

FINAL WDR/SSMP Audit Report

Orange County Sanitation District WDR/SSMP Audit

Subject: 2015-2016 WDR/SSMP Audit

Prepared for: Dindo Carrillo, OCSD

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Date: May 19, 2017

Purpose

The purpose of this document is to report the results of the Waste Discharge Requirements (WDR) Audit conducted for the Orange County Sanitation District (OCSD/District) covering Calendar Years (CY) 2015 and CY 2016. This report was prepared pursuant to the requirements included in the State Water Resources Control Board Order No. 2006-0003 – Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WDR). The audit requirements are:

“As part of the Sewer System Management Plan (SSMP), the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee’s compliance with the SSMP requirements identified in this subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them.”

This audit serves as the District’s 2017 SSMP audit. The District is in compliance with the SSMP Program Audit element.

Background

The District is a regional sewer agency formed to address the need for sewage collection, treatment, and disposal for 20 cities and four special districts in Orange County. The District is responsible for operation and maintenance of a sanitary sewer system that includes 369 miles of sewer mains and 15 outlying lift stations¹. In August 2016, the District successfully transferred approximately 170 miles of local sewers serving parts of Tustin and unincorporated areas north of Tustin to the East Orange County Water District, allowing the District to focus on regional wastewater collection, treatment, and recycling. The District is not responsible for maintenance of sewer laterals. The District Board last adopted an updated version of the SSMP on March 28,

¹ Source: State Water Resources Control Board, California Integrated Water Quality System, Sanitary Sewer Overflow database. Data downloaded on March 31, 2017.

2012. The District's SSMP was last revised on January 18, 2017 and did not include significant updates.

WDR/SSMP Audit

This audit reviews the period between January 1, 2015 and December 31, 2016 and is the fourth WDR Audit performed to meet WDR requirements for completion of an audit a minimum of once every two years. The previous audit was completed on July 31, 2015. This audit assesses the current state of WDR compliance with the provisions included in the WDR including Provision D.13, identifies any deficiencies found in the SSMP, and recommends corrective actions. In addition, the audit provides an evaluation of SSMP effectiveness. The District intends to use the audit results to maintain SSMP compliance and performance in reducing sewer overflows.

HDR conducted the audit on behalf of the District through a series of meetings with District staff involved with implementation of activities required by provisions included in Provision D.13 of the WDR. The HDR Audit Team members and District staff supporting the audit interviews and audit process are identified in **Table 1**.

Table 1: WDR Audit Team Members

Team Member	Organization	Role
Dindo Carrillo	OCSD	WDR Audit Project Manager & Subject Matter Expert
Michael Flores	HDR	Lead Auditor
Jennifer Duffy	HDR	Technical Expert, System Evaluation and Capacity Assurance Plan

SSMP audit interviews were performed over a three-day period starting on March 13, 2017 and concluding on March 16, 2017. The order of the audit interviews, WDR provision audited, and District staff interviewed is documented in **Table 2**:

Table 2: Audit Meeting Participants

Date	WDR Provision Section	Topics	Interviewees
3/13/17	D.13 (vi)	Overflow Emergency Response Plan Reporting	Dindo Carrillo
3/13/17	D.13 (vii)	FOG Control Program	Merrill Seiler
3/13/17	D.13 (i) D.13 (ii) D.13 (iii)	Goal Organization Legal Authority	Jim Colston Ron Coss Lisa Frigo
3/13/17	D.13 (viii)	System Evaluation and Capacity Assurance Plan	Eros Yong Wendy Smith
3/13/17	D.13 (x)	Monitoring, Measurement, and Program Modifications SSMP Program Audit	Ron Coss Lisa Frigo Michele Farmer
3/13/07	D.13 (xi)	Communication Program	Jennifer Cabral
3/14/17	D.13 (iv)	O&M Program - Information and Data Management, Decision-Making – Small Diameter Contractor Cleaning and CCTV	Mark Esquer Andrew Brown
3/14/17	D.13 (iv)	O&M Program – Information and Data Management – Large Diameter Inspection, Assessment, and Decision-Making	Mark Esquer Andrew Brown Peter Cheffs David Andrade Erik Stratmoen
3/14/17	D.13 (iv)	O&M Program – Information and Data Management – Pump Station O&M, RCM, Inspection, Condition Assessment, and R&R Decision-Making	Santiago Escobar Adam Newsom
3/14/17	D.13 (iv)	O&M Program – Information and Data Management – In-House Cleaning PM for Large and Small Diameter Pipes	Mike Bolster
3/14/17	D.13 (iv)	O&M Program – Funding and Adequate Resources and Accounting Practices	Mark Esquer Mike White
3/16/17	D.13 (vi)	Overflow Emergency Response Plan – Response, Containment, Clean-up	James Cabral John Gonzalez Erik Stratmoen
3/16/17	D.13 (iv)	O&M Program – Review of Cleaning and Inspection CMMS Records	James Cabral John Gonzalez Mike Bolster
3/16/17	D.13 (iv)	O&M Program – Review of Contractor Cleaning Crew CMMS Records and Documentation	Mark Esquer Andrew Brown
3/16/17	D.13 (iv)	O&M Program – Review of Pump Station Crew CMMS Records and Documentation	James Cabral Mike Bolster

Evaluation of SSMP Effectiveness

Overall, based on the analysis of sanitary sewer overflow (SSO) trends over the last two years and the results of the WDR/SSMP audit, the overall program for managing, operating, and maintaining the sewer system has continued to improve and operate at a high level of performance.

Sewer Overflow Performance

An important measure of the effectiveness of the SSMP is sewer overflow performance. This section reviews the District's recent sewer overflow performance through analysis of the sewer overflow data reported to the State Water Resource Control Board (SWRCB) California Integrated Water Quality System (CIWQS) SSO database.

Number of Sewer Overflow Events Per 100 Miles

The District has maintained a sewer overflow rate averaging less than 1.15 SSOs per 100 miles of sewer pipelines per year consistently over the past two years as indicated by the 12-month rolling average SSO rate over that period. Over the last five years, the District has consistently operated below 1.31 SSOs per 100 miles per year as shown in **Figure 1**. This SSO rate is well below the average annual SSO rate during the same period of the combined forty-nine (49) agencies in Region 8 that do not have sewer lateral responsibility². **Figure 1** shows the 12-month rolling average of SSOs per 100 miles of pipelines per year from January 2012 through March 2017 for all OCSD sewer mains versus the combined 49 agencies in Region 8 without lateral responsibility. Figure 1 also separates OCSD sewer mains into two categories: local sewers and regional sewers. Local sewers are sewer mains serving only one agency. Regional sewers convey flow from more than one agency and are larger pipelines. As can be seen in Figure 1, the local sewers have a higher SSO rate than the regional sewers due to a significantly higher likelihood of a blockage causing an overflow in these smaller pipelines.

Gallons Spilled Per 100 Miles

Another performance measure indicating the effectiveness of the SSMP is the volume spilled per 100 miles of pipelines. The District has maintained a sewer overflow volume of less than 17 gallons per 100 miles of sewer pipelines per year consistently over the past two years as indicated by the 12-month rolling average SSO volume per 100 miles over that period. The District has actually maintained this same level over the past five years as shown in **Figure 2**. As shown in Figure 2, this SSO volume per 100 miles is well below the average SSO volume per 100 miles of the other 49 agencies in Region 8 that do not have lateral responsibility.

² Region 8 refers to Regional Water Quality Control Board, Santa Ana Region.

Figure 1: 12-Month Rolling Average of SSOs per 100 Miles of Sewer Pipeline per Year

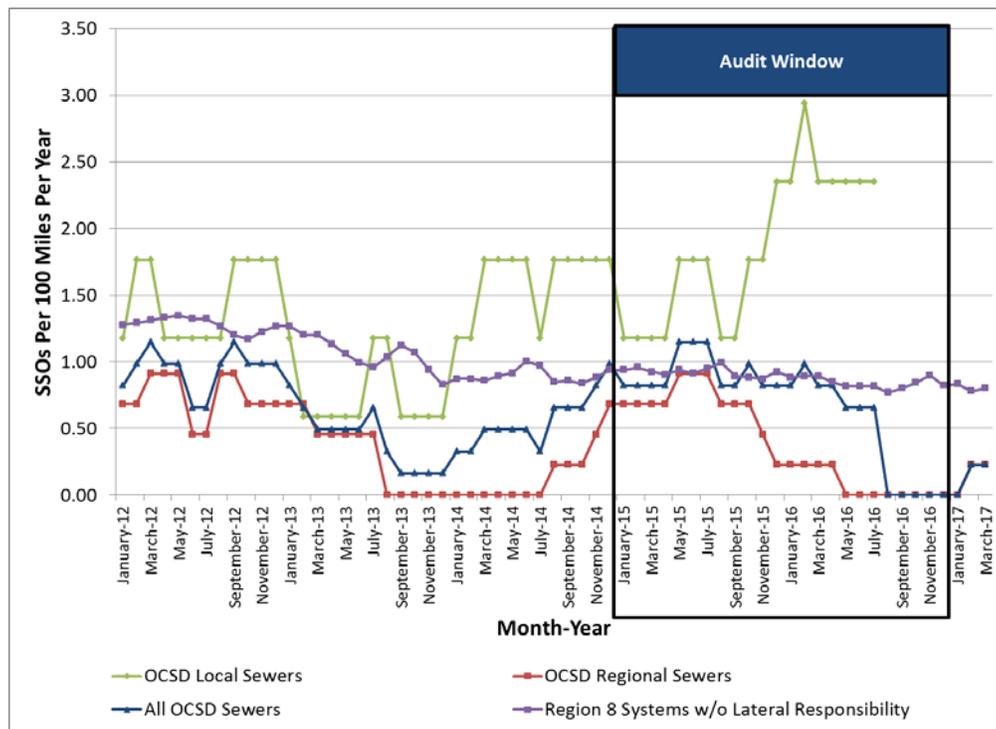
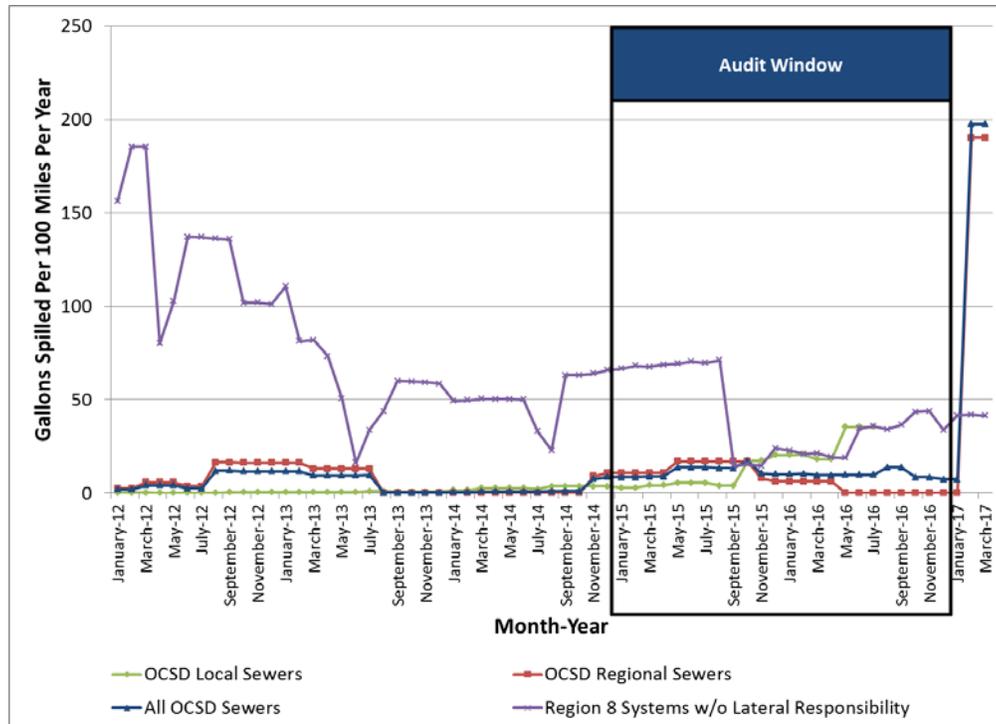


Figure 2: 12-Month Rolling Average of Gallons Spilled per 100 Miles of Sewer Pipeline per Year



Number and Size of Sewer Overflows

During the period between January 1, 2015 and December 31, 2016, the District experienced seven (7) SSOs with six (6) SSOs occurring in local sewer gravity mainlines and one (1) SSO occurring in the regional sewer system. Over the past five years, the District has experienced a total of 20 SSOs. The number and volume category of SSOs in the local and regional system can be seen in **Figure 3** and **Figure 4**.

