

<table>
<thead>
<tr>
<th><strong>Category (check applicable):</strong></th>
<th>[x] Policy [ ] Process [ ] Procedure [ ] Strategy [ ] Program [ ] SupMat.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose:</strong></td>
<td>The purpose of this document is to describe the Sewer System Management Plan (SSMP) of the Sacramento Area Sewer District (SASD).</td>
</tr>
<tr>
<td><strong>Version Date:</strong></td>
<td>September 3, 2019</td>
</tr>
<tr>
<td><strong>Effective Date:</strong></td>
<td>September 3, 2019</td>
</tr>
<tr>
<td><strong>Original or Revision:</strong></td>
<td>Revision</td>
</tr>
<tr>
<td><strong>Review/Revise Cycle:</strong></td>
<td>12 months / 60 months</td>
</tr>
<tr>
<td><strong>Key Stakeholders:</strong></td>
<td>SASD – All Units</td>
</tr>
<tr>
<td><strong>Approving Authority (name/position):</strong></td>
<td>Prabhakar Somavarapu, District Engineer</td>
</tr>
<tr>
<td><strong>Sponsor (name/position):</strong></td>
<td>Rosemary Clark, Director of Operations</td>
</tr>
<tr>
<td><strong>Owner (name/position):</strong></td>
<td>Patrick Schroeder, Engineering Manager</td>
</tr>
<tr>
<td><strong>Author (name):</strong></td>
<td>Jennifer Tigue, Senior Civil Engineer</td>
</tr>
<tr>
<td><strong>File Name and Location:</strong></td>
<td>SASD SharePoint</td>
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Approved By: Prabhakar Somavarapu  
District Engineer  
Signature  
9/3/2019  
Date

Approval Recommended By: Rosemary Clark  
Director Of Operations  
Signature  
8/26/19  
Date
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<th>Date of Approval</th>
<th>Approving Authority (Board / LRO)</th>
<th>Change Description</th>
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<tr>
<td>9/3/2019</td>
<td>LRO</td>
<td>• The SSMP was updated. The Reference to the <strong>Main Line Cracked, Brocken, Missing, and Collapsed Pipe Decision Policy</strong> was updated to <strong>Main Line Repair-Maintain-Replace Decision Policy</strong></td>
</tr>
<tr>
<td>8/20/2019</td>
<td>LRO</td>
<td>• The <strong>Main Line Cracked, Brocken, Missing, and Collapsed Pipe Decision Policy</strong> was revised and updated to mimic the <strong>Lower Lateral Repair-Maintain-Replace (LLRMR) Decision Policy</strong> as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ <strong>Existing Cracked, Broken, Missing, and Collapsed Pipe assessment process and its flowcharts were kept without any changes.</strong></td>
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<tr>
<td></td>
<td></td>
<td>➢ <strong>Preventive Maintenance flowchart and Main Line Observed Problems flowchart were added.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ Title was changed to <strong>Main Line Repair-Maintain-Replace (MLRMR) Decision Policy</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>➢ Purpose and background sections were updated to reflect the content of the updated policy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The Reference to the <strong>Main Line Cracked, Brocken, Missing, and Collapsed Pipe Decision Policy</strong> was updated to <strong>Main Line Repair-Maintain-Replace Decision Policy</strong> throughout the SSMP Reference Document.</td>
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<tr>
<td>3/13/2019</td>
<td>Board</td>
<td>• The SSMP was approved and certified by the SASD’s Board of Directors.</td>
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Sewer System Management Plan

Developed in compliance with Waste Discharge Requirement
Water Quality Order Number 2006-0003
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Sewer System Management Plan

1. Purpose

The purpose of this document is to provide the Sacramento Area Sewer District (SASD) a system-wide living management plan for the operation, maintenance, expansion, repair, and replacement of SASD’s sewer collection system. The intent of this document is to be a day-to-day working management plan that also meets the requirements of the Statewide General Waste Discharge Requirements (WDR) Water Quality Order No. 2006-0003 (Sanitary Sewer Order) approved on May 2, 2006 Provisions D 13 (D13). The District Engineer is authorized to make non-consequential changes to the SSMP.

2. Background

SASD provides wastewater collection services to approximately 270 square miles of the greater Sacramento area. Table 2-1 gives round values for various assets owned by SASD. The more current asset count for any given year is recorded and annually updated in the California Integrated Water Quality System (CIWQS) database questionnaire.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>Main Lines</td>
<td>3100 miles</td>
</tr>
<tr>
<td>Lower Laterals</td>
<td>1500 miles</td>
</tr>
<tr>
<td>Connections</td>
<td>297,000</td>
</tr>
<tr>
<td>Pump Stations</td>
<td>105</td>
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3. Application for Permit Coverage

SASD’s Notice of Intent (NOI) for coverage under the Sanitary Sewer Order was submitted to the State Water Board on November 2, 2006. It is included in Appendix A.

SASD received the Waste Discharge Identification (WDID) # 5SSO10912.

4. Reporting Program

SASD has complied with the General Monitoring and Reporting requirements by the online reporting (via CIWQS) of Sanitary Sewer Overflows since September 2, 2007.

5. Sacramento Area Sewer District SSMP Document Overview

SASD’s Sewer System Management Plan (SSMP) is arranged to be a living day-to-day management plan. The arrangement for SASD’s SSMP is shown graphically in Section 5.1 Diagram 5-1. General Management Overview.
D13 of the **WDR** specifies the mandatory elements of the **SSMP**. Some of the mandatory elements are treated individually as standalone elements in the **SSMP**. These elements are listed in Table 5-1 below.

**Table 5-1 Stand Alone Elements**

<table>
<thead>
<tr>
<th>WDR</th>
<th>WDR Mandatory Element</th>
<th>SSMP Section</th>
</tr>
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<tbody>
<tr>
<td>13(i)</td>
<td>Goal</td>
<td>7</td>
</tr>
<tr>
<td>13(ii)</td>
<td>Organization</td>
<td>8</td>
</tr>
<tr>
<td>13(iii)</td>
<td>Legal Authority</td>
<td>9</td>
</tr>
<tr>
<td>13(vi)</td>
<td>Overflow Emergency Response Plan</td>
<td>10</td>
</tr>
<tr>
<td>13(v)</td>
<td>Design and Performance Provisions</td>
<td>11</td>
</tr>
<tr>
<td>13(x)</td>
<td>SSMP Program Audits</td>
<td>12</td>
</tr>
<tr>
<td>13(xi)</td>
<td>Communication Program</td>
<td>13</td>
</tr>
</tbody>
</table>

The remaining mandatory elements are covered in combination in Section 14, Combined **SSMP** Elements Overview and Section 15, System-wide Assessment Programs. These elements are listed in Table 5-2 below.

