City of Carlsbad

Sewer System Management Plan

2019 SSMP Update

Carlsbad, CA
July 10, 2019

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Table of Acronyms and Abbreviations

Acronym or Abbreviation	Definition
BMP	Best Management Practice
BOD	Biochemical oxygen demand
CCTV	Closed-circuit television
CIP	Capital improvement program
CIPP	Cured-in-place pipe
CIPP	Cured-in-place pipe
City	City of Carlsbad
CIWQS	California Integrated Water Quality System
CM	Corrective maintenance
DnMH	Downstream manhole
EWA	Encina Wastewater Authority
FOG	Fats, oils, and grease
GBMP	Grease best management practices
GCD	Grease control device
GCDI	Grease control device inspection
GIS	Geographical information system
HOA	Homeowner's Association
LRO	Legally Responsible Official
MAM	Member Agency Meeting
Muni Code	Municipal Code
NASSCO	National Association of Sewer Service Companies
PACP	Pipeline Assessment and Certification Program
PM	Preventive maintenance
R9	San Diego Regional Water Quality Control Board
SCADA	Supervisory Control and Data Acquisition
SSMP	Sewer System Management Plan
SSO	Sanitary sewer overflow
State Board	State Water Resources Control Board
State Board WDRs	State Water Resources Control Board Waste Discharge Requirements
SWRCB	State Water Resources Control Board
UpMH	Upstream manhole
WDID	Wastewater Discharger Identification Number
WDRs	Waste Discharge Requirements

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1 Goal and Overview

1.1 Goal

The goal of this Sewer System Management Plan (SSMP) is to provide a plan and schedule to properly manage, operate, and maintain all parts of the City of Carlsbad's sewer system. The overall goal of the City's SSMP program implementation is to prevent and minimize sewer overflows and mitigate SSOs that do occur. Specific goals of our SSMP program implementation are as follows:

- Protect public health and safety, and the environment
- Properly manage, operate and maintain all portions of the City's wastewater collection system to minimize SSOs
- Provide adequate capacity to convey peak wastewater flows associated with the City's design storm event
- Cost effectively manage infiltration/inflow (I/I)
- Involve employees involved in collection system program implementation in the strategic planning process for the collection system
- Perform all operation and maintenance activities in a safe manner

1.2 SSMP Overview

This SSMP is in full compliance with the State Water Resources Control Board's Waste Discharge Requirements (State Board WDRs)[1] for sanitary sewer systems and meets the following objectives:

a) Properly fund, manage, operate and maintain, with adequately trained staffs and/or contractors possessing adequate knowledge, skills, and abilities, all parts of the collection system owned and/or operated by the City.

b) Provide adequate capacity to convey base flows and peak flows, including flows during wet weather events, to the minimum design criteria as defined in the City's System Evaluation and Capacity Assurance Plan (a required component of the SSMP), for all parts of the collection system owned and/or operated by the City.

c) Take all feasible steps to stop and mitigate the impact of SSOs in the collection system owned and/or operated by the City.

The City achieves these objectives by implementing a comprehensive sewer infrastructure asset management program that is documented in the following 11 SSMP elements:

1. Goal and Overview

[1] This refers to State Board's Order No. 2006-003, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

2. Organization
3. Legal Authority
4. Operation and Maintenance Program
5. Design and Performance Provisions
6. Overflow Emergency Response Plan
7. FOG Control Program
8. System Evaluation and Capacity Assurance Plan
9. Monitoring, Measurement, and Program Modifications
10. SSMP Program Audits
11. Communication Program

This SSMP integrates documentation of numerous collection system management programs into one formal document. These programs are described in greater detail in a variety of documents, which are referenced in this SSMP when appropriate.

1.3 System Overview

The City of Carlsbad sanitary sewer system consists of:

- 265 miles of gravity mains
- 3.9 miles of force mains
- 11 sewer lift stations

Carlsbad is located in North County, San Diego County. The City is 87 miles south of Los Angeles and 35 miles north of downtown San Diego and is part of the San Diego-Carlsbad, CA Metropolitan Statistical Area. It is a tourist destination referred to as “The Village by the Sea” by locals. The City contains three (3) lagoons, one (1) lake and borders over 3 miles of Pacific Ocean coastline.

1.4 Regulatory Context

The City is required to comply with the State Board WDRs adopted May 2, 2006. The Order, and associated Monitoring and Reporting Program (MRP) requirements are included as **Attachment A1** (Order) and **Attachment A2** (MRP) and additional information can be found at:

https://www.waterboards.ca.gov/water_issues/programs/sso.

The City is also required to comply with California Regional Water Quality Control Board, Region 9, Order R9-2007-0005 entitled *Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region* (Regional Board WDRs). The Regional Board WDRs are included as **Attachment A3**. Additional information regarding the Region 9 Regional Board WDRs can be found at:

https://www.waterboards.ca.gov/sandiego/publications_forms/general_orders.html.

1.4.1 Summary of State Board WDRs

Table 1-1 summarizes the State Board WDRs and associated monitoring and reporting requirements under which the collection system operates and that are addressed by this SSMP[2]. All agencies that own and operate collection systems greater than one mile in length must comply with these requirements. In addition, Section C of the State Board WDRs prohibits sanitary sewer overflows (SSOs) to waters of the United States and SSOs that cause a nuisance per the California Water Code Section 13050(m).

Table 1-1: Summary of State Board WDRs and Monitoring and Reporting Program Requirements

Provisions	Description	Applies to
D.3-5, 7	SSO prevention, response, and control	Element 4, Operation and Maintenance Program; Element 6, Overflow Emergency Response Plan; Element 7, FOG Control Program; Element 8, System Evaluation and Capacity Assurance Plan
D.8-9	System operations and maintenance, adequate resource allocation, appropriate training, knowledge, and abilities	Element 4, Operation and Maintenance Program
D.10	Adequate capacity for base, peak, and wet weather flows	Element 8, System Evaluation and Capacity Assurance Plan
D.11, 13-14	SSMP requirement, content, update and certification	All Elements of SSMP
D.12	Use of qualified professionals for engineering and geological evaluations and judgments	Element 5, Design and Performance Provisions
Monitoring and Reporting Requirements	SSO reporting and notification; water quality monitoring; change log	Element 6, Overflow Emergency Response Plan; Water Quality Monitoring Plan; SSMP Revision Log

1.4.2 Summary of Regional Board WDRs

On February 14, 2007, the San Diego Regional Water Quality Control Board issued the Regional Board WDRs, which include additional requirements more stringent than the State Board WDRs. The Regional Board WDRs reaffirms the prohibition of all SSOs upstream of a sewage treatment plant. The Regional Board WDRs also references the Water Quality Control Plan (Basin Plan), adopted by the Regional Board, which designates beneficial uses, narrative, and numerical water quality objectives, and prohibitions which are applicable to the discharges prohibited in the Regional Board WDRs. The Regional Board WDRs also requires notification and reporting of Private Lateral Sewage Discharges.

[2] Summarized from the *SWRCB Order No. 2006-0003-DWQ Statewide General Waste Discharge Requirements for Sanitary Sewer Systems*, Section D "Provisions".https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2006/wqo/wqo2006_0003.pdf

1.5 Application for Coverage Under the State Board WDRs

The City applied for coverage under the general Waste Discharge Requirements (WDRs) in 2006 for one collection system and was assigned a Wastewater Discharger Identification Number (WDID) of **9SSO11209** in the California Integrated Water Quality System (CIWQS).

2 Organization

2.1 Overview

The City of Carlsbad is a charter city operating with a “Council-Manager” system. The City Council sets policy guidelines for the city and those guidelines are carried out under the supervision of the City Manager. The sanitary sewer system is managed by the Wastewater Manager in the Utilities section of the Public Works Department.

2.2 Authorized Representative

The City has designated a primary Legally Responsible Official (LRO) pursuant to Section J., REPORT DECLARATION, of the State General Waste Discharge Requirements (Order No. 2006-0003).