Figure 3: Number of SSOs for Local and Regional Systems by Calendar Year

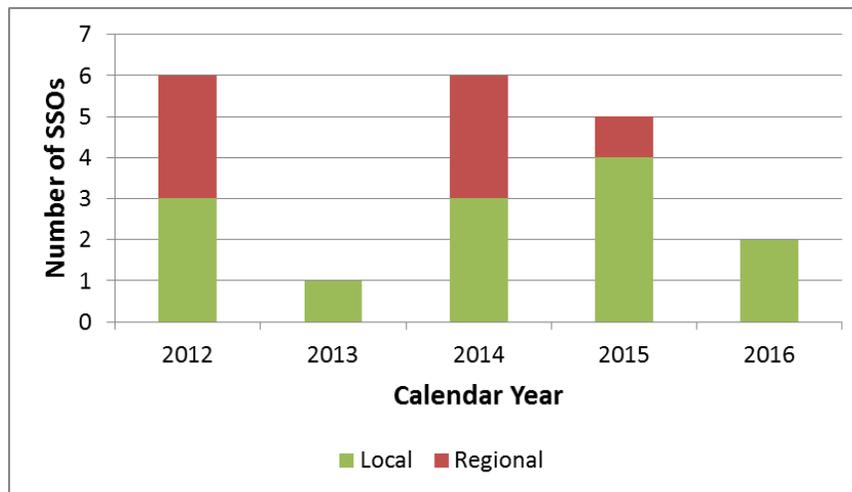
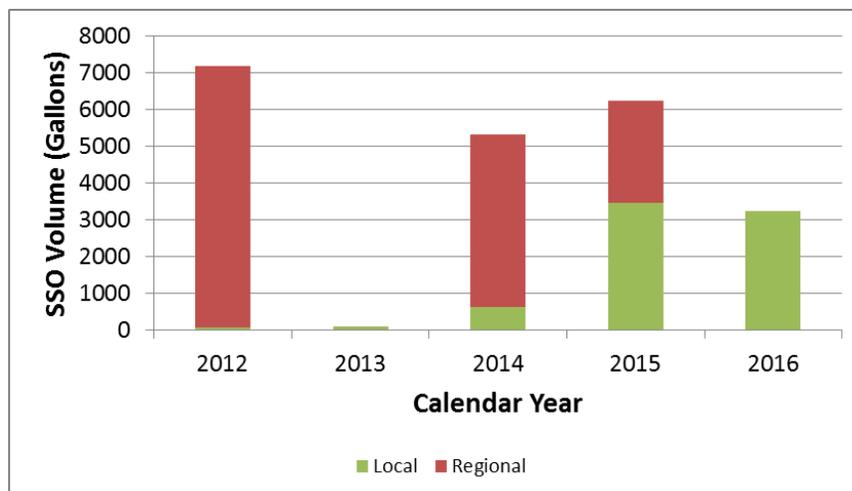


Figure 4: SSO Volume for Local and Regional Systems by Calendar Year



In the past five years, 13 out of 20 SSOs (65 percent) had volumes of less than 1,000 gallons. Of the six (7) SSOs larger than 1,000 gallons, four (4) occurred prior to 2015. OCSD did not experience any SSO greater than 1,000 gallons in CY 2013. **Table 3** shows the number and size of all SSOs occurring in the OCSD sewer system between CY 2012 through CY 2016. It should be noted that OCSD only experienced one SSO in Calendar Year 2013 and two SSOs in Calendar Year 2016, which is an outstanding achievement.

Table 3: Number and Size of All OCSD SSOs from CY 2012 through CY 2016

Size of SSO (gallons)	CY 2012	CY2013	CY2014	CY2015	CY2016	TOTAL
Greater than 10,000	0	0	0	0	0	0
From 1,000 to 9,999	3	0	1	2	1	7
From 100 to 999	0	1	4	3	0	8
From 10 to 99	2	0	1	0	1	4
From 1 to 9	1	0	0	0	0	1
Total	6	1	6	5	2	20

Causes of SSOs

SSOs caused by roots (9) and grease (1) accounted for 50 percent of SSOs occurring from the District's sewer system between January 1, 2012 and December 31, 2016 as shown in **Table 4**. Of the remaining ten (10) SSOs, four (4) were caused by construction-related issues, two (2) were caused by pump station-related issues, two (2) were caused by operator error, and the remaining two were caused by other causes.

Table 4: Causes of OCSD SSOs (1/1/2012 – 12/31/2016)

Cause of SSO	Number of SSO in Local System	Number of SSOs in Regional System	Total Number of SSOs	Percent of Total
Blockage:				
Roots	9	0	9	45%
Grease	1	0	1	5%
Subtotal for Blockage	10	0	10	50%
Construction-Related	2	2	4	20%
Pump Station-Related	0	2	2	10%
Operator Error	0	2	2	10%
Structural	0	1	1	5%
Other	1	0	1	5%
TOTAL (ALL)	13	7	20	100%

Review of Effectiveness of SSMP and Audit Narrative

The following sections focus on evaluating the effectiveness of each chapter of the SSMP and provide a narrative of the audit findings.

Chapter 1 – Prohibitions and Provisions

WDR Requirement: The WDR does not require this section to be part of the SSMP.

Audit Finding: This chapter explicitly documents all of the prohibitions and provisions included in the WDR and provides a means for the District Board to acknowledge and approve all provisions and prohibitions included in the WDR, not just Provision D.13 that requires the development and implementation of the SSMP.

Chapter 2 - Goal

WDR Requirement: *The goal of the Sewer System Management Plan (SSMP) is to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help reduce and prevent SSOs, as well as mitigate any SSOs that do occur.*

Audit Finding: As stated in the OCSO SSMP, the goal of the SSMP is to provide a plan and schedule for measures to be implemented to prevent SSOs. Overall, the programs, plans, systems, and practices the District employs to manage, operate, and maintain the sewer system resulted in a 12-month rolling average SSO rate that consistently remained at or below 1.15 SSOs per 100 miles of pipelines per year over the last two years. This indicates the District has been effective with achieving this goal. The District is in compliance with the Goal element requirement of WDR Provision D.13.

Chapter 3 – Organization

WDR Requirement: *The Sewer System Management Plan (SSMP) must identify:*

- a. *The name of the responsible or authorized representative as described in Section J of this Order.*
- b. *The names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an organization chart or similar document with a narrative explanation; and*
- c. *The chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services (OES)).*

Audit Findings:

The District is in compliance with the Organization element requirement of WDR Provision D.13.

- The authorized representative is Mark Esquer, Collection Facilities Manager, O&M Division.

- The organization chart also shows both Jim Herberg and John Gonzalez as legally responsible officials (LROs). The State Water Resources Control Board CIWQS SSO database also indicates both Jim Herberg and John Gonzalez as LROs.
- Ed Torres is not currently shown as a legally responsible official in the organization chart or in the State Water Resources Control Board CIWQS SSO database. OCSD may want to consider including Ed Torres as a legally responsible official since he ultimately oversees the Collection O&M crews responsible for pipeline and pump station emergency response, operations, and maintenance.
- The District has assigned roles and responsibilities for development and implementation of specific measures in the SSMP program. Appendix C is up-to-date and includes an organization chart with line of authority indicating the names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures of the SSMP. Attachment C also includes a narrative explanation of the responsibilities of each of the positions. There are inconsistencies between the titles used on the Organizational Narrative versus those shown on the Program Organizational Chart making it challenging for someone outside of the OCSD organization to follow, yet both documents are mostly up-to-date and comply with the WDR requirement.
 - The title for the Principal Public Affairs Specialist needs to be updated to reflect a recent promotion.
 - The lines of authority for staff performing reliability testing for pump stations is not indicated on the organization chart or within the organization narrative.
- Appendix P1 of the SSMP contains a SSO Response Flow Chart and Appendix P3 contains SSO Notification Procedures clearly documenting the chain of communication and notifications.

Chapter 4 – Legal Authority

WDR Requirement: *Each Enrollee must demonstrate, through sanitary sewer system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:*

- a. *Prevent illicit discharges into its sanitary sewer system (examples may include I/I, stormwater, chemical dumping, unauthorized debris and cut roots, etc.);*
- b. *Require that sewers and connections be properly designed and constructed;*
- c. *Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency;*
- d. *Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and*
- e. *Enforce any violation of its sewer ordinances.*

Audit Finding: The District is in compliance with the Legal Authority requirement of the WDR Provision D.13. Legal authorities satisfying the requirements of the WDR are included in the District's ordinances, Engineering Design Guidelines, and the Sewer Connection Application and Permit for Construction. The District has two ordinances providing legal authorities related to the WDR:

- Wastewater Discharge Regulations, Ordinance No. OCSD-48 (OCSD-48)
- Fats, Oils, and Grease Control Regulations Applicable to Food Service Establishments, Ordinance No. OCSD-25 (OCSD-25)

OCSD-48 was adopted on February 24, 2016 and was effective on July 1, 2016. OCSD-48 replaced OCSD-39.

OCSD-25 was passed on November 17, 2004 and was effective on January 1, 2005.

These ordinances, along with the District's engineering design guidelines and connection permit, provide the District with the authority to prevent illicit discharges, require sewers be properly designed, limit discharge of fats, oils, and grease, and enforce violations of sewer ordinances.

Table 5 identifies linkages to the District ordinances, Engineering Design Guidelines, and connection permit for each of the legal authority requirements.

OCSD claims responsibility for maintaining and repairing the first four feet of local satellite agency pipelines connecting to OCSD sewers. In most cases, a satellite agency's pipeline connects to the District's sewer system at an OCSD structure providing the District with access to the portion of local agency sewer OCSD is responsible for maintaining and repairing.

