City of SACRAMENTO
Department of Utilities

Sewer System Management Plan

Two-Year Audit for FY 19/20 – FY 20/21

February 7, 2022

Prepared By:

Amy Farmer, Administrative Analyst

City of SACRAMENTO
Department of Utilities

City of Sacramento
Department of Utilities
Sewer System Management Plan (SSMP)
Two-Year Audit for FY 19/20 – FY 20/21

Table of Contents

List of Tables

List of Figures

SECTION 1 Audit Objectives

This report summarizes the results of the required Sewer System Management Plan (SSMP) internal audit process for the areas served by the City of Sacramento's (City) sanitary sewer system for fiscal years 2019-2020 (FY 19/20) and 2020-2021 (FY 20/21). The purpose of the SSMP is to provide a written framework and plan for properly managing, operating, and maintaining the City's sanitary sewer collection system by the Department of Utilities (DOU). The programs described in the SSMP are designed to minimize the occurrence of sanitary sewer overflows (SSOs) and ensure compliance with California State Water Resources Control Board (SWRCB) Order No. 2006-0003-DWQ and Attachment A of the Order, known as SWRCB Order No. WQO 2013-0058-EXEC, together constituting the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (SSS WDR). The purpose of the SSMP audit is to evaluate the effectiveness of the SSMP, by reviewing the performance of programs described in the SSMP against the performance measures used by the City to evaluate compliance with requirements of the SSS WDRs.

The intention of conducting the SSMP audit is for the SSMP to evolve over time as a "living document" that the City continually adjusts after identifying potential enhancements and implementing changes in the management, operation, and maintenance of the City's sanitary sewer collection system. The SWRCB is proposing a statewide sanitary sewer system order reissuance. The proposed reissuance, which will be built on the existing general order, was drafted and released for public review and commenting in Spring 2021. The revised order is expected to go into effect in 2022.

The City will be completing the SSMP internal audit (Audit) on a biennial basis that is consistent with the procedure outlined in element ten (Chapter 10) of the SSMP. The City updated its SSMP in 2019 and completed its last SSMP audit in 2020. The objective of this Audit is to review the current SSMP compliance, implementation, effectiveness, and make recommendations for updating the SSMP. This report includes the following key tasks:

1. Review records from previous internal audits, to confirm deficiencies have been addressed (see **SECTION 2**).
2. Analyze the City's historical SSO data and the performance measures listed in the City's SSMP (see **SECTION 3**).
3. Establish a standardized procedure for this and future SSMP Audits (see **SECTION 4**).
4. Evaluate the City's performance in achieving compliance with all the various requirements of the SSS WDRs (see **SECTION 5**).
    a. Analyze the City's preventative maintenance program and Rehabilitation and Replacement (R&R) plan as it relates to the operation and maintenance of the separated sewer system (see **Section 5.4**).
    b. Review Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response and identify improvements. (see **Section 5.6**).
5. Record all findings during the audit process and retain the SSMP Audit on file (see **SECTION 6**).

Note that this Audit is based on the City's 2018/2019 SSMP version.

SECTION 2 Agency Background / System Information

The City of Sacramento is situated at the confluence of the Sacramento River and the American River in the northern Central Valley area. As the cultural and economic core of the Sacramento metropolitan area, Sacramento has previously been named one of the most diverse cities in the nation (Booth & Molinar, 2021). The City covers approximately 100 square miles, 98% of which is land with the other 2% being water. The terrain of Sacramento is relatively flat throughout.

Wastewater collection within City limits is provided by both the City and the County of Sacramento. The Sacramento Area Sewer District (SASD) maintains about 35 percent of the public collection system and the City maintains the remaining 65 percent, as shown in **Figure 1**. The City is responsible for inspection, maintenance, and repair of the sewer mains located in public right of way or easement. Services or laterals are considered private from the point of connection with the main to the private property and beyond. The City collection system owned and managed by DOU covers 36,780 acres and consists of two different systems, a combined sewer collection system and a separated sewer collection system. Separated sewer system will be referred to in the remainder of this Audit as "sanitary sewer system", in alignment with the Waste Discharge Requirements referenced, which do not pertain to the combined sewer system. The combined sewer collection system has a total service area of 11,345 acres and includes both the Combined Sewer System (CSS), which resides in the older central portion of the City encompassing a total service area of about 7,545 acres, and 3,800 acres of subsequent development that contribute flows from the separated sewer system (classified as system X) within the CSS service area. The 3,800 acres of the separated sewer system (X) that abut the CSS on the north and east, connect to, and flow through the CSS to the Sacramento Regional County Sanitation District (SRCSD) interceptor system. The CSS is unique in California, and its collection and treatment system is covered under an individual National Pollutant Discharge Elimination System (NPDES) permit issued by the Central Valley Regional Water Quality Control Board (Region 5) (WDR No. R5-2020-0039, NPDES No. CA0079111). The sanitary sewer collection system, which resides primarily in the northeast, east, and southwest sections of the City, encompasses a service area of about 25,435 acres. **Table 1** provides additional information about the sanitary sewer system over the current SSMP Audit time period. This SSMP Audit covers compliance activities related to the sanitary sewer system only.

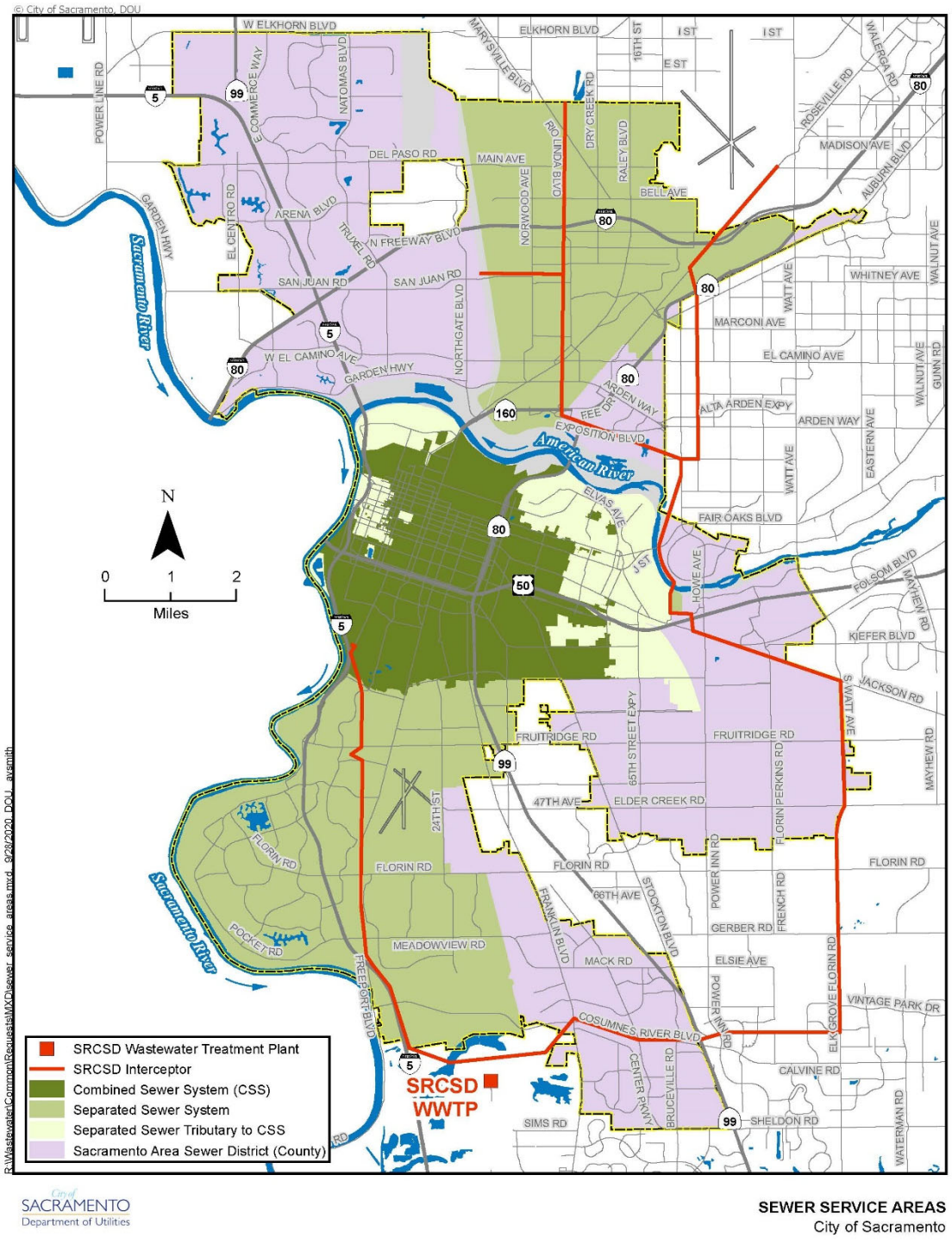
Table 1 – Overview of System Indicators (Separated Sewer)

Audit	FY 15/16 – 18/19		FY19/20 – FY20/21
Miles of mainline	547		483
Miles of pressure sewer	8		6
Pump stations	41		43
Population served	150,960		153,466
Sewer Maintenance Staff	48		48
SSO period	15/16-16/17	17/18-18/19	19/20-20/21
Category 1 SSOs	1	4	2
Category 2 SSOs	1	7	3
Category 3 SSOs	27	26	25

Note: Reduction in miles of mainline noted in Table 1 since the last audit period is due to change of interpretation of the mainlines classified as separated sewer flowing to the combined system, also known as System X. These mainlines were previously recorded by GIS as separated system but have been reclassified to the combined system because they route to combined systems interceptors which ultimately convey flows to Regional Sanitation Treatment Plant for treatment. Sump station classifications will need to be reevaluated as a result of this change.

Wastewater is conveyed from the City's sanitary sewer system to the Sacramento Regional County Sanitation District's (SRCSD) treatment plant known as the Sacramento Regional Wastewater Treatment Plant (SRWTP). The City's wastewater is routed to the SRWTP via an interceptor system (also owned by SRCSD) consisting of large diameter pipes and pump stations. The City of Sacramento is a part of Region 5 (Central Valley) of SWRCB.

Figure 1 – City of Sacramento Service Areas



2.1 Review of Last SSMP Audit

The previous internal audit of the City's SSMP was conducted and concluded October of 2020, and reviewed the activities and performance related to the SSMP for fiscal years 15/16-18/19. This internal SSMP Audit was organized to correspond with the SSMP document section for ease of reference. **Table 3** lists recommendations from the previous SSMP audit which will not be pursued and have no impact on compliance.

Table 2 summarizes the identified deficiencies, the recommended corrective actions outlined in the previous SSMP audit and shows the current status of the corrective actions per City tracking efforts. **Table 3** lists recommendations from the previous SSMP audit which will not be pursued and have no impact on compliance.

