



STORM SEWER SYSTEM ANNUAL REPORT FY 2017-2018



Alviso Storm Pump Station – Construction

October 2018

City of San José
Storm Sewer System Annual Report
FY 2017-18

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I. HISTORY AND BACKGROUND

The City of San José drains into two main watershed/drainage basin areas: Coyote Creek and Guadalupe River. Within the tributary areas of these two watersheds, most of the City's storm sewer collection system benefits from the uniform topography of the Santa Clara Valley, allowing most of the water to be conveyed into the waterways using gravity lines with minimal use of pump stations.

The City's storm sewer network is a storm water collection system that includes more than 1,100 miles of storm sewer pipelines, 32,200 storm sewer drain inlets, 30 pump stations, 1,510 storm sewer outfalls, and over 4,500 miles of curb and gutter. Various channels, culverts, ditches, detention, and debris basins make up the remainder of the system; as well as 21 large trash capture systems that support the City's compliance with the Municipal Regional Stormwater Permit (Stormwater Permit). The most recent Stormwater Permit that became effective January 1, 2016, mandates municipalities to initiate planning efforts for implementation of additional stormwater quality features such as green infrastructure which may use vegetation, soils, and natural processes to filter the runoff and reduce pollutants (e.g. bioretention). The storm sewer system is designed to convey stormwater away from developed areas to local creeks and rivers, and ultimately, to San Francisco Bay. An estimated 67 percent of the City's storm sewer drainage system was constructed between 1950 and 1990.

The Santa Clara Valley Water District constructed levees in north San Jose along Coyote Creek and the Guadalupe River to convey flood flows from upstream areas. These levees cause water levels in both waterways to rise to elevations higher than adjacent surface elevation of the lands in North San José. In those instances, storm sewer pump stations are needed to discharge stormwater runoff into the waterways. In the absence of storm sewer pump stations, internal flooding would likely occur in various portions of North San José. The City owns and operates 30 storm sewer pump stations with various capacities, including the Cahill Pump Station recently relinquished to the City and previously operated and maintained by Caltrans and the Berryessa Pump Station constructed for the Flea Market Development. The larger storm sewer pump stations drain areas located north of Highway 101 into the Guadalupe River. The smaller storm sewer pump stations typically drain street underpasses. The construction dates of the smaller pumps range from 1928 to 1975, many of which are over 40 years of age.

Since the mid 1980's, the City's design standard requires storm sewer systems to be designed to convey a 10-year storm event (a storm event large enough to have a 10 percent chance of occurring in any year) instead of a 3-year event (a storm event that has a 33 percent chance of occurring in any year; typically, this storm will be smaller than a 10-year storm). The 10-year event is widely recognized as a reasonable, safe standard, and is employed by numerous jurisdictions nation-wide. Prior to 1990, approximately 67 percent of the storm sewer drains were designed for a 3-year storm event standard. In many areas that have been annexed to the City, the capacity is even less than a 3-year event. While all new developments are required to design their on-site storm sewer system to accommodate a 10-year event, they are not required to address downstream deficiencies in the storm sewer system to which the developer connects.

The Department of Public Works designs and builds storm sewer infrastructure funded through the City's Capital Improvement Program. Public Works also reviews and inspects storm sewer improvements constructed by private developers and other public agencies. The Storm Section is

part of the Transportation & Hydraulics Services Division in Public Works. The Storm Section is tasked with:

- Design and construction of improvements that maximize the efficiency of the existing storm sewer system to meet current and future needs,
- Design and construction of improvements that rehabilitate older deteriorated storm sewers and storm sewer pump stations to extend useful life,
- Design and construction of green infrastructure and trash reduction projects for stormwater quality improvements,
- Master-planning the storm sewer system to meet the future demands for conveyance,
- Identifying and prioritizing the City's storm sewer capital investments,
- Rehabilitation program and corrective maintenance activities.

The Department of Transportation performs day-to-day operation and maintenance of the storm sewer collection system, debris basins, storm inlets, storm pump stations and regulated facilities such as bioretention and large and small trash capture devices.

The Environmental Services Department manages regulatory programs and oversees Citywide activities that help reduce or prevent pollution from entering the storm sewer system and waterways, ensuring the health of the South Bay watershed.

