Sewer System Management Plan

Prepared by the City of Orange

Prepared for

State Water Resources Control Board
Order 2022-0103-DWQ

Updated May 2025

Sewer System Management Plan
Update Log Sheet

Date	Rev. #	By	Revisions
January 2012	1	G. Estrada	Title change, update org chart, sewer maps, other minor changes
May 2013	2	G. Estrada	Update text, Overflow Emergency Response Plan, org charts, ordinances, maps, sewer master plan,
May 2014	3	G. Estrada	Updated org charts and maps, City Council Certification
November 2017	4	G. Estrada	Update Public Works Organization, maps, spill guide
May 2020	5	Frank Sun	Update Public Works Organization, add definitions, update Operations and Maintenance Program, update Overflow Emergency Response Plan
June 2023	6	Frank Sun	Updated the Spill (formerly Overflow) Emergency Response Plan to comply with Order 2022-0103-DWQ
May 2025	7	Frank Sun	General updates to comply with Order 2022-0103-DWQ. Also changed the Plan's name from Sanitary Sewer Management Plan to Sewer System Management Plan to align with the Order.

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I. Goal and Introduction

Goal

Requirement
The goal of the Sewer System Management Plan (SSMP or Plan) is to provide a plan and schedule to: (1) properly manage, operate, and maintain all parts of the Enrollee's sanitary sewer system(s), (2) reduce and prevent spills, and (3) contain and mitigate spills that do occur.

The goal of the City's Plan is to provide a plan and schedule to: (1) properly manage, operate, and maintain all parts of the Enrollee's sanitary sewer system(s), (2) reduce and prevent spills, and (3) contain and mitigate spills that do occur.

Introduction

The Plan must include a narrative Introduction section that discusses the following items:

Requirement: Regulatory Context
The Plan Introduction section must provide a general description of the local sewer system management program and discuss Plan implementation and updates.

The City's sewer system management program aims to manage, operate, and maintain the sanitary sewer system, reduce and prevent spills, and mitigate the impact of spills. The Public Works Department is responsible for implementing the Plan. The city evaluates its activities annually to minimize sewer spills by reviewing spill locations and causes, cleaning and videoing frequency, capital improvement programs, and deficiency locations. The City also implements a Sewer Pipe Blockage Control Program, cleans hot spots regularly, and updates its Sewer Master Plan (SMP) as-needed.

Plan updates and self-audits will occur at the frequencies required by the Statewide Sanitary Sewer Systems General Order (Order). Plan updates may also occur as needed. Plan updates will be logged in the Plan and will include a summary of revisions.

Requirement: Sewer System Management Plan Update Schedule
The Plan Introduction section must include a schedule for the Enrollee to update the Plan, including the schedule for conducting internal audits. The schedule must include milestones for incorporation of activities addressing prevention of sewer spills.

Plan updates and self-audits will occur at the frequencies required by the Order. So future Plan updates will be every 6 years starting from 5/2/2025 (e.g., 5/2/2031, 5/2/2036) and future self-audit periods will cover every 3 years starting from 5/2/2024 (e.g., 5/3/2024 - 5/2/2027, 5/3/2027 - 5/30/2030), with the audit reports due six months after the end of the audit period (e.g., 11/2/2027, 11/2/2030). Plan updates may also occur as needed. Plan updates will be logged in the Plan and will include a summary of revisions.

Milestones for the incorporation of activities addressing prevention of sewer spills include the development of the City's Sewer Collection System Master Plan Update in 2012 (SMP, Appendix D), the development of the City's Sanitary Sewer Rehabilitation and Replacement Plan in 2015 (SSRRP, Appendix E), the update to the Spill Emergency Response Plan (SERP) in 2023, the latest update to this Plan (2025), the continued implementation of an annual Capital Improvement Plan for the sanitary sewer system that is based off of the SMP/SSRRP (2023-24 to 2027-28, Appendix F), and the continued implementation of ongoing programmatic activities detailed in this Plan, such as sewer system maintenance, sewer blockage prevention, and spill response.

Plan updates will include the incorporation of any new activities addressing prevention of sewer spills.

Requirement: Sewer System Asset Overview
The Plan Introduction section must provide a description of the Enrollee-owned assets and service area, including but not limited to: ● *Location, including county(ies);* ● *Service area boundary;* ● *Population and community served;* ● *System size, including total length in miles, length of gravity mainlines, length of pressurized (force) mains, and number of pump stations and siphons;* ● *Structures diverting stormwater to the sewer system;* ● *Data management systems;* ● *Sewer system ownership and operation responsibilities between Enrollee and private entities for upper and lower sewer laterals;* ● *Estimated number or percent of residential, commercial, and industrial service connections; and* ● *Unique service boundary conditions and challenge(s).* *Additionally, the Plan Introduction section must provide reference to the Enrollee's up-to-date map of its sanitary sewer system, as required in section 4.1 (Updated Map of Sanitary Sewer System) of this Attachment.*

Description of assets and service area:

- Location, including county(ies): City of Orange, County of Orange.

- Service area boundary: Jurisdictional boundaries of the City of Orange.
- Population and community served: 136,718 residents (as of 2022) of the City of Orange.
- System size, including total length in miles, length of gravity mainlines, length of pressurized (force) mains, and number of pump stations and siphons: 313 miles of gravity mainlines, 0.1 miles of pressurized (force) mains, 2 pump stations, and 14 siphons.
- Structures diverting stormwater to the sewer system: None.
- Data management systems: MaintStar Asset Management System manages sanitary sewer system data and an MS Access database (and CIWQS) is used for spill data.
- Sewer system ownership and operation responsibilities between the City and private entities for upper and lower sewer laterals: The City does not own or operate upper and lower sewer laterals. Lateral operation is the responsibility of the owners.
- Estimated number or percent of residential, commercial, and industrial service connections: Approximately 30,278 residential, 2,524 commercial, and 260 industrial.
- Unique service boundary conditions and challenge(s): The City of Villa Park's and parts of unincorporated county's sanitary sewer systems in part connect to the City's system.