Primary LRO

Mrs. Vicki Quiram, Utilities Director

5950 El Camino Real

Carlsbad, CA 92028

(760) 438-2722

Vicki.Quiram@carlsbadca.gov

Secondary LRO

Mr. Don B. Wasko, Wastewater Manager

5950 El Camino Real

Carlsbad, CA 92028

(760) 438-2722

Don.Wasko@carlsbadca.gov

Secondary LRO

Mr. Jesse Castaneda, Operations Supervisor

5950 El Camino Real

Carlsbad, CA 92028

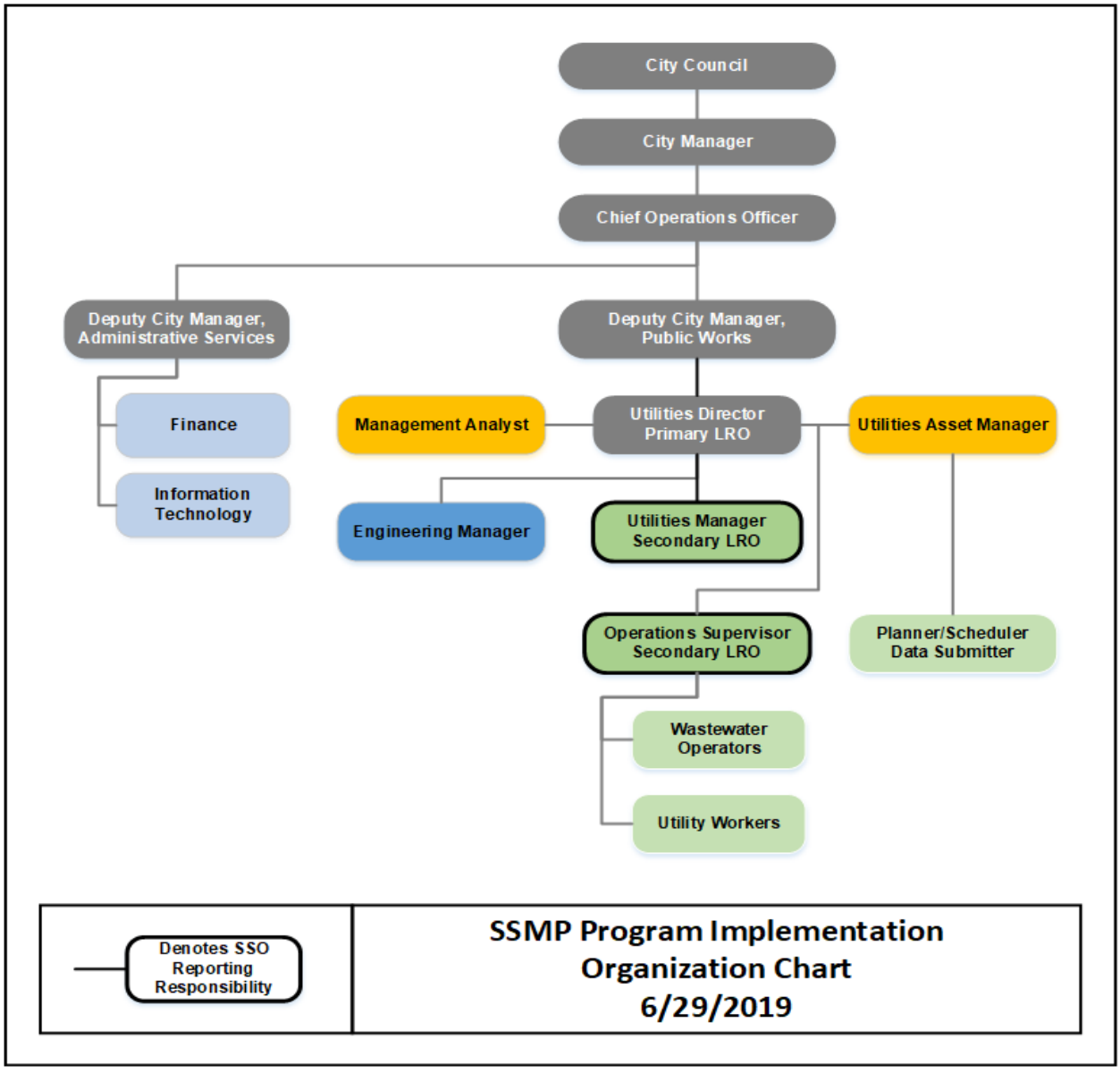
(760) 438-2722

Jesse.Castaneda@carlsbadca.gov

2.3 Positions Responsible for Implementing SSMP Program

Figure 2-1 is an organization chart showing the lines of authority for key positions responsible for implementing various elements of the SSMP program.

Figure 2-1: SSMP Program Implementation Organization Chart



A summary for key positions, including the personnel responsible for responding to and reporting SSOs, is presented below.

- **City Council** – responsible for approval of funding requests and the Sewer System Management Plan.
- **City Manager** - responsible for establishing and communicating high level policy relating to the outcomes of the SSMP.

- **Chief Operations Officer** – responsible for direct oversight of operating departments responsible for SSMP development and implementation.
- **Public Works Director** – work as liaison between Carlsbad senior management and Utilities.
- **Utilities Director** - responsible for establishing and communicating high level policy relating to the outcomes of the SSMP.
- **Utilities Manager** -responsible for the development and implementation of the SSMP as well as planning, organizing and directing the activities of the work units through the Superintendents and Supervisors.
- **Operations Supervisor** – notifies the Sanitation System Operator I-III, Utility Worker I-III or Wastewater Duty Operator when alerted to a potential SSO. During working hours, oversees reporting and notification of SSOs, manages field operations and maintenance activities, provides relevant information to agency management, prepares and implements contingency plans, leads emergency response, investigates and reports SSO, and trains field crews.
- **Wastewater Operator I-III and Utility Worker I-III** (may also be the Wastewater Duty Operator) - responsible for the day-to-day work activities to clean and maintain the collections system. If after hours, notifies the Supervisor and Superintendent when alerted to a potential SSO.
- **Utilities Asset Manager** – responsible for implementing assessment, evaluation, decision-making and controls processes for asset monitoring, repair, rehabilitation and replacement. Responsible for specifying mid-term and long-term asset monitoring, repair, rehabilitation and replacement. Responsible for project management for sewer system condition assessment and rehabilitation activities.
- **Utilities Maintenance Planner/Scheduler** – responsible for planning and scheduling sewer system maintenance activities including sewer cleaning, closed circuit television inspection, sewer repair and pump station maintenance. Responsible for reviewing and modifying maintenance frequency and methods.
- **Engineering Manager** – responsible for managing the execution of the City's capital improvement program including the development of design standards, specifications, construction inspection and construction management of sewer system capital improvements.
- **Management Analyst** – has an understanding of the City's services, policies and procedures, and in multiple areas of federal, state and local laws, codes and regulations affecting multiple, complex areas. Knowledge of principles of organization, administration, budgeting and human resources management.

2.4 Chain of Communication for Reporting SSOs

The chain of communication for reporting and notification of sanitary sewer overflows is documented in detail in the Overflow Emergency Response Plan. A detailed workflow for the sanitary sewer overflow response is provided as **Attachment B**. Key positions described in the workflow include:

Utilities Receptionist: The Utilities Receptionist receives complaint calls during Normal Working Hours and forwards these calls to the Utilities Admin.

Utilities Admin: The Utilities Admin receives SSO complaints during Normal Working Hours and contacts the Utilities Supervisor to determine the appropriate crew to dispatch to investigate.

First Responder: The First Responder is the first crew dispatched to investigate the SSO. Once the First Responder verifies an SSO is occurring, the First Responder requests additional resources, if needed.

Spill Response Crew Lead: The Spill Response Crew Lead is the most senior collection system maintenance crew member on-site at the spill event. The Spill Response Crew Lead is responsible for leading spill response activities and documentation of the spill event.

Police Department Dispatch: The Police Department Dispatch is responsible for receiving customer complaints during After Hours and will contact the Construction Maintenance Duty when notified of a spill during After Hours.

Construction Maintenance Duty: The Construction Maintenance Duty is responsible for investigating spill complaints during After Hours and will request support from the Collections Duty when an SSO is verified.

Collections Duty: The Collections Duty will respond to an SSO during After Hours when requested by the Construction Maintenance Duty or Utilities Supervisor.

Wastewater Operations Crew: The Wastewater Operations Crew responds to pump station alarms and pump station-related SmartCover alarms. The Wastewater Operations Crew will notify the Wastewater Operations Lead when an alarm occurs.

Wastewater Operations Lead: The Wastewater Operations Lead notified the Utilities Supervisor when a pump station alarm occurs.

Utilities Supervisor: The Utilities Supervisor designates the SSO response crew during the day. The Utilities Supervisor is responsible for draft SSO reporting in CIWQS. The Utilities Supervisor is responsible for SSO notifications to OES, Regional Board, and other stakeholders. The Utilities Supervisor is designated as an Onsite Manager in CIWQS and can certify SSO reports.

Utilities Manager: The Utilities Manager is responsible for certifying SSO reports in CIWQS.

Normal Working Hours are 8:00 a.m. to 5:00 p.m. on Monday through Friday, except holidays. After Hours are 5:00 p.m. to 8:00 a.m. on Monday through Friday as well as weekends and holidays.

3 Legal Authorities

The City's legal authorities are primarily contained in the City's municipal code and the City's engineering standards. Table 3-1 summarizes the source of the City's legal authorities for each of the legal authorities required by the WDRs.