Table 2 – Summary of Findings from the Last SSMP Internal Audit (October, 2020)

SSMP Chapter	Recommendation	Suggested Timeline	Status FY21/22
2.2	Update SSMP Contact List to show the Wastewater and Drainage Division Manager as an LRO.	2022	Continued
2.2	Moving the SSMP contact list in Section IV into an appendix can help this element to be updated separately from the SSMP.	2022	See Table 3
4.2	Develop a Quality Assurance Quality Control (QAQC) process and metric to review and track the map updates with achievable goals and review per described frequency, example of this metric is shown in Table 16.	2022	Complete
4.3	Finalize the new Standard Operating Procedures (SOPs) that are currently being developed and include them in Appendix B, including CCTV SOP and First Responders SOP.	2022	Continued
4.3	Provide a simplified PM flowchart of current O&M activities with frequencies (1 mo, 3 mo, 6 mo, 12 mo, 24 mo, and 60 mo), this could eliminate some of the text and statistics from the SSMP and help simplifying future updates.	2022	Continued
4.3	Describe how manholes are visually inspected as part of the PM activities and are repaired if needed.	2022	Continued
4.3	Defined metrics to track the PM activities per year, this could be done by mileage basis or based on % completed of scheduled mains, see Table 16 for examples.	2022	Complete
4.3	Modify the SSMP to mention criteria used to place an asset in a higher frequency cleaning program as described in the Cleaning SOP and Appendix B.	2022	Continued
4.4	Continue holding periodic meetings between the O&M, Engineering, and Asset Management to ensure that everyone is aware of and understands the entire R&R plan and their role within it.	Ongoing	Ongoing
4.4	Update the SSMP to reflect the actual methodology used for CIP prioritization and include supporting documents in the SSMP (CIP prioritization system).	2022	Continued
4.4	Establish a periodic basis to analyze work orders with multiple condition assessment scores of 4 to determine what type of work is required to address the defects.	Ongoing	Ongoing
4.4	Consider modification of the CIP Prioritization System technical memorandum to incorporate capacity-based scores/parameters.	2025	Continued
4.4	Update the SSMP to include current process for visual manhole inspection.	2022	Continued
4.4	Continue implementation of a manhole inspection program with NASSCO MACP standards.	2022	Ongoing
4.4	Consider the development and implementation of a force main condition assessment program.	2025	Continued

SSMP Chapter	Recommendation	Suggested Timeline	Status FY21/22
4.5	Consider summarizing this section with a table that shows training topics and frequencies: • Training topics: PM SOPs, OERP, JHAs, First Responder, etc. • Quarterly, biannually, or annual • When onboarding • When new equipment	2022	Continued
4.5	Utilize the newly developed SOPs as a training tool for City staff. The SOPs should be developed so that they 1) provide a framework for the consistent delivery of required information, skills, and familiarity with equipment and 2) can be used to demonstrate competence of an individual in the particular subject.	2022	Continued
4.5	Develop a training log sheet to track training topics through a year and develop a metric that can be used to evaluate performance of the training element. For instance, this can be measured by % completed of required annual trainings or total hours of trainings combined based on a set goal, see Table 16 for an example KPI.	2022	Continued
4.6	Provide more details on how major maintenance equipment and critical parts are managed by Business Service Logistics Section. It would be beneficial to include a list of critical equipment in Appendix B of the SSMP.	2022	Continued
4.6	Identify critical replacement parts for pump stations. Include a plan to either acquire spare parts in the replacement parts inventories or a timely means for fabricating or acquiring critical spare parts in the event of a failure (outstanding action from previous audits).	2025	Continued
4.6	Implement the Condition Assessment Program for pump stations once it has been finalized. Update the SSMP to reflect this implementation.	2022	Continued
6.3	Update the 2014 OERP and upload to the City's SSMP. Chain of communication and contact tables can be moved out of the SSMP and into the OERP as attachments to avoid repetition of information.	2022	Continued
6.4	Complete the development of pump station failure contingency standard procedures indicating each pump station's location, wet well capacity, estimate of how much storage time the wet wells would provide under different flow conditions, alarm capacities, on-site back-up pumps, back-up power generators, and an operations or bypass approach in the case of a force main failure. For any stations that lack back-up pumps and generators, the procedures should specify a protocol for prompt delivery of portable pumps or generators in the event of a station failure. The procedures should also identify where an SSO will occur if a station fails and where bypass intake and discharge should be set up (outstanding action from previous audits).	2025	Continued
6.5	Update the organization chart or reference Chapter 2.2 of the SSMP.	2022	Continued
7.2	Include the updated 2015 FOG program manual and corresponding appendices in the SSMP and modify the section. Ensure consistency between the SSMP and the FOG program documents.	2022	Continued
7.6	Include a review frequency to routinely QAQC transmitted data regarding building permits involving new or modified grease removal equipment to the DOU and in updating the FSEs inspection inventory (outstanding from previous audits).	2022	Complete
7.9	Add FOG control program performance metrics to the SSMP and track progress. This may include % of FSE inspection completed per year, number of FOG hotspots in the short and long cleaning cycles, number of SSOs caused by FOG, etc. See Table 16 for a list of recommended metrics.	2022	Complete
8.3	Continue flow monitoring and development of hydraulic evaluation to confirm and update spreadsheet results.	Ongoing	Ongoing

SSMP Chapter	Recommendation	Suggested Timeline	Status FY21/22
8.3	Continue the process of developing hydraulic models for all basins where the future conditions spreadsheet and/or flow monitoring analysis indicate capacity deficiencies. Utilize hydraulic models to identify/confirm future hydraulic deficiencies and plan, design, and construct improvements as needed to eliminate them.	Ongoing	Continued
8.4	Include depth-to-diameter ratio (d/D) maximum limits listed in the DPM in the SSMP design criteria table.	2022	Continued
8.5	Modify the SSMP to reference the latest ongoing CIP projects (e.g., 5-year, etc.). This can also be added as a tabular CIP schedule in Appendix D.	2022	Continued
8.5	Describe procedure(s) used to create and/or modify the list of potential CIPs to address capacity-related deficiencies in the separated sewer system.	2025	Continued
8.6	Update Table 8.3 of the SSMP or reference where outstanding CIPs can be found.	2022	Continued
9.3	Consider tracking additional metrics related to various SSMP elements that are summarized in Table 16 on an annual schedule. Tracking these measures over time will help evaluate the effectiveness of the SSMP programs as well as adjust future PM activities and CIPs to reduce the potential for SSOs.	2022	Complete
9.4	Establish a procedure to utilize the existing sewer dashboard data and track the performance of each element or Key Performance Indicators (KPI). Develop numerical goals for each metric that tracks preventative maintenance activities and identify the responsible party for tracking data against those goals. An example of a KPI is shown in Appendix 7.3 of this Audit and in Table 16.	2022	Complete
9.5	Provide a change log as an appendix that documents changes made to the SSMP per element with corresponding date and brief explanation of the update since the last recertification.	2022	Continued
9.6	Add units to the vertical axis in Figures 9.1 and 9.2.	2022	Continued
9.6	Make sure the fiscal year period in these analyses is consistent with City's internal data.	2022	Complete
9.6	Consider replacing Table 9.1 with a table listing volumes per 100 miles per category, volume of spill reached SW per 100 miles of sewer, or volume per 100 miles per cause.	2022	Continued
9.6	Consider clarifying in the SSMP the definition of total sewer miles in these calculations, this is typically calculated as total of pressured + gravity + public laterals. This could be clarified in a Glossary of terms.	2022	Continued
9.6	Update Appendix E of the SSMP, detailed SSO data may be included in the audits and out of the SSMP, modify text accordingly.	2022	Continued
10.2	Schedule the next Internal SSMP Audit for 2022. Identify the appropriate level of internal or external resources to conduct the Audit and describe the audit procedure and schedule in the SSMP.	2022	Complete
10.2	Post this Audit on the City of Sacramento's website, Department of Utilities page.	2020	Complete
10.2	Update the SSMP at minimum every two years (every year if significant changes are warranted). Re-certify SSMP updates every 5-years through City Council.	Ongoing	Ongoing
10.2	Stay up to date on upcoming SWRCB WDR revisions and requirements through the State Water Board email system: (https://www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html	Ongoing	Ongoing

Table 3 – Recommendations Not Pursued from Last Audit

SSMP Section	Recommendation	Reason for not pursuing
2.2	Moving the SSMP contact list in Section IV into an appendix can help this element to be updated separately from the SSMP.	Prefer contact list to be in early part of SSMP. Not compliance-related.

SECTION 3 SSO Trends

3.1 Historical Sanitary Sewer Overflow (SSO) Data

Appendix 8.1 of this report includes the date, location, type, cause, SSO duration and response times, volume, volume recovered, and recovery percentage of total volume of each Sanitary Sewer Overflow (SSO) reported to California Integrated Water Quality System (CIWQS) during the audit period.

One of the tasks of the Audit is to compare the information submitted to the publicly available CIWQS database with internal City records. This is done because Order No. WQ 2013-0058-EXEC (Section E – Record Keeping Requirements) requires the City to maintain detailed records of each SSO event. The City generates internal records of all documentation pertaining to the SSO response and submits a report to CIWQS. The Wastewater Collection Superintendent verifies that the SSO data in the SSO Field Report Forms and CIWQS is accurate. **Table 4** summarizes key data present in CIWQS and City internal records, and shows some inconsistencies related to reported SSO data. Previous fiscal years' comparisons are included to monitor trending since the last audit period.

During this Audit period, DOU had a wastewater Administrative Analyst vacancy. The Analyst would have performed a first review of all data and addressed any discrepancies prior to results being reported for the audit. Due to the vacancy, Supervisors were required to research any differences in data between internal records (Cityworks SSO inspections) and CIWQS reported calculations. This review uncovered a potential need for process improvements following CIWQS submittal as some updates to the internal records were captured inconsistently (in written comments instead of the inspection fields), or not updated once a change was made to the information that was eventually submitted to CIWQS.

- ***Recommendation (Noted as new item in Table 18 under SSMP Chapter 2.2):*** Consider process and workflow improvements to ensure that Cityworks SSO inspection data is consistent with all information entered into CIWQs. Clearly define by who, when, and how data is entered into each required record keeping system.

While reviewing internal records for discrepancies, the Wastewater Supervisor discovered errors in the volume calculations of five SSOs that had already been submitted and certified in CIWQS. The Supervisor then requested in August for the SSO reports to be reopened to update the errors found. Internal records were updated to reflect

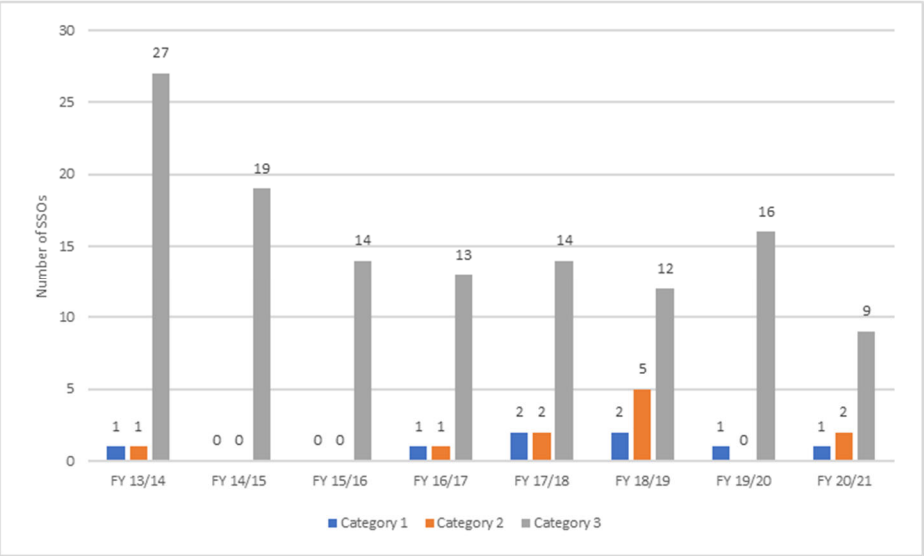
the corrected volumes, while Wastewater waited for a response from the California State Water Resources Control Board (SWRCB). Prior to the error being identified, the CIWQS and internal records data had almost identical values for SSO volumes.

Table 4 – CIWQS and City SSO Historic Data

SSO Historical Data since last SSMP Internal Audit	CIWQS Data FY 17/18	Internal Records FY 17/18	CIWQS Data FY 18/19	Internal Records FY 18/19	CIWQS Data FY 19/20	Internal Records FY 19/20	CIWQS Data FY 20/21	Internal Records FY 20/21
The total number of SSOs reported	18	18	19	19	17	17	12	12
The reported total volume of SSOs	6,858	6,836	19,276	19,275	23,298	23,297	65,657	61,887
The reported total volume of SSOs that reached waters of the State	365	365	6,416	6,416	12,600	12,600	24,900	24,900
The percent volume of SSOs recovered	93%	93%	37%	37%	46%	46%	62%	60%
The average SSO response time [hh:mm]	0:47	0:44	0:43	0:43	0:51	0:49	0:30	0:29
The average SSO duration time [hh:mm]	10:02	9:50	8:56	8:56	4:56	4:50	6:25	6:24

The following section analyzes the City's historical SSO data to identify potential trends to provide insight into measuring the effectiveness of the City SSMP and future improvements in reducing SSOs. **Figure 2** highlights the category and number of SSOs since FY 13/14. The State Water Resources Control Board defined three new SSO categories as of September 13th, 2013. A Category 1 SSO is currently defined as a spill of any volume that reaches a surface water. A Category 2 SSO is currently defined as a spill greater than or equal to 1,000 gallons that does not reach surface water. A Category 3 SSO is currently defined as a spill less than 1,000 gallons that does not reach a surface water. **Figure 2** shows a declining trend for Category 3 SSO events over time. This figure also shows a slight increase in Category 1 and 2 events during three of the last four years.

