.67 | 06:15 | 0.67 | 12:45 | 1.93 | 1.48 | 06:15 | 0.242 | 12:45 | 1.687 | 1.009 | 1.009 | |
| 02/03/2020 | 05:35 | 4.71 | 09:20 | 9.25 | 7.18 | 04:55 | 0.55 | 09:35 | 1.97 | 1.39 | 05:25 | 0.174 | 09:35 | 1.621 | 0.865 | 0.865 | |
| 02/04/2020 | 05:15 | 4.68 | 09:20 | 9.14 | 7.17 | 05:50 | 0.50 | 09:50 | 1.98 | 1.40 | 05:50 | 0.160 | 09:50 | 1.592 | 0.873 | 0.873 | |
| 02/05/2020 | 05:10 | 4.59 | 09:30 | 9.27 | 7.09 | 05:35 | 0.51 | 09:40 | 1.88 | 1.37 | 05:35 | 0.157 | 09:40 | 1.554 | 0.838 | 0.838 | |
| 02/06/2020 | 05:00 | 4.57 | 09:20 | 9.22 | 7.04 | 04:45 | 0.47 | 09:25 | 1.94 | 1.36 | 04:45 | 0.143 | 09:25 | 1.592 | 0.825 | 0.825 | |
| 02/07/2020 | 04:55 | 4.73 | 09:30 | 9.22 | 7.12 | 04:55 | 0.52 | 09:20 | 2.01 | 1.37 | 04:55 | 0.166 | 09:20 | 1.643 | 0.840 | 0.840 | |
| 02/08/2020 | 06:25 | 4.56 | 12:30 | 9.21 | 7.29 | 06:30 | 0.50 | 11:00 | 1.85 | 1.41 | 06:30 | 0.149 | 13:05 | 1.487 | 0.910 | 0.910 | |
| 02/09/2020 | 06:00 | 4.75 | 13:05 | 9.32 | 7.46 | 06:00 | 0.52 | 12:40 | 1.88 | 1.43 | 06:00 | 0.167 | 12:40 | 1.545 | 0.955 | 0.955 | |
| 02/10/2020 | 05:40 | 4.65 | 09:20 | 8.93 | 6.98 | 04:20 | 0.50 | 09:35 | 1.84 | 1.35 | 05:20 | 0.158 | 09:35 | 1.440 | 0.806 | 0.806 | |
| 02/11/2020 | 05:25 | 4.67 | 09:15 | 8.80 | 6.99 | 04:40 | 0.53 | 08:45 | 1.89 | 1.35 | 04:40 | 0.171 | 09:05 | 1.425 | 0.806 | 0.806 | |
| 02/12/2020 | 05:35 | 4.61 | 09:20 | 9.22 | 7.04 | 04:30 | 0.51 | 09:05 | 1.97 | 1.34 | 05:35 | 0.163 | 09:05 | 1.602 | 0.810 | 0.810 | |
| 02/13/2020 | 05:55 | 4.87 | 09:20 | 9.05 | 7.15 | 05:30 | 0.59 | 09:35 | 1.96 | 1.37 | 05:30 | 0.198 | 09:35 | 1.570 | 0.840 | 0.840 | |
| 02/14/2020 | 05:20 | 4.87 | 09:20 | 9.02 | 6.65 | 05:55 | 0.58 | 08:50 | 1.89 | 1.26 | 05:55 | 0.193 | 09:15 | 1.489 | 0.717 | 0.359 | |
| 02/15/2020 | 05:35 | 4.89 | 13:15 | 9.39 | 7.63 | 05:40 | 0.64 | 13:25 | 1.86 | 1.49 | 05:40 | 0.214 | 13:25 | 1.572 | 0.999 | 0.999 | |
| 02/16/2020 | 05:55 | 4.99 | 12:30 | 9.59 | 7.70 | 06:35 | 0.59 | 12:05 | 1.91 | 1.50 | 06:35 | 0.206 | 12:05 | 1.643 | 1.032 | 1.032 | |
| 02/17/2020 | 05:50 | 5.13 | 11:00 | 9.50 | 7.80 | 05:25 | 0.67 | 10:40 | 1.96 | 1.52 | 06:05 | 0.238 | 11:10 | 1.674 | 1.057 | 1.057 | |
| 02/18/2020 | 05:20 | 5.16 | 09:45 | 9.45 | 7.58 | 05:40 | 0.72 | 10:10 | 1.95 | 1.49 | 05:40 | 0.260 | 09:45 | 1.654 | 0.987 | 0.987 | |
| 02/19/2020 | 05:15 | 5.24 | 09:25 | 9.63 | 7.60 | 05:55 | 0.70 | 09:55 | 1.96 | 1.49 | 05:55 | 0.263 | 09:30 | 1.698 | 0.989 | 0.989 | |
| 02/20/2020 | 05:30 | 5.18 | 09:30 | 9.66 | 7.59 | 04:30 | 0.68 | 09:15 | 2.01 | 1.50 | 04:30 | 0.251 | 09:30 | 1.737 | 0.995 | 0.995 | |
| 02/21/2020 | 05:00 | 5.15 | 09:45 | 9.55 | 7.57 | 04:45 | 0.65 | 09:40 | 2.02 | 1.49 | 04:45 | 0.235 | 09:40 | 1.746 | 0.988 | 0.988 | |
| 02/22/2020 | 07:05 | 5.33 | 13:20 | 9.64 | 7.80 | 07:25 | 0.73 | 14:05 | 1.99 | 1.54 | 07:25 | 0.276 | 14:05 | 1.713 | 1.061 | 1.061 | |
| 02/23/2020 | 07:45 | 5.27 | 14:20 | 9.65 | 7.91 | 08:00 | 0.74 | 12:45 | 1.99 | 1.55 | 08:00 | 0.275 | 14:20 | 1.711 | 1.103 | 1.103 | |
| 02/24/2020 | 06:00 | 5.11 | 10:35 | 9.58 | 7.50 | 05:15 | 0.68 | 10:25 | 1.99 | 1.50 | 05:15 | 0.251 | 10:25 | 1.713 | 0.980 | 0.980 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 06:00 | 5.21 | 10:20 | 9.50 | 7.40 | 06:25 | 0.70 | 09:30 | 2.00 | 1.45 | 06:25 | 0.258 | 10:30 | 1.690 | 0.942 | 0.674 | |
| 02/26/2020 | 05:10 | 5.21 | 09:15 | 9.76 | 7.63 | 05:05 | 0.69 | 08:50 | 2.07 | 1.51 | 05:05 | 0.255 | 08:50 | 1.790 | 1.009 | 1.009 | |
| 02/27/2020 | 05:20 | 5.43 | 09:15 | 9.84 | 7.73 | 05:30 | 0.76 | 09:00 | 2.05 | 1.53 | 05:30 | 0.297 | 09:00 | 1.821 | 1.034 | 1.034 | |
| 02/28/2020 | 05:30 | 5.39 | 09:25 | 9.70 | 7.73 | 05:25 | 0.74 | 09:35 | 2.03 | 1.54 | 05:25 | 0.285 | 09:35 | 1.784 | 1.040 | 1.040 | |
| 02/29/2020 | 05:50 | 5.41 | 13:45 | 9.92 | 7.93 | 05:45 | 0.83 | 13:35 | 2.04 | 1.57 | 05:45 | 0.321 | 13:35 | 1.836 | 1.110 | 1.110 | |
| 03/01/2020 | 06:05 | 5.44 | 13:15 | 9.97 | 8.20 | 06:10 | 0.75 | 11:50 | 2.09 | 1.60 | 06:10 | 0.292 | 11:50 | 1.882 | 1.197 | 1.197 | |
| 03/02/2020 | 05:10 | 5.56 | 09:20 | 10.01 | 7.97 | 05:35 | 0.79 | 09:45 | 2.08 | 1.59 | 05:35 | 0.318 | 09:15 | 1.905 | 1.119 | 1.119 | |
| 03/03/2020 | 05:25 | 5.45 | 09:45 | 10.15 | 8.02 | 05:20 | 0.75 | 09:20 | 2.18 | 1.60 | 05:20 | 0.294 | 09:45 | 2.004 | 1.148 | 1.148 | |
| 03/04/2020 | 05:35 | 5.59 | 09:25 | 10.16 | 8.10 | 05:35 | 0.79 | 09:20 | 2.18 | 1.62 | 05:35 | 0.319 | 09:20 | 2.041 | 1.174 | 1.174 | |
| 03/05/2020 | 05:25 | 5.71 | 09:35 | 10.10 | 8.11 | 05:30 | 0.82 | 09:05 | 2.14 | 1.65 | 05:30 | 0.341 | 09:35 | 1.971 | 1.183 | 1.183 | |
| 03/06/2020 | 05:40 | 5.43 | 09:55 | 9.69 | 7.97 | 05:40 | 0.73 | 09:45 | 2.04 | 1.60 | 05:40 | 0.285 | 09:45 | 1.789 | 1.132 | 1.132 | |
| 03/07/2020 | 06:10 | 5.39 | 13:25 | 10.11 | 8.26 | 06:05 | 0.73 | 17:05 | 2.11 | 1.65 | 06:05 | 0.281 | 13:05 | 1.947 | 1.243 | 1.243 | |
| 03/08/2020 | 07:05 | 5.62 | 13:30 | 10.33 | 8.44 | 06:30 | 0.83 | 13:45 | 2.16 | 1.68 | 06:30 | 0.345 | 13:45 | 2.069 | 1.309 | 1.309 | |
| 03/09/2020 | 05:55 | 5.69 | 22:20 | 9.71 | 8.15 | 04:50 | 0.83 | 21:40 | 2.07 | 1.65 | 04:50 | 0.350 | 21:40 | 1.825 | 1.199 | 1.198 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 105.605 | 4.90 |
| Avg | 7.53 | 1.46 | 0.969 | |

Site Commentary

Site Information

| MIL_0744 | |
|-----------------|-------|
| Pipe Dimensions | 15 |
| Silt Level | 0.00" |

Overview

Site MIL_0744 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Surcharged conditions were experienced at this location. Review of the scattergraph shows that both free flow and backwater conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|------------------|-------------------|------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 6.17 | 0.94 | 0.283 |
| Minimum | 2.74 | 0.16 | 0.080 |
| Maximum | 34.98 | 1.78 | 1.416 |
| Time of Minimum | 3/1/2020 5:45 AM | 2/27/2020 5:30 PM | 2/6/2020 3:40 AM |
| Time of Maximum | 3/8/2020 2:15 PM | 3/8/2020 2:15 PM | 3/8/2020 2:15 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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. Site installed later than other sites on November 22, 2019. Uptime reflects time in service.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_0744

Site Address /Location:

Thompson Court and Machado Avenue

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details:

Drive

Latitude:

37.419309°

Longitude:

-121.911002°

Pipe Size (H x W)

15.0" x 15.0"

Pipe Shape

Circular

Manhole #

744

System Characteristics

Residential

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

6:52:52 AM

Pipe Size (HxW)

15.0" x 15.0"

Depth of Flow (Wet DOF) (in)

5.50

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.05

Velocity Sensor Offset (in)

0"

Silt

0"

Silt Type

Hydraulic Comments:

Smooth flow with medium depth and velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

5'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:



ADS Project Name:

Milpitas.WWTFM.CA19-20

ADS Project Number:

22431

SCATTERGRAPH REPORT

MIL_0744

Flow Monitor

MIL_0744

Pipe Height
15.00 in

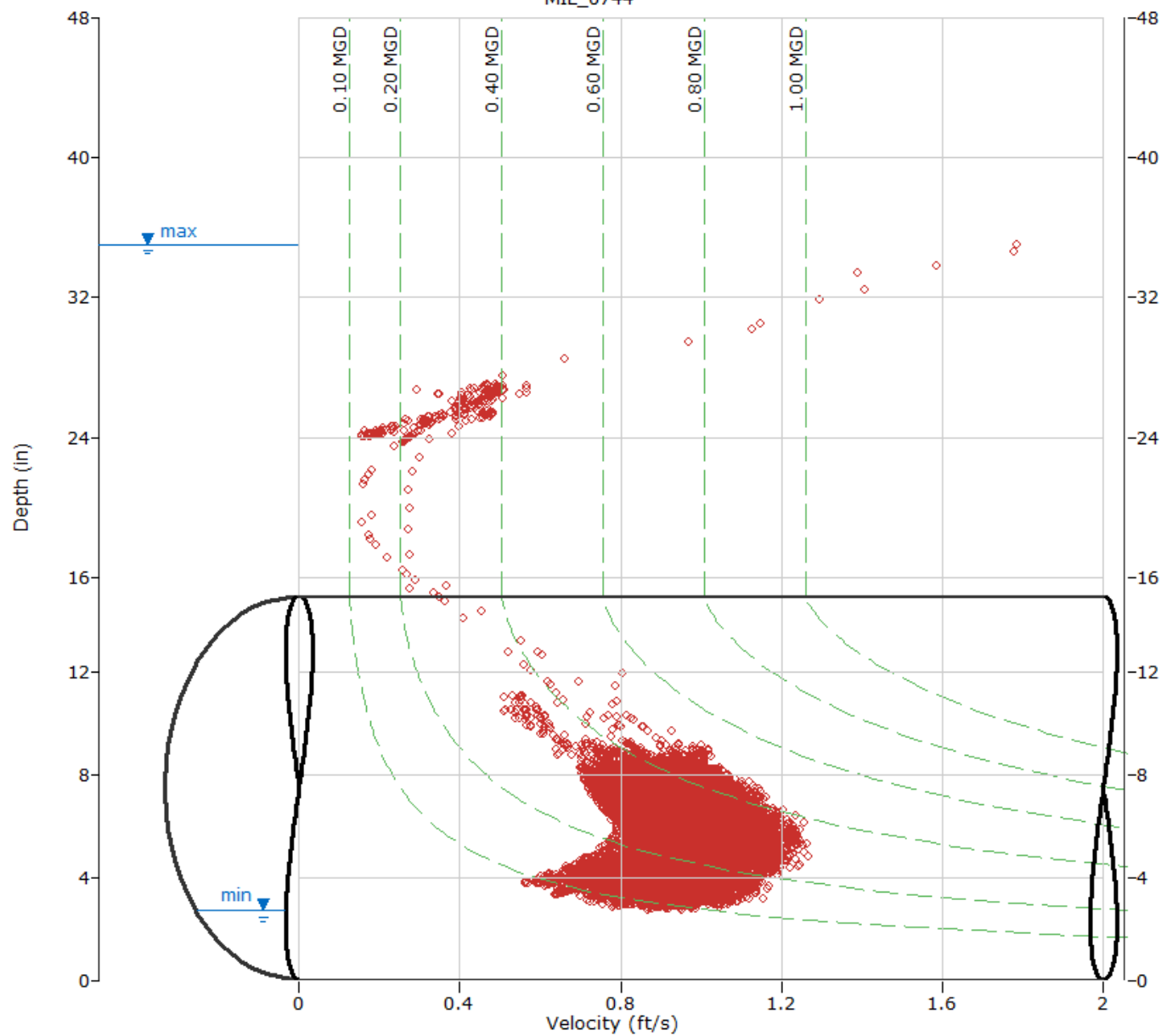
Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

ADS ENVIRONMENTAL
SERVICES

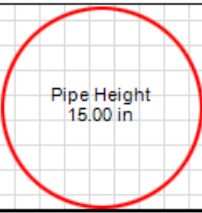


HYDROGRAPH REPORT

MIL_0744

Flow Monitor

MIL_0744




Pipe Height
15.00 in.

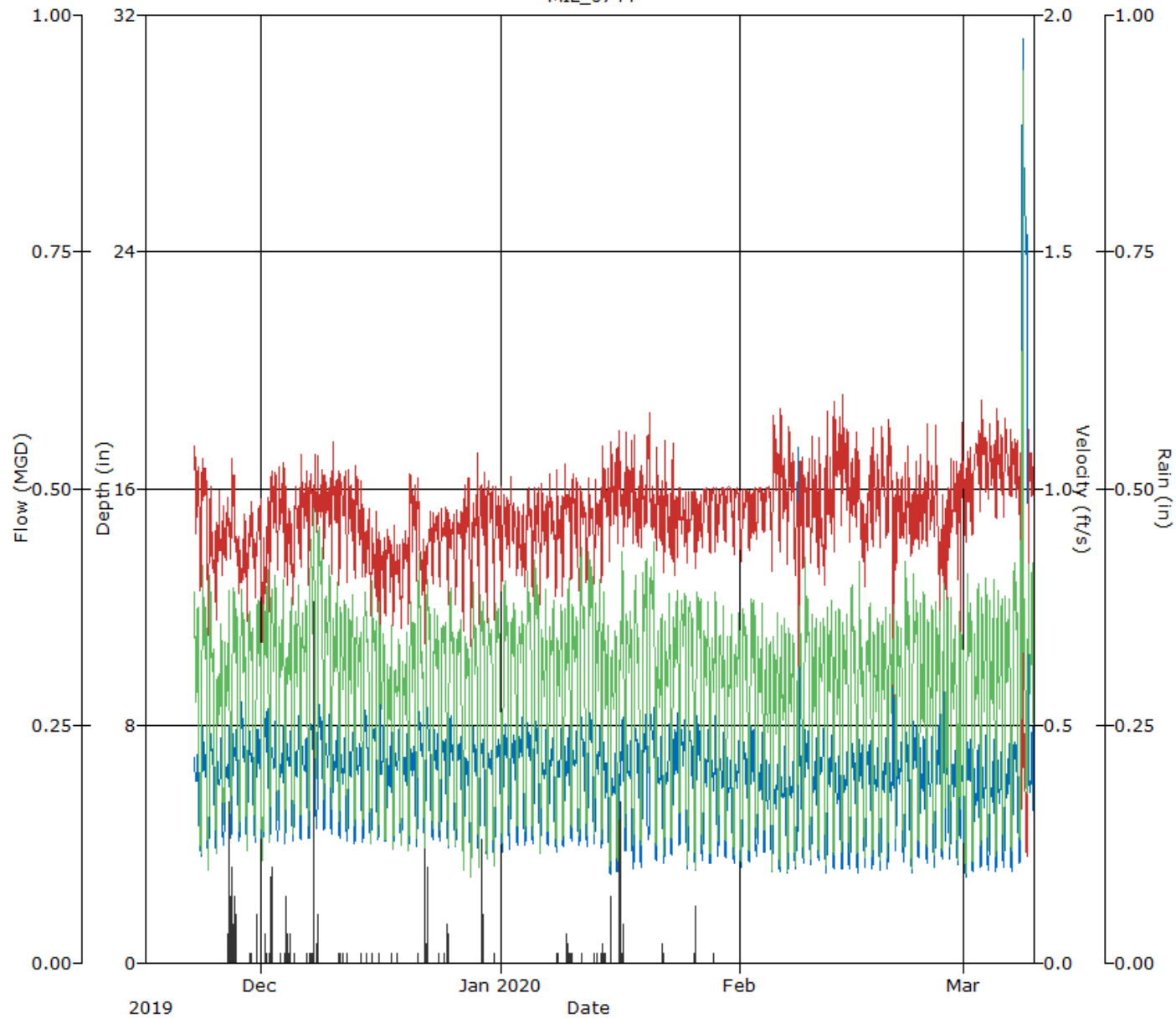
Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain





Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_0744, Pipe Height: 15.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 11/17/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 11/18/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 11/19/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 11/20/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 11/21/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 11/22/2019 | 23:50 | 5.35 | 22:20 | 7.49 | 6.47 | 14:55 | 0.82 | 09:25 | 1.13 | 1.01 | 15:05 | 0.250 | 22:25 | 0.403 | 0.333 | 0.214 | |
| 11/23/2019 | 05:40 | 3.43 | 10:55 | 8.49 | 5.95 | 03:20 | 0.67 | 19:05 | 1.12 | 0.96 | 05:25 | 0.099 | 10:35 | 0.451 | 0.289 | 0.289 | |
| 11/24/2019 | 05:30 | 3.43 | 10:25 | 8.27 | 6.10 | 05:25 | 0.64 | 14:15 | 1.09 | 0.87 | 05:25 | 0.088 | 10:25 | 0.454 | 0.270 | 0.270 | |
| 11/25/2019 | 05:05 | 3.63 | 19:40 | 7.82 | 5.81 | 05:10 | 0.61 | 13:25 | 1.06 | 0.87 | 05:10 | 0.091 | 21:50 | 0.428 | 0.250 | 0.250 | |
| 11/26/2019 | 03:10 | 3.81 | 21:40 | 8.27 | 6.02 | 03:20 | 0.64 | 16:55 | 1.06 | 0.91 | 03:20 | 0.103 | 21:45 | 0.435 | 0.272 | 0.272 | 0.36 |
| 11/27/2019 | 03:05 | 4.05 | 19:20 | 8.19 | 6.46 | 02:20 | 0.73 | 06:40 | 1.10 | 0.93 | 03:10 | 0.130 | 09:55 | 0.412 | 0.305 | 0.305 | 0.63 |
| 11/28/2019 | 05:25 | 4.07 | 12:05 | 9.02 | 6.58 | 05:45 | 0.72 | 21:55 | 1.09 | 0.85 | 05:40 | 0.126 | 14:30 | 0.469 | 0.285 | 0.285 | |
| 11/29/2019 | 05:35 | 3.84 | 11:10 | 8.30 | 6.25 | 05:35 | 0.69 | 19:50 | 1.11 | 0.88 | 05:35 | 0.110 | 10:00 | 0.437 | 0.281 | 0.281 | 0.02 |
| 11/30/2019 | 06:05 | 3.92 | 10:55 | 8.34 | 6.32 | 05:45 | 0.67 | 21:35 | 1.09 | 0.89 | 05:45 | 0.111 | 14:00 | 0.456 | 0.287 | 0.287 | 0.10 |
| 12/01/2019 | 06:10 | 3.73 | 20:30 | 8.83 | 6.59 | 05:45 | 0.56 | 00:00 | 1.12 | 0.84 | 05:55 | 0.088 | 20:30 | 0.451 | 0.285 | 0.285 | 0.06 |
| 12/02/2019 | 03:30 | 3.89 | 21:20 | 8.59 | 6.30 | 03:00 | 0.61 | 17:55 | 1.12 | 0.94 | 03:00 | 0.105 | 21:15 | 0.458 | 0.303 | 0.303 | 0.30 |
| 12/03/2019 | 04:20 | 3.93 | 21:40 | 8.37 | 6.16 | 03:30 | 0.71 | 23:40 | 1.12 | 0.95 | 03:30 | 0.131 | 20:00 | 0.416 | 0.295 | 0.295 | 0.01 |
| 12/04/2019 | 03:45 | 3.94 | 19:55 | 8.06 | 6.37 | 04:05 | 0.69 | 07:10 | 1.14 | 0.89 | 04:05 | 0.129 | 21:20 | 0.425 | 0.287 | 0.287 | 0.39 |
| 12/05/2019 | 03:35 | 3.90 | 21:45 | 8.49 | 6.25 | 03:15 | 0.64 | 09:45 | 1.07 | 0.91 | 03:40 | 0.107 | 09:45 | 0.433 | 0.290 | 0.290 | 0.01 |
| 12/06/2019 | 05:10 | 4.03 | 20:55 | 7.82 | 6.20 | 04:10 | 0.71 | 07:30 | 1.12 | 0.95 | 04:10 | 0.126 | 19:30 | 0.422 | 0.296 | 0.296 | 0.01 |
| 12/07/2019 | 05:15 | 4.06 | 19:10 | 9.08 | 6.79 | 03:10 | 0.74 | 00:00 | 1.07 | 0.96 | 03:30 | 0.131 | 19:45 | 0.501 | 0.340 | 0.340 | 0.67 |
| 12/08/2019 | 05:05 | 4.47 | 10:05 | 9.22 | 7.10 | 03:50 | 0.77 | 08:05 | 1.12 | 0.98 | 03:50 | 0.179 | 09:45 | 0.508 | 0.363 | 0.363 | 0.20 |
| 12/09/2019 | 05:15 | 4.35 | 21:05 | 8.75 | 6.50 | 02:55 | 0.80 | 07:05 | 1.12 | 0.97 | 02:55 | 0.160 | 21:10 | 0.458 | 0.321 | 0.321 | |
| 12/10/2019 | 02:40 | 4.22 | 21:55 | 8.12 | 6.28 | 03:25 | 0.68 | 07:05 | 1.13 | 0.96 | 03:25 | 0.126 | 21:05 | 0.417 | 0.305 | 0.305 | |
| 12/11/2019 | 03:15 | 4.08 | 21:05 | 7.89 | 6.10 | 03:30 | 0.71 | 07:10 | 1.14 | 0.96 | 04:05 | 0.135 | 08:45 | 0.408 | 0.294 | 0.294 | 0.03 |
| 12/12/2019 | 03:25 | 3.80 | 22:20 | 8.06 | 6.16 | 04:00 | 0.69 | 07:55 | 1.11 | 0.94 | 04:00 | 0.123 | 21:55 | 0.434 | 0.293 | 0.293 | 0.01 |
| 12/13/2019 | 05:05 | 3.88 | 20:45 | 7.81 | 6.09 | 04:00 | 0.71 | 07:25 | 1.12 | 0.94 | 04:00 | 0.131 | 09:15 | 0.386 | 0.286 | 0.286 | 0.01 |
| 12/14/2019 | 05:35 | 3.92 | 13:45 | 8.88 | 6.45 | 03:55 | 0.70 | 00:20 | 1.07 | 0.89 | 03:10 | 0.128 | 11:55 | 0.433 | 0.290 | 0.290 | 0.01 |
| 12/15/2019 | 05:20 | 3.90 | 10:55 | 8.49 | 6.59 | 04:50 | 0.68 | 23:55 | 1.09 | 0.85 | 05:40 | 0.115 | 10:15 | 0.444 | 0.286 | 0.286 | 0.01 |
| 12/16/2019 | 03:35 | 3.88 | 09:10 | 10.28 | 6.53 | 09:35 | 0.54 | 00:00 | 1.06 | 0.82 | 03:35 | 0.113 | 08:35 | 0.440 | 0.272 | 0.272 | 0.01 |
| 12/17/2019 | 05:00 | 3.92 | 21:20 | 7.91 | 5.99 | 02:50 | 0.62 | 12:35 | 1.05 | 0.84 | 03:25 | 0.105 | 21:20 | 0.376 | 0.252 | 0.252 | 0.01 |
| 12/18/2019 | 03:15 | 3.76 | 21:55 | 8.23 | 6.22 | 04:05 | 0.59 | 23:40 | 1.00 | 0.82 | 03:15 | 0.094 | 21:50 | 0.372 | 0.259 | 0.259 | 0.01 |
| 12/19/2019 | 03:25 | 3.79 | 22:55 | 7.85 | 6.15 | 03:30 | 0.58 | 07:05 | 0.97 | 0.83 | 03:25 | 0.093 | 21:40 | 0.369 | 0.259 | 0.259 | |
| 12/20/2019 | 03:25 | 3.78 | 21:20 | 7.56 | 6.10 | 03:35 | 0.61 | 07:30 | 1.12 | 0.91 | 03:35 | 0.097 | 08:40 | 0.399 | 0.282 | 0.282 | |
| 12/21/2019 | 03:40 | 3.74 | 11:40 | 8.58 | 6.50 | 04:10 | 0.67 | 07:30 | 1.06 | 0.89 | 03:45 | 0.109 | 11:15 | 0.458 | 0.294 | 0.294 | 0.01 |
| 12/22/2019 | 05:35 | 3.73 | 13:45 | 9.05 | 6.67 | 06:00 | 0.62 | 00:10 | 0.97 | 0.85 | 05:45 | 0.098 | 13:45 | 0.417 | 0.295 | 0.295 | 0.41 |
| 12/23/2019 | 05:10 | 4.00 | 10:20 | 8.07 | 6.28 | 05:10 | 0.77 | 23:55 | 0.97 | 0.90 | 05:10 | 0.132 | 10:20 | 0.383 | 0.287 | 0.287 | |
| 12/24/2019 | 05:00 | 3.90 | 19:30 | 7.77 | 6.23 | 05:00 | 0.76 | 23:25 | 0.97 | 0.90 | 05:00 | 0.124 | 19:30 | 0.369 | 0.283 | 0.283 | 0.02 |
| 12/25/2019 | 05:35 | 3.79 | 14:00 | 8.71 | 6.43 | 05:35 | 0.74 | 00:05 | 0.96 | 0.89 | 05:35 | 0.116 | 14:00 | 0.409 | 0.291 | 0.291 | 0.08 |
| 12/26/2019 | 05:05 | 3.79 | 19:15 | 8.07 | 6.15 | 05:05 | 0.74 | 23:50 | 0.97 | 0.89 | 05:05 | 0.116 | 19:15 | 0.383 | 0.278 | 0.278 | |
| 12/27/2019 | 05:25 | 3.33 | 13:20 | 7.24 | 5.73 | 05:25 | 0.64 | 11:35 | 1.10 | 0.91 | 05:25 | 0.084 | 11:40 | 0.385 | 0.259 | 0.259 | |
| 12/28/2019 | 05:10 | 3.31 | 12:10 | 8.23 | 5.96 | 04:00 | 0.61 | 00:00 | 1.10 | 0.90 | 05:10 | 0.083 | 12:05 | 0.417 | 0.272 | 0.272 | |
| 12/29/2019 | 05:45 | 3.36 | 21:50 | 8.00 | 5.98 | 03:55 | 0.63 | 00:30 | 1.10 | 0.94 | 05:45 | 0.086 | 17:05 | 0.416 | 0.283 | 0.283 | 0.22 |
| 12/30/2019 | 03:50 | 3.56 | 13:15 | 7.37 | 5.84 | 03:50 | 0.69 | 11:45 | 1.09 | 0.95 | 03:50 | 0.099 | 13:10 | 0.395 | 0.276 | 0.276 | |
| 12/31/2019 | 05:25 | 3.44 | 10:25 | 7.90 | 6.03 | 04:00 | 0.59 | 10:05 | 1.07 | 0.91 | 05:25 | 0.091 | 17:35 | 0.404 | 0.279 | 0.279 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 05:15 | 3.66 | 14:05 | 8.32 | 6.32 | 04:50 | 0.71 | 01:00 | 1.11 | 0.92 | 04:50 | 0.113 | 13:25 | 0.443 | 0.295 | 0.295 | |
| 01/02/2020 | 04:10 | 3.69 | 19:50 | 7.90 | 6.20 | 03:20 | 0.71 | 07:50 | 1.13 | 0.93 | 04:05 | 0.111 | 22:40 | 0.405 | 0.291 | 0.291 | |
| 01/03/2020 | 05:30 | 3.78 | 20:10 | 8.44 | 6.42 | 03:35 | 0.73 | 23:55 | 1.04 | 0.88 | 03:35 | 0.131 | 20:30 | 0.405 | 0.288 | 0.288 | |
| 01/04/2020 | 05:15 | 3.92 | 13:50 | 8.35 | 6.36 | 03:45 | 0.72 | 17:55 | 1.06 | 0.92 | 03:45 | 0.122 | 14:00 | 0.434 | 0.301 | 0.301 | |
| 01/05/2020 | 06:10 | 3.85 | 13:40 | 8.29 | 6.53 | 03:45 | 0.72 | 10:15 | 1.08 | 0.91 | 06:00 | 0.119 | 10:30 | 0.457 | 0.309 | 0.309 | |
| 01/06/2020 | 03:50 | 3.65 | 21:45 | 8.05 | 6.02 | 04:05 | 0.67 | 07:25 | 1.10 | 0.91 | 03:25 | 0.103 | 19:30 | 0.433 | 0.277 | 0.277 | |
| 01/07/2020 | 04:05 | 3.75 | 22:35 | 8.03 | 6.21 | 02:45 | 0.70 | 10:20 | 1.08 | 0.93 | 03:55 | 0.116 | 10:20 | 0.394 | 0.291 | 0.291 | |
| 01/08/2020 | 05:20 | 3.62 | 22:25 | 8.27 | 6.07 | 03:20 | 0.71 | 07:20 | 1.08 | 0.91 | 03:25 | 0.112 | 19:00 | 0.409 | 0.277 | 0.277 | 0.02 |
| 01/09/2020 | 05:20 | 3.74 | 22:30 | 8.30 | 6.15 | 02:05 | 0.70 | 15:35 | 1.15 | 0.94 | 05:15 | 0.113 | 22:05 | 0.448 | 0.292 | 0.292 | 0.18 |
| 01/10/2020 | 05:35 | 3.96 | 19:15 | 8.00 | 6.23 | 04:55 | 0.76 | 06:50 | 1.15 | 0.94 | 03:15 | 0.136 | 09:00 | 0.422 | 0.296 | 0.296 | 0.02 |
| 01/11/2020 | 04:55 | 3.86 | 11:05 | 8.41 | 6.35 | 04:55 | 0.70 | 19:05 | 1.06 | 0.92 | 04:55 | 0.114 | 11:30 | 0.458 | 0.302 | 0.302 | 0.01 |
| 01/12/2020 | 05:20 | 3.86 | 14:25 | 8.71 | 6.51 | 04:05 | 0.69 | 11:40 | 1.10 | 0.91 | 04:05 | 0.113 | 11:50 | 0.457 | 0.309 | 0.309 | |
| 01/13/2020 | 03:20 | 3.85 | 21:05 | 8.08 | 6.17 | 04:00 | 0.73 | 18:15 | 1.13 | 0.93 | 04:00 | 0.125 | 20:20 | 0.425 | 0.290 | 0.290 | 0.02 |
| 01/14/2020 | 03:00 | 3.81 | 08:40 | 7.99 | 5.78 | 03:10 | 0.70 | 07:30 | 1.12 | 0.95 | 03:10 | 0.112 | 08:35 | 0.410 | 0.273 | 0.273 | 0.11 |
| 01/15/2020 | 05:10 | 2.74 | 21:10 | 7.23 | 5.28 | 04:15 | 0.70 | 07:40 | 1.25 | 0.99 | 03:30 | 0.085 | 20:35 | 0.374 | 0.251 | 0.251 | 0.07 |
| 01/16/2020 | 03:30 | 2.82 | 19:35 | 8.52 | 5.88 | 04:05 | 0.73 | 07:05 | 1.20 | 0.99 | 03:20 | 0.095 | 19:25 | 0.458 | 0.287 | 0.287 | 0.66 |
| 01/17/2020 | 03:25 | 3.55 | 08:55 | 8.25 | 5.93 | 03:30 | 0.73 | 07:00 | 1.21 | 1.00 | 03:30 | 0.126 | 20:40 | 0.395 | 0.292 | 0.292 | |
| 01/18/2020 | 05:20 | 3.05 | 11:40 | 8.04 | 6.00 | 21:10 | 0.77 | 00:10 | 1.19 | 0.97 | 05:25 | 0.118 | 11:15 | 0.441 | 0.287 | 0.287 | |
| 01/19/2020 | 05:35 | 3.12 | 21:50 | 8.80 | 6.19 | 04:05 | 0.75 | 05:45 | 1.15 | 0.98 | 05:15 | 0.117 | 21:50 | 0.451 | 0.304 | 0.304 | |
| 01/20/2020 | 05:30 | 4.11 | 13:40 | 9.28 | 6.70 | 16:00 | 0.76 | 06:35 | 1.21 | 1.00 | 05:30 | 0.157 | 13:30 | 0.459 | 0.339 | 0.339 | |
| 01/21/2020 | 05:10 | 3.31 | 21:35 | 7.91 | 5.69 | 03:50 | 0.75 | 07:45 | 1.15 | 0.95 | 03:45 | 0.110 | 21:50 | 0.399 | 0.265 | 0.265 | |
| 01/22/2020 | 03:25 | 3.21 | 22:40 | 8.31 | 5.88 | 03:15 | 0.71 | 07:40 | 1.13 | 0.95 | 03:25 | 0.095 | 22:15 | 0.419 | 0.276 | 0.276 | 0.03 |
| 01/23/2020 | 03:35 | 3.43 | 21:55 | 8.83 | 6.29 | 11:55 | 0.73 | 07:15 | 1.14 | 0.93 | 03:40 | 0.116 | 13:25 | 0.400 | 0.294 | 0.294 | |
| 01/24/2020 | 05:10 | 3.85 | 22:20 | 8.39 | 6.52 | 22:20 | 0.86 | 07:45 | 1.00 | 0.95 | 05:10 | 0.148 | 22:20 | 0.393 | 0.312 | 0.312 | |
| 01/25/2020 | 05:35 | 3.13 | 19:25 | 8.13 | 6.06 | 05:35 | 0.83 | 00:25 | 1.00 | 0.94 | 05:35 | 0.100 | 19:25 | 0.388 | 0.287 | 0.287 | |
| 01/26/2020 | 05:30 | 2.96 | 11:10 | 8.51 | 6.24 | 05:30 | 0.81 | 00:30 | 1.00 | 0.92 | 05:30 | 0.089 | 11:10 | 0.394 | 0.291 | 0.291 | 0.16 |
| 01/27/2020 | 03:35 | 3.19 | 21:25 | 8.09 | 5.82 | 03:35 | 0.84 | 00:00 | 1.00 | 0.96 | 03:35 | 0.104 | 21:25 | 0.387 | 0.276 | 0.276 | |
| 01/28/2020 | 05:10 | 3.08 | 20:00 | 8.74 | 5.85 | 20:00 | 0.83 | 15:25 | 1.00 | 0.95 | 05:10 | 0.097 | 20:00 | 0.396 | 0.276 | 0.276 | 0.01 |
| 01/29/2020 | 03:25 | 3.18 | 21:30 | 8.17 | 5.84 | 03:25 | 0.84 | 18:05 | 1.00 | 0.96 | 03:25 | 0.103 | 21:30 | 0.389 | 0.278 | 0.278 | |
| 01/30/2020 | 03:20 | 3.43 | 22:25 | 7.77 | 5.66 | 03:20 | 0.87 | 23:50 | 1.00 | 0.97 | 03:20 | 0.119 | 22:25 | 0.379 | 0.269 | 0.269 | |
| 01/31/2020 | 05:05 | 3.20 | 19:30 | 7.81 | 5.71 | 05:05 | 0.84 | 23:35 | 1.00 | 0.96 | 05:05 | 0.105 | 19:30 | 0.380 | 0.271 | 0.271 | |
| 02/01/2020 | 03:25 | 3.10 | 10:00 | 7.71 | 5.75 | 03:25 | 0.83 | 23:40 | 1.00 | 0.95 | 03:25 | 0.098 | 10:00 | 0.377 | 0.272 | 0.272 | |
| 02/02/2020 | 03:40 | 3.31 | 12:30 | 8.50 | 6.00 | 12:30 | 0.85 | 08:30 | 1.00 | 0.94 | 03:40 | 0.112 | 12:30 | 0.394 | 0.282 | 0.282 | |
| 02/03/2020 | 03:30 | 3.48 | 21:30 | 7.92 | 5.75 | 03:30 | 0.88 | 07:30 | 1.00 | 0.96 | 03:30 | 0.123 | 21:30 | 0.383 | 0.273 | 0.273 | |
| 02/04/2020 | 03:15 | 3.53 | 08:50 | 7.21 | 5.32 | 03:15 | 0.89 | 17:00 | 1.00 | 0.98 | 03:15 | 0.126 | 08:50 | 0.360 | 0.249 | 0.249 | |
| 02/05/2020 | 02:55 | 2.93 | 21:45 | 6.87 | 5.14 | 06:25 | 0.80 | 07:40 | 1.25 | 1.02 | 02:55 | 0.087 | 11:25 | 0.400 | 0.253 | 0.253 | |
| 02/06/2020 | 03:40 | 2.80 | 19:10 | 7.96 | 5.29 | 03:15 | 0.74 | 07:40 | 1.23 | 1.00 | 03:40 | 0.080 | 19:15 | 0.385 | 0.254 | 0.254 | |
| 02/07/2020 | 03:55 | 2.91 | 21:20 | 7.10 | 5.29 | 03:00 | 0.72 | 11:55 | 1.19 | 1.02 | 03:00 | 0.083 | 08:55 | 0.379 | 0.260 | 0.260 | |
| 02/08/2020 | 05:30 | 3.06 | 15:15 | 25.11 | 5.77 | 15:25 | 0.16 | 23:40 | 1.11 | 0.92 | 03:30 | 0.094 | 16:20 | 0.407 | 0.241 | 0.241 | |
| 02/09/2020 | 05:30 | 3.30 | 11:15 | 8.27 | 6.03 | 11:20 | 0.73 | 00:00 | 1.17 | 0.96 | 05:55 | 0.101 | 11:15 | 0.470 | 0.291 | 0.291 | |
| 02/10/2020 | 03:35 | 3.12 | 21:00 | 7.73 | 5.70 | 05:15 | 0.74 | 07:30 | 1.23 | 0.97 | 03:40 | 0.091 | 19:50 | 0.418 | 0.273 | 0.273 | |
| 02/11/2020 | 04:50 | 3.17 | 22:25 | 8.30 | 6.09 | 22:05 | 0.71 | 07:25 | 1.15 | 0.90 | 03:05 | 0.091 | 09:05 | 0.394 | 0.275 | 0.275 | |
| 02/12/2020 | 03:10 | 2.94 | 19:25 | 7.95 | 5.79 | 19:55 | 0.74 | 07:20 | 1.26 | 0.98 | 02:50 | 0.093 | 19:10 | 0.408 | 0.279 | 0.279 | |
| 02/13/2020 | 03:25 | 2.94 | 19:55 | 7.12 | 5.34 | 04:00 | 0.77 | 07:35 | 1.24 | 1.05 | 03:35 | 0.089 | 21:50 | 0.415 | 0.270 | 0.270 | |
| 02/14/2020 | 03:30 | 3.03 | 08:45 | 7.87 | 5.43 | 03:35 | 0.77 | 07:25 | 1.27 | 1.05 | 03:35 | 0.088 | 20:05 | 0.424 | 0.274 | 0.274 | |
| 02/15/2020 | 05:15 | 3.12 | 10:45 | 8.15 | 5.71 | 04:35 | 0.73 | 00:05 | 1.18 | 1.00 | 04:35 | 0.093 | 10:40 | 0.436 | 0.282 | 0.282 | |
| 02/16/2020 | 05:35 | 2.89 | 12:30 | 7.85 | 5.72 | 04:00 | 0.78 | 00:50 | 1.18 | 0.97 | 06:00 | 0.091 | 11:25 | 0.460 | 0.270 | 0.270 | |
| 02/17/2020 | 05:00 | 3.07 | 20:15 | 7.73 | 5.73 | 04:35 | 0.72 | 23:40 | 1.13 | 0.93 | 04:40 | 0.091 | 20:05 | 0.425 | 0.265 | 0.265 | |
| 02/18/2020 | 03:20 | 2.98 | 19:45 | 7.61 | 5.52 | 02:35 | 0.75 | 00:00 | 1.18 | 1.00 | 04:50 | 0.095 | 18:50 | 0.389 | 0.268 | 0.268 | |
| 02/19/2020 | 03:35 | 3.04 | 21:40 | 8.09 | 5.55 | 22:00 | 0.74 | 10:30 | 1.26 | 1.00 | 03:25 | 0.094 | 19:45 | 0.404 | 0.271 | 0.271 | |
| 02/20/2020 | 03:40 | 3.06 | 21:05 | 11.07 | 6.09 | 22:30 | 0.51 | 07:25 | 1.20 | 0.95 | 03:05 | 0.104 | 23:05 | 0.444 | 0.272 | 0.272 | |
| 02/21/2020 | 03:10 | 3.58 | 08:15 | 9.33 | 6.13 | 08:15 | 0.65 | 23:30 | 1.11 | 0.95 | 02:45 | 0.110 | 18:55 | 0.393 | 0.290 | 0.290 | |
| 02/22/2020 | 06:00 | 3.24 | 10:30 | 8.20 | 6.00 | 10:50 | 0.72 | 08:10 | 1.19 | 0.96 | 06:05 | 0.111 | 10:35 | 0.443 | 0.287 | 0.287 | |
| 02/23/2020 | 05:35 | 2.93 | 10:50 | 8.46 | 6.10 | 05:25 | 0.76 | 18:10 | 1.14 | 0.94 | 05:25 | 0.084 | 12:40 | 0.437 | 0.288 | 0.288 | |
| 02/24/2020 | 04:55 | 3.37 | 20:45 | 7.93 | 5.75 | 04:50 | 0.75 | 07:30 | 1.15 | 0.95 | 04:10 | 0.103 | 19:25 | 0.414 | 0.270 | 0.270 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 03:35 | 3.02 | 22:25 | 7.81 | 5.65 | 04:15 | 0.75 | 07:20 | 1.24 | 0.97 | 03:15 | 0.102 | 21:25 | 0.403 | 0.270 | 0.270 | |
| 02/26/2020 | 03:15 | 3.11 | 19:35 | 9.23 | 6.17 | 19:25 | 0.67 | 07:30 | 1.18 | 0.93 | 03:30 | 0.092 | 20:30 | 0.419 | 0.282 | 0.282 | |
| 02/27/2020 | 04:20 | 3.28 | 17:30 | 19.17 | 6.12 | 17:30 | 0.16 | 09:35 | 1.13 | 0.89 | 04:30 | 0.100 | 09:00 | 0.545 | 0.262 | 0.262 | |
| 02/28/2020 | 05:05 | 3.30 | 08:55 | 7.51 | 5.69 | 03:55 | 0.77 | 06:55 | 1.14 | 0.97 | 02:55 | 0.107 | 08:35 | 0.414 | 0.269 | 0.269 | |
| 02/29/2020 | 05:50 | 3.23 | 13:15 | 23.46 | 5.72 | 13:20 | 0.16 | 18:15 | 1.22 | 0.96 | 04:30 | 0.094 | 14:20 | 0.502 | 0.257 | 0.257 | |
| 03/01/2020 | 05:45 | 2.74 | 21:25 | 7.88 | 5.70 | 04:25 | 0.78 | 18:25 | 1.22 | 1.00 | 04:25 | 0.084 | 11:45 | 0.433 | 0.283 | 0.283 | |
| 03/02/2020 | 05:05 | 2.90 | 20:10 | 7.69 | 5.28 | 02:40 | 0.80 | 18:20 | 1.20 | 1.03 | 03:30 | 0.091 | 19:20 | 0.422 | 0.264 | 0.264 | |
| 03/03/2020 | 05:00 | 2.90 | 21:50 | 7.93 | 5.37 | 03:25 | 0.83 | 07:25 | 1.24 | 1.07 | 03:25 | 0.099 | 21:25 | 0.429 | 0.277 | 0.277 | |
| 03/04/2020 | 05:00 | 2.99 | 20:25 | 7.84 | 5.43 | 02:35 | 0.89 | 07:45 | 1.23 | 1.05 | 02:35 | 0.102 | 21:15 | 0.418 | 0.276 | 0.276 | |
| 03/05/2020 | 03:15 | 2.84 | 20:00 | 7.32 | 5.44 | 04:15 | 0.80 | 06:55 | 1.23 | 1.05 | 03:25 | 0.089 | 19:50 | 0.415 | 0.278 | 0.278 | |
| 03/06/2020 | 03:05 | 2.95 | 21:00 | 7.50 | 5.53 | 03:15 | 0.86 | 07:25 | 1.22 | 1.05 | 03:15 | 0.096 | 21:10 | 0.399 | 0.283 | 0.283 | |
| 03/07/2020 | 03:35 | 2.92 | 20:05 | 7.83 | 5.79 | 13:45 | 0.89 | 19:00 | 1.20 | 1.05 | 03:45 | 0.107 | 12:35 | 0.454 | 0.300 | 0.300 | |
| 03/08/2020 | 04:00 | 3.28 | 14:15 | 34.98 | 16.56 | 11:00 | 0.26 | 14:15 | 1.78 | 0.71 | 05:10 | 0.110 | 14:15 | 1.416 | 0.316 | 0.316 | |
| 03/09/2020 | 23:55 | 4.57 | 06:40 | 25.25 | 11.60 | 03:20 | 0.16 | 11:30 | 1.20 | 0.81 | 03:20 | 0.125 | 07:05 | 0.472 | 0.300 | 0.300 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 30.779 | 4.90 |
| Avg | 6.17 | 0.94 | 0.283 | |

Site Commentary

Site Information

| MIL_1043 | |
|-----------------|-------|
| Pipe Dimensions | 20.75 |
| Silt Level | 0.00" |

Overview

Site MIL_1043 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited a small response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed downstream of MIL_1193. A review of balancing of combined flows MIL_1043 and MIL_2840 shows a net flow of 0.663 MGD.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|---------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 5.25 | 4.00 | 1.263 |
| Minimum | 3.29 | 1.93 | 0.306 |
| Maximum | 7.55 | 4.98 | 2.432 |
| Time of Minimum | 2/26/2020 3:35 AM | 3/2/2020 4:00 AM | 3/2/2020 4:00 AM |
| Time of Maximum | 12/7/2019 6:15 PM | 11/28/2019 12:30 PM | 12/7/2019 6:15 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_1043

Site Address /Location: Ayer St and Park Hill Dr, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.436384°

Longitude:

-121.887700°

Pipe Size (H x W)

20.75"x20.75"

Pipe Shape

Circular

Manhole #

1043

System Characteristics

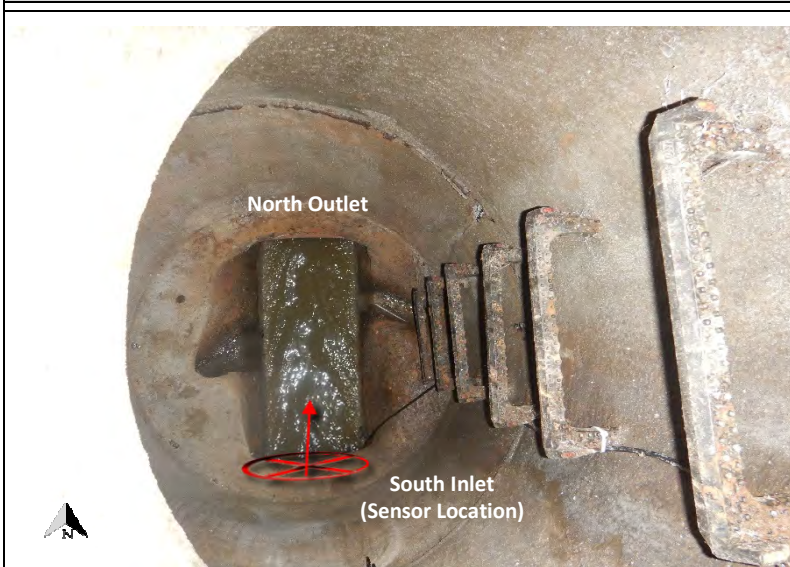
Residential/Commercial

Access

Traffic

Drive

Medium



Installation Information

Installation Date:

Thursday, November 14, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

6:52:00 AM

Pipe Size (HxW)

20.75"x20.75"

Depth of Flow (Wet DOF) (in)

6.38"

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

4.50'

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Medium depth with fast velocity and small waves

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

10'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_1043

Flow Monitor

MIL_1043

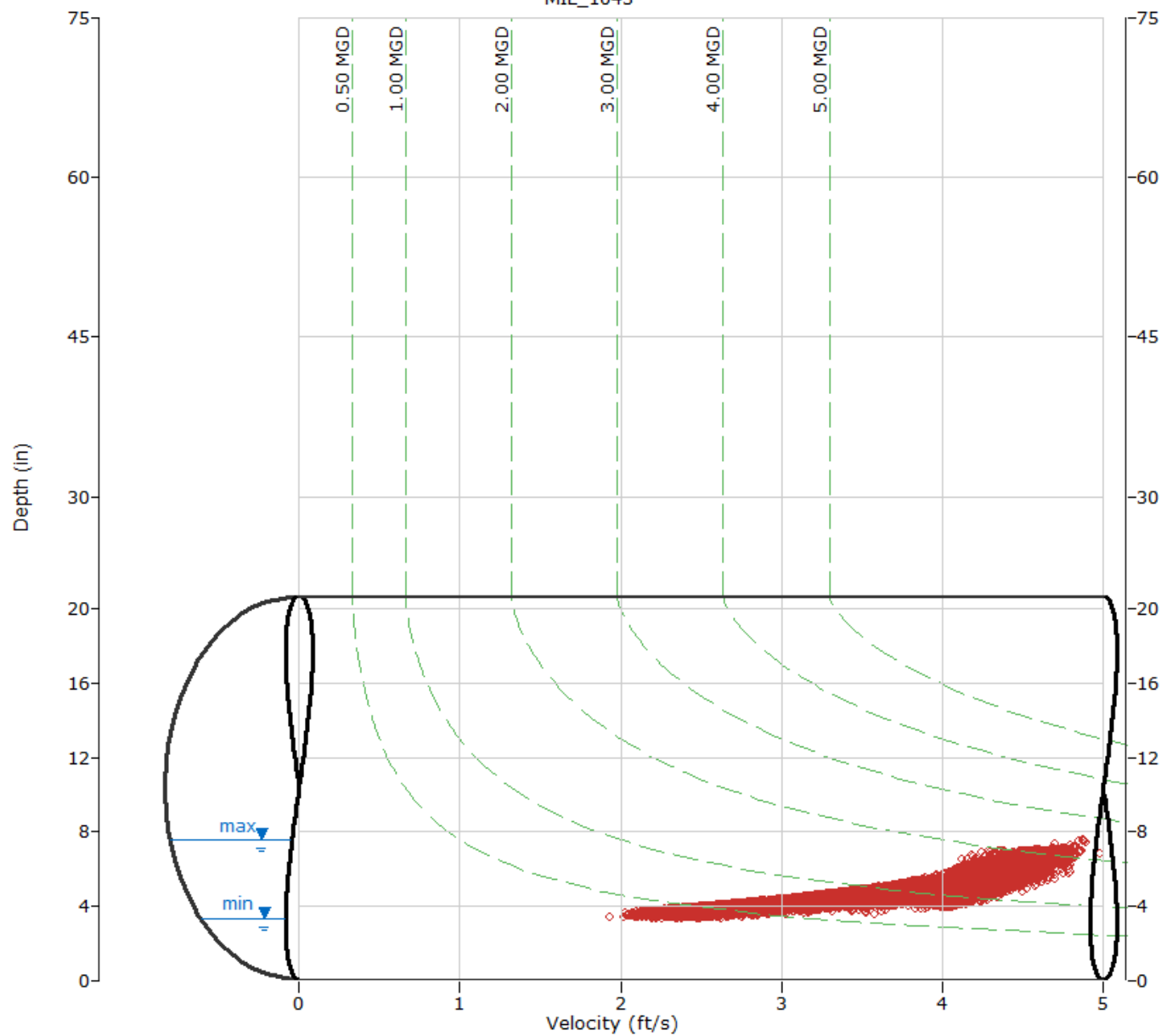
Pipe Height
20.75 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



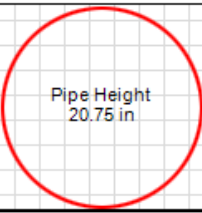
ADS ENVIRONMENTAL
SERVICES

HYDROGRAPH REPORT

MIL_1043

Flow Monitor

MIL_1043




Pipe Height
20.75 in

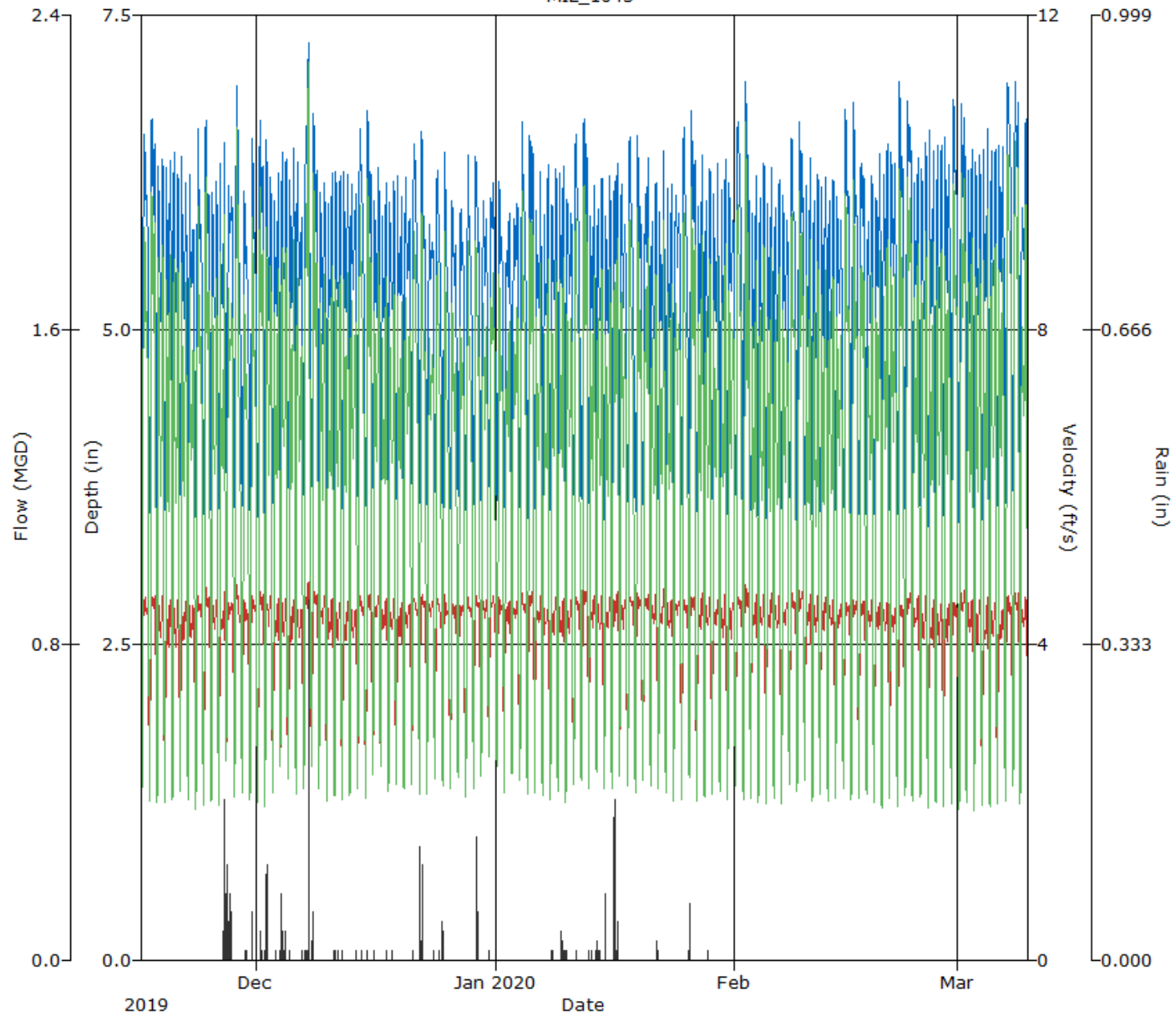
Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain





Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_1043, Pipe Height: 20.75 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 11/16/2019 | 03:25 | 3.55 | 10:30 | 6.60 | 5.43 | 04:55 | 2.20 | 13:25 | 4.68 | 3.94 | 04:55 | 0.387 | 10:25 | 1.915 | 1.316 | 1.316 | | |
| 11/17/2019 | 04:45 | 3.48 | 10:40 | 6.86 | 5.50 | 04:30 | 2.20 | 21:10 | 4.74 | 3.99 | 04:30 | 0.373 | 10:50 | 2.066 | 1.366 | 1.366 | | |
| 11/18/2019 | 03:25 | 3.47 | 07:55 | 6.71 | 5.27 | 02:20 | 2.15 | 20:15 | 4.73 | 3.94 | 04:20 | 0.372 | 07:55 | 2.002 | 1.251 | 1.251 | | |
| 11/19/2019 | 04:35 | 3.51 | 08:05 | 6.55 | 5.27 | 02:55 | 2.17 | 07:35 | 4.63 | 3.90 | 04:20 | 0.381 | 08:05 | 1.888 | 1.238 | 1.238 | | |
| 11/20/2019 | 04:25 | 3.59 | 08:10 | 6.63 | 5.26 | 03:30 | 2.11 | 07:55 | 4.70 | 3.91 | 03:30 | 0.377 | 08:00 | 1.938 | 1.235 | 1.235 | | |
| 11/21/2019 | 04:25 | 3.59 | 07:55 | 6.68 | 5.27 | 03:35 | 2.20 | 18:15 | 4.70 | 3.93 | 03:35 | 0.400 | 07:55 | 1.961 | 1.242 | 1.242 | | |
| 11/22/2019 | 03:35 | 3.58 | 08:05 | 6.49 | 5.26 | 04:25 | 2.14 | 08:05 | 4.62 | 3.94 | 04:25 | 0.382 | 08:05 | 1.873 | 1.240 | 1.240 | | |
| 11/23/2019 | 04:30 | 3.47 | 11:00 | 6.70 | 5.31 | 04:00 | 2.13 | 11:20 | 4.71 | 3.94 | 04:30 | 0.361 | 11:25 | 1.978 | 1.276 | 1.276 | | |
| 11/24/2019 | 04:40 | 3.49 | 11:10 | 6.75 | 5.35 | 04:45 | 2.07 | 11:35 | 4.82 | 4.00 | 04:45 | 0.350 | 11:10 | 2.035 | 1.314 | 1.314 | | |
| 11/25/2019 | 04:10 | 3.45 | 08:05 | 6.32 | 5.12 | 03:20 | 2.21 | 21:55 | 4.65 | 3.95 | 04:10 | 0.371 | 08:10 | 1.811 | 1.203 | 1.203 | | |
| 11/26/2019 | 04:10 | 3.51 | 08:00 | 6.68 | 5.18 | 03:45 | 2.13 | 07:55 | 4.82 | 3.94 | 03:45 | 0.373 | 08:00 | 2.033 | 1.223 | 1.223 | 0.36 | |
| 11/27/2019 | 03:10 | 3.66 | 10:10 | 6.24 | 5.40 | 02:35 | 2.38 | 21:15 | 4.64 | 4.07 | 03:10 | 0.439 | 10:25 | 1.771 | 1.324 | 1.324 | 0.63 | |
| 11/28/2019 | 05:00 | 3.43 | 12:10 | 7.05 | 5.30 | 05:00 | 2.28 | 12:30 | 4.98 | 3.98 | 05:00 | 0.375 | 12:30 | 2.164 | 1.288 | 1.288 | | |
| 11/29/2019 | 04:05 | 3.40 | 11:15 | 6.18 | 5.05 | 04:20 | 2.25 | 11:50 | 4.70 | 3.95 | 04:05 | 0.390 | 11:15 | 1.731 | 1.177 | 1.177 | 0.02 | |
| 11/30/2019 | 03:45 | 3.41 | 13:15 | 6.57 | 5.17 | 04:10 | 2.13 | 11:50 | 4.69 | 3.97 | 05:00 | 0.357 | 11:50 | 1.931 | 1.237 | 1.237 | 0.10 | |
| 12/01/2019 | 04:55 | 3.42 | 12:45 | 6.70 | 5.38 | 04:15 | 2.23 | 18:20 | 4.74 | 4.03 | 04:55 | 0.366 | 12:40 | 2.007 | 1.334 | 1.334 | 0.06 | |
| 12/02/2019 | 04:05 | 3.40 | 08:15 | 6.81 | 5.23 | 03:05 | 2.10 | 08:10 | 4.75 | 4.03 | 03:05 | 0.348 | 08:05 | 2.038 | 1.267 | 1.267 | 0.30 | |
| 12/03/2019 | 03:25 | 3.41 | 07:55 | 6.43 | 5.21 | 04:25 | 2.14 | 20:25 | 4.64 | 3.96 | 04:25 | 0.375 | 08:00 | 1.848 | 1.232 | 1.232 | 0.01 | |
| 12/04/2019 | 03:25 | 3.52 | 08:05 | 6.61 | 5.39 | 03:25 | 2.25 | 08:05 | 4.77 | 4.02 | 03:25 | 0.383 | 08:05 | 1.984 | 1.303 | 1.303 | 0.39 | |
| 12/05/2019 | 04:35 | 3.53 | 21:35 | 6.46 | 5.29 | 04:10 | 2.17 | 07:55 | 4.66 | 3.94 | 04:35 | 0.392 | 07:55 | 1.859 | 1.251 | 1.251 | 0.01 | |
| 12/06/2019 | 03:30 | 3.58 | 08:15 | 6.57 | 5.31 | 04:45 | 2.24 | 17:25 | 4.62 | 3.94 | 03:35 | 0.402 | 08:15 | 1.812 | 1.253 | 1.253 | 0.01 | |
| 12/07/2019 | 03:25 | 3.55 | 18:15 | 7.55 | 5.61 | 04:25 | 2.22 | 18:05 | 4.90 | 4.04 | 04:35 | 0.392 | 18:15 | 2.432 | 1.417 | 1.417 | 0.67 | |
| 12/08/2019 | 05:05 | 3.60 | 10:55 | 6.83 | 5.53 | 03:35 | 2.44 | 20:20 | 4.75 | 4.14 | 05:05 | 0.436 | 10:50 | 2.054 | 1.404 | 1.404 | 0.20 | |
| 12/09/2019 | 04:25 | 3.52 | 08:05 | 6.43 | 5.18 | 02:40 | 2.03 | 20:30 | 4.71 | 4.01 | 02:40 | 0.364 | 08:10 | 1.859 | 1.233 | 1.233 | | |
| 12/10/2019 | 03:50 | 3.45 | 20:50 | 6.38 | 5.17 | 03:45 | 2.11 | 20:55 | 4.68 | 3.95 | 03:45 | 0.356 | 20:55 | 1.845 | 1.212 | 1.212 | | |
| 12/11/2019 | 04:40 | 3.56 | 08:10 | 6.39 | 5.27 | 03:30 | 2.17 | 20:40 | 4.62 | 3.92 | 04:30 | 0.387 | 08:15 | 1.813 | 1.240 | 1.240 | 0.03 | |
| 12/12/2019 | 04:00 | 3.48 | 08:00 | 6.35 | 5.23 | 04:05 | 2.10 | 08:00 | 4.60 | 3.89 | 04:05 | 0.356 | 08:00 | 1.811 | 1.220 | 1.220 | 0.01 | |
| 12/13/2019 | 04:15 | 3.58 | 07:55 | 6.35 | 5.28 | 03:15 | 2.15 | 07:40 | 4.63 | 3.91 | 03:15 | 0.386 | 07:55 | 1.776 | 1.237 | 1.237 | 0.01 | |
| 12/14/2019 | 04:35 | 3.57 | 11:05 | 6.65 | 5.42 | 03:25 | 2.20 | 14:05 | 4.68 | 3.99 | 03:35 | 0.397 | 11:05 | 1.941 | 1.322 | 1.322 | 0.01 | |
| 12/15/2019 | 04:35 | 3.40 | 10:50 | 6.87 | 5.42 | 04:15 | 2.20 | 10:30 | 4.71 | 4.03 | 04:30 | 0.380 | 11:05 | 2.051 | 1.347 | 1.347 | 0.01 | |
| 12/16/2019 | 04:30 | 3.60 | 21:20 | 6.36 | 5.20 | 02:40 | 2.30 | 21:50 | 4.66 | 4.06 | 03:20 | 0.422 | 21:15 | 1.834 | 1.256 | 1.256 | 0.01 | |
| 12/17/2019 | 04:40 | 3.67 | 21:55 | 6.25 | 5.17 | 04:25 | 2.49 | 21:00 | 4.67 | 4.04 | 04:25 | 0.460 | 21:55 | 1.774 | 1.229 | 1.229 | 0.01 | |
| 12/18/2019 | 02:50 | 3.51 | 07:50 | 6.31 | 5.19 | 02:55 | 2.23 | 22:05 | 4.68 | 3.99 | 02:55 | 0.390 | 22:10 | 1.802 | 1.232 | 1.232 | 0.01 | |
| 12/19/2019 | 03:05 | 3.54 | 08:25 | 6.38 | 5.25 | 03:20 | 2.23 | 07:45 | 4.71 | 3.98 | 03:20 | 0.399 | 07:45 | 1.813 | 1.246 | 1.246 | | |
| 12/20/2019 | 04:25 | 3.57 | 08:05 | 6.32 | 5.30 | 04:40 | 2.18 | 18:50 | 4.68 | 3.97 | 04:40 | 0.399 | 08:05 | 1.764 | 1.259 | 1.259 | | |
| 12/21/2019 | 03:40 | 3.66 | 11:55 | 6.52 | 5.36 | 03:30 | 2.26 | 14:00 | 4.67 | 4.00 | 04:50 | 0.418 | 12:00 | 1.888 | 1.302 | 1.302 | 0.01 | |
| 12/22/2019 | 04:25 | 3.43 | 11:00 | 6.61 | 5.31 | 04:15 | 2.19 | 19:35 | 4.75 | 4.05 | 04:15 | 0.379 | 11:30 | 1.930 | 1.304 | 1.304 | 0.41 | |
| 12/23/2019 | 04:30 | 3.45 | 11:00 | 5.94 | 5.12 | 04:25 | 2.20 | 12:40 | 4.62 | 4.06 | 04:25 | 0.373 | 11:00 | 1.640 | 1.224 | 1.224 | | |
| 12/24/2019 | 03:55 | 3.63 | 11:50 | 6.41 | 5.19 | 03:30 | 2.26 | 12:55 | 4.78 | 4.06 | 03:30 | 0.414 | 11:50 | 1.833 | 1.252 | 1.252 | 0.02 | |
| 12/25/2019 | 05:15 | 3.42 | 11:15 | 6.51 | 5.03 | 05:25 | 2.23 | 11:15 | 4.72 | 4.04 | 05:25 | 0.387 | 11:15 | 1.924 | 1.190 | 1.190 | 0.08 | |
| 12/26/2019 | 04:25 | 3.47 | 10:10 | 6.37 | 5.05 | 05:00 | 2.35 | 10:05 | 4.67 | 3.99 | 04:25 | 0.406 | 10:10 | 1.830 | 1.188 | 1.188 | | |
| 12/27/2019 | 03:50 | 3.48 | 11:45 | 6.05 | 5.10 | 04:30 | 2.30 | 22:05 | 4.61 | 4.02 | 04:25 | 0.393 | 12:15 | 1.655 | 1.207 | 1.207 | | |
| 12/28/2019 | 04:25 | 3.43 | 12:05 | 6.46 | 5.14 | 04:45 | 2.13 | 12:10 | 4.64 | 3.97 | 04:45 | 0.373 | 12:05 | 1.865 | 1.220 | 1.220 | | |
| 12/29/2019 | 03:55 | 3.47 | 11:55 | 6.51 | 5.16 | 04:35 | 2.16 | 10:45 | 4.73 | 4.01 | 04:35 | 0.381 | 11:50 | 1.894 | 1.242 | 1.242 | 0.22 | |
| 12/30/2019 | 04:30 | 3.55 | 11:30 | 6.10 | 5.11 | 03:30 | 2.27 | 12:45 | 4.79 | 4.06 | 03:30 | 0.396 | 12:45 | 1.717 | 1.226 | 1.226 | | |
| 12/31/2019 | 04:25 | 3.70 | 18:20 | 6.24 | 5.21 | 04:20 | 2.55 | 19:10 | 4.68 | 4.13 | 04:20 | 0.469 | 18:20 | 1.787 | 1.275 | 1.275 | 0.01 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 05:40 | 3.47 | 12:10 | 6.24 | 5.04 | 05:20 | 2.63 | 12:00 | 4.67 | 4.08 | 05:40 | 0.463 | 12:10 | 1.796 | 1.205 | 1.205 | | |
| 01/02/2020 | 03:45 | 3.46 | 21:10 | 6.01 | 5.08 | 03:35 | 2.27 | 21:50 | 4.59 | 4.05 | 03:50 | 0.392 | 20:30 | 1.657 | 1.208 | 1.208 | | |
| 01/03/2020 | 03:00 | 3.59 | 19:45 | 6.07 | 5.21 | 03:10 | 2.28 | 20:50 | 4.58 | 4.04 | 04:15 | 0.419 | 19:45 | 1.682 | 1.248 | 1.248 | | |
| 01/04/2020 | 03:30 | 3.45 | 12:45 | 6.72 | 5.30 | 04:55 | 2.41 | 12:10 | 4.72 | 4.03 | 04:55 | 0.408 | 12:10 | 1.988 | 1.299 | 1.299 | | |
| 01/05/2020 | 04:25 | 3.38 | 10:25 | 6.66 | 5.37 | 04:20 | 2.27 | 20:30 | 4.76 | 4.08 | 04:20 | 0.382 | 20:30 | 1.966 | 1.341 | 1.341 | | |
| 01/06/2020 | 04:00 | 3.46 | 20:35 | 6.33 | 5.15 | 03:40 | 2.12 | 19:45 | 4.73 | 4.04 | 04:15 | 0.376 | 20:35 | 1.813 | 1.235 | 1.235 | | |
| 01/07/2020 | 03:25 | 3.53 | 21:00 | 6.38 | 5.16 | 04:50 | 2.25 | 21:00 | 4.66 | 3.96 | 03:30 | 0.400 | 21:00 | 1.848 | 1.216 | 1.216 | | |
| 01/08/2020 | 03:55 | 3.50 | 09:50 | 6.39 | 5.25 | 03:45 | 2.18 | 20:45 | 4.63 | 3.94 | 03:45 | 0.375 | 21:00 | 1.820 | 1.242 | 1.242 | | 0.02 |
| 01/09/2020 | 04:10 | 3.49 | 08:00 | 6.57 | 5.28 | 04:10 | 2.25 | 21:05 | 4.62 | 3.97 | 04:10 | 0.379 | 08:00 | 1.894 | 1.262 | 1.262 | 0.18 | |
| 01/10/2020 | 03:10 | 3.51 | 08:05 | 6.34 | 5.23 | 03:50 | 2.12 | 08:05 | 4.61 | 3.96 | 03:55 | 0.364 | 08:05 | 1.808 | 1.238 | 1.238 | 0.02 | |
| 01/11/2020 | 04:05 | 3.58 | 11:35 | 6.58 | 5.31 | 04:35 | 2.26 | 10:30 | 4.77 | 4.01 | 04:35 | 0.416 | 11:45 | 1.934 | 1.292 | 1.292 | 0.01 | |
| 01/12/2020 | 04:10 | 3.46 | 12:20 | 6.82 | 5.38 | 03:55 | 2.24 | 10:15 | 4.76 | 4.09 | 03:55 | 0.385 | 12:15 | 2.034 | 1.349 | 1.349 | | |
| 01/13/2020 | 03:45 | 3.50 | 07:55 | 6.35 | 5.08 | 02:25 | 2.25 | 08:00 | 4.68 | 4.04 | 03:20 | 0.396 | 08:00 | 1.839 | 1.212 | 1.212 | | 0.02 |
| 01/14/2020 | 02:30 | 3.65 | 08:00 | 6.31 | 5.11 | 02:10 | 2.42 | 21:45 | 4.74 | 4.01 | 02:35 | 0.451 | 21:45 | 1.839 | 1.209 | 1.209 | 0.11 | |
| 01/15/2020 | 04:30 | 3.33 | 20:40 | 6.32 | 5.07 | 04:35 | 2.47 | 21:35 | 4.66 | 4.03 | 04:35 | 0.391 | 20:40 | 1.805 | 1.202 | 1.202 | 0.07 | |
| 01/16/2020 | 03:25 | 3.54 | 20:35 | 6.43 | 5.32 | 03:20 | 2.27 | 13:05 | 4.79 | 4.08 | 03:30 | 0.393 | 20:25 | 1.902 | 1.311 | 1.311 | 0.66 | |
| 01/17/2020 | 03:40 | 3.54 | 09:00 | 6.89 | 5.19 | 04:30 | 2.32 | 08:15 | 4.66 | 4.07 | 04:30 | 0.409 | 09:00 | 2.050 | 1.251 | 1.251 | | |
| 01/18/2020 | 04:00 | 3.48 | 11:15 | 6.56 | 5.21 | 04:05 | 2.28 | 12:15 | 4.72 | 4.07 | 04:05 | 0.385 | 11:15 | 1.916 | 1.274 | 1.274 | | |
| 01/19/2020 | 05:00 | 3.38 | 11:00 | 6.68 | 5.19 | 04:40 | 2.31 | 10:55 | 4.73 | 4.07 | 04:40 | 0.376 | 11:00 | 1.993 | 1.271 | 1.271 | | |
| 01/20/2020 | 04:05 | 3.48 | 21:10 | 6.45 | 5.22 | 04:05 | 2.39 | 14:45 | 4.80 | 4.11 | 04:05 | 0.402 | 21:10 | 1.886 | 1.284 | 1.284 | | |
| 01/21/2020 | 03:45 | 3.56 | 21:55 | 6.25 | 5.05 | 04:35 | 2.24 | 20:45 | 4.78 | 4.05 | 04:35 | 0.401 | 21:50 | 1.795 | 1.197 | 1.197 | | |
| 01/22/2020 | 03:00 | 3.54 | 21:35 | 6.48 | 5.12 | 04:05 | 2.17 | 19:20 | 4.75 | 4.06 | 04:05 | 0.382 | 20:55 | 1.905 | 1.228 | 1.228 | | 0.03 |
| 01/23/2020 | 04:35 | 3.50 | 08:05 | 6.41 | 5.15 | 03:30 | 2.13 | 07:20 | 4.67 | 4.03 | 03:30 | 0.369 | 08:00 | 1.835 | 1.228 | 1.228 | | |
| 01/24/2020 | 03:15 | 3.53 | 10:35 | 6.15 | 5.26 | 04:20 | 2.15 | 19:40 | 4.60 | 4.04 | 03:45 | 0.374 | 10:35 | 1.697 | 1.275 | 1.275 | | |
| 01/25/2020 | 05:20 | 3.52 | 11:35 | 6.75 | 5.30 | 04:20 | 2.18 | 11:25 | 4.69 | 4.01 | 04:20 | 0.382 | 11:35 | 1.967 | 1.286 | 1.286 | | |
| 01/26/2020 | 04:10 | 3.54 | 12:15 | 6.80 | 5.42 | 03:40 | 2.33 | 19:40 | 4.68 | 4.09 | 04:10 | 0.415 | 11:30 | 2.006 | 1.352 | 1.352 | | 0.16 |
| 01/27/2020 | 03:40 | 3.39 | 20:55 | 6.46 | 5.17 | 04:15 | 2.16 | 20:05 | 4.70 | 4.02 | 03:40 | 0.370 | 20:50 | 1.889 | 1.240 | 1.240 | | |
| 01/28/2020 | 04:15 | 3.51 | 20:30 | 6.46 | 5.11 | 03:55 | 2.17 | 20:30 | 4.71 | 3.98 | 03:35 | 0.378 | 20:30 | 1.898 | 1.208 | 1.208 | | 0.01 |
| 01/29/2020 | 04:20 | 3.46 | 21:05 | 6.37 | 5.15 | 03:50 | 2.09 | 22:15 | 4.66 | 3.99 | 03:50 | 0.369 | 19:50 | 1.819 | 1.220 | 1.220 | | |
| 01/30/2020 | 03:45 | 3.58 | 21:55 | 6.44 | 5.21 | 04:30 | 2.14 | 20:50 | 4.78 | 3.98 | 02:50 | 0.392 | 20:50 | 1.917 | 1.237 | 1.237 | | |
| 01/31/2020 | 04:00 | 3.40 | 08:05 | 6.34 | 5.18 | 02:55 | 2.12 | 18:35 | 4.69 | 3.98 | 04:00 | 0.361 | 08:10 | 1.782 | 1.228 | 1.228 | | |
| 02/01/2020 | 04:15 | 3.53 | 10:45 | 6.85 | 5.42 | 04:15 | 2.34 | 10:05 | 4.76 | 4.06 | 04:15 | 0.401 | 10:45 | 2.032 | 1.344 | 1.344 | | |
| 02/02/2020 | 04:50 | 3.38 | 11:35 | 7.06 | 5.34 | 03:50 | 2.18 | 12:00 | 4.87 | 4.09 | 03:50 | 0.370 | 12:00 | 2.186 | 1.340 | 1.340 | | |
| 02/03/2020 | 03:50 | 3.43 | 21:10 | 6.29 | 5.02 | 03:40 | 2.25 | 19:25 | 4.72 | 4.05 | 03:40 | 0.380 | 21:10 | 1.832 | 1.194 | 1.194 | | |
| 02/04/2020 | 04:15 | 3.40 | 20:45 | 6.49 | 5.05 | 04:10 | 2.22 | 20:55 | 4.72 | 4.04 | 04:10 | 0.363 | 20:45 | 1.911 | 1.203 | 1.203 | | |
| 02/05/2020 | 03:10 | 3.42 | 20:45 | 6.34 | 5.05 | 03:00 | 2.20 | 21:05 | 4.71 | 4.02 | 03:00 | 0.369 | 21:00 | 1.849 | 1.197 | 1.197 | | |
| 02/06/2020 | 04:10 | 3.37 | 21:25 | 6.28 | 5.06 | 03:40 | 2.13 | 20:45 | 4.68 | 4.02 | 04:10 | 0.358 | 21:25 | 1.801 | 1.198 | 1.198 | | |
| 02/07/2020 | 03:25 | 3.49 | 08:05 | 6.37 | 5.09 | 03:30 | 2.12 | 07:50 | 4.64 | 4.00 | 03:20 | 0.367 | 08:05 | 1.806 | 1.200 | 1.200 | | |
| 02/08/2020 | 03:55 | 3.49 | 11:45 | 6.62 | 5.31 | 03:55 | 2.14 | 12:10 | 4.70 | 4.08 | 03:55 | 0.360 | 11:50 | 1.952 | 1.310 | 1.310 | | |
| 02/09/2020 | 04:25 | 3.38 | 10:45 | 6.81 | 5.32 | 03:40 | 2.22 | 10:50 | 4.80 | 4.09 | 03:40 | 0.370 | 10:50 | 2.066 | 1.331 | 1.331 | | |
| 02/10/2020 | 04:15 | 3.47 | 08:00 | 6.61 | 5.08 | 02:50 | 2.28 | 20:50 | 4.77 | 4.08 | 04:10 | 0.386 | 08:00 | 1.958 | 1.223 | 1.223 | | |
| 02/11/2020 | 04:40 | 3.47 | 08:05 | 6.35 | 5.01 | 03:15 | 2.18 | 20:00 | 4.67 | 4.00 | 03:15 | 0.365 | 20:45 | 1.806 | 1.176 | 1.176 | | |
| 02/12/2020 | 04:10 | 3.35 | 08:05 | 6.35 | 5.07 | 04:15 | 2.16 | 08:15 | 4.67 | 4.02 | 04:15 | 0.345 | 08:15 | 1.828 | 1.204 | 1.204 | | |
| 02/13/2020 | 04:10 | 3.32 | 07:55 | 6.36 | 5.07 | 03:30 | 2.19 | 07:55 | 4.70 | 4.00 | 04:10 | 0.349 | 07:55 | 1.852 | 1.198 | 1.198 | | |
| 02/14/2020 | 04:00 | 3.40 | 08:05 | 6.19 | 5.14 | 04:55 | 2.19 | 18:10 | 4.60 | 4.00 | 04:00 | 0.360 | 07:55 | 1.735 | 1.215 | 1.215 | | |
| 02/15/2020 | 04:25 | 3.41 | 10:45 | 6.81 | 5.38 | 04:40 | 2.24 | 11:05 | 4.66 | 4.03 | 04:25 | 0.388 | 11:05 | 1.992 | 1.323 | 1.323 | | |
| 02/16/2020 | 03:40 | 3.34 | 11:15 | 6.86 | 5.34 | 03:30 | 2.18 | 10:30 | 4.67 | 3.98 | 03:45 | 0.367 | 11:10 | 2.015 | 1.308 | 1.308 | | |
| 02/17/2020 | 04:25 | 3.43 | 10:45 | 6.50 | 5.28 | 04:05 | 2.14 | 10:55 | 4.62 | 3.99 | 03:50 | 0.380 | 10:55 | 1.868 | 1.277 | 1.277 | | |
| 02/18/2020 | 04:25 | 3.30 | 20:20 | 6.30 | 5.10 | 03:20 | 2.24 | 20:10 | 4.62 | 4.01 | 04:20 | 0.368 | 20:20 | 1.798 | 1.208 | 1.208 | | |
| 02/19/2020 | 03:00 | 3.45 | 22:00 | 6.53 | 5.22 | 03:25 | 2.20 | 18:35 | 4.58 | 3.95 | 03:00 | 0.372 | 22:00 | 1.855 | 1.238 | 1.238 | | |
| 02/20/2020 | 03:30 | 3.38 | 21:10 | 6.55 | 5.32 | 04:45 | 2.12 | 20:55 | 4.80 | 3.93 | 04:35 | 0.357 | 20:55 | 1.911 | 1.265 | 1.265 | | |
| 02/21/2020 | 04:15 | 3.53 | 09:10 | 6.47 | 5.36 | 04:55 | 2.16 | 09:10 | 4.57 | 3.91 | 03:35 | 0.381 | 09:10 | 1.845 | 1.273 | 1.273 | | |
| 02/22/2020 | 04:25 | 3.42 | 11:25 | 7.00 | 5.53 | 04:25 | 2.07 | 09:20 | 4.67 | 3.93 | 04:25 | 0.340 | 11:25 | 2.061 | 1.355 | 1.355 | | |
| 02/23/2020 | 04:40 | 3.39 | 11:05 | 6.89 | 5.59 | 03:45 | 2.17 | 12:50 | 4.70 | 4.02 | 04:40 | 0.370 | 10:55 | 2.051 | 1.410 | 1.410 | | |
| 02/24/2020 | 04:05 | 3.43 | 21:45 | 6.49 | 5.24 | 04:30 | 2.15 | 20:10 | 4.71 | 3.98 | 04:30 | 0.365 | 21:40 | 1.863 | 1.255 | 1.255 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 03:20 | 3.52 | 21:50 | 6.55 | 5.24 | 03:50 | 2.11 | 20:40 | 4.66 | 3.93 | 03:50 | 0.374 | 20:45 | 1.907 | 1.239 | 1.239 | |
| 02/26/2020 | 03:35 | 3.29 | 08:05 | 6.65 | 5.27 | 04:15 | 2.06 | 21:30 | 4.65 | 3.89 | 04:15 | 0.337 | 08:05 | 1.927 | 1.241 | 1.241 | |
| 02/27/2020 | 04:05 | 3.36 | 07:55 | 6.60 | 5.31 | 04:30 | 2.04 | 20:10 | 4.56 | 3.90 | 03:20 | 0.341 | 08:00 | 1.868 | 1.250 | 1.250 | |
| 02/28/2020 | 02:55 | 3.41 | 08:35 | 6.63 | 5.35 | 04:05 | 2.12 | 20:10 | 4.55 | 3.90 | 04:05 | 0.355 | 08:35 | 1.870 | 1.264 | 1.264 | |
| 02/29/2020 | 04:10 | 3.42 | 11:30 | 6.93 | 5.55 | 04:20 | 2.04 | 18:05 | 4.64 | 3.95 | 04:20 | 0.340 | 11:30 | 2.053 | 1.364 | 1.364 | |
| 03/01/2020 | 04:55 | 3.36 | 11:05 | 6.91 | 5.51 | 04:20 | 2.09 | 10:40 | 4.83 | 4.00 | 04:20 | 0.342 | 10:40 | 2.097 | 1.380 | 1.380 | |
| 03/02/2020 | 04:00 | 3.34 | 07:50 | 6.60 | 5.23 | 04:00 | 1.93 | 07:35 | 4.69 | 3.94 | 04:00 | 0.306 | 07:50 | 1.945 | 1.239 | 1.239 | |
| 03/03/2020 | 04:00 | 3.29 | 08:00 | 6.50 | 5.23 | 04:10 | 2.04 | 19:50 | 4.63 | 3.88 | 04:35 | 0.336 | 08:05 | 1.856 | 1.226 | 1.226 | |
| 03/04/2020 | 03:30 | 3.40 | 07:55 | 6.73 | 5.31 | 04:05 | 2.14 | 07:55 | 4.83 | 3.91 | 04:05 | 0.353 | 07:55 | 2.059 | 1.256 | 1.256 | |
| 03/05/2020 | 04:50 | 3.42 | 20:15 | 6.57 | 5.32 | 04:25 | 2.15 | 20:15 | 4.63 | 3.92 | 04:00 | 0.362 | 20:15 | 1.912 | 1.264 | 1.264 | |
| 03/06/2020 | 04:10 | 3.53 | 08:00 | 6.59 | 5.43 | 03:55 | 2.06 | 07:50 | 4.56 | 3.89 | 03:55 | 0.354 | 07:55 | 1.887 | 1.286 | 1.286 | |
| 03/07/2020 | 04:45 | 3.52 | 11:35 | 7.03 | 5.66 | 03:35 | 2.14 | 12:30 | 4.70 | 3.96 | 04:45 | 0.376 | 12:30 | 2.101 | 1.410 | 1.410 | |
| 03/08/2020 | 05:15 | 3.65 | 11:40 | 7.12 | 5.65 | 03:50 | 2.10 | 09:50 | 4.77 | 4.02 | 03:50 | 0.378 | 11:40 | 2.161 | 1.427 | 1.427 | |
| 03/09/2020 | 02:35 | 3.46 | 20:35 | 6.75 | 5.39 | 02:35 | 2.06 | 20:10 | 4.72 | 3.95 | 02:35 | 0.343 | 20:10 | 1.980 | 1.296 | 1.295 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 145.284 | 4.90 |
| Avg | 5.25 | 4.00 | 1.263 | |

Site Commentary

Site Information

| MIL_1193 | |
|-----------------|-------|
| Pipe Dimensions | 21 |
| Silt Level | 0.00" |

Overview

Site MIL_1193 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited a small response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location. Due to a meter malfunction, data confidence is less than typical during December 16, 2019 through December 20, 2019. A data gap occurs during December 20, 2020 at 10:00 pm through December 27, 2020 at 6:00 am.

This location was installed upstream of sites MIL_1043 and MIL_2840. (See MIL_1043 and MIL_2840 Site Commentary for More Details)

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 4.15 | 2.59 | 0.600 |
| Minimum | 2.34 | 1.36 | 0.136 |
| Maximum | 6.11 | 3.72 | 1.368 |
| Time of Minimum | 11/19/2019 4:20 AM | 3/4/2020 3:15 AM | 2/18/2020 3:50 AM |
| Time of Maximum | 1/8/2020 9:25 AM | 2/2/2020 1:10 PM | 1/8/2020 9:25 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|----|
| Depth (in) | 95 |
| Velocity (ft/s) | 95 |
| Quantity (MGD) | 95 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_1193

Site Address /Location: Yosemite Dr and Dempsey Rd, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.426666°

Longitude:

-121.883676°

Pipe Size (H x W)

21.00"x21.00"

Pipe Shape

Circular

Manhole #

1193

System Characteristics

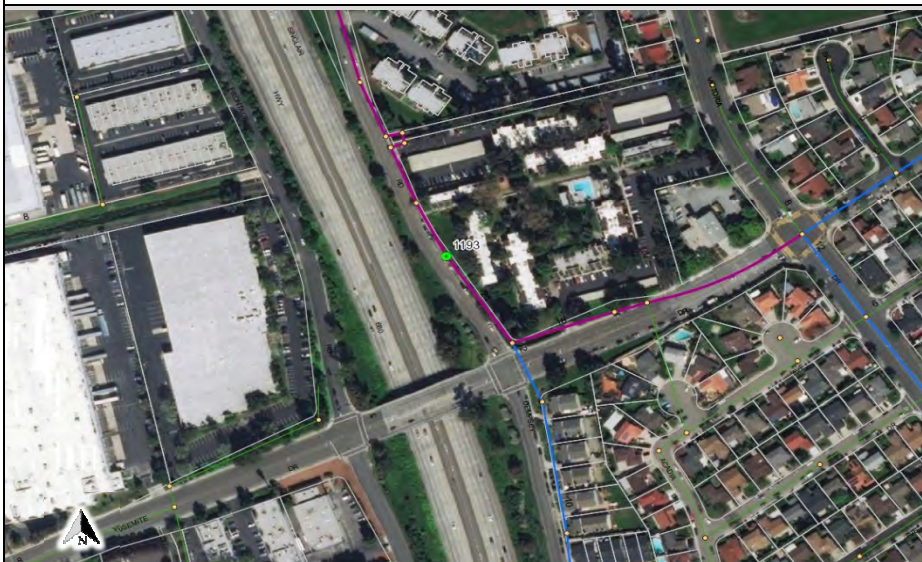
Residential/Commercial

Access

Drive

Traffic

Light



Installation Information

Installation Date:

Thursday, November 14, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

8:09:00 AM

Pipe Size (HxW)

21.00"x21.00"

Depth of Flow (Wet DOF) (in)

5.13"

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

3.50'

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Smooth flow with medium depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

15'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_1193

Flow Monitor

MIL_1193

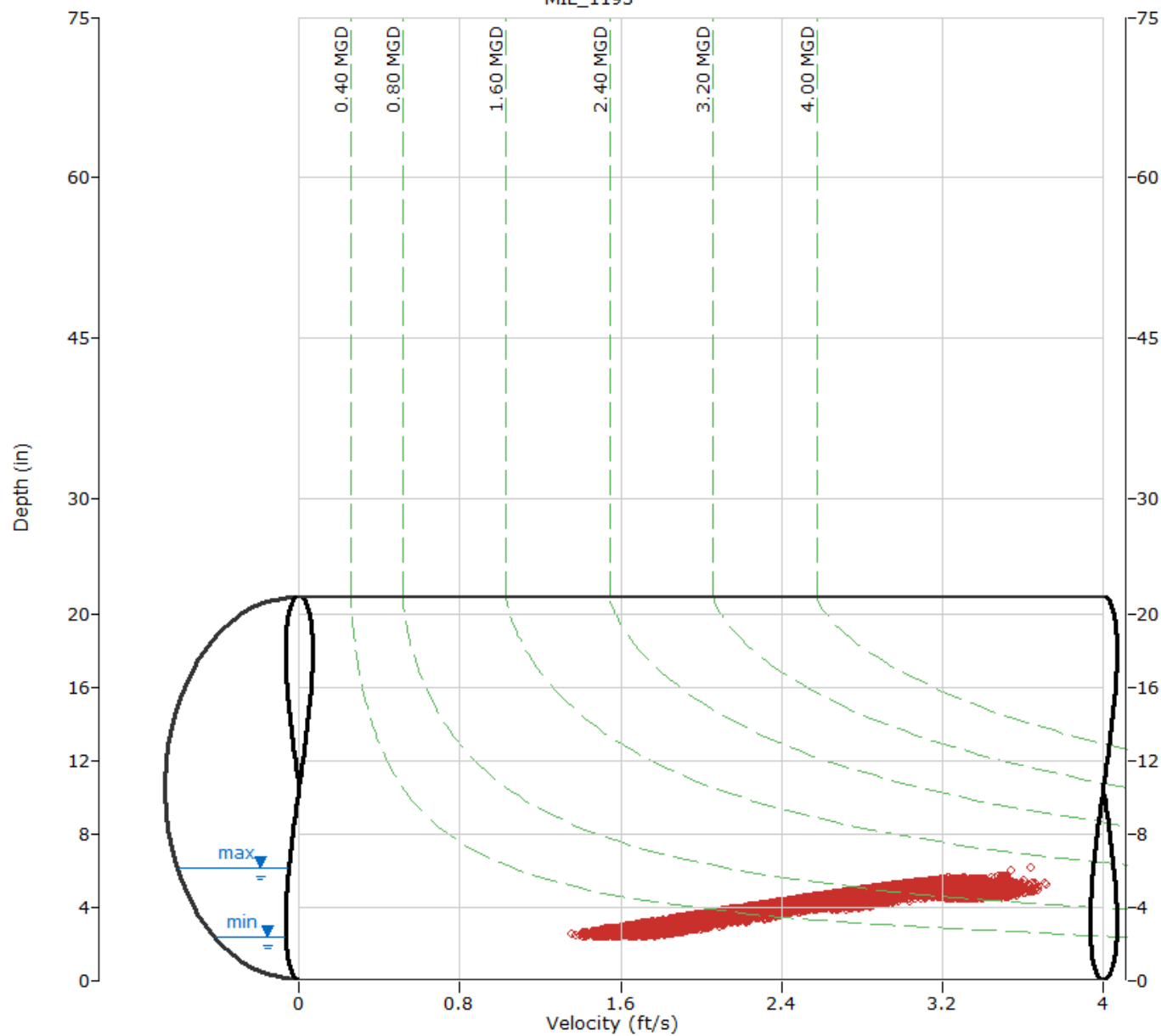
Pipe Height
21.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_1193

Flow Monitor

MIL_1193

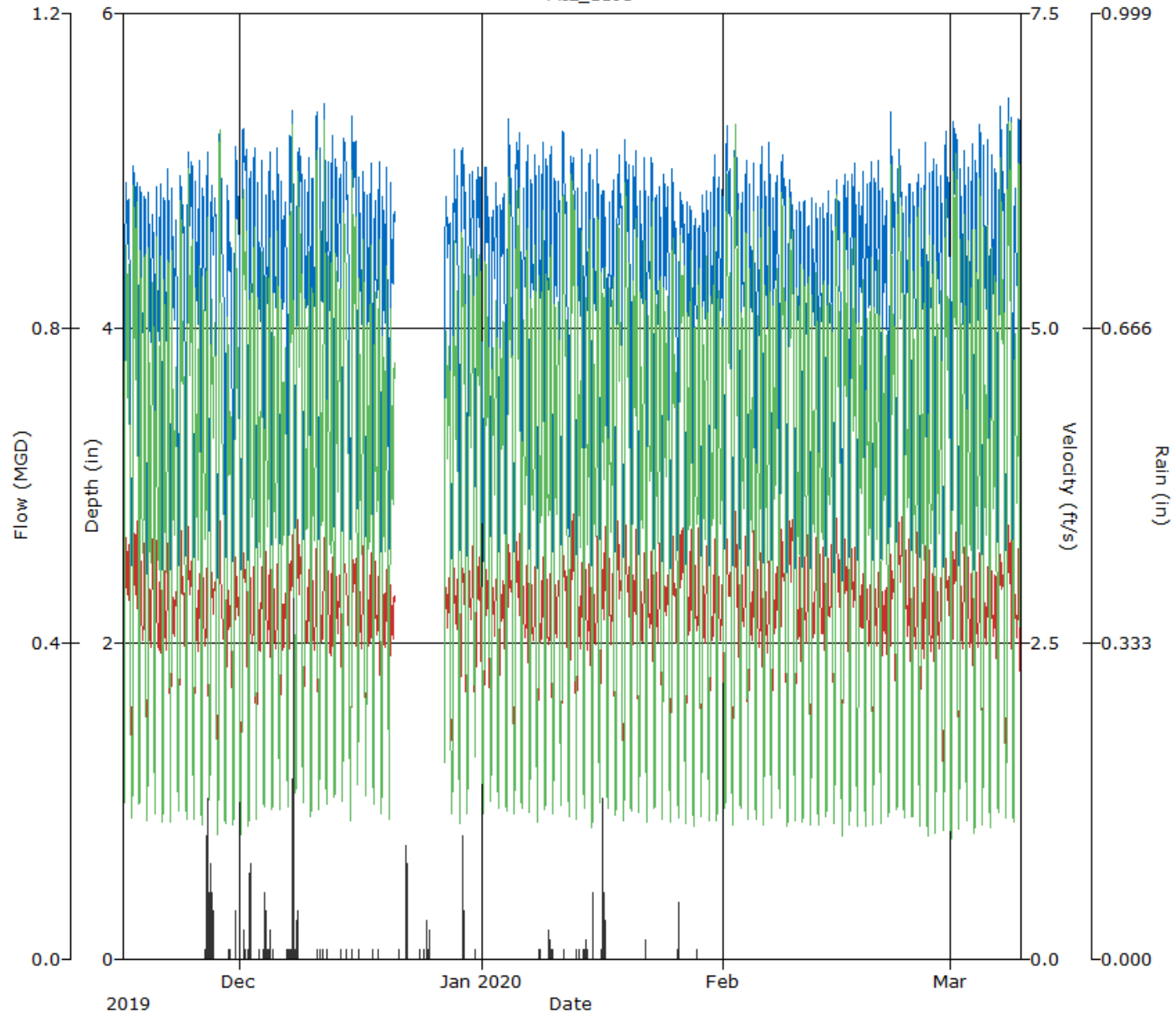
Pipe Height
21.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_1193, Pipe Height: 21.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 04:20 | 2.45 | 10:35 | 4.97 | 4.10 | 05:00 | 1.62 | 12:00 | 3.42 | 2.66 | 04:20 | 0.176 | 10:35 | 0.938 | 0.607 | 0.607 | |
| 11/17/2019 | 05:25 | 2.41 | 10:20 | 5.31 | 4.16 | 04:00 | 1.60 | 10:20 | 3.60 | 2.76 | 05:25 | 0.161 | 10:20 | 1.111 | 0.653 | 0.653 | |
| 11/18/2019 | 03:15 | 2.54 | 07:45 | 5.11 | 4.01 | 04:40 | 1.67 | 07:50 | 3.54 | 2.62 | 04:40 | 0.186 | 07:50 | 1.027 | 0.572 | 0.572 | |
| 11/19/2019 | 04:20 | 2.34 | 07:50 | 5.05 | 3.92 | 04:45 | 1.62 | 21:40 | 3.44 | 2.61 | 04:15 | 0.161 | 07:50 | 0.981 | 0.555 | 0.555 | |
| 11/20/2019 | 04:20 | 2.37 | 07:50 | 5.24 | 3.99 | 04:15 | 1.53 | 07:45 | 3.48 | 2.57 | 04:15 | 0.150 | 07:50 | 1.053 | 0.558 | 0.558 | |
| 11/21/2019 | 03:55 | 2.39 | 07:45 | 5.11 | 4.01 | 03:45 | 1.52 | 22:00 | 3.50 | 2.59 | 03:55 | 0.149 | 07:45 | 0.993 | 0.568 | 0.568 | |
| 11/22/2019 | 03:55 | 2.37 | 07:50 | 5.13 | 4.02 | 03:40 | 1.60 | 07:45 | 3.50 | 2.56 | 03:40 | 0.156 | 07:50 | 1.024 | 0.560 | 0.560 | |
| 11/23/2019 | 05:30 | 2.36 | 09:00 | 5.14 | 4.12 | 05:25 | 1.52 | 12:00 | 3.58 | 2.68 | 05:25 | 0.149 | 10:40 | 1.038 | 0.617 | 0.617 | |
| 11/24/2019 | 04:20 | 2.41 | 11:05 | 5.21 | 4.23 | 04:10 | 1.54 | 10:50 | 3.62 | 2.67 | 04:10 | 0.154 | 10:50 | 1.080 | 0.643 | 0.643 | |
| 11/25/2019 | 04:20 | 2.44 | 21:45 | 5.13 | 4.08 | 02:35 | 1.54 | 07:45 | 3.51 | 2.51 | 04:00 | 0.164 | 07:45 | 0.991 | 0.566 | 0.566 | |
| 11/26/2019 | 04:10 | 2.42 | 20:40 | 5.20 | 4.09 | 04:10 | 1.49 | 07:40 | 3.55 | 2.51 | 04:10 | 0.148 | 07:40 | 1.050 | 0.570 | 0.570 | 0.36 |
| 11/27/2019 | 03:10 | 2.64 | 09:30 | 5.03 | 4.20 | 04:20 | 1.57 | 10:45 | 3.25 | 2.59 | 03:10 | 0.189 | 10:55 | 0.908 | 0.604 | 0.604 | 0.63 |
| 11/28/2019 | 04:45 | 2.37 | 10:55 | 5.34 | 4.12 | 04:35 | 1.47 | 13:10 | 3.60 | 2.57 | 04:35 | 0.143 | 11:50 | 1.082 | 0.598 | 0.598 | |
| 11/29/2019 | 03:55 | 2.43 | 10:55 | 5.14 | 4.02 | 04:35 | 1.47 | 10:50 | 3.16 | 2.45 | 04:35 | 0.154 | 10:50 | 0.933 | 0.542 | 0.542 | 0.02 |
| 11/30/2019 | 04:55 | 2.46 | 12:45 | 5.23 | 4.20 | 04:05 | 1.47 | 13:35 | 3.30 | 2.53 | 04:45 | 0.152 | 13:35 | 0.968 | 0.603 | 0.603 | 0.10 |
| 12/01/2019 | 04:10 | 2.43 | 11:50 | 5.43 | 4.32 | 04:30 | 1.43 | 21:05 | 3.39 | 2.60 | 04:30 | 0.143 | 11:45 | 1.051 | 0.651 | 0.651 | 0.06 |
| 12/02/2019 | 03:10 | 2.51 | 21:30 | 5.46 | 4.18 | 03:35 | 1.43 | 08:00 | 3.38 | 2.51 | 03:35 | 0.151 | 21:30 | 1.067 | 0.588 | 0.588 | 0.30 |
| 12/03/2019 | 04:20 | 2.52 | 07:45 | 5.36 | 4.09 | 02:40 | 1.52 | 07:45 | 3.30 | 2.49 | 04:20 | 0.166 | 07:45 | 1.032 | 0.562 | 0.562 | 0.01 |
| 12/04/2019 | 03:05 | 2.53 | 21:40 | 5.18 | 4.13 | 02:55 | 1.54 | 07:45 | 3.55 | 2.54 | 02:55 | 0.167 | 07:15 | 0.999 | 0.578 | 0.578 | 0.39 |
| 12/05/2019 | 04:00 | 2.48 | 20:45 | 5.23 | 4.13 | 04:00 | 1.41 | 07:35 | 3.39 | 2.51 | 04:00 | 0.145 | 21:35 | 0.967 | 0.573 | 0.573 | 0.01 |
| 12/06/2019 | 04:05 | 2.59 | 07:55 | 5.18 | 4.14 | 04:00 | 1.56 | 07:55 | 3.18 | 2.49 | 04:00 | 0.173 | 07:55 | 0.949 | 0.567 | 0.567 | 0.01 |
| 12/07/2019 | 04:00 | 2.60 | 18:00 | 5.68 | 4.33 | 04:15 | 1.64 | 18:20 | 3.54 | 2.65 | 04:15 | 0.184 | 18:00 | 1.195 | 0.656 | 0.656 | 0.67 |
| 12/08/2019 | 04:35 | 2.68 | 19:10 | 5.37 | 4.34 | 04:25 | 1.67 | 10:50 | 3.61 | 2.73 | 04:25 | 0.194 | 13:05 | 1.058 | 0.676 | 0.676 | 0.20 |
| 12/09/2019 | 04:15 | 2.60 | 07:35 | 5.25 | 4.16 | 03:20 | 1.56 | 07:55 | 3.42 | 2.53 | 03:20 | 0.178 | 07:45 | 1.007 | 0.582 | 0.582 | |
| 12/10/2019 | 03:20 | 2.50 | 20:30 | 5.44 | 4.17 | 03:00 | 1.49 | 20:30 | 3.36 | 2.52 | 03:00 | 0.159 | 20:30 | 1.073 | 0.586 | 0.586 | |
| 12/11/2019 | 04:10 | 2.56 | 21:40 | 5.63 | 4.24 | 04:20 | 1.42 | 21:40 | 3.48 | 2.56 | 04:20 | 0.157 | 21:40 | 1.167 | 0.609 | 0.609 | 0.03 |
| 12/12/2019 | 03:45 | 2.61 | 08:00 | 5.53 | 4.22 | 02:45 | 1.52 | 08:00 | 3.41 | 2.55 | 02:45 | 0.182 | 08:00 | 1.116 | 0.599 | 0.599 | 0.01 |
| 12/13/2019 | 03:15 | 2.66 | 21:35 | 5.49 | 4.27 | 04:40 | 1.54 | 21:35 | 3.39 | 2.59 | 04:40 | 0.184 | 21:35 | 1.096 | 0.616 | 0.616 | 0.01 |
| 12/14/2019 | 04:25 | 2.68 | 09:00 | 5.35 | 4.33 | 04:10 | 1.51 | 09:00 | 3.29 | 2.61 | 04:10 | 0.180 | 09:00 | 1.027 | 0.638 | 0.638 | 0.01 |
| 12/15/2019 | 05:25 | 2.56 | 10:25 | 5.50 | 4.42 | 04:30 | 1.43 | 10:35 | 3.34 | 2.66 | 04:30 | 0.155 | 10:35 | 1.069 | 0.682 | 0.682 | 0.01 |
| 12/16/2019 | 04:15 | 2.75 | 07:35 | 5.13 | 4.18 | 03:45 | 1.54 | 21:25 | 3.51 | 2.60 | 03:45 | 0.189 | 07:40 | 0.985 | 0.598 | 0.598 | 0.01 |
| 12/17/2019 | 04:35 | 2.63 | 20:25 | 5.30 | 4.10 | 03:55 | 1.68 | 21:20 | 3.51 | 2.57 | 04:30 | 0.196 | 20:55 | 1.018 | 0.578 | 0.578 | 0.01 |
| 12/18/2019 | 03:30 | 2.63 | 21:30 | 5.12 | 4.10 | 03:10 | 1.58 | 21:35 | 3.52 | 2.56 | 03:10 | 0.183 | 21:35 | 0.959 | 0.578 | 0.578 | 0.01 |
| 12/19/2019 | 04:00 | 2.53 | 07:40 | 5.23 | 4.03 | 04:50 | 1.51 | 07:45 | 3.32 | 2.50 | 04:50 | 0.164 | 19:55 | 0.941 | 0.551 | 0.551 | |
| 12/20/2019 | 04:50 | 2.56 | 08:05 | 5.23 | 4.14 | 04:20 | 1.53 | 08:10 | 3.17 | 2.50 | 04:20 | 0.167 | 08:10 | 0.941 | 0.572 | 0.467 | |
| 12/21/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | 0.01 |
| 12/22/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | 0.41 |
| 12/23/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 12/24/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | 0.02 |
| 12/25/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | 0.08 |
| 12/26/2019 | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | 00:00 | | 00:00 | | | | |
| 12/27/2019 | 05:50 | 2.90 | 21:50 | 5.20 | 4.47 | 06:15 | 1.82 | 21:35 | 3.54 | 2.72 | 05:50 | 0.246 | 21:50 | 1.001 | 0.669 | 0.506 | |
| 12/28/2019 | 04:55 | 2.49 | 19:50 | 5.39 | 4.16 | 02:50 | 1.60 | 19:50 | 3.32 | 2.53 | 05:35 | 0.171 | 19:50 | 1.048 | 0.591 | 0.591 | |
| 12/29/2019 | 05:20 | 2.49 | 13:20 | 5.33 | 4.25 | 05:10 | 1.43 | 10:30 | 3.33 | 2.57 | 05:10 | 0.150 | 13:20 | 1.019 | 0.622 | 0.622 | 0.22 |
| 12/30/2019 | 04:30 | 2.52 | 22:00 | 5.16 | 4.18 | 04:30 | 1.59 | 21:05 | 3.56 | 2.59 | 04:30 | 0.168 | 21:05 | 0.977 | 0.605 | 0.605 | |
| 12/31/2019 | 03:55 | 2.95 | 18:45 | 5.17 | 4.26 | 03:20 | 1.72 | 10:55 | 3.61 | 2.64 | 03:20 | 0.233 | 10:55 | 1.013 | 0.623 | 0.623 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 05:15 | 2.39 | 11:45 | 5.15 | 4.10 | 05:20 | 1.57 | 10:50 | 3.47 | 2.56 | 05:15 | 0.162 | 12:00 | 0.966 | 0.581 | 0.581 | | |
| 01/02/2020 | 03:25 | 2.60 | 22:00 | 5.08 | 4.14 | 03:25 | 1.59 | 22:00 | 3.29 | 2.54 | 03:25 | 0.177 | 22:00 | 0.956 | 0.577 | 0.577 | | |
| 01/03/2020 | 03:45 | 2.44 | 18:00 | 4.98 | 4.16 | 03:50 | 1.57 | 18:00 | 3.20 | 2.56 | 03:50 | 0.166 | 18:00 | 0.903 | 0.587 | 0.587 | | |
| 01/04/2020 | 03:35 | 2.46 | 12:25 | 5.60 | 4.24 | 03:35 | 1.56 | 12:25 | 3.46 | 2.62 | 03:35 | 0.159 | 12:25 | 1.152 | 0.630 | 0.630 | | |
| 01/05/2020 | 04:40 | 2.54 | 19:05 | 5.53 | 4.30 | 03:25 | 1.52 | 21:30 | 3.68 | 2.66 | 04:30 | 0.174 | 19:05 | 1.117 | 0.657 | 0.657 | | |
| 01/06/2020 | 03:55 | 2.54 | 19:20 | 5.25 | 4.22 | 04:10 | 1.54 | 19:20 | 3.37 | 2.55 | 04:10 | 0.172 | 19:20 | 1.025 | 0.599 | 0.599 | | |
| 01/07/2020 | 04:15 | 2.51 | 19:45 | 5.19 | 4.19 | 04:05 | 1.48 | 19:40 | 3.23 | 2.52 | 04:05 | 0.161 | 19:45 | 0.962 | 0.589 | 0.589 | | |
| 01/08/2020 | 03:25 | 2.37 | 09:25 | 6.11 | 4.17 | 03:35 | 1.50 | 09:25 | 3.64 | 2.53 | 03:35 | 0.146 | 09:25 | 1.368 | 0.590 | 0.590 | | 0.02 |
| 01/09/2020 | 03:20 | 2.58 | 07:50 | 5.26 | 4.19 | 04:00 | 1.63 | 21:25 | 3.17 | 2.51 | 04:00 | 0.181 | 07:45 | 0.958 | 0.587 | 0.587 | 0.18 | |
| 01/10/2020 | 04:05 | 2.45 | 07:45 | 5.30 | 4.18 | 03:50 | 1.57 | 21:50 | 3.24 | 2.53 | 03:50 | 0.162 | 07:50 | 0.975 | 0.586 | 0.586 | 0.02 | |
| 01/11/2020 | 04:35 | 2.59 | 10:00 | 5.33 | 4.27 | 04:25 | 1.60 | 10:10 | 3.36 | 2.64 | 04:25 | 0.177 | 10:10 | 1.002 | 0.641 | 0.641 | 0.01 | |
| 01/12/2020 | 04:25 | 2.60 | 17:45 | 5.36 | 4.31 | 03:35 | 1.53 | 20:55 | 3.68 | 2.73 | 04:25 | 0.171 | 10:40 | 1.056 | 0.676 | 0.676 | | |
| 01/13/2020 | 03:55 | 2.51 | 20:30 | 5.25 | 4.14 | 03:35 | 1.55 | 07:45 | 3.49 | 2.55 | 03:50 | 0.166 | 07:45 | 1.015 | 0.584 | 0.584 | | 0.02 |
| 01/14/2020 | 04:05 | 2.57 | 20:45 | 5.29 | 4.15 | 02:55 | 1.62 | 08:00 | 3.53 | 2.55 | 04:20 | 0.181 | 21:25 | 1.010 | 0.588 | 0.588 | | 0.11 |
| 01/15/2020 | 03:15 | 2.44 | 07:40 | 5.26 | 4.10 | 03:55 | 1.47 | 21:35 | 3.65 | 2.55 | 03:55 | 0.150 | 07:40 | 1.037 | 0.582 | 0.582 | | 0.07 |
| 01/16/2020 | 04:10 | 2.57 | 07:30 | 5.12 | 4.15 | 05:05 | 1.58 | 07:45 | 3.57 | 2.71 | 04:15 | 0.180 | 09:20 | 0.994 | 0.623 | 0.623 | 0.66 | |
| 01/17/2020 | 04:10 | 2.52 | 09:00 | 5.10 | 4.13 | 03:50 | 1.54 | 07:50 | 3.55 | 2.59 | 04:25 | 0.165 | 07:50 | 0.955 | 0.590 | 0.590 | | |
| 01/18/2020 | 03:35 | 2.53 | 12:45 | 5.43 | 4.18 | 03:55 | 1.55 | 11:00 | 3.59 | 2.66 | 03:35 | 0.174 | 12:45 | 1.028 | 0.629 | 0.629 | | |
| 01/19/2020 | 04:30 | 2.48 | 09:55 | 5.32 | 4.23 | 04:20 | 1.49 | 12:00 | 3.65 | 2.65 | 04:20 | 0.161 | 10:40 | 1.063 | 0.638 | 0.638 | | |
| 01/20/2020 | 03:45 | 2.54 | 19:20 | 5.33 | 4.24 | 04:55 | 1.57 | 21:05 | 3.64 | 2.62 | 04:20 | 0.173 | 19:05 | 1.016 | 0.627 | 0.627 | | |
| 01/21/2020 | 04:20 | 2.48 | 07:35 | 5.29 | 4.12 | 03:15 | 1.59 | 21:30 | 3.53 | 2.55 | 03:15 | 0.172 | 21:30 | 1.001 | 0.580 | 0.580 | | |
| 01/22/2020 | 03:40 | 2.43 | 19:45 | 5.18 | 4.15 | 04:05 | 1.54 | 21:35 | 3.63 | 2.61 | 04:05 | 0.161 | 21:35 | 1.044 | 0.601 | 0.601 | | 0.03 |
| 01/23/2020 | 04:15 | 2.48 | 07:45 | 5.07 | 4.07 | 04:25 | 1.52 | 21:35 | 3.49 | 2.58 | 04:25 | 0.159 | 07:45 | 1.001 | 0.577 | 0.577 | | |
| 01/24/2020 | 04:10 | 2.41 | 09:15 | 5.16 | 4.16 | 04:00 | 1.59 | 08:30 | 3.20 | 2.61 | 04:00 | 0.158 | 21:45 | 0.906 | 0.602 | 0.602 | | |
| 01/25/2020 | 03:50 | 2.45 | 12:55 | 5.15 | 4.09 | 04:20 | 1.61 | 10:55 | 3.57 | 2.63 | 04:20 | 0.166 | 10:55 | 1.024 | 0.600 | 0.600 | | |
| 01/26/2020 | 04:50 | 2.40 | 17:30 | 5.02 | 4.10 | 04:50 | 1.62 | 12:05 | 3.57 | 2.77 | 04:50 | 0.159 | 11:35 | 0.980 | 0.635 | 0.635 | | 0.16 |
| 01/27/2020 | 04:20 | 2.39 | 18:30 | 5.05 | 4.01 | 04:30 | 1.53 | 21:20 | 3.64 | 2.63 | 04:20 | 0.150 | 21:05 | 0.975 | 0.578 | 0.578 | | |
| 01/28/2020 | 03:50 | 2.36 | 08:00 | 5.34 | 3.95 | 04:25 | 1.54 | 21:40 | 3.61 | 2.63 | 03:50 | 0.152 | 08:00 | 1.085 | 0.564 | 0.564 | | 0.01 |
| 01/29/2020 | 03:55 | 2.49 | 08:15 | 5.17 | 4.05 | 04:25 | 1.56 | 19:25 | 3.46 | 2.58 | 04:25 | 0.171 | 21:05 | 0.963 | 0.574 | 0.574 | | |
| 01/30/2020 | 03:40 | 2.46 | 21:50 | 5.27 | 4.10 | 03:05 | 1.60 | 20:30 | 3.46 | 2.56 | 03:50 | 0.167 | 21:35 | 0.988 | 0.581 | 0.581 | | |
| 01/31/2020 | 04:10 | 2.48 | 08:15 | 5.19 | 4.10 | 03:10 | 1.59 | 07:50 | 3.46 | 2.55 | 03:55 | 0.166 | 07:35 | 0.969 | 0.574 | 0.574 | | |
| 02/01/2020 | 04:35 | 2.56 | 10:25 | 5.55 | 4.29 | 04:35 | 1.60 | 10:35 | 3.48 | 2.64 | 04:35 | 0.172 | 10:25 | 1.134 | 0.644 | 0.644 | | |
| 02/02/2020 | 04:25 | 2.41 | 11:50 | 5.28 | 4.23 | 04:35 | 1.59 | 13:10 | 3.72 | 2.72 | 04:25 | 0.159 | 11:50 | 1.137 | 0.660 | 0.660 | | |
| 02/03/2020 | 04:10 | 2.43 | 20:05 | 5.25 | 4.09 | 04:05 | 1.50 | 21:05 | 3.50 | 2.61 | 04:05 | 0.150 | 20:00 | 0.981 | 0.589 | 0.589 | | |
| 02/04/2020 | 04:00 | 2.43 | 19:50 | 5.22 | 4.07 | 04:10 | 1.60 | 20:30 | 3.49 | 2.59 | 04:00 | 0.162 | 07:35 | 1.013 | 0.581 | 0.581 | | |
| 02/05/2020 | 03:05 | 2.47 | 21:15 | 5.43 | 4.08 | 03:45 | 1.63 | 20:20 | 3.51 | 2.55 | 03:05 | 0.171 | 21:15 | 1.066 | 0.575 | 0.575 | | |
| 02/06/2020 | 04:15 | 2.46 | 21:10 | 5.27 | 4.13 | 04:30 | 1.54 | 08:00 | 3.46 | 2.52 | 04:15 | 0.161 | 08:00 | 1.009 | 0.578 | 0.578 | | |
| 02/07/2020 | 03:50 | 2.46 | 19:20 | 5.09 | 4.15 | 03:25 | 1.64 | 07:35 | 3.36 | 2.56 | 03:50 | 0.171 | 19:20 | 0.964 | 0.589 | 0.589 | | |
| 02/08/2020 | 03:45 | 2.52 | 09:00 | 5.25 | 4.25 | 04:50 | 1.65 | 10:10 | 3.58 | 2.71 | 04:50 | 0.179 | 12:25 | 1.010 | 0.654 | 0.654 | | |
| 02/09/2020 | 04:50 | 2.40 | 14:25 | 5.04 | 4.08 | 04:40 | 1.53 | 20:15 | 3.64 | 2.80 | 04:40 | 0.152 | 10:45 | 1.024 | 0.644 | 0.644 | | |
| 02/10/2020 | 04:20 | 2.46 | 22:10 | 5.05 | 3.97 | 03:20 | 1.62 | 21:40 | 3.49 | 2.64 | 03:50 | 0.167 | 07:45 | 0.992 | 0.572 | 0.572 | | |
| 02/11/2020 | 04:20 | 2.42 | 07:45 | 5.00 | 3.95 | 03:00 | 1.52 | 07:40 | 3.59 | 2.62 | 03:00 | 0.155 | 07:40 | 1.005 | 0.563 | 0.563 | | |
| 02/12/2020 | 04:05 | 2.39 | 18:55 | 5.04 | 3.99 | 03:50 | 1.49 | 20:05 | 3.46 | 2.60 | 03:50 | 0.150 | 07:50 | 0.946 | 0.566 | 0.566 | | |
| 02/13/2020 | 03:50 | 2.37 | 19:10 | 5.07 | 3.98 | 02:30 | 1.64 | 19:50 | 3.49 | 2.61 | 03:50 | 0.159 | 19:50 | 0.983 | 0.567 | 0.567 | | |
| 02/14/2020 | 04:15 | 2.40 | 08:55 | 4.98 | 4.00 | 03:35 | 1.52 | 21:50 | 3.46 | 2.66 | 03:35 | 0.160 | 07:25 | 0.907 | 0.580 | 0.580 | | |
| 02/15/2020 | 04:40 | 2.38 | 11:00 | 5.12 | 4.08 | 04:30 | 1.54 | 11:00 | 3.66 | 2.73 | 04:30 | 0.150 | 11:00 | 1.075 | 0.623 | 0.623 | | |
| 02/16/2020 | 04:20 | 2.35 | 13:40 | 5.13 | 4.11 | 04:40 | 1.48 | 18:55 | 3.60 | 2.67 | 04:40 | 0.143 | 18:55 | 0.994 | 0.618 | 0.618 | | |
| 02/17/2020 | 04:00 | 2.49 | 12:40 | 5.15 | 4.17 | 04:30 | 1.41 | 10:15 | 3.49 | 2.61 | 04:30 | 0.151 | 11:45 | 0.969 | 0.614 | 0.614 | | |
| 02/18/2020 | 04:00 | 2.36 | 19:55 | 5.24 | 4.10 | 03:50 | 1.41 | 20:00 | 3.45 | 2.51 | 03:50 | 0.136 | 20:00 | 0.966 | 0.571 | 0.571 | | |
| 02/19/2020 | 03:40 | 2.47 | 21:35 | 5.18 | 4.09 | 04:10 | 1.49 | 21:25 | 3.31 | 2.47 | 04:10 | 0.157 | 21:40 | 0.979 | 0.558 | 0.558 | | |
| 02/20/2020 | 03:40 | 2.48 | 21:40 | 5.25 | 4.12 | 03:35 | 1.49 | 21:15 | 3.18 | 2.51 | 03:35 | 0.158 | 21:40 | 0.960 | 0.573 | 0.573 | | |
| 02/21/2020 | 04:00 | 2.47 | 08:50 | 5.03 | 4.10 | 04:15 | 1.52 | 20:45 | 3.09 | 2.50 | 04:15 | 0.159 | 08:50 | 0.878 | 0.565 | 0.565 | | |
| 02/22/2020 | 03:20 | 2.58 | 11:00 | 5.51 | 4.23 | 04:20 | 1.48 | 10:35 | 3.37 | 2.59 | 04:25 | 0.169 | 10:45 | 1.081 | 0.621 | 0.621 | | |
| 02/23/2020 | 05:10 | 2.60 | 11:05 | 5.23 | 4.25 | 03:45 | 1.55 | 20:55 | 3.66 | 2.76 | 04:15 | 0.176 | 12:25 | 1.035 | 0.671 | 0.671 | | |
| 02/24/2020 | 04:20 | 2.44 | 20:45 | 5.13 | 4.08 | 02:10 | 1.50 | 21:25 | 3.50 | 2.61 | 04:20 | 0.162 | 19:45 | 0.975 | 0.589 | 0.589 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 04:15 | 2.51 | 21:15 | 5.13 | 4.05 | 04:30 | 1.54 | 20:25 | 3.58 | 2.57 | 04:00 | 0.163 | 20:25 | 1.004 | 0.574 | 0.574 | |
| 02/26/2020 | 04:15 | 2.39 | 21:00 | 5.36 | 4.11 | 03:55 | 1.45 | 21:05 | 3.50 | 2.53 | 04:15 | 0.144 | 21:40 | 1.058 | 0.579 | 0.579 | |
| 02/27/2020 | 04:20 | 2.42 | 07:40 | 5.31 | 4.14 | 04:00 | 1.38 | 07:35 | 3.56 | 2.51 | 04:00 | 0.140 | 07:40 | 1.097 | 0.580 | 0.580 | |
| 02/28/2020 | 03:15 | 2.43 | 07:30 | 5.41 | 4.16 | 04:15 | 1.49 | 07:45 | 3.46 | 2.49 | 03:20 | 0.152 | 07:40 | 1.029 | 0.577 | 0.577 | |
| 02/29/2020 | 03:45 | 2.39 | 11:10 | 5.42 | 4.27 | 05:25 | 1.42 | 11:10 | 3.26 | 2.59 | 05:25 | 0.148 | 11:10 | 1.037 | 0.635 | 0.635 | |
| 03/01/2020 | 05:00 | 2.40 | 19:00 | 5.40 | 4.33 | 04:35 | 1.40 | 20:05 | 3.57 | 2.65 | 04:35 | 0.137 | 22:15 | 1.089 | 0.671 | 0.671 | |
| 03/02/2020 | 04:00 | 2.39 | 07:50 | 5.24 | 4.11 | 03:50 | 1.43 | 07:20 | 3.56 | 2.53 | 03:55 | 0.143 | 07:35 | 1.031 | 0.582 | 0.582 | |
| 03/03/2020 | 04:05 | 2.43 | 07:20 | 5.26 | 4.13 | 02:45 | 1.46 | 07:45 | 3.41 | 2.53 | 04:05 | 0.157 | 21:15 | 0.997 | 0.584 | 0.584 | |
| 03/04/2020 | 04:10 | 2.40 | 20:25 | 5.49 | 4.13 | 03:15 | 1.36 | 07:30 | 3.54 | 2.53 | 03:15 | 0.139 | 20:25 | 1.099 | 0.585 | 0.585 | |
| 03/05/2020 | 04:20 | 2.38 | 21:15 | 5.45 | 4.19 | 04:15 | 1.42 | 07:35 | 3.33 | 2.53 | 04:15 | 0.139 | 07:35 | 1.053 | 0.595 | 0.595 | |
| 03/06/2020 | 04:05 | 2.45 | 07:30 | 5.37 | 4.18 | 03:50 | 1.43 | 07:35 | 3.33 | 2.53 | 03:50 | 0.146 | 07:45 | 1.036 | 0.591 | 0.591 | |
| 03/07/2020 | 04:30 | 2.55 | 10:30 | 5.47 | 4.32 | 05:00 | 1.58 | 10:10 | 3.36 | 2.64 | 04:15 | 0.174 | 10:10 | 1.079 | 0.655 | 0.655 | |
| 03/08/2020 | 04:30 | 2.57 | 11:35 | 5.58 | 4.40 | 03:05 | 1.52 | 20:35 | 3.60 | 2.69 | 04:30 | 0.170 | 12:00 | 1.135 | 0.689 | 0.689 | |
| 03/09/2020 | 03:15 | 2.47 | 19:55 | 5.60 | 4.21 | 03:15 | 1.41 | 19:40 | 3.48 | 2.55 | 03:15 | 0.144 | 19:55 | 1.100 | 0.602 | 0.602 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 65.190 | 4.90 |
| Avg | 4.15 | 2.59 | 0.600 | |