Table 3-1: Summary of Legal Authorities

Requirement	Source of Authority
GENERAL	
Prevent illicit discharges into the wastewater collection system	Muni Code 13.04.050
Limit the discharge of fats, oils, and grease and other debris that may cause blockages	Muni Code 13.04.050; 13.06.010
Require that sewers and connection be properly designed and constructed	Engineering Standards, Volume1, Chapter 6 – Design Criteria for Gravity Sewer Line and Appurtenances
Require proper installation, testing, and inspection of new and rehabilitated sewers	Engineering Standards, Volume 3, Chapter 6 – Construction Specifications
LATERALS	
Clearly define City lateral responsibility and policies	Muni Code 13.04.45
Ensure access for maintenance, inspection, or repairs for portions of the service lateral owned or maintained by the City	City does not own any portion of the laterals.
Control infiltration and inflow (I/I) from private service laterals	Muni Code13.040.050
FOG SOURCE CONTROL	
Installation of grease removal device (GRE)	Muni Code 13.06.040
Design standards for GRE	Muni Code 13.06.090 (Interceptor) Muni Code 13.06.100 (Trap)
Maintenance and BMP requirements	Muni Code 13.06.100; 13.06.120; and 13.06.130
Record keeping and reporting	Muni Code 13.06.140
Authority to inspect grease producing facilities	Muni Code 13.06.150; and 13.06.160
ENFORCEMENT	
Enforce any violations of sewer ordinances	Muni Code 13.04.080

3.1 Municipal Code

City of Carlsbad, Municipal Code, Chapter 13 (Sewers) provides the City with the majority of the legal authorities required by the WDRs and can be found on the City's webpage at:

http://www.carlsbadca.gov/cityhall/clerk/municipalcode/municipalcode.asp

This Municipal Code sets conditions and limitations on the use of the City's sewer system and outlines provisions for enforcement for noncompliance with the City's Municipal Code. The provisions of the Municipal Code apply to sewer construction, use,

maintenance, discharge, deposit, or disposal of wastewater into and through the City's collection systems and the issuance of fees, fines and penalties thereof. This Chapter of the Municipal Code applies to all users of the City's sewer system and specifies herein that all users of the City's sewer system are subject to regulation and enforcement.

3.1.1 Authority to Prevent Illicit Discharges

Section 13.04.050 of the City's municipal code prohibits illicit discharges. Key prohibitions impacting sewer system operation include:

- *Discharge of storm water, surface water, groundwater, unpolluted industrial process water, roof runoff, subsurface drainage, or any waters from an uncontaminated cooling system, swimming pool, decorative fountain or pond, into any public sewer or any private sewer which is connected to the public sewer without written permission in conformance with adopted regulations.*
- *No person shall enter, obstruct, uncover or tamper with any portion of the public sewer, or connect to it, or dispose anything into any sewer and/or sewer manhole without the written permission of the utilities director.*
- *No person shall fill or backfill over, or cause to cover, or obstruct access to, any sewer manhole.*

Key prohibitions of illicit discharges that could potentially impact sewer system operation include:

- *Liquid or vapor having a temperature higher than 140 degrees Fahrenheit;*
- *Water or waste containing substances which may solidify or become viscous at temperatures between 32 degrees and 150 degrees Fahrenheit;*
- *Gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid or gas;*
- *Toxic, noxious or malodorous liquid, solid, or gas deemed a public hazard and nuisance;*
- *Garbage that has not been properly shredded to a size of one-fourth inch or less so that all particles will be carried freely under normal flow conditions in the public sewers;*
- *Ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, paunch manure, paper substances or normally dry, solid wastes capable of causing obstruction to the flow in or damage to sewers or other interference with the proper operation of the sewerage works;*
- *Water or wastes having a pH lower than 5.5 or higher than 9.5 or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sewerage works;*
- *Water or wastes containing any substance in sufficient quantity to discolor, injure, disrupt or interfere with the normal operation of any sewage treatment process, constitute a hazard to human or animal life, create a public nuisance, or significantly lower the quality of the receiving waters;*

3.1.2 Authority to Ensure Access for Maintenance, Inspection or Repairs for Portions of Lateral Owned or Maintained by the City

The City does not own any portion of the sewer laterals connecting to the public sewer mains. Section 13.04.45 of the City's municipal code clearly states maintenance of sewer laterals is the responsibility of the property owner or parcel occupant/user.

3.1.3 Authority to Limit Discharge of Fats, Oils and Grease or Other Debris

Section 13.04.050 of the City's municipal code prohibits the discharge of fats, oils and grease and other debris through the following general prohibitions:

- Water or waste containing substances which may solidify or become viscous at temperatures between 32 degrees and 150 degrees Fahrenheit;
- Garbage that has not been properly shredded to a size of one-fourth inch or less so that all particles will be carried freely under normal flow conditions in the public sewers;
- Ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, paunch manure, paper substances or normally dry, solid wastes capable of causing obstruction to the flow in or damage to sewers or other interference with the proper operation of the sewerage works;

Furthermore, Section 13.06.010 of the City's municipal code prohibits any food service facility to discharge or cause to be discharged any fats, oils or grease to the sewer system in concentrations that may result in separation from effluent and adherence to sewer structures and appurtenances, accumulate and/or cause or contribute to blockages in the sewer system or at the sewer system lateral which connects the food service facility to the sewer system.

3.2 Authority to Require Proper Design and Construction of Sewers and Connections

Section 13.04.050 of the City's municipal code states that *"No person shall enter, obstruct, uncover or tamper with any portion of the public sewer, or connect to it, or dispose anything into any sewer and/or sewer manhole without the written permission of the utilities director."* All connections to the sewer system require City permission and are managed and inspected by City of Carlsbad Public Works Construction Management and Inspection.

All public improvements constructed within the City are required to comply with the City's Engineering Standards. The City's Engineering Standards provide a comprehensive set of standards and design criteria to ensure quality and uniformity of the public improvements constructed in Carlsbad. The City posts these standards on the City website at:

http://www.carlsbadca.gov/services/building/codes/lde.asp

4 Operations and Maintenance Program

4.1 Sanitary Sewer System Mapping

The City of Carlsbad's Utilities Wastewater Program includes an up-to-date map of the sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes, as well as a map of all gravity main problem areas. The City of Carlsbad Utilities field crews have access to up-to-date GIS mapping of stormwater conveyance infrastructure to help expedite environmental protection in the event of a sewer overflow.

The Utilities Asset Manager oversees the upkeep of sewer system mapping. New capital improvement projects under development are identified during the planning or permitting process and input into the geographical information system (GIS) database as a "future" project. Once capital improvements are constructed, Public Works Engineering provides "As-Built" drawings to Utilities GIS for final update of the GIS mapping.

Utilities Wastewater field employees also submit corrections to the GIS using mobile computing devices. The Utilities Operations Supervisor and Utilities Planner/Scheduler provide requested changes to GIS based on discrepancies identified during CCTV inspection.

The GIS has a facility identification number (Facility ID) for each individual pipe segment in the sewer system. Utilities staff track maintenance history by upstream manhole to downstream manhole (i.e., UpMH-DnMH) and has developed a protocol for splitting maintenance history in the case a specific asset is divided (e.g., a new manhole is constructed on an existing pipe segment).

4.2 Preventive Maintenance Program

4.2.1 Preventive Maintenance Program

Gravity Sewer Main Cleaning

The City of Carlsbad routinely cleans all gravity mains 12 inches in diameter and smaller on a four year rotation. In addition, the City has identified specific sewer pipe segments with a history of maintenance issues as high priority area gravity mains. High priority area gravity mains are cleaned either quarterly or semi-annually.

Sewer mains larger than 12 inches in diameter are inspected using closed circuit video (CCTV) inspection on a five-year rotation and cleaned if operations staff determine the operation of the system might be impacted by material deposited in the pipe.

Sewer Manhole Visual Inspection

Crews tasked with daily cleaning activities perform visual inspections of each manhole accessed during work activities. The protocol for sewer cleaning is to open both the upstream and downstream manhole when cleaning a pipe segment. A work order is documented for each manhole visual inspection including a rating of the condition of

components of the manhole and an overall manhole condition score of 1 to 5. The condition scoring scale ranges from 1 (Excellent) to 5 (Very Poor) The Operations Supervisor, Planner/Scheduler and Utilities Asset Manager review the results of manhole visual inspections monthly and flag specific manholes with “poor” or “very poor” conditions for potential follow-up. Follow-up activities include additional reconnaissance, repair, or rehabilitation.

Chemical Root Control

The City uses chemical root control on select pipe segments known to have significant root intrusion. The City evaluates maintenance history to make sure root intrusion is the sole maintenance risk factor for the pipe segment, will determine where the roots are intruding into the pipe segment, and will evaluate remediation options with the goal of choosing the most cost effective maintenance approach. The City applies root control chemical using in-house crews as needed to control root growth.

Sewer Manhole Flow Level Monitoring

The City uses flow level monitoring at select manhole locations to provide an additional level of system monitoring and failure detection. The City has several use cases for flow level monitoring, including:

- Secondary Failure Detection for a Lift Station: The monitor is located upstream of a lift station and will alarm if flow to the lift station is backing up into the upstream manhole.
- Monitoring Past Problem Locations: The monitor is placed upstream of past problem locations that may still pose a failure risk.
- Strategic Monitoring of Sewer Mains in Extended Cleaning Area: The flow level monitor is strategically located upstream of areas in the extended cleaning area with suspected overflow risk. This includes monitors in areas near lagoons and waterways to provide an additional level of monitoring of sewer mains with potential for high impact failures.