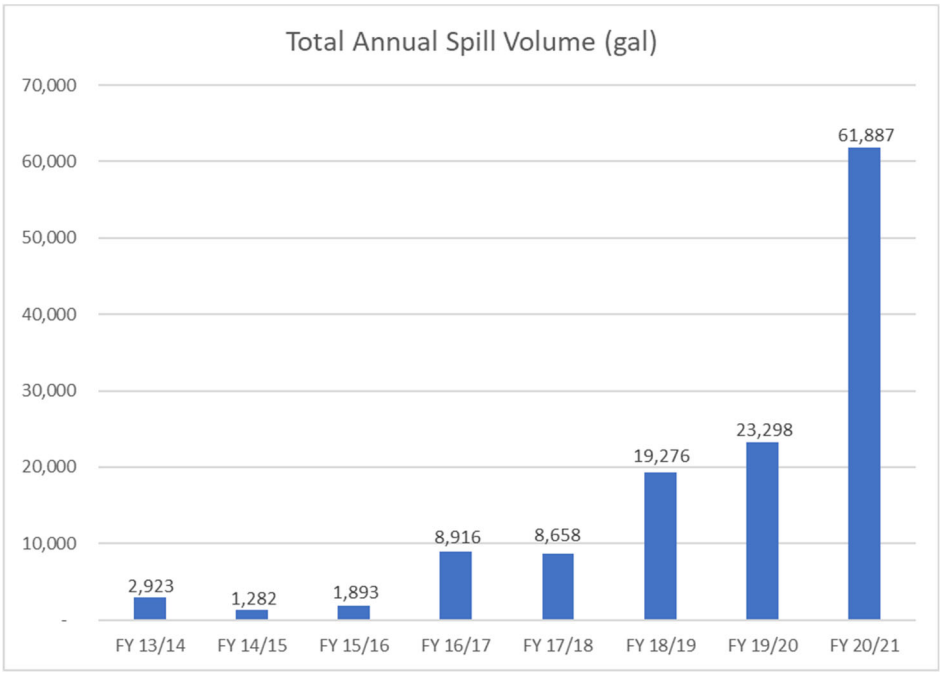
Figure 2 – Number of SSOs per Fiscal Year



FY13/14-FY19/20 Source: CIWQS ; FY20/21 Source: Cityworks Inspection Data (Pending CIWQS volume corrections)

Figure 3 shows the total annual SSO volume since FY 13/14. Although the number of SSO events has generally been decreasing over recent years, **Figure 3** indicates that the spill volume has been increasing during this Audit period.

Figure 3 – Total Annual Spill Volume



FY13/14-FY19/20 Source: CIWQS ; FY20/21 Source: Cityworks Inspection Data (Pending CIWQS volume corrections)

Further details regarding higher volume spills that occurred between FY 19/20 and FY 20/21 are provided below:

- Fiscal Year 19/20 Category 1 SSO was discovered by FOG inspectors during routine inspections. A nearby worker (non-City) informed inspectors that they had noticed the overflow occurring more than six hours prior to discovery by City staff but saw that it had temporarily stopped and decided to refrain from reporting this to the City. Due to the lack of notification in a timely manner by observing parties the City was unable to respond until 20,900 gallons spilled, 12,600 gallons discharging to the Sacramento River.
- Fiscal Year 20/21 Category 1 SSO (24,900 gallons) was due to sump issues including grease blockage and concern about construction design. The matter has been referred to the Construction Manager and Engineering for review. Additionally, sump discharge levels have been adjusted, maintenance frequency has been changed to annual for the mains approaching the sump, and a SmartCover sensor is being used to monitor the upstream manhole.
- In Fiscal Year 20/21 there were two Category 2 SSOs. The larger spill (33,517 gallons) was responded to within 31 minutes of notification and fully recovered. Spill volume was large due to Wastewater not being notified until more than 12 hours after the overflow had started. The smaller Category 2 SSO of 1,842 gallons was responded to within 35 minutes, however flow rate caused volume to exceed 1,000 gallons.

Below, the City's number of SSOs per 100 miles of separated sewer pipeline (including gravity mains and force mains) and spill volume per 100 miles of separated sewer pipeline are compared with the results from sub-region Central Valley (SWRCB Region 5) and California (State), to provide regional context and insight into the City's collection system performance. **Table 5** summarizes these findings, gathered from the SWRCB's annual performance reports. These reports and their related data can be found online at the following link:

https://www.waterboards.ca.gov/about_us/performance_report_1920/plan_assess/124_sanitary_sewage_overflow.html

The City's SSO events per 100 miles of pipe are generally lower than the region and similar to the State, during the past six years. The spill volume per 100 miles of pipe was lower than the region and State averages in five of the last six years, but higher than State in FY20/21. Overall, **Table 5** suggests that the City had better performance than the region as it relates to SSO mitigation and spill volume per 100 miles, but recent increases in spill volume have caused the City's SSO volumes to surpass the state's averages. Further monitoring and analysis is required to determine corrective actions needed to reduce SSO spill volumes.

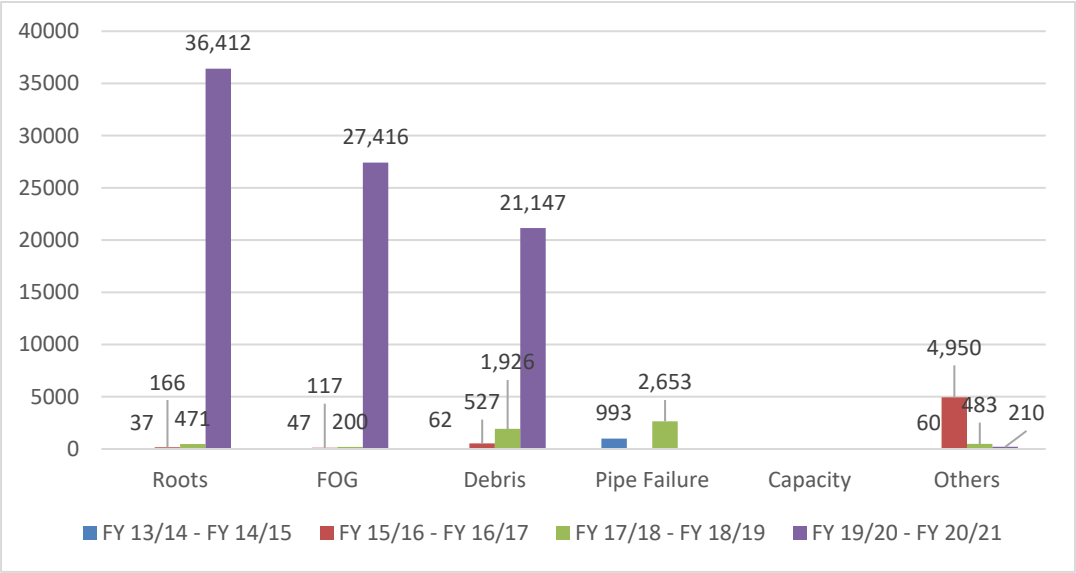
Table 5 – Regional Comparison of SSO Data

Fiscal Year	# of SSOs per 100 miles of pipe			Spill volume per 100 miles (gal)		
	City	Region 5	State	City	Region 5	State
2015/16	2.5	8.8	4.0	341	7,484	25,134
2016/17	2.7	7.4	3.7	1,606	76,009	49,725
2017/18	3.2	5.7	3.0	1,236	6,856	8,674
2018/19	3.4	5.9	3.2	3,473	10,170	23,982
2019/20	3	5.5	2.6	4,249	6,075	18,441
2020/21	2.5	6.01	2.78	12,813	16,244	9,538

FY15/16-FY19/20 Source: CIWQS ; FY20/21 Source: Cityworks Inspection Data (Pending CIWQS volume corrections)

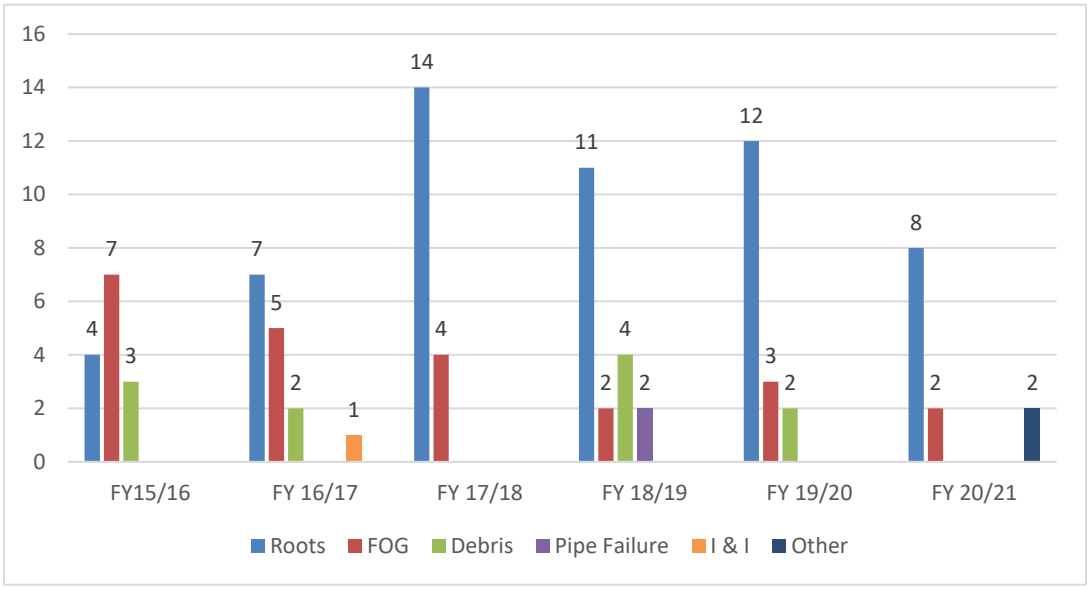
Additional data illustrating a decrease in SSOs but increase in volume across all major causes in the most recent audit period can be found in **Figures 4** and **5** below.

Figure 4 – Total Annual Spill Volume per Cause



FY13/14-FY19/20 Source: CIWQS ; FY20/21 Source: Cityworks Inspection Data (Pending CIWQS volume corrections)

Figure 5 – SSOs by Cause



FY15/16-FY19/20 Source: CIWQS ; FY20/21 Source: Cityworks Inspection Data (Pending CIWQS volume corrections)

3.2 Performance Measures

To improve operation and management of the sanitary sewer system and to prevent SSOs, the City monitors multiple performance measures to assess the effectiveness of the SSMP. The following performance measures are specific to SSO occurrences:

- SSO Occurrence Rate (number of SSOs per 100 miles of collection system per year)
- SSO Volume Rate (gallons of SSOs per 100 miles of collection system per year)
- Number of SSOs for each cause (roots, FOG, debris, pipe failure, capacity, lift station failures, etc.)
- Percentage of SSO volume recovered (%)
- Percentage of SSO volume reaching a surface water (%)

The City's SSO performance measure data from FY 15/16 to FY 20/21 is shown in **Table 3** below.