Site Commentary

Site Information

| MIL_1564 | |
|-----------------|-------|
| Pipe Dimensions | 8 |
| Silt Level | 0.00" |

Overview

Site MIL_1564 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Surge conditions were experienced at this location. Review of the scattergraph shows that both free flow and backwater flows were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|-------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 1.60 | 2.40 | 0.078 |
| Minimum | 1.17 | 0.49 | 0.011 |
| Maximum | 21.57 | 4.82 | 0.785 |
| Time of Minimum | 2/10/2020 4:45 AM | 2/16/2020 4:10 AM | 2/16/2020 4:10 AM |
| Time of Maximum | 1/29/2020 6:30 PM | 1/24/2020 9:45 PM | 1/29/2020 6:20 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_1564

Site Address /Location: Country Club Dr and Park Victoria Dr, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.449480°

Longitude:

-121.887946°

Pipe Size (H x W)

8.00"x8.00"

Pipe Shape

Circular

Manhole #

1564

System Characteristics

Residential/Commercial

Access

Traffic

Drive

Medium



Installation Information

Installation Date:

Thursday, November 14, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

4:25:00 AM

Pipe Size (HxW)

8.00"x8.00"

Depth of Flow (Wet DOF) (in)

0.63"

Range (Air DOF) (in)

0.63"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.69

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Shallow depth with moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

4'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_1564

Flow Monitor

MIL_1564

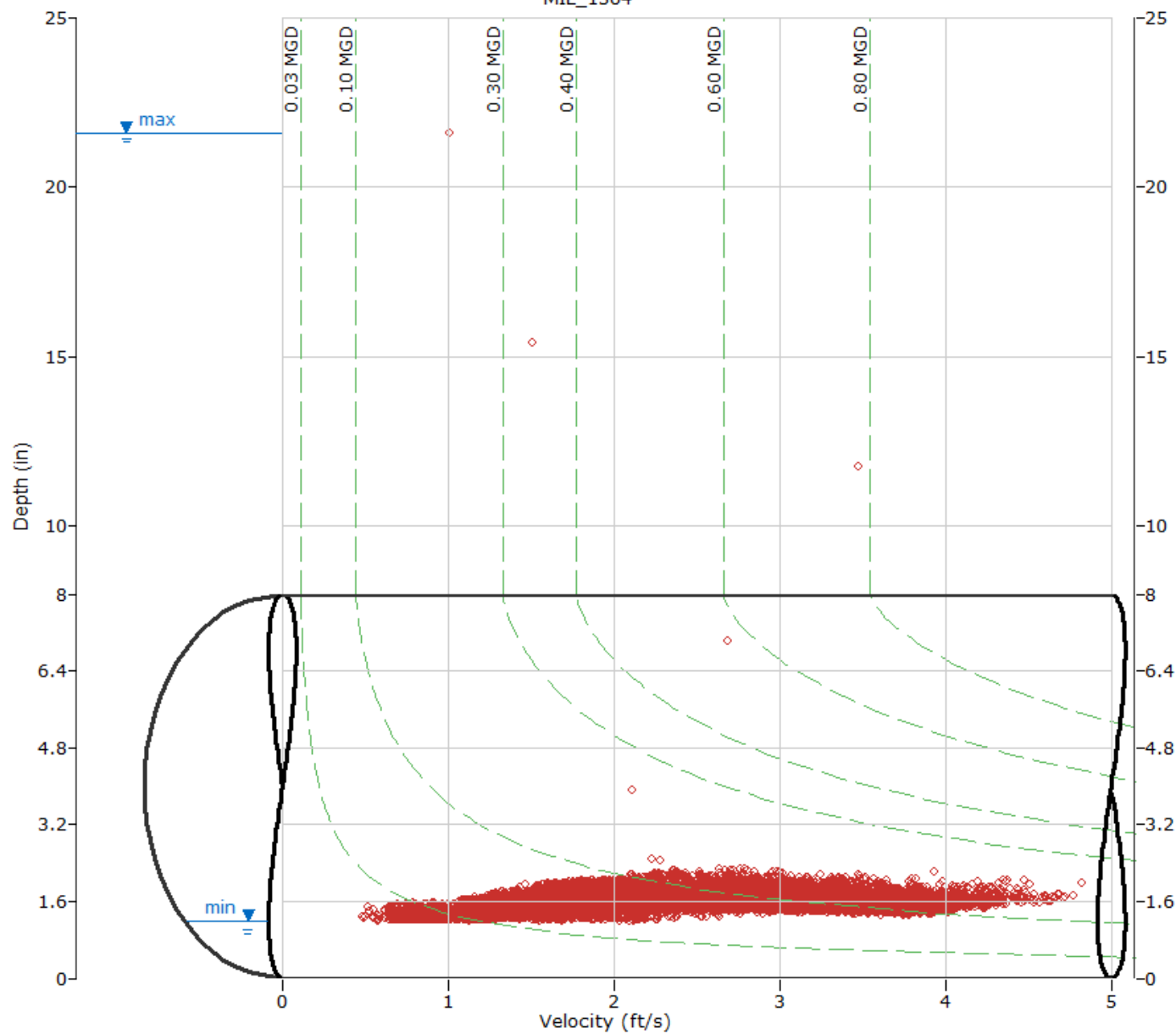
Pipe Height
8.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_1564

Flow Monitor

MIL_1564

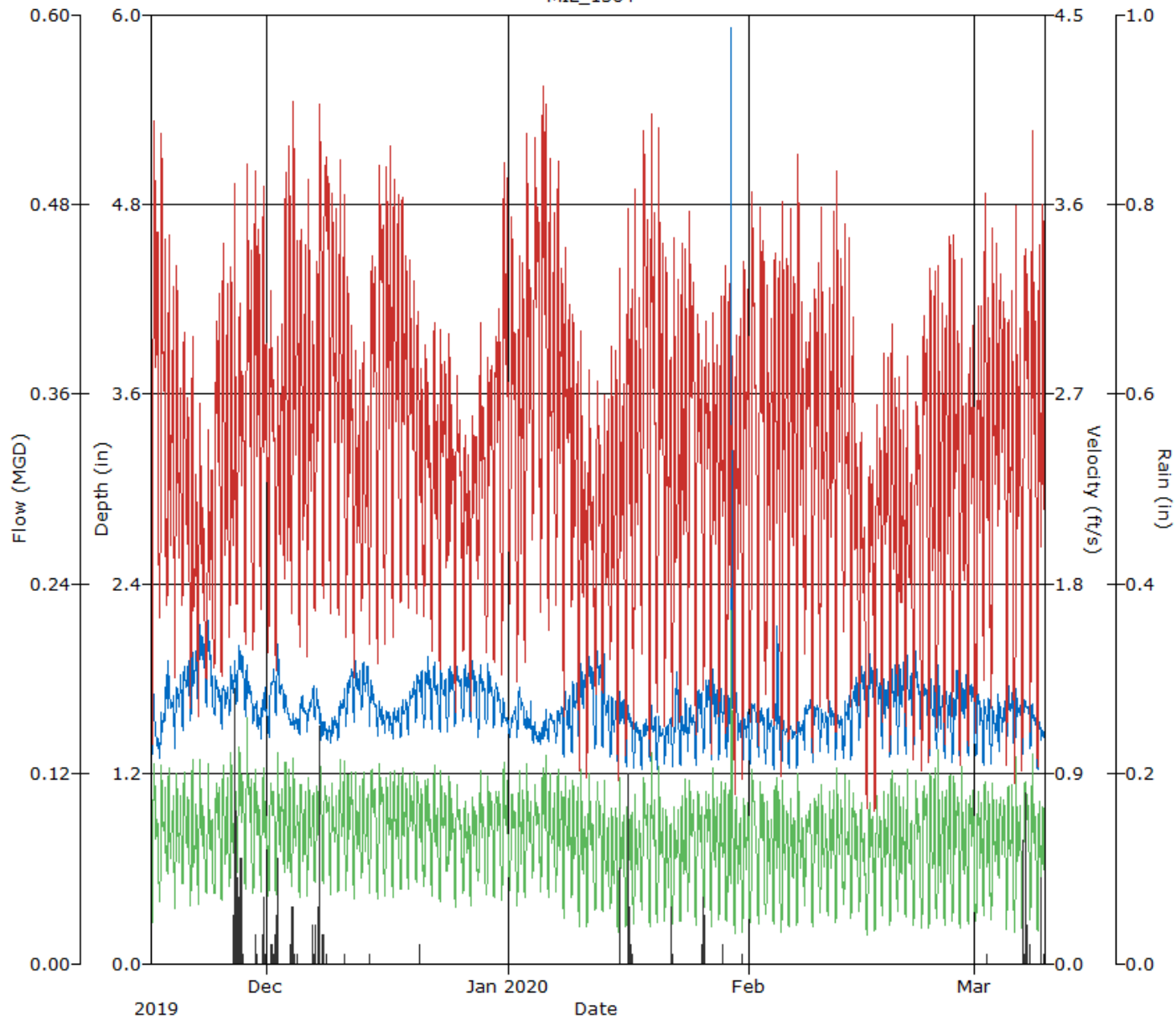
Pipe Height
8.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_1564, Pipe Height: 8.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 05:00 | 1.30 | 08:25 | 1.81 | 1.47 | 04:40 | 0.86 | 09:30 | 4.23 | 2.63 | 04:40 | 0.021 | 09:30 | 0.149 | 0.076 | 0.076 | |
| 11/17/2019 | 03:45 | 1.28 | 23:55 | 1.80 | 1.49 | 06:40 | 1.25 | 08:50 | 4.53 | 2.74 | 06:40 | 0.030 | 08:50 | 0.143 | 0.081 | 0.081 | |
| 11/18/2019 | 16:10 | 1.46 | 07:10 | 2.48 | 1.70 | 05:20 | 1.07 | 10:15 | 4.44 | 2.45 | 05:20 | 0.034 | 10:15 | 0.174 | 0.086 | 0.086 | |
| 11/19/2019 | 03:35 | 1.34 | 22:15 | 1.94 | 1.64 | 04:55 | 0.92 | 09:30 | 4.01 | 2.31 | 04:55 | 0.023 | 09:30 | 0.146 | 0.079 | 0.079 | |
| 11/20/2019 | 04:35 | 1.46 | 21:20 | 2.10 | 1.74 | 05:35 | 1.42 | 12:40 | 3.62 | 2.30 | 05:35 | 0.040 | 21:25 | 0.152 | 0.085 | 0.085 | |
| 11/21/2019 | 03:45 | 1.52 | 08:25 | 2.08 | 1.81 | 03:35 | 1.04 | 10:25 | 3.44 | 1.96 | 03:35 | 0.031 | 10:25 | 0.152 | 0.077 | 0.077 | |
| 11/22/2019 | 04:40 | 1.58 | 09:35 | 2.22 | 1.91 | 04:35 | 1.08 | 10:25 | 3.01 | 1.86 | 04:35 | 0.035 | 08:40 | 0.152 | 0.079 | 0.079 | |
| 11/23/2019 | 04:35 | 1.61 | 09:55 | 2.28 | 1.88 | 04:35 | 1.15 | 21:10 | 3.21 | 1.91 | 04:35 | 0.037 | 09:50 | 0.147 | 0.079 | 0.079 | |
| 11/24/2019 | 07:10 | 1.54 | 00:40 | 1.88 | 1.69 | 02:55 | 1.20 | 21:50 | 3.80 | 2.33 | 02:55 | 0.037 | 10:20 | 0.133 | 0.082 | 0.082 | |
| 11/25/2019 | 04:30 | 1.46 | 11:50 | 1.89 | 1.65 | 05:40 | 1.17 | 08:25 | 4.05 | 2.35 | 05:40 | 0.034 | 08:25 | 0.164 | 0.081 | 0.081 | |
| 11/26/2019 | 04:15 | 1.56 | 20:20 | 2.05 | 1.75 | 03:40 | 1.42 | 20:20 | 4.47 | 2.40 | 03:40 | 0.044 | 20:20 | 0.204 | 0.089 | 0.089 | 0.63 |
| 11/27/2019 | 01:55 | 1.61 | 10:25 | 2.08 | 1.85 | 03:55 | 1.45 | 11:25 | 3.80 | 2.46 | 01:55 | 0.047 | 08:45 | 0.166 | 0.099 | 0.099 | 0.77 |
| 11/28/2019 | 04:50 | 1.55 | 11:45 | 2.01 | 1.73 | 04:50 | 1.39 | 11:50 | 4.51 | 2.66 | 04:50 | 0.043 | 11:50 | 0.191 | 0.097 | 0.097 | |
| 11/29/2019 | 22:55 | 1.42 | 00:40 | 1.88 | 1.59 | 03:45 | 1.36 | 11:15 | 4.28 | 2.70 | 06:20 | 0.040 | 11:20 | 0.159 | 0.086 | 0.086 | |
| 11/30/2019 | 05:50 | 1.39 | 13:45 | 1.82 | 1.60 | 05:25 | 1.34 | 12:15 | 3.97 | 2.68 | 05:25 | 0.036 | 12:15 | 0.147 | 0.087 | 0.087 | 0.05 |
| 12/01/2019 | 05:35 | 1.40 | 21:15 | 1.98 | 1.68 | 04:15 | 1.20 | 17:55 | 3.81 | 2.44 | 04:15 | 0.035 | 12:15 | 0.149 | 0.086 | 0.086 | 0.14 |
| 12/02/2019 | 03:00 | 1.51 | 08:10 | 2.16 | 1.76 | 05:00 | 0.97 | 23:10 | 3.86 | 2.23 | 05:00 | 0.029 | 08:15 | 0.177 | 0.084 | 0.084 | 0.06 |
| 12/03/2019 | 22:45 | 1.46 | 10:15 | 1.88 | 1.61 | 17:00 | 1.32 | 21:15 | 4.72 | 2.67 | 17:00 | 0.042 | 10:15 | 0.171 | 0.087 | 0.087 | 0.36 |
| 12/04/2019 | 11:30 | 1.40 | 07:55 | 1.75 | 1.53 | 04:40 | 1.40 | 10:40 | 4.59 | 2.85 | 04:40 | 0.041 | 10:40 | 0.157 | 0.086 | 0.086 | 0.44 |
| 12/05/2019 | 04:20 | 1.43 | 13:55 | 1.76 | 1.59 | 04:30 | 1.36 | 22:05 | 4.29 | 2.57 | 04:30 | 0.037 | 22:05 | 0.134 | 0.083 | 0.083 | |
| 12/06/2019 | 04:20 | 1.44 | 23:05 | 1.80 | 1.62 | 04:15 | 1.22 | 10:10 | 3.99 | 2.56 | 04:15 | 0.034 | 10:10 | 0.147 | 0.084 | 0.084 | |
| 12/07/2019 | 21:05 | 1.36 | 10:05 | 1.97 | 1.60 | 04:10 | 1.39 | 19:05 | 4.67 | 2.81 | 04:10 | 0.041 | 10:05 | 0.186 | 0.090 | 0.090 | 0.06 |
| 12/08/2019 | 13:00 | 1.35 | 20:55 | 1.72 | 1.48 | 13:10 | 1.51 | 11:50 | 4.66 | 3.18 | 13:10 | 0.039 | 11:50 | 0.159 | 0.091 | 0.091 | 0.84 |
| 12/09/2019 | 04:20 | 1.37 | 09:55 | 1.66 | 1.49 | 03:25 | 1.50 | 09:35 | 4.20 | 2.83 | 03:25 | 0.039 | 09:00 | 0.138 | 0.082 | 0.082 | 0.10 |
| 12/10/2019 | 03:20 | 1.40 | 22:05 | 1.90 | 1.59 | 04:35 | 1.43 | 22:05 | 4.26 | 2.75 | 04:35 | 0.039 | 22:05 | 0.175 | 0.089 | 0.089 | |
| 12/11/2019 | 04:25 | 1.47 | 21:10 | 1.96 | 1.73 | 04:20 | 1.27 | 10:20 | 3.80 | 2.49 | 04:20 | 0.036 | 21:30 | 0.146 | 0.091 | 0.091 | 0.01 |
| 12/12/2019 | 04:25 | 1.50 | 05:35 | 2.06 | 1.75 | 04:20 | 1.21 | 09:00 | 3.66 | 2.20 | 04:20 | 0.036 | 05:35 | 0.154 | 0.082 | 0.082 | 0.00 |
| 12/13/2019 | 04:00 | 1.55 | 01:20 | 2.04 | 1.77 | 03:55 | 1.41 | 09:25 | 3.48 | 2.26 | 03:55 | 0.043 | 09:25 | 0.154 | 0.085 | 0.085 | |
| 12/14/2019 | 04:25 | 1.49 | 00:10 | 1.93 | 1.68 | 04:35 | 1.21 | 08:25 | 4.21 | 2.69 | 04:35 | 0.036 | 08:25 | 0.160 | 0.093 | 0.093 | |
| 12/15/2019 | 18:20 | 1.37 | 12:10 | 1.85 | 1.56 | 04:10 | 1.21 | 11:55 | 4.69 | 2.87 | 04:10 | 0.035 | 12:10 | 0.173 | 0.090 | 0.090 | 0.01 |
| 12/16/2019 | 04:20 | 1.39 | 04:55 | 1.75 | 1.54 | 03:50 | 1.31 | 21:10 | 4.43 | 2.82 | 03:50 | 0.037 | 07:35 | 0.151 | 0.086 | 0.086 | |
| 12/17/2019 | 03:10 | 1.40 | 21:45 | 1.88 | 1.53 | 03:50 | 1.40 | 08:05 | 4.22 | 2.84 | 03:55 | 0.038 | 21:45 | 0.171 | 0.086 | 0.086 | |
| 12/18/2019 | 03:45 | 1.41 | 12:15 | 1.79 | 1.57 | 03:25 | 1.47 | 09:15 | 4.31 | 2.72 | 05:50 | 0.040 | 09:20 | 0.159 | 0.086 | 0.086 | |
| 12/19/2019 | 03:40 | 1.42 | 21:45 | 1.89 | 1.66 | 03:40 | 1.41 | 08:10 | 3.99 | 2.61 | 03:40 | 0.038 | 08:10 | 0.150 | 0.090 | 0.090 | |
| 12/20/2019 | 02:10 | 1.48 | 23:50 | 1.94 | 1.72 | 05:35 | 1.28 | 11:00 | 3.75 | 2.35 | 05:35 | 0.038 | 08:55 | 0.148 | 0.085 | 0.085 | 0.02 |
| 12/21/2019 | 04:25 | 1.46 | 17:20 | 2.04 | 1.74 | 05:40 | 1.43 | 11:50 | 3.59 | 2.36 | 05:40 | 0.042 | 11:50 | 0.150 | 0.087 | 0.087 | |
| 12/22/2019 | 06:10 | 1.45 | 13:25 | 2.07 | 1.71 | 05:45 | 1.24 | 13:25 | 3.80 | 2.28 | 05:45 | 0.035 | 13:25 | 0.175 | 0.083 | 0.083 | |
| 12/23/2019 | 05:30 | 1.45 | 09:00 | 2.22 | 1.69 | 05:20 | 1.23 | 09:00 | 3.94 | 2.31 | 05:20 | 0.034 | 09:00 | 0.201 | 0.082 | 0.082 | |
| 12/24/2019 | 04:10 | 1.44 | 09:20 | 1.93 | 1.72 | 03:20 | 1.23 | 10:55 | 3.80 | 2.36 | 03:20 | 0.038 | 10:55 | 0.158 | 0.085 | 0.085 | |
| 12/25/2019 | 03:40 | 1.48 | 09:10 | 1.96 | 1.73 | 05:05 | 1.06 | 00:35 | 3.36 | 2.17 | 05:10 | 0.031 | 10:45 | 0.138 | 0.079 | 0.079 | |
| 12/26/2019 | 04:50 | 1.52 | 21:20 | 1.97 | 1.74 | 04:45 | 1.28 | 09:30 | 2.97 | 2.09 | 04:45 | 0.038 | 09:30 | 0.125 | 0.077 | 0.077 | |
| 12/27/2019 | 04:45 | 1.52 | 08:45 | 1.99 | 1.74 | 04:15 | 1.13 | 21:00 | 2.89 | 2.10 | 04:15 | 0.034 | 08:45 | 0.124 | 0.077 | 0.077 | |
| 12/28/2019 | 04:25 | 1.41 | 11:35 | 2.01 | 1.68 | 01:40 | 1.70 | 11:30 | 3.60 | 2.37 | 04:30 | 0.049 | 10:30 | 0.146 | 0.083 | 0.083 | |
| 12/29/2019 | 02:35 | 1.50 | 11:35 | 2.07 | 1.69 | 06:20 | 1.30 | 11:25 | 3.65 | 2.31 | 06:20 | 0.038 | 11:25 | 0.166 | 0.082 | 0.082 | |
| 12/30/2019 | 04:00 | 1.48 | 10:00 | 1.87 | 1.66 | 03:30 | 1.26 | 08:55 | 3.85 | 2.45 | 04:30 | 0.038 | 08:55 | 0.140 | 0.084 | 0.084 | |
| 12/31/2019 | 19:35 | 1.46 | 09:15 | 1.73 | 1.57 | 03:55 | 1.23 | 20:10 | 4.47 | 2.72 | 03:55 | 0.036 | 20:10 | 0.153 | 0.086 | 0.086 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 05:35 | 1.41 | 23:45 | 1.67 | 1.53 | 06:35 | 1.59 | 10:20 | 4.49 | 2.71 | 06:35 | 0.044 | 10:20 | 0.146 | 0.083 | 0.083 | | |
| 01/02/2020 | 05:10 | 1.42 | 10:55 | 1.82 | 1.61 | 05:10 | 1.20 | 23:00 | 4.02 | 2.36 | 05:10 | 0.032 | 10:55 | 0.141 | 0.078 | 0.078 | | |
| 01/03/2020 | 14:15 | 1.38 | 09:50 | 1.90 | 1.54 | 03:25 | 1.25 | 12:00 | 4.35 | 2.78 | 03:25 | 0.036 | 09:50 | 0.169 | 0.084 | 0.084 | | |
| 01/04/2020 | 14:05 | 1.29 | 13:40 | 1.82 | 1.44 | 14:05 | 1.25 | 20:35 | 4.51 | 3.06 | 14:05 | 0.030 | 13:40 | 0.164 | 0.085 | 0.085 | | |
| 01/05/2020 | 10:40 | 1.34 | 12:10 | 1.68 | 1.46 | 05:55 | 1.43 | 11:20 | 4.72 | 3.14 | 05:55 | 0.037 | 12:10 | 0.158 | 0.089 | 0.089 | | |
| 01/06/2020 | 03:40 | 1.36 | 08:25 | 1.70 | 1.51 | 05:10 | 1.42 | 08:20 | 4.44 | 2.72 | 05:10 | 0.037 | 08:25 | 0.145 | 0.081 | 0.081 | | |
| 01/07/2020 | 04:00 | 1.37 | 09:50 | 1.88 | 1.53 | 03:20 | 1.56 | 08:15 | 4.77 | 2.73 | 04:00 | 0.041 | 08:15 | 0.169 | 0.084 | 0.084 | | |
| 01/08/2020 | 03:30 | 1.27 | 09:30 | 1.83 | 1.54 | 05:45 | 0.81 | 10:10 | 3.97 | 2.47 | 05:45 | 0.019 | 09:30 | 0.139 | 0.078 | 0.078 | | |
| 01/09/2020 | 05:30 | 1.29 | 07:55 | 2.00 | 1.63 | 05:00 | 0.65 | 07:55 | 3.99 | 2.43 | 05:00 | 0.015 | 07:55 | 0.176 | 0.081 | 0.081 | | |
| 01/10/2020 | 04:55 | 1.34 | 09:45 | 1.99 | 1.69 | 05:00 | 0.71 | 09:50 | 3.68 | 1.98 | 05:00 | 0.018 | 09:55 | 0.148 | 0.071 | 0.071 | | |
| 01/11/2020 | 04:30 | 1.28 | 08:35 | 2.11 | 1.71 | 04:20 | 0.63 | 10:25 | 3.59 | 1.91 | 04:20 | 0.015 | 10:20 | 0.160 | 0.071 | 0.071 | | |
| 01/12/2020 | 04:50 | 1.33 | 10:50 | 2.12 | 1.72 | 04:20 | 0.67 | 18:00 | 3.52 | 2.07 | 04:20 | 0.017 | 18:00 | 0.167 | 0.076 | 0.076 | | |
| 01/13/2020 | 05:00 | 1.32 | 08:40 | 2.13 | 1.61 | 04:55 | 0.73 | 20:55 | 3.09 | 1.96 | 04:55 | 0.018 | 08:40 | 0.148 | 0.065 | 0.065 | | |
| 01/14/2020 | 04:55 | 1.28 | 21:50 | 1.89 | 1.53 | 06:15 | 0.76 | 20:50 | 3.87 | 2.13 | 06:15 | 0.019 | 20:50 | 0.148 | 0.066 | 0.066 | | |
| 01/15/2020 | 05:15 | 1.19 | 08:20 | 1.93 | 1.52 | 05:35 | 0.58 | 08:10 | 4.48 | 2.08 | 05:35 | 0.012 | 08:10 | 0.173 | 0.065 | 0.065 | 0.10 | |
| 01/16/2020 | 05:35 | 1.21 | 10:40 | 1.89 | 1.50 | 05:10 | 0.77 | 10:40 | 4.06 | 2.36 | 05:40 | 0.017 | 10:40 | 0.165 | 0.071 | 0.071 | 0.66 | |
| 01/17/2020 | 20:05 | 1.19 | 07:25 | 1.59 | 1.43 | 04:05 | 0.75 | 22:00 | 4.28 | 2.40 | 04:05 | 0.017 | 09:50 | 0.133 | 0.067 | 0.067 | | |
| 01/18/2020 | 04:40 | 1.21 | 14:35 | 1.69 | 1.44 | 06:50 | 1.05 | 11:30 | 4.62 | 2.92 | 04:45 | 0.023 | 14:35 | 0.150 | 0.082 | 0.082 | | |
| 01/19/2020 | 05:40 | 1.26 | 11:50 | 1.85 | 1.47 | 05:30 | 0.78 | 11:15 | 4.38 | 2.62 | 05:30 | 0.018 | 11:50 | 0.166 | 0.076 | 0.076 | | |
| 01/20/2020 | 04:40 | 1.22 | 10:35 | 1.80 | 1.44 | 04:25 | 0.96 | 11:20 | 4.52 | 2.64 | 04:25 | 0.021 | 08:45 | 0.160 | 0.074 | 0.074 | | |
| 01/21/2020 | 03:00 | 1.23 | 22:50 | 1.63 | 1.44 | 05:35 | 0.95 | 08:05 | 3.80 | 2.36 | 03:00 | 0.021 | 08:05 | 0.114 | 0.067 | 0.067 | 0.01 | |
| 01/22/2020 | 04:25 | 1.21 | 17:15 | 1.97 | 1.52 | 02:10 | 0.92 | 22:40 | 3.85 | 2.27 | 05:10 | 0.021 | 21:25 | 0.112 | 0.069 | 0.069 | 0.09 | |
| 01/23/2020 | 04:15 | 1.22 | 23:10 | 1.79 | 1.48 | 02:35 | 0.89 | 08:15 | 3.81 | 2.32 | 02:35 | 0.020 | 20:20 | 0.131 | 0.069 | 0.069 | | |
| 01/24/2020 | 02:55 | 1.28 | 21:45 | 1.97 | 1.51 | 04:10 | 0.92 | 21:45 | 4.82 | 2.62 | 04:10 | 0.023 | 21:45 | 0.208 | 0.079 | 0.079 | | |
| 01/25/2020 | 04:50 | 1.22 | 22:55 | 1.91 | 1.56 | 04:00 | 0.85 | 09:55 | 3.80 | 2.44 | 04:00 | 0.019 | 23:00 | 0.140 | 0.078 | 0.078 | | |
| 01/26/2020 | 03:15 | 1.31 | 18:00 | 1.92 | 1.61 | 03:10 | 1.14 | 11:15 | 3.64 | 2.32 | 03:10 | 0.027 | 22:25 | 0.137 | 0.077 | 0.077 | 0.16 | |
| 01/27/2020 | 04:05 | 1.27 | 08:10 | 1.94 | 1.60 | 03:50 | 0.83 | 10:10 | 3.66 | 2.24 | 03:50 | 0.019 | 08:20 | 0.147 | 0.076 | 0.076 | | |
| 01/28/2020 | 04:05 | 1.27 | 07:30 | 1.81 | 1.55 | 04:00 | 0.87 | 21:25 | 4.07 | 2.26 | 04:00 | 0.020 | 21:20 | 0.149 | 0.072 | 0.072 | 0.02 | |
| 01/29/2020 | 02:15 | 1.20 | 18:30 | 21.57 | 1.72 | 01:25 | 0.68 | 08:20 | 3.89 | 2.16 | 01:25 | 0.017 | 18:20 | 0.785 | 0.074 | 0.074 | | |
| 01/30/2020 | 04:00 | 1.22 | 07:40 | 1.81 | 1.49 | 03:45 | 0.58 | 11:35 | 3.80 | 2.16 | 03:45 | 0.013 | 11:35 | 0.135 | 0.065 | 0.065 | | |
| 01/31/2020 | 04:10 | 1.21 | 20:55 | 1.66 | 1.46 | 04:10 | 0.70 | 07:40 | 4.05 | 2.45 | 04:10 | 0.015 | 07:40 | 0.133 | 0.072 | 0.072 | 0.01 | |
| 02/01/2020 | 03:45 | 1.21 | 05:20 | 1.84 | 1.53 | 02:55 | 0.79 | 10:10 | 4.19 | 2.52 | 02:55 | 0.018 | 10:10 | 0.154 | 0.078 | 0.078 | | |
| 02/02/2020 | 05:25 | 1.28 | 07:50 | 1.78 | 1.51 | 04:35 | 0.76 | 12:15 | 3.90 | 2.50 | 04:35 | 0.018 | 12:15 | 0.127 | 0.076 | 0.076 | | |
| 02/03/2020 | 02:50 | 1.23 | 08:10 | 1.68 | 1.48 | 05:00 | 1.02 | 07:45 | 3.65 | 2.32 | 05:00 | 0.024 | 07:50 | 0.117 | 0.068 | 0.068 | | |
| 02/04/2020 | 03:30 | 1.22 | 14:40 | 2.24 | 1.54 | 03:30 | 0.85 | 07:45 | 4.24 | 2.39 | 03:30 | 0.019 | 07:45 | 0.148 | 0.075 | 0.075 | | |
| 02/05/2020 | 04:40 | 1.22 | 08:20 | 1.69 | 1.44 | 05:50 | 0.58 | 08:20 | 4.00 | 2.40 | 05:50 | 0.013 | 08:20 | 0.139 | 0.068 | 0.068 | | |
| 02/06/2020 | 04:05 | 1.21 | 07:50 | 1.56 | 1.43 | 03:50 | 0.84 | 08:15 | 4.09 | 2.39 | 03:50 | 0.018 | 07:50 | 0.122 | 0.067 | 0.067 | | |
| 02/07/2020 | 05:25 | 1.22 | 08:40 | 1.77 | 1.44 | 03:55 | 0.93 | 08:20 | 4.43 | 2.44 | 03:55 | 0.020 | 08:40 | 0.148 | 0.069 | 0.069 | | |
| 02/08/2020 | 02:50 | 1.27 | 04:30 | 1.97 | 1.59 | 02:55 | 1.15 | 08:35 | 4.21 | 2.47 | 02:50 | 0.027 | 08:35 | 0.133 | 0.079 | 0.079 | | |
| 02/09/2020 | 05:20 | 1.26 | 12:15 | 1.79 | 1.53 | 05:50 | 0.84 | 12:05 | 3.95 | 2.36 | 05:50 | 0.019 | 09:10 | 0.129 | 0.074 | 0.074 | | |
| 02/10/2020 | 04:45 | 1.17 | 08:30 | 1.89 | 1.51 | 04:10 | 0.99 | 08:30 | 4.08 | 2.40 | 04:10 | 0.026 | 08:30 | 0.166 | 0.072 | 0.072 | | |
| 02/11/2020 | 03:30 | 1.28 | 09:00 | 1.88 | 1.53 | 01:15 | 0.95 | 20:15 | 3.84 | 2.40 | 04:50 | 0.023 | 09:00 | 0.154 | 0.074 | 0.074 | | |
| 02/12/2020 | 04:00 | 1.25 | 08:25 | 1.82 | 1.49 | 04:00 | 0.76 | 08:25 | 4.34 | 2.48 | 04:00 | 0.017 | 08:25 | 0.168 | 0.074 | 0.074 | | |
| 02/13/2020 | 01:35 | 1.23 | 09:40 | 1.86 | 1.54 | 02:50 | 1.23 | 09:40 | 4.28 | 2.45 | 04:35 | 0.030 | 09:40 | 0.170 | 0.076 | 0.076 | | |
| 02/14/2020 | 03:25 | 1.27 | 18:45 | 1.95 | 1.61 | 05:35 | 1.04 | 08:25 | 3.50 | 2.16 | 05:35 | 0.024 | 09:25 | 0.139 | 0.072 | 0.072 | | |
| 02/15/2020 | 04:25 | 1.38 | 20:20 | 2.12 | 1.69 | 05:30 | 1.06 | 10:05 | 2.85 | 1.80 | 05:30 | 0.028 | 12:00 | 0.126 | 0.065 | 0.065 | | |
| 02/16/2020 | 04:25 | 1.26 | 12:15 | 2.19 | 1.69 | 04:10 | 0.49 | 09:50 | 3.35 | 1.70 | 04:10 | 0.011 | 09:50 | 0.149 | 0.062 | 0.062 | | |
| 02/17/2020 | 06:10 | 1.44 | 11:55 | 1.96 | 1.69 | 03:45 | 0.52 | 09:20 | 3.53 | 1.92 | 03:45 | 0.015 | 09:20 | 0.146 | 0.069 | 0.069 | | |
| 02/18/2020 | 05:05 | 1.32 | 08:00 | 1.89 | 1.62 | 04:10 | 0.89 | 09:35 | 3.40 | 2.13 | 04:10 | 0.023 | 08:00 | 0.130 | 0.072 | 0.072 | | |
| 02/19/2020 | 04:05 | 1.28 | 08:35 | 2.09 | 1.67 | 03:55 | 0.88 | 07:40 | 3.61 | 2.12 | 03:55 | 0.021 | 08:40 | 0.160 | 0.076 | 0.076 | | |
| 02/20/2020 | 04:00 | 1.29 | 22:00 | 2.09 | 1.68 | 04:30 | 0.70 | 22:00 | 3.12 | 2.04 | 04:30 | 0.019 | 22:00 | 0.146 | 0.073 | 0.073 | | |
| 02/21/2020 | 03:35 | 1.28 | 19:25 | 2.10 | 1.71 | 03:20 | 0.76 | 08:40 | 3.43 | 1.94 | 03:20 | 0.018 | 08:40 | 0.153 | 0.070 | 0.070 | | |
| 02/22/2020 | 04:05 | 1.31 | 11:10 | 2.06 | 1.69 | 03:45 | 0.83 | 23:55 | 3.33 | 2.05 | 03:45 | 0.020 | 23:55 | 0.140 | 0.074 | 0.074 | | |
| 02/23/2020 | 07:05 | 1.26 | 12:05 | 1.93 | 1.62 | 07:05 | 0.49 | 11:35 | 3.79 | 2.25 | 07:05 | 0.011 | 11:35 | 0.145 | 0.077 | 0.077 | | |
| 02/24/2020 | 05:35 | 1.26 | 21:50 | 1.88 | 1.59 | 05:35 | 0.84 | 20:15 | 3.88 | 2.16 | 05:35 | 0.019 | 20:15 | 0.143 | 0.072 | 0.072 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 02/25/2020 | 02:40 | 1.32 | 08:30 | 2.00 | 1.60 | 05:05 | 0.88 | 19:50 | 4.28 | 2.21 | 05:05 | 0.021 | 19:50 | 0.153 | 0.074 | 0.074 | | |
| 02/26/2020 | 04:50 | 1.26 | 20:50 | 1.85 | 1.57 | 04:40 | 0.87 | 20:50 | 4.22 | 2.29 | 04:40 | 0.020 | 20:50 | 0.167 | 0.074 | 0.074 | | |
| 02/27/2020 | 04:50 | 1.25 | 17:45 | 1.91 | 1.59 | 04:20 | 0.88 | 14:30 | 4.09 | 2.42 | 04:20 | 0.020 | 14:30 | 0.150 | 0.079 | 0.079 | | |
| 02/28/2020 | 04:10 | 1.23 | 22:45 | 1.90 | 1.61 | 04:10 | 0.72 | 08:40 | 3.85 | 2.08 | 04:10 | 0.016 | 08:40 | 0.146 | 0.071 | 0.071 | | |
| 02/29/2020 | 04:30 | 1.29 | 20:35 | 1.93 | 1.63 | 04:25 | 0.88 | 20:45 | 3.99 | 2.21 | 04:30 | 0.021 | 20:40 | 0.147 | 0.075 | 0.075 | | |
| 03/01/2020 | 06:15 | 1.27 | 15:55 | 2.03 | 1.55 | 06:15 | 0.73 | 15:55 | 4.35 | 2.23 | 06:15 | 0.017 | 15:55 | 0.196 | 0.070 | 0.070 | | |
| 03/02/2020 | 05:30 | 1.20 | 07:40 | 2.04 | 1.51 | 04:15 | 0.93 | 07:40 | 4.37 | 2.50 | 04:45 | 0.020 | 07:40 | 0.198 | 0.076 | 0.076 | 0.01 | |
| 03/03/2020 | 02:00 | 1.24 | 22:50 | 1.71 | 1.49 | 05:55 | 0.92 | 22:50 | 4.36 | 2.48 | 05:55 | 0.021 | 22:50 | 0.154 | 0.074 | 0.074 | | |
| 03/04/2020 | 04:15 | 1.19 | 01:35 | 2.27 | 1.55 | 01:00 | 1.67 | 07:40 | 4.32 | 2.72 | 01:00 | 0.041 | 07:40 | 0.145 | 0.084 | 0.084 | | |
| 03/05/2020 | 03:40 | 1.22 | 09:15 | 1.94 | 1.59 | 02:55 | 0.82 | 21:00 | 3.98 | 2.26 | 03:40 | 0.018 | 09:15 | 0.148 | 0.075 | 0.075 | | |
| 03/06/2020 | 04:00 | 1.25 | 08:45 | 1.93 | 1.56 | 03:50 | 0.71 | 08:25 | 4.11 | 2.24 | 03:50 | 0.016 | 08:25 | 0.172 | 0.072 | 0.072 | | |
| 03/07/2020 | 03:40 | 1.23 | 01:15 | 1.79 | 1.57 | 04:10 | 0.68 | 10:30 | 3.98 | 2.55 | 03:40 | 0.018 | 10:35 | 0.136 | 0.082 | 0.082 | 0.58 | |
| 03/08/2020 | 05:55 | 1.30 | 11:35 | 1.88 | 1.53 | 04:15 | 0.92 | 11:00 | 4.60 | 2.51 | 04:15 | 0.023 | 11:35 | 0.173 | 0.077 | 0.077 | 0.02 | |
| 03/09/2020 | 03:40 | 1.22 | 20:10 | 1.69 | 1.43 | 03:40 | 0.81 | 20:10 | 4.20 | 2.45 | 03:40 | 0.018 | 20:10 | 0.146 | 0.069 | 0.069 | 0.11 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 9.014 | 5.26 |
| Avg | 1.60 | 2.40 | 0.078 | |

Site Commentary

Site Information

| MIL_1790 | |
|-----------------|-------|
| Pipe Dimensions | 28 |
| Silt Level | 0.00" |

Overview

Site MIL_1790 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed downstream of sites MIL_0190, MIL_0649 and MIL_1795. A check of balancing shows a net flow of 0.837 MGD between the sites.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|---------------------|---------------------|---------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 10.91 | 1.97 | 2.006 |
| Minimum | 7.93 | 1.32 | 0.852 |
| Maximum | 13.37 | 2.51 | 3.219 |
| Time of Minimum | 3/1/2020 5:45 AM | 3/1/2020 5:40 AM | 3/1/2020 5:40 AM |
| Time of Maximum | 12/23/2019 12:05 PM | 11/27/2019 10:55 AM | 12/23/2019 12:05 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_1790

Site Address /Location: 490 N McCarthy Blvd, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.435578°

Longitude:

-121.919933°

Pipe Size (H x W)

28.00"x28.00"

Pipe Shape

Circular

Manhole #

1790

System Characteristics

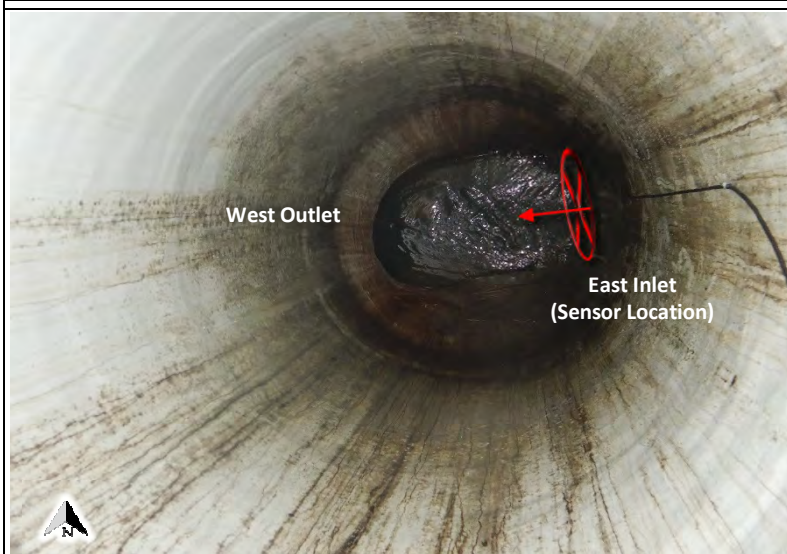
Residential/Commercial

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Friday, November 15, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

4:26:00 AM

Pipe Size (HxW)

28.00"x28.00"

Depth of Flow (Wet DOF) (in)

9.00"

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.82'

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Smooth flow with deep depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

12'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_1790

Flow Monitor

MIL_1790

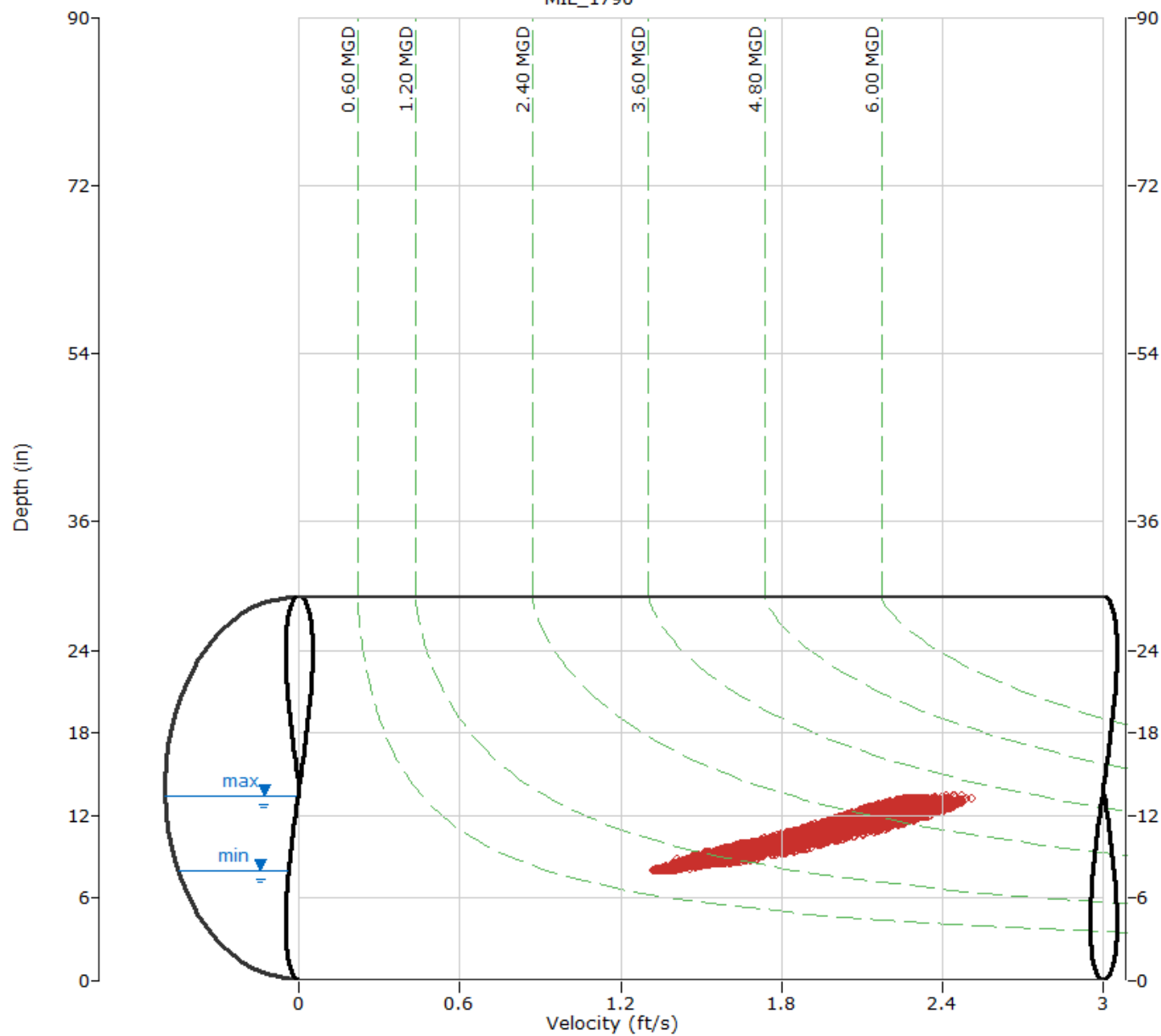
Pipe Height
28.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

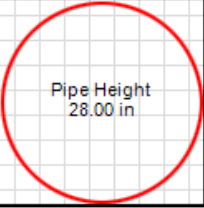


HYDROGRAPH REPORT

MIL_1790

Flow Monitor

MIL_1790



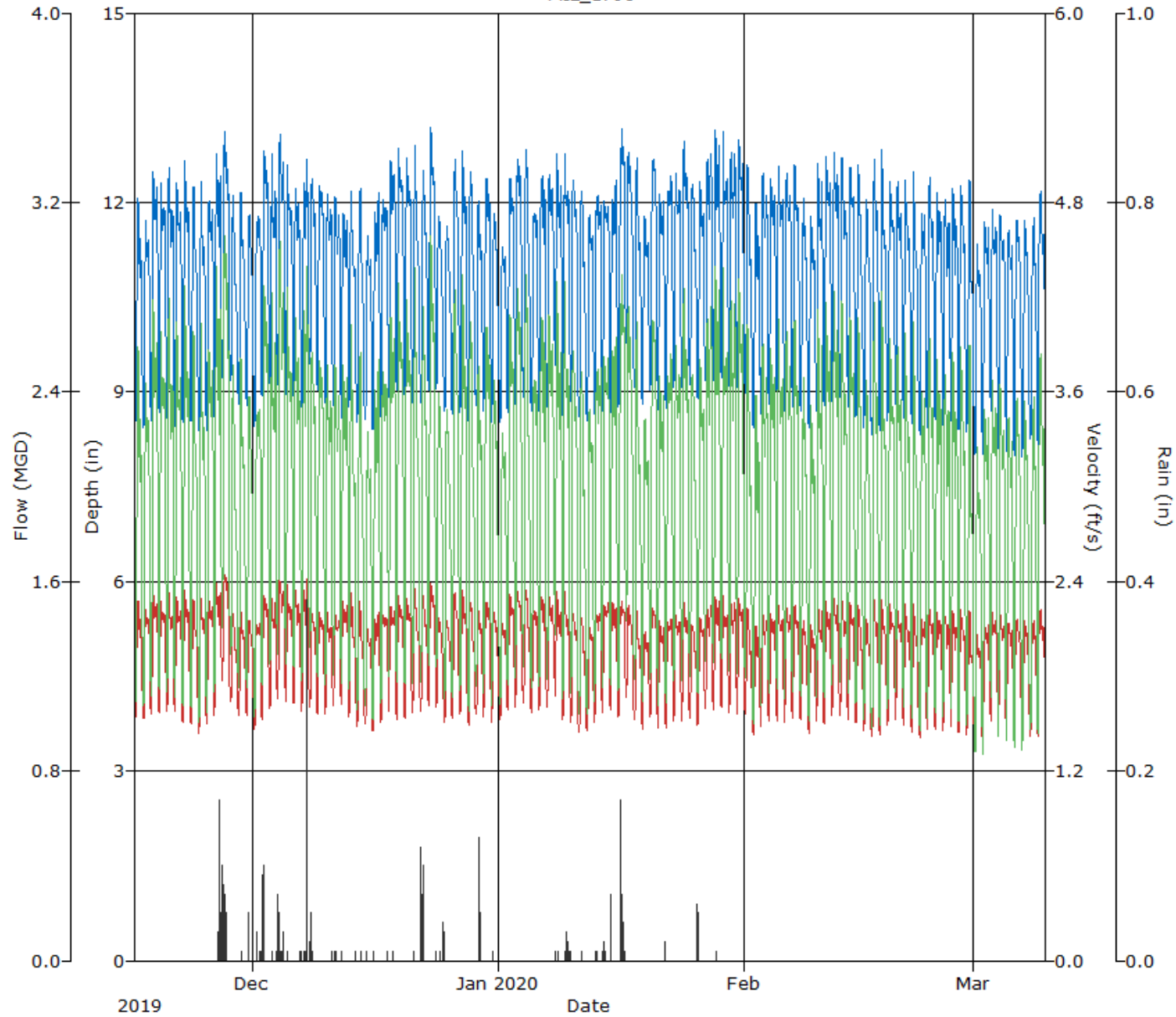
Pipe Height
28.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_1790, Pipe Height: 28.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 04:50 | 8.41 | 13:00 | 12.14 | 10.48 | 04:50 | 1.49 | 13:05 | 2.35 | 1.96 | 04:50 | 1.042 | 13:05 | 2.693 | 1.892 | 1.892 | |
| 11/17/2019 | 05:10 | 8.36 | 11:25 | 11.76 | 10.38 | 05:00 | 1.50 | 11:30 | 2.26 | 1.96 | 05:00 | 1.043 | 11:15 | 2.492 | 1.863 | 1.863 | |
| 11/18/2019 | 03:55 | 8.47 | 10:55 | 12.74 | 11.03 | 04:05 | 1.54 | 10:40 | 2.41 | 2.05 | 04:05 | 1.085 | 10:45 | 2.934 | 2.124 | 2.124 | |
| 11/19/2019 | 04:30 | 8.64 | 10:30 | 12.37 | 11.03 | 04:35 | 1.56 | 09:20 | 2.31 | 2.04 | 04:30 | 1.130 | 10:30 | 2.717 | 2.101 | 2.101 | |
| 11/20/2019 | 04:20 | 8.59 | 10:20 | 12.63 | 10.92 | 03:55 | 1.56 | 10:40 | 2.36 | 2.02 | 03:55 | 1.124 | 10:40 | 2.840 | 2.058 | 2.058 | |
| 11/21/2019 | 04:45 | 8.43 | 09:55 | 12.75 | 10.93 | 04:35 | 1.56 | 10:00 | 2.36 | 2.04 | 04:35 | 1.095 | 09:55 | 2.893 | 2.079 | 2.079 | |
| 11/22/2019 | 04:05 | 8.48 | 10:30 | 12.74 | 11.03 | 05:05 | 1.49 | 10:40 | 2.39 | 2.03 | 03:55 | 1.059 | 10:40 | 2.911 | 2.105 | 2.105 | |
| 11/23/2019 | 05:30 | 8.52 | 13:00 | 12.43 | 10.62 | 05:00 | 1.49 | 11:25 | 2.33 | 1.96 | 04:55 | 1.057 | 11:25 | 2.735 | 1.929 | 1.929 | |
| 11/24/2019 | 04:50 | 8.32 | 11:50 | 12.42 | 10.50 | 04:35 | 1.42 | 11:00 | 2.33 | 1.95 | 04:50 | 0.980 | 11:55 | 2.752 | 1.897 | 1.897 | |
| 11/25/2019 | 04:10 | 8.35 | 13:00 | 12.08 | 10.80 | 03:55 | 1.49 | 12:15 | 2.31 | 2.03 | 03:55 | 1.031 | 12:15 | 2.618 | 2.041 | 2.041 | |
| 11/26/2019 | 03:45 | 8.54 | 10:00 | 12.85 | 11.16 | 03:40 | 1.49 | 10:00 | 2.46 | 2.10 | 03:40 | 1.064 | 10:00 | 3.038 | 2.202 | 2.202 | 0.36 |
| 11/27/2019 | 03:30 | 9.16 | 10:35 | 13.21 | 11.60 | 03:30 | 1.64 | 10:55 | 2.51 | 2.20 | 03:30 | 1.285 | 10:55 | 3.198 | 2.420 | 2.420 | 0.63 |
| 11/28/2019 | 05:55 | 9.13 | 12:15 | 12.16 | 10.64 | 05:55 | 1.63 | 10:45 | 2.29 | 1.95 | 05:55 | 1.274 | 12:15 | 2.542 | 1.896 | 1.896 | |
| 11/29/2019 | 05:05 | 8.72 | 14:45 | 12.30 | 10.67 | 05:05 | 1.53 | 18:15 | 2.24 | 1.94 | 05:05 | 1.123 | 14:45 | 2.601 | 1.910 | 1.910 | 0.02 |
| 11/30/2019 | 06:50 | 8.72 | 13:05 | 11.84 | 10.52 | 06:50 | 1.53 | 13:05 | 2.16 | 1.91 | 06:50 | 1.126 | 13:05 | 2.400 | 1.843 | 1.843 | 0.10 |
| 12/01/2019 | 06:55 | 8.39 | 16:00 | 11.80 | 10.50 | 06:55 | 1.45 | 22:05 | 2.16 | 1.89 | 06:55 | 1.010 | 22:10 | 2.376 | 1.833 | 1.833 | 0.06 |
| 12/02/2019 | 04:40 | 8.91 | 09:20 | 12.88 | 11.47 | 04:20 | 1.52 | 10:50 | 2.35 | 2.06 | 04:25 | 1.151 | 09:30 | 2.909 | 2.240 | 2.240 | 0.30 |
| 12/03/2019 | 04:25 | 9.10 | 10:15 | 12.85 | 11.19 | 04:55 | 1.57 | 21:30 | 2.35 | 2.04 | 04:55 | 1.227 | 10:30 | 2.880 | 2.133 | 2.133 | 0.01 |
| 12/04/2019 | 04:25 | 8.62 | 10:05 | 13.23 | 11.53 | 04:25 | 1.51 | 09:45 | 2.44 | 2.14 | 04:25 | 1.090 | 10:00 | 3.092 | 2.336 | 2.336 | 0.39 |
| 12/05/2019 | 04:35 | 8.92 | 09:40 | 12.68 | 11.22 | 04:30 | 1.62 | 10:55 | 2.42 | 2.09 | 04:30 | 1.228 | 09:40 | 2.931 | 2.197 | 2.197 | 0.01 |
| 12/06/2019 | 04:25 | 8.85 | 09:45 | 12.34 | 10.95 | 03:00 | 1.52 | 09:45 | 2.39 | 2.05 | 03:00 | 1.162 | 09:45 | 2.800 | 2.090 | 2.090 | 0.01 |
| 12/07/2019 | 04:00 | 8.72 | 19:55 | 12.74 | 10.99 | 03:25 | 1.55 | 20:15 | 2.44 | 2.07 | 04:50 | 1.150 | 19:55 | 2.988 | 2.135 | 2.135 | 0.67 |
| 12/08/2019 | 06:20 | 9.41 | 11:30 | 12.40 | 11.14 | 06:30 | 1.56 | 13:40 | 2.23 | 1.97 | 06:30 | 1.273 | 10:50 | 2.621 | 2.046 | 2.046 | 0.20 |
| 12/09/2019 | 04:45 | 8.99 | 09:50 | 12.37 | 11.20 | 03:55 | 1.51 | 09:30 | 2.27 | 1.99 | 03:55 | 1.172 | 09:45 | 2.644 | 2.088 | 2.088 | |
| 12/10/2019 | 04:30 | 8.80 | 10:05 | 12.20 | 10.96 | 04:15 | 1.49 | 09:20 | 2.25 | 1.97 | 04:15 | 1.119 | 09:25 | 2.587 | 2.004 | 2.004 | |
| 12/11/2019 | 03:50 | 8.74 | 11:20 | 12.19 | 10.87 | 04:05 | 1.55 | 09:05 | 2.27 | 2.00 | 04:05 | 1.148 | 11:20 | 2.570 | 2.010 | 2.010 | 0.03 |
| 12/12/2019 | 04:35 | 8.56 | 09:55 | 11.95 | 10.77 | 03:05 | 1.57 | 11:35 | 2.32 | 2.05 | 04:20 | 1.161 | 11:35 | 2.574 | 2.040 | 2.040 | 0.01 |
| 12/13/2019 | 03:55 | 8.75 | 10:10 | 12.54 | 10.61 | 03:55 | 1.54 | 10:15 | 2.37 | 1.96 | 03:55 | 1.137 | 10:10 | 2.832 | 1.916 | 1.916 | 0.01 |
| 12/14/2019 | 04:45 | 8.48 | 14:40 | 12.24 | 10.45 | 04:45 | 1.47 | 12:00 | 2.34 | 1.90 | 04:45 | 1.040 | 12:00 | 2.658 | 1.827 | 1.827 | 0.01 |
| 12/15/2019 | 03:45 | 8.49 | 12:15 | 11.66 | 10.25 | 03:45 | 1.47 | 12:15 | 2.13 | 1.86 | 03:45 | 1.043 | 12:15 | 2.322 | 1.732 | 1.732 | 0.01 |
| 12/16/2019 | 03:50 | 8.27 | 21:35 | 12.25 | 10.76 | 03:50 | 1.42 | 22:10 | 2.32 | 1.95 | 03:50 | 0.971 | 22:10 | 2.668 | 1.951 | 1.951 | 0.01 |
| 12/17/2019 | 04:15 | 8.56 | 10:55 | 12.12 | 10.94 | 04:15 | 1.49 | 10:55 | 2.20 | 1.99 | 04:15 | 1.068 | 10:55 | 2.523 | 2.024 | 2.024 | 0.01 |
| 12/18/2019 | 04:50 | 8.81 | 11:10 | 12.72 | 11.41 | 04:50 | 1.55 | 10:15 | 2.28 | 2.04 | 04:50 | 1.159 | 11:10 | 2.775 | 2.192 | 2.192 | 0.01 |
| 12/19/2019 | 04:15 | 8.96 | 10:40 | 12.98 | 11.54 | 04:00 | 1.51 | 11:05 | 2.36 | 2.04 | 04:20 | 1.155 | 10:40 | 2.908 | 2.238 | 2.238 | |
| 12/20/2019 | 05:35 | 8.91 | 10:55 | 12.85 | 11.40 | 05:00 | 1.51 | 10:45 | 2.37 | 2.04 | 05:00 | 1.145 | 10:50 | 2.925 | 2.195 | 2.195 | |
| 12/21/2019 | 04:50 | 8.76 | 11:10 | 12.98 | 10.98 | 04:45 | 1.54 | 12:00 | 2.38 | 2.00 | 04:45 | 1.139 | 11:25 | 2.970 | 2.048 | 2.048 | 0.01 |
| 12/22/2019 | 04:30 | 8.77 | 14:25 | 12.58 | 10.86 | 04:25 | 1.55 | 15:00 | 2.36 | 1.99 | 04:25 | 1.152 | 15:00 | 2.816 | 2.014 | 2.014 | 0.41 |
| 12/23/2019 | 04:20 | 8.98 | 12:05 | 13.37 | 11.47 | 04:30 | 1.60 | 12:05 | 2.47 | 2.09 | 04:30 | 1.226 | 12:05 | 3.219 | 2.280 | 2.280 | |
| 12/24/2019 | 04:55 | 9.01 | 11:45 | 11.85 | 10.67 | 04:55 | 1.58 | 12:55 | 2.19 | 1.95 | 04:55 | 1.212 | 11:45 | 2.436 | 1.910 | 1.910 | 0.02 |
| 12/25/2019 | 07:20 | 8.64 | 11:55 | 11.72 | 10.39 | 06:15 | 1.41 | 11:55 | 2.18 | 1.90 | 06:15 | 1.037 | 11:55 | 2.385 | 1.805 | 1.805 | 0.08 |
| 12/26/2019 | 04:10 | 8.56 | 13:45 | 12.77 | 11.05 | 04:15 | 1.49 | 12:50 | 2.39 | 2.02 | 04:10 | 1.071 | 13:20 | 2.889 | 2.101 | 2.101 | |
| 12/27/2019 | 04:35 | 8.59 | 11:25 | 12.92 | 11.09 | 05:35 | 1.55 | 11:20 | 2.39 | 2.02 | 04:30 | 1.117 | 11:25 | 2.969 | 2.107 | 2.107 | |
| 12/28/2019 | 06:15 | 8.43 | 11:30 | 12.54 | 10.69 | 05:00 | 1.45 | 14:55 | 2.29 | 1.94 | 05:00 | 1.036 | 11:30 | 2.729 | 1.926 | 1.926 | |
| 12/29/2019 | 03:55 | 8.63 | 13:00 | 12.08 | 10.52 | 03:45 | 1.53 | 11:50 | 2.26 | 1.93 | 03:55 | 1.117 | 11:50 | 2.567 | 1.865 | 1.865 | 0.22 |
| 12/30/2019 | 05:00 | 8.63 | 12:05 | 12.49 | 11.06 | 04:10 | 1.52 | 12:10 | 2.30 | 2.03 | 04:50 | 1.112 | 12:10 | 2.745 | 2.100 | 2.100 | |
| 12/31/2019 | 04:55 | 8.48 | 12:10 | 11.96 | 10.57 | 04:00 | 1.49 | 12:00 | 2.25 | 1.95 | 04:55 | 1.056 | 12:00 | 2.512 | 1.897 | 1.897 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 06:40 | 8.45 | 11:15 | 11.44 | 10.24 | 06:05 | 1.50 | 13:00 | 2.15 | 1.90 | 06:50 | 1.062 | 13:40 | 2.250 | 1.769 | 1.769 | |
| 01/02/2020 | 04:55 | 8.64 | 14:00 | 12.47 | 11.10 | 04:45 | 1.57 | 14:05 | 2.36 | 2.06 | 05:00 | 1.141 | 14:05 | 2.803 | 2.140 | 2.140 | |
| 01/03/2020 | 04:15 | 8.73 | 12:50 | 12.84 | 11.17 | 04:10 | 1.57 | 12:40 | 2.42 | 2.04 | 04:10 | 1.158 | 12:40 | 2.975 | 2.147 | 2.147 | |
| 01/04/2020 | 04:40 | 8.87 | 11:50 | 13.21 | 10.98 | 04:35 | 1.61 | 11:50 | 2.42 | 2.03 | 04:50 | 1.213 | 11:50 | 3.104 | 2.078 | 2.078 | |
| 01/05/2020 | 04:15 | 8.67 | 12:00 | 11.86 | 10.68 | 04:05 | 1.55 | 12:15 | 2.32 | 1.98 | 04:15 | 1.134 | 12:15 | 2.581 | 1.951 | 1.951 | |
| 01/06/2020 | 05:00 | 8.63 | 13:45 | 12.51 | 11.13 | 04:50 | 1.55 | 10:45 | 2.35 | 2.05 | 04:50 | 1.128 | 10:45 | 2.804 | 2.142 | 2.142 | |
| 01/07/2020 | 04:25 | 8.73 | 09:55 | 12.56 | 11.21 | 04:25 | 1.59 | 09:30 | 2.39 | 2.06 | 04:25 | 1.166 | 09:30 | 2.848 | 2.173 | 2.173 | |
| 01/08/2020 | 05:00 | 9.14 | 10:50 | 12.92 | 11.34 | 04:50 | 1.60 | 10:40 | 2.45 | 2.07 | 04:50 | 1.261 | 10:40 | 3.044 | 2.202 | 2.202 | 0.02 |
| 01/09/2020 | 04:20 | 8.55 | 11:15 | 13.09 | 11.17 | 03:40 | 1.51 | 10:45 | 2.39 | 2.01 | 04:20 | 1.080 | 11:05 | 3.005 | 2.110 | 2.110 | 0.18 |
| 01/10/2020 | 04:30 | 8.79 | 10:20 | 12.42 | 11.06 | 04:00 | 1.49 | 10:05 | 2.22 | 1.94 | 04:20 | 1.113 | 10:40 | 2.629 | 2.007 | 2.007 | 0.02 |
| 01/11/2020 | 04:00 | 8.51 | 12:55 | 12.28 | 10.62 | 04:00 | 1.42 | 12:50 | 2.23 | 1.85 | 04:00 | 1.006 | 12:50 | 2.596 | 1.823 | 1.823 | 0.01 |
| 01/12/2020 | 04:10 | 8.51 | 11:50 | 11.85 | 10.50 | 06:15 | 1.44 | 11:50 | 2.16 | 1.86 | 04:10 | 1.023 | 11:50 | 2.406 | 1.797 | 1.797 | |
| 01/13/2020 | 04:20 | 8.58 | 13:55 | 12.28 | 10.93 | 04:25 | 1.48 | 22:35 | 2.28 | 1.98 | 04:25 | 1.066 | 13:55 | 2.606 | 2.016 | 2.016 | 0.02 |
| 01/14/2020 | 04:00 | 8.64 | 09:50 | 12.09 | 10.94 | 02:15 | 1.52 | 10:35 | 2.34 | 2.03 | 04:00 | 1.125 | 10:35 | 2.645 | 2.077 | 2.077 | 0.11 |
| 01/15/2020 | 04:25 | 8.64 | 20:10 | 12.45 | 11.09 | 04:25 | 1.56 | 11:10 | 2.36 | 2.06 | 04:25 | 1.128 | 11:10 | 2.687 | 2.129 | 2.129 | 0.07 |
| 01/16/2020 | 04:50 | 8.69 | 14:25 | 13.23 | 11.54 | 04:50 | 1.52 | 12:45 | 2.32 | 2.04 | 04:50 | 1.114 | 14:00 | 2.970 | 2.243 | 2.243 | 0.66 |
| 01/17/2020 | 04:10 | 9.72 | 10:35 | 12.87 | 11.64 | 04:55 | 1.64 | 09:40 | 2.28 | 2.03 | 04:05 | 1.407 | 09:40 | 2.809 | 2.226 | 2.226 | |
| 01/18/2020 | 04:40 | 9.03 | 12:55 | 12.88 | 10.93 | 04:40 | 1.52 | 10:50 | 2.26 | 1.89 | 04:40 | 1.168 | 12:45 | 2.801 | 1.929 | 1.929 | |
| 01/19/2020 | 06:00 | 8.73 | 11:45 | 11.92 | 10.57 | 04:15 | 1.45 | 14:35 | 2.11 | 1.84 | 04:15 | 1.076 | 11:45 | 2.359 | 1.794 | 1.794 | |
| 01/20/2020 | 03:45 | 8.99 | 15:25 | 12.78 | 11.27 | 04:10 | 1.51 | 12:55 | 2.25 | 1.97 | 03:45 | 1.170 | 15:15 | 2.750 | 2.096 | 2.096 | |
| 01/21/2020 | 04:55 | 8.63 | 10:15 | 12.24 | 11.02 | 04:45 | 1.44 | 10:15 | 2.18 | 1.93 | 04:45 | 1.043 | 10:15 | 2.529 | 1.977 | 1.977 | |
| 01/22/2020 | 04:20 | 8.72 | 20:10 | 12.46 | 11.16 | 04:20 | 1.46 | 19:55 | 2.22 | 1.94 | 04:20 | 1.072 | 20:00 | 2.633 | 2.037 | 2.037 | 0.03 |
| 01/23/2020 | 04:35 | 9.06 | 09:50 | 12.69 | 11.30 | 04:50 | 1.49 | 09:25 | 2.23 | 1.97 | 04:50 | 1.152 | 09:50 | 2.687 | 2.093 | 2.093 | |
| 01/24/2020 | 04:45 | 9.02 | 11:30 | 13.07 | 11.46 | 04:45 | 1.50 | 12:00 | 2.29 | 1.99 | 04:45 | 1.158 | 11:30 | 2.891 | 2.159 | 2.159 | |
| 01/25/2020 | 04:35 | 9.03 | 15:15 | 12.37 | 10.91 | 04:35 | 1.51 | 12:15 | 2.18 | 1.88 | 04:35 | 1.166 | 11:30 | 2.537 | 1.907 | 1.907 | |
| 01/26/2020 | 05:35 | 8.87 | 11:30 | 12.42 | 10.90 | 04:55 | 1.47 | 13:40 | 2.20 | 1.91 | 04:55 | 1.112 | 11:40 | 2.599 | 1.940 | 1.940 | 0.16 |
| 01/27/2020 | 04:20 | 9.13 | 20:40 | 12.82 | 11.47 | 03:20 | 1.59 | 09:40 | 2.33 | 2.02 | 04:35 | 1.252 | 09:40 | 2.855 | 2.193 | 2.193 | |
| 01/28/2020 | 04:05 | 9.12 | 10:30 | 13.20 | 11.57 | 04:00 | 1.56 | 11:00 | 2.34 | 2.04 | 04:00 | 1.217 | 10:55 | 2.986 | 2.245 | 2.245 | 0.01 |
| 01/29/2020 | 04:20 | 9.14 | 10:15 | 13.19 | 11.53 | 02:55 | 1.58 | 09:40 | 2.37 | 2.03 | 04:20 | 1.246 | 09:40 | 3.013 | 2.212 | 2.212 | |
| 01/30/2020 | 04:30 | 9.07 | 21:30 | 12.86 | 11.45 | 03:20 | 1.56 | 10:55 | 2.31 | 2.02 | 04:30 | 1.213 | 10:55 | 2.855 | 2.190 | 2.190 | |
| 01/31/2020 | 04:45 | 9.04 | 09:35 | 13.05 | 11.54 | 04:45 | 1.55 | 09:55 | 2.38 | 2.03 | 04:45 | 1.193 | 09:55 | 2.995 | 2.227 | 2.227 | |
| 02/01/2020 | 04:30 | 8.93 | 11:50 | 12.66 | 10.87 | 04:35 | 1.54 | 10:35 | 2.28 | 1.92 | 04:35 | 1.173 | 10:40 | 2.756 | 1.936 | 1.936 | |
| 02/02/2020 | 05:50 | 8.37 | 13:20 | 12.05 | 10.42 | 05:40 | 1.39 | 13:50 | 2.14 | 1.83 | 05:40 | 0.966 | 12:30 | 2.413 | 1.754 | 1.754 | |
| 02/03/2020 | 04:15 | 8.60 | 10:50 | 12.57 | 11.06 | 04:30 | 1.45 | 11:10 | 2.26 | 1.95 | 04:00 | 1.052 | 11:10 | 2.703 | 2.019 | 2.019 | |
| 02/04/2020 | 03:45 | 8.73 | 09:50 | 12.47 | 11.14 | 03:50 | 1.50 | 09:20 | 2.25 | 1.96 | 03:50 | 1.102 | 09:25 | 2.660 | 2.050 | 2.050 | |
| 02/05/2020 | 04:15 | 8.88 | 10:40 | 12.68 | 11.19 | 04:10 | 1.50 | 10:35 | 2.26 | 1.99 | 04:15 | 1.131 | 10:40 | 2.740 | 2.084 | 2.084 | |
| 02/06/2020 | 04:30 | 8.67 | 10:05 | 12.55 | 11.15 | 04:30 | 1.50 | 09:50 | 2.25 | 1.99 | 04:30 | 1.091 | 10:05 | 2.693 | 2.082 | 2.082 | |
| 02/07/2020 | 04:20 | 8.71 | 10:50 | 12.66 | 11.16 | 04:05 | 1.52 | 11:25 | 2.28 | 1.99 | 04:25 | 1.120 | 11:25 | 2.761 | 2.083 | 2.083 | |
| 02/08/2020 | 04:35 | 8.67 | 16:10 | 12.60 | 10.62 | 03:45 | 1.51 | 16:10 | 2.26 | 1.90 | 04:35 | 1.105 | 16:10 | 2.726 | 1.858 | 1.858 | |
| 02/09/2020 | 05:10 | 8.41 | 11:40 | 11.84 | 10.41 | 06:15 | 1.42 | 12:05 | 2.15 | 1.86 | 05:10 | 0.997 | 12:05 | 2.372 | 1.774 | 1.774 | |
| 02/10/2020 | 04:30 | 8.66 | 09:45 | 12.79 | 11.02 | 04:25 | 1.50 | 10:10 | 2.34 | 1.97 | 04:25 | 1.090 | 10:10 | 2.866 | 2.025 | 2.025 | |
| 02/11/2020 | 05:00 | 8.73 | 09:35 | 12.83 | 11.31 | 04:55 | 1.49 | 09:45 | 2.32 | 1.99 | 05:00 | 1.094 | 09:45 | 2.850 | 2.128 | 2.128 | |
| 02/12/2020 | 05:00 | 8.79 | 10:40 | 12.82 | 11.40 | 04:45 | 1.52 | 10:00 | 2.32 | 2.03 | 04:55 | 1.136 | 10:40 | 2.859 | 2.187 | 2.187 | |
| 02/13/2020 | 04:40 | 8.81 | 09:35 | 12.81 | 11.16 | 05:20 | 1.52 | 09:20 | 2.33 | 2.00 | 05:15 | 1.142 | 09:25 | 2.868 | 2.089 | 2.089 | |
| 02/14/2020 | 04:40 | 8.71 | 11:05 | 12.67 | 11.19 | 04:35 | 1.52 | 11:05 | 2.30 | 2.00 | 04:35 | 1.116 | 11:05 | 2.791 | 2.102 | 2.102 | |
| 02/15/2020 | 04:00 | 8.50 | 12:15 | 12.72 | 10.65 | 04:00 | 1.47 | 12:20 | 2.31 | 1.91 | 04:00 | 1.042 | 12:15 | 2.818 | 1.881 | 1.881 | |
| 02/16/2020 | 04:50 | 8.31 | 13:10 | 12.24 | 10.40 | 04:40 | 1.41 | 13:05 | 2.18 | 1.86 | 04:45 | 0.969 | 13:05 | 2.531 | 1.774 | 1.774 | |
| 02/17/2020 | 05:15 | 8.29 | 11:30 | 12.82 | 10.70 | 06:00 | 1.40 | 11:35 | 2.33 | 1.90 | 06:00 | 0.959 | 11:35 | 2.864 | 1.908 | 1.908 | |
| 02/18/2020 | 04:30 | 8.31 | 10:45 | 12.93 | 10.89 | 04:25 | 1.41 | 10:15 | 2.32 | 1.96 | 04:25 | 0.969 | 10:50 | 2.855 | 1.984 | 1.984 | |
| 02/19/2020 | 04:35 | 8.51 | 10:45 | 12.39 | 10.85 | 03:05 | 1.46 | 10:35 | 2.29 | 1.96 | 03:40 | 1.045 | 10:45 | 2.701 | 1.987 | 1.987 | |
| 02/20/2020 | 05:00 | 8.69 | 11:30 | 12.43 | 10.95 | 04:55 | 1.50 | 11:30 | 2.25 | 1.97 | 04:55 | 1.097 | 11:30 | 2.667 | 2.000 | 2.000 | |
| 02/21/2020 | 04:40 | 8.56 | 10:55 | 12.63 | 10.77 | 03:55 | 1.46 | 10:50 | 2.33 | 1.93 | 03:55 | 1.046 | 10:50 | 2.795 | 1.926 | 1.926 | |
| 02/22/2020 | 06:35 | 8.46 | 11:30 | 12.56 | 10.54 | 06:50 | 1.44 | 11:15 | 2.29 | 1.89 | 06:20 | 1.016 | 11:15 | 2.737 | 1.836 | 1.836 | |
| 02/23/2020 | 06:45 | 8.26 | 20:50 | 11.96 | 10.49 | 06:00 | 1.39 | 11:40 | 2.19 | 1.88 | 06:40 | 0.952 | 11:30 | 2.444 | 1.826 | 1.826 | |
| 02/24/2020 | 03:55 | 8.42 | 11:30 | 12.52 | 10.87 | 05:00 | 1.43 | 11:30 | 2.27 | 1.96 | 05:00 | 1.003 | 11:30 | 2.718 | 1.984 | 1.984 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 05:15 | 8.41 | 10:15 | 12.22 | 10.84 | 05:00 | 1.41 | 10:20 | 2.24 | 1.95 | 05:05 | 0.995 | 10:20 | 2.584 | 1.967 | 1.967 | |
| 02/26/2020 | 05:00 | 8.35 | 10:55 | 12.23 | 10.78 | 04:50 | 1.43 | 10:55 | 2.22 | 1.95 | 05:00 | 0.993 | 10:55 | 2.581 | 1.942 | 1.942 | |
| 02/27/2020 | 05:20 | 8.44 | 09:55 | 12.33 | 10.84 | 04:30 | 1.46 | 10:10 | 2.24 | 1.95 | 05:20 | 1.034 | 09:55 | 2.618 | 1.959 | 1.959 | |
| 02/28/2020 | 04:20 | 8.37 | 11:05 | 12.44 | 10.75 | 03:50 | 1.43 | 09:55 | 2.26 | 1.92 | 04:35 | 0.994 | 11:05 | 2.664 | 1.924 | 1.924 | |
| 02/29/2020 | 04:05 | 8.25 | 14:10 | 12.89 | 10.38 | 03:50 | 1.40 | 14:00 | 2.33 | 1.85 | 03:50 | 0.957 | 14:10 | 2.893 | 1.760 | 1.760 | |
| 03/01/2020 | 05:45 | 7.93 | 12:35 | 11.38 | 10.01 | 05:40 | 1.32 | 12:10 | 2.08 | 1.77 | 05:40 | 0.852 | 12:10 | 2.189 | 1.611 | 1.611 | |
| 03/02/2020 | 04:35 | 7.99 | 09:45 | 12.02 | 10.50 | 04:35 | 1.33 | 20:50 | 2.21 | 1.88 | 04:35 | 0.864 | 20:50 | 2.488 | 1.827 | 1.827 | |
| 03/03/2020 | 05:55 | 8.52 | 11:00 | 12.07 | 10.65 | 04:50 | 1.46 | 11:00 | 2.27 | 1.95 | 05:50 | 1.050 | 11:00 | 2.588 | 1.914 | 1.914 | |
| 03/04/2020 | 03:45 | 8.00 | 09:40 | 12.22 | 10.51 | 03:45 | 1.40 | 09:35 | 2.26 | 1.93 | 03:45 | 0.911 | 09:35 | 2.607 | 1.868 | 1.868 | |
| 03/05/2020 | 04:15 | 7.99 | 10:55 | 11.62 | 10.43 | 04:25 | 1.36 | 11:00 | 2.20 | 1.91 | 04:25 | 0.888 | 11:00 | 2.379 | 1.831 | 1.831 | |
| 03/06/2020 | 04:20 | 7.96 | 12:35 | 11.81 | 10.44 | 04:10 | 1.35 | 12:30 | 2.21 | 1.90 | 04:10 | 0.877 | 12:35 | 2.447 | 1.827 | 1.827 | |
| 03/07/2020 | 04:30 | 7.94 | 12:10 | 11.94 | 10.24 | 03:40 | 1.34 | 10:20 | 2.21 | 1.86 | 03:40 | 0.872 | 12:05 | 2.474 | 1.745 | 1.745 | |
| 03/08/2020 | 05:30 | 8.22 | 15:05 | 12.34 | 10.08 | 04:25 | 1.39 | 15:00 | 2.26 | 1.83 | 04:25 | 0.947 | 15:05 | 2.655 | 1.678 | 1.678 | |
| 03/09/2020 | 03:25 | 8.15 | 12:20 | 12.27 | 10.71 | 03:15 | 1.41 | 12:10 | 2.25 | 1.94 | 03:25 | 0.942 | 12:20 | 2.618 | 1.930 | 1.928 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 230.723 | 4.90 |
| Avg | 10.91 | 1.97 | 2.006 | |

Site Commentary

Site Information

| MIL_1795 | |
|-----------------|-------|
| Pipe Dimensions | 27 |
| Silt Level | 1.50" |

Overview

Site MIL_1795 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location. Sediment and slow flow conditions render data of lower confidence than typical.

This location was installed upstream of site MIL_1790. (See MIL_1790 Site Commentary for More Details)

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|--------------------|---------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 9.47 | 0.40 | 0.299 |
| Minimum | 6.32 | 0.17 | 0.087 |
| Maximum | 12.80 | 0.54 | 0.503 |
| Time of Minimum | 2/7/2020 3:55 AM | 11/22/2019 4:40 AM | 2/7/2020 3:55 AM |
| Time of Maximum | 1/9/2020 11:40 AM | 3/8/2020 1:35 PM | 12/30/2019 12:35 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_1795

Site Address /Location: Marylinn Dr and Penitencia St, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.435797°

Longitude:

-121.911864°

Pipe Size (H x W)

27.00"x27.00"

Pipe Shape

Circular

Manhole #

1795

System Characteristics

Residential/Commercial

Access

Traffic

Drive

Medium



Installation Information

Installation Date:

Friday, November 15, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

6:23:00 AM

Pipe Size (HxW)

27.00"x27.00"

Depth of Flow (Wet DOF) (in)

9.75"

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

0.34'

Velocity Sensor Offset (in)

0"

Silt (in)

3.0"

Silt Type

Soft / Loose

Hydraulic Comments:

Smooth flow with deep depth and slow velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

8'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_1795

Flow Monitor

MIL_1795

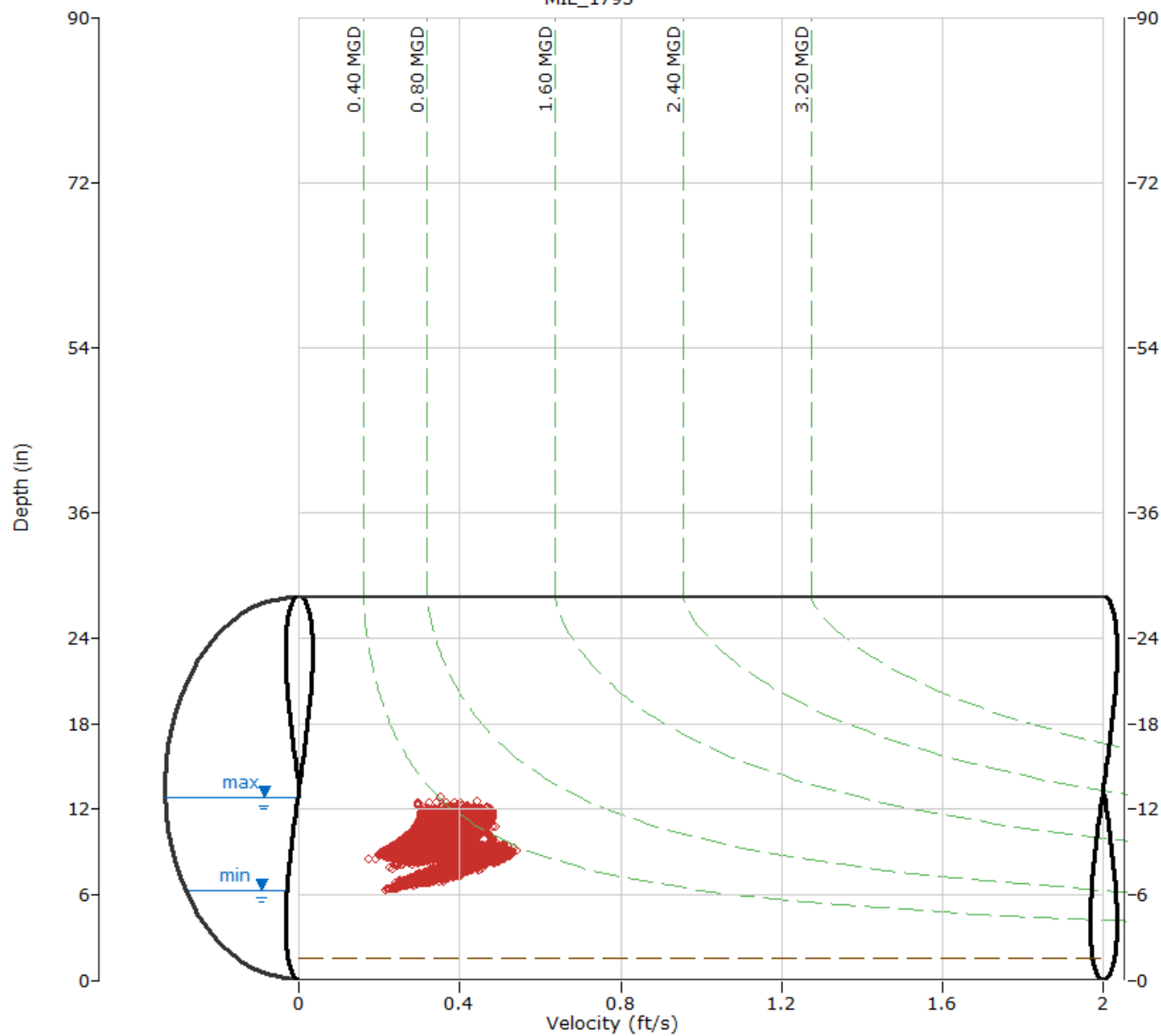
Pipe Height
27.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_1795

Flow Monitor

MIL_1795

Pipe Height

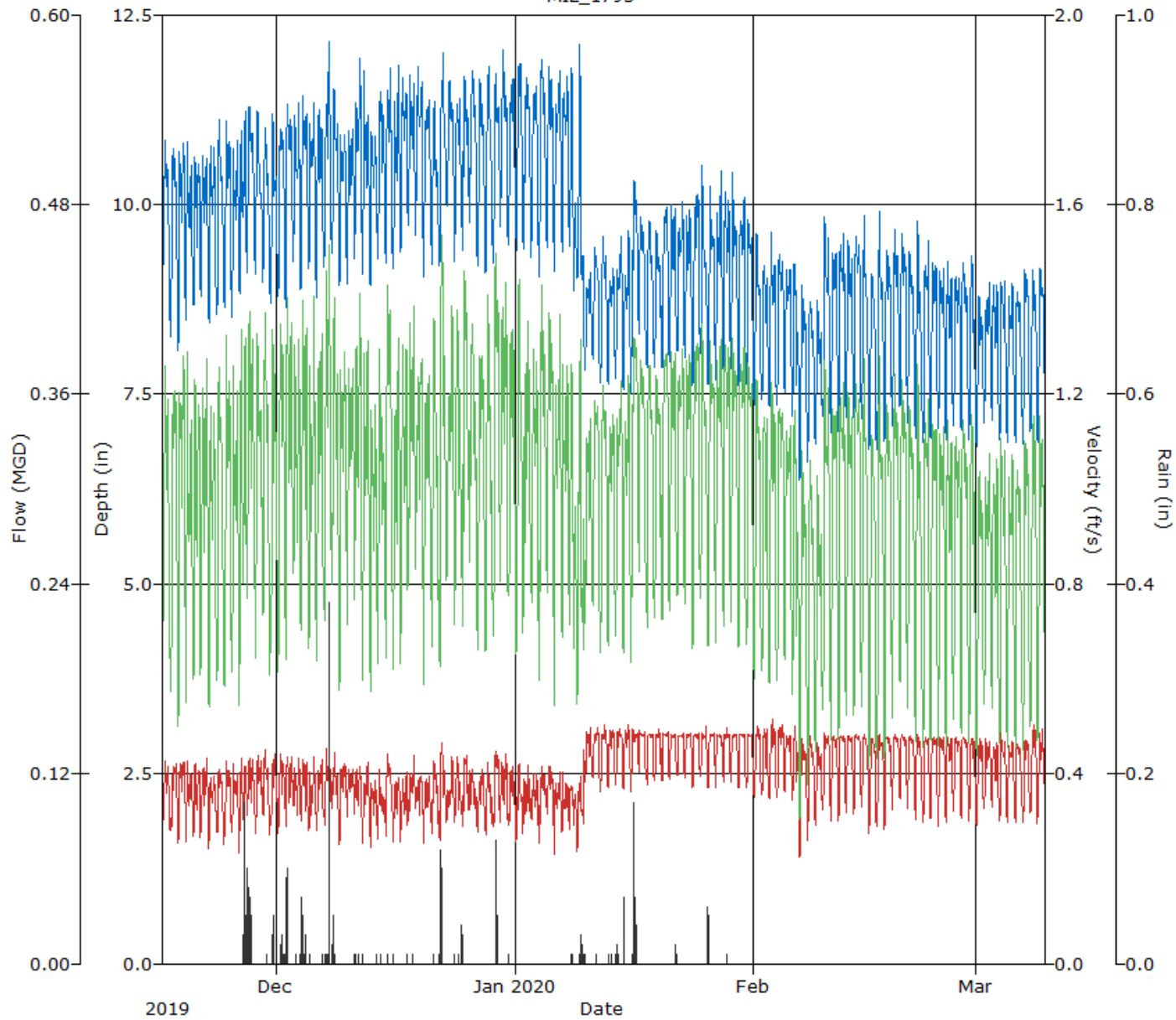
27.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_1795, Pipe Height: 27.00 in, Silt: 1.50 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 04:40 | 8.99 | 11:20 | 10.88 | 10.01 | 04:15 | 0.22 | 13:40 | 0.46 | 0.36 | 04:15 | 0.156 | 13:40 | 0.412 | 0.297 | 0.297 | |
| 11/17/2019 | 05:20 | 8.24 | 13:15 | 10.80 | 9.77 | 05:50 | 0.24 | 11:15 | 0.46 | 0.36 | 05:50 | 0.148 | 11:15 | 0.409 | 0.287 | 0.287 | |
| 11/18/2019 | 04:20 | 8.06 | 08:10 | 10.91 | 9.74 | 04:05 | 0.24 | 21:55 | 0.47 | 0.37 | 04:05 | 0.140 | 21:55 | 0.427 | 0.292 | 0.292 | |
| 11/19/2019 | 03:30 | 8.46 | 07:55 | 10.99 | 9.73 | 04:35 | 0.22 | 08:50 | 0.46 | 0.35 | 04:35 | 0.142 | 08:45 | 0.408 | 0.278 | 0.278 | |
| 11/20/2019 | 02:40 | 8.63 | 17:40 | 10.85 | 9.82 | 04:10 | 0.21 | 07:30 | 0.46 | 0.36 | 04:10 | 0.140 | 09:05 | 0.398 | 0.286 | 0.286 | |
| 11/21/2019 | 02:40 | 8.76 | 20:40 | 10.77 | 9.93 | 02:20 | 0.24 | 20:45 | 0.46 | 0.36 | 02:20 | 0.158 | 20:45 | 0.409 | 0.295 | 0.295 | |
| 11/22/2019 | 04:15 | 8.41 | 17:05 | 11.12 | 9.87 | 04:40 | 0.17 | 21:50 | 0.47 | 0.34 | 04:40 | 0.110 | 21:50 | 0.410 | 0.275 | 0.275 | |
| 11/23/2019 | 03:55 | 8.51 | 13:20 | 11.32 | 9.92 | 05:25 | 0.23 | 13:05 | 0.47 | 0.35 | 05:25 | 0.147 | 13:05 | 0.448 | 0.287 | 0.287 | |
| 11/24/2019 | 04:45 | 8.62 | 12:00 | 11.14 | 10.10 | 02:50 | 0.21 | 09:05 | 0.47 | 0.36 | 02:50 | 0.142 | 10:45 | 0.432 | 0.299 | 0.299 | |
| 11/25/2019 | 03:30 | 8.47 | 20:20 | 10.88 | 9.94 | 04:45 | 0.20 | 19:40 | 0.45 | 0.36 | 04:45 | 0.132 | 19:40 | 0.405 | 0.290 | 0.290 | |
| 11/26/2019 | 04:15 | 8.80 | 21:05 | 11.28 | 10.08 | 04:10 | 0.20 | 07:45 | 0.47 | 0.35 | 04:10 | 0.135 | 07:45 | 0.439 | 0.292 | 0.292 | 0.36 |
| 11/27/2019 | 03:20 | 9.00 | 09:50 | 11.41 | 10.48 | 05:05 | 0.29 | 12:00 | 0.48 | 0.39 | 03:20 | 0.208 | 10:35 | 0.459 | 0.337 | 0.337 | 0.63 |
| 11/28/2019 | 05:25 | 9.04 | 11:05 | 11.32 | 10.25 | 05:30 | 0.22 | 14:50 | 0.47 | 0.37 | 05:30 | 0.155 | 12:30 | 0.437 | 0.313 | 0.313 | |
| 11/29/2019 | 04:05 | 8.87 | 10:55 | 11.05 | 10.09 | 04:20 | 0.23 | 10:40 | 0.47 | 0.38 | 04:20 | 0.160 | 10:40 | 0.436 | 0.311 | 0.311 | 0.02 |
| 11/30/2019 | 06:00 | 8.66 | 11:35 | 11.32 | 9.98 | 03:15 | 0.21 | 11:30 | 0.48 | 0.36 | 03:15 | 0.142 | 11:30 | 0.458 | 0.299 | 0.299 | 0.10 |
| 12/01/2019 | 05:50 | 8.76 | 15:10 | 11.11 | 10.17 | 06:40 | 0.21 | 12:50 | 0.48 | 0.37 | 06:40 | 0.150 | 12:50 | 0.444 | 0.313 | 0.313 | 0.06 |
| 12/02/2019 | 03:35 | 8.62 | 08:50 | 11.52 | 10.37 | 04:45 | 0.24 | 16:00 | 0.48 | 0.38 | 04:45 | 0.157 | 08:20 | 0.458 | 0.326 | 0.326 | 0.30 |
| 12/03/2019 | 03:10 | 9.15 | 19:15 | 11.56 | 10.43 | 04:35 | 0.27 | 22:10 | 0.47 | 0.38 | 04:35 | 0.207 | 20:10 | 0.451 | 0.325 | 0.325 | 0.01 |
| 12/04/2019 | 03:10 | 8.77 | 08:45 | 11.59 | 10.53 | 03:25 | 0.26 | 20:55 | 0.47 | 0.38 | 03:25 | 0.176 | 10:35 | 0.461 | 0.332 | 0.332 | 0.39 |
| 12/05/2019 | 04:00 | 9.10 | 21:25 | 11.42 | 10.43 | 05:00 | 0.23 | 21:55 | 0.48 | 0.36 | 05:00 | 0.166 | 21:55 | 0.455 | 0.310 | 0.310 | 0.01 |
| 12/06/2019 | 04:10 | 8.72 | 07:50 | 11.41 | 10.33 | 03:55 | 0.21 | 12:10 | 0.47 | 0.37 | 03:55 | 0.137 | 12:10 | 0.443 | 0.316 | 0.316 | 0.01 |
| 12/07/2019 | 02:50 | 9.15 | 18:35 | 12.16 | 10.63 | 05:55 | 0.26 | 12:00 | 0.48 | 0.38 | 05:55 | 0.193 | 17:45 | 0.501 | 0.339 | 0.339 | 0.67 |
| 12/08/2019 | 05:50 | 9.33 | 10:20 | 11.56 | 10.56 | 23:55 | 0.28 | 11:35 | 0.48 | 0.38 | 23:55 | 0.230 | 11:35 | 0.476 | 0.335 | 0.335 | 0.20 |
| 12/09/2019 | 04:10 | 8.91 | 06:50 | 11.26 | 10.25 | 04:05 | 0.21 | 19:40 | 0.47 | 0.37 | 04:05 | 0.142 | 19:40 | 0.437 | 0.311 | 0.311 | |
| 12/10/2019 | 04:20 | 8.95 | 08:40 | 11.04 | 10.30 | 04:40 | 0.27 | 20:25 | 0.47 | 0.38 | 04:40 | 0.184 | 20:25 | 0.432 | 0.321 | 0.321 | |
| 12/11/2019 | 04:10 | 9.24 | 20:25 | 12.06 | 10.70 | 04:50 | 0.25 | 20:00 | 0.46 | 0.37 | 04:50 | 0.181 | 20:00 | 0.474 | 0.334 | 0.334 | 0.03 |
| 12/12/2019 | 04:55 | 9.03 | 08:20 | 11.94 | 10.45 | 04:05 | 0.23 | 22:00 | 0.47 | 0.35 | 04:05 | 0.164 | 22:00 | 0.443 | 0.305 | 0.305 | 0.01 |
| 12/13/2019 | 04:05 | 8.91 | 07:00 | 11.11 | 10.26 | 04:20 | 0.21 | 07:05 | 0.45 | 0.34 | 04:20 | 0.142 | 07:05 | 0.417 | 0.290 | 0.290 | 0.01 |
| 12/14/2019 | 03:35 | 9.23 | 19:35 | 11.88 | 10.53 | 04:30 | 0.24 | 14:55 | 0.46 | 0.33 | 04:30 | 0.175 | 14:55 | 0.433 | 0.291 | 0.291 | 0.01 |
| 12/15/2019 | 05:30 | 9.22 | 19:20 | 11.90 | 10.67 | 06:10 | 0.24 | 11:55 | 0.48 | 0.38 | 05:15 | 0.175 | 11:55 | 0.471 | 0.337 | 0.337 | 0.01 |
| 12/16/2019 | 03:25 | 9.04 | 19:15 | 12.04 | 10.56 | 04:30 | 0.23 | 20:55 | 0.47 | 0.35 | 04:30 | 0.168 | 20:55 | 0.475 | 0.306 | 0.306 | 0.01 |
| 12/17/2019 | 03:00 | 9.35 | 11:25 | 11.82 | 10.81 | 03:20 | 0.23 | 21:00 | 0.47 | 0.34 | 03:20 | 0.171 | 21:00 | 0.460 | 0.310 | 0.310 | 0.01 |
| 12/18/2019 | 03:20 | 9.69 | 09:05 | 11.84 | 10.90 | 03:30 | 0.25 | 08:55 | 0.48 | 0.37 | 03:30 | 0.198 | 08:55 | 0.488 | 0.340 | 0.340 | 0.01 |
| 12/19/2019 | 03:10 | 9.40 | 21:45 | 11.97 | 10.96 | 05:30 | 0.27 | 16:10 | 0.47 | 0.36 | 05:30 | 0.216 | 17:55 | 0.449 | 0.335 | 0.335 | |
| 12/20/2019 | 04:00 | 8.98 | 19:15 | 11.49 | 10.60 | 04:10 | 0.23 | 21:35 | 0.45 | 0.34 | 04:10 | 0.157 | 18:55 | 0.421 | 0.306 | 0.306 | |
| 12/21/2019 | 05:05 | 9.18 | 14:15 | 11.67 | 10.37 | 05:55 | 0.23 | 12:45 | 0.48 | 0.36 | 05:40 | 0.164 | 14:30 | 0.462 | 0.309 | 0.309 | 0.01 |
| 12/22/2019 | 06:00 | 9.09 | 15:05 | 12.18 | 10.70 | 05:50 | 0.22 | 12:45 | 0.48 | 0.37 | 05:50 | 0.158 | 12:40 | 0.474 | 0.333 | 0.333 | 0.41 |
| 12/23/2019 | 05:10 | 9.93 | 10:40 | 11.67 | 10.90 | 02:45 | 0.28 | 20:25 | 0.48 | 0.36 | 01:20 | 0.228 | 20:45 | 0.457 | 0.329 | 0.329 | |
| 12/24/2019 | 04:50 | 9.20 | 19:15 | 11.56 | 10.58 | 04:55 | 0.28 | 13:45 | 0.48 | 0.36 | 04:55 | 0.199 | 13:45 | 0.450 | 0.319 | 0.319 | 0.02 |
| 12/25/2019 | 05:10 | 9.37 | 11:55 | 11.70 | 10.65 | 04:20 | 0.25 | 19:10 | 0.47 | 0.37 | 04:20 | 0.187 | 12:00 | 0.465 | 0.333 | 0.333 | 0.08 |
| 12/26/2019 | 02:45 | 9.69 | 12:55 | 11.93 | 10.97 | 02:50 | 0.27 | 14:10 | 0.48 | 0.37 | 02:50 | 0.212 | 14:10 | 0.480 | 0.339 | 0.339 | |
| 12/27/2019 | 04:55 | 9.18 | 11:35 | 11.70 | 10.65 | 04:45 | 0.24 | 16:25 | 0.47 | 0.35 | 04:45 | 0.172 | 12:25 | 0.439 | 0.318 | 0.318 | |
| 12/28/2019 | 05:05 | 9.03 | 14:20 | 11.92 | 10.57 | 05:30 | 0.24 | 13:50 | 0.48 | 0.34 | 05:30 | 0.171 | 13:50 | 0.470 | 0.305 | 0.305 | |
| 12/29/2019 | 05:05 | 9.20 | 13:25 | 11.80 | 10.72 | 06:55 | 0.27 | 13:40 | 0.48 | 0.37 | 05:40 | 0.196 | 09:45 | 0.488 | 0.337 | 0.337 | 0.22 |
| 12/30/2019 | 03:55 | 9.62 | 12:50 | 12.09 | 11.03 | 03:10 | 0.26 | 15:55 | 0.48 | 0.38 | 03:35 | 0.203 | 12:35 | 0.503 | 0.357 | 0.357 | |
| 12/31/2019 | 04:10 | 9.43 | 19:50 | 11.96 | 10.81 | 06:00 | 0.26 | 19:00 | 0.48 | 0.36 | 06:00 | 0.207 | 19:00 | 0.459 | 0.328 | 0.328 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 06:20 | 9.37 | 18:45 | 12.51 | 10.90 | 05:00 | 0.24 | 20:00 | 0.47 | 0.34 | 05:00 | 0.185 | 18:45 | 0.491 | 0.318 | 0.318 | |
| 01/02/2020 | 03:35 | 9.39 | 13:40 | 11.71 | 10.83 | 02:25 | 0.25 | 19:10 | 0.47 | 0.34 | 04:30 | 0.188 | 19:10 | 0.467 | 0.314 | 0.314 | |
| 01/03/2020 | 03:00 | 9.16 | 19:35 | 11.60 | 10.72 | 05:20 | 0.24 | 20:50 | 0.47 | 0.35 | 05:20 | 0.182 | 20:50 | 0.459 | 0.316 | 0.316 | |
| 01/04/2020 | 04:15 | 9.03 | 13:25 | 11.96 | 10.76 | 04:15 | 0.21 | 13:05 | 0.45 | 0.35 | 04:15 | 0.149 | 13:05 | 0.464 | 0.320 | 0.320 | |
| 01/05/2020 | 04:45 | 9.38 | 12:20 | 11.88 | 10.84 | 05:15 | 0.24 | 09:20 | 0.47 | 0.37 | 05:15 | 0.178 | 09:20 | 0.456 | 0.341 | 0.341 | |
| 01/06/2020 | 04:00 | 9.02 | 21:40 | 11.80 | 10.72 | 04:05 | 0.22 | 21:20 | 0.48 | 0.34 | 04:00 | 0.151 | 21:20 | 0.490 | 0.310 | 0.310 | |
| 01/07/2020 | 04:50 | 9.35 | 20:05 | 11.71 | 10.90 | 04:50 | 0.26 | 06:15 | 0.47 | 0.34 | 04:50 | 0.190 | 06:20 | 0.435 | 0.311 | 0.311 | |
| 01/08/2020 | 15:20 | 7.76 | 10:15 | 11.81 | 10.31 | 15:25 | 0.23 | 14:35 | 0.47 | 0.34 | 15:25 | 0.129 | 14:35 | 0.434 | 0.292 | 0.292 | 0.02 |
| 01/09/2020 | 23:55 | 8.58 | 11:40 | 12.80 | 9.84 | 03:00 | 0.22 | 10:40 | 0.45 | 0.32 | 04:25 | 0.150 | 11:45 | 0.465 | 0.258 | 0.258 | 0.18 |
| 01/10/2020 | 03:50 | 7.77 | 19:20 | 9.17 | 8.61 | 03:35 | 0.38 | 19:00 | 0.52 | 0.45 | 03:35 | 0.212 | 19:00 | 0.364 | 0.296 | 0.296 | 0.02 |
| 01/11/2020 | 05:10 | 7.93 | 11:00 | 9.52 | 8.81 | 05:10 | 0.39 | 12:30 | 0.52 | 0.45 | 05:10 | 0.223 | 12:30 | 0.380 | 0.308 | 0.308 | 0.01 |
| 01/12/2020 | 05:00 | 7.61 | 11:00 | 9.82 | 8.72 | 04:50 | 0.34 | 15:55 | 0.52 | 0.45 | 04:50 | 0.181 | 11:00 | 0.380 | 0.299 | 0.299 | |
| 01/13/2020 | 04:15 | 7.61 | 19:40 | 9.24 | 8.59 | 04:15 | 0.37 | 21:15 | 0.52 | 0.45 | 04:15 | 0.199 | 21:15 | 0.367 | 0.291 | 0.291 | 0.02 |
| 01/14/2020 | 02:15 | 7.68 | 20:30 | 9.62 | 8.74 | 03:35 | 0.35 | 08:15 | 0.52 | 0.45 | 03:35 | 0.194 | 20:30 | 0.370 | 0.304 | 0.304 | 0.11 |
| 01/15/2020 | 04:55 | 7.52 | 20:30 | 9.69 | 8.65 | 04:20 | 0.36 | 19:00 | 0.52 | 0.45 | 04:20 | 0.194 | 21:20 | 0.380 | 0.298 | 0.298 | 0.07 |
| 01/16/2020 | 04:00 | 7.44 | 13:15 | 10.33 | 9.21 | 04:00 | 0.36 | 10:05 | 0.52 | 0.45 | 04:00 | 0.186 | 13:15 | 0.395 | 0.330 | 0.330 | 0.66 |
| 01/17/2020 | 04:50 | 8.28 | 09:50 | 9.95 | 9.22 | 04:50 | 0.40 | 07:20 | 0.52 | 0.47 | 04:50 | 0.247 | 09:50 | 0.386 | 0.339 | 0.339 | |
| 01/18/2020 | 05:40 | 7.83 | 14:15 | 9.85 | 8.91 | 05:55 | 0.35 | 22:25 | 0.52 | 0.45 | 05:55 | 0.200 | 14:15 | 0.382 | 0.312 | 0.312 | |
| 01/19/2020 | 04:55 | 7.85 | 11:55 | 9.74 | 8.86 | 04:55 | 0.38 | 22:50 | 0.52 | 0.45 | 04:55 | 0.217 | 11:55 | 0.376 | 0.310 | 0.310 | |
| 01/20/2020 | 04:40 | 7.84 | 15:20 | 10.01 | 9.16 | 04:40 | 0.38 | 23:35 | 0.52 | 0.46 | 04:40 | 0.216 | 15:20 | 0.388 | 0.329 | 0.329 | |
| 01/21/2020 | 03:55 | 7.87 | 11:45 | 10.30 | 9.14 | 03:55 | 0.39 | 07:25 | 0.52 | 0.46 | 03:55 | 0.219 | 11:45 | 0.395 | 0.329 | 0.329 | |
| 01/22/2020 | 05:00 | 8.01 | 21:15 | 10.12 | 9.17 | 05:00 | 0.39 | 07:35 | 0.52 | 0.46 | 05:00 | 0.229 | 21:15 | 0.391 | 0.331 | 0.331 | 0.03 |
| 01/23/2020 | 04:35 | 7.98 | 19:45 | 10.10 | 9.12 | 04:35 | 0.39 | 23:30 | 0.52 | 0.46 | 04:35 | 0.227 | 19:45 | 0.391 | 0.328 | 0.328 | |
| 01/24/2020 | 04:50 | 7.59 | 17:45 | 10.20 | 9.19 | 04:55 | 0.36 | 08:35 | 0.51 | 0.45 | 04:55 | 0.194 | 17:45 | 0.393 | 0.327 | 0.327 | |
| 01/25/2020 | 05:05 | 8.00 | 10:35 | 10.74 | 9.09 | 05:05 | 0.39 | 21:20 | 0.52 | 0.46 | 05:05 | 0.228 | 10:35 | 0.438 | 0.327 | 0.327 | |
| 01/26/2020 | 05:05 | 7.59 | 11:15 | 10.31 | 9.05 | 05:10 | 0.37 | 09:00 | 0.52 | 0.45 | 05:05 | 0.197 | 11:15 | 0.395 | 0.319 | 0.319 | 0.16 |
| 01/27/2020 | 05:20 | 7.67 | 21:20 | 10.68 | 9.17 | 05:05 | 0.34 | 08:10 | 0.48 | 0.46 | 05:05 | 0.184 | 21:05 | 0.396 | 0.328 | 0.328 | |
| 01/28/2020 | 04:30 | 7.76 | 10:45 | 10.40 | 9.18 | 04:30 | 0.38 | 14:35 | 0.52 | 0.46 | 04:30 | 0.211 | 10:45 | 0.396 | 0.332 | 0.332 | 0.01 |
| 01/29/2020 | 04:05 | 7.76 | 10:05 | 10.69 | 9.20 | 04:05 | 0.38 | 00:00 | 0.52 | 0.46 | 04:05 | 0.211 | 10:20 | 0.396 | 0.331 | 0.331 | |
| 01/30/2020 | 04:05 | 7.59 | 22:25 | 10.33 | 9.14 | 04:05 | 0.37 | 07:35 | 0.51 | 0.46 | 04:05 | 0.198 | 22:25 | 0.395 | 0.328 | 0.328 | |
| 01/31/2020 | 04:55 | 7.62 | 10:40 | 9.84 | 8.99 | 04:55 | 0.37 | 22:50 | 0.51 | 0.45 | 04:55 | 0.200 | 10:40 | 0.381 | 0.318 | 0.318 | |
| 02/01/2020 | 04:40 | 7.32 | 11:30 | 9.64 | 8.60 | 04:40 | 0.35 | 09:50 | 0.52 | 0.44 | 04:40 | 0.176 | 11:30 | 0.371 | 0.290 | 0.290 | |
| 02/02/2020 | 04:55 | 7.41 | 10:45 | 9.24 | 8.40 | 04:55 | 0.35 | 21:30 | 0.52 | 0.43 | 04:55 | 0.183 | 21:30 | 0.366 | 0.271 | 0.271 | |
| 02/03/2020 | 04:05 | 7.32 | 08:55 | 10.48 | 8.57 | 04:05 | 0.35 | 13:30 | 0.52 | 0.44 | 04:05 | 0.176 | 09:00 | 0.396 | 0.289 | 0.289 | |
| 02/04/2020 | 04:35 | 7.34 | 13:50 | 9.45 | 8.62 | 06:10 | 0.34 | 08:20 | 0.52 | 0.45 | 04:35 | 0.177 | 08:20 | 0.364 | 0.295 | 0.295 | |
| 02/05/2020 | 05:30 | 7.48 | 20:55 | 9.34 | 8.56 | 03:50 | 0.33 | 19:15 | 0.52 | 0.44 | 03:50 | 0.176 | 09:15 | 0.368 | 0.286 | 0.286 | |
| 02/06/2020 | 15:00 | 6.59 | 14:50 | 9.92 | 8.19 | 15:00 | 0.26 | 11:40 | 0.52 | 0.42 | 15:00 | 0.114 | 14:50 | 0.385 | 0.258 | 0.258 | |
| 02/07/2020 | 03:55 | 6.32 | 11:20 | 8.99 | 7.91 | 03:55 | 0.22 | 20:10 | 0.50 | 0.39 | 03:55 | 0.087 | 11:20 | 0.328 | 0.231 | 0.231 | |
| 02/08/2020 | 04:00 | 6.57 | 12:00 | 8.81 | 7.88 | 04:45 | 0.24 | 11:00 | 0.50 | 0.40 | 04:00 | 0.107 | 12:10 | 0.337 | 0.233 | 0.233 | |
| 02/09/2020 | 03:50 | 6.83 | 11:20 | 8.82 | 7.82 | 04:35 | 0.25 | 21:55 | 0.48 | 0.39 | 04:35 | 0.117 | 11:20 | 0.316 | 0.224 | 0.224 | |
| 02/10/2020 | 03:20 | 7.20 | 09:25 | 9.88 | 8.65 | 01:45 | 0.29 | 15:55 | 0.50 | 0.43 | 01:45 | 0.144 | 09:25 | 0.383 | 0.289 | 0.289 | |
| 02/11/2020 | 03:40 | 6.95 | 21:05 | 9.40 | 8.58 | 04:50 | 0.29 | 10:05 | 0.48 | 0.43 | 04:50 | 0.138 | 09:10 | 0.353 | 0.285 | 0.285 | |
| 02/12/2020 | 04:05 | 7.00 | 20:10 | 9.76 | 8.68 | 04:15 | 0.27 | 16:25 | 0.51 | 0.44 | 04:15 | 0.127 | 20:10 | 0.377 | 0.294 | 0.294 | |
| 02/13/2020 | 04:00 | 7.13 | 11:55 | 9.57 | 8.65 | 03:35 | 0.29 | 21:00 | 0.51 | 0.44 | 03:35 | 0.142 | 21:00 | 0.376 | 0.293 | 0.293 | |
| 02/14/2020 | 04:00 | 7.12 | 11:25 | 9.65 | 8.74 | 03:50 | 0.28 | 22:55 | 0.51 | 0.44 | 03:50 | 0.138 | 19:20 | 0.372 | 0.299 | 0.299 | |
| 02/15/2020 | 05:30 | 7.13 | 12:20 | 9.92 | 8.50 | 06:15 | 0.30 | 13:55 | 0.48 | 0.43 | 06:15 | 0.150 | 12:20 | 0.385 | 0.280 | 0.280 | |
| 02/16/2020 | 04:45 | 6.74 | 13:10 | 9.27 | 8.18 | 04:45 | 0.24 | 19:55 | 0.49 | 0.41 | 04:45 | 0.107 | 13:10 | 0.344 | 0.255 | 0.255 | |
| 02/17/2020 | 04:50 | 6.75 | 13:25 | 9.99 | 8.37 | 03:00 | 0.27 | 10:45 | 0.51 | 0.41 | 04:50 | 0.122 | 13:25 | 0.387 | 0.267 | 0.267 | |
| 02/18/2020 | 03:50 | 6.85 | 11:00 | 9.50 | 8.45 | 04:55 | 0.27 | 08:30 | 0.50 | 0.43 | 05:25 | 0.123 | 11:00 | 0.358 | 0.277 | 0.277 | |
| 02/19/2020 | 04:30 | 7.06 | 12:10 | 9.75 | 8.61 | 04:30 | 0.31 | 13:25 | 0.51 | 0.44 | 04:30 | 0.150 | 13:25 | 0.383 | 0.289 | 0.289 | |
| 02/20/2020 | 03:30 | 7.30 | 11:20 | 9.64 | 8.72 | 04:20 | 0.31 | 21:45 | 0.51 | 0.45 | 04:20 | 0.160 | 11:20 | 0.371 | 0.299 | 0.299 | |
| 02/21/2020 | 04:20 | 7.10 | 11:00 | 9.56 | 8.48 | 03:50 | 0.29 | 11:00 | 0.48 | 0.44 | 03:50 | 0.145 | 11:00 | 0.367 | 0.281 | 0.281 | |
| 02/22/2020 | 05:40 | 6.88 | 12:05 | 9.91 | 8.34 | 03:40 | 0.28 | 12:35 | 0.48 | 0.42 | 05:45 | 0.135 | 12:05 | 0.384 | 0.267 | 0.267 | |
| 02/23/2020 | 05:35 | 6.85 | 20:20 | 9.71 | 8.32 | 03:00 | 0.28 | 17:55 | 0.50 | 0.42 | 05:15 | 0.129 | 20:20 | 0.375 | 0.265 | 0.265 | |
| 02/24/2020 | 04:30 | 6.91 | 11:40 | 9.34 | 8.37 | 01:50 | 0.29 | 14:50 | 0.51 | 0.42 | 03:50 | 0.137 | 14:50 | 0.360 | 0.271 | 0.271 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 02/25/2020 | 05:10 | 7.00 | 20:45 | 9.19 | 8.44 | 03:55 | 0.28 | 10:55 | 0.50 | 0.43 | 03:55 | 0.133 | 10:55 | 0.351 | 0.277 | 0.277 | | |
| 02/26/2020 | 04:15 | 6.90 | 08:30 | 9.34 | 8.33 | 05:15 | 0.27 | 08:50 | 0.48 | 0.43 | 05:15 | 0.127 | 08:30 | 0.348 | 0.268 | 0.268 | | |
| 02/27/2020 | 04:10 | 7.06 | 12:30 | 9.10 | 8.41 | 04:05 | 0.29 | 07:50 | 0.50 | 0.43 | 04:05 | 0.139 | 07:50 | 0.336 | 0.276 | 0.276 | | |
| 02/28/2020 | 04:05 | 7.00 | 11:00 | 9.33 | 8.41 | 04:55 | 0.29 | 12:25 | 0.50 | 0.43 | 04:55 | 0.140 | 11:00 | 0.350 | 0.276 | 0.276 | | |
| 02/29/2020 | 03:55 | 6.85 | 13:55 | 9.42 | 8.13 | 03:45 | 0.26 | 12:10 | 0.50 | 0.41 | 03:45 | 0.118 | 12:10 | 0.363 | 0.250 | 0.250 | | |
| 03/01/2020 | 05:30 | 6.79 | 12:55 | 8.88 | 7.97 | 03:10 | 0.25 | 20:40 | 0.51 | 0.41 | 03:15 | 0.116 | 14:25 | 0.328 | 0.239 | 0.239 | | |
| 03/02/2020 | 04:25 | 7.12 | 20:55 | 9.06 | 8.22 | 01:50 | 0.29 | 08:55 | 0.52 | 0.42 | 04:00 | 0.146 | 08:40 | 0.336 | 0.256 | 0.256 | | |
| 03/03/2020 | 04:40 | 7.14 | 20:20 | 9.01 | 8.18 | 04:40 | 0.33 | 07:55 | 0.52 | 0.41 | 04:40 | 0.160 | 07:55 | 0.353 | 0.247 | 0.247 | | |
| 03/04/2020 | 03:50 | 6.87 | 09:40 | 9.11 | 8.21 | 03:50 | 0.30 | 11:45 | 0.53 | 0.42 | 03:50 | 0.137 | 11:45 | 0.361 | 0.258 | 0.258 | | |
| 03/05/2020 | 03:35 | 6.84 | 20:45 | 9.08 | 8.16 | 04:30 | 0.29 | 09:40 | 0.48 | 0.41 | 04:30 | 0.133 | 20:45 | 0.331 | 0.251 | 0.251 | | |
| 03/06/2020 | 05:35 | 6.83 | 10:35 | 8.98 | 8.16 | 05:35 | 0.29 | 10:35 | 0.47 | 0.41 | 05:35 | 0.134 | 10:35 | 0.323 | 0.252 | 0.252 | | |
| 03/07/2020 | 05:15 | 6.78 | 11:05 | 9.25 | 8.19 | 04:55 | 0.28 | 20:40 | 0.52 | 0.40 | 04:55 | 0.126 | 20:40 | 0.348 | 0.248 | 0.248 | | |
| 03/08/2020 | 04:50 | 6.98 | 11:30 | 9.18 | 8.17 | 04:50 | 0.31 | 13:35 | 0.54 | 0.42 | 04:50 | 0.146 | 13:35 | 0.379 | 0.257 | 0.257 | | |
| 03/09/2020 | 03:30 | 6.86 | 10:25 | 9.21 | 8.25 | 01:40 | 0.27 | 10:20 | 0.53 | 0.41 | 02:40 | 0.130 | 10:20 | 0.383 | 0.257 | 0.257 | | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 34.416 | 4.90 |
| Avg | 9.47 | 0.40 | 0.299 | |