**Table 5-2 Combined Elements**

<table>
<thead>
<tr>
<th>WDR</th>
<th>WDR Mandatory Element</th>
<th>SSMP Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>13(iv)</td>
<td>Operation and Maintenance Program</td>
<td>14 and 15</td>
</tr>
<tr>
<td>13(vii)</td>
<td>FOG Control Program</td>
<td>14 and 15</td>
</tr>
<tr>
<td>13(viii)</td>
<td>System Evaluation and Capacity Assurance Plan</td>
<td>14 and 15</td>
</tr>
<tr>
<td>13(ix)</td>
<td>Monitoring, Measurement, and Program Modifications</td>
<td>14 and 15</td>
</tr>
</tbody>
</table>
5.1 Diagram 5-1 General Management Overview
6. **Board Approved SSMP Development Plan and Schedule**

The WDR requires that publicly-owned sewer collection systems that meet the requirements of the order have the approving authority to formally approve the agency’s SSMP Development Plan and Schedule.

SASD approved the SSMP Development Plan and Schedule on June 13, 2007. A scanned copy of the Board approval documents can be found in Section 17 Appendix B.

7. **Goal**

On November 2, 2007, SASD certified that the “Goals” mandatory element of the SSMP was complete.

“The goal of the Districts’ SSMP is to provide a plan and schedule to continue to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help reduce and prevent SSOs, as well as mitigate any SSOs that occur.”

8. **Organization**

8.1 **Certified Organization Structure Element**

On November 2, 2007, SASD’s Board certified that the District Engineer is the responsible or authorized representative as described in Section J of the Waste Discharge Requirement Water Quality Order Number 2006-0003-DWQ. Figure 8-1 on the following page shows the organizational structure at the time of agency approval of this SSMP.

On July 8, 2013 the following person was appointed by the Board as the District Engineer.

*District Engineer: Prabhakar Somavarapu*

8.2 **Chain of Communication for Reporting SSOs**

The chain of communication for reporting SSOs is located in the most current version of Sanitary Sewer Overflow Emergency Response Procedures Manual, Section 205 of the SSMP Reference Document and the Customer Call Handling and Service Request Creation Policy, Section 206 of the SSMP Reference Document. Figure 8-1 on the following page shows the Legal Responsible Officials (LRO) for reporting SSOs.
For more information contact
Sacramento Area Sewer District (SASD)
(916) 876-6000
9. **Legal Authority**

The Sacramento Area Sewer District Sewer Ordinance (Ordinance), Section 203 of the SSMP Reference Document provides SASD with the Legal Authority to:

- prevent illicit discharges
- require that sewers and connections be properly designed and constructed
- ensure access for maintenance, inspection, or repairs for portions of laterals owned by SASD
- limit the discharge of fats, oils, and grease (FOG) and other debris that may cause blockages
- enforce any violation of its sewer ordinance
- prohibit discharges to the system and identify measures to prevents SSO’s and blockages caused by FOG

When SASD finds an inconsistency or shortcoming in the Ordinance or when SASD program modifications are made, the Ordinance is reviewed and updated as necessary. The Ordinance is kept in alignment with current practices, ensuring the legal authority for the required SSMP elements is maintained.

10. **Overflow Emergency Response Plan**

SASD maintains a Sanitary Sewer Overflow (SSO) Emergency Response Procedures Manual that complies with the SSMP Overflow Emergency Response Plan requirements. The manual contains procedures to:

- provide timely and proper notification of responders, regulatory agencies and other potentially affected entities
- ensure appropriate staff are aware of and follow the emergency response plan and address emergency operations and other necessary response activities
- ensure all reasonable steps are taken to contain and prevent sewage from entering waters of the United States and to minimize or correct any adverse impact of overflows in case they occur.

11. **Design and Performance Provisions**

SASD maintains the Sacramento Area Sewer District Standards and Specifications (Standards), Section 204 of the SSMP Reference Document that complies with the SSMP design and performance requirements. The Standards include design and construction standards and specifications for inspecting and testing the installation of new sanitary sewer systems and rehabilitation and repair of existing sanitary sewer systems. The Standards are reviewed annually and updated as changes are needed.

12. **SSMP Program Audits**

SASD conducts periodic internal audits at least every two years. A report is prepared after the audit and kept on file. SASD uses the SSMP Audit Procedures, Section 202 of the SSMP Reference Document as guidance when conducting an internal audit.

13. **Communication Program**

SASD has provided and will continue to provide information to its customers and the public with information about the SSMP as described in the SSMP Communication Program, Section 201 of the SSMP Reference Document. SASD communicates with tributary and satellite sewer systems as needed.
14. Combined SSMP Elements Overview

As shown in Table 5-2 contained in Section 5 Sacramento Area Sewer District SSMP Document Overview, some of the D13 provisions of the WDR elements are covered in combination. Most of these elements are addressed in Section 15 System-wide Assessment Programs.

There are three combined SSMP elements that are not part of Section 15 System-wide Assessment Programs:

- Computerized Maintenance Management Systems (CMMS)
- Training
- Up-to Date System Maps

These elements are discussed below.

14.1 Computerized Maintenance Management System (CMMS)

SASD employs a computerized maintenance management system (CMMS) to document work orders, Preventive Maintenance (PM) schedules, emergency response, and the records of completed work. Reports from the CMMS are used to provide the data for trending SASD’s sewer system performance. The performance trends for the SSO related service levels, failure modes, and performance measures drive the priority for SASD actions. The CMMS is also used to document SASD equipment and replacement part inventories, including identification of critical replacement parts.

In order to increase the staff awareness of system-wide SSO performance, SASD trends and prominently posts the main line and lower lateral overflow rate graphs monthly. In addition, performance measures such as work orders completed on time, production rates, and costs per unit completed are trended.

14.2 Training

SASD provides training for staff on regular basis in sanitary sewer system operations and maintenance. Training includes SSO response procedures, job plans, and on the job training as described in SASD Training Policy, Section 208 of the SSMP Reference Document.