Table 3 – Performance Measures

Performance Measures		FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	FY 20/21
SSO Occurrence Rate, # SSOs/100 mi		2.5	2.7	3.2	3.4	3.1	2.5
SSO Volume Rate, gallons SSOs/100 mi		341	1,606	1,236	3,473	4,259	12,813
SSO Cause	Roots	4	7	14	11	12	8
	FOG	7	5	4	2	3	2
	Debris	3	2	0	4	2	0
	Pipe Failure	0	0	0	2	0	0
	Capacity	0	0	0	0	0	0
	Others	0	1	0	0	0	2
Total SSO numbers		14	15	18	19	17	12
Total SSO volume		1,893	8,916	6,858	19,276	23,298	61,887
Average SSO Vol (gal)		135	594	381	1015	1370	5157
% of SSOs > 100 gal		21.4%	33.3%	61.1%	42.1%	35.3%	75%
Category 1 % of Total SSOs		0%	7%	11%	11%	6%	8%
% of Spill Volume Recovered		100%	66%	93%	37%	54%	60%
% of Spill Vol Reaching Surface Water		0%	34%	5%	33%	54%	40%

FY15/16-FY19/20 Source: CIWQS ; FY20/21 Source: Cityworks Inspection Data (Pending CIWQS volume corrections)

Table 6 indicates that the most frequent causes of SSO occurrences have been roots, FOG, and debris during this Audit period. While that was also the case for the previous audit period, it was shown that the number of SSOs related to these causes were reduced compared to the previous two fiscal years. The volume of SSOs for these causes has increased comparing to the past audit, largely due to slow reporting from the public and 311 service routing issues, but this is still at an acceptable level when compared to the rest of the region. Overall, results suggest that the City's efforts in mitigating SSO events have been effective during this two-year audit period and will continue to seek process improvements to reduce volumes.

SECTION 4 Audit Procedure

In accordance with SSS WDR Section D.13.x, the primary SSMP audit objective is to focus on evaluating the effectiveness of implementing the SSMP and the City's compliance with the SSMP requirements identified in the SSS WDR Order.

4.1 Review of SSMP Compliance

This Audit assessed the City's SSMP (2018/2019) against the requirements outlined in the SSS WDR. The subsections of **SECTION 5** are organized by SSMP element. Each subsection contains a table which lists the SSS WDR section D.13 requirements and the City's level of compliance of the SSMP with each corresponding requirement. The compliance status of the City's SSMP is indicated with one of the following ratings: ***Yes*** *– in compliance,* ***No*** *– not in compliance, or* ***N/A*** *– not applicable with a written justification in the SSMP.* If there are any compliance deficiencies, then an explanation of the deficiency is included. Each deficiency will have a recommended SSMP enhancement, which may include action items, adjustments, and/or timelines for planned completion. Potential enhancements may also be provided for SSMP elements that are in compliance.

4.2 Review of SSMP Effectiveness

Following the SSMP compliance assessment compared to SSS WDR requirements, an evaluation of the effectiveness of the SSMP elements has been conducted to comply with the requirements for SSMP audits per subsection D.13.x of the SSS WDR. The discussion reviews if the programs outlined for each section are being followed, and how effective the programs are at reaching the desired objectives. Recommendations will be made where appropriate based on the results of this Audit to identify tasks to improve the effectiveness of SSMP activities or SSMP updates required.

SECTION 5 Audit of SSMP Elements

This section evaluates all elements of the City's SSMP. Each section of this chapter is associated with one of the eleven elements of the SSMP in accordance with SSS WDR section D.13 requirements. Each element is evaluated for compliance and effectiveness based on the audit procedure described above. A summary of the recommended modifications made through this Audit is included in SECTION 6, Table 18. Outstanding recommendations from past audits have been carried forward to this document, to provide an all-inclusive listing. New or modified recommendations will be indicated with an asterisk throughout the document and in summary Table 18.

5.1 Goals

5.1.1 Compliance

Table 4 – Compliance with SSS WDR D.13.i - Goals

SSMP Requirement	Compliance	Deficiencies
i Provide a plan and schedule to properly manage, operate, and maintain all portions of the City's wastewater collection system.	Yes	-

5.1.2 Effectiveness of SSMP Elements and Recommended Modifications

Goals (SSMP Section V Chapter 1.2)

- Level of Effectiveness: The City currently has five general goals identified in the SSMP. The SSMP references the City DOU's Strategic Plan as the source of the goals. Four actions that the Operations and Maintenance (O&M) Division listed align with the SSS WDR and the Strategic Plan. All of the goals that the City DOU recorded in the SSMP and Strategic Plan have been effective in guiding the activities of the City to properly manage, operate, and maintain all parts of the sanitary sewer system.

- ***Recommendations:*** No recommended modifications at this time.

5.2 Organization

5.2.1 Compliance

Table 5 – Compliance with SSS WDR D.13.ii - Organization

SSMP Requirement	Compliance	Deficiencies
ii(a) Identify Legally Responsible Official (LRO)	Yes	-
ii(b) SSMP responsibility and organization chart	Yes	-
ii(c) Chain of communication for reporting SSOs	Yes	-

5.2.2 Effectiveness of SSMP Elements and Recommended Modifications

Identify Legally Responsible Official (LRO) (SSMP Section V Chapter 2.2)

- Level of Effectiveness: The SSMP Contact List notes the Wastewater and Drainage Division Manager as currently vacant. Rotational coverage of this position has been established, and the contact list will be updated once a replacement is hired. Wastewater Collection Supervisors Kevin Guerra and Kevin Waller are listed as designated Legally Responsible Officials (LROs) for the City's collection systems. Those positions are authorized to certify all CIWQS electronic reports. The current organization of LROs and Data Submitters has proven effective in appropriately reporting SSOs to meet the requirements of the Monitoring and Reporting Program.

- ***Recommendations:***
    - Designate the Division Manager and Superintendent as LROs, once hired.

SSMP Responsibility Organization Chart (SSMP Section V Chapter 2.2)

- Level of Effectiveness: Section IV SSMP Contact List of the City SSMP is referenced in this chapter. Section IV contains a table that provides the title, name, phone number, e-mail address, and a short description of each individual's job responsibilities. The SSMP also includes an organization chart to identify lines of authority. The combination of the table and the chart in the SSMP effectively outlines the names of

individuals responsible for implementing the SSMP and their contact information, however, both require updates based on changes since the last audit period.

- ***Recommendations:***
    - Update organization chart.

Chain of Communication Reporting Chart (SSMP Section V Chapter 2.2)

- Level of Effectiveness: The SSMP outlines the chain of communication for reporting all three SSO Categories from the receipt of a complaint to CIWQS reporting. The figures in the SSMP that show the chain of communication for SSO reporting delineate which position within the City's organizational structure is responsible for each action. The City's chain of communication for SSO reporting appears to be effective based on the completeness and thoroughness of the information documented in the CIWQS database.

  The City's internal SSO data is currently tracked through an Excel spreadsheet and Cityworks inspections to ensure consistency of SSO data between CIWQS and City records. As shown in **Table** , the City's internal data is nearly identical to the CIWQS database. This suggests that the City has been effectively tracking and documenting SSO data.

- ***Recommendations:*** No recommended modifications at this time.

5.3 Legal Authority

5.3.1 Compliance

Table 6 – Compliance with SSS WDR D.13.iii – Legal Authority

SSMP Requirement	Compliance	Deficiencies
iii(a) Prevent illicit discharges	Yes	-
iii(b) Properly designed and constructed sewers	Yes	-
iii(c) Ensure access to laterals owned/maintained by District	Yes	-
iii(d) Limit the discharge of FOG and other debris	Yes	-
iii(e) Enforce any violation of District ordinances	Yes	-

5.3.2 Effectiveness of SSMP Elements and Recommended Modifications

Prevent Illicit Discharges Authority (SSMP Section V Chapter 3.2)

- Level of Effectiveness: City Municipal Code 13.08.040 lists the various substances that are prohibited from being discharged to the sewer system. City Municipal Code 13.08.130 prohibits cross connections between sanitary sewer pipes and the storm drain system. City Municipal Code 13.08.160 requires property owners to repair any leak or defect found in a private sewer line and gives the City the power to perform the repair at the cost of the property owner if the property owner fails to do so.

- ***Recommendations:*** No recommended modifications at this time.

Design and Construction Standards (SSMP Section V Chapter 3.2)

- Level of Effectiveness: City Municipal Code 13.08.360 requires that the application requesting City sewer service contain plans and specifications for the proposed sewer facilities that conform to the City Standard Specifications. City Municipal Code 13.08.380 gives the City the right to inspect all work performed, and all work must be approved by the City before connection to the sewer system can be completed.

- ***Recommendations:*** No recommended modifications at this time.

Sewer Access Authority (SSMP Section V Chapter 3.2)

- Level of Effectiveness: City Municipal Code 13.08.240 prohibits the construction of any permanent structure on top of public water, sewer, or drainage pipelines. City Municipal Code 13.08.290 provides the City with the legal authority to inspect private sewer or storm drain facilities to enforce any provision in the sewer service system chapter of the City's Municipal Code.

- ***Recommendations:*** No recommended modifications at this time.

Limit FOG Discharges Authority (SSMP Section V Chapter 3.2)

- Level of Effectiveness: City Municipal Code 13.08.040 lists the various substances that are prohibited from being discharged to the sewer system. City Municipal Code 13.08.090 requires that all FSEs comply with best management practices (BMPs) that the City Council establishes from time to time by resolution. City Municipal Code 13.08.100 gives the City the legal authority to require businesses other than FSEs to install interceptors of a type and capacity approved by the City.

- ***Recommendations:***
    - Review and update ordinance, including recommendations from FOG consultant from update to FOG manual

Enforcement Authority (SSMP Section V Chapter 3.2)

- Level of Effectiveness: City Municipal Code 13.08.060 describes the City's legal authority to enforce any violation(s) of its sewer ordinances. City Municipal Code 13.08.340 describes what is considered a violation of its sewer ordinances. City Municipal Code 13.08.270 describes discontinuance of unauthorized connections. In addition, City Municipal Code 13.16.020, 13.16.050, 13.16.080, and 13.16.090 describe purpose, prohibition of non-stormwater, violation of permit, and prohibition of illicit connections.

- ***Recommendations:*** No recommended modifications at this time.

5.4 Operation and Maintenance Program

5.4.1 Compliance

Table 7 – Compliance with SSS WDR D.13.iv – O&M Program

SSMP Requirement	Compliance	Deficiencies
iv(a) Collection system maps	Yes	-
iv(b) Preventative O&M activities	Yes	-
iv(c) Rehabilitation and Replacement (R&R) plan	Yes	The City does have an R&R plan in place, but additional improvements can be implemented (see below).
iv(d) Training	Yes	The City provides regular training, additional improvements to the training program can be implemented (see below).
iv(e) Equipment and critical replacement parts	No	Include list of critical parts for pump stations and collection system.

5.4.2 Effectiveness of SSMP Elements and Recommended Modifications

Collection System Maps (SSMP Section V Chapter 4.2)

- Level of Effectiveness:
  - The City's Facilities Operations Information System (FOIS), which is maintained by the DOU Engineering and Water Resources Division, is a web-based application on the City's intranet that serves as the repository for record drawings; improvement plans prepared by staff, outside consultants, and other agencies; specifications; O&M manuals; and facility photographs, etc., as they relate to the collection system.
  - The City's Computerized Maintenance Management System (CMMS) contains all linear and vertical asset data. DOU updates pipe attribute information through a map correction work order process, using information derived from CCTV inspections and field observation. Work orders are routed to GIS staff's queue for review and completion.
  - The City maintains an updated ArcGIS mapping system that contains the entire sanitary sewer collection system, the storm drainage system, and applicable sewer appurtenances (e.g. pump stations, valves, etc.). The maps are continually updated by the GIS staff through map corrections from field visits, data review, internal review, and new utility projects. The electronic (PDF) sewer and drainage map book pages are available through the DOU intranet site.
  - Redline map corrections are received by GIS through Cityworks CMMS attached to a work order. GIS staff regularly check the Cityworks updates and communicate with field staff as needed. In addition, when a project Notice of Completion is filed, GIS staff receive a notification from DOU for updating the GIS map. Wastewater Supervisors and Administrative staff meet with GIS throughout the year on an ad hoc, project driven basis, and will be including GIS in quarterly coordination meetings with Engineering to maintain collaboration and continuous improvement of shared processes.