Table 5: Summary of OCSD Legal Authorities

Requirement	District Ordinances	Engineering Design Guidelines or Connection Permit	Meets WDR Requirements?
GENERAL			
Prevent illicit discharges into the wastewater collection system	OCSD-48, 201		Yes
Limit the discharge of fats, oils, and grease and other debris that may cause blockages	OCSD-25, 2.2		Yes
Require that sewers and connection be properly designed and constructed		Chapter 12.2 & 12.3	Yes
Require proper installation, testing, and inspection of new and rehabilitated sewers		Chapter 12.4 Included in Project specifications for rehabilitated sewers	Yes
LATERALS			
Clearly define District responsibility and policies	District references California Civil Code 831.	Sewer Connection Application and Permit for Construction	Yes
Ensure access for maintenance, inspection, or repairs for portions of the service lateral owned or maintained by the District	Not applicable. District does not own, operate, or maintain any portion of service laterals connecting private buildings to District sewers.		
Control infiltration and inflow (I/I) from private service laterals	OCSD-48, 203		Yes
FOG SOURCE CONTROL			
Installation of grease removal device (GRE)	OCSD-25, 2.5		Yes
Design standards for GRE	OCSD-25, 4.2-4.3		Yes
Maintenance and BMP requirements	OCSD-25, 2.4 & 3.3 & 4.5-4.6		Yes
Record keeping and reporting	OCSD-25, 3.3 & 5.1		Yes
Authority to inspect grease producing facilities	OCSD-25, 5.2-5.3		Yes
ENFORCEMENT			
Enforce any violations of sewer ordinances	OCSD-48, Article 6	Sewer Connection Application Permit for Construction	Yes

Chapter 5 – Operation and Maintenance Program

WDR Requirement: *The Sewer System Management Plan (SSMP) must include those elements listed below that are appropriate and applicable to the Enrollee's system:*

- a. *Maintain an up-to-date map of the sanitary sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities;*
- b. *Describe routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas. The Preventative Maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders;*
- c. *Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a capital improvement plan that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan;*
- d. *Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained; and*
- e. *Provide equipment and replacement part inventories, including identification of critical replacement parts.*

Audit Finding: The District is in compliance with the Operation and Maintenance Program element of WDR Provision D.13. The primary measure of the effectiveness of the operation and maintenance program is SSO performance improvements over time. The District has sustained a 12-month rolling average SSO rate in the sewer system of less than 1.15 SSOs per 100 miles of sewer pipelines per year over the last two years, placing OCSD in the category of high-performing sewer systems. The Operation and Maintenance Program is a key contributor to the high level of SSO performance achieved in the last five years through the following efforts:

- An aggressive sewer cleaning program on all pipes from 8 to 12 inches in diameter. This size class of pipes is cleaned on a 12 to 18-month schedule with higher-risk pipes and areas cleaned every 12 months and lower risk pipes and areas cleaned every 18 months. Known trouble spot sewer segments are cleaned on a 1-month or 3-month schedule.
- A five-year cleaning cycle for all regional sewers, less than or equal to 42-inch diameter, and more frequent cleaning of known problem regional sewer pipe segments. Trouble spots and siphons are cleaned every 4 weeks to 3 months based on historical cleaning needs, which may include pipe segments larger than 42-inch diameter.

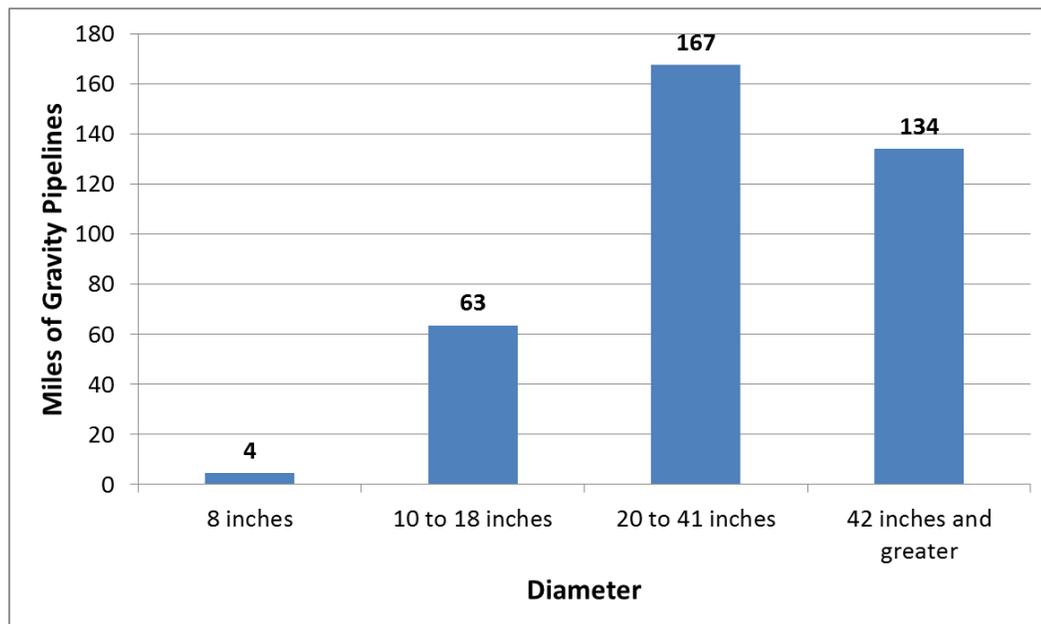
- Systematic CCTV inspection of the sewer system on a 7-year cycle, beginning with the problematic and older portions of the system, enabling the District to identify and monitor structural deficiencies in the early stages of deterioration and determine appropriate corrective actions.
- Well-trained collection system employees with all employees above the Maintenance Worker classification maintaining CWEA Collection System Maintenance certifications at or above levels required for their position.
- Accurate and up-to-date mapping of the sewer system to support SSO response and preventive maintenance activities. District response crews also have access to stormwater drainage system mapping to support sewer overflow response and recovery.
- A pump station maintenance and inspection program with a well-defined maintenance schedule, documented standard operating procedures, checklists, and daily SCADA data review.

Operations and Maintenance Program findings include:

- As noted previously, the District transferred approximately 170 miles of gravity sewers to East Orange County Water District.
 - The transfer included approximately 180 food service establishments connected to the pipelines.
 - The transfer also included a Combination Jetter/Vacuum truck and all available maintenance and CCTV data and videos.

The remaining pipelines the District currently owns amounts to approximately 369 miles of gravity sewer mains, 31 miles of force mains, and 15 pump stations. **Figure 5** provides a breakdown of the remaining miles of gravity sewer pipelines into four pipe size categories.

Figure 5: Miles of Gravity Pipelines Remaining in OCSD Sewer System



- The District has defined “regional” pipes as all pipelines that convey flow from two or more agencies. In some cases, OCSD has transferred pipe segments, historically owned and operated by the District, back to local agencies when those pipes only serve that one agency. There are exceptions to this rule. For example, the City of Huntington Beach is not equipped to handle the maintenance of a 30-inch diameter pipeline and pump station serving only that City. OCSD is going to continue operating and maintaining those assets.
- OCSD is going to release a new contract for cleaning of the smaller diameter pipes (less than or equal to 12 inches diameter) remaining in the District’s collection system and is considering cleaning these pipelines on a 12-month cleaning cycle. According to GIS, this is approximately 24 miles of pipelines.
 - Contractors are provided a Microsoft Excel Spreadsheet to document cleaning activities and the amount and type of material found during cleaning.
 - Contractors are asked to document any “out-of-the-ordinary” issues found at the manholes in a general comments field. Any issues contractors identify are reviewed by OCSD inspectors and are either assigned to Collection O&M or to a contractor to address.
- As noted in Appendix I1 of the SSMP, all pipelines greater than 12-inch diameter and less than or equal to 42-inch diameter are cleaned at least once every 60 months. Pipe segments in this size class with known maintenance issues are cleaned more frequently based on historical knowledge and experience. OCSD uses a tire cleaning similar in nature to balling. The tire diameter is slightly smaller than the diameter of the pipe and the hydraulic force of the water around the tire flushes the pipe segment clean. The tire

provides the added benefit of serving as a proofing device by verifying an object of similar diameter to the pipe is able to pass through the entire pipe segment.

- The District has developed a master schedule for system-wide CCTV inspection. The collection system has been divided into five areas. The District currently has a backlog of CCTV inspection and made one of the five areas larger than the other four to address the backlog. The CCTV inspection schedule is going to be placed into the Maximo CMMS in mid-2017.
 - OCSD obtains a CCTV contract for all pipes and all sizes. The contract provides different unit costs for working in primary versus secondary roadways, including costs for traffic control.
 - The CCTV contract is only for conventional CCTV inspection. Multi-sensor inspection would require a separate contract.
- Force main inspection is still and will likely continue to remain problematic due to limited access. OCSD has used Smartball to assess the condition of some force mains and in some cases has performed external inspection on metallic pipelines. OCSD should consider developing a programmatic force main inspection and condition assessment plan that evaluates current force main access and materials, identifies potential improvements to improve access, and documents the best approach currently available to assess condition given the current state of maintenance accessibility and material specific to each force main.
- Siphons are inspected using a proofing tool (e.g., tire). CCTV is not performed on siphons since the data collected yields no value since the pipeline is fully submerged.
- OCSD has a two-tier approach to manhole inspection.
 - A separate OCSD manhole inspection crew performs Tier 1 inspections using the Trimble mobile data unit. A Tier 1 inspection is a short-form inspection designed to determine whether the condition is acceptable or if additional inspection is required.
 - OCSD hires a contractor to perform Tier 2 manhole inspections using National Association of Sewer Service Companies (NASSCO) Manhole Assessment and Certification Program (MACP) standards for manhole inspection. A Tier 2 inspection gathers coded observations of specific manhole maintenance, structural, and construction defects. This data becomes the basis for remediation decision-making and, if required, remediation design.
 - The overall goal is to inspect all manholes at least once every seven (7) years, with an internal goal to achieve this on a 5-year cycle.
- In January 2015, the District implemented Maximo Computerized Maintenance Management System (CMMS) to plan, schedule, and document maintenance activities performed on the sewer system as well as to support documentation of important information collected during maintenance at the asset level. The audit team reviewed a random set of Collection O&M sewer cleaning and pump station maintenance work

orders in the Maximo CMMS to determine the accuracy, completeness, and usefulness of the data collected. The audit team also reviewed the maintenance supervisor dashboards to see how supervisors are interacting with the dashboard to manage work activities.

- Preventive maintenance routes and schedules were migrated from the CASSWorks CMMS into the Maximo CMMS. CASSWorks did not have step-by-step protocols that could be migrated into Job Plans in Maximo. Maintenance Planning staff are developing Job Plans in Maximo. Ideally Job Plans would be updated over time to reflect actual protocols followed by Collection O&M crews in the field. This will require feedback from Collection O&M crews back to Maintenance Planning. One issue with the Job Plans for pump station crews is the lack of connectivity in the pump stations. Pump station crews also perform these activities so often, there is not a need to read Job Plans to be able to perform the work. The District should develop a plan to update generic Job Plans to become station-specific to improve the ability of the organization to pass this knowledge to future Collection O&M pump station maintenance employees. Once updated, the only time these Job Plans would need to be modified are when something changes at the station (i.e., different equipment purchased, different materials used for upkeep, etc.). The other reason is if something is wrong and is brought to the attention of the Maintenance Planner such as a safety issue or something to increase operational efficiency. The key is to invest the time up front to ensure the Job Plans have appropriate detail and are correct. This may require multiple visits to the pump station to ensure everything is covered. The District may want to consider revisiting Job Plans once every five years to ensure everything is still the same and no further improvements can be made.
- OCSD is using time-based work order scheduling. Work orders are generated whether previous work orders were completed or not. During the early implementation phase, work orders that were late could be cancelled and cancelled work orders would not be counted in the PM Compliance performance metric as being past due. This created the incentive to cancel late work orders to achieve PM Compliance goals. Recent reporting improvements now count cancelled work orders, removing the incentive to use this approach.
- OCSD is using a centralized maintenance planning unit to plan maintenance activities and create planned Maximo work orders. The overall plan for system maintenance is clearer now. Communication through the chain of command is improving. Documentation of work activities has improved.
 - Maintenance planners (Instrumentation Planner, Electrical Planner, and Collection O&M Planner) meet weekly to discuss upcoming work to take advantage of opportunities to schedule maintenance activities between different trades working at a site.