Contractors awarded a job or a project by SASD are trained on SSO response procedures and sanitary sewer system operations and maintenance.

14.3 Up-to Date System Maps

SASD utilizes a Geographic Information System (GIS) to display location and asset information about the sewer system. The computerized map shows various information including pipe sizes, manhole rim elevations, pipe materials, manhole depths, and the locations of pipes, manholes, pump stations, force mains, and sewer laterals.

The storm water facilities are owned and operated by local jurisdictions. These jurisdictions are responsible for the accuracy and timeliness of storm water facilities mapping updates to the regional GIS Collaborative. These storm water maps are then available to SASD’s staff by retrieving them from different layers in the GIS Viewer.

SASD maintains the sewer and storm water system map in accordance with the most current version of Mapping Update Policy and Process, Section 207 of the SSMP Reference Document. The policy specifies mapping documentation procedures, mapping update timelines, and mapping rollout procedures.

15. System-wide Assessment Programs

This section describes the programs that are designed to investigate any shortcomings in meeting SASD’s approved Service Levels or regulatory requirements as follows:
monitor and analyze trends on service levels and performance measures
review the results the work done to accomplish a strategy
make Preventive Maintenance (PM) schedule, strategy modifications or other corrections, depending on trends and target performance level
evaluate and manage risk associated with failing to meet service levels, regulatory requirements, community/social needs and business goals
address capital and operating needs and project revenue and funding needs
monitor the result of strategy modifications

The Assessment Programs are broken into the following three categories:

- **Structural Assessment Program**
- **SSO Assessment Program**
- **Management Plan Assessment Program**

The Assessment Programs include strategies that drive SASD’s operation and maintenance practices, FOG Control Program, system evaluation and capacity assurance plan, and monitoring, measurement, and program modifications elements. These strategies address:

- pipeline loss of support failure mode
- pipeline crush collapse failure mode
- pipeline stoppage failure mode
- pump station and force main failure modes
- under capacity failure mode
- damage by others failure mode

### 15.1 Structural Assessment Program

SASD owns and operates a variety of physical assets. Each asset type has its own degradation pattern that leads to various modes of structural failures. The Structural Assessment Program, Section 400 of the SSMP Reference Document describes the strategies SASD implements to identify and mitigate failure modes that lead to structural failures of sewer collection assets such as manholes, pipes, and pump stations.

This program is divided into different types of strategies addressing structural failure modes. These strategies are then further divided by procedures and practices since different asset classes have different required methodology to determine investigatory and action triggers. SASD’s supporting information can be found in the following:

- Loss of Support Failure Mode Strategy, Section 401 of the SSMP Reference Document
- Crush Collapse Failure Mode Strategy, Section 402 of the SSMP Reference Document
- Pump Station Structural Assessment Strategy, Section 403 of the SSMP Reference Document

Structural failures which have caused stoppages are addressed directly through SASD’s SSO Assessment Program, Section 500 of the SSMP Reference Document, (and via the SSO Emergency Response Procedures Manual, if an SSO or BIS resulted).

### 15.1.1 Loss of Support Failure Mode Strategy

Loss of support failure mode is when the gravity collection system asset failure is due to the failure of the supporting substructure – such as the erosion of soil beneath a buried pipe or the failure of a support pier or hanger. This type of failure mode results in the pipe separating at joints or structurally failing. The **Loss of Support Failure Mode Strategy** defines the reactive and proactive approaches to cost effectively reduce loss of support failures.
15.1.2 **Crush Collapse Failure Mode Strategy**

Crush collapse failure mode is when the asset fails due to either the degradation of the asset (such as corrosion of the asset structure) or when excessive forces have been applied causing cracking or breaking of the pipe. If this type of failure leads to the asset collapsing in on itself then it is considered a crush collapse failure. The **Crush Collapse Failure Mode Strategy** is used to cost effectively reduce the frequency of crush collapse caused SSOs.

15.1.3 **Pump Station Structural Assessment Strategy**

Pump stations consist of wet well structures, valve vaults, and force mains. Some pump stations also have buildings. These different asset classes have different approaches to mitigate the risk of structural failure. The **Pump Station Structural Assessment Strategy** addresses the actions SASD takes to assess the pressurized assets for risk of failure and discusses approaches to cost effectively minimize failures.

15.2 **SSO Assessment Program**

SASD takes all feasible steps to reduce SSOs. The **SSO Assessment Program** is used to identify strategies SASD implements to identify and mitigate failure modes that cause SSOs.

This program is divided into different types of strategies addressing SSO-producing failure modes. These strategies are then further divided by procedures and practices since different asset classes have different required methodology to determine investigatory and action triggers. SASD’s supporting information can be found in the following:

- Main line Stoppage Failure Mode Strategy, Section 501 of the SSMP Reference Document
- Lower Lateral Stoppage Failure Mode Strategy, Section 502 of the SSMP Reference Document
- Manhole Stoppage Failure Mode Strategy, Section 503 of the SSMP Reference Document
- Pump Station Component Failure Mode Strategy, Section 504 of the SSMP Reference Document
- Damage by Others Failure Mode Strategy, Section 505 of the SSMP Reference Document
- Under Capacity Failure Mode Strategy, Section 506 of the SSMP Reference Document
- Underground Facility Damage Investigation Process, Section 508 of the SSMP Reference Document
- SASD Comprehensive FOG Program, Section 511 of the SSMP Reference Document
- Root Control Program, Section 512 of the SSMP Reference Document

All SASD SSO responses follow the **Sanitary Sewer Overflow Emergency Response Procedures Manual** and the **Customer Call Handling & Service Request Creation Policy**.

15.2.1 **Main Line Stoppage Failure Mode Strategy**

Main line stoppages are blockages in the pipe that impede the movement of sewage through the collection system. Stoppage failure mode is when a stoppage from such things as debris, roots, or grease causes an overflow of SASD’s facility. The **Main Line Stoppage Failure Mode Strategy** defines the strategy that is used to cost effectively reduce the frequency of main line stoppage caused SSOs. The strategy incorporates both proactive and reactive approaches. A proactive approach is used when SASD can identify a cost effective method to locate where stoppages may occur and take appropriate action, such as implementing the Main Line Scheduled Maintenance Program. The reactive approach is used when a stoppage occurs and SASD carries out actions to prevent future stoppages in that main line.