- City GIS maintains a dashboard of open map correction work orders for monitoring. Additionally, Wastewater (WW) staff can review progress of outstanding map corrections through Cityworks, and request escalation of high priority updates.

- ***Recommendations:*** No recommended modifications at this time.

Preventative Operations & Maintenance Activities (SSMP Section V Chapter 4.3)

- Level of Effectiveness: Below is a summary of the City's current Preventative Maintenance (PM) program:
  - Reactive maintenance: These maintenance activities are triggered by sewer complaints received by DOU. QAQC done by CCTV also identifies assets in need of additional maintenance and/or repair.
  - Preventative maintenance: The City engages in programs to complete routine preventative maintenance activities, which include jet cleaning, root control, FOG inspections, CCTV inspections, and pump station maintenance.
    - Currently the cleaning program frequencies range from 1 month to 60 months, depending on history of the asset and are continuously updated after each PM activity.
    - The City's CMMS has been configured to analyze cleaning and CCTV inspection results through unique algorithms which deliver recommendations to adjust the maintenance frequency as needed.
    - The Root Control Program consists of mechanical and chemical methods (often referred to as root foaming). Mechanical rodding is performed on pipes that have been identified as having a potential for root-related blockages, with their frequencies modified based on previous mechanical rodding results and historical knowledge. The City is continuously evaluating the effectiveness of root control measures.
    - FOG control is performed based on historical and CMMS data as part of PM activities.
    - CCTV is performed continuously as part of maintenance, condition assessment, and cleaning activities. CCTV is required within 30 days of a corrective maintenance for QAQC and frequency adjustment.
    - The City performs monthly inspections of pump stations. Routine maintenance procedures vary from station to station. The City is also in the process of developing pump station failure responses.

As demonstrated in **Table 3**, the City's O&M programs have shown to be effective in reducing the number of FOG, roots, and debris caused SSOs. The overall increase in the SSO volumes was largely due to three large SSOs over the audit period, two of which had prolonged periods of time between start of the SSO and notification to the City. The third large volume SSO was due to a pump failure, and corrective actions have been initiated to prevent a similar occurrence in the future. Overall, the City's preventative maintenance activities have been effective in maintaining the condition of the sanitary sewer system, which correlates to the reduction of frequency of O&M-related SSOs.

- ***Recommendations:***
  - Finalize the new SOPs that are currently being developed and include them in **Appendix B**, including CCTV SOP and First Responders SOP.
  - Provide a simplified PM flowchart of current O&M activities with frequencies (1 mo, 3 mo, 6 mo, 12 mo, 24 mo, and 60 mo). This could eliminate some of the text and statistics from the SSMP and help simplifying future updates.
  - Describe how manholes are visually inspected as part of the PM activities and are repaired if needed.
  - Modify the SSMP to mention criteria used to place an asset on a more frequent cleaning program as described in the Cleaning SOP and **Appendix B**.
  - Consider public outreach messaging to educate residents on the importance of quickly notifying the City via 311 if a potential SSO is observed.
  - As a result of System X reclassification to Combined (noted in Section 2, Agency Background/System Information), sump stations will need to be reviewed for potential recategorization.

Rehabilitation and Replacement Plan (SSMP Section V Chapter 4.4)

- Level of Effectiveness: The City regularly CCTV inspects pipelines using the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) coding standard. The O&M Division reviews the CCTV inspection reports and determines what type of work is required to address the defects found. This work may entail a re-inspection, a spot repair, or a capital improvement project (CIP).

  If it is determined that a CIP is warranted, a CIP work order is created and submitted to the Engineering & Water Resources Division of DOU (Engineering) for review. Engineering has a CIP process to prioritize assets for R&R program and is in the process of utilizing InfoAsset Planner to refine the process further.

  The City holds periodic meetings between O&M and Engineering staff to ensure everyone is aware of and understands the entire Rehabilitation and Replacement (R&R) plan and their role within it. It is recognized as a best practice that when there are staffing or process changes that impact the R&R plan, O&M and Engineering staff should meet more regularly to discuss changes, the potential impact of those changes, and how to ensure that the continuity of implementation is maintained.

  The SSMP lists the CIP Programming Guide as the baseline for analysis and prioritization process for potential CIPs. However, the CIP Prioritization System technical memo is also used for this prioritization. While these two documents have similarities, there are enough differences to warrant an update of the SSMP to reflect the actual methodology used in this process. Engineering has implemented an InfoAsset Planner Sewer Model that has the ability to use criteria, condition and CCTV data for analysis, risk assessment, and prioritization planning. . Engineering is in the process of integrating the existing CIP process into this model for improved rehabilitation planning.

The City's CCTV inspection software GraniteNet is integrated with their Cityworks CMMS through an Application Programming Interface (API). This allows the City to be more efficient in utilizing the CMMS for processes such as modifying assets' planned preventative maintenance or deciding if an asset should be elevated to a CIP.

The City's CIP Prioritization System does not currently incorporate a capacity-based parameter in its evaluation of CIPs, nor does there appear to be a methodology for capturing capacity-based parameters within the InfoAsset Planner Sewer Model. The City should consider a process for incorporating capacity considerations into the rehabilitation decision flow chart. Capacity analyses are intended to identify hydraulic deficiencies in the system that should have short and/or long-term alternative solutions. Capacity upgrades may need to be incorporated separately into the CIP, and the recommended construction method for any pipes that need rehab for condition and also upsizing for capacity would be modified outside of InfoAsset Planner.

Currently, the City conducts visual manhole inspections as a part of CCTV and preventative maintenance activities. The City has implemented a manhole inspection system called SPiDER, which is being used to generate NASSCO's Manhole Assessment Certification Program (MACP) defect coding and will increase and improve data available in GIS. The City also uses a GPS system in conjunction with SPiDER to geolocate manholes and update in GIS. The City is planning to use the system to inspect and geolocate all manholes. It is estimated to take approximately 15 to 20 years to complete the surveys of all manholes.

The City does not have a program in place to perform condition assessment of force mains in the system. The development and implementation of such a program is recommended to ensure the City remains in compliance with this SSMP requirement. The City has started this program by performing a data collection and initial assessment in which all force mains' age, pipe material, maintenance history, etc. is recorded. Further internal discussion and data validation/inventory is warranted to determine a path forward for procedures to allow for CCTV condition assessment of force mains.

- ***Recommendations:***
    - Update the SSMP to reflect the revised methodology used for CIP prioritization and include supporting documents in the SSMP (InfoAsset Planner Sewer Model Implementation Project Summary Report).
    - Utilize InfoAsset Planner to establish a periodic analysis of work orders with multiple condition assessment scores of 4 to determine what type of work is required to address the defects.
    - Develop method for addressing capacity considerations in the prioritization and development of CIPs, and document approach.
    - Update the SSMP to include the current process for visual manhole inspection.
    - Continue implementation of a manhole inspection program with NASSCO MACP standards.
    - Consider the development and implementation of a force main condition assessment program.

Training (SSMP Section V Chapter 4.5)

- Level of Effectiveness: The City requires its crews to receive annual maintenance training by internal staff. This particular training program is focused on best practices for the cleaning, inspection, operation, and maintenance of the City's mainline sewer pipes. The City also provides new employees a binder that includes onboarding and Job Hazard Analysis (JHA) trainings, new employees are supervised on a daily basis.

  Training on the operation of equipment used by the O&M Division is initially provided by the vendor or manufacturer of the equipment. Continual training afterwards is provided through on-the-job training and rotation among the different maintenance crews and equipment.

  The City Wastewater Section tracks training mostly through sign-in sheets. The Supervisors used to turn in these sheets to the City Typist Clerk, who then filed them away for record-keeping using a training management software program called TargetSolutions. During this Audit period the City transitioned to a new learning management system called Acumen, which has had challenges in tracking items outside of the training delivered through its platform. Supervisors are exploring tracking solutions to ensure all training is documented properly.

  The City Standard Specification also requires all contractor and subcontractors be experienced with sanitary sewer work and to fully comply with regulations and standards.
- ***Recommendations:***
  - Consider summarizing this section with a table that shows training topics and frequencies:
    - Training topics: PM SOPs, Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response, JHAs, First Responder, etc.
    - Frequencies: Quarterly, biannually, or annual; when onboarding; when new equipment is added.
  - Utilize the newly developed SOPs as a training tool for City staff. The SOPs should be developed so that they 1) provide a framework for the consistent delivery of required information, skills, and familiarity with equipment and 2) can be used to demonstrate competence of an individual in the particular subject.
  - Develop a training log sheet to track training topics through a year and develop a metric that can be used to evaluate performance of the training element. For instance, this can be measured by percent completed of required annual trainings or total hours of trainings combined based on a set goal.

Equipment and Critical Replacement Parts (SSMP Section V Chapter 4.6)

- Level of Effectiveness: Operations and Maintenance staff manage spare part inventory internally, replenishing parts as needed. The Electrical and Instrumentation section tracks critical spare parts on site at each location, including satellite stockrooms, through CMMS. Mechanical section also keeps a list of critical spare parts, though in paper format, not in CMMS. Now that Electrical and Instrumentation have inventoried all their parts in CMMS, Mechanical will soon follow this model. This will help to balance inventory needs across multiple locations, provide one centralized source for monitoring stock levels in real time, and minimizes the potential for error in paper tracking. Business Services Logistics handles order

placing upon request but does not manage the inventory directly due to the specialized nature of the parts and potentially long shelf time for parts that are needed on a very infrequent basis, though critical to have on hand when the need arises. Parts that are unavailable for purchase and need fabrication are produced based on the specifications of the parts they are replacing.

- ***Recommendations:***
  - Provide more details on how major maintenance equipment and critical parts are managed by Business Service Logistics Section and others. It would be beneficial to include a list of critical equipment (CCTV trucks, VacCons, etc.) in **Appendix B** of the SSMP.
  - Identify critical replacement parts for pump stations. Include a plan to either acquire spare parts in the replacement parts inventories or a timely means for fabricating or acquiring critical spare parts in the event of a failure.
  - Implement the Condition Assessment Program for pump stations once it has been finalized. Update the SSMP to reflect this implementation.
  - Continue implementation of CMMS tracking process for Mechanical section.
  - Create fabrication instructions for replacement parts that are not otherwise available.

5.5 Design and Performance Provisions

5.5.1 Compliance

Table 8 – Compliance with SSS WDR D.13.v – Design and Performance Provisions

SSMP Requirement	Compliance	Deficiencies
v(a) Sanitary sewer design and construction specifications	Yes	-
v(b) Procedures and standards for inspecting and testing new and R&R projects	Yes	-

5.5.2 Effectiveness of SSMP Elements and Recommended Modifications

Sanitary Sewer Design and Specifications (SSMP Section V Chapter 5.2)

- Level of Effectiveness: The City's Standard Specifications and the Design and Procedure Manual (DPM) are effective in ensuring that new or rehabilitated infrastructure is designed and constructed in an acceptable manner. Some of these documents are accessible to interested parties on the City of Sacramento's website, Department of Utilities page. The Standard Specifications and addendum were updated in 2020. The DPM was revised in 2018.

- ***Recommendations:***
  - Post all DPM sections on City of Sacramento's website, DOU page.

Sanitary Sewer Inspection and Testing Provisions (SSMP Section V Chapter 5.3)

- Level of Effectiveness: The City's Standard Specifications include procedures for the testing of new/rehabilitated assets and has been effective in ensuring that recently constructed assets perform as expected.

- ***Recommendations:*** No recommended modifications at this time.