- Maintenance planners create job plans, issue work, and help supervisors schedule work if needed. Maintenance planners also generate service requests.
- Supervisors make assignment to crews. Supervisors also review service requests for validation and conversion into work orders. This is a current process bottleneck. The District needs to improve this process work flow or have the ability to delegate authority for review of service requests in the case where supervisors are not available for short fuse service requests.
- The District has an analyst generating performance reporting for the whole department.
- The graphical user interface of the first generation of Maximo CMMS was problematic. The most recent version Maximo 7.6 has an improved interface and is being built while the District is using it. There is administrative burden associated with using the new system, yet the District is benefiting from the improved documentation and access to data.
- Maximo provides the ability to document cleaning activities at the asset level, including measurement of the amount and type of debris collected during cleaning activities in cubic yards. Data collection appears to be inconsistent between crews. The District may want to consider developing guidance to standardize data collection practices for Collection O&M crews. For example, sewer cleaning crews should utilize the same terminology and volume quantification practices for documenting the type and amount of material removed from sewer pipe segments during sewer cleaning.
- The District has a District Reliability Engineering and Maintenance (DREAM) Team that performs reliability testing program for pump station mechanical equipment consisting of monthly vibration and infrared thermography testing at all 15 pump stations.
 - The reliability testing is performed following protocols to ensure operating conditions are consistent to ensure the results can be trended appropriately.
 - Reliability data is uploaded into the Emerson AMS Machinery Health Manager software which supports data management, trending, and analysis. A Condition-Based Monitoring (CBM) Summary is generated monthly.
 - OCSD uses the results to generate proactive maintenance work orders. The reliability testing enables OCSD to detect issues occurring at the microscopic level. Repairs are performed before significant damage occurs on the equipment, reducing the downtime of the equipment and the extent of repairs.
 - After repairs are completed, new baseline vibration and infrared thermography readings are collected.
 - Ninety-five percent (95%) of the testing is now performed by District staff.
 - The District is considering expansion of the program to include infrared thermography of electrical assets and ultrasonic testing (UT).
 - District staff obtain reliability training from a variety of sources:
 - Vibration Institute (Vibration)

- Mobius Institute (Vibration)
 - Snell (Infrared thermography)
 - Noria (oil analysis)
 - Trico (oil analysis)
 - Descase (oil analysis)
 - Maintenance and Reliability Conference
 - International Maintenance and Vibration Conference
- The District owns a Machinery Fault Simulator enabling staff to train on reliability testing techniques.
- Risk Assessment – OCSD does not continuously update collection system risk as new CCTV data is collected. This has evolved from being a best management practice to becoming a standard industry practice. OCSD recently purchased Innovyze InfoMaster, which has risk assessment functionality. OCSD should move forward with configuring InfoMaster to calculate asset risk and continuously update the risk assessment for all pipes in the sewer system as new CCTV data is collected.
- Decision-Making Guidelines – OCSD continues to evaluate the maintenance and renewal needs of sewer pipelines manually and on a case-by-case basis. OCSD has the opportunity to develop a standardized approach to evaluating maintenance and CCTV data and determine maintenance and renewal actions (i.e., repair, replace, CIPP, upscale, etc.) to address asset deficiencies as maintenance and CCTV data is collected. OCSD also has the opportunity to configure InfoMaster software, recently purchased by the District, to leverage its information analysis tools to support maintenance and renewal decision-making and documentation.
- Estimating Renewal Needs – OCSD has estimated long-term asset renewal needs and has incorporated these estimates into OCSD's budget and rate structure. These estimates were based on assumptions for useful life of collection system assets. OCSD has condition data for almost all collection system assets. OCSD should consider using this data to calculate actual asset reliability rates using available CCTV inspection data and then updating the renewal needs funding forecast. OCSD can then begin to understand whether the current funding level is adequate to sustain desired service levels and risk tolerances.
- CCTV Inspection Schedule – OCSD has collected CCTV inspection data for almost all collection system gravity mainline assets. OCSD should consider moving towards a risk-based CCTV monitoring schedule for future inspections. High-risk pipes would be inspected more frequently (e.g. 5 to 10-year schedule) and low risk pipes less frequently (e.g., 10 to 20 year schedule).
- Funding – The District has the funding in place to address all forecasted capital improvement needs and emergency needs. The District has a total reserve of \$518 million that can be applied to any District infrastructure need. The District has a \$57 million catastrophic reserve. The CIP reserve includes funding for 50 percent of the forecasted capital improvement needs over the next 10 years. This includes an assumption for rehabilitation and replacement of two percent of the value of the collection system annually.

- The District is in the process of developing a Facilities Master Plan that will include a 20-year forecast of collection system capital improvement needs as well as the identification of operations, maintenance, and capital improvement needs to address growth as well as condition-related deficiencies. The results of the Facilities Master Plan will become the basis for the next 5-year Rate Plan for the period from Fiscal Year 2019 through Fiscal Year 2024. The Facilities Master Plan will be a collaborative process and will include input from Collection System O&M staff.
- Collection O&M staff have implemented a stretch exercise routine as part of routine beginning of workday activity. The practice is leading to reduced strains and improved safety.

Chapter 6 – Design and Performance Provisions

WDR Requirement:

- a. *Design and construction standards and specifications for the installation of new sanitary sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sanitary sewer systems; and*
- b. *Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.*

Audit Finding: The District is in compliance with the Design and Performance Provisions elements of WDR Provision D.13 and has appropriate design and construction standards and specifications as well as procedures and standards for inspection and testing of new sewers and rehabilitation and repair projects.

OCSD has a process for updating OCSD's Master Specifications, Design Guidelines, and other Design Standards. OCSD staff can provide input using an Engineering Field Feedback form and the Sharepoint document management system. Project managers for design and construction projects are required to provide a "lessons learned" report at the end of a project, which may include recommended changes to standards and specifications. Significant and proposed changes to standards are submitted to the Engineering Department Advisory Council (EDAC) for review and approval. Less significant changes do not require EDAC approval and are published by the Engineering and Construction Division as finalized.

Chapter 9 of the SSMP references Appendix M, which includes a description of the criteria used by the District to identify hydraulic deficiencies in the system and to initiate an evaluation to determine whether capital improvements are needed to address hydraulic deficiencies. The depth of flow versus diameter criteria included in the District's Design and Construction Requirements for Sanitary Sewers is more conservative than the criteria described in Appendix M for evaluating and designing improvements to the existing system (See audit narrative for Chapter 9 below). The District should consider updating Appendix M to more clearly define the distinction between project initiation criteria used by Planning Division to evaluate hydraulic deficiencies versus design criteria used to design collection system capital improvements. The update should also clarify discrepancies between the depth of flow to diameter design criteria provided in the District's Design and Construction Requirements for Sanitary Sewers versus those described in Appendix M. The District should also update the Design and Construction

Requirements for Sanitary Sewers to include depth of flow versus diameter parameters for the replacement of existing sewer pipelines in areas that are built-out to align with Appendix M. On existing pipelines, the District will have historical flow data, and in some cases hydraulic modeling results from the District's dynamic hydraulic model, enabling the District to make informed and risk-based decisions with depth of flow versus diameter parameters that are less conservative than those employed for new sewers in undeveloped areas.

Chapter 7 – Overflow Emergency Response Plan

WDR Requirement: *Each Enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:*

- a. *Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;*
- b. *A program to ensure an appropriate response to all overflows;*
- c. *Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the MRP. All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The Sewer System Management Plan (SSMP) should identify the officials who will receive immediate notification;*
- d. *Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained;*
- e. *Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities; and*
- f. *A program to ensure that all reasonable steps are taken to contain and prevent the discharge of untreated and partially treated wastewater to waters of the United States and to minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.*

Audit Finding: The District is in compliance with the Overflow Emergency Response Plan requirement of WDR Provision D.13. The District has developed and implemented an overflow response capability, procedures, and training program to effectively respond to SSOs and to promptly communicate and notify responsible personnel and regulatory authorities as necessary.

Appendix P1 - SSO Response Flow Chart: Includes a flow chart of the overall response process identifying SSO response activities from receipt of the call through response, clean-up, and field reporting. It was last updated on 12/8/2016.

Appendix P2 – Laboratory, Monitoring, and Compliance (LMC) SSO Response Procedure: Includes procedures for the LMC primary responder including protocols for responding to notification, field visitation, and reporting. It was last updated on 11/2/2016. References to this

appendix in SSMP Chapter 7 reference Environmental Compliance versus LMC. Also, the cover page for this appendix is titled SSO Notification Procedures and should be updated to SSO Response Procedure.

Appendix P3 – SSO Notification Procedures: Includes protocols for notifications during both work hours and after-hours. In all cases, Control Center receives reports of sewer overflows, initiates documentation, and notifies appropriate OCSD Collection O&M staff if the SSO is determined to be in the OCSD service area. OCSD utilizes a mix of communication methods (i.e. PNA pager, emails, or both) to notify appropriate OCSD staff of the event. OCSD also has protocols to notify external contacts from Orange County Public Works, Orange County Health Care Agency, and Region Water Quality Control Board.

Appendix Q1 - OCSD SSO Emergency Response Plan Description: Provides a narrative description of the overall emergency response program. It may be more appropriate to include this material as part of Chapter 7 of the SSMP.

Appendix Q2 – 870-GEN-08 SOP: Provides Collection O&M emergency response crews with step-by-step instructions for responding to an SSO event including protocols for receiving the call from Control Center, spill verification, communication, containment, blockage removal, clean-up, field reporting, and data management for field data collected.

Appendix R – Sewer Spill Estimation and Simulation Training: Provides guidance for estimating sewer overflow volume.

Together these documents provide procedures to the key parties involved in SSO response: Control Center, Laboratory, Monitoring, & Compliance, and Collection O&M. As documented in the 2013 WDR Audit, the various attachments documenting SSO response protocols are fragmented. Laboratory, Monitoring, & Compliance staff maintain a spreadsheet in ECAP with milestones for SSO reporting to support meeting regulatory deadlines.

As noted in the 2010 SSMP audit, SSO response documents still do not address overflows from pump stations and force mains. Overflows from these locations can create significant volumes of sewage in a short amount of time and benefit from having contingency plans in place in the event of a failure. The District may want to include a section in the next SSO Emergency Response Plan update focused on pump stations indicating each pump station, location, whether it is equipped with alarms, on-site back-up pumps, and back-up power generators. For any stations that lack back-up pumps and generators, the plan should specify a protocol for prompt delivery of portable pumps or generators in the event of a station failure. In addition, the wet well capacity at each pump station should be provided along with an estimate of how much storage time the wet wells would provide under different flow conditions. It should identify where an SSO will occur if a station fails and where bypass intake and discharge should be set up. Finally, the plan should identify an operation or bypass approach in the case of force main failure and should evaluate whether a more detailed response or contingency plan is necessary for larger pump stations and forcemains or complicated pump station and force main operations.

As noted in the 2015 SSMP audit, the Control Center staff has a training binder for training new Control Center staff on how to appropriately document and communicate customer calls for potential SSO events. This document is an important training tool and guide for Control Center staff and is not referenced in the SSMP.

During the audit interviews, the audit team selected four SSO reports randomly and reviewed reporting with OCSD staff during the audit interviews. SSO reporting for CIWQS SSO Event ID 814162, 818788, 824417 and 832505 were reviewed. The audit confirmed that documentation for these SSOs including the initial call, field report, spill volume calculation, and certified CIWQS SSO report were stored in ECAP following reporting protocols. The documentation uploaded to CIWQS includes all of the documentation OCSD has compiled and stored in ECAP for each of these events. A detailed review of the CIWQS report for each of these SSOs noted the following:

- CIWQS Spill ID 814162
 - Documentation loaded into CIWQS for Spill ID 814162 includes:
 - Spill volume calculation backup documentation;
 - Email communications during the event;
 - Field report;
 - Mapbook page of where the spill occurred with notations;
 - Photos from the spill response;
 - A sketch with notes documenting measurements for use with spill volume estimation; and,
 - Certified spill report.
 - The “Spill corrective action taken” noted in the spill report states “Inspected Sewer Using CCTV to Determine Cause”. The cause was determined to be root intrusion. OCSD may want to consider adding additional notes indicating the current cleaning frequency and whether the cleaning frequency was increased as a result of this event or whether any other corrective actions were implemented to reduce the likelihood of a future SSO at this location.
- CIWQS Spill ID 818788
 - Documentation loaded into CIWQS for Spill ID 818788 includes:
 - Emails communications during the event;
 - Field report;
 - As-Built drawings and Mapbook page;
 - Photos documenting the spill response;
 - A sketch of the flow path with measurement to support spill volume estimation;
 - Two certified spill reports documenting changes made to the certified report over time
 - The “Spill corrective action taken” notes spill response and clean-up activities, yet does not describe the corrective actions taken to reduce the likelihood of a future SSO at this location.