All of the flow-level monitors have intrusion alarms providing a time-stamped log of when the manhole location of the flow-level monitor is accessed. The data collected by the flow-level monitors is transmitted via cellular technology to a Cloud database. The data is accessible by City staff via phone or internet. The City contracts with the flow-level monitoring vendor to analyze the data and send alarms if the flow level as a specific location violates the criteria set for that location. The Operations Supervisor, or designee, is responsible for receiving alarms from the flow-level monitors and dispatching operations and maintenance staff to investigate the alarm.

Gravity Main Closed Circuit Television Inspection

The City of Carlsbad began a system-wide closed-circuit television (CCTV) inspection of the gravity main sewer system in 2008 and collected inspection data in CUES defect coding format for small diameter gravity sewers (12-inch diameter and less) and some large diameter gravity sewers (greater than 12-inch diameter). In 2017, the City converted to National Association of Sewer Service Companies (NASSCO) Pipeline

Assessment Certification Program (PACP) system for gravity sewer inspection. Inspection of large diameter gravity mains is performed on five-year rotation. The inspection frequency for small diameter gravity sewer mains is based on risk and inspection is performed over an 8-year period for the lowest risk pipe. Higher risk pipe, as determined by inclusion on a high priority cleaning area or based on pipe material, are planned for inspection more frequently. The City has inspected over 90 percent of the small diameter sewers and the majority of the large diameter sewers. City staff and contractors are utilized to perform CCTV inspection. Additionally, the City of Carlsbad field staff will request CCTV inspection of pipe segments if an issue of concern is encountered during cleaning activities. Issues of concern include:

- Pieces of pipe wall found during cleaning indicating the possibility of a severe pipe barrel defect;
- Locations in the pipe where the crew had difficulty in passing with the cleaning equipment indicating the possibility of a severe offset joint, protruding lateral or other obstruction.

A CCTV crew may conduct localized video inspections when the cleaning crews' observations warrant such further investigation.

Lift Station Preventive Maintenance

The City owns, operates and maintains eleven (11) lift stations. Utilities is responsible for operations and maintenance of the lift stations and performs these duties using three types of activities: operational inspection, SCADA review, and preventive maintenance.

Lift Station Operational Inspections and SCADA review: Utilities lift station crews perform sewer lift station checks five days per week for larger lift stations and two days per week for smaller lift stations by visual inspection, physical inspection and by using the existing SCADA System for inspection. The visual inspections include a survey of the station area, log hours and/or flow meter reads. The physical inspections include checking and hand operating pumps, checking alarms, ventilation, odor chemicals and scrubbers. The Mission SCADA system monitors for alarm set points. Utilities field crews review SCADA data regularly to look for trends and identify proactive work. The City is currently planning a SCADA Master Plan project to plan the upgrade and replacement of the existing SCADA system with the vision that the future SCADA system will have more monitoring capabilities and be more useful in detecting deteriorating performance of equipment.

Lift Station Preventive Maintenance: The Utilities Planner/Scheduler and Operations Supervisor have implemented an extensive schedule of preventive maintenance activities with the intent of ensuring lift station equipment perform at acceptable levels throughout the useful life of the equipment. The Utilities Asset Manager, Utilities Planner/Scheduler and Operations Supervisor review monthly data collected by lift station crews and will identify a corrective action if there are indications of potential maintenance issues. All wet wells are cleaned when the need is identified by lift station maintenance crews and/or the Operations Supervisor.

Lift Station Corrective Maintenance: Lift station maintenance crews identify the need for potential corrective maintenance activities during lift station operational inspection

and while performing preventive maintenance activities. The Utilities Planner/Scheduler and Operations Supervisor will prioritize corrective maintenance work to address pump station issues. In general, Utilities lift station crews will perform minor repairs and rehabilitation, while larger scale pump station issues and needs are delivered using capital improvements projects.

Force Main Inspection and Maintenance

Force mains are pressurized sewer mains that convey wastewater from lift stations to a manhole where it can flow by gravity. The City owns approximately 3.9 miles of force mains. Utilities field crews review SCADA data regularly to identify operational trends and changes in performance. Issues with force main operation, such as a partial blockage, are detectable using trending analysis and SCADA review. In some cases it may also be possible to detect a force main failure if a step change in pumping pressure or run-time is detected. Utilities field crews also visually inspect the alignment of these pipelines annually to identify any signs of leakage from the system.

When possible, the City designs force mains to have a continuous uphill slope without high points so that air-release valves are not required on the force mains. If this is not possible, the City requires air-release valves on high points of a force main. Utilities field crews inspect air-release valves quarterly and perform additional maintenance as needed.

The City has initiated a program to evaluate new methods for assessing force main condition. The City performed inspections of all force mains using either “smart ball” technology or CCTV inspection between 2017 and 2018.

Inflow and Infiltration Program

Rainfall results in additional water flows into the sewer system through inflow and infiltration. Water entering from illicit connections is called inflow. Typical sources include sump pumps, roof drains, surface runoff and unauthorized storm drain connections. Inflow also includes flows entering at sewer manholes through pick holes or around the edges of the manhole cover in cases where stormwater flooding covers a manhole. Infiltration is when water flows through the soil and enters into a pipeline through pipe joints, cracks, fractures or other pipeline defects. Infiltration typically occurs for some period after rainfall events when the soil become saturated, yet can also occur during dry weather conditions in locations where the groundwater elevation is higher than the sewer pipe.

The City has an on-going program to detect and address inflow and infiltration issues in the system. The City uses a combination of staff operational knowledge and hydraulic modeling of the sewer system to identify potential areas in the system with elevated inflow and infiltration. This process results in the identification of sewer sub-basins that are targeted for inflow/infiltration evaluation. This evaluation can include targeted flow monitoring to further isolate the issue and area of concern, as well as to further characterize the type of problem. Inflow will result in a near-term and short-lived increase in flows on the order of hours, while infiltration results in a longer-term increase in flow on the order of days.

Flow monitoring can use used to identify the magnitude of inflow versus infiltration, which is used to determine the approach to further evaluation or corrective action. In some cases, Utilities will perform smoke testing to determine potential inflow sources, if flow monitoring identifies inflow as an issue. CCTV inspection is the primary means to evaluate whether pipeline defects are the cause of potential infiltration if flow monitoring identifies infiltration as an issue.

Corrective actions for inflow and infiltration include:

- **Outreach**: Utilities will perform outreach to property owners to correct illegal connections. Utilities will notify the property owners of the issue and will check to confirm the illicit connection is disconnected.
- **Small Pipeline Repair**: Utilities will perform small repairs to correct acute defects found to be the source of significant infiltration.
- **Pipeline Lining or Replacement**: In some cases, Utilities will rehabilitate an entire pipe segment using cured-in-place pipe lining (CIPP), sliplining, or in some cases will replace the entire pipe segment.

4.2.2 Information Management

Maintenance Work Management

Utilities maintains a log of all cleaning activities by its 40 cleaning zones in its work management system. The current work management system interfaces with the GIS attributes and details the size, material and location of each pipe cleaned, as well as the equipment utilized, and any relevant remarks observed during the cleaning. The City of Carlsbad utilizes Infor IPS software for preventative maintenance and work orders.

Inspection Data Management

Utilities captures CCTV inspection observations using the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) inspection coding standard and maintains CCTV inspection data in GraniteNet software which provides easy access for review. Granite Net has a GIS interface which makes it easy to see problem sewer pipes on a map. Issues found during CCTV inspection are evaluated and solutions developed on a case-by-case basis. In the past, Utilities captured CCTV inspection data using the CUES inspection coding system. Ninety percent (90%) of small gravity sewers currently have CCTV inspection data coded using the CUES inspection coding system format.

4.3 Rehabilitation and Replacement Planning

4.3.1 Risk-Based Prioritization

The City developed the Asset Management Master Plan in 2018-19, included as **Attachment D**, which includes a risk model for prioritization and decision logic to identify repair, rehabilitation and replacement recommendations for condition defects in gravity sewers and manholes. The risk score for gravity sewers includes quantity and severity of condition defects, cleaning frequency, pipe capacity, spill volume potential, public

health and environmental impact, and emergency response impact. The risk score for manholes includes condition assessment scores from City staff inspections, spill volume potential, public health and environmental impact, and emergency response impact. The risk model and decision logic are built in Innovyze InfoMaster software which provides a single GIS based platform for City staff to review CCTV video inspections, manhole condition assessment scores, risk and decision logic recommendations.

4.3.2 Condition Assessment and Remediation Decision-Making

The City conducts workshops to review CCTV data and make remediation decisions for large diameter gravity sewers and small diameter gravity sewers with NASSCO PACP CCTV data format.

4.3.3 Capital Improvement Plan

Asset Management Master Plan

The Asset Management Master Plan recommended a 5-year CIP program for repairs, rehabilitation and replacement for manholes and gravity sewers based on all CCTV inspection data available at that time. The CIP recommendations will be updated annually as new condition assessments are done and evaluated.