5.6 Overflow Emergency Response Plan

5.6.1 Compliance

Table 9 – Compliance with SSS WDR D.13.vi - OERP

SSMP Requirement	Compliance	Deficiencies
vi(a) Proper notification procedures	Yes	-
vi(b) Program for appropriate SSO response	Yes	Continue development of pump station failure contingency standard procedures for each station, using the templates that were created for this purpose.
vi(c) Procedure for prompt notification to regulatory agencies	Yes	-
vi(d) Procedures for appropriate training of staff and contractors	Yes	-
vi(e) Procedures to address emergency operations (e.g., traffic, crowd control)	Yes	-
vi(f) Program to ensure containment of SSO to prevent discharge and minimize adverse impacts on the environment	Yes	-

5.6.2 Effectiveness of SSMP Elements and Recommended Modifications

Notification Procedures (SSMP Section V Chapter 6.3)

- Level of Effectiveness: In FY20 the average SSO response time (time between notification of SSO to operator arrival time) was higher than the previous audit period (6 minutes longer based on internal records, 8 minutes longer based on CIWQS reporting). Review of SSOs during that fiscal year shows six instances where it took over an hour from notification to arrival, which drove up the average. Of the six events, all but one were due to the incoming call being assigned by 311, the City's service request division, to the Water division for investigation first then reassigned to the Sewer section, or due to a delay in communication from 311 to the Sewer section. By FY21 these matters were corrected through communication and process improvements, with zero SSOs having a response time greater than 45 minutes.

  The City's Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response clearly outline the notification procedures for the various situations that may be encountered and lists the

contact information of all potentially applicable agencies and City staff, though currently outdated with employees listed who are no longer with the City of Sacramento.

- ***Recommendations:***
    - Update the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response and upload to the City's SSMP.

Response Program (SSMP Section V Chapter 6.4)

- Level of Effectiveness: The City's Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response effectively outlines the program that the City uses to appropriately respond to an SSO event. This plan was updated in 2014 and encapsulates the best practices of the City in responding to an SSO. Section II of the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response contains the procedures employed by the City. These procedures include an investigation and debriefing on the spill event after the spill has been appropriately responded to by City staff. This is effective in documenting the level of effectiveness of the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response to unique problems encountered during the response, and suggested improvements to the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response while the information from the spill event is still fresh in the responders' minds. The Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response has been effective in responding to SSOs appropriately.

  The City is currently in the process of developing emergency responses for sewer pump station failures and has completed five templates representative of the major categories/common characteristics for the inventory of pump stations. The next step would be to use these to develop specific bypass plans for each station. The goal of this is to ensure that pertinent information that is needed for an SSO emergency is available at each sewer pump station. Most of the required asset information is currently available, such as location, wet-well capacity, backup pumps, backup generators, but needs to complete remaining data collection and process/procedural descriptions.

- ***Recommendations:***
    - Complete the development of pump station failure contingency standard procedures. For any stations that lack back-up pumps and generators, the procedures should specify a protocol for prompt delivery of portable pumps or generators in the event of a station failure. The procedures should also identify where an SSO will occur if a station fails and where bypass intake and discharge should be set up (outstanding action from previous audits).

Regulatory Notification Procedure (SSMP Section V Chapter 6.5)

Level of Effectiveness: The SSMP contact list identifies the Wastewater Collection Superintendent as the legally responsible official (LRO) for certification of SSO reports submitted to the CIWQS database. One current Wastewater Supervisor is also designated as LRO, though not reflected in the contact list. Additionally, significant staffing changes within the Wastewater and Drainage division since the 2018/2019 SSMP update bring about the need to do a comprehensive update to the contact list.

- ***Recommendations:***
    - Update the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response contact list to align with the SSMP updates. Consider moving to an appendix in the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response for easier and more timely updates.

Staff and Contractors Training (SSMP Section V Chapter 6.6)

- Level of Effectiveness: Any new City employee will be trained on the contents of the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response prior to being placed in a position that may need to respond to a spill event. Current employees receive annual refresher training on the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response as well. All contractor personnel that may have to respond to a spill event, report to the City, and/or mitigate a spill will be trained on response and notification protocols to DOU. Overall, the implementation of the training program has been effective as indicated in recent SSO trends.

- ***Recommendations:*** No recommended modifications at this time.

Emergency Response Coordination (SSMP Section V Chapter 6.7)

- Level of Effectiveness: The City's Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response addresses emergency operations such as traffic and crowd control. The measures outlined in the SOP have proven effective for the situations that the City has encountered to date.

- ***Recommendations:*** No recommended modifications at this time.

Spill Mitigation and Containment Procedure (SSMP Section V Chapter 6.8)

- Level of Effectiveness: The City's Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response includes procedures for activities such as estimating spill volumes, containing, and mitigating spills, and a Water Quality Monitoring Plan (Attachment 1 of Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response). The plan has been effective in defining the steps to be taken to contain and prevent an SSO from discharging to waters of the United States and to minimize any adverse impact on the environment.

- ***Recommendations:*** No recommended modifications at this time.

5.7 FOG Control Program

5.7.1 Compliance

Table 10 – Compliance with SSS WDR D.13.vii – FOG Control Program

SSMP Requirement	Compliance	Deficiencies
vii(a) Public education plan	Yes	-
vii(b) FOG disposal plan	Yes	-
vii(c) Legal authority to prohibit SSOs and blockages caused by FOG discharges	Yes	-
vii(d) Grease removal devices, design standards, BMPs, maintenance, recordkeeping, and reporting requirements	Yes	-
vii(e) Authority to inspect and enforce FOG ordinance	Yes	-
vii(f) FOG Characterization Assessment and Associated Cleaning Schedule	Yes	-
vii(g) FOG Source Control Measures	Yes	-

The City has developed a FOG control program manual that includes guidance on FOG background, ordinances, FSE establishments, discharge requirements, grease removal devices (GRDs), disposal, outreach, inspection, and enforcement.

- ***Recommendations:***
  - Include the updated 2015 FOG program manual and corresponding appendices in the SSMP. Ensure consistency between the SSMP and the FOG program documents.

5.7.2 Effectiveness of SSMP Elements and Recommended Modifications

Public Education Plan (SSMP Section V Chapter 7.3)

- Level of Effectiveness: The City developed the "Sacramento Fat Free Drains" website (www.sacramentofatfreedrains.com) that provides restaurant owners and managers with useful information and documents that could benefit training programs within these restaurants. There are even multiple versions of videos in different languages to aid City inspectors in explaining the process and reason for their visit. This website is also an important part of the residential outreach program. In addition to the website, the City provides informational brochures that show proper FOG disposal techniques in City utility bills annually in the fall. Additional outreach efforts include (but are not limited to) FOG television ads, targeted display ads, video pre-roll and mobile ad messenger promoting FOG best management practices with the message "Pour it. Scrape it. Seal it. Trash it"

- ***Recommendations:*** No recommended modifications at this time.

FOG Disposal Plan (SSMP Section V Chapter 7.4)

- Level of Effectiveness: The City informs the public of multiple FOG disposal options and their respective schedules through the public outreach efforts previously discussed. Examples of these options include landfills for small quantities of grease, Household Hazardous Waste Facilities for larger quantities of grease, and commercial grease hauling companies. Information on disposal can also be found on the "Sacramento Fat Free Drains" website. The City's FOG disposal plan appears effective as evidenced by the decreasing trend in FOG-related SSOs.

- ***Recommendations:*** No recommended modifications at this time.

Legal Authority to Prevent SSOs/Blockages Caused by FOG Discharges (SSMP Section V Chapter 7.5)

- Level of Effectiveness: City Municipal Code 13.08.040 lists the various substances that are prohibited from being discharged to the sewer system. City Municipal Code 13.08.090 requires that all Food Service Establishments (FSEs) comply with best management practices (BMPs) that the City Council establishes from time to time by resolution. City Municipal Code 13.08.100 gives the City the legal authority to require businesses other than FSEs to install interceptors of a type and capacity approved by the City. These City Municipal Codes appear effective in organizing the type of equipment required to reduce FOG discharges from FSEs, as well as indicating the authority of the City to prohibit SSOs and blockages due to FOG.

- ***Recommendations:*** No recommended modifications at this time.

Grease Removal Device Requirements (SSMP Section V Chapter 7.6)

- Level of Effectiveness: Requirements for the installation of GRDs, design standards for the devices, maintenance requirements, BMP requirements, record keeping requirements, and reporting requirements are covered in Title 15 of the City Municipal Code. As it pertains to the FOG program, Title 15 adopts and incorporates into the City Municipal Code the 2013 California Plumbing Code (CPC). The City's Community Development Department, Building Division, is responsible for implementing these requirements and standards. The City's efforts to disseminate information regarding these requirements appear effective as can be seen by the continual decrease in FOG-related SSOs in recent years.

  The City updates its FSE database by either routine field inspections or via the County's FSE inspection program. GIS has developed a process to pull FSE inventory updates directly from the County. Additionally, one of the recently adopted performance measures requires annual confirmation that this inventory update has been performed. The City aims to routinely inspect all permits on a 1 to 2-year cycle, depending on the food service equipment on-site.

- ***Recommendations:*** No recommendations at this time.

Inspection and Enforcement Authority – FOG Producers (SSMP Section V Chapter 7.7)

- Level of Effectiveness: City Municipal Code 13.08.290 provides City staff right of entry to inspect FSEs and the proper authority to enforce provisions of pertinent sewer-related ordinances. The City DOU allocated dedicated FOG inspection staff to implement this part of the FOG program. This allocation of staff appears

sufficient to inspect and enforce FOG ordinances. The FOG program has a goal to inspect every FSE at least once a year or every two years, depending on the cooking/food service/grease producing equipment used on-site, with 678 FSEs to the sanitary sewer system. The appropriate City Municipal Codes and dedicated FOG inspection staff appear effective in inspecting FSEs and enforcing FOG ordinances if necessary.

- ***Recommendations:*** No recommended modifications at this time.

FOG Characterization Assessment and Hot Spot Cleaning Schedule (SSMP Section V Chapter 7.8)

- Level of Effectiveness: The City uses service requests, historical knowledge, experience, CCTV inspection, and CMMS inspection data to prioritize its preventative maintenance activities. In regard to FOG-related maintenance, O&M staff analyzes the previously mentioned data along with weekly cleaning findings to adjust scheduled maintenance cleaning frequencies. In principle, finding medium and/or heavy amounts of grease will trigger that pipe asset to be placed on a higher frequency. In contrast, clear findings will trigger that pipe asset to be placed on a lower frequency. The cleaning maintenance schedules for sections of the sanitary sewer system subject to FOG blockages appears to be effective, as evidenced by the significant decrease in FOG-related SSOs in recent years.

- ***Recommendations:*** No recommended modifications at this time.

FOG Source Control Measures (SSMP Section V Chapter 7.9)

- Level of Effectiveness: The City's FOG source control measures are comprised of the various elements of the FOG program as a whole, which include public/FSE educational outreach efforts, FSE inspections and enforcement actions, and disposal options. City Analysts review FOG performance measures for percent of inspections completed, notices of correction or violation, hot spots (1-6 month cleaning frequency pipes due to all reasons, including grease) on a regular basis, alerting Wastewater Supervisors and Superintendent of any concerns or large changes presented in the data. Additionally, they perform a QAQC of FSE inventory, to ensure GIS has made the annual update.

- ***Recommendations:*** No recommendation modifications at this time.

5.8 System Evaluation and Capacity Assurance Plan (SECAP)

5.8.1 Compliance

Table 11 – Compliance with SSS WDR D.13.viii - SECAP

SSMP Requirement		Compliance	Deficiencies
viii(a)	Evaluate hydraulic deficiencies	Yes	-
viii(b)	Establish design criteria	Yes	-
viii(c)	Establish short- and long-term CIP	Yes	-
viii(d)	Develop schedule of completion dates for CIP	Yes	-

5.8.2 Effectiveness of SSMP Elements and Recommended Modifications

Hydraulic Capacity Evaluation (SSMP Section V Chapter 8.3)

- Level of Effectiveness: The City performed a capacity evaluation for each of the 54 sanitary sewer system basins using a spreadsheet analysis. This analysis differentiated between existing and future land use conditions and utilized a conservative static analysis.

  The existing conditions analysis indicated that 15 basins have potential capacity deficiencies. Each of the studies showed surcharging above the crown under wet weather conditions, with no SSO potential. The City has implemented flow monitoring in several of the basins with potential hydraulic capacity and will continue the analysis to identify inflow and infiltration (I/I) sources and for developing the hydraulic modeling.