The **Incorrect Cleaning Frequency Failure Mode Strategy, Section 507 of the SSMP Reference Document** and the **Quality Control for Sewer Pipe Cleaning Procedure/Policy, Section 510 of the**
SSMP Reference Document are part of the proactive approach tools that were put in place to reduce the risk of an SSO in the main line.

15.2.2 Lower Lateral Stoppage Failure Mode Strategy

Lower lateral stoppages are blockages in the pipe that impede the movement of sewage from the customer to the SASD collection system. Stoppage failure mode is when a stoppage from such things as debris, roots, or grease causes an overflow of SASD’s facility. The Lower Lateral Stoppage Failure Mode Strategy defines the strategy that is used to cost effectively reduce the frequency of lower lateral stoppage caused SSOs. The strategy incorporates both proactive and reactive approaches. A proactive approach is used when SASD can identify a cost effective method to locate where stoppages may occur and take appropriate action such as implementing the Lower Lateral Scheduled Maintenance Program. The reactive approach is used when a stoppage occurs and SASD carries out actions to prevent future stoppages in that lower lateral.

15.2.3 Manhole Stoppage Failure Mode Strategy

Manhole stoppages are blockages in the manhole that impede the movement of sewage through the collection system. Stoppage failure mode is when a stoppage from such things as debris, roots, or grease causes an overflow of SASD’s facility. The Manhole Stoppage Failure Mode Strategy defines cost-effective strategies used to reduce the frequency of SSOs caused by stoppages in manholes. The strategy incorporates both proactive and reactive approaches. A proactive approach is used when SASD can identify a cost effective method to locate where stoppages may occur and take appropriate action such as implementing a Manhole Scheduled Maintenance Program. The reactive approach is used when a stoppage occurs and SASD carries out actions to prevent future stoppages in that manhole.

15.2.4 Pump Station Component Failure Mode Strategy

Pump station component failures can impede the flow of sewage from a lower elevation gravity asset to a higher elevation gravity asset. There are a large number of failure modes that can cause pump station component failure. The purpose of the Pump Station Component Failure Mode Strategy is to identify circumstances in which non-structural pump station components may fail and approaches to cost effectively minimize failures. The strategy incorporates both proactive and reactive approaches. A proactive approach is used when SASD can identify a cost effective method to repair, replace, or maintain the asset prior to failure. The reactive approach is used to respond to alarms that identify a failure in the pressurized system asset.

15.2.5 Damage by Others Failure Mode Strategy

Collection system failures caused by others is when any outside agency or vandal causes damage to SASD’s facilities resulting in an overflow. The Damage by Others Failure Mode Strategy defines strategies used to mitigate and reduce damage by others to SASD’s assets. The strategy incorporates both proactive and reactive approaches. A proactive approach is used when SASD can identify a cost effective method to locate where damages may occur and take appropriate action. The reactive approach is used when damage occurs and SASD does something to prevent future damages to that facility.
15.2.6 **Under Capacity Failure Mode Strategy**

The Sacramento Area Sewer District Sewer System Capacity Plan (formerly referred to as the Master Plan) is updated about every 5 years. The Sewer System Capacity Plan has the following two major components:

- an evaluation of the existing system’s capacity performance and identification of potential relief projects
- design of new sewer trunk system to serve future development.

The evaluation of the existing system’s capacity performance in the Sewer System Capacity Plan is intended to identify areas of potential capacity deficiencies, which then undergo further investigation through the Under Capacity Failure Mode Strategy that defines the design criteria and ensures consistency in the evaluation of potential capacity deficiencies and the development of alternative solutions in SASD’s collection system. The expansion portion of the Sewer System Capacity Plan and the Standards are used as a guide to design sewer facilities to serve new development.

15.2.7 **Underground Facility Damage Investigation Process**

The Underground Facility Damage Investigation Process, Section 508 of the SSMP Reference Document is used to ensure consistency in the investigation and reporting of damages to any SASD facility during an excavation process. This information will assist SASD in knowing who is financially responsible for the damage and assist in the recovery of all associated costs.

15.2.8 **SASD Comprehensive FOG Control Program**

SASD Comprehensive FOG Program captures all of SASD’s data, efforts and achievements related to compliance with the WDR mandated FOG requirements. The program document contains the details of SASD’s approach to mitigate FOG impacts and to meet the SSMP requirements. The Main line Stoppage Failure Mode Strategy and the Televised Inspection Policy, Section 509 of the SSMP Reference Document address the way SASD develops maintenance schedules for areas subject to all types of stoppages, including FOG.

15.2.9 **Root Control Program**

The Root Control Program aims at reducing the impacts of root intrusion in SASD’s system. This includes both a reactive approach and a proactive approach. The reactive approach aims at responding to and dealing with SSO’s in a quick and effective way and enforcing corrective action of private root problems. This minimizes the impacts of root intrusion that has occurred. The proactive approach aims at stopping root intrusion before it becomes a problem. Finding innovative root control techniques, appropriate mechanical cleaning methods, applying physical pipeline rehabilitation, and maintaining Sacramento Area Sewer District Standards and Specifications are all part of this approach.

15.3 **Management Plan Assessment Program**

The purpose of the Management Plan Assessment Program, Section 300 of the SSMP Reference Document is to describe the activities that explain how SASD manages decision-making processes and fiscal decision making. It also describes how SASD meets the requirements of the Monitoring, Measurement, and Program Modification element of the SSMP. Decision-making processes are managed so that attention is focused on assets at risk of failing in any of the failure modes identified to date. The document describes how various revenue scenarios are evaluated and how a schedule for developing the funds needed is updated each year.
### 15.3.1 Gravity Assets Management Strategy

The **Gravity Assets Management Strategy, Section 303 of the SSMP Reference Document** documents how SASD manages the sustainability and performance of gravity assets by reviewing system-wide SSO Service Level performance trends and evaluating operational efficiency, maintenance activities, procedures, frequencies and practices; along with these activities, costs are estimated and projected. SASD staff then develops scenarios of different approaches, estimates effectiveness, and projects cost and performance expectations. **Main line Stoppage Failure Mode Strategy, Lower Lateral Stoppage Failure Mode Strategy, Manhole Stoppage Failure Mode Strategy, and Damage by Others Failure Mode Strategy** are all evaluated for cost effective reduction of SSOs, mitigation of SSO risk, and reduction of SSO consequence.