Site Commentary

Site Information

| MIL_2300 | |
|-----------------|-------|
| Pipe Dimensions | 10.25 |
| Silt Level | 0.00" |

Overview

Site MIL_2300 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020 . This site exhibited a small response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020 , along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|---------------------|---------------------|---------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 1.65 | 1.40 | 0.056 |
| Minimum | 0.93 | 0.33 | 0.006 |
| Maximum | 2.44 | 2.89 | 0.177 |
| Time of Minimum | 1/13/2020 4:15 AM | 2/27/2020 3:50 AM | 1/13/2020 3:55 AM |
| Time of Maximum | 11/28/2019 12:45 PM | 12/13/2019 11:10 AM | 11/28/2019 12:50 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2300

Site Address /Location: Washington Dr and Fontainebleu Avenue, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: In between lanes w/buses

Latitude:

37.452734

Longitude:

-121.909412

Pipe Size (H x W)

10.25" x 10.25"

Pipe Shape

Circular

Manhole #

2300

System Characteristics

Residential

Access

Traffic

Drive

Medium



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

3:03:34 AM

Pipe Size (HxW)

10.25" x 10.25"

Depth of Flow (Wet DOF) (in)

1.13"

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.2

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Good flow shallow depth, moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

6'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_2300

Flow Monitor

MIL_2300

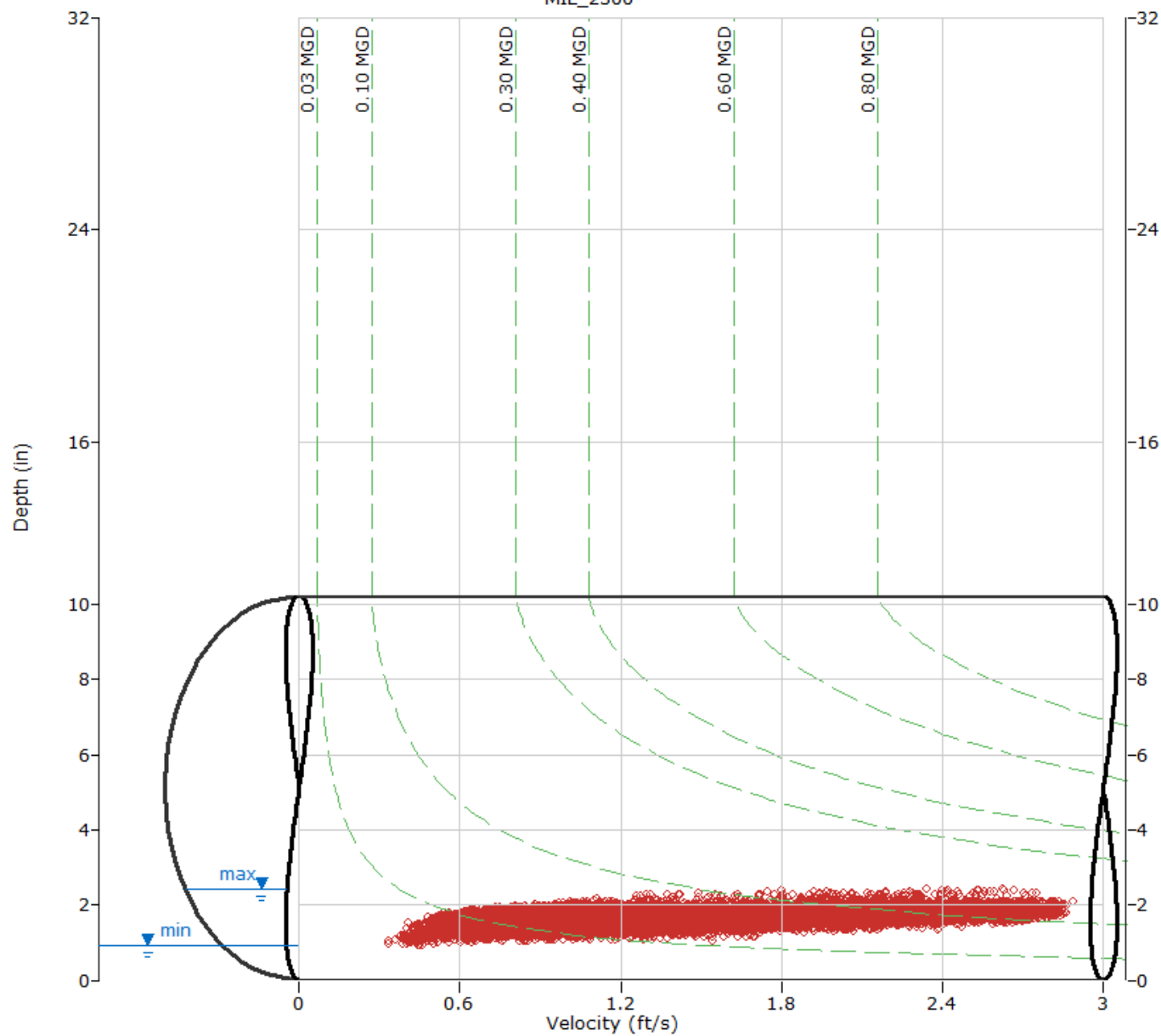
Pipe Height
10.25 in

Report Period

11/16/2019
To
3/9/2020

Legend

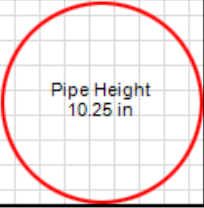
- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_2300

Flow Monitor
MIL_2300

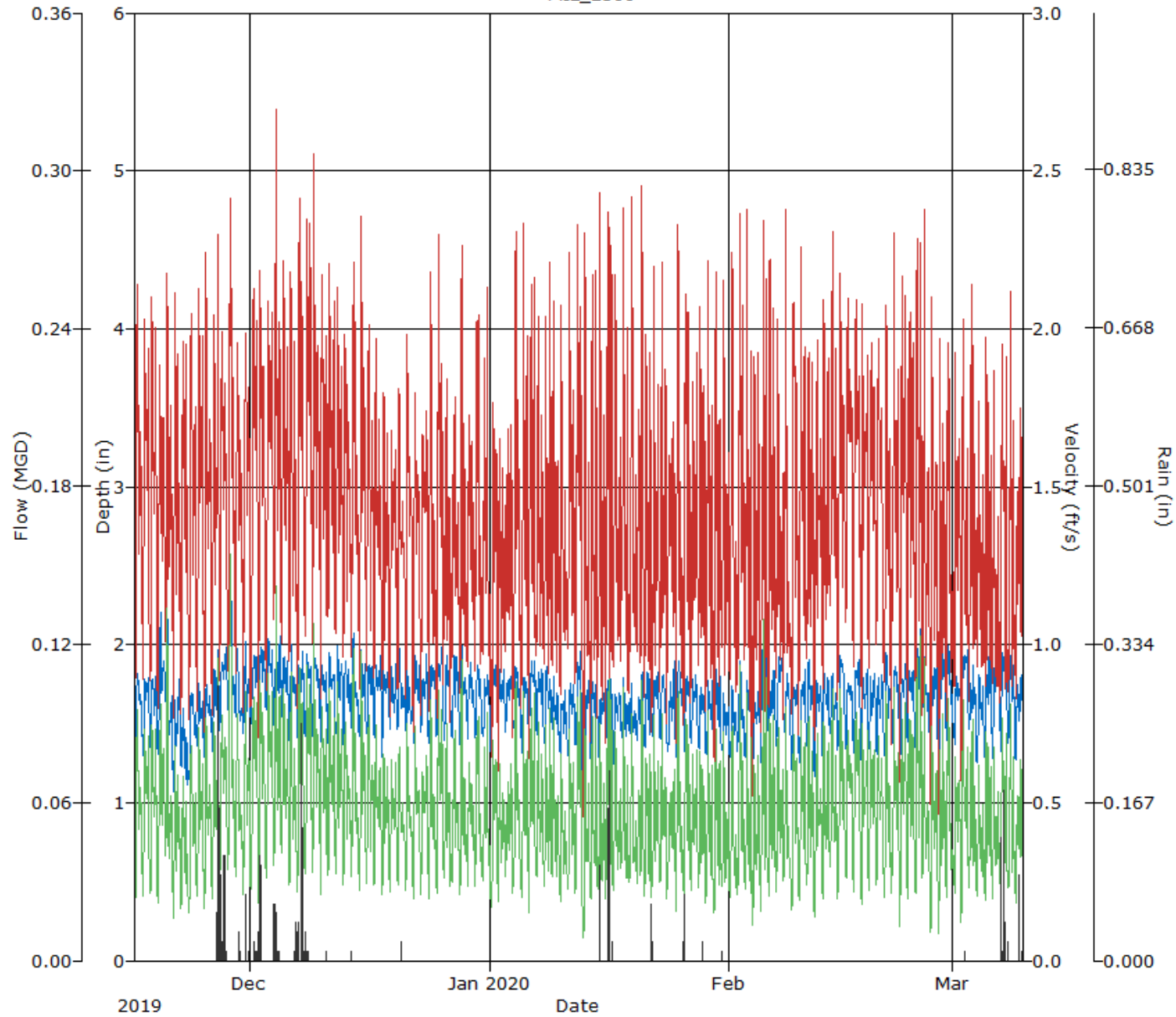


Pipe Height
10.25 in.

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2300, Pipe Height: 10.25 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 05:45 | 1.20 | 11:55 | 1.86 | 1.60 | 04:05 | 0.54 | 11:55 | 2.71 | 1.45 | 04:05 | 0.014 | 11:55 | 0.125 | 0.055 | 0.055 | |
| 11/17/2019 | 05:25 | 1.27 | 20:00 | 2.02 | 1.61 | 05:25 | 0.65 | 20:00 | 2.83 | 1.47 | 05:25 | 0.017 | 20:00 | 0.146 | 0.057 | 0.057 | |
| 11/18/2019 | 01:55 | 1.30 | 19:25 | 1.93 | 1.63 | 00:35 | 0.65 | 18:50 | 2.58 | 1.49 | 04:25 | 0.020 | 18:50 | 0.118 | 0.058 | 0.058 | |
| 11/19/2019 | 03:05 | 1.22 | 11:15 | 2.33 | 1.74 | 23:50 | 0.54 | 07:50 | 2.59 | 1.40 | 02:25 | 0.015 | 11:20 | 0.143 | 0.061 | 0.061 | |
| 11/20/2019 | 23:40 | 1.32 | 07:35 | 2.40 | 1.67 | 02:40 | 0.65 | 07:40 | 2.63 | 1.43 | 23:25 | 0.021 | 07:40 | 0.172 | 0.058 | 0.058 | |
| 11/21/2019 | 04:15 | 0.99 | 14:00 | 2.04 | 1.43 | 03:40 | 0.36 | 14:10 | 2.66 | 1.37 | 03:40 | 0.008 | 14:00 | 0.133 | 0.045 | 0.045 | |
| 11/22/2019 | 23:50 | 1.05 | 07:55 | 1.71 | 1.34 | 02:30 | 0.49 | 10:10 | 2.67 | 1.43 | 02:35 | 0.013 | 14:20 | 0.100 | 0.042 | 0.042 | |
| 11/23/2019 | 00:15 | 1.04 | 13:40 | 2.05 | 1.46 | 03:20 | 0.54 | 12:25 | 2.82 | 1.48 | 03:15 | 0.012 | 12:25 | 0.115 | 0.050 | 0.050 | |
| 11/24/2019 | 03:50 | 1.31 | 09:50 | 1.95 | 1.54 | 05:15 | 0.50 | 09:50 | 2.82 | 1.46 | 05:15 | 0.014 | 09:50 | 0.138 | 0.052 | 0.052 | |
| 11/25/2019 | 02:40 | 1.24 | 11:15 | 1.88 | 1.56 | 03:15 | 0.46 | 11:25 | 2.76 | 1.45 | 03:15 | 0.012 | 11:25 | 0.127 | 0.053 | 0.053 | |
| 11/26/2019 | 03:40 | 1.29 | 23:55 | 2.22 | 1.69 | 04:00 | 0.50 | 21:50 | 2.74 | 1.47 | 04:00 | 0.014 | 20:50 | 0.143 | 0.061 | 0.061 | 0.63 |
| 11/27/2019 | 03:30 | 1.43 | 22:05 | 2.09 | 1.78 | 03:55 | 0.45 | 22:05 | 2.67 | 1.53 | 03:55 | 0.015 | 22:05 | 0.144 | 0.067 | 0.067 | 0.77 |
| 11/28/2019 | 04:15 | 1.55 | 12:45 | 2.44 | 1.89 | 04:10 | 0.61 | 11:45 | 2.75 | 1.58 | 04:10 | 0.021 | 12:50 | 0.177 | 0.078 | 0.078 | |
| 11/29/2019 | 18:05 | 1.43 | 08:55 | 2.08 | 1.66 | 05:20 | 0.56 | 10:25 | 2.44 | 1.43 | 05:20 | 0.019 | 10:25 | 0.118 | 0.057 | 0.057 | |
| 11/30/2019 | 04:10 | 1.42 | 10:25 | 2.14 | 1.70 | 02:40 | 0.53 | 19:15 | 2.73 | 1.51 | 02:40 | 0.017 | 19:15 | 0.143 | 0.063 | 0.063 | 0.14 |
| 12/01/2019 | 03:40 | 1.47 | 14:30 | 2.07 | 1.77 | 05:05 | 0.41 | 12:10 | 2.70 | 1.58 | 05:05 | 0.014 | 14:30 | 0.144 | 0.070 | 0.070 | 0.06 |
| 12/02/2019 | 04:50 | 1.35 | 14:50 | 2.17 | 1.79 | 05:05 | 0.49 | 14:30 | 2.76 | 1.57 | 04:25 | 0.017 | 14:50 | 0.148 | 0.071 | 0.071 | 0.36 |
| 12/03/2019 | 04:35 | 1.45 | 09:55 | 2.18 | 1.84 | 03:20 | 0.58 | 08:05 | 2.73 | 1.59 | 03:20 | 0.020 | 08:05 | 0.147 | 0.074 | 0.074 | |
| 12/04/2019 | 03:10 | 1.45 | 22:00 | 2.12 | 1.80 | 04:05 | 0.80 | 09:50 | 2.84 | 1.70 | 04:05 | 0.027 | 09:50 | 0.154 | 0.077 | 0.077 | |
| 12/05/2019 | 23:55 | 1.51 | 09:40 | 2.01 | 1.78 | 04:30 | 0.61 | 07:30 | 2.80 | 1.58 | 04:30 | 0.027 | 07:30 | 0.136 | 0.069 | 0.069 | |
| 12/06/2019 | 05:20 | 1.32 | 09:00 | 2.15 | 1.68 | 02:00 | 0.62 | 11:10 | 2.75 | 1.49 | 02:00 | 0.019 | 09:20 | 0.147 | 0.061 | 0.061 | |
| 12/07/2019 | 03:30 | 1.37 | 20:15 | 2.04 | 1.72 | 04:20 | 0.50 | 17:45 | 2.84 | 1.66 | 04:50 | 0.015 | 19:45 | 0.138 | 0.070 | 0.070 | 0.84 |
| 12/08/2019 | 01:25 | 1.34 | 10:25 | 2.00 | 1.72 | 04:45 | 0.55 | 19:20 | 2.82 | 1.73 | 04:45 | 0.018 | 12:00 | 0.132 | 0.073 | 0.073 | 0.10 |
| 12/09/2019 | 04:05 | 1.28 | 07:40 | 2.04 | 1.75 | 04:10 | 0.58 | 07:15 | 2.84 | 1.66 | 04:10 | 0.016 | 07:20 | 0.147 | 0.072 | 0.072 | |
| 12/10/2019 | 03:30 | 1.29 | 09:15 | 2.03 | 1.70 | 02:55 | 0.61 | 10:10 | 2.74 | 1.57 | 03:30 | 0.018 | 10:25 | 0.132 | 0.065 | 0.065 | |
| 12/11/2019 | 03:05 | 1.35 | 08:30 | 2.08 | 1.71 | 00:55 | 0.47 | 21:00 | 2.78 | 1.58 | 00:55 | 0.015 | 08:30 | 0.135 | 0.066 | 0.066 | 0.00 |
| 12/12/2019 | 05:10 | 1.36 | 07:35 | 2.07 | 1.73 | 01:45 | 0.68 | 15:30 | 2.75 | 1.53 | 01:45 | 0.022 | 08:05 | 0.142 | 0.065 | 0.065 | |
| 12/13/2019 | 02:50 | 1.29 | 11:20 | 2.12 | 1.69 | 05:05 | 0.57 | 11:10 | 2.89 | 1.48 | 03:05 | 0.017 | 11:10 | 0.157 | 0.061 | 0.061 | |
| 12/14/2019 | 03:00 | 1.27 | 13:30 | 2.21 | 1.71 | 03:55 | 0.49 | 08:40 | 2.79 | 1.51 | 03:55 | 0.016 | 08:40 | 0.145 | 0.063 | 0.063 | 0.01 |
| 12/15/2019 | 05:35 | 1.35 | 09:20 | 2.12 | 1.68 | 07:25 | 0.65 | 18:45 | 2.73 | 1.53 | 03:20 | 0.020 | 11:05 | 0.141 | 0.063 | 0.063 | |
| 12/16/2019 | 05:05 | 1.39 | 12:15 | 2.13 | 1.71 | 02:40 | 0.61 | 08:30 | 2.74 | 1.46 | 02:40 | 0.020 | 08:30 | 0.135 | 0.061 | 0.061 | |
| 12/17/2019 | 02:55 | 1.37 | 09:15 | 2.16 | 1.72 | 02:50 | 0.59 | 07:35 | 2.72 | 1.38 | 02:50 | 0.018 | 07:35 | 0.139 | 0.058 | 0.058 | |
| 12/18/2019 | 01:50 | 1.18 | 07:00 | 2.03 | 1.67 | 03:45 | 0.60 | 09:10 | 2.41 | 1.34 | 03:45 | 0.018 | 11:25 | 0.109 | 0.054 | 0.054 | |
| 12/19/2019 | 02:55 | 1.41 | 08:50 | 2.01 | 1.69 | 03:05 | 0.63 | 11:30 | 2.39 | 1.34 | 03:05 | 0.020 | 21:25 | 0.112 | 0.054 | 0.054 | |
| 12/20/2019 | 04:40 | 1.41 | 10:35 | 2.08 | 1.66 | 02:40 | 0.66 | 08:25 | 2.45 | 1.31 | 02:40 | 0.023 | 08:25 | 0.118 | 0.052 | 0.052 | |
| 12/21/2019 | 05:35 | 1.42 | 09:35 | 1.97 | 1.62 | 05:05 | 0.69 | 09:35 | 2.51 | 1.39 | 05:05 | 0.022 | 09:35 | 0.125 | 0.053 | 0.053 | |
| 12/22/2019 | 04:35 | 1.33 | 11:30 | 2.26 | 1.70 | 03:50 | 0.57 | 10:50 | 2.40 | 1.33 | 03:50 | 0.017 | 10:50 | 0.134 | 0.055 | 0.055 | |
| 12/23/2019 | 02:40 | 1.39 | 20:30 | 2.00 | 1.70 | 23:35 | 0.66 | 22:45 | 2.70 | 1.37 | 02:30 | 0.022 | 22:45 | 0.128 | 0.056 | 0.056 | |
| 12/24/2019 | 04:20 | 1.31 | 09:55 | 2.01 | 1.70 | 00:25 | 0.56 | 13:55 | 2.71 | 1.35 | 03:20 | 0.019 | 09:50 | 0.132 | 0.055 | 0.055 | |
| 12/25/2019 | 06:40 | 1.36 | 20:40 | 2.06 | 1.74 | 23:55 | 0.56 | 11:50 | 2.75 | 1.44 | 05:45 | 0.019 | 09:45 | 0.139 | 0.062 | 0.062 | |
| 12/26/2019 | 04:50 | 1.33 | 11:05 | 2.08 | 1.69 | 23:25 | 0.54 | 11:05 | 2.77 | 1.23 | 04:50 | 0.018 | 11:05 | 0.149 | 0.050 | 0.050 | |
| 12/27/2019 | 04:20 | 1.32 | 21:15 | 2.07 | 1.70 | 00:15 | 0.55 | 11:40 | 2.59 | 1.33 | 00:15 | 0.019 | 09:10 | 0.133 | 0.055 | 0.055 | |
| 12/28/2019 | 03:55 | 1.26 | 10:35 | 2.05 | 1.68 | 05:00 | 0.45 | 10:35 | 2.77 | 1.33 | 05:00 | 0.014 | 10:35 | 0.146 | 0.055 | 0.055 | |
| 12/29/2019 | 05:45 | 1.38 | 13:45 | 1.97 | 1.67 | 17:35 | 0.54 | 10:35 | 2.65 | 1.30 | 05:50 | 0.017 | 08:25 | 0.122 | 0.052 | 0.052 | |
| 12/30/2019 | 04:50 | 1.32 | 11:35 | 1.97 | 1.68 | 23:15 | 0.60 | 11:35 | 2.65 | 1.38 | 03:00 | 0.021 | 11:35 | 0.132 | 0.056 | 0.056 | |
| 12/31/2019 | 03:05 | 1.33 | 22:00 | 1.88 | 1.64 | 15:40 | 0.63 | 16:20 | 2.80 | 1.34 | 03:15 | 0.019 | 17:30 | 0.124 | 0.052 | 0.052 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 05:10 | 1.24 | 11:00 | 2.00 | 1.68 | 05:05 | 0.41 | 11:00 | 2.73 | 1.20 | 05:05 | 0.011 | 11:00 | 0.138 | 0.050 | 0.050 | 0.10 |
| 01/02/2020 | 05:05 | 1.47 | 09:10 | 1.96 | 1.71 | 02:25 | 0.48 | 08:35 | 2.69 | 1.21 | 03:20 | 0.018 | 09:05 | 0.130 | 0.050 | 0.050 | |
| 01/03/2020 | 01:30 | 1.40 | 09:05 | 1.90 | 1.67 | 06:55 | 0.50 | 19:10 | 2.69 | 1.31 | 06:55 | 0.016 | 19:10 | 0.126 | 0.052 | 0.052 | |
| 01/04/2020 | 04:10 | 1.40 | 10:10 | 1.96 | 1.67 | 03:25 | 0.47 | 09:50 | 2.83 | 1.39 | 03:25 | 0.016 | 11:30 | 0.135 | 0.056 | 0.056 | |
| 01/05/2020 | 04:30 | 1.27 | 09:30 | 1.94 | 1.64 | 01:00 | 0.50 | 11:20 | 2.82 | 1.36 | 05:15 | 0.018 | 11:20 | 0.129 | 0.054 | 0.054 | |
| 01/06/2020 | 03:15 | 1.29 | 12:00 | 2.02 | 1.71 | 04:05 | 0.40 | 09:50 | 2.78 | 1.41 | 04:05 | 0.012 | 09:50 | 0.134 | 0.059 | 0.059 | |
| 01/07/2020 | 03:05 | 1.33 | 08:40 | 1.97 | 1.69 | 23:50 | 0.55 | 19:25 | 2.76 | 1.34 | 23:50 | 0.021 | 07:35 | 0.131 | 0.054 | 0.054 | |
| 01/08/2020 | 02:45 | 1.32 | 08:00 | 1.94 | 1.65 | 14:25 | 0.51 | 21:30 | 2.79 | 1.32 | 02:30 | 0.017 | 11:10 | 0.131 | 0.052 | 0.052 | |
| 01/09/2020 | 10:40 | 1.32 | 09:45 | 1.86 | 1.59 | 23:35 | 0.57 | 10:10 | 2.76 | 1.32 | 23:35 | 0.017 | 07:15 | 0.124 | 0.050 | 0.050 | |
| 01/10/2020 | 04:35 | 1.12 | 20:20 | 1.75 | 1.53 | 01:00 | 0.58 | 09:30 | 2.71 | 1.30 | 04:30 | 0.015 | 08:20 | 0.107 | 0.046 | 0.046 | |
| 01/11/2020 | 03:45 | 1.21 | 23:10 | 1.94 | 1.57 | 07:10 | 0.54 | 13:50 | 2.80 | 1.45 | 05:25 | 0.017 | 11:05 | 0.116 | 0.053 | 0.053 | 0.66 |
| 01/12/2020 | 23:50 | 1.14 | 19:50 | 2.02 | 1.64 | 01:05 | 0.47 | 10:40 | 2.86 | 1.52 | 01:05 | 0.014 | 19:10 | 0.144 | 0.061 | 0.061 | |
| 01/13/2020 | 04:15 | 0.93 | 17:35 | 2.03 | 1.47 | 03:55 | 0.33 | 20:50 | 2.74 | 1.15 | 03:55 | 0.006 | 12:00 | 0.127 | 0.041 | 0.041 | |
| 01/14/2020 | 04:35 | 1.26 | 21:00 | 1.87 | 1.59 | 06:35 | 0.47 | 20:25 | 2.84 | 1.22 | 03:20 | 0.015 | 21:00 | 0.129 | 0.046 | 0.046 | |
| 01/15/2020 | 04:40 | 1.20 | 20:00 | 1.78 | 1.55 | 23:50 | 0.53 | 21:30 | 2.71 | 1.27 | 23:50 | 0.018 | 21:30 | 0.116 | 0.046 | 0.046 | |
| 01/16/2020 | 23:45 | 1.34 | 12:50 | 1.93 | 1.62 | 00:45 | 0.49 | 19:50 | 2.77 | 1.50 | 00:45 | 0.016 | 07:25 | 0.131 | 0.059 | 0.059 | |
| 01/17/2020 | 01:20 | 1.22 | 14:50 | 1.98 | 1.55 | 01:00 | 0.52 | 12:20 | 2.79 | 1.39 | 01:00 | 0.014 | 07:55 | 0.121 | 0.050 | 0.050 | |
| 01/18/2020 | 22:45 | 1.33 | 10:25 | 1.86 | 1.55 | 01:10 | 0.50 | 10:15 | 2.79 | 1.39 | 01:10 | 0.017 | 10:25 | 0.124 | 0.050 | 0.050 | |
| 01/19/2020 | 05:30 | 1.38 | 09:45 | 1.81 | 1.55 | 01:30 | 0.58 | 14:50 | 2.85 | 1.42 | 03:50 | 0.020 | 14:50 | 0.120 | 0.051 | 0.051 | |
| 01/20/2020 | 23:55 | 1.35 | 19:15 | 1.97 | 1.57 | 01:10 | 0.61 | 18:10 | 2.86 | 1.40 | 01:10 | 0.020 | 18:50 | 0.135 | 0.052 | 0.052 | |
| 01/21/2020 | 04:25 | 1.24 | 20:35 | 2.05 | 1.59 | 00:20 | 0.55 | 12:30 | 2.80 | 1.34 | 00:20 | 0.016 | 20:35 | 0.137 | 0.050 | 0.050 | 0.01 |
| 01/22/2020 | 00:35 | 1.34 | 17:45 | 1.89 | 1.65 | 01:10 | 0.51 | 13:25 | 2.71 | 1.30 | 00:55 | 0.018 | 17:45 | 0.125 | 0.051 | 0.051 | 0.09 |
| 01/23/2020 | 23:50 | 1.33 | 17:10 | 1.93 | 1.62 | 00:10 | 0.55 | 19:45 | 2.71 | 1.36 | 23:50 | 0.017 | 07:25 | 0.124 | 0.052 | 0.052 | 0.16 |
| 01/24/2020 | 12:10 | 1.19 | 10:55 | 2.05 | 1.57 | 00:10 | 0.68 | 13:05 | 2.68 | 1.35 | 00:10 | 0.017 | 22:20 | 0.114 | 0.049 | 0.049 | |
| 01/25/2020 | 03:20 | 1.19 | 13:10 | 1.98 | 1.64 | 01:05 | 0.54 | 09:30 | 2.82 | 1.36 | 05:00 | 0.014 | 13:10 | 0.137 | 0.054 | 0.054 | |
| 01/26/2020 | 18:30 | 1.13 | 21:55 | 1.88 | 1.62 | 04:50 | 0.52 | 11:10 | 2.83 | 1.45 | 04:50 | 0.014 | 11:10 | 0.130 | 0.056 | 0.056 | |
| 01/27/2020 | 01:15 | 1.18 | 19:00 | 1.87 | 1.61 | 23:50 | 0.45 | 19:50 | 2.74 | 1.31 | 23:50 | 0.013 | 19:00 | 0.123 | 0.050 | 0.050 | |
| 01/28/2020 | 18:10 | 1.18 | 15:05 | 1.83 | 1.55 | 00:35 | 0.46 | 21:25 | 2.79 | 1.32 | 00:35 | 0.014 | 15:05 | 0.121 | 0.047 | 0.047 | 0.02 |
| 01/29/2020 | 00:55 | 1.05 | 08:40 | 1.98 | 1.56 | 01:35 | 0.52 | 19:20 | 2.81 | 1.36 | 00:55 | 0.013 | 19:20 | 0.134 | 0.050 | 0.050 | |
| 01/30/2020 | 00:05 | 1.23 | 10:35 | 2.17 | 1.60 | 01:10 | 0.43 | 10:00 | 2.73 | 1.30 | 01:10 | 0.013 | 19:45 | 0.133 | 0.050 | 0.050 | |
| 01/31/2020 | 17:35 | 1.20 | 16:05 | 1.78 | 1.49 | 15:40 | 0.57 | 16:10 | 2.82 | 1.31 | 17:35 | 0.015 | 16:10 | 0.121 | 0.045 | 0.045 | 0.01 |
| 02/01/2020 | 03:05 | 1.15 | 10:05 | 1.86 | 1.49 | 07:45 | 0.58 | 11:05 | 2.73 | 1.37 | 07:45 | 0.018 | 13:10 | 0.114 | 0.047 | 0.047 | 0.01 |
| 02/02/2020 | 01:55 | 1.20 | 11:45 | 2.04 | 1.57 | 23:10 | 0.57 | 14:10 | 2.74 | 1.48 | 23:10 | 0.016 | 11:45 | 0.127 | 0.056 | 0.056 | |
| 02/03/2020 | 05:10 | 1.12 | 21:05 | 1.95 | 1.59 | 00:10 | 0.49 | 07:10 | 2.81 | 1.33 | 00:10 | 0.014 | 21:05 | 0.122 | 0.050 | 0.050 | |
| 02/04/2020 | 00:40 | 1.15 | 20:30 | 1.88 | 1.53 | 03:35 | 0.39 | 22:25 | 2.79 | 1.26 | 03:35 | 0.009 | 22:25 | 0.118 | 0.045 | 0.045 | |
| 02/05/2020 | 03:50 | 1.21 | 12:05 | 2.40 | 1.75 | 04:40 | 0.47 | 20:25 | 2.81 | 1.26 | 04:40 | 0.013 | 12:05 | 0.168 | 0.056 | 0.056 | |
| 02/06/2020 | 03:20 | 1.34 | 13:45 | 1.98 | 1.65 | 03:25 | 0.52 | 20:20 | 2.75 | 1.40 | 03:25 | 0.015 | 20:20 | 0.130 | 0.056 | 0.056 | |
| 02/07/2020 | 05:00 | 1.28 | 11:15 | 2.13 | 1.73 | 15:55 | 0.64 | 14:15 | 2.81 | 1.29 | 04:25 | 0.019 | 14:15 | 0.147 | 0.054 | 0.054 | |
| 02/08/2020 | 06:50 | 1.39 | 19:25 | 1.95 | 1.63 | 22:45 | 0.57 | 10:00 | 2.75 | 1.23 | 22:45 | 0.019 | 14:00 | 0.121 | 0.047 | 0.047 | |
| 02/09/2020 | 04:50 | 1.10 | 08:25 | 1.87 | 1.53 | 23:30 | 0.44 | 19:45 | 2.82 | 1.37 | 23:30 | 0.014 | 08:30 | 0.121 | 0.050 | 0.050 | |
| 02/10/2020 | 04:10 | 1.16 | 11:30 | 2.00 | 1.60 | 00:20 | 0.58 | 19:55 | 2.84 | 1.45 | 04:40 | 0.018 | 13:25 | 0.128 | 0.056 | 0.056 | |
| 02/11/2020 | 02:15 | 1.34 | 08:30 | 1.98 | 1.65 | 13:25 | 0.67 | 07:30 | 2.81 | 1.34 | 16:25 | 0.023 | 07:30 | 0.137 | 0.053 | 0.053 | 0.058 |
| 02/12/2020 | 02:05 | 1.08 | 10:15 | 2.02 | 1.59 | 06:10 | 0.50 | 10:05 | 2.86 | 1.37 | 02:00 | 0.012 | 10:15 | 0.146 | 0.052 | 0.052 | |
| 02/13/2020 | 02:00 | 1.25 | 09:50 | 1.90 | 1.61 | 14:05 | 0.58 | 13:20 | 2.83 | 1.41 | 04:35 | 0.019 | 07:55 | 0.127 | 0.054 | 0.054 | |
| 02/14/2020 | 04:00 | 1.40 | 13:00 | 2.01 | 1.62 | 15:30 | 0.63 | 10:05 | 2.83 | 1.55 | 15:30 | 0.021 | 13:00 | 0.140 | 0.060 | 0.060 | |
| 02/15/2020 | 02:20 | 1.27 | 09:30 | 2.04 | 1.70 | 03:00 | 0.60 | 09:05 | 2.75 | 1.51 | 03:00 | 0.016 | 09:30 | 0.141 | 0.064 | 0.064 | |
| 02/16/2020 | 05:35 | 1.26 | 16:20 | 1.85 | 1.61 | 00:25 | 0.53 | 16:30 | 2.69 | 1.61 | 00:25 | 0.018 | 16:20 | 0.112 | 0.061 | 0.061 | |
| 02/17/2020 | 04:15 | 1.26 | 20:50 | 1.94 | 1.67 | 04:15 | 0.58 | 17:40 | 2.51 | 1.57 | 04:15 | 0.015 | 14:45 | 0.121 | 0.064 | 0.064 | |
| 02/18/2020 | 04:20 | 1.20 | 18:55 | 1.94 | 1.62 | 04:35 | 0.55 | 18:55 | 2.83 | 1.52 | 04:35 | 0.013 | 18:55 | 0.138 | 0.059 | 0.059 | |
| 02/19/2020 | 04:35 | 1.30 | 08:05 | 1.96 | 1.62 | 23:55 | 0.60 | 20:25 | 2.53 | 1.53 | 04:20 | 0.017 | 08:10 | 0.122 | 0.059 | 0.059 | |
| 02/20/2020 | 04:20 | 1.24 | 10:20 | 1.92 | 1.60 | 00:00 | 0.55 | 09:25 | 2.44 | 1.47 | 00:00 | 0.018 | 09:25 | 0.109 | 0.056 | 0.056 | |
| 02/21/2020 | 03:30 | 1.25 | 09:15 | 2.10 | 1.63 | 02:20 | 0.43 | 09:15 | 2.73 | 1.38 | 02:20 | 0.013 | 09:15 | 0.149 | 0.054 | 0.054 | |
| 02/22/2020 | 03:45 | 1.30 | 14:10 | 1.95 | 1.68 | 00:35 | 0.50 | 09:35 | 2.83 | 1.52 | 00:35 | 0.018 | 09:35 | 0.130 | 0.061 | 0.061 | |
| 02/23/2020 | 04:05 | 1.10 | 19:50 | 2.00 | 1.63 | 04:25 | 0.38 | 18:05 | 2.74 | 1.46 | 04:10 | 0.009 | 18:05 | 0.131 | 0.058 | 0.058 | |
| 02/24/2020 | 03:25 | 1.33 | 11:30 | 2.06 | 1.67 | 23:40 | 0.50 | 11:30 | 2.81 | 1.47 | 03:05 | 0.015 | 11:30 | 0.149 | 0.059 | 0.059 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 04:05 | 1.27 | 13:40 | 2.25 | 1.79 | 03:50 | 0.75 | 21:35 | 2.86 | 1.57 | 03:55 | 0.020 | 20:45 | 0.151 | 0.071 | 0.071 | 0.01 |
| 02/26/2020 | 23:50 | 1.44 | 00:00 | 2.04 | 1.71 | 02:40 | 0.50 | 10:00 | 2.84 | 1.32 | 23:05 | 0.017 | 10:00 | 0.143 | 0.055 | 0.055 | |
| 02/27/2020 | 04:10 | 0.99 | 12:30 | 1.95 | 1.62 | 03:50 | 0.33 | 07:35 | 2.68 | 1.22 | 03:50 | 0.006 | 18:00 | 0.120 | 0.049 | 0.049 | |
| 02/28/2020 | 03:55 | 1.03 | 14:35 | 2.40 | 1.64 | 03:50 | 0.41 | 14:35 | 2.67 | 1.15 | 03:50 | 0.009 | 14:35 | 0.176 | 0.047 | 0.047 | |
| 02/29/2020 | 05:15 | 1.33 | 11:25 | 2.07 | 1.71 | 05:00 | 0.49 | 11:40 | 2.57 | 1.23 | 05:00 | 0.014 | 11:40 | 0.132 | 0.051 | 0.051 | |
| 03/01/2020 | 05:40 | 1.29 | 16:40 | 1.95 | 1.62 | 00:05 | 0.55 | 21:05 | 2.50 | 1.32 | 00:05 | 0.020 | 21:05 | 0.120 | 0.051 | 0.051 | |
| 03/02/2020 | 01:50 | 1.20 | 12:50 | 2.10 | 1.75 | 02:30 | 0.47 | 07:30 | 2.70 | 1.27 | 02:30 | 0.012 | 07:30 | 0.138 | 0.056 | 0.056 | |
| 03/03/2020 | 04:25 | 1.35 | 14:00 | 1.99 | 1.63 | 23:15 | 0.53 | 14:05 | 2.85 | 1.29 | 04:25 | 0.016 | 14:00 | 0.144 | 0.050 | 0.050 | |
| 03/04/2020 | 04:25 | 1.18 | 12:50 | 1.97 | 1.56 | 03:25 | 0.45 | 10:25 | 2.72 | 1.23 | 03:25 | 0.011 | 12:50 | 0.123 | 0.045 | 0.045 | |
| 03/05/2020 | 04:00 | 1.21 | 13:35 | 2.25 | 1.66 | 04:00 | 0.53 | 10:10 | 2.74 | 1.30 | 04:00 | 0.013 | 13:55 | 0.144 | 0.052 | 0.052 | |
| 03/06/2020 | 03:20 | 1.17 | 21:10 | 1.99 | 1.69 | 11:25 | 0.60 | 20:45 | 2.46 | 1.12 | 03:20 | 0.019 | 20:45 | 0.116 | 0.045 | 0.045 | 0.58 |
| 03/07/2020 | 04:55 | 1.24 | 14:05 | 2.04 | 1.72 | 03:15 | 0.47 | 14:00 | 2.74 | 1.30 | 03:15 | 0.014 | 14:00 | 0.142 | 0.055 | 0.055 | |
| 03/08/2020 | 04:35 | 1.34 | 09:45 | 2.03 | 1.68 | 03:35 | 0.51 | 21:50 | 2.72 | 1.25 | 03:35 | 0.016 | 09:45 | 0.125 | 0.051 | 0.051 | 0.02 |
| 03/09/2020 | 04:20 | 1.22 | 22:00 | 1.90 | 1.59 | 04:25 | 0.50 | 07:10 | 2.60 | 1.27 | 04:25 | 0.013 | 19:45 | 0.108 | 0.047 | 0.047 | 0.11 |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 6.402 | 5.26 |
| Avg | 1.65 | 1.40 | 0.056 | |

Site Commentary

Site Information

| MIL_2334 | |
|-----------------|-------|
| Pipe Dimensions | 12.5 |
| Silt Level | 0.00" |

Overview

Site MIL_2334 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited little to no response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|-------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 2.12 | 2.77 | 0.175 |
| Minimum | 1.55 | 1.24 | 0.052 |
| Maximum | 3.31 | 3.62 | 0.352 |
| Time of Minimum | 11/25/2019 3:50 AM | 2/28/2020 3:55 AM | 2/28/2020 3:55 AM |
| Time of Maximum | 12/8/2019 2:25 PM | 3/6/2020 9:45 AM | 12/8/2019 2:25 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2334

Site Address /Location: Tramway Dr and Strickroth Dr

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details:

Drive

Latitude:

37.44209

Longitude:

-121.903338

Pipe Size (H x W)

12.5" x 12.5"

Pipe Shape

Circular

Manhole #

2334

System Characteristics

Residential

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Friday, November 15, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

7:47:00 AM

Pipe Size (HxW)

12.5" x 12.5"

Depth of Flow (Wet DOF) (in)

2.25"

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

3.52

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

good flow, shallow and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

12'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Vitrified Clay Pipe

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name:

Milpitas.WWTFM.CA19-20

1/2

ADS Project Number:

22431

SCATTERGRAPH REPORT

MIL_2334

Flow Monitor

MIL_2334

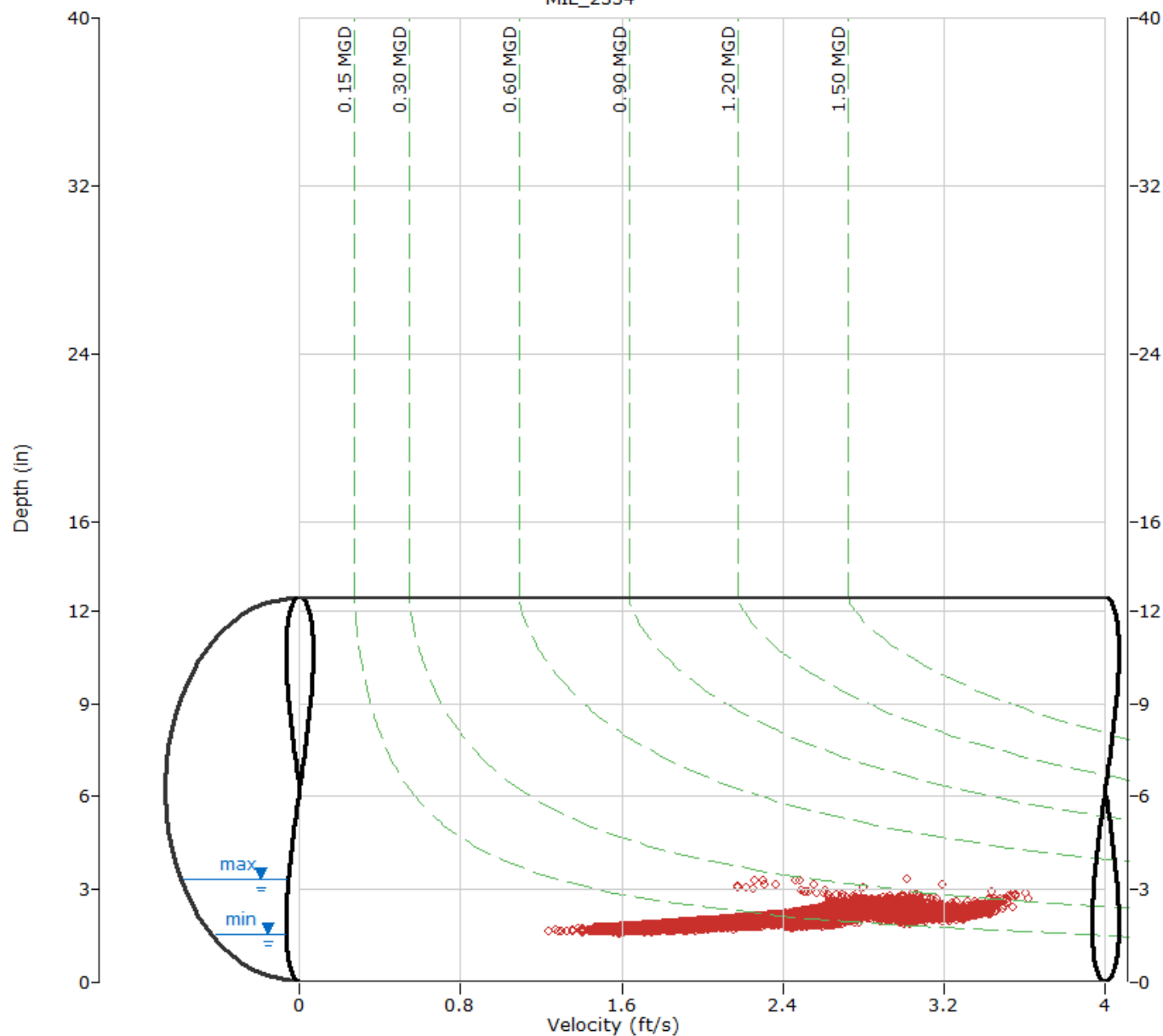
Pipe Height
12.50 in

Report Period

11/16/2019
To
3/9/2020

Legend

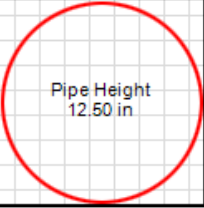
- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_2334

Flow Monitor
MIL_2334

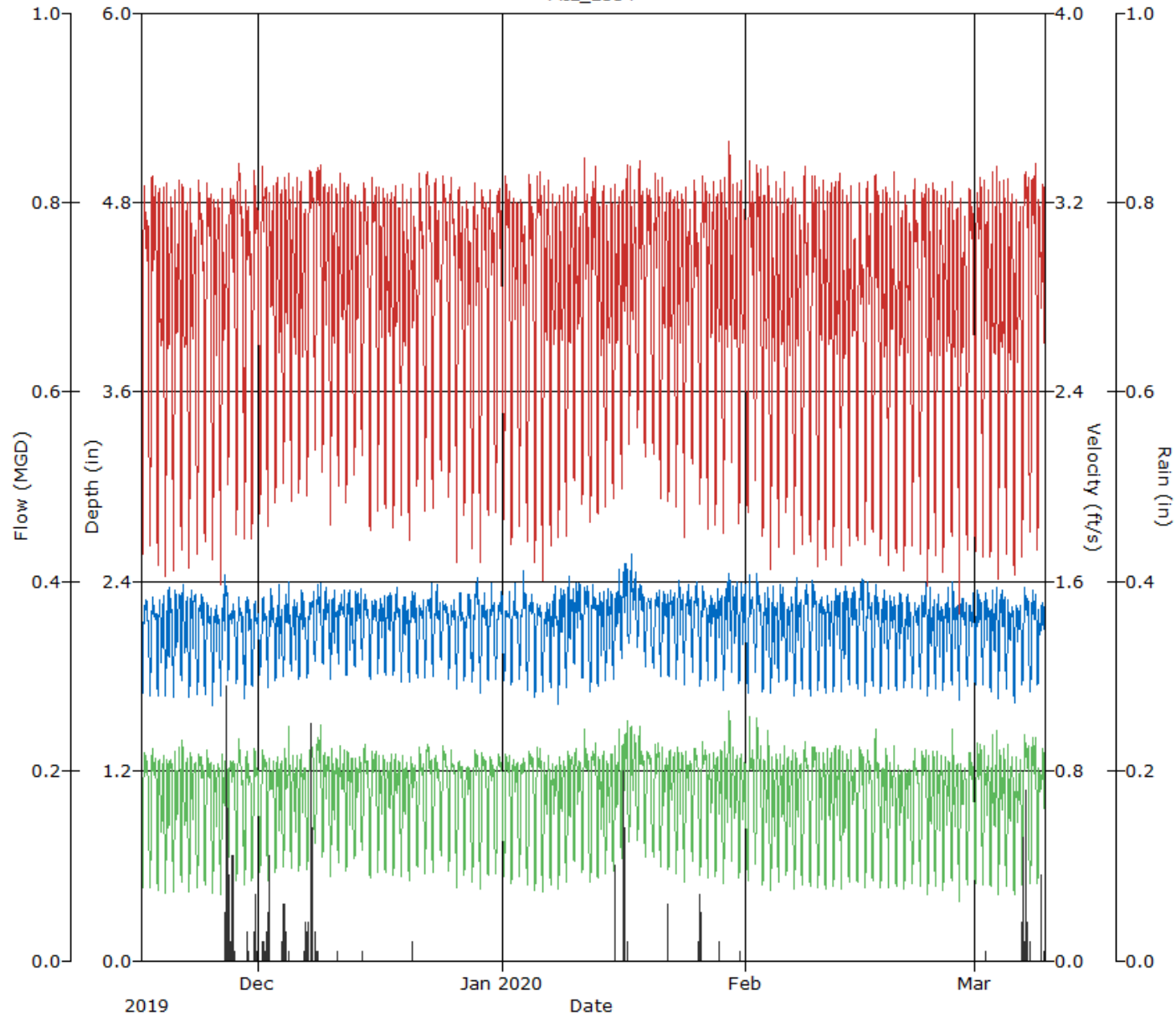


Pipe Height
12.50 in

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2334, Pipe Height: 12.50 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 03:55 | 1.64 | 18:45 | 2.65 | 2.08 | 04:10 | 1.41 | 12:05 | 3.37 | 2.74 | 04:10 | 0.062 | 17:40 | 0.252 | 0.170 | 0.170 | |
| 11/17/2019 | 04:05 | 1.63 | 12:25 | 2.68 | 2.09 | 03:45 | 1.50 | 11:15 | 3.41 | 2.81 | 03:50 | 0.067 | 14:30 | 0.254 | 0.175 | 0.175 | |
| 11/18/2019 | 04:00 | 1.63 | 17:25 | 2.50 | 2.07 | 03:55 | 1.47 | 08:15 | 3.35 | 2.70 | 03:55 | 0.062 | 07:50 | 0.239 | 0.165 | 0.165 | |
| 11/19/2019 | 03:10 | 1.66 | 19:15 | 2.58 | 2.09 | 03:10 | 1.36 | 20:20 | 3.38 | 2.71 | 03:10 | 0.059 | 11:15 | 0.237 | 0.168 | 0.168 | |
| 11/20/2019 | 03:50 | 1.64 | 07:10 | 2.65 | 2.10 | 03:50 | 1.46 | 20:25 | 3.38 | 2.67 | 03:50 | 0.062 | 07:10 | 0.245 | 0.168 | 0.168 | |
| 11/21/2019 | 03:55 | 1.72 | 23:00 | 2.48 | 2.10 | 04:00 | 1.51 | 07:35 | 3.41 | 2.65 | 04:00 | 0.070 | 07:35 | 0.256 | 0.166 | 0.166 | |
| 11/22/2019 | 03:55 | 1.59 | 09:15 | 2.52 | 2.10 | 03:40 | 1.51 | 07:55 | 3.38 | 2.66 | 03:40 | 0.063 | 07:40 | 0.242 | 0.167 | 0.167 | |
| 11/23/2019 | 04:05 | 1.63 | 16:55 | 2.87 | 2.10 | 04:15 | 1.33 | 10:45 | 3.35 | 2.78 | 04:15 | 0.057 | 16:55 | 0.290 | 0.174 | 0.174 | |
| 11/24/2019 | 05:30 | 1.67 | 10:55 | 2.75 | 2.08 | 04:35 | 1.53 | 10:25 | 3.39 | 2.82 | 04:35 | 0.071 | 10:55 | 0.276 | 0.173 | 0.173 | |
| 11/25/2019 | 03:50 | 1.55 | 11:40 | 2.50 | 2.05 | 04:10 | 1.41 | 21:20 | 3.34 | 2.73 | 04:10 | 0.057 | 11:45 | 0.225 | 0.165 | 0.165 | |
| 11/26/2019 | 04:00 | 1.63 | 19:05 | 2.59 | 2.13 | 03:55 | 1.29 | 08:40 | 3.34 | 2.66 | 03:55 | 0.054 | 20:35 | 0.238 | 0.170 | 0.170 | 0.63 |
| 11/27/2019 | 03:00 | 1.76 | 14:45 | 2.46 | 2.10 | 01:40 | 1.78 | 11:40 | 3.38 | 2.89 | 01:40 | 0.089 | 17:45 | 0.220 | 0.179 | 0.179 | 0.77 |
| 11/28/2019 | 03:55 | 1.72 | 11:50 | 2.50 | 2.10 | 03:40 | 1.56 | 11:50 | 3.47 | 2.91 | 03:40 | 0.073 | 11:50 | 0.271 | 0.180 | 0.180 | |
| 11/29/2019 | 04:40 | 1.60 | 16:35 | 2.69 | 2.08 | 05:30 | 1.56 | 09:35 | 3.33 | 2.80 | 05:30 | 0.067 | 16:40 | 0.260 | 0.171 | 0.171 | 0.05 |
| 11/30/2019 | 03:30 | 1.70 | 12:00 | 2.96 | 2.06 | 03:35 | 1.52 | 11:20 | 3.37 | 2.83 | 03:35 | 0.068 | 12:00 | 0.248 | 0.172 | 0.172 | 0.14 |
| 12/01/2019 | 04:30 | 1.79 | 13:55 | 3.12 | 2.09 | 04:05 | 1.79 | 10:45 | 3.39 | 2.89 | 04:05 | 0.088 | 13:55 | 0.254 | 0.178 | 0.178 | 0.06 |
| 12/02/2019 | 03:15 | 1.69 | 13:05 | 2.45 | 2.10 | 02:35 | 1.65 | 07:45 | 3.36 | 2.80 | 03:10 | 0.077 | 08:00 | 0.244 | 0.174 | 0.174 | 0.36 |
| 12/03/2019 | 03:45 | 1.76 | 12:15 | 2.47 | 2.07 | 03:40 | 1.70 | 08:30 | 3.35 | 2.78 | 03:40 | 0.081 | 08:05 | 0.223 | 0.169 | 0.169 | |
| 12/04/2019 | 02:15 | 1.77 | 19:15 | 2.88 | 2.13 | 02:10 | 1.86 | 19:15 | 3.61 | 2.85 | 03:10 | 0.089 | 19:15 | 0.346 | 0.180 | 0.180 | 0.44 |
| 12/05/2019 | 03:35 | 1.80 | 07:30 | 2.46 | 2.11 | 02:25 | 1.75 | 20:45 | 3.34 | 2.81 | 02:25 | 0.086 | 07:35 | 0.234 | 0.174 | 0.174 | |
| 12/06/2019 | 03:45 | 1.75 | 10:20 | 2.50 | 2.13 | 03:35 | 1.80 | 08:05 | 3.35 | 2.77 | 03:35 | 0.086 | 08:05 | 0.240 | 0.174 | 0.174 | 0.06 |
| 12/07/2019 | 04:20 | 1.75 | 00:00 | 2.52 | 2.13 | 04:10 | 1.76 | 20:55 | 3.39 | 2.92 | 04:10 | 0.084 | 20:55 | 0.234 | 0.185 | 0.185 | 0.84 |
| 12/08/2019 | 02:35 | 1.86 | 14:25 | 3.31 | 2.18 | 04:40 | 1.86 | 19:40 | 3.56 | 3.00 | 04:45 | 0.098 | 14:25 | 0.352 | 0.195 | 0.195 | 0.10 |
| 12/09/2019 | 03:50 | 1.79 | 09:50 | 2.52 | 2.16 | 03:05 | 1.80 | 08:10 | 3.38 | 2.84 | 03:05 | 0.091 | 07:55 | 0.244 | 0.183 | 0.183 | |
| 12/10/2019 | 03:20 | 1.77 | 16:20 | 2.58 | 2.13 | 03:30 | 1.62 | 07:35 | 3.39 | 2.79 | 03:30 | 0.077 | 07:35 | 0.250 | 0.176 | 0.176 | 0.01 |
| 12/11/2019 | 01:20 | 1.83 | 23:45 | 2.47 | 2.18 | 03:45 | 1.93 | 07:55 | 3.41 | 2.83 | 03:25 | 0.099 | 07:55 | 0.252 | 0.184 | 0.184 | 0.00 |
| 12/12/2019 | 03:45 | 1.78 | 10:30 | 2.54 | 2.12 | 04:35 | 1.84 | 22:15 | 3.39 | 2.78 | 03:50 | 0.090 | 07:30 | 0.251 | 0.175 | 0.175 | |
| 12/13/2019 | 05:20 | 1.78 | 09:05 | 2.52 | 2.16 | 03:00 | 1.78 | 08:05 | 3.34 | 2.77 | 03:00 | 0.088 | 09:05 | 0.233 | 0.179 | 0.179 | |
| 12/14/2019 | 05:55 | 1.86 | 17:25 | 2.60 | 2.16 | 03:50 | 1.90 | 11:10 | 3.31 | 2.91 | 03:50 | 0.101 | 17:25 | 0.243 | 0.187 | 0.187 | 0.01 |
| 12/15/2019 | 04:05 | 1.75 | 18:15 | 3.13 | 2.11 | 04:10 | 1.63 | 21:05 | 3.39 | 2.85 | 04:10 | 0.077 | 18:15 | 0.249 | 0.179 | 0.179 | |
| 12/16/2019 | 03:40 | 1.79 | 09:10 | 2.83 | 2.14 | 04:00 | 1.75 | 08:05 | 3.35 | 2.80 | 04:00 | 0.086 | 07:50 | 0.248 | 0.177 | 0.177 | |
| 12/17/2019 | 03:35 | 1.80 | 10:45 | 2.58 | 2.13 | 02:30 | 1.75 | 07:35 | 3.36 | 2.77 | 02:30 | 0.087 | 11:40 | 0.231 | 0.175 | 0.175 | |
| 12/18/2019 | 03:05 | 1.79 | 13:45 | 2.47 | 2.14 | 03:55 | 1.67 | 08:10 | 3.42 | 2.76 | 03:55 | 0.083 | 08:10 | 0.241 | 0.175 | 0.175 | |
| 12/19/2019 | 03:20 | 1.73 | 09:05 | 2.58 | 2.10 | 03:20 | 1.73 | 07:45 | 3.34 | 2.75 | 03:20 | 0.079 | 07:40 | 0.242 | 0.171 | 0.171 | |
| 12/20/2019 | 03:50 | 1.74 | 11:45 | 2.53 | 2.14 | 03:15 | 1.59 | 07:35 | 3.38 | 2.74 | 03:15 | 0.075 | 07:35 | 0.232 | 0.175 | 0.175 | 0.02 |
| 12/21/2019 | 06:35 | 1.75 | 23:25 | 2.50 | 2.11 | 04:10 | 1.80 | 12:25 | 3.37 | 2.85 | 04:10 | 0.086 | 23:15 | 0.236 | 0.178 | 0.178 | |
| 12/22/2019 | 04:20 | 1.76 | 18:55 | 2.67 | 2.13 | 04:20 | 1.65 | 17:10 | 3.50 | 2.87 | 04:20 | 0.078 | 17:10 | 0.267 | 0.183 | 0.183 | |
| 12/23/2019 | 04:50 | 1.77 | 13:30 | 2.52 | 2.13 | 04:55 | 1.63 | 09:50 | 3.42 | 2.84 | 04:55 | 0.078 | 13:20 | 0.236 | 0.179 | 0.179 | |
| 12/24/2019 | 03:55 | 1.84 | 21:00 | 2.49 | 2.14 | 03:40 | 1.84 | 17:20 | 3.43 | 2.90 | 03:40 | 0.097 | 17:20 | 0.234 | 0.184 | 0.184 | |
| 12/25/2019 | 05:30 | 1.77 | 18:45 | 2.65 | 2.12 | 04:40 | 1.78 | 11:00 | 3.37 | 2.87 | 04:40 | 0.086 | 18:45 | 0.250 | 0.180 | 0.180 | |
| 12/26/2019 | 05:05 | 1.67 | 16:40 | 2.57 | 2.09 | 04:40 | 1.58 | 11:50 | 3.43 | 2.79 | 04:40 | 0.072 | 15:30 | 0.237 | 0.173 | 0.173 | |
| 12/27/2019 | 03:40 | 1.72 | 14:15 | 2.64 | 2.13 | 03:50 | 1.64 | 12:45 | 3.32 | 2.75 | 03:50 | 0.075 | 14:15 | 0.236 | 0.173 | 0.173 | |
| 12/28/2019 | 03:30 | 1.73 | 14:30 | 2.65 | 2.15 | 04:35 | 1.57 | 12:40 | 3.36 | 2.74 | 04:35 | 0.073 | 21:55 | 0.257 | 0.177 | 0.177 | |
| 12/29/2019 | 05:25 | 1.66 | 18:25 | 2.53 | 2.09 | 03:50 | 1.50 | 20:50 | 3.35 | 2.80 | 05:10 | 0.068 | 10:45 | 0.244 | 0.174 | 0.174 | |
| 12/30/2019 | 04:00 | 1.74 | 17:05 | 2.63 | 2.12 | 04:00 | 1.55 | 11:15 | 3.31 | 2.79 | 04:00 | 0.072 | 14:50 | 0.243 | 0.176 | 0.176 | |
| 12/31/2019 | 04:45 | 1.76 | 17:05 | 2.67 | 2.13 | 03:10 | 1.61 | 18:15 | 3.36 | 2.81 | 03:10 | 0.078 | 17:05 | 0.254 | 0.178 | 0.178 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 05:20 | 1.76 | 22:55 | 2.55 | 2.11 | 05:55 | 1.78 | 10:25 | 3.38 | 2.84 | 05:55 | 0.085 | 22:55 | 0.235 | 0.177 | 0.177 | | |
| 01/02/2020 | 03:55 | 1.72 | 14:45 | 2.46 | 2.12 | 03:05 | 1.59 | 11:55 | 3.35 | 2.77 | 03:55 | 0.074 | 11:55 | 0.223 | 0.175 | 0.175 | | |
| 01/03/2020 | 04:40 | 1.76 | 21:50 | 2.59 | 2.15 | 04:45 | 1.66 | 07:45 | 3.26 | 2.74 | 04:45 | 0.079 | 17:50 | 0.241 | 0.176 | 0.176 | | |
| 01/04/2020 | 05:40 | 1.67 | 20:40 | 2.64 | 2.11 | 03:35 | 1.57 | 10:35 | 3.38 | 2.78 | 03:35 | 0.073 | 20:40 | 0.253 | 0.175 | 0.175 | | |
| 01/05/2020 | 04:20 | 1.64 | 11:35 | 2.33 | 2.09 | 04:20 | 1.48 | 14:05 | 3.39 | 2.83 | 04:20 | 0.063 | 11:40 | 0.236 | 0.176 | 0.176 | | |
| 01/06/2020 | 03:35 | 1.68 | 09:20 | 2.55 | 2.08 | 03:10 | 1.38 | 08:20 | 3.38 | 2.73 | 03:10 | 0.062 | 09:20 | 0.232 | 0.169 | 0.169 | | |
| 01/07/2020 | 03:40 | 1.69 | 06:40 | 2.51 | 2.11 | 03:45 | 1.56 | 21:30 | 3.38 | 2.73 | 03:45 | 0.069 | 17:50 | 0.225 | 0.171 | 0.171 | | |
| 01/08/2020 | 04:00 | 1.61 | 09:00 | 2.60 | 2.12 | 03:45 | 1.67 | 08:00 | 3.32 | 2.71 | 03:45 | 0.069 | 09:00 | 0.245 | 0.172 | 0.172 | | |
| 01/09/2020 | 03:20 | 1.68 | 23:05 | 2.55 | 2.13 | 04:25 | 1.59 | 08:05 | 3.36 | 2.71 | 03:20 | 0.072 | 07:50 | 0.252 | 0.173 | 0.173 | | |
| 01/10/2020 | 01:10 | 1.85 | 08:10 | 2.60 | 2.18 | 03:40 | 1.81 | 07:35 | 3.41 | 2.77 | 03:40 | 0.094 | 08:10 | 0.271 | 0.181 | 0.181 | | |
| 01/11/2020 | 05:15 | 1.76 | 17:50 | 2.64 | 2.16 | 05:10 | 1.77 | 11:00 | 3.49 | 2.80 | 05:10 | 0.084 | 11:00 | 0.252 | 0.181 | 0.181 | 0.10 | |
| 01/12/2020 | 04:10 | 1.67 | 10:45 | 3.06 | 2.12 | 02:50 | 1.61 | 21:20 | 3.40 | 2.82 | 05:10 | 0.076 | 14:50 | 0.270 | 0.179 | 0.179 | | |
| 01/13/2020 | 03:50 | 1.70 | 09:50 | 2.56 | 2.13 | 02:10 | 1.74 | 07:40 | 3.35 | 2.74 | 03:45 | 0.079 | 09:50 | 0.250 | 0.174 | 0.174 | | |
| 01/14/2020 | 02:40 | 1.72 | 06:45 | 2.62 | 2.13 | 02:20 | 1.71 | 22:15 | 3.33 | 2.72 | 02:40 | 0.082 | 14:25 | 0.247 | 0.173 | 0.173 | | |
| 01/15/2020 | 04:15 | 1.76 | 22:15 | 2.81 | 2.16 | 02:40 | 1.75 | 07:45 | 3.40 | 2.71 | 04:30 | 0.085 | 22:15 | 0.285 | 0.176 | 0.176 | | |
| 01/16/2020 | 03:40 | 1.88 | 17:45 | 2.76 | 2.27 | 03:40 | 1.83 | 21:20 | 3.42 | 2.81 | 03:40 | 0.096 | 12:35 | 0.276 | 0.195 | 0.195 | | 0.66 |
| 01/17/2020 | 01:25 | 1.90 | 21:40 | 2.80 | 2.28 | 03:05 | 2.03 | 08:00 | 3.45 | 2.83 | 03:05 | 0.114 | 21:40 | 0.282 | 0.197 | 0.197 | | |
| 01/18/2020 | 03:40 | 1.93 | 00:55 | 2.69 | 2.24 | 05:10 | 2.00 | 11:15 | 3.42 | 2.92 | 05:10 | 0.112 | 00:55 | 0.263 | 0.197 | 0.197 | | |
| 01/19/2020 | 03:15 | 1.81 | 18:50 | 2.75 | 2.17 | 02:15 | 1.83 | 19:25 | 3.46 | 2.90 | 02:15 | 0.095 | 18:50 | 0.243 | 0.188 | 0.188 | | |
| 01/20/2020 | 05:40 | 1.84 | 13:45 | 2.69 | 2.15 | 05:00 | 1.99 | 17:50 | 3.37 | 2.88 | 05:00 | 0.102 | 13:50 | 0.245 | 0.184 | 0.184 | | 0.01 |
| 01/21/2020 | 03:50 | 1.76 | 17:35 | 2.50 | 2.15 | 02:40 | 1.78 | 23:50 | 3.40 | 2.77 | 03:45 | 0.088 | 23:50 | 0.252 | 0.178 | 0.178 | | |
| 01/22/2020 | 05:05 | 1.78 | 10:00 | 2.54 | 2.16 | 04:05 | 1.71 | 22:00 | 3.41 | 2.73 | 04:05 | 0.083 | 22:05 | 0.238 | 0.177 | 0.177 | 0.09 | |
| 01/23/2020 | 03:50 | 1.74 | 09:50 | 2.56 | 2.17 | 03:55 | 1.72 | 07:45 | 3.35 | 2.75 | 03:55 | 0.080 | 12:15 | 0.244 | 0.180 | 0.180 | 0.16 | |
| 01/24/2020 | 03:55 | 1.71 | 22:35 | 2.61 | 2.17 | 03:20 | 1.58 | 09:00 | 3.37 | 2.79 | 03:20 | 0.073 | 22:35 | 0.245 | 0.181 | 0.181 | | |
| 01/25/2020 | 04:10 | 1.77 | 19:20 | 2.59 | 2.17 | 04:00 | 1.84 | 13:00 | 3.33 | 2.81 | 04:00 | 0.088 | 23:45 | 0.239 | 0.183 | 0.183 | | |
| 01/26/2020 | 04:10 | 1.67 | 11:05 | 2.97 | 2.13 | 04:00 | 1.64 | 12:25 | 3.37 | 2.85 | 04:00 | 0.073 | 11:05 | 0.262 | 0.182 | 0.182 | | |
| 01/27/2020 | 03:40 | 1.73 | 06:30 | 2.64 | 2.12 | 03:55 | 1.62 | 07:45 | 3.40 | 2.76 | 03:55 | 0.078 | 06:30 | 0.243 | 0.174 | 0.174 | | |
| 01/28/2020 | 04:05 | 1.75 | 17:15 | 2.55 | 2.13 | 03:30 | 1.63 | 20:10 | 3.37 | 2.75 | 03:30 | 0.077 | 06:45 | 0.236 | 0.174 | 0.174 | | 0.02 |
| 01/29/2020 | 03:40 | 1.68 | 12:55 | 2.59 | 2.17 | 03:45 | 1.74 | 20:00 | 3.54 | 2.79 | 03:45 | 0.078 | 20:15 | 0.276 | 0.184 | 0.184 | | |
| 01/30/2020 | 04:15 | 1.79 | 18:25 | 2.56 | 2.18 | 04:15 | 1.92 | 20:35 | 3.37 | 2.82 | 04:15 | 0.093 | 07:50 | 0.251 | 0.183 | 0.183 | | |
| 01/31/2020 | 03:40 | 1.73 | 22:10 | 2.55 | 2.13 | 02:40 | 1.60 | 08:25 | 3.36 | 2.70 | 03:45 | 0.074 | 07:50 | 0.238 | 0.172 | 0.172 | | 0.01 |
| 02/01/2020 | 05:10 | 1.65 | 10:45 | 2.68 | 2.13 | 03:30 | 1.69 | 10:40 | 3.51 | 2.84 | 05:35 | 0.076 | 10:40 | 0.304 | 0.181 | 0.181 | | |
| 02/02/2020 | 03:35 | 1.80 | 12:00 | 3.28 | 2.16 | 05:05 | 1.86 | 10:15 | 3.47 | 2.86 | 03:45 | 0.094 | 10:15 | 0.292 | 0.185 | 0.185 | | |
| 02/03/2020 | 03:50 | 1.68 | 01:20 | 2.55 | 2.11 | 04:10 | 1.61 | 20:10 | 3.52 | 2.72 | 04:10 | 0.073 | 20:10 | 0.281 | 0.171 | 0.171 | | |
| 02/04/2020 | 03:40 | 1.66 | 08:45 | 2.53 | 2.09 | 03:50 | 1.46 | 08:00 | 3.36 | 2.69 | 03:50 | 0.064 | 10:00 | 0.242 | 0.166 | 0.166 | | |
| 02/05/2020 | 03:50 | 1.73 | 09:30 | 2.57 | 2.11 | 03:35 | 1.57 | 21:40 | 3.40 | 2.69 | 03:50 | 0.074 | 07:55 | 0.238 | 0.169 | 0.169 | | |
| 02/06/2020 | 02:25 | 1.74 | 09:05 | 2.70 | 2.10 | 02:20 | 1.64 | 07:30 | 3.34 | 2.72 | 02:20 | 0.077 | 09:05 | 0.259 | 0.170 | 0.170 | | |
| 02/07/2020 | 04:00 | 1.65 | 18:10 | 2.57 | 2.12 | 03:35 | 1.61 | 09:20 | 3.37 | 2.66 | 03:35 | 0.071 | 10:20 | 0.237 | 0.169 | 0.169 | | |
| 02/08/2020 | 04:50 | 1.68 | 21:25 | 2.62 | 2.15 | 03:30 | 1.52 | 11:15 | 3.37 | 2.73 | 03:30 | 0.070 | 14:40 | 0.244 | 0.177 | 0.177 | | |
| 02/09/2020 | 05:10 | 1.66 | 11:55 | 3.29 | 2.13 | 04:55 | 1.61 | 12:05 | 3.38 | 2.78 | 05:00 | 0.071 | 11:55 | 0.262 | 0.178 | 0.178 | | |
| 02/10/2020 | 02:40 | 1.67 | 09:20 | 2.52 | 2.11 | 03:50 | 1.52 | 07:30 | 3.41 | 2.67 | 02:45 | 0.068 | 07:35 | 0.233 | 0.168 | 0.168 | | |
| 02/11/2020 | 03:40 | 1.65 | 10:45 | 2.56 | 2.09 | 03:30 | 1.49 | 08:05 | 3.35 | 2.69 | 04:10 | 0.066 | 10:45 | 0.245 | 0.167 | 0.167 | | |
| 02/12/2020 | 03:55 | 1.68 | 23:25 | 2.58 | 2.13 | 02:45 | 1.63 | 08:00 | 3.41 | 2.70 | 03:50 | 0.073 | 08:00 | 0.253 | 0.172 | 0.172 | | |
| 02/13/2020 | 04:15 | 1.68 | 20:45 | 2.91 | 2.10 | 04:25 | 1.49 | 07:35 | 3.41 | 2.65 | 04:25 | 0.068 | 20:45 | 0.246 | 0.165 | 0.165 | | |
| 02/14/2020 | 03:50 | 1.65 | 09:20 | 2.65 | 2.13 | 03:55 | 1.54 | 07:50 | 3.39 | 2.67 | 03:55 | 0.067 | 07:50 | 0.252 | 0.170 | 0.170 | | |
| 02/15/2020 | 05:10 | 1.67 | 17:35 | 2.60 | 2.16 | 04:20 | 1.50 | 11:20 | 3.41 | 2.70 | 04:20 | 0.070 | 11:35 | 0.251 | 0.176 | 0.176 | | |
| 02/16/2020 | 05:25 | 1.64 | 14:25 | 2.69 | 2.12 | 04:10 | 1.50 | 12:05 | 3.39 | 2.76 | 04:10 | 0.067 | 14:25 | 0.256 | 0.174 | 0.174 | | |
| 02/17/2020 | 04:00 | 1.68 | 10:55 | 2.93 | 2.11 | 04:00 | 1.55 | 11:00 | 3.55 | 2.77 | 04:00 | 0.069 | 10:55 | 0.338 | 0.174 | 0.174 | | |
| 02/18/2020 | 03:30 | 1.67 | 10:15 | 2.73 | 2.10 | 03:30 | 1.51 | 20:25 | 3.43 | 2.68 | 03:30 | 0.066 | 20:20 | 0.265 | 0.167 | 0.167 | | |
| 02/19/2020 | 03:10 | 1.68 | 22:35 | 2.58 | 2.12 | 03:10 | 1.49 | 21:00 | 3.41 | 2.72 | 03:10 | 0.066 | 22:35 | 0.245 | 0.172 | 0.172 | | |
| 02/20/2020 | 03:50 | 1.67 | 18:50 | 2.59 | 2.09 | 03:55 | 1.50 | 08:00 | 3.29 | 2.64 | 03:55 | 0.066 | 18:50 | 0.232 | 0.163 | 0.163 | | |
| 02/21/2020 | 03:40 | 1.68 | 17:55 | 2.58 | 2.09 | 02:45 | 1.53 | 09:45 | 3.35 | 2.67 | 03:50 | 0.070 | 20:45 | 0.236 | 0.165 | 0.165 | | |
| 02/22/2020 | 04:20 | 1.68 | 13:25 | 2.55 | 2.08 | 03:30 | 1.54 | 10:05 | 3.41 | 2.75 | 04:20 | 0.071 | 11:35 | 0.228 | 0.169 | 0.169 | | |
| 02/23/2020 | 04:40 | 1.66 | 10:05 | 3.26 | 2.12 | 04:15 | 1.56 | 21:45 | 3.40 | 2.81 | 04:20 | 0.069 | 10:05 | 0.263 | 0.178 | 0.178 | | |
| 02/24/2020 | 03:30 | 1.65 | 06:35 | 2.55 | 2.08 | 03:25 | 1.27 | 07:30 | 3.39 | 2.66 | 03:25 | 0.055 | 07:55 | 0.235 | 0.164 | 0.164 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | |
| 02/25/2020 | 04:00 | 1.65 | 13:55 | 2.53 | 2.10 | 02:25 | 1.50 | 07:30 | 3.39 | 2.68 | 02:25 | 0.066 | 07:50 | 0.233 | 0.167 | 0.167 | 0.01 |
| 02/26/2020 | 02:55 | 1.62 | 18:30 | 2.58 | 2.11 | 03:00 | 1.40 | 07:35 | 3.39 | 2.66 | 03:00 | 0.060 | 07:50 | 0.248 | 0.167 | 0.167 | |
| 02/27/2020 | 04:30 | 1.72 | 07:50 | 2.87 | 2.10 | 03:45 | 1.46 | 07:50 | 3.55 | 2.68 | 03:45 | 0.067 | 07:50 | 0.339 | 0.168 | 0.168 | |
| 02/28/2020 | 03:50 | 1.61 | 23:00 | 2.56 | 2.10 | 03:55 | 1.24 | 08:10 | 3.34 | 2.65 | 03:55 | 0.052 | 07:50 | 0.234 | 0.166 | 0.166 | |
| 02/29/2020 | 04:05 | 1.68 | 23:25 | 2.54 | 2.09 | 05:30 | 1.48 | 12:05 | 3.35 | 2.79 | 05:30 | 0.069 | 22:45 | 0.237 | 0.173 | 0.173 | |
| 03/01/2020 | 05:30 | 1.69 | 10:25 | 3.29 | 2.10 | 05:25 | 1.52 | 10:20 | 3.39 | 2.80 | 05:25 | 0.068 | 10:25 | 0.285 | 0.176 | 0.176 | |
| 03/02/2020 | 03:40 | 1.72 | 13:20 | 2.49 | 2.11 | 02:50 | 1.48 | 08:10 | 3.41 | 2.72 | 03:55 | 0.068 | 07:50 | 0.260 | 0.171 | 0.171 | |
| 03/03/2020 | 02:50 | 1.66 | 06:40 | 2.58 | 2.08 | 03:00 | 1.46 | 21:20 | 3.47 | 2.66 | 03:00 | 0.064 | 21:20 | 0.279 | 0.164 | 0.164 | |
| 03/04/2020 | 03:35 | 1.61 | 09:55 | 2.50 | 2.13 | 03:35 | 1.42 | 08:05 | 3.39 | 2.68 | 03:35 | 0.059 | 07:55 | 0.238 | 0.171 | 0.171 | |
| 03/05/2020 | 03:30 | 1.69 | 17:45 | 2.73 | 2.08 | 03:15 | 1.50 | 07:55 | 3.36 | 2.70 | 03:30 | 0.068 | 17:45 | 0.246 | 0.166 | 0.166 | |
| 03/06/2020 | 03:35 | 1.62 | 09:45 | 2.70 | 2.08 | 04:05 | 1.49 | 09:45 | 3.62 | 2.70 | 04:05 | 0.064 | 09:45 | 0.317 | 0.167 | 0.167 | 0.58 |
| 03/07/2020 | 03:05 | 1.67 | 12:50 | 2.74 | 2.12 | 05:05 | 1.46 | 12:05 | 3.42 | 2.86 | 05:05 | 0.065 | 12:50 | 0.259 | 0.182 | 0.182 | |
| 03/08/2020 | 04:05 | 1.65 | 10:30 | 3.13 | 2.11 | 04:45 | 1.68 | 09:50 | 3.43 | 2.86 | 04:45 | 0.075 | 10:30 | 0.345 | 0.181 | 0.181 | 0.02 |
| 03/09/2020 | 02:50 | 1.70 | 12:05 | 2.58 | 2.09 | 02:30 | 1.56 | 21:15 | 3.37 | 2.78 | 02:30 | 0.073 | 19:45 | 0.235 | 0.172 | 0.172 | 0.11 |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 20.139 | 5.26 |
| Avg | 2.12 | 2.77 | 0.175 | |

Site Commentary

Site Information

| MIL_2491 | |
|-----------------|-------|
| Pipe Dimensions | 15 |
| Silt Level | 0.00" |

Overview

Site MIL_2491 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location. Due to a meter malfunction, data confidence is less than typical from January 28, 2020 through February 22, 2020. A data gap also occurs February 23, 2020 through March 2, 2020.

This location was installed upstream of site MIL_2569 and downstream of the combined flows of sites MIL_0386 and MIL_2840. A review of balancing with the combined flows of MIL_0386 and MIL_2840 into MIL_0649 and MIL_2491 shows a net flow between the sites of 0.426 MGD.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 2.34 | 2.36 | 0.216 |
| Minimum | 1.07 | 0.37 | 0.010 |
| Maximum | 4.18 | 3.84 | 0.682 |
| Time of Minimum | 1/3/2020 9:55 PM | 3/8/2020 3:05 AM | 3/8/2020 3:05 AM |
| Time of Maximum | 1/17/2020 1:15 PM | 11/21/2019 9:30 AM | 11/21/2019 9:30 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|----|
| Depth (in) | 91 |
| Velocity (ft/s) | 91 |
| Quantity (MGD) | 91 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2491

Site Address /Location: N Milpitas Blvd and E Calaveras Blvd, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: Drive

Latitude:

37.433991

Longitude:

-121.900388

Pipe Size (H x W)

15.0" x 15.0"

Pipe Shape

Circular

Manhole #

2491

System Characteristics

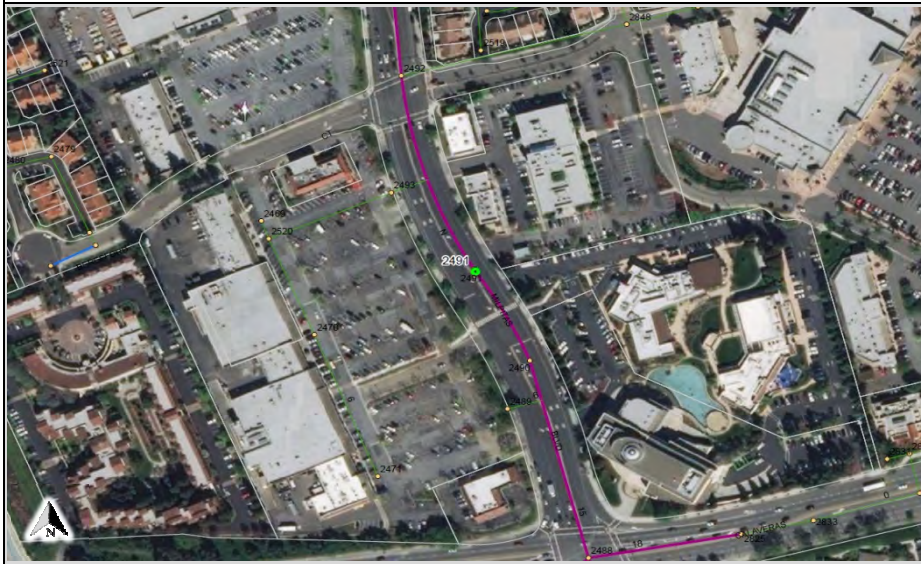
Residential/Commercial

Access

Traffic

Drive

Heavy



Installation Information

Installation Date:

Wednesday, November 13, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

9:04:37 AM

Pipe Size (HxW)

15.0" x 15.0"

Depth of Flow (Wet DOF) (in)

3.25"

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

3.74

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Good flow, Moderate depth and velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

10'

Manhole Configuration

Single

Manhole Material:

Vitrified Clay Pipe

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_2491

Flow Monitor

MIL_2491

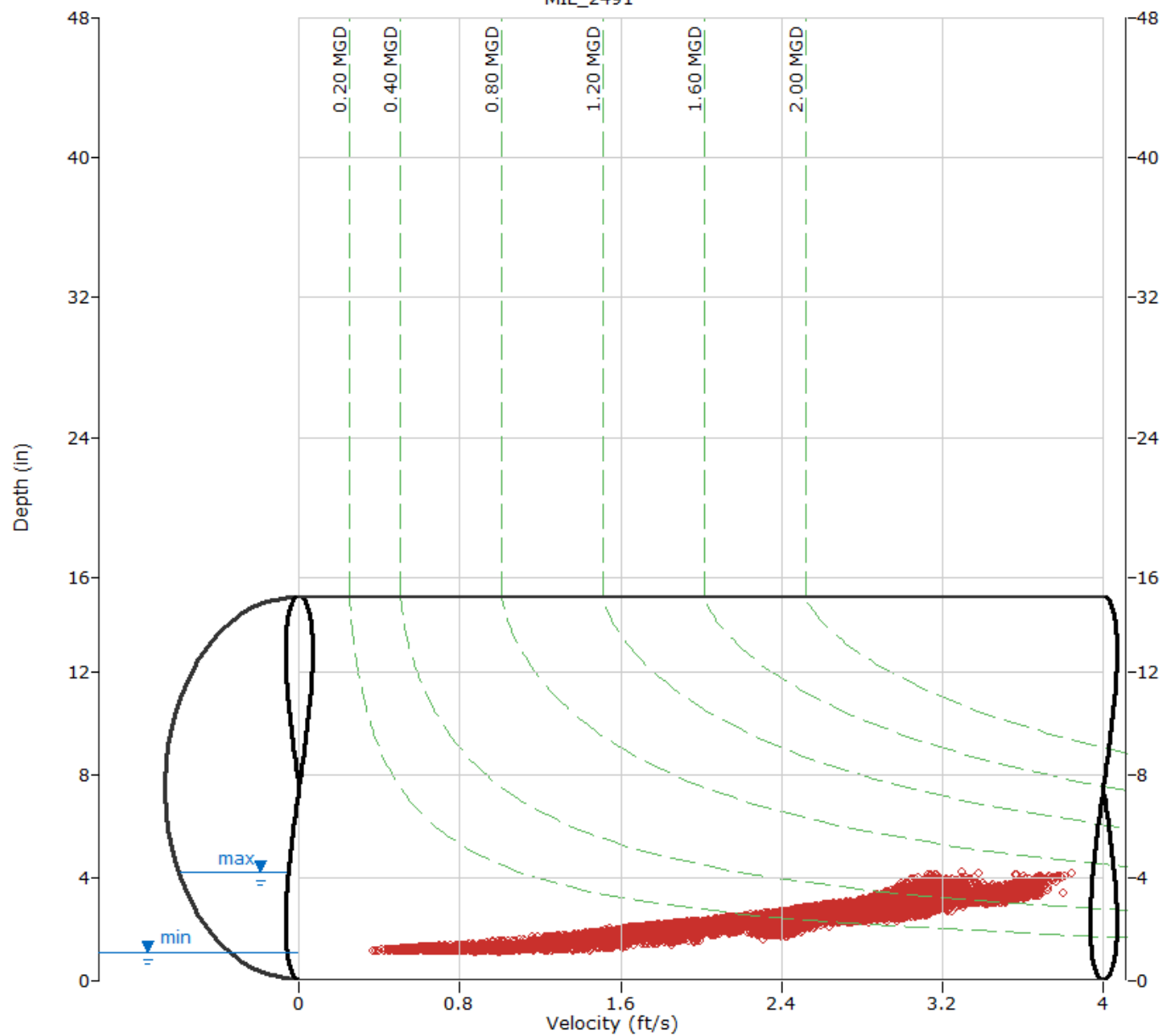
Pipe Height
15.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

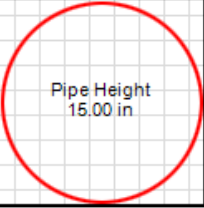


ADS ENVIRONMENTAL
SERVICES

HYDROGRAPH REPORT

MIL_2491

Flow Monitor
MIL_2491

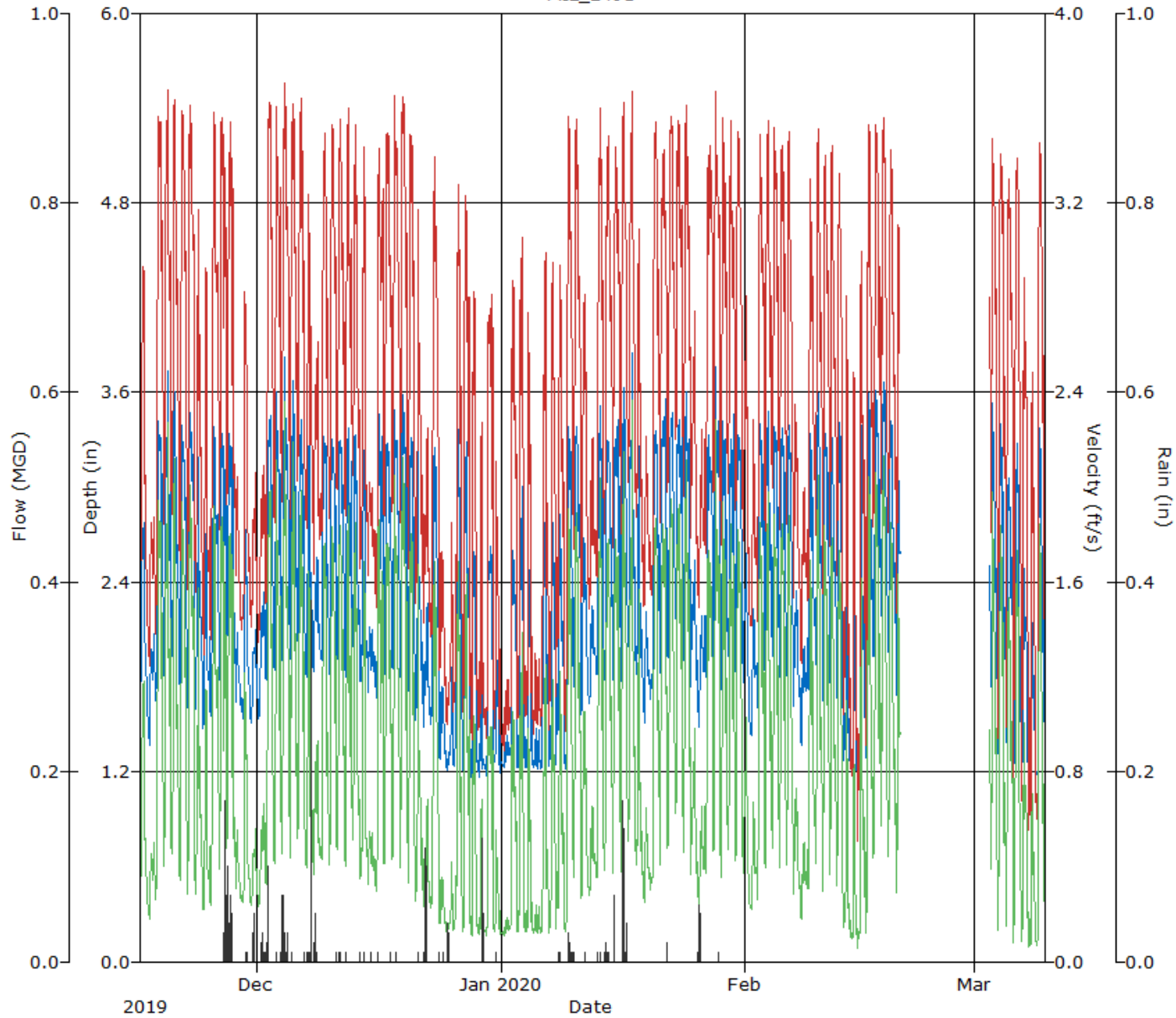


Pipe Height
15.00 in.