II. Organization

Requirement: Sewer System Management Plan Update Schedule
The Plan must identify organizational staffing responsible and integral for implementing the local Sewer System Management Plan through an organization chart or similar narrative documentation that includes: 1. *The name of the Legally Responsible Official as required in section 5.1 (Designation of a Legally Responsible Official) of the Order;* 2. *The position titles, telephone numbers, and email addresses for management, administrative, and maintenance positions responsible for implementing specific Sewer System Management Plan elements;* 3. *Organizational lines of authority; and* 4. *Chain of communication for reporting spills from receipt of complaint or other information, including the person responsible for reporting spills to the State and Regional Water Boards and other agencies, as applicable. (For example, county health officer, county environmental health agency, and State Office of Emergency Services.)*

Legally Responsible Official

See Appendix A.

Position titles, telephone numbers, and email addresses for management, administrative, and maintenance positions responsible for implementing specific Plan elements, as well as organizational lines of authority.

The City of Orange Public Works Department is responsible for implementing the Plan. A set of organization charts that includes position titles, telephone numbers, and email addresses for management, administrative, and maintenance positions responsible for implementing specific Plan elements is in Appendix A. The charts also outline the lines of authority for administrative and field staff.

Chain of communication for reporting spills from receipt of complaint or other information, including the person responsible for reporting spills to the State and Regional Water Boards and other agencies, as applicable.

The Public Works Engineering Division's Surface Water Quality Section is responsible for oversight of the reporting process. Depending on the time of day in which spills occur, calls for the reporting of spills occur in two ways as reported in the Sewer Emergency Response Plan included in Appendix B. During normal working office hours, calls of spills are reported to the Public Works Maintenance Division at (714) 532-6480. After normal working hours including weekends and holidays the 24 hour hotline number (714) 538-1961, Water Plant Operator and/or call center, receives calls and takes all information and forwards the information to the on-call Public Works supervisor. At that point City work crews are dispatched to the site along with an Environmental Compliance Specialist, who provides reports.

III. Legal Authority

Requirement
The Plan must include copies or an electronic link to the Enrollee's current sewer system use ordinances, service agreements and/or other legally binding procedures to demonstrate the Enrollee possesses the necessary legal authority to: ● *Prevent illicit discharges into its sanitary sewer system from inflow and infiltration (I&I); unauthorized stormwater; chemical dumping; unauthorized debris; roots; fats, oils, and grease; and trash, including rags and other debris that may cause blockages;* ● *Collaborate with storm sewer agencies to coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross connections of sanitary sewer infrastructure to storm sewer infrastructure;* ● *Require that sewer system components and connections be properly designed and constructed;* ● *Ensure access for maintenance, inspection, and/or repairs for portions of the service lateral owned and/or operated by the Enrollee;* ● *Enforce any violation of its sewer ordinances, service agreements, or other legally binding procedures; and* ● *Obtain easement accessibility agreements for locations requiring sewer system operations and maintenance, as applicable.*

The City's legal authority for these items is established by the following:

Legal Authority Requirement 1 of 6. Legal authority to prevent illicit discharges into its sanitary sewer system from inflow and infiltration (I&I); unauthorized stormwater; chemical dumping; unauthorized debris; roots; fats, oils, and grease; and trash, including rags and other debris that may cause blockages.

Orange County Sanitation District Ord. 53, which covers the City of Orange, is a general ordinance for the Orange County Sanitary District which treats all of the wastewater from the City. The ordinance contains requirements on what can be disposed of in the sewers, prohibited discharges, authority to carry out the ordinance, and enforcement. The City also uses Municipal Code Sections 13.66 (FOG requirements) and 13.64 (Industrial Waste) to prohibit the discharge of waste that may be harmful or obstruct flow within the sewer system.

Links:
https://records.ocsan.gov/WebLink/DocView.aspx?id=205719&dbid=0&repo=OrangeCountySanitationDistrict

https://ecode360.com/43564751

https://ecode360.com/43564689

Legal Authority Requirement 2 of 6. Legal authority to collaborate with storm sewer agencies to coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross connections of sanitary sewer infrastructure to storm sewer infrastructure.

The City is party to a Water Quality Ordinance Implementation Agreement with the Orange County Flood Control District. This Agreement, along with the similar Water Quality Ordinances of the City and its adjoining storm sewer agencies, provides the legal authority to collaborate with and coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross connections of sanitary sewer infrastructure to storm sewer infrastructure.

Legal Authority Requirement 3 of 6. Legal authority to require that sewer system components and connections be properly designed and constructed.

Design of sewers in the City's collection system is based on the requirements contained in Design and Construction Requirements of Sanitary Sewers by the Orange County Sanitation District. It contains design requirements such as maximum peak flow allowed, minimum velocity, depth of cover, land use density, manhole spacing, materials and other criteria used in designing sewers within the City. While not formally incorporated into the City's municipal code, it is used by the various divisions involved in the design of sewers.

Link:
https://www.ocsan.gov/wp-content/uploads/2024/08/2022-OC-SAN-Design-and-Con.pdf

The City of Orange Standard Plans Series 200 provides information on constructing sewer manholes and other elements related to sanitary sewers.

Link:
https://www.cityoforange.org/our-city/departments/public-works/engineering-division/engineering-standards

Through its municipal code, the City has adopted the Standard Specifications for Public Works Construction more commonly known as the Green Book. This document, particularly sections 306 and 500 are used in the construction of City sewers. Section 306 Underground Conduit Construction covers sewer pipe construction and includes information on excavation, trenching, bedding, joints, backfill, air pressure tests, water pressure tests and other items related to the installation and acceptance of underground pipes. Section 500, Pipeline Rehabilitation, includes information on various lining methods that can be used to rehabilitate underground pipes.

Link:
https://citydocs.cityoforange.org/WebLink/DocView.aspx?id=244347704&dbid=0&repo=CityofOrange

Legal Authority Requirement 4 of 6. Legal authority to ensure access for maintenance, inspection, and/or repairs for portions of the service lateral owned and/or operated by the City.

Most laterals in the City are privately owned. It is the responsibility of the owner to maintain the private lateral in good working condition free of obstructions (OMC 13.56.050). In cases where a sewer lateral is required to be maintained by the City, an easement is recorded that contains provisions for access, maintenance and inspection by the City.

