Attachment A

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

STORM SEWER SYSTEM ANNUAL REPORT FY 2018-2019

Alviso Storm Pump Station Construction

Large Trash Capture Device Installation

October 2019

City of San José
Storm Sewer System Annual Report
FY 2018-19

CONTENTS

I. HISTORY AND BACKGROUND 3
II. PROGRAM FUNDING 5
A. Adopted FY 2018-19 CIP Budget Revenue 5
B. Adopted FY 2018-19 CIP Budget Expenditures 5
C. Adopted FY 2018-19 Operations and Maintenance Budget Expenditures 5
III. PROGRAM ACTIVITY 6
A. Storm Sewer Improvement Projects 6
B. Citywide Outfall Rehabilitation Projects 9
E. Existing Storm Pump Stations 10
F. Non-Construction Activities 12
G. System Management and Planning 12
1. Master Planning 12
a. Modeling of Coyote Creek and Guadalupe River/Ross Creek/Canoas Creek 12
b. Phase I Citywide Storm Drain System Master Plan 12
2. Support Economic Development 20
3. Coordination with Valley Water 21
4. Condition Assessment Storm Sewer Repairs 21
5. Storm Sewer Improvements/Urgent Flood Prevention and Repair projects 21
6. Green Stormwater Instructure Plan 22
7. Outfall Rehabilitation 22
8. Rehabilitation of Pump Stations 22
9. Improving Annexation Areas 23
10. San Jose-Santa Clara Regional Wastewater Facility 23
H. Permit Compliance/Sustainability 24
IV. OPERATIONS AND MAINTENANCE 26
V. CONCLUSION 27

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, 31 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 32 large trash capture devices 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 stormwater infrastructure, which may use vegetation, soils, and natural processes to filter the runoff and reduce pollutants (e.g. bioretention). The storm sewer system is currently 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 incorporation of green stormwater infrastructure will allow urban stormwater runoff to be slowed, infiltrated, and/or treated prior to discharging into the City's local waterways.

The Santa Clara Valley Water District (Valley Water) 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 stormwater 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 full trash capture (FTC) 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.

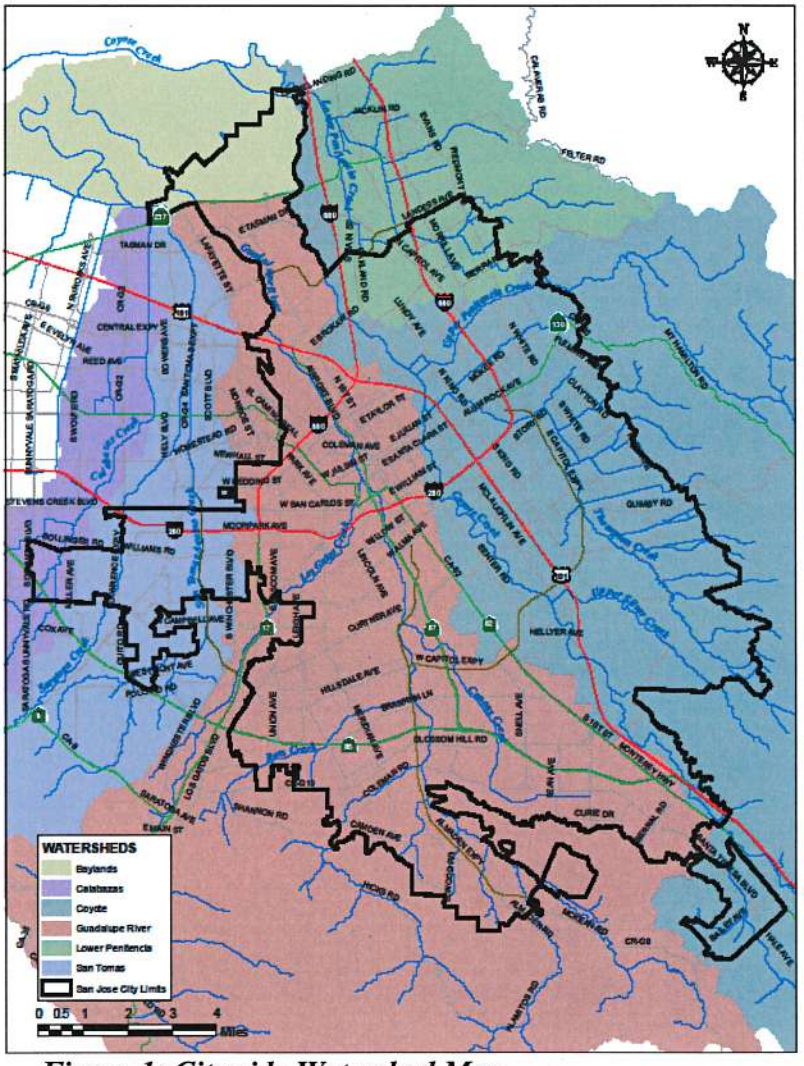


Figure 1: Citywide Watershed Map

II. PROGRAM FUNDING

A. Adopted FY 2018-19 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 – $1,663,018; 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 - $34,079,160; 5-Year CIP) - Funds for capital improvement projects consist of a transfer from the Storm Sewer Operating Fund (Fund 446) in the amount of $4M annually, $1.18M from the California Proposition 84 Storm Water Grant Program (SWGP) in FY 2018-19, and $200K annually from Local Agencies. These funds are used for new or rehabilitated pump stations, storm drain system improvements, new or replacement laterals, pipes, storm drain inlets, outfall rehabilitation, outfall flap gate installation, and projects that address water quality issues.