  Under future conditions analysis, 12 of these same 15 basins exhibited potential capacity deficiencies after taking into account future infill and redevelopment. In addition, two additional (not part of the original 15) basins were found to have potential future capacity deficiencies. For all of these basins, the City is developing hydraulic models by internal staff and through outside consultants to confirm potential future deficiencies and identify required upgrades. The City has performed flow monitoring analysis in several of the identified basins to ensure accurate dry and wet weather flow calibration of the models. These efforts are continued on an as-needed basis for hydraulic modeling and I/I investigation.

  The City's efforts in evaluating the sanitary sewer system for hydraulic deficiencies are ongoing and appear to be effective in determining basins with a potential for capacity issues.

- ***Recommendations:***
  - Conduct further flow monitoring if needed to ensure adequate model calibration.
  - Continue with any needed static hydraulic evaluation for areas not yet modeled.
  - Continue the process of developing hydraulic models for all basins where the future conditions spreadsheet and/or flow monitoring analysis indicate capacity deficiencies. Utilize hydraulic models to identify/confirm future hydraulic deficiencies and plan, design and construct improvements as needed to eliminate them.

Design Criteria (SSMP Section V Chapter 8.4)

- Level of Effectiveness: Table 8.2 shows the City's hydraulic capacity design/performance criteria for the existing sewer collection system, including land use, base flow, Average Dry Weather Flow (ADWF), peaking factor, design storm for peak wet weather flows, I/I, etc. in the SSMP. Section 9 of the City's design standard lists maximum depth to diameter (d/D) ratio for sanitary sewer system to be 0.7 for pipes smaller than 12 inches and 1 for larger pipes. The City established a 10-year 6-hour peak wet weather design storm, which appears to be an appropriate design storm to effectively account for the impact of wet weather events on the sanitary sewer system for current and future system capital improvement planning.

- ***Recommendations:***
  - Reference d/D maximum limits listed in DPM in Table 8.2 of the SSMP.

Capacity Enhancement Measures (SSMP Section V Chapter 8.5)

- Level of Effectiveness: In 2021 the City completed a water retrofit program that will have all customers metered by the CA state mandated deadline of 2025. Various CIP alternatives are under study and prioritization by DOU. These CIPs are funded using rate charges, developer funding, and impact or connection fees. Capacity-related projects Fare funded by developers or by impact fees. Rate payer charges may be used for R&R programs.

- ***Recommendations:***
  - Update the SSMP to reflect completion of the water retrofit program.
  - Modify the SSMP to reference that the latest ongoing CIP projects can be found in the Approved Capital Improvement Program budget documents, which are posted on the City's Budget, Policy & Strategic Planning Division page. Update Appendix D flowchart.
  - Describe procedure(s) used to create and/or modify the list of potential CIPs to address capacity-related deficiencies in the sanitary sewer system.

Capital Improvement Program Schedule (SSMP Section V Chapter 8.6)

- Level of Effectiveness: Table 8.3 in the City's SSMP shows a schedule for completion of all portions of the Capital Improvement Program. This schedule appears effective in identifying the timing with which certain portions of the Capital Improvement Program are to be completed.

- ***Recommendations:***
  - Update Table 8.3 of the SSMP or reference where outstanding CIPs can be found.

5.9 Monitoring, Measurement, and Program Modifications

5.9.1 Compliance

Table 12 – Compliance with SSS WDR D.13.ix – MMM

SSMP Requirement		Compliance	Deficiencies
ix(a)	Maintain information to establish and prioritize SSMP activities	Yes	-
ix(b)	Measure effectiveness of SSMP elements	Yes	-
ix(c)	Assess preventative maintenance program	Yes	-
ix(d)	Update elements based on evaluations	Yes	-
ix(e)	Identify and illustrate SSO trends	Yes	-

5.9.2 Effectiveness of SSMP Elements and Recommended Modifications

Relevant Information to Establish and Prioritize SSMP Activities (SSMP Section V Chapter 9.2)

- Level of Effectiveness: The City keeps records of information relative to its SSMP programs including:
  - Documentation of all sewer cleaning activities by year
  - Documentation of pump stations and maintenance by year
  - CCTV inspection historical database
  - Equipment spare parts and inventory
  - FSE inspection records
  - SSO records posted to CIWQS
  - Capital Improvement Plan updates and record drawings

- ***Recommendations:*** No recommended modifications at this time.

Measure Effectiveness of SSMP Elements (SSMP Section V Chapter 9.3)

- Level of Effectiveness: Since the last audit period, City Analysts and Supervisors have worked together to develop meaningful performance metrics aligned with SSMP elements to track on a regular basis, with defined goals/target ranges.

- ***Recommendations:***
  - Continue to evaluate performance metrics and goals/target ranges to ensure alignment with SSMP elements and effectiveness in providing meaningful insights into potential improvements to the preventative maintenance program. Add additional metrics to align with new activities, or activities that are deemed to need greater emphasis/monitoring.

Assess Preventative Maintenance Program (SSMP Section V Chapter 9.4)

- Level of Effectiveness: The City's current approach to documenting PM activities is effective because it allows the City to monitor completion of planned activities.

- ***Recommendations:*** No recommended modifications at this time.

Update SSMP Elements Based on Performance (SSMP Section V Chapter 9.5)

- Level of Effectiveness: The performance of various SSMP elements are overseen by individual City staff. The City performs a comprehensive review and update of the SSMP at least every five years. Based on biennial audits and the annual performance evaluation, the City may determine an increased frequency is required for reviewing and updating the SSMP. A change log that tracks all revisions and updates to the SSMP will facilitate the ability of the City to update the SSMP at a higher frequency, if needed, and encourages the use of the SSMP as a living document.

- ***Recommendations:***

- Provide a change log as an appendix that documents changes made to the SSMP per element with corresponding date and brief explanation of the update since the last recertification.

SSO Trends – Frequency, Location and Volume (SSMP Section V Chapter 9.6)

- Level of Effectiveness: The City tracks a number of key pieces of information to identify trends in SSO data. The SSMP contains multiple figures and tables that illustrate these trends through information such as SSO frequency, SSO causes, and SSO volumes. These SSO trends appear effective in communicating the highest priorities for attempting to minimize the number and severity of SSOs.

- ***Recommendations:***
  - Add units to the vertical axis in Figures 9.1 and 9.2.
  - Consider replacing Table 9.1 with a table listing volumes per 100 miles per category, volume of spill reached surface water (SW) per 100 miles of sewer, or volume per 100 miles per cause.
  - Consider clarifying in the SSMP the definition of total sewer miles in these calculations. This could be clarified in a Glossary of terms.
  - Update Appendix E of the SSMP, detailed SSO data may be included in the audits and out of the SSMP, modify text accordingly.

5.10 SSMP Program Audits

5.10.1 Compliance

Table 16 – Compliance with SSS WDR D.13.x – SSMP Program Audits

SSMP Requirement	Compliance	Deficiencies
x Conduct periodic audits	Yes	-

5.10.2 Effectiveness of SSMP Elements and Recommended Modifications

Periodic SSMP Internal Audits (SSMP Section V Chapter 10.2)

- Level of Effectiveness: The City conducts SSMP audits to maintain an effective SSMP to properly manage, operate, and maintain all parts of the sanitary sewer system. The first internal biennial SSMP Audit was conducted in FY 11/12 and the second internal biennial SSMP Audit was conducted in FY 12/13. This SSMP Audit for FY 19/20-20/21 was conducted by City of Sacramento staff. A copy is available on the City's website, DOU page.

- ***Recommendations:***
  - Schedule the next Internal SSMP Audit for 2023. Identify the appropriate level of internal or external resources to conduct the Audit and describe the audit procedure and schedule in the SSMP.
  - Post this Audit on City of Sacramento's website, DOU page.

- Update the SSMP at minimum every two years (preferably every year if significant changes are warranted). Re-certify SSMP updates every five years through City Council. Due date for next recertification will be October 15, 2024.
- Stay up to date on upcoming SWRCB WDR revisions and requirements through the State Water Board email system: (https://www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html)

5.11 Communication Program

5.11.1 Compliance

Table 17 – Compliance with SSS WDR D.13.xi – Communications Program

SSMP Requirement	Compliance	Deficiencies
xi(a) Communicate on a regular basis with the public and tributary/satellite systems regarding SSMP	Yes	-

5.11.2 Effectiveness of SSMP Elements and Recommended Modifications

Internal Communication – Staff and Board of Directors (SSMP Section V Chapter 11.2)

- Level of Effectiveness: The City communicates information about the SSMP and its related programs to the public on a regular basis using print media, social media, public hearings, and the City's website, DOU page. This website contains the most up-to-date version of the SSMP, with the previous SSMP Audit attached. There is also contact information provided if the public would like to make comments/suggestions regarding the SSMP and billing inserts are distributed by the City to inform its customers of upcoming issues related to the SSMP. The City also continually participates in California Alliance for Sewer System Excellence (CASSE).

- ***Recommendations:***
  - Update contact information on City's website, DOU page to reflect any staffing changes since last audit.

SECTION 6 Audit Summary

Table 18 lists a summary of all recommendations for this Audit and the responsible party for implementation.

Table 18 – Summary of Recommendations

SSMP Chapter	Recommendation	Suggested Timeline
2.2	Consider process and workflow improvements to ensure that Cityworks SSO inspection data is consistent with all information entered into CIWQs. Clearly define by who, when, and how data is entered into each required record keeping system.	2023*

SSMP Chapter	Recommendation	Suggested Timeline
2.2	Update SSMP Contact List to show the Wastewater and Drainage Division Manager as LRO (once hired), and organization chart to reflect and changes since last SSMP audit.	2022*
3.2	Review and update ordinance, including recommendations from FOG consultant from update to FOG manual	2024*
4.3	Finalize the new SOPs that are currently being developed and include them in Appendix B, including CCTV SOP and First Responders SOP.	2022
4.3	Provide a simplified PM flowchart of current O&M activities with frequencies (1 mo, 3 mo, 6 mo, 12 mo, 24 mo, and 60 mo), this could eliminate some of the text and statistics from the SSMP and help simplifying future updates.	2023
4.3	Describe how manholes are visually inspected as part of the PM activities and are repaired if needed.	2022
4.3	Modify the SSMP to mention criteria used to place an asset in a higher frequency cleaning program as described in the Cleaning SOP and Appendix B.	2022
4.3	Consider public outreach messaging to educate residents on the importance of quickly notifying the City via 311 if a potential SSO is observed.	2024*
4.3	As a result of System X reclassification to Combined (noted in Section 2, Agency Background/System Information), sump stations will need to be reviewed for potential recategorization.	2023*
4.4	Update the SSMP to reflect the actual methodology used for CIP prioritization and include supporting documents in the SSMP (InfoAsset Planner Sewer Model Implementation Project Summary Report).	2022
4.4	Utilize InfoAsset Planner to establish a periodic analysis of work orders with multiple condition assessment scores of 4 to determine what type of work is required to address the defects.	Ongoing*
4.4	Develop method for addressing capacity considerations in the prioritization and development of CIPs, and document approach.	2025
4.4	Update the SSMP to include current process for visual manhole inspection.	2022
4.4	Continue implementation of a manhole inspection program with NASSCO MACP standards.	2022
4.4	Consider the development and implementation of a force main condition assessment program.	2025
4.5	Consider summarizing this section with a table that shows training topics and frequencies: • Training topics: PM SOPs, Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response, JHAs, First Responder, etc. • Quarterly, biannually, or annual; when onboarding; when new equipment is added	2023*
4.5	Utilize the newly developed SOPs as a training tool for City staff. The SOPs should be developed so that they 1) provide a framework for the consistent delivery of required information, skills, and familiarity with equipment and 2) can be used to demonstrate competence of an individual in the particular subject.	2022
4.5	Develop a training log sheet to track training topics through a year and develop a metric that can be used to evaluate performance of the training element. For instance, this can be measured by % completed of required annual trainings or total hours of trainings combined based on a set goal.	2022