Link:
https://ecode360.com/43564654

Legal Authority Requirement 5 of 6. Enforce any violation of its sewer ordinances, service agreements, or other legally binding procedures.

Chapter 1.08 of the Municipal Code provides the legal authority to enforce the City's sewer ordinances. The City Attorney ensures that service agreements and other legally binding procedures include the legal authority to enforce violations.

Link:
https://ecode360.com/43545657

Legal Authority Requirement 6 of 6. Obtain easement accessibility agreements for locations requiring sewer system operations and maintenance, as applicable.

In cases where a sewer lateral is required to be maintained by the City, an easement is recorded that contains provisions for access, maintenance and inspection by the City.

IV. Operation and Maintenance Program

The Plan must include the items listed below that are appropriate and applicable to the Enrollee's system.

Requirement: Updated Map of Sanitary Sewer System
An up-to-date map(s) of the sanitary sewer system, and procedures for maintaining and providing State and Regional Water Board staff access to the map(s). The map(s) must show gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities within the sewer system service area boundaries.

The City collection system has been mapped including all gravity lines and manholes, pump facilities and storm water conveyance systems. These maps are stored within the City's geographic information system (GIS) and are maintained and updated as needed. Attributes available for viewing within the GIS system include pipe size, material, year built, pipe identifier, slope, invert, manhole number and other attributes. Storm water conveyance facilities are also stored in a GIS database and include information such as pip size, material, catch basin and their identifier and other information.

A copy of these up-to-date maps is accessible to the public at the following link:
https://experience.arcgis.com/experience/d5b47f56c689474bafa6e0070af1217d/

Requirement: Preventive Operation and Maintenance Activities
A scheduling system and a data collection system for preventive operation and maintenance activities conducted by staff and contractors. The scheduling system must include: ● *Inspection and maintenance activities;* ● *Higher-frequency inspections and maintenance of known problem areas, including areas with tree root problems;* ● *Regular visual and closed-circuit television (CCTV) inspections of manholes and sewer pipes.* *The data collection system must document data from system inspection and maintenance activities, including system areas/components prone to root-intrusion potentially resulting in system backup and/or failure.*

The City has historically had a Preventive Maintenance Plan, which included cleaning of the City's collection system. To provide increased and dedicated resources to the sewer system, the City contracts out a vast majority of the cleaning and inspection. This includes routine cleaning and inspection as well as the more frequent "hot spots" cleaning. The city is divided into 5

sections based on their primary servicing requirements where areas of greater need would be emphasized such as industrial/commercial areas and areas where sewer pipe grades were minimal. The oldest sections of the City will be inspected annually. Residential areas and areas where sewer pipe grades are in excess of minimal scour velocity will be cleaned less frequently (every two to three years) and other areas inspected every five years. Until a specific cause is identified and eliminated, hot spots will be monitored and cleaned as needed, typically every three or six months depending on suspected cause and buildup in the pipe.

The City will implement mechanical root control methods when roots are determined to be the cause of buildup in the pipe. Chemical root control is not allowed.

The City will continue to monitor and adjust schedules to facilitate optimal operation of the collection system and proper allocation of limited resources. Cleaning and CCTV inspection will be on the schedule identified in Attachment B of the Sanitary Sewer Rehabilitation and Replacement (SSRRP, Appendix E). A listing of the existing hot spots can be found in Appendix C.

In addition, the City has two sewer pump stations, which are serviced and inspected monthly under a contract.

Manhole inspections are conducted during field visits and documented using a form.

The City will utilize the CCTV inspection program as outlined above. This program identifies structural deficiencies in the City's collection system. Prioritization along with short and long term strategies for rehabilitation of any structural deficiencies found through the inspection program will be addressed in the City's capital improvement program. This is a comprehensive budgeting program, which looks forward seven years and is updated annually. Items related to deficiencies identified in the City's Master Plan of Sewers are discussed in Section 6 of the latest plan dated August 2012.

By February 2025, for all sewer lines in the Collection System located within two hundred (200) feet of Surface Waters, the City:

1. Repaired or replaced all gravity sewer lines previously found to be Significantly Defective;
2. Began a Surface Water Assessment to prioritize the review, rating, and repairs of gravity sewer lines located within 200 feet of surface water.
3. Sewer pipe segments containing defects with a PACP rating of 3 that are not repaired or replaced within five (5) years after completion of the Surface Water Condition Assessment are to be re-CCTV'd every ten (10) years to ascertain their condition. If the City determined the sewer pipe segment had deteriorated and needed to be repaired or replaced, the City completed such repair or replacement within five (5) years after the last CCTV cycle.

For the remainder of the Collection System, the City will implement the Condition Assessment Cycle and re-inspect all gravity sewer lines, manholes, pump/lift stations, and pipe segments at

least every ten (10) years. This program of re-inspection will begin one (1) year following completion of the Full Condition Assessment.

Requirement: Training
In-house and external training provided on a regular basis for sanitary sewer system operations and maintenance staff and contractors. The training must cover: ● *The requirements of the Order;* ● *The Enrollee's Spill Emergency Response Plan procedures and practice drills;* ● *Skilled estimation of spill volume for field operators; and* ● *Electronic CIWQS reporting procedures for staff submitting data.*

Administrative and Field Staff are regularly trained in the above elements. California Water Environment Association (CWEA) certification training for Field staff is conducted on a regular basis. Attainment of the following "Collections" certification grades will be the goal of the City.

Position	Grade level
Maintenance Division Manager	4
Assistant Field Services Manager	3
General/Sanitation Supervisor	2
All Field support staff	1
Environmental Compliance Specialist	1
Environmental Scientist	3
Environmental Program Manager (NPDES)	3
Contract personnel are trained on an as-needed basis	

Requirement: Equipment Inventory
An inventory of sewer system equipment, including the identification of critical replacement and spare parts.

The City has or has on order general maintenance equipment necessary to perform minor sewer construction, maintenance, and inspection work. The City maintains a limited supply of sewer pipe, clamps, manhole covers and emergency pumps and hoses stored at the City's Corporation Yard. In addition, as part of an emergency response cooperative, the City is able to contact other local wastewater agencies to obtain emergency repair parts.