Annual Capital Replacement Program Planning

Utilities updates the CIP and project priorities annually through workshops with engineering and operations staff based on current operating conditions including recent data such as inspections or flow monitoring. The CIP includes rehabilitation and replacement projects, as well as repair projects developed by a collaboration of the Utilities Asset Manager, Operations Supervisor and Utilities Maintenance Planner/Scheduler. In the future, Utilities intends to use decision support software (i.e. InfoMaster) to analyze sewer main and manhole data and make recommendations that are prioritized by risk.

The City's capital improvement program can be found on the City Budget webpage at:

http://www.carlsbadca.gov/services/depts/finance/budget.asp

Long-Range Capital Financing

The City maintains a 15-year CIP and regularly conducts a cost of service study to finance the recommended projects. Wastewater replacement revenues are generated by user fees equal to approximately 30 percent of total revenues, and are used to pay for replacement of existing sewer facilities. The City of Carlsbad's Capital Improvement Program uses replacement funding, which is set aside annually, to fund Capital Improvement and Replacement Programs.

4.4 Training Program

The City of Carlsbad staff currently participates in the California Water Environment Association (CWEA) certification program for Collection System Maintenance and for Mechanical Technologist. The City provides on-going in house technical, job skills and

safety training for its staff and participates in local and regional training events. The City of Carlsbad has been and continues to conduct training of Waste Discharge Requirements (WDR) awareness including an SSO Response Training, internal training programs for sewer line cleaning, combination truck operations, sewer grit removal and dumping, station valve repair and pump replacement operations and maintenance, and other related tasks.

4.5 Equipment and Replacement Part Inventories

The City of Carlsbad maintains a rental pump plan for each sewer lift station and maintains a portable generator for its sewer lift stations that do not have fixed emergency generators.

5 Design and Performance Provisions

The City of Carlsbad requires that all new sewer systems, pump stations and other appurtenances, as well as the rehabilitation and repair of existing sewer facilities, be designed and constructed in accordance with the City of Carlsbad's Engineering Standards:

- Engineering Standards Volume 1 - General Design Standards
- Engineering Standards Volume 3 – Standard Drawings & Specifications.

Both are available on the internet on the City's Codes, Standards & Policies webpage at:

http://www.carlsbadca.gov/services/depts/landev/landdev.asp

5.1 Design and Construction Standards and Specifications

5.1.1 Standards for Gravity Sewers

The City's *Engineering Standards Volume 1 – General Design Standards*, *Chapter 6 – Design Criteria for Gravity Sewer Lines and Appurtenances* includes design criteria applying to both new, repaired and rehabilitated assets. The following are key design standards included in *Chapter 6 – Design Criteria for Gravity Sewer Lines and Appurtenances*:

- Sewer main depth and size
- Sewer lateral depth and size
- Pipeline material types
- Design parameters for gravity sewer main slope, flow and demand
- Horizontal and vertical layout
- Laterals shall be bedded, backfilled and compacted in the same manner as the sewer main to which they are connected
- Connection to existing manholes shall be core drilled when stubs have not been provided. Special care shall be used to facilitate the flow when forming the tributary channel into the existing channel
- Miscellaneous requirements
    - The City will only maintain sewer mains located in dedicated right-of-ways and easements which have all weather vehicular access
    - **Maintenance of sewer laterals from the main to the building shall be the responsibility of the property owner**

5.1.2 General Guidelines for Sewer Force Mains

The City's *Engineering Standards Volume 1 – General Design Standards*, *Chapter 6 – Design Criteria for Gravity Sewer Lines and Appurtenances* contains general guidelines for sewer force main design. Key guidelines for force mains include:

- Minimum clearances per the State of California Department of Public Health "Guidance Memo No. 2003-02: Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines"
- Constructed of High Density Polyethylene or Ductile Iron with polyethylene liner and external corrosion control
- Dual force mains may be required at discretion of City Engineer where frequent maintenance is required or due to environmental constraints

5.1.3 General Guidelines for Sewer Lift Stations

The City's *Engineering Standards Volume 1 – General Design Standards*, *Chapter 6 – Design Criteria for Gravity Sewer Lines and Appurtenances* contains general guidelines for sewer lift station design. The City avoids incorporating sewer lift stations into the City's sewer system unless deemed essential by the City Engineer. The design standards provide guidelines for sewer lift stations smaller than 3 million gallons per day (MGD). All sewer lift stations larger than 3 MGD are designed in close coordination with City engineering staff.

5.1.4 Standard Drawings

The City of Carlsbad's *Engineering Standards Volume 3 – Standard Drawings and Specifications, Chapter 1 – City of Carlsbad Standard Drawing* contains standard drawings for standard sewer improvements, including:

- S-1: Standard Sewer Manhole
- S-1A: PVC Lined Manhole
- S-2: Drop Manhole
- S-3: Shallow Manhole
- S-4: Manhole Frame and Cover
- S-5: Pipe Bedding and Trench Backfill for Sewers
- S-6: Sewer Main Cleanout
- S-7: Sewer Lateral
- S-8: Sewer Lateral (Deep Cut)
- S-9: Manhole Marker Post

5.2 Procedures and Standards for Inspection and Testing

The City of Carlsbad's *Engineering Standards Volume 3 – Standard Drawings and Specifications, Chapter 6 – Construction Specifications* contains specifications for inspecting and testing the installation of new sewers, pumps and other appurtenances and for rehabilitation and repair projects. The City has construction inspection staff assigned to sewer system improvement projects who are responsible for using inspection and testing specifications to manage and control quality installation of sewer system improvements. In addition to frequent contact and oversight of construction

activities, the construction inspector tests gravity and pressurized sewer pipelines following:

Division 15, Mechanical, 15043 – Testing of Gravity Sewer Pipelines

Gravity sewer pipes are tested for exfiltration and/or infiltration and deflection. Testing includes a water infiltration test, air pressure test, and a deflection test using a mandel. The pipe is also inspected using CCTV with all evidence of re reverse slope by ponding of water or dips in pipe alignment revealed by the closed circuit television inspection shall be repaired to the satisfaction of the City Engineer at the Contractor's expense.

Division 15, Mechanical, 15044 – Hydrostatic Testing of Pressure Pipelines

Pressurized sewer pipes are tested for leakage by applying and maintaining a test pressure by means of a hydraulic pump.

Lift Station Inspection and Testing

Lift stations undergo testing throughout the construction phase starting with factory testing of equipment and finishing with field testing of the fully constructed lift station prior to acceptance by the City.

6 Overflow Emergency Response Plan

The City's Overflow Emergency Response Plan documents the protocols City staff follow in the event of a sewer overflow and is included as **Attachment F1**. **Table 6-1** provides a summary of the WDR requirements for an Overflow Emergency Response Plan and the relevant section of the City's Overflow Emergency Response Plan addressing the WDR requirement.

Table 6-1: Linkage between Overflow Response Requirements and Overflow Emergency Response Plan

OERP Requirement	OERP Section
Prompt Initial Notification Procedures	Section 3 – Overflow Detection and Initial Response
Appropriate Response to SSOs	Section 3 – Overflow Detection and Initial Response; Section 4 – Mitigation; Section 6 – Recovery and Clean Up; Section 7 – Water Quality Monitoring and Sampling Procedures; Section 8 – Investigation and Overflow Estimation Section 10 - Equipment
Prompt Notification of SSO Reaching Waters of the State	Section 5 – Public Access and Warning; Section 7 – Water Quality Monitoring and Sampling Procedures Section 9 – Regulatory Notification and Reporting
Procedures for Awareness and Training for Emergency Response Plan	Section 12 – Training
Procedures to Address Emergency Operations	Section 11 - Safety
Program to Ensure Reasonable Steps Taken to Contain and Prevent Discharge	Section 6 – Recovery and Clean Up SSMP Chapter 4 - Operations and Maintenance Program

6.1 Summary of the Overflow Emergency Response Plan Sections

The City's Overflow Emergency Response Plan contains the following sections:

Section 1 - Purpose

This section states that the Sewer Overflow Response Plan has been developed to ensure an appropriate standardized response in the event of a sewer overflow. The Plan also ensures that the City of Carlsbad is adequately prepared to respond to SSO events by:

- Reducing or eliminating public health hazards,
- Preventing unnecessary property damage,
- Ensuring thorough recovery and cleanup efforts,
- Properly documenting, notifying and reporting overflow spill events,
- Minimizing the inconvenience of service interruptions, and
- Ensuring staff and contracted personnel are properly trained to respond to such events.

Section 2 - General

The General Section of the Plan describes the Orders and permits from the Regional Board, Carlsbad's obligation to comply, the relationship between the City of Carlsbad and the Encina Wastewater Authority, prohibitions, civil and monetary penalties for enforcement and the definition of a sewer overflow.

Section 3 - Overflow Detection and Initial Response

Describes the methods in which overflows may be discovered or detected as well as the responsibilities of City of Carlsbad personnel to respond to overflows, what a preliminary assessment and response might consist of, and how to respond to overflows in the collection system, at lift stations and on private property. This section also describes the SEMS/Incident Command structure.

Section 4 - Mitigation

Mitigation describes the concept of reducing spill severity and the sensitivity of the coastal waters and the environment to SSOs.

Section 5 - Public Access and Warning

This section describes procedures to protect the public from a public nuisance by posting signage.