Joint Participation Annual 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 2018-19 CIP Budget Expenditures

The Storm CIP Program had a $35.7 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 stormwater infrastructure recommendations identified in the Santa Clara Basin Stormwater Resource Plan and the Green Stormwater Infrastructure Plan, approved in September 2019, wherever feasible within the storm sewer system.

C. Adopted FY 2018-19 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

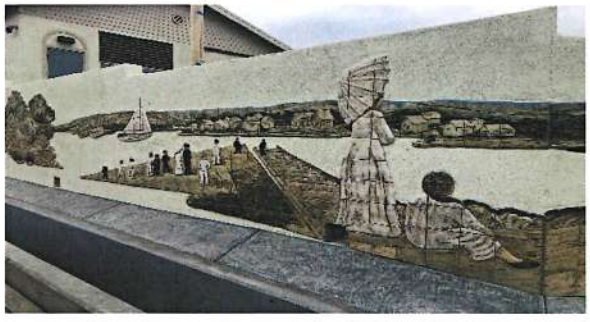
A. Storm Sewer Improvement Projects

The Storm Sewer Improvement Program includes large capital improvement projects to address drainage deficiencies and to maintain the storm drain capacity of existing systems. The Storm CIP also includes other Storm Sewer system improvements 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. A portion of the Storm CIP is 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. Improvement projects for fiscal year 2018-19, 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, consists of four pumps with total capacity of 110 cubic feet per second. The project also includes the installation of more than 1,000 feet of 48-inch diameter force main along Catherine Street and tunneled under Union Pacific Railroad tracks and the levee along the Guadalupe River. The force main is tied to a new bubble-up discharge structure 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 has been 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.



The existing 30 cubic feet per second Gold Street Pump Station will work in series with the new pump station to help alleviate the impact to 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 construction is complete, and the project ribbon cutting took place in September 2019.

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 installed 6 additional large trash capture devices to catch and retain trash within the storm sewer system. The devices are underground and connected to the 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 was awarded in November 2018, and construction started in March 2019. The Project's Beneficial Use was achieved in June 2019, meeting the mandated deadline in compliance with the municipal regional stormwater permit.

Bailey Avenue Storm Drain Inlet Repair (CPMS ID 8732)

The project is located at Bailey Avenue between Monterey Road and Santa Teresa Blvd. During the 2017 flood event, heavy rains, flooding, high winds, and storm surge caused widespread damages throughout the State of California. Bailey Avenue, a two-lane road in south San Jose, sustained storm related damages and was partially eroded. The City is applying for funding from the Federal Highway Administration (FHWA) to complete the repair of the storm drain inlet and restore the roadway pavement. The project design has been completed and the funding application for FHWA grant is in progress.

Charcot Storm Pump Rental

This project allocates $300,000 per year for the rental of temporary storm pump system to alleviate flooding in the area near Charcot Avenue. The annual budget allocation for temporary storm pump system will end when the permanent storm drain improvements for the area are constructed.

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

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

This project was advertised in June 2018, and Council awarded the contract to the low bidder, Wattis Construction Company Inc., in the amount of $1,057,550 in August 2018. Construction commenced in October 2018, and was completed in April 2019.

B. Citywide Outfall Rehabilitation Projects

Thompson Creek Outfall 258 (near Timberline Court) Rehabilitation

The City's 48-inch storm outfalls draining to Thompson Creek near Timberline Court was rusting with its bottom corroded out. Additionally, the surrounding creek bank was found eroded from behind which threatened the integrity of the entire outfall structure and the slope embankment around it. Understanding the urgency of this issue, Santa Clara Valley Water District (Valley Water) and the City entered into a cost-share agreement in May 2019. As part of the Agreement, the City will contribute up to $410,000 toward a total project cost of $740,000 for the repair of the bank erosion and replacement of the outfall. Valley Water will be responsible for the total project delivery, including design, permitting, and final construction. Valley Water completed the bank erosion repair in summer 2018, and is on schedule to start construction of the outfall replacement in Fall 2019 and complete the work in December 2019.

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 complete. Staff is waiting for permits from Valley Water, California Department of Fish and Wildlife and Regional Water Quality Control Board before finalizing the contract documents for advertising and construction.

Autumn Street Outfall 67F Rehabilitation (CPMS 7700)

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

The design is complete. Staff is waiting for permits from Valley Water, California Department of Fish and Wildlife and Regional Water Quality Control Board before finalizing the contract documents for advertising and construction.

C. 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 which required 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 RCP storm sewer mains, and the replacement of 4 manholes. The project construction contract was awarded in June 2019, and construction is scheduled to start in September 2019 and complete in November 2019.