The **Gravity Assets Management Strategy** references the **Under Capacity Failure Mode Strategy** and the **System Capacity Plan**, which describe how capacity assurance is managed. The **Gravity Assets Management Strategy** also references the **Structural Assessment Program**, which is intended to reduce the probability of high consequence of crush collapse failures.

The **Gravity Assets Management Strategy** documents how SASD manages the short-term repair and replacement processes as described in the **Main Line Repair-Maintain-Replace Decision Policy, Section 304 of the SSMP reference Document**, the **Lower Lateral Repair-Maintain-Replace Decision Policy, Section 305 of the SSMP Reference Document**, and the **Generic BCE Process, Section 306 of the SSMP Reference Document**.

### 15.3.2 Pressurized Assets Management Strategy

The **Pressurized Assets Management Strategy, Section 302 of the SSMP Reference Document** documents how SASD manages the sustainability and performance of pressurized assets by reviewing system-wide SSO Service Level performance trends and evaluating operational efficiency, maintenance activities, procedures, frequencies and practices. SASD staff then develops scenarios of different approaches, estimates effectiveness, and projects cost and performance expectations. **Pump Station Component Failure Mode Strategy, Pump Station Structural Assessment Strategy, and the Pump Station Condition Assessment Strategy, Section 301 of the SSMP Reference Document** are evaluated for cost effective operations, reduction of SSOs, mitigation of SSO risk, and reduction of SSO consequence.

The **Pressurized Assets Management Strategy** references the **Under Capacity Failure Mode Strategy** and the **System Capacity Plan**, which describe how SASD manages capacity assurance in the pressurized system. The **Pressurized Assets Management Strategy** also references the **Structural Assessment Program**, which is intended to reduce the probability of high consequence of crush collapse failures.

For pressurized assets, custom Business Case Evaluations (BCE), are performed for an asset class, and when appropriate, extended system-wide. The **Generic BCE Process** provides general guidelines on how SASD makes short-term repair and replacement decisions for pressurized assets.

### 15.3.3 Asset Management Plan and Staffing Projections

The **Asset Management Plan** is a report that describes SASD's asset portfolio and the asset life cycle projections. The purpose of the **Asset Management Plan** is to demonstrate responsible management, to communicate and justify funding requirements, to comply with regulatory requirements, and to assist in the long-term sustainability of SASD’s assets.

Staffing plans provide information to be used as a planning tool to determine the amount of work and resources needed for SASD staff to effectively maintain its collection system. The staffing plans are
used in conjunction with the Service Level Agreements to ensure adequate resources are allocated for the operation, maintenance, and repair of the sanitary sewer system.

15.3.4 Funding Needs Assessments

The Asset Management Plan and the Long-term Financial Plan (LTFP) contain the plan to rehabilitate and replace capital assets along with a schedule for rehabilitation and replacement. The Long-term Financial Plan describes the methodology that SASD uses to ensure it is in good financial health, using details from audited reports and budgets. The Long-term Financial Plan looks at sources of funding and compares them to a financial needs forecast.
## 16. Appendix A - Notice of Intent

### I. Notice of Intent (NOI) Status

| Mark Only One Item | 1. [ ] New Permittee | 2. [ X ] Change of Information WDID #: 5SSO10912 |

### II. Agency Information

| A. Legally Responsible Official | Mary Snyder |
| B. Agency | Sacramento Area Sewer District |
| C. Title | District Engineer |
| D. Mailing Address | 10545 Armstrong Avenue |
| E. Address (Line 2) | |
| F. City | Mather |
| G. State | CA |
| H. Zip | 95655 |
| I. County | Sacramento |
| J. Phone | 916-876-6105 |
| K. Email Address | SnyderM@SacCounty.net |
| L. Sanitary Sewer System | Sacramento Area Sewer District |
| M. Regional Water Quality Control Board | Region 5S - Sacramento |

### III. Billing Information

| A. Agency | Sacramento Area Sewer District (formerly known as CSD-1) |
| B. Contact Person | Marcia Maurer |
| C. Title | Chief Financial Officer |
| D. Mailing Address | 10545 Armstrong Avenue |
| E. Address (Line 2) | |
| F. City | Mather |
| G. State | CA |
| H. Zip | 95655 |
| I. County | Sacramento |
| J. Phone | 916-876-6116 |
| K. Email Address | MaurerM@SacCounty.net |

The annual fee, which is required by the California Water Code (section 13250), is based on the daily population served by the sanitary sewer system. Additionally, an ambient water monitoring surcharge of 9 percent is required for each annual fee. The total fee is the sum of the annual fee and ambient water monitoring surcharge. Please see the instructions on completing this NOI for a detailed explanation of the fee structure.

### L. Total Fee (check one)

- [ ] Population served < 50,000 – total fee submitted is $ 872.30
- [ X ] Population served ≥ 50,000 – total fee submitted is $ 4,676.00

A check for the appropriate total fee amount should be made payable to SWRCB and mailed with this completed NOI to the following address:

State Water Board Accounting Office  
P O Box 1888  
Attn: SSO Fees  
Sacramento, CA 95812-1888

SWRCB Tax ID is: 68-0281986
16.1 Appendix A – Notice of Intent (continued)

IV. Electronic Submittal Authorization

I, __________ Mary Snyder ____________, certify that I am the legally responsible official for ______ Sacramento Area Sewer District _______. My signature on this form certifies that, I agree, my California Integrated Water Quality System (CIWQS) user ID and password constitute my electronic signature and any information I indicate I am electronically certifying contains my signature. I understand that I am legally bound, obligated, and responsible by use of my electronic signature as much as by a hand-written signature.

I agree that I will protect my electronic signature from unauthorized use, and that I will contact the State Water Resources Control Board, within 24-hours of discovery, if I suspect that my electronic signature has been lost, stolen, or otherwise compromised. I certify that my electronic signature is for my own use, that I will keep it confidential, and that I will not delegate or share it with any other person.

V. Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Additionally, I certify that the provisions of the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, including electronic reporting of all sanitary sewer overflows and development and implementation of a sewer system management plan, will be complied with."

<table>
<thead>
<tr>
<th>A. Printed Name:</th>
<th>Mary Snyder</th>
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<tbody>
<tr>
<td>B. Title:</td>
<td>District Engineer</td>
</tr>
<tr>
<td>C. Signature:</td>
<td>[Signature]</td>
</tr>
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</table>

NOTE: Mail completed and signed form with a check for fee payment to the address below.