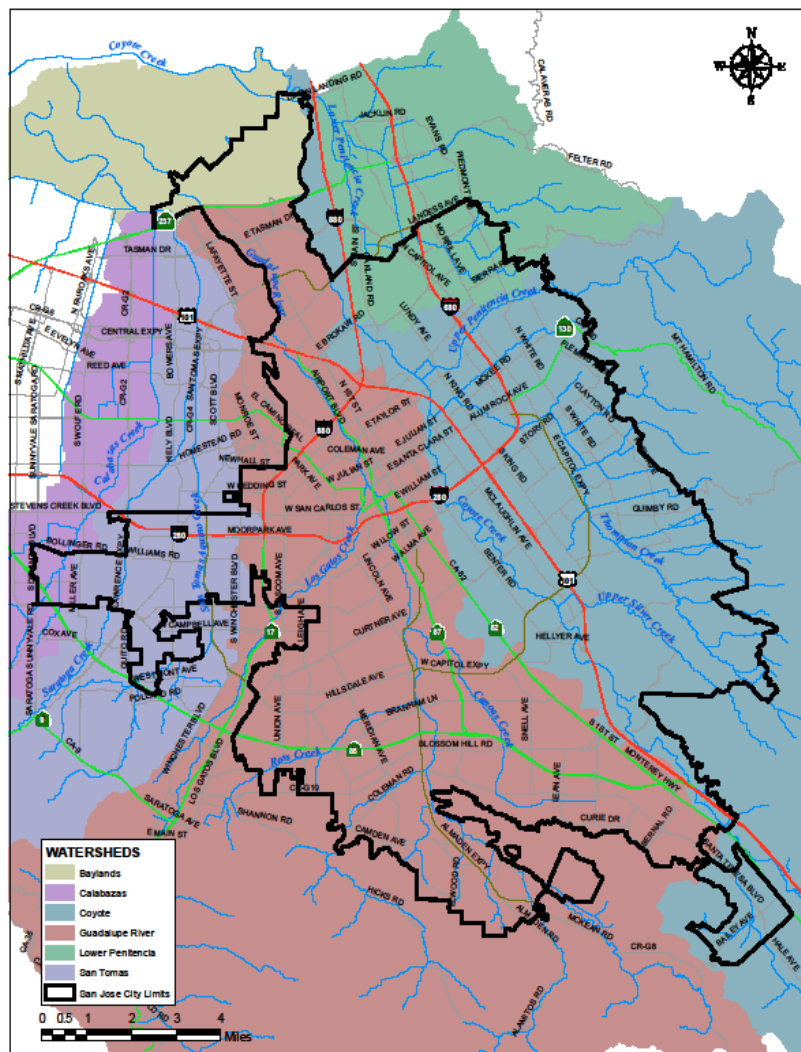


Figure 1: Citywide Watershed Map

II. PROGRAM FUNDING

A. Adopted FY 2017-18 CIP Budget Revenue

Primary sources of funding include transfers from the Storm Sewer Operating Fund, the Storm Drainage Fee, grants, interest earnings, and joint participation revenues. The Storm Sewer Operating Fund provides funding for capital improvement projects and the federally mandated National Pollutant Discharge Elimination System requirements through Storm Sewer Service Charge fees.

Storm Drainage Fee (Fund 413 – \$878,494; 5-Year CIP)- Storm Drainage Fees are charged to developers for the privilege and benefit of land directly or indirectly discharging into the storm drainage system, and also for the benefits accruing to said land because of the existence of a city storm drainage system which collects and disposes of waters from other lands in the city. The fees collected may only be used for the construction, reconstruction and maintenance of the storm drainage system for the City of San José, and for acquisition of land for such system. The fee is based on land use and acreage.

Storm Sewer Capital Fund (Fund 469 - \$27,855,334; 5-Year CIP) - Funds for capital improvement projects are transferred from the Storm Sewer Operating Fund (Fund 446) with \$2.5M from the California Proposition 84 Storm Water Grant Program (SWGP) and Integrated Regional Water Management (IRWM) Implementation Grant Program. These funds are used for new or rehabilitated pump stations, new or replacement laterals, pipes, storm drain inlets, outfall rehabilitation, and projects that address water quality issues.

Joint Participation Revenues (\$4,000) - This revenue comes from the City of Cupertino, when, in the late 1970s, City boundaries were redrawn and a portion of Cupertino's storm sewers system was connected into San Jose's system before being conveyed downstream. This revenue covers maintenance and operations expenses for Cupertino's share of the system.

B. Adopted FY 2017-18 CIP Budget Expenditures

The Storm CIP Program has a \$46.3 million, 5-year budget. This level of funding allows one to two neighborhood improvement projects to be completed each year. It is important to note that the current level of funding in the Storm CIP program only addresses immediate needs to reduce or minimize drainage issues. It does not address long-term, system-wide needs stemming from significant development activities that have occurred over the past few decades and those planned for future years. The on-going Master Planning effort will provide a working document that establishes city-wide long-term solutions for any deficiencies or lack of efficiency. Master Planning will incorporate appropriate findings of green infrastructure recommendations identified in the Santa Clara Basin Stormwater Resource Plan and the Green Infrastructure Plan wherever feasible within the storm sewer system.

C. Adopted FY 2017-18 Operations and Maintenance Budget Expenditures

(Fund 446) – The annual ongoing operating and maintenance budget is approximately \$8.2 million which provides funding for administration, engineering, and maintenance.

III. PROGRAM ACTIVITY

A. Storm Sewer Improvement Projects

A portion of the Storm Section's resources are allocated to the Storm CIP for resolution of localized drainage problems, primarily in residential neighborhoods, neighborhood business districts and school zones. These projects typically address localized ponding and neighborhood drainage issues that can be corrected by extending or enhancing the existing storm sewer system. Other Storm Sewer system improvements are mandated by the Municipal Regional Stormwater NPDES Permit. The Federal Clean Water Act requires storm water discharges to surface waters from municipal separate storm water systems (MS4s) to be regulated under a municipal separate storm sewer system NPDES permit. The City's current NPDES permit became effective January 1, 2016. Improvement projects for fiscal year 2017-18, besides improving water quality, also address trash load reduction requirements in the NPDES Permit and include the following:

Alviso Storm Pump Station Project– (CPMS ID 6095)

This project, located at the northeast corner of Gold Street and Catherine Street, will consist of four pumps with total capacity of 110 cubic feet per second. In addition, more than 1,000 feet of 48-inch diameter force main will be installed along Catherine Street, tunneled under Union Pacific Railroad tracks and the levee along the Guadalupe River, and tied to a new discharge structure. The outfall will be a bubble-up structure located in the Guadalupe River that will help dissipate the velocity of the discharge from the new pump station. Per provision C.3 of the Municipal Regional Stormwater Permit (MRP), the project incorporates 1,700 square feet of bioretention parallel to the exterior walls of the pump station to intercept stormwater runoff from the site.



In collaboration with Alviso residents and the Office of Cultural Affairs, approximately 1,000 square feet of public art will be incorporated onto the exterior walls. Artist Sam Toribio had worked with the Alviso community and selected an art rendering that primarily focuses on environmental themed elements that embodies the Alviso marshland area and eloquently weaves the history of Alviso in the proposed artwork.

This new pump station will be in addition to the existing 30 cubic feet per second Gold Street Pump Station and work in series to help alleviate the community of Alviso from a 100-year flood event. The project was awarded to JMB Construction Inc. in October 2017 in the amount of \$13,130,420. The project is currently 30 percent in construction and is scheduled for completion in June 2019.