Section 6 - Recovery and Cleanup

The Recovery and Cleanup section of the Plan describes procedures to be followed for clean-up of spills into concrete lined storm drains, catch basins, under sidewalk drains, streets, curbs, gutters and other storm water conveyance structures. The section also describes procedures to be followed for clean-up of spills into waterways, into lawns or landscaping, into natural vegetation or environmentally sensitive areas, indoors or from private lateral spills.

The City of Carlsbad (City) has a Sanitary Sewer Overflow (SSO) Remediation Protocol for SSOs of 1,000-gallons or more spilled to surface waters. For the purposes of the SSO Remediation Plan, an SSO is defined as any overflow, spill, release, discharge or

diversion of untreated or partially treated wastewater from a sanitary sewer system. SSOs can contain suspended solids, pathogenic organisms, nutrients and other pollutants that may impact surface and ground waters, threaten public health, or adversely affect aquatic life. The SSO Remediation Protocol integrates the City's sanitary sewer infrastructure, Sanitary Sewer Management Plan (SSMP) overflow emergency response plan(s), adjacent watershed configuration and water quality monitoring information, sewage spill remediation techniques and other relevant information specific to SSO response procedures. The SSO Remediation Protocol also includes reference to existing initial response strategies, an SSO evaluation and adaptive monitoring remediation approach and identify a suite of potential SSO remediation actions applicable to potential SSO scenarios.

Section 7 - Water Quality Monitoring and Sampling Procedures

This section describes procedures to be followed for sampling after a SSO has occurred. Water quality sampling and testing will take place when SSO's of 50 gallons or more enter receiving waters. These waters include; Buena Vista Creek/Lagoon, Agua Hedionda Creek/Lagoon, San Marcos Creek and Batiquitos Lagoon. Tests will the following; Ammonia, Fecal Coliform, E. Coli, Total Coliform, Dissolved Oxygen, Copper, Zinc and Biochemical Oxygen Demand or BOD.

Section 8 - Investigation and Overflow Estimation

Ensures that overflow quantification is accurate and lists several means of quantifying overflow. The section also describes what is contained in an overflow events record and describes an after action report.

Section 9 - Regulatory Notification and Reporting

Describes the different category of spills and the reporting protocol for the various spill types.

Section 10 - Equipment

Includes a description of vehicles and equipment to support the daily needs, routine maintenance and emergency situation for the wastewater division.

Section 11 - Safety

Stresses the criticality of resolving a spill incident safely and competently. Describes typical safety procedures that personnel may be required to implement during spill responses including; lockout/tagout of equipment for repairs, confined space entry procedures, traffic and crowd control procedures at site, equipment and/or vehicle operation, use of personnel protective equipment. This section also outlines safety training goals.

Section 12 - Training

The Training section outlines reviewing and amending the Overflow Emergency Response Plan as well as an annual training schedule.

Sections 13 & 14 - Contact Information

Lists contact numbers for personnel, outside Districts and Utilities, outside agencies, lagoon contacts, emergency contractors, general contractors, welding contractors, electrical contractors, and various suppliers and specialty contracting services.

6.2 Contractor Spill Prevention and Emergency Response Plans

The City requires all construction contractors performing work on the collection system to develop, submit and implement a Spill Prevention and Emergency Response Plan as part of their construction contracts. The contractor Spill Prevention and Emergency Response Plans include:

- Emergency contact information
- Contact information for notifying impacted parties
- Spill prevention measures and protocols
- Employee training plan and records
- Hazardous substance inventory
- Spill response equipment inventory
- Sewer bypass protocols
- Spill cleanup and disposal protocols
- Spill reporting protocols

City staff review the contractor Spill Prevention and Emergency Response Plan for approval prior to construction activities. The plan is a formal submittal signed by both the City's Engineer and Construction Manager responsible for overseeing construction activities. **Attachment F2** includes an example Spill Prevention and Emergency Response Plan.

7 Fats, Oils, and Grease Control Program

The City has implemented a FOG source control program to reduce the amount of Fats, Oils and Grease discharged to the City's sewer system. The City identifies all food preparation and service locations within its service area. Food preparation and service locations must keep annual records of maintenance of grease control device(s). Customers with a history of contributing FOG to the sewer system are sent a letter of correction. The City maintains an active listing of all food preparation and service locations and permits are not required at this time.

7.1 Public Education Outreach Program

Facilities are provided with a FOG binder consisting of an educational video, posters and other materials educating them on proper FOG disposal. Utilities Wastewater Division staff, as well as consultants, have met with each food service facility owner to distribute the FOG binder. The FOG binder contains:

- A list of independent vendors which can provide collection and disposal services in the service area
- A link to an information video on proper FOG disposal
- A FOG poster promoting best management practices

The City also held a series of workshops in 2008-09 focused on FOG disposal, interceptor requirements and implementation of Best Management Practices. The City plans to update public outreach materials in the next two years including:

- FOG program rebranding to increase outreach effectiveness;
- Use of social media to spread FOG messaging;
- Update of the FOG binder used to educate food service facility owners; and,
- Development and sharing of training videos on FOG best management practices.

7.2 Acceptable Disposal Locations

The City provides food service facilities with a list of independent vendors which can provide collection and disposal services in the service area.

7.3 FOG Legal Authorities

The City possesses the legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG through the City of Carlsbad, Municipal Code, Chapter 13 (Sewers), Section 13.06.

Table 7-1: Summary of FOG Source Control and Enforcement Legal Authorities

Requirement	Source of Authority
GENERAL	
Limit the discharge of fats, oils, and grease and other debris that may cause blockages	Muni Code 13.06.010

FOG SOURCE CONTROL	
Installation of grease control device (GCD)	Muni Code 13.06.040
Design standards for GCD	Muni Code 13.06.090 (Interceptor) Muni Code 13.06.100 (Trap)
Maintenance and BMP requirements	Muni Code 13.06.100; 13.06.120; and 13.06.130
Record keeping and reporting	Muni Code 13.06.140
Authority to inspect grease producing facilities	Muni Code 13.06.150; and 13.06.160
ENFORCEMENT	
Enforce any violations of sewer ordinances	Muni Code 13.04.080

7.3.1 Authority to Prohibit FOG Discharges

Section 13.06.010 of the Municipal Code prohibits FOG discharge by food service facilities.

7.3.2 Authority to Inspect Grease Producing Facilities

Section 13.06.150 of the Municipal Code provides authority to inspect and sample a food service facilities wastewater discharges. The City has the authority to inspect grease producing facilities through City of Carlsbad, Municipal Code, Chapter 13 (Sewers), Section 13.06.160 Right of Entry.

7.3.3 Enforcement Authorities

Enforcement of food service facilities for violations of Chapter 13.06 requires an administrative decision from the Utilities Director through the following steps:

1. Utilities Wastewater Division staff or contractors identify a violation of Chapter 13.06 of the municipal code.
2. Utilities Wastewater Division staff notify the food service facility of the violation and issue a decision, action or determination for how the food service facility can address the violation.
3. The food service facility can either choose to address the violation or can file a written request for appeal hearing with Utilities. The written request must be received within 10 calendar days of the mailing of Utilities Wastewater Division decision, action or determination.
4. If Utilities receives an appeal, the Utilities Director will, within 15 days of receipt, designate a representative to hear the appeal.
5. The appellant meets with the representative to present information supporting their position concerning the decision, action, or determination.
6. After the hearing, the representative will document their findings in a formal report with recommendations.
7. The Utilities Director will then issue a written determination, which shall be final.
8. The food service facility can choose to appeal further to the City Council. If the food

service facility representative fails to appeal or the City Council fails to reverse or modify the decision, the Utilities Director decision is deemed final.

Once a Utilities Director decision is deemed final, if a food service facility fails to rectify the issue, the City has the authority to issue an administrative citation following the City's Administrative Code Enforcement Remedies in Chapter 1.10 of the municipal code.

7.4 FOG Program Requirements

7.4.1 Best Management Practice, Record-Keeping and Reporting Requirements

The maintenance requirements, BMP requirements, record keeping and reporting requirements are found in the following sections of the municipal code:

- Section 13.06.130 Grease interceptor maintenance requirements;
- Section 13.06.030 Best management practices required;
- Section 13.06.130 Grease interceptor maintenance requirement, and;
- Section 13.06.140 Monitoring and reporting conditions.

Food service facilities undergo annual Grease Best Management Practices (GBMP) inspection where the following is evaluated: exhaust hoods, documentation, existing FOG fixtures, review of best management practices in the food preparation area and grease control device (GCD) inspection. The inspection is performed by Utilities Wastewater Division staff or using an inspection contractor.

7.4.2 Grease Control Device Requirements

The City's requirements to install grease control devices are discussed in the following sections of the City of Carlsbad, Municipal Code, Chapter 13 (Sewers):

- Section 13.06.040 FOG pretreatment required;
- Section 13.06.090 Grease interceptor requirements, and;
- Section 13.06.100 Grease trap requirements.