D. 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 FY18-19 included the following:

- Old Piedmont and Sally Lane Storm Drain Repair
- East Taylor and Mabury Storm Drain Repair
- Village SD Manhole Sinkhole Repair
- 16th and Jackson Drainage Repair

E. Existing Storm Pump Stations

The average age of the City's 31 storm sewer pump stations is approximately over 44 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 determined 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, Peak[1] (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
Alviso	2019	N/A	110	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

mgd = million gallons per day
N/A = not applicable
Unk = unknown
[1] - Peak stormwater pump station (SPS) effluent capacity (from hydrologic and hydraulic (H&H) model).

F. 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.

G. System Management and Planning

1. Master Planning

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

After the Coyote Creek flood event in February 2017, the City's hydraulic modeling team provided preliminary storm drain modeling results to Valley Water in 2017-2018 for the preparation of the Coyote Creek Emergency Action Plan. The City also prepared the storm drain system flooding impact analysis for the Guadalupe River/Ross Creek/Canoas Creek Emergency Action Plan. The City will continue to collaborate with the Valley Water as storm drain models are re-fined and results are updated.

b. Phase I Citywide Storm Drain System Master Plan – Preparation of Hydrologic and Hydraulic (H&H) Model and Preliminary Recommendation of Capacity 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 inches and larger in diameter using the City's GIS datasets, as-built plans, and survey data, and incorporated boundary information from Valley Water's HEC-RAS 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. 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).

The City collaborated with Valley Water on the methodologies for runoff calculations as well as getting their HEC-RAS model to develop boundary conditions for the storm drain model. The model was calibrated using 2013-2014 and 2014-2015 flow and rainfall monitoring data.

A draft storm sewer master plan report was prepared in December 2017 and recommended a preliminary list of storm drain capacity improvement projects to address 10-year storm events. Twenty-two high priority projects including the new Charcot Avenue Pump Station and Stockton-Taylor area storm drain improvement were identified based on historical flooding observation and input from the DOT storm sewer maintenance staff, totaling approximately $215 million in capital costs.

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**

c. Phase II Master Plan – Enhancement and Update of Phase I Model

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

After the February 2017 flood event, Valley Water collected high water marks, additional channel cross-sections and roughness through field visits along Coyote Creek. Subsequently during recent storm events in 2018 and early 2019, Valley Water also collected channel data in the Guadalupe watersheds. Valley Water updated their Coyote Creek and Guadalupe River HEC-RAS models using the recent channel flow and condition data, as well as observations by Valley Water staff, City staff, and residents. Valley Water's riverine models provide important boundary condition information for the modeling of the City's storm drain system as the two systems interact with each other. The storm sewer systems discharge to the creek/river and in turn, creek/river flow levels affect the performance of the storm sewer system.

The City has strategically divided the modeling areas (see Figure 2) and prioritized the model refinement and master plan update work into different phases. Based on the Phase I Master Plan results and historical flooding information, the first priorities were the North San Jose (NSJ) and Stockton/Taylor of Central Watersheds.

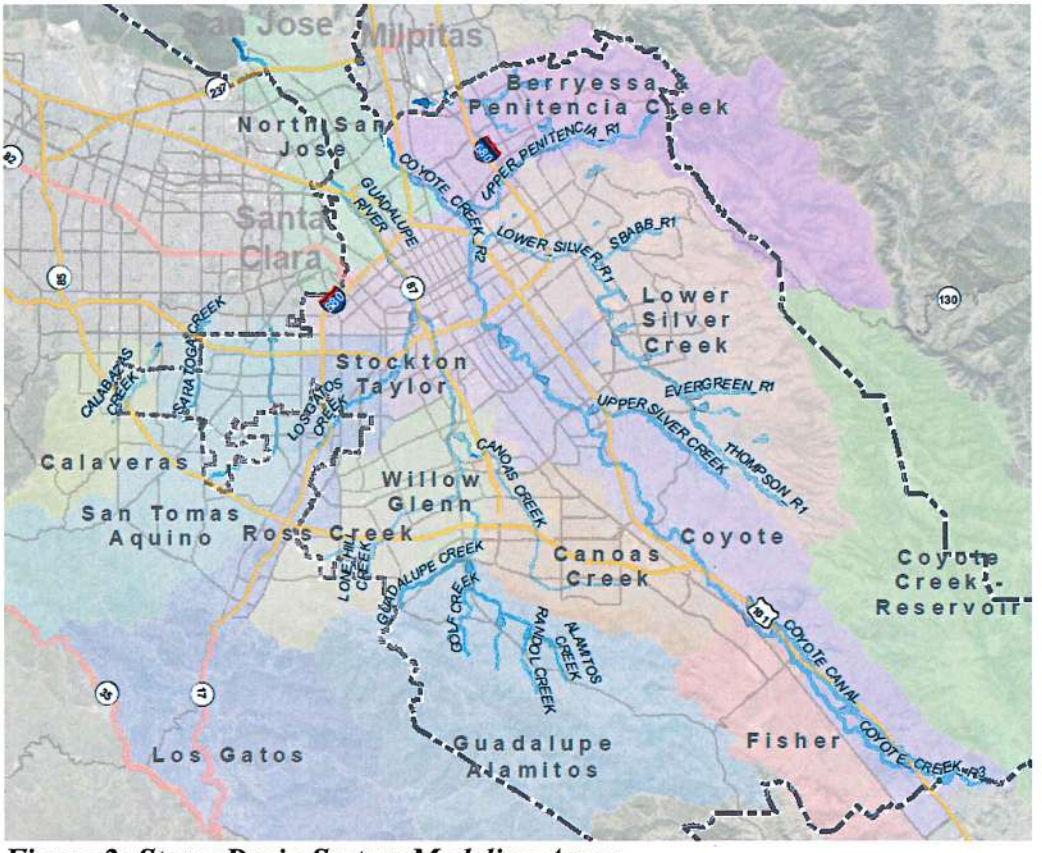


Figure 2: Storm Drain System Modeling Areas

North San Jose Area:

The NSJ model area as shown in Figure 2 includes NSJ Development Policy and Alviso areas.

The North San Jose area model has been refined and updated using the information from the latest Guadalupe River and Coyote Creek HEC-RAS models provided by Valley Water. The model considers the new Alviso Pump Station is in effect. The model was simulated for 3-, 10- and 100-year design storm events under existing conditions. The resulted flooded areas are presented in Figures 3 to 5 with Figure 4 shows deficient storm drain systems under a 10-year storm event.

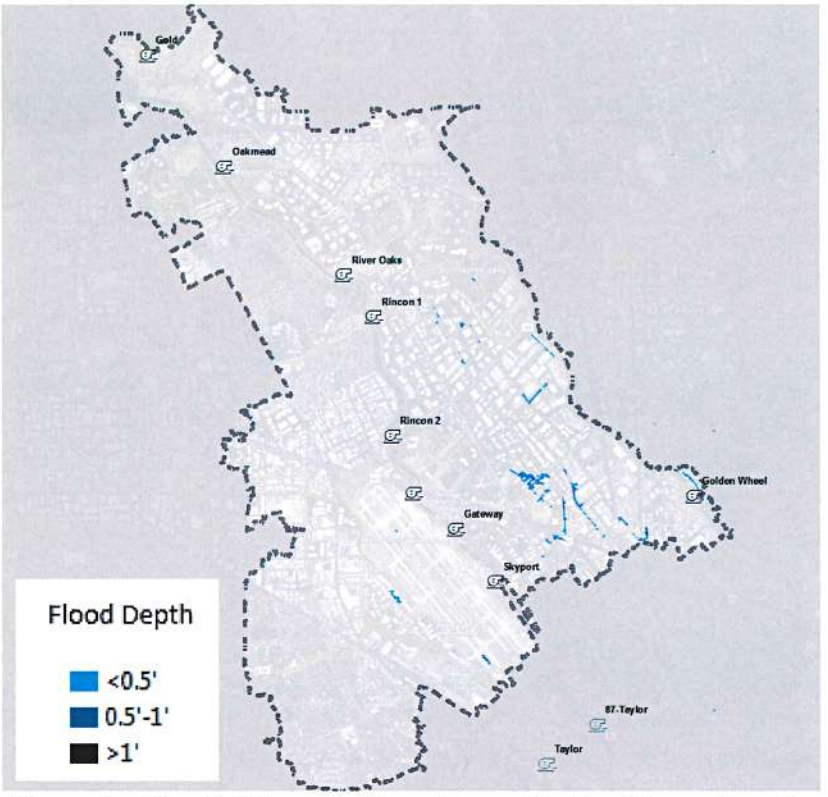


Figure 3: Flooded Area under a 3-year Design Storm Event

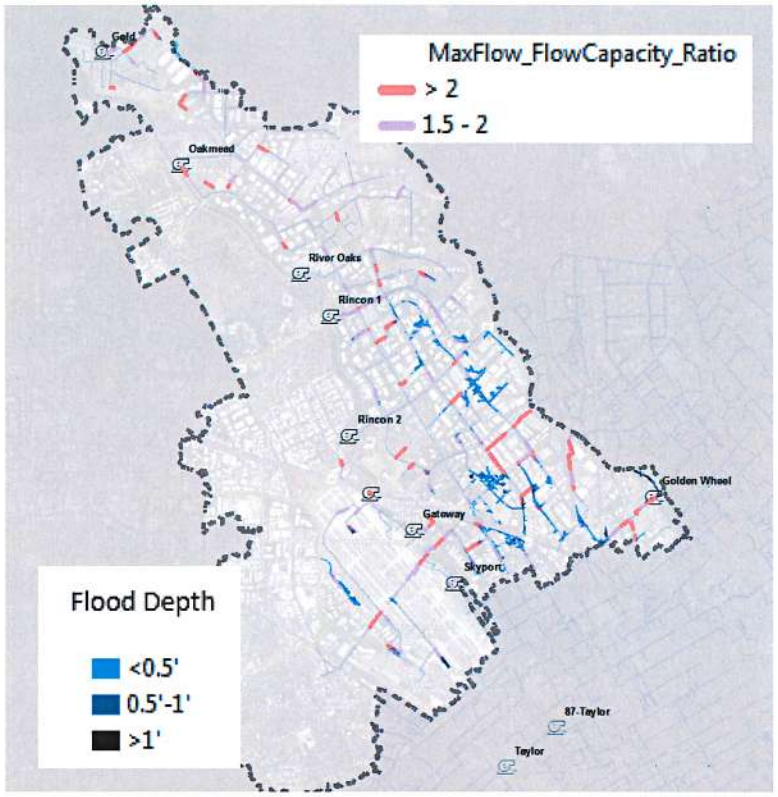


Figure 4: Flooded Area and Pipeline Deficiencies under a 10-year Design Storm Event