Large Trash Capture Device Installation Phase IV Project– (CPMS ID 8149)

Provision C.10 of the MRP requires cities to reduce the amount of trash discharging from their storm drain systems from 2009 levels by 70% by July 1, 2017, 80% by July 1, 2019, and 100% by July 1, 2022. Under these regulatory mandates and conditions, the City of San José is required to implement measures to capture or eliminate trash that enters into the stormwater system prior to discharging into any waterways. Prior to this project, the City installed a total of 17 Large Trash Capture (LTC) devices removing trash from approximately 5,100 acres of combined watersheds. This project installed a total of four new LTC devices at the three locations along Canoas Creek and Los Gatos Creek listed below:



- Blossom Hill Rd. between Shadowcrest Way and Chesbro Ave.
- Dupont St. near the intersection of W. San Carlos St. and McEvoy St.
- Parkmoor Ave. between Race St. and Northrup St. (dual devices).

These four LTC devices capture trash from approximately 2,000 acres of combined watersheds and are all operational prior to the July 2017 deadline. The total project cost is \$4,034,420.



Large Trash Capture Device Installation Phase V Project – (CPMS ID 8150)

Similar to the Large Trash Capture Device Installation Phase IV, this project installed LTC devices at the following three locations:

- Edwards Avenue & McLellan Avenue,
- 33rd Street and Melody Lane,
- Sonora Avenue at Rosemary Gardens Park (three devices).

The project was awarded on January 31, 2017, in the amount of \$4,488,723 to JMB Construction, Inc. The first two locations were completed and complied with the State's mandate to reduce 70% trash reduction by July 1, 2017. The last location on Sonora Avenue was completed and became operational on August 16, 2017, bringing the entire project to beneficial use on August 26, 2017.



Large Trash Capture Device Installation Phase VI Project – (CPMS ID 8151)

The Municipal Regional Stormwater Permit mandates all municipalities to reduce trash entering creeks and the Bay by 80% by July 1, 2019. To comply with this requirement, the City will install 6 additional large trash capture devices to catch and retain trash within the storm sewer system. The devices will be underground and connected to City's storm sewer system at the following locations:

- George Street at the intersection of N. San Pedro Street,
- Fruitdale Avenue between Delbert Way and Northrup Street,
- Rock Springs Drive at the intersection of Needles Drive and Wool Creek Drive,
- Guadalupe Parkway between Hawthorne Way and San Pedro Circle,
- Hamilton Avenue between Beck Drive and Phoenix Drive,
- Blossom Hill Road between Almaden Express Way and Sanchez Drive.



The project is scheduled to be awarded in the Winter of 2018. Construction will follow in the Spring of 2019 with beneficial use by July 1, 2019.

Cahill Storm Pump Station Rehabilitation - (CPMS ID 7410)

Cahill Pump Station is located in the southwest corner of the Caltrain Diridon Station parking lot, along the south side of West Santa Clara Street between Cahill Street and Stockton Avenue, adjacent to the Caltrain railroad overcrossing. The pump station captures storm water from four existing storm inlets in this low land area. This pump station was managed by the California Department of Transportation ("Caltrans") until they relinquished the station to the City of San Jose in July 2013. The last rehabilitation to the station was completed in 1975.

The project upgraded the mechanical and electrical equipment at the pump station by installing two new pumps and a standby generator, upsizing the force mains from 6-inch to



8-inch diameter, and upgrading the electrical control panels. The project also upgraded two of the four inlet grates within the railroad undercrossing area in order to decrease blockages caused by organic matter.

The project was awarded to Anderson Pacific Construction, Inc. in July 2014. The project reached substantial completion in December 2017 with a total construction cost of \$919,331.



Chynoweth Avenue Green Street Project (CPMS ID 7756)

This project installed seven bioretention facilities along Chynoweth Avenue, west of Snell Avenue, to capture and treat stormwater runoff. Additionally, this project installed median islands with trees, bulb-out with ADA wheelchair ramps, new sidewalks and one new street light. This project is funded from the Department of Water Resources grant program.

The total construction cost of the project was \$1,804,353 completed on December 7, 2017.



Park Avenue Green Street and Multimodal Streetscape Improvements (CPMS ID 7207 and 7015)

This project added to the City of San Jose's bicycle/pedestrian network and provided a variety of traffic safety, roadway configuration and infrastructure improvements along Park Avenue between Hedding Street and Montgomery Street. The scope of work includes seven bioretention facilities, pavement rehabilitation (including several permeable paver areas), traffic signal modifications, and the installation of new median islands, bike lanes, ADA compliant curb ramps, sidewalks, curb and gutter, and driveway improvements. The multimodal streetscape improvements were funded through the Federal Community Design and Transportation Capital Grant Program. The green street improvements were partially funded by a State Water Board Prop 84 Grant.



The total construction cost of the Park Avenue Green Street project was \$972,100, and the contractor for this project was Guerra Construction Group. It was completed on November 1, 2017. The total construction cost for the Park Avenue Multimodal Streetscape Improvement project was \$3,095,872, and the contractor for this project was Redgwick Construction Company. It was completed on December 28, 2017.

Horace Mann and Washington Neighborhood Green Alleyways Improvements (CPMS ID 8632)

This project will install approximately 3,000 square feet of permeable pavers underground infiltration trenches. The project removes approximately 22,000 square feet of sediment sources by replacing deteriorated asphalt with a durable surface of new asphalt that will drain towards approximately 1,000 linear feet of infiltration trenches located within the two urban alleyways. Three new streetlights will be installed at the Julian and North 9th Street alleyway.

This project was advertised on June 6, 2018, and bids were opened on July 5, 2018. City Council awarded the contract to the low bidder, Wattis Construction Company Inc., in the amount of \$1,057,550. Construction is scheduled to commence in October 2018, with completion expected in January 2019.



B. Rehabilitation Projects

Citywide Outfall Rehabilitation (CPMS ID 7699)

This project entails the rehabilitation of seven deteriorated storm sewer outfalls located along four creeks throughout the City. Scour has resulted in the erosion of the creek banks that has undermined the existing concrete sack rip-rap and outfalls infrastructure.



The design is 95% complete. Staff is waiting for permits from Santa Clara Valley Water District, California Department of Fish and Wildlife and Regional Water Quality Control Board.

Autumn Street Outfall 67F Rehabilitation (CPMS 7700)



This project will replace the existing 27-inch storm main, manhole, and outfall facilities with new manhole, a 72-inch RCP storm drain outfall pipe and a new concrete headwall with wing walls.