State Water Board Accounting Office
P O Box 1888
Attn: SSO Fees
Sacramento, CA 95812-1888
17. **Appendix B – Board Approved Plan and Schedule**

**DATE:** June 13, 2007

**TO:** Honorable Board of Directors
County Sanitation District 1

**FROM:** County Sanitation District 1 (CSD-1)

**SUBJECT:** Development Plan and Schedule for the CSD-1 Sewer System Management Plan (SSMP)

**RECOMMENDATION:**

It is recommended that your Board approve the SSMP Development Plan and Schedule to comply with the Waste Discharge Requirements (WDRs) for CSD-1.

**BACKGROUND:**

On May 2, 2006, the California State Water Resources Control Board (SWRCB) adopted Statewide General Waste Discharge Requirements (WDRs), Order No. 2006-0003, for all publicly owned sanitary sewer collection systems.

CSD-1 is subject to the requirements of the General WDRs. The WDRs require that all publicly owned collection systems greater than one mile in length take all feasible steps to prevent Sanitary Sewer Overflows (SSO’s), develop a Sewer System Management Plan (SSMP), and comply with reporting requirements.

The Statewide WDR requires that the agencies governing board approve the SSMP Development Plan and Schedule at a public meeting. The action your Board takes today by adopting this plan and schedule satisfies this requirement. The SSMP Development Plan and Schedule identifies the milestone dates for completing each element of the SSMP and identifies the responsible party for completing the SSMP plan sections. As the attached table illustrates, this is the first of many tasks the District will be undertaking and committing resources to develop a SSMP and comply with the WDR.


17.1 Appendix B - Board Approved Plan and Schedule (continued)

Honorable Board of Directors
June 13, 2007
Page 2

CONCLUSION:

It is recommended that the SSMP Development Plan and Schedule be approved and that the District Engineer be authorized to certify approval of the plan to the SWRCB.

Respectfully submitted, 

Christoph Dobson
Collection Systems Manager

CD/PKS:jc

Attachments: SSMP Development Plan and Schedule for CSD-1

Contact for additional information:
Christoph Dobson
Collection Systems Manager
876-6042

APPROVED:

Mary K. Snyder
District Engineer

[Signatures]
### 17.2 Appendix B - Board Approved Plan and Schedule (continued)

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17.3 Appendix B - Board Approved Plan and Schedule (continued)

COUNTY SANITATION DISTRICT NO. 1
RESOLUTION NO. CD-1225

SSMP DEVELOPMENT PLAN AND SCHEDULE – SACRAMENTO COUNTY SANITATION DISTRICT NO. 1 SEWER SYSTEM MANAGEMENT PLAN

BE IT RESOLVED AND ORDERED that the Board of Directors of the SACRAMENTO COUNTY SANITATION DISTRICT NO. 1 (CSD-1), a sanitation district organized under the laws of the State of California, hereby approves a Sewer System Management Plan (SSMP) Development Plan and Schedule, in the form hereto attached, and authorizes the District Engineer or her designee to certify approval of the SSMP Development Plan and Schedule in the California State Water Resources Control Board's (SWRCB) electronic database to comply with the SWRCB statewide general Waste Discharge Requirements (WDR's).

ON A MOTION by Director Yee, and seconded by Director MacGlashan, the foregoing resolution was passed and adopted by the Board of Directors of the Sacramento County Sanitation District No. 1, State of California, this 13th day of June, 2007, by the following vote, to wit:

AYES: Directors, Bruins, Dickinson, MacGlashan, Nottoli, Peters, Scherman, Stoglund, Yee, McCarty

NOES: Directors, none

ABSENT: Directors, Howell

ABSTAIN: Directors, none

Chair of the Board of Directors
Sacramento County Sanitation District No. 1, a sanitation district organized under the laws of the State of California.
REFERENCE DOCUMENT
FOR THE
SEWER SYSTEM
MANAGEMENT
PLAN

Approved By:
Rosemary Clark
Director Of Operations
Signature

Sacramento Area Sewer District
10060 Goethe Road
Sacramento, CA 95827

Review 12 months from effective date, and revise 24 months from effective date.
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</tbody>
</table>
100 Overview

100.1. Purpose

The purpose of the Sewer System Management Plan (SSMP) is to provide the Sacramento Area Sewer District (SASD) a system-wide living management plan for the operation, maintenance, expansion, repair, and replacement of SASD’s sewer collection system. This document is a Reference Document to the SSMP, going into greater detail than the SSMP does. This document also establishes the policies that SASD employees are required to follow in their daily work activities.

100.2. Background

The SSMP lays out the structure for the SSMP Reference Document Sections; programs, policies, procedures, and strategies. The Sections are arranged in a way to best meet the business needs as a living management plan. The Statewide General Waste Discharge Requirements (WDR) Provisions D13 (D13) specifies the mandatory elements of the SSMP. Section 100.3 is a key reference that ties WDR D13 mandatory elements to the SSMP Reference Document Sections. The following Figure 100-1 and Figure 100-2 show how the elements are organized as Sections in the SSMP Reference Document.

Some of the SSMP mandatory elements fit into the business structure best as independent elements and are referenced in Section 200 of the SSMP Reference Document. These elements are shown in Figure 100-1; SASD Sewer Ordinance, SASD Standards and Specifications, SSO Emergency Response Procedures Manual. Figure 100-1 also lists the elements that are included as part of the SSMP Reference Document Sections, but best fit under the General Section (Section 200).

Figure 100-1 General and Stand Alone Elements
The remaining mandatory elements of the SSMP are grouped in Sections according to why, when, and how the business decision is made. These Sections; strategies, policies, and procedures are grouped under three main Sections named programs; **Structural Assessments Program, Management Plan Assessment Program, and SSO Assessment program**, as shown in the Figure 100-2.
### 100.3. Key Reference to WDR Requirements

Table 100-1 below lists the Reference Document Section and ties it to the WDR Section requirement that it satisfies. The WDR Sections in this table are limited to Section 13.