- CIWQS Spill ID 824417
 - Documentation loaded into CIWQS includes:
 - Spill calculation;
 - Email communications during the event;
 - Field report;
 - Map showing location of blockage and location of house where spill discharged;
 - Photos of extent of discharge into the house;
 - Certified report
 - A 20-page Spill Report documenting the spill event, follow-up investigation, conclusions and corrective actions.
 - OCSD may want to consider providing guidance to the homeowner to install a backflow preventer. OCSD may also want to perform an analysis of low lying areas to determine if there are other high-risk sites that will overflow into private buildings versus discharging from a manhole.
- CIWQS Spill ID 832505
 - This sewer overflow was outside of the audit window, yet due to the magnitude of the event the audit team decided to review the event as part of this audit.
 - Documentation loaded into CIWQS includes:
 - Spill volume calculation backup documentation;
 - Email communications during the event;
 - Field report;
 - Maps showing the blockage location, locations where spill discharged from the collection system, and location where the spill entered the storm drain;
 - Photos of spill response activities;
 - A copy of the SSO Technical Report required since the SSO was greater than 50,000 gallons.
 - Two certified spill reports documenting changes to the report over time.
 - The SSO Technical Report provides strong backup documentation for the SSO volume estimate, documentation of impacts to surface waters, and final corrective actions including the scheduled replacement in Fall 2017 of the three cast iron pipe segments with tuberculation.
 - The report documented the use of unsterilized water bottles for water sample collection, yet the report did not mention a corrective action to ensure the availability of sterilized water bottles in the future.

With regards to spill response capabilities and training, OCSD has more than adequate training, equipment, and supplemental contractor support available to address large and complex sewer overflow events, if they occur. OCSD has created an SSO training facility and provides access to the facility for use by other agencies in the region.

The District has wet weather preparedness protocols in place to anticipate potential issues during wet weather events and to implement contingency plans including the purchase of bypass pumping and discharge hose required to accomplish bypass pumping. For example, a high risk section of pipe in Carbon Canyon area led to the development of a contingency plan to bypass the pipe, including the identification of the pumping equipment and bypass hose required to accomplish bypass. OCSD is considering the purchase of discharge hose on a motorized wheel. Another example is Bitterpoint, where equipment is staged as a contingency measure.

The District has a High Flow Emergency Response Plan (HFERP) for the Collection System for responding to high influent wastewater flows. This response plan identifies specific preparation and response activities as part of either normal shift staffing or, if activated, the Incident Command System (ICS). The HFERP identifies a set of codes and criteria for activating these codes. The codes range from Code Blue, activated by the forecast of a heavy storm within the next 7 days, to Code Red, indicating the flow has exceeded the capacity of the 120-inch outfall and lack of availability of any remaining capacity within the collection system. Each code is associated with a response of either normal shift staffing or activation of ICS. Each code has a set of protocols for preparation and response actions.

The recent intense rainstorms necessitated the activation of a HFERP Code Blue. OCSD performed outreach to member agencies to manage flows coming into the system and staff performed preparation and response activities as identified in the HFERP. The District was able to convey all flows through the collection system and treatment plant in through the outfall without a spill.

OCSD has a strong set of protocols and training program for emergency operations. The District performs periodic mock drills to assess staff response to various emergency situations. The District also leverages planned shutdowns to simulate infrastructure failure conditions. For example, in 2015 there was a planned power outage at Plant 2 for two hours. District staff utilized this as an opportunity to simulate the loss of SCADA communications and protocols to manage this type of event. Lessons learned included enhancements to the sequencing of shutdown and startup of facilities.

The District has a set of seven contracts with contractors and vendors, known as the "7-Pack", to support emergency response needs. In a true emergency, OCSD staff are provided the authority to enter into agreements with any service providers deemed necessary. If needed, OCSD staff has a database of over 1,000 emergency vendors and contractors to access if additional support required in a true emergency.

Chapter 8 – FOG Control Program Plan

WDR Requirement: *Each Enrollee shall evaluate its service area to determine whether a FOG control program is needed. If an Enrollee determines that a FOG program is not needed, the Enrollee must provide justification for why it is not needed. If FOG is found to be a problem, the Enrollee must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system. This plan shall include the following as appropriate:*

- a. *An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;*
- b. *A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;*
- c. *The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;*
- d. *Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;*
- e. *Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the FOG ordinance;*
- f. *An identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section; and*
- g. *Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system for each section identified in (f) above.*

Audit Finding: Similar to the 2015 WDR Audit, this audit review finds the District in compliance with WDR requirements for a FOG Control Program and has a very effective program consisting of the following components:

- Consistent and effective source control of active permitted food service establishments (FSEs).
- Implementation of GIS information tools to support FOG investigations.
- Aggressive sewer cleaning of all areas known to have a history of FOG issues.
- An effective public outreach education program for proper disposal of FOG through education at public events, website, social media, and news letters. The District increases promotion prior to holiday events where grease can be an issue (e.g., Thanksgiving and Christmas holidays).
- A FOG ordinance providing adequate FOG enforcement authorities.
- Adequate staffing to accomplish FOG program inspections and enforcement as required.
- Close coordination between source control and collection system operations and maintenance staff to investigate FOG issues and determine appropriate source control and maintenance corrective actions to address issues.

Over the past five years, the District has only experienced one (1) grease-related sewer overflow, as shown in **Table 6**. This SSO event occurred in an 8-inch sewer main that spilled 73 gallons. This level of performance is a strong indicator that the District's FOG Control Program is effective at controlling grease issues in the District sewer mainlines. It is important to note this level of performance was achieved prior to the transfer of local sewers.

Table 6: Grease-Related SSOs

Year	2012	2013	2014	2015	2016	2017 YTD	Total
Number of Grease-related SSOs	1	0	0	0	0	0	1

In August 2016, most of the smaller diameter sewer mains were transferred from the District's sewer system to East Orange County Water District, along with 180 of the 220 food service establishments the District was inspecting as part of the District's FOG program. Currently, the District has 40 FOG program permits being inspected as part of the District FOG program. Overall, the risk of sewer overflows due to grease blockages has been dramatically diminished with the transfer of the local sewers.

Chapter 9 – System Evaluation and Capacity Assurance Plan

WDR Requirement: *The Enrollee shall prepare and implement a capital improvement plan (CIP) that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. At a minimum, the plan must include:*

- a. *Evaluation: Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events;*
- b. *Design Criteria: Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to establish appropriate design criteria; and*
- c. *Capacity Enhancement Measures: The steps needed to establish a short- and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.*
- d. *Schedule: The Enrollee shall develop a schedule of completion dates for all portions of the capital improvement program developed in (a)-(c) above. This schedule shall be reviewed and updated consistent with the Sewer System Management Plan (SSMP) review and update requirements as described in Section D. 14.*

Audit Finding: Overall, the District's approach to system evaluation and capacity assurance has proven to be effective, as evidenced by no capacity-related SSOs occurring since before January 2007. The District is in compliance with the System Evaluation and Capacity Assurance element of the SSMP.

The District performed a system evaluation and capacity assurance analysis and developed a plan to address deficiencies identified as part of the 2006 Strategic Plan Update. This analysis

was reviewed and updated as part of the development of the 2009 Facilities Plan. The evaluation performed as part of the 2006 Strategic Plan Update identified project initiation criteria for system evaluation and capacity assurance. Projects identified to address capacity issues in 2006 were reviewed in 2009 and in some cases were eliminated or deferred indefinitely due to revisions in flow projections or corrections/changes to the modeled network. The District is currently in the process of developing a new capacity assessment of its collection system (Project PS 15-08) that includes an extensive flow monitoring program and hydraulic model update to assess the system's capacity to convey current and projected sewer flows.

OCSD has implemented activities to manage flows in areas with known capacity issues. Activities to manage flows include flow diversion, flow bypass, and field monitoring by OCSD staff during high flow events. Flow management protocols are incorporated into the District emergency response procedures. The District has also incorporated high flow scenarios in emergency response preparedness exercises.

Based on the results and recommendations from PS 15-08, Collection System Capacity Study, the District may develop a field monitoring plan to strategically collect additional flow data. This strategic data collection may or may not include areas previously identified; however, it would take into account pipes that have the potential to become hydraulically deficient. Since surcharging or overflows are generally not expected to occur in these sewers, except under extreme rainfall events exceeding the design storm, monitoring should focus on wet weather periods exceeding design storm conditions. The District's extensive flow monitoring program conducted during the 2016-2017 FY period, in conjunction with the PS 15-08, captured significant storm data which will identify areas currently in danger of surcharging. Comparison of those areas with the hydraulic model results will help to validate the model and develop CIP recommendations. Based on the results and recommendations of PS 15-08, District staff will determine whether or not on-going field monitoring of potential hydraulically deficient areas is beneficial. If implemented, the field monitoring program should be documented and referenced in future SSMPs.

The SSMP and referenced documents such as the 2006 Strategic Plan Update, the 2009 Facilities Plan, and Fiscal Year Budgets describe capital improvement projects for capacity enhancement. Some of the identified projects have been completed and others deferred for a variety of reasons. It is not easy to determine the status of each project because the information is contained in various documents. Since the last SSMP Audit, the District has updated the table in Appendix M that lists the capacity-related CIP projects that were identified in the 2006 Strategic Plan Update, the 2009 Facilities Plan, or in other studies, however, the original source of the recommendation to perform the project is not listed in the table. The schedule and status of each project has been documented. Ongoing status refers to projects in either the design or construction phase, and could be further clarified in future updates. Anticipated completion dates, as required in the WDR D.13 viii (d) – System Evaluation and Capacity Assurance Plan, are not listed. For projects that have been deferred and/or are not currently included in the District's CIP, the table should include the reason for the deferral (e.g., reduced flows, lower growth projections, acceptable level of risk, etc.). This table will continue to be updated annually and included in the SSMP.

Evaluation

OCSD's Capital Improvement Program is updated annually, in alignment with the budgeting process. The District is currently in the process of developing a new capacity assessment of its collection system (Project PS 15-08) that includes an extensive flow monitoring program and hydraulic model update to assess the system's capacity to convey current and projected sewer flows and to assess potential impacts on the system due to climate change (e.g. design storm selection and analysis). The District is planning to include an I&I evaluation and monitoring of dry weather flows to re-calibrate the hydraulic model. Once PS 15-08 is complete, the District intends to annually update the model network.

OCSD has seen a decrease in sewage flows associated with economic conditions and water conservation efforts of the local water agencies. OCSD also has very strict/robust bypass requirements for construction projects, to minimize risk of spills. OCSD does permit dry weather urban run off diversions, which are assessed for hydraulic flow and capacity issues and approved on a case by case basis.

District staff meet monthly with member agencies to discuss ongoing interagency issues (e.g. flow monitoring, I&I, future development projects). The District is a reviewer of CEQA documents for new development projects. Dry weather projected flows are checked against the hydraulic model to determine potential capacity constraints. The updated hydraulic model being developed as part of PS15-08 will include a tool in GIS that will identify potential capacity projects that may be triggered through the development review process.

Once a project is identified to address a capacity deficiency, the OCSD Planning Division defines and prioritizes potential projects to remediate the capacity deficiency and works with the District's Design group on the timing for project delivery to ensure staffing levels can accommodate project recommendations. The schedule and budget for projects are managed by Division 750 (Project Management).

Operational changes can impact capacity availability, e.g. diversion of sewage from one service area to another. The hydraulic model is run in those cases to assess ability of the system to handle diverted flows.