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2491, Pipe Height: 15.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 11/16/2019 | 23:25 | 1.71 | 12:20 | 3.63 | 2.11 | 22:35 | 1.41 | 12:20 | 3.30 | 2.11 | 22:35 | 0.071 | 12:20 | 0.488 | 0.153 | 0.153 | | |
| 11/17/2019 | 06:30 | 1.33 | 19:25 | 2.32 | 1.75 | 07:55 | 1.17 | 19:30 | 2.22 | 1.60 | 06:20 | 0.042 | 19:25 | 0.171 | 0.085 | 0.085 | | |
| 11/18/2019 | 00:45 | 1.57 | 14:50 | 3.97 | 2.72 | 01:00 | 1.25 | 13:25 | 3.72 | 2.77 | 00:45 | 0.056 | 13:25 | 0.582 | 0.300 | 0.300 | | |
| 11/19/2019 | 04:45 | 1.76 | 15:30 | 3.93 | 2.76 | 04:55 | 1.72 | 15:45 | 3.72 | 2.88 | 04:55 | 0.092 | 15:30 | 0.615 | 0.308 | 0.308 | | |
| 11/20/2019 | 03:25 | 1.82 | 12:20 | 3.94 | 2.66 | 03:05 | 1.81 | 12:20 | 3.72 | 2.75 | 03:25 | 0.100 | 12:20 | 0.618 | 0.280 | 0.280 | | |
| 11/21/2019 | 04:10 | 1.68 | 09:30 | 4.13 | 2.70 | 03:00 | 1.60 | 09:30 | 3.84 | 2.81 | 04:15 | 0.080 | 09:30 | 0.682 | 0.295 | 0.295 | | |
| 11/22/2019 | 04:30 | 1.58 | 11:30 | 3.91 | 2.79 | 04:20 | 1.52 | 11:30 | 3.69 | 2.88 | 04:20 | 0.069 | 11:30 | 0.607 | 0.315 | 0.315 | | |
| 11/23/2019 | 05:00 | 1.55 | 12:05 | 3.76 | 2.14 | 04:55 | 1.47 | 12:00 | 3.41 | 2.15 | 04:55 | 0.064 | 12:05 | 0.504 | 0.159 | 0.159 | | |
| 11/24/2019 | 03:20 | 1.44 | 09:30 | 3.57 | 1.98 | 05:30 | 1.05 | 11:15 | 3.21 | 1.89 | 05:30 | 0.044 | 09:30 | 0.452 | 0.128 | 0.128 | | |
| 11/25/2019 | 02:00 | 1.51 | 16:45 | 3.74 | 2.58 | 02:20 | 1.12 | 12:40 | 3.63 | 2.65 | 02:05 | 0.047 | 12:25 | 0.519 | 0.268 | 0.268 | | |
| 11/26/2019 | 04:10 | 1.75 | 13:35 | 3.61 | 2.75 | 05:10 | 1.58 | 13:10 | 3.68 | 2.89 | 05:10 | 0.085 | 13:35 | 0.493 | 0.306 | 0.306 | 0.36 | |
| 11/27/2019 | 03:10 | 1.92 | 10:20 | 3.75 | 2.79 | 02:55 | 1.76 | 13:55 | 3.60 | 2.86 | 02:00 | 0.107 | 21:05 | 0.502 | 0.307 | 0.307 | 0.63 | |
| 11/28/2019 | 20:05 | 1.59 | 02:50 | 2.32 | 1.86 | 22:45 | 1.22 | 00:00 | 2.34 | 1.77 | 20:00 | 0.058 | 09:20 | 0.177 | 0.102 | 0.102 | | |
| 11/29/2019 | 04:15 | 1.50 | 09:10 | 3.87 | 2.01 | 05:55 | 1.28 | 14:05 | 3.35 | 1.98 | 04:25 | 0.057 | 09:10 | 0.524 | 0.137 | 0.137 | 0.02 | |
| 11/30/2019 | 06:20 | 1.46 | 17:25 | 2.26 | 1.79 | 06:25 | 1.30 | 17:35 | 2.35 | 1.68 | 06:25 | 0.052 | 17:25 | 0.172 | 0.091 | 0.091 | 0.10 | |
| 12/01/2019 | 06:00 | 1.49 | 21:25 | 2.54 | 1.94 | 04:15 | 1.25 | 21:40 | 2.62 | 1.73 | 04:15 | 0.054 | 21:40 | 0.223 | 0.107 | 0.107 | 0.06 | |
| 12/02/2019 | 04:10 | 1.74 | 08:30 | 3.62 | 2.77 | 04:10 | 1.39 | 15:20 | 3.68 | 2.79 | 04:10 | 0.071 | 13:20 | 0.513 | 0.308 | 0.308 | 0.30 | |
| 12/03/2019 | 04:05 | 1.79 | 10:00 | 4.05 | 2.75 | 04:10 | 1.82 | 09:55 | 3.69 | 2.80 | 04:05 | 0.097 | 10:00 | 0.636 | 0.298 | 0.298 | 0.01 | |
| 12/04/2019 | 01:45 | 1.87 | 12:05 | 4.04 | 2.92 | 03:20 | 1.84 | 12:05 | 3.81 | 2.97 | 02:00 | 0.109 | 12:05 | 0.656 | 0.341 | 0.341 | 0.39 | |
| 12/05/2019 | 03:25 | 1.88 | 14:30 | 4.04 | 2.82 | 03:10 | 1.72 | 13:25 | 3.80 | 2.92 | 03:10 | 0.102 | 14:30 | 0.643 | 0.318 | 0.318 | 0.01 | |
| 12/06/2019 | 05:00 | 1.87 | 14:45 | 3.76 | 2.73 | 01:15 | 1.90 | 12:30 | 3.69 | 2.84 | 05:00 | 0.111 | 14:45 | 0.524 | 0.295 | 0.295 | 0.01 | |
| 12/07/2019 | 06:00 | 1.76 | 11:35 | 3.72 | 2.35 | 05:45 | 1.74 | 12:15 | 3.51 | 2.39 | 05:45 | 0.091 | 11:35 | 0.508 | 0.200 | 0.200 | 0.67 | |
| 12/08/2019 | 03:50 | 1.82 | 07:40 | 3.31 | 2.11 | 05:30 | 1.48 | 07:35 | 3.16 | 2.05 | 05:30 | 0.082 | 07:40 | 0.410 | 0.143 | 0.143 | 0.20 | |
| 12/09/2019 | 04:20 | 1.82 | 17:05 | 3.83 | 2.69 | 01:10 | 1.53 | 13:30 | 3.58 | 2.79 | 04:15 | 0.086 | 17:05 | 0.507 | 0.288 | 0.288 | | |
| 12/10/2019 | 04:55 | 1.78 | 09:20 | 3.94 | 2.70 | 05:10 | 1.80 | 14:40 | 3.63 | 2.81 | 05:10 | 0.096 | 09:20 | 0.540 | 0.291 | 0.291 | | |
| 12/11/2019 | 04:15 | 1.87 | 09:40 | 3.85 | 2.74 | 02:40 | 1.88 | 13:10 | 3.63 | 2.85 | 03:55 | 0.109 | 14:20 | 0.532 | 0.298 | 0.298 | 0.03 | |
| 12/12/2019 | 04:20 | 1.77 | 17:05 | 3.81 | 2.72 | 04:10 | 1.84 | 12:30 | 3.65 | 2.85 | 04:20 | 0.097 | 17:05 | 0.518 | 0.295 | 0.295 | 0.01 | |
| 12/13/2019 | 01:40 | 1.92 | 12:55 | 3.75 | 2.57 | 23:50 | 1.89 | 12:25 | 3.57 | 2.66 | 01:40 | 0.119 | 12:55 | 0.515 | 0.254 | 0.254 | 0.01 | |
| 12/14/2019 | 03:05 | 1.74 | 15:20 | 3.69 | 2.30 | 02:05 | 1.49 | 14:05 | 3.51 | 2.31 | 02:05 | 0.079 | 15:20 | 0.510 | 0.194 | 0.194 | 0.01 | |
| 12/15/2019 | 06:15 | 1.61 | 11:30 | 2.25 | 1.93 | 23:45 | 1.46 | 06:35 | 2.29 | 1.85 | 03:10 | 0.071 | 11:35 | 0.160 | 0.111 | 0.111 | 0.01 | |
| 12/16/2019 | 03:40 | 1.64 | 14:00 | 4.10 | 2.75 | 04:05 | 1.32 | 10:05 | 3.58 | 2.69 | 04:05 | 0.065 | 14:00 | 0.556 | 0.294 | 0.294 | 0.01 | |
| 12/17/2019 | 05:10 | 1.75 | 09:40 | 3.65 | 2.74 | 05:10 | 1.78 | 15:35 | 3.59 | 2.86 | 05:10 | 0.092 | 16:45 | 0.470 | 0.303 | 0.303 | 0.01 | |
| 12/18/2019 | 04:05 | 1.68 | 09:05 | 3.72 | 2.82 | 03:40 | 1.66 | 11:15 | 3.71 | 2.96 | 04:05 | 0.084 | 11:15 | 0.551 | 0.323 | 0.323 | 0.01 | |
| 12/19/2019 | 03:35 | 1.77 | 18:35 | 3.79 | 2.84 | 04:25 | 1.78 | 10:15 | 3.70 | 2.96 | 04:25 | 0.094 | 13:10 | 0.561 | 0.328 | 0.328 | | |
| 12/20/2019 | 04:55 | 1.63 | 15:50 | 3.84 | 2.69 | 04:30 | 1.60 | 10:20 | 3.58 | 2.80 | 05:00 | 0.076 | 15:50 | 0.538 | 0.287 | 0.287 | | |
| 12/21/2019 | 04:20 | 1.50 | 11:15 | 3.82 | 2.15 | 04:25 | 1.44 | 11:20 | 3.32 | 2.16 | 04:25 | 0.060 | 11:15 | 0.514 | 0.166 | 0.166 | 0.01 | |
| 12/22/2019 | 03:15 | 1.44 | 14:30 | 2.50 | 1.77 | 03:05 | 1.35 | 14:30 | 2.49 | 1.72 | 03:30 | 0.053 | 14:30 | 0.217 | 0.093 | 0.093 | 0.41 | |
| 12/23/2019 | 01:05 | 1.40 | 16:20 | 3.71 | 2.47 | 01:20 | 1.23 | 09:50 | 3.52 | 2.50 | 01:20 | 0.046 | 16:20 | 0.493 | 0.238 | 0.238 | | |
| 12/24/2019 | 22:40 | 1.25 | 00:00 | 2.57 | 1.49 | 20:20 | 1.03 | 00:00 | 2.53 | 1.43 | 23:50 | 0.033 | 00:00 | 0.229 | 0.061 | 0.061 | 0.02 | |
| 12/25/2019 | 01:30 | 1.18 | 16:00 | 1.98 | 1.36 | 01:25 | 0.90 | 15:45 | 1.99 | 1.23 | 01:30 | 0.027 | 16:00 | 0.123 | 0.046 | 0.046 | 0.08 | |
| 12/26/2019 | 02:05 | 1.17 | 15:20 | 3.72 | 2.27 | 03:40 | 1.01 | 13:15 | 3.39 | 2.24 | 02:15 | 0.031 | 14:40 | 0.486 | 0.199 | 0.199 | | |
| 12/27/2019 | 02:50 | 1.16 | 09:50 | 3.66 | 2.23 | 02:50 | 1.03 | 10:55 | 3.53 | 2.29 | 02:50 | 0.029 | 13:50 | 0.494 | 0.197 | 0.197 | | |
| 12/28/2019 | 03:55 | 1.10 | 12:05 | 2.92 | 1.73 | 06:35 | 0.82 | 13:00 | 3.05 | 1.73 | 06:35 | 0.022 | 13:00 | 0.318 | 0.109 | 0.109 | | |
| 12/29/2019 | 03:20 | 1.10 | 11:40 | 2.73 | 1.41 | 01:45 | 0.78 | 09:15 | 2.79 | 1.29 | 01:45 | 0.022 | 11:40 | 0.252 | 0.056 | 0.056 | 0.22 | |
| 12/30/2019 | 01:00 | 1.08 | 08:30 | 2.93 | 2.03 | 00:55 | 0.80 | 17:40 | 3.05 | 2.06 | 00:55 | 0.021 | 17:40 | 0.328 | 0.152 | 0.152 | | |
| 12/31/2019 | 21:30 | 1.11 | 08:40 | 2.26 | 1.48 | 18:05 | 0.82 | 08:45 | 2.32 | 1.35 | 18:05 | 0.023 | 08:45 | 0.170 | 0.059 | 0.059 | 0.01 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 14:05 | 1.14 | 16:35 | 1.68 | 1.30 | 07:05 | 0.86 | 16:35 | 1.55 | 1.03 | 14:05 | 0.026 | 16:35 | 0.076 | 0.035 | 0.035 | |
| 01/02/2020 | 23:30 | 1.23 | 07:30 | 3.51 | 2.01 | 23:35 | 0.95 | 07:30 | 3.29 | 2.01 | 23:35 | 0.030 | 07:30 | 0.465 | 0.146 | 0.146 | |
| 01/03/2020 | 21:55 | 1.07 | 15:10 | 3.39 | 1.92 | 00:30 | 0.89 | 15:10 | 3.16 | 1.90 | 21:55 | 0.025 | 15:10 | 0.425 | 0.139 | 0.139 | |
| 01/04/2020 | 19:50 | 1.14 | 12:35 | 2.84 | 1.64 | 05:55 | 0.83 | 11:00 | 2.94 | 1.55 | 05:55 | 0.025 | 12:35 | 0.282 | 0.087 | 0.087 | |
| 01/05/2020 | 11:50 | 1.11 | 17:35 | 2.14 | 1.29 | 11:55 | 0.75 | 17:35 | 2.21 | 1.07 | 11:50 | 0.020 | 17:35 | 0.153 | 0.037 | 0.037 | |
| 01/06/2020 | 00:05 | 1.22 | 13:05 | 3.31 | 1.93 | 00:00 | 0.89 | 13:05 | 3.14 | 1.90 | 00:00 | 0.027 | 13:05 | 0.408 | 0.134 | 0.134 | |
| 01/07/2020 | 23:45 | 1.13 | 14:30 | 2.99 | 1.92 | 01:05 | 0.87 | 12:30 | 3.02 | 1.92 | 01:05 | 0.027 | 12:35 | 0.323 | 0.133 | 0.133 | |
| 01/08/2020 | 04:25 | 1.12 | 08:35 | 3.04 | 2.01 | 04:30 | 0.98 | 08:35 | 3.16 | 2.04 | 04:30 | 0.026 | 08:35 | 0.364 | 0.143 | 0.143 | 0.02 |
| 01/09/2020 | 02:05 | 1.09 | 10:45 | 4.03 | 2.41 | 05:05 | 0.86 | 10:45 | 3.69 | 2.42 | 02:05 | 0.023 | 10:45 | 0.633 | 0.245 | 0.245 | 0.18 |
| 01/10/2020 | 05:05 | 1.72 | 16:00 | 3.89 | 2.68 | 02:30 | 1.66 | 14:05 | 3.62 | 2.76 | 05:05 | 0.085 | 16:00 | 0.538 | 0.287 | 0.287 | 0.02 |
| 01/11/2020 | 06:05 | 1.53 | 13:50 | 3.23 | 2.09 | 06:05 | 1.43 | 17:45 | 2.96 | 2.12 | 06:05 | 0.061 | 13:50 | 0.371 | 0.151 | 0.151 | 0.01 |
| 01/12/2020 | 03:40 | 1.62 | 14:05 | 2.39 | 1.94 | 03:30 | 1.16 | 14:15 | 2.38 | 1.80 | 03:30 | 0.055 | 14:05 | 0.193 | 0.110 | 0.110 | |
| 01/13/2020 | 04:30 | 1.72 | 14:50 | 3.86 | 2.68 | 03:10 | 1.50 | 12:55 | 3.66 | 2.71 | 04:25 | 0.079 | 13:05 | 0.535 | 0.282 | 0.282 | 0.02 |
| 01/14/2020 | 04:50 | 1.74 | 08:25 | 3.94 | 2.70 | 04:50 | 1.68 | 12:50 | 3.55 | 2.75 | 04:50 | 0.086 | 08:25 | 0.555 | 0.287 | 0.287 | 0.11 |
| 01/15/2020 | 04:15 | 1.73 | 10:30 | 4.01 | 2.80 | 03:45 | 1.67 | 12:10 | 3.54 | 2.84 | 04:20 | 0.087 | 10:30 | 0.542 | 0.306 | 0.306 | 0.07 |
| 01/16/2020 | 04:20 | 1.75 | 14:00 | 4.00 | 2.84 | 04:05 | 1.78 | 14:00 | 3.75 | 2.93 | 04:20 | 0.093 | 14:00 | 0.637 | 0.323 | 0.323 | 0.66 |
| 01/17/2020 | 04:40 | 1.89 | 13:15 | 4.18 | 2.77 | 05:00 | 1.92 | 15:00 | 3.74 | 2.84 | 04:45 | 0.113 | 15:00 | 0.629 | 0.301 | 0.301 | |
| 01/18/2020 | 07:25 | 1.68 | 12:40 | 3.38 | 2.18 | 22:15 | 1.53 | 12:40 | 3.17 | 2.23 | 22:15 | 0.083 | 12:40 | 0.425 | 0.169 | 0.169 | |
| 01/19/2020 | 04:50 | 1.46 | 08:55 | 2.39 | 1.81 | 19:55 | 1.43 | 08:55 | 2.42 | 1.78 | 04:50 | 0.057 | 08:55 | 0.197 | 0.099 | 0.099 | |
| 01/20/2020 | 00:40 | 1.63 | 11:00 | 3.70 | 2.64 | 03:15 | 1.37 | 14:55 | 3.58 | 2.68 | 00:55 | 0.068 | 12:30 | 0.495 | 0.279 | 0.279 | |
| 01/21/2020 | 04:00 | 1.75 | 17:20 | 3.99 | 2.91 | 04:00 | 1.78 | 12:40 | 3.60 | 2.89 | 04:00 | 0.092 | 17:20 | 0.562 | 0.327 | 0.327 | |
| 01/22/2020 | 04:15 | 1.84 | 09:25 | 3.87 | 2.87 | 04:05 | 1.92 | 12:50 | 3.62 | 2.93 | 04:15 | 0.108 | 09:25 | 0.516 | 0.327 | 0.327 | 0.03 |
| 01/23/2020 | 04:10 | 1.94 | 13:15 | 3.75 | 2.92 | 04:10 | 1.92 | 08:55 | 3.61 | 2.96 | 04:10 | 0.116 | 15:05 | 0.503 | 0.333 | 0.333 | |
| 01/24/2020 | 04:50 | 1.88 | 19:00 | 4.11 | 2.81 | 02:45 | 1.90 | 11:05 | 3.72 | 2.87 | 04:45 | 0.112 | 11:05 | 0.594 | 0.313 | 0.313 | |
| 01/25/2020 | 23:15 | 1.66 | 14:00 | 2.76 | 2.07 | 23:15 | 1.50 | 11:10 | 2.95 | 2.12 | 23:15 | 0.072 | 11:10 | 0.287 | 0.145 | 0.145 | |
| 01/26/2020 | 03:20 | 1.42 | 19:10 | 2.70 | 1.88 | 02:30 | 1.32 | 08:15 | 2.91 | 1.84 | 03:20 | 0.054 | 08:15 | 0.270 | 0.108 | 0.108 | 0.16 |
| 01/27/2020 | 22:35 | 1.84 | 08:50 | 3.78 | 2.76 | 01:25 | 1.81 | 14:40 | 3.55 | 2.89 | 01:15 | 0.105 | 08:50 | 0.495 | 0.305 | 0.305 | |
| 01/28/2020 | 22:55 | 1.70 | 05:15 | 3.83 | 2.81 | 23:35 | 1.69 | 05:10 | 3.76 | 2.85 | 22:55 | 0.086 | 05:10 | 0.599 | 0.315 | 0.315 | 0.01 |
| 01/29/2020 | 21:05 | 1.84 | 10:25 | 3.82 | 2.69 | 21:10 | 1.88 | 03:25 | 3.61 | 2.80 | 21:05 | 0.105 | 03:25 | 0.505 | 0.285 | 0.285 | |
| 01/30/2020 | 18:25 | 1.78 | 05:50 | 3.87 | 2.76 | 18:00 | 1.82 | 03:20 | 3.69 | 2.84 | 18:25 | 0.097 | 05:50 | 0.529 | 0.299 | 0.299 | |
| 01/31/2020 | 17:50 | 1.67 | 02:45 | 3.90 | 2.67 | 17:40 | 1.68 | 03:05 | 3.59 | 2.72 | 17:50 | 0.082 | 02:45 | 0.528 | 0.280 | 0.280 | |
| 02/01/2020 | 14:55 | 1.39 | 03:30 | 2.78 | 1.84 | 15:00 | 1.35 | 03:30 | 2.96 | 1.85 | 15:00 | 0.050 | 03:30 | 0.300 | 0.111 | 0.111 | |
| 02/02/2020 | 13:00 | 1.58 | 19:45 | 3.71 | 2.24 | 12:55 | 1.21 | 23:15 | 3.53 | 2.20 | 12:55 | 0.055 | 19:45 | 0.490 | 0.189 | 0.189 | |
| 02/03/2020 | 13:05 | 1.73 | 20:15 | 3.73 | 2.77 | 12:55 | 1.73 | 21:15 | 3.62 | 2.82 | 13:00 | 0.089 | 21:45 | 0.524 | 0.302 | 0.302 | |
| 02/04/2020 | 11:10 | 1.85 | 21:40 | 3.65 | 2.80 | 11:05 | 1.88 | 16:10 | 3.58 | 2.88 | 11:10 | 0.106 | 21:40 | 0.490 | 0.307 | 0.307 | |
| 02/05/2020 | 09:25 | 1.75 | 17:00 | 3.82 | 2.75 | 09:25 | 1.73 | 17:35 | 3.68 | 2.83 | 09:25 | 0.089 | 17:35 | 0.584 | 0.297 | 0.297 | |
| 02/06/2020 | 04:50 | 1.73 | 14:50 | 3.81 | 2.76 | 04:25 | 1.73 | 13:10 | 3.57 | 2.79 | 04:50 | 0.088 | 14:50 | 0.505 | 0.295 | 0.295 | |
| 02/07/2020 | 03:25 | 1.55 | 11:00 | 2.68 | 1.94 | 22:55 | 1.23 | 10:40 | 2.47 | 1.88 | 22:55 | 0.053 | 10:55 | 0.234 | 0.117 | 0.117 | |
| 02/08/2020 | 01:15 | 1.34 | 11:15 | 2.26 | 1.75 | 02:40 | 1.16 | 11:15 | 2.26 | 1.65 | 03:55 | 0.041 | 11:15 | 0.170 | 0.087 | 0.087 | |
| 02/09/2020 | 01:55 | 1.65 | 10:10 | 3.64 | 2.50 | 00:15 | 1.46 | 04:30 | 3.36 | 2.45 | 01:55 | 0.069 | 10:10 | 0.456 | 0.230 | 0.230 | |
| 02/10/2020 | 20:35 | 1.62 | 08:05 | 4.14 | 2.71 | 20:55 | 1.44 | 06:30 | 3.58 | 2.70 | 21:00 | 0.067 | 08:05 | 0.603 | 0.284 | 0.284 | |
| 02/11/2020 | 16:45 | 1.70 | 02:50 | 4.00 | 2.80 | 15:55 | 1.56 | 02:00 | 3.54 | 2.78 | 16:45 | 0.085 | 02:50 | 0.537 | 0.304 | 0.304 | |
| 02/12/2020 | 16:20 | 1.57 | 22:00 | 4.10 | 2.62 | 16:15 | 1.53 | 00:10 | 3.50 | 2.62 | 16:25 | 0.068 | 22:00 | 0.553 | 0.262 | 0.262 | |
| 02/13/2020 | 12:25 | 1.15 | 01:50 | 3.91 | 2.17 | 13:10 | 0.81 | 00:00 | 3.39 | 2.13 | 12:45 | 0.026 | 01:50 | 0.522 | 0.180 | 0.180 | |
| 02/14/2020 | 16:20 | 1.13 | 21:40 | 2.89 | 1.67 | 16:15 | 0.43 | 19:25 | 2.77 | 1.48 | 16:15 | 0.012 | 21:40 | 0.280 | 0.088 | 0.088 | |
| 02/15/2020 | 06:00 | 1.12 | 18:00 | 4.07 | 1.79 | 06:00 | 0.39 | 16:35 | 3.16 | 1.56 | 06:00 | 0.010 | 18:00 | 0.544 | 0.110 | 0.110 | |
| 02/16/2020 | 04:35 | 1.20 | 16:25 | 4.09 | 2.40 | 04:35 | 0.51 | 16:35 | 3.61 | 2.32 | 04:35 | 0.015 | 16:35 | 0.625 | 0.231 | 0.231 | |
| 02/17/2020 | 08:15 | 1.83 | 12:40 | 3.85 | 2.79 | 06:30 | 1.64 | 14:00 | 3.57 | 2.74 | 08:05 | 0.098 | 14:05 | 0.546 | 0.301 | 0.301 | |
| 02/18/2020 | 06:55 | 1.93 | 19:20 | 4.01 | 2.96 | 06:55 | 1.69 | 14:35 | 3.60 | 2.90 | 06:55 | 0.101 | 14:30 | 0.563 | 0.336 | 0.336 | |
| 02/19/2020 | 02:05 | 1.89 | 13:00 | 3.83 | 2.69 | 01:50 | 1.62 | 11:00 | 3.52 | 2.62 | 01:50 | 0.100 | 16:55 | 0.514 | 0.271 | 0.271 | |
| 02/20/2020 | 06:05 | 1.60 | 10:40 | 3.78 | 2.43 | 04:35 | 1.19 | 12:40 | 3.43 | 2.35 | 04:35 | 0.057 | 12:40 | 0.498 | 0.214 | 0.137 | |
| 02/21/2020 | | | | | | | | | | | | | | | | | |
| 02/22/2020 | | | | | | | | | | | | | | | | | |
| 02/23/2020 | | | | | | | | | | | | | | | | | |
| 02/24/2020 | | | | | | | | | | | | | | | | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | | | | | | | | | | | | | | | | | |
| 02/26/2020 | | | | | | | | | | | | | | | | | |
| 02/27/2020 | | | | | | | | | | | | | | | | | |
| 02/28/2020 | | | | | | | | | | | | | | | | | |
| 02/29/2020 | | | | | | | | | | | | | | | | | |
| 03/01/2020 | | | | | | | | | | | | | | | | | |
| 03/02/2020 | | | | | | | | | | | | | | | | | |
| 03/03/2020 | 23:50 | 1.45 | 10:00 | 3.65 | 2.56 | 05:05 | 1.01 | 10:00 | 3.56 | 2.80 | 23:50 | 0.040 | 10:00 | 0.530 | 0.270 | 0.238 | |
| 03/04/2020 | 04:35 | 1.16 | 09:00 | 3.60 | 2.44 | 04:35 | 0.50 | 11:50 | 3.52 | 2.56 | 04:35 | 0.014 | 09:00 | 0.511 | 0.247 | 0.247 | |
| 03/05/2020 | 04:35 | 1.32 | 08:30 | 3.42 | 2.40 | 04:40 | 0.72 | 08:40 | 3.49 | 2.63 | 04:40 | 0.025 | 08:30 | 0.474 | 0.234 | 0.234 | |
| 03/06/2020 | 04:15 | 1.11 | 15:35 | 3.39 | 2.23 | 03:40 | 0.50 | 15:20 | 3.43 | 2.43 | 03:40 | 0.015 | 15:35 | 0.461 | 0.212 | 0.212 | |
| 03/07/2020 | 03:35 | 1.10 | 11:25 | 2.98 | 1.68 | 03:55 | 0.48 | 11:25 | 3.31 | 1.81 | 01:05 | 0.013 | 11:25 | 0.370 | 0.105 | 0.105 | |
| 03/08/2020 | 05:15 | 1.11 | 11:45 | 2.77 | 1.50 | 03:05 | 0.37 | 13:40 | 3.09 | 1.40 | 03:05 | 0.010 | 11:45 | 0.303 | 0.072 | 0.072 | |
| 03/09/2020 | 03:50 | 1.17 | 12:00 | 3.55 | 2.19 | 02:30 | 0.45 | 13:25 | 3.53 | 2.30 | 02:30 | 0.013 | 12:00 | 0.503 | 0.205 | 0.205 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 22.365 | 4.90 |
| Avg | 2.34 | 2.36 | 0.216 | |

Site Commentary

Site Information

| MIL_2569 | |
|-----------------|-------|
| Pipe Dimensions | 21 |
| Silt Level | 0.00" |

Overview

Site MIL_2569 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited a small response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed downstream of site MIL_2491. A check of balancing shows a net flow of 0.225 MGD between the sites.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 6.43 | 1.05 | 0.441 |
| Minimum | 4.32 | 0.45 | 0.121 |
| Maximum | 9.03 | 1.68 | 0.966 |
| Time of Minimum | 11/16/2019 5:00 AM | 2/18/2020 3:50 AM | 2/18/2020 3:50 AM |
| Time of Maximum | 12/23/2019 3:10 PM | 12/4/2019 12:25 PM | 12/23/2019 3:10 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2569

Site Address /Location: Milpitas Blvd and Tramway Dr

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details:

Drive

Latitude:

37.440801

Longitude:

-121.9044

Pipe Size (H x W)

21.0" x 21.0"

Pipe Shape

Circular

Manhole #

2569

System Characteristics

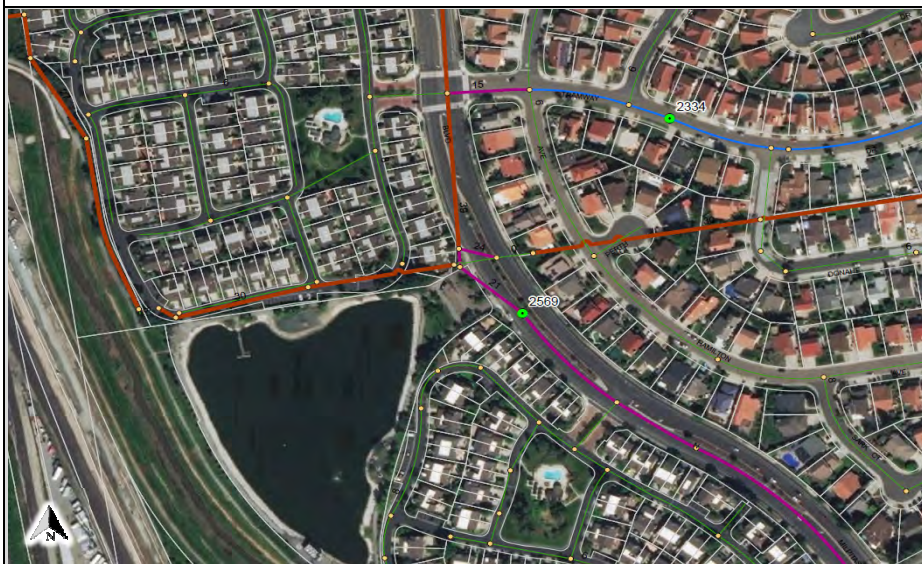
Residential/Commercial

Access

Traffic

Drive

Medium



Installation Information

Installation Date:

Wednesday, November 13, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

8:15:00 AM

Pipe Size (HxW)

21.0" x 21.0"

Depth of Flow (Wet DOF) (in)

7.5"

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.26

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Smooth good flow, Medium depth and velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

10'

Manhole Configuration

Single

Manhole Material:

Vitrified Clay Pipe

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_2569

Flow Monitor

MIL_2569

Pipe Height
21.00 in

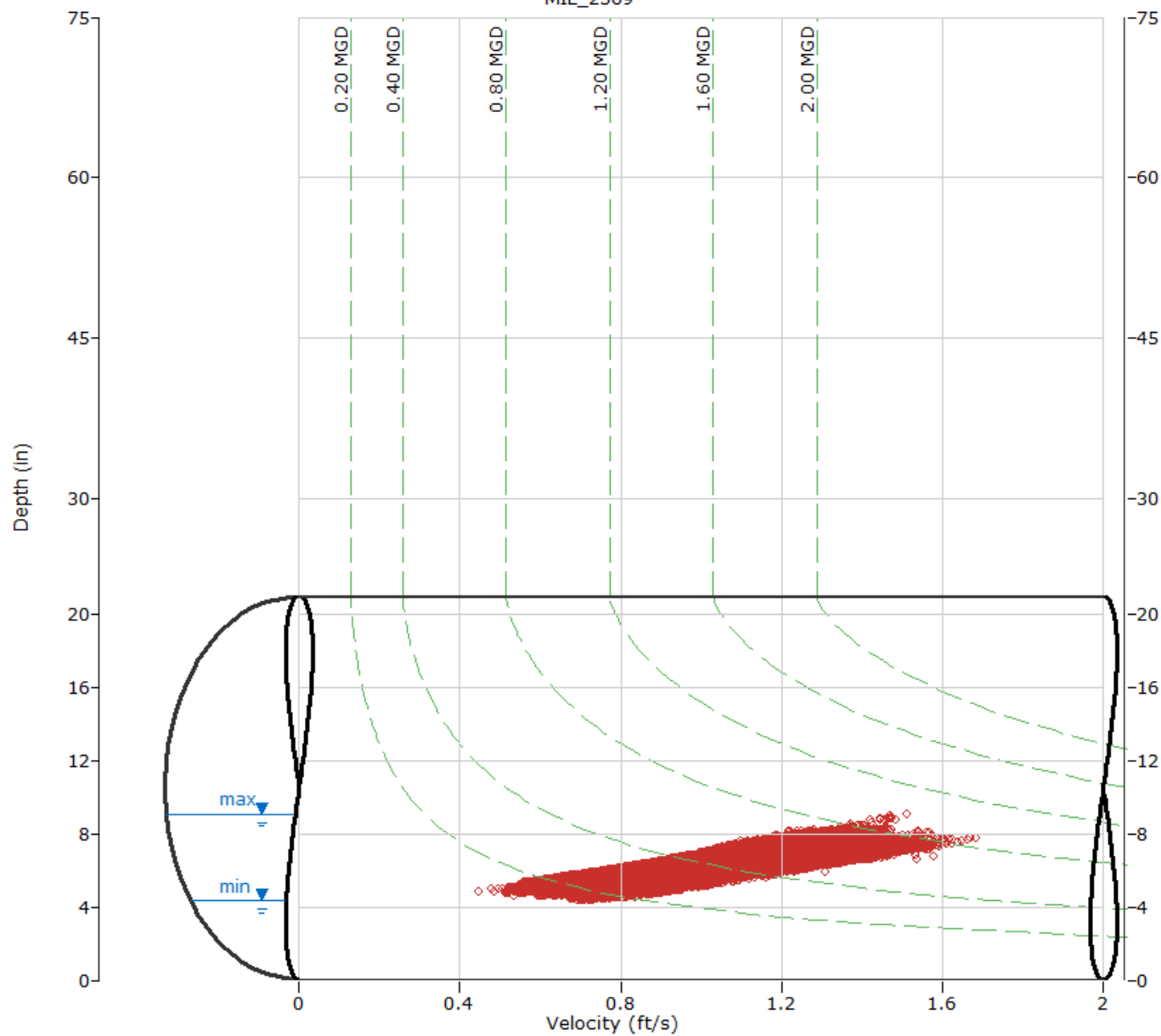
Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

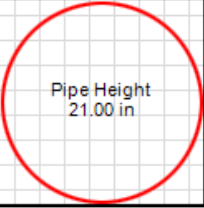
ADS ENVIRONMENTAL
SERVICES



HYDROGRAPH REPORT

MIL_2569

Flow Monitor
MIL_2569

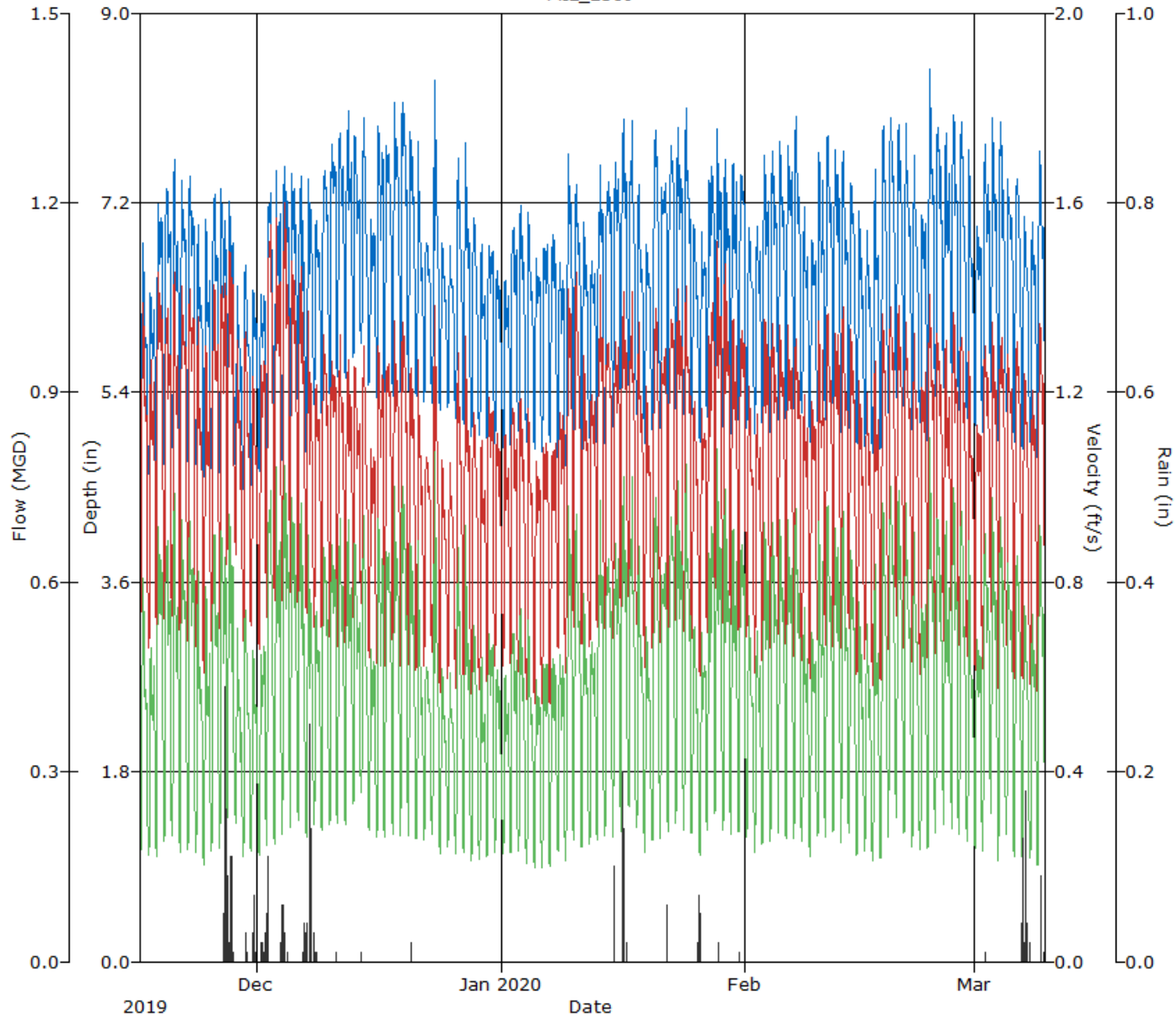


Pipe Height
21.00 in

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2569, Pipe Height: 21.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 11/16/2019 | 05:00 | 4.32 | 11:20 | 6.92 | 5.69 | 04:50 | 0.70 | 11:10 | 1.42 | 1.10 | 05:00 | 0.161 | 11:20 | 0.631 | 0.389 | 0.389 | | |
| 11/17/2019 | 03:40 | 4.61 | 09:30 | 6.49 | 5.63 | 03:20 | 0.61 | 10:50 | 1.29 | 1.02 | 03:20 | 0.153 | 10:50 | 0.507 | 0.352 | 0.352 | | |
| 11/18/2019 | 03:55 | 4.38 | 10:30 | 7.50 | 6.21 | 02:55 | 0.67 | 10:35 | 1.55 | 1.18 | 03:15 | 0.163 | 10:30 | 0.773 | 0.475 | 0.475 | | |
| 11/19/2019 | 05:20 | 4.71 | 16:05 | 7.66 | 6.46 | 03:50 | 0.69 | 16:00 | 1.50 | 1.15 | 03:50 | 0.183 | 16:00 | 0.771 | 0.488 | 0.488 | | |
| 11/20/2019 | 04:45 | 4.82 | 10:05 | 7.76 | 6.34 | 03:45 | 0.71 | 12:35 | 1.49 | 1.13 | 03:45 | 0.194 | 10:05 | 0.780 | 0.465 | 0.465 | | |
| 11/21/2019 | 04:50 | 4.70 | 09:50 | 7.82 | 6.35 | 04:15 | 0.64 | 09:50 | 1.52 | 1.15 | 04:15 | 0.167 | 09:50 | 0.801 | 0.475 | 0.475 | | |
| 11/22/2019 | 05:00 | 4.71 | 20:45 | 7.96 | 6.47 | 04:05 | 0.67 | 20:50 | 1.57 | 1.17 | 04:00 | 0.175 | 20:50 | 0.845 | 0.499 | 0.499 | | |
| 11/23/2019 | 05:10 | 4.67 | 12:25 | 7.10 | 5.94 | 05:25 | 0.64 | 12:50 | 1.41 | 1.04 | 05:25 | 0.166 | 12:50 | 0.654 | 0.388 | 0.388 | | |
| 11/24/2019 | 05:15 | 4.57 | 10:00 | 7.10 | 5.89 | 05:15 | 0.60 | 09:55 | 1.34 | 1.00 | 05:15 | 0.149 | 09:55 | 0.619 | 0.372 | 0.372 | | |
| 11/25/2019 | 04:15 | 4.66 | 12:45 | 7.48 | 6.21 | 04:55 | 0.66 | 12:45 | 1.51 | 1.13 | 04:55 | 0.171 | 12:45 | 0.749 | 0.454 | 0.454 | | |
| 11/26/2019 | 05:25 | 4.60 | 09:55 | 7.59 | 6.31 | 04:15 | 0.67 | 09:40 | 1.54 | 1.19 | 05:30 | 0.174 | 09:45 | 0.772 | 0.486 | 0.486 | 0.63 | |
| 11/27/2019 | 03:30 | 4.60 | 09:15 | 7.38 | 6.17 | 03:20 | 0.81 | 10:10 | 1.57 | 1.26 | 03:20 | 0.205 | 10:15 | 0.759 | 0.497 | 0.497 | 0.77 | |
| 11/28/2019 | 05:45 | 4.53 | 12:00 | 6.44 | 5.53 | 05:40 | 0.83 | 11:40 | 1.33 | 1.07 | 05:40 | 0.206 | 12:40 | 0.535 | 0.357 | 0.357 | | |
| 11/29/2019 | 04:50 | 4.40 | 14:25 | 6.80 | 5.65 | 03:50 | 0.54 | 14:25 | 1.38 | 1.05 | 03:50 | 0.133 | 14:25 | 0.602 | 0.365 | 0.365 | | |
| 11/30/2019 | 04:55 | 4.48 | 12:00 | 6.43 | 5.60 | 03:50 | 0.68 | 11:40 | 1.26 | 1.00 | 03:50 | 0.166 | 11:40 | 0.506 | 0.341 | 0.341 | 0.14 | |
| 12/01/2019 | 05:55 | 4.61 | 21:55 | 6.45 | 5.70 | 05:40 | 0.63 | 22:05 | 1.32 | 1.04 | 05:45 | 0.159 | 22:00 | 0.533 | 0.366 | 0.366 | 0.06 | |
| 12/02/2019 | 04:50 | 4.50 | 17:20 | 7.33 | 6.29 | 02:00 | 0.67 | 17:00 | 1.59 | 1.27 | 02:00 | 0.178 | 17:05 | 0.763 | 0.521 | 0.521 | 0.36 | |
| 12/03/2019 | 04:40 | 4.46 | 10:15 | 7.67 | 6.20 | 04:40 | 0.73 | 10:05 | 1.62 | 1.23 | 04:40 | 0.177 | 10:05 | 0.833 | 0.494 | 0.494 | | |
| 12/04/2019 | 03:05 | 4.74 | 12:25 | 7.74 | 6.49 | 03:05 | 0.74 | 12:25 | 1.68 | 1.27 | 03:05 | 0.195 | 12:25 | 0.875 | 0.541 | 0.541 | | |
| 12/05/2019 | 04:30 | 4.83 | 14:55 | 7.78 | 6.51 | 04:25 | 0.76 | 14:50 | 1.56 | 1.23 | 04:25 | 0.205 | 14:50 | 0.814 | 0.521 | 0.521 | | |
| 12/06/2019 | 05:35 | 4.97 | 12:55 | 7.57 | 6.44 | 03:00 | 0.69 | 12:55 | 1.52 | 1.18 | 05:35 | 0.209 | 12:55 | 0.765 | 0.493 | 0.493 | | |
| 12/07/2019 | 05:00 | 4.77 | 12:45 | 7.47 | 6.32 | 05:10 | 0.73 | 12:15 | 1.39 | 1.07 | 05:05 | 0.193 | 12:05 | 0.689 | 0.437 | 0.437 | 0.84 | |
| 12/08/2019 | 05:15 | 5.27 | 11:30 | 7.07 | 6.33 | 06:00 | 0.66 | 11:10 | 1.23 | 1.01 | 06:00 | 0.202 | 11:10 | 0.562 | 0.410 | 0.410 | 0.10 | |
| 12/09/2019 | 05:00 | 5.12 | 09:35 | 7.65 | 6.72 | 04:55 | 0.68 | 09:30 | 1.42 | 1.09 | 04:55 | 0.200 | 09:35 | 0.715 | 0.484 | 0.484 | | |
| 12/10/2019 | 05:10 | 5.36 | 12:25 | 7.85 | 6.92 | 04:25 | 0.67 | 14:50 | 1.32 | 1.07 | 04:30 | 0.210 | 12:20 | 0.696 | 0.493 | 0.493 | | |
| 12/11/2019 | 03:30 | 5.52 | 11:10 | 7.96 | 7.00 | 03:15 | 0.65 | 13:35 | 1.33 | 1.06 | 03:15 | 0.213 | 13:35 | 0.715 | 0.495 | 0.495 | | |
| 12/12/2019 | 04:55 | 5.50 | 12:55 | 8.11 | 7.06 | 05:10 | 0.64 | 12:55 | 1.33 | 1.05 | 05:10 | 0.209 | 12:55 | 0.735 | 0.496 | 0.496 | | |
| 12/13/2019 | 05:10 | 5.63 | 12:40 | 7.99 | 6.96 | 05:10 | 0.67 | 12:40 | 1.33 | 1.05 | 05:10 | 0.226 | 12:40 | 0.720 | 0.482 | 0.482 | | |
| 12/14/2019 | 05:25 | 5.84 | 13:35 | 8.06 | 6.87 | 04:30 | 0.73 | 11:05 | 1.34 | 1.03 | 04:30 | 0.260 | 13:40 | 0.728 | 0.464 | 0.464 | | |
| 12/15/2019 | 03:40 | 5.41 | 11:10 | 7.12 | 6.43 | 03:40 | 0.62 | 23:00 | 1.12 | 0.92 | 03:40 | 0.196 | 11:15 | 0.520 | 0.377 | 0.377 | | |
| 12/16/2019 | 03:45 | 5.31 | 08:40 | 8.39 | 6.92 | 03:35 | 0.58 | 08:35 | 1.40 | 1.04 | 03:35 | 0.179 | 08:35 | 0.813 | 0.485 | 0.485 | | |
| 12/17/2019 | 04:55 | 5.37 | 08:25 | 7.95 | 6.97 | 03:35 | 0.59 | 17:05 | 1.32 | 1.07 | 03:35 | 0.184 | 08:25 | 0.713 | 0.499 | 0.499 | | |
| 12/18/2019 | 04:45 | 5.30 | 11:35 | 8.30 | 7.09 | 04:50 | 0.63 | 10:20 | 1.38 | 1.08 | 04:50 | 0.194 | 11:40 | 0.782 | 0.518 | 0.518 | | |
| 12/19/2019 | 05:05 | 5.36 | 10:55 | 8.32 | 7.13 | 05:10 | 0.58 | 13:35 | 1.38 | 1.09 | 05:10 | 0.182 | 10:55 | 0.790 | 0.527 | 0.527 | | |
| 12/20/2019 | 05:00 | 5.32 | 09:00 | 8.01 | 6.98 | 05:30 | 0.60 | 14:45 | 1.33 | 1.05 | 05:05 | 0.187 | 14:45 | 0.712 | 0.487 | 0.487 | | |
| 12/21/2019 | 03:45 | 5.31 | 10:00 | 7.85 | 6.51 | 03:50 | 0.57 | 11:35 | 1.29 | 0.95 | 03:50 | 0.175 | 10:05 | 0.685 | 0.403 | 0.403 | | |
| 12/22/2019 | 04:30 | 5.28 | 11:05 | 6.97 | 6.26 | 04:45 | 0.61 | 11:05 | 1.12 | 0.91 | 04:45 | 0.189 | 11:05 | 0.503 | 0.360 | 0.360 | | |
| 12/23/2019 | 05:20 | 5.29 | 15:10 | 9.03 | 6.68 | 05:55 | 0.64 | 15:10 | 1.51 | 1.00 | 05:55 | 0.196 | 15:10 | 0.966 | 0.446 | 0.446 | | |
| 12/24/2019 | 05:05 | 5.20 | 12:10 | 6.85 | 6.18 | 05:00 | 0.55 | 12:50 | 1.17 | 0.86 | 05:00 | 0.165 | 12:50 | 0.514 | 0.334 | 0.334 | | |
| 12/25/2019 | 05:00 | 5.23 | 12:15 | 6.85 | 6.09 | 04:45 | 0.55 | 11:25 | 1.09 | 0.85 | 04:45 | 0.169 | 11:25 | 0.475 | 0.324 | 0.324 | | |
| 12/26/2019 | 03:50 | 5.12 | 13:40 | 7.71 | 6.51 | 03:40 | 0.55 | 13:35 | 1.33 | 0.97 | 03:40 | 0.162 | 13:35 | 0.685 | 0.416 | 0.416 | | |
| 12/27/2019 | 04:55 | 5.06 | 11:15 | 7.87 | 6.45 | 05:00 | 0.57 | 11:15 | 1.35 | 0.97 | 05:00 | 0.164 | 11:15 | 0.720 | 0.411 | 0.411 | | |
| 12/28/2019 | 05:20 | 4.97 | 11:10 | 7.25 | 6.18 | 04:50 | 0.55 | 11:35 | 1.30 | 0.91 | 04:50 | 0.156 | 11:35 | 0.584 | 0.361 | 0.361 | | |
| 12/29/2019 | 05:20 | 4.96 | 11:35 | 6.86 | 5.94 | 05:15 | 0.56 | 09:50 | 1.12 | 0.87 | 05:15 | 0.156 | 11:05 | 0.490 | 0.321 | 0.321 | | |
| 12/30/2019 | 03:40 | 4.93 | 19:10 | 6.92 | 6.13 | 03:25 | 0.57 | 19:05 | 1.26 | 0.97 | 03:25 | 0.160 | 19:05 | 0.561 | 0.381 | 0.381 | | |
| 12/31/2019 | 05:25 | 4.91 | 11:00 | 6.59 | 5.90 | 04:50 | 0.60 | 10:55 | 1.13 | 0.92 | 05:15 | 0.168 | 11:00 | 0.473 | 0.337 | 0.337 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 05:25 | 4.85 | 12:15 | 6.51 | 5.83 | 05:55 | 0.60 | 12:15 | 1.14 | 0.91 | 05:55 | 0.163 | 12:15 | 0.467 | 0.328 | 0.328 | | |
| 01/02/2020 | 04:45 | 4.83 | 10:40 | 7.01 | 6.17 | 03:45 | 0.60 | 10:35 | 1.21 | 0.96 | 03:45 | 0.165 | 10:35 | 0.549 | 0.380 | 0.380 | | |
| 01/03/2020 | 04:45 | 4.99 | 12:40 | 7.24 | 6.21 | 02:50 | 0.58 | 12:40 | 1.24 | 0.94 | 02:50 | 0.169 | 12:40 | 0.587 | 0.375 | 0.375 | | |
| 01/04/2020 | 05:05 | 4.88 | 11:50 | 7.28 | 6.06 | 05:20 | 0.52 | 11:50 | 1.21 | 0.88 | 05:20 | 0.143 | 11:50 | 0.579 | 0.339 | 0.339 | | |
| 01/05/2020 | 05:25 | 4.84 | 11:05 | 6.79 | 6.00 | 05:15 | 0.52 | 12:00 | 1.08 | 0.86 | 05:15 | 0.142 | 11:05 | 0.468 | 0.325 | 0.325 | | |
| 01/06/2020 | 04:50 | 4.79 | 12:40 | 7.01 | 6.15 | 04:00 | 0.49 | 10:35 | 1.16 | 0.91 | 04:00 | 0.131 | 12:45 | 0.522 | 0.357 | 0.357 | | |
| 01/07/2020 | 03:20 | 4.90 | 12:55 | 7.03 | 6.17 | 05:25 | 0.51 | 12:55 | 1.13 | 0.90 | 05:25 | 0.143 | 12:55 | 0.518 | 0.356 | 0.356 | | |
| 01/08/2020 | 04:45 | 4.67 | 10:55 | 6.68 | 5.90 | 04:45 | 0.63 | 12:50 | 1.20 | 0.98 | 04:45 | 0.163 | 10:55 | 0.508 | 0.361 | 0.361 | | |
| 01/09/2020 | 04:40 | 4.67 | 11:10 | 7.79 | 6.39 | 03:45 | 0.59 | 11:10 | 1.49 | 1.10 | 03:45 | 0.153 | 11:10 | 0.783 | 0.467 | 0.467 | | |
| 01/10/2020 | 04:40 | 4.82 | 13:10 | 7.44 | 6.39 | 03:20 | 0.68 | 13:15 | 1.48 | 1.15 | 03:20 | 0.185 | 13:15 | 0.728 | 0.479 | 0.479 | | |
| 01/11/2020 | 05:20 | 4.76 | 11:15 | 7.15 | 6.08 | 03:50 | 0.64 | 11:15 | 1.36 | 1.02 | 05:30 | 0.172 | 11:15 | 0.635 | 0.393 | 0.393 | | |
| 01/12/2020 | 05:30 | 4.94 | 11:35 | 6.70 | 5.99 | 05:10 | 0.65 | 11:30 | 1.22 | 1.00 | 05:35 | 0.181 | 11:35 | 0.518 | 0.374 | 0.374 | | |
| 01/13/2020 | 03:30 | 4.84 | 13:25 | 7.66 | 6.42 | 03:20 | 0.68 | 13:35 | 1.49 | 1.13 | 03:25 | 0.185 | 13:35 | 0.760 | 0.474 | 0.474 | | |
| 01/14/2020 | 04:40 | 4.87 | 13:25 | 7.50 | 6.52 | 02:15 | 0.68 | 08:55 | 1.36 | 1.10 | 04:40 | 0.189 | 13:20 | 0.670 | 0.470 | 0.470 | | |
| 01/15/2020 | 04:40 | 5.06 | 12:15 | 7.69 | 6.74 | 04:15 | 0.67 | 12:25 | 1.35 | 1.10 | 04:15 | 0.194 | 12:25 | 0.691 | 0.489 | 0.489 | | |
| 01/16/2020 | 04:45 | 5.08 | 14:15 | 8.22 | 6.88 | 04:40 | 0.68 | 14:10 | 1.47 | 1.14 | 04:40 | 0.198 | 14:10 | 0.825 | 0.524 | 0.524 | | |
| 01/17/2020 | 05:10 | 5.35 | 15:20 | 8.19 | 6.79 | 05:10 | 0.74 | 15:25 | 1.45 | 1.12 | 05:10 | 0.231 | 15:20 | 0.815 | 0.499 | 0.499 | | |
| 01/18/2020 | 04:35 | 5.14 | 13:00 | 7.56 | 6.34 | 03:35 | 0.69 | 13:00 | 1.44 | 1.04 | 04:35 | 0.204 | 13:00 | 0.725 | 0.424 | 0.424 | | |
| 01/19/2020 | 05:20 | 4.89 | 10:30 | 6.86 | 6.07 | 05:20 | 0.60 | 10:25 | 1.25 | 0.95 | 05:20 | 0.166 | 10:25 | 0.551 | 0.366 | 0.366 | | |
| 01/20/2020 | 05:20 | 5.01 | 12:45 | 8.10 | 6.72 | 03:45 | 0.60 | 15:00 | 1.40 | 1.09 | 03:45 | 0.172 | 12:45 | 0.770 | 0.491 | 0.491 | | |
| 01/21/2020 | 04:15 | 5.06 | 21:55 | 7.60 | 6.73 | 04:05 | 0.66 | 21:45 | 1.36 | 1.11 | 04:05 | 0.190 | 21:55 | 0.690 | 0.492 | 0.492 | 0.01 | |
| 01/22/2020 | 04:40 | 5.18 | 12:55 | 7.81 | 6.85 | 04:35 | 0.67 | 17:15 | 1.39 | 1.14 | 04:35 | 0.199 | 13:05 | 0.721 | 0.521 | 0.521 | 0.09 | |
| 01/23/2020 | 04:40 | 5.16 | 09:15 | 8.02 | 6.84 | 04:40 | 0.70 | 19:25 | 1.47 | 1.15 | 04:40 | 0.207 | 09:15 | 0.797 | 0.522 | 0.522 | | |
| 01/24/2020 | 04:45 | 5.14 | 11:20 | 8.24 | 6.83 | 05:05 | 0.68 | 11:10 | 1.47 | 1.13 | 05:05 | 0.201 | 11:20 | 0.829 | 0.515 | 0.515 | | |
| 01/25/2020 | 03:40 | 5.15 | 11:55 | 7.03 | 6.21 | 03:45 | 0.66 | 12:40 | 1.20 | 0.97 | 03:45 | 0.194 | 11:50 | 0.543 | 0.383 | 0.383 | | |
| 01/26/2020 | 05:35 | 4.90 | 11:05 | 7.06 | 6.11 | 05:30 | 0.59 | 10:45 | 1.28 | 0.95 | 05:30 | 0.161 | 11:05 | 0.584 | 0.369 | 0.369 | | |
| 01/27/2020 | 03:00 | 5.12 | 18:35 | 7.84 | 6.67 | 02:10 | 0.66 | 18:40 | 1.46 | 1.13 | 02:55 | 0.202 | 18:35 | 0.758 | 0.500 | 0.500 | | |
| 01/28/2020 | 04:05 | 5.19 | 10:15 | 8.02 | 6.70 | 03:50 | 0.77 | 10:30 | 1.58 | 1.20 | 03:55 | 0.230 | 10:15 | 0.856 | 0.531 | 0.531 | | |
| 01/29/2020 | 04:55 | 5.04 | 10:00 | 7.69 | 6.52 | 04:35 | 0.71 | 10:00 | 1.51 | 1.16 | 04:50 | 0.203 | 10:00 | 0.780 | 0.493 | 0.493 | | |
| 01/30/2020 | 04:45 | 4.95 | 11:30 | 7.66 | 6.59 | 02:45 | 0.66 | 10:30 | 1.38 | 1.12 | 02:45 | 0.190 | 10:30 | 0.700 | 0.483 | 0.483 | | |
| 01/31/2020 | 03:30 | 5.12 | 12:50 | 7.71 | 6.69 | 03:30 | 0.68 | 12:40 | 1.41 | 1.13 | 03:30 | 0.200 | 12:45 | 0.730 | 0.497 | 0.497 | | |
| 02/01/2020 | 04:10 | 5.04 | 11:40 | 7.11 | 6.22 | 03:45 | 0.66 | 11:35 | 1.30 | 0.99 | 03:45 | 0.191 | 11:35 | 0.600 | 0.390 | 0.390 | | |
| 02/02/2020 | 05:20 | 4.98 | 12:50 | 7.10 | 6.15 | 05:15 | 0.59 | 12:35 | 1.19 | 0.93 | 05:15 | 0.167 | 12:50 | 0.550 | 0.364 | 0.364 | | |
| 02/03/2020 | 04:45 | 5.09 | 10:35 | 7.73 | 6.60 | 03:35 | 0.62 | 11:20 | 1.43 | 1.09 | 03:35 | 0.181 | 10:40 | 0.715 | 0.476 | 0.476 | | |
| 02/04/2020 | 04:50 | 5.00 | 13:30 | 7.77 | 6.64 | 03:15 | 0.62 | 13:20 | 1.39 | 1.09 | 03:15 | 0.177 | 13:25 | 0.724 | 0.478 | 0.478 | | |
| 02/05/2020 | 04:45 | 5.10 | 09:50 | 7.91 | 6.75 | 04:45 | 0.67 | 10:00 | 1.38 | 1.11 | 04:45 | 0.196 | 10:00 | 0.737 | 0.495 | 0.495 | | |
| 02/06/2020 | 04:40 | 5.09 | 11:30 | 8.02 | 6.79 | 05:20 | 0.65 | 11:25 | 1.45 | 1.09 | 04:40 | 0.188 | 11:30 | 0.784 | 0.493 | 0.493 | | |
| 02/07/2020 | 03:30 | 5.20 | 11:15 | 8.10 | 6.83 | 03:10 | 0.62 | 08:45 | 1.37 | 1.08 | 03:10 | 0.187 | 11:10 | 0.757 | 0.490 | 0.490 | | |
| 02/08/2020 | 03:45 | 5.18 | 11:35 | 7.37 | 6.24 | 04:25 | 0.58 | 11:35 | 1.26 | 0.97 | 04:25 | 0.174 | 11:35 | 0.612 | 0.382 | 0.382 | | |
| 02/09/2020 | 05:40 | 4.90 | 11:05 | 6.87 | 6.12 | 05:45 | 0.58 | 13:55 | 1.20 | 0.97 | 05:45 | 0.161 | 11:25 | 0.526 | 0.376 | 0.376 | | |
| 02/10/2020 | 03:55 | 5.10 | 08:20 | 7.98 | 6.52 | 03:05 | 0.63 | 08:20 | 1.47 | 1.06 | 03:05 | 0.193 | 08:20 | 0.796 | 0.453 | 0.453 | | |
| 02/11/2020 | 05:00 | 5.07 | 13:20 | 7.97 | 6.78 | 04:45 | 0.64 | 13:15 | 1.44 | 1.11 | 04:55 | 0.184 | 13:15 | 0.776 | 0.502 | 0.502 | | |
| 02/12/2020 | 04:40 | 5.26 | 09:05 | 7.86 | 6.82 | 03:25 | 0.56 | 12:15 | 1.35 | 1.12 | 03:25 | 0.170 | 09:05 | 0.715 | 0.505 | 0.505 | | |
| 02/13/2020 | 04:40 | 5.00 | 11:15 | 7.82 | 6.53 | 03:10 | 0.63 | 11:15 | 1.44 | 1.09 | 03:10 | 0.182 | 11:15 | 0.759 | 0.469 | 0.469 | | |
| 02/14/2020 | 03:55 | 5.04 | 10:50 | 7.50 | 6.52 | 03:40 | 0.68 | 10:20 | 1.36 | 1.09 | 03:40 | 0.195 | 10:45 | 0.667 | 0.463 | 0.463 | | |
| 02/15/2020 | 03:50 | 4.87 | 12:10 | 7.48 | 6.10 | 03:20 | 0.55 | 12:05 | 1.31 | 0.95 | 03:20 | 0.153 | 12:05 | 0.650 | 0.371 | 0.371 | | |
| 02/16/2020 | 05:10 | 4.86 | 11:10 | 7.04 | 6.00 | 05:10 | 0.63 | 12:45 | 1.26 | 0.95 | 05:10 | 0.171 | 12:45 | 0.572 | 0.358 | 0.358 | | |
| 02/17/2020 | 05:10 | 4.78 | 12:45 | 7.56 | 6.16 | 05:55 | 0.48 | 11:05 | 1.33 | 0.96 | 05:55 | 0.135 | 11:05 | 0.667 | 0.381 | 0.381 | | |
| 02/18/2020 | 03:45 | 4.83 | 12:25 | 8.16 | 6.56 | 03:50 | 0.45 | 12:15 | 1.54 | 1.05 | 03:50 | 0.121 | 12:20 | 0.856 | 0.458 | 0.458 | | |
| 02/19/2020 | 05:00 | 5.16 | 12:55 | 8.14 | 6.88 | 03:10 | 0.56 | 11:25 | 1.45 | 1.11 | 03:10 | 0.167 | 11:25 | 0.796 | 0.515 | 0.515 | | |
| 02/20/2020 | 04:55 | 5.24 | 11:25 | 8.09 | 6.93 | 04:55 | 0.70 | 11:15 | 1.44 | 1.13 | 04:55 | 0.212 | 11:15 | 0.793 | 0.522 | 0.522 | | |
| 02/21/2020 | 04:40 | 5.21 | 10:15 | 7.98 | 6.71 | 03:20 | 0.59 | 10:20 | 1.38 | 1.07 | 03:20 | 0.181 | 10:20 | 0.747 | 0.475 | 0.475 | | |
| 02/22/2020 | 05:10 | 5.01 | 11:35 | 7.71 | 6.42 | 05:05 | 0.61 | 11:40 | 1.39 | 1.03 | 05:05 | 0.174 | 11:40 | 0.718 | 0.428 | 0.428 | | |
| 02/23/2020 | 05:55 | 5.06 | 10:00 | 7.14 | 6.31 | 06:05 | 0.56 | 20:40 | 1.27 | 1.00 | 06:05 | 0.162 | 20:40 | 0.585 | 0.407 | 0.407 | | |
| 02/24/2020 | 03:45 | 4.89 | 11:05 | 8.78 | 6.87 | 03:55 | 0.60 | 11:20 | 1.48 | 1.11 | 03:55 | 0.166 | 11:05 | 0.905 | 0.513 | 0.513 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | |
| 02/25/2020 | 05:00 | 5.30 | 12:40 | 8.03 | 6.93 | 05:10 | 0.62 | 12:50 | 1.38 | 1.07 | 05:10 | 0.190 | 12:50 | 0.750 | 0.498 | 0.498 | 0.01 |
| 02/26/2020 | 04:55 | 5.34 | 10:35 | 7.98 | 6.92 | 05:00 | 0.63 | 12:55 | 1.48 | 1.07 | 05:00 | 0.197 | 12:55 | 0.784 | 0.492 | 0.492 | |
| 02/27/2020 | 04:55 | 5.32 | 12:55 | 8.12 | 6.98 | 04:50 | 0.61 | 12:50 | 1.41 | 1.10 | 04:50 | 0.190 | 12:50 | 0.781 | 0.513 | 0.513 | |
| 02/28/2020 | 03:35 | 5.21 | 10:40 | 8.05 | 6.79 | 02:45 | 0.64 | 12:05 | 1.37 | 1.07 | 03:35 | 0.194 | 10:55 | 0.740 | 0.486 | 0.486 | |
| 02/29/2020 | 03:30 | 5.14 | 11:10 | 8.12 | 6.39 | 03:05 | 0.62 | 11:15 | 1.37 | 0.98 | 03:05 | 0.183 | 11:15 | 0.760 | 0.405 | 0.405 | |
| 03/01/2020 | 05:50 | 5.08 | 12:35 | 7.05 | 6.23 | 05:20 | 0.55 | 11:30 | 1.18 | 0.94 | 05:20 | 0.161 | 12:35 | 0.536 | 0.376 | 0.376 | |
| 03/02/2020 | 03:35 | 5.00 | 10:40 | 7.86 | 6.69 | 03:55 | 0.60 | 10:55 | 1.36 | 1.06 | 03:45 | 0.170 | 10:55 | 0.715 | 0.473 | 0.473 | |
| 03/03/2020 | 05:40 | 5.30 | 10:20 | 8.14 | 6.81 | 05:35 | 0.70 | 10:05 | 1.40 | 1.08 | 05:35 | 0.215 | 10:15 | 0.773 | 0.485 | 0.485 | |
| 03/04/2020 | 03:45 | 4.89 | 09:20 | 8.20 | 6.71 | 03:30 | 0.55 | 09:25 | 1.37 | 1.06 | 03:30 | 0.152 | 09:25 | 0.771 | 0.476 | 0.476 | |
| 03/05/2020 | 04:55 | 5.07 | 08:50 | 7.82 | 6.61 | 04:55 | 0.59 | 08:55 | 1.38 | 1.07 | 04:55 | 0.170 | 08:50 | 0.724 | 0.461 | 0.461 | |
| 03/06/2020 | 05:10 | 4.88 | 15:55 | 7.57 | 6.48 | 03:05 | 0.49 | 15:45 | 1.36 | 1.04 | 03:05 | 0.139 | 15:45 | 0.675 | 0.446 | 0.446 | 0.58 |
| 03/07/2020 | 05:05 | 4.79 | 11:55 | 7.44 | 6.16 | 05:25 | 0.56 | 11:55 | 1.47 | 0.99 | 05:25 | 0.151 | 11:55 | 0.723 | 0.390 | 0.390 | |
| 03/08/2020 | 04:55 | 4.90 | 11:00 | 7.14 | 6.11 | 05:20 | 0.50 | 10:55 | 1.24 | 0.95 | 05:20 | 0.139 | 11:00 | 0.577 | 0.370 | 0.370 | 0.02 |
| 03/09/2020 | 03:20 | 4.74 | 12:10 | 7.84 | 6.44 | 03:20 | 0.52 | 12:15 | 1.42 | 1.05 | 03:20 | 0.135 | 12:10 | 0.753 | 0.449 | 0.449 | 0.11 |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 50.750 | 5.26 |
| Avg | 6.43 | 1.05 | 0.441 | |

Site Commentary

Site Information

| MIL_2666 | |
|-----------------|-------|
| Pipe Dimensions | 17.88 |
| Silt Level | 0.00" |

Overview

Site MIL_2666 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited a moderate response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Surge conditions were experienced at this site. Review of the scattergraph shows that both free flow and backwater conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|-------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 8.74 | 1.74 | 0.949 |
| Minimum | 5.81 | 0.77 | 0.363 |
| Maximum | 21.77 | 2.28 | 1.470 |
| Time of Minimum | 2/14/2020 2:55 AM | 3/3/2020 7:40 AM | 2/25/2020 3:25 AM |
| Time of Maximum | 1/26/2020 11:35 AM | 2/25/2020 7:30 AM | 1/13/2020 8:00 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2666

Site Address /Location: California Cir and Cadillac Court, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: Drive

Latitude:

37.449182°

Longitude:

-121.919254°

Pipe Size (H x W)

17.88" x 17.88"

Pipe Shape

Circular

Manhole #

2666

System Characteristics

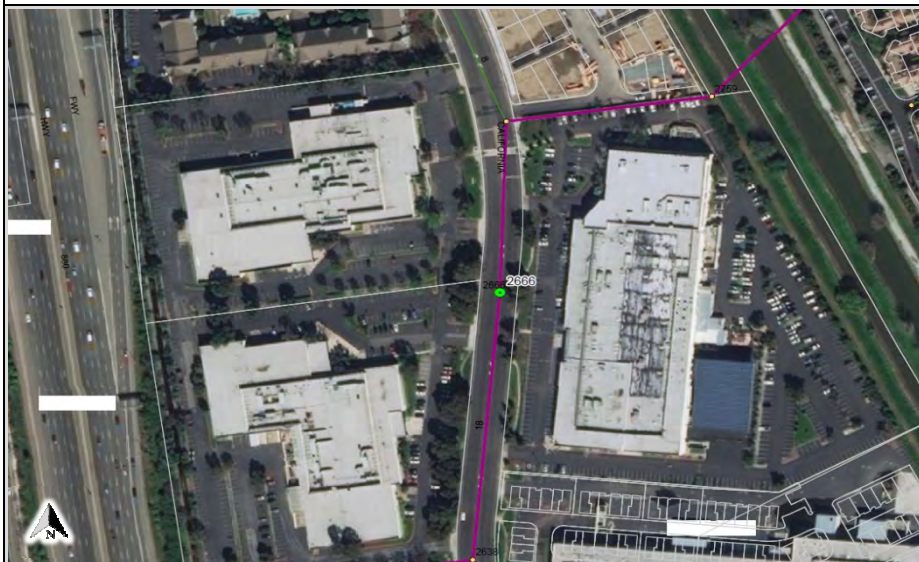
Residential/Commercial

Access

Drive

Traffic

Medium



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

4:33:04 AM

Pipe Size (HxW)

17.88" x 17.88"

Depth of Flow (Wet DOF) (in)

6.25"

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.58

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

good flow, medium depth and velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

9'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_2666

Flow Monitor

MIL_2666

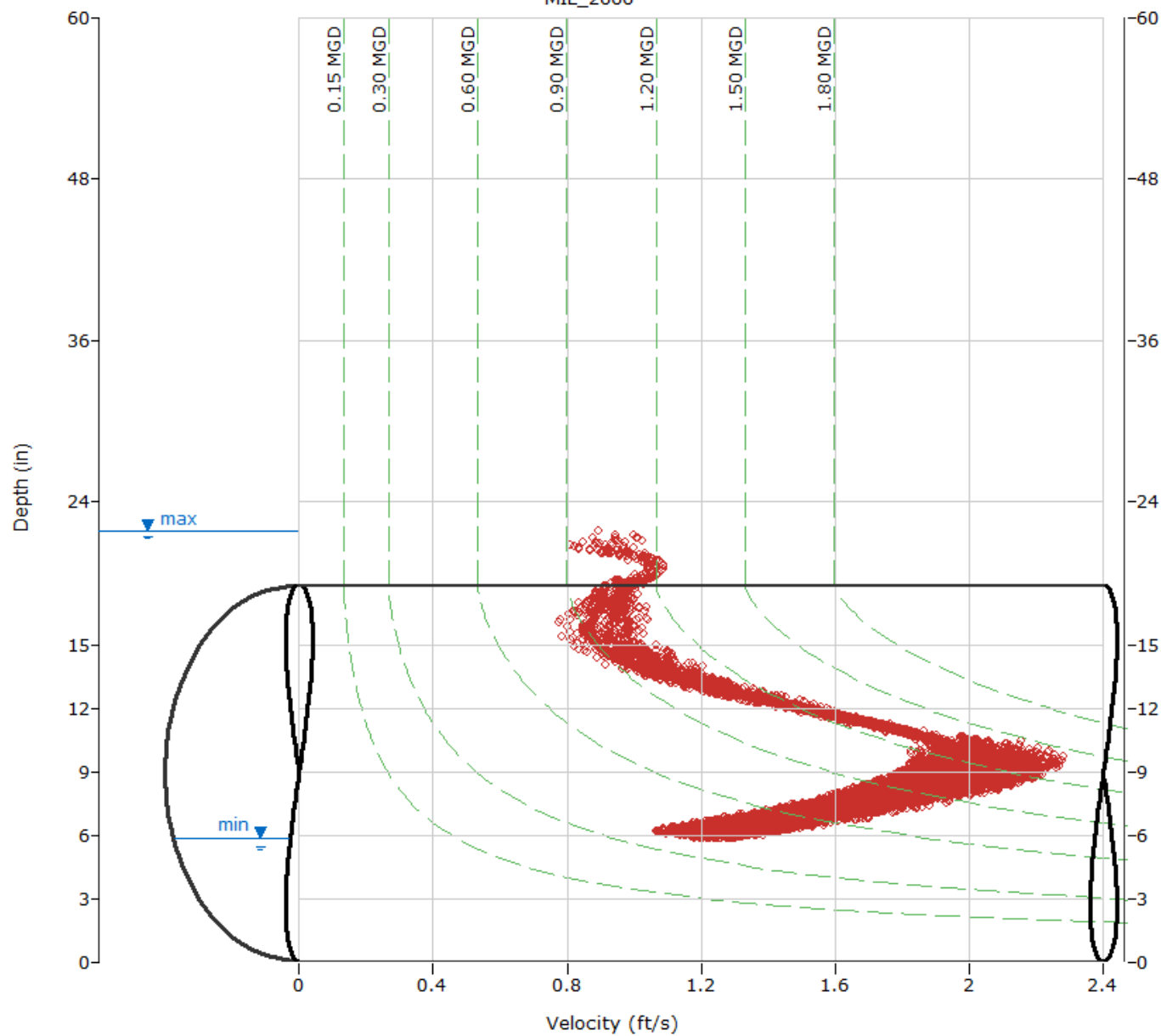
Pipe Height
17.88 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_2666

Flow Monitor

MIL_2666

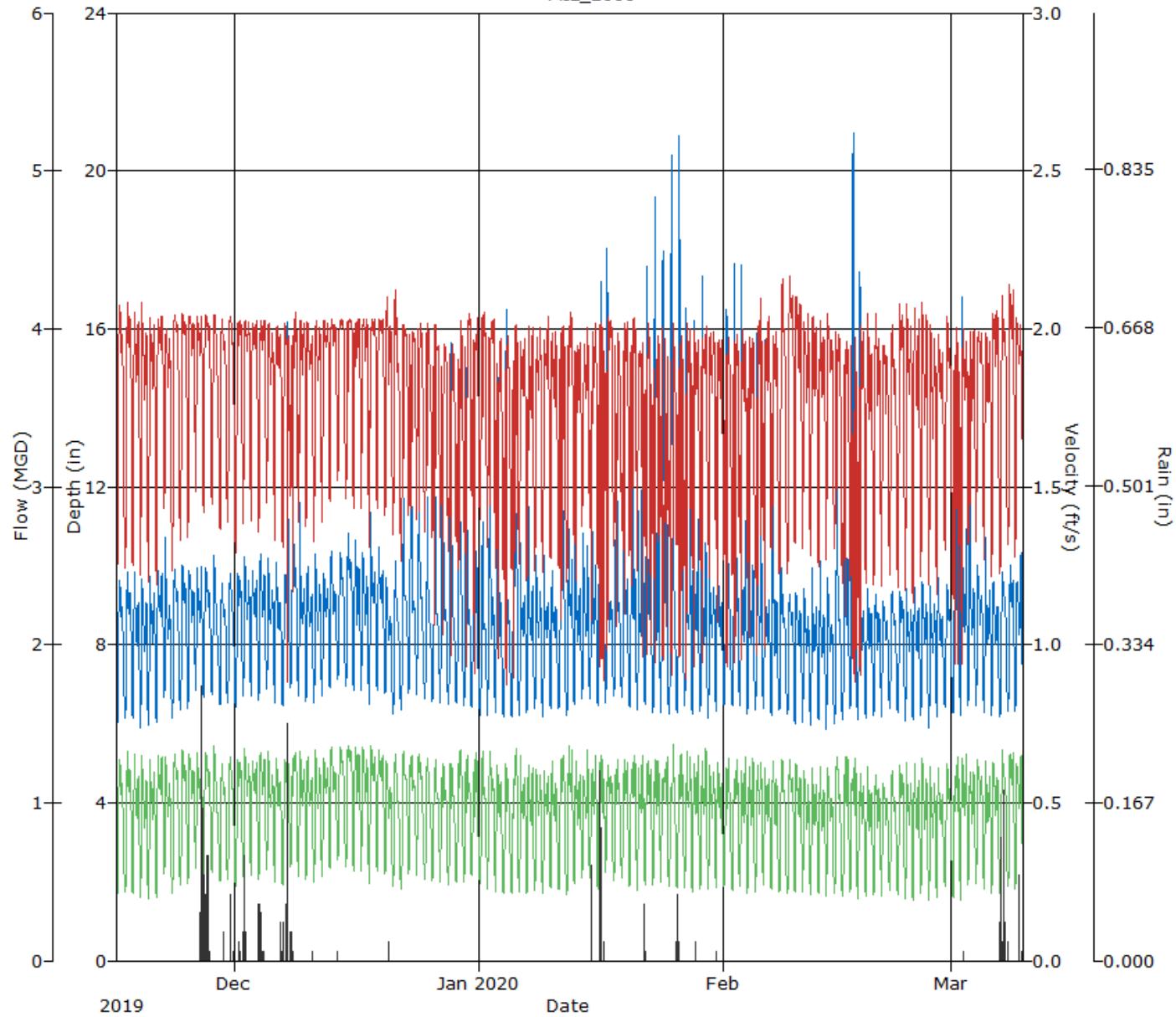
Pipe Height
17.88 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2666, Pipe Height: 17.88 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 04:30 | 5.94 | 11:15 | 9.75 | 8.10 | 04:10 | 1.19 | 10:35 | 2.15 | 1.78 | 04:10 | 0.393 | 12:50 | 1.313 | 0.912 | 0.912 | |
| 11/17/2019 | 04:10 | 6.11 | 10:45 | 10.15 | 8.25 | 03:35 | 1.20 | 20:00 | 2.14 | 1.78 | 05:05 | 0.413 | 11:15 | 1.385 | 0.935 | 0.935 | |
| 11/18/2019 | 03:25 | 6.10 | 07:35 | 10.12 | 8.22 | 02:55 | 1.19 | 19:55 | 2.14 | 1.79 | 02:55 | 0.412 | 07:40 | 1.391 | 0.931 | 0.931 | |
| 11/19/2019 | 03:40 | 5.87 | 07:45 | 10.35 | 8.08 | 02:20 | 1.14 | 08:05 | 2.19 | 1.78 | 04:10 | 0.381 | 07:35 | 1.437 | 0.905 | 0.905 | |
| 11/20/2019 | 03:45 | 5.91 | 07:35 | 10.48 | 8.17 | 03:45 | 1.18 | 19:20 | 2.06 | 1.78 | 03:45 | 0.383 | 07:35 | 1.389 | 0.915 | 0.915 | |
| 11/21/2019 | 03:45 | 6.02 | 08:10 | 10.54 | 8.58 | 03:35 | 1.13 | 08:00 | 2.09 | 1.84 | 03:35 | 0.379 | 08:10 | 1.396 | 1.012 | 1.012 | |
| 11/22/2019 | 03:45 | 6.64 | 07:40 | 11.30 | 8.47 | 03:45 | 1.42 | 09:20 | 2.16 | 1.84 | 03:45 | 0.540 | 08:10 | 1.372 | 0.975 | 0.975 | |
| 11/23/2019 | 04:10 | 6.09 | 11:05 | 10.26 | 8.34 | 03:50 | 1.18 | 12:35 | 2.06 | 1.79 | 03:50 | 0.405 | 11:05 | 1.363 | 0.954 | 0.954 | |
| 11/24/2019 | 05:05 | 6.33 | 12:35 | 10.23 | 8.53 | 05:05 | 1.32 | 11:00 | 2.07 | 1.83 | 05:05 | 0.471 | 11:45 | 1.363 | 0.995 | 0.995 | |
| 11/25/2019 | 03:55 | 6.35 | 07:50 | 10.47 | 8.59 | 03:55 | 1.32 | 07:40 | 2.07 | 1.86 | 03:55 | 0.475 | 07:45 | 1.409 | 1.017 | 1.017 | |
| 11/26/2019 | 03:45 | 6.80 | 07:45 | 10.52 | 8.68 | 03:45 | 1.47 | 20:40 | 2.04 | 1.88 | 03:45 | 0.578 | 07:45 | 1.394 | 1.037 | 1.037 | 0.63 |
| 11/27/2019 | 03:30 | 6.63 | 08:40 | 10.23 | 8.82 | 03:25 | 1.37 | 09:40 | 2.04 | 1.90 | 03:25 | 0.520 | 08:40 | 1.359 | 1.069 | 1.069 | 0.77 |
| 11/28/2019 | 04:40 | 6.68 | 11:30 | 10.47 | 8.48 | 04:40 | 1.43 | 10:55 | 2.04 | 1.84 | 04:40 | 0.551 | 11:30 | 1.389 | 0.985 | 0.985 | |
| 11/29/2019 | 05:05 | 6.46 | 10:55 | 9.77 | 8.21 | 05:05 | 1.36 | 10:55 | 2.04 | 1.80 | 05:05 | 0.499 | 10:55 | 1.285 | 0.927 | 0.927 | |
| 11/30/2019 | 05:25 | 6.50 | 12:05 | 10.15 | 8.34 | 05:25 | 1.38 | 11:55 | 2.04 | 1.82 | 05:25 | 0.509 | 12:05 | 1.348 | 0.957 | 0.957 | 0.14 |
| 12/01/2019 | 05:15 | 6.41 | 11:15 | 10.05 | 8.49 | 05:15 | 1.29 | 11:55 | 2.09 | 1.80 | 05:15 | 0.467 | 11:15 | 1.320 | 0.976 | 0.976 | 0.06 |
| 12/02/2019 | 03:35 | 6.68 | 07:55 | 10.76 | 8.77 | 03:35 | 1.38 | 08:00 | 2.06 | 1.86 | 03:35 | 0.529 | 08:00 | 1.398 | 1.044 | 1.044 | 0.36 |
| 12/03/2019 | 03:50 | 6.67 | 07:35 | 10.41 | 8.65 | 03:50 | 1.38 | 20:00 | 2.03 | 1.86 | 03:50 | 0.528 | 07:40 | 1.361 | 1.021 | 1.021 | |
| 12/04/2019 | 03:15 | 6.56 | 08:20 | 11.02 | 8.79 | 03:15 | 1.34 | 20:40 | 2.03 | 1.87 | 03:15 | 0.501 | 07:35 | 1.378 | 1.049 | 1.049 | |
| 12/05/2019 | 03:40 | 6.84 | 08:20 | 10.59 | 8.62 | 03:40 | 1.43 | 19:00 | 2.12 | 1.84 | 03:40 | 0.568 | 08:20 | 1.377 | 1.003 | 1.003 | |
| 12/06/2019 | 03:40 | 6.48 | 07:55 | 10.81 | 8.50 | 03:40 | 1.31 | 09:20 | 2.08 | 1.83 | 03:40 | 0.483 | 08:15 | 1.339 | 0.980 | 0.980 | |
| 12/07/2019 | 04:55 | 6.41 | 18:05 | 16.58 | 9.36 | 19:55 | 0.87 | 17:15 | 2.18 | 1.67 | 04:35 | 0.462 | 17:15 | 1.414 | 0.959 | 0.959 | 0.84 |
| 12/08/2019 | 03:55 | 6.90 | 11:55 | 13.35 | 9.32 | 12:00 | 1.12 | 15:50 | 2.16 | 1.77 | 05:00 | 0.567 | 17:55 | 1.412 | 1.044 | 1.044 | 0.10 |
| 12/09/2019 | 03:15 | 6.68 | 07:50 | 12.68 | 8.79 | 07:55 | 1.29 | 10:00 | 2.03 | 1.83 | 03:15 | 0.530 | 08:45 | 1.356 | 1.019 | 1.019 | |
| 12/10/2019 | 03:25 | 6.51 | 08:15 | 10.66 | 8.46 | 02:45 | 1.31 | 20:45 | 2.05 | 1.83 | 02:45 | 0.491 | 08:20 | 1.368 | 0.974 | 0.974 | |
| 12/11/2019 | 03:25 | 6.51 | 08:30 | 10.68 | 8.55 | 03:30 | 1.29 | 14:05 | 2.07 | 1.82 | 03:30 | 0.477 | 08:15 | 1.384 | 0.988 | 0.988 | 0.00 |
| 12/12/2019 | 03:45 | 6.66 | 07:40 | 10.43 | 8.65 | 03:45 | 1.37 | 10:10 | 2.03 | 1.86 | 03:45 | 0.525 | 07:40 | 1.364 | 1.023 | 1.023 | |
| 12/13/2019 | 03:00 | 6.88 | 08:15 | 10.59 | 8.88 | 03:00 | 1.44 | 08:50 | 2.03 | 1.90 | 03:00 | 0.577 | 08:15 | 1.377 | 1.074 | 1.074 | |
| 12/14/2019 | 04:20 | 7.04 | 10:40 | 10.60 | 8.98 | 04:20 | 1.49 | 15:30 | 2.03 | 1.89 | 04:20 | 0.616 | 10:40 | 1.377 | 1.087 | 1.087 | 0.01 |
| 12/15/2019 | 04:40 | 6.93 | 11:05 | 10.95 | 9.10 | 04:40 | 1.46 | 14:25 | 2.03 | 1.87 | 04:40 | 0.590 | 10:50 | 1.383 | 1.096 | 1.096 | |
| 12/16/2019 | 03:45 | 6.77 | 08:25 | 10.78 | 9.05 | 03:45 | 1.41 | 20:50 | 2.03 | 1.89 | 03:45 | 0.552 | 08:40 | 1.377 | 1.095 | 1.095 | |
| 12/17/2019 | 03:35 | 6.81 | 07:40 | 10.73 | 8.87 | 03:35 | 1.42 | 11:10 | 2.03 | 1.89 | 03:35 | 0.559 | 07:35 | 1.376 | 1.067 | 1.067 | |
| 12/18/2019 | 03:45 | 6.43 | 08:20 | 11.98 | 8.99 | 04:10 | 1.26 | 21:05 | 2.03 | 1.86 | 04:10 | 0.464 | 08:50 | 1.383 | 1.073 | 1.073 | |
| 12/19/2019 | 03:35 | 6.82 | 08:00 | 10.95 | 9.02 | 03:35 | 1.42 | 19:15 | 2.03 | 1.89 | 03:35 | 0.562 | 07:40 | 1.380 | 1.093 | 1.093 | |
| 12/20/2019 | 05:05 | 6.59 | 08:25 | 10.05 | 8.25 | 05:10 | 1.38 | 09:30 | 2.26 | 1.86 | 05:10 | 0.523 | 07:40 | 1.408 | 0.961 | 0.961 | |
| 12/21/2019 | 05:00 | 6.21 | 11:00 | 10.40 | 8.15 | 04:25 | 1.32 | 10:05 | 2.28 | 1.80 | 04:25 | 0.464 | 11:00 | 1.395 | 0.921 | 0.921 | |
| 12/22/2019 | 04:45 | 6.32 | 12:15 | 12.19 | 8.67 | 04:30 | 1.24 | 10:05 | 2.09 | 1.75 | 04:30 | 0.444 | 14:25 | 1.370 | 0.968 | 0.968 | |
| 12/23/2019 | 03:25 | 6.72 | 12:15 | 13.17 | 8.97 | 12:20 | 1.18 | 08:50 | 2.03 | 1.79 | 03:25 | 0.538 | 13:40 | 1.377 | 1.019 | 1.019 | |
| 12/24/2019 | 04:05 | 6.63 | 11:15 | 12.60 | 8.92 | 04:05 | 1.36 | 14:05 | 2.03 | 1.78 | 04:05 | 0.518 | 13:40 | 1.374 | 1.004 | 1.004 | |
| 12/25/2019 | 05:20 | 6.61 | 13:10 | 12.38 | 8.45 | 05:20 | 1.35 | 11:20 | 2.11 | 1.76 | 05:20 | 0.512 | 13:55 | 1.376 | 0.936 | 0.936 | |
| 12/26/2019 | 04:10 | 6.51 | 11:55 | 14.17 | 8.82 | 11:35 | 0.97 | 18:10 | 2.10 | 1.72 | 04:10 | 0.490 | 14:00 | 1.374 | 0.943 | 0.943 | |
| 12/27/2019 | 04:15 | 6.46 | 11:55 | 14.12 | 9.00 | 11:55 | 0.98 | 14:30 | 2.03 | 1.67 | 03:35 | 0.480 | 14:05 | 1.374 | 0.930 | 0.930 | |
| 12/28/2019 | 05:00 | 6.46 | 12:25 | 16.08 | 9.04 | 11:35 | 0.86 | 09:50 | 2.09 | 1.62 | 05:00 | 0.470 | 15:10 | 1.375 | 0.900 | 0.900 | |
| 12/29/2019 | 05:05 | 6.52 | 11:15 | 13.33 | 9.13 | 11:10 | 1.15 | 20:30 | 2.03 | 1.66 | 06:00 | 0.484 | 17:25 | 1.380 | 0.966 | 0.966 | |
| 12/30/2019 | 04:05 | 6.41 | 11:45 | 15.44 | 9.14 | 12:05 | 0.83 | 18:00 | 2.20 | 1.68 | 03:30 | 0.484 | 09:15 | 1.374 | 0.937 | 0.937 | |
| 12/31/2019 | 03:25 | 6.28 | 11:45 | 15.22 | 9.04 | 11:45 | 0.87 | 14:50 | 2.14 | 1.72 | 03:30 | 0.480 | 09:55 | 1.380 | 0.950 | 0.950 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 05:35 | 6.16 | 12:20 | 11.50 | 8.08 | 04:10 | 1.35 | 16:50 | 2.19 | 1.81 | 05:30 | 0.474 | 13:25 | 1.381 | 0.913 | 0.913 | |
| 01/02/2020 | 03:20 | 6.21 | 12:10 | 12.67 | 8.65 | 05:05 | 1.24 | 18:25 | 2.13 | 1.79 | 03:45 | 0.437 | 13:10 | 1.383 | 0.973 | 0.973 | |
| 01/03/2020 | 04:10 | 6.18 | 12:05 | 15.89 | 9.08 | 12:15 | 0.86 | 08:00 | 2.04 | 1.63 | 04:10 | 0.417 | 09:55 | 1.381 | 0.909 | 0.909 | |
| 01/04/2020 | 04:50 | 6.18 | 12:55 | 16.78 | 9.08 | 12:25 | 0.80 | 15:05 | 2.02 | 1.57 | 04:45 | 0.377 | 14:45 | 1.366 | 0.862 | 0.862 | |
| 01/05/2020 | 05:05 | 6.11 | 11:00 | 15.63 | 9.47 | 10:55 | 0.82 | 22:45 | 2.07 | 1.56 | 05:05 | 0.395 | 19:10 | 1.371 | 0.924 | 0.924 | |
| 01/06/2020 | 04:05 | 6.17 | 08:15 | 11.25 | 8.25 | 03:15 | 1.21 | 10:35 | 2.07 | 1.74 | 03:15 | 0.420 | 08:00 | 1.370 | 0.905 | 0.905 | |
| 01/07/2020 | 03:55 | 6.26 | 08:10 | 13.58 | 8.37 | 08:10 | 1.04 | 07:25 | 2.11 | 1.72 | 03:35 | 0.417 | 08:30 | 1.378 | 0.906 | 0.906 | |
| 01/08/2020 | 04:00 | 6.36 | 08:05 | 11.90 | 8.26 | 03:40 | 1.16 | 07:25 | 2.09 | 1.75 | 03:40 | 0.419 | 07:45 | 1.380 | 0.908 | 0.908 | |
| 01/09/2020 | 03:40 | 6.12 | 08:10 | 11.96 | 8.23 | 05:00 | 1.14 | 21:40 | 2.11 | 1.75 | 03:40 | 0.403 | 07:40 | 1.383 | 0.910 | 0.910 | |
| 01/10/2020 | 03:40 | 6.35 | 08:35 | 10.00 | 8.26 | 03:10 | 1.21 | 18:55 | 2.13 | 1.76 | 03:10 | 0.436 | 08:30 | 1.312 | 0.912 | 0.912 | |
| 01/11/2020 | 04:40 | 6.29 | 12:35 | 14.83 | 9.30 | 12:45 | 0.91 | 09:40 | 2.10 | 1.62 | 04:25 | 0.425 | 20:35 | 1.382 | 0.957 | 0.957 | |
| 01/12/2020 | 05:35 | 6.18 | 11:05 | 12.10 | 8.41 | 05:10 | 1.15 | 19:35 | 2.17 | 1.74 | 05:10 | 0.397 | 11:25 | 1.383 | 0.939 | 0.939 | |
| 01/13/2020 | 03:40 | 6.47 | 08:35 | 14.71 | 8.47 | 08:40 | 0.95 | 08:00 | 2.15 | 1.73 | 03:40 | 0.483 | 08:00 | 1.470 | 0.915 | 0.915 | |
| 01/14/2020 | 03:10 | 6.62 | 08:00 | 14.30 | 8.54 | 08:00 | 0.95 | 09:50 | 2.03 | 1.77 | 04:50 | 0.492 | 20:45 | 1.381 | 0.954 | 0.954 | |
| 01/15/2020 | 03:45 | 6.60 | 08:00 | 15.26 | 8.81 | 08:00 | 0.87 | 10:10 | 2.02 | 1.73 | 03:45 | 0.514 | 10:00 | 1.382 | 0.949 | 0.949 | 0.10 |
| 01/16/2020 | 04:15 | 6.44 | 13:20 | 17.95 | 10.81 | 08:00 | 0.80 | 15:35 | 2.02 | 1.45 | 03:35 | 0.445 | 11:05 | 1.381 | 0.954 | 0.954 | 0.66 |
| 01/17/2020 | 03:55 | 6.42 | 08:50 | 20.36 | 9.07 | 09:30 | 0.87 | 11:35 | 2.19 | 1.79 | 04:15 | 0.523 | 09:55 | 1.373 | 0.979 | 0.979 | |
| 01/18/2020 | 05:00 | 6.68 | 11:05 | 14.00 | 9.04 | 11:05 | 1.00 | 15:50 | 2.10 | 1.66 | 04:55 | 0.492 | 10:05 | 1.383 | 0.935 | 0.935 | |
| 01/19/2020 | 05:35 | 6.64 | 11:45 | 13.98 | 8.94 | 11:50 | 1.00 | 18:35 | 2.12 | 1.70 | 05:50 | 0.484 | 13:55 | 1.369 | 0.945 | 0.945 | |
| 01/20/2020 | 03:45 | 6.39 | 11:40 | 13.75 | 8.87 | 11:50 | 1.06 | 18:30 | 2.16 | 1.71 | 04:00 | 0.439 | 13:50 | 1.371 | 0.953 | 0.953 | |
| 01/21/2020 | 03:15 | 6.32 | 20:45 | 15.12 | 9.19 | 20:55 | 0.89 | 14:10 | 2.08 | 1.62 | 03:10 | 0.425 | 17:40 | 1.379 | 0.918 | 0.918 | 0.01 |
| 01/22/2020 | 03:55 | 6.45 | 08:20 | 18.11 | 9.90 | 09:05 | 0.87 | 07:15 | 2.11 | 1.62 | 04:10 | 0.472 | 10:25 | 1.383 | 0.978 | 0.978 | 0.09 |
| 01/23/2020 | 03:35 | 6.25 | 08:50 | 20.32 | 10.37 | 10:45 | 0.87 | 06:55 | 2.12 | 1.58 | 03:25 | 0.466 | 19:00 | 1.383 | 0.967 | 0.967 | |
| 01/24/2020 | 03:55 | 6.24 | 10:10 | 18.25 | 11.02 | 12:40 | 0.87 | 07:05 | 2.07 | 1.49 | 03:55 | 0.483 | 07:55 | 1.373 | 0.985 | 0.985 | |
| 01/25/2020 | 05:00 | 6.19 | 12:00 | 20.73 | 10.31 | 12:05 | 0.82 | 22:25 | 2.05 | 1.57 | 05:25 | 0.395 | 19:15 | 1.383 | 0.935 | 0.935 | |
| 01/26/2020 | 05:00 | 6.25 | 11:35 | 21.77 | 10.90 | 10:15 | 0.83 | 16:45 | 2.02 | 1.46 | 04:55 | 0.450 | 17:45 | 1.381 | 0.943 | 0.943 | 0.16 |
| 01/27/2020 | 03:55 | 6.45 | 08:15 | 16.90 | 9.44 | 08:00 | 0.78 | 07:15 | 2.14 | 1.63 | 03:45 | 0.448 | 11:15 | 1.383 | 0.949 | 0.949 | |
| 01/28/2020 | 03:45 | 6.20 | 08:10 | 17.31 | 9.02 | 08:40 | 0.87 | 07:25 | 2.06 | 1.68 | 03:50 | 0.428 | 09:40 | 1.379 | 0.944 | 0.944 | 0.02 |
| 01/29/2020 | 03:45 | 6.27 | 08:20 | 17.83 | 9.14 | 09:10 | 0.87 | 11:40 | 2.06 | 1.70 | 04:10 | 0.440 | 20:10 | 1.380 | 0.954 | 0.954 | |
| 01/30/2020 | 03:45 | 6.10 | 08:20 | 14.39 | 8.47 | 08:20 | 0.94 | 19:30 | 2.12 | 1.77 | 03:30 | 0.437 | 09:05 | 1.364 | 0.935 | 0.935 | |
| 01/31/2020 | 02:55 | 6.27 | 08:15 | 14.81 | 8.66 | 08:15 | 0.90 | 07:30 | 2.19 | 1.72 | 03:30 | 0.448 | 07:30 | 1.380 | 0.927 | 0.927 | 0.01 |
| 02/01/2020 | 03:35 | 6.45 | 12:10 | 16.80 | 9.52 | 11:05 | 0.87 | 08:50 | 2.05 | 1.57 | 03:40 | 0.433 | 15:10 | 1.304 | 0.915 | 0.915 | |
| 02/02/2020 | 05:05 | 6.41 | 12:10 | 18.12 | 9.75 | 10:55 | 0.87 | 16:40 | 2.07 | 1.53 | 04:25 | 0.437 | 09:55 | 1.312 | 0.902 | 0.902 | |
| 02/03/2020 | 03:50 | 6.43 | 08:15 | 18.18 | 9.21 | 08:55 | 0.83 | 07:15 | 2.18 | 1.66 | 03:30 | 0.440 | 07:15 | 1.388 | 0.940 | 0.940 | |
| 02/04/2020 | 03:35 | 6.23 | 07:55 | 15.84 | 8.73 | 07:45 | 0.85 | 07:20 | 2.08 | 1.69 | 03:30 | 0.407 | 10:00 | 1.304 | 0.918 | 0.918 | |
| 02/05/2020 | 04:10 | 6.30 | 08:15 | 17.09 | 9.05 | 08:10 | 0.86 | 18:55 | 2.19 | 1.67 | 04:10 | 0.420 | 07:25 | 1.361 | 0.935 | 0.935 | |
| 02/06/2020 | 03:40 | 6.35 | 08:10 | 17.37 | 8.70 | 08:25 | 0.82 | 11:25 | 2.17 | 1.73 | 03:20 | 0.467 | 09:50 | 1.303 | 0.925 | 0.925 | |
| 02/07/2020 | 03:45 | 6.19 | 08:05 | 14.72 | 8.40 | 08:00 | 0.85 | 18:40 | 2.08 | 1.75 | 02:25 | 0.441 | 08:40 | 1.303 | 0.917 | 0.917 | |
| 02/08/2020 | 05:10 | 6.28 | 08:30 | 15.11 | 8.18 | 08:30 | 0.87 | 13:15 | 2.27 | 1.77 | 05:00 | 0.414 | 11:50 | 1.345 | 0.909 | 0.909 | |
| 02/09/2020 | 05:30 | 6.17 | 10:40 | 9.52 | 8.05 | 05:30 | 1.17 | 12:05 | 2.26 | 1.81 | 05:30 | 0.404 | 10:40 | 1.357 | 0.920 | 0.920 | |
| 02/10/2020 | 03:40 | 5.93 | 07:55 | 10.11 | 7.99 | 03:40 | 1.29 | 07:30 | 2.23 | 1.85 | 03:40 | 0.422 | 07:55 | 1.449 | 0.923 | 0.923 | |
| 02/11/2020 | 03:50 | 5.99 | 07:55 | 10.11 | 7.93 | 02:30 | 1.28 | 07:45 | 2.25 | 1.80 | 02:50 | 0.428 | 07:45 | 1.388 | 0.888 | 0.888 | |
| 02/12/2020 | 03:25 | 5.96 | 08:10 | 11.00 | 7.92 | 02:25 | 1.24 | 07:40 | 2.21 | 1.79 | 03:35 | 0.409 | 07:40 | 1.393 | 0.883 | 0.883 | |
| 02/13/2020 | 03:20 | 6.06 | 07:55 | 11.30 | 7.96 | 03:05 | 1.22 | 09:40 | 2.18 | 1.77 | 03:00 | 0.412 | 07:35 | 1.354 | 0.879 | 0.879 | |
| 02/14/2020 | 02:55 | 5.81 | 08:30 | 10.12 | 7.85 | 03:45 | 1.22 | 07:25 | 2.17 | 1.80 | 03:45 | 0.391 | 08:30 | 1.300 | 0.878 | 0.878 | |
| 02/15/2020 | 04:40 | 5.96 | 12:20 | 12.23 | 8.30 | 04:40 | 1.14 | 18:55 | 2.14 | 1.72 | 04:40 | 0.374 | 13:15 | 1.304 | 0.900 | 0.900 | |
| 02/16/2020 | 04:00 | 6.08 | 11:30 | 14.05 | 8.73 | 11:30 | 0.99 | 17:25 | 2.12 | 1.62 | 05:10 | 0.389 | 13:30 | 1.311 | 0.895 | 0.895 | |
| 02/17/2020 | 04:15 | 6.31 | 13:10 | 21.29 | 11.84 | 13:30 | 0.81 | 08:25 | 2.03 | 1.33 | 04:10 | 0.414 | 18:05 | 1.304 | 0.913 | 0.913 | |
| 02/18/2020 | 03:00 | 6.05 | 09:15 | 17.91 | 9.05 | 08:20 | 0.78 | 12:20 | 2.15 | 1.63 | 03:20 | 0.368 | 07:45 | 1.304 | 0.881 | 0.881 | |
| 02/19/2020 | 03:15 | 6.09 | 08:10 | 9.70 | 8.05 | 03:20 | 1.14 | 08:40 | 2.21 | 1.74 | 03:20 | 0.386 | 08:05 | 1.312 | 0.878 | 0.878 | |
| 02/20/2020 | 03:55 | 6.15 | 09:00 | 9.50 | 8.05 | 03:50 | 1.17 | 10:50 | 2.16 | 1.74 | 03:50 | 0.401 | 10:10 | 1.252 | 0.874 | 0.874 | |
| 02/21/2020 | 04:10 | 6.02 | 08:20 | 9.30 | 8.03 | 04:00 | 1.13 | 14:00 | 2.06 | 1.72 | 04:00 | 0.377 | 12:10 | 1.169 | 0.865 | 0.865 | |
| 02/22/2020 | 04:35 | 6.34 | 12:15 | 9.46 | 8.10 | 04:40 | 1.15 | 11:55 | 2.09 | 1.71 | 04:40 | 0.411 | 11:55 | 1.234 | 0.869 | 0.869 | |
| 02/23/2020 | 04:50 | 6.26 | 11:10 | 9.60 | 8.11 | 05:35 | 1.11 | 11:45 | 2.25 | 1.75 | 05:35 | 0.391 | 11:45 | 1.343 | 0.899 | 0.899 | |
| 02/24/2020 | 03:35 | 6.01 | 07:25 | 9.90 | 8.01 | 02:55 | 1.16 | 07:35 | 2.25 | 1.77 | 03:35 | 0.389 | 07:35 | 1.388 | 0.887 | 0.887 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | |
| 02/25/2020 | 03:15 | 6.07 | 07:40 | 10.11 | 8.00 | 03:25 | 1.07 | 07:30 | 2.28 | 1.74 | 03:25 | 0.363 | 08:00 | 1.448 | 0.872 | 0.872 | 0.01 |
| 02/26/2020 | 03:10 | 6.17 | 07:25 | 10.20 | 8.15 | 03:15 | 1.18 | 07:20 | 2.16 | 1.77 | 03:15 | 0.408 | 07:25 | 1.411 | 0.903 | 0.903 | |
| 02/27/2020 | 03:40 | 5.85 | 07:35 | 10.02 | 7.99 | 04:00 | 1.14 | 08:25 | 2.21 | 1.73 | 04:00 | 0.373 | 08:25 | 1.381 | 0.866 | 0.866 | |
| 02/28/2020 | 03:25 | 6.14 | 07:50 | 10.19 | 8.08 | 03:25 | 1.08 | 07:30 | 2.01 | 1.73 | 03:25 | 0.371 | 07:30 | 1.313 | 0.876 | 0.876 | |
| 02/29/2020 | 04:30 | 6.32 | 11:20 | 9.65 | 8.16 | 04:30 | 1.27 | 11:25 | 2.16 | 1.75 | 04:30 | 0.451 | 11:25 | 1.338 | 0.899 | 0.899 | |
| 03/01/2020 | 05:05 | 6.23 | 12:00 | 15.82 | 9.83 | 11:40 | 0.83 | 15:25 | 2.02 | 1.46 | 05:10 | 0.391 | 18:45 | 1.316 | 0.890 | 0.890 | |
| 03/02/2020 | 03:40 | 6.18 | 08:00 | 18.41 | 9.10 | 08:40 | 0.85 | 11:20 | 2.02 | 1.65 | 03:35 | 0.368 | 19:55 | 1.316 | 0.930 | 0.930 | |
| 03/03/2020 | 03:30 | 6.42 | 08:05 | 17.17 | 8.71 | 07:40 | 0.77 | 20:25 | 2.06 | 1.75 | 03:30 | 0.477 | 08:25 | 1.309 | 0.949 | 0.949 | |
| 03/04/2020 | 04:05 | 6.40 | 07:50 | 10.38 | 8.52 | 04:05 | 1.30 | 09:10 | 2.16 | 1.81 | 04:05 | 0.471 | 07:35 | 1.343 | 0.978 | 0.978 | |
| 03/05/2020 | 03:10 | 6.25 | 07:40 | 11.68 | 8.31 | 02:30 | 1.12 | 07:10 | 2.22 | 1.76 | 02:30 | 0.400 | 07:10 | 1.326 | 0.919 | 0.919 | |
| 03/06/2020 | 04:10 | 6.15 | 08:15 | 9.97 | 8.23 | 02:55 | 1.13 | 20:15 | 2.21 | 1.82 | 02:55 | 0.399 | 07:55 | 1.359 | 0.941 | 0.941 | 0.58 |
| 03/07/2020 | 04:45 | 6.14 | 12:20 | 10.36 | 8.35 | 04:35 | 1.08 | 12:45 | 2.21 | 1.77 | 04:35 | 0.369 | 12:45 | 1.402 | 0.943 | 0.943 | |
| 03/08/2020 | 05:05 | 6.31 | 11:20 | 10.38 | 8.42 | 02:45 | 1.22 | 20:55 | 2.25 | 1.83 | 04:20 | 0.439 | 20:10 | 1.428 | 0.981 | 0.981 | 0.02 |
| 03/09/2020 | 03:00 | 6.28 | 20:10 | 10.66 | 8.50 | 02:20 | 1.24 | 07:40 | 2.16 | 1.81 | 02:20 | 0.440 | 06:40 | 1.374 | 0.978 | 0.977 | 0.11 |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 109.178 | 5.26 |
| Avg | 8.74 | 1.74 | 0.949 | |

Site Commentary

Site Information

| MIL_2721 | |
|-----------------|-------|
| Pipe Dimensions | 8 |
| Silt Level | 0.00" |

Overview

Site MIL_2721 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited a moderate response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location. Due to the high flows at the creek, crews could not access the meter and data stops on March 02, 2020 for this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|-------------------|-------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 6.23 | 1.05 | 0.198 |
| Minimum | 3.86 | 0.53 | 0.080 |
| Maximum | 9.28 | 1.61 | 0.363 |
| Time of Minimum | 3/2/2020 3:05 AM | 2/2/2020 5:45 AM | 2/2/2020 5:45 AM |
| Time of Maximum | 1/17/2020 8:05 AM | 1/17/2020 8:10 AM | 1/17/2020 8:10 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 2, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2721

Site Address /Location: 1545 N Milpitas Blvd

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: Gate access. Need hip waders to cross stream.