V. Design and Performance Provisions

The Plan includes the following items as appropriate and applicable to the City's system:

Requirement: Updated Design Criteria and Construction Standards and Specifications
Updated design criteria, and construction standards and specifications, for the construction, installation, repair, and rehabilitation of existing and proposed system infrastructure components, including but not limited to pipelines, pump stations, and other system appurtenances. If existing design criteria and construction standards are deficient to address the necessary component-specific hydraulic capacity as specified in section 8 (System Evaluation, Capacity Assurance and Capital Improvements) of this Attachment, the procedures must include component-specific evaluation of the design criteria.

As noted in Section III, design of the City's sewer collection system is based on the Orange County Sanitation District's document Design and Construction Requirements of Sanitary Sewers. The document contains design requirements such as maximum peak flow allowed, minimum velocity, depth of cover, land use density, manhole spacing, materials and other criteria used in designing sewers within the City.

Construction specifications for construction and performance of its new sewer lines and the rehabilitation of existing sewer lines are through the Standard Specifications for Public Works Construction (Green book) as modified internally to meet City requirements. The Green Book sections most commonly used in the construction of City sewers are sections 306 and 500.

Section 306 Underground Conduit Construction covers sewer pipe construction and includes information on excavation, trenching, bedding, joints, backfill, air pressure tests, water pressure tests and other items related to the installation and acceptance of underground pipes. Section 500, Pipeline Rehabilitation, includes information on various lining methods that can be used to rehabilitate underground pipes.

Existing design criteria and construction standards are sufficient to address the necessary component-specific hydraulic capacity as specified in Section 8 of Attachment D of the Order.

Requirement: Procedures and Standards
Procedures, and standards for the inspection and testing of newly constructed, newly installed, repaired, and rehabilitated system pipelines, pumps, and other equipment and appurtenances.

Inspection and testing standards of new sewers and rehabilitation of existing sewers are in accordance with Section 306 of the Green Book as noted above.

VI. Spill Emergency Response Plan

Requirement

The Plan must include an up to date Spill Emergency Response Plan to ensure prompt detection and response to spills to reduce spill volumes and collect information for prevention of future spills. The Spill Emergency Response Plan must include procedures to:

- *Notify primary responders, appropriate local officials, and appropriate regulatory agencies of a spill in a timely manner;*
- *Notify other potentially affected entities (for example, health agencies, water suppliers, etc.) of spills that potentially affect public health or reach waters of the State;*
- *Comply with the notification, monitoring and reporting requirements of this Order, State law and regulations, and applicable Regional Water Board Orders;*
- *Ensure that appropriate staff and contractors implement the Spill Emergency Response Plan and are appropriately trained;*
- *Address emergency system operations, traffic control and other necessary response activities;*
- *Contain a spill and prevent/minimize discharge to waters of the State or any drainage conveyance system;*
- *Minimize and remediate public health impacts and adverse impacts on beneficial uses of waters of the State;*
- *Remove sewage from the drainage conveyance system;*
- *Clean the spill area and drainage conveyance system in a manner that does not inadvertently impact beneficial uses in the receiving waters;*
- *Implement technologies, practices, equipment, and interagency coordination to expedite spill containment and recovery;*
- *Implement pre-planned coordination and collaboration with storm drain agencies and other utility agencies/departments prior, during, and after a spill event;*
- *Conduct post-spill assessments of spill response activities;*
- *Document and report spill events as required in this General Order; and*
- *Annually, review and assess effectiveness of the Spill Emergency Response Plan, and update the Plan as needed.*

The City's Spill Emergency Response Plan (SERP) is in Appendix B. Annually, the City will review and assess effectiveness of the SERP, and update it as needed.

VII. Sewer Pipe Blockage Program

Core Requirement
The Plan must include procedures for the evaluation of the City's service area to determine whether a sewer pipe blockage control program (SPBP) is needed to control fats, oils, grease, rags and debris. If the City determines that a program is not needed, the City shall provide justification in its Plan for why a program is not needed.

Spill causes reported through the SERP indicated that an SPBP is needed to control FOG, rags, and debris. The SPBP procedures required by the Order are as follows:

SPBP Procedures Requirement 1 of 7: An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG.

At the on-set of the FOG program, the City provided a poster and two informational DVDs to all inventoried City restaurants on the proper disposal of FOG and kitchen best management practices. When a new restaurant opens in the City an Environmental Compliance Specialist will conduct an introductory meeting/informal training during which the restaurant receives a poster and brochures containing appropriate best management practices for kitchen procedures to ensure it adheres to proper FOG disposal. In addition, the City currently uses its local newsletter *Our Orange* and website to reach residents and inform them of the need for proper FOG disposal. FOG brochures are also available at the City's Public Works counter.

SPBP Procedures Requirement 2 of 7: A plan and schedule for the disposal of pipe-blocking substances 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 substances generated within a sanitary sewer system service area.

Each restaurant within the City is responsible for the proper disposal of pipe-blocking substances generated within its facility. If necessary and requested by the facility, the City provides a list of acceptable disposal operators.

SPBP Procedures Requirement 3 of 7: The legal authority to prohibit discharges to the system and identify measures to prevent spills and blockages.

The City of Orange adopted Ordinance 17-04 its Fats, Oils and Grease Control Regulations Applicable to Food Service Establishments on November 9, 2004 to control the discharge of FOG into the City's sanitary sewer system. The ordinance was codified into its municipal code in Chapter 13.66. The ordinance contains information on how to reduce the impact of FOG on the sewer system through the use of kitchen best management practices. In addition, Orange County Sanitation District Ord. 53, which covers the City of Orange, is a general ordinance for the Orange County Sanitary District which treats all of the wastewater from the City. The ordinance contains requirements on what can be disposed of in the sewers, prohibited discharges, authority to carry out ordinance and enforcement.

SPBP Procedures Requirement 4 of 7: Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, best management practices requirements, recordkeeping and reporting requirements.

Ordinance 17-04 requires all new food service facilities (FSEs) to install grease interceptors or grease traps as necessary to control the discharge of FOG into the sanitary sewer system. FSEs that are upgraded or have operational changes may also be required to install grease interceptors or grease traps if they trigger certain requirements in the ordinance. In addition, existing FSE may be required to install new grease control devices if it is determined that they

are discharging an excessive amount of grease and it is contributing to sanitary sewer overflows. The ordinance also contains BMP, recordkeeping, and reporting requirements.