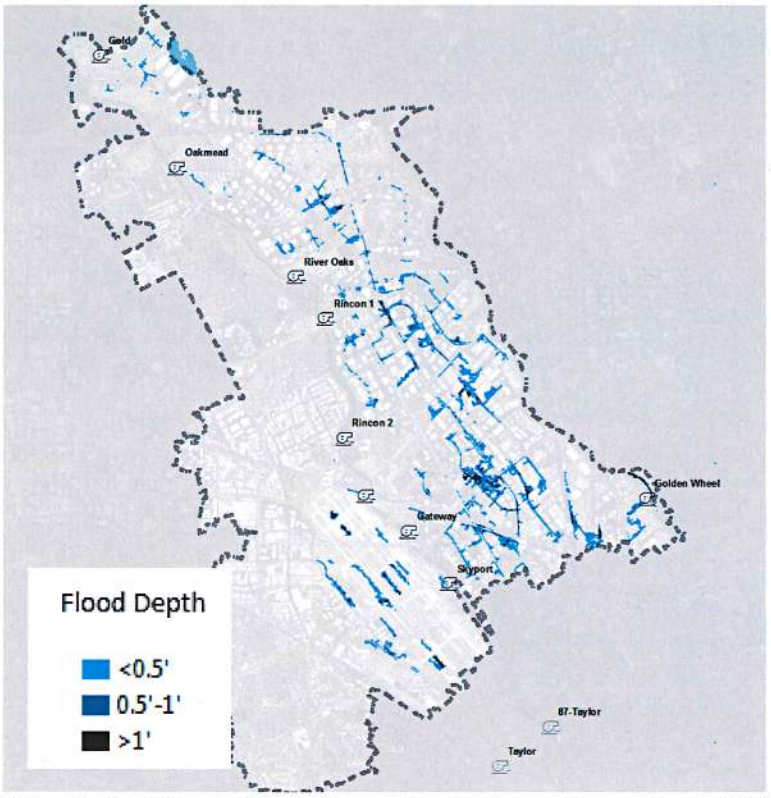


Figure 5: Storm Drain Capacity Deficiencies under a 100-year Design Storm Event

There is minor drainage deficiency under a 3-year storm event which was City's design standard before the 1990s and consistent with the industry standard. The 3-year storm exceeded pipeline capacity and the Coyote Creek tailwater conditions also played a small role in the case of the flooding near Brokaw Road and Zanker Road area. The flooding under the 10-year and 100-year storm events was caused by combination of high flow level at Coyote Creek, low ground that slopes towards Guadalupe River, and insufficient storm sewer capacity.

By June 2019, the alternative analysis for capacity improvement in Charcot drainage system was completed while other NSJ areas' capacity improvement are being evaluated and will be discussed in next year annual report.

Charcot Sub Watershed:

The Charcot sub watershed slopes naturally towards Guadalupe River to the west while the storm sewer system collects runoff and discharges in the opposite direction toward Coyote Creek to the east. This configuration creates low ground condition in the areas upstream of the system which become more prone to flooding, even during a less than 3-year design storm. On the other hand, toward the outfall end, because the water surface elevation in Coyote Creek is generally higher than the storm sewer system, a flap gate was installed at the Charcot outfall to prevent the high WSE from flowing back to the storm sewer system and flood the street.

During a 10-year design storm, there is only a small window of time when the water surface elevation in the storm sewer is higher than the Coyote Creek and allows gravity flow to the channel. During other times, stormwater level would build up in the pipe and flood the area. Flood water would then flow naturally to the west and discharge into the Guadalupe River through the Rincon II Pump Station on Trimble Road.

To alleviate flooding in the Charcot area under a 10-year design storm event, three alternatives were developed as shown in Figures 6 to 8.

Alternative 1 – Diversion System: The Rincon II Pump Station on Trimble Road is determined to have enough capacity for additional flow from adjacent watershed. The Rincon II pipeline system is close to the Charcot sub watershed flooding locations and it is cost effective to divert flood water from Charcot to the Rincon II pump station.

A bypass at the Brokaw Road and Bering Drive intersection to the Orchard Parkway storm sewer system was proposed. This alternative also takes advantage of the natural terrain in the Charcot and Rincon II sub watershed areas, which drains runoff from the southeast to the northwest towards Guadalupe River.

The diversion storm sewers could be installed in two phases. Phase I would include approximately 6,000 feet of 66-inch to 72-inch RCP along Charcot Road, Bering Drive and Brokaw Road in the downstream connecting with the Rincon II system. Phase II would install approximately 1,500 feet of 33-inch to 54-inch RCP upstream of Phase I.