Latitude:

37.452946°

Longitude:

-121.914112°

Pipe Size (H x W)

8.0" x 8.0"

Pipe Shape

Circular

Manhole #

2721

System Characteristics

Residential

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Friday, November 15, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

9:56:00 AM

Pipe Size (HxW)

8.0" x 8.0"

Depth of Flow (Wet DOF) (in)

5.50"

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.7

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Good flow medium depth and velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

6'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:

ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_2721

Flow Monitor

MIL_2721

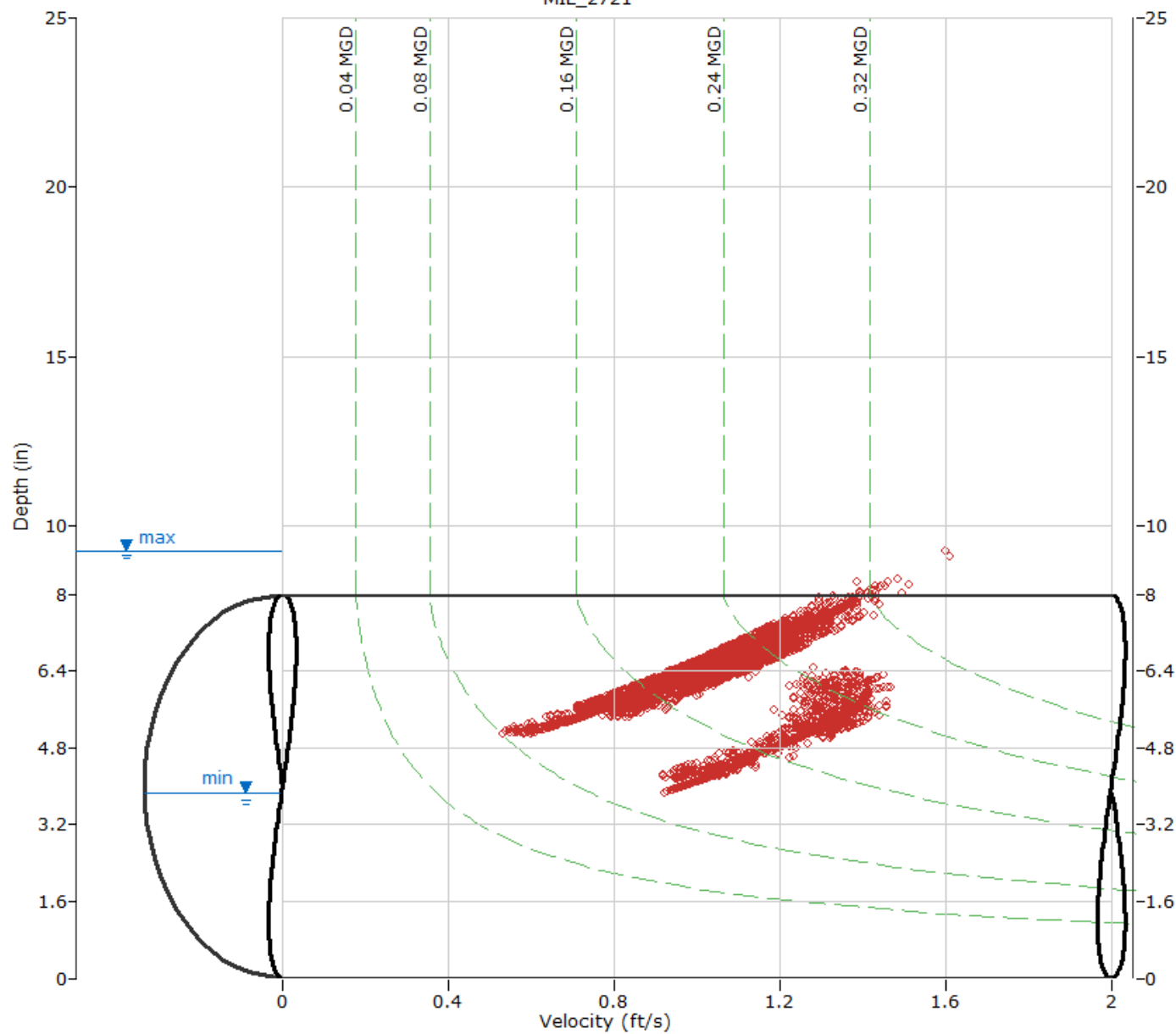
Pipe Height
8.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

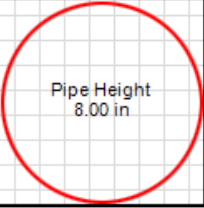
- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_2721

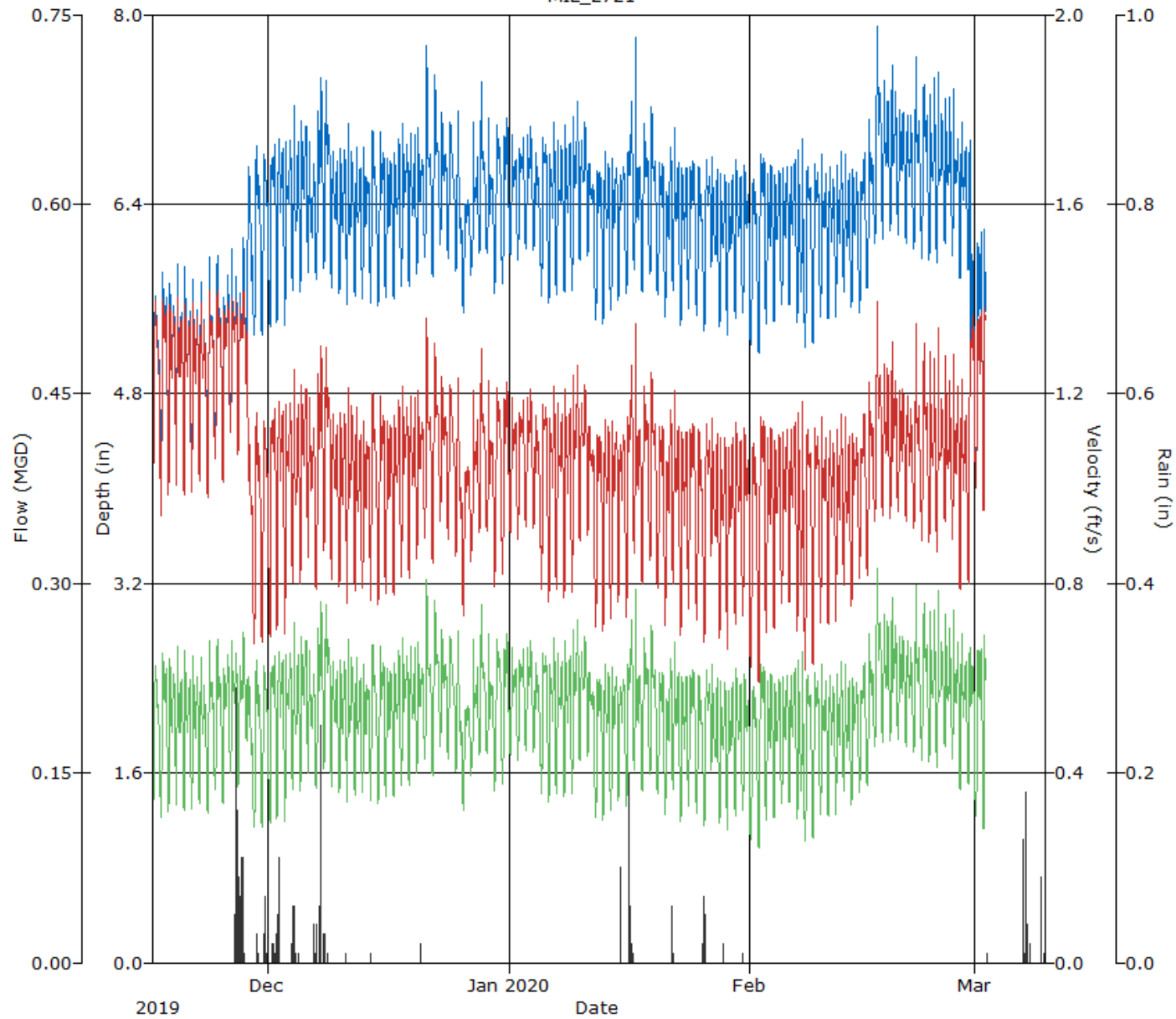
Flow Monitor
MIL_2721



Pipe Height
8.00 in

Report Period
11/16/2019
To
3/9/2020

Legend
— Depth
— Velocity
— Quantity
— Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2721, Pipe Height: 8.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 03:25 | 4.20 | 10:20 | 5.97 | 5.03 | 04:30 | 1.01 | 09:55 | 1.46 | 1.24 | 04:30 | 0.123 | 10:20 | 0.255 | 0.188 | 0.188 | |
| 11/17/2019 | 03:35 | 4.18 | 09:20 | 6.03 | 5.11 | 05:15 | 0.92 | 09:25 | 1.42 | 1.24 | 05:20 | 0.110 | 09:25 | 0.257 | 0.191 | 0.191 | |
| 11/18/2019 | 02:55 | 4.16 | 07:50 | 5.95 | 5.08 | 02:55 | 0.95 | 07:50 | 1.41 | 1.25 | 02:55 | 0.113 | 07:50 | 0.254 | 0.191 | 0.191 | |
| 11/19/2019 | 03:35 | 4.28 | 07:50 | 6.27 | 5.07 | 03:35 | 1.00 | 07:20 | 1.43 | 1.25 | 03:35 | 0.123 | 07:20 | 0.261 | 0.190 | 0.190 | |
| 11/20/2019 | 03:00 | 4.19 | 07:45 | 6.37 | 5.04 | 03:00 | 0.97 | 07:55 | 1.41 | 1.24 | 03:00 | 0.116 | 07:45 | 0.261 | 0.187 | 0.187 | |
| 11/21/2019 | 03:10 | 4.20 | 07:50 | 6.12 | 5.03 | 03:10 | 0.97 | 07:55 | 1.46 | 1.24 | 03:10 | 0.116 | 07:55 | 0.267 | 0.187 | 0.187 | |
| 11/22/2019 | 02:20 | 4.28 | 07:40 | 6.00 | 5.03 | 02:20 | 1.00 | 07:40 | 1.42 | 1.24 | 02:20 | 0.123 | 07:40 | 0.257 | 0.186 | 0.186 | |
| 11/23/2019 | 04:30 | 4.15 | 10:20 | 6.12 | 5.09 | 04:30 | 0.95 | 10:15 | 1.47 | 1.25 | 04:30 | 0.112 | 10:15 | 0.269 | 0.191 | 0.191 | |
| 11/24/2019 | 04:40 | 4.41 | 09:45 | 6.26 | 5.19 | 04:40 | 1.05 | 10:35 | 1.45 | 1.27 | 04:40 | 0.134 | 09:45 | 0.272 | 0.199 | 0.199 | |
| 11/25/2019 | 03:50 | 4.22 | 19:15 | 6.14 | 5.19 | 03:50 | 0.98 | 19:10 | 1.41 | 1.27 | 03:50 | 0.118 | 19:15 | 0.256 | 0.199 | 0.199 | |
| 11/26/2019 | 01:30 | 4.57 | 07:40 | 6.34 | 5.29 | 01:30 | 1.11 | 07:25 | 1.45 | 1.30 | 01:30 | 0.148 | 07:50 | 0.271 | 0.207 | 0.207 | 0.63 |
| 11/27/2019 | 04:20 | 4.42 | 18:30 | 6.33 | 5.34 | 04:20 | 1.05 | 21:25 | 1.47 | 1.30 | 04:20 | 0.135 | 18:25 | 0.277 | 0.210 | 0.210 | 0.77 |
| 11/28/2019 | 04:30 | 4.82 | 11:10 | 6.82 | 5.85 | 23:55 | 0.85 | 08:20 | 1.40 | 1.11 | 23:55 | 0.150 | 08:20 | 0.247 | 0.194 | 0.194 | |
| 11/29/2019 | 04:40 | 5.27 | 10:45 | 7.15 | 6.21 | 04:40 | 0.67 | 10:45 | 1.22 | 0.96 | 04:40 | 0.105 | 10:45 | 0.260 | 0.183 | 0.183 | 0.05 |
| 11/30/2019 | 04:40 | 5.23 | 13:30 | 7.09 | 6.19 | 04:40 | 0.65 | 13:30 | 1.21 | 0.96 | 04:40 | 0.102 | 13:30 | 0.256 | 0.181 | 0.181 | 0.14 |
| 12/01/2019 | 05:35 | 5.34 | 19:25 | 7.32 | 6.31 | 05:35 | 0.68 | 19:25 | 1.27 | 1.00 | 05:35 | 0.108 | 19:25 | 0.275 | 0.192 | 0.192 | 0.06 |
| 12/02/2019 | 02:45 | 5.31 | 07:50 | 7.41 | 6.35 | 02:45 | 0.67 | 07:50 | 1.29 | 1.01 | 02:45 | 0.106 | 07:50 | 0.282 | 0.196 | 0.196 | 0.36 |
| 12/03/2019 | 03:30 | 5.32 | 07:25 | 7.08 | 6.34 | 03:30 | 0.67 | 07:25 | 1.22 | 1.01 | 03:30 | 0.107 | 07:25 | 0.257 | 0.195 | 0.195 | |
| 12/04/2019 | 02:15 | 5.65 | 07:40 | 7.51 | 6.39 | 02:15 | 0.79 | 07:40 | 1.31 | 1.03 | 02:15 | 0.135 | 07:40 | 0.289 | 0.199 | 0.199 | 0.44 |
| 12/05/2019 | 02:20 | 5.63 | 19:30 | 7.37 | 6.52 | 02:20 | 0.79 | 19:30 | 1.28 | 1.06 | 02:20 | 0.133 | 19:30 | 0.279 | 0.210 | 0.210 | |
| 12/06/2019 | 03:25 | 5.77 | 07:50 | 7.16 | 6.37 | 03:25 | 0.84 | 07:55 | 1.29 | 1.03 | 03:25 | 0.146 | 07:55 | 0.274 | 0.200 | 0.200 | 0.06 |
| 12/07/2019 | 04:05 | 5.72 | 17:40 | 7.81 | 6.66 | 02:50 | 0.75 | 17:40 | 1.37 | 1.08 | 02:50 | 0.129 | 17:40 | 0.308 | 0.218 | 0.218 | 0.84 |
| 12/08/2019 | 04:55 | 5.79 | 10:50 | 7.74 | 6.68 | 04:55 | 0.84 | 10:50 | 1.36 | 1.11 | 04:55 | 0.147 | 10:50 | 0.304 | 0.223 | 0.223 | 0.10 |
| 12/09/2019 | 04:15 | 5.62 | 07:45 | 7.11 | 6.38 | 04:15 | 0.78 | 07:45 | 1.22 | 1.02 | 04:15 | 0.133 | 07:45 | 0.259 | 0.198 | 0.198 | |
| 12/10/2019 | 02:35 | 5.59 | 07:40 | 7.16 | 6.33 | 02:35 | 0.77 | 07:40 | 1.23 | 1.01 | 02:35 | 0.130 | 07:40 | 0.263 | 0.194 | 0.194 | 0.01 |
| 12/11/2019 | 02:55 | 5.51 | 07:45 | 7.40 | 6.30 | 02:55 | 0.74 | 07:45 | 1.29 | 1.02 | 02:55 | 0.123 | 07:45 | 0.281 | 0.195 | 0.195 | 0.00 |
| 12/12/2019 | 04:15 | 5.55 | 07:20 | 7.11 | 6.30 | 04:15 | 0.76 | 07:55 | 1.26 | 0.99 | 04:15 | 0.127 | 07:55 | 0.261 | 0.190 | 0.190 | |
| 12/13/2019 | 03:00 | 5.57 | 07:45 | 7.03 | 6.31 | 04:10 | 0.75 | 08:00 | 1.19 | 0.99 | 04:10 | 0.126 | 08:00 | 0.249 | 0.190 | 0.190 | |
| 12/14/2019 | 03:55 | 5.51 | 10:05 | 7.35 | 6.40 | 03:55 | 0.74 | 10:05 | 1.28 | 1.03 | 03:55 | 0.123 | 10:05 | 0.277 | 0.200 | 0.200 | 0.01 |
| 12/15/2019 | 03:45 | 5.49 | 11:00 | 7.46 | 6.39 | 03:45 | 0.73 | 11:00 | 1.30 | 1.02 | 03:45 | 0.121 | 11:00 | 0.285 | 0.199 | 0.199 | |
| 12/16/2019 | 02:50 | 5.57 | 07:45 | 7.10 | 6.33 | 02:50 | 0.76 | 07:45 | 1.22 | 1.01 | 02:50 | 0.128 | 07:45 | 0.258 | 0.194 | 0.194 | |
| 12/17/2019 | 01:25 | 5.57 | 20:35 | 7.07 | 6.39 | 01:25 | 0.76 | 20:35 | 1.21 | 1.03 | 01:25 | 0.128 | 20:35 | 0.256 | 0.199 | 0.199 | |
| 12/18/2019 | 03:15 | 5.65 | 07:25 | 7.29 | 6.46 | 03:15 | 0.79 | 07:25 | 1.26 | 1.05 | 03:15 | 0.135 | 07:25 | 0.273 | 0.206 | 0.206 | |
| 12/19/2019 | 03:15 | 5.63 | 07:40 | 7.44 | 6.42 | 03:15 | 0.79 | 07:40 | 1.30 | 1.03 | 03:15 | 0.133 | 07:40 | 0.284 | 0.202 | 0.202 | |
| 12/20/2019 | 03:05 | 5.71 | 07:30 | 7.35 | 6.50 | 03:05 | 0.82 | 07:30 | 1.28 | 1.06 | 03:05 | 0.140 | 07:30 | 0.277 | 0.208 | 0.208 | 0.02 |
| 12/21/2019 | 04:40 | 5.89 | 09:50 | 7.90 | 6.65 | 04:40 | 0.88 | 09:50 | 1.39 | 1.10 | 04:40 | 0.156 | 09:50 | 0.313 | 0.221 | 0.221 | |
| 12/22/2019 | 04:25 | 5.75 | 13:25 | 7.91 | 6.70 | 04:25 | 0.83 | 13:25 | 1.39 | 1.11 | 04:25 | 0.144 | 13:25 | 0.313 | 0.224 | 0.224 | |
| 12/23/2019 | 04:20 | 6.01 | 09:40 | 7.43 | 6.61 | 04:20 | 0.92 | 09:40 | 1.30 | 1.09 | 04:20 | 0.167 | 09:40 | 0.283 | 0.218 | 0.218 | |
| 12/24/2019 | 04:20 | 5.92 | 09:40 | 7.32 | 6.59 | 04:20 | 0.89 | 09:40 | 1.27 | 1.08 | 04:20 | 0.159 | 09:40 | 0.275 | 0.216 | 0.216 | |
| 12/25/2019 | 23:25 | 5.75 | 11:35 | 8.01 | 6.31 | 23:25 | 0.83 | 11:35 | 1.41 | 1.00 | 23:25 | 0.144 | 11:35 | 0.318 | 0.192 | 0.192 | |
| 12/26/2019 | 04:20 | 5.42 | 08:25 | 6.60 | 6.14 | 04:20 | 0.71 | 08:25 | 1.09 | 0.95 | 04:20 | 0.115 | 08:25 | 0.218 | 0.178 | 0.178 | |
| 12/27/2019 | 03:45 | 5.76 | 09:35 | 7.60 | 6.33 | 03:45 | 0.83 | 09:25 | 1.43 | 1.01 | 03:45 | 0.145 | 09:25 | 0.315 | 0.194 | 0.194 | |
| 12/28/2019 | 06:20 | 5.92 | 12:45 | 7.79 | 6.60 | 06:20 | 0.89 | 12:45 | 1.37 | 1.09 | 06:20 | 0.159 | 12:45 | 0.307 | 0.217 | 0.217 | |
| 12/29/2019 | 02:55 | 5.95 | 10:35 | 7.52 | 6.44 | 02:55 | 0.84 | 10:35 | 1.31 | 1.04 | 02:55 | 0.151 | 10:35 | 0.289 | 0.204 | 0.204 | |
| 12/30/2019 | 02:50 | 5.60 | 17:35 | 7.32 | 6.47 | 02:50 | 0.78 | 17:35 | 1.27 | 1.05 | 02:50 | 0.131 | 17:35 | 0.275 | 0.205 | 0.205 | |
| 12/31/2019 | 04:15 | 5.67 | 19:05 | 7.45 | 6.52 | 04:15 | 0.80 | 19:05 | 1.30 | 1.06 | 04:15 | 0.137 | 19:05 | 0.284 | 0.210 | 0.210 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 03:55 | 5.94 | 10:10 | 7.26 | 6.52 | 03:55 | 0.89 | 10:10 | 1.26 | 1.07 | 03:55 | 0.161 | 10:10 | 0.271 | 0.211 | 0.211 | |
| 01/02/2020 | 04:25 | 5.87 | 09:15 | 7.18 | 6.52 | 04:25 | 0.87 | 09:15 | 1.24 | 1.07 | 04:25 | 0.154 | 09:15 | 0.264 | 0.210 | 0.210 | |
| 01/03/2020 | 04:15 | 5.93 | 17:35 | 7.45 | 6.61 | 04:15 | 0.89 | 17:35 | 1.30 | 1.09 | 04:15 | 0.160 | 17:35 | 0.284 | 0.218 | 0.218 | |
| 01/04/2020 | 04:00 | 5.91 | 11:25 | 6.98 | 6.45 | 04:00 | 0.88 | 11:25 | 1.19 | 1.05 | 04:00 | 0.158 | 11:25 | 0.249 | 0.205 | 0.205 | |
| 01/05/2020 | 05:40 | 5.60 | 20:55 | 7.20 | 6.44 | 05:40 | 0.78 | 20:55 | 1.24 | 1.04 | 05:40 | 0.131 | 20:55 | 0.266 | 0.203 | 0.203 | |
| 01/06/2020 | 02:25 | 5.53 | 18:55 | 7.42 | 6.38 | 04:20 | 0.71 | 18:55 | 1.29 | 1.02 | 04:20 | 0.120 | 18:55 | 0.282 | 0.199 | 0.199 | |
| 01/07/2020 | 02:25 | 5.59 | 20:15 | 7.17 | 6.40 | 02:25 | 0.77 | 20:15 | 1.24 | 1.03 | 02:25 | 0.130 | 20:15 | 0.264 | 0.200 | 0.200 | |
| 01/08/2020 | 03:20 | 5.64 | 07:45 | 7.45 | 6.44 | 02:15 | 0.75 | 07:50 | 1.32 | 1.03 | 02:25 | 0.127 | 07:50 | 0.288 | 0.201 | 0.201 | |
| 01/09/2020 | 02:50 | 5.59 | 19:55 | 7.54 | 6.56 | 03:55 | 0.71 | 07:45 | 1.35 | 1.06 | 03:55 | 0.121 | 07:45 | 0.292 | 0.211 | 0.211 | |
| 01/10/2020 | 01:30 | 5.83 | 07:00 | 7.22 | 6.62 | 01:30 | 0.86 | 07:00 | 1.25 | 1.09 | 01:30 | 0.151 | 07:00 | 0.267 | 0.219 | 0.219 | |
| 01/11/2020 | 04:15 | 5.74 | 09:00 | 7.10 | 6.42 | 04:15 | 0.83 | 09:00 | 1.22 | 1.04 | 04:15 | 0.143 | 09:00 | 0.258 | 0.202 | 0.202 | |
| 01/12/2020 | 03:30 | 5.39 | 17:15 | 6.87 | 6.21 | 03:30 | 0.70 | 17:15 | 1.16 | 0.97 | 03:30 | 0.113 | 17:15 | 0.240 | 0.184 | 0.184 | |
| 01/13/2020 | 03:40 | 5.30 | 08:00 | 7.49 | 6.20 | 03:40 | 0.66 | 08:10 | 1.31 | 0.97 | 03:40 | 0.105 | 08:00 | 0.285 | 0.183 | 0.183 | |
| 01/14/2020 | 01:45 | 5.44 | 07:35 | 6.97 | 6.26 | 01:55 | 0.64 | 07:35 | 1.19 | 0.98 | 01:55 | 0.105 | 07:35 | 0.248 | 0.187 | 0.187 | |
| 01/15/2020 | 02:35 | 5.55 | 09:05 | 6.95 | 6.32 | 01:10 | 0.71 | 09:15 | 1.22 | 0.99 | 02:55 | 0.120 | 09:15 | 0.250 | 0.191 | 0.191 | 0.10 |
| 01/16/2020 | 02:40 | 5.58 | 18:50 | 7.48 | 6.57 | 02:40 | 0.71 | 18:50 | 1.31 | 1.06 | 02:40 | 0.119 | 18:50 | 0.287 | 0.211 | 0.211 | 0.66 |
| 01/17/2020 | 03:35 | 5.82 | 08:05 | 9.28 | 6.45 | 03:35 | 0.85 | 08:10 | 1.61 | 1.04 | 03:35 | 0.150 | 08:10 | 0.363 | 0.203 | 0.203 | |
| 01/18/2020 | 03:10 | 5.61 | 09:40 | 7.41 | 6.46 | 03:10 | 0.78 | 09:40 | 1.29 | 1.04 | 03:10 | 0.132 | 09:40 | 0.282 | 0.205 | 0.205 | |
| 01/19/2020 | 05:10 | 5.77 | 09:45 | 7.80 | 6.48 | 05:10 | 0.84 | 09:45 | 1.37 | 1.05 | 05:10 | 0.146 | 09:45 | 0.308 | 0.207 | 0.207 | |
| 01/20/2020 | 03:30 | 5.61 | 20:05 | 6.90 | 6.31 | 03:30 | 0.78 | 20:05 | 1.17 | 1.00 | 03:30 | 0.132 | 20:05 | 0.242 | 0.192 | 0.192 | |
| 01/21/2020 | 03:00 | 5.38 | 21:35 | 7.07 | 6.18 | 04:40 | 0.65 | 21:35 | 1.21 | 0.96 | 04:40 | 0.107 | 21:35 | 0.256 | 0.181 | 0.181 | 0.01 |
| 01/22/2020 | 02:35 | 5.62 | 08:00 | 7.17 | 6.34 | 02:35 | 0.78 | 08:00 | 1.24 | 1.01 | 02:35 | 0.133 | 08:00 | 0.264 | 0.195 | 0.195 | 0.09 |
| 01/23/2020 | 03:15 | 5.30 | 19:40 | 6.92 | 6.19 | 03:15 | 0.66 | 19:40 | 1.18 | 0.97 | 03:15 | 0.105 | 19:40 | 0.244 | 0.182 | 0.182 | |
| 01/24/2020 | 03:05 | 5.45 | 09:40 | 7.00 | 6.32 | 03:05 | 0.72 | 09:40 | 1.20 | 1.01 | 03:05 | 0.118 | 09:40 | 0.250 | 0.193 | 0.193 | |
| 01/25/2020 | 03:10 | 5.43 | 12:10 | 6.92 | 6.17 | 03:10 | 0.71 | 12:10 | 1.18 | 0.96 | 03:10 | 0.116 | 12:10 | 0.244 | 0.181 | 0.181 | |
| 01/26/2020 | 04:40 | 5.26 | 11:15 | 6.98 | 6.20 | 04:40 | 0.65 | 11:15 | 1.19 | 0.96 | 04:40 | 0.101 | 11:15 | 0.249 | 0.183 | 0.183 | 0.16 |
| 01/27/2020 | 05:55 | 5.59 | 05:25 | 7.24 | 6.23 | 00:05 | 0.78 | 05:25 | 1.25 | 0.98 | 06:00 | 0.135 | 05:25 | 0.269 | 0.185 | 0.185 | |
| 01/28/2020 | 02:35 | 5.33 | 07:40 | 6.83 | 6.08 | 02:35 | 0.67 | 07:40 | 1.15 | 0.93 | 02:35 | 0.107 | 07:40 | 0.237 | 0.173 | 0.173 | 0.02 |
| 01/29/2020 | 03:20 | 5.27 | 19:10 | 6.82 | 6.11 | 03:20 | 0.65 | 19:10 | 1.15 | 0.94 | 03:20 | 0.102 | 19:10 | 0.236 | 0.176 | 0.176 | |
| 01/30/2020 | 03:05 | 5.38 | 07:55 | 6.95 | 6.21 | 03:05 | 0.69 | 07:55 | 1.18 | 0.97 | 03:05 | 0.112 | 07:55 | 0.246 | 0.184 | 0.184 | |
| 01/31/2020 | 02:55 | 5.43 | 08:15 | 6.88 | 6.18 | 02:55 | 0.71 | 08:15 | 1.17 | 0.96 | 02:55 | 0.116 | 08:15 | 0.241 | 0.181 | 0.181 | 0.01 |
| 02/01/2020 | 02:55 | 5.15 | 08:00 | 7.09 | 6.04 | 04:30 | 0.56 | 08:00 | 1.19 | 0.92 | 04:30 | 0.087 | 08:00 | 0.251 | 0.169 | 0.169 | |
| 02/02/2020 | 06:05 | 5.08 | 21:20 | 7.08 | 6.15 | 05:45 | 0.53 | 21:20 | 1.22 | 0.94 | 05:45 | 0.080 | 21:20 | 0.257 | 0.178 | 0.178 | |
| 02/03/2020 | 03:35 | 5.36 | 07:45 | 6.92 | 6.18 | 03:35 | 0.68 | 07:45 | 1.18 | 0.96 | 03:35 | 0.110 | 07:45 | 0.244 | 0.181 | 0.181 | |
| 02/04/2020 | 02:15 | 5.36 | 18:45 | 6.91 | 6.19 | 02:15 | 0.68 | 18:45 | 1.17 | 0.97 | 02:15 | 0.110 | 18:45 | 0.243 | 0.182 | 0.182 | |
| 02/05/2020 | 04:05 | 5.50 | 07:25 | 6.89 | 6.21 | 04:05 | 0.74 | 07:25 | 1.17 | 0.97 | 04:05 | 0.122 | 07:25 | 0.242 | 0.184 | 0.184 | |
| 02/06/2020 | 02:25 | 5.50 | 21:05 | 7.16 | 6.25 | 02:25 | 0.74 | 21:05 | 1.23 | 0.99 | 02:25 | 0.122 | 21:05 | 0.263 | 0.187 | 0.187 | |
| 02/07/2020 | 03:10 | 5.30 | 18:10 | 7.26 | 6.07 | 03:10 | 0.66 | 18:10 | 1.26 | 0.93 | 03:10 | 0.105 | 18:10 | 0.271 | 0.172 | 0.172 | |
| 02/08/2020 | 04:20 | 5.16 | 09:35 | 6.93 | 6.12 | 04:20 | 0.60 | 09:35 | 1.18 | 0.94 | 04:20 | 0.093 | 09:35 | 0.245 | 0.176 | 0.176 | |
| 02/09/2020 | 05:00 | 5.13 | 12:35 | 7.04 | 6.15 | 05:00 | 0.59 | 12:35 | 1.21 | 0.95 | 05:00 | 0.090 | 12:35 | 0.254 | 0.179 | 0.179 | |
| 02/10/2020 | 03:30 | 5.38 | 07:45 | 7.14 | 6.21 | 03:30 | 0.69 | 07:45 | 1.23 | 0.97 | 03:30 | 0.112 | 07:45 | 0.261 | 0.184 | 0.184 | |
| 02/11/2020 | 03:45 | 5.37 | 07:50 | 6.94 | 6.19 | 03:45 | 0.69 | 07:50 | 1.18 | 0.96 | 03:45 | 0.111 | 07:50 | 0.246 | 0.182 | 0.182 | |
| 02/12/2020 | 02:05 | 5.41 | 07:45 | 7.02 | 6.23 | 02:05 | 0.70 | 07:45 | 1.20 | 0.98 | 02:05 | 0.114 | 07:45 | 0.252 | 0.186 | 0.186 | |
| 02/13/2020 | 04:05 | 5.56 | 07:30 | 6.96 | 6.22 | 04:05 | 0.76 | 07:30 | 1.19 | 0.98 | 04:05 | 0.127 | 07:30 | 0.247 | 0.185 | 0.185 | |
| 02/14/2020 | 03:30 | 5.50 | 07:45 | 6.84 | 6.22 | 03:30 | 0.74 | 18:40 | 1.17 | 0.99 | 03:30 | 0.122 | 07:45 | 0.237 | 0.187 | 0.187 | |
| 02/15/2020 | 05:10 | 5.44 | 15:55 | 7.03 | 6.27 | 03:05 | 0.79 | 15:55 | 1.24 | 1.02 | 03:10 | 0.130 | 15:55 | 0.261 | 0.194 | 0.194 | |
| 02/16/2020 | 02:20 | 5.66 | 10:15 | 7.49 | 6.44 | 04:15 | 0.79 | 10:00 | 1.31 | 1.05 | 04:15 | 0.135 | 10:15 | 0.286 | 0.205 | 0.205 | |
| 02/17/2020 | 04:20 | 5.98 | 10:00 | 8.34 | 6.92 | 04:20 | 0.90 | 10:05 | 1.51 | 1.14 | 04:20 | 0.163 | 10:05 | 0.341 | 0.235 | 0.235 | |
| 02/18/2020 | 03:05 | 6.06 | 09:30 | 7.95 | 6.85 | 03:05 | 0.93 | 09:30 | 1.39 | 1.12 | 03:05 | 0.170 | 09:30 | 0.314 | 0.230 | 0.230 | |
| 02/19/2020 | 02:45 | 6.01 | 08:35 | 7.78 | 6.84 | 02:45 | 0.91 | 08:45 | 1.37 | 1.11 | 02:45 | 0.166 | 08:35 | 0.304 | 0.229 | 0.229 | |
| 02/20/2020 | 04:20 | 6.05 | 09:00 | 7.73 | 6.77 | 04:20 | 0.92 | 09:05 | 1.34 | 1.10 | 04:20 | 0.169 | 09:05 | 0.300 | 0.223 | 0.223 | |
| 02/21/2020 | 03:40 | 6.01 | 18:45 | 7.58 | 6.69 | 03:40 | 0.91 | 18:45 | 1.32 | 1.07 | 03:40 | 0.166 | 18:45 | 0.292 | 0.217 | 0.217 | |
| 02/22/2020 | 05:00 | 5.89 | 10:20 | 8.07 | 6.77 | 05:00 | 0.87 | 10:20 | 1.39 | 1.10 | 05:00 | 0.156 | 10:20 | 0.315 | 0.224 | 0.224 | |
| 02/23/2020 | 05:15 | 5.89 | 11:05 | 7.88 | 6.74 | 05:15 | 0.87 | 11:00 | 1.39 | 1.10 | 05:15 | 0.156 | 11:05 | 0.310 | 0.223 | 0.223 | |
| 02/24/2020 | 03:15 | 5.87 | 19:50 | 8.34 | 6.69 | 03:15 | 0.87 | 19:50 | 1.46 | 1.08 | 03:15 | 0.154 | 19:50 | 0.330 | 0.217 | 0.217 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 02:30 | 5.85 | 07:40 | 7.89 | 6.64 | 02:30 | 0.79 | 07:45 | 1.43 | 1.07 | 02:30 | 0.140 | 07:45 | 0.322 | 0.215 | 0.215 | 0.01 |
| 02/26/2020 | 04:10 | 6.02 | 07:40 | 7.55 | 6.65 | 04:10 | 0.91 | 07:35 | 1.38 | 1.07 | 04:10 | 0.167 | 07:35 | 0.301 | 0.214 | 0.214 | |
| 02/27/2020 | 02:50 | 5.90 | 07:10 | 7.61 | 6.59 | 02:50 | 0.88 | 07:10 | 1.40 | 1.07 | 02:50 | 0.156 | 07:10 | 0.311 | 0.213 | 0.213 | |
| 02/28/2020 | 03:10 | 5.71 | 07:35 | 7.69 | 6.49 | 02:55 | 0.74 | 07:35 | 1.35 | 1.03 | 03:00 | 0.128 | 07:35 | 0.300 | 0.203 | 0.203 | |
| 02/29/2020 | 23:50 | 4.83 | 11:05 | 7.31 | 5.91 | 03:30 | 0.79 | 14:30 | 1.43 | 1.15 | 03:30 | 0.139 | 11:05 | 0.273 | 0.204 | 0.204 | |
| 03/01/2020 | 04:35 | 4.05 | 20:55 | 6.58 | 5.30 | 04:35 | 0.99 | 12:35 | 1.42 | 1.24 | 04:35 | 0.113 | 19:40 | 0.265 | 0.199 | 0.199 | |
| 03/02/2020 | 03:05 | 3.86 | 07:35 | 6.38 | 4.60 | 03:05 | 0.92 | 07:00 | 1.41 | 1.12 | 03:05 | 0.100 | 07:30 | 0.267 | 0.153 | 0.055 | |
| 03/03/2020 | | | | | | | | | | | | | | | | | |
| 03/04/2020 | | | | | | | | | | | | | | | | | |
| 03/05/2020 | | | | | | | | | | | | | | | | | |
| 03/06/2020 | | | | | | | | | | | | | | | | | 0.58 |
| 03/07/2020 | | | | | | | | | | | | | | | | | |
| 03/08/2020 | | | | | | | | | | | | | | | | | |
| 03/09/2020 | | | | | | | | | | | | | | | | | 0.11 |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 21.255 | 5.26 |
| Avg | 6.23 | 1.05 | 0.198 | |

Site Commentary

Site Information

| MIL_2724 | |
|-----------------|-------|
| Pipe Dimensions | 39.88 |
| Silt Level | 0.00" |

Overview

Site MIL_2724 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019 and December 7, 2019 - December 8, 2019. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|-------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 18.34 | 0.78 | 2.042 |
| Minimum | 13.49 | 0.43 | 0.744 |
| Maximum | 22.23 | 1.11 | 3.446 |
| Time of Minimum | 3/4/2020 5:30 AM | 3/4/2020 4:40 AM | 3/4/2020 4:40 AM |
| Time of Maximum | 12/7/2019 7:45 PM | 12/2/2019 10:10 AM | 12/4/2019 10:25 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2724

Site Address /Location: California Cir and Cadillac Court, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: Drive

Latitude:

37.446644°

Pipe Size (H x W)

39.88" x 40.50"

Pipe Shape

Circular

Longitude:

-121.918485°

Manhole #

2724

System Characteristics

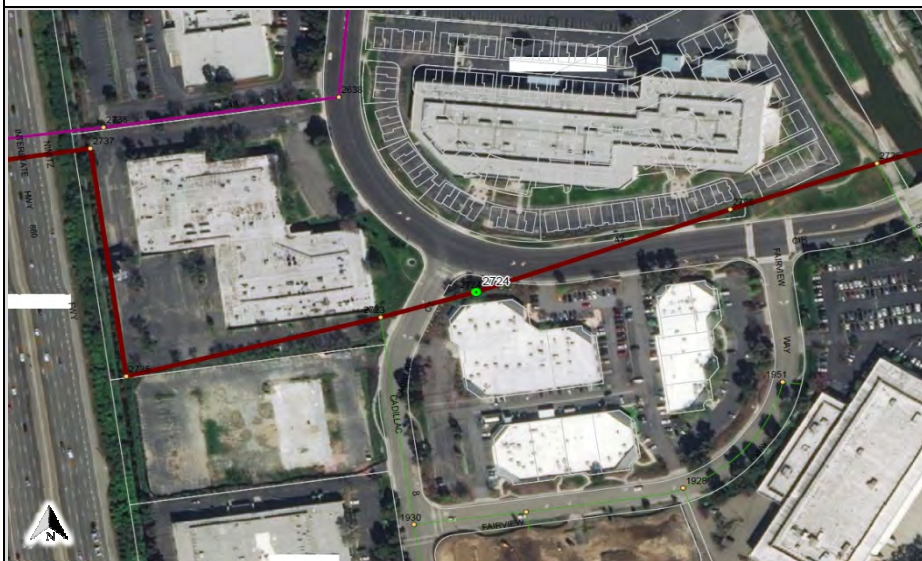
Residential/Commercial

Access

Drive

Traffic

Light



Installation Information

Installation Date:

Tuesday, November 12, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

5:37:34 AM

Pipe Size (HxW)

39.88" x 40.50"

Depth of Flow (Wet DOF) (in)

14.00"

Range (Air DOF) (in)

0.00"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

0.89

Velocity Sensor Offset (in)

0"

Silt (in)

0"

Silt Type

Hydraulic Comments:

Ok flow, Deep and slow

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

20'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

PVC

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Manhole Pick / Vent Hole

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA19-20

ADS Project Number: 22431

SCATTERGRAPH REPORT

MIL_2724

Flow Monitor

MIL_2724

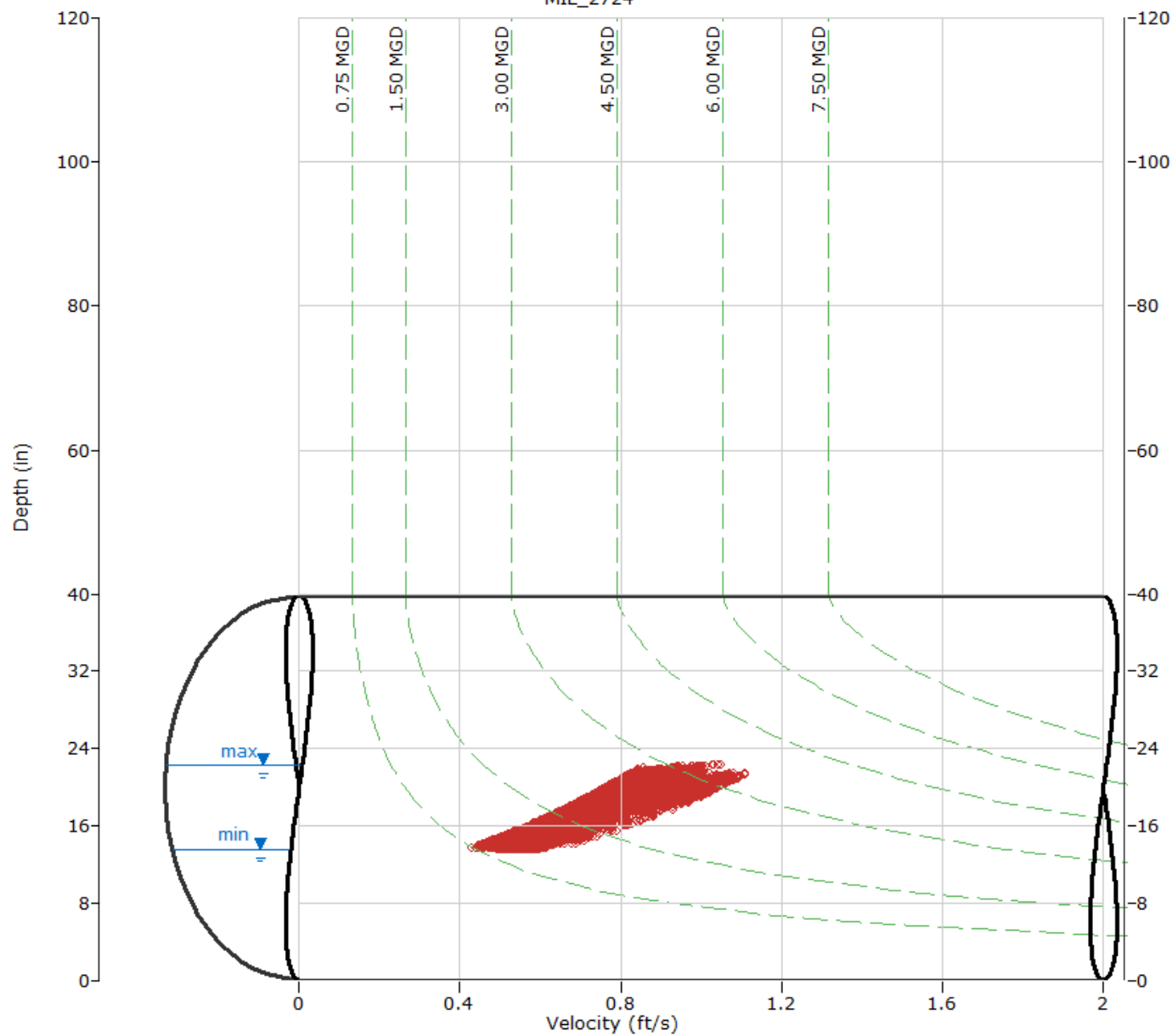
Pipe Height
39.88 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

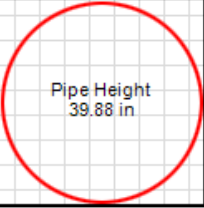


ADS ENVIRONMENTAL
SERVICES

HYDROGRAPH REPORT

MIL_2724

Flow Monitor
MIL_2724

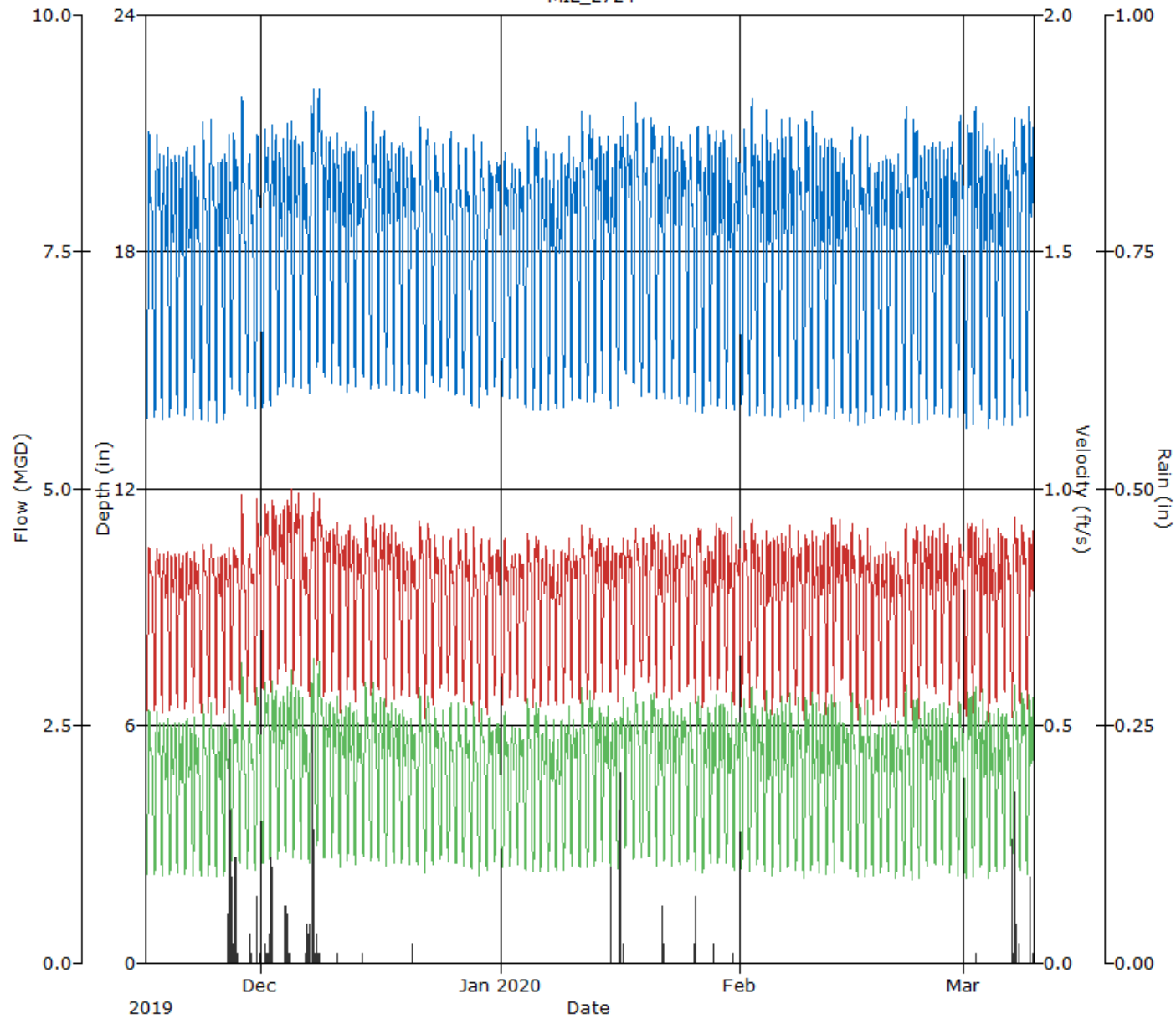


Pipe Height
39.88 in

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2724, Pipe Height: 39.88 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 06:05 | 13.74 | 12:15 | 21.05 | 18.02 | 06:05 | 0.53 | 12:15 | 0.88 | 0.75 | 06:05 | 0.917 | 12:15 | 2.670 | 1.935 | 1.935 | |
| 11/17/2019 | 06:05 | 13.78 | 12:45 | 20.99 | 18.15 | 06:05 | 0.53 | 12:45 | 0.87 | 0.76 | 06:05 | 0.925 | 12:45 | 2.656 | 1.968 | 1.968 | |
| 11/18/2019 | 05:30 | 13.71 | 22:10 | 20.69 | 18.05 | 05:30 | 0.53 | 22:10 | 0.87 | 0.76 | 05:30 | 0.910 | 22:10 | 2.587 | 1.942 | 1.942 | |
| 11/19/2019 | 05:35 | 13.80 | 09:50 | 20.54 | 18.07 | 05:35 | 0.53 | 09:50 | 0.86 | 0.76 | 05:35 | 0.931 | 09:50 | 2.551 | 1.949 | 1.949 | |
| 11/20/2019 | 05:25 | 13.88 | 09:50 | 20.59 | 18.03 | 05:25 | 0.54 | 09:50 | 0.86 | 0.76 | 05:25 | 0.946 | 09:50 | 2.564 | 1.938 | 1.938 | |
| 11/21/2019 | 05:40 | 13.81 | 10:10 | 20.70 | 18.02 | 05:40 | 0.53 | 10:10 | 0.87 | 0.76 | 05:40 | 0.932 | 10:10 | 2.589 | 1.937 | 1.937 | |
| 11/22/2019 | 05:30 | 13.71 | 10:05 | 20.76 | 18.09 | 05:30 | 0.53 | 10:05 | 0.87 | 0.76 | 05:30 | 0.912 | 10:05 | 2.603 | 1.953 | 1.953 | |
| 11/23/2019 | 06:05 | 13.69 | 12:45 | 21.31 | 18.08 | 06:05 | 0.52 | 12:45 | 0.88 | 0.76 | 06:05 | 0.906 | 12:45 | 2.729 | 1.951 | 1.951 | |
| 11/24/2019 | 06:25 | 13.67 | 12:30 | 21.38 | 18.19 | 06:25 | 0.52 | 12:30 | 0.88 | 0.76 | 06:25 | 0.902 | 12:30 | 2.746 | 1.977 | 1.977 | |
| 11/25/2019 | 05:35 | 13.64 | 09:55 | 20.41 | 17.97 | 05:35 | 0.52 | 09:55 | 0.86 | 0.75 | 05:35 | 0.897 | 09:55 | 2.520 | 1.925 | 1.925 | |
| 11/26/2019 | 05:35 | 13.71 | 22:15 | 21.05 | 18.15 | 05:35 | 0.53 | 22:15 | 0.88 | 0.76 | 05:35 | 0.911 | 22:15 | 2.671 | 1.968 | 1.968 | 0.63 |
| 11/27/2019 | 04:50 | 14.44 | 11:30 | 21.02 | 18.67 | 04:50 | 0.57 | 11:30 | 0.88 | 0.78 | 04:50 | 1.065 | 11:30 | 2.664 | 2.093 | 2.093 | 0.77 |
| 11/28/2019 | 06:40 | 14.33 | 13:45 | 21.91 | 18.41 | 06:40 | 0.57 | 13:45 | 1.00 | 0.77 | 06:40 | 1.043 | 13:45 | 3.198 | 2.040 | 2.040 | |
| 11/29/2019 | 06:20 | 14.05 | 12:50 | 20.54 | 17.82 | 06:20 | 0.55 | 12:50 | 0.86 | 0.75 | 06:20 | 0.981 | 12:50 | 2.552 | 1.884 | 1.884 | |
| 11/30/2019 | 06:00 | 13.99 | 13:50 | 21.00 | 17.98 | 05:40 | 0.51 | 11:55 | 1.06 | 0.79 | 05:40 | 0.914 | 13:35 | 3.216 | 2.021 | 2.021 | 0.14 |
| 12/01/2019 | 06:35 | 14.06 | 13:45 | 21.12 | 18.38 | 05:15 | 0.53 | 12:35 | 1.09 | 0.83 | 06:35 | 0.950 | 13:15 | 3.333 | 2.196 | 2.196 | 0.06 |
| 12/02/2019 | 05:35 | 14.07 | 10:05 | 21.27 | 18.67 | 05:45 | 0.51 | 10:10 | 1.11 | 0.84 | 05:45 | 0.916 | 10:10 | 3.427 | 2.251 | 2.251 | 0.36 |
| 12/03/2019 | 05:35 | 14.37 | 22:15 | 20.89 | 18.45 | 05:25 | 0.57 | 21:35 | 1.08 | 0.84 | 05:25 | 1.051 | 23:10 | 3.240 | 2.193 | 2.193 | |
| 12/04/2019 | 04:55 | 14.58 | 22:25 | 21.36 | 18.87 | 04:50 | 0.58 | 22:25 | 1.11 | 0.87 | 04:50 | 1.091 | 22:25 | 3.446 | 2.348 | 2.348 | |
| 12/05/2019 | 05:30 | 14.58 | 10:05 | 21.01 | 18.69 | 05:45 | 0.55 | 10:30 | 1.07 | 0.86 | 05:45 | 1.039 | 10:30 | 3.235 | 2.303 | 2.303 | |
| 12/06/2019 | 05:30 | 14.54 | 10:15 | 20.84 | 18.47 | 05:00 | 0.55 | 09:10 | 1.06 | 0.80 | 05:15 | 1.034 | 09:10 | 3.106 | 2.087 | 2.087 | |
| 12/07/2019 | 06:10 | 14.37 | 19:45 | 22.23 | 18.99 | 06:40 | 0.51 | 19:45 | 1.05 | 0.81 | 06:40 | 0.953 | 19:45 | 3.419 | 2.231 | 2.231 | 0.84 |
| 12/08/2019 | 06:30 | 15.07 | 12:25 | 22.18 | 19.31 | 04:35 | 0.58 | 12:25 | 1.00 | 0.84 | 06:00 | 1.140 | 12:25 | 3.264 | 2.341 | 2.341 | 0.10 |
| 12/09/2019 | 05:35 | 14.80 | 09:50 | 21.02 | 18.87 | 05:05 | 0.51 | 21:20 | 0.97 | 0.82 | 05:05 | 0.991 | 22:45 | 2.940 | 2.204 | 2.204 | |
| 12/10/2019 | 05:35 | 14.64 | 22:50 | 21.07 | 18.60 | 06:00 | 0.52 | 22:30 | 0.98 | 0.81 | 06:00 | 0.993 | 22:30 | 2.988 | 2.153 | 2.153 | |
| 12/11/2019 | 05:25 | 14.61 | 22:55 | 20.85 | 18.60 | 05:05 | 0.50 | 10:25 | 0.96 | 0.80 | 05:20 | 0.935 | 23:15 | 2.887 | 2.115 | 2.115 | 0.00 |
| 12/12/2019 | 05:35 | 14.43 | 10:00 | 20.73 | 18.44 | 04:45 | 0.50 | 09:20 | 0.96 | 0.80 | 04:45 | 0.932 | 10:20 | 2.871 | 2.097 | 2.097 | |
| 12/13/2019 | 05:45 | 14.57 | 09:50 | 20.80 | 18.46 | 04:50 | 0.50 | 10:50 | 0.94 | 0.79 | 05:45 | 0.932 | 10:50 | 2.815 | 2.078 | 2.078 | |
| 12/14/2019 | 06:20 | 14.81 | 12:30 | 21.71 | 18.85 | 06:35 | 0.52 | 13:20 | 1.01 | 0.80 | 06:35 | 1.006 | 13:20 | 3.176 | 2.176 | 2.176 | 0.01 |
| 12/15/2019 | 06:35 | 14.51 | 12:30 | 21.60 | 18.72 | 05:20 | 0.51 | 12:00 | 1.00 | 0.79 | 06:25 | 0.978 | 12:40 | 3.116 | 2.141 | 2.141 | |
| 12/16/2019 | 05:35 | 14.52 | 22:40 | 21.09 | 18.64 | 05:35 | 0.58 | 10:15 | 0.98 | 0.81 | 05:35 | 1.078 | 23:05 | 2.982 | 2.152 | 2.152 | |
| 12/17/2019 | 05:40 | 14.60 | 22:55 | 20.78 | 18.58 | 05:35 | 0.50 | 09:40 | 0.96 | 0.80 | 05:35 | 0.935 | 23:20 | 2.876 | 2.127 | 2.127 | |
| 12/18/2019 | 05:25 | 14.46 | 22:30 | 20.69 | 18.58 | 04:55 | 0.50 | 10:25 | 0.96 | 0.79 | 04:55 | 0.947 | 10:25 | 2.836 | 2.100 | 2.100 | |
| 12/19/2019 | 05:35 | 14.39 | 10:00 | 20.84 | 18.55 | 05:55 | 0.50 | 09:40 | 0.94 | 0.78 | 05:55 | 0.935 | 09:40 | 2.804 | 2.051 | 2.051 | |
| 12/20/2019 | 05:40 | 14.38 | 10:10 | 20.54 | 18.50 | 05:50 | 0.49 | 10:30 | 0.93 | 0.78 | 05:50 | 0.899 | 10:30 | 2.739 | 2.039 | 2.039 | |
| 12/21/2019 | 06:15 | 14.41 | 12:50 | 21.47 | 18.43 | 06:40 | 0.49 | 11:30 | 0.99 | 0.79 | 06:40 | 0.906 | 13:20 | 3.084 | 2.093 | 2.093 | |
| 12/22/2019 | 06:25 | 14.30 | 13:20 | 21.12 | 18.49 | 06:05 | 0.48 | 13:40 | 0.99 | 0.79 | 06:15 | 0.876 | 13:40 | 3.029 | 2.093 | 2.093 | |
| 12/23/2019 | 06:00 | 14.63 | 12:50 | 20.84 | 18.53 | 05:35 | 0.50 | 11:25 | 0.96 | 0.78 | 05:40 | 0.939 | 12:35 | 2.866 | 2.071 | 2.071 | |
| 12/24/2019 | 06:00 | 14.53 | 13:20 | 20.76 | 18.30 | 07:00 | 0.50 | 12:25 | 0.95 | 0.77 | 07:00 | 0.941 | 14:05 | 2.826 | 2.004 | 2.004 | |
| 12/25/2019 | 07:05 | 14.40 | 13:15 | 21.12 | 18.00 | 07:05 | 0.57 | 13:10 | 0.95 | 0.76 | 07:05 | 1.051 | 13:10 | 2.921 | 1.927 | 1.927 | |
| 12/26/2019 | 05:55 | 14.29 | 13:00 | 20.76 | 18.16 | 05:55 | 0.56 | 12:25 | 0.97 | 0.77 | 05:55 | 1.029 | 13:05 | 2.912 | 1.998 | 1.998 | |
| 12/27/2019 | 05:55 | 14.31 | 12:15 | 20.62 | 18.16 | 04:50 | 0.49 | 12:15 | 0.96 | 0.77 | 05:55 | 0.893 | 12:15 | 2.860 | 1.998 | 1.998 | |
| 12/28/2019 | 06:35 | 14.09 | 13:35 | 20.99 | 18.06 | 07:10 | 0.49 | 12:20 | 0.96 | 0.75 | 07:10 | 0.880 | 12:35 | 2.881 | 1.928 | 1.928 | |
| 12/29/2019 | 06:30 | 14.06 | 13:20 | 20.82 | 18.02 | 06:25 | 0.46 | 13:40 | 0.96 | 0.75 | 06:25 | 0.823 | 13:40 | 2.890 | 1.933 | 1.933 | |
| 12/30/2019 | 05:55 | 14.35 | 12:55 | 20.33 | 18.20 | 05:15 | 0.50 | 12:10 | 0.95 | 0.77 | 05:55 | 0.913 | 12:10 | 2.767 | 1.991 | 1.991 | |
| 12/31/2019 | 06:05 | 14.53 | 13:00 | 20.30 | 18.28 | 04:55 | 0.50 | 19:40 | 0.94 | 0.76 | 06:40 | 0.951 | 19:40 | 2.733 | 1.974 | 1.974 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 07:20 | 14.33 | 13:45 | 20.53 | 17.98 | 06:05 | 0.50 | 12:50 | 0.96 | 0.75 | 06:25 | 0.922 | 13:55 | 2.842 | 1.912 | 1.912 | |
| 01/02/2020 | 05:50 | 14.22 | 11:50 | 20.44 | 18.11 | 05:40 | 0.50 | 11:45 | 0.94 | 0.76 | 05:40 | 0.919 | 11:50 | 2.750 | 1.948 | 1.948 | |
| 01/03/2020 | 05:50 | 14.26 | 12:35 | 20.09 | 18.12 | 05:50 | 0.56 | 12:35 | 0.86 | 0.76 | 05:50 | 1.023 | 12:35 | 2.472 | 1.960 | 1.960 | |
| 01/04/2020 | 06:30 | 14.06 | 13:30 | 21.19 | 18.21 | 06:30 | 0.55 | 13:30 | 0.91 | 0.77 | 06:30 | 0.980 | 13:30 | 2.786 | 1.993 | 1.993 | |
| 01/05/2020 | 06:45 | 13.97 | 13:15 | 21.14 | 18.39 | 06:20 | 0.46 | 12:45 | 0.91 | 0.77 | 06:20 | 0.819 | 12:45 | 2.775 | 2.038 | 2.038 | |
| 01/06/2020 | 05:35 | 13.96 | 22:20 | 20.57 | 18.05 | 05:35 | 0.54 | 22:20 | 0.88 | 0.76 | 05:35 | 0.960 | 22:20 | 2.607 | 1.945 | 1.945 | |
| 01/07/2020 | 05:35 | 13.98 | 22:10 | 20.49 | 17.96 | 05:35 | 0.54 | 22:10 | 0.88 | 0.75 | 05:35 | 0.965 | 22:10 | 2.585 | 1.914 | 1.914 | |
| 01/08/2020 | 05:50 | 13.98 | 22:20 | 20.50 | 17.98 | 05:50 | 0.54 | 21:55 | 0.92 | 0.75 | 05:50 | 0.965 | 21:55 | 2.703 | 1.908 | 1.908 | |
| 01/09/2020 | 05:35 | 14.03 | 22:00 | 20.97 | 18.39 | 05:35 | 0.54 | 21:10 | 0.94 | 0.77 | 05:35 | 0.974 | 21:20 | 2.859 | 2.032 | 2.032 | |
| 01/10/2020 | 05:40 | 14.23 | 10:00 | 20.40 | 18.44 | 05:40 | 0.56 | 23:05 | 0.88 | 0.78 | 05:40 | 1.016 | 10:00 | 2.560 | 2.042 | 2.042 | |
| 01/11/2020 | 06:20 | 14.26 | 13:30 | 21.59 | 18.52 | 06:30 | 0.49 | 13:30 | 0.92 | 0.78 | 06:30 | 0.890 | 13:30 | 2.902 | 2.069 | 2.069 | |
| 01/12/2020 | 06:20 | 14.18 | 12:55 | 21.48 | 18.67 | 06:20 | 0.55 | 13:10 | 0.92 | 0.78 | 06:20 | 1.006 | 13:10 | 2.869 | 2.111 | 2.111 | |
| 01/13/2020 | 05:25 | 14.19 | 22:50 | 20.89 | 18.48 | 05:25 | 0.56 | 22:50 | 0.89 | 0.78 | 05:25 | 1.008 | 22:50 | 2.698 | 2.057 | 2.057 | |
| 01/14/2020 | 05:45 | 14.42 | 22:20 | 20.92 | 18.42 | 05:45 | 0.57 | 22:20 | 0.89 | 0.78 | 05:45 | 1.057 | 22:20 | 2.707 | 2.042 | 2.042 | |
| 01/15/2020 | 05:30 | 13.93 | 22:00 | 20.77 | 18.28 | 05:30 | 0.54 | 19:55 | 0.95 | 0.77 | 05:30 | 0.956 | 19:55 | 2.723 | 1.998 | 1.998 | 0.10 |
| 01/16/2020 | 05:30 | 14.07 | 22:10 | 21.46 | 18.85 | 03:40 | 0.51 | 20:30 | 0.98 | 0.79 | 05:35 | 0.934 | 20:30 | 2.975 | 2.130 | 2.130 | 0.66 |
| 01/17/2020 | 05:30 | 14.90 | 10:00 | 21.03 | 18.91 | 03:40 | 0.55 | 10:05 | 0.95 | 0.79 | 04:50 | 1.115 | 10:05 | 2.890 | 2.145 | 2.145 | |
| 01/18/2020 | 06:15 | 14.62 | 13:40 | 21.78 | 18.71 | 06:35 | 0.51 | 11:10 | 0.98 | 0.79 | 06:35 | 0.963 | 11:20 | 2.982 | 2.116 | 2.116 | |
| 01/19/2020 | 06:30 | 14.32 | 13:00 | 21.43 | 18.49 | 05:25 | 0.49 | 14:20 | 0.98 | 0.78 | 05:25 | 0.918 | 14:20 | 2.980 | 2.074 | 2.074 | |
| 01/20/2020 | 06:00 | 14.37 | 13:45 | 21.42 | 18.85 | 04:05 | 0.52 | 22:00 | 0.99 | 0.80 | 04:10 | 1.017 | 22:00 | 3.042 | 2.167 | 2.167 | |
| 01/21/2020 | 05:35 | 14.26 | 22:45 | 20.98 | 18.47 | 05:30 | 0.47 | 09:35 | 0.96 | 0.78 | 05:30 | 0.863 | 21:50 | 2.846 | 2.050 | 2.050 | 0.01 |
| 01/22/2020 | 05:45 | 14.24 | 22:30 | 21.20 | 18.58 | 04:55 | 0.49 | 21:20 | 0.97 | 0.78 | 06:00 | 0.905 | 21:20 | 2.956 | 2.071 | 2.071 | 0.09 |
| 01/23/2020 | 05:40 | 14.23 | 10:00 | 21.02 | 18.50 | 05:45 | 0.48 | 22:45 | 0.97 | 0.78 | 05:45 | 0.879 | 22:45 | 2.893 | 2.049 | 2.049 | |
| 01/24/2020 | 05:50 | 14.12 | 12:00 | 20.91 | 18.63 | 05:10 | 0.49 | 10:45 | 0.96 | 0.80 | 05:10 | 0.884 | 10:45 | 2.847 | 2.122 | 2.122 | |
| 01/25/2020 | 06:15 | 14.09 | 13:15 | 21.03 | 18.17 | 07:20 | 0.52 | 12:55 | 0.97 | 0.78 | 07:20 | 0.970 | 12:55 | 2.935 | 2.003 | 2.003 | |
| 01/26/2020 | 06:15 | 13.91 | 13:30 | 21.20 | 18.32 | 05:15 | 0.47 | 13:45 | 0.99 | 0.79 | 05:15 | 0.846 | 13:45 | 3.036 | 2.075 | 2.075 | 0.16 |
| 01/27/2020 | 05:40 | 13.88 | 21:55 | 21.17 | 18.27 | 05:40 | 0.54 | 22:45 | 0.97 | 0.77 | 05:40 | 0.946 | 22:45 | 2.982 | 1.996 | 1.996 | |
| 01/28/2020 | 05:20 | 14.11 | 21:50 | 21.09 | 18.40 | 04:15 | 0.52 | 22:15 | 0.98 | 0.79 | 05:20 | 0.952 | 22:15 | 2.987 | 2.061 | 2.061 | 0.02 |
| 01/29/2020 | 05:30 | 14.06 | 22:20 | 21.11 | 18.38 | 05:15 | 0.57 | 21:35 | 0.98 | 0.79 | 05:15 | 1.015 | 21:35 | 2.975 | 2.074 | 2.074 | |
| 01/30/2020 | 05:35 | 14.00 | 22:15 | 21.00 | 18.27 | 05:20 | 0.54 | 23:00 | 0.98 | 0.79 | 05:20 | 0.968 | 23:00 | 2.946 | 2.050 | 2.050 | |
| 01/31/2020 | 05:35 | 13.96 | 10:05 | 20.42 | 18.29 | 04:35 | 0.49 | 09:40 | 0.95 | 0.78 | 05:30 | 0.885 | 09:40 | 2.757 | 2.035 | 2.035 | 0.01 |
| 02/01/2020 | 06:15 | 14.11 | 12:05 | 21.13 | 18.31 | 05:40 | 0.50 | 14:35 | 0.98 | 0.78 | 05:40 | 0.903 | 12:30 | 2.973 | 2.051 | 2.051 | |
| 02/02/2020 | 06:30 | 13.83 | 13:30 | 21.92 | 18.34 | 05:50 | 0.48 | 15:05 | 0.99 | 0.78 | 05:50 | 0.845 | 14:10 | 3.084 | 2.068 | 2.068 | |
| 02/03/2020 | 05:30 | 13.88 | 22:25 | 20.98 | 18.34 | 04:45 | 0.48 | 09:50 | 0.95 | 0.78 | 04:45 | 0.852 | 22:35 | 2.819 | 2.031 | 2.031 | |
| 02/04/2020 | 05:45 | 13.83 | 10:10 | 21.72 | 18.50 | 04:10 | 0.47 | 10:35 | 0.99 | 0.78 | 05:40 | 0.839 | 10:05 | 3.098 | 2.061 | 2.061 | |
| 02/05/2020 | 05:30 | 13.84 | 22:15 | 20.86 | 18.19 | 05:50 | 0.45 | 09:45 | 0.96 | 0.77 | 05:50 | 0.797 | 09:45 | 2.820 | 1.988 | 1.988 | |
| 02/06/2020 | 05:35 | 13.79 | 10:25 | 21.37 | 18.51 | 06:05 | 0.50 | 10:00 | 0.96 | 0.78 | 06:05 | 0.880 | 10:00 | 2.988 | 2.075 | 2.075 | |
| 02/07/2020 | 05:35 | 13.97 | 12:10 | 21.45 | 18.56 | 04:25 | 0.48 | 11:25 | 0.98 | 0.79 | 04:25 | 0.873 | 11:25 | 3.000 | 2.101 | 2.101 | |
| 02/08/2020 | 06:05 | 13.98 | 12:50 | 21.28 | 18.29 | 05:20 | 0.48 | 12:20 | 0.97 | 0.77 | 05:20 | 0.862 | 12:50 | 3.008 | 2.003 | 2.003 | |
| 02/09/2020 | 06:30 | 13.68 | 12:50 | 21.39 | 18.35 | 05:30 | 0.48 | 12:55 | 0.97 | 0.77 | 05:30 | 0.849 | 12:55 | 3.015 | 2.027 | 2.027 | |
| 02/10/2020 | 05:45 | 13.91 | 10:35 | 21.64 | 18.34 | 04:50 | 0.47 | 09:30 | 0.98 | 0.77 | 04:50 | 0.846 | 10:55 | 3.022 | 2.024 | 2.024 | |
| 02/11/2020 | 05:40 | 13.93 | 22:20 | 20.89 | 18.30 | 05:45 | 0.46 | 22:45 | 0.96 | 0.78 | 05:45 | 0.815 | 22:45 | 2.874 | 2.030 | 2.030 | |
| 02/12/2020 | 05:20 | 13.87 | 22:25 | 20.89 | 18.28 | 04:10 | 0.48 | 22:45 | 0.98 | 0.78 | 04:10 | 0.875 | 22:45 | 2.948 | 2.044 | 2.044 | |
| 02/13/2020 | 05:45 | 13.77 | 10:00 | 20.68 | 18.17 | 05:10 | 0.44 | 10:15 | 0.97 | 0.79 | 05:10 | 0.777 | 10:15 | 2.874 | 2.048 | 2.048 | |
| 02/14/2020 | 05:40 | 13.90 | 10:15 | 20.40 | 18.17 | 04:55 | 0.56 | 09:55 | 0.95 | 0.80 | 04:55 | 0.994 | 09:55 | 2.789 | 2.052 | 2.052 | |
| 02/15/2020 | 06:20 | 13.69 | 12:55 | 21.28 | 17.98 | 05:20 | 0.48 | 12:20 | 0.98 | 0.77 | 05:20 | 0.842 | 13:05 | 3.009 | 1.979 | 1.979 | |
| 02/16/2020 | 06:50 | 13.59 | 13:00 | 21.00 | 17.91 | 05:55 | 0.46 | 12:10 | 0.96 | 0.76 | 05:55 | 0.799 | 13:10 | 2.910 | 1.933 | 1.933 | |
| 02/17/2020 | 05:50 | 13.62 | 13:05 | 20.97 | 17.99 | 06:10 | 0.47 | 13:30 | 0.95 | 0.75 | 06:10 | 0.812 | 13:30 | 2.883 | 1.931 | 1.931 | |
| 02/18/2020 | 05:35 | 13.73 | 22:05 | 20.32 | 18.02 | 05:30 | 0.46 | 11:05 | 0.92 | 0.75 | 05:30 | 0.803 | 11:05 | 2.610 | 1.915 | 1.915 | |
| 02/19/2020 | 05:45 | 13.82 | 23:05 | 20.49 | 18.19 | 06:10 | 0.47 | 22:50 | 0.94 | 0.75 | 06:10 | 0.842 | 22:50 | 2.761 | 1.954 | 1.954 | |
| 02/20/2020 | 05:35 | 13.96 | 11:40 | 20.35 | 18.22 | 04:55 | 0.46 | 09:55 | 0.93 | 0.76 | 04:55 | 0.831 | 21:00 | 2.643 | 1.960 | 1.960 | |
| 02/21/2020 | 05:25 | 13.73 | 11:25 | 20.49 | 18.03 | 04:50 | 0.45 | 19:35 | 0.90 | 0.74 | 05:45 | 0.790 | 12:15 | 2.604 | 1.900 | 1.900 | |
| 02/22/2020 | 06:25 | 13.70 | 12:30 | 21.74 | 18.19 | 05:35 | 0.46 | 12:10 | 1.00 | 0.75 | 05:35 | 0.807 | 12:10 | 3.175 | 1.960 | 1.960 | |
| 02/23/2020 | 06:45 | 13.60 | 12:35 | 21.39 | 18.40 | 07:10 | 0.44 | 22:35 | 0.97 | 0.77 | 07:10 | 0.761 | 22:35 | 2.966 | 2.056 | 2.056 | |
| 02/24/2020 | 05:40 | 13.65 | 22:10 | 20.68 | 18.25 | 05:15 | 0.45 | 22:20 | 0.97 | 0.77 | 05:15 | 0.772 | 22:20 | 2.887 | 2.006 | 2.006 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-------|-------|-------|-------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | |
| 02/25/2020 | 05:25 | 13.72 | 22:30 | 20.76 | 18.16 | 06:10 | 0.53 | 22:20 | 0.98 | 0.78 | 06:10 | 0.935 | 22:20 | 2.919 | 2.022 | 2.022 | 0.01 |
| 02/26/2020 | 05:45 | 13.85 | 09:50 | 20.90 | 18.24 | 05:55 | 0.54 | 23:15 | 0.97 | 0.79 | 05:55 | 0.944 | 23:15 | 2.918 | 2.059 | 2.059 | |
| 02/27/2020 | 06:05 | 13.77 | 09:45 | 20.68 | 18.24 | 06:35 | 0.55 | 09:50 | 0.97 | 0.80 | 06:35 | 0.986 | 09:50 | 2.898 | 2.065 | 2.065 | |
| 02/28/2020 | 05:25 | 13.79 | 10:05 | 20.86 | 18.29 | 04:10 | 0.48 | 20:20 | 0.93 | 0.76 | 04:10 | 0.857 | 09:25 | 2.706 | 1.985 | 1.985 | |
| 02/29/2020 | 06:40 | 13.81 | 12:30 | 21.47 | 18.32 | 06:45 | 0.45 | 11:55 | 0.99 | 0.76 | 06:45 | 0.781 | 11:55 | 3.083 | 2.008 | 2.008 | |
| 03/01/2020 | 06:35 | 13.50 | 13:05 | 21.27 | 18.34 | 05:40 | 0.46 | 13:05 | 0.99 | 0.78 | 05:40 | 0.787 | 13:05 | 3.052 | 2.064 | 2.064 | |
| 03/02/2020 | 05:35 | 13.63 | 11:30 | 21.72 | 18.55 | 05:05 | 0.45 | 23:10 | 0.98 | 0.78 | 05:05 | 0.772 | 11:05 | 3.028 | 2.081 | 2.081 | |
| 03/03/2020 | 05:40 | 13.94 | 10:10 | 21.48 | 18.22 | 05:05 | 0.51 | 09:45 | 1.00 | 0.78 | 05:05 | 0.906 | 10:05 | 3.126 | 2.016 | 2.016 | |
| 03/04/2020 | 05:30 | 13.49 | 22:20 | 20.92 | 18.10 | 04:40 | 0.43 | 10:05 | 0.97 | 0.77 | 04:40 | 0.744 | 10:05 | 2.906 | 1.981 | 1.981 | |
| 03/05/2020 | 05:50 | 13.72 | 09:45 | 20.67 | 18.04 | 06:10 | 0.46 | 09:50 | 0.97 | 0.78 | 06:10 | 0.799 | 09:50 | 2.897 | 2.003 | 2.003 | |
| 03/06/2020 | 05:40 | 13.56 | 14:05 | 20.51 | 18.19 | 06:30 | 0.53 | 14:15 | 0.96 | 0.78 | 06:30 | 0.939 | 14:15 | 2.840 | 2.017 | 2.017 | 0.58 |
| 03/07/2020 | 05:45 | 13.50 | 13:10 | 21.42 | 18.27 | 03:50 | 0.48 | 13:20 | 1.00 | 0.77 | 05:45 | 0.868 | 13:20 | 3.120 | 2.037 | 2.037 | |
| 03/08/2020 | 06:05 | 13.77 | 13:20 | 21.37 | 18.58 | 07:00 | 0.51 | 14:45 | 0.98 | 0.79 | 07:00 | 0.913 | 13:40 | 3.000 | 2.113 | 2.113 | 0.02 |
| 03/09/2020 | 04:10 | 13.82 | 10:55 | 21.69 | 18.65 | 04:10 | 0.53 | 20:45 | 0.98 | 0.78 | 04:10 | 0.934 | 20:45 | 2.985 | 2.091 | 2.090 | 0.11 |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 234.802 | 5.26 |
| Avg | 18.34 | 0.78 | 2.042 | |

Site Commentary

Site Information

| MIL_2808 | |
|-----------------|-------|
| Pipe Dimensions | 36 |
| Silt Level | 0.00" |

Overview

Site MIL_2808 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that free flow conditions were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed downstream of sites MIL_0229 and MIL_0715. A review of balancing shows a net flow of 0.938 MGD between the sites.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|-------------------|------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 8.74 | 2.26 | 2.009 |
| Minimum | 5.84 | 1.16 | 0.567 |
| Maximum | 11.20 | 3.09 | 3.591 |
| Time of Minimum | 1/5/2020 6:30 AM | 1/4/2020 6:30 AM | 1/4/2020 6:30 AM |
| Time of Maximum | 12/23/2019 2:10 PM | 1/23/2020 9:45 AM | 3/4/2020 9:55 AM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2808

Site Address /Location: N McCarthy Blvd and Ranch Dr, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.433534°

Longitude:

-121.922138°

Pipe Size (H x W)

36.00"x36.00"

Pipe Shape

Circular

Manhole #

2808

System Characteristics

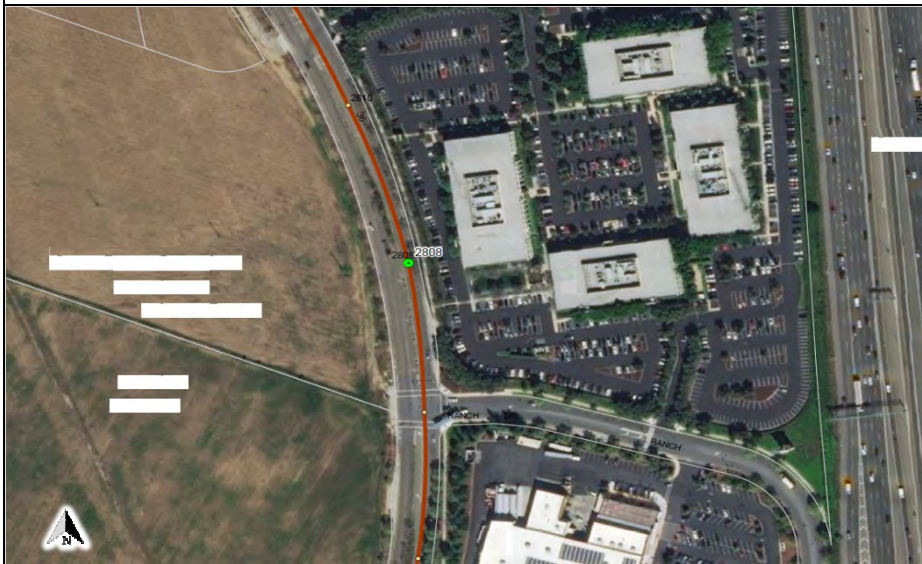
Residential/Commercial

Access

Traffic

Drive

Heavy



Installation Information

Installation Date:

Wednesday, November 13, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

12:08:00 AM

Pipe Size (HxW)

36.00"x36.00"

Depth of Flow (Wet DOF) (in)

11.25"

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

2.45'

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Smooth flow with deep depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

12'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_2808

Flow Monitor

MIL_2808

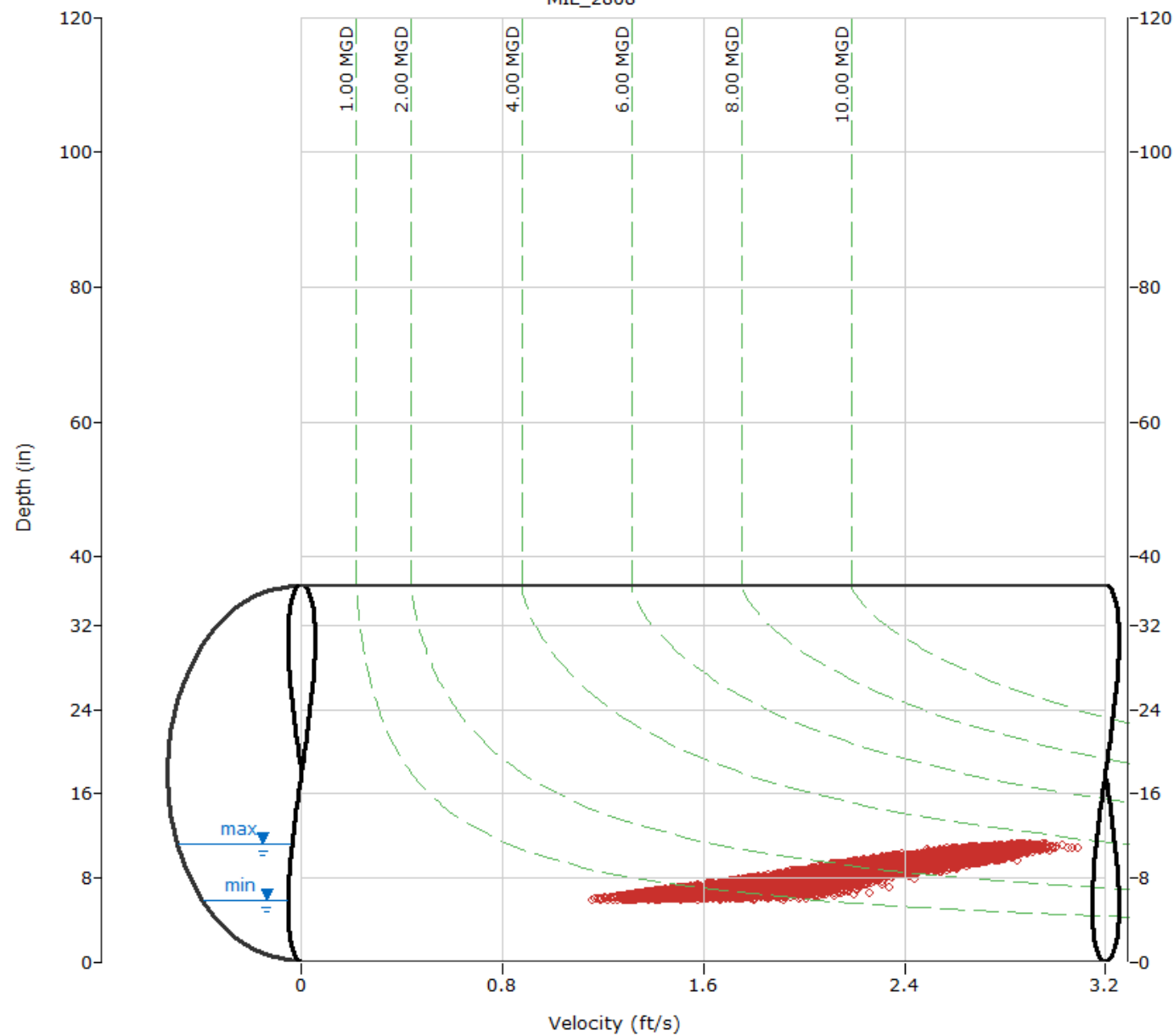
Pipe Height
36.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth

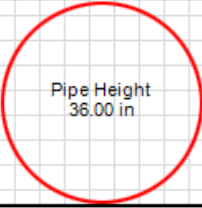


HYDROGRAPH REPORT

MIL_2808

Flow Monitor

MIL_2808



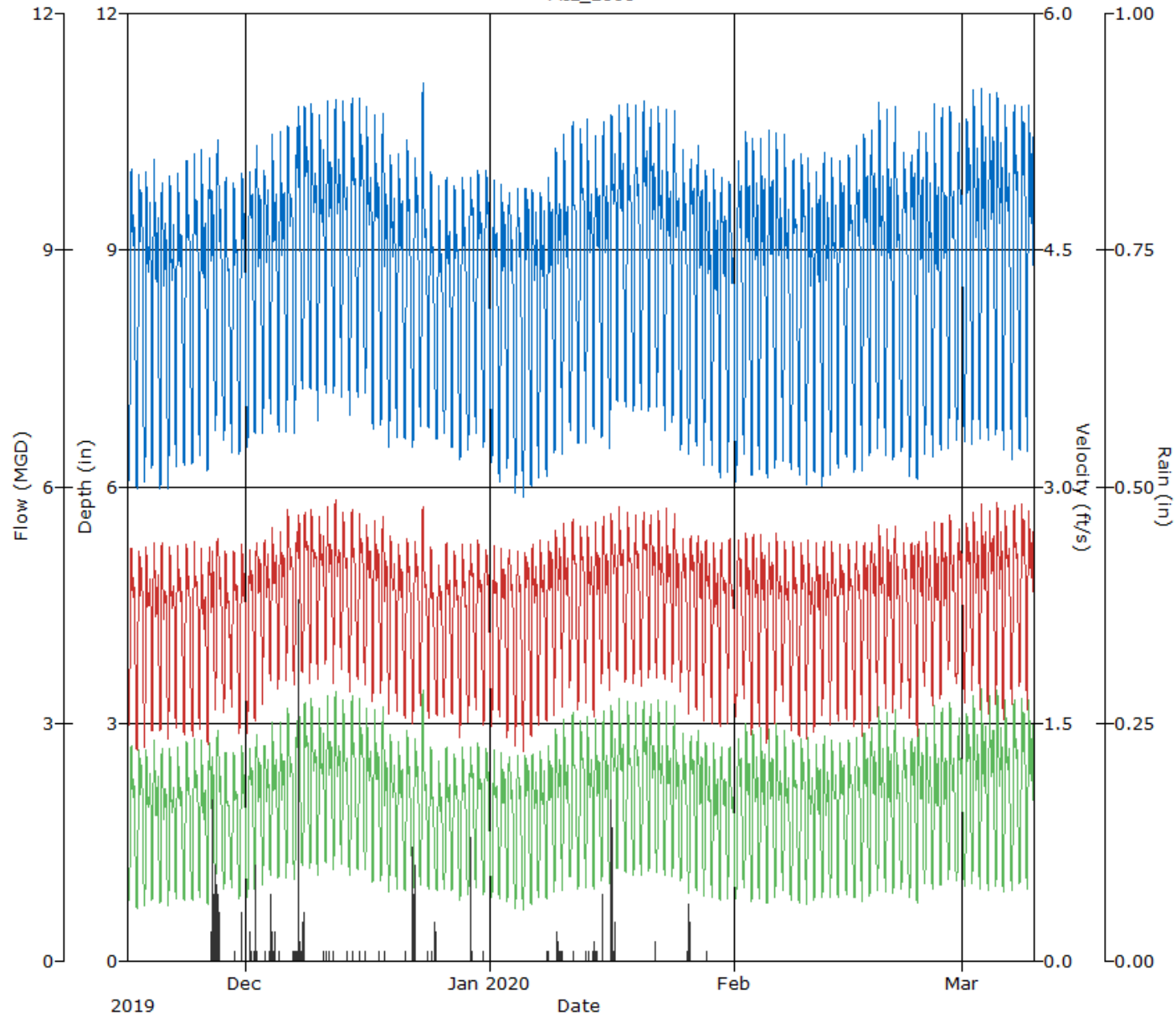
Pipe Height
36.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2808, Pipe Height: 36.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 06:00 | 6.05 | 13:00 | 10.14 | 8.37 | 05:20 | 1.25 | 13:30 | 2.73 | 2.15 | 06:00 | 0.638 | 13:30 | 2.852 | 1.816 | 1.816 | |
| 11/17/2019 | 06:25 | 5.94 | 12:50 | 10.15 | 8.39 | 06:10 | 1.19 | 20:00 | 2.70 | 2.12 | 06:10 | 0.593 | 12:55 | 2.766 | 1.812 | 1.812 | |
| 11/18/2019 | 05:25 | 6.04 | 10:05 | 10.08 | 8.43 | 04:45 | 1.23 | 09:20 | 2.74 | 2.14 | 04:45 | 0.632 | 09:55 | 2.810 | 1.819 | 1.819 | |
| 11/19/2019 | 04:40 | 6.18 | 09:55 | 10.21 | 8.48 | 04:35 | 1.31 | 10:55 | 2.84 | 2.17 | 04:35 | 0.686 | 10:55 | 2.954 | 1.848 | 1.848 | |
| 11/20/2019 | 06:00 | 5.93 | 10:10 | 9.95 | 8.35 | 06:10 | 1.27 | 11:00 | 2.75 | 2.15 | 06:10 | 0.625 | 11:00 | 2.777 | 1.794 | 1.794 | |
| 11/21/2019 | 06:05 | 5.93 | 10:25 | 10.00 | 8.40 | 05:50 | 1.17 | 09:25 | 2.67 | 2.15 | 05:55 | 0.580 | 10:25 | 2.715 | 1.814 | 1.814 | |
| 11/22/2019 | 05:35 | 6.19 | 12:05 | 10.05 | 8.47 | 05:30 | 1.26 | 10:10 | 2.76 | 2.17 | 05:30 | 0.660 | 10:10 | 2.863 | 1.845 | 1.845 | |
| 11/23/2019 | 06:05 | 6.26 | 13:10 | 10.24 | 8.52 | 07:20 | 1.31 | 12:35 | 2.75 | 2.14 | 07:20 | 0.705 | 12:35 | 2.910 | 1.846 | 1.846 | |
| 11/24/2019 | 07:00 | 6.23 | 13:10 | 10.38 | 8.54 | 07:05 | 1.31 | 11:45 | 2.78 | 2.12 | 07:05 | 0.694 | 13:00 | 2.939 | 1.843 | 1.843 | |
| 11/25/2019 | 06:40 | 6.37 | 10:45 | 10.35 | 8.57 | 05:35 | 1.33 | 10:45 | 2.69 | 2.10 | 05:35 | 0.738 | 10:45 | 2.921 | 1.818 | 1.818 | |
| 11/26/2019 | 05:50 | 6.17 | 11:05 | 10.22 | 8.58 | 06:25 | 1.26 | 21:50 | 2.71 | 2.14 | 06:25 | 0.664 | 10:55 | 2.869 | 1.870 | 1.870 | 0.36 |
| 11/27/2019 | 05:40 | 6.69 | 11:15 | 10.47 | 8.78 | 05:00 | 1.45 | 12:10 | 2.76 | 2.25 | 05:10 | 0.855 | 11:15 | 2.981 | 2.001 | 2.001 | 0.63 |
| 11/28/2019 | 07:25 | 6.55 | 13:50 | 9.99 | 8.33 | 07:00 | 1.43 | 12:55 | 2.66 | 2.12 | 07:00 | 0.818 | 13:00 | 2.723 | 1.745 | 1.745 | |
| 11/29/2019 | 07:00 | 6.39 | 12:30 | 9.90 | 8.35 | 05:45 | 1.35 | 12:35 | 2.72 | 2.17 | 05:45 | 0.763 | 12:35 | 2.746 | 1.795 | 1.795 | 0.02 |
| 11/30/2019 | 06:35 | 6.39 | 13:55 | 10.16 | 8.43 | 07:30 | 1.34 | 14:30 | 2.74 | 2.14 | 07:30 | 0.747 | 13:50 | 2.859 | 1.811 | 1.811 | 0.10 |
| 12/01/2019 | 07:50 | 6.47 | 13:55 | 10.08 | 8.53 | 07:25 | 1.34 | 15:25 | 2.75 | 2.14 | 07:25 | 0.754 | 15:25 | 2.854 | 1.843 | 1.843 | 0.06 |
| 12/02/2019 | 06:25 | 6.62 | 10:35 | 10.40 | 8.73 | 06:10 | 1.40 | 11:25 | 2.72 | 2.23 | 06:10 | 0.814 | 10:35 | 2.955 | 1.973 | 1.973 | 0.30 |
| 12/03/2019 | 05:30 | 6.66 | 10:50 | 10.05 | 8.77 | 05:15 | 1.42 | 22:20 | 2.80 | 2.29 | 05:15 | 0.827 | 11:55 | 2.782 | 2.031 | 2.031 | 0.01 |
| 12/04/2019 | 05:00 | 6.81 | 10:25 | 10.54 | 8.95 | 05:00 | 1.54 | 09:55 | 2.83 | 2.35 | 05:00 | 0.926 | 10:25 | 3.108 | 2.137 | 2.137 | 0.39 |
| 12/05/2019 | 05:20 | 6.68 | 10:35 | 10.54 | 8.92 | 04:45 | 1.53 | 09:40 | 2.89 | 2.35 | 04:45 | 0.901 | 09:40 | 3.117 | 2.130 | 2.130 | 0.01 |
| 12/06/2019 | 05:30 | 6.65 | 10:40 | 10.64 | 8.98 | 05:25 | 1.45 | 10:20 | 2.98 | 2.39 | 05:25 | 0.844 | 10:20 | 3.330 | 2.188 | 2.188 | 0.01 |
| 12/07/2019 | 05:55 | 6.66 | 20:00 | 10.89 | 9.09 | 06:10 | 1.48 | 19:15 | 2.94 | 2.38 | 06:10 | 0.863 | 20:10 | 3.399 | 2.241 | 2.241 | 0.67 |
| 12/08/2019 | 06:45 | 7.19 | 12:10 | 10.89 | 9.28 | 06:55 | 1.61 | 14:25 | 3.00 | 2.39 | 06:55 | 1.049 | 14:25 | 3.449 | 2.299 | 2.299 | 0.20 |
| 12/09/2019 | 06:20 | 7.20 | 10:20 | 10.91 | 9.23 | 04:40 | 1.58 | 10:15 | 2.95 | 2.40 | 04:50 | 1.040 | 10:15 | 3.444 | 2.274 | 2.274 | |
| 12/10/2019 | 05:25 | 6.83 | 11:00 | 10.76 | 9.18 | 04:35 | 1.47 | 10:40 | 2.92 | 2.43 | 04:35 | 0.907 | 10:40 | 3.336 | 2.287 | 2.287 | |
| 12/11/2019 | 06:10 | 7.14 | 09:55 | 10.95 | 9.28 | 04:35 | 1.68 | 10:30 | 2.99 | 2.44 | 05:10 | 1.106 | 10:30 | 3.491 | 2.323 | 2.323 | 0.03 |
| 12/12/2019 | 04:55 | 7.14 | 09:50 | 10.96 | 9.32 | 04:00 | 1.63 | 09:25 | 3.07 | 2.44 | 04:55 | 1.093 | 09:25 | 3.534 | 2.341 | 2.341 | 0.01 |
| 12/13/2019 | 05:50 | 7.09 | 10:20 | 10.97 | 9.25 | 05:05 | 1.65 | 10:10 | 2.93 | 2.42 | 05:05 | 1.073 | 10:10 | 3.421 | 2.297 | 2.297 | 0.01 |
| 12/14/2019 | 06:40 | 6.86 | 13:35 | 10.99 | 9.18 | 05:55 | 1.49 | 13:20 | 2.98 | 2.36 | 05:55 | 0.923 | 13:20 | 3.493 | 2.240 | 2.240 | 0.01 |
| 12/15/2019 | 07:05 | 7.08 | 13:05 | 11.02 | 9.25 | 07:20 | 1.55 | 13:25 | 2.96 | 2.37 | 07:20 | 0.990 | 13:25 | 3.491 | 2.269 | 2.269 | 0.01 |
| 12/16/2019 | 06:00 | 7.11 | 10:50 | 10.97 | 9.20 | 05:55 | 1.57 | 10:10 | 2.90 | 2.36 | 05:55 | 1.005 | 10:10 | 3.321 | 2.228 | 2.228 | 0.01 |
| 12/17/2019 | 04:55 | 6.71 | 10:45 | 10.78 | 9.08 | 04:50 | 1.49 | 10:15 | 2.93 | 2.35 | 04:50 | 0.880 | 10:15 | 3.330 | 2.192 | 2.192 | 0.01 |
| 12/18/2019 | 05:30 | 6.76 | 10:30 | 10.78 | 9.00 | 04:50 | 1.44 | 10:45 | 2.91 | 2.33 | 04:50 | 0.870 | 09:55 | 3.303 | 2.141 | 2.141 | 0.01 |
| 12/19/2019 | 05:00 | 6.48 | 10:20 | 10.41 | 8.76 | 05:45 | 1.35 | 10:10 | 2.80 | 2.27 | 05:45 | 0.762 | 10:25 | 3.041 | 2.015 | 2.015 | |
| 12/20/2019 | 06:25 | 6.60 | 11:00 | 10.32 | 8.75 | 06:50 | 1.39 | 10:05 | 2.79 | 2.23 | 06:50 | 0.802 | 10:05 | 2.873 | 1.980 | 1.980 | |
| 12/21/2019 | 07:05 | 6.57 | 13:30 | 10.48 | 8.66 | 05:30 | 1.42 | 13:25 | 2.72 | 2.23 | 05:30 | 0.815 | 13:30 | 3.007 | 1.954 | 1.954 | 0.01 |
| 12/22/2019 | 06:30 | 6.47 | 14:50 | 10.27 | 8.67 | 07:15 | 1.39 | 14:45 | 2.78 | 2.22 | 07:15 | 0.803 | 14:45 | 2.968 | 1.955 | 1.955 | 0.41 |
| 12/23/2019 | 06:25 | 6.74 | 14:10 | 11.20 | 8.83 | 06:00 | 1.43 | 12:55 | 2.97 | 2.25 | 06:15 | 0.850 | 14:15 | 3.580 | 2.042 | 2.042 | |
| 12/24/2019 | 06:45 | 6.73 | 12:50 | 10.04 | 8.48 | 06:00 | 1.45 | 13:40 | 2.70 | 2.16 | 06:00 | 0.858 | 14:00 | 2.787 | 1.825 | 1.825 | 0.02 |
| 12/25/2019 | 06:35 | 6.58 | 13:35 | 9.84 | 8.22 | 05:25 | 1.39 | 13:15 | 2.65 | 2.07 | 06:25 | 0.798 | 13:20 | 2.665 | 1.674 | 1.674 | 0.08 |
| 12/26/2019 | 06:10 | 6.67 | 13:40 | 9.99 | 8.46 | 05:50 | 1.47 | 13:00 | 2.71 | 2.17 | 05:50 | 0.866 | 13:50 | 2.773 | 1.834 | 1.834 | |
| 12/27/2019 | 05:40 | 6.46 | 13:30 | 9.86 | 8.40 | 04:50 | 1.38 | 12:45 | 2.79 | 2.16 | 06:20 | 0.772 | 12:45 | 2.809 | 1.814 | 1.814 | |
| 12/28/2019 | 06:45 | 6.31 | 13:00 | 9.98 | 8.35 | 06:20 | 1.30 | 14:10 | 2.73 | 2.13 | 06:20 | 0.706 | 14:10 | 2.800 | 1.786 | 1.786 | |
| 12/29/2019 | 06:15 | 6.44 | 13:55 | 10.02 | 8.48 | 06:05 | 1.33 | 13:05 | 2.72 | 2.16 | 06:05 | 0.744 | 12:50 | 2.775 | 1.849 | 1.849 | 0.22 |
| 12/30/2019 | 06:20 | 6.66 | 12:55 | 10.11 | 8.63 | 06:20 | 1.41 | 13:15 | 2.77 | 2.21 | 06:20 | 0.820 | 13:15 | 2.897 | 1.916 | 1.916 | |
| 12/31/2019 | 06:25 | 6.46 | 13:30 | 10.04 | 8.59 | 06:35 | 1.35 | 14:20 | 2.76 | 2.18 | 06:35 | 0.753 | 14:20 | 2.838 | 1.892 | 1.892 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | 07:55 | 6.27 | 14:00 | 9.92 | 8.26 | 07:10 | 1.33 | 14:50 | 2.71 | 2.12 | 07:10 | 0.722 | 14:50 | 2.744 | 1.741 | 1.741 | |
| 01/02/2020 | 05:30 | 6.04 | 11:50 | 9.90 | 8.35 | 05:35 | 1.35 | 11:55 | 2.77 | 2.17 | 05:35 | 0.686 | 11:55 | 2.825 | 1.812 | 1.812 | |
| 01/03/2020 | 06:20 | 6.20 | 11:50 | 9.83 | 8.36 | 07:10 | 1.31 | 11:10 | 2.69 | 2.16 | 06:25 | 0.700 | 13:20 | 2.681 | 1.806 | 1.806 | |
| 01/04/2020 | 06:30 | 5.90 | 13:35 | 9.84 | 8.18 | 06:30 | 1.16 | 13:50 | 2.71 | 2.10 | 06:30 | 0.567 | 13:50 | 2.720 | 1.722 | 1.722 | |
| 01/05/2020 | 06:30 | 5.84 | 14:30 | 9.84 | 8.22 | 07:30 | 1.19 | 13:30 | 2.70 | 2.12 | 07:30 | 0.578 | 13:30 | 2.699 | 1.753 | 1.753 | |
| 01/06/2020 | 06:05 | 5.92 | 11:00 | 9.83 | 8.32 | 06:05 | 1.18 | 11:00 | 2.73 | 2.17 | 06:05 | 0.579 | 11:00 | 2.760 | 1.810 | 1.810 | |
| 01/07/2020 | 06:05 | 6.01 | 09:45 | 9.79 | 8.40 | 05:15 | 1.29 | 10:25 | 2.73 | 2.22 | 06:20 | 0.673 | 10:25 | 2.713 | 1.863 | 1.863 | |
| 01/08/2020 | 06:00 | 6.04 | 10:20 | 9.98 | 8.48 | 06:05 | 1.24 | 10:20 | 2.78 | 2.25 | 06:05 | 0.628 | 10:20 | 2.871 | 1.923 | 1.923 | 0.02 |
| 01/09/2020 | 06:10 | 6.39 | 09:50 | 10.41 | 8.71 | 04:10 | 1.40 | 09:50 | 2.87 | 2.30 | 04:10 | 0.795 | 09:50 | 3.143 | 2.028 | 2.028 | 0.18 |
| 01/10/2020 | 05:25 | 6.39 | 10:45 | 10.55 | 8.74 | 04:25 | 1.37 | 10:20 | 2.84 | 2.32 | 04:25 | 0.785 | 11:15 | 3.111 | 2.049 | 2.049 | 0.02 |
| 01/11/2020 | 05:55 | 6.70 | 13:45 | 10.74 | 8.83 | 04:35 | 1.55 | 13:05 | 2.86 | 2.34 | 05:05 | 0.911 | 13:25 | 3.222 | 2.096 | 2.096 | 0.01 |
| 01/12/2020 | 06:05 | 6.47 | 14:15 | 10.64 | 8.83 | 05:05 | 1.38 | 12:10 | 2.86 | 2.29 | 05:05 | 0.794 | 12:10 | 3.162 | 2.077 | 2.077 | |
| 01/13/2020 | 06:00 | 6.48 | 10:25 | 10.69 | 8.85 | 05:00 | 1.46 | 14:25 | 2.85 | 2.29 | 06:00 | 0.820 | 10:35 | 3.182 | 2.065 | 2.065 | 0.02 |
| 01/14/2020 | 04:55 | 6.71 | 10:45 | 10.56 | 8.87 | 05:05 | 1.41 | 10:30 | 2.87 | 2.31 | 05:05 | 0.831 | 10:45 | 3.173 | 2.086 | 2.086 | 0.11 |
| 01/15/2020 | 06:00 | 6.55 | 10:05 | 10.68 | 8.91 | 03:20 | 1.57 | 10:20 | 2.85 | 2.35 | 06:25 | 0.919 | 10:20 | 3.222 | 2.129 | 2.129 | 0.07 |
| 01/16/2020 | 05:25 | 6.46 | 13:55 | 10.84 | 9.17 | 05:00 | 1.47 | 10:15 | 2.94 | 2.40 | 05:00 | 0.823 | 10:15 | 3.346 | 2.279 | 2.279 | 0.66 |
| 01/17/2020 | 04:50 | 7.02 | 10:50 | 10.91 | 9.27 | 04:00 | 1.55 | 10:15 | 2.93 | 2.42 | 04:00 | 1.004 | 10:15 | 3.391 | 2.314 | 2.314 | |
| 01/18/2020 | 07:10 | 6.95 | 12:55 | 10.94 | 9.08 | 07:15 | 1.62 | 12:30 | 2.95 | 2.35 | 07:15 | 1.002 | 12:30 | 3.418 | 2.189 | 2.189 | |
| 01/19/2020 | 06:00 | 6.94 | 12:55 | 10.92 | 9.09 | 06:30 | 1.48 | 12:05 | 2.91 | 2.35 | 06:30 | 0.913 | 12:05 | 3.380 | 2.194 | 2.194 | |
| 01/20/2020 | 05:55 | 6.97 | 14:25 | 10.97 | 9.18 | 05:30 | 1.55 | 13:45 | 2.94 | 2.37 | 05:30 | 0.972 | 14:30 | 3.450 | 2.254 | 2.254 | |
| 01/21/2020 | 05:55 | 6.94 | 10:30 | 10.83 | 9.19 | 04:30 | 1.61 | 10:55 | 2.90 | 2.39 | 04:30 | 1.008 | 10:55 | 3.309 | 2.261 | 2.261 | |
| 01/22/2020 | 05:20 | 6.98 | 10:20 | 10.89 | 9.16 | 04:45 | 1.58 | 10:35 | 2.92 | 2.38 | 04:45 | 1.012 | 10:30 | 3.389 | 2.236 | 2.236 | 0.03 |
| 01/23/2020 | 05:15 | 6.70 | 09:55 | 10.95 | 9.03 | 04:45 | 1.58 | 09:45 | 3.09 | 2.38 | 05:00 | 0.931 | 09:45 | 3.580 | 2.200 | 2.200 | |
| 01/24/2020 | 05:30 | 6.80 | 10:15 | 10.80 | 9.00 | 05:35 | 1.62 | 10:35 | 2.90 | 2.36 | 05:35 | 0.971 | 11:10 | 3.323 | 2.161 | 2.161 | |
| 01/25/2020 | 06:15 | 6.45 | 13:15 | 10.43 | 8.62 | 08:20 | 1.39 | 13:05 | 2.74 | 2.26 | 08:20 | 0.810 | 13:05 | 2.977 | 1.964 | 1.964 | |
| 01/26/2020 | 06:25 | 6.39 | 13:50 | 10.24 | 8.66 | 05:30 | 1.34 | 13:10 | 2.77 | 2.27 | 05:30 | 0.751 | 13:40 | 2.918 | 1.994 | 1.994 | 0.16 |
| 01/27/2020 | 05:55 | 6.44 | 10:25 | 10.42 | 8.69 | 04:20 | 1.39 | 10:10 | 2.80 | 2.25 | 04:20 | 0.796 | 10:10 | 3.026 | 1.982 | 1.982 | |
| 01/28/2020 | 05:35 | 6.24 | 10:15 | 10.11 | 8.57 | 05:45 | 1.27 | 09:45 | 2.80 | 2.25 | 05:45 | 0.676 | 09:45 | 2.847 | 1.934 | 1.934 | 0.01 |
| 01/29/2020 | 05:45 | 6.22 | 10:35 | 10.17 | 8.44 | 05:10 | 1.39 | 09:30 | 2.70 | 2.21 | 05:50 | 0.737 | 10:35 | 2.863 | 1.864 | 1.864 | |
| 01/30/2020 | 05:25 | 6.09 | 10:20 | 9.98 | 8.41 | 05:50 | 1.28 | 10:35 | 2.79 | 2.22 | 05:50 | 0.662 | 10:35 | 2.861 | 1.861 | 1.861 | |
| 01/31/2020 | 05:00 | 6.13 | 10:55 | 9.91 | 8.35 | 05:25 | 1.31 | 11:15 | 2.77 | 2.20 | 05:25 | 0.684 | 11:15 | 2.810 | 1.826 | 1.826 | |
| 02/01/2020 | 06:55 | 6.04 | 14:10 | 10.26 | 8.43 | 04:35 | 1.31 | 15:15 | 2.74 | 2.20 | 07:20 | 0.673 | 14:20 | 2.869 | 1.875 | 1.875 | |
| 02/02/2020 | 06:30 | 6.39 | 13:20 | 10.57 | 8.62 | 06:00 | 1.36 | 13:15 | 2.80 | 2.23 | 06:00 | 0.756 | 13:15 | 3.126 | 1.946 | 1.946 | |
| 02/03/2020 | 06:20 | 6.09 | 10:25 | 10.47 | 8.62 | 05:35 | 1.25 | 11:30 | 2.85 | 2.21 | 05:35 | 0.645 | 10:35 | 3.072 | 1.938 | 1.938 | |
| 02/04/2020 | 05:55 | 6.19 | 10:10 | 10.51 | 8.66 | 05:05 | 1.28 | 10:05 | 2.81 | 2.24 | 05:05 | 0.678 | 10:05 | 3.114 | 1.967 | 1.967 | |
| 02/05/2020 | 05:30 | 6.09 | 10:00 | 10.69 | 8.67 | 05:50 | 1.23 | 09:45 | 2.80 | 2.22 | 05:50 | 0.632 | 09:45 | 3.131 | 1.961 | 1.961 | |
| 02/06/2020 | 05:20 | 6.20 | 09:55 | 10.69 | 8.68 | 05:20 | 1.29 | 10:00 | 2.75 | 2.23 | 05:20 | 0.677 | 10:00 | 3.113 | 1.958 | 1.958 | |
| 02/07/2020 | 06:00 | 6.30 | 10:05 | 10.53 | 8.65 | 04:10 | 1.42 | 09:45 | 2.81 | 2.22 | 05:50 | 0.769 | 09:45 | 3.103 | 1.941 | 1.941 | |
| 02/08/2020 | 06:10 | 6.18 | 12:55 | 10.32 | 8.48 | 06:05 | 1.26 | 12:00 | 2.72 | 2.17 | 06:05 | 0.659 | 13:30 | 2.864 | 1.862 | 1.862 | |
| 02/09/2020 | 06:40 | 6.11 | 13:45 | 10.28 | 8.56 | 06:15 | 1.26 | 13:00 | 2.85 | 2.17 | 06:15 | 0.656 | 13:00 | 3.012 | 1.893 | 1.893 | |
| 02/10/2020 | 05:40 | 5.97 | 10:35 | 10.20 | 8.44 | 05:40 | 1.17 | 10:30 | 2.76 | 2.15 | 05:40 | 0.582 | 10:30 | 2.935 | 1.828 | 1.828 | |
| 02/11/2020 | 06:30 | 6.14 | 11:50 | 10.05 | 8.50 | 04:05 | 1.23 | 12:15 | 2.80 | 2.19 | 04:05 | 0.639 | 12:15 | 2.900 | 1.872 | 1.872 | |
| 02/12/2020 | 05:40 | 5.97 | 10:00 | 10.47 | 8.49 | 04:15 | 1.34 | 10:10 | 2.71 | 2.21 | 06:05 | 0.682 | 10:05 | 2.943 | 1.882 | 1.882 | |
| 02/13/2020 | 05:40 | 6.13 | 10:00 | 10.25 | 8.61 | 04:10 | 1.30 | 11:25 | 2.74 | 2.22 | 04:55 | 0.707 | 11:25 | 2.852 | 1.931 | 1.931 | |
| 02/14/2020 | 05:05 | 6.21 | 11:15 | 10.22 | 8.66 | 06:10 | 1.33 | 09:45 | 2.73 | 2.22 | 06:10 | 0.704 | 09:45 | 2.844 | 1.946 | 1.946 | |
| 02/15/2020 | 06:50 | 6.32 | 13:30 | 10.28 | 8.63 | 07:35 | 1.36 | 12:10 | 2.72 | 2.20 | 07:35 | 0.740 | 13:30 | 2.897 | 1.924 | 1.924 | |
| 02/16/2020 | 06:50 | 6.15 | 13:25 | 10.36 | 8.63 | 06:25 | 1.26 | 11:50 | 2.71 | 2.18 | 06:25 | 0.661 | 13:25 | 2.950 | 1.921 | 1.921 | |
| 02/17/2020 | 06:15 | 6.17 | 12:05 | 10.60 | 8.78 | 06:50 | 1.35 | 11:30 | 2.77 | 2.20 | 06:50 | 0.713 | 11:30 | 3.075 | 1.987 | 1.987 | |
| 02/18/2020 | 05:40 | 6.35 | 10:50 | 10.68 | 8.82 | 05:00 | 1.35 | 10:55 | 2.74 | 2.22 | 05:00 | 0.753 | 10:55 | 3.093 | 2.006 | 2.006 | |
| 02/19/2020 | 05:25 | 6.47 | 10:20 | 10.94 | 8.89 | 04:15 | 1.43 | 10:15 | 2.89 | 2.28 | 04:45 | 0.822 | 10:15 | 3.388 | 2.074 | 2.074 | |
| 02/20/2020 | 05:20 | 6.33 | 10:25 | 10.89 | 8.88 | 06:20 | 1.36 | 10:15 | 2.85 | 2.28 | 06:20 | 0.760 | 10:15 | 3.269 | 2.072 | 2.072 | |
| 02/21/2020 | 05:45 | 6.30 | 11:00 | 10.91 | 8.81 | 05:45 | 1.41 | 10:30 | 2.85 | 2.26 | 05:45 | 0.759 | 10:30 | 3.320 | 2.031 | 2.031 | |
| 02/22/2020 | 06:15 | 6.39 | 13:00 | 10.32 | 8.68 | 04:55 | 1.38 | 12:15 | 2.73 | 2.23 | 04:55 | 0.800 | 12:55 | 2.945 | 1.966 | 1.966 | |
| 02/23/2020 | 06:20 | 6.10 | 12:55 | 10.29 | 8.63 | 06:20 | 1.36 | 22:00 | 2.75 | 2.21 | 06:20 | 0.695 | 13:00 | 2.876 | 1.949 | 1.949 | |
| 02/24/2020 | 04:40 | 6.06 | 10:45 | 10.59 | 8.66 | 04:40 | 1.23 | 10:10 | 2.73 | 2.23 | 04:40 | 0.624 | 10:45 | 3.004 | 1.972 | 1.972 | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|-------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 02/25/2020 | 06:10 | 6.34 | 10:05 | 10.55 | 8.70 | 04:35 | 1.36 | 10:05 | 2.84 | 2.29 | 04:35 | 0.772 | 10:05 | 3.169 | 2.015 | 2.015 | | |
| 02/26/2020 | 05:45 | 6.34 | 10:15 | 10.98 | 8.81 | 04:30 | 1.44 | 10:05 | 2.89 | 2.28 | 06:05 | 0.800 | 10:05 | 3.371 | 2.048 | 2.048 | | |
| 02/27/2020 | 05:30 | 6.44 | 09:55 | 10.95 | 8.88 | 03:45 | 1.43 | 10:00 | 2.88 | 2.31 | 04:50 | 0.818 | 10:00 | 3.378 | 2.096 | 2.096 | | |
| 02/28/2020 | 05:45 | 6.42 | 10:50 | 10.96 | 8.90 | 06:25 | 1.34 | 10:30 | 2.91 | 2.33 | 06:25 | 0.755 | 10:50 | 3.376 | 2.111 | 2.111 | | |
| 02/29/2020 | 06:25 | 6.53 | 14:30 | 10.69 | 8.81 | 05:10 | 1.52 | 13:50 | 2.88 | 2.29 | 05:10 | 0.888 | 13:05 | 3.203 | 2.055 | 2.055 | | |
| 03/01/2020 | 05:45 | 6.54 | 14:10 | 10.78 | 8.92 | 05:25 | 1.44 | 14:25 | 2.88 | 2.30 | 06:15 | 0.837 | 14:25 | 3.261 | 2.118 | 2.118 | | |
| 03/02/2020 | 06:00 | 6.42 | 10:40 | 11.12 | 9.05 | 04:45 | 1.39 | 10:30 | 2.92 | 2.35 | 04:45 | 0.804 | 10:30 | 3.472 | 2.194 | 2.194 | | |
| 03/03/2020 | 06:05 | 6.53 | 10:35 | 11.07 | 9.14 | 06:25 | 1.45 | 10:55 | 2.97 | 2.36 | 06:05 | 0.836 | 10:55 | 3.540 | 2.240 | 2.240 | | |
| 03/04/2020 | 06:15 | 6.54 | 10:00 | 11.02 | 9.20 | 06:10 | 1.38 | 09:55 | 3.03 | 2.38 | 06:10 | 0.784 | 09:55 | 3.591 | 2.275 | 2.275 | | |
| 03/05/2020 | 06:00 | 6.61 | 10:05 | 11.06 | 9.23 | 05:00 | 1.40 | 10:45 | 3.01 | 2.38 | 05:00 | 0.823 | 10:45 | 3.549 | 2.277 | 2.277 | | |
| 03/06/2020 | 06:05 | 6.45 | 10:05 | 10.89 | 9.05 | 06:05 | 1.37 | 10:20 | 2.99 | 2.36 | 06:05 | 0.760 | 10:20 | 3.482 | 2.209 | 2.209 | | |
| 03/07/2020 | 06:55 | 6.28 | 13:30 | 10.89 | 9.02 | 06:50 | 1.41 | 12:45 | 2.98 | 2.37 | 06:50 | 0.759 | 14:45 | 3.390 | 2.223 | 2.223 | | |
| 03/08/2020 | 05:55 | 6.43 | 13:55 | 10.86 | 9.12 | 05:30 | 1.38 | 12:45 | 3.05 | 2.41 | 05:35 | 0.771 | 12:45 | 3.522 | 2.287 | 2.287 | | |
| 03/09/2020 | 05:00 | 6.42 | 10:35 | 10.91 | 9.08 | 04:45 | 1.38 | 10:30 | 2.93 | 2.38 | 04:45 | 0.766 | 10:30 | 3.412 | 2.239 | 2.238 | | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 231.008 | 4.90 |
| Avg | 8.74 | 2.26 | 2.009 | |

Site Commentary

Site Information

| MIL_2840 | |
|-----------------|-------|
| Pipe Dimensions | 15 |
| Silt Level | 0.00" |

Overview

Site MIL_2840 functioned under normal conditions during the period Saturday, November 16, 2019 to Monday, March 9, 2020. This site exhibited an observable response to the wet weather events of November 26, 2019 - November 27, 2019, December 7, 2019 - December 8, 2019, and January 16, 2020 - January 17, 2020. Review of the scattergraph shows that both free flow and backwater flows were recorded during the study period.

Flow depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

This location was installed upstream of sites MIL_0649 and MIL_2491, and downstream of MIL_1193. A review of balancing of combined flows MIL_1043 and MIL_2840 shows a net flow of 0.663 MGD.

Observations

Average flow depth, velocity, and quantity data observed during Saturday, November 16, 2019 to Monday, March 9, 2020, along with observed minimum and maximum data, are provided in the following table.

| Observed Flow Conditions | | | |
|--------------------------|--------------------|--------------------|--------------------|
| Item | Depth (in) | Velocity (ft/s) | Quantity (MGD) |
| Average | 1.99 | 1.38 | 0.087 |
| Minimum | 1.80 | 0.99 | 0.055 |
| Maximum | 2.26 | 1.82 | 0.131 |
| Time of Minimum | 11/21/2019 3:35 PM | 11/24/2019 7:15 AM | 11/24/2019 7:15 AM |
| Time of Maximum | 12/8/2019 6:00 PM | 12/10/2019 5:35 PM | 12/9/2019 5:25 PM |

Data Quality

Data uptime observed during the Saturday, November 16, 2019 to the Monday, March 9, 2020 monitoring period is provided in the table below. 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.

| Percent Uptime | |
|-----------------|-----|
| Depth (in) | 100 |
| Velocity (ft/s) | 100 |
| Quantity (MGD) | 100 |

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_2840

Site Address /Location: S Abel St and Curtis Ave, Milpitas, CA

Monitor Series

TRITON+

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.433982°

Longitude:

-121.891547°

Pipe Size (H x W)

15.00"x15.00"

Pipe Shape

Circular

Manhole #

2840

System Characteristics

Residential/Commercial

Access

Traffic

Drive

Heavy



Installation Information

Installation Date:

Wednesday, November 13, 2019

Installation Type:

Doppler Standard Ring and Crank

Monitoring Location (Sensors):

Upstream 0-5 FT

Monitor Location:

Manhole

Sensors / Devices:

Peak Combo (CS4)

Pressure Sensor Range (psi)

0 - 5 psi

Installation Confirmation:

Confirmation Time:

11:04:00 AM

Pipe Size (HxW)

15.00"x15.00"

Depth of Flow (Wet DOF) (in)

2.00"

Range (Air DOF) (in)

0.25"

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

0.25"

Peak Velocity (fps)

1.28'

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Smooth flow with shallow depth and moderate velocity

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

10'

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Unbolted

Manhole Frame

Normal

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Good

Communication Information:

Communication Type

Wireless

Antenna Location

Drilled Pavement / Concrete

Additional Site Info. / Comments:



ADS Project Name: Milpitas.WWTFM.CA2019-2020

161

ADS Project Number: 22431.11.325

SCATTERGRAPH REPORT

MIL_2840

Flow Monitor

MIL_2840

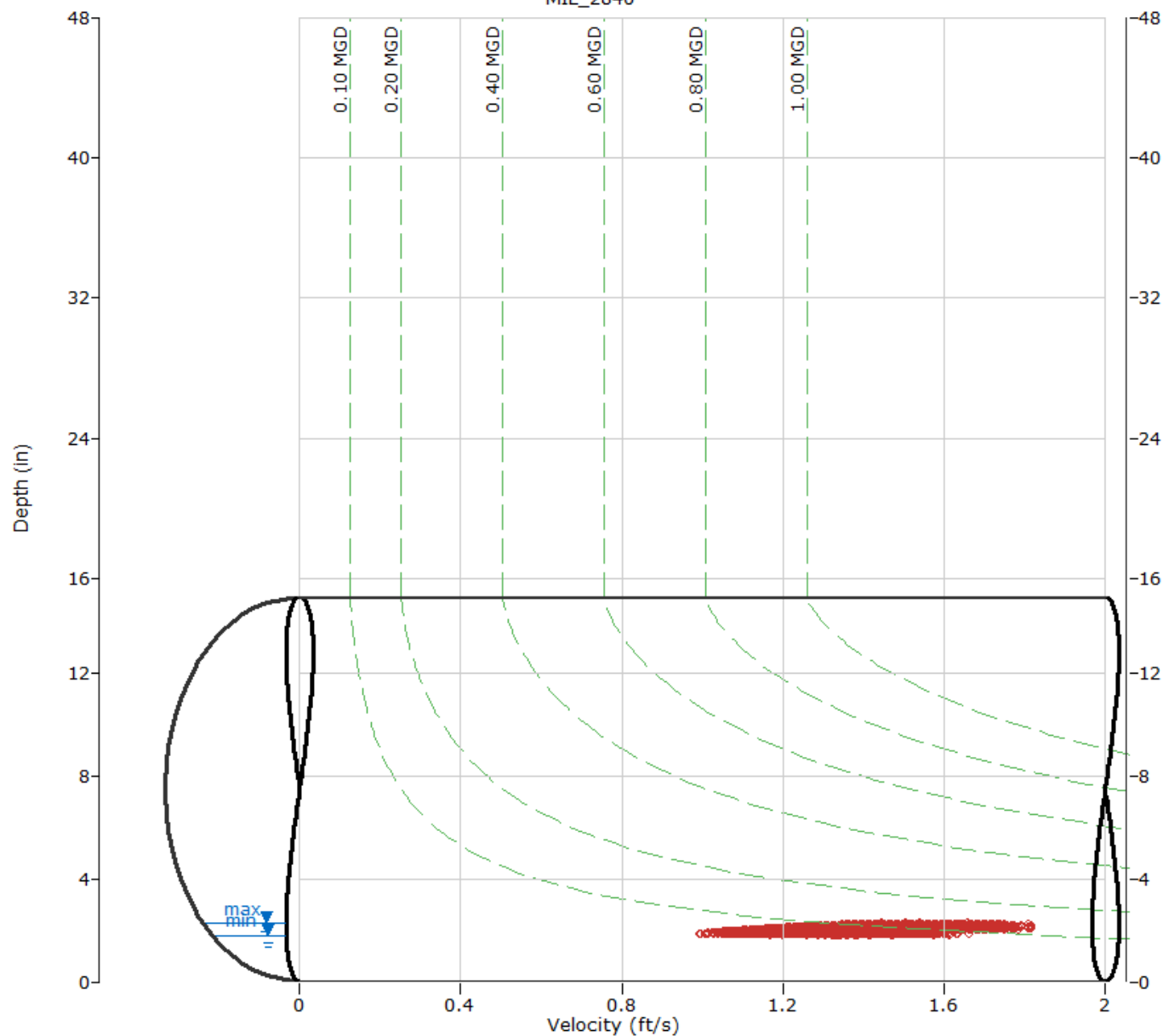
Pipe Height
15.00 in

Report Period

11/16/2019
To
3/9/2020

Legend

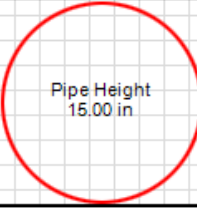
- Depth - Velocity
- Iso-Q™
- Silt
- ▼ Min-Max Depth



HYDROGRAPH REPORT

MIL_2840

Flow Monitor
MIL_2840

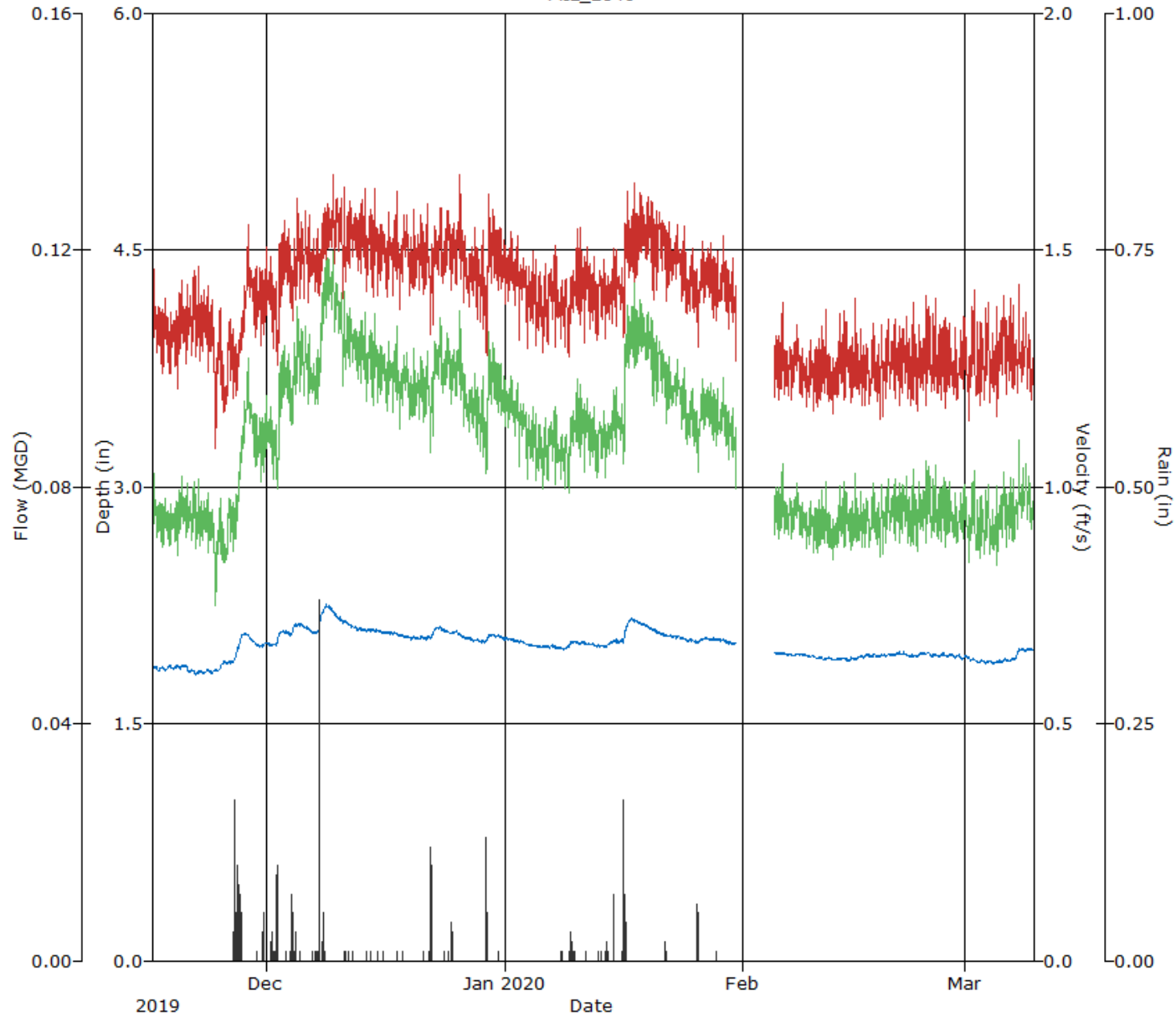


Pipe Height
15.00 in.