Design Criteria

The design criteria for the wastewater collection system is defined in the District's master specifications and the District's Design and Construction Requirements for Sanitary Sewers, also referred to as the Design Guidelines. The Design Guidelines include requirements for depth of flow versus diameter (D/d) in sewer pipe³.

<u>Diameter of Pipe (d)</u>	<u>Max Depth vs Diameter</u>
8 inches to 18 inches	0.50
21 inches to 60 inches	0.75
Over 60 inches	0.75

This criteria is considered to be very conservative and the District currently only applies these parameters on sewer pipes in new developments.

In addition, Appendix M of the SSMP describes project initiation criteria the District uses to evaluate potential hydraulic deficiencies to trigger analysis of capital improvement alternatives designed to address the deficiency. Project initiation criteria includes a depth to diameter ratio and allowable surcharge based on depth of pipe, using a 10-year design storm. Smaller sewers are determined deficient when the ratio of peak depth of flow to pipe diameter is equal to or greater than 1.0. When redesigning sewers larger than 12 inches, the desired ratio of the peak depth of flow to pipe diameter (d/D) is equal to 1.0. For sewer with a diameter of 12 inches or less, the desired d/D is equal to 0.75. The District should consider updating Appendix M to more clearly define the distinction between project initiation criteria used by Planning Division to evaluate hydraulic deficiencies versus design criteria used to design collection system capital improvements. The update should also clarify discrepancies between the depth of flow to diameter design criteria provided in the District's Design and Construction Requirements for Sanitary Sewers versus those described in Appendix M. The District should also update the Design and Construction Requirements for Sanitary Sewers to include depth of flow versus diameter parameters for the replacement of existing sewer pipelines in areas that are built-out to align with Appendix M. On existing pipelines, the District will have historical flow data, and in some cases hydraulic modeling results from the District's dynamic hydraulic model, enabling the District to make informed and risk-based decisions with depth of flow versus diameter parameters that are less conservative than those employed for new sewers in undeveloped areas.

Hydraulic deficiencies exceeding project initiation criteria are brought to the attention of the Design Group Managers and any variances from the criteria are discussed and documented in a technical memorandum. The Collection System Capacity Assessment Study (PS-15-08) will evaluate the current project initiation criteria used to evaluate hydraulic deficiencies and will determine if changes need to be made to design storm selection, based on an evaluation of

³ Design and Construction Requirements for Sanitary Sewers, OCSD, November 2014, Page 12-7.

actual wet weather events over the past 10 years and potential changes in wet weather patterns due to climate change.

Capacity Enhancement Measures

OCSD maintains a short and long term CIP, prioritized in the schedule based on need and available funding. The District is implementing a risk model in association with the condition assessment work that will incorporate capacity projects identified to develop a prioritized project list. Priorities are checked annually during the budgeting process. Project justification descriptions identify whether a project is capacity related, or partially capacity related.

In 2006, OCSD established Ordinance OCSD-27, which instituted a consolidated revenue district and applies fees and charges uniformly throughout the service area, with the exception of IRWD (Revenue Area 14) which is fully funded by IRWD. OCSD uses an empirical model to distribute its available revenues among projects, and develop schedules for the CIP components.

Schedule

The CIP is updated annually and the Budget Process, with upcoming dates, is provided in Appendix U of the SSMP. Projects are initiated by the identification of issues (e.g. condition, capacity, regulatory requirements, etc.) and a rough order of magnitude cost is determined based on a preliminary project scope for each project identified. The cashflow of these projects, as well as existing active projects are then compared against budget and resource constraints and projects are then prioritized to meet these constraints. The CIP list indicates the reference number and name of the project and anticipated fiscal year for the start of the project. Those projects that have been started are noted as on-going in Appendix M; however more detail is noted in the CIP.

Chapter 10 – Monitoring, Measurement, and Program Modifications

WDR Requirement: *The Enrollee shall:*

- a. *Maintain relevant information that can be used to establish and prioritize appropriate Sewer System Management Plan (SSMP) activities;*
- b. *Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP;*
- c. *Assess the success of the preventative maintenance program;*
- d. *Update program elements, as appropriate, based on monitoring or performance evaluations; and*
- e. *Identify and illustrate SSO trends, including: frequency, location, and volume.*

Audit Findings: The District is maintaining relevant information that is used to establish and prioritize appropriate SSMP activities.

Overall SSMP Performance: The primary indicators utilized to measure and monitor the success of SSMP implementation include the following performance indicators:

- SSOs per 100 miles per year: Goal is less than 2.1 SSOs per 100 miles per year

- Time to contain flow: Goal is to contain SSOs within 5 hours.
- SSO response time: Goal is to respond to all SSOs within 1 hour of notification.

Each of these indicators are tracked and communicated to the District Managers and District Board monthly. Organizational units responsible for various SSMP elements and SSMP activities are tracking relevant data required to manage operational units, SSMP programs, and system performance.

Operations and Maintenance Program: In January 2015, the District began tracking and assessing the success of operations and maintenance work activities using the Maximo Computerized Maintenance Management System (CMMS). The District is using Maximo CMMS data to generate an Operational Dashboard report measuring the following metrics monthly:

- Sanitary Sewer Overflows Per 100 Miles; Goal is less than 2.1 SSOs per 100 miles
- Collection System Odor Complaints
- Collection Preventive Maintenance work order compliance (i.e., whether preventive maintenance is performed on schedule)
- Miles of Cleaning Production; Goal is 5 miles per month
- Completion of Pump Station Preventive Maintenance Work Orders Due; Goal is 95 percent completion
- Completion of Inverted Siphon Preventive Maintenance Work Orders; Goal is 95 percent completion
- Number of Regional System Manholes inspected using Closed Circuit Television Production of per Month; Goal is 42 manholes inspected per month
- Miles of Regional Sewer pipelines inspected per month; Goal is 6.7 miles inspected per month

The report includes a measured value for each metric along with a colored circle indicating whether the measured value is within a Green, Yellow, or Red operating range, with Green being the preferred operating range. The Operational Dashboard is a significant improvement in performance measurement that is providing Collection O&M management and supervision real-time operational performance feedback to manage collection system maintenance activities.

Appendix I1 of the SSMP titled Preventative Maintenance Program specifies collection system maintenance output goals. These goals are summarized in **Table 7**. As documented in the 2015 WDR Audit Report, OCSD may want to focus efforts on improving the ability to provide documentation verifying SSMP commitments are being achieved. As OCSD's implementation of the Maximo computerized maintenance management system continues to mature, OCSD should consider developing additional performance metrics to track achievement of these goals. The current Operational Dashboard metrics come close to achieving this goal. A further improvement OCSD may want to consider is a periodic report indicating which assets have exceeded the preventive maintenance frequencies summarized in Table 7 and which assets are close to exceeding those frequencies.

Table 7: Summary of Maintenance Outputs Specified in SSMP Appendix I1 – Preventive Maintenance Program

Asset Type			Activity Frequency (months)		
			Cleaning	Inspection	Exercise
Gravity Pipe	12-inches and smaller	Higher risk	12	60	
		Lower risk	18	60	
	Greater than 12-inches and less than or equal to 42-inches		60	84	
	Greater than 42-inches		<i>Note 1</i>	84	
Siphons and trouble spot gravity pipe			1 to 9		
Manholes				<i>Note 2</i>	
Pressure sewers and Pumping Facilities	Isolation valves				3
	Air/vacuum release valves			6	

Note 1: Cleaned as required based on CCTV results.

Note 2: Manholes are inspected as part of gravity sewer inspection

Overflow Emergency Response: In addition to the SSO response activities tracked in the Maximo CMMS, the District relies on the SWRCB CIWQS database to store SSO event and reporting data. Supporting SSO documentation (pictures, forms, calculations, etc.) is stored on a District server and is uploaded to the SWRCB CIWQS database.

Fats, Oils, and Grease Control Program: FOG Program inspection information is tracked in the District's FOG Program database. This database tracks all active FOG Program permits, scheduled inspections, follow-up inspections, inspection results, FOG program violations, and enforcement activities.

Sewer Repair, Rehabilitation and Replacement Program: The District is tracking sewer repair activities in the Maximo CMMS. Sewer rehabilitation and replacement is tracked in the GIS as part of the GIS update process. Prior to the GIS update, rehabilitation and replacement of specific assets is tracked by project either by Engineering or Contracts Support Services.

System Evaluation and Capacity Assurance Program: The District tracks the implementation of system evaluation and capacity assurance program recommendations on a project by project basis. These projects are being implemented over a long-term horizon and tracking is documented in the SSMP in Appendix M, Table 1-3. The technical memorandum was last updated on November 14, 2016.

Asset Management Improvement Program: The District has an active Asset Management Improvement Program with long-term, medium-term, and short-term strategies for managing asset reliability. OCSO is currently developing and implementing the processes required to more accurately predict funding required for long-term asset reliability and sustainability. The District's current long-term funding predictions are based on best professional judgment at this time. In the medium-term, CIP funding is reviewed annually based on the projects identified and prioritized to address system reliability needs.

Program Modifications: The SSMP was last certified by the District Board in March 2012. As required by the Monitoring and Reporting Program (Order No. WQ 2013-0058-EXEC) the SSMP includes records documenting the dates of all changes to SSMP chapters and attachments since the last certification, including the name of the person authorizing the changes for all changes occurring since September 2013. Environmental Compliance staff use ECAP to send email reminders to owners assigned to maintain various SSMP chapters and elements. Currently these reminders are sent every six months. Environmental Compliance staff is in the process of reviewing the appropriateness of the update frequency and may be modifying the frequency and schedule for updates based on feedback from chapter and appendix owners. As updates are made by chapter and appendix owners, the revised versions are collected and managed by Environmental Services staff for incorporation into the next published update.

Chapter 11 – SSMP Program Audits

WDR Requirement: *As part of the SSMP, the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee's compliance with the SSMP requirements identified in this subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them.*

Audit Findings: The District is in compliance with the SSMP Program Audit requirement. This audit serves as the District's 2017 SSMP Program Audit and is being performed at a minimum of every two years as required by WDR. As documented in the SSMP Effectiveness section of this audit report, the District's sewer overflow performance is excellent and a two-year audit frequency is appropriate. The District keeps prior SSMP Program Audits on file and the previous SSMP Program Audit is available electronically on the District's website at:

<https://www.ocsd.com/about-us/transparency/waste-discharge-requirements/-folder-612>.

The District's 2015 audit report contained a section analyzing the District's sewer overflow performance and overall SSMP effectiveness. The audit report also included a section providing a narrative review of the effectiveness of each SSMP Program element and identified strengths in the SSMP program as well as deficiencies and steps to correct them.

The District reviewed the findings of the 2015 SSMP program audit, assigned a resource to evaluate each deficiency and develop a plan of action, and documented the results in an Audit Closeout Memo dated June 30, 2016. The Audit Closeout Memo was presented to the Operations Committee on October 5, 2016 and the Board of Directors on October 26, 2016. The Audit Closeout Memo documented updates to the SSMP required to address identified deficiencies. The changes made to the SSMP were deemed not substantial enough to require certification by the Board of Directors.

Environmental Compliance staff has created a calendar reminder to trigger an audit schedule review by the WDR/SSMP audit Subject Matter Expert 7 months in advance of the audit deadline, which will provide enough time to implement OCSD's Environmental Auditing Program Procedures TS-ECRA-SOP-011 and complete the next WDR/SSMP audit on time by May 2, 2019.

Environmental Compliance staff have assigned one point of contact for procurement of audit support services. The scope for the audit is stored on ECAP providing a starting point for future procurements, which streamlines the audit process.

Chapter 12 – Communication Program

WDR Requirement: *The Enrollee shall communicate on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.*

The Enrollee shall also create a plan of communication with systems that are tributary and/or satellite to the Enrollee's sanitary sewer system.