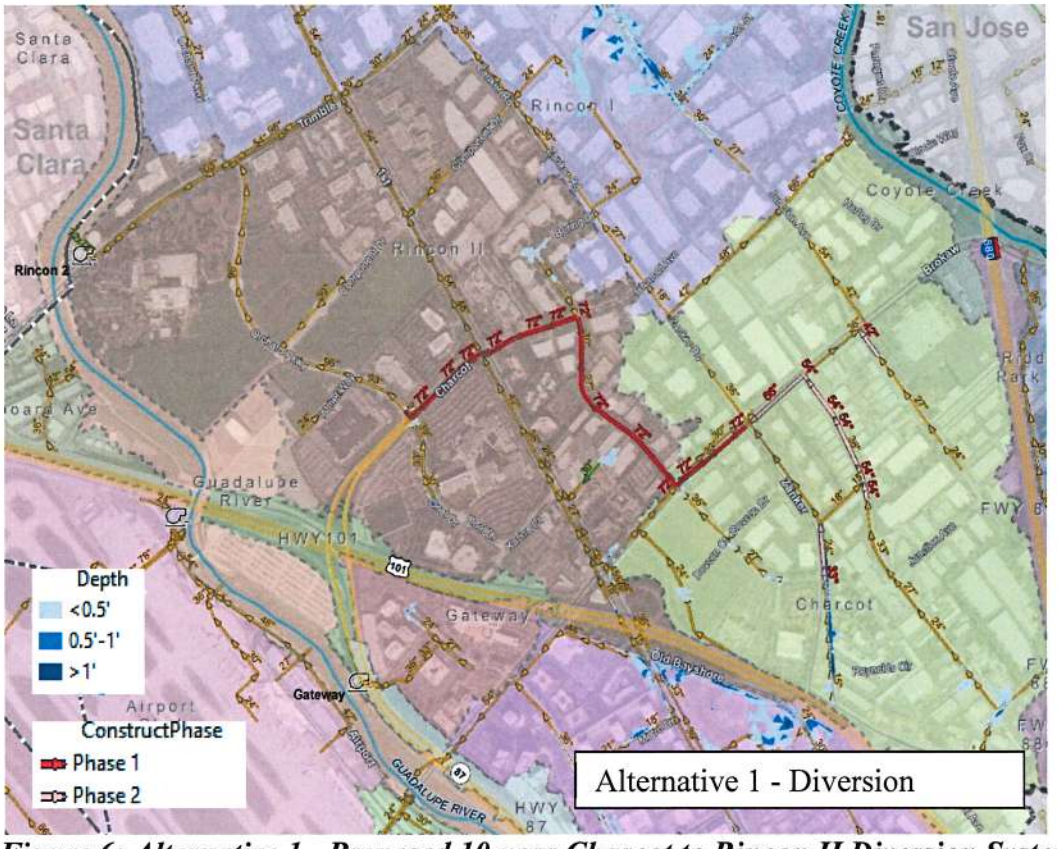


Figure 6: Alternative 1 - Proposed 10-year Charcot to Rincon II Diversion System

Alternative 2 – New 250 cfs Pump Station: This alternative would include the installation of a new 250 cfs pump station at Charcot Avenue and Coyote Creek, and upsizing of deficient storm sewers in the Charcot sub watershed. The storm sewers in the Charcot sub watershed area need to be upsized to collect runoff without flooding the streets and properties, and the pump station would be sized to discharge peak flow from the pipeline system into Coyote Creek. Approximately 8,000 feet of 24-inch to 84-inch RCP and a 250 cfs pump station would need to be built under this alternative.