**Table 100-1 Key Reference to WDR Requirements**

<table>
<thead>
<tr>
<th>WDR Section</th>
<th>Sewer System Management Plan (SSMP) Reference Document Section</th>
<th>SSMP Reference Document Section</th>
<th>SSMP Page Number</th>
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<tbody>
<tr>
<td>13(i)</td>
<td>All Sections of SSMP</td>
<td>All Sections</td>
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<tr>
<td>13(ii)(a)</td>
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<td>Organization</td>
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<td>13(iii)(a)</td>
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<td>13(iii)(b)</td>
<td>SASD Standards And Specifications</td>
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<td>SASD Standards And Specifications</td>
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<td>FOG Program</td>
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<td>Damage By others Failure Mode Strategy</td>
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<td>Underground Facility Damage Investigation Process</td>
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<td>Quality Control for Sewer Pipe Cleaning Procedure/Policy</td>
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<td>13(x)</td>
<td>SSMP Audits Procedure</td>
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</table>
### 100.4. Roles and Responsibilities

The Engineering Business Planning Group is the lead on ensuring the SSMP and its Reference Document are updated. Business Planning will work as the liaison between the Reference Document Section owner and the District Director of Operations to produce an updated document at least every two years.

Table 100-2 lists the SSMP Reference Document Sections and their owners. The listed owner will be the main contact for any questions. The owner will also be responsible for periodical review and update of their Section to ensure it is meeting its stated goals. Stakeholders are listed as a guide for the units affected by each Section. Updates to the Sections should be made in coordination with the affected stakeholders.

#### Table 100-2 Section Owners and Key Stakeholders

<table>
<thead>
<tr>
<th>Section</th>
<th>Section Title</th>
<th>Owner</th>
<th>Key Stakeholders</th>
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</thead>
<tbody>
<tr>
<td>201</td>
<td>SSMP Communication Program</td>
<td>Nicole Coleman, Public Affairs Office</td>
<td>PAO, Engineering-Business Planning, Engineering-Information Management</td>
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<tr>
<td>202</td>
<td>SSMP Audit Procedures</td>
<td>Rosemary Clark, SASD Operations Department</td>
<td>Maintenance and Operations (M&amp;O), Engineering, Customer Care</td>
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<td>203</td>
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<td>See Section 203 of the Reference Document</td>
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<td>Sacramento Area Sewer District Standards and Specifications</td>
<td>See Section 204 of the Reference Document</td>
<td>See Section 204 of the Reference Document</td>
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<tr>
<td>206</td>
<td>Customer Call Handling and Service Creation Request Policy</td>
<td>Aimee Norman, Customer Care</td>
<td>Customer Care, Engineering, M&amp;O</td>
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<tr>
<td>207</td>
<td>Mapping Update Policy and Process</td>
<td>Luisa Gomez, Engineering-Information Management</td>
<td>Engineering-Information Management, M&amp;O</td>
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<td>SASD Training Policy</td>
<td>Robert Bradley, Internal Services-Training</td>
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<td>Section</td>
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<td>Key Stakeholders</td>
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<td><strong>300</strong> Management Plan Assessment Program</td>
<td>Jennifer Tigue, Engineering-Business Planning</td>
<td>Finance, M&amp;O, Administration, Engineering</td>
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<td><strong>301</strong> Pump Station Condition Assessment Strategy</td>
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<td>Engineering, M&amp;O</td>
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<td><strong>302</strong> Pressurized Asset Management Strategy</td>
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<td>Engineering, M&amp;O</td>
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<td><strong>303</strong> Gravity Assets Management Strategy</td>
<td>Jennifer Tigue, Engineering-Business Planning</td>
<td>Engineering, M&amp;O</td>
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<td><strong>304</strong> Main Line Repair-Maintain-Replace Decision Policy</td>
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<td>Engineering, M&amp;O</td>
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<td>Engineering, M&amp;O</td>
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<td><strong>401</strong> Loss of Support Failure Mode Strategy</td>
<td>Jennifer Tigue, Engineering-Business Planning</td>
<td>Engineering, M&amp;O</td>
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<td><strong>402</strong> Crush Collapse Failure Mode Strategy</td>
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<td>Section Title</td>
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<td>Key Stakeholders</td>
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<td>Engineering, M&amp;O</td>
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<td>Engineering, M&amp;O, Customer Care</td>
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<td>Incorrect Cleaning Frequency Failure Mode Strategy</td>
<td>Roy Carlson, Engineering-Operations Support</td>
<td>Engineering, M&amp;O</td>
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<td>508</td>
<td>Underground Facility Damage Investigation Process</td>
<td>Jerry Carnahan, Maintenance &amp; Operations</td>
<td>M&amp;O, Customer Care, Engineering, Internal Services Division</td>
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<td>Televised Inspection Policy</td>
<td>Jennifer Tigue, Engineering-Business Planning</td>
<td>Engineering, M&amp;O</td>
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<td>510</td>
<td>Quality Control For Sewer Pipe Cleaning Procedure / Policy</td>
<td>J.P. Morris, Maintenance &amp; Operations</td>
<td>Engineering, M&amp;O</td>
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<td>511</td>
<td>SASD Comprehensive FOG Control Program</td>
<td>Luisa Gomez, Engineering-Information Management</td>
<td>P&amp;P-Legislative &amp; Regulatory Affairs, P&amp;P-WSCS, PAO, Engineering, M&amp;O</td>
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</tbody>
</table>
Table 100-3 Lists the general SSMP related roles and their respective responsible units. Specific roles are found as part of the SSMP Reference Document Sections.