Report Period
11/16/2019
To
3/9/2020

Legend

- Depth
- Velocity
- Quantity
- Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_2840, Pipe Height: 15.00 in, Silt: 0.00 in

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | 21:25 | 1.83 | 13:55 | 1.86 | 1.85 | 23:15 | 1.11 | 02:50 | 1.63 | 1.35 | 23:15 | 0.062 | 02:50 | 0.091 | 0.076 | 0.076 | |
| 11/17/2019 | 16:55 | 1.83 | 07:55 | 1.86 | 1.85 | 16:35 | 1.05 | 15:05 | 1.56 | 1.32 | 16:35 | 0.059 | 15:05 | 0.087 | 0.074 | 0.074 | |
| 11/18/2019 | 19:25 | 1.84 | 09:30 | 1.87 | 1.85 | 12:05 | 1.06 | 19:50 | 1.66 | 1.31 | 00:30 | 0.060 | 19:50 | 0.093 | 0.074 | 0.074 | |
| 11/19/2019 | 16:25 | 1.84 | 22:40 | 1.88 | 1.86 | 08:20 | 1.07 | 21:30 | 1.57 | 1.33 | 08:20 | 0.060 | 22:25 | 0.090 | 0.075 | 0.075 | |
| 11/20/2019 | 23:05 | 1.83 | 10:10 | 1.88 | 1.85 | 17:45 | 1.04 | 08:45 | 1.61 | 1.34 | 17:45 | 0.058 | 08:45 | 0.092 | 0.076 | 0.076 | |
| 11/21/2019 | 15:35 | 1.80 | 06:00 | 1.85 | 1.83 | 06:35 | 1.10 | 11:30 | 1.62 | 1.35 | 06:35 | 0.061 | 11:30 | 0.090 | 0.074 | 0.074 | |
| 11/22/2019 | 00:05 | 1.81 | 06:35 | 1.84 | 1.83 | 19:10 | 1.13 | 10:35 | 1.58 | 1.35 | 19:10 | 0.062 | 10:35 | 0.087 | 0.074 | 0.074 | |
| 11/23/2019 | 21:05 | 1.81 | 08:20 | 1.85 | 1.83 | 14:30 | 1.10 | 01:10 | 1.58 | 1.34 | 14:30 | 0.061 | 01:10 | 0.087 | 0.074 | 0.074 | |
| 11/24/2019 | 00:05 | 1.82 | 23:50 | 1.87 | 1.84 | 07:15 | 0.99 | 01:00 | 1.55 | 1.25 | 07:15 | 0.055 | 23:50 | 0.086 | 0.070 | 0.070 | |
| 11/25/2019 | 00:45 | 1.85 | 14:00 | 1.90 | 1.88 | 18:05 | 1.02 | 00:55 | 1.54 | 1.23 | 18:05 | 0.058 | 00:55 | 0.087 | 0.071 | 0.071 | |
| 11/26/2019 | 05:00 | 1.87 | 23:50 | 1.94 | 1.90 | 16:50 | 1.04 | 15:50 | 1.58 | 1.28 | 16:50 | 0.061 | 15:50 | 0.091 | 0.075 | 0.075 | 0.36 |
| 11/27/2019 | 00:30 | 1.94 | 22:45 | 2.07 | 2.02 | 06:00 | 1.09 | 22:00 | 1.52 | 1.30 | 06:00 | 0.067 | 22:00 | 0.100 | 0.083 | 0.083 | 0.63 |
| 11/28/2019 | 22:20 | 2.03 | 01:15 | 2.08 | 2.06 | 15:00 | 1.19 | 09:40 | 1.69 | 1.43 | 15:00 | 0.078 | 09:40 | 0.111 | 0.094 | 0.094 | |
| 11/29/2019 | 18:55 | 1.99 | 00:50 | 2.04 | 2.01 | 10:50 | 1.14 | 00:40 | 1.72 | 1.40 | 10:50 | 0.072 | 00:40 | 0.111 | 0.089 | 0.089 | 0.02 |
| 11/30/2019 | 08:10 | 1.98 | 22:15 | 2.02 | 2.00 | 05:15 | 1.12 | 04:15 | 1.63 | 1.40 | 05:15 | 0.070 | 04:15 | 0.102 | 0.088 | 0.088 | 0.10 |
| 12/01/2019 | 11:05 | 1.98 | 06:50 | 2.02 | 2.00 | 22:35 | 1.13 | 00:05 | 1.62 | 1.41 | 22:35 | 0.071 | 00:05 | 0.103 | 0.089 | 0.089 | 0.06 |
| 12/02/2019 | 05:20 | 1.99 | 20:10 | 2.10 | 2.04 | 08:45 | 1.14 | 22:35 | 1.70 | 1.39 | 08:45 | 0.072 | 22:35 | 0.113 | 0.090 | 0.090 | 0.30 |
| 12/03/2019 | 22:30 | 2.06 | 03:40 | 2.10 | 2.08 | 05:15 | 1.20 | 09:50 | 1.76 | 1.49 | 05:15 | 0.080 | 09:50 | 0.116 | 0.099 | 0.099 | 0.01 |
| 12/04/2019 | 02:35 | 2.05 | 18:15 | 2.14 | 2.10 | 09:00 | 1.22 | 23:35 | 1.73 | 1.44 | 04:15 | 0.081 | 23:35 | 0.119 | 0.097 | 0.097 | 0.39 |
| 12/05/2019 | 22:45 | 2.10 | 03:30 | 2.14 | 2.12 | 19:50 | 1.23 | 03:00 | 1.71 | 1.49 | 19:50 | 0.083 | 03:00 | 0.118 | 0.102 | 0.102 | 0.01 |
| 12/06/2019 | 22:15 | 2.06 | 05:40 | 2.12 | 2.09 | 08:05 | 1.24 | 01:00 | 1.72 | 1.49 | 19:55 | 0.083 | 01:00 | 0.116 | 0.100 | 0.100 | 0.01 |
| 12/07/2019 | 03:45 | 2.06 | 22:45 | 2.17 | 2.09 | 16:10 | 1.20 | 08:55 | 1.70 | 1.46 | 16:10 | 0.080 | 08:55 | 0.113 | 0.098 | 0.098 | 0.67 |
| 12/08/2019 | 00:00 | 2.17 | 18:00 | 2.26 | 2.22 | 00:50 | 1.31 | 03:05 | 1.73 | 1.52 | 00:50 | 0.094 | 17:45 | 0.126 | 0.112 | 0.112 | 0.20 |
| 12/09/2019 | 23:30 | 2.17 | 00:15 | 2.25 | 2.22 | 19:10 | 1.35 | 17:25 | 1.81 | 1.55 | 18:35 | 0.097 | 17:25 | 0.131 | 0.113 | 0.113 | |
| 12/10/2019 | 23:00 | 2.13 | 00:10 | 2.20 | 2.16 | 21:00 | 1.29 | 17:35 | 1.82 | 1.55 | 23:15 | 0.089 | 02:05 | 0.128 | 0.109 | 0.109 | |
| 12/11/2019 | 16:20 | 2.11 | 04:55 | 2.16 | 2.14 | 18:15 | 1.27 | 01:50 | 1.77 | 1.53 | 18:15 | 0.088 | 01:50 | 0.123 | 0.106 | 0.106 | 0.03 |
| 12/12/2019 | 16:15 | 2.08 | 00:00 | 2.12 | 2.11 | 16:50 | 1.24 | 08:10 | 1.79 | 1.53 | 16:50 | 0.085 | 08:10 | 0.122 | 0.104 | 0.104 | 0.01 |
| 12/13/2019 | 22:00 | 2.07 | 03:15 | 2.12 | 2.10 | 21:15 | 1.24 | 18:25 | 1.75 | 1.53 | 21:15 | 0.083 | 20:20 | 0.118 | 0.103 | 0.103 | 0.01 |
| 12/14/2019 | 00:00 | 2.08 | 07:35 | 2.11 | 2.09 | 00:30 | 1.21 | 10:55 | 1.73 | 1.51 | 00:30 | 0.081 | 10:55 | 0.116 | 0.101 | 0.101 | 0.01 |
| 12/15/2019 | 03:30 | 2.07 | 00:00 | 2.10 | 2.09 | 12:30 | 1.26 | 02:10 | 1.74 | 1.51 | 12:30 | 0.084 | 02:10 | 0.117 | 0.101 | 0.101 | 0.01 |
| 12/16/2019 | 00:10 | 2.06 | 01:00 | 2.10 | 2.08 | 12:05 | 1.24 | 01:00 | 1.81 | 1.50 | 12:00 | 0.083 | 01:00 | 0.122 | 0.100 | 0.100 | 0.01 |
| 12/17/2019 | 00:05 | 2.06 | 06:15 | 2.09 | 2.07 | 08:35 | 1.26 | 23:55 | 1.82 | 1.50 | 08:35 | 0.083 | 23:55 | 0.120 | 0.099 | 0.099 | 0.01 |
| 12/18/2019 | 17:05 | 2.04 | 00:05 | 2.07 | 2.06 | 08:20 | 1.21 | 00:05 | 1.81 | 1.49 | 08:20 | 0.079 | 00:05 | 0.120 | 0.098 | 0.098 | 0.01 |
| 12/19/2019 | 20:10 | 2.02 | 03:50 | 2.06 | 2.05 | 23:20 | 1.16 | 07:55 | 1.72 | 1.49 | 23:20 | 0.075 | 03:50 | 0.113 | 0.097 | 0.097 | |
| 12/20/2019 | 02:05 | 2.03 | 03:10 | 2.06 | 2.04 | 20:20 | 1.22 | 23:35 | 1.72 | 1.48 | 20:20 | 0.079 | 23:35 | 0.111 | 0.096 | 0.096 | |
| 12/21/2019 | 17:25 | 2.02 | 06:15 | 2.07 | 2.04 | 14:05 | 1.18 | 21:55 | 1.75 | 1.49 | 14:05 | 0.077 | 21:55 | 0.113 | 0.097 | 0.097 | 0.01 |
| 12/22/2019 | 06:20 | 2.03 | 22:45 | 2.11 | 2.06 | 07:35 | 1.17 | 23:00 | 1.70 | 1.46 | 07:35 | 0.075 | 23:00 | 0.115 | 0.096 | 0.096 | 0.41 |
| 12/23/2019 | 19:00 | 2.08 | 13:00 | 2.13 | 2.10 | 08:40 | 1.29 | 13:50 | 1.82 | 1.51 | 08:40 | 0.087 | 13:50 | 0.124 | 0.102 | 0.102 | |
| 12/24/2019 | 14:50 | 2.07 | 00:55 | 2.10 | 2.08 | 02:35 | 1.28 | 18:10 | 1.74 | 1.51 | 02:35 | 0.086 | 15:30 | 0.115 | 0.101 | 0.101 | 0.02 |
| 12/25/2019 | 03:25 | 2.06 | 07:50 | 2.09 | 2.08 | 15:50 | 1.21 | 14:20 | 1.72 | 1.49 | 15:50 | 0.081 | 14:20 | 0.115 | 0.099 | 0.099 | 0.08 |
| 12/26/2019 | 19:20 | 2.03 | 01:35 | 2.08 | 2.05 | 17:45 | 1.24 | 04:25 | 1.74 | 1.50 | 17:45 | 0.081 | 04:25 | 0.115 | 0.098 | 0.098 | |
| 12/27/2019 | 20:55 | 2.01 | 01:45 | 2.05 | 2.03 | 08:00 | 1.19 | 14:25 | 1.67 | 1.44 | 08:00 | 0.077 | 14:25 | 0.108 | 0.093 | 0.093 | |
| 12/28/2019 | 23:30 | 2.00 | 01:55 | 2.04 | 2.02 | 20:45 | 1.19 | 03:00 | 1.68 | 1.43 | 20:45 | 0.076 | 03:50 | 0.108 | 0.092 | 0.092 | |
| 12/29/2019 | 01:10 | 2.01 | 23:40 | 2.07 | 2.03 | 06:10 | 1.17 | 20:25 | 1.72 | 1.41 | 06:10 | 0.074 | 20:25 | 0.111 | 0.091 | 0.091 | 0.22 |
| 12/30/2019 | 03:45 | 2.04 | 00:15 | 2.07 | 2.06 | 21:55 | 1.22 | 02:30 | 1.74 | 1.51 | 21:55 | 0.079 | 02:30 | 0.114 | 0.099 | 0.099 | |
| 12/31/2019 | 14:35 | 2.03 | 01:30 | 2.07 | 2.05 | 06:55 | 1.17 | 03:45 | 1.71 | 1.49 | 06:55 | 0.077 | 03:45 | 0.111 | 0.097 | 0.097 | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total | |
| 01/01/2020 | 11:50 | 2.02 | 00:05 | 2.06 | 2.04 | 03:15 | 1.19 | 13:25 | 1.77 | 1.45 | 03:15 | 0.077 | 13:25 | 0.114 | 0.094 | 0.094 | | |
| 01/02/2020 | 03:15 | 2.01 | 00:45 | 2.04 | 2.03 | 22:15 | 1.16 | 18:20 | 1.68 | 1.44 | 22:15 | 0.074 | 18:20 | 0.107 | 0.092 | 0.092 | | |
| 01/03/2020 | 21:15 | 1.99 | 00:20 | 2.03 | 2.01 | 22:50 | 1.19 | 21:50 | 1.78 | 1.43 | 22:50 | 0.075 | 21:50 | 0.113 | 0.091 | 0.091 | | |
| 01/04/2020 | 10:10 | 1.98 | 00:00 | 2.01 | 2.00 | 00:15 | 1.20 | 02:30 | 1.75 | 1.41 | 17:05 | 0.075 | 02:30 | 0.109 | 0.088 | 0.088 | | |
| 01/05/2020 | 10:00 | 1.97 | 01:05 | 2.00 | 1.99 | 15:55 | 1.13 | 00:25 | 1.67 | 1.37 | 15:55 | 0.071 | 00:25 | 0.104 | 0.085 | 0.085 | | |
| 01/06/2020 | 19:40 | 1.97 | 01:20 | 2.00 | 1.99 | 00:30 | 1.13 | 07:45 | 1.60 | 1.38 | 00:30 | 0.071 | 07:45 | 0.100 | 0.086 | 0.086 | | |
| 01/07/2020 | 16:30 | 1.97 | 04:15 | 2.01 | 1.99 | 18:45 | 1.18 | 16:15 | 1.70 | 1.41 | 18:45 | 0.073 | 16:15 | 0.106 | 0.088 | 0.088 | | |
| 01/08/2020 | 07:20 | 1.96 | 00:30 | 1.99 | 1.98 | 07:55 | 1.10 | 00:15 | 1.60 | 1.37 | 07:55 | 0.067 | 00:15 | 0.099 | 0.085 | 0.085 | | |
| 01/09/2020 | 00:00 | 1.97 | 13:45 | 2.02 | 2.00 | 09:40 | 1.12 | 23:10 | 1.70 | 1.38 | 09:40 | 0.070 | 23:10 | 0.107 | 0.087 | 0.087 | | |
| 01/10/2020 | 21:00 | 1.99 | 09:25 | 2.03 | 2.01 | 18:25 | 1.14 | 11:30 | 1.71 | 1.43 | 18:25 | 0.073 | 11:30 | 0.109 | 0.091 | 0.091 | 0.02 | |
| 01/11/2020 | 17:30 | 1.99 | 04:35 | 2.03 | 2.01 | 10:45 | 1.13 | 01:45 | 1.64 | 1.42 | 10:45 | 0.072 | 01:45 | 0.104 | 0.090 | 0.090 | 0.18 | |
| 01/12/2020 | 21:35 | 1.98 | 01:10 | 2.02 | 2.00 | 20:25 | 1.16 | 18:15 | 1.70 | 1.40 | 20:25 | 0.072 | 18:15 | 0.106 | 0.088 | 0.088 | 0.02 | |
| 01/13/2020 | 00:45 | 1.98 | 05:25 | 2.01 | 1.99 | 02:45 | 1.12 | 23:30 | 1.64 | 1.40 | 02:45 | 0.070 | 23:30 | 0.101 | 0.088 | 0.088 | 0.11 | |
| 01/14/2020 | 02:50 | 1.97 | 13:25 | 2.02 | 2.00 | 02:40 | 1.16 | 11:05 | 1.64 | 1.40 | 02:40 | 0.072 | 11:05 | 0.103 | 0.088 | 0.088 | 0.07 | |
| 01/15/2020 | 01:10 | 2.01 | 12:05 | 2.04 | 2.02 | 15:45 | 1.18 | 06:45 | 1.69 | 1.43 | 15:45 | 0.075 | 06:45 | 0.107 | 0.091 | 0.091 | 0.66 | |
| 01/16/2020 | 10:15 | 2.00 | 23:40 | 2.13 | 2.05 | 11:40 | 1.15 | 23:10 | 1.77 | 1.43 | 11:40 | 0.073 | 23:40 | 0.120 | 0.093 | 0.093 | | |
| 01/17/2020 | 00:00 | 2.12 | 11:55 | 2.17 | 2.15 | 03:15 | 1.30 | 17:05 | 1.77 | 1.52 | 03:15 | 0.090 | 17:05 | 0.124 | 0.106 | 0.106 | | |
| 01/18/2020 | 20:00 | 2.11 | 00:30 | 2.16 | 2.14 | 02:50 | 1.28 | 21:40 | 1.78 | 1.54 | 04:30 | 0.089 | 01:20 | 0.123 | 0.107 | 0.107 | | |
| 01/19/2020 | 11:20 | 2.10 | 03:20 | 2.14 | 2.12 | 07:20 | 1.30 | 17:55 | 1.78 | 1.54 | 07:20 | 0.088 | 18:25 | 0.121 | 0.105 | 0.105 | | |
| 01/20/2020 | 17:55 | 2.07 | 00:00 | 2.11 | 2.09 | 13:45 | 1.21 | 10:40 | 1.77 | 1.50 | 13:45 | 0.081 | 10:40 | 0.118 | 0.101 | 0.101 | | |
| 01/21/2020 | 16:20 | 2.04 | 00:00 | 2.09 | 2.07 | 18:25 | 1.24 | 03:40 | 1.76 | 1.52 | 18:25 | 0.082 | 03:40 | 0.116 | 0.100 | 0.100 | | |
| 01/22/2020 | 01:50 | 2.04 | 03:55 | 2.07 | 2.05 | 01:10 | 1.21 | 13:00 | 1.71 | 1.48 | 01:10 | 0.079 | 13:00 | 0.113 | 0.097 | 0.097 | 0.03 | |
| 01/23/2020 | 22:35 | 2.03 | 02:40 | 2.06 | 2.05 | 00:00 | 1.25 | 12:15 | 1.70 | 1.48 | 00:00 | 0.081 | 12:15 | 0.111 | 0.097 | 0.097 | | |
| 01/24/2020 | 04:00 | 2.02 | 06:55 | 2.06 | 2.03 | 18:15 | 1.14 | 09:35 | 1.67 | 1.45 | 18:15 | 0.073 | 09:35 | 0.108 | 0.093 | 0.093 | | |
| 01/25/2020 | 02:05 | 2.01 | 02:45 | 2.05 | 2.03 | 19:25 | 1.15 | 21:55 | 1.69 | 1.43 | 19:25 | 0.073 | 21:55 | 0.108 | 0.092 | 0.092 | | |
| 01/26/2020 | 03:50 | 2.00 | 14:40 | 2.05 | 2.03 | 02:10 | 1.17 | 13:40 | 1.70 | 1.42 | 02:10 | 0.074 | 13:40 | 0.110 | 0.091 | 0.091 | 0.16 | |
| 01/27/2020 | 10:35 | 2.02 | 03:55 | 2.05 | 2.04 | 09:00 | 1.22 | 20:25 | 1.68 | 1.45 | 09:00 | 0.078 | 20:25 | 0.109 | 0.094 | 0.094 | | |
| 01/28/2020 | 03:15 | 2.02 | 00:45 | 2.05 | 2.03 | 04:05 | 1.16 | 06:15 | 1.69 | 1.43 | 04:05 | 0.075 | 06:15 | 0.108 | 0.092 | 0.092 | 0.01 | |
| 01/29/2020 | 21:55 | 2.00 | 00:10 | 2.04 | 2.02 | 10:55 | 1.17 | 01:15 | 1.64 | 1.43 | 10:55 | 0.075 | 01:15 | 0.106 | 0.092 | 0.092 | | |
| 01/30/2020 | 06:15 | 1.99 | 03:30 | 2.03 | 2.01 | 16:05 | 1.15 | 00:50 | 1.66 | 1.42 | 16:05 | 0.072 | 00:50 | 0.105 | 0.090 | 0.090 | | |
| 01/31/2020 | 01:00 | 1.99 | 00:35 | 2.02 | 2.01 | 00:05 | 1.21 | 00:20 | 1.58 | 1.38 | 00:05 | 0.076 | 00:20 | 0.100 | 0.087 | 0.015 | | |
| 02/01/2020 | | | | | | | | | | | | | | | | | | |
| 02/02/2020 | | | | | | | | | | | | | | | | | | |
| 02/03/2020 | | | | | | | | | | | | | | | | | | |
| 02/04/2020 | | | | | | | | | | | | | | | | | | |
| 02/05/2020 | 15:55 | 1.93 | 17:25 | 1.96 | 1.94 | 05:30 | 1.08 | 17:40 | 1.57 | 1.26 | 14:45 | 0.065 | 17:40 | 0.095 | 0.076 | 0.063 | | |
| 02/06/2020 | 22:45 | 1.93 | 04:30 | 1.96 | 1.94 | 15:00 | 1.07 | 06:10 | 1.52 | 1.26 | 15:00 | 0.064 | 06:10 | 0.092 | 0.076 | 0.076 | | |
| 02/07/2020 | 18:30 | 1.92 | 03:10 | 1.95 | 1.94 | 19:45 | 1.06 | 17:45 | 1.48 | 1.25 | 19:45 | 0.063 | 17:45 | 0.088 | 0.075 | 0.075 | | |
| 02/08/2020 | 23:05 | 1.93 | 06:35 | 1.95 | 1.94 | 20:05 | 1.06 | 04:55 | 1.52 | 1.26 | 20:05 | 0.063 | 04:55 | 0.092 | 0.076 | 0.076 | | |
| 02/09/2020 | 23:25 | 1.91 | 04:05 | 1.95 | 1.93 | 16:50 | 1.06 | 19:40 | 1.51 | 1.24 | 20:30 | 0.062 | 19:40 | 0.090 | 0.074 | 0.074 | | |
| 02/10/2020 | 14:00 | 1.91 | 06:25 | 1.94 | 1.92 | 22:40 | 1.06 | 00:10 | 1.50 | 1.24 | 22:40 | 0.062 | 00:10 | 0.089 | 0.074 | 0.074 | | |
| 02/11/2020 | 14:25 | 1.90 | 05:05 | 1.93 | 1.91 | 01:20 | 1.05 | 11:05 | 1.63 | 1.26 | 15:30 | 0.062 | 11:05 | 0.096 | 0.074 | 0.074 | | |
| 02/12/2020 | 21:00 | 1.90 | 07:35 | 1.93 | 1.91 | 21:50 | 1.04 | 08:40 | 1.61 | 1.23 | 21:50 | 0.061 | 08:40 | 0.095 | 0.072 | 0.072 | | |
| 02/13/2020 | 00:10 | 1.89 | 13:30 | 1.92 | 1.91 | 06:15 | 1.04 | 02:00 | 1.49 | 1.25 | 06:15 | 0.061 | 02:00 | 0.087 | 0.073 | 0.073 | | |
| 02/14/2020 | 17:50 | 1.89 | 01:40 | 1.92 | 1.91 | 12:05 | 1.04 | 05:10 | 1.50 | 1.27 | 12:05 | 0.061 | 05:10 | 0.089 | 0.074 | 0.074 | | |
| 02/15/2020 | 01:30 | 1.89 | 05:15 | 1.93 | 1.91 | 06:35 | 1.05 | 19:50 | 1.54 | 1.26 | 11:00 | 0.062 | 19:55 | 0.091 | 0.074 | 0.074 | | |
| 02/16/2020 | 00:45 | 1.90 | 04:25 | 1.93 | 1.92 | 00:50 | 1.05 | 00:40 | 1.51 | 1.24 | 00:50 | 0.061 | 11:25 | 0.089 | 0.074 | 0.074 | | |
| 02/17/2020 | 21:50 | 1.92 | 06:05 | 1.95 | 1.93 | 19:25 | 1.06 | 11:00 | 1.54 | 1.24 | 19:25 | 0.063 | 11:00 | 0.092 | 0.074 | 0.074 | | |
| 02/18/2020 | 23:45 | 1.92 | 04:35 | 1.95 | 1.93 | 23:50 | 1.05 | 20:40 | 1.49 | 1.24 | 23:50 | 0.062 | 20:40 | 0.089 | 0.074 | 0.074 | | |
| 02/19/2020 | 00:00 | 1.92 | 06:50 | 1.94 | 1.93 | 19:30 | 1.05 | 05:00 | 1.55 | 1.24 | 19:30 | 0.063 | 05:00 | 0.093 | 0.074 | 0.074 | | |
| 02/20/2020 | 17:45 | 1.92 | 04:35 | 1.95 | 1.94 | 19:05 | 1.06 | 01:05 | 1.52 | 1.26 | 19:05 | 0.064 | 01:05 | 0.091 | 0.076 | 0.076 | | |
| 02/21/2020 | 00:00 | 1.93 | 14:25 | 1.96 | 1.94 | 16:15 | 1.07 | 04:40 | 1.58 | 1.25 | 21:05 | 0.064 | 04:40 | 0.096 | 0.076 | 0.076 | | |
| 02/22/2020 | 21:35 | 1.91 | 03:45 | 1.96 | 1.93 | 17:50 | 1.05 | 10:00 | 1.52 | 1.26 | 17:50 | 0.062 | 10:00 | 0.091 | 0.076 | 0.076 | | |
| 02/23/2020 | 00:10 | 1.92 | 03:25 | 1.94 | 1.93 | 15:55 | 1.05 | 13:10 | 1.54 | 1.24 | 15:55 | 0.062 | 13:10 | 0.092 | 0.074 | 0.074 | | |
| 02/24/2020 | 01:05 | 1.93 | 12:10 | 1.95 | 1.94 | 21:45 | 1.06 | 09:25 | 1.54 | 1.25 | 21:45 | 0.064 | 09:25 | 0.093 | 0.075 | 0.075 | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|------|-------|------|------|-----------------|------|-------|------|------|---------------------------|-------|-------|-------|-------|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | 22:10 | 1.92 | 05:15 | 1.96 | 1.94 | 20:20 | 1.06 | 01:50 | 1.52 | 1.29 | 20:05 | 0.063 | 03:05 | 0.092 | 0.077 | 0.077 | |
| 02/26/2020 | 14:25 | 1.92 | 00:55 | 1.95 | 1.93 | 10:00 | 1.06 | 15:15 | 1.53 | 1.26 | 10:00 | 0.064 | 15:15 | 0.091 | 0.075 | 0.075 | |
| 02/27/2020 | 18:45 | 1.92 | 05:50 | 1.96 | 1.93 | 19:40 | 1.06 | 17:20 | 1.48 | 1.27 | 19:40 | 0.063 | 08:50 | 0.089 | 0.076 | 0.076 | |
| 02/28/2020 | 20:55 | 1.91 | 02:40 | 1.95 | 1.93 | 17:55 | 1.06 | 03:20 | 1.49 | 1.25 | 16:55 | 0.063 | 03:20 | 0.090 | 0.074 | 0.074 | |
| 02/29/2020 | 22:10 | 1.90 | 07:20 | 1.94 | 1.92 | 01:05 | 1.06 | 23:40 | 1.51 | 1.26 | 22:05 | 0.063 | 23:45 | 0.089 | 0.075 | 0.075 | |
| 03/01/2020 | 20:20 | 1.89 | 04:15 | 1.93 | 1.92 | 15:10 | 1.05 | 02:55 | 1.51 | 1.25 | 15:10 | 0.062 | 02:55 | 0.090 | 0.074 | 0.074 | |
| 03/02/2020 | 18:30 | 1.88 | 05:00 | 1.92 | 1.90 | 12:45 | 1.04 | 08:25 | 1.58 | 1.29 | 12:45 | 0.061 | 08:25 | 0.093 | 0.075 | 0.075 | |
| 03/03/2020 | 20:15 | 1.87 | 04:45 | 1.91 | 1.89 | 14:35 | 1.08 | 18:20 | 1.50 | 1.28 | 14:35 | 0.062 | 01:10 | 0.087 | 0.074 | 0.074 | |
| 03/04/2020 | 22:00 | 1.87 | 06:15 | 1.90 | 1.89 | 18:45 | 1.03 | 01:50 | 1.52 | 1.26 | 18:45 | 0.059 | 01:50 | 0.088 | 0.073 | 0.073 | |
| 03/05/2020 | 11:00 | 1.88 | 14:50 | 1.90 | 1.89 | 07:05 | 1.05 | 02:35 | 1.55 | 1.28 | 07:05 | 0.061 | 02:35 | 0.090 | 0.074 | 0.074 | |
| 03/06/2020 | 18:05 | 1.88 | 05:20 | 1.91 | 1.90 | 05:10 | 1.06 | 05:05 | 1.59 | 1.31 | 05:10 | 0.062 | 05:05 | 0.093 | 0.076 | 0.076 | |
| 03/07/2020 | 00:35 | 1.88 | 23:25 | 1.96 | 1.92 | 11:00 | 1.05 | 08:05 | 1.53 | 1.29 | 11:00 | 0.062 | 08:05 | 0.090 | 0.076 | 0.076 | |
| 03/08/2020 | 01:15 | 1.95 | 15:25 | 1.98 | 1.97 | 01:10 | 1.08 | 16:40 | 1.54 | 1.28 | 01:10 | 0.065 | 16:40 | 0.094 | 0.079 | 0.079 | |
| 03/09/2020 | 21:35 | 1.95 | 08:20 | 1.98 | 1.97 | 09:45 | 1.09 | 12:40 | 1.60 | 1.26 | 09:45 | 0.067 | 12:40 | 0.099 | 0.077 | 0.077 | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Depth (in) | Velocity (ft/s) | Quantity (MGD - Total MG) | Rain (in) |
|-------|------------|-----------------|---------------------------|-----------|
| Total | | | 9.571 | 4.90 |
| Avg | 1.99 | 1.38 | 0.087 | |

Rainfall data

| MIL_RG01 | |
|---------------------------|----|
| Rain Collector Dimensions | 8" |

The rainfall measured at MIL_RG01 from November 16, 2019 to March 09, 2020 is 4.90 inches.

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_RG01

Site Address /Location:

641 Gibraltar Court, Milpitas, CA

Monitor Series

Rain Alert III

Location Type

Temporary

Site Access Details:

DRIVE.

Latitude:

37.423469°

Longitude:

-121.898106°

Pipe Size (H x W)

Pipe Shape

Manhole #

System Characteristics

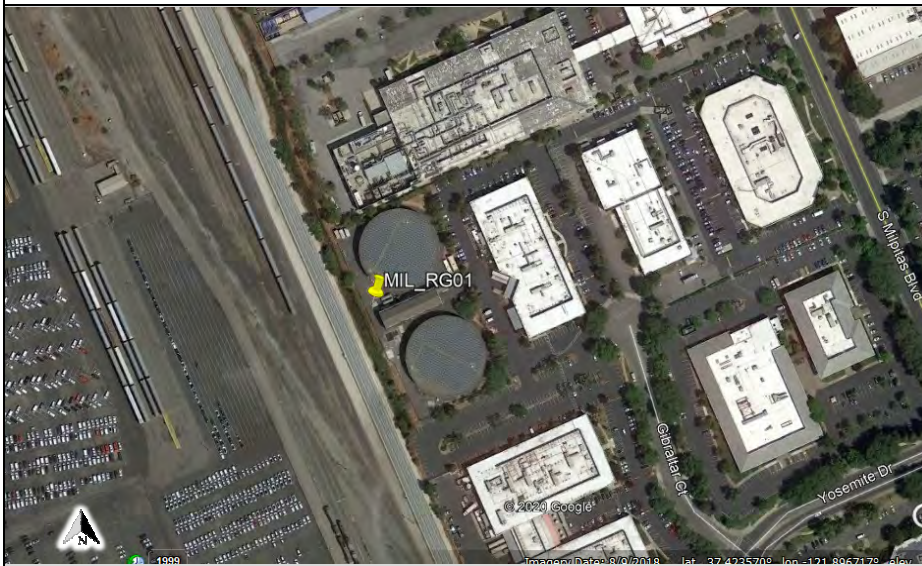
Commercial

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Friday, November 15, 2019

Installation Type:

Rain Gauge

Monitoring Location (Sensors):

Field

Monitor Location:

Building

Sensors / Devices:

Rain Gauge Tipping Bucket

Pressure Sensor Range (psi)

Installation Confirmation:

Confirmation Time:

Pipe Size (HxW)

Depth of Flow (Wet DOF) (in)

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

Peak Velocity (fps)

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Manhole Frame

Active Drop Connections

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Communication Information:

Communication Type

Wireless

Antenna Location

Additional Site Info. / Comments:

Need key to access.

ADS Project Name:

Milpitas.WWTFM.CA2019-2020

168

ADS Project Number:

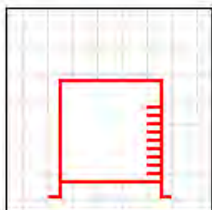
22431.11.325

HYDROGRAPH REPORT

MIL_RG01

Rain Gauge

MIL_RG01

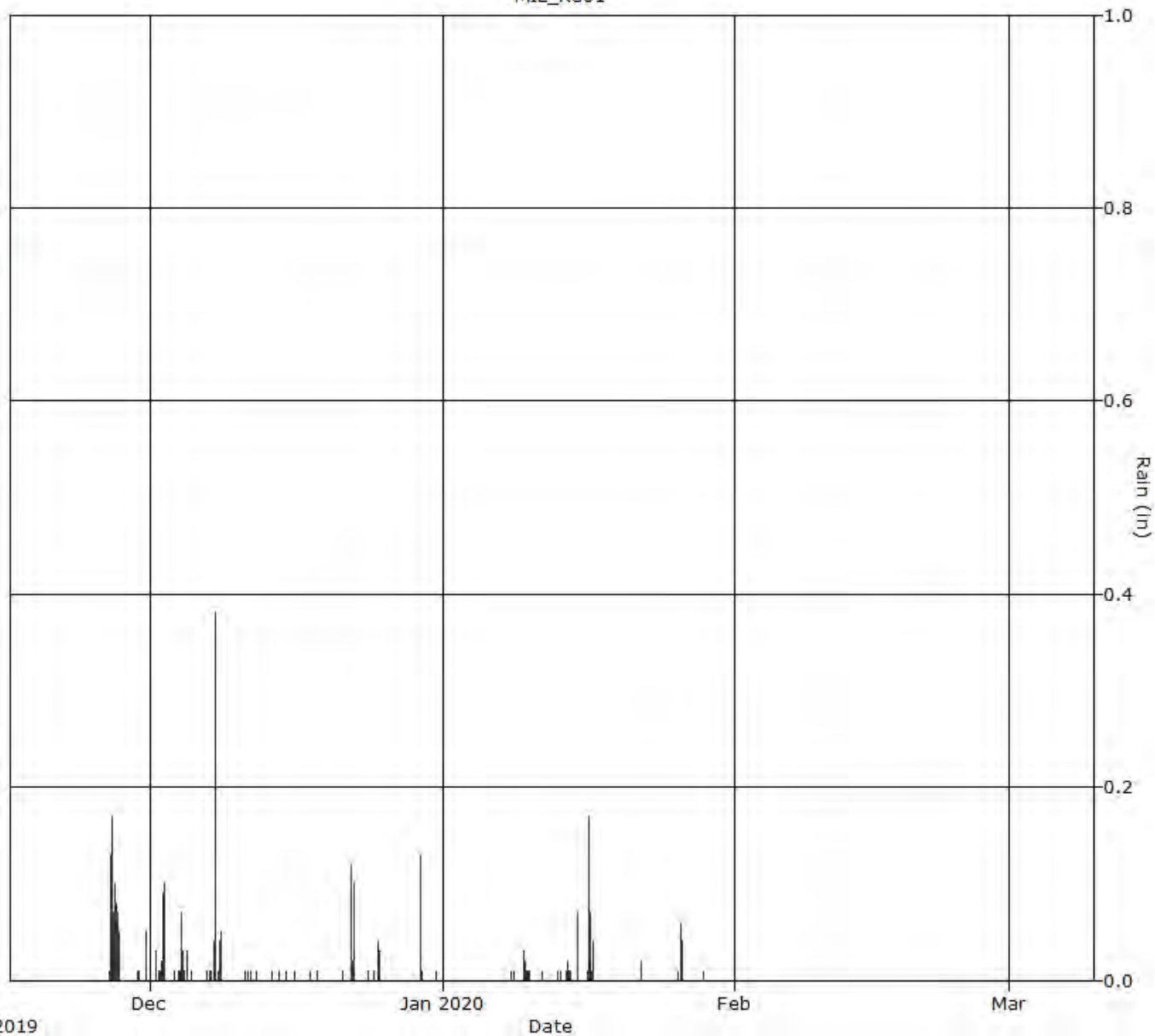


Report Period

11/16/2019
To
3/9/2020

Legend

— Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_RG01 , Silt: --

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-----|------|-----|-----|-----------------|-----|------|-----|-----|---------------------------|-----|------|-----|-----|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | | | | | | | | | | | | | | | | | |
| 11/17/2019 | | | | | | | | | | | | | | | | | |
| 11/18/2019 | | | | | | | | | | | | | | | | | |
| 11/19/2019 | | | | | | | | | | | | | | | | | |
| 11/20/2019 | | | | | | | | | | | | | | | | | |
| 11/21/2019 | | | | | | | | | | | | | | | | | |
| 11/22/2019 | | | | | | | | | | | | | | | | | |
| 11/23/2019 | | | | | | | | | | | | | | | | | |
| 11/24/2019 | | | | | | | | | | | | | | | | | |
| 11/25/2019 | | | | | | | | | | | | | | | | | |
| 11/26/2019 | | | | | | | | | | | | | | | | | 0.36 |
| 11/27/2019 | | | | | | | | | | | | | | | | | 0.63 |
| 11/28/2019 | | | | | | | | | | | | | | | | | |
| 11/29/2019 | | | | | | | | | | | | | | | | | 0.02 |
| 11/30/2019 | | | | | | | | | | | | | | | | | 0.10 |
| 12/01/2019 | | | | | | | | | | | | | | | | | 0.06 |
| 12/02/2019 | | | | | | | | | | | | | | | | | 0.30 |
| 12/03/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/04/2019 | | | | | | | | | | | | | | | | | 0.39 |
| 12/05/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/06/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/07/2019 | | | | | | | | | | | | | | | | | 0.67 |
| 12/08/2019 | | | | | | | | | | | | | | | | | 0.20 |
| 12/09/2019 | | | | | | | | | | | | | | | | | |
| 12/10/2019 | | | | | | | | | | | | | | | | | |
| 12/11/2019 | | | | | | | | | | | | | | | | | 0.03 |
| 12/12/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/13/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/14/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/15/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/16/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/17/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/18/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/19/2019 | | | | | | | | | | | | | | | | | |
| 12/20/2019 | | | | | | | | | | | | | | | | | |
| 12/21/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/22/2019 | | | | | | | | | | | | | | | | | 0.41 |
| 12/23/2019 | | | | | | | | | | | | | | | | | |
| 12/24/2019 | | | | | | | | | | | | | | | | | 0.02 |
| 12/25/2019 | | | | | | | | | | | | | | | | | 0.08 |
| 12/26/2019 | | | | | | | | | | | | | | | | | |
| 12/27/2019 | | | | | | | | | | | | | | | | | |
| 12/28/2019 | | | | | | | | | | | | | | | | | |
| 12/29/2019 | | | | | | | | | | | | | | | | | 0.22 |
| 12/30/2019 | | | | | | | | | | | | | | | | | |
| 12/31/2019 | | | | | | | | | | | | | | | | | 0.01 |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-----|------|-----|-----|-----------------|-----|------|-----|-----|---------------------------|-----|------|-----|-----|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | | | | | | | | | | | | | | | | | |
| 01/02/2020 | | | | | | | | | | | | | | | | | |
| 01/03/2020 | | | | | | | | | | | | | | | | | |
| 01/04/2020 | | | | | | | | | | | | | | | | | |
| 01/05/2020 | | | | | | | | | | | | | | | | | |
| 01/06/2020 | | | | | | | | | | | | | | | | | |
| 01/07/2020 | | | | | | | | | | | | | | | | | |
| 01/08/2020 | | | | | | | | | | | | | | | | | 0.02 |
| 01/09/2020 | | | | | | | | | | | | | | | | | 0.18 |
| 01/10/2020 | | | | | | | | | | | | | | | | | 0.02 |
| 01/11/2020 | | | | | | | | | | | | | | | | | 0.01 |
| 01/12/2020 | | | | | | | | | | | | | | | | | |
| 01/13/2020 | | | | | | | | | | | | | | | | | 0.02 |
| 01/14/2020 | | | | | | | | | | | | | | | | | 0.11 |
| 01/15/2020 | | | | | | | | | | | | | | | | | 0.07 |
| 01/16/2020 | | | | | | | | | | | | | | | | | 0.66 |
| 01/17/2020 | | | | | | | | | | | | | | | | | |
| 01/18/2020 | | | | | | | | | | | | | | | | | |
| 01/19/2020 | | | | | | | | | | | | | | | | | |
| 01/20/2020 | | | | | | | | | | | | | | | | | |
| 01/21/2020 | | | | | | | | | | | | | | | | | |
| 01/22/2020 | | | | | | | | | | | | | | | | | 0.03 |
| 01/23/2020 | | | | | | | | | | | | | | | | | |
| 01/24/2020 | | | | | | | | | | | | | | | | | |
| 01/25/2020 | | | | | | | | | | | | | | | | | |
| 01/26/2020 | | | | | | | | | | | | | | | | | 0.16 |
| 01/27/2020 | | | | | | | | | | | | | | | | | |
| 01/28/2020 | | | | | | | | | | | | | | | | | 0.01 |
| 01/29/2020 | | | | | | | | | | | | | | | | | |
| 01/30/2020 | | | | | | | | | | | | | | | | | |
| 01/31/2020 | | | | | | | | | | | | | | | | | |
| 02/01/2020 | | | | | | | | | | | | | | | | | |
| 02/02/2020 | | | | | | | | | | | | | | | | | |
| 02/03/2020 | | | | | | | | | | | | | | | | | |
| 02/04/2020 | | | | | | | | | | | | | | | | | |
| 02/05/2020 | | | | | | | | | | | | | | | | | |
| 02/06/2020 | | | | | | | | | | | | | | | | | |
| 02/07/2020 | | | | | | | | | | | | | | | | | |
| 02/08/2020 | | | | | | | | | | | | | | | | | |
| 02/09/2020 | | | | | | | | | | | | | | | | | |
| 02/10/2020 | | | | | | | | | | | | | | | | | |
| 02/11/2020 | | | | | | | | | | | | | | | | | |
| 02/12/2020 | | | | | | | | | | | | | | | | | |
| 02/13/2020 | | | | | | | | | | | | | | | | | |
| 02/14/2020 | | | | | | | | | | | | | | | | | |
| 02/15/2020 | | | | | | | | | | | | | | | | | |
| 02/16/2020 | | | | | | | | | | | | | | | | | |
| 02/17/2020 | | | | | | | | | | | | | | | | | |
| 02/18/2020 | | | | | | | | | | | | | | | | | |
| 02/19/2020 | | | | | | | | | | | | | | | | | |
| 02/20/2020 | | | | | | | | | | | | | | | | | |
| 02/21/2020 | | | | | | | | | | | | | | | | | |
| 02/22/2020 | | | | | | | | | | | | | | | | | |
| 02/23/2020 | | | | | | | | | | | | | | | | | |
| 02/24/2020 | | | | | | | | | | | | | | | | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-----|------|-----|-----|-----------------|-----|------|-----|-----|---------------------------|-----|------|-----|-----|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | | | | | | | | | | | | | | | | | |
| 02/26/2020 | | | | | | | | | | | | | | | | | |
| 02/27/2020 | | | | | | | | | | | | | | | | | |
| 02/28/2020 | | | | | | | | | | | | | | | | | |
| 02/29/2020 | | | | | | | | | | | | | | | | | |
| 03/01/2020 | | | | | | | | | | | | | | | | | |
| 03/02/2020 | | | | | | | | | | | | | | | | | |
| 03/03/2020 | | | | | | | | | | | | | | | | | |
| 03/04/2020 | | | | | | | | | | | | | | | | | |
| 03/05/2020 | | | | | | | | | | | | | | | | | |
| 03/06/2020 | | | | | | | | | | | | | | | | | |
| 03/07/2020 | | | | | | | | | | | | | | | | | |
| 03/08/2020 | | | | | | | | | | | | | | | | | |
| 03/09/2020 | | | | | | | | | | | | | | | | | |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Rain (in) |
|-------|-----------|
| Total | 4.90 |
| Avg | |

Rainfall data

| MIL_RG02 | |
|---------------------------|----|
| Rain Collector Dimensions | 8" |

The rainfall measured at MIL_RG02 from November 16, 2019 to March 09, 2020 is 5.26 inches.

Milpitas Temp Study 2019-20

Flow Monitoring Site Report



Site Name

MIL_RG02

Site Address /Location: 1328 Tularcitos Drive, Milpitas, CA

Monitor Series

Rain Alert III

Location Type

Temporary

Site Access Details: DRIVE.

Latitude:

37.455939°

Longitude:

-121.875253°

Pipe Size (H x W)

Pipe Shape

Manhole #

System Characteristics

Commercial

Access

Traffic

Drive

Light



Installation Information

Installation Date:

Friday, November 15, 2019

Installation Type:

Rain Gauge

Monitoring Location (Sensors):

Field

Monitor Location:

Building

Sensors / Devices:

Rain Gauge Tipping Bucket

Pressure Sensor Range (psi)

Installation Confirmation:

Confirmation Time:

1:30:00 AM

Pipe Size (HxW)

Depth of Flow (Wet DOF) (in)

Range (Air DOF) (in)

Downlooker Physical Offset (in)

NA

Measurement Confidence (in)

Peak Velocity (fps)

Velocity Sensor Offset (in)

0"

Silt (in)

0.0"

Silt Type

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):

Manhole Configuration

Single

Manhole Material:

Concrete

Manhole Condition:

Good

Manhole Opening Diameter (in)

26"

Manhole Diameter (Approx.):

54"

Manhole Cover

Manhole Frame

Active Drop Connections

No

Air Quality:

Normal

Pipe Material

Concrete

Pipe Condition:

Communication Information:

Communication Type

Wireless

Antenna Location

Additional Site Info. / Comments:

Tularcitos Pump Station. Needs passcode and key.



ADS Project Name: Milpitas.WWTFM.CA2019-2020

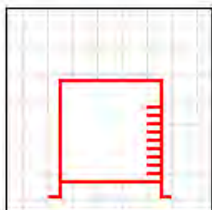
ADS Project Number: 22431.11.325

HYDROGRAPH REPORT

MIL_RG02

Rain Gauge

MIL_RG02

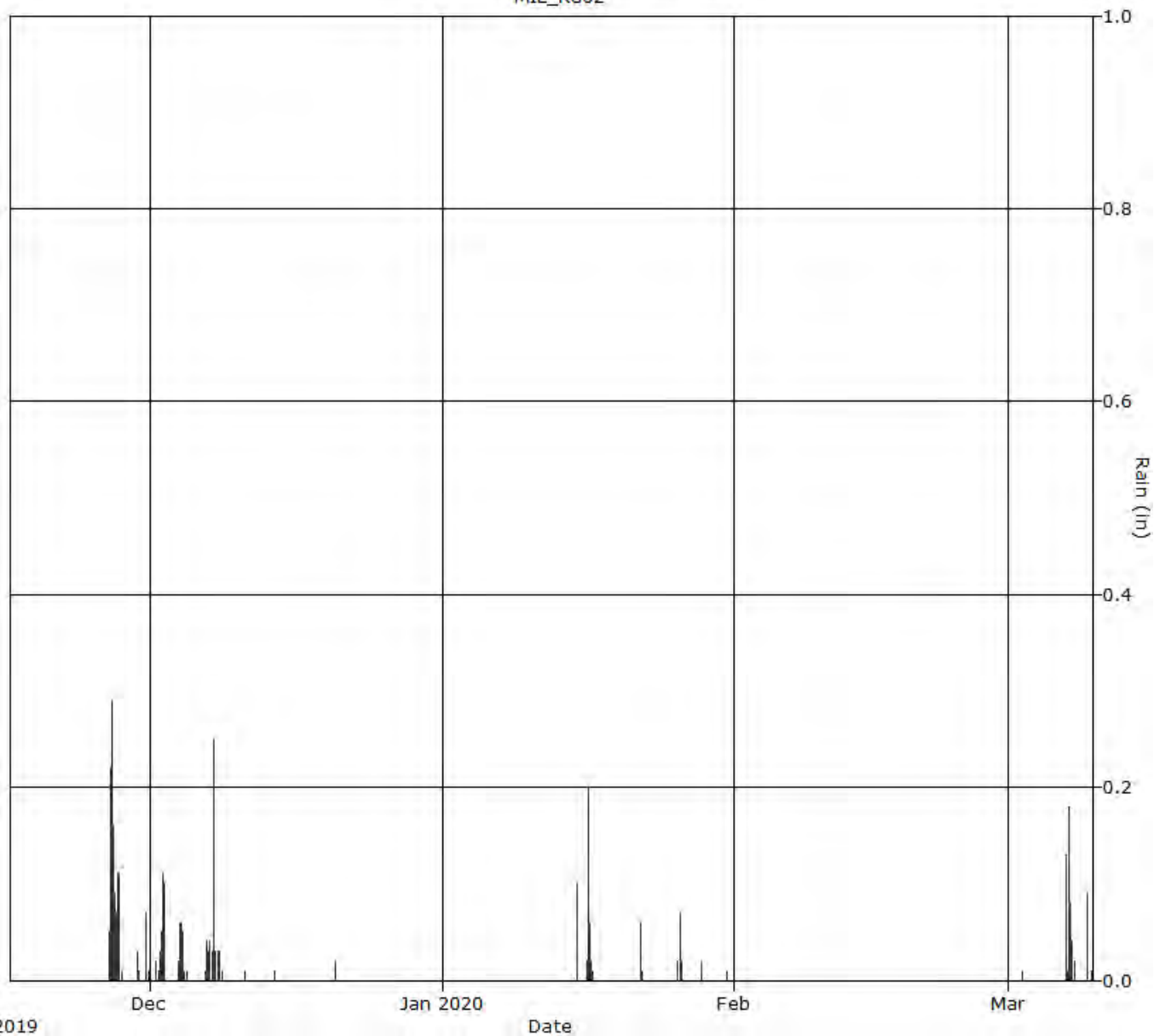


Report Period

11/16/2019
To
3/9/2020

Legend

— Rain



Daily Tabular Report For The Period 11/16/2019 00:00 - 03/09/2020 23:59

MIL_RG02 , Silt: --

Daily Tabular Report

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-----|------|-----|-----|-----------------|-----|------|-----|-----|---------------------------|-----|------|-----|-----|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 11/16/2019 | | | | | | | | | | | | | | | | | |
| 11/17/2019 | | | | | | | | | | | | | | | | | |
| 11/18/2019 | | | | | | | | | | | | | | | | | |
| 11/19/2019 | | | | | | | | | | | | | | | | | |
| 11/20/2019 | | | | | | | | | | | | | | | | | |
| 11/21/2019 | | | | | | | | | | | | | | | | | |
| 11/22/2019 | | | | | | | | | | | | | | | | | |
| 11/23/2019 | | | | | | | | | | | | | | | | | |
| 11/24/2019 | | | | | | | | | | | | | | | | | |
| 11/25/2019 | | | | | | | | | | | | | | | | | |
| 11/26/2019 | | | | | | | | | | | | | | | | | 0.63 |
| 11/27/2019 | | | | | | | | | | | | | | | | | 0.77 |
| 11/28/2019 | | | | | | | | | | | | | | | | | |
| 11/29/2019 | | | | | | | | | | | | | | | | | 0.05 |
| 11/30/2019 | | | | | | | | | | | | | | | | | 0.14 |
| 12/01/2019 | | | | | | | | | | | | | | | | | 0.06 |
| 12/02/2019 | | | | | | | | | | | | | | | | | 0.36 |
| 12/03/2019 | | | | | | | | | | | | | | | | | |
| 12/04/2019 | | | | | | | | | | | | | | | | | 0.44 |
| 12/05/2019 | | | | | | | | | | | | | | | | | |
| 12/06/2019 | | | | | | | | | | | | | | | | | 0.06 |
| 12/07/2019 | | | | | | | | | | | | | | | | | 0.84 |
| 12/08/2019 | | | | | | | | | | | | | | | | | 0.10 |
| 12/09/2019 | | | | | | | | | | | | | | | | | |
| 12/10/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/11/2019 | | | | | | | | | | | | | | | | | 0.00 |
| 12/12/2019 | | | | | | | | | | | | | | | | | |
| 12/13/2019 | | | | | | | | | | | | | | | | | |
| 12/14/2019 | | | | | | | | | | | | | | | | | 0.01 |
| 12/15/2019 | | | | | | | | | | | | | | | | | |
| 12/16/2019 | | | | | | | | | | | | | | | | | |
| 12/17/2019 | | | | | | | | | | | | | | | | | |
| 12/18/2019 | | | | | | | | | | | | | | | | | |
| 12/19/2019 | | | | | | | | | | | | | | | | | |
| 12/20/2019 | | | | | | | | | | | | | | | | | 0.02 |
| 12/21/2019 | | | | | | | | | | | | | | | | | |
| 12/22/2019 | | | | | | | | | | | | | | | | | |
| 12/23/2019 | | | | | | | | | | | | | | | | | |
| 12/24/2019 | | | | | | | | | | | | | | | | | |
| 12/25/2019 | | | | | | | | | | | | | | | | | |
| 12/26/2019 | | | | | | | | | | | | | | | | | |
| 12/27/2019 | | | | | | | | | | | | | | | | | |
| 12/28/2019 | | | | | | | | | | | | | | | | | |
| 12/29/2019 | | | | | | | | | | | | | | | | | |
| 12/30/2019 | | | | | | | | | | | | | | | | | |
| 12/31/2019 | | | | | | | | | | | | | | | | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|---------------|-----|------|-----|-----|--------------------|-----|------|-----|-----|------------------------------|-----|------|-----|-----|-------|--------------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 01/01/2020 | | | | | | | | | | | | | | | | | |
| 01/02/2020 | | | | | | | | | | | | | | | | | |
| 01/03/2020 | | | | | | | | | | | | | | | | | |
| 01/04/2020 | | | | | | | | | | | | | | | | | |
| 01/05/2020 | | | | | | | | | | | | | | | | | |
| 01/06/2020 | | | | | | | | | | | | | | | | | |
| 01/07/2020 | | | | | | | | | | | | | | | | | |
| 01/08/2020 | | | | | | | | | | | | | | | | | |
| 01/09/2020 | | | | | | | | | | | | | | | | | |
| 01/10/2020 | | | | | | | | | | | | | | | | | |
| 01/11/2020 | | | | | | | | | | | | | | | | | |
| 01/12/2020 | | | | | | | | | | | | | | | | | |
| 01/13/2020 | | | | | | | | | | | | | | | | | |
| 01/14/2020 | | | | | | | | | | | | | | | | | |
| 01/15/2020 | | | | | | | | | | | | | | | | | 0.10 |
| 01/16/2020 | | | | | | | | | | | | | | | | | 0.66 |
| 01/17/2020 | | | | | | | | | | | | | | | | | |
| 01/18/2020 | | | | | | | | | | | | | | | | | |
| 01/19/2020 | | | | | | | | | | | | | | | | | |
| 01/20/2020 | | | | | | | | | | | | | | | | | |
| 01/21/2020 | | | | | | | | | | | | | | | | | 0.01 |
| 01/22/2020 | | | | | | | | | | | | | | | | | 0.09 |
| 01/23/2020 | | | | | | | | | | | | | | | | | |
| 01/24/2020 | | | | | | | | | | | | | | | | | |
| 01/25/2020 | | | | | | | | | | | | | | | | | |
| 01/26/2020 | | | | | | | | | | | | | | | | | 0.16 |
| 01/27/2020 | | | | | | | | | | | | | | | | | |
| 01/28/2020 | | | | | | | | | | | | | | | | | 0.02 |
| 01/29/2020 | | | | | | | | | | | | | | | | | |
| 01/30/2020 | | | | | | | | | | | | | | | | | |
| 01/31/2020 | | | | | | | | | | | | | | | | | 0.01 |
| 02/01/2020 | | | | | | | | | | | | | | | | | |
| 02/02/2020 | | | | | | | | | | | | | | | | | |
| 02/03/2020 | | | | | | | | | | | | | | | | | |
| 02/04/2020 | | | | | | | | | | | | | | | | | |
| 02/05/2020 | | | | | | | | | | | | | | | | | |
| 02/06/2020 | | | | | | | | | | | | | | | | | |
| 02/07/2020 | | | | | | | | | | | | | | | | | |
| 02/08/2020 | | | | | | | | | | | | | | | | | |
| 02/09/2020 | | | | | | | | | | | | | | | | | |
| 02/10/2020 | | | | | | | | | | | | | | | | | |
| 02/11/2020 | | | | | | | | | | | | | | | | | |
| 02/12/2020 | | | | | | | | | | | | | | | | | |
| 02/13/2020 | | | | | | | | | | | | | | | | | |
| 02/14/2020 | | | | | | | | | | | | | | | | | |
| 02/15/2020 | | | | | | | | | | | | | | | | | |
| 02/16/2020 | | | | | | | | | | | | | | | | | |
| 02/17/2020 | | | | | | | | | | | | | | | | | |
| 02/18/2020 | | | | | | | | | | | | | | | | | |
| 02/19/2020 | | | | | | | | | | | | | | | | | |
| 02/20/2020 | | | | | | | | | | | | | | | | | |
| 02/21/2020 | | | | | | | | | | | | | | | | | |
| 02/22/2020 | | | | | | | | | | | | | | | | | |
| 02/23/2020 | | | | | | | | | | | | | | | | | |
| 02/24/2020 | | | | | | | | | | | | | | | | | |

| Date | Depth (in) | | | | | Velocity (ft/s) | | | | | Quantity (MGD - Total MG) | | | | | | Rain (in) |
|------------|------------|-----|------|-----|-----|-----------------|-----|------|-----|-----|---------------------------|-----|------|-----|-----|-------|-----------|
| | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Time | Min | Time | Max | Avg | Total | Total |
| 02/25/2020 | | | | | | | | | | | | | | | | | |
| 02/26/2020 | | | | | | | | | | | | | | | | | |
| 02/27/2020 | | | | | | | | | | | | | | | | | |
| 02/28/2020 | | | | | | | | | | | | | | | | | |
| 02/29/2020 | | | | | | | | | | | | | | | | | |
| 03/01/2020 | | | | | | | | | | | | | | | | | |
| 03/02/2020 | | | | | | | | | | | | | | | | | 0.01 |
| 03/03/2020 | | | | | | | | | | | | | | | | | |
| 03/04/2020 | | | | | | | | | | | | | | | | | |
| 03/05/2020 | | | | | | | | | | | | | | | | | |
| 03/06/2020 | | | | | | | | | | | | | | | | | |
| 03/07/2020 | | | | | | | | | | | | | | | | | 0.58 |
| 03/08/2020 | | | | | | | | | | | | | | | | | 0.02 |
| 03/09/2020 | | | | | | | | | | | | | | | | | 0.11 |

Report Summary For The Period 11/16/2019 00:00 - 03/09/2020 23:59

| | Rain (in) |
|-------|-----------|
| Total | 5.26 |
| Avg | |

APPENDIX C
City of Milpitas
Sewer Master Plan Study
Summary of GIS Updates

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GIS Updates

The City provided their most up-to-date records of the wastewater collection system as an ArcGIS geodatabase (GIS) as well as a hard-drive containing most of the record drawings on file. The GIS had not been updated with any recent CIP projects implemented since the last model update in 2009. The City also provided a spreadsheet listing all of the record drawings and designating them as one of the following seven categories:

1. Category 1: Pre-2002, DWG # is not referenced on GIS, plat sheet # has been identified;
2. Category 2: Pre-2002, DWG # is referenced on GIS, plat sheet # has not been identified;
3. Category 3: Pre-2002, DWG # is not referenced on GIS, plat sheet # has not been identified;
4. Category 4: Post-2002, DWG # is referenced on GIS, plat sheet # has not been identified;
5. Category 5: Post-2002, DWG # is referenced on GIS, plat sheet # has been identified;
6. Category 6: Post-2002, DWG # is not referenced on GIS, plat sheet # has been identified, alignment not drawn in GIS; and
7. Category 7: Post-2002, No utility improvements but existing utilities shown on plan for reference.

Based on these categories, the following drawing reviews were completed to update the GIS:

1. All category 1, 4, and 5 record drawings, along with many category 2 record drawings, were reviewed and updates were made where there was missing information;
2. All available category 3 record drawings were reviewed, but none of the available drawings had any sanitary sewer pipe information;
3. All category 6 record drawings were reviewed and new alignments were added;
4. Benchmark and/or datum information found on each reviewed drawing was recorded or it was noted if there was no information.

Based on the review of the abovementioned record drawings, the following information was added to or updated in the GIS:

1. Pipe GIS updates:
 - Material, diameter, upstream and downstream invert elevations, measured length, slope, year built, and drawing number were updated where information was found in the set of available record drawings;
 - The actual length was also calculated using one dimensional horizontal distance calculator in ArcGIS once all updates were complete;
 - Where siphons are located throughout the system, "siphon" was listed in the "slope" field;
 - All existing pipe segments with the material "High Density Polyurethane" were changed to "HDPE" for consistency with the rest of the system;
 - In cases where the pipe material was not specified on the drawing, but it was listed in the notes that all sanitary sewer pipes on this drawing should be, for example, "VCP or ABS or other approved material," the material was listed as "VCP/ABS";
 - Where the material was listed as "SS" or "SSP" and no material was listed in the record drawings, these were left as "SS" or "SSP." When referring to pipe material, these

acronyms often represent stainless steel pipe; however, for a gravity collection system, it is assumed that these are simply to indicate that the pipelines are “sanitary sewer” and are not a representation of the pipe material;

- An attribute column titled “HSE_NOTES” was added for tracking notes and edits made to the pipeline GIS file. Notes were standardized to the extent possible for streamlined sorting. Notes indicated in that column include the following:
 - If a drawing indicated that a liner was added to an existing pipe or the pipe was rehabilitated, the year built was updated to indicate the year the liner was added or the rehab was completed, and “UPDT_YR(NEWLINER)” or “UPDT_YR(REHAB)” was added;
 - Abandoned pipes were labeled “ABANDONED”;
 - New pipes were labeled “ADDED_SEGMENT”;
 - Pipes that were already in GIS but were indicated as private on record drawings were labeled “PRIVATE”;

2. Manhole GIS updates:

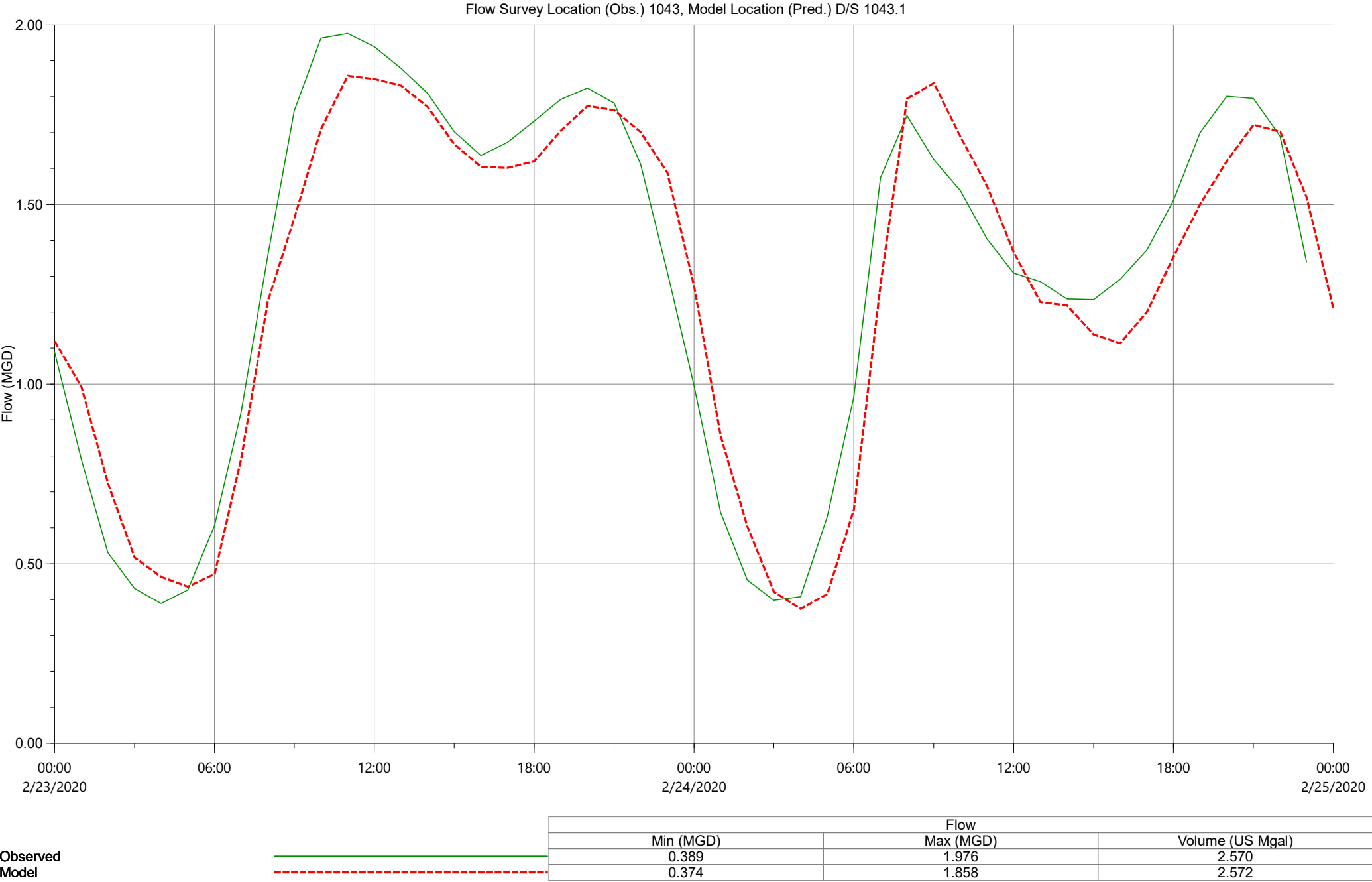
- Rim elevation, year of installation, and drawing number were updated where available;
- Manhole invert elevations were not typically available on record drawings and were not prioritized;
- An attribute column titled “HSE_NOTES” was also added for tracking notes and edits made to the manhole GIS file. Notes indicated in that column include the following:
 - Abandoned and floating manholes were labeled “ABANDONED” or “DISCONNECTED,” respectively;
 - New manholes were labeled “ADDED_MH”;

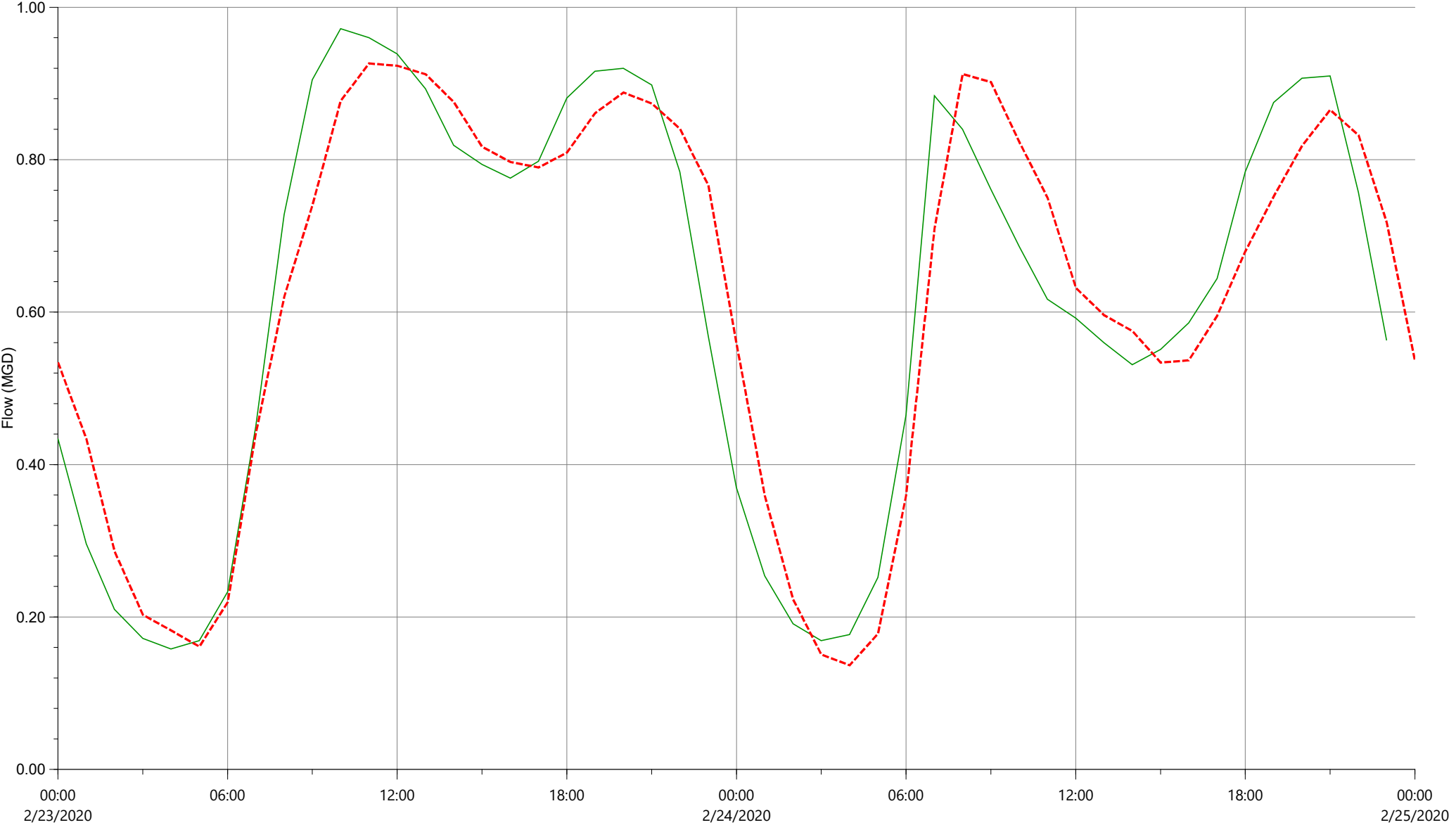
3. Two of the fields included in the attributes table for both the pipeline and manhole GIS files are DRAWINGNO (drawing number) and UPDTSRC (update source). The DRAWINGNO was reserved for the original utility construction drawing. The UPDTSRC field indicated the drawing number for updates made during our review and generally referred to record drawings of new facilities that might show the facility as “existing.”

During the GIS update process, the update of model information for areas containing either flow splits or where critical information, such as pipe diameter, material, invert elevations, and year built, was missing was prioritized.

APPENDIX D
City of Milpitas
Sewer Master Plan Study
Dry Weather Calibration Charts

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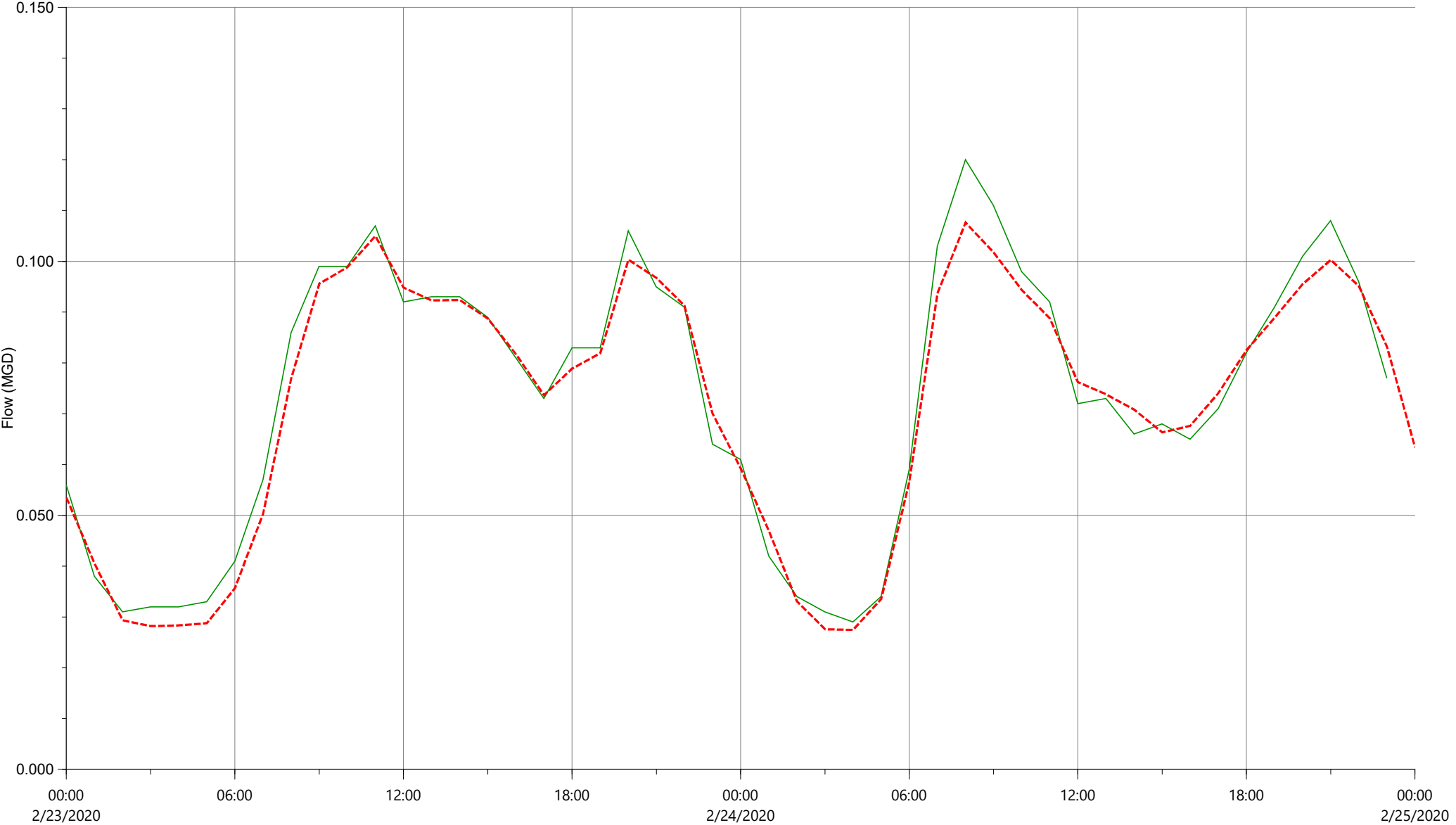


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.158 | 0.972 | 1.213 |
| 0.137 | 0.926 | 1.249 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

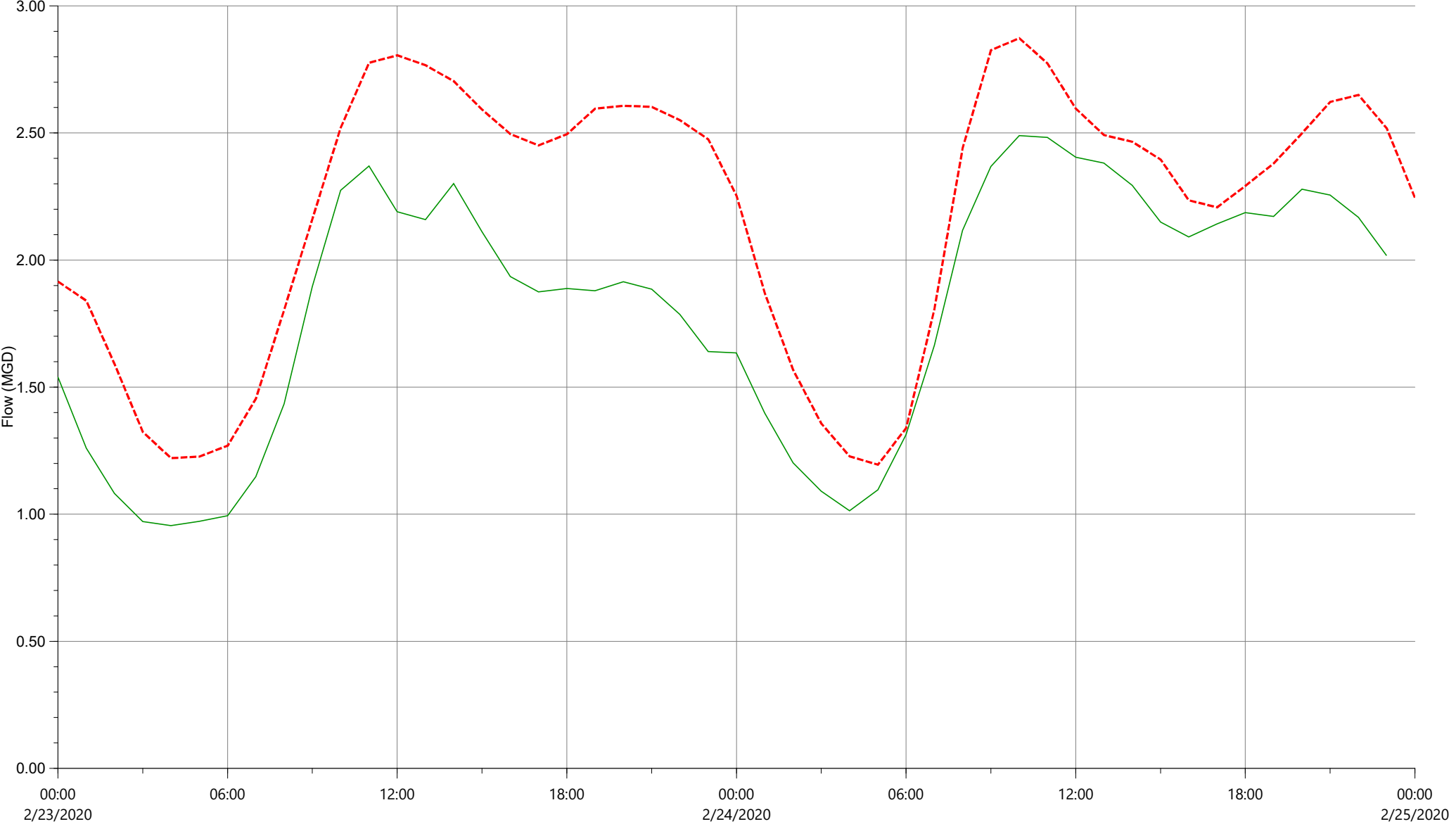


Observed
Model



| Flow | | |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | Volume (US Mgal) |
| 0.029 | 0.120 | 0.145 |
| 0.027 | 0.108 | 0.144 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

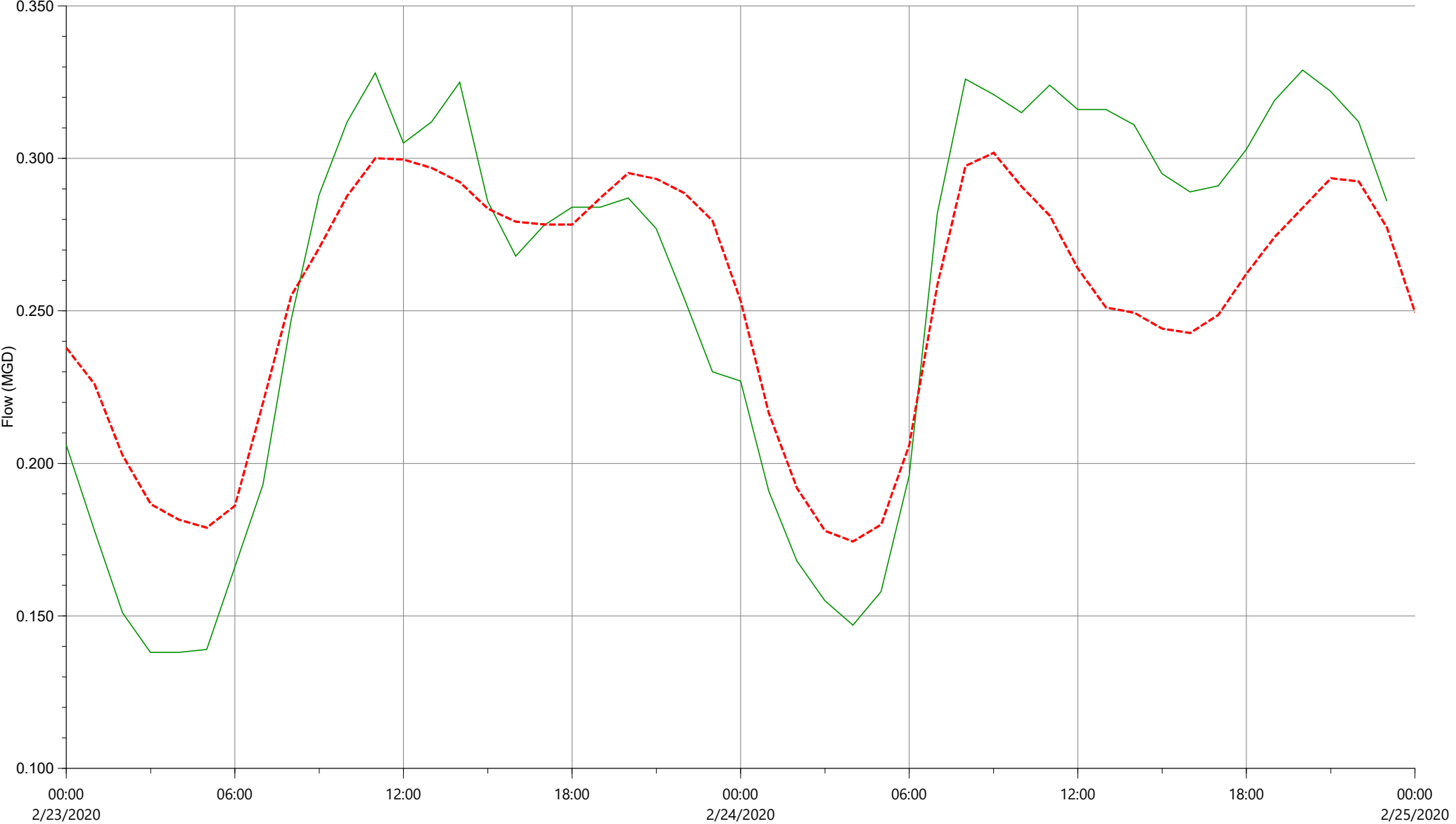


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.955 | 2.490 | 3.546 |
| 1.196 | 2.874 | 4.388 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

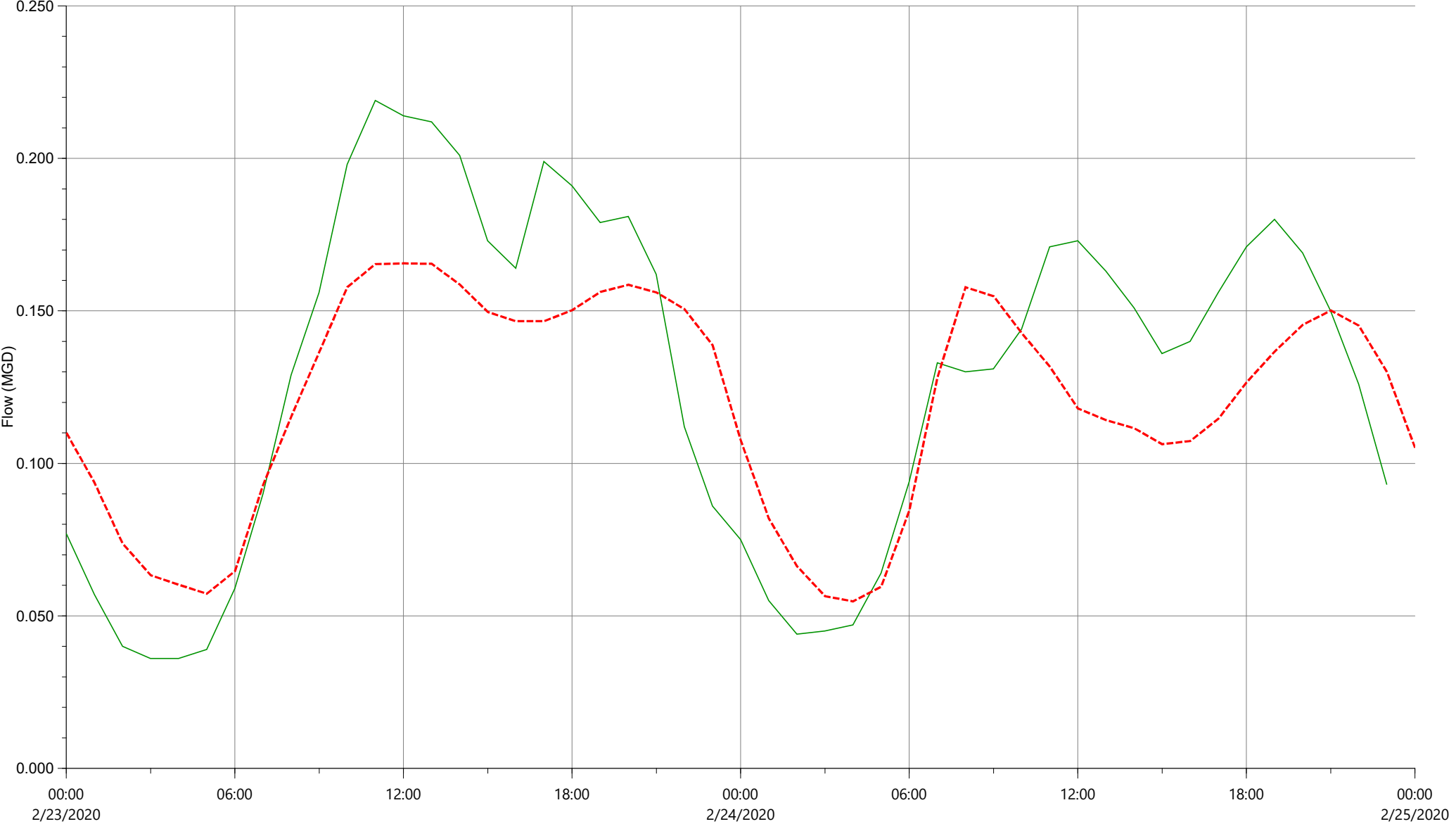


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.138 | 0.329 | 0.505 |
| 0.174 | 0.302 | 0.509 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

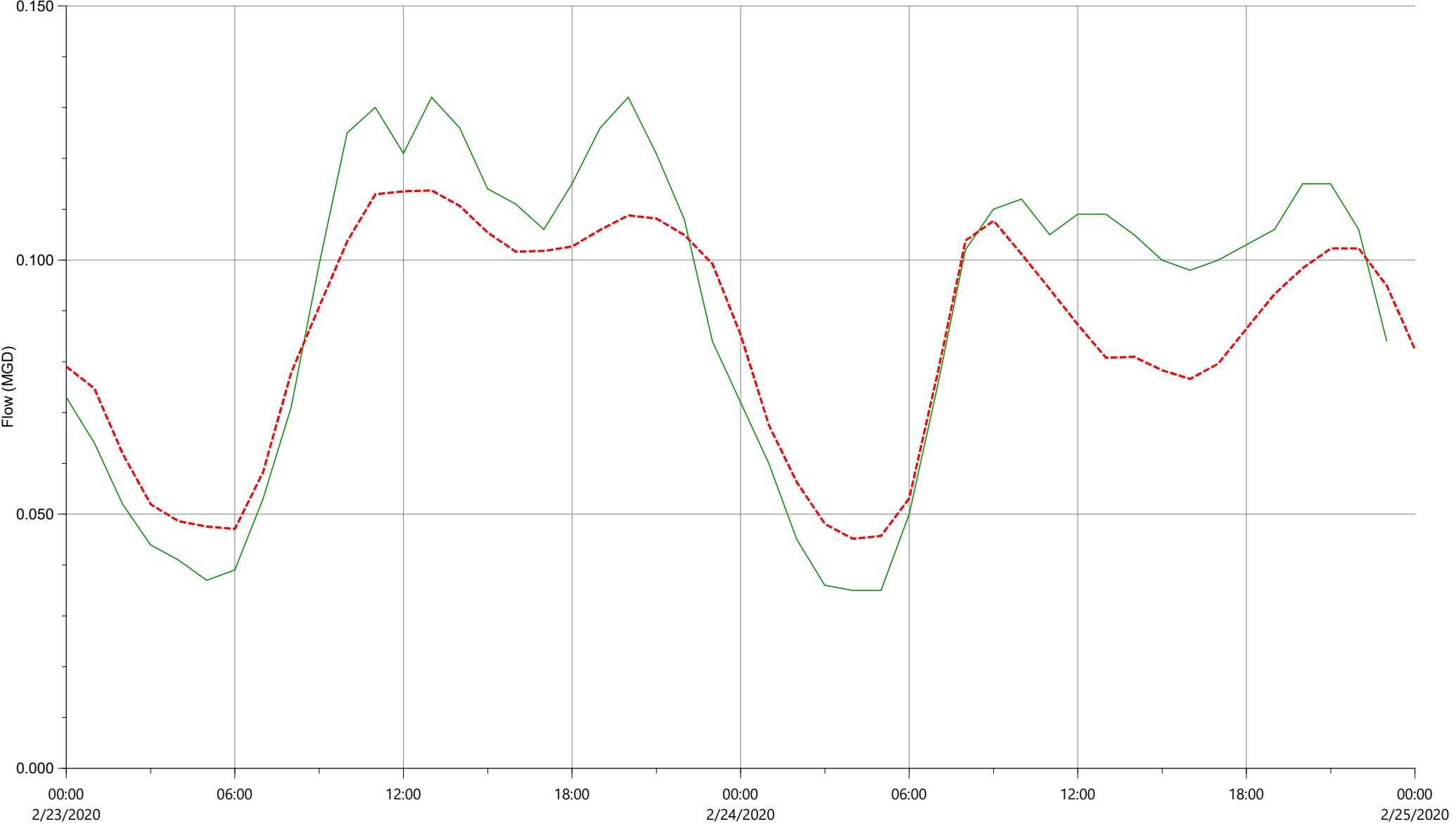


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.036 | 0.219 | 0.253 |
| 0.055 | 0.166 | 0.240 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

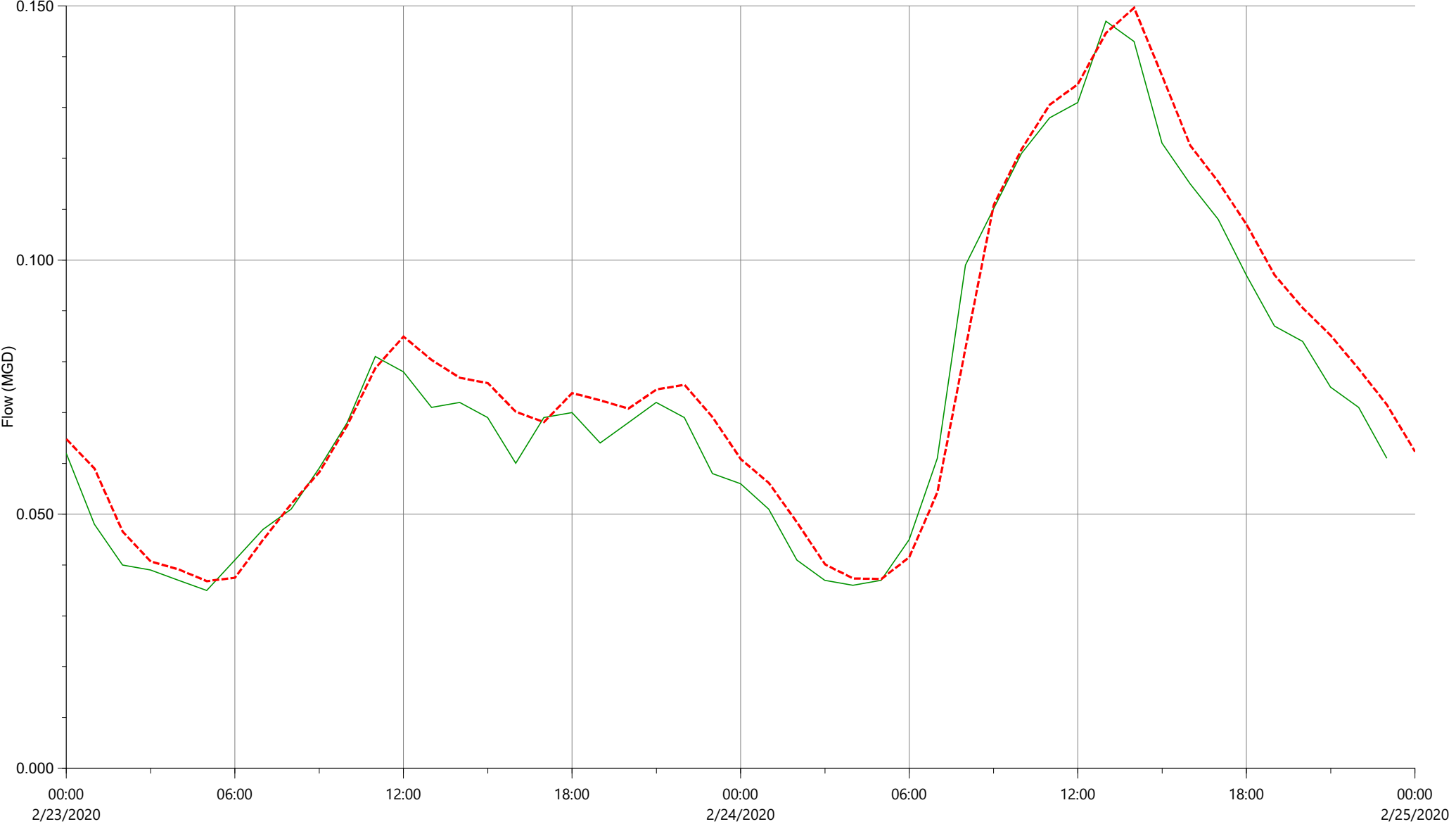


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.035 | 0.132 | 0.176 |
| 0.045 | 0.114 | 0.170 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

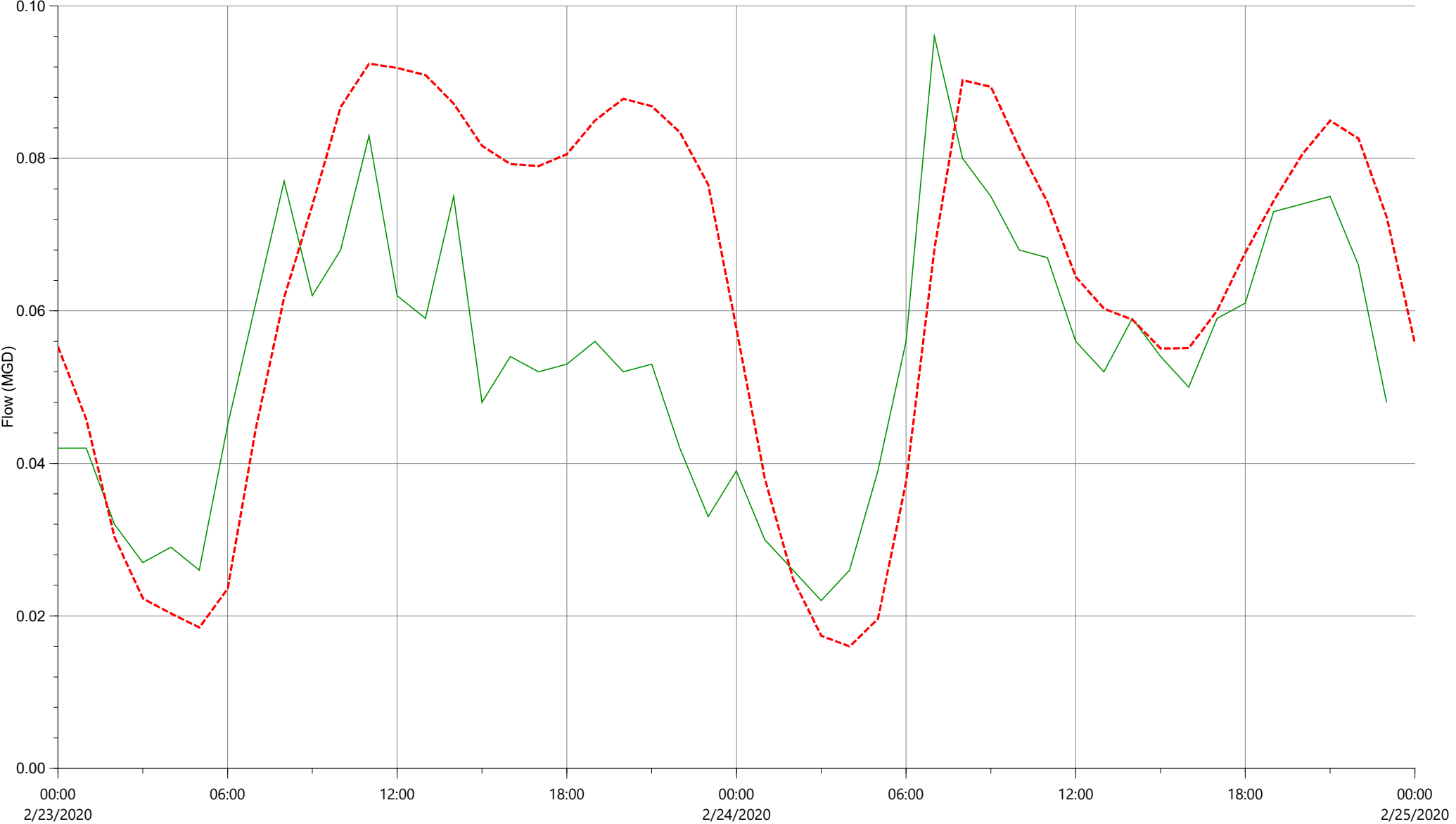


Observed
Model



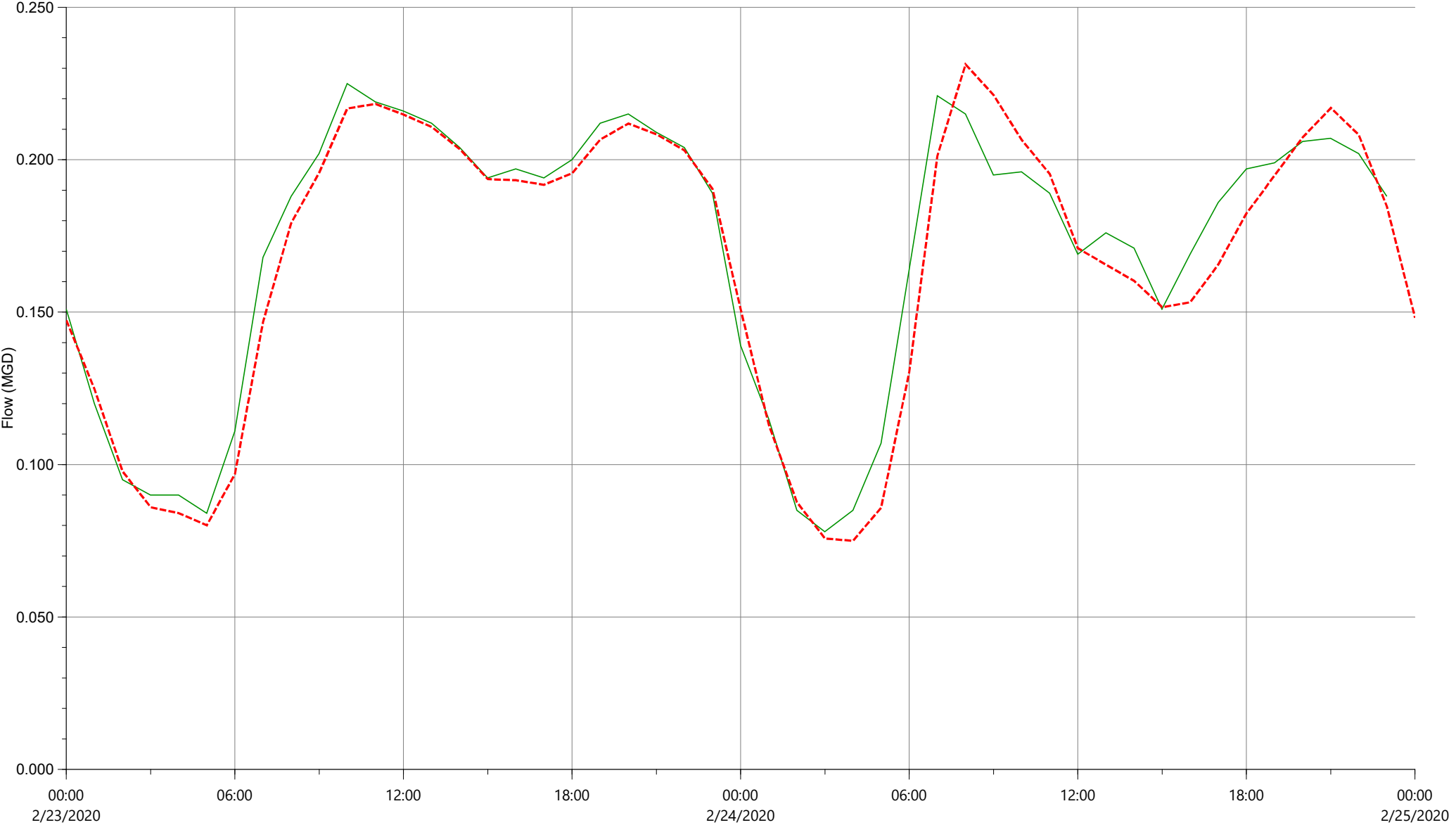
| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.035 | 0.147 | 0.143 |
| 0.037 | 0.150 | 0.153 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL



Observed
Model

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

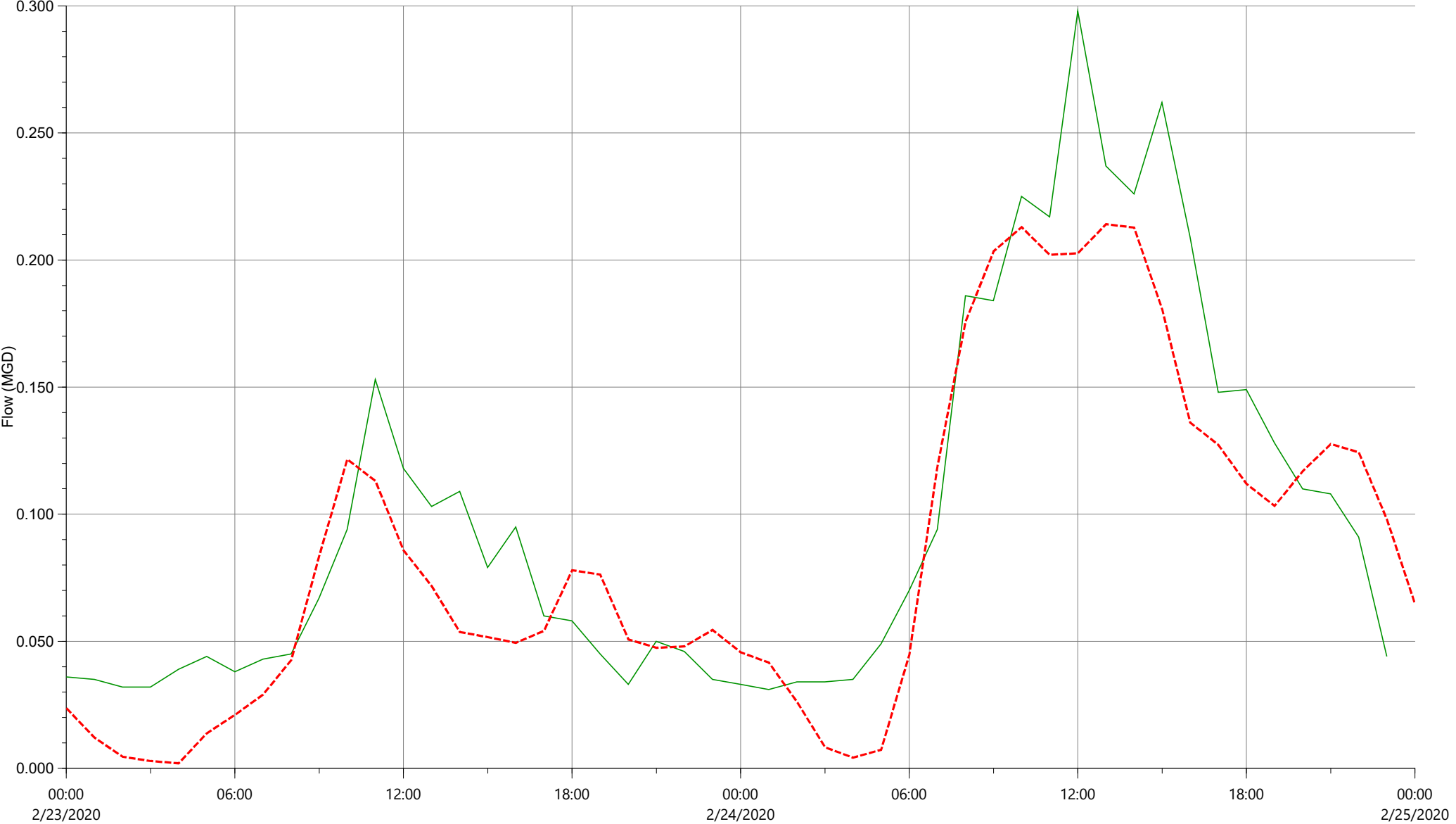


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.078 | 0.225 | 0.335 |
| 0.075 | 0.231 | 0.335 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

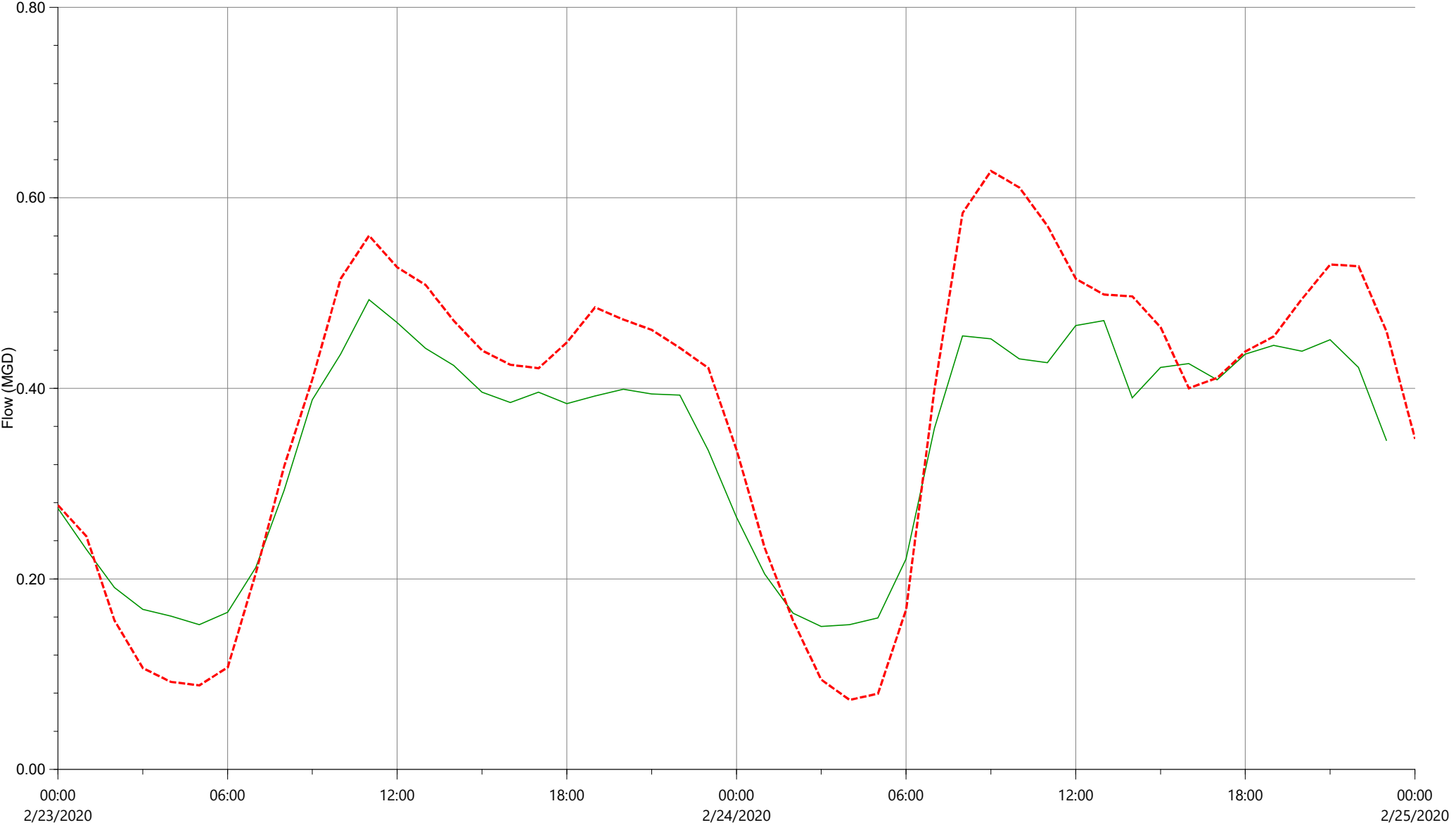


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.031 | 0.298 | 0.194 |
| 0.002 | 0.214 | 0.169 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

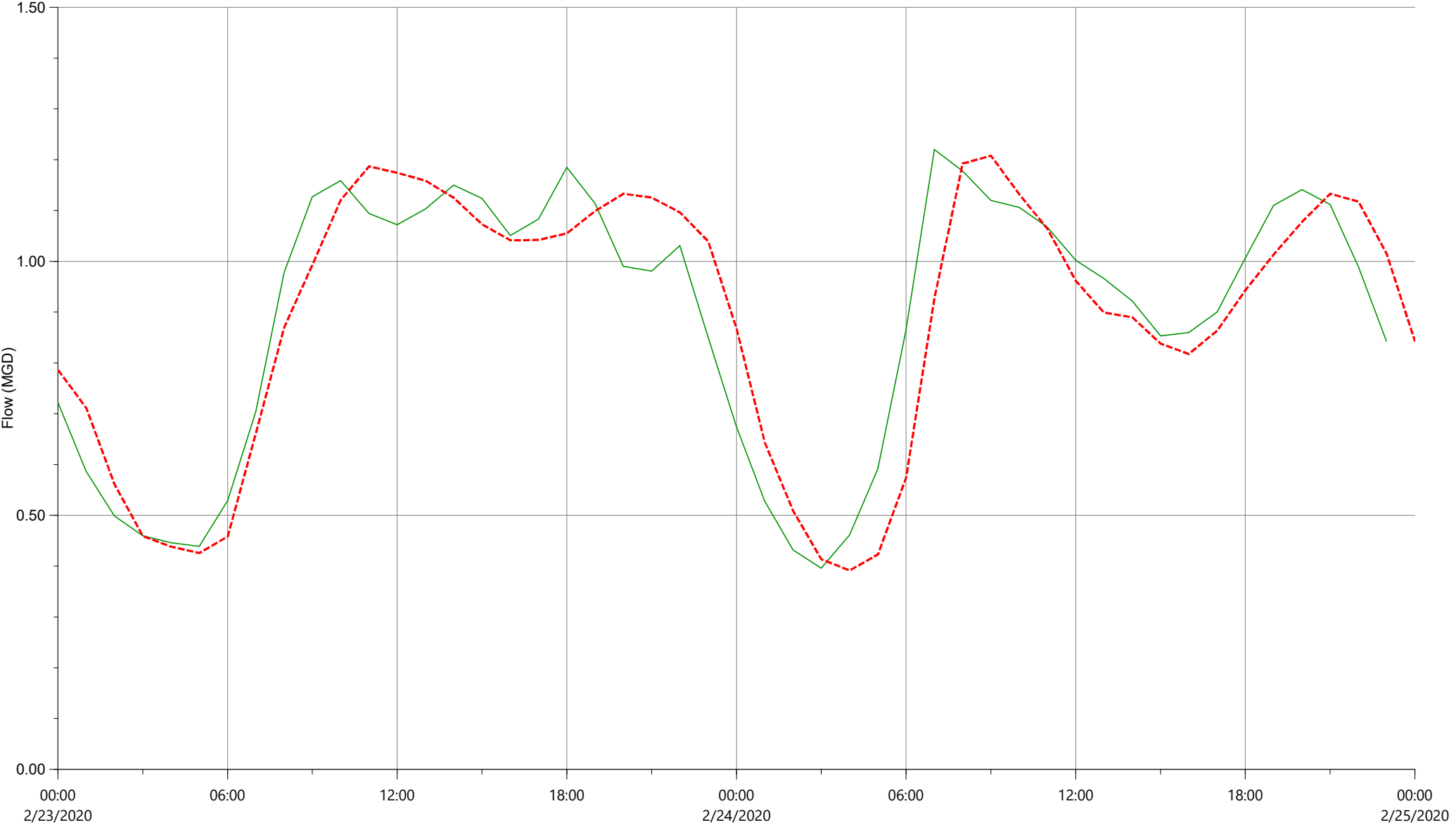


Observed
Model



| Flow | | |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | Volume (US Mgal) |
| 0.150 | 0.493 | 0.676 |
| 0.073 | 0.628 | 0.761 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