SPBP Procedures Requirement 5 of 7: Authority to inspect grease producing facilities, enforcement authorities, and whether the City has sufficient staff to inspect and enforce the fats, oils, and grease ordinance.

Ordinance 17-04 provides authority to inspect grease producing facilities and contains enforcement provisions that include Civil and Criminal penalties to ensure those discharging FOG into the sanitary sewer system can be prosecuted. The City of Orange currently contracts with the Orange County Health Care Agency to inspect all of the City's restaurants to ensure proper best management practices are being implemented and FOG is not being discharged. City staff are used to inspect grease interceptors and grease traps every 3 to 6 months as needed based on the amount of FOG generated.

SPBP Procedures Requirement 6 of 7: An identification of sanitary sewer system sections subject to fats, oils, and grease blockages and establishment of a cleaning schedule for each section.

The City regularly produces a list of hot spots associated with FOG discharges. Hot spots are cleaned regularly every 3 to 6 months to minimize spills.

SPBP Procedures 7 of 7: Implementation of source control measures for all sources of fats, oils, and grease reaching the sanitary sewer system for each section identified above.

As noted above, all grease producing facilities are provided with education and training material on the proper disposal of FOG. Where specific sources have been identified, attempts are made to remove the FOG source through education, additional BMP training or installation of grease capturing devices. Where the source cannot be identified, the area is targeted for outreach through flier distribution of door hangers or educational letters. The area may also be added for frequent cleaning. All of this is considered instrumental in reducing spills from hot spot areas. Based on the frequency of sewer spills the previous years, the program seems to be successful.

VIII. System Evaluation, Capacity Assurance and Capital Improvements

Core Requirement

The Plan must include procedures and activities for:

- *Routine evaluation and assessment of system conditions;*
- *Capacity assessment and design criteria;*
- *Prioritization of corrective actions; and*
- *A capital improvement plan.*

The required procedures and activities are as follows:

Requirement: System Evaluation and Condition Assessment
The Plan must include procedures to: ● *Evaluate the sanitary sewer system assets utilizing the best practices and technologies available;* ● *Identify and justify the amount (percentage) of its system for its condition to be assessed each year;* ● *Prioritize the condition assessment of system areas that:* ○ *Hold a high level of environmental consequences if vulnerable to collapse, failure, blockage, capacity issues, or other system deficiencies;* ○ *Are located in or within the vicinity of surface waters, steep terrain, high groundwater elevations, and environmentally sensitive areas;* ○ *Are within the vicinity of a receiving water with a bacterial-related impairment on the most current Clean Water Act section 303(d) List;* ● *Assess the system conditions using visual observations, video surveillance and/or other comparable system inspection methods;* ● *Utilize observations/evidence of system conditions that may contribute to exiting of sewage from the system which can reasonably be expected to discharge into a water of the State;* ● *Maintain documents and recordkeeping of system evaluation and condition assessment inspections and activities; and* ● *Identify system assets vulnerable to direct and indirect impacts of climate change, including but not limited to: sea level rise; flooding and/or erosion due to increased storm volumes, frequency, and/or intensity; wildfires; and increased power disruptions.*

The City evaluates its sanitary sewer system assets through a combination of master planning, hydraulic modeling, flow monitoring, and physical condition assessments. The Sewer System Master Plan (SMP, included as Appendix D) is a key planning tool that is updated periodically (most recently in 2012) to analyze the existing system capacity and identify required upgrades based on both existing and ultimate (build-out) conditions outlined in the City's General Plan. This evaluation involves creating a computer model using GIS data of the sewer infrastructure, including pipe and manhole information, and calibrating it with field flow monitoring data. Hydraulic modeling is used to assess the capacity of the pipelines under both dry and estimated wet weather flows, identifying hydraulically deficient segments based on d/D ratios exceeding established criteria. The City also utilizes flow monitoring investigations at key locations to verify flow characteristics and calibrate the hydraulic model, contributing to the development of flow generation factors for different land uses. In addition, the City conducts video inspection (CCTV) of the sewer lines as a primary method for assessing their physical condition. This allows for the identification of structural deficiencies such as broken pipes and severe offsets. The City uses the PACP (Pipeline Assessment Certification Program) developed by NASSCO to grade the condition of the sewer line segments based on these inspections.

In 2015 the City developed a Sanitary Sewer Rehabilitation and Replacement Plan (SSRRP, included in Appendix E). Although the SSRRP does not state a target annual percentage for condition assessment, it details a cyclical and risk-based approach that indicates that a significant portion of the system is evaluated regularly. The SSRRP states that the entire sewer system is cleaned over a five-year cycle, meaning approximately 20% of the system is cleaned annually. This cleaning process, while not a detailed condition assessment, allows for visual observations and can help identify areas needing further inspection. For more detailed condition assessment using CCTV, the City aims to CCTV each gravity sewer line at least every ten years on a rolling basis. This suggests an average annual assessment rate of approximately 10% of the sewer lines through CCTV inspection. This ten-year cycle, along with the more frequent cleaning in older areas like Old Towne (annually) and known hot spots (quarterly), demonstrates a justified approach based on the age of pipelines and known problem areas. The Maintenance Division adjusts inspection frequencies as necessary based on these factors. The City conducts condition assessment for about 20% of the City's sewer system with a combination of both programmed annual video inspection and targeted inspection as needed. The amount of the annual assessment is what the City's sewer fee can support and the City's sewer capital improvement funding can implement. This plan has been effective in addressing both the sewer maintenance need and the structural deficient sewer main improvement need.

The prioritization of the condition assessment is based on historical data and identified deficiencies:

- The SMP focuses on mitigating potential cumulative impacts to the sewer collection system, which inherently considers the consequences of system deficiencies. Identifying hydraulically deficient pipes, especially those exceeding d/D criteria under both dry and wet weather conditions, prioritizes areas vulnerable to capacity issues, which could lead to overflows with environmental consequences.
- The SSRRP highlights "sewer hot spots" known for past spills and identifies "Sewer Repair Areas" with existing defects (broken pipes, offsets) based on video inspections. These areas, with a demonstrated history or high potential for sewage exiting the system, are implicitly prioritized for assessment and repair. The more frequent cleaning cycle in Old Towne, with its older infrastructure, also indicates a prioritization based on the potential for failure.
- The recommendation to investigate the Hart Park Lift Station due to concerns about capacity and operation in preventing sewer spills indicates a prioritization of assets near surface waters (Santiago Creek) to mitigate potential environmental impacts.