The City has a standard drawing for the grease interceptor. Utilities Wastewater Division staff, or the inspection contractor, performs an annual Grease Control Device Inspection (GCDI) to ensure that interceptors are routinely serviced to minimize FOG discharges to the sewer system. The City performs more frequent inspections of those facilities experiencing inconsistent maintenance practices.

7.5 Preventive Maintenance Program to Address FOG Accumulation

The City has identified the pipe segments of the sewer system subject to higher levels of FOG and has assigned these pipe segments to either a quarterly or semi-annual cleaning schedule. As sewer lines are cleaned, the severity of the FOG accumulation is

documented in the Infor Public Section (IPS) work management system and the cleaning program is updated based on the most recent data collected by field staff.

7.6 Source Control Measures for All Sources of FOG Discharged

The City addresses all known locations of FOG accumulation through either FOG source control inspections of food service facilities and/or preventive maintenance cleaning on pipe segments with known propensity for FOG accumulation. The City's Utilities Wastewater Division cleans pipe segments with excessive FOG accumulation issues quarterly.

7.7 FOG Program Staffing

Utilities Wastewater Division staff are responsible for performing food service facility inspections. In some cases, Utilities Wastewater Division contracts with an inspection service provider for support with performing the annual food service facility inspections. All follow-up inspections and enforcement interactions with food service facilities is performed by City staff.

8 System Evaluation and Capacity Assurance Plan

The City has implemented a program to assure system capacity to convey peak dry weather flows as well as peak wet weather flows generated during a 10-year design storm event. The City updated the Sewer Master Plan in 2019. The plan includes wet weather monitoring, evaluation of peak flow including rainfall derived infiltration and inflow, updated unit sewer flows, projected build-out wastewater flows, and a hydraulic model of the entire collection system.

8.1 Evaluation to Identify Potential Hydraulic Deficiencies

In 2018, the City updated capacity analyses of the existing and build-out scenarios to determine if there are any potential capacity deficiencies. The plan aligned flow monitoring data with the InfoSWMM hydraulic model, incorporated flows from other regional member agencies and updated flows for seasonal demand changes due to tourism in the summer.

Flow monitoring was used to evaluate the monitoring of regional flows from member agencies. System flows identified through flow monitoring in the 2019 Sewer Master Plan are less than flows identified in the previous master plan and this reduction in flow is primarily attributed to water conservation. The City is evaluating odor complaints and cleaning frequencies due to the low flows.

The capacity assessment utilizes a 10-year design storm event that aligns with a member agency design storm that shares sewer interceptor systems with the City so the hydraulic analysis is aligned and easier to evaluate between the two systems.

Dynamic Hydraulic Model

The hydraulic model is fully dynamic and is utilized to evaluate surcharge, backflow and SSO conditions in addition to pipe flows and capacity. Water billing data was used to update unit sewer flows used in the hydraulic model to reflect current conditions.

The pipe capacity and flow information from the hydraulic model is used in the City's risk model which identifies pipes with less capacity and higher flows as higher risk.

Communication and Coordination with Neighboring Agencies

The City jointly owns an outfall interceptor sewer, two lift stations, and associated force mains with the City of Vista. The outfall interceptor routes sewage approximately 7.5 miles through these two (2) lift stations and associated force mains to the Encina Water Pollution Control Facility. Both jointly-owned lift stations are operated and maintained by Encina Wastewater Authority under various MOUs and agreements. The City of Carlsbad coordinates closely with both the City of Vista and Encina Wastewater Authority on issues impacting the jointly-owned infrastructure through regular Member Agency Meetings hosted by Encina Wastewater Authority. As part of ongoing system evaluation the City meets regularly with Encina Wastewater Authority member agencies to discuss

ongoing interagency issues (e.g. flow monitoring, I&I, future development projects). This includes potential future development impacting jointly-owned infrastructure.

8.2 Design Criteria

The City's sewer system design criteria is located in the 2019 Sewer Master Plan and Chapter 6 of Volume 1 of the City's Engineering Standard. Design criteria for Carlsbad for designing pipe is d/D of less than or equal to 0.75 for pipe greater than 12-inch diameter, and 050 for pipe less than or equal to 12 inch diameter. Trigger criteria for upsizing a pipe was developed in the 2019 Sewer Master Plan which is d/D of 0.90 or greater and q/Q of 1.0 or greater.

8.3 Capacity Enhancement Measures

The 2019 Sewer Master Plan utilizes the results of the evaluation and trigger criteria to recommend short- and long-term CIP projects for existing and system build out scenarios. A few minor deficiencies were identified in the existing system scenario which are identified for short-term projects. There were a few deficiencies identified in the build-out scenario that are identified for longer-term projects. The 2019 Sewer Master Plan includes cost estimates, schedule and prioritization for improvement of existing wastewater collection and treatment facilities. The City conducts smoke testing and temporary flow monitoring when potential inflow and infiltration issues are identified and takes steps, such as CIP projects or customer notification, to address issues. The 2019 Sewer Master Plan capacity projects are coordinated with condition related projects identified in the Asset Management Master Plan. The City regularly conducts a cost of service study to finance the recommended projects. Water and wastewater replacement revenues are generated by user fees equal to approximately 30 percent of total revenues, and are used to pay for replacement of existing water and sewer facilities.

8.4 Schedule for Completion of Capital Program

The 2019 Sewer Master Plan identifies completion dates and trigger criteria for CIP projects related to hydraulic deficiencies. The City updates the CIP and project priorities annually through workshops with engineering and operations staff based on current operating conditions including recent data such as inspections or flow monitoring. The City maintains a 15-year CIP.

SUPPORTING DOCUMENTS

The following documents, support the City's System Evaluation and Capacity Assurance Plan, thereby allowing the City to comply with the System Evaluation and Capacity Assurance Plan requirements of the WDR:

City of Carlsbad Engineering Standards, Volume 1 – Chapter 6

http://www.carlsbadca.gov/services/depts/landev/landdev.asp

2019 Sewer Master Plan

http://www.carlsbadca.gov/services/depts/landev/landdev.asp

Capital Improvement Program

http://www.carlsbadca.gov/services/depts/finance/budget.asp

9 Monitoring, Measurement, and Program Modifications

The City has developed a leading edge performance management system to monitor and measure the effectiveness of the SSMP program implementation and to perform data analytics to diagnose the root causes of issues impacting SSMP program effectiveness. The City uses this system to monitor the performance of the collection system on an on-going basis through monthly performance management system reviews performed at the operating unit level, and annually during Utilities business planning, goal setting and the annual budget review.

9.1 Collection and Management of Relevant Data

Table 9-1 lists the information systems the City uses to collect, store and analyze SSMP program data. Key data collected by City staff includes:

- Pipe, manhole and pump station asset attribute data
- Pipe, manhole and pump station asset failure history
- Pipe, manhole and pump station maintenance schedule and work history
- Pipe, manhole and pump station asset inspection data
- Pipe, manhole and pump station asset remediation decisions

The data collected in these information systems provides the source data for the City's performance management system.

Table 9-1: Information Systems Used to Collect, Store and Analyze Relevant SSMP Program Data

Information System	System Type	Data or Information Stored
ESRI GIS	Geographical information system	Pipe and manhole geospatial and attribute data; pump station location
Infor Public Sector – Hansen	Maintenance management system	Pump station asset attribute data; Pipe, manhole, pump station maintenance schedule and work history; manhole inspection data; remediation history
Cues GraniteNet	Asset inspection software	Pipeline inspection data
InfoMaster	Asset decision support software	Pipe and manhole remediation decision; pipe risk assessment data
Tableau	Visual analytics	Business intelligence. Used for the performance management system to see and understand the data.

9.2 Active Performance Management of SSMP Program Effectiveness

The City actively monitors SSMP program effectiveness using a multi-layer performance management framework that incorporates the types of performance measurement described in **Table 9-2**. This multi-layered performance management system is linked to the live information systems providing timely data analysis. The City spent several years building and perfecting this system and it is proving to be an invaluable tool for assessing SSMP program effectiveness, drilling down into the root causes of sewer overflows and the process breakdowns that may be impacting the overall performance of the SSMP program implementation.

Table 9-2: Multi-Layered Performance Management Framework

Measurement Type	Measurement Description
Failure analysis	The City reviews reported SSOs, prevented SSOs, and lift station equipment failures. These events drive root cause analysis. Failure events are visualized on charts to show monthly or seasonal changes and on maps to show geographical trends.
Productivity analysis	The City is tracking the unit cost of routine cleaning, frequency cleaning, and routine filming to provide insight into work efficiency as well as insight into potential work capacity issues that may be arising.
System flows conveyed	The City compiles data from EWA reporting to track average flows from the six EWA owners into Water Pollution Control Facility. The City is also tracking the ratio of gravity flows versus pumped flows and the ratio of the flow conveyed to EWA from the City versus the overall flow.
System condition monitoring	The City is closely monitoring the type and severity of material found during cleaning activities; manhole condition ratings; and CCTV inspections surpassing condition threshold. This data is charted and mapped to support root cause analysis drill downs. System condition monitoring is also used to change preventive maintenance frequencies for sewer cleaning.
Production monitoring	Production of key SSMP program activities are monitored including preventive maintenance cleaning production and average daily footage; preventive maintenance filming production and daily footage; ratio of scheduled versus completed lift station preventive maintenance; the number of scheduled lift station preventive maintenance work orders by priority; and the number of incomplete lift station work orders. These are visualized in various charts for analysis.
Field staff utilization tracking	The City tracks the available time of collection system and lift stations operators. This provides insights into why production may be impacted.
Unplanned work volume tracking	The City is tracking the volume and types of service requests; the volume of unscheduled lift station work orders; and the costs of unscheduled work activities by lift station.