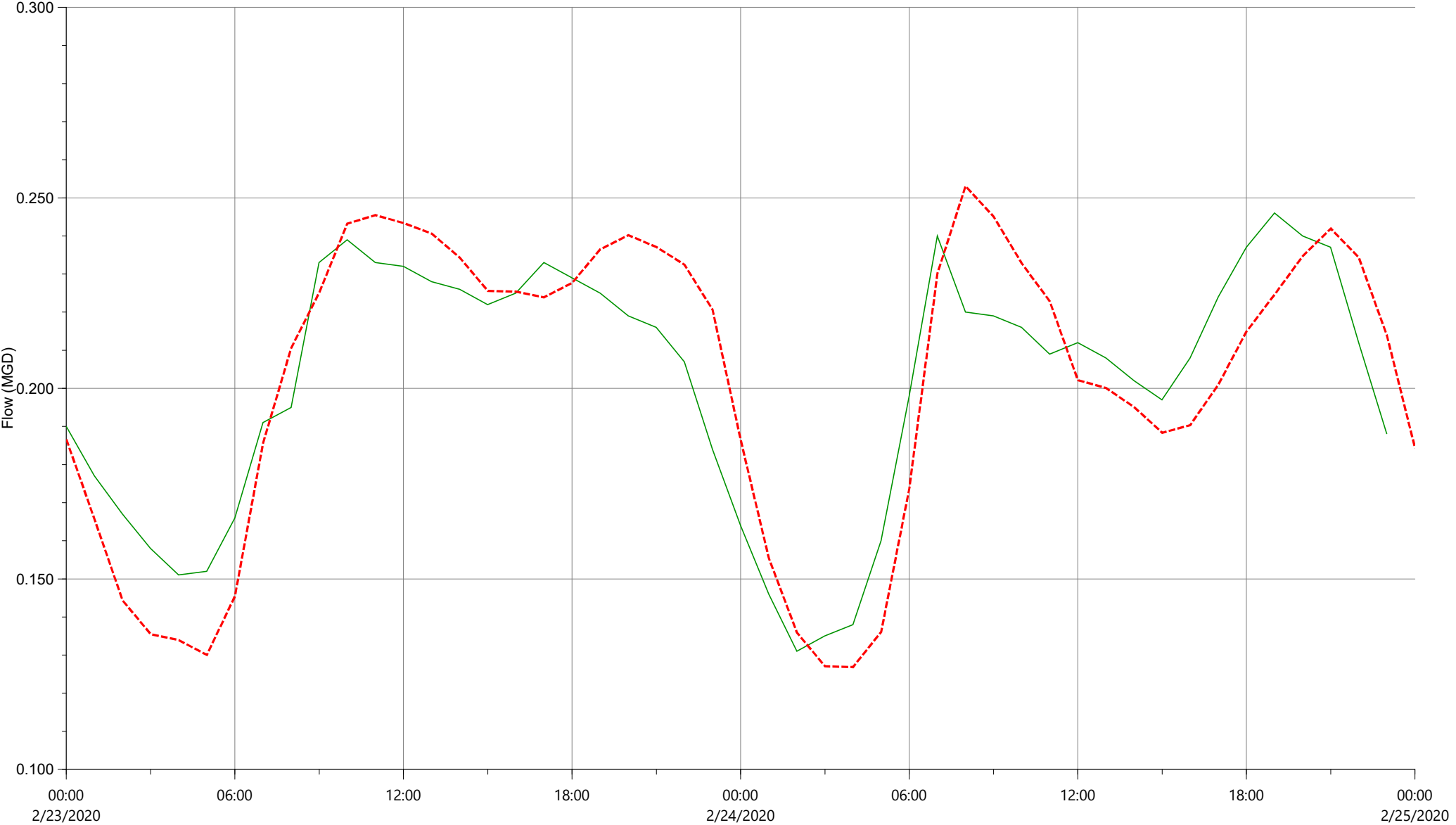


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.396 | 1.220 | 1.752 |
| 0.392 | 1.208 | 1.783 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

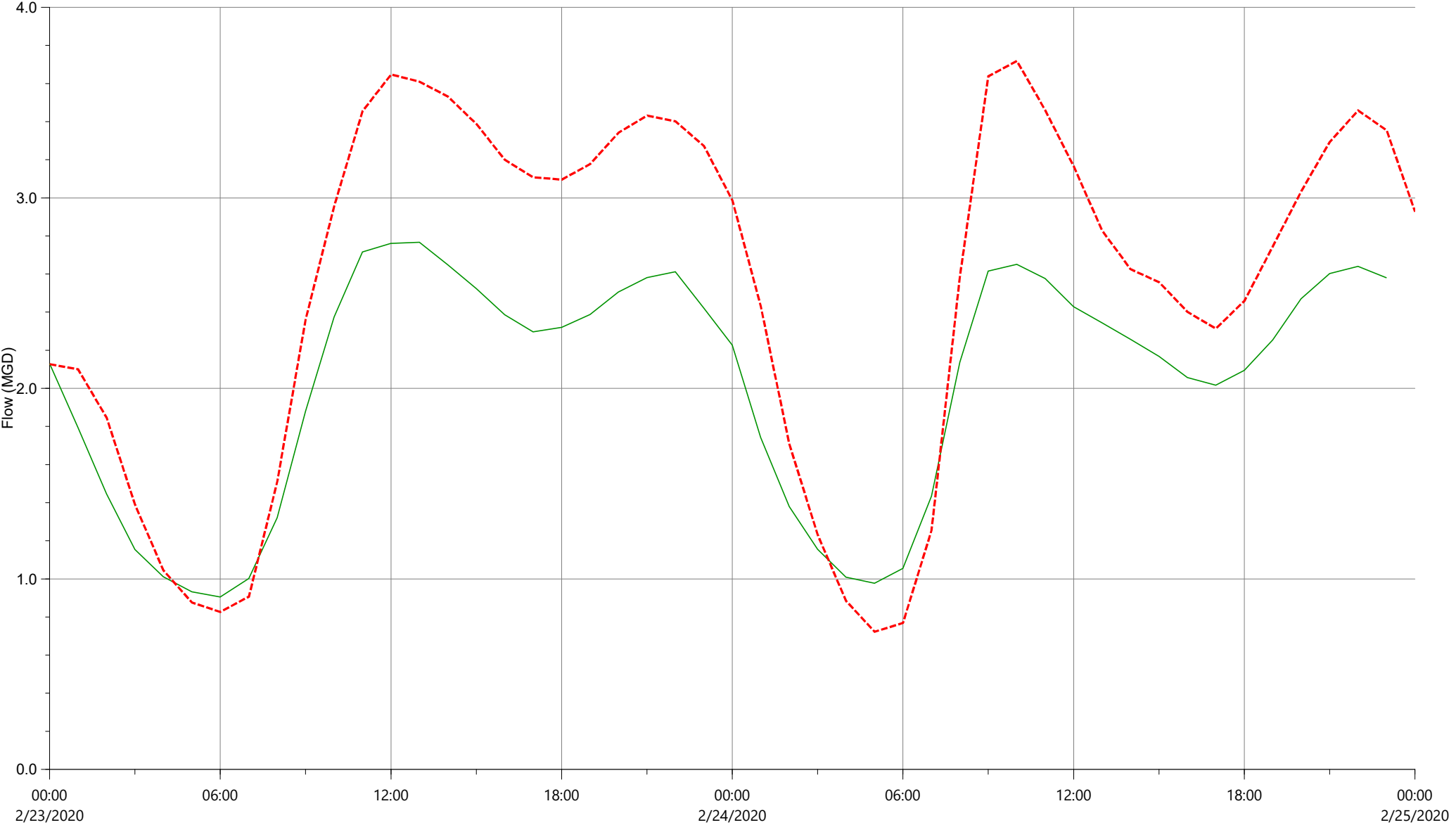


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.131 | 0.246 | 0.396 |
| 0.127 | 0.253 | 0.404 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

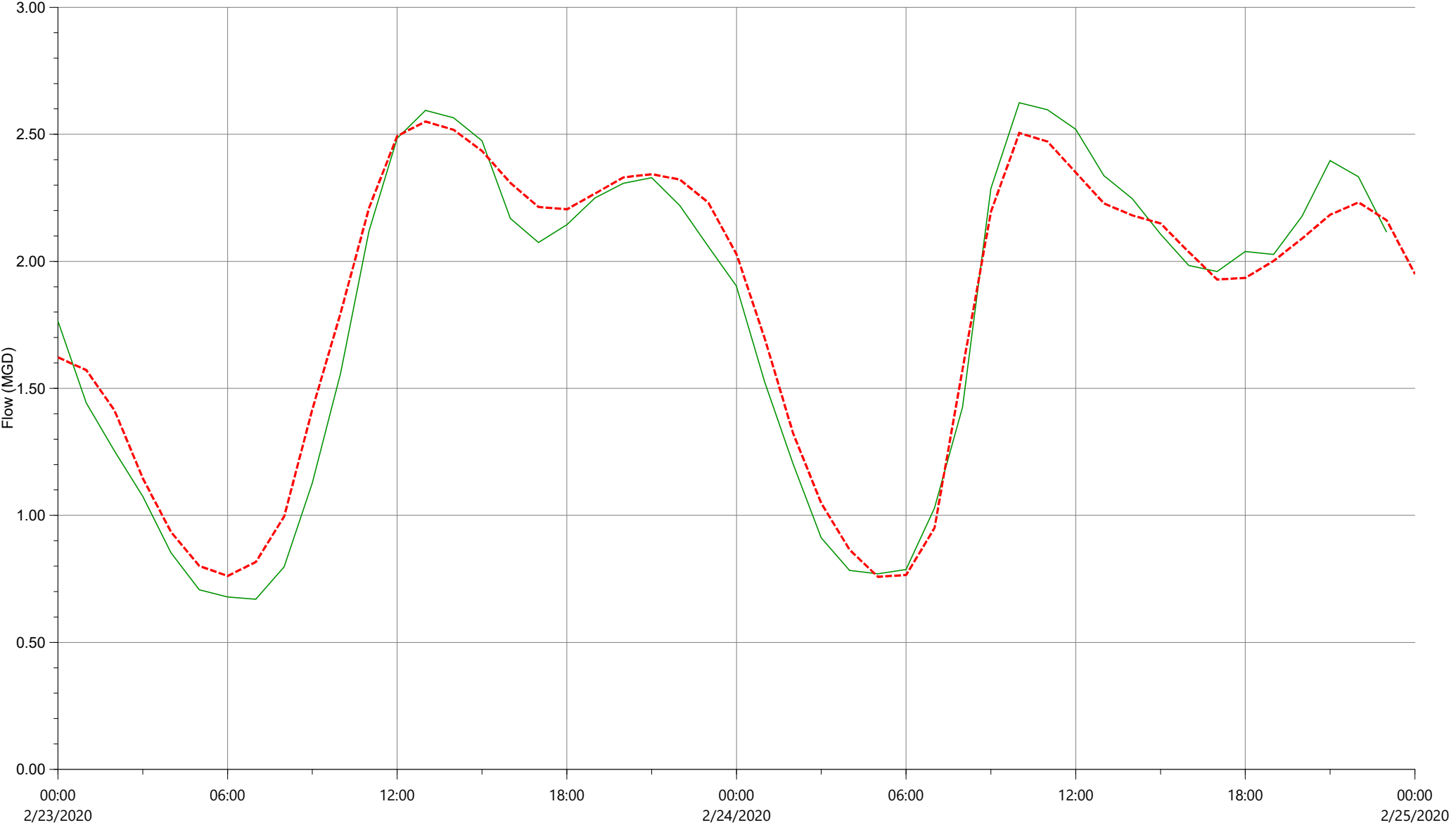


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.905 | 2.767 | 3.975 |
| 0.723 | 3.719 | 5.069 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

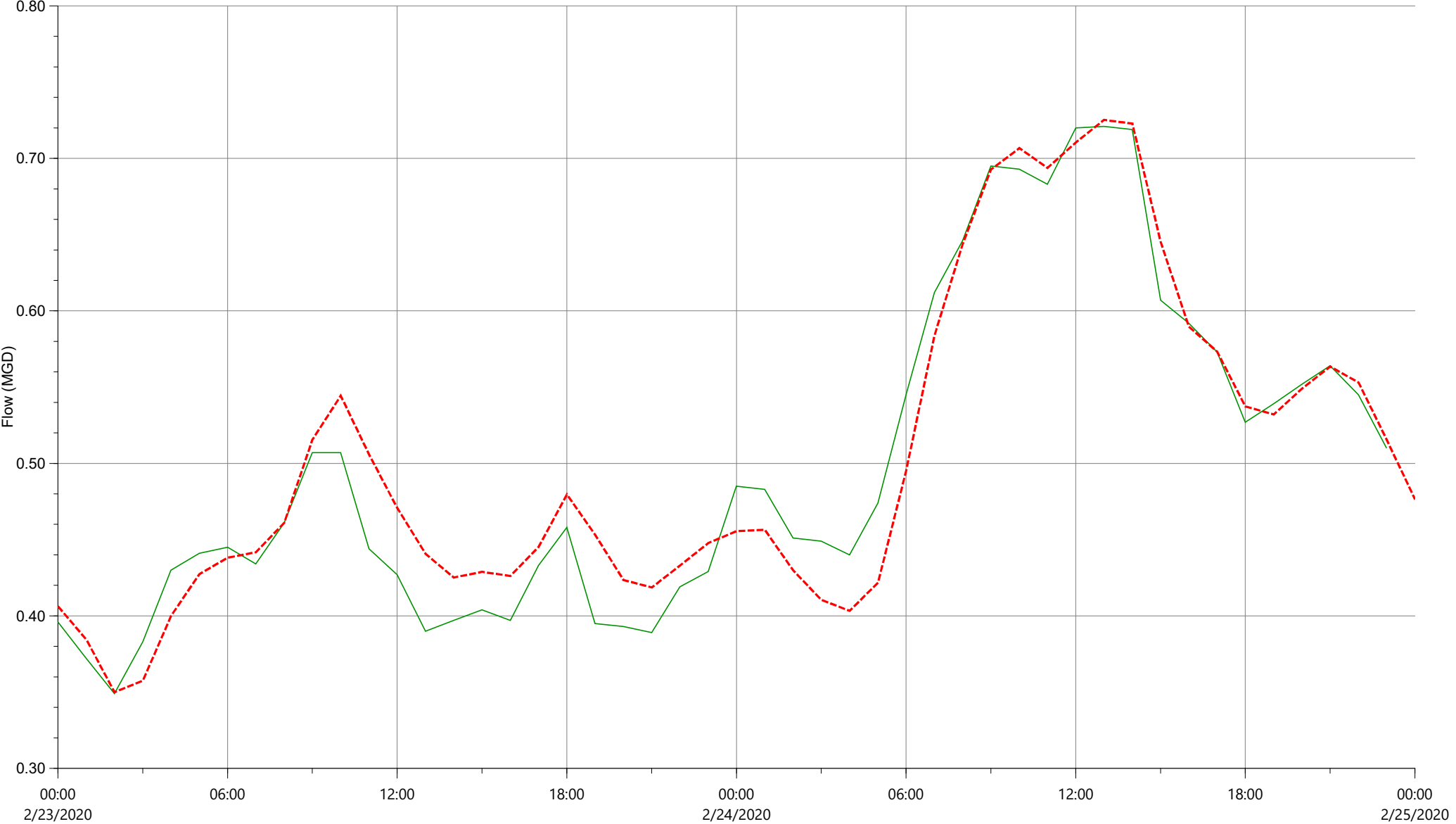


Observed
Model



| Flow | | |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | Volume (US Mgal) |
| 0.670 | 2.624 | 3.494 |
| 0.758 | 2.551 | 3.648 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

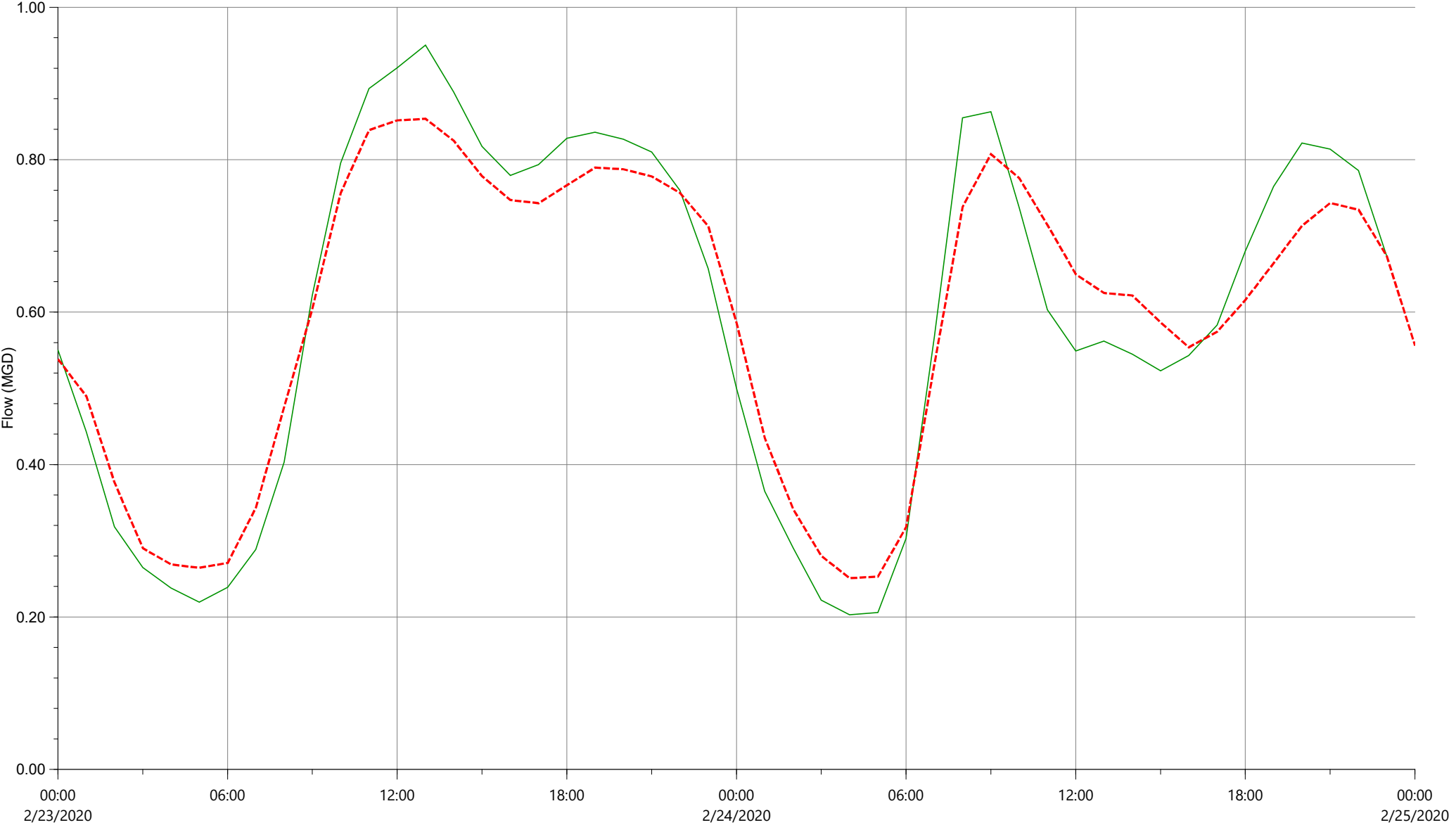


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.349 | 0.721 | 0.978 |
| 0.350 | 0.725 | 1.007 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

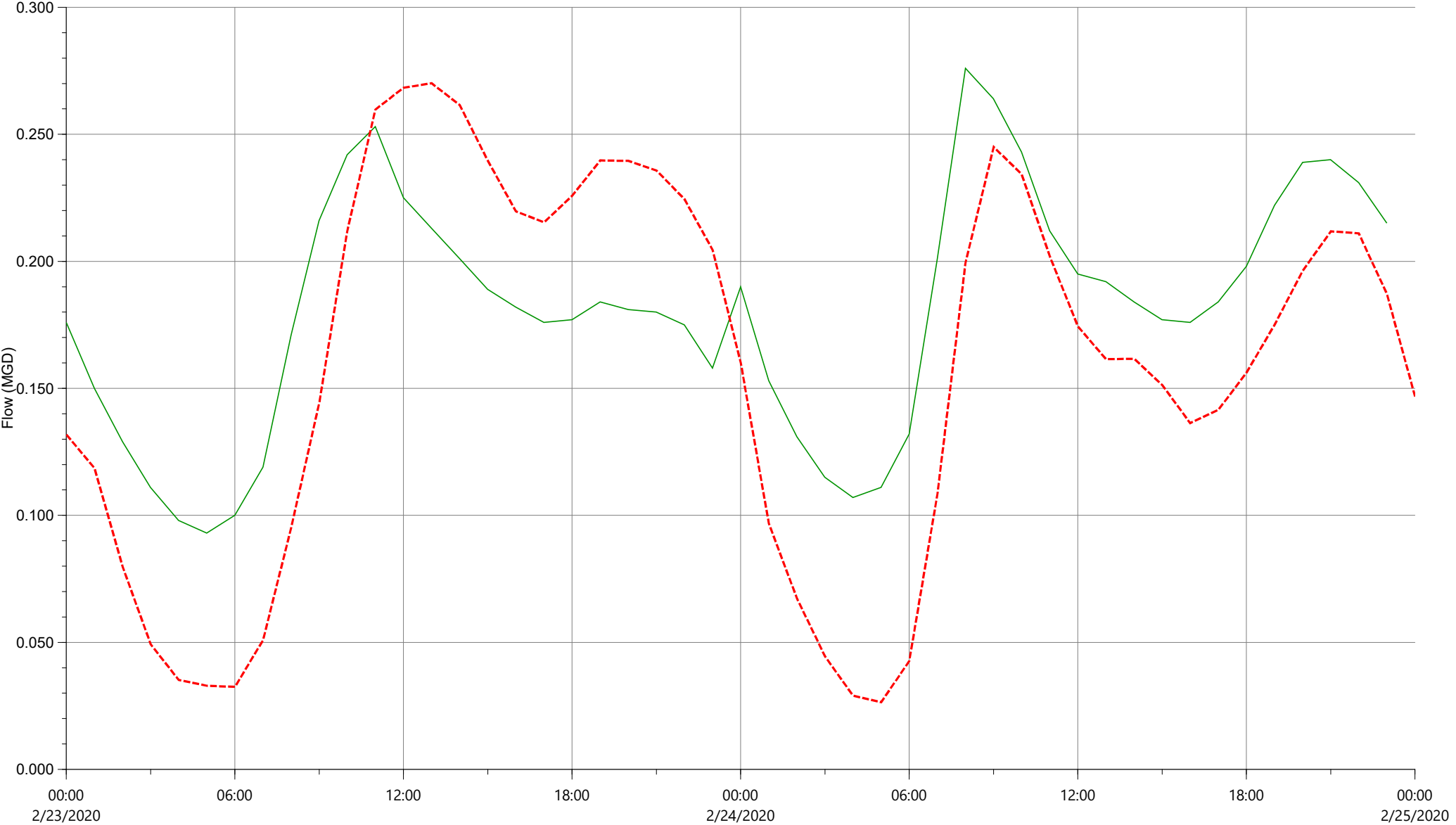


Observed
Model



| Flow | | |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | Volume (US Mgal) |
| 0.203 | 0.951 | 1.171 |
| 0.251 | 0.854 | 1.196 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

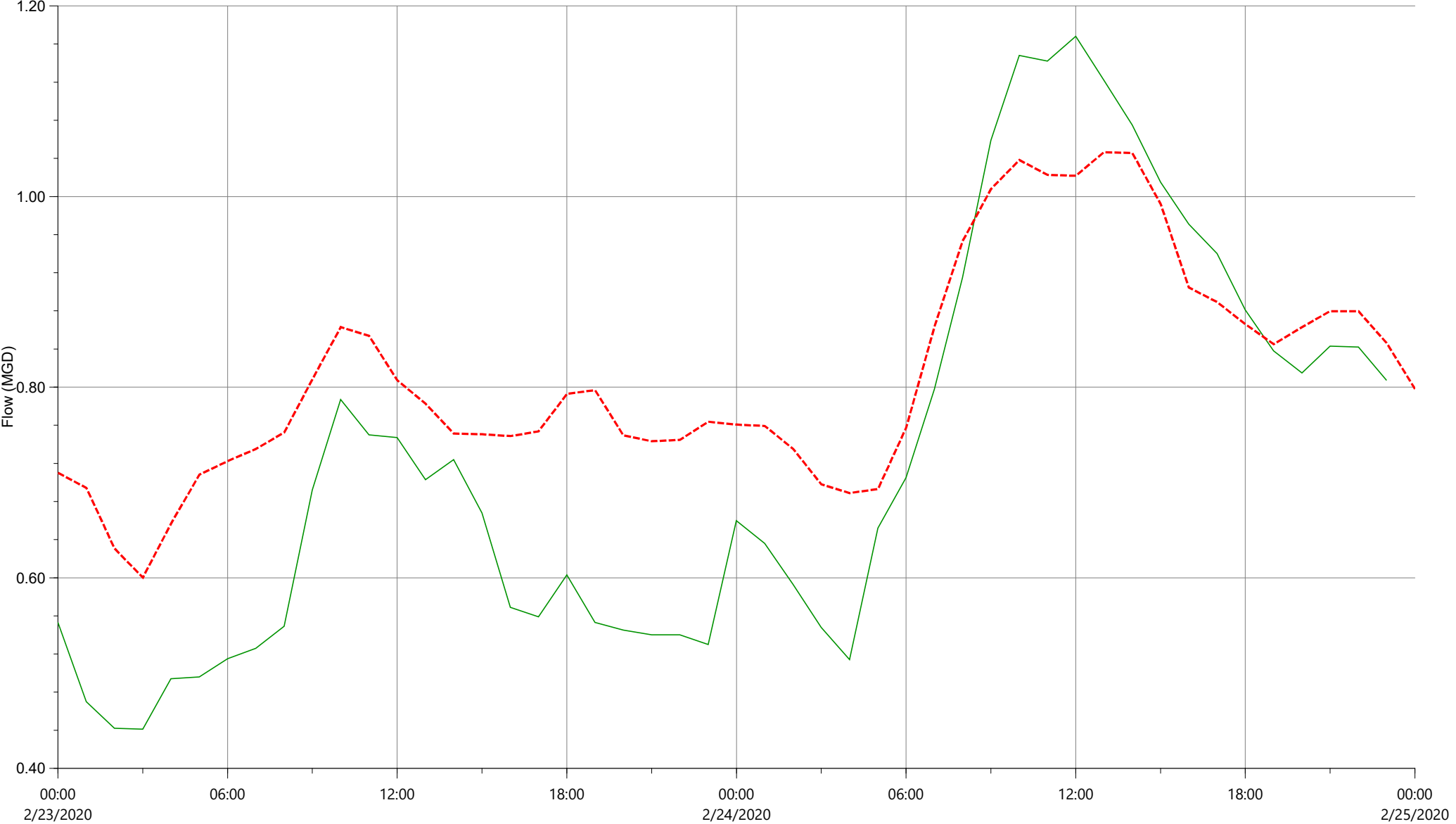


Observed
Model



| Flow | | Volume (US Mgal) |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | |
| 0.093 | 0.276 | 0.354 |
| 0.027 | 0.270 | 0.317 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

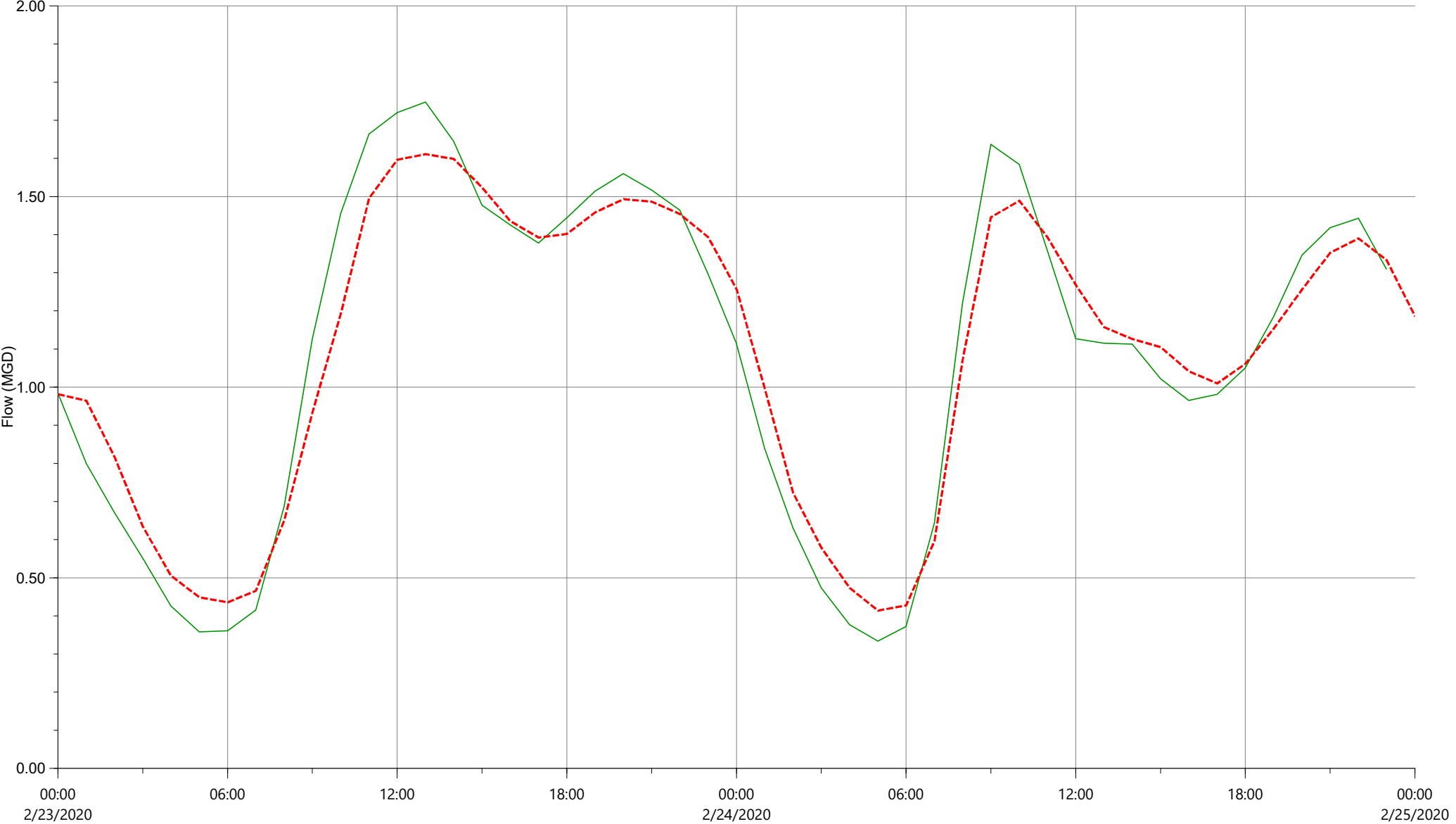


Observed
Model



| Flow | | |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | Volume (US Mgal) |
| 0.441 | 1.168 | 1.417 |
| 0.600 | 1.047 | 1.626 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

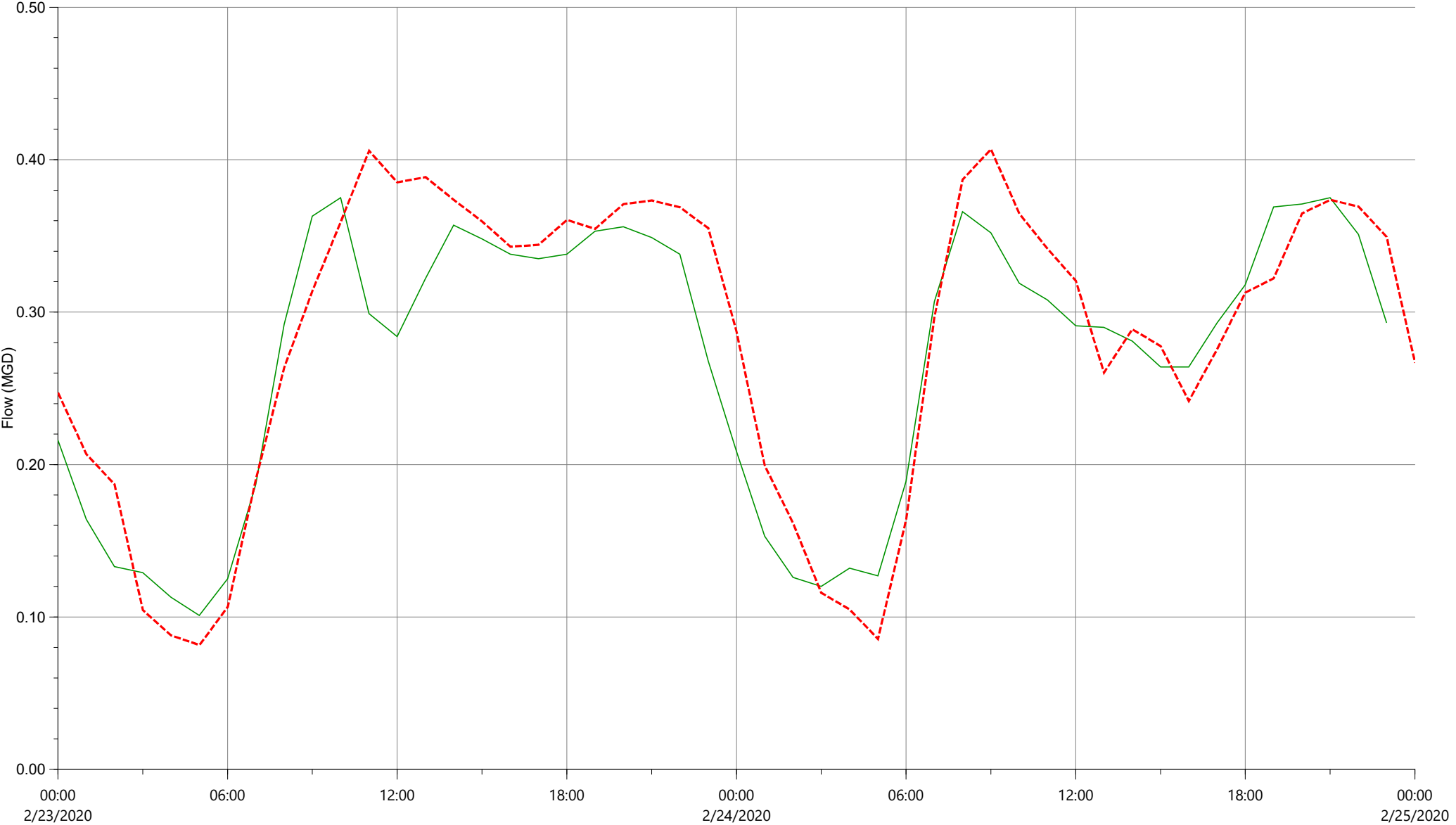


Observed
Model



| Flow | | |
|-----------|-----------|------------------|
| Min (MGD) | Max (MGD) | Volume (US Mgal) |
| 0.334 | 1.748 | 2.133 |
| 0.414 | 1.611 | 2.192 |

Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

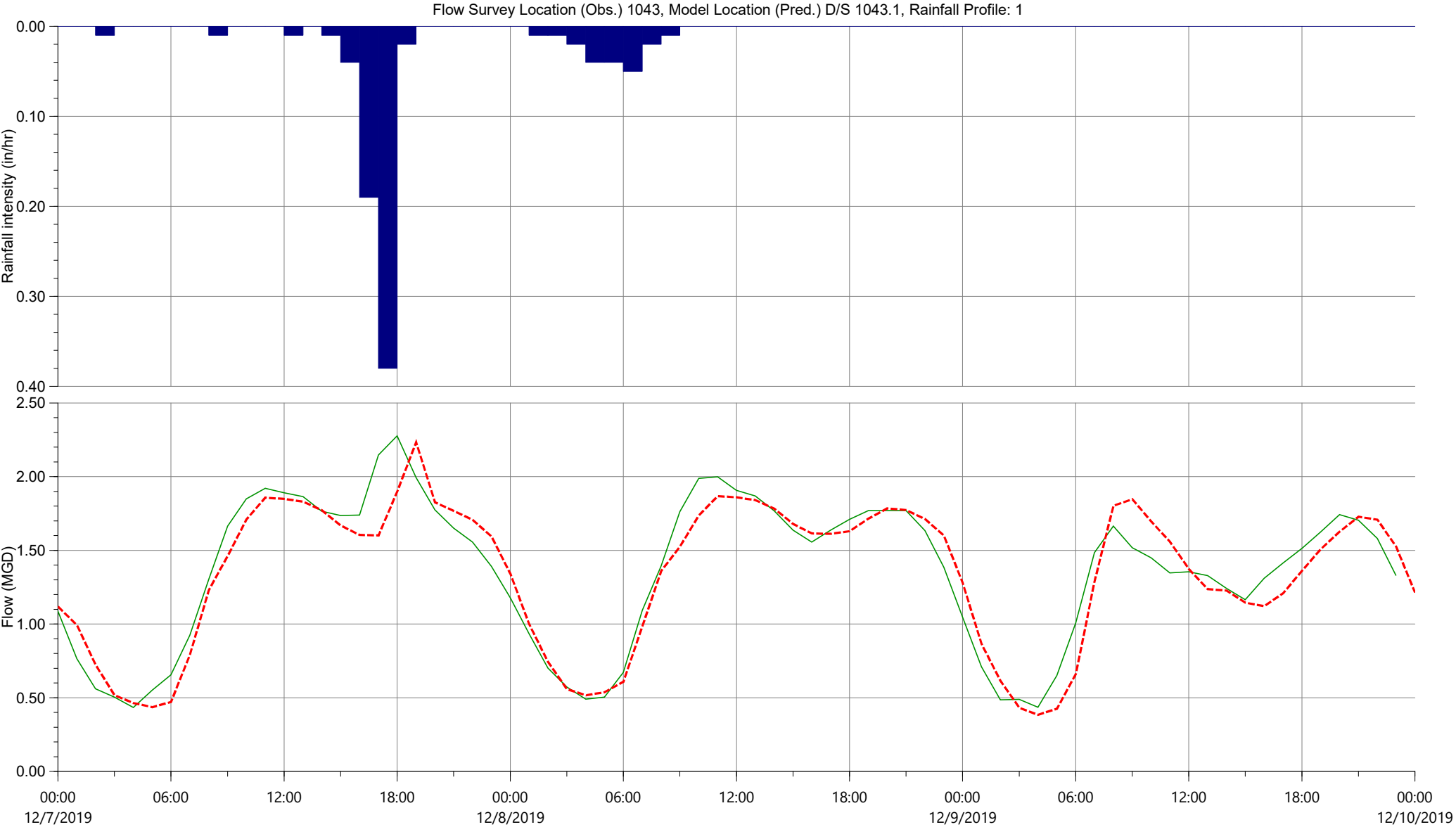


Observed
Model

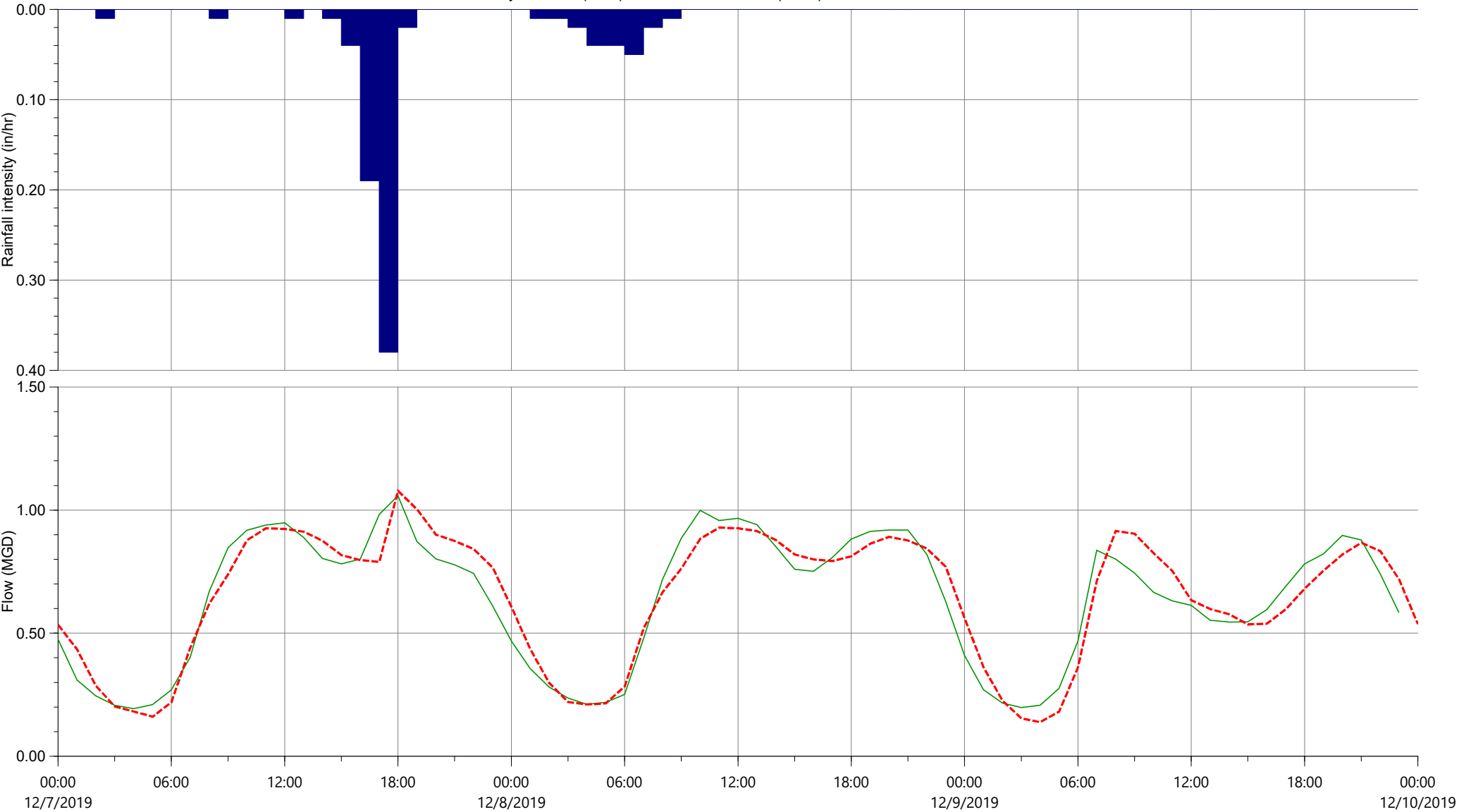
Observed / Predicted Report (Custom graph) - DWF Calibration FINAL

APPENDIX E
City of Milpitas
Sewer Master Plan Study
Wet Weather Calibration Charts

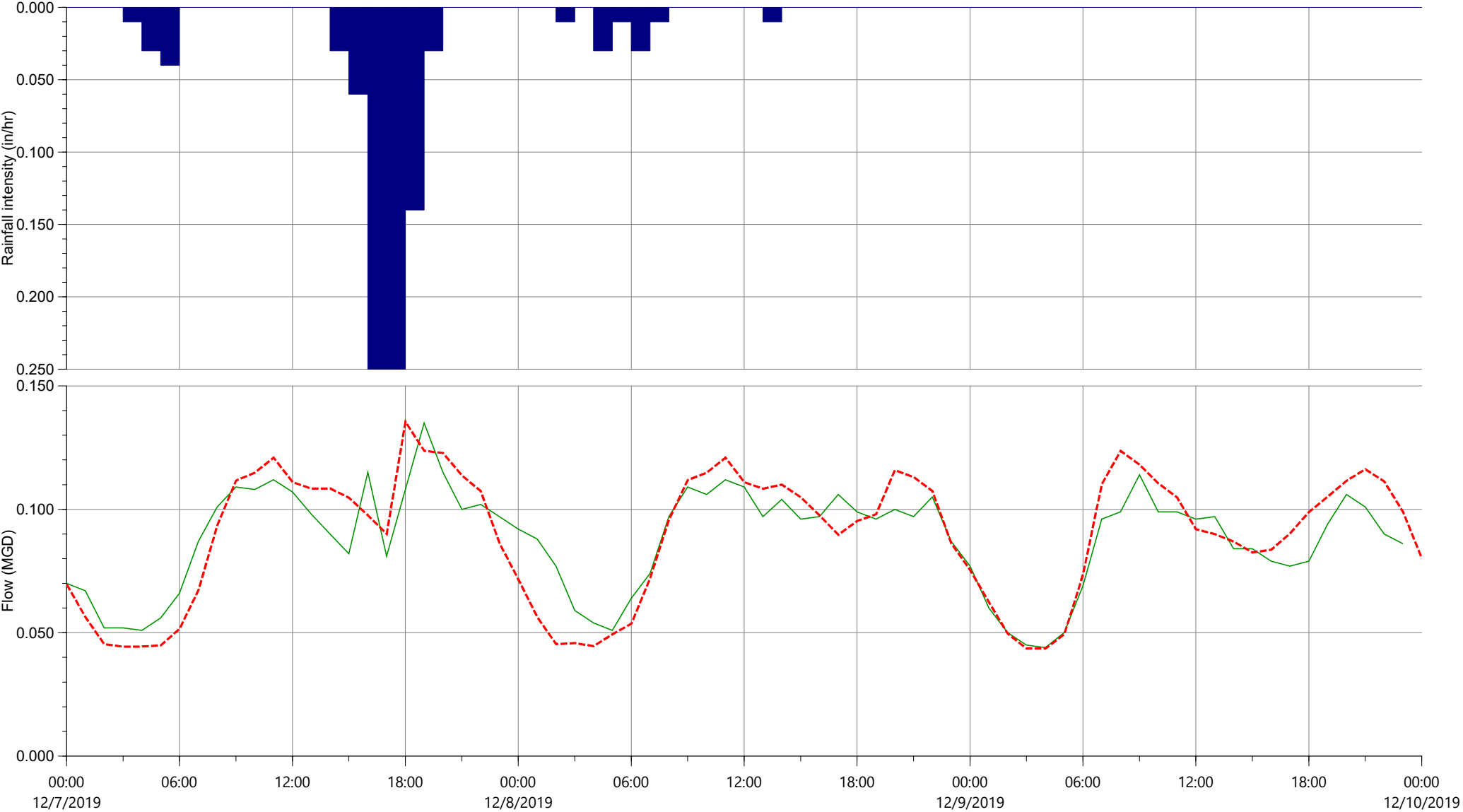
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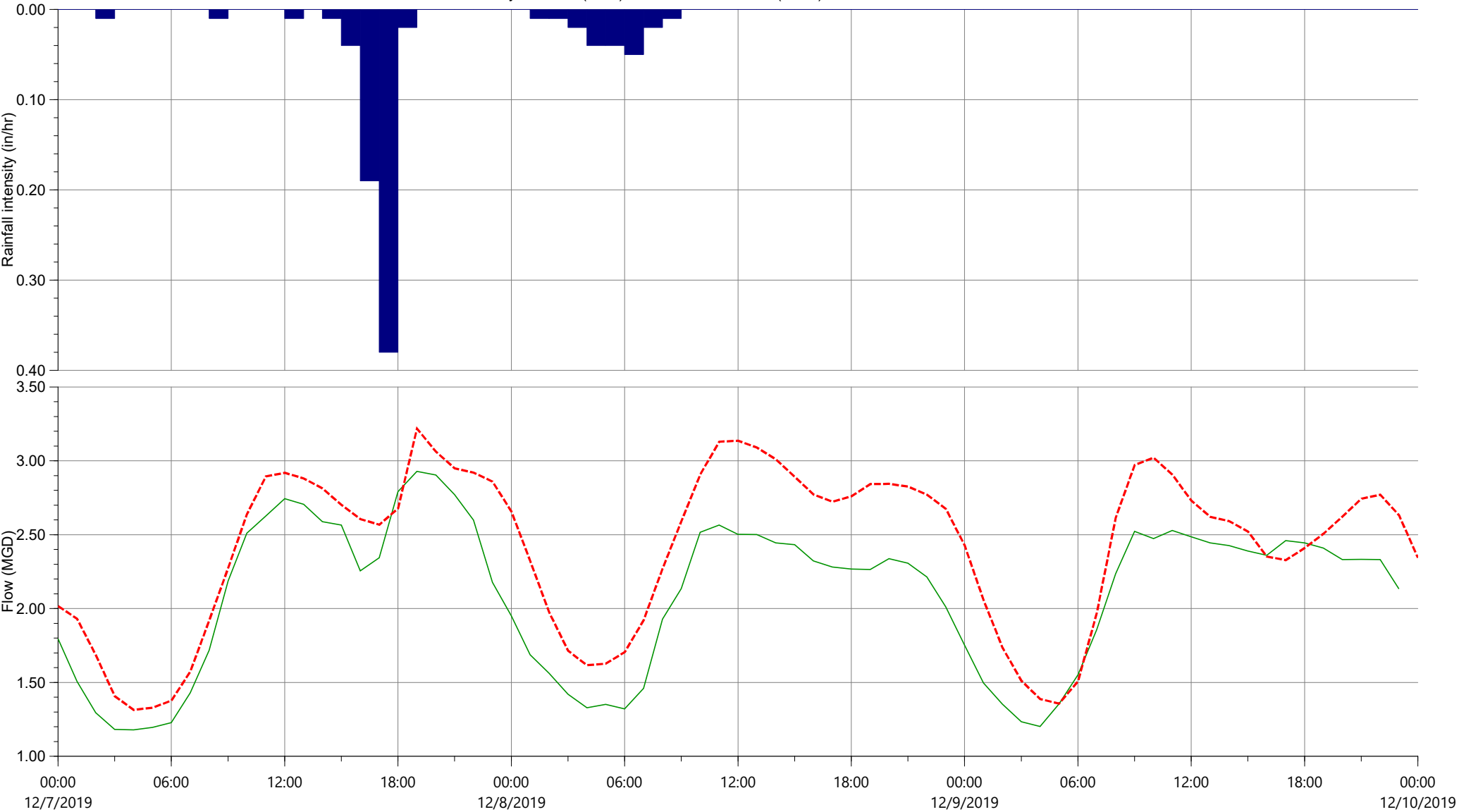
| | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Rain | 0.870 | 0.380 | 0.012 | | | |
| Observed | | | | 0.433 | 2.277 | 4.004 |
| Model | | | | 0.384 | 2.235 | 4.010 |



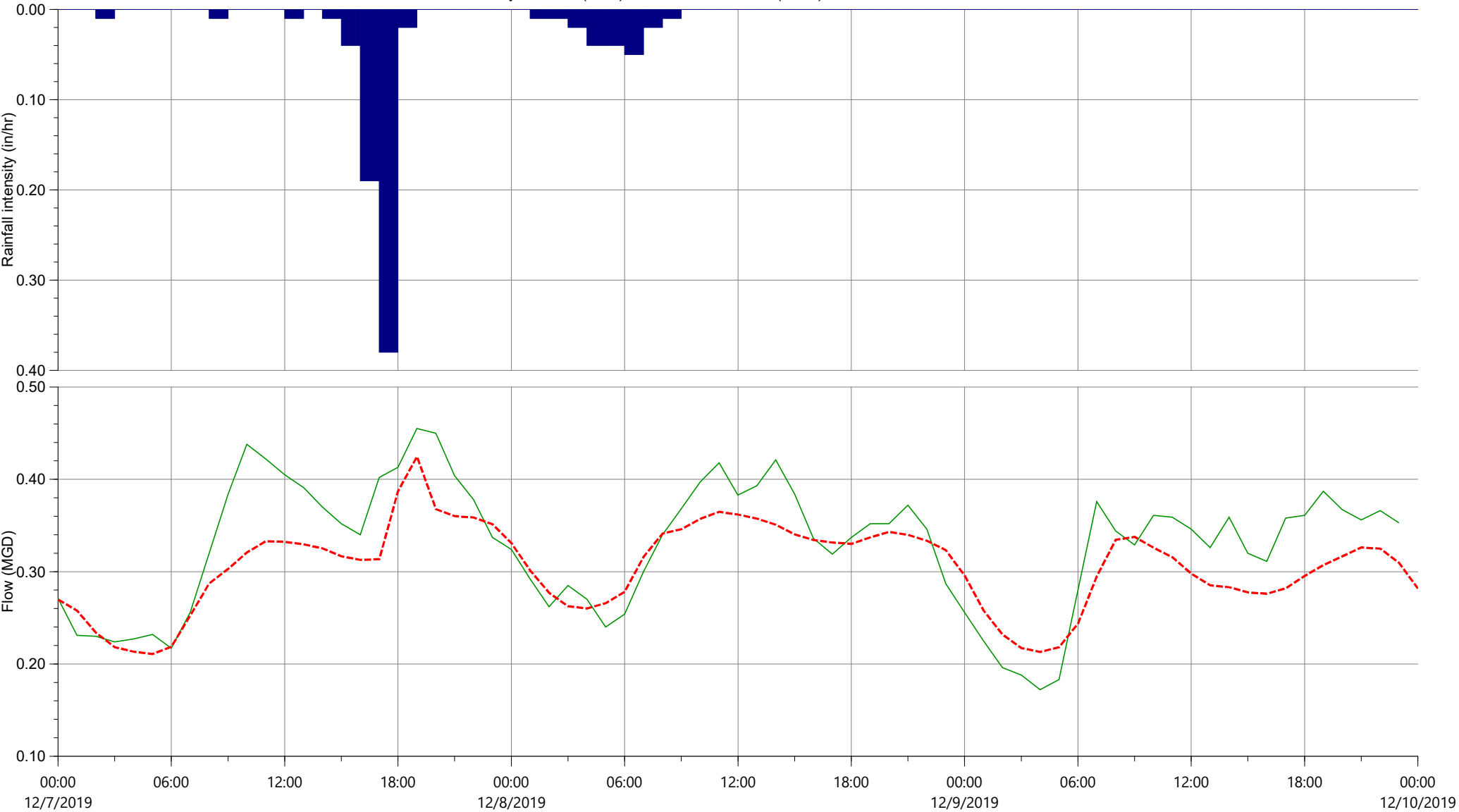
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 0.193 | 1.058 | 1.892 |
| Observed | | | | 0.139 | 1.079 | 1.946 |
| Model | | | | | | |



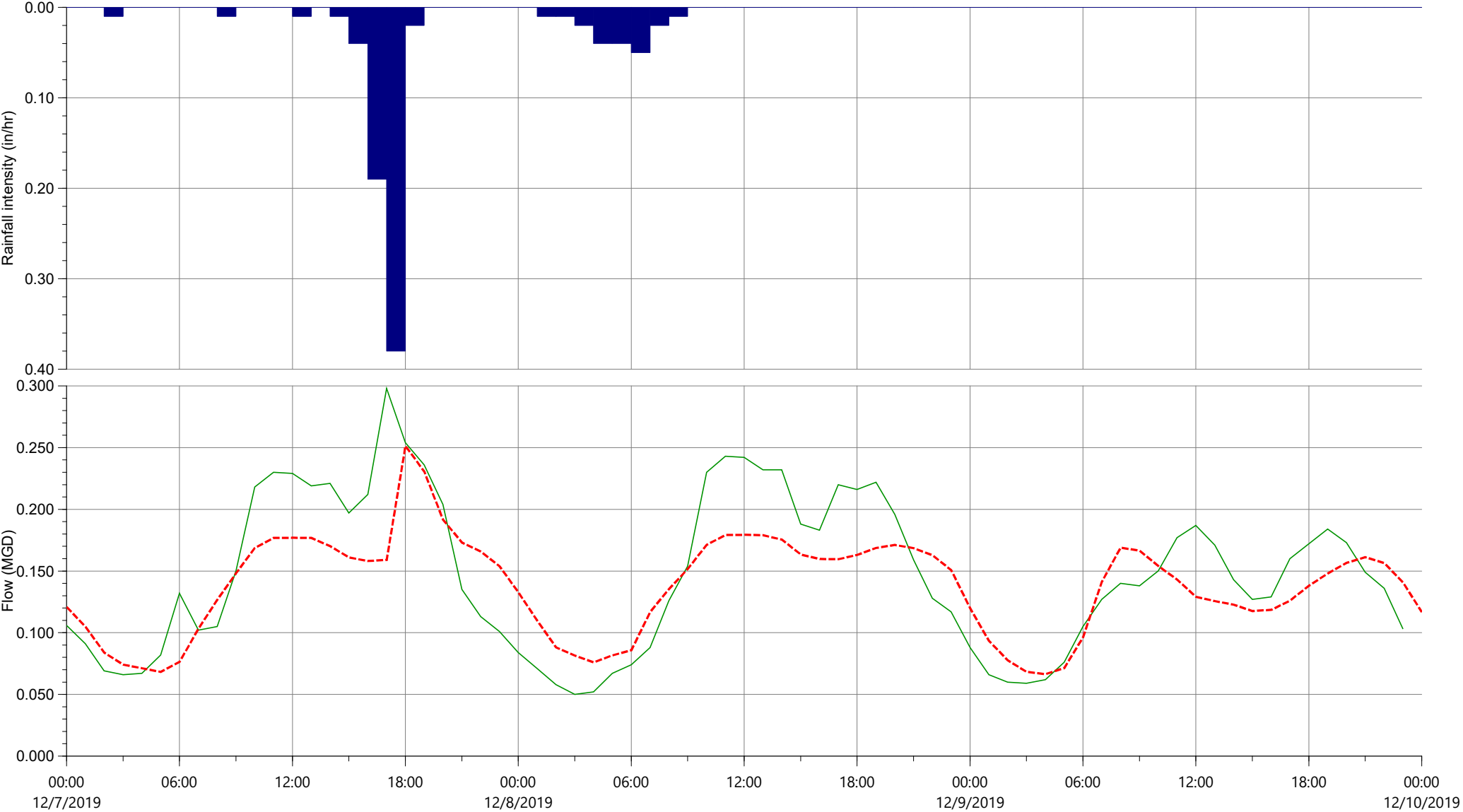
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Observed | 0.940 | 0.250 | 0.013 | 0.044 | 0.135 | 0.260 |
| Model | | | | 0.044 | 0.135 | 0.268 |



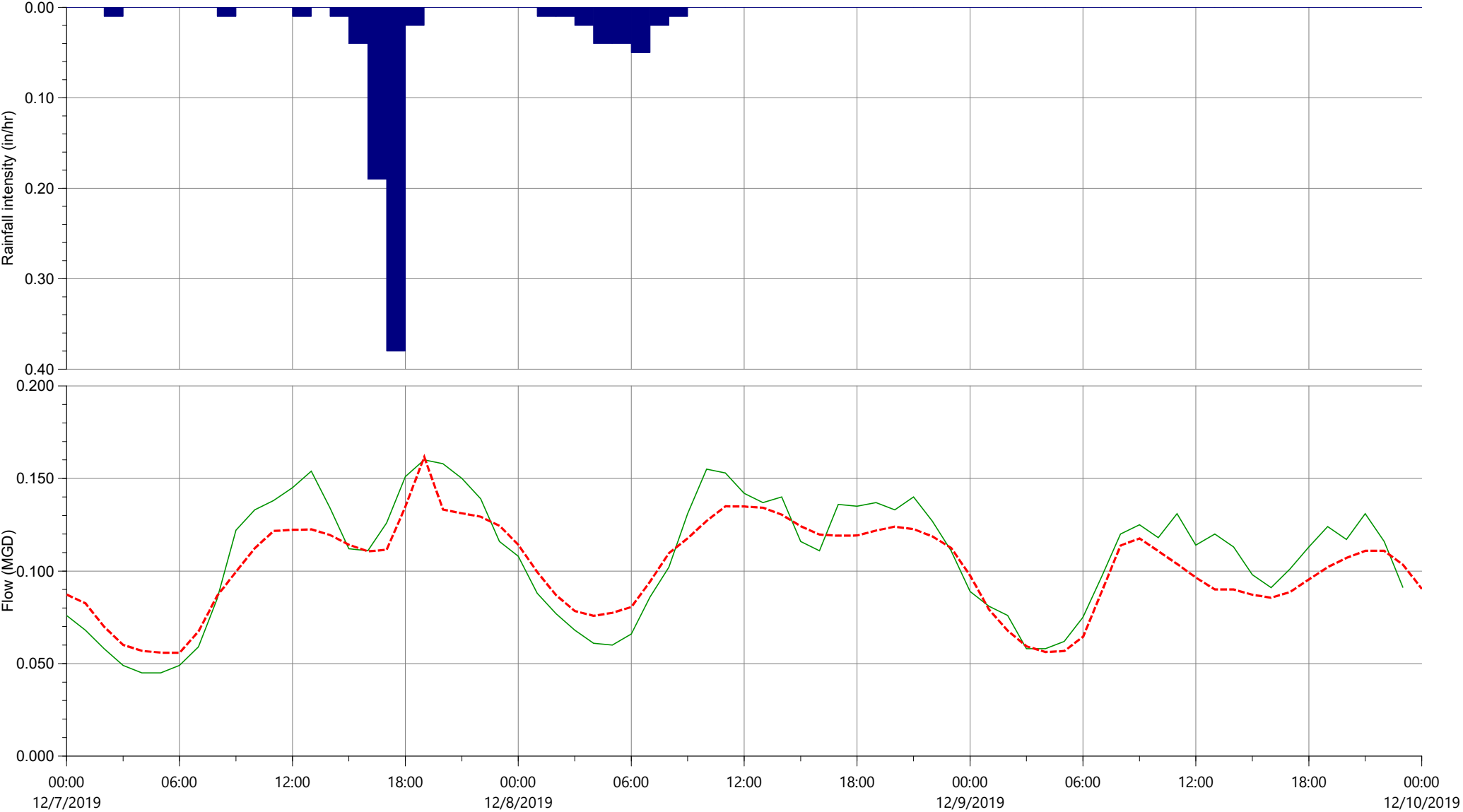
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 1.179 | 2.929 | 6.187 |
| Observed | | | | 1.314 | 3.219 | 7.243 |
| Model | | | | | | |



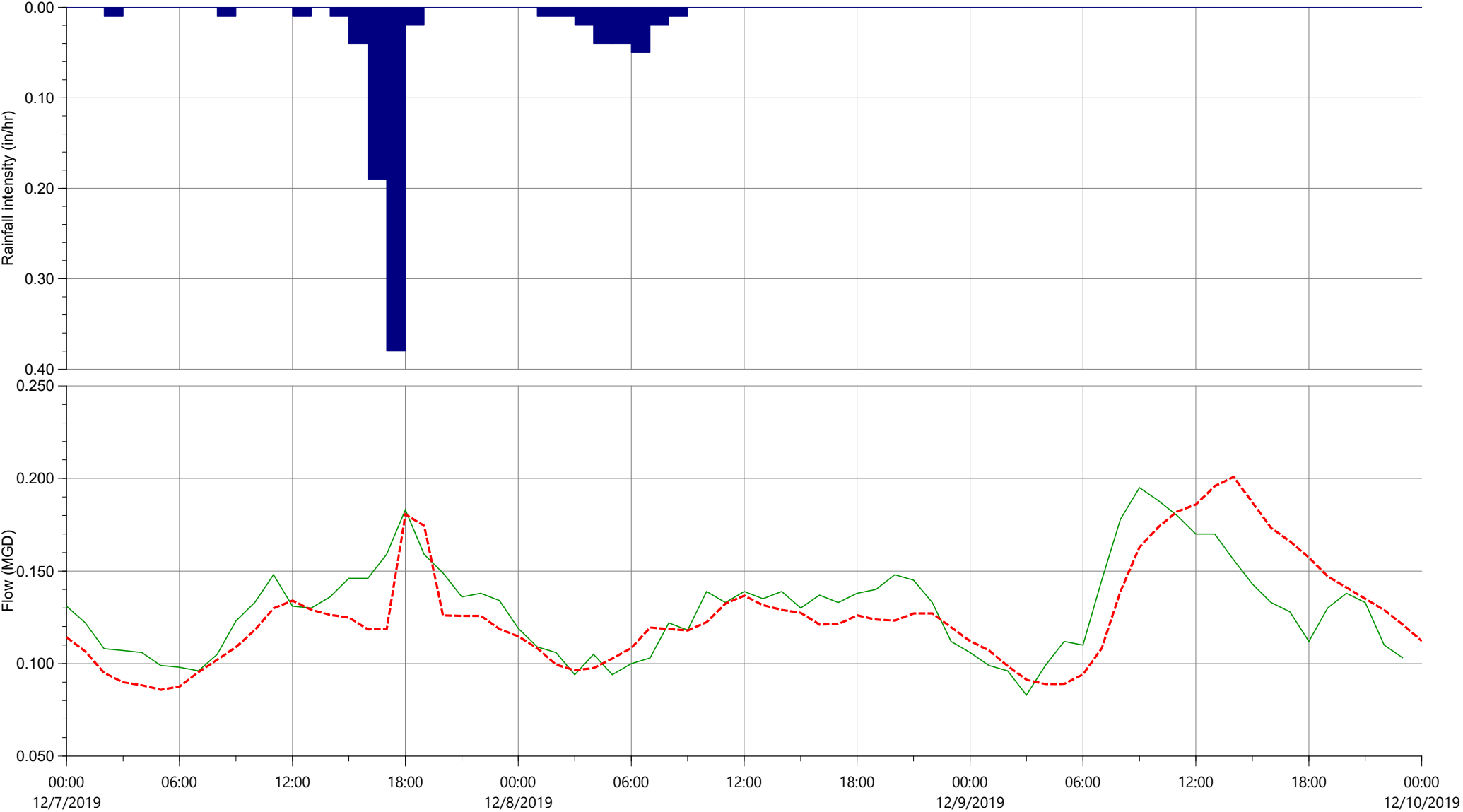
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Observed | 0.870 | 0.380 | 0.012 | 0.172 | 0.455 | 0.973 |
| Model | | | | 0.211 | 0.425 | 0.915 |



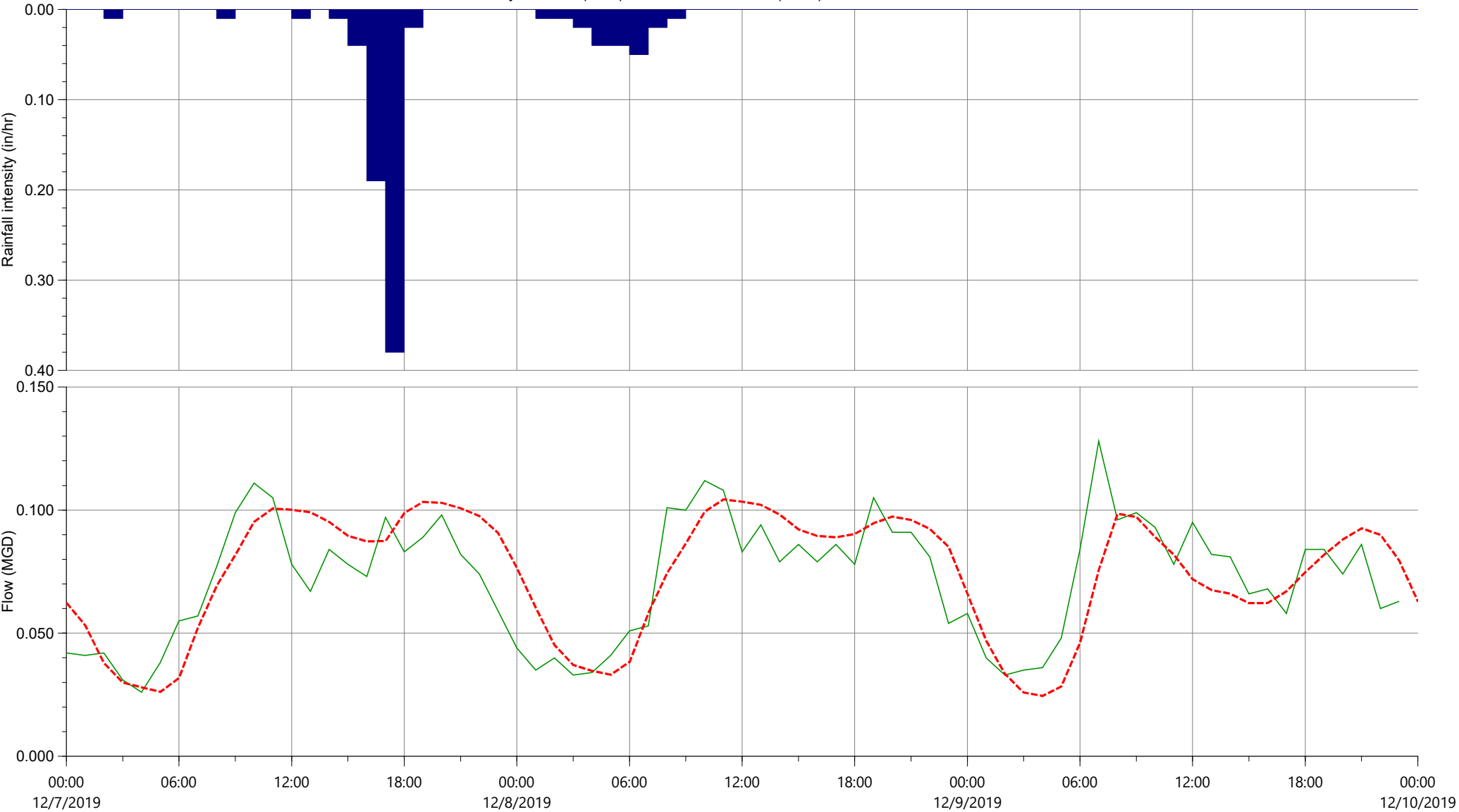
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 0.050 | 0.298 | 0.435 |
| Observed | | | | 0.067 | 0.251 | 0.413 |
| Model | | | | | | |



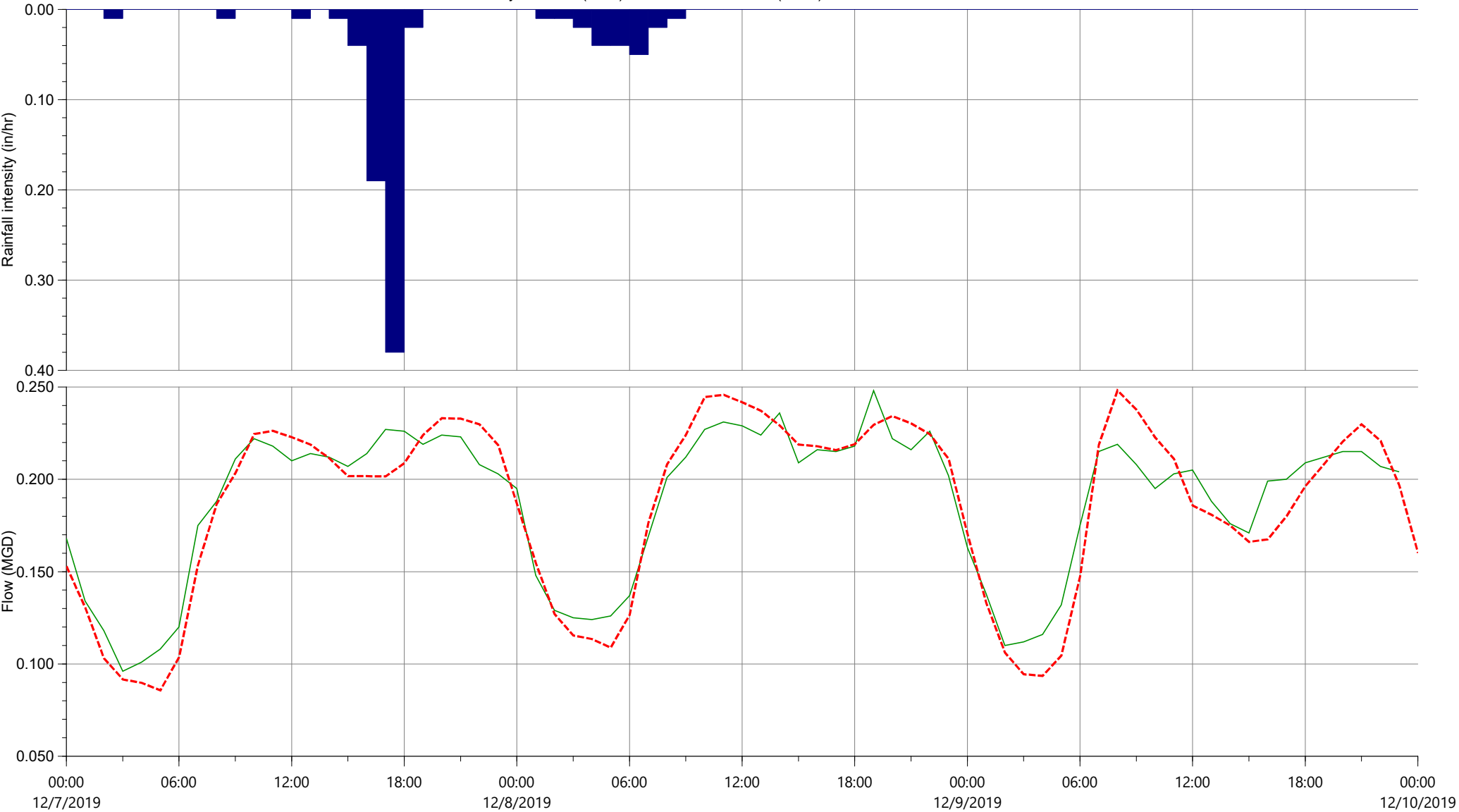
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Observed | 0.870 | 0.380 | 0.012 | 0.045 | 0.160 | 0.318 |
| Model | | | | 0.056 | 0.162 | 0.306 |



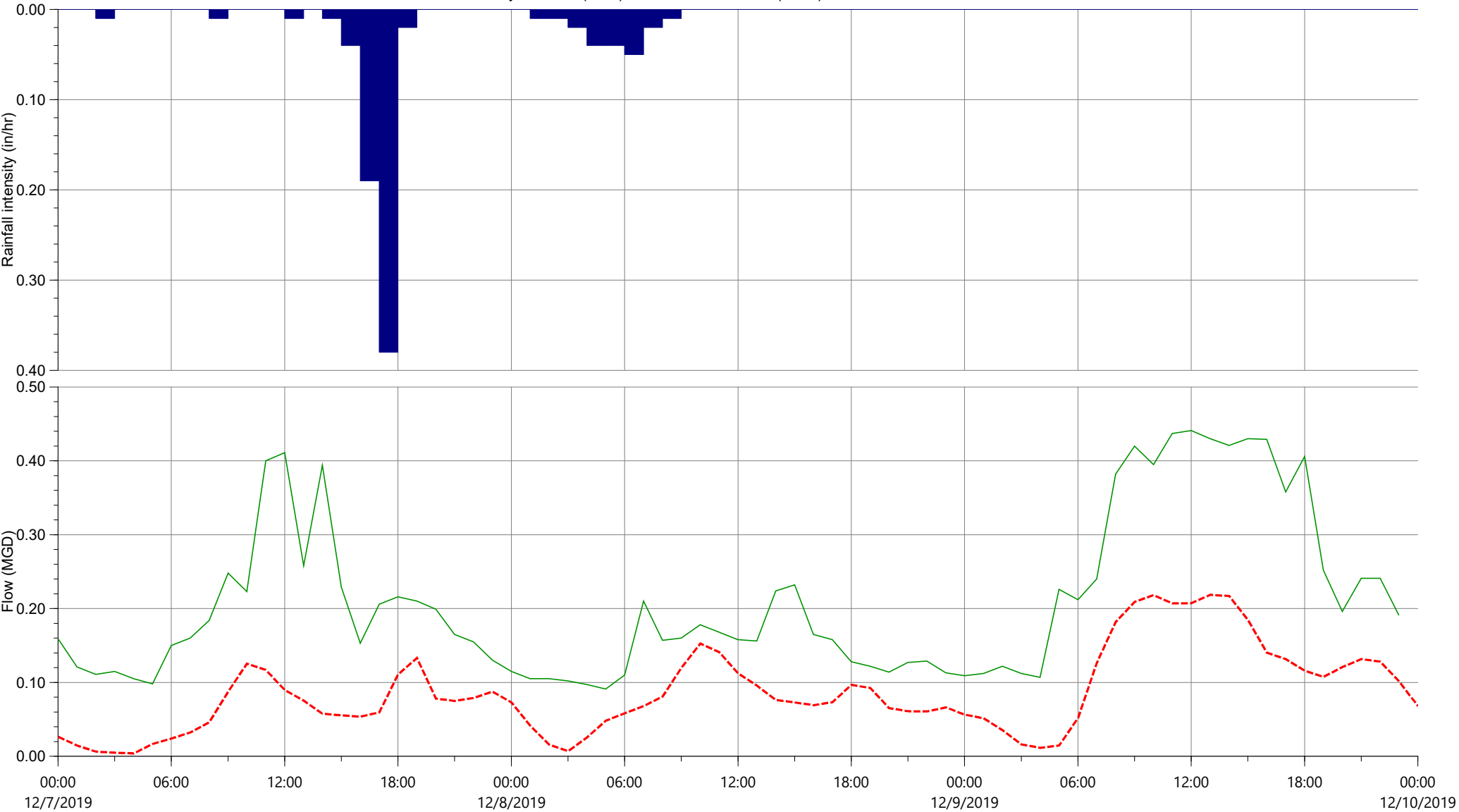
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Observed | 0.870 | 0.380 | 0.012 | 0.083 | 0.195 | 0.383 |
| Model | | | | 0.086 | 0.201 | 0.378 |



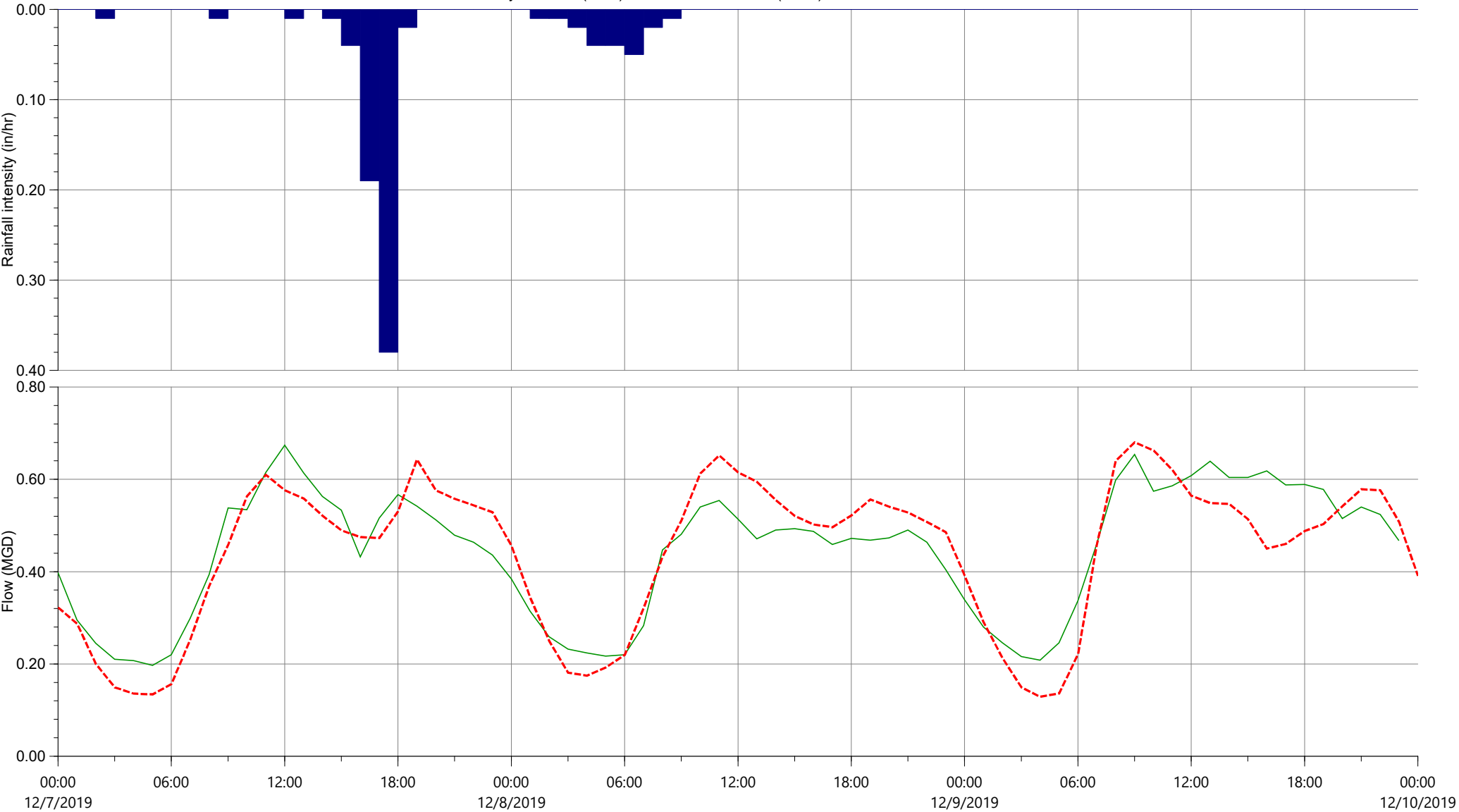
| | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Rain | 0.870 | 0.380 | 0.012 | | | |
| Observed | | | | 0.026 | 0.128 | 0.213 |
| Model | | | | 0.025 | 0.104 | 0.222 |



| | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Rain | 0.870 | 0.380 | 0.012 | | | |
| Observed | | | | 0.096 | 0.248 | 0.555 |
| Model | | | | 0.086 | 0.248 | 0.559 |

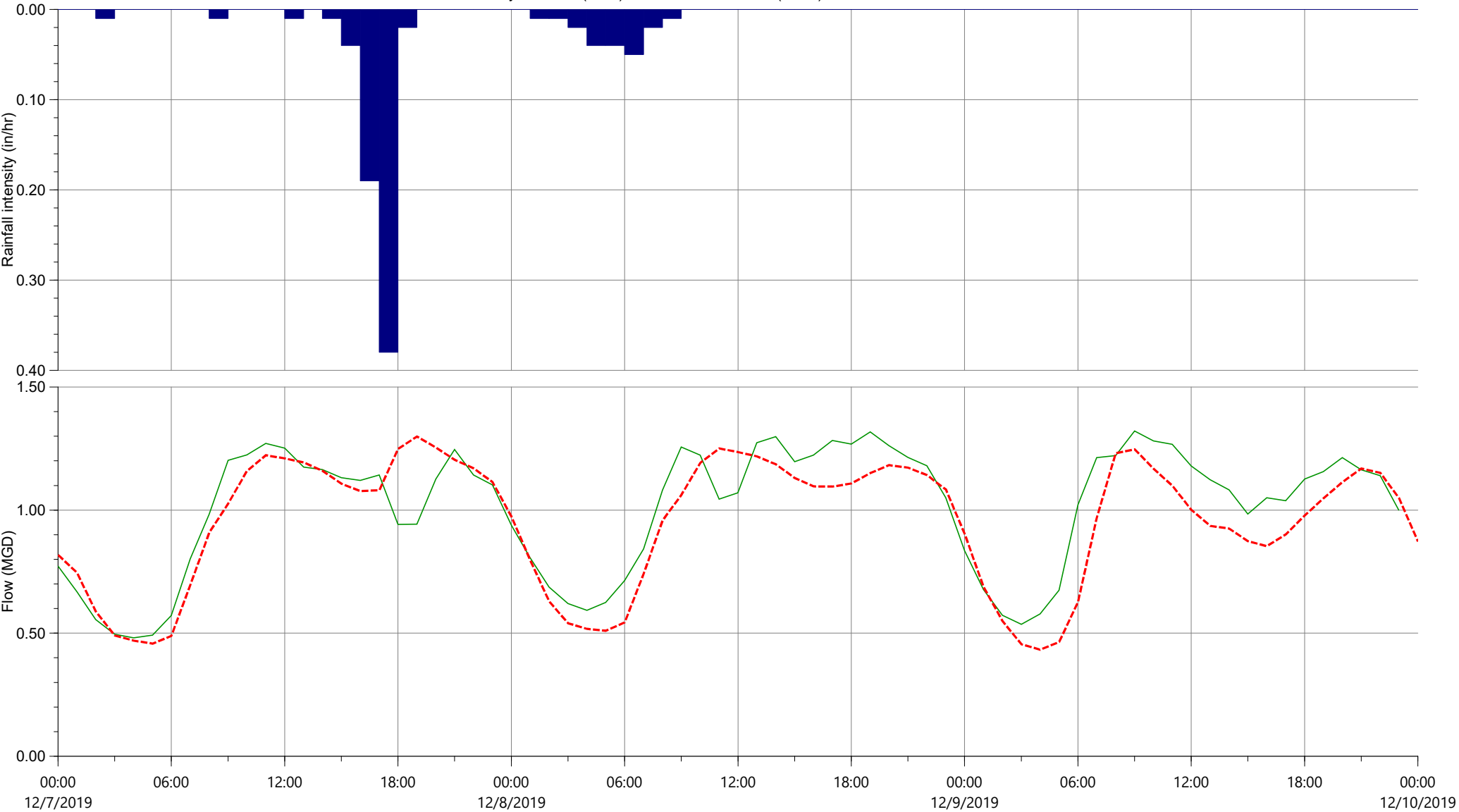


| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 0.091 | 0.441 | 0.623 |
| Observed | | | | 0.004 | 0.219 | 0.260 |
| Model | | | | | | |

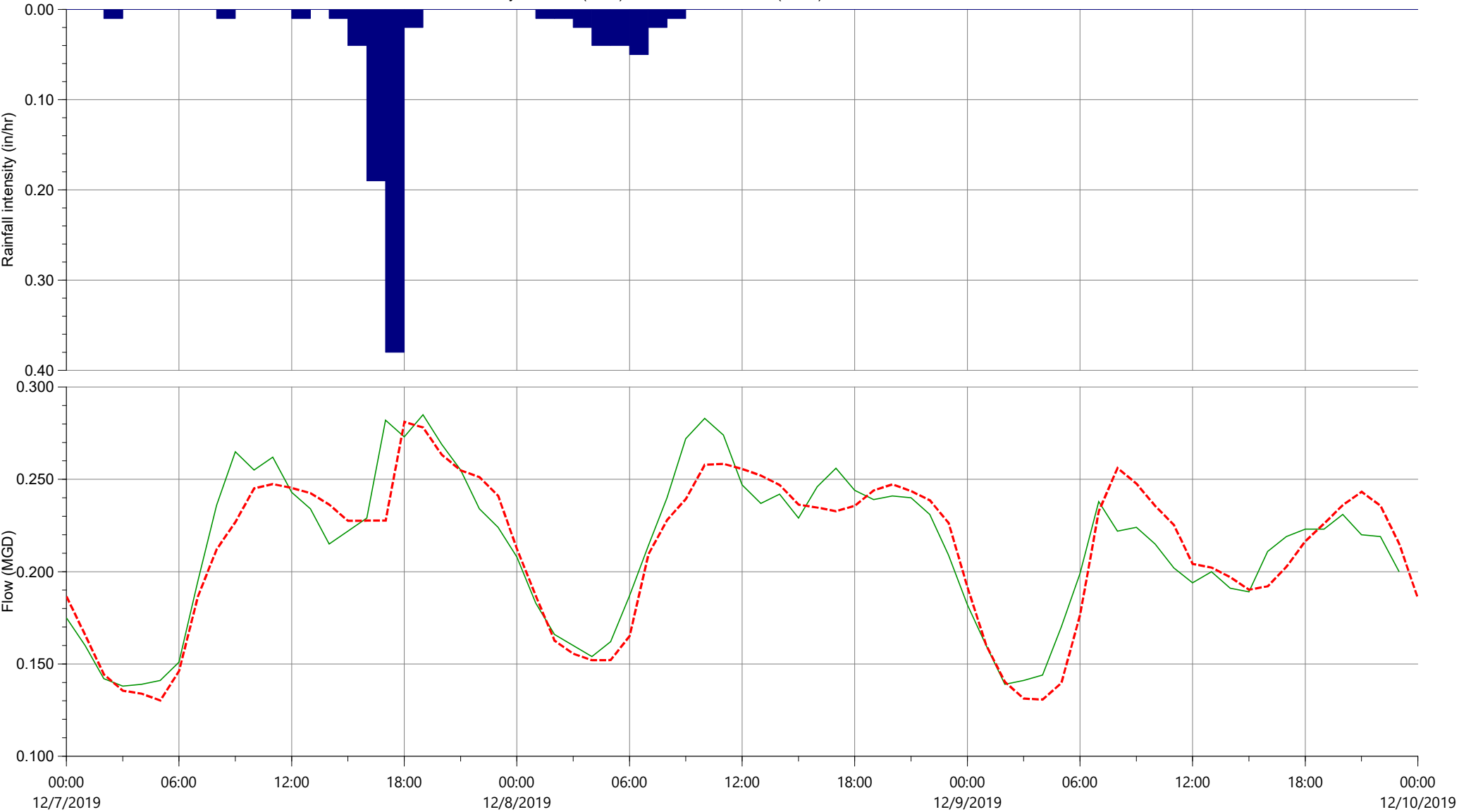


| | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Rain | 0.870 | 0.380 | 0.012 | | | |
| Observed | | | | 0.197 | 0.674 | 1.313 |
| Model | | | | 0.129 | 0.680 | 1.325 |

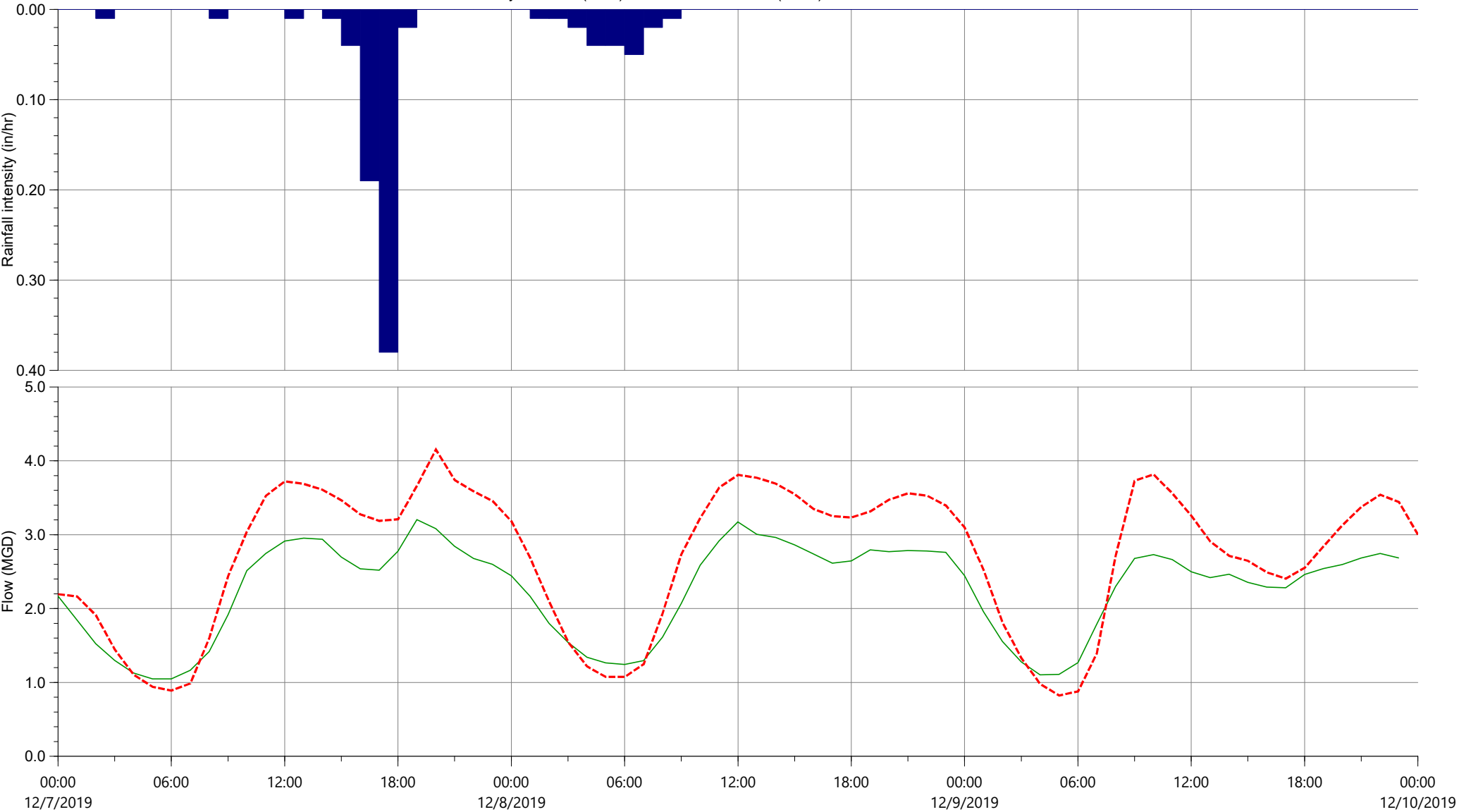
Observed / Predicted Report (Custom graph) - Wet Weather Calibration FINAL



| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 0.481 | 1.321 | 2.985 |
| Observed | | | | 0.433 | 1.299 | 2.858 |
| Model | | | | | | |

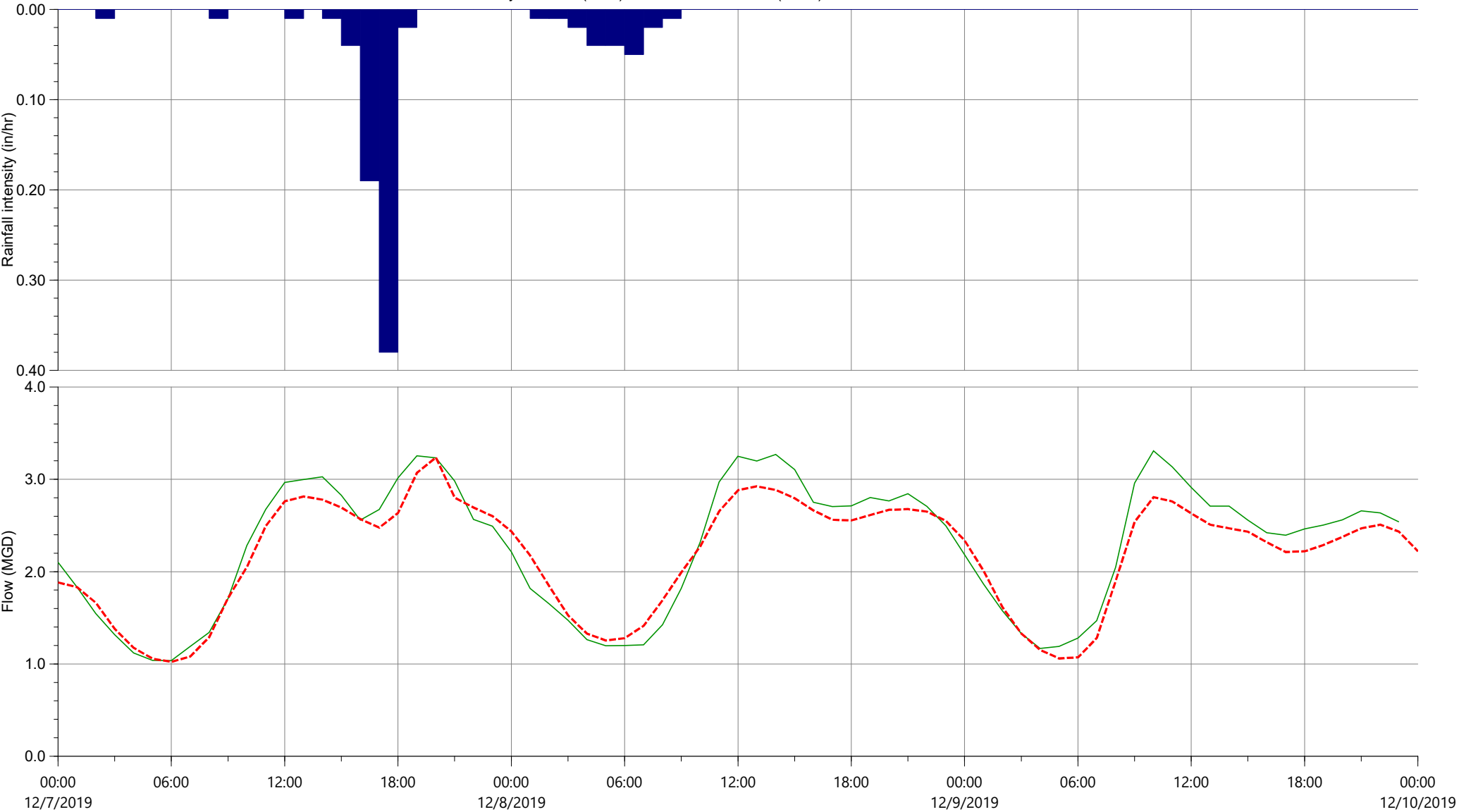


| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 0.138 | 0.285 | 0.632 |
| Observed | | | | 0.130 | 0.281 | 0.635 |
| Model | | | | | | |

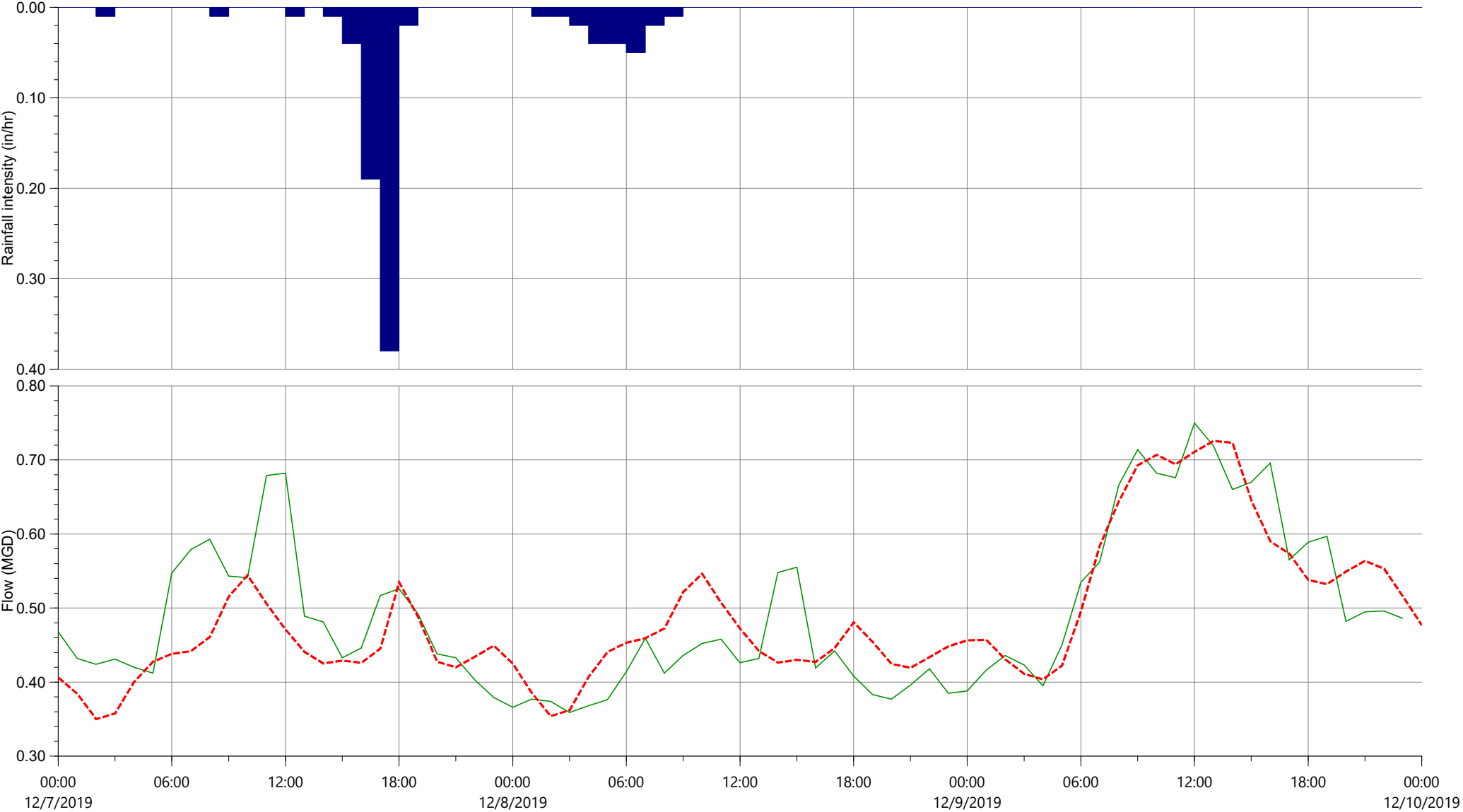


| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Observed | 0.870 | 0.380 | 0.012 | 1.047 | 3.205 | 6.675 |
| Model | | | | 0.824 | 4.153 | 8.127 |

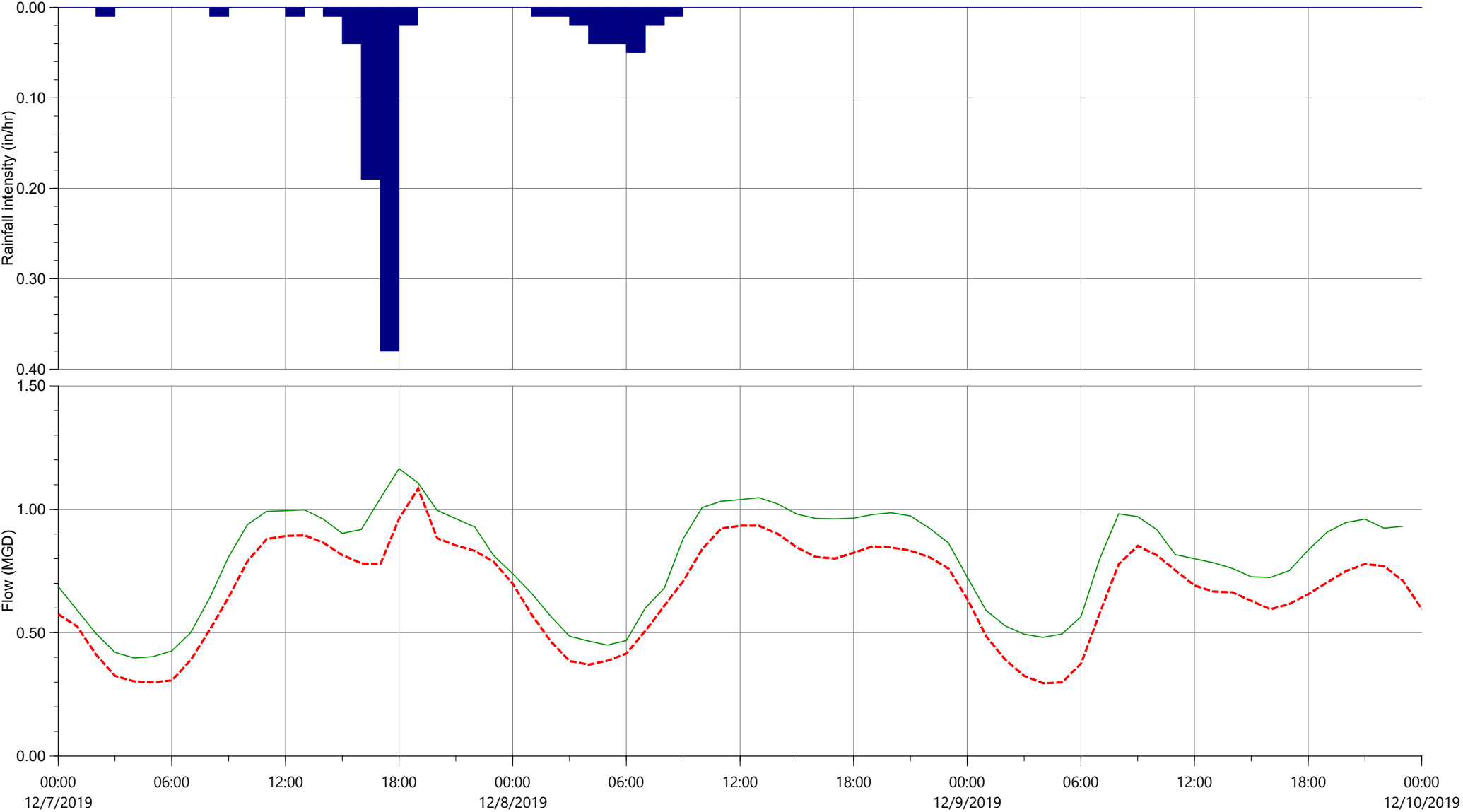
Observed / Predicted Report (Custom graph) - Wet Weather Calibration FINAL



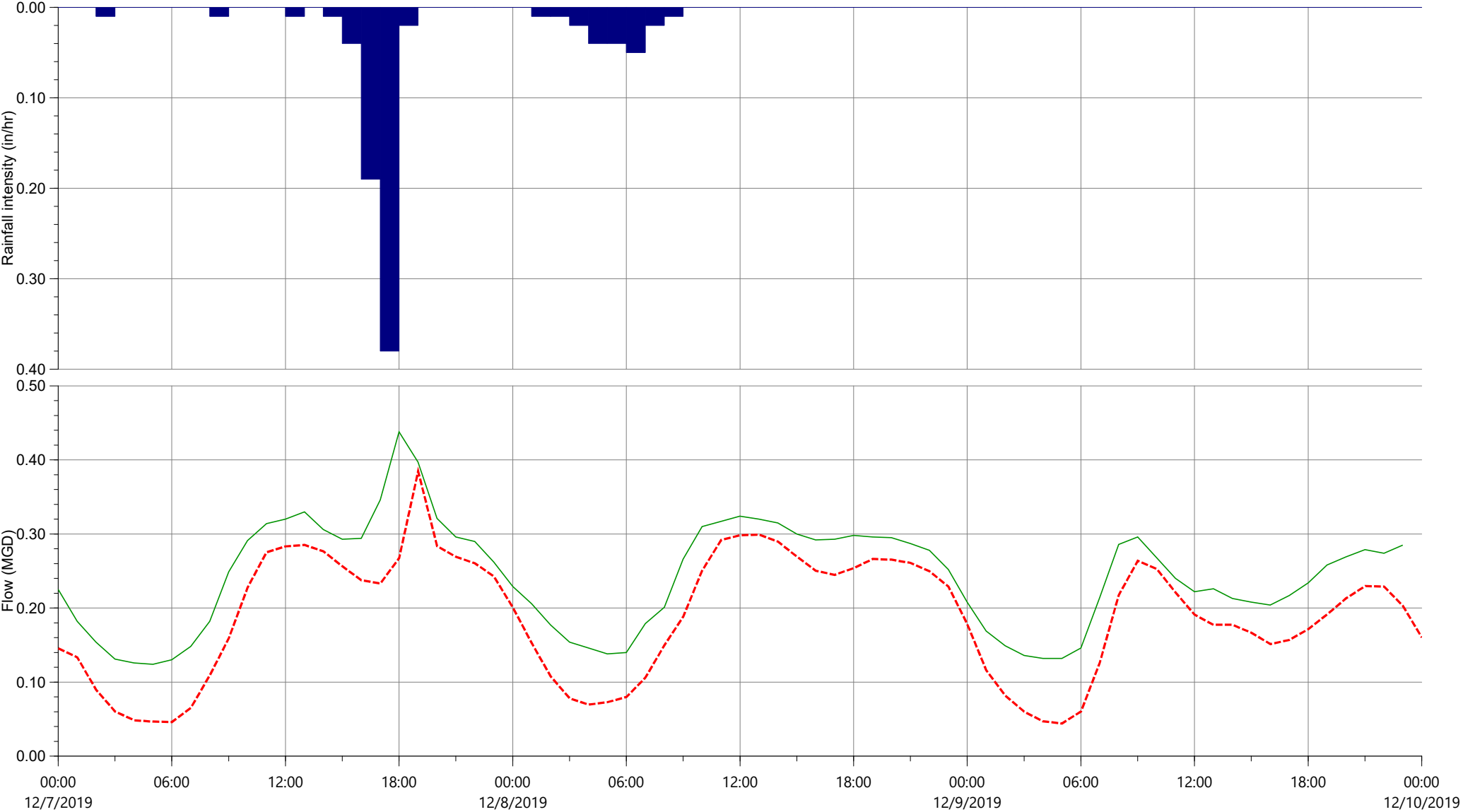
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 1.036 | 3.308 | 6.717 |
| Observed | | | | 1.023 | 3.238 | 6.544 |
| Model | | | | | | |



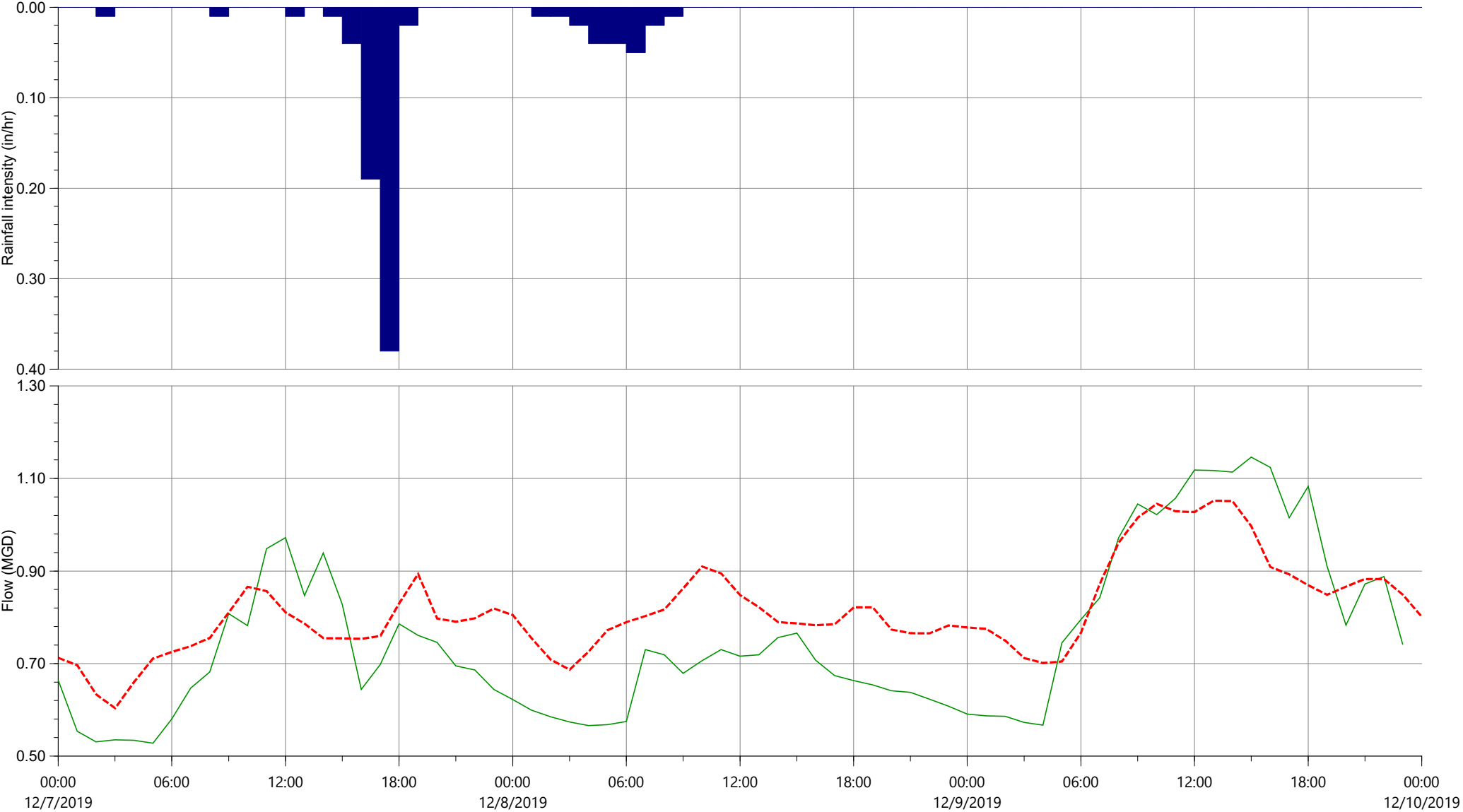
| | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Rain | 0.870 | 0.380 | 0.012 | | | |
| Observed | | | | 0.359 | 0.750 | 1.454 |
| Model | | | | 0.350 | 0.726 | 1.455 |



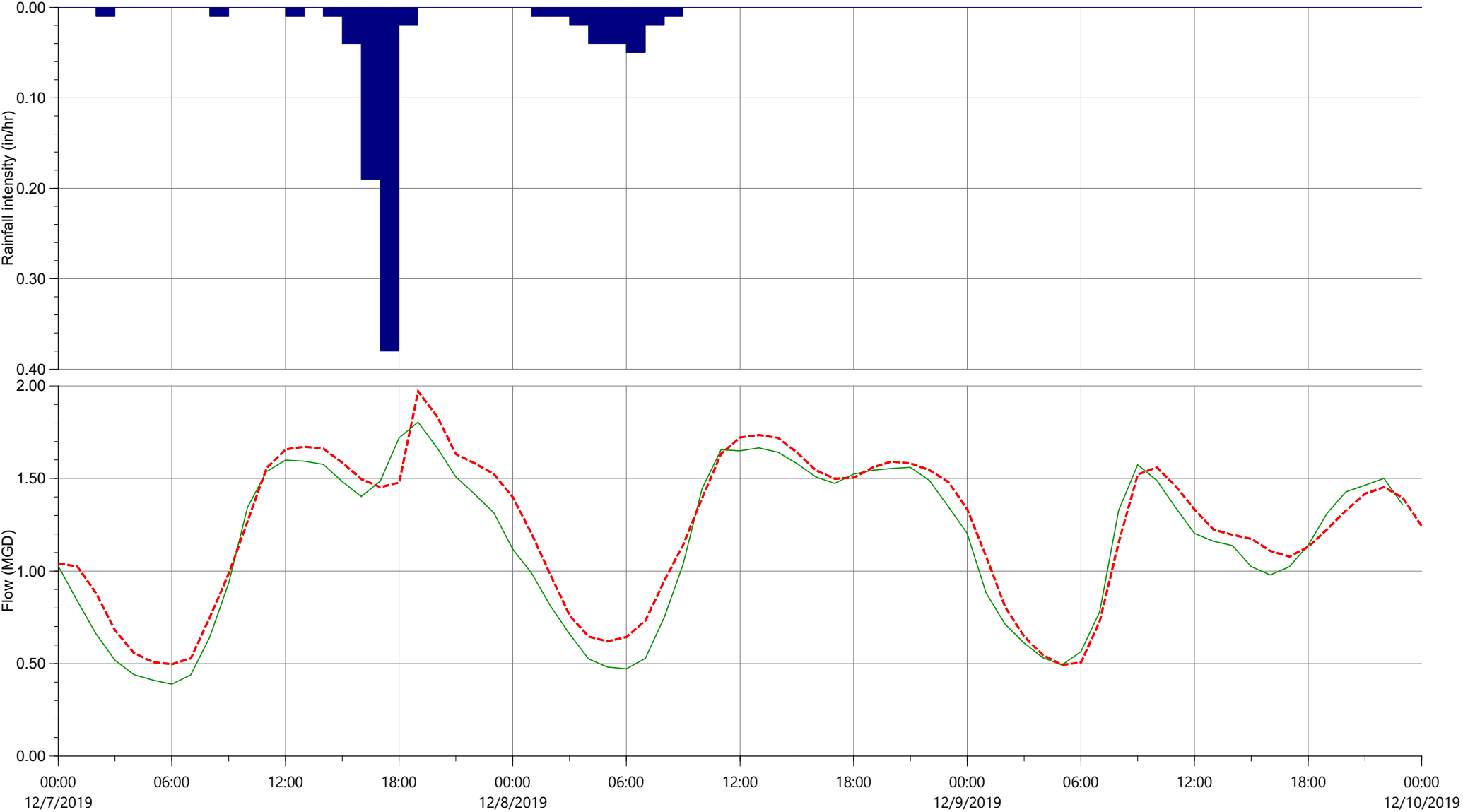
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 0.398 | 1.165 | 2.351 |
| Observed | | | | 0.296 | 1.085 | 2.011 |
| Model | | | | | | |



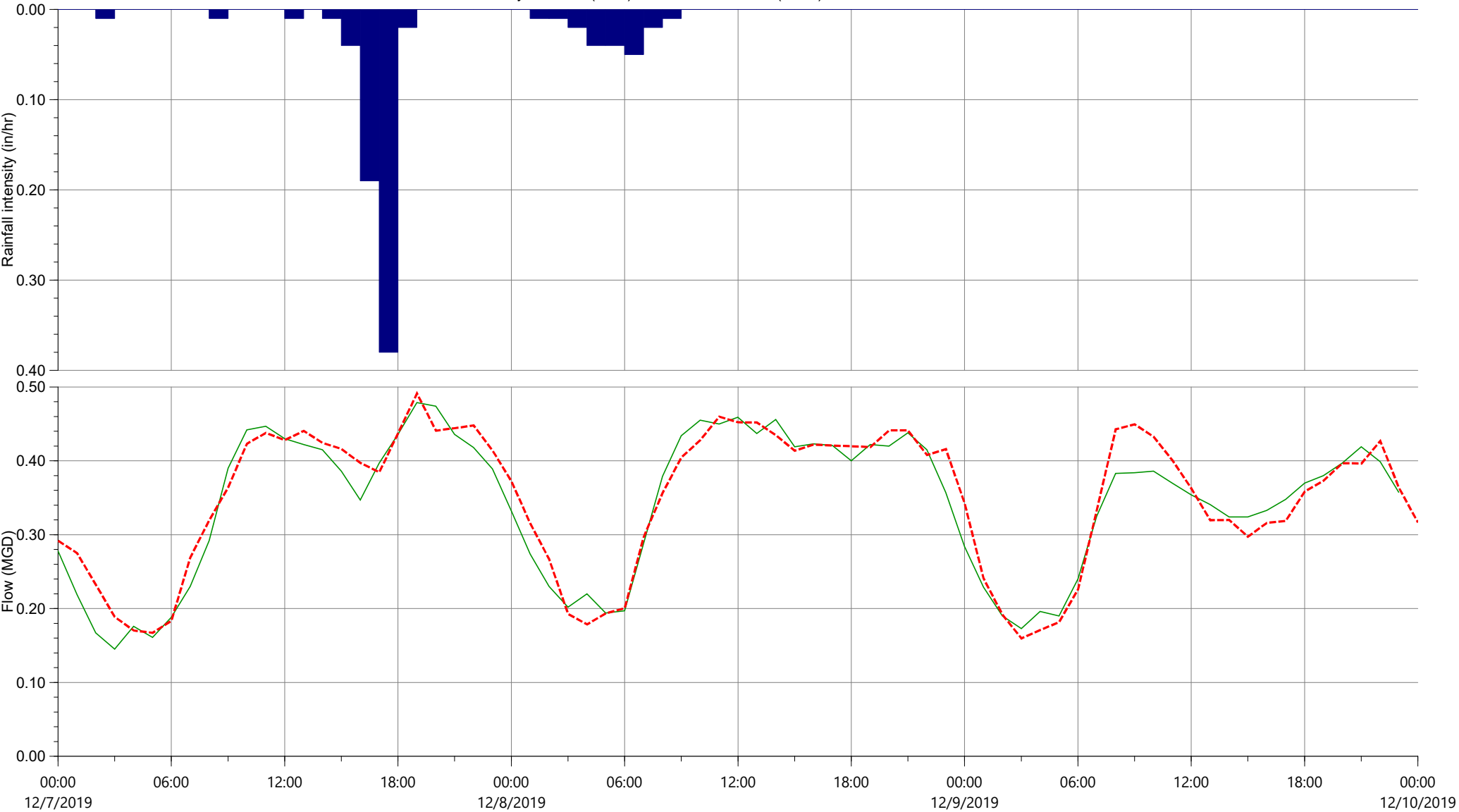
| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Observed | 0.870 | 0.380 | 0.012 | 0.124 | 0.438 | 0.715 |
| Model | | | | 0.044 | 0.385 | 0.565 |



| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Observed | 0.870 | 0.380 | 0.012 | 0.528 | 1.146 | 2.227 |
| Model | | | | 0.603 | 1.052 | 2.445 |



| Rain | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| | 0.870 | 0.380 | 0.012 | 0.388 | 1.804 | 3.408 |
| Observed | | | | 0.494 | 1.971 | 3.670 |
| Model | | | | | | |



| | Rainfall | | | Flow | | |
|----------|------------|--------------|-----------------|-----------|-----------|------------------|
| | Depth (in) | Peak (in/hr) | Average (in/hr) | Min (MGD) | Max (MGD) | Volume (US Mgal) |
| Rain | 0.870 | 0.380 | 0.012 | | | |
| Observed | | | | 0.145 | 0.479 | 1.011 |
| Model | | | | 0.160 | 0.492 | 1.047 |

APPENDIX F
City of Milpitas
Sewer Master Plan Study
Los Esteros Ranch Agreement

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Fees.... * No Fees
 Taxes....
 Copies...
 AMT PAID

Control No. 2003-008

Recording requested by:

City of Milpitas

When recorded mail to:

City of Milpitas

City Engineer's Office

455 E. Calaveras Blvd.

Milpitas, Ca 95035

Record without fee under Section
 6103-Government Code, State of
 California

BRENDA DAVIS
 SANTA CLARA COUNTY RECORDER
 Recorded at the request of
 City

RDE # 003
 11/25/2003
 9:18 AM

**AGREEMENT
 BETWEEN
 THE CITY OF MILPITAS
 AND
 LOS ESTEROS RANCH PARTNERSHIP
 FOR
 USE OF CERTAIN CITY OF MILPITAS
 SANITARY SEWER AND WATER FACILITIES
 BY THE CITY OF SAN JOSE**

This agreement ("Agreement"), is made and entered into this 6th day of August, 2003 ("Effective Date"), by and between the City of Milpitas, California, a general law city of the State of California ("Milpitas") and Los Esteros Ranch Partnership ("Property Owner"). Milpitas and Property Owner may be referred to herein individually as a "Party" or collectively as the "Parties" or the "Parties to this Agreement".