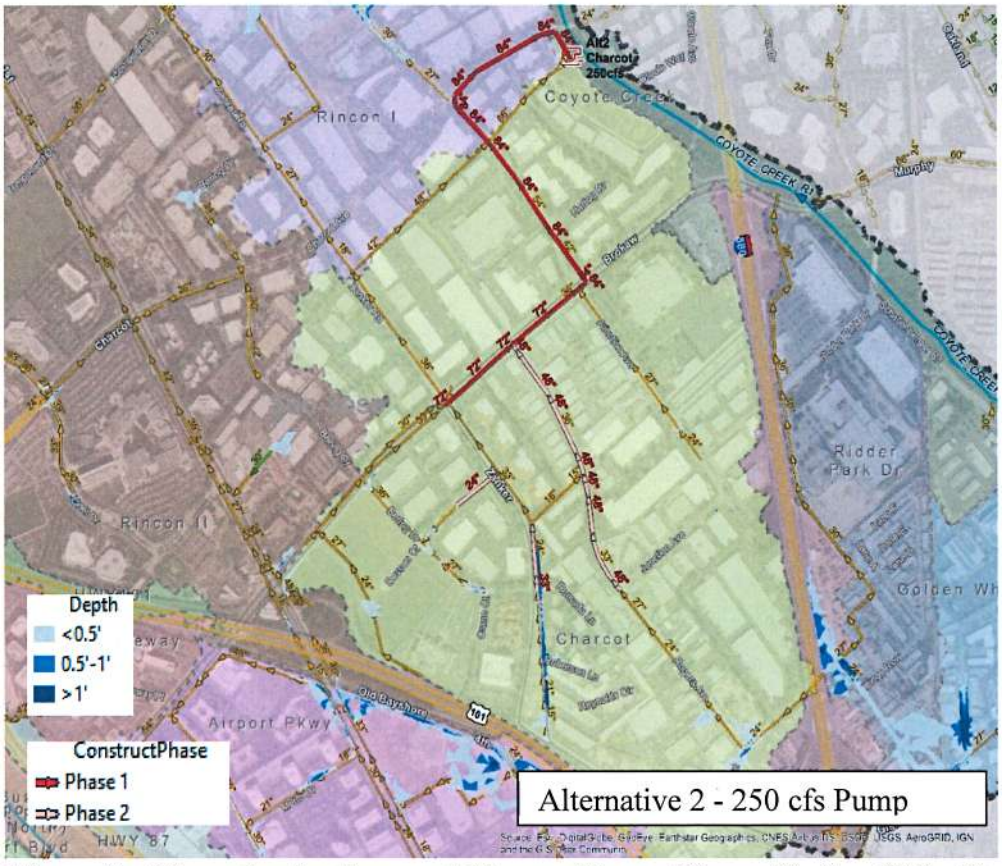


Figure 7: Alternative 2 - Proposed 10-year Charcot Pump Station (250 cfs)

Alternative 3 – New 140 cfs Pump Station and Underground Storage: This alternative would require a smaller pump station by adding an underground storage to store flow during peak hours to reduce peak pumping capacity. Improvements on upstream system would be same as those of Alternative 2.

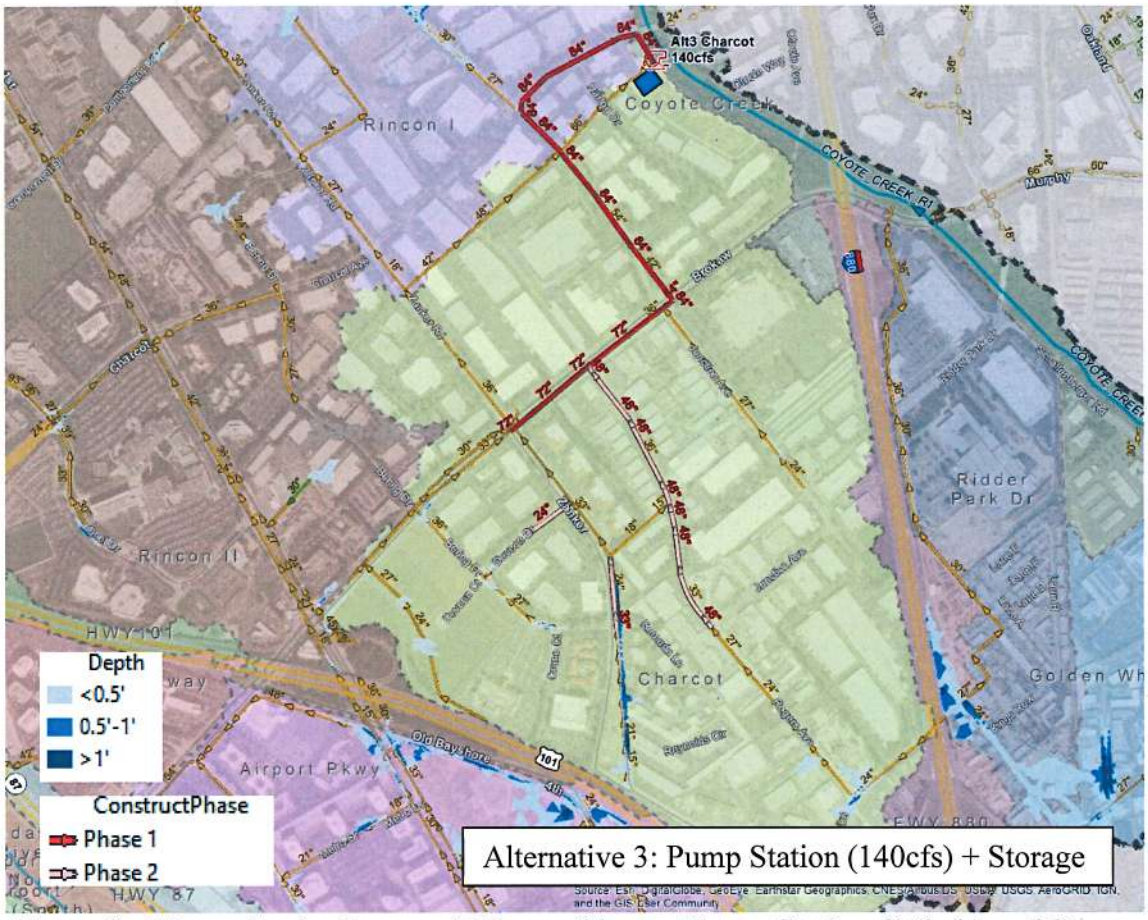


Figure 8: Alternative 3 - Proposed 10-year Charcot Pump Station (140cfs) and Storage

Staff will continue to analyze these alternatives. Due to its potential low cost in construction and operation and maintenance, Alternative 1 is a preferred option. City staff is reviewing the constructability of this alternative and coordinating with Valley Water to confirm the feasibility of and permit requirement for rerouting stormwater from one watershed to another. With Alternative 1, staff will also look into incorporating a regional green stormwater infrastructure near the Charcot outfall to treat storm runoff from the Charcot sub watershed consistent with the MRP's C.3 requirements.