Audit Finding: The District is in compliance with WDR requirements for a Communication Program. The District has a Sanitary Sewer Overflow webpage dedicated to providing the public with information regarding the WDR, OCSD's SSMP, and sewer overflow reporting.

<https://www.ocsd.com/residents/sanitary-sewer-overflow>

The webpage has:

1. Description of sewer responsibility and sewer overflow definition.
2. Information about the State Water Resource Control Board (SWRCB) WDR and a link to the WDR on the State Water Resources Control Board SSO Program webpage (http://www.waterboards.ca.gov/water_issues/programs/sso/).
3. Description of OCSD's SSMP and a link to the document on the OCSD Transparency webpage (<http://www.ocsd.com/about-us/transparency/waste-discharge-requirements/-folder-612>).
4. A list of all of the required elements of the SSMP. The list of outdated and aligned with the older Region 8 SSMP requirements and should be updated to align with the SWRCB WDR SSMP requirements.
5. Information regarding SSO reporting and links to the SWRCB California Integrated Water Quality System (CIWQS) website and spill maps.
6. Information regarding Orange County WDR General Committee meetings and with an open invitation to the public. The page points to the OCSD Calendar which provides the date and time of these meetings.
7. Contact information for key OCSD staff involved with the WDR.

The District has formed two periodic meetings to communicate with tributary agencies including the WDR Steering Committee and the Orange County Waste Discharge Requirements (OC WDR) General Meeting. These meetings occur every two months and consist of representatives of the District and all agencies with a collection systems tributary to OCSD's regional system. These meetings cover a range of topics related to the WDR and serve as an effective means for OCSD to communicate with tributary agencies and the public.

- A list of upcoming meetings for each of these groups is can be found at: <https://www.ocsd.com/about-us/calendar>.

In addition to periodic WDR Steering Committee and OC WDR General Meeting, the District communicates with tributary and satellite agencies in cases where OCSD staff responds to a neighboring agencies SSO event or when the High Flow Emergency Response Plan is activated.

- In the case an SSO occurs on OCSD pipelines, OCSD will coordinate and communicate messaging with the local agency Public Information Officer as necessary.
 - Depending on the magnitude or impact of an SSO event, Environmental Compliance staff and Collection O&M staff will brief Communications staff on the details of the event and Communication staff may develop talking points in preparation of potential news coverage of the event. Two recent events (CIWQS Spill IDs 824417 and 832505) resulted in the development of talking points in preparation for media coverage.
- As described previous, when criteria is met to activate the High Flow Emergency Response Plan, OCSD will communicate the situation to tributary and satellite agencies to support management of flows into the OCSD system.

The Communication Program element of the WDR requires that “*the communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented*”. OCSD is missing out on an opportunity to provide the public with another opportunity and means to provide input on the development and implementation of the SSMP. In addition to all of the other communication mechanisms OCSD employs to communicate with the public, tributary agencies, and satellite agencies, OCSD may want to consider adding a message on the District’s SSO webpage indicating that the current version of the SSMP available on the District website is always available for review and any comments, suggestions, or input from the public is welcome and appreciated. The message can instruct the public to provide this input to any of the three contacts identified on at the bottom of the page for consideration in future SSMP updates.

Strengths and Implementation Accomplishments

Documenting the strengths and implementation accomplishments of the SSMP is as important as determining the deficiencies and corrective actions. The District should recognize the areas of strength in sewer system management as well as continue building upon success in these areas. **Table 8** includes the strengths and implementation accomplishments that were identified during the audit.

Table 8: Strengths and Implementation Accomplishments

WDR Provision	Strengths and Implementation Accomplishments
Overall	The District successfully transferred approximately 170 miles of local sewer pipelines in the Tustin area to the East Orange County Water District, enabling OCSD to focus on management operation and maintenance of the regional system.
D.13(ii) - Organization	The District recently reorganized and has assigned roles and responsibilities for development and implementation of the SSMP. The SSMP organization documentation was updated prior to the audit and staff have been effective at implementing key elements of the SSMP.
D.13(iii) – Legal Authority	The District completed an update of the Waste Discharge Regulation Ordinance in July 2016. OCSD-39 was repealed and replaced by OCSD-48 effective July 1, 2016.
D.13(iv) – Operations and Maintenance Program	<p>The District has sustained an SSO rate in the sewer system of less than 1.31 SSOs per 100 miles of sewer pipelines per year over the last five years, placing OCSD in the category of high-performing sewer systems. The Operations and Maintenance Program is a key contributor to the high level of SSO performance achieved in the last five years through:</p> <ul style="list-style-type: none"> • An aggressive sewer cleaning program in the local sewer system which focuses aggressive sewer cleaning in pipelines with historical maintenance issues and cleaning of all other pipes at least once every year; • A five-year cleaning cycle for all regional sewers less than or equal to 42-inch diameter and more frequent cleaning of known problem regional sewer pipe segments. Trouble spots and siphons are cleaned every 4 weeks to 3 months based on historical cleaning needs, which may include pipe segments larger than 42-inch diameter. • Systematic CCTV inspection of the sewer system on a 5-year cycle beginning with the problematic and older portions

WDR Provision	Strengths and Implementation Accomplishments
	<p>of the system. This systematic approach enables OCSD to identify structural deficiencies in the early stages of deterioration and to monitor these deficiencies and determine appropriate corrective actions.</p> <ul style="list-style-type: none"> • Well-trained collection system employees with all employees above the Maintenance Worker classification maintaining CWEA Collection System Maintenance certifications at or above levels required for their position. • Accurate and up-to-date mapping of the sewer system to support SSO response and preventive maintenance activities. District response crews also have access to stormwater drainage system mapping to support sewer overflow response and recovery. • A pump station maintenance and inspection program with a well-defined maintenance schedule, documented standard operating procedures, checklists, and daily SCADA data review. • Baseline CCTV inspection of all new pipe upon acceptance of new construction.
D.13(iv)(c) – Operations and Maintenance Program	The District has implemented a pump station reliability program that currently performs vibration analysis, oil analysis, and thermography on pump station equipment. This analysis can lead to additional monitoring, maintenance, repair, and in some cases replacement of pump assets. The District has just started utilizing ultrasound to support similar types of decisions. Collection and use of reliability data to support maintenance and renewal decisions is a best practice.
D.13(vi)(c) – Overflow Emergency Response Plan	The District has documented and trained staff on procedures and process for SSO notifications and communication (SSMP Appendices P2 and P3).
D.13(vii) – FOG Control Program	<p>The District has a very effective program for fats, oils, and grease (FOG) blockage control including:</p> <ul style="list-style-type: none"> • Consistent and effective source control of active permitted FSEs. • Implementation of GIS information tools to support FOG investigations. • Aggressive sewer cleaning of all areas known to have a history of FOG issues. • An effective public outreach education program for proper

WDR Provision	Strengths and Implementation Accomplishments
	<p>disposal of FOG through education at public events, website, social media, and newsletters. The District increases promotion prior to holiday events where grease can be an issue (e.g., Thanksgiving and Christmas holidays).</p> <ul style="list-style-type: none"> • A FOG ordinance providing adequate FOG enforcement authorities. • Adequate staffing to accomplish FOG program inspections and enforcement as required. • Close coordination between source control and collection system operations and maintenance staff to investigate FOG issues and determine appropriate source control and maintenance corrective actions to address issues.
D.13(ix) – Monitoring, Measurement, and Program Modifications	The District is tracking SSO performance indicators and is communicating these to District Managers and District Board monthly.
D. 13 (viii) – System Evaluation and Capacity Assurance Program	The District has not experienced any capacity-related sewer overflows in the past eight years.
D. 13 (viii) – System Evaluation and Capacity Assurance Program	In August 2016, the District authorized a new capacity assessment of its collection system (PS 15-08 Collection System Capacity Assessment Study) which will assess current sewer flows, update and validate the hydraulic model, review current design criteria, evaluate hydraulic deficiencies and develop a new Capital Improvement Program. Upon completion of the 2-year project, these findings will be incorporated into the SSMP.
D.13(x) – SSMP Program Audits	The District successfully completed an SSMP Audit and Update cycle. The District conducted an SSMP audit in early 2015. The audit assessed the effectiveness of the SSMP implementation and identified deficiencies in the SSMP and steps to correct them.
D.13(xi) – Communication Plan	The District employs multiple communication methods ranging from face-to-face meetings with tributary and satellite agencies; periodic OC WDR meetings open to the public; a large volume of collection system program documentation available on the OCSD website, and an SSO webpage dedicated to informing the public of the WDR requirements and OCSD's Sewer

WDR Provision	Strengths and Implementation Accomplishments
	System Management Plan.

WDR Compliance, SSMP Deficiencies and Corrective Actions

Several deficiencies were identified during the audit and are in this Section along with recommended corrective actions. Deficiencies were divided into three categories and assigned a deficiency type code. The deficiency categories are coded and defined as shown in **Table 9**:

Table 9: Deficiency Definitions

Deficiency Type	Deficiency Type	Deficiency Definition
A	Non-Compliance	A process or outcome resulting in the SSMP not currently being in compliance with the WDR/SSMP requirements.
B-major	Major Non-Conformance	Moderate to high likelihood that a statement in the SSMP is not fully conformed. Moderate to high likelihood the deficiency may impact the success of the SSMP and/or program performance.
B-minor	Minor Non-Conformance	Low likelihood that a statement in the SSMP is not fully conformed. Low likelihood the deficiency may impact the success of the SSMP and/or program performance.

WDR Compliance

This audit finds the District in compliance with the State Water Resources Control Board Order No. 2006-0003 – Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

SSMP Deficiencies and Corrective Actions

The following tables document the SSMP non-conformance deficiencies identified as a result of the audit along with recommended corrective actions.

Table 10: Major and Minor Non-Conformance Deficiencies and Recommended Corrective Actions

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13(ii) - Organization	Ed Torres is not currently shown as a legally responsible official in the organization chart or in the State Water Resources Control Board CIWQS SSO database.	OCSD may want to consider including Ed Torres as a legally responsible official since he ultimately oversees the Collection O&M crews responsible for pipeline and pump station emergency response, operations, and maintenance.	B-minor
D.13(ii) - Organization	The District Reliability Engineering and Maintenance Team (DREAM Team) is not shown on the organization chart.	Update the Organization Chart to indicate the lines of authority of the DREAM Team.	B-minor
D.13(iv) – O&M Program	The DREAM Team is an important sub-element of the Operation and Maintenance Program and their activities should be described in the Operations and Maintenance chapter of the SSMP.	Incorporate a description of the DREAM Team activities into the SSMP Operations and Maintenance Program chapter.	B-minor
D.13(iv) – O&M Program	Force main inspection is still problematic due to limited access and many force mains remain uninspected. OCSD has used Smartball to assess the condition of some force mains and in some cases has performed external inspection on metallic pipelines.	OCSD should consider developing a programmatic force main inspection and condition assessment plan that evaluates current force main access, identifies potential improvements to improve access, and documents the best approach currently available to assess condition given the current state of maintenance accessibility specific to each force main.	B-major

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13(iv) – O&M Program	Maintenance Planning staff are developing Job Plans in Maximo. Ideally Job Plans would be updated over time to reflect actual protocols followed by Collection O&M crews in the field. This will require feedback from Collection O&M crews back to Maintenance Planning. One issue with the Job Plans for pump station crews is the lack of connectivity in the pump stations. Pump station crews also perform these activities so often, there is not a need to read Job Plans to be able to perform the work.	Develop a plan to update generic Job Plans to become station-specific to improve the ability of the organization to pass this knowledge to future Collection O&M pump station maintenance employees. The plan should take into account the available resource capacity of Maintenance Planning and Pump Station O&M staff. The key is to invest the time up front to ensure the Job Plans have appropriate detail and are correct. This may require multiple visits to the pump station to ensure everything is covered. The District may want to consider revisiting Job Plans once every five years to ensure everything is still the same and no further improvements can be made.	B-minor
D.13(iv) – O&M Program	Supervisors make assignment to crews. Supervisors also review service requests for validation and conversion into work orders. This is a current process bottleneck.	Need to improve this process work flow or have the ability to delegate authority for review of service requests in the case where supervisors are not available for short fuse service requests.	B-minor
D.13(iv) – O&M Program	Work order data collection appears to be inconsistent between crews.	Consider developing guidance to standardize data collection practices for Collection O&M crews. For example, sewer cleaning crews should utilize the same terminology and volume quantification practices for documenting the type and amount of material removed from sewer pipe segments during sewer cleaning.	B-major