The design is 95% complete. Staff is waiting for permits from Santa Clara Valley Water District, California Department of Fish and Wildlife and Regional Water Quality Control Board.

Alviso Storm Sewer Condition Assessment Repairs

(CPMS ID 8795)

The City conducted a condition assessment on the existing storm pipe network in Alviso in 2016. Several defects were found throughout the storm sewer network and require repair to avoid further deterioration. The project scope of work includes approximately 84 feet of point repairs on existing 24-inch, 30-inch and 48-inch reinforced concrete pipe (RCP) storm sewer mains, and the replacement of 4 manholes. The project design is complete, and staff is evaluating the appropriate and cost-effective procurement method to construct the project.

Other Minor Storm Drain System Repairs or Improvements (CPMS ID 8290)

The City has completed other minor Storm Drain repair projects through a \$1 million Public Works General Engineering Contract. Work completed in FY17-18 included the following:

- Los Arboles Elementary School Storm Repairs
- Chynoweth Avenue Hydroseeding and Slope Protection
- African American Community Center Storm Improvements



C. Existing Storm Pump Stations

The average age of the City's 30 storm sewer pump stations is approximately over 40 years. These facilities are listed in Table 1 shown below. The existing major pump stations at Oakmead, River Oaks, Rincon I, Rincon II and Gateway were evaluated to have adequate capacity for the 10-year storm event. Pump stations are generally considered adequate if there is sufficient pump capacity to discharge design runoff into the receiving waters or if excess flows can be stored without causing property damage.

The Master Plan recommended existing pump station improvements to increase reliability and redundancy, and to comply with FEMA flood hazard mapping requirements. These projects include installation of on-site backup power at the major pump stations at Rincon I, Rincon II, and Gateway.

Table 1: Stormwater Pump Stations

Name	Built	Upgraded	Q, Peak¹ (mgd)	Backup Power
Hester	1928	N/A	0.2	Portable pumps
Hope 1	2008	N/A	0.2	Portable pumps
Hope 2	1992	N/A	0.4	Portable pumps
Liberty	1973	1990	0.1	Portable pumps
Rincon 1	1998	N/A	288	Portable pumps
Rincon 2	2004	N/A	388.8	Portable pumps
Alma	1955	2008	5	Portable generator
Almaden	1935	1994	2.9	Portable generator
Bascom	1958	1990	4	Portable generator
Berryessa	2015	N/A	7.5	Portable generator
Bird	1969	2008	9.4	Portable generator
Capital	1990	N/A	2.9	Portable generator
Delmas	1934	1990	1.2	Portable generator
Forest	1961	1993	2	Portable generator
Gateway	1960	2016	3.3	Portable generator
Golden Wheel	2001	N/A	60.5	Portable generator
Hedding	1960	1990	2.7	Portable generator
Julian	1975	1990	1.3	Portable generator
Skyport	1966	2002	2.2	Portable generator
Taylor	1939	1990	2.9	Portable generator
Taylor 87	2002	N/A	4.9	Portable generator
Willow	1934	2005	3.8	Portable generator
Park	1966	1990	2.9	On-site generator
Chynoweth	1988	N/A	20.7	On-site generator
Communication Hill	2008	N/A	0.7	On-site generator
Gold Street	1979	2003	20.2	On-site generator
River Oaks	1979	2011	43.2	On-site generator
Cahill	1939	2017	2.4	Diesel pumps
Oakmead	1982	2013	475.2	Diesel pumps
Rocky Pond (Airport)	1990	N/A	41.3	N/A

D. Non-Construction Activities

Non-construction activities for the Storm Sewer Section include oversight of storm sewer program management, Preliminary and Final Engineering design, construction management, updating GIS information, Storm Sewer Master Planning, Storm Sewer Permit Review and Inspection for

Development and Outside Agencies, Public Art, Fee Administration, plan review for other sections and divisions of Public Works.

E. System Management and Planning

1. Master Planning

a. Alviso and North San Jose Master Plan

The North San Jose Storm Drain Master Plan for North San Jose Development Policy and Alviso areas was completed and a final report was prepared in June 2014. The Master Plan evaluated the storm drain system capacity under existing and 2040 General Plan land use conditions and identified capacity deficiencies at a 10-year 24-hour design storm event.

The Master Plan recommended 55 improvement projects totaling approximately \$131 million for flood protection. Among these projects, twelve (12) projects totaling close to \$57 million are high priority projects including a new 110 cubic feet per second (cfs) pump station for Alviso area and a new 225 cfs pump station for Charcot area. The new Alviso Pump Station is currently under construction with anticipated completion in June 2019.

b. Modeling of Coyote Creek and Guadalupe River/Ross Creek/Canoas Creek

Since the flood event from Coyote Creek in February 2017, the City's hydraulic modeling team has been working with Santa Clara Valley Water District (Water District) on the Emergency Action Plan preparation. The work included developing condition levels and flood thresholds using hydraulic models. City staff refined the Coyote Creek Watershed storm drain system models to identify flooding impacts based on Water District's various storm frequencies. The results of the analysis have been incorporated into floodplain mapping developed from the Water District's Coyote Creek Models.

This joint effort will allow both agencies to develop a realistic inundation maps based on a known stage gauge (Madrone Gage) so that a better flood prediction can be made during a flood event.

The City is currently working with the Water District to develop the storm drain system flooding impact for the Guadalupe River/Ross Creek/Canoas Creek Emergency Action Plan. Preliminary results by the City will be merged with Water District inundation maps in October, and fine-tuning of City's modeling analysis is expected to continue into 2019.

c. Citywide Storm Drain System Master Plan

c1. Initial Phase of Master Plan – Preparation of Hydrologic and Hydraulic (H&H) Model and Preliminary Recommendation of Improvement Projects

The citywide storm drain system's dynamic H&H model was developed using the InfoWorks ICM (Integrated Catchment Model) software. The model included pipes of 24 inch and larger using City's GIS datasets, as-builts and survey data, and incorporated boundary information from the Water District's HEC model files. The model included

over 40 percent of the storm drains or over 540 miles of pipeline system, 634 outfalls, and 29 pump stations. Over 250 Low Impact Development and 7 hydro-modification projects were included in the H&H model. Three major watersheds, Guadalupe River, Coyote Creek, and San Tomas Aquino/Calabazas Creeks of 580 square miles of drainage area were included in the H&H model, with approximately 20 percent being inside the City's Urban Growth Boundary (UGB). Figure 2 shows the modeled pipes, pump stations and outfalls.