While the SMP and SSRRP do not explicitly state a prioritization based on steep terrain and high groundwater elevations, the overall approach of addressing known problem areas, aging infrastructure, and hydraulically deficient segments inherently targets vulnerabilities that could be exacerbated by such conditions. The City's sewer system located within the vicinity of surface waters, steep terrain, high groundwater elevations, and environmentally sensitive areas is limited and can be prioritized within the City's programmed annual inspection activities.

According to the California proposed 2020-2022 Integrated Report 303(d) Map, there are no impaired waterbodies within the City limits, or within approximately 3.5 miles downstream of the City. Most of the City falls within the Santa Ana River Watershed, for which there are no impairments listed. (A small southwestern portion of the City drains about 3.5 miles to the East Garden Grove Wintersburg Channel, which is impaired for Ammonia. A relatively small southeastern portion of the

City drains about 5 miles to Peters Canyon Channel, which is impaired for pH, Toxaphene, Benthic Community Effects, Malathion, Selenium, Toxicity, DDT, and Indicator Bacteria. Peters Canyon Channel drains to the San Diego Creek and the Newport Bay, both of which are listed for Indicator Bacteria, in addition to other listings.)

The SSRRP outlines the methods used to assess system conditions:

- Visual Observations: These occur during the cleaning process, where maintenance crews can identify obvious issues.
- Video Surveillance (CCTV): The Maintenance Division utilizes vans equipped with video cameras and cleaning equipment to conduct internal inspections of sewer lines. Pipe hunters are also used for inspection.
- PACP Grading: The video inspections result in a condition grade (1 to 5) based on the PACP standards, providing a systematic way to categorize the severity of observed defects.

The City's condition assessment practices directly target observations and evidence of system conditions that could lead to sewage exiting the system. The identification of hydraulically deficient pipes through modeling points to areas susceptible to backups and overflows, particularly during peak flows, which could result in sewage discharge. Similarly, the video inspections identify physical defects such as broken pipes, severe offsets, cracks, and holes that can directly cause leaks and exfiltration of sewage into the surrounding environment, potentially reaching waters of the State. The "Sewer Repair Areas" list explicitly documents these conditions. The focus on "hot spots" with a history of sewer spills further demonstrates the utilization of evidence of past sewage exiting the system to inform ongoing assessment and maintenance efforts.

The SSRRP and the development of the SMP demonstrate a commitment to maintaining documents and recordkeeping.

- The Maintenance Division maintains records of sewer line videos and forwards them to the City's GIS group to be attached to the appropriate line segment.
- Segments with deficiencies identified through video inspection are documented and forwarded to the Maintenance Manager. The SSRRP lists deficient sewer segments.
- The Sewer System Master Plan itself is a comprehensive document detailing the system evaluation, modeling results, and recommendations. Updates to the SMP (e.g., the 2012 update) are also documented.
- The Capital Improvement Program (CIP) lists proposed sewer projects derived from the identified deficiencies, indicating a record of planned improvements based on assessment findings.
- The existence of a GIS-based sewer system with plans indicates a centralized system for maintaining data about the sewer assets.

The City's sewer system has vulnerability to sea level rise and increased storm volumes, frequency, and/or intensity due to their potential impacts to the Orange County Sanitation District's trunk line that the city's system convenes flow to.

Requirement: Capacity Assessment and Design Criteria

The Plan must include procedures to identify system components that are experiencing or contributing to spills caused by hydraulic deficiency and/or limited capacity, including procedures to identify the appropriate hydraulic capacity of key system elements for:

- *Dry-weather peak flow conditions that cause or contribute to spill events;*
- *The appropriate design storm(s) or wet weather events that causes or contributes to spill events;*
- *The capacity of key system components; and*
- *Identify the major sources that contribute to the peak flows associated with sewer spills.*

The capacity assessment must consider:

- *Data from existing system condition assessments, system inspections, system audits, spill history, and other available information;*
- *Capacity of flood-prone systems subject to increased infiltration and inflow, under normal local and regional storm conditions;*
- *Capacity of systems subject to increased infiltration and inflow due to larger and/or higher-intensity storm events as a result of climate change;*
- *Increases of erosive forces in canyons and streams near underground and above-ground system components due to larger and/or higher-intensity storm events;*
- *Capacity of major system elements to accommodate dry weather peak flow conditions, and updated design storm and wet weather events; and*
- *Necessary redundancy in pumping and storage capacities.*

The following are City procedures to identify system components that are experiencing or contributing to spills caused by hydraulic deficiency and/or limited capacity:

- Hydraulic Modeling: The City develops and updates a comprehensive hydraulic computer model of its sewer collection system using GIS-based software. This model simulates flow under various conditions to identify pipe segments where capacity is exceeded based on the ratio of water depth to pipe diameter (d/D).
- Flow Monitoring: Field flow monitoring investigations are conducted at key locations within the system to measure actual flow characteristics. This data is crucial for calibrating the hydraulic model and verifying previously identified deficiencies.
- Master Plan Analysis: The SMP includes a systematic analysis of the City's sewer system capacity. This analysis identifies deficient segments based on criteria derived from the Orange County Sanitation District (OCSD) and the City’s General Plan, considering both existing and ultimate build-out conditions.

The following are City procedures to identify the appropriate hydraulic capacity of key system elements for:

- Dry-weather peak flow conditions that cause or contribute to spill events: The hydraulic model is run for peak dry weather flows, which are determined using flow monitoring data to establish diurnal flow patterns and peaking factors. The OCSD peaking formula is also

utilized for analysis outside of monitored areas. System components exceeding defined d/D criteria (0.50 for pipes < 18 inches, 0.75 for pipes ≥ 18 inches) under peak dry weather flow are identified as potentially deficient.