RECITALS

The purpose for which this Agreement is made, and all pertinent recitals, is described below:

- A. Property Owner owns or leases certain real property located in the city of San Jose as shown on Exhibit A. The properties subject to this Agreement are Parcel 1, hereinafter referred to as the "East of McCarthy Boulevard Parcel", Parcel 2, hereinafter referred to as the "West of McCarthy Boulevard Parcel" and Parcel 3, hereinafter referred to as the "BFI Recyclery Parcel" ("Subject Properties"). Parcel 1 and Parcel 2 are jointly subject to the terms and conditions of San Jose PDC No. 99-09-078

and PD 01-084. Parcel 3 is subject to the terms and conditions of San Jose Planned Development Zoning PDC93-044, Planned Development Permit PD95-068, and Planned Development Permit Adjustments AD01-637 and AD02-679.

- B. Property Owner wishes to be allowed to discharge sewage into the Milpitas-Owned Sewer System as shown on Exhibit B; and receive potable water from the Milpitas-Owned Water System.
- C. The City of Jose and Milpitas are preparing to enter into sewer and water agreements to enable the Subject Properties to receive sewage discharge and receive water services from the City of Milpitas without cost or expense to Milpitas ("City Agreements") attached hereto and incorporated herein as Exhibit C.
- D. Property Owner, in consideration for Milpitas entering into the City Agreements, provides the commitments herein.

Therefore, in consideration of their mutual covenants, promises and undertakings, Property Owner and Milpitas agree as follows:

1. EFFECTIVE DATE

This Agreement will become effective immediately upon the execution of both the City Agreements by San Jose and Milpitas and this Agreement.

2. DEFINITIONS

For the purpose of this Agreement, the following words or terms shall have the following meanings, unless otherwise stated in this Agreement:

- A. Milpitas-Owned Sewer System - "Milpitas-Owned Sewer Lines" means those sewer lines and related facilities including pump stations within the legal boundaries of Milpitas, or outside Milpitas where rights are defined by ownership of property, easements, public right of way or other agreements.
- B. Milpitas-Owned Water System - "Milpitas-Owned Water Lines" means those water lines and related facilities within the legal boundaries of Milpitas, or outside Milpitas where rights are defined by ownership of property, easements, public right of way or other agreements.

3. LAND USE CONSENT

A. Property Owner acknowledges that the subject Property is located adjacent to the McCarthy Business Park and is in an area that serves as a gateway entrance to Milpitas. Milpitas, therefore, has a significant interest in ensuring that any new development or redevelopment on the subject Property is consistent and/or compatible with the McCarthy Business Park and with the City's goals for this gateway area. Property Owner hereby agrees that there shall be no new change in use, or other development, redevelopment, or change in design of the subject Property, or improvement thereon, without the prior consent of the Milpitas Planning Manager or employee with equivalent responsibilities.

B. Milpitas has reviewed and approved the terms and conditions of San Jose PDC99-09-078 and the plans for the development of the West of McCarthy Boulevard Parcel. Milpitas consents to this development receiving sewer and water service. All connections to Milpitas facilities will be performed at no cost to Milpitas.

C. No development has been initiated for the East of McCarthy Boulevard Parcel. Prior to any future development on this parcel receiving water and sewer service pursuant to the City Agreements, the Property Owner shall comply with Section 3.A of this Agreement.

D. The BFI Recyclery Parcel contains an existing use and improvements. This Agreement shall serve as Milpitas' consent to this parcel receiving sewer and water service from San Jose to serve this existing use.

4. INDEMNIFICATION

A. The City of San Jose has agreed to defend, hold harmless, and indemnify Milpitas, its elective and appointive boards and commissions; and its officers, agents, and employees for loss or damage to any person or entity, and to defend, indemnify, hold harmless and release Milpitas, its agents and employees, from and against any and all actions, regulatory proceedings, claims, damages, liabilities, fines, penalties, or expenses that may be asserted by any person or entity, including San Jose arising out of or in connection with the performance of the Agreement hereunder, whether or not there is concurrent negligence on the part of the Milpitas, but excluding liability due to the sole active negligence or sole willful misconduct of the Milpitas.

B. Property Owner has agreed to provide an indemnification to the City of San Jose which indemnifies that city to the full extent of its indemnification of Milpitas.

5. WAIVERS

Waiver by any party to this Agreement of any breach, default, or violation of any term or condition of this Agreement shall not be deemed to be a waiver of any other term or condition of this Agreement, or a waiver of any subsequent breach or violation of the same, or any other term or condition.

6. NOTICES

All notices and other communications required or permitted to be given under this Agreement shall be in writing and shall be personally served or mailed, postage prepaid and return-receipt requested, addressed to the respective Parties, or by facsimile, as follows:

To Property Owner: Los Esteros Ranch
c/o Mr. Will Oswald
1125 North Amphlett Blvd.
San Mateo, CA 94401

Copy To: Realty Law, LLP
c/o Joan Gallo
125 S. Market St. Suite 500
San Jose, CA 95112

To Milpitas: City Engineer
City of Milpitas
455 E. Calavaras Blvd.
Milpitas, CA 95035
Or by facsimile at (408) 586-3305

Notice shall be deemed effective on the date personally delivered or, if mailed, three (3) days after deposit in the mail.

7. NO TITLE OR PROPERTY RIGHTS CONFERRED

This Agreement is not intended to and shall not confer title or any other property right to Property Owner in any part of Milpitas Owned Sewer or Water Lines.

8. RECORDATION

This Agreement is intended to and shall run with the land. Property Owner shall cause this Agreement to be recorded within thirty (30) days after the effective date and shall provide a copy of the recorded document to Milpitas.

9. TERMINATION AND NONRENEWAL

The City Agreements give rights of termination to both cities. Milpitas shall immediately give notice to Property Owner of any violation under the City Agreements Termination clause. In addition, the City Agreements are subject to a limited term of twenty years with a provision that allows for an extension of not more than ten (10) years. Milpitas shall endeavor to provide property owners with one year advance notice should it determine for any reason that it will not extend either of the City Agreements. This Agreement shall terminate if such termination or refusal to extend by either City shall ever become effective. If in the future, for any reason, services to a property subject to this Agreement are provided by the City of San Jose, this Agreement shall terminate with respect to that property. In addition, each Property Owner may terminate this Agreement on ninety (90) days advance written notice to the City, at which time this Agreement will be of no further force or effect.

10. GOVERNING LAW

The law governing this Agreement shall be that of the State of California.

11. COMPLIANCE WITH LAWS

Parties agree to comply with all applicable laws, ordinances, codes and regulations of the federal, state and local governments.

12. VENUE

In the event that suit shall be brought by either Party to this Agreement, the Parties agree that venue shall be exclusively vested in the State Courts of the County of Santa Clara, or where otherwise appropriate, exclusively in the United States District Court, Northern District of California, San Jose, California.

13. PRIOR AGREEMENTS AND AMENDMENTS

This Agreement, including all Exhibits attached hereto, represents the entire understanding of the Parties as to those matters contained herein. No prior or written understanding shall be of any force or effect with respect to those matters covered hereunder.

14. INTERPRETATION OF AGREEMENT

The Parties to this Agreement acknowledge that each Party and their respective counsel have participated in the drafting and revision of this Agreement. Accordingly, the Parties agree that any rule of construction to the effect that ambiguities are to be resolved against the drafting party shall not apply in the interpretation of this Agreement or any Exhibit hereto.

15. THIRD PARTY BENEFICIARY

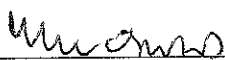
This Agreement shall be binding on and inure to the benefit of the Parties any owner, tenant or other person with an interest in the subject Properties.

16. AMENDMENT

This Agreement may be modified only by a written amendment duly executed by the Parties to this Agreement.

The Parties acknowledge and accept the terms and conditions of this Agreement as evidenced by the following signatures of their duly authorized representatives. It is the intent of the Parties that this Agreement shall become operative on the Effective Date.

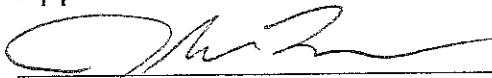
PROPERTY OWNER

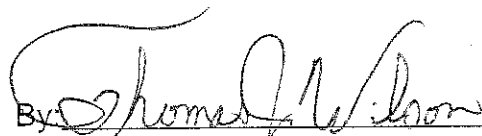


Will Oswald, Partner
Los Esteros Ranch Partnership

MILPITAS

Approved as to Form:


for Steven T. Mattas, City Attorney

By 
THOMAS WILSON
City Manager

ATTEST:



Gail Blalock, City Clerk

Attach Notary Certificate

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

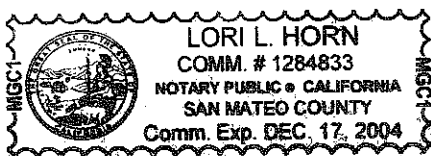
State of CALIFORNIA

County of SAN MATEO

On AUGUST 6, 2003 before me, LORI L. HORN, NOTARY PUBLIC
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared WILL OSWALD
Name(s) of Signer(s)

☐ personally known to me - OR - ☒ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Lori L. Horn
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

- ☐ Individual
☐ Corporate Officer
Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT
OF SIGNER

Top of thumb here

Signer's Name: _____

- ☐ Individual
☐ Corporate Officer
Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT
OF SIGNER

Top of thumb here

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of Santa Clara } ss.

On 11-20-2003, before me, GAIL A. BLALOCK, Notary Public,
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared THOMAS J. WILSON,
Name(s) of Signer(s)

☒ personally known to me
☐ proved to me on the basis of satisfactory evidence



to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Agreement for Sanitary Sewer & Water

Document Date: August 6, 2003 Number of Pages: 6 + exhibits

Signer(s) Other Than Named Above: Will Oswald

Capacity(ies) Claimed by Signer

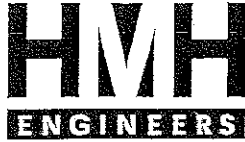
Signer's Name: THOMAS J. WILSON

- ☐ Individual
☒ Corporate Officer — Title(s): CITY MANAGER
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: CITY OF MILPITAS

RIGHT THUMBPRINT
OF SIGNER

Top of thumb here



San Jose
(408) 487-2200
Pleasanton
(925) 600-7335
Gilroy
(408) 846-0707
www.hmh-engineers.com

William J. Wagner
Thomas A. Armstrong
Michael L. Morsilli
David M. Wilson
James E. Thompson

July 9, 2003
HMH 2734-01-099
Page 1 of 2

EXHIBIT "A"

All that certain real property situate in the City of San Jose, County of Santa Clara, State of California, described as follows:

PARCEL A

A portion of that certain parcel of land described in the deed from J. E. Fifer and Ellie E. Fifer, His Wife, to A. M. Standish dated September 23, 1946 and recorded in Book 1534 Official Records at page 499, Santa Clara County Records, said portion being bounded and described as follows:

COMMENCING at a 3/4 inch iron pipe found in the Northerly line of said parcel conveyed from J. E. Fifer, et ux, to A. M. Standish at the Westerly line of a 60 foot strip of land conveyed by William Boots, et al., to the County of Santa Clara, by deed dated April 26, 1876 and recorded July 11, 1876 in Book 41 of Deeds, page 469, Santa Clara County Records, said 3/4 inch iron pipe being N. 34° 39' 00" E., 3209.7 feet from a one (1) inch bar found at the section corner common to Sections 1 and 2, Township 6 South, Range 1 West, M.D.B. & M. and Sections 35 and 36, Township 5 South, Range 1 West, M.D.B. & M. as surveyed by Mission Engineers, Inc., in April 1963.

THENCE, along said Westerly line of a 60 foot strip of land conveyed by William Boots, et al, to the County of Santa Clara, the following courses and distances:

S. 69° 34' 00" E., 473.39 feet; S. 9° 09' 00" E., 111.36 feet; S. 48° 59' 00" W., 99.64 feet; S. 77° 15' 00" W., 478.87 feet; N. 85° 56' 00" W., 250.14 feet;

Thence S. 53° 33' 00" W. a distance of 11.67 feet, more or less, to the point of intersection with the Easterly prolongation of the common boundary lines of Parcels 1 and 2 above described (the course of said common boundary being N. 89° 58' 00" W.); thence N. 89° 58' 00" W. along said Easterly prolongation of said common boundary line a distance of 122.09 feet, more or less, to the Southeasterly corner of said Parcel 1 above described; thence along the Easterly boundary line of said Parcel 1 N. 43° 02' 00" E. a distance of 595.61 feet to a one (1) inch iron pipe in the said Northerly line of the said parcel conveyed to A. M. Standish; thence along said Northerly line S. 89° 58' 00" E., a distance of 55.46 feet to the point of commencement.

Being a portion of the Swamp and Overflow Survey No. 59 in Section 36, Township 5 South, Range 1 West, M.D.B. & M.

PARCEL B

BEGINNING at a point on the general Southerly line of that certain parcel of land described in the Deed from J. E. Fifer et ux to A. M. Standish, recorded December 1, 1947 in Book 1534, Official Records, at page 499, Santa Clara County Records distant thereof North 77° 15' 00" East 175.16 feet from the Southwesterly terminus of that certain course designated as North 77° 15' 00" East, 478.87 feet; thence leaving said point of beginning along said general Southerly line North 77° 15' 00" East 279.04 feet to a point hereinafter referred to as Point "A"; thence leaving said general Southerly line from a tangent bearing of South 42° 14' 45" West along a curve to the right with a radius of 190.00 feet through a central angle of 48° 03' 04" for an arc length of 159.34 feet and North 89° 42' 11" West, 130.53 feet to the point of beginning.

PARCEL THREE

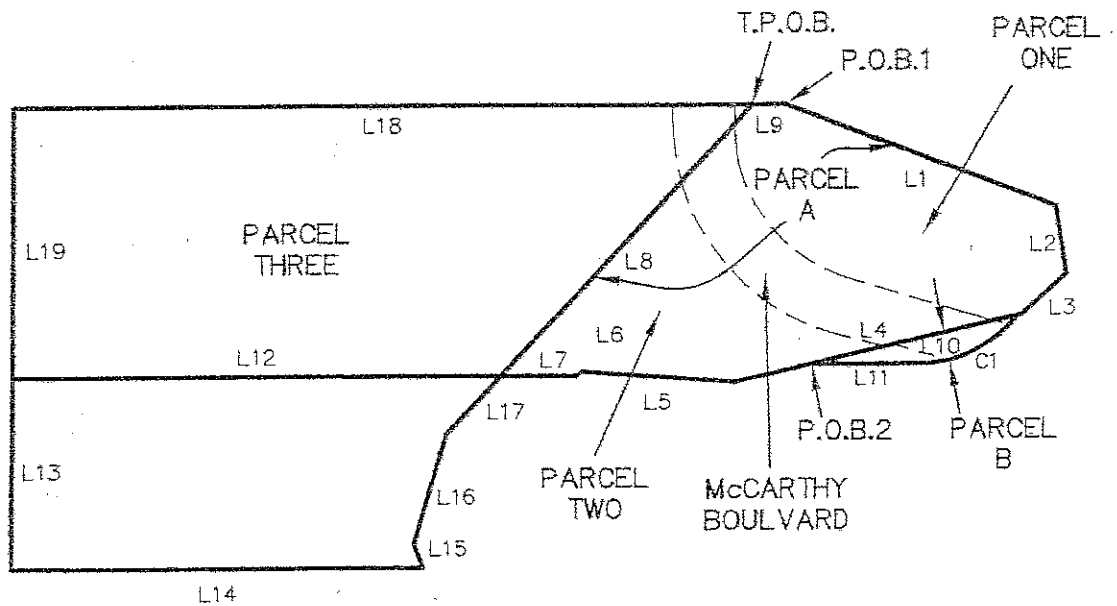
A portion of that certain parcel of land described in the deed from J. E. Filer and Ellie E. Filer, his wife, to A. M. Standish dated September 23, 1946 and recorded in Book 1534 Official Records at page 499, Santa Clara County Records, said portion being bounded and described as follows:

COMENCING at a 3/4 inch iron pipe found in the northerly line of said parcel conveyed from J. E. Filer, et ux to A. M. Standish at the westerly line of a 60 foot strip of land conveyed by William Boots, et al., to the County of Santa Clara, by deed dated April 26 1876 and recorded July 11, 1876 in Book 41 of Deeds, page 469, Santa Clara County Records; said 3/4 inch iron pipe being N. 34° 39' 00" E., 3209.7 feet from a one (1) inch bar found at the section corner common to Sections 1 and 2, Township 6 South, Range 1 West, M.D.B. & M. and Sections 35 and 36; Township 5 South, Range 1 West, M.D.B. & M. as surveyed by Mission Engineers, Inc. in April, 1963.

THENCE, on and along the said northerly line of said parcel conveyed to A. M. Standish N. 89° 58' 00" W., 55.46 feet to a one (1) inch iron pipe and the TRUE POINT OF COMMENCEMENT.

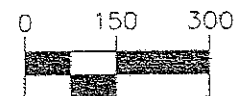
THENCE, along said northerly line N. 89° 58' 00" W., 1203.10 feet to a one (1) inch iron pipe; thence, S. 0° 02' 00" W., 435.60 feet to a one (1) inch iron pine; thence, S. 89° 58' 00" E., 796.90 feet to a one (1) inch iron pipe; thence, N. 43° 02' 00" E., 595.61 feet to the true point of commencement.

And being a portion of the Swamp and Overflow Survey No. 59 in Section 36, Township 5 South, Range 1 West, M.D.B. & M.



| LINE | BEARING | DISTANCE |
|------|-------------|----------|
| L1 | S69°34'00"E | 473.39' |
| L2 | S09°09'00"E | 111.36' |
| L3 | S48°59'00"W | 99.64' |
| L4 | S77°15'00"W | 478.87' |
| L5 | N85°56'00"W | 250.14' |
| L6 | S53°33'00"W | 11.67' |
| L7 | N89°58'00"W | 122.09' |
| L8 | N43°02'00"E | 595.61' |
| L9 | S89°58'00"E | 55.46' |
| L10 | N77°15'00"E | 279.04' |
| L11 | N89°42'11"W | 130.53' |
| L12 | S89°58'00"E | 796.90' |
| L13 | S00°02'00"W | 310.52' |
| L14 | S89°58'00"E | 671.84' |
| L15 | N22°54'00"W | 41.59' |
| L16 | S16°40'00"W | 185.40' |
| L17 | N43°02'00"E | 129.32' |
| L18 | N89°58'00"W | 1203.10' |
| L19 | S00°02'00"W | 435.60' |

| CURVE | RADIUS | DELTA | LENGTH |
|-------|---------|-----------|---------|
| C1 | 190.00' | 48°03'04" | 159.34' |



GRAPHIC SCALE
1 INCH = 300 FT.

SHEET 1 OF 1

Date: 7-09-03
Scale: 1"=300'
Designed: -
Drawn: dt
Checked: DT
Proj. Engr: -
Draw Name: 2734PL11

HMH
ENGINEERS

San Jose
(408) 487-2200
Pleasanton
(925) 800-7235
Gilroy
(408) 846-0707
www.hmh-engineers.com

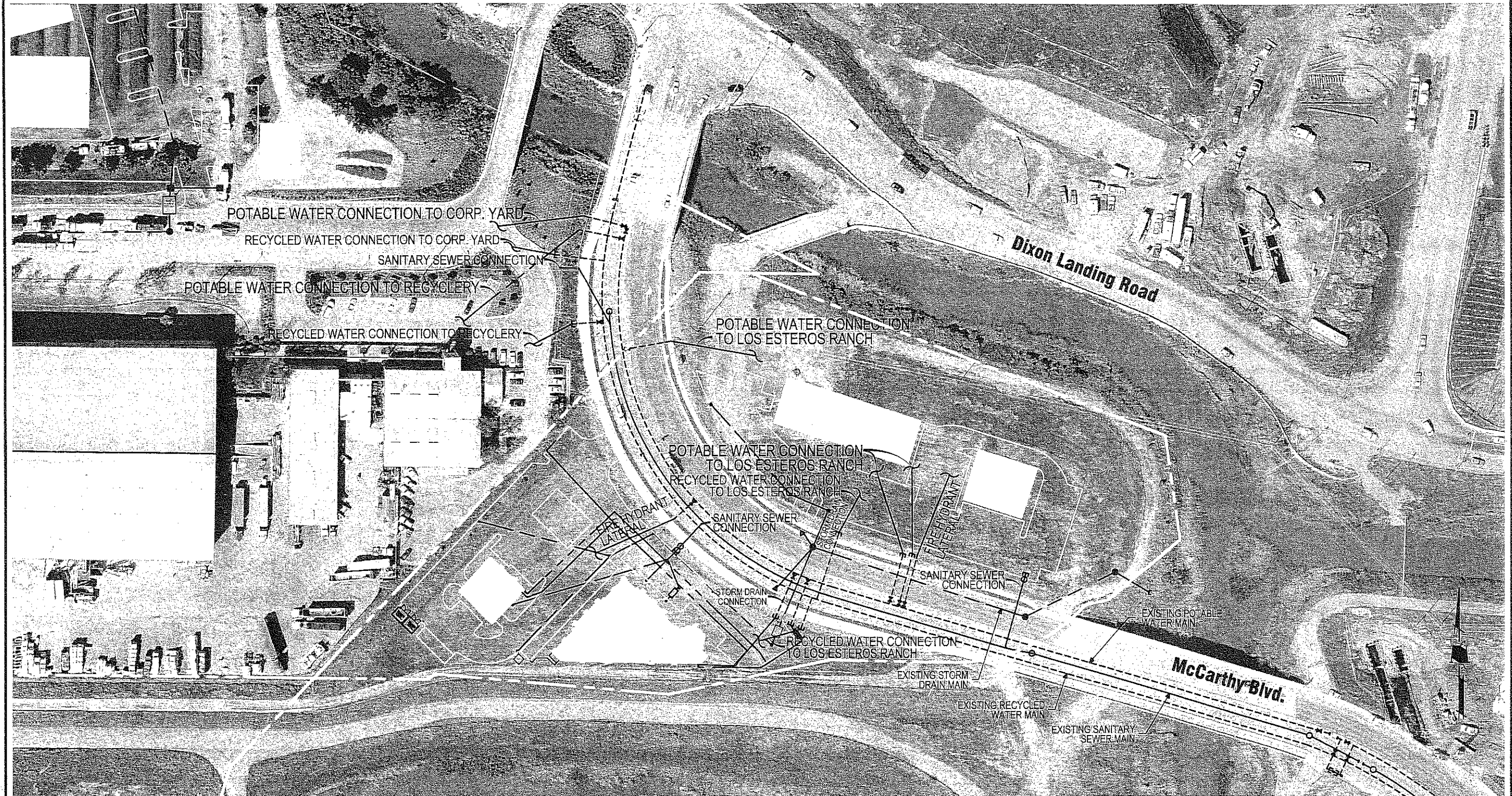
PLAT TO ACCOMPANY
EXHIBIT "A"
LOS ESTEROS RANCH PROPERTIES"
SAN JOSE CALIFORNIA

20030709.1113

LEGEND

| | | | | | |
|----------|---------------------|----------|----------|----------------|----------|
| EXISTING | POTABLE WATER LINE | PROPOSED | EXISTING | SANITARY SEWER | PROPOSED |
| EXISTING | RECYCLED WATER LINE | PROPOSED | EXISTING | STORM DRAIN | PROPOSED |

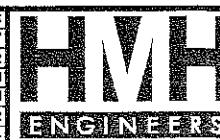
EXHIBIT B



| BY | DATE | REVISIONS |
|----|------|-----------|
| | | |
| | | |
| | | |
| | | |
| | | |

The Los Esteros Ranch
1125 N. Amphlett
San Mateo, CA 94401

Date: 7.29.03
Scale: 1"=100'
Designed: DRR
Drawn: JAM
Checked: RTH
Proj. Engr: DRR
File: 273401EX04



San Jose
(408) 487-2200
Pleasanton
(925) 600-7335
Gilroy
(408) 846-0707
www.hmh-engineers.com

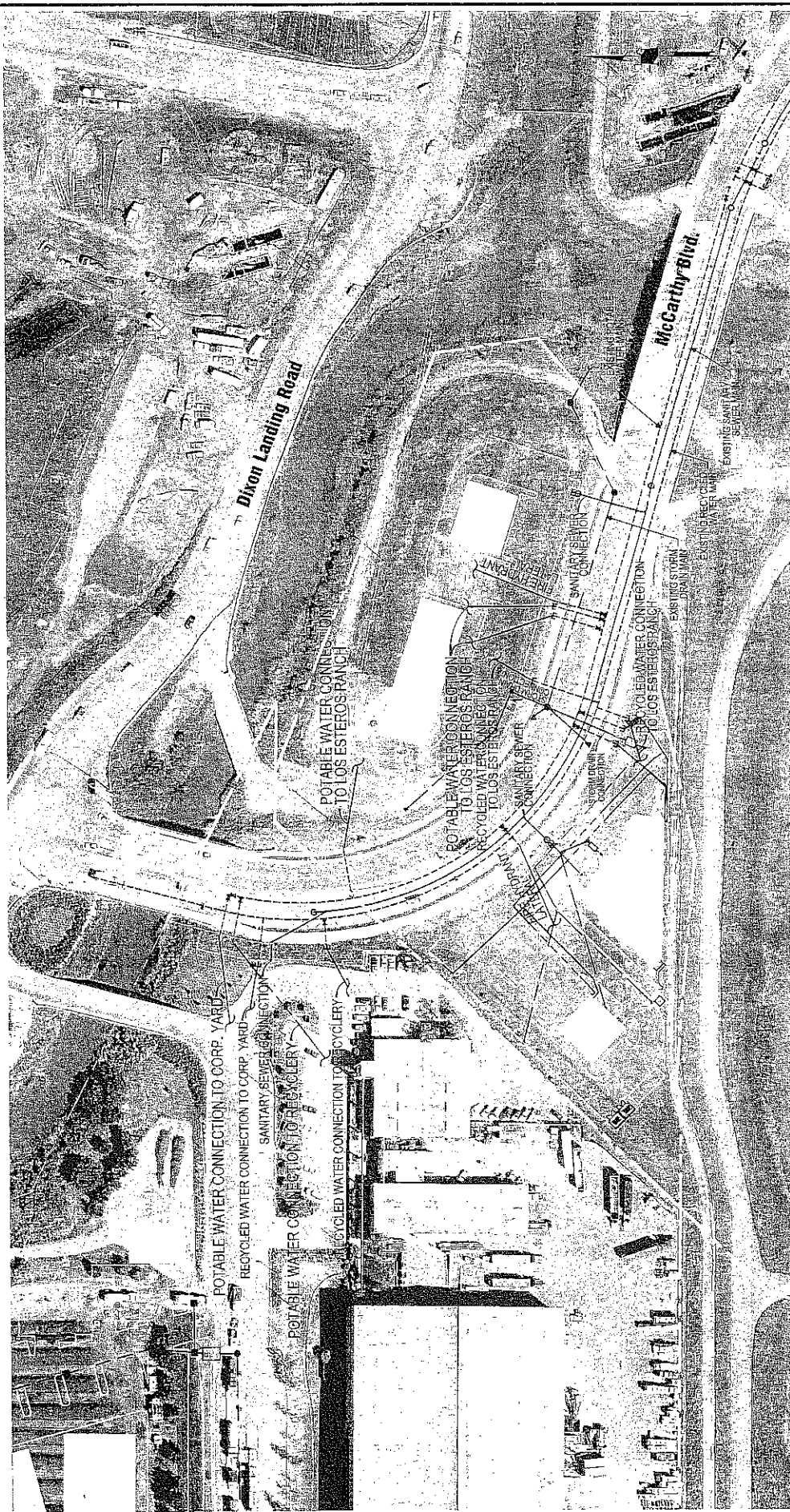
The Los Esteros Ranch - Site One & Two
BFI Proposed Corporation Yard
Utility Connections

Sheet
1
Of 1 Sheets
JOB NUMBER
2734-01

LEGEND

| | | | | | |
|----------|---------------------|----------|----------|----------------|----------|
| EXISTING | POTABLE WATER LINE | PROPOSED | EXISTING | SANITARY SEWER | PROPOSED |
| EXISTING | RECYCLED WATER LINE | PROPOSED | EXISTING | STORM DRAIN | PROPOSED |

EXHIBIT B



| | | | | |
|--|---------|--|------------|---------------------------------------|
| The Los Esteros Ranch 1125 N. Amphlett San Mateo, CA 94401 | | The Los Esteros Ranch - Site One & Two BFI Proposed Corporation Yard Utility Connections | | Sheet 1 of 1 Date 2734-01 |
| Date | 7/28/03 | San Jose | 09/01/2004 | |
| Scale | 1"=100' | San Jose | 09/01/2004 | |
| Designed | AM | San Jose | 09/01/2004 | |
| Checked | RTH | San Jose | 09/01/2004 | |
| Proj. Eng. | DRL | San Jose | 09/01/2004 | |
| HMM ENGINEERS 11000 E. 15th Ave. Suite 100 Denver, CO 80231 Phone: 303.750.1000 Fax: 303.750.1001 www.hmm.com | | | | |

EXHIBIT C

City Agreements

APPENDIX G
City of Milpitas
Sewer Master Plan Study
Raftelis Wastewater Financial Plan Options Report

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Project Memo

DATE: June 9, 2022
TO: Tony Ndah
Public Works Director
FROM: Todd Cristiano
Senior Manager
SUBJECT: Draft Wastewater Financial Plan Options

Introduction

The City of Milpitas retained Raftelis to complete a comprehensive financial planning forecast for their water, wastewater¹, and stormwater utilities². Separate financial plans and memorandums were developed for each utility. This memorandum summarizes the wastewater financial plan results. The analysis included the following:

1. **Revenue forecast.** Includes the projection of rate revenues, the number of accounts, growth in accounts, and billed volume per account; projection of other operating and non-operating income, and development fees.
2. **Expenditures forecast.** Includes the projection of operation and maintenance expenses, transfers to the general fund, payments on existing debt service, and capital projects identified in the most recent master plan documents.
3. **Revenue adjustments.** Optimizing the use of rate revenues and bond issues to minimize revenue adjustments while meeting annual revenue requirements, debt service coverage, and reserve targets.

The forecast presented in this memo is for the study period FY 2022 through FY 2040. The City's wastewater utility is financially self-sufficient with funding for capital and operating requirements derived primarily from rates.

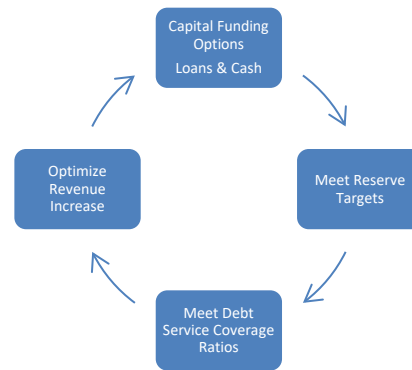
¹ Wastewater and sewer utility are used interchangeably throughout this memo.

² Stormwater activities are currently within the general fund and is not a stand-alone utility. For the purposes of this study, we created a cash flow consolidating the O&M costs for the various areas in the general fund and projects identified in the most recent master plan.

Financial Planning Process

A primary consideration in developing an ‘optimal’ financial plan is minimizing annual revenue increases by balancing the use of reserves, existing rate revenue, and debt proceeds. This balance is subject to the constraints of meeting the City’s target reserve policies and debt service coverage requirements on any proposed debt.

This approach is an iterative process. For example, while issuing debt to fund a capital project may keep revenue increases low, new debt payments may decrease the coverage below the target level. As a result, a revenue increase may be needed to maintain compliance with the target. This revenue may produce an ending balance which exceeds the target reserve. This excess can be used to partially fund the capital project which, in turn, could reduce the proposed debt issuance amount.



Reserves

The City maintains three reserves for the wastewater utility. The excerpts below are from the City’s financial reserve policy 11. These descriptions can also be found in the City’s consolidated annual financial report. The proposed financial plan allows the City to maintain reserves in compliance with this policy.

Capital reserves for emergencies. The City will maintain capital reserves in the Water and Sewer utility enterprise funds to provide for future capital projects and unanticipated emergencies. The City will attempt to maintain a capital reserve of approximately 30% of the annual operating and maintenance expenses for the Water utility fund and 25% of the annual operating and maintenance expenses for the Sewer utility fund.

Rate stabilization reserve. The City will maintain a Rate Stabilization Reserve (RSR) in the Water and Sewer utility enterprise funds with a goal of at least 16.67% or two months of the respective annual operating expenditures after the Capital Reserve requirements have been met. The RSR shall be used to mitigate the effects of occasional shortfalls in revenue or unanticipated expenditures that cannot be rebalanced within existing budgeted resources in any given fiscal year.

Public Employees Retirement (PERS) Rate Stabilization Reserve. The City will maintain in the Utility Enterprise Funds or in a Section 115 Trust a Public Employees Retirement (PERS) Rate Stabilization Reserve to be funded by 20% of any General Fund or Enterprise Funds annual operating surpluses. The Water and Sewer Utility Enterprise Funds’ portion of the Unfunded Actuarial Liability for the Miscellaneous Retirement Plan is 8.5% and 6.6%, respectively. The Utility Funds’ portion of the contribution to the PERS Rate Stabilization Reserve shall be consistent with the General Fund contributions and only be funded after the Capital Reserve and Rate Stabilization Reserve (RSR) requirements in the Water and Sewer utility funds have been met.

Wastewater Utility Findings

Raftelis used the assumptions shown in Table 1 to develop the financial plan options. Changes in these assumptions could materially affect the results. These assumptions were based on information provided by Staff over the course of the study which included annual budgets, detailed billing data, forecasts of new customer connections, and master plan reports. The detailed wastewater cash flows are attached at the end of this memorandum.

Table 1: Wastewater Utility Assumptions

| Item | Description |
|--|--|
| FY 2022 Beginning Fund Balance | |
| Capital Reserve for Emergencies | \$3,675,927 |
| Rate Stabilization Reserve | \$2,451,108 |
| Capital Fund | \$35,522,844 |
| TASP Fund | \$0 |
| Debt Issues | |
| Term | 20 years |
| Interest Rate | 4.25% |
| Debt Service Coverage Target | 1.25x debt service payments |
| Average growth in number of accounts | 2.2% |
| Annual average O&M Inflation [1] | 3.5% |
| Average Annual Capital Projects Inflation | 6.0% (FY 2023 – FY 2026) 4.0% (FY 2027 – FY 2040) Study period average ~4.3% |
| San José-Santa Clara Regional Wastewater Facility O&M Inflation | 4% |
| [1] Include the City's portion of the Jose San José-Santa Clara Regional Wastewater Facility costs | |

The wastewater utility financial plan consists of three sub-funds:

- **Operating Fund.** Funds activities associated with annual operation and maintenance of the utility, debt service payments, the City's portion of the San José-Santa Clara Regional Wastewater Facility treatment costs, maintaining emergency and rate stabilization reserves, and transfers of any surplus to the Capital Fund.
- **Capital Fund.** Tracks activities associated with previously adopted CIP projects, projects identified in the master plan, and the City's capital portion of the San José-Santa Clara Regional Wastewater Facility costs. Primary sources of funding include transfers from the operating fund and debt issuance proceeds.
- **TASP Fund.** Tracks funding and projects that have specifically been identified as being funded by TASP or future METRO development fees.

Operating Fund

Sources of Funds

Sources of funds consist primarily of rate revenue, other operating income, and non-operating income. Rate revenues with proposed increases is projected to increase from \$21.7 million in FY 2023 to \$27.1 million in FY 2040. This includes an average annual account growth of 2.2% from FY 2023 to FY 2040 based on future METRO plan development forecasts.

Uses of funds

Uses of Funds consist of operation and maintenance expense, debt service on the existing Series 2017 and Series 2019, and transfers to the capital fund to assist in funding the capital improvement program. O&M consists of the items required to collect wastewater and the costs the City pays to San Jose for wastewater treatment services, as well as costs associated with administration of the utility, and customer services. San José-Santa Clara Regional Wastewater Facility costs are projected to increase 4.0% annually based on information from San Jose. O&M expenses for the City's core operations (personnel services, general supplies, contractual services excluding water purchases, etc.) will increase by 4.0% from FY 2023 through FY 2025. This short-term inflation estimates are based on publications from the Philadelphia Federal Reserve. Inflation from FY 2026 through FY 2040 is estimated at 3.0% based on historical trends of the Consumer Price Index (CPI). Total O&M including wastewater treatment expense will increase by an average of 3.5% annually over the study period or from \$13.0 million in FY 2023 to \$24.0 million in FY 2040.

Capital Fund

Sources of Funds

Primary sources of funding include transfers from the operating fund and bond proceeds. Transfers from the operating fund are made in years where operating revenue exceeds operating expenses and required transfers to reserve funds.

Uses of Funds

Expenditures include capital projects identified in the adopted FY 2023 – FY 2040 capital budget and the master plan as well as the capital portion of the San José-Santa Clara Regional Wastewater Facility treatment capital costs from San Jose. Capital improvement program costs total \$208.6 million for the study period which includes annual inflation of 6.0% from FY 2023 through FY 2025 and 4.0% from FY 2026 through FY 2040.

Revenue Requirement

Revenue from rates and other miscellaneous revenue should be sufficient to meet annual revenue requirements in the operating and capital funds; however, the City could issue a bond to accelerate implementation of critical projects. Revenue requirements include operation and maintenance expenses, capital project funding, payments on proposed debt service, and meeting target debt service coverage and reserves. Raftelis and City staff developed a financial plan to fully fund expenses, including the master plan projects, using revenue derived from rates and an option to issue bonds to accelerate project implementation.

Financial Plan Options

Raftelis and City staff developed two financial planning options to fully fund the expenses described above. Each option will ensure that the City is able to meet its obligations to San Jose for the San José-Santa Clara Regional Wastewater Facility expenses, continue to make debt service payments, operate and maintain the wastewater collection system, complete all projects identified in the master plan, and meet required reserve targets. The primary difference in the financial plan options relate to the timing and funding source for the Force main A project, which is a 40-year steel pipeline which conveys sewage from the City to the San José-Santa Clara Regional Wastewater Facility for treatment. The pipeline is in a corrosive environment and the condition of the pipeline is unknown due to the inability to dewater and inspect the pipeline

Option 1 – Bond Financing

Under this option, the City would issue a \$30 million revenue bond in FY 2025 to fund the Force main A project. In addition to funding the O&M and capital expenditures described above, the City could make the required annual debt service payments (estimated at \$2.3 million per year) with annual rate increases of 4.0% from FY 2024 through FY 2040.

- ***Operating and Capital Fund.*** Annual increases to sewer user charges of 4.0% are required in FY 2024 through FY 2040 in order to meet the annual revenue requirements. The revenue from these increases will adequately fund O&M, sewer treatment, reserve requirements, and provide surplus revenue to transfer to the CALPERS and capital funds.
- ***Bill Impact.*** Based on the rate increases proposed for this option, the bimonthly bill for typical single-family residential customer is projected to increase \$4.97 from \$124.14 to \$129.11.

Option 1 has the following advantages:

- ***Lower rate impact on customers*** (4% increase in FY 2024) versus Option 2 (6% increase in FY 2024).
- ***Intergenerational equity.*** The use of bonds recovers the cost of the asset over a time horizon that is closer to its useful life ensuring that future users, who will also benefit from the use of the force main, will participate in funding it.
- ***No reliance on development fees.*** Does not rely on revenue from future METRO development fees that have not yet been determined
- ***Timely replacement.*** Since the current condition of the Force main is unknown, it is safer to replace it sooner than later.

Option 2 – Cash and TASP Financing

Under this option, the Force main A project would be completed in FY 2030 and be 20% funded by future METRO development fees. This plan requires wastewater rate increases of 6% each year from FY 2024 to FY 2029 and 4% each year thereafter. This higher rate increase allows the City to generate the cash needed to fund approximately \$29 million of the Force main A project expense. Additionally, the City must ensure that future METRO development fees are sufficient to provide \$7.3 million by FY 2030 for the remainder of the project.

- **Operating and Capital Fund.** Annual increases to sewer user charges of 6.0% are required from FY 2024 through FY 2029 and 4.0% from FY 2029 through FY 2040. The revenue from these increases will adequately fund O&M, sewer treatment, reserve requirements, and provide surplus revenue to transfer to the CALPERS and capital funds.
- **Bill Impact.** Based on the rate increases proposed for this option, the bimonthly bill for typical single-family residential customer is projected to increase \$7.45 from \$124.14 to \$131.59.

The primary advantage of this option is the savings on interest expense by cash funding the CIP rather than debt funding (Option 1). In addition, cash financing the CIP will not impact debt service coverage.

Reliance on City Provided Data

During this project, the City (and/or its representatives) provided Raftelis with a variety of technical information, including cost and revenue data. Raftelis did not independently assess or test for the accuracy of such data – historic or projected. Raftelis has relied on this data in the formulation of our findings and subsequent recommendations, as well as in the preparation of this memorandum.

There are often differences between actual and projected data. Some of the assumptions used for projections in this memorandum will not be realized, and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the data or results projected in this memorandum and actual results achieved, and those differences may be material. As a result, Raftelis takes no responsibility for the accuracy of data or projections provided by or prepared on behalf of the City, nor do we have any responsibility for updating this memorandum for events occurring after the date of this memorandum.

Table B-4
City of Milpitas, CA
Sewer Utility Cash Flow Analysis
Option 1 - Bond Finance Forcemain

| Line No. | Description | Budget | | | | | Projected | | | | |
|--|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | | |
| 1 | Revenue from Existing Wastewater Fees | 20,236,812 | 21,735,520 | 22,042,585 | 22,373,301 | 22,695,210 | 23,017,441 | 23,340,002 | 23,662,901 | 23,986,148 | 24,318,934 |
| 2 | Add'l Wastewater Fee Revenue from Rate Increases | - | - | 881,703 | 1,825,661 | 2,833,815 | 3,909,709 | 5,056,679 | 6,278,218 | 7,577,986 | 8,963,207 |
| 3 | Total Wastewater Fee Revenue | 20,236,812 | 21,735,520 | 22,924,289 | 24,198,962 | 25,529,025 | 26,927,150 | 28,396,681 | 29,941,119 | 31,564,134 | 33,282,141 |
| 4 | Investment Interest | 251,000 | 205,863 | 128,475 | 135,749 | 140,330 | 163,748 | 168,270 | 168,270 | 172,524 | 177,612 |
| 5 | Total Sources | 20,487,812 | 21,941,383 | 23,052,764 | 24,334,711 | 25,669,354 | 27,090,899 | 28,564,951 | 30,109,389 | 31,736,658 | 33,459,753 |
| Revenue Requirements | | | | | | | | | | | |
| 6 | Operation and Maintenance Expense | 12,647,178 | 12,984,506 | 13,829,820 | 14,383,013 | 14,937,446 | 15,483,703 | 16,050,272 | 16,637,921 | 17,247,445 | 17,879,671 |
| 7 | Debt Service | 2,435,875 | 2,431,275 | 2,458,700 | 2,455,200 | 4,710,795 | 4,707,045 | 4,060,545 | 4,063,295 | 4,064,295 | 4,063,545 |
| 8 | Total Revenue Requirements | \$ 15,083,053 | \$ 15,415,781 | \$ 16,288,520 | \$ 16,838,213 | \$ 19,648,241 | \$ 20,190,748 | \$ 20,110,817 | \$ 20,701,216 | \$ 21,311,740 | \$ 21,943,216 |
| 9 | Operating Surplus | 5,404,759 | 6,525,602 | 6,764,244 | 7,496,498 | 6,021,113 | 6,900,151 | 8,454,133 | 9,408,172 | 10,424,917 | 11,516,537 |
| Reserve Fund Summary | | | | | | | | | | | |
| 10 | Capital for Emergencies | 3,770,763 | 3,853,945 | 4,072,130 | 4,209,553 | 4,912,060 | 5,047,687 | 5,047,687 | 5,175,304 | 5,327,935 | 5,485,804 |
| 11 | Rate Stabilization | 2,514,345 | 2,569,811 | 2,715,296 | 2,806,930 | 3,275,362 | 3,365,798 | 3,365,798 | 3,450,893 | 3,552,667 | 3,657,934 |
| 12 | CALPERS | 2,377,519 | 3,654,910 | 4,935,025 | 6,388,513 | 7,358,548 | 8,693,365 | 10,384,192 | 12,223,284 | 14,257,386 | 16,508,067 |
| 13 | Infrastructure | 31,767,093 | 30,810,141 | 26,925,283 | 19,492,104 | 13,487,785 | 13,000,029 | 12,635,035 | 15,944,039 | 14,768,426 | 11,180,628 |
| 14 | Total Reserves | \$ 40,429,720 | \$ 40,888,807 | \$ 38,647,734 | \$ 32,897,100 | \$ 29,033,755 | \$ 30,106,879 | \$ 31,432,712 | \$ 36,793,519 | \$ 37,906,415 | \$ 36,832,433 |
| | <i>Reserves less CALPERS</i> | 6,285,108 | 6,423,756 | 6,787,426 | 7,016,483 | 8,187,422 | 8,413,485 | 8,413,485 | 8,626,197 | 8,880,602 | 9,143,738 |
| | | 6,285,108 | 6,423,756 | 6,787,426 | 7,016,483 | 8,187,422 | 8,413,485 | 8,380,178 | 8,626,197 | 8,880,602 | 9,143,738 |
| 17 | Annualized Wastewater Service Revenue Increase | 0.0% | 0.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% |
| 18 | Cumulative Revenue Increase | 0.0% | 0.0% | 4.0% | 8.2% | 12.5% | 17.0% | 21.7% | 26.5% | 31.6% | 36.9% |
| 19 | Debt Service Coverage | 3.22 | 3.68 | 3.75 | 4.05 | 2.28 | 2.47 | 3.08 | 3.32 | 3.57 | 3.83 |
| Reserve Fund Detail | | | | | | | | | | | |
| Line No. | Reserve Fund Detail | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| Capital Reserve for Emergencies | | | | | | | | | | | |
| 1 | Beginning Balance | \$ 3,675,927 | \$ 3,770,763 | \$ 3,853,945 | \$ 4,072,130 | \$ 4,209,553 | \$ 4,912,060 | \$ 5,047,687 | \$ 5,047,687 | \$ 5,175,304 | \$ 5,327,935 |
| 2 | Contribution | 94,836 | 83,182 | 218,185 | 137,423 | 702,507 | 135,627 | - | 127,617 | 152,631 | 157,869 |
| 3 | Ending Balance | \$ 3,770,763 | \$ 3,853,945 | \$ 4,072,130 | \$ 4,209,553 | \$ 4,912,060 | \$ 5,047,687 | \$ 5,047,687 | \$ 5,175,304 | \$ 5,327,935 | \$ 5,485,804 |
| 4 | <i>Target</i> | 3,770,763 | 3,853,945 | 4,072,130 | 4,209,553 | 4,912,060 | 5,047,687 | 5,027,704 | 5,175,304 | 5,327,935 | 5,485,804 |
| Rate Stabilization Reserve | | | | | | | | | | | |
| 5 | Beginning Balance | \$ 2,451,108 | 2,514,345 | 2,569,811 | 2,715,296 | 2,806,930 | 3,275,362 | 3,365,798 | 3,365,798 | 3,450,893 | 3,552,667 |
| 6 | Contribution | 63,237 | 55,466 | 145,486 | 91,634 | 468,432 | 90,436 | - | 85,095 | 101,774 | 105,267 |
| 7 | Ending Balance | \$ 2,514,345 | \$ 2,569,811 | \$ 2,715,296 | \$ 2,806,930 | \$ 3,275,362 | \$ 3,365,798 | \$ 3,365,798 | \$ 3,450,893 | \$ 3,552,667 | \$ 3,657,934 |
| 8 | <i>Target</i> | 2,514,345 | 2,569,811 | 2,715,296 | 2,806,930 | 3,275,362 | 3,365,798 | 3,352,473 | 3,450,893 | 3,552,667 | 3,657,934 |
| CALPERS Reserve | | | | | | | | | | | |
| 9 | Beginning Balance | \$ 1,328,182 | 2,377,519 | 3,654,910 | 4,935,025 | 6,388,513 | 7,358,548 | 8,693,365 | 10,384,192 | 12,223,284 | 14,257,386 |
| 10 | Contribution | 1,049,337 | 1,277,391 | 1,280,115 | 1,453,488 | 970,035 | 1,334,818 | 1,690,827 | 1,839,092 | 2,034,102 | 2,250,680 |
| 11 | Ending Balance | \$ 2,377,519 | \$ 3,654,910 | \$ 4,935,025 | \$ 6,388,513 | \$ 7,358,548 | \$ 8,693,365 | \$ 10,384,192 | \$ 12,223,284 | \$ 14,257,386 | \$ 16,508,067 |
| 12 | Transfer to Infrastructure Replacement | \$ 4,197,349 | \$ 5,109,563 | \$ 5,120,459 | \$ 5,813,953 | \$ 3,880,139 | \$ 5,339,271 | \$ 6,763,307 | \$ 7,356,368 | \$ 8,136,410 | \$ 9,002,721 |
| | <i>Check</i> | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| Infrastructure Replacement | | | | | | | | | | | |
| 13 | Beginning Balance | \$ 35,522,844 | \$ 31,767,093 | \$ 30,810,141 | \$ 26,925,283 | \$ 19,492,104 | \$ 13,487,785 | \$ 13,000,029 | \$ 12,635,035 | \$ 15,944,039 | \$ 14,768,426 |
| 14 | Contribution | (3,755,751) | (956,952) | (3,884,858) | (7,433,179) | (6,004,319) | (487,756) | (364,994) | 3,309,004 | (1,175,612) | (3,587,798) |
| 15 | Ending Balance | \$ 31,767,093 | \$ 30,810,141 | \$ 26,925,283 | \$ 19,492,104 | \$ 13,487,785 | \$ 13,000,029 | \$ 12,635,035 | \$ 15,944,039 | \$ 14,768,426 | \$ 11,180,628 |
| | <i>Target</i> | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 |

Table B-4
City of Milpitas, CA
Sewer Utility Cash Flow Analysis
Option 1 - Bond Finance Forcemain

| Line No. | Description | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
|---------------------------------|--|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | |
| 1 | Revenue from Existing Wastewater Fees | 24,652,571 | 24,987,076 | 25,322,469 | 25,658,771 | 25,996,002 | 26,334,184 | 26,673,339 | 27,013,488 | 27,133,054 |
| 2 | Add'l Wastewater Fee Revenue from Rate Increases | 10,435,724 | 11,999,900 | 13,660,309 | 15,421,748 | 17,289,252 | 19,268,102 | 21,363,838 | 23,582,269 | 25,719,435 |
| 3 | Total Wastewater Fee Revenue | 35,088,295 | 36,986,976 | 38,982,778 | 41,080,519 | 43,285,255 | 45,602,287 | 48,037,176 | 50,595,757 | 52,852,489 |
| 4 | Investment Interest | 182,875 | 188,319 | 194,223 | 199,381 | 204,754 | 210,326 | 216,086 | 222,039 | 228,234 |
| 5 | Total Sources | 35,271,170 | 37,175,295 | 39,177,001 | 41,279,899 | 43,490,009 | 45,812,612 | 48,253,262 | 50,817,796 | 53,080,723 |
| Revenue Requirements | | | | | | | | | | |
| 6 | Operation and Maintenance Expense | 18,535,455 | 19,243,111 | 19,863,208 | 20,506,219 | 21,173,003 | 21,864,452 | 22,581,494 | 23,325,089 | 24,096,236 |
| 7 | Debt Service | 4,061,045 | 4,061,795 | 4,060,545 | 4,062,295 | 4,064,045 | 4,063,795 | 4,061,045 | 4,060,795 | 4,062,795 |
| 8 | Total Revenue Requirements | \$ 22,596,500 | \$ 23,304,906 | \$ 23,923,753 | \$ 24,568,514 | \$ 25,237,048 | \$ 25,928,247 | \$ 26,642,539 | \$ 27,385,884 | \$ 28,159,031 |
| 9 | Operating Surplus | 12,674,670 | 13,870,389 | 15,253,247 | 16,711,385 | 18,252,961 | 19,884,365 | 21,610,724 | 23,431,912 | 24,921,692 |
| Reserve Fund Summary | | | | | | | | | | |
| 10 | Capital for Emergencies | 5,649,125 | 5,826,226 | 5,980,938 | 6,142,129 | 6,309,262 | 6,482,062 | 6,660,635 | 6,846,471 | 7,039,758 |
| 11 | Rate Stabilization | 3,766,836 | 3,884,928 | 3,988,090 | 4,095,571 | 4,207,016 | 4,322,239 | 4,441,311 | 4,565,227 | 4,694,111 |
| 12 | CALPERS | 18,988,556 | 21,703,595 | 24,702,670 | 27,991,213 | 31,586,089 | 35,505,358 | 39,767,973 | 44,392,405 | 49,312,310 |
| 13 | Infrastructure | 19,296,211 | 18,803,709 | 19,885,515 | 22,128,922 | 23,615,088 | 27,395,292 | 35,362,200 | 44,463,662 | 54,429,953 |
| 14 | Total Reserves | \$ 47,700,728 | \$ 50,218,459 | \$ 54,557,213 | \$ 60,357,835 | \$ 65,717,455 | \$ 73,704,950 | \$ 86,232,119 | \$ 100,267,765 | \$ 115,476,131 |
| | Reserves less CALPERS | 9,415,961 | 9,711,154 | 9,969,028 | 10,237,700 | 10,516,278 | 10,804,301 | 11,101,946 | 11,411,698 | 11,733,868 |
| | | 9,415,961 | 9,711,154 | 9,969,028 | 10,237,700 | 10,516,278 | 10,804,301 | 11,101,946 | 11,411,698 | 11,733,868 |
| 17 | Annualized Wastewater Service Revenue Increase | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% |
| 18 | Cumulative Revenue Increase | 42.3% | 48.0% | 53.9% | 60.1% | 66.5% | 73.2% | 80.1% | 87.3% | 94.8% |
| 19 | Debt Service Coverage | 4.12 | 4.41 | 4.76 | 5.11 | 5.49 | 5.89 | 6.32 | 6.77 | 7.13 |
| Line No. | Reserve Fund Detail | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
| Capital Reserve for Emergencies | | | | | | | | | | |
| 1 | Beginning Balance | \$ 5,485,804 | \$ 5,649,125 | \$ 5,826,226 | \$ 5,980,938 | \$ 6,142,129 | \$ 6,309,262 | \$ 6,482,062 | \$ 6,660,635 | \$ 6,846,471 |
| 2 | Contribution | 163,321 | 177,102 | 154,712 | 161,190 | 167,133 | 172,800 | 178,573 | 185,836 | 193,287 |
| 3 | Ending Balance | \$ 5,649,125 | \$ 5,826,226 | \$ 5,980,938 | \$ 6,142,129 | \$ 6,309,262 | \$ 6,482,062 | \$ 6,660,635 | \$ 6,846,471 | \$ 7,039,758 |
| 4 | Target | 5,649,125 | 5,826,226 | 5,980,938 | 6,142,129 | 6,309,262 | 6,482,062 | 6,660,635 | 6,846,471 | 7,039,758 |
| Rate Stabilization Reserve | | | | | | | | | | |
| 5 | Beginning Balance | 3,657,934 | 3,766,836 | 3,884,928 | 3,988,090 | 4,095,571 | 4,207,016 | 4,322,239 | 4,441,311 | 4,565,227 |
| 6 | Contribution | 108,902 | 118,091 | 103,162 | 107,482 | 111,445 | 115,223 | 119,072 | 123,916 | 128,884 |
| 7 | Ending Balance | \$ 3,766,836 | \$ 3,884,928 | \$ 3,988,090 | \$ 4,095,571 | \$ 4,207,016 | \$ 4,322,239 | \$ 4,441,311 | \$ 4,565,227 | \$ 4,694,111 |
| 8 | Target | 3,766,836 | 3,884,928 | 3,988,090 | 4,095,571 | 4,207,016 | 4,322,239 | 4,441,311 | 4,565,227 | 4,694,111 |
| CALPERS Reserve | | | | | | | | | | |
| 9 | Beginning Balance | 16,508,067 | 18,988,556 | 21,703,595 | 24,702,670 | 27,991,213 | 31,586,089 | 35,505,358 | 39,767,973 | 44,392,405 |
| 10 | Contribution | 2,480,489 | 2,715,039 | 2,999,075 | 3,288,543 | 3,594,877 | 3,919,268 | 4,262,616 | 4,624,432 | 4,919,904 |
| 11 | Ending Balance | \$ 18,988,556 | \$ 21,703,595 | \$ 24,702,670 | \$ 27,991,213 | \$ 31,586,089 | \$ 35,505,358 | \$ 39,767,973 | \$ 44,392,405 | \$ 49,312,310 |
| 12 | Transfer to Infrastructure Replacement Check | \$ 9,921,957 TRUE | \$ 10,860,157 TRUE | \$ 11,996,299 TRUE | \$ 13,154,171 TRUE | \$ 14,379,506 TRUE | \$ 15,677,074 TRUE | \$ 17,050,463 TRUE | \$ 18,497,728 TRUE | \$ 19,679,617 TRUE |
| Infrastructure Replacement | | | | | | | | | | |
| 13 | Beginning Balance | \$ 11,180,628 | \$ 19,296,211 | \$ 18,803,709 | \$ 19,885,515 | \$ 22,128,922 | \$ 23,615,088 | \$ 27,395,292 | \$ 35,362,200 | \$ 44,463,662 |
| 14 | Contribution | 8,115,582 | (492,501) | 1,081,806 | 2,243,407 | 1,486,165 | 3,780,204 | 7,966,908 | 9,101,462 | 9,966,291 |
| 15 | Ending Balance | \$ 19,296,211 | \$ 18,803,709 | \$ 19,885,515 | \$ 22,128,922 | \$ 23,615,088 | \$ 27,395,292 | \$ 35,362,200 | \$ 44,463,662 | \$ 54,429,953 |
| | Target | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 |

Table B-5
City of Milpitas, CA
Sewer Capital Improvement Plan (CIP)
Option 1 - Bond Finance Forcemain

| Line No. | Capital Financing Plan | Budget | | | | | Projected | | | | |
|-------------------------|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | | |
| 1 | Beginning Balance | \$ 35,522,844 | \$ 31,767,093 | \$ 30,810,141 | \$ 26,925,283 | \$ 19,492,104 | \$ 13,487,785 | \$ 13,000,029 | \$ 12,635,035 | \$ 15,944,039 | \$ 14,768,426 |
| 2 | Revenue Bonds | - | - | - | 30,000,000 | - | - | - | - | - | - |
| 3 | Development Fees | 452,000 | 1,417,137 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 |
| 4 | Interest | 394,900 | 156,722 | 308,101 | 269,253 | 194,921 | 134,878 | 130,000 | 126,350 | 159,440 | 147,684 |
| 5 | Transfer of Surplus from O&M | 4,197,349 | 5,109,563 | 5,120,459 | 5,813,953 | 3,880,139 | 5,339,271 | 6,763,307 | 7,356,368 | 8,136,410 | 9,002,721 |
| 6 | Subtotal: Sources | \$ 40,567,093 | \$ 38,450,515 | \$ 36,690,701 | \$ 63,460,488 | \$ 24,019,164 | \$ 19,413,934 | \$ 20,345,336 | \$ 20,569,754 | \$ 24,691,889 | \$ 24,370,832 |
| Uses of Funds | | | | | | | | | | | |
| 7 | CIP Projects | \$ 8,800,000 | \$ 7,640,374 | \$ 9,765,418 | \$ 43,968,384 | \$ 10,531,379 | \$ 6,413,905 | \$ 7,710,301 | \$ 4,625,715 | \$ 9,923,462 | \$ 13,190,204 |
| 8 | Subtotal: Uses | \$ 8,800,000 | \$ 7,640,374 | \$ 9,765,418 | \$ 43,968,384 | \$ 10,531,379 | \$ 6,413,905 | \$ 7,710,301 | \$ 4,625,715 | \$ 9,923,462 | \$ 13,190,204 |
| 9 | Ending Balance | \$ 31,767,093 | \$ 30,810,141 | \$ 26,925,283 | \$ 19,492,104 | \$ 13,487,785 | \$ 13,000,029 | \$ 12,635,035 | \$ 15,944,039 | \$ 14,768,426 | \$ 11,180,628 |
| CIP Adjustments | | | | | | | | | | | |
| 10 | Completion Percentage | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| 11 | Annual Cost Inflation | | 6.0% | 6.0% | 6.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% |
| 12 | Cumulative Inflation Rate | 100.0% | 106.0% | 112.4% | 119.1% | 123.9% | 128.8% | 134.0% | 139.3% | 144.9% | 150.7% |

Table B-5
City of Milpitas, CA
Sewer Capital Improvement Plan (CIP)
Option 1 - Bond Finance Forcemain

| Line No. | Capital Financing Plan | Projected | | | | | | | | |
|------------------|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | |
| 1 | Beginning Balance | \$ 11,180,628 | \$ 19,296,211 | \$ 18,803,709 | \$ 19,885,515 | \$ 22,128,922 | \$ 23,615,088 | \$ 27,395,292 | \$ 35,362,200 | \$ 44,463,662 |
| 2 | Revenue Bonds | - | - | - | - | - | - | - | - | - |
| 3 | Development Fees | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 |
| 4 | Interest | 111,806 | 192,962 | 188,037 | 198,855 | 221,289 | 236,151 | 273,953 | 353,622 | 444,637 |
| 5 | Transfer of Surplus from O&M | 9,921,957 | 10,860,157 | 11,996,299 | 13,154,171 | 14,379,506 | 15,677,074 | 17,050,463 | 18,497,728 | 19,679,617 |
| 6 | Subtotal: Sources | \$ 21,666,392 | \$ 30,801,330 | \$ 31,440,045 | \$ 33,690,541 | \$ 37,181,717 | \$ 39,980,312 | \$ 45,171,707 | \$ 54,665,550 | \$ 65,039,916 |
| Uses of Funds | | | | | | | | | | |
| 7 | CIP Projects | \$ 2,370,181 | \$ 11,997,621 | \$ 11,554,530 | \$ 11,561,619 | \$ 13,566,630 | \$ 12,585,020 | \$ 9,809,508 | \$ 10,201,888 | \$ 10,609,963 |
| 8 | Subtotal: Uses | \$ 2,370,181 | \$ 11,997,621 | \$ 11,554,530 | \$ 11,561,619 | \$ 13,566,630 | \$ 12,585,020 | \$ 9,809,508 | \$ 10,201,888 | \$ 10,609,963 |
| 9 | Ending Balance | \$ 19,296,211 | \$ 18,803,709 | \$ 19,885,515 | \$ 22,128,922 | \$ 23,615,088 | \$ 27,395,292 | \$ 35,362,200 | \$ 44,463,662 | \$ 54,429,953 |
| CIP Adjustments | | | | | | | | | | |
| 10 | Completion Percentage | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| 11 | Annual Cost Inflation | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% |
| 12 | Cumulative Inflation Rate | 156.7% | 163.0% | 169.5% | 176.3% | 183.4% | 190.7% | 198.3% | 206.2% | 214.5% |

Table B-6
City of Milpitas, CA
Sewer Capital Improvement Plan - TASP
Option 1 - Bond Finance Forcemain

| Line No. | Capital Financing Plan | Budget | | | | | Projected | | | | |
|-------------------------|--------------------------------|---------|---------|---------|---------|---------|-----------|---------|---------|---------|---------|
| | | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | | |
| 1 | Beginning Balance | | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 2 | Additional Rate Funded Capital | | | | | | | | | | |
| 3 | Subtotal: Sources | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| Uses of Funds | | | | | | | | | | | |
| 4 | CIP Projects | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 5 | Subtotal: Uses | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 6 | Ending Balance | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| CIP Adjustments | | | | | | | | | | | |
| 7 | Cumulative Inflation Rate | 100.0% | 106.0% | 112.4% | 119.1% | 123.9% | 128.8% | 134.0% | 139.3% | 144.9% | 150.7% |

Table B-6
City of Milpitas, CA
Sewer Capital Improvement Plan - TASP
Option 1 - Bond Finance Forcemain

| Line No. | Capital Financing Plan | Projected | | | | | | | | |
|------------------|--------------------------------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | |
| 1 | Beginning Balance | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 2 | Additional Rate Funded Capital | | | | | | | | | |
| 3 | Subtotal: Sources | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| Uses of Funds | | | | | | | | | | |
| 4 | CIP Projects | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 5 | Subtotal: Uses | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 6 | Ending Balance | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| CIP Adjustments | | | | | | | | | | |
| 7 | Cumulative Inflation Rate | 156.7% | 163.0% | 169.5% | 176.3% | 183.4% | 190.7% | 198.3% | 206.2% | 214.5% |

Table B-4
City of Milpitas, CA
Sewer Utility Cash Flow Analysis
Option 2 - Cash Finance Forcemain

| Line No. | Description | Budget | | | | | Projected | | | | |
|---------------------------------|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | | |
| 1 | Revenue from Existing Wastewater Fees | 20,236,812 | 21,735,520 | 22,042,585 | 22,373,301 | 22,695,210 | 23,017,441 | 23,340,002 | 23,662,901 | 23,986,148 | 24,318,934 |
| 2 | Add'l Wastewater Fee Revenue from Rate Increases | - | - | 1,322,555 | 2,765,340 | 4,335,148 | 6,041,548 | 7,894,186 | 9,903,376 | 11,399,654 | 12,992,884 |
| 3 | Total Wastewater Fee Revenue | 20,236,812 | 21,735,520 | 23,365,140 | 25,138,641 | 27,030,358 | 29,058,989 | 31,234,188 | 33,566,278 | 35,385,801 | 37,311,818 |
| 4 | Investment Interest | 251,000 | 205,863 | 128,475 | 135,749 | 140,330 | 145,116 | 149,643 | 149,643 | 153,908 | 159,002 |
| 5 | Total Sources | 20,487,812 | 21,941,383 | 23,493,615 | 25,274,390 | 27,170,688 | 29,204,105 | 31,383,830 | 33,715,920 | 35,539,709 | 37,470,820 |
| Revenue Requirements | | | | | | | | | | | |
| 6 | Operation and Maintenance Expense | 12,647,178 | 12,984,506 | 13,829,820 | 14,383,013 | 14,958,333 | 15,505,216 | 16,072,431 | 16,660,745 | 17,270,954 | 17,903,884 |
| 7 | Debt Service | 2,435,875 | 2,431,275 | 2,458,700 | 2,455,200 | 2,454,200 | 2,450,450 | 1,803,950 | 1,806,700 | 1,807,700 | 1,806,950 |
| 8 | Total Revenue Requirements | \$ 15,083,053 | \$ 15,415,781 | \$ 16,288,520 | \$ 16,838,213 | \$ 17,412,533 | \$ 17,955,666 | \$ 17,876,381 | \$ 18,467,445 | \$ 19,078,654 | \$ 19,710,834 |
| 9 | Operating Surplus | 5,404,759 | 6,525,602 | 7,205,095 | 8,436,177 | 9,758,154 | 11,248,438 | 13,507,449 | 15,248,475 | 16,461,055 | 17,759,985 |
| Reserve Fund Summary | | | | | | | | | | | |
| 10 | Capital for Emergencies | 3,770,763 | 3,853,945 | 4,072,130 | 4,209,553 | 4,353,133 | 4,488,917 | 4,488,917 | 4,616,861 | 4,769,663 | 4,927,709 |
| 11 | Rate Stabilization | 2,514,345 | 2,569,811 | 2,715,296 | 2,806,930 | 2,902,669 | 2,993,210 | 2,993,210 | 3,078,523 | 3,180,412 | 3,285,796 |
| 12 | CALPERS | 2,377,519 | 3,654,910 | 5,023,195 | 6,664,619 | 8,568,386 | 10,772,809 | 13,474,299 | 16,481,342 | 19,722,615 | 23,221,926 |
| 13 | Infrastructure | 31,767,093 | 30,810,141 | 27,277,964 | 20,375,455 | 18,114,899 | 21,151,835 | 24,911,011 | 33,014,580 | 7,857,294 | 9,194,907 |
| 14 | Total Reserves | \$ 40,429,720 | \$ 40,888,807 | \$ 39,088,585 | \$ 34,056,557 | \$ 33,939,087 | \$ 39,406,770 | \$ 45,867,436 | \$ 57,191,306 | \$ 35,529,984 | \$ 40,630,338 |
| | Reserves less CALPERS | 6,285,108 | 6,423,756 | 6,787,426 | 7,016,483 | 7,255,803 | 7,482,126 | 7,482,126 | 7,695,384 | 7,950,075 | 8,213,505 |
| | | 6,285,108 | 6,423,756 | 6,787,426 | 7,016,483 | 7,255,803 | 7,482,126 | 7,449,088 | 7,695,384 | 7,950,075 | 8,213,505 |
| 17 | Annualized Wastewater Service Revenue Increase | 0.0% | 0.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 4.0% | 4.0% |
| 18 | Cumulative Revenue Increase | 0.0% | 0.0% | 6.0% | 12.4% | 19.1% | 26.2% | 33.8% | 41.9% | 47.5% | 53.4% |
| 19 | Debt Service Coverage | 3.22 | 3.68 | 3.93 | 4.44 | 4.98 | 5.59 | 8.49 | 9.44 | 10.11 | 10.83 |
| Line No. | Reserve Fund Detail | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| Capital Reserve for Emergencies | | | | | | | | | | | |
| 1 | Beginning Balance | \$ 3,675,927 | \$ 3,770,763 | \$ 3,853,945 | \$ 4,072,130 | \$ 4,209,553 | \$ 4,353,133 | \$ 4,488,917 | \$ 4,488,917 | \$ 4,616,861 | \$ 4,769,663 |
| 2 | Contribution | 94,836 | 83,182 | 218,185 | 137,423 | 143,580 | 135,783 | - | 127,945 | 152,802 | 158,045 |
| 3 | Ending Balance | \$ 3,770,763 | \$ 3,853,945 | \$ 4,072,130 | \$ 4,209,553 | \$ 4,353,133 | \$ 4,488,917 | \$ 4,488,917 | \$ 4,616,861 | \$ 4,769,663 | \$ 4,927,709 |
| 4 | Target | 3,770,763 | 3,853,945 | 4,072,130 | 4,209,553 | 4,353,133 | 4,488,917 | 4,469,095 | 4,616,861 | 4,769,663 | 4,927,709 |
| Rate Stabilization Reserve | | | | | | | | | | | |
| 5 | Beginning Balance | \$ 2,451,108 | 2,514,345 | 2,569,811 | 2,715,296 | 2,806,930 | 2,902,669 | 2,993,210 | 2,993,210 | 3,078,523 | 3,180,412 |
| 6 | Contribution | 63,237 | 55,466 | 145,486 | 91,634 | 95,739 | 90,540 | - | 85,313 | 101,888 | 105,384 |
| 7 | Ending Balance | \$ 2,514,345 | \$ 2,569,811 | \$ 2,715,296 | \$ 2,806,930 | \$ 2,902,669 | \$ 2,993,210 | \$ 2,993,210 | \$ 3,078,523 | \$ 3,180,412 | \$ 3,285,796 |
| 8 | Target | 2,514,345 | 2,569,811 | 2,715,296 | 2,806,930 | 2,902,669 | 2,993,210 | 2,979,993 | 3,078,523 | 3,180,412 | 3,285,796 |
| CALPERS Reserve | | | | | | | | | | | |
| 9 | Beginning Balance | \$ 1,328,182 | 2,377,519 | 3,654,910 | 5,023,195 | 6,664,619 | 8,568,386 | 10,772,809 | 13,474,299 | 16,481,342 | 19,722,615 |
| 10 | Contribution | 1,049,337 | 1,277,391 | 1,368,285 | 1,641,424 | 1,903,767 | 2,204,423 | 2,701,490 | 3,007,043 | 3,241,273 | 3,499,311 |
| 11 | Ending Balance | \$ 2,377,519 | \$ 3,654,910 | \$ 5,023,195 | \$ 6,664,619 | \$ 8,568,386 | \$ 10,772,809 | \$ 13,474,299 | \$ 16,481,342 | \$ 19,722,615 | \$ 23,221,926 |
| 12 | Transfer to Infrastructure Replacement | \$ 4,197,349 | \$ 5,109,563 | \$ 5,473,140 | \$ 6,565,696 | \$ 7,615,068 | \$ 8,817,692 | \$ 10,805,959 | \$ 12,028,174 | \$ 12,965,092 | \$ 13,997,245 |
| | Check | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| Infrastructure Replacement | | | | | | | | | | | |
| 13 | Beginning Balance | \$ 35,522,844 | \$ 31,767,093 | \$ 30,810,141 | \$ 27,277,964 | \$ 20,375,455 | \$ 18,114,899 | \$ 21,151,835 | \$ 24,911,011 | \$ 33,014,580 | \$ 7,857,294 |
| 14 | Contribution | (3,755,751) | (956,952) | (3,532,177) | (6,902,509) | (2,260,556) | 3,036,936 | 3,759,176 | 8,103,569 | (25,157,286) | 1,337,614 |
| 15 | Ending Balance | \$ 31,767,093 | \$ 30,810,141 | \$ 27,277,964 | \$ 20,375,455 | \$ 18,114,899 | \$ 21,151,835 | \$ 24,911,011 | \$ 33,014,580 | \$ 7,857,294 | \$ 9,194,907 |
| | Target | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 |

Table B-4
City of Milpitas, CA
Sewer Utility Cash Flow Analysis
Option 2 - Cash Finance Forcemain

| Line No. | Description | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
|---------------------------------|--|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | |
| 1 | Revenue from Existing Wastewater Fees | 24,652,571 | 24,987,076 | 25,322,469 | 25,658,771 | 25,996,002 | 26,334,184 | 26,673,339 | 27,013,488 | 27,133,054 |
| 2 | Add'l Wastewater Fee Revenue from Rate Increases | 14,684,084 | 16,478,145 | 18,380,197 | 20,395,624 | 22,530,069 | 24,789,457 | 27,179,999 | 29,708,214 | 32,118,617 |
| 3 | Total Wastewater Fee Revenue | 39,336,655 | 41,465,221 | 43,702,666 | 46,054,394 | 48,526,071 | 51,123,641 | 53,853,338 | 56,721,702 | 59,251,671 |
| 4 | Investment Interest | 164,270 | 169,721 | 175,631 | 180,795 | 186,175 | 191,753 | 197,521 | 203,481 | 209,683 |
| 5 | Total Sources | 39,500,925 | 41,634,941 | 43,878,297 | 46,235,189 | 48,712,246 | 51,315,394 | 54,050,859 | 56,925,183 | 59,461,354 |
| Revenue Requirements | | | | | | | | | | |
| 6 | Operation and Maintenance Expense | 18,560,395 | 19,268,799 | 19,889,667 | 20,533,472 | 21,201,073 | 21,893,365 | 22,611,274 | 23,355,762 | 24,127,830 |
| 7 | Debt Service | 1,804,450 | 1,805,200 | 1,803,950 | 1,805,700 | 1,807,450 | 1,807,200 | 1,804,450 | 1,804,200 | 1,806,200 |
| 8 | Total Revenue Requirements | \$ 20,364,845 | \$ 21,073,999 | \$ 21,693,617 | \$ 22,339,172 | \$ 23,008,523 | \$ 23,700,565 | \$ 24,415,724 | \$ 25,159,962 | \$ 25,934,030 |
| 9 | Operating Surplus | 19,136,080 | 20,560,942 | 22,184,680 | 23,896,017 | 25,703,723 | 27,614,829 | 29,635,135 | 31,765,221 | 33,527,325 |
| Reserve Fund Summary | | | | | | | | | | |
| 10 | Capital for Emergencies | 5,091,211 | 5,268,500 | 5,423,404 | 5,584,793 | 5,752,131 | 5,925,141 | 6,103,931 | 6,289,991 | 6,483,507 |
| 11 | Rate Stabilization | 3,394,820 | 3,513,036 | 3,616,326 | 3,723,940 | 3,835,521 | 3,950,884 | 4,070,101 | 4,194,166 | 4,323,203 |
| 12 | CALPERS | 26,994,637 | 31,047,724 | 35,433,021 | 40,158,424 | 45,243,385 | 50,708,676 | 56,576,102 | 62,867,121 | 69,508,075 |
| 13 | Infrastructure | 22,459,518 | 27,350,843 | 34,063,009 | 42,195,632 | 49,842,802 | 60,069,374 | 74,782,263 | 90,944,275 | 108,259,571 |
| 14 | Total Reserves | \$ 57,940,186 | \$ 67,180,102 | \$ 78,535,761 | \$ 91,662,789 | \$ 104,673,838 | \$ 120,654,075 | \$ 141,532,397 | \$ 164,295,552 | \$ 188,574,356 |
| | Reserves less CALPERS | 8,486,031 | 8,781,535 | 9,039,730 | 9,308,733 | 9,587,652 | 9,876,025 | 10,174,032 | 10,484,156 | 10,806,710 |
| | | 8,486,031 | 8,781,535 | 9,039,730 | 9,308,733 | 9,587,652 | 9,876,025 | 10,174,032 | 10,484,156 | 10,806,710 |
| 17 | Annualized Wastewater Service Revenue Increase | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% |
| 18 | Cumulative Revenue Increase | 59.6% | 65.9% | 72.6% | 79.5% | 86.7% | 94.1% | 101.9% | 110.0% | 118.4% |
| 19 | Debt Service Coverage | 11.60 | 12.39 | 13.30 | 14.23 | 15.22 | 16.28 | 17.42 | 18.61 | 19.56 |
| Line No. | Reserve Fund Detail | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
| Capital Reserve for Emergencies | | | | | | | | | | |
| 1 | Beginning Balance | \$ 4,927,709 | \$ 5,091,211 | \$ 5,268,500 | \$ 5,423,404 | \$ 5,584,793 | \$ 5,752,131 | \$ 5,925,141 | \$ 6,103,931 | \$ 6,289,991 |
| 2 | Contribution | 163,503 | 177,289 | 154,905 | 161,389 | 167,338 | 173,010 | 178,790 | 186,060 | 193,517 |
| 3 | Ending Balance | \$ 5,091,211 | \$ 5,268,500 | \$ 5,423,404 | \$ 5,584,793 | \$ 5,752,131 | \$ 5,925,141 | \$ 6,103,931 | \$ 6,289,991 | \$ 6,483,507 |
| 4 | Target | 5,091,211 | 5,268,500 | 5,423,404 | 5,584,793 | 5,752,131 | 5,925,141 | 6,103,931 | 6,289,991 | 6,483,507 |
| Rate Stabilization Reserve | | | | | | | | | | |
| 5 | Beginning Balance | 3,285,796 | 3,394,820 | 3,513,036 | 3,616,326 | 3,723,940 | 3,835,521 | 3,950,884 | 4,070,101 | 4,194,166 |
| 6 | Contribution | 109,024 | 118,216 | 103,290 | 107,614 | 111,581 | 115,363 | 119,217 | 124,065 | 129,037 |
| 7 | Ending Balance | \$ 3,394,820 | \$ 3,513,036 | \$ 3,616,326 | \$ 3,723,940 | \$ 3,835,521 | \$ 3,950,884 | \$ 4,070,101 | \$ 4,194,166 | \$ 4,323,203 |
| 8 | Target | 3,394,820 | 3,513,036 | 3,616,326 | 3,723,940 | 3,835,521 | 3,950,884 | 4,070,101 | 4,194,166 | 4,323,203 |
| CALPERS Reserve | | | | | | | | | | |
| 9 | Beginning Balance | 23,221,926 | 26,994,637 | 31,047,724 | 35,433,021 | 40,158,424 | 45,243,385 | 50,708,676 | 56,576,102 | 62,867,121 |
| 10 | Contribution | 3,772,711 | 4,053,088 | 4,385,297 | 4,725,403 | 5,084,961 | 5,465,291 | 5,867,426 | 6,291,019 | 6,640,954 |
| 11 | Ending Balance | \$ 26,994,637 | \$ 31,047,724 | \$ 35,433,021 | \$ 40,158,424 | \$ 45,243,385 | \$ 50,708,676 | \$ 56,576,102 | \$ 62,867,121 | \$ 69,508,075 |
| 12 | Transfer to Infrastructure Replacement | \$ 15,090,843 | \$ 16,212,350 | \$ 17,541,188 | \$ 18,901,612 | \$ 20,339,843 | \$ 21,861,164 | \$ 23,469,703 | \$ 25,164,077 | \$ 26,563,817 |
| | Check | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE |
| Infrastructure Replacement | | | | | | | | | | |
| 13 | Beginning Balance | \$ 9,194,907 | \$ 22,459,518 | \$ 27,350,843 | \$ 34,063,009 | \$ 42,195,632 | \$ 49,842,802 | \$ 60,069,374 | \$ 74,782,263 | \$ 90,944,275 |
| 14 | Contribution | 13,264,611 | 4,891,324 | 6,712,166 | 8,132,623 | 7,647,170 | 10,226,572 | 14,712,889 | 16,162,012 | 17,315,296 |
| 15 | Ending Balance | \$ 22,459,518 | \$ 27,350,843 | \$ 34,063,009 | \$ 42,195,632 | \$ 49,842,802 | \$ 60,069,374 | \$ 74,782,263 | \$ 90,944,275 | \$ 108,259,571 |
| | Target | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 |

Table B-5
City of Milpitas, CA
Sewer Capital Improvement Plan (CIP)
Option 2 - Cash Finance Forcemain

| Line | | Budget | | | | Projected | | | | | |
|------------------|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| No. | Capital Financing Plan | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | | |
| 1 | Beginning Balance | \$ 35,522,844 | \$ 31,767,093 | \$ 30,810,141 | \$ 27,277,964 | \$ 20,375,455 | \$ 18,114,899 | \$ 21,151,835 | \$ 24,911,011 | \$ 33,014,580 | \$ 7,857,294 |
| 2 | Revenue Bonds | - | - | - | - | - | - | - | - | - | - |
| 3 | Development Fees | 452,000 | 1,417,137 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 |
| 4 | Interest | 394,900 | 156,722 | 308,101 | 272,780 | 203,755 | 181,149 | 211,518 | 249,110 | 330,146 | 78,573 |
| 5 | Transfer of Surplus from O&M | 4,197,349 | 5,109,563 | 5,473,140 | 6,565,696 | 7,615,068 | 8,817,692 | 10,805,959 | 12,028,174 | 12,965,092 | 13,997,245 |
| 6 | Subtotal: Sources | \$ 40,567,093 | \$ 38,450,515 | \$ 37,043,382 | \$ 34,568,439 | \$ 28,646,278 | \$ 27,565,740 | \$ 32,621,312 | \$ 37,640,295 | \$ 46,761,817 | \$ 22,385,111 |
| Uses of Funds | | | | | | | | | | | |
| 7 | CIP Projects | \$ 8,800,000 | \$ 7,640,374 | \$ 9,765,418 | \$ 14,192,984 | \$ 10,531,379 | \$ 6,413,905 | \$ 7,710,301 | \$ 4,625,715 | \$ 38,904,524 | \$ 13,190,204 |
| 8 | Subtotal: Uses | \$ 8,800,000 | \$ 7,640,374 | \$ 9,765,418 | \$ 14,192,984 | \$ 10,531,379 | \$ 6,413,905 | \$ 7,710,301 | \$ 4,625,715 | \$ 38,904,524 | \$ 13,190,204 |
| 9 | Ending Balance | \$ 31,767,093 | \$ 30,810,141 | \$ 27,277,964 | \$ 20,375,455 | \$ 18,114,899 | \$ 21,151,835 | \$ 24,911,011 | \$ 33,014,580 | \$ 7,857,294 | \$ 9,194,907 |
| CIP Adjustments | | | | | | | | | | | |
| 10 | Completion Percentage | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| 11 | Annual Cost Inflation | | 6.0% | 6.0% | 6.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% |
| 12 | Cumulative Inflation Rate | 100.0% | 106.0% | 112.4% | 119.1% | 123.9% | 128.8% | 134.0% | 139.3% | 144.9% | 150.7% |

Table B-5
City of Milpitas, CA
Sewer Capital Improvement Plan (CIP)
Option 2 - Cash Finance Forcemain

| Line No. | Capital Financing Plan | Projected | | | | | | | | |
|------------------|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|
| | | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | |
| 1 | Beginning Balance | \$ 9,194,907 | \$ 22,459,518 | \$ 27,350,843 | \$ 34,063,009 | \$ 42,195,632 | \$ 49,842,802 | \$ 60,069,374 | \$ 74,782,263 | \$ 90,944,275 |
| 2 | Revenue Bonds | - | - | - | - | - | - | - | - | - |
| 3 | Development Fees | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 | 452,000 |
| 4 | Interest | 91,949 | 224,595 | 273,508 | 340,630 | 421,956 | 498,428 | 600,694 | 747,823 | 909,443 |
| 5 | Transfer of Surplus from O&M | 15,090,843 | 16,212,350 | 17,541,188 | 18,901,612 | 20,339,843 | 21,861,164 | 23,469,703 | 25,164,077 | 26,563,817 |
| 6 | Subtotal: Sources | \$ 24,829,699 | \$ 39,348,463 | \$ 45,617,539 | \$ 53,757,251 | \$ 63,409,432 | \$ 72,654,394 | \$ 84,591,770 | \$ 101,146,162 | \$ 118,869,534 |
| Uses of Funds | | | | | | | | | | |
| 7 | CIP Projects | \$ 2,370,181 | \$ 11,997,621 | \$ 11,554,530 | \$ 11,561,619 | \$ 13,566,630 | \$ 12,585,020 | \$ 9,809,508 | \$ 10,201,888 | \$ 10,609,963 |
| 8 | Subtotal: Uses | \$ 2,370,181 | \$ 11,997,621 | \$ 11,554,530 | \$ 11,561,619 | \$ 13,566,630 | \$ 12,585,020 | \$ 9,809,508 | \$ 10,201,888 | \$ 10,609,963 |
| 9 | Ending Balance | \$ 22,459,518 | \$ 27,350,843 | \$ 34,063,009 | \$ 42,195,632 | \$ 49,842,802 | \$ 60,069,374 | \$ 74,782,263 | \$ 90,944,275 | \$ 108,259,571 |
| CIP Adjustments | | | | | | | | | | |
| 10 | Completion Percentage | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| 11 | Annual Cost Inflation | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% |
| 12 | Cumulative Inflation Rate | 156.7% | 163.0% | 169.5% | 176.3% | 183.4% | 190.7% | 198.3% | 206.2% | 214.5% |

Table B-6
City of Milpitas, CA
Sewer Capital Improvement Plan - TASP
Option 2 - Cash Finance Forcemain

| Line No. | Capital Financing Plan | Budget | | | | | Projected | | | | |
|-------------------------|--------------------------------|---------|---------|---------|---------|---------|-----------|---------|---------|----------------|----------------|
| | | FY 2022 | FY 2023 | FY 2024 | FY 2025 | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | FY 2031 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | | |
| 1 | Beginning Balance | | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ (7,245,265) |
| 2 | Additional Rate Funded Capital | | | | | | | | | | |
| 3 | Subtotal: Sources | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ (7,245,265) |
| Uses of Funds | | | | | | | | | | | |
| 4 | CIP Projects | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 7,245,265 | \$ - |
| 5 | Subtotal: Uses | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 7,245,265 | \$ - |
| 6 | Ending Balance | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ (7,245,265) | \$ (7,245,265) |
| CIP Adjustments | | | | | | | | | | | |
| 7 | Cumulative Inflation Rate | 100.0% | 106.0% | 112.4% | 119.1% | 123.9% | 128.8% | 134.0% | 139.3% | 144.9% | 150.7% |

Table B-6
City of Milpitas, CA
Sewer Capital Improvement Plan - TASP
Option 2 - Cash Finance Forcemain

| Line No. | Capital Financing Plan | Projected | | | | | | | | |
|------------------|--------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | FY 2032 | FY 2033 | FY 2034 | FY 2035 | FY 2036 | FY 2037 | FY 2038 | FY 2039 | FY 2040 |
| | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Sources of Funds | | | | | | | | | | |
| 1 | Beginning Balance | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) |
| 2 | Additional Rate Funded Capital | | | | | | | | | |
| 3 | Subtotal: Sources | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) |
| Uses of Funds | | | | | | | | | | |
| 4 | CIP Projects | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 5 | Subtotal: Uses | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| 6 | Ending Balance | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) | \$ (7,245,265) |
| CIP Adjustments | | | | | | | | | | |
| 7 | Cumulative Inflation Rate | 156.7% | 163.0% | 169.5% | 176.3% | 183.4% | 190.7% | 198.3% | 206.2% | 214.5% |

APPENDIX H
City of Milpitas
Sewer Master Plan Study
Sanitary Sewer Force Main Cleaning and CCTV Inspection
Project Report

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PROJECT REPORT

SANITARY SEWER FORCE MAIN CLEANING AND CCTV INSPECTION

CITY OF MILPITAS ENGINEERING DEPARTMENT

PREPARED BY: LYHAK EAM, P.E.
REVIEWED BY: MICHAEL SILVEIRA, P.E.
DATE: FEBRUARY 22, 2021





EXECUTIVE SUMMARY

The City of Milpitas sanitary sewer system consists of two force mains that carries the City’s wastewater from the City of Milpitas Main Lift Sewer Pump Station at North McCarthy Boulevard to the San Jose-Santa Clara Regional Wastewater Treatment Plants. Force Main A and B were constructed in 1974 and 2000, respectively. The objective of this project was to perform an internal assessment of Force Main A (“FM-A”), but it was not possible to complete within budget due to unforeseen conditions and challenges. Engineering Department reported the findings to Public Works and recommends FM-A be either rehabilitated or replaced due to the its condition and age.

PROJECT BACKGROUND

Cathodic Protection Improvement Project No. 6131 (“Project”) is in the approved Capital Improvement Program 2020-2025. The Project provides for the replacement of two existing mag meters at the Milpitas Main Lift Station, installation of cathodic protection system along the FM-A, removal or abandonment of the existing diverter valve vault near the Coyote Creek, evaluation and renovation of existing pinch valve vaults, and an assessment of FM-A. Per the “Water Pollution Control Facilities Project” record drawing dated April 1972 (**Attachment A**), FM-A is approximate 12,000 feet including 12 access manholes spaced approximately 1,000 feet apart. The force main extends from the Main Lift Pump Station, crossing under the Coyote Creek as a siphon, going underneath San Jose Residual Sludge Management (RSM) drying beds (Lagoons) and Zander Road, and connecting to the San Jose-Santa Clara Regional Wastewater Treatment Plants. (**Figure 01**).

JDH Corrosion Consultant, Inc. was retained to perform an indirect pipe assessment by using a Close Interval Survey (CIS) to measure the soil corrosivity surrounding the FM-A. The survey concluded the soils are inherently very corrosive and can potentially corrode and damage the steel force main (**Attachment B**). Based on the survey and the age of the system, Pipe and Plant Solutions Inc (PPSI) was retained to perform the cleaning and CCTV inspection to assess the internal condition of the force main. The work included site investigation of all sewer manholes, replacement of any corroded bolts and gaskets as needed, clearing and grubbing surrounding areas for safe and secure access, removal and disposal of any debris from the sanitary sewer force main, and performing CCTV inspection.

CITY OF MILPITAS

Engineering Department



Figure 1- Ariel Map of City Force Mains



SITE INVESTIGATION FINDINGS/CHALLENGES

The following is a summary of findings/challenges that Engineering staff encountered during the site investigation.

1. RIGHT-OF-WAY/PERMITTING PROCESS

The entire FM-A (**Figure 02**) is located within the Santa Clara-San Jose Wastewater Treatment Plant property, and the City of Milpitas has an easement to maintain and operate the facility at any time (**Attachment B**). Without any additional provisions or requirements mentioned in the easement, the City of San Jose requires the City of Milpitas to enter into Right of Entry agreement (**Attachment C**) to access the City right-of-way for any work. The City attorney reviewed the languages in the easement and re-affirmed that the City of Milpitas has the right to access and perform work necessary without any further restriction by San Jose. Due to the schedule and need to investigate the FM-A, Engineering applied for a Right of Entry permit and tabled the discussion of the City of Milpitas rights to their Right of way. The permit process took approximately 3 months.



Figure 2- Force Main A Alignment

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Engineering Department



In addition, the City is required to obtain an encroachment permit from Santa Clara Valley Water District (Valley Water) to access manhole #1 because of its close proximity to Coyote Creek that falls under their jurisdiction (**Figure 3**). At the time, Valley Water issued a permit for pedestrian access for site investigation search of the manhole with no excavation allowed. To obtain a vehicle access permit, the Valley Water will require an environmental assessment of invasive plants in the area. The assessment shall include the impacts of the work and any mitigation measures to preserve the surrounding area.

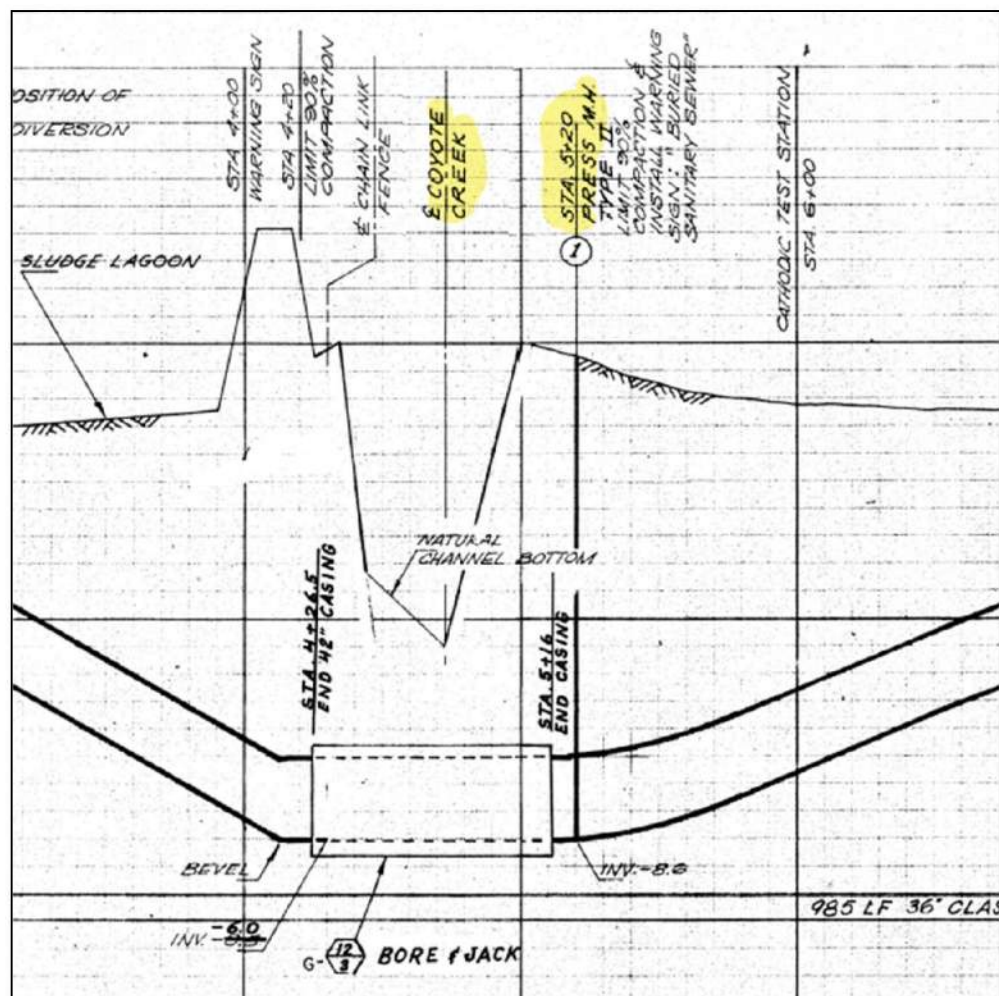


Figure 3- Manhole #1 Location Per As built



2. MISSING MANHOLES

After securing necessary permits, the contractor began to locate and assess all the manholes to access FM-A for cleaning and CCTV inspection. The contractor was able to locate manhole #2-6, 9-12, but unable to locate manhole #1, 7, and 8.

Manhole #1: Per Record Drawings, the manhole is located adjacent to Coyote Creek (**Figure 04**) under District jurisdiction. The manhole was not found because the permit issued by Valley Water is limited to pedestrian access and no excavation or removal of vegetation allowed. In order to locate the manhole, heavy equipment will have to be used to excavate and remove the vegetation around the area.



Figure 4: Force Main Manhole #1 Location

Manhole #7: Per Record Drawings, the manhole is approximate 972 feet from manhole #6 (**Figure 05**). Contractor was unable to locate the manhole and speculated it is buried under the existing access road.



Figure 5: Force Main Manhole #7 Location

According to the force main profile shown in **Figure 06**, manhole #7 is a critical access point to remove debris from pipe segment between manhole 6-7, 7-8 & 8-9 because it is the low point in the system.



Figure 6: Force Main Profile

Manhole #8: Contractor searched for the manhole without success but found a 30' high vertical pipe where the manhole should be located as shown in **Figure 07**. It is assumed the manhole was modified for this vertical pipe. Public Works staff does not have knowledge or the functionality of this pipe. The City does not have existing records of this modification.



Figure 7: Force Main Manhole #8 Location

3. CORRODED MANHOLES' COMPONENTS

The Contractor investigated available manholes and the internal components including air release valves, bolts, gaskets and blind flanges. The components in manholes #9-12 appeared to be in good conditions. However, components in manholes #2 – 6, located in the lagoon area, are significantly corroded and not functional, see **Figure 8 & 9**.

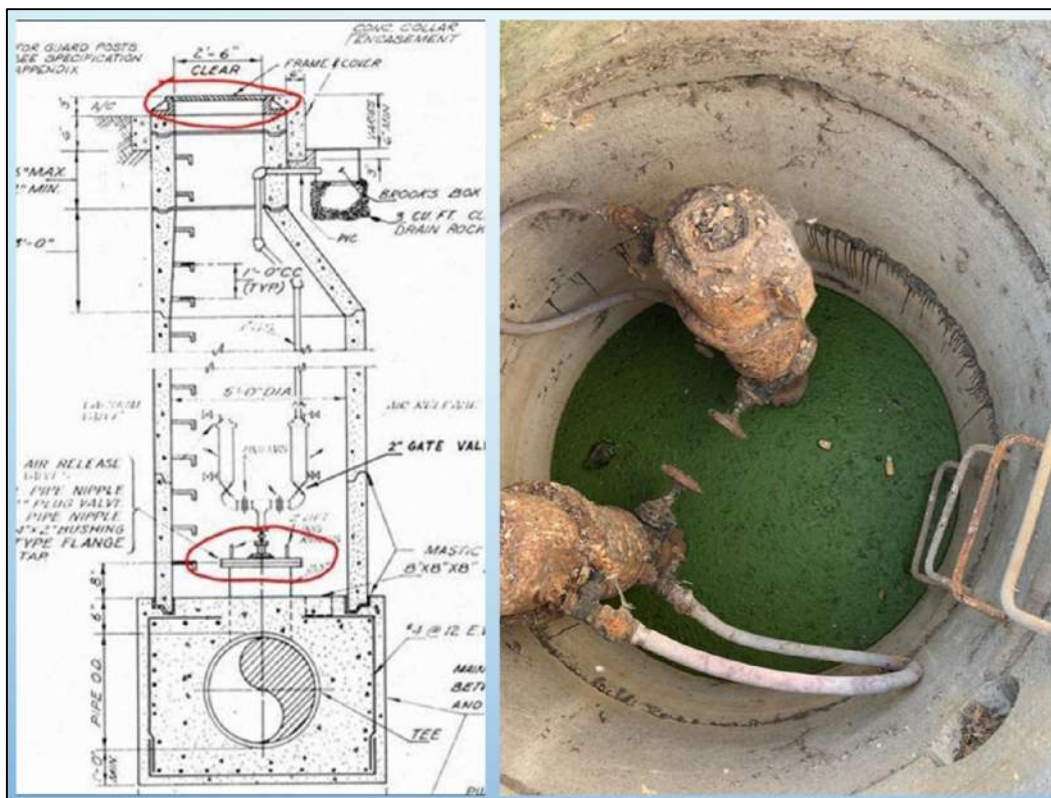


Figure 8: Force Main Manhole



Figure 9: Corroded Air Release Valve and Blind Flange



In order to access the force main at manholes, both air release valves and blind flanges must be removed. Since components at manhole #2-6 are significantly corroded, they must be replaced to ensure the force main is properly sealed. The cost of replacing these components with stainless steel is approximately \$25,000, which is not included in the project scope and budget. Therefore, the cleaning and CCTV inspection of the segments between manhole #2-6 were postponed until the aforementioned issues are resolved.

4. HIGH LEL AND H2S GAS LEVELS

During first attempt of the removal of the blind flange at MH#12, the Contractor encountered H2S and LEL gases levels that were beyond the maximum value of 100%, which was considered very hazardous. The Contractor had to immediately seal the blind flange and evacuate the area. It was assumed that the existence of high gas levels was due to the stagnant wastewater in the force main for approximate 4 weeks and could not be completely flush out of the system due to challenges accessing the system. Not knowing the exact source of the gases, staff recommended to resume the operation of the FM-A for 48-hours in the hope the gas would dissipate. The strategy was successful, and the Contractor was able to access the manhole safely. The source of the gases were not determined and may appear again in future work if the wastewater is stagnant for a period of time.

5. SEWER OVERFLOW INCIDENT AND UNFUNCTIONAL SLIDE GATE

After resolving the gas issue, Public Works switched the wastewater operation from Force Main A to Force Main B (FM-B) to allow the Contractor to access manhole #12. As the contractor began to remove the blind flange, effluent started to overflow out of the manhole as shown in **Figure 10**. The overflow was a result from the wastewater from FM-B backflowing into FM-A at the Milpitas structure (**Figure 11**). Both FM-A and FM-B are connected directly to the Milpitas structure (**Figure 12**) that serves as a detention basin to receive and store all effluent before sending down to the Plant for treatment via an overflow weir wall.

In order to prevent the backflow from FM-B to FM-A, the FM-A sliding gate in the structure needs to be closed which is currently non-operational. Public Works shut down both force mains to stop the

CITY OF MILPITAS

Engineering Department



overflow and allow the contractor to re-install the blind flange. The non-functional sliding gate caused effluent to backflow into the entire system because the elevation of force main A is lower than the Milpitas Structure. Such condition will create the potential overflow situation at other manholes similar to that encountered at manhole #12. To conduct any inspections of FM-A by CCTV, the sliding gate needs to be repaired to isolate the force main from one another.

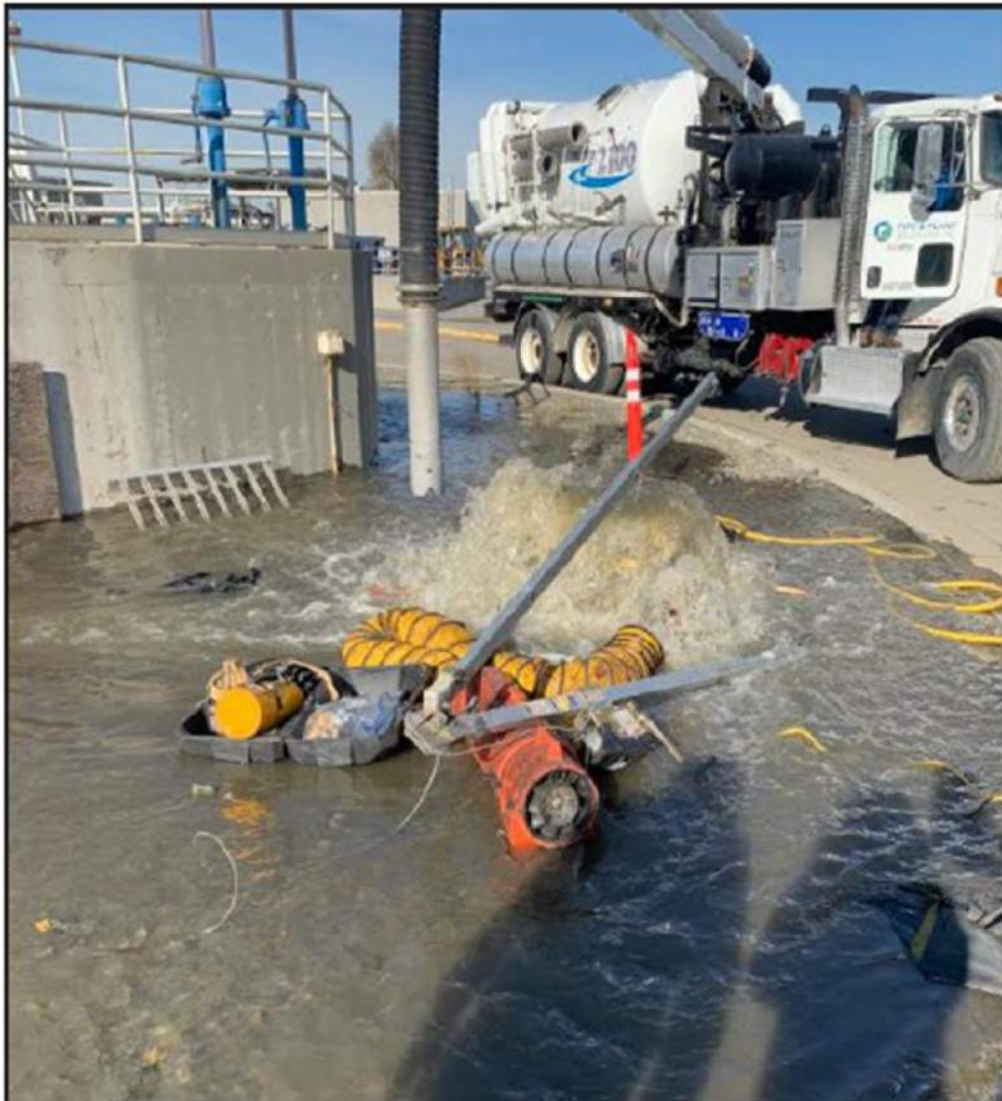


Figure 10: Sewer Overflow at MH #12

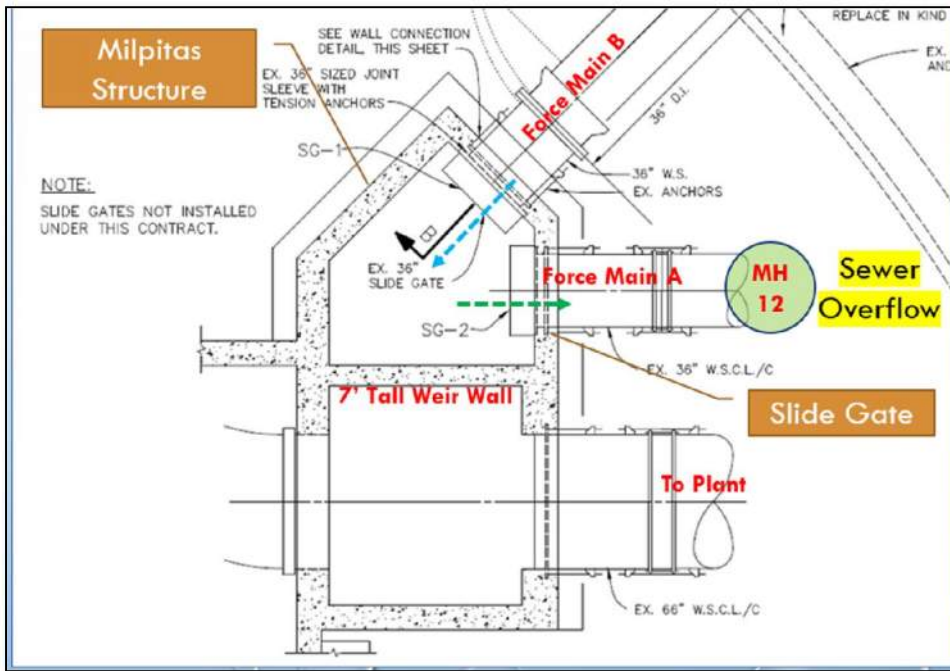


Figure 11: Milpitas Structure Drawing



Figure 12: Milpitas Structure



CONCLUSION

Due to numerous issues as described, the following tasks shall be completed prior to performing the cleaning and CCTV inspection of the force main.

1. Locate all missing manholes along the force main including manholes #1, 7, and 8.
2. Replace all corroded air release valves and blind flanges for manhole #2 to #6.
3. Repair slide gate at Milpitas Structure so that the FM-A can be isolated from the structure itself.

Based upon this preliminary evaluation, the cost to complete the cleaning and CCTV inspection and all associated work is approximate \$ 850,000. The following is the summary of the cost breakdown.

| Description | Cost |
|--|-----------|
| Cleaning and CCTV inspection | \$350,000 |
| Replacement of (6) manholes' parts (bolts, blind flange, gasket, ARV) | \$150,000 |
| Repair slide gate and bypass pumping | \$150,000 |
| Permitting process | \$30,000 |
| Bidding process and construction administration | \$30,000 |
| Construction contingency (20%) | \$140,000 |
| TOTAL | \$850,000 |

It is assumed the condition of the force main is deteriorating and doesn't meet industrial standards due to the age of the system, level of soil corrosivity surrounding the steel pipe, and the minimal routine maintenance since it was installed in 1974. The City should consider to either rehabilitate or replace the system in the near future. Rehabilitation of existing force main with a liner may extend its service life; however, the City should hire a professional license engineer to evaluate the existing system and provide improvement options and estimated cost. The installation of new force main is another option that the City should consider to ensure the well-being of this critical infrastructure for next 50 years. The estimated project cost for the construction of a new force main is as follows, and detailed cost breakdown is provided in **Attachment D**.

CITY OF MILPITAS

Engineering Department



| | |
|---|---------------------|
| Improvement Cost | \$14,197,000 |
| Design (20%) | \$ 2,839,400 |
| Administration (15%) | \$ 2,129,550 |
| Testing and Inspection (5%) | \$ 709,850 |
| Environmental Review & Permitting (5%) | \$ 709,850 |
| TOTAL | \$20,585,650 |

Note the Engineering cost estimate provided are based on the construction cost of the Force Main B in 2000 and cost escalations over the past decades. No details planning or study has been conducted as part of this process. The basis for this estimate includes the following assumptions:

- 12,000 linear feet of 36" HDPE line
- The new force main is parallel to the existing force main B (HDPE)
- 12 manholes access with air release valves
- Bore and Jack under Zanker Road & Milpitas Structure
- Micro-tunneling- Coyote Creek crossing

ATTACHMENTS

- Attachment A : Water Pollution Control Facilities As built
- Attachment B : Close Internal Survey Report
- Attachment C : Right of Entry Agreement
- Attachment C : Detailed Cost Estimate to Construct New Fore Main



HydroScience is a civil engineering firm that plans, designs, and manages the construction of water, wastewater, and recycled water projects. With offices in Berkeley, San Jose, and Sacramento, we understand and address the complex water and wastewater needs of Northern California.

HydroScience 

741 Allston Way
Berkeley, CA 94710
510.540.7100