The City collaborate with the Water District on the methodologies for runoff calculations and percent of impervious area values for various land use types, as well as other modeling techniques. Coordination and synchronization of modeling methodologies allow ease and efficiency in modeling data and result transfer for use in each agency's respective modeling studies in the future.

Calibration and verification using recent flow and rainfall data were performed to validate and verify the model's accuracy.

The initial phase of the citywide storm sewer master plan study concluded with a draft report prepared in December 2017 to document the model preparation and results, and recommended a preliminary list of storm drain capacity improvement projects for the 10-year storm event. Out of the list, 22 high priority projects including the new 225 cfs pump station at Charcot Avenue and storm drain improvement at Stockton/Taylor/Diridon area were identified based on historical flooding observation and input from the DOT storm sewer maintenance staff, totaling approximately \$215 million in capital costs.

The 22 high priority projects are listed in Table 2 and the locations of these projects are shown in Figure 2.

Table 2: High Priority Capacity Improvement Projects

Priority	Watershed	Location	Pipeline Length (ft)	Cost
H1	Guadalupe	Stockton Ave/Cinnabar St	13,900	\$14,146,000
H1	Coyote	Charcot PS (225 cfs)		\$20,000,000
H1	Coyote	Zanker Rd from Charcot Ave to Brokaw Rd	12,300	\$15,099,000
H1	Guadalupe	Foxworthy Ave/Curtner Ave	21,200	\$26,200,000
H1	San Tomas Aquino	S Winchester Blvd/Williams Rd	14,400	\$17,600,000
H1	Guadalupe	Mill Pond Dr/Canoas Garden Ave	1,800	\$1,907,000
H2	Guadalupe	Newhall Ave from Campbell Av to Guadalupe River	4,837	\$4,400,000
H2	Guadalupe	Monterey Rd from Curtner to Alma Av	12,000	\$11,716,000
H2	Los Gatos	Union Ave and Camden Ave	10,497	\$14,400,000
H2	San Tomas Aquino	Saratoga Ave from Hamilton Av to Graves Av	9,740	\$10,500,000

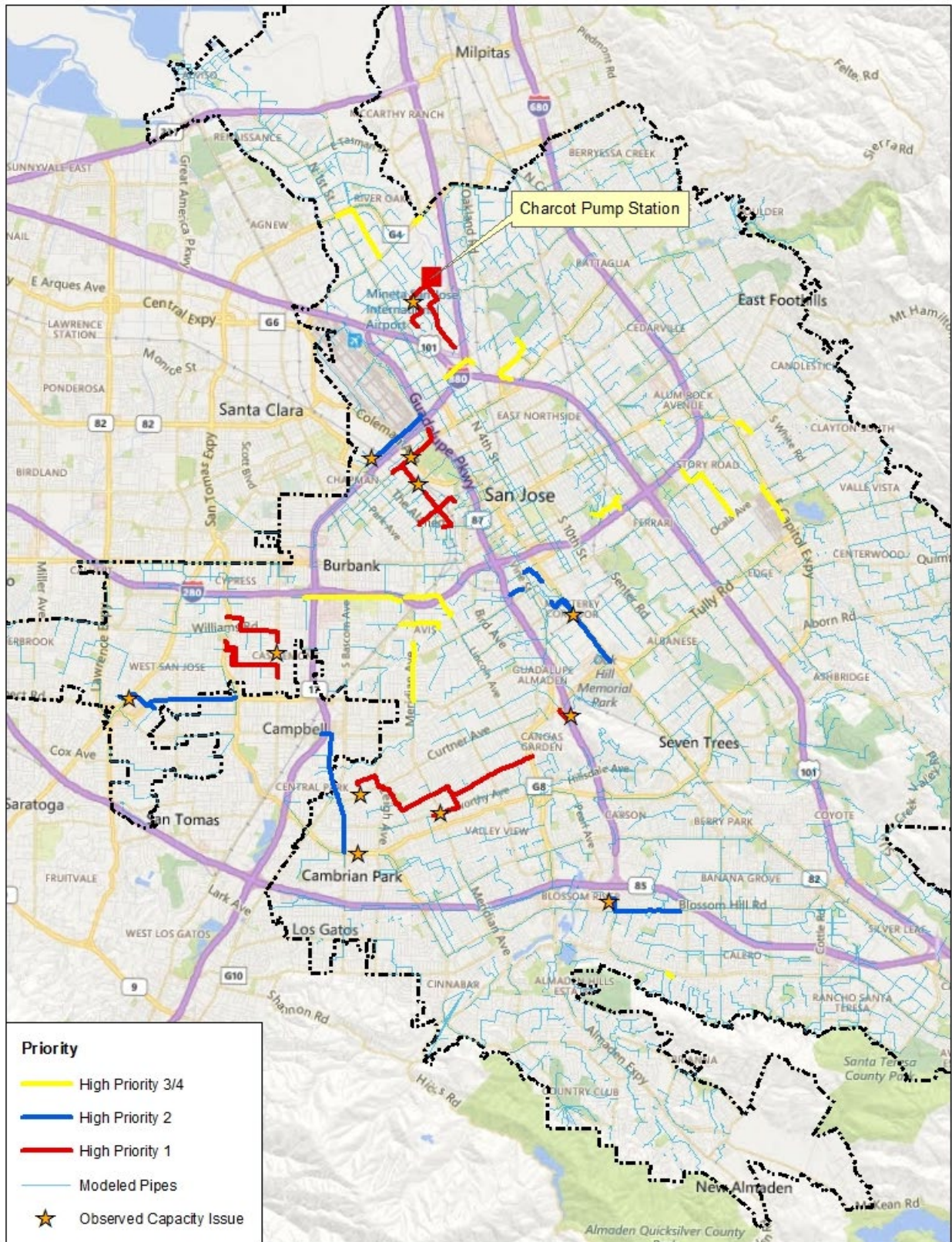
H2	San Tomas Aquino	Thronwood Dr and Santa Teresa Blvd	6,200	\$7,900,000
H3	Coyote	Commercial Street	3,909	\$3,400,000
H3	Coyote	Melbourne Blvd/Applan Lane	3,892	\$4,700,000
H3	Lower Silver	Hopkins from Ocala Ave to Story Rd	6450	\$6,800,000
H3	Lower Silver	McGinness Ave	4,284	\$4,400,000
H4	Guadalupe	Zanker Rd from Bering Dr to Montague Expwy	5,735	\$8,500,000
H4	Los Gatos	Moorpark Ave from HWY880 to Los Gatos Creek	12,497	\$19,000,000
H4	Guadalupe	Gish Rd	2,868	\$3,300,000
H4	Los Gatos	Fruitdale Ave from Southwest Ex to Los Gatos Creek	3,331	\$3,900,000
H4	Coyote	Montague Expwy	600	\$700,000
H4	Los Gatos	Meridian Av from Hamilton Av to Los Gatos Creek	4,496	\$4,900,000
H4	Canoas	Santa Teresa Blvd and Canoas Creek	644	\$11,900,000
		Total	155,580	\$215,368,000