2. Support Economic Development

Working with Development Services Division, DOT, VTA, and Planning Department, the Master Plan staff reviewed the storm drain capacity for over 30 mass transit and land use development projects. Some of development projects that staff conducted capacity reviews on included Diridon Station Area Plan, 440 West Julian Street (Akatiff Site), VTA BART TOD Study, Kearny Street, Capital Expressway Light Rail, and US101/De La Cruz Interchange.

3. Coordination with Valley Water

Approximately 30 percent (or 375) of the storm outfalls need 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 is working to develop 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 Valley Water 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 Valley Water 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 Valley Water 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 Valley Water. Throughout the entire master planning effort, the City and Valley Water's hydraulic modeling groups 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 Valley Water 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 Valley Water for their floodplain studies of Lower Silver Creek, Ross Creek, Upper Penitencia Creek, and Canoas Creek watersheds. Valley Water also shared with the City their updated HEC-RAS and other HEC models to the 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 Storm Drain 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 Stormwater Infrastructure Plan

This is a new program initiated in 2016, as required by the Municipal Regional Permit, to allocate funding to implement green stormwater infrastructure projects. During its early phase, the goal of this program was to complete pilot projects to reduce impervious surfaces by utilizing low impact development (i.e. bioretention, pervious pavement, regional facilities). These pilot projects aimed to reduce the amount of flow and improve water quality by treating urban stormwater runoff before it enters into waterways in San José.

In addition, City staff worked collaboratively with consultants to develop a Green Stormwater Infrastructure (GSI) Plan which was approved by City Council in September 2019. The GSI Plan describes how the City will shift from directing stormwater flows from impervious surfaces such as streets, parking lots, and buildings directly into existing storm drain infrastructure to a system where stormwater runoff is slowed, infiltrated, and/or treated prior to discharge into storm drain systems and receiving waterbodies. The GSI Plan provides a comprehensive overview of the citywide strategy, describes implementation steps, and identifies potential projects, including regional stormwater capture projects. City staff will now implement the plan by further prioritizing locations for potential projects utilizing the approaches laid out in the GSI Plan, beginning planning of projects, developing planning level cost estimates, and identifying potential funding sources to support the program.

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 375 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, Valley Water 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 most 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 improvement needs 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 was initiated in Fall 2017 and construction is scheduled for completion in 2021.

Flooding Study

In addition to stormwater modeling, a flooding study was conducted during 2015-16 to better understand impacts associated with regional flooding 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. However, further analysis is required to estimate the potential flooding impacts at the RWF due to riverine flooding should Coyote Creek or Guadalupe River overflow their banks or levee systems during a 500-year event. In 2018, staff initiated a Flood Risk Analysis project to assess the flood threats and better understand regional flooding at the RWF. Data developed in the Flood Risk Analysis effort led CIP staff to initiate negotiations with Valley Water staff to identify

the potential for flooding at the RWF during a 500-year river flooding event. In addition to CIP staff working with Valley Water staff, the Shoreline Levee project has begun, which will provide the RWF and surrounding community with 100-year flood protection when it is completed. 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 (North San Jose area) and recognized design standards for critical infrastructure.

H. 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, 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. The parties reached a voluntary agreement for resolution of the 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 Stormwater 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 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 the Stormwater Permit requirements, 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 polychlorinated biphenyls (PCBs). 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 waterbodies 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 City will evaluate stormwater conveyance and water quality impacts on downstream waterbodies due to the City's discharges and actions under normal and peak flooding conditions. 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. The GSI Plan also includes green street prioritization maps that were developed by ranking elements of GIS layers that would impact performance, constructability, and have potential synergistic opportunities with other City efforts (e.g. bike lanes). The City will now use those GIS maps to select high priority project locations while including other considerations such as City goals, neighborhood needs, grant requirements, and proximity to potential regional stormwater capture projects.

In an effort to support compliance with the MRP and gain experience in designing and constructing green stormwater 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, Chynoweth Avenue Green Street Project, and Horace Mann and Washington Neighborhood Green Alleyway Improvements Project.

Green stormwater infrastructure elements in these projects include 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 completed construction in FY 17-18. The Park Avenue project was constructed in coordination with a Department of Transportation grant-funded multi-modal project.

The Horace Mann and Washington Neighborhood Green Alleyway Improvements Project, at more than $1 million in construction cost, included installation of permeable paver infiltration trenches

to capture and treat stormwater runoff from the alleyways. The project construction was completed in April 2019.

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 26 large trash capture devices (hydrodynamic separator devices) at 21 locations 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 2017-18 and FY 2018-19, the Storm Section, in collaboration with the Environmental Services Department and the Department of Transportation, completed the planning, design, and installation of six additional large trash capture devices, respectively for the total of 32 devices at 27 locations and achieved the 80% trash load reduction goal meeting the mandated July 1, 2019 deadline.

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), Hydrodynamic Separators, (HDS) and GSI 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 hots 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.