- The appropriate design storm(s) or wet weather events that causes or contributes to spill events: Peak wet weather flows are estimated by increasing peak dry weather flows by a factor to account for rainfall dependent inflow and infiltration (I/I). Estimates are based on previous OCSD studies and adjacent agency criteria. Pipes exceeding a d/D ratio of 0.90 during these estimated peak wet weather flow conditions are considered deficient.
- The capacity of key system components: The hydraulic model analyzes the carrying capacity of individual pipelines based on factors like diameter, slope, and roughness coefficient (Manning's n). The capacity is evaluated against peak dry and wet weather flow estimates to determine if the component can adequately convey the flow without surcharging.

The following are City procedures to identify the major sources that contribute to the peak flows associated with sewer spills:

- Land Use and Population: The SMP utilizes land use data and projected population from the City's General Plan to estimate both existing and ultimate system flows. Changes in land use intensity and population density are considered major drivers of increased flows.
- Inflow and Infiltration (I/I): Wet weather peak flows are directly influenced by inflow (surface water entering through manholes) and infiltration (groundwater entering through pipe defects). Estimates for I/I are incorporated into wet weather flow analyses.

The capacity assessment considers the following:

- Data from existing system condition assessments, system inspections, system audits, spill history, and other available information: The SMP utilizes information on known O&M problem areas identified by the Public Works Maintenance Division. Sewer Repair Areas with documented defects from video inspections (as noted in the SSRRP) and the history of sewer spill locations and causes (as tracked for the SSMP) inform the prioritization of capacity assessments in areas with a higher likelihood of hydraulic deficiencies contributing to spills.
- Capacity of flood-prone systems subject to increased infiltration and inflow, under normal local and regional storm conditions: The estimation of wet weather flows in the SMP attempts to account for increased I/I during storm events.
- Capacity of systems subject to increased infiltration and inflow due to larger and/or higher-intensity storm events as a result of climate change: The current wet weather flow estimation methodology in the SMP is based on historical data and does not explicitly model the impact of larger or higher-intensity storm events resulting from climate change. The SMP recommends a more extensive wet weather flow monitoring program for a better understanding of I/I impacts. As noted above, the estimation of wet weather flows in the SMP attempts to account for increased I/I during storm events.
- Increases of erosive forces in canyons and streams near underground and above-ground system components due to larger and/or higher-intensity storm events: . As noted above, the estimation of wet weather flows in the SMP attempts to account for increased I/I during storm events.

- Capacity of major system elements to accommodate dry weather peak flow conditions, and updated design storm and wet weather events: The hydraulic modeling within the SMP assesses the capacity of sewer pipelines against calculated peak dry weather flows and estimated peak wet weather flows using established design criteria for d/D ratios and velocities. The SMP aims to provide a planning tool to ensure the collection system can operate effectively under these flow conditions.
- Necessary redundancy in pumping and storage capacities: The SSMP identified the need to replace aging pumps at the Hart Park and Stacey Lee Lift Stations, which the SSRRP notes as being replaced in 2014.

Requirement: Prioritization of Corrective Action
The findings of the condition assessments and capacity assessments must be used to prioritize corrective actions. Prioritization must consider the severity of the consequences of potential spills.

Condition assessment data is used for prioritization:

- The SSRRP states that a committee comprised of the Public Works Director, City Engineer, and Maintenance Manager will review a list of sewer segments with deficiencies annually and prioritize segments for rehabilitation and replacement. This prioritization is based on several factors, including the severity of the deficiency.
- The SSRRP uses the PACP (Pipeline Assessment and Certification Program) rating system to grade the condition of sewer line segments from 1 (Excellent) to 5 (Immediate Attention). Segments receiving a grade of 4 or 5 are considered Significantly Defective. The rehabilitation replacement focuses on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects, which correlate with higher PACP ratings.
- The City will repair or replace all gravity sewer lines previously found to be significantly defective. This demonstrates a prioritization based on the potential consequence of a spill reaching sensitive environmental areas.

Capacity assessment data is used for prioritization:

- The SMP provides a detailed capacity analysis of the sewer system, identifying hydraulically deficient pipes based on the ratio of the depth of water to the diameter of the pipeline (d/D ratio) under both dry and wet weather conditions.
- The SMP establishes priority level criteria for deficient pipelines based on the d/D ratio:
    - Critical Priority: d/D > 0.90 in all conditions. This signifies a severe deficiency with a high potential for overflow.
    - High Priority: Dry weather d/D exceeded, wet weather d/D > 0.90. These segments are also at high risk of spilling, especially during wet weather events.
    - Low Priority: Dry weather d/D exceeded, wet weather d/D < 0.90. These may be addressed in the longer term.
- The SRP states that pipelines with a critical priority are to be considered as the City's top priority projects for capital improvement. This links the severity of the hydraulic deficiency to the urgency of corrective action.

Prioritization considers the severity of consequences of potential spills:

- This Plan emphasizes an annual evaluation of activities to ensure resources are used effectively and targeted to minimize sewer spills. This includes reviewing sewer spill locations, causes of spills, cleaning and videoing frequency, the capital improvement program, and hot spot and sewer deficiency locations. This holistic review integrates findings from condition and capacity assessments with spill history to inform prioritization.
- The SSRRP notes that prioritization considers "public risk". This implies that deficiencies in areas with higher population density, proximity to critical infrastructure, or a history of spills impacting the public health or environment would likely be given higher priority.
- The Plan's SERP details procedures for responding to and reporting spills, including categorization based on whether the spill reaches surface waters or the MS4. This focus on the potential for spills to impact receiving waters indicates that deficiencies that could lead to such spills are prioritized for corrective action.

Requirement: Capital Improvement Plan
The capital improvement plan must include the following items: ● *Project schedules including completion dates for all portions of the capital improvement program;* ● *Internal and external project funding sources for each project; and* ● *Joint coordination between operation and maintenance staff, and engineering staff/consultants during planning, design, and construction of capital improvement projects; and Interagency coordination with other impacted utility agencies.*

The SMP, created in 2012, identified existing and future needs for the sewer system and proposed a Capital Improvement Program (CIP) to address these deficiencies. This included recommendations for sewer main replacements, lift station upgrades, and pipeline capacity improvements, along with preliminary cost estimations and potential funding strategies.