c2. Refinement of Initial Master Plan Study – Model Enhancement and Incorporation of Green Infrastructure Plan

The City's storm drain master plan is an on-going, multi-year program that requires changes and refinements to reflect the dynamic of the growth in the area and to adapt to regulatory requirements or events.

After the February 2017 flood event, the Water District collected high water mark, additional channel cross-section and roughness through field visits along Coyote Creek. The District re-calibrated both Coyote and Guadalupe Watersheds riverine models. Around the same time, the City also collected additional rainfall, flow and flooding data of the storm drain system. With these new data and findings, as well as the updated District models, the City is currently working to enhance the storm drain model and refine the capacity improvement recommendations.

Figure 2: High Priority Capacity Improvement Project Locations



In addition, the Santa Clara Basin Stormwater Resource Plan has recently been completed and identified a long list of low impact development, green street and regional stormwater

projects. The City's storm drain master plan will incorporate the feasible green infrastructures as part of the overall storm drain improvement program and will support development of the City's Green Infrastructure Plan.

2. Support Economic Development

Working with Development Services Division, DOT, VTA, and Planning Department, the Master Plan staff reviewed the storm drain capacity for mass transit and land use development projects. The partial list of development projects that staff conducted capacity reviews on included 440 West Julian Street, Evergreen Initiative Senior Housing, 2670 Seeley Avenue, High Speed Rail, Caltrain Electrification, Downtown/Diridon, and BART Phase II TOD.

3. Coordination with Santa Clara Valley Water District (Water District)

Approximately 20 percent (or 250) of the storm outfalls are in need of rehabilitation in order to maximize operational capacity and minimize maintenance requirements. The range of improvements needed include flap gate repair, vegetation removal, sediment removal, riprap repair, bank erosion repair, channel dredging, and/or outfall structure and pipe reconstruction.

The City does not have a comprehensive outfall program to address the widespread planning and funding needs, environmental and regulatory permitting requirements, and mitigation and monitoring plans that would be necessary to implement a robust and long-term program. Currently, repairs to existing outfalls are considered on a case-by-case basis; when possible the City will collaborate with the Water District to implement select projects through their Stream Maintenance Program or Five-Year Capital Improvement Program. This approach will continue to be used to rehabilitate outfalls in conjunction with ongoing Water District river and creek channel improvement projects (Coyote Creek, Guadalupe River, Los Gatos Creek, Lower Silver Creek, Thompson Creek, etc.)

City staff has closely coordinated with the Water District on the progress of the City's storm master plan development. Staff provided results of the North San Jose and Alviso area storm drain master plan study to the Water District. Throughout the entire master planning effort, the City and Water District's hydraulic modeling groups has worked together to develop hydrologic and hydraulic parameters, land use impervious area percentage values, and other modeling techniques to use in the urban drainage analysis. Both the City and the District want to be able to efficiently exchange their respective models for use by each agency. In recent years, the City has prepared the InfoWorks ICM storm drain system model and provided it to the Water District for their floodplain studies of Lower Silver Creek, Ross Creek, Upper Penitencia Creek, and Canoas Creek watersheds. The District also shared with the City their updated HEC-RAS and other HEC models to City's storm draining modeling analysis.

4. Condition Assessment Storm Sewer Repairs

This is a new program that was initiated in 2015 and models the Sanitary Sewer Condition Assessment program. The purpose of this program is to identify and repair damaged pipes in the

storm sewer system in areas that are prone to flooding. The results from these identified projects will focus on areas with significant groundwater infiltration and structural defects will be corrected immediately.

5. Storm Sewer Improvements/Urgent Flood Prevention and Repair projects

The Storm Sewer Improvement program consolidated two previous programs (Minor Neighborhood and Special Corridor). This program will continue to address minor storm drain projects, such as construction of new inlets and laterals (storm pipe connections from the inlet to the main), and the establishment of flow-lines in various neighborhoods. Future projects will provide relief for minor drainage problems on neighborhood streets and improve water quality in the runoff conducted by the system.

The citywide master planning effort is expected to yield the data necessary to plan and estimate Storm Capital Projects. Currently, most storm system improvement projects are identified and selected for implementation based on public complaints and City staff observation, as well as historical knowledge of chronic/re-occurring drainage problems. These improvement projects are funded by the Storm Sewer Capital Improvement Program (CIP). Priority for funding of storm improvement projects through Neighborhood/Special Corridors funding is based on proximity to public gathering centers, such as schools, community centers, libraries, etc.