9.3 Assessment of Preventive Maintenance Program Success and SSO Trends

The success of the preventive maintenance program is evaluated monthly using both leading and lagging indicators built into the performance management system. Lagging indicators include analysis of failures such as SSOs and private lateral sewage discharges as well as potential failures such as blockages and lift station alarms. Leading indicators include productivity analysis, production monitoring, system condition monitoring and unplanned work volume tracking. The City works towards maximizing planned work and minimizing failures. Each failure or potential failure is monitored to determine if a trend is forming. Based on the analysis, corrective actions may include localized preventive maintenance program modifications (i.e., changes to a small number of pipe segments), such as a change to maintenance method or frequency, or, if a trend appears to be forming, a programmatic maintenance program change to address problems impacting a geographical area or specific asset class. The City's SSO rate has averaged below 1 SSO per 100 miles of sewer pipelines since October 2015, which is well below the regional average. This SSO rate is a strong indicator of the success of our preventive maintenance program.

9.4 Program Updates Driven by Performance Monitoring

The majority of program updates driven by performance monitoring affect a small number of assets with a change occurring at the asset level with the modification being a maintenance method or frequency change. The City is continually optimizing the maintenance program to perform inspection and maintenance activities at the right frequencies, using efficient methods and tools, and balancing cost with benefit derived.

10 SSMP Program Audit and SSMP Updates

The City uses the SSMP audit process to identify actions for improving how it manages, operates, and maintains the collection system. This process identifies the tasks and actions that are required to meet SSMP goals and defines and prioritizes them. In addition, the City formally updates and recertifies the SSMP at a minimum of every five years. **Table 10-1** shows the timeline for SSMP audits and updates for the last five years and the anticipated schedule for the next five years. The City's most recent SSMP Program Audit Report is included as **Attachment J**.

Table 10-1: SSMP Audit and Update Schedule

Year	Audit
2016	Biennial self-audit completed in January 2016
2019	Biennial third-party audit completed in April 2019
2019	5-year SSMP update completed in October 2019
2021	Biennial self-audit planned in early 2021
2023	Biennial self-audit planned in early 2023
2024	5-year SSMP update planned in late 2024

10.1.1 SSMP Program Audit Process

A team of experienced personnel is formed once every two years to perform biennial self-audits in accordance with regulatory requirements for SSMP Program Audits. The team consists of representatives from relevant city departments and is led or assigned by the Primary LRO. In a series of in-person meetings over the course of approximately three months, the audit team evaluates the effectiveness of each SSMP element, identifies any deficiencies, and makes recommendations for improvements and updates. This is done by answering a set of questions developed specifically for the purpose of the audit for each element of the SSMP. It also includes referencing and reviewing performance reports and measures monitored throughout the year using the SSMP program performance management system. These findings are documented in an audit report. Once the audit is complete, a QC review of the audit report is performed, with a focus on consistency, completeness, and inclusion of references and attachments as appropriate. The final audit report is reviewed by the Primary LRO before final acceptance. Audit reports and related materials are maintained in a hard copy and an electronic file is stored on the City's server.

10.1.2 Audit Implementation and Tracking of Results

Once audit report findings and corrective actions are finalized, City staff responsible for the various elements of the SSMP program implementation review the SSMP program audit findings to determine an appropriate course of action. City staff will inform the Primary LRO if plans to address an audit finding deviates from the corrective action identified in the SSMP program audit report. The implementation progress of SSMP program audit corrective action are measured and reported on an ongoing basis to ensure timely completion of corrective actions. Any deficiencies in meeting the schedule are identified or anticipated and mitigation measures developed and implemented to ensure the corrective actions from the audit are addressed. Each subsequent audit update begins with a review of the previous audit to identify any corrective actions that

have been not been addressed. As described in *Element* ***Error! Reference source not found. Error! Reference source not found.***, any updates necessary to enhance the SSMP performance are included as a part of the following year's budgeting process and/or the formal SSMP program audit.

10.2 SSMP Update Process

The Utilities Manager is responsible for ensuring the SSMP is updated when major changes occur to the SSMP program implementation or at a minimum of five years from the previous SSMP update, approval and recertification. The results of the prior SSMP program audit reports are factored into the SSMP update process.

References for Further Information

- *SSMP Program Audit Report, 2019* kept on file at City Public Works Utilities as required per the General Waste Discharge Requirements

11 Communication Plan

The City communicates with the public and neighboring agencies on an on-going basis. The following sections describes the processes the City uses to communicate with the public and neighboring agencies.

11.1 Communication with the Public

The City communicates with the public on a continual basis through the City website and City Council meetings, which are open to the public. The updated SSMP is discussed and approved at a City Council meeting. The last 5-year SSMP update was approved at a City Council meeting on October 21, 2014, providing the public with the opportunity to review the SSMP, as part of the City Council meeting attachments, and to comment on the SSMP at the City Council meeting.

The City website also provides a continual link for the public to download the Sewer System Management Plan at:

http://www.carlsbadca.gov/services/depts/pw/utils/sewer/default.asp

The webpage also invites the public to send any comments on how the City is operating and maintaining the sewer system to wastewater@carlsbadca.gov or to call at 760-438-2722. These modes of communication can occur at any time during development and implementation of the SSMP.

11.2 Communication with Tributary or Satellite Systems

The City has no public systems tributary and/or satellite to the City of Carlsbad's sanitary sewer system. The City has two large private systems discharging into the City's collection system:

- Rancho Carlsbad HOA
- Lakeshore Gardens Mobile Home Park

The City jointly owns an outfall interceptor sewer, two lift stations, and associated force mains with the City of Vista. The outfall interceptor routes sewage approximately 7.5 miles through these two (2) lift stations and associated force mains to the Encina Water Pollution Control Facility. Both jointly-owned lift stations are operated and maintained by Encina Wastewater Authority under various MOUs and agreements.

All flows from the City are conveyed to the Encina Water Pollution Control Facility, owned by Encina Wastewater Authority (EWA), for treatment and disposal. The Utilities Director participates in monthly Member Agency Meetings hosted by EWA, which is owned by six public agencies governed by a Joint Powers Agreement. Under this agreement, owners share in the operational and management costs of EWA. The six owners are:

- City of Carlsbad,
- City of Vista,
- City of Encinitas,

- Vallecitos Water District,
- Buena Sanitation District, and
- Leucadia Wastewater District.

The City of Carlsbad Utilities Director attends monthly Member Agency Meetings (MAM) hosted by EWA to discuss and resolve issues impacting all parties. The MAM is primarily focused on issues related to the Water Pollution Control Facility, yet can be utilized as a forum to discuss sewer system issues and WDR compliance if necessary. EWA also hosts a Collection Managers Meeting, which is attended by the City of Carlsbad Wastewater staff. This forum provides direct access to the various collection system managers of nearby agencies when needed.

Through these mechanisms, the City is able to communicate with both the public on an on-going basis as well as with collection system managers of nearby agencies when needed to address issues impacting the City's sewer system.

Attachments

List of Attachments

ID	Title	Owner	Last Updated
A1	State Board's Order No. 2006-003, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems	Wasko	N/A
A2	State Of California Water Resources Control Board, Order No. WQ 2013-0058-EXEC, Amending Monitoring And Reporting Program for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems	Wasko	N/A
A3	California Regional Water Quality Control Board, Region 9, Order R9-2007-0005 entitled Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region	Wasko	N/A
B	SSO Response, Notification and Reporting Workflow	Casteneda	July 2019
C	*Reserved*		
D	Asset Management Master Plan	Harrison	
E	*Reserved*		
F1	Overflow Emergency Response Plan	Wasko	November 2018
F2	Example Spill Prevention and Emergency Response Plan	Casteneda	
G	*Reserved*		
H	*Reserved*		
I	*Reserved*		
J	SSMP Program Audit Report, April 2019	Wasko	April 2019
K	*Reserved*		

Attachment A1

State Board's Order No. 2006-003, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems

Attachment A2

State Of California Water Resources Control Board, Order No. WQ 2013-0058-EXEC, Amending Monitoring And Reporting Program for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems

Attachment A3

California Regional Water Quality Control Board, Region 9, Order R9-2007-0005 entitled Waste Discharge Requirements for Sewage Collection Agencies in the San Diego Region

Attachment B

SSO Response, Notification and Reporting Workflow

Attachment D

Asset Management Master Plan

Attachment F1

Overflow Emergency Response Plan

Attachment F2

Example Spill Prevention and Emergency Response Plan