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13(iv) – O&M Program	Risk Assessment – OCSD does not continuously update collection system risk as new CCTV data is collected. This has evolved from being a best management practice to becoming a standard industry practice. OCSD recently purchased Innovyze InfoMaster, which has risk assessment functionality.	OCSD should move forward with configuring InfoMaster to calculate asset risk and continuously update the risk assessment for all pipes in the sewer system as new CCTV data is collected.	B-minor
D.13(v) – Design and Performance Provisions	The depth of flow versus diameter criteria included in the District’s Design and Construction Requirements for Sanitary Sewers is more conservative than the criteria described in Appendix M for evaluating and designing improvements to the existing system.	The District should update the Design and Construction Requirements for Sanitary Sewers to include depth of flow versus diameter parameters for the replacement of existing sewer pipelines in areas that are built-out to align with Appendix M.	B-major
D.13(vi) – Overflow Emergency Response Plan	Appendix P2 – Laboratory, Monitoring, and Compliance (LMC) SSO Response Procedure: Includes procedures for the LMC primary responder including protocols for responding to notification, field visitation, and reporting. It was last updated on 11/2/2016. References to this appendix in SSMP Chapter 7 reference Environmental Compliance versus LMC. Also, the cover page for this appendix is titled SSO Notification Procedures and should be updated to SSO Response Procedure.	Update Appendix P2 to address.	B-minor

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13(vi) – Overflow Emergency Response Plan	As documented in the 2013 WDR Audit, the various attachments documenting SSO response protocols are fragmented.	The District may want to consider updates to the Overflow Emergency Response Plan chapter and attachment to address this issue. One suggestion is the consolidation of Appendix Q1 into Chapter 7 of the SSMP. Appendix Q1 provides a narrative description of the overall emergency response program, which is more appropriately included as part of Chapter 7 instead of as an appendix.	B-minor

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13(vi) – Overflow Emergency Response Plan	As noted in the 2010 SSMP audit, SSO response documents still do not address overflows from pump stations and force mains. Overflows from these locations can create significant volumes of sewage in a short amount of time and benefit from having contingency plans in place in the event of a failure.	The District may want to Include a section in the next SSO Emergency Response Plan update focused on pump stations indicating each pump station, location, whether it is equipped with alarms, on-site back-up pumps, and back-up power generators. For any stations that lack back-up pumps and generators, the plan should specify a protocol for prompt delivery of portable pumps or generators in the event of a station failure. In addition, the wet well capacity at each pump station should be provided along with an estimate of how much storage time the wet wells would provide under different flow conditions. It should identify where an SSO will occur if a station fails and where bypass intake and discharge should be set up. Finally, the plan should identify an operation or bypass approach in the case of force main failure and should evaluate whether a more detailed response or contingency plan is necessary for larger pump stations and forcemains or complicated pump station and force main operations.	B-major

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13(vi) – Overflow Emergency Response Plan	As noted in the 2015 SSMP audit, the Control Center staff has a training binder for training new Control Center staff on how to appropriately document and communicate customer calls for potential SSO events. This document is an important training tool and guide for Control Center staff and is not referenced in the SSMP.	Incorporate a reference to the Control Center training binder into the next SSMP update.	B-minor
D.13(vi) – Overflow Emergency Response Plan	The SSO Technical Report for CIWQS Spill ID 832505 documented the use of unsterilized water bottles for water sample collection.	Develop a corrective action to ensure the availability of sterilized water bottles for Collection O&M staff to take water samples if needed.	B-minor
D.13 viii (b) – System Evaluation and Capacity Assurance Plan	Appendix M of the SSMP describes project initiation criteria the District uses to evaluate potential hydraulic deficiencies to trigger analysis of capital improvement alternatives designed to address the deficiency. Project initiation criteria includes a depth to diameter ratio and allowable surcharge based on depth of pipe, using a 10-year design storm. Smaller sewers are determined deficient when the ratio of peak depth of flow to pipe diameter is equal to or greater than 1.0. When redesigning sewers larger than 12 inches, the desired ratio of the peak depth of flow to pipe diameter (d/D) is equal to 1.0. For sewer with a diameter of 12 inches or less, the desired d/D is equal to 0.75.	The District should consider updating Appendix M to more clearly define the distinction between project initiation criteria used by Planning Division to evaluate hydraulic deficiencies versus design criteria used to design collection system capital improvements. The update should also clarify discrepancies between the depth of flow to diameter design criteria provided in the District's Design and Construction Requirements for Sanitary Sewers versus those described in Appendix M.	B-minor

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13 viii (d) – System Evaluation and Capacity Assurance Plan	<p>SSMP and referenced documents such as the 2006 Strategic Plan Update, the 2009 Facilities Plan, and Fiscal Year Budgets describe capital improvement projects for capacity enhancement. Some of the identified projects have been completed and others deferred for a variety of reasons. Although improvements have been made to the table in Appendix M since the last audit, the reason for the cancellation of projects is still not included. Projects listed as “on going” could be in design or construction phases. The anticipated start dates of the projects are listed, however, the anticipated completion dates (as required by the WDR) are not.</p>	<p>Update the table in Appendix M that lists all the capacity-related CIP projects that were identified in the 2006 Strategic Plan Update, the 2009 Facilities Plan, or in the current PS 15-08 study. Include the original source of the recommendation to perform the project. Document the priority and status of each project and projected completion date.</p> <p>For projects that have been deferred and/or are not currently included in the District’s CIP, the table should include the justification for the deferral (e.g., reduced flows, lower growth projections, acceptable level of risk, etc.). This table should be updated annually and included in the SSMP.</p>	B-minor

WDR Provision	Identified Deficiency	Recommended Corrective Action	Deficiency Type
D.13(ix) – Monitoring, Measurement, and Program Modifications	Appendix I1 of the SSMP titled Preventative Maintenance Program, specifies collection system maintenance output goals. These goals are summarized in Table 7 . The current Operational Dashboard metrics come close to achieving this goal.	As documented in the 2015 WDR Audit Report, OCSD may want to focus efforts on improving the ability to provide documentation verifying SSMP commitments are being achieved. As OCSD’s implementation of the Maximo computerized maintenance management system continues to mature, OCSD should consider developing additional performance metrics to track achievement of these goals. A further improvement OCSD may want to consider is a periodic report indicating which assets have exceeded the preventive maintenance frequencies summarized in Table 7 and which assets are close to exceeding those frequencies.	B-minor

Other Findings and Opportunities

This section includes other findings and opportunities for improvements not linked directly to issues of compliance or conformance with the WDR. These are ideas which resulted from the audit and are presented for the District's consideration.

Table 11: Other Findings and Opportunities

WDR Provision	Finding	Opportunity
D.13(ii) - Organization	There are inconsistencies between the titles used on the Organizational Narrative versus those shown on the Program Organizational Chart making it challenging for someone outside of the OCSD organization to follow, yet both documents are mostly up-to-date and comply with the WDR requirement.	Update the Organizational Narrative and Program Organizational Chart to create consistency between the titles or a clear linkage between the titles. For example, a new column could be added to the Organization Narrative to include the exact titles shown in the Program Organizational Chart.
D.13(ii) - Organization	The title for the Principal Public Affairs Specialist is not correct due to a recent promotion.	Update the title.
D.13(iv) – O&M Program	Decision-Making Guidelines – OCSD continues to evaluate the maintenance and renewal needs of sewer pipelines manually and on a case-by-case basis.	OCSD has the opportunity to develop a standardized approach to evaluating maintenance and CCTV data and determine maintenance and renewal actions (i.e., repair, replace, CIPP, upsized, etc.) to address asset deficiencies as maintenance and CCTV data is collected.
D.13(iv) – O&M Program	OCSD recently purchased Innovyze InfoMaster software, which has the functionality to support asset management decision-making.	OCSD should move forward with configuring InfoMaster to calculate asset risk and continuously update the risk assessment for all pipes in the sewer system as new CCTV data is collected.

WDR Provision	Finding	Opportunity
D.13(iv) – O&M Program	Estimating Renewal Needs – OCSD has estimated long-term asset renewal needs and has incorporated these estimates into OCSD’s budget and rate structure. These estimates were based on assumptions for useful life of collection system assets.	OCSD has condition data for almost all collection system assets. OCSD should consider using this data to calculate actual asset reliability rates using available CCTV inspection data and then updating the renewal needs funding forecast. OCSD can then begin to understand whether the current funding level is adequate to sustain desired service levels and risk tolerances.
D.13(iv) – O&M Program	CCTV Inspection Schedule – OCSD has collected CCTV inspection data for almost all collection system gravity mainline assets.	OCSD should consider moving towards a risk-based CCTV monitoring schedule for future inspections. High-risk pipes would be inspected more frequently (e.g. 5 to 10-year schedule) and low risk pipes less frequently (e.g., 10 to 20 year schedule).
D.13(viii) – System Evaluation and Capacity Assurance Plan	The District is currently in the process of developing a new capacity assessment of its collection system (Project PS 15-08) that includes an extensive flow monitoring program and hydraulic model update to assess the system’s capacity to convey current and projected sewer flows.	PS 15-08 provides an opportunity for the District to assess current sewer flows, update and validate the hydraulic model, review current design criteria, evaluate hydraulic deficiencies and develop a new Capital Improvement Program. Upon completion of the project, these findings should be incorporated into the SSMP.

WDR Provision	Finding	Opportunity
D.13(viii) – System Evaluation and Capacity Assurance Plan	As part of PS 15-08, the District will be assessing flows from member agencies. As the District has invested significant funds to assist member agencies with their I/I reduction efforts, this project will help to quantify trends in I/I over time. It is important to the District that peak I/I be controlled by the member agencies. Significant increases in peak I/I could result in additional hydraulic deficiencies that have not yet been identified in the District’s trunk sewers, as well as in the District’s treatment plants and ocean outfalls.	<p>PS 15-08 presents an opportunity for the District to develop a plan to continue to assess I/I from member agencies over time. The updated hydraulic model is capable of quantifying I/I as a percentage of rainfall, factoring in dry and wet antecedent rainfall conditions, and should be able to quantify any significant increases or decreases in I/I that occurs, allowing the District to follow-up and document I&I improvement efforts by upstream agencies. Proposed monitoring program should include comprehensive analysis of flows from these agencies.</p> <p>If a flow monitoring plan is developed as a result of the PS15-08 project, this information should be included in the SSMP and regular updates of the “watch” areas should be provided.</p>
D.13(ix) – Monitoring, Measurement, and Program Modifications	Environmental Compliance staff use ECAP to send email reminders to owners assigned to maintain various SSMP chapters and elements. Currently these reminders are sent every six months.	Environmental Compliance staff is in the process of reviewing the appropriateness of the update frequency and should follow through with modifying the frequency and schedule for updates, as appropriate, taking into consideration the feedback received from chapter and appendix owners.
D.13(xi) – Communication Plan	OCSD is missing out on an opportunity to provide the public with another opportunity and means to provide input on the development and implementation of the SSMP.	OCSD may want to consider adding a message on the District’s SSO webpage indicating that the current version of the SSMP available on the District website is always available for review and any comments, suggestions, or input from the public is welcome and appreciated. The message can instruct the public to provide this input to any of the three contacts identified on at the bottom of the page for consideration in future SSMP updates.