The SSRRP further detailed the CIP and its processes: The SSRRP outlines the responsible divisions within the Public Works Department for carrying out the CIP, with the Maintenance Division handling inspections and videoing, and the Engineering Division overseeing updates to the Master Plan and CIP implementation. It also describes the process for assessing sewer deficiencies using CCTV inspections and the PACP rating system, which helps prioritize rehabilitation and replacement projects. The SSRRP emphasizes the need for a capital improvement plan that addresses infrastructure needs with a time schedule and funding development plan.

The City's 2023-24 Five-Year Capital Improvement Plan for the City's sewer system is in Appendix F. The Capital Improvement Plan provides evidence of the sanitary sewer CIP in action, meeting key requirements: It showcases specific ongoing sewer projects and their financial planning, demonstrating the implementation of the recommendations and processes outlined in the earlier plans.

- Project Schedules and Completion Dates: The Sewer Cleaning & Video project is an ongoing project with budget allocations from 2023-24 through 2027-28. This reflects the ongoing condition assessment cycle. Similarly, the Sewer Line Maintenance & Replacement project is also ongoing with $2.4 million allocated in FY 23-24, indicating a scheduled annual program for necessary upgrades.
- Internal and External Funding Sources: The Sewer Cleaning & Video project is funded through the "Sewer" Enterprise Fund, an internal funding source as discussed in our previous turn. The Sewer Line Maintenance & Replacement project is also funded by Sewer funds, resulting from the 2023 Sanitation Fee study, again representing an internal funding source.
- Joint Coordination Between Operation and Maintenance, and Engineering Staff: The Sewer Cleaning & Video project directly involves operation and maintenance staff in the initial assessment. The findings from these activities would then inform the Sewer Line Maintenance & Replacement project, which would be planned and overseen by engineering staff. This demonstrates the coordination highlighted in the SSRRP, where the Maintenance Division conducts inspections and the Engineering Division manages the CIP.
- Interagency Coordination with Other Impacted Utility Agencies: The City coordinates with impacted utility agencies, for example the Irvine Ranch Water District, regarding sewer service areas.

IX. Monitoring, Measurement and Program Modifications

Requirement
The Plan must include an Adaptive Management section that addresses Plan-implementation effectiveness and the steps for necessary Plan improvement, including: ● *Maintaining relevant information, including audit findings, to establish and prioritize appropriate Plan activities;* ● *Monitoring the implementation and measuring the effectiveness of each Plan Element;* ● *Assessing the success of the preventive operation and maintenance activities;* ● *Updating Plan procedures and activities, as appropriate, based on results of monitoring and performance evaluations; and* ● *Identifying and illustrating spill trends, including spill frequency, locations and estimated volumes.*

The following is the Adaptive Management section that addresses Plan-implementation effectiveness and the steps for necessary Plan improvement.

Adaptive Management Requirement 1 of 5: Maintaining relevant information, including audit findings, to establish and prioritize appropriate Plan activities.

The City will evaluate its activities annually to ensure that its resources are used effectively and targeted to minimize sewer spills. This includes the review of sewer spill locations, causes of spills, cleaning and videoing frequency of its sewer system, capital improvement program and

hot spot and sewer deficiency locations. This information will be contained in its GIS system for rapid visual assessment or contained in spread sheets where information can be tracked accurately. Once compiled, the information will be reviewed annually with the goal of reducing sewer spills and future work will be prioritized accordingly.

Adaptive Management Requirement 2 of 5: Monitoring the implementation and measuring the effectiveness of each Plan Element.

The Plan will be reviewed annually and each program element assessed. Where changes are needed, the Plan will be revised. In addition, where resources or changes are deemed more crucial to a particular part of the program, those changes will be implemented following the annual review noted above.

Adaptive Management Requirement 3 of 5: Assessing the success of the preventive operation and maintenance activities.

The maintenance program will be evaluated on an annual basis to ensure resources are applied where deemed necessary. This includes the review of all relevant factors noted above.

Adaptive Management Requirement 4 of 5: Updating Plan procedures and activities, as appropriate, based on results of monitoring and performance evaluations.

The City will review and update the program elements of the Plan annually as noted above to assess and measure their effectiveness and update as necessary.

Adaptive Management Requirement 5 of 5: Identifying and illustrating spill trends, including spill frequency, locations and estimated volumes.

As part of the annual review of the Plan program elements, the City will look for trends, frequency, locations and volumes to assess changes to its maintenance program.

X. Internal Audits

Requirement
The Plan shall include internal audit procedures, appropriate to the size and performance of the system, to comply with section 5.4 (Sewer System Management Plan Audits) of the Order.

The City will undertake the audits of the Plan as specified in Section 5.4. That is, the City will:

- Conduct an internal audit of its Plan, and implementation of its Plan, at a minimum frequency of once every three years.
- Conduct each audit for the period after the end of the last required audit period.

- Within six months after the end of the required 3-year audit period, have the Legally Responsible Official submit an audit report into the online CIWQS Sanitary Sewer System Database per the requirements in section 3.10 of Attachment E1 of the Order.
- Appropriately scale the audit to the size of the system(s) and the number of spills.
- Involve the City's sewer system operators in completing the audit.
- Evaluate the implementation and effectiveness of the Plan in preventing spills.
- Evaluate compliance with the Order.
- Identify Plan deficiencies in addressing ongoing spills and discharges to waters of the State.
- Identify necessary modifications to the Plan to correct deficiencies.
- Submit a complete audit report that includes:
    - Audit findings and recommended corrective actions.
    - A statement that sewer system operators' input on the audit findings has been considered.
    - A proposed schedule to address the identified deficiencies.

XI. Communication Program

Requirement
The Plan must include procedures to communicate with: ● *The public for:* ○ *Spills and discharges resulting in closures of public areas, or that enter a source of drinking water, and* ○ *The development, implementation, and update of its Plan, including opportunities for public input to Plan implementation and updates.* ● *Owners/operators of systems that connect into the Enrollee's system, including satellite systems, for:* ○ *System operation, maintenance, and capital improvement-related activities.*

The City has established a website that describes the Plan and posted companion documents. Input from interested parties is solicited via the website.