SSMP Chapter	Recommendation	Suggested Timeline
4.6	Provide more details on how major maintenance equipment and critical parts are managed by Business Service Logistics Section and others. It would be beneficial to include a list of critical equipment in Appendix B of the SSMP.	2022
4.6	Identify critical replacement parts for pump stations. Include a plan to either acquire spare parts in the replacement parts inventories or a timely means for fabricating or acquiring critical spare parts in the event of a failure (outstanding action from previous audits).	2025
4.6	Implement the Condition Assessment Program for pump stations once it has been finalized. Update the SSMP to reflect this implementation.	2022
4.6	Continue implementation of CMMS tracking process for Mechanical section.	2025
4.6	Create instructions for creation of replacement parts in need of fabrication.	2025
5.2	Post all DPM sections on City of Sacramento's website, DOU page.	2023*
6.3	Update the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response and upload to the City's SSMP.	2022*
6.4	Complete the development of pump station failure contingency standard procedures. For any stations that lack back-up pumps and generators, the procedures should specify a protocol for prompt delivery of portable pumps or generators in the event of a station failure. The procedures should also identify where an SSO will occur if a station fails and where bypass intake and discharge should be set up (outstanding action from previous audits).	2025*
6.5	Update the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response contact list to align with the SSMP updates. Consider moving to an appendix in the Standard Operating Procedures for Sewer Overflow/Outflow Emergency Response for easier and more timely updates.	2022*
7.2	Include the updated 2015 FOG program manual and corresponding appendices in the SSMP and modify the section. Ensure consistency between the SSMP and the FOG program documents.	2024
8.3	Conduct further flow monitoring if needed to ensure adequate model calibration.	Ongoing
8.3	Continue with any needed static hydraulic evaluation to confirm and update spreadsheet results.	Ongoing*
8.3	Continue the process of developing hydraulic models for all basins where the future conditions spreadsheet and/or flow monitoring analysis indicate capacity deficiencies. Utilize hydraulic models to identify/confirm future hydraulic deficiencies and plan, design, and construct improvements as needed to eliminate them.	2024
8.4	Include depth-to-diameter ratio (d/D) maximum limits listed in the DPM in the SSMP design criteria table.	2024
8.5	Update the SSMP to reflect completion of the water retrofit program.	2022*
8.5	Modify the SSMP to reference that the latest ongoing CIP projects can be found in the Approved Capital Improvement Program budget documents, which are posted on the City's Budget, Policy & Strategic Planning Division page. Update Appendix D flowchart.	2024*
8.5	Describe procedure(s) used to create and/or modify the list of potential CIPs to address capacity-related deficiencies in the sanitary sewer system.	2024
8.6	Update Table 8.3 of the SSMP or reference where outstanding CIPs can be found.	2024

SSMP Chapter	Recommendation	Suggested Timeline
9.3	Continue to evaluate performance metrics and goals/target ranges to ensure alignment with SSMP elements and effectiveness in providing meaningful insights into potential improvements to the preventative maintenance program. Add additional metrics to align with new activities, or activities that are deemed to need greater emphasis/monitoring.	Ongoing*
9.5	Provide a change log as an appendix that documents changes made to the SSMP per element with corresponding date and brief explanation of the update since the last recertification.	2024
9.6	Add units to the vertical axis in Figures 9.1 and 9.2.	2022
9.6	Make sure the fiscal year period in these analyses is consistent with City's internal data.	Ongoing
9.6	Consider replacing Table 9.1 with a table listing volumes per 100 miles per category, volume of spill reached SW per 100 miles of sewer, or volume per 100 miles per cause.	2024
9.6	Consider clarifying in the SSMP the definition of total sewer miles in these calculations. This could be clarified in a Glossary of terms.	2024
9.6	Update Appendix E of the SSMP, detailed SSO data may be included in the audits and out of the SSMP, modify text accordingly.	2024
10.2	Schedule the next Internal SSMP Audit for 2023. Identify the appropriate level of internal or external resources to conduct the Audit and describe the audit procedure and schedule in the SSMP.	2023
10.2	Post this Audit on the City of Sacramento's website, Department of Utilities page.	2022
10.2	Update the SSMP at minimum every two years (every year if significant changes are warranted). Re-certify SSMP updates every 5-years through City Council. Due date for next recertification will be October 15, 2024.	Ongoing
10.2	Stay up to date on upcoming SWRCB WDR revisions and requirements through the State Water Board email system: (https://www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html)	Ongoing
11.2	Update contact information on City DOU website to reflect any staffing changes since last audit.	2022*

*Newly added or modified recommendation

SECTION 7 References

Booth, J., & Molinar, A. (2021, November 19). New figures show Sacramento maintains its coveted 'Most Diverse City' title. Sacramento, CA, United States of America.

SECTION 8 Appendices

8.1 SSO Summary & Data Comparison

FY 19/20 SSO Data Comparison

				Category		Spill Volume (gal)		Recovered Volume (gal)		SSO Duration - Start > End (hh:mm)		Response Time - Notification > Arrival (hh:mm)		Cause	
	Event ID	*Date*	*Address*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*
	865921	3/31/2020	2820 17th Ave. Sacramento, Ca.	Category 3	Category 3	247	247	247	247	25:10	25:10	1:04	1:04	Debris	Debris
	865920	3/16/2021	7432 Amherst Street Sacramento, Ca.	Category 3	Category 3	65	65	65	65	:40	:40	:30	:30	Roots	Roots
	861456	9/5/2019	5352 Karbet Way	Category 3	Category 3	131	131	131	131	:45	:45	:21	:21	Roots	Roots
	866158	4/14/2020	7522 Flores Way Sacramento, Ca.	Category 3	Category 3	605	605	605	605	2:01	2:01	:17	:17	FOG	FOG
	862961	11/14/2019	781 Woodlake Dr	Category 3	Category 3	61	61	61	61	2:50	2:50	2:22	2:22	Roots	Roots
	862542	10/27/2019	3520 MAHOGANY ST	Category 3	Category 3	9	9	0	0	1:47	1:47	:59	1:00	Roots	Roots
	861700	9/25/2019	1195 FLORIN RD	Category 3	Category 3	64	64	64	64	:19	:19	:05	:05	Roots	Roots
	863608	11/29/2019	6180 Colgate Ct	Category 3	Category 3	4	4	4	4	1:35	1:35	1:16	1:16	Roots	Roots
	865070	2/14/2020	2020 QUINCY AVE	Category 3	Category 3	298	298	298	298	2:55	2:55	:42	:42	Roots	Roots
	864625	1/16/2020	2400 34th Ave	Category 3	Category 3	56	56	56	56	27:31	27:31	:10	:10	Roots	Roots
	863609	11/24/2019	4401 SOUTH LAND PARK DR	Category 3	Category 3	44	43	42	41	1:50	1:50	:53	:53	Roots	Roots
	865924	3/26/2020	7025 Catlen Way Sacramento,Ca.	Category 3	Category 3	17	17	17	17	:54	:54	:34	:34	FOG	FOG
	863610	12/9/2019	7536 EDDYLEE WAY	Category 3	Category 3	52	52	52	52	1:11	1:11	1:05	1:05	FOG	FOG
	863925	12/29/2019	601 J ST	Category 1	Category 1	20900	20900	8300	8300	6:58	6:58	:30	:22	Debris	Debris
	865068	2/24/2020	4511 CRESTWOOD WAY	Category 3	Category 3	31	31	31	31	2:48	:56	:15	:07	Roots	Roots
	866155	4/11/2020	6811 Demaret Dr. Sacramento, Ca.	Category 3	Category 3	655	655	655	655	2:08	2:08	1:48	1:48	Roots	Roots
	862586	10/26/2019	7424 Amherst Ave	Category 3	Category 3	59	59	59	59	2:49	2:49	1:15	1:15	Roots	Roots
Totals	17					23298	23297	10687	10686						
Recovery %								45.87%	45.87%						
Averages										4:56	4:50	:50	:49		

Note: Blue shading indicates discrepancy between CIWQs and City's internal SSO data.

FY 20/21 SSO Data Comparison

			Category		Spill Volume (gal)		Recovered Volume (gal)		SSO Duration - Start > End (hh:mm)		Response Time - Notification > Arrival (hh:mm)		Cause	
Event ID	*Date*	*Address*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*	*CIWQS*	*City*
868233	7/23/2020	1217 Ridgeway Dr. Sacramento, Ca.	Category 3	Category 3	18	18	18	18	:39	:40	:15	:15	Other - concrete chunk	Other
868313	8/1/2020	5002 South Land Park Dr. Sacramento, Ca.	Category 2	Category 2	33517	33517	33517	33517	13:21	13:21	:31	:31	Roots	Roots
868551	8/18/2020	7341 Amherst St. Sacramento, Ca.	Category 3	Category 3	18	18	0	0	1:29	1:29	:11	:11	Roots	Roots
869941	10/24/2020	7540 Eddylee Way Sacramento, Ca.	Category 2	Category 3	1102	418	1102	418	29:21	29:21	:39	:39	Roots	Roots
871435	1/18/2021	2432 40th Ave. Sacramento Ca.	Category 2	Category 2	1842	1842	1842	1842	1:09	1:09	:35	:35	FOG	FOG
871644	1/8/2021	1831 FERRAN AVE. SACRAMENTO, CA.	Category 3	Category 3	303	252	303	252	:34	:34	:14	:14	Roots	Roots
871645	1/10/2021	2095 Oxford Street Sacramento, Ca.	Category 3	Category 3	194	194	194	194	1:35	1:35	:44	:33	Roots	Roots
872187	2/5/2021	2951 Howe Ave. Sacramento, Ca.	Category 3	Category 3	203	112	203	112	19:13	19:13	:35	:35	Roots	Roots
872739	2/26/2021	2120 Forrest St. Sacramento, Ca.	Category 2	Category 3	1475	364	1475	364	3:00	3:00	:32	:32	Roots	Roots
872833	3/8/2021	53 Dean Rd. Sacramento, Ca.	Category 2	Category 3	2025	192	2025	192	2:34	2:34	:31	:31	Other - mop head, object in main	Other
872942	3/15/2021	2209 John Still Dr, Sacramento, Ca.	Category 3	Category 3	60	60	60	60	1:15	1:15	:45	:45	Roots	Roots
873007	3/17/2021	3238 Deforest Way Sacramento, Ca.	Category 1	Category 1	24900	24900	0	0	2:46	2:46	:35	:35	FOG	FOG
Totals	12				65657	61887	40739	36969						
Recovery %							62.05%	59.74%						
Averages									6:25	6:24	:30	:29		

Note: Blue shading indicates discrepancy between CIWQs and City's internal SSO data.

8.2 Key Performance Indicators

SSMP Performance Measures Newly Adopted Starting in FY22

Metric	Goal/Target Range	Review Frequency
CLEANING Number of completed miles of mains scheduled for cleaning per year	18-22 miles per month = 216-264 per year	Monthly
CCTV Number of completed miles of main scheduled for CCTV per year	4.5-5.5 miles per month = 54-66 miles per year	Monthly
FSE INVENTORY Was an annual FSE inventory refresh performed by GIS?	Yes	Annual
FSE INSPECTIONS Are all FSEs on a cycled Work Order (WO)? How many inspections are being performed?	100% should be on cycled WOs and receive annual or bi-annual inspection based on equipment used on site	Quarterly
FSE NOC/NOV Notice of Corrections/Notice of Violations	100% of violations resolved	Annual
HOT SPOTS 1-6 month frequency mains	Less than 10% of mains with 1-6 month cleaning frequency. Alert level when this measure exceeds 7%.	Quarterly
REPAIRS Percent of Level 5 defects addressed within 6 months of CCTV date	100%	Monthly

SSO Monthly Certification Meeting Performance Measures/Trending Analysis

1. Total number of SSOs/SSO Rate per 100 miles
2. Number of SSOs by cause (roots, debris, pipe failure, capacity)
3. Average response time to SSO
4. Total volume of SSO events/Total volume of SSO events per 100 miles of pipe
5. Percent of total SSO volume recovered
6. Percent of SSO volume reaching a surface water