6. Green Infrastructure Improvements

This is a new program that was initiated in 2016 that allocated funding to implement Green Infrastructure as required by the Municipal Regional Permit. The goal of this program is to reduce impervious surfaces by using low impact development (i.e. bioretention, regional facilities) that will reduce the amount of flow and improve water quality by treating the urban stormwater runoff before it enters into waterways such as creeks and rivers in San Jose.

Currently, City staff are in the process of evaluating options to secure additional on-going funding revenue source for this program so that the City can meet the regulatory and Baykeeper consent decree requirements. In addition, staff will work with consultants to develop a Green Infrastructure Plan that will describe how the City will retrofit existing impervious surfaces to connect to green infrastructure facilities such as bioretention areas prior to draining to the storm sewer and creeks. As a part of that planning process, a model will be developed which will allow the City to prioritize and select green infrastructure projects and quantify pollution reduction to demonstrate compliance with the Stormwater Permit and Baykeeper settlement agreement.

7. Outfall Rehabilitation

This program focuses on the construction or rehabilitation of storm drain outfalls at various locations throughout the City. The Department of Transportation (DOT) has identified more than 250 outfalls that are missing, deteriorated, or in need of improvement to bring them to current design standards. This ongoing allocation funds the most critical outfall construction based on priorities jointly established by DOT, the Department of Public Works, Santa Clara Valley Water District and other regulatory agencies.

8. Rehabilitation of Pump Stations

As noted above, the City owns and operates 30 storm pump stations with various capacities. The majority of the City's 30 pump stations are over 40 years old. Although the majority of the storm pump stations have been rehabilitated within the last 20 years, Public Works continues coordination with the Department of Transportation to develop and implement a plan for prioritizing the rehabilitation of the City's storm pump stations.

9. Improving Annexation Areas

In April 2006, the San José City Council launched a three to five-year program in which the City of San José will annex the remaining "islands" (or "pockets") of less than 150 acres of unincorporated County of Santa Clara land. Unincorporated islands are governed by and receive services from the County even though they are completely or substantially surrounded by incorporated, or City lands. Upon annexation, the land use and general governing responsibility changes from the County of Santa Clara to the City of San José. This change enables residents in these County islands to receive urban services from the City rather than the County.

The addition of these pockets to the City service area increases the demand on existing City storm infrastructure. The total impact of the annexation to the storm program is unknown, but County pockets typically lack underground storm sewer pipes and tend to experience various problems related to ponding. In addition, the lack of curbs and gutters does not address the current standards for protection from overland release (streets are designed to capture the effects of the 100-year storm or failure of the storm sewer system). The city-wide master planning effort is expected to identify any deficiencies or needs for improvements within the recently annexed County pockets.

10. San Jose-Santa Clara Regional Wastewater Facility

Storm Drain System Model

A dynamic H&H model using Infoworks ICM software was developed for the Regional Wastewater Facility's (RWF) internal drainage system as part of the RWF's CIP effort. The RWF site is located within the Citywide Storm Sewer Master Plan currently under development, but the RWF model was developed separately to allow analysis to a higher level of detail. The goals of the modeling effort were to create a H&H model, evaluate the performance of the existing drainage network and to identify deficiencies and potential solutions. The stormwater analysis was completed in December 2015. Model results confirmed RWF staff observations of areas within the stormwater system that do not meet level of service criteria. Potential solutions were developed to address the identified deficiencies. Eighteen individual deficiencies were identified and prioritized to allow RWF staff to split the recommended solutions into phases to spread the implementation over a period of time. Two alternative packages of projects were developed to resolve these stormwater deficiencies, either alternative costing an estimated \$9 million. A new project has been approved in the current CIP budget. The project will be initiated in Fall 2017 and construction is scheduled for completion in 2021.

Flooding Study

In addition to stormwater modeling, a flooding study was conducted to better understand impacts associated with regional flooding and heavy rainfall at the RWF. Completed in

April 2016, the study analyzed numerous 100-year and 500-year flooding scenarios, coupled with the cumulative impacts of projected sea-level rise. 100-year flood protection for the RWF and surrounding community will be provided with the Shoreline Levee, soon to be constructed by the Corps of Engineers. Further analysis is required to estimate the potential flooding impacts at the RWF due to riverine flooding should the Coyote Creek or Guadalupe River overflow their banks or levee systems during a 500-year event. Staff is working with Water District staff to identify the potential for flooding at the RWF during a 500-year river flooding event. Understanding the risks of 100-year and 500-year events is important due to the critical nature of the facility, the unique topography of the South Bay and recognized design standards for critical infrastructure. A new project has been approved in the FY2017-2018 CIP and will provide interim protection to the 100-year elevation. A future project phase will provide 500-year protection, including the effects of sea-level rise, as soon as the analysis and impacts are fully modelled and understood.

F. Permit Compliance/Sustainability

The Federal Clean Water Act requires the City to operate under a National Pollutant Discharge Elimination System (NPDES) municipal stormwater permit for the discharge of stormwater to surface waters via the City's storm sewer collection system. On November 19, 2015, the Water Board adopted the second Municipal Regional Stormwater NPDES Permit for the San Francisco Bay Region that became effective January 1, 2016. It regulates 76 municipalities, counties, and flood control agencies in the Bay Area and specifies actions necessary to reduce the discharge of pollutants in stormwater to the maximum extent practicable and to effectively prohibit non-stormwater discharges into the municipal storm sewer system to protect local creeks and the Bay.

On February 11, 2015, the San Francisco Baykeeper (Baykeeper) filed a complaint against the City of San José based on alleged Clean Water Act violations of the City's Stormwater Permit, including alleged unlawful discharges of pollutants from the San Jose stormwater system and alleged sewage discharges to the San Jose stormwater collection system from the San Jose sanitary collection system. Without admitting liability, the parties settled the lawsuit and the Baykeeper Consent Decree (CD) was approved by the court on August 11, 2016. The general terms of the CD include the following:

- Reduce trash levels by 70% by 2017 and 80% by 2019
- Conduct Fecal Indicator Bacteria monitoring in waterways
- Develop a Comprehensive Load Reduction Plan (CLRP) (i.e., Green Infrastructure Plan) by July 2020
- Appropriate at least \$100M over the 10-year period to implement the CLRP
- Replace or Rehab an annual average of 6.5 miles over 10 years of "high risk" sanitary collection system pipes
- Provide \$200,000 per year for 5 years to SJ Parks Foundation for creek cleanup and improvement grants (this settlement term was modified on August 2, 2017 to directly fund \$100,000 for four years each to South Bay Clean Creeks Coalition and Keep Coyote Creek Beautiful)

The settlement terms are generally consistent with Stormwater Permit, with the development and implementation of some terms being accelerated or more comprehensive than Permit requirements.

The City complies with the stormwater NPDES permit and Baykeeper CD requirements by administering a comprehensive Stormwater Management Program, led by the Environmental Services Department. Other City Departments such as Public Works, Planning, and Transportation ensure adherence to permit requirements for private development and municipal projects through plan preparation, review and inspection. The Departments of Transportation, Public Works, and Parks, Recreation and Neighborhood Services are responsible for operation and maintenance of City stormwater facilities.

The City's Stormwater Program is comprised of a variety of program elements, including inspection and enforcement; outreach and education; municipal maintenance activities; controls on new development projects (private and public); and activities to address specific pollutants such as trash, mercury, and copper. Public Works is actively involved in the following elements of the Stormwater Program:

1. Green Streets Pilot Projects

Provision C.3 (New Development and Redevelopment) of the MRP requires development projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows to local water bodies through the implementation of low impact development (LID) techniques. The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source.

As part of the Storm Sewer Master Plan study, the storm water conveyance and water quality impacts on the downstream water bodies due to the City's discharges and actions under normal and peak flooding conditions will be evaluated. ESD, Public Works, and PRNS coordinated to develop regional stormwater capture project prioritization and selection processes that resulted in concept project designs for potential project locations. Green street prioritization and selection processes are currently under development as part of the Green Infrastructure Planning process.

In an effort to support compliance with the MRP and gain experience in designing and constructing green infrastructure, the City secured grant funding for four green street retrofit pilot projects; Martha Gardens Green Alleys Pilot Project, Park Avenue Green Avenue Pilot Project, and Chynoweth Avenue Green Street Project.

Green elements included in these projects consist of bioretention areas, or "rain gardens" that function as a soil and plant-based filtration measure, and permeable pavers and infiltration trenches which allow stormwater runoff to infiltrate into the ground. Total costs of the projects are approximately \$5.3 million, including approximately \$4 million in grant funding, and approximately \$1.5 million in matching funds. Construction of the Martha Gardens Alleyways project began in FY 14-15 and was completed in FY 15-16. Construction of the Park Avenue and Chynoweth Avenue projects began in FY 16-17 and both were completed in FY 17-18. The Park

Avenue project was constructed in coordination with a Department of Transportation grant funded multi-modal project.

2. Trash Load Reduction

Provision C.10 of the current MRP requires that trash loads from separate storm sewer systems be reduced by 70 percent by 2017, 80 percent by 2019, and 100 percent by 2022. From 2011 to 2017, the City installed a total of 23 large trash capture devices (hydrodynamic separator devices) within the Coyote Creek and Guadalupe River watersheds. Though this accomplishment, the City achieved the 70% reduction target for July 1, 2017, meeting the MRP requirement. In FY 2017-2018, the City completed installation of three devices, for a total of 26 large trash capture devices installed which altogether treat more than 9,400 acres. In FY 2017-2018, the Storm Section continued work with the Environmental Services Department and the Department of Transportation to plan and design for the installation of six additional large trash capture devices to assist the City achieve the 80% trash load reduction goal by July 1, 2019.

IV. OPERATIONS AND MAINTENANCE

Funded directly from the Storm Sewer Operating Fund, the day-to-day maintenance and operations of the 1,250 miles of storm sewer collection system is primarily the responsibility of the Department of Transportation (DOT). Functions performed by DOT generally include the following:

- Cleaning and removing debris from the City's storm drain inlets at least once per year
- Inspecting & repairing localized failures and deficiencies in the City's storm sewer mains, laterals and inlets Inspecting and performing minor routine maintenance at City outfalls
- Inspecting and maintaining 30 storm pump stations, which include the annual cleaning of wet wells and the repairing of pumps and other pump station facilities
- Inspecting and maintaining storm water quality devices within the City's right-of-way, which include Connector pipe screens (CPS), Hydro Dynamic Separators, (HDS) and landscaped based treatment facilities
- Sweeping more than 67,000 curb miles of streets to minimize contaminants from entering into the storm system and waterways
- Responding to and resolving more than 1,400 storm related calls every year

The Department of Transportation prepared for the storm season with increased maintenance activities and planning as follows:

- Coordinating Storm Preparation kickoff meeting with interdepartmental and interagency staff;
- Updating the Storm Response Handbook and all hot spot contingency plans;
- Organizing field trips to critical storm hot spots to review contingency plans;
- Installing temporary portable pumps for the Alviso area, Charcot Avenue area, and identifying potential need for portable pumps at other hot spot locations;
- Cleaning and removing debris from all storm pump stations, large trash caption (LTC) units, and connector pipe screen (CPS) units;

- Cleaning and removing debris from the City's storm laterals in the Alviso and the downtown area;
- Cleaning and removing debris from the City's storm mains (less than or equal to 24" in diameter) in the Alviso area;
- Sweeping problematic debris hotspots before the rain's arrival; and
- Cleaning and removing debris from storm drain inlets at various hotspot locations.

V. CONCLUSION

The City's Storm Sewer System is a significant infrastructure asset that has taken more than a century to construct. The overall system provides effective drainage for the protection of life and property, and is increasingly becoming a mechanism for treating polluted runoff and protecting local creeks, rivers, and the San Francisco Bay. However, as with any long-term asset, routine maintenance and rehabilitation are required to keep the system performing efficiently. Funding levels in recent years have been adequate for addressing small, nuisance issues, but the investment required to rehabilitate aging facilities and address chronic flooding issues is significant. The master planning effort will assess the condition and investment needs for the entire system and will develop the funding strategies to keep the system functioning efficiently.