### Table 100-3 General Roles Related to the SSMP

<table>
<thead>
<tr>
<th>Responsible Unit</th>
<th>Roles</th>
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</thead>
<tbody>
<tr>
<td>Engineering-Development</td>
<td>• Plan review and installation inspection</td>
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<tr>
<td>Engineering-Design</td>
<td>• Responsible for completing the detailed work orders (WOs), per job plan and according to the SASD’s Standards and Specifications, for any work that is contracted out as well as in-house originated projects</td>
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</tbody>
</table>
| Maintenance & Operations | • Writing WOs, planning and scheduling work, and completing work  
• Performs the necessary maintenance and construction work  
• Damage investigation |  |
| Engineering-Operations Support | • TVI Review, writing WOs, and planning and scheduling work |  |
| Engineering-Business planning | • Determine the effectiveness of the programs that have been approved |  |
| ISD Training Office (Goethe) | • Manage and coordinate training |  |
| SASD | • The Reference Document Sections incorporate numerous activities taking place throughout SASD. As such all units within SASD should be familiar with the basic nature and elements of these Sections  
• Each business unit identified as a stakeholder in Table-1, and each business unit identified as having a role or responsibility for carrying out a Section of this Reference Document, is responsible for training its staff as needed to successfully implement the Section  
• Follow the SSMP Document Update and Storage Policy when creating or updating a portion of the SSMP Reference Document |  |
### 100.5. Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<td>ARV</td>
<td>Air Relief Valve</td>
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<td>ASM</td>
<td>Area Scheduled Maintenance</td>
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<td>ASMRP</td>
<td>Area Scheduled Maintenance Reduction Program</td>
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<tr>
<td>BCE</td>
<td>Business Case Evaluation</td>
</tr>
<tr>
<td>BIS</td>
<td>Backup Into Structures</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practices</td>
</tr>
<tr>
<td>BPX</td>
<td>Broken Pipe or Hole in Pipe</td>
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<td>Cal - EMA</td>
<td>California Emergency Management Agency</td>
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<td>CARV</td>
<td>Combination Air Release Valves</td>
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<td>CCTV</td>
<td>Closed Circuit Television Inspection</td>
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<tr>
<td>CGA</td>
<td>The Common Ground Alliance</td>
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<td>CIP</td>
<td>Capital Improvement Project</td>
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<td>CIPP</td>
<td>Cured in Place Pipe</td>
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<td>Collaboration and Innovation Team</td>
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<td>CLEANOBS</td>
<td>Pipeline PM Cleaning Observations</td>
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<td>Cleanout</td>
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<td>Cracked Pipe – Moderate</td>
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<td>CPS</td>
<td>Cracked Pipe – Severe</td>
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<tr>
<td>CSD-1</td>
<td>The County Sanitation District 1</td>
</tr>
<tr>
<td>DIP</td>
<td>Ductile Iron Pipe</td>
</tr>
<tr>
<td>DIRT</td>
<td>Damage Information Report Tool</td>
</tr>
<tr>
<td>District</td>
<td>Sacramento Area Sewer District</td>
</tr>
<tr>
<td>DWPF</td>
<td>Dry Weather Peak Flow</td>
</tr>
<tr>
<td>EMD</td>
<td>Environmental Management Department</td>
</tr>
<tr>
<td>FOG</td>
<td>Fats, Oils and Grease</td>
</tr>
<tr>
<td>Generic BCE Process</td>
<td>Generic Business Case Evaluation Process</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>HMP</td>
<td>Hazardous Materials Plan</td>
</tr>
<tr>
<td>I/I</td>
<td>Inflow &amp; Infiltration</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>IIPP</td>
<td>Injury &amp; Illness Prevention Program</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LL</td>
<td>Lower Lateral</td>
</tr>
<tr>
<td>LLORP</td>
<td>Lower Lateral Overflow Reduction Program</td>
</tr>
<tr>
<td>LLSM</td>
<td>Lower Lateral Scheduled Maintenance Program</td>
</tr>
<tr>
<td>LRO</td>
<td>Legally Responsible Official</td>
</tr>
<tr>
<td>M&amp;O</td>
<td>Maintenance and Operations</td>
</tr>
<tr>
<td>MHSM</td>
<td>Manhole Scheduled Maintenance Program</td>
</tr>
<tr>
<td>ML</td>
<td>Main Line</td>
</tr>
<tr>
<td>MLORP</td>
<td>Main Line Overflow Reduction Program</td>
</tr>
<tr>
<td>MLSM</td>
<td>Main Line Scheduled Maintenance Program</td>
</tr>
<tr>
<td>MMICP</td>
<td>Main Line Maximum Interval Cleaning Program</td>
</tr>
<tr>
<td>MPAP</td>
<td>Management Plan Assessment Program</td>
</tr>
<tr>
<td>MRP</td>
<td>Monitoring and Reporting Program</td>
</tr>
<tr>
<td>NACWA</td>
<td>National Association of Clean Water Agencies</td>
</tr>
<tr>
<td>NPV</td>
<td>Net Present Value</td>
</tr>
<tr>
<td>NTSB</td>
<td>National Transportation Safety Board</td>
</tr>
<tr>
<td>OES</td>
<td>Office of Emergency Services</td>
</tr>
<tr>
<td>OPS</td>
<td>Office of Pipeline Safety</td>
</tr>
<tr>
<td>OPT</td>
<td>Organizational Planning Team</td>
</tr>
<tr>
<td>Ordinance</td>
<td>SASD Sewer Ordinance</td>
</tr>
<tr>
<td>P&amp;S</td>
<td>Planning &amp; Scheduling</td>
</tr>
<tr>
<td>PAC</td>
<td>Project Authorization Committee</td>
</tr>
<tr>
<td>PAP</td>
<td>Project Authorization Process</td>
</tr>
<tr>
<td>PDP</td>
<td>Project Development Plan</td>
</tr>
<tr>
<td>PDP-1</td>
<td>Project Development Plan Phase #1</td>
</tr>
<tr>
<td>PDP-2</td>
<td>Project Development Plan Phase #2</td>
</tr>
<tr>
<td>PM</td>
<td>Preventive Maintenance</td>
</tr>
<tr>
<td>PrePAC</td>
<td>Pre Project Authorization Committee</td>
</tr>
<tr>
<td>PSCFMS</td>
<td>Pump Station Component Failure Mode Strategy</td>
</tr>
<tr>
<td>PSSAS</td>
<td>Pump Station Structural Assessment Strategy</td>
</tr>
<tr>
<td>PSU</td>
<td>Permit Services Unit</td>
</tr>
<tr>
<td>PWWF</td>
<td>Peak Wet Weather Flow</td>
</tr>
<tr>
<td>QC</td>
<td>Quality Control</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>RCP</td>
<td>Reinforced Concrete Pipe</td>
</tr>
<tr>
<td>RDII</td>
<td>Rainfall-Dependent Inflow and Infiltration</td>
</tr>
<tr>
<td>RTU</td>
<td>Remote Telemetry Unit</td>
</tr>
<tr>
<td>SACC</td>
<td>Sacramento Area Creeks Council</td>
</tr>
<tr>
<td>SAP</td>
<td>Structural Assessment Program</td>
</tr>
<tr>
<td>SASD</td>
<td>Sacramento Area Sewer District</td>
</tr>
<tr>
<td>SCADA</td>
<td>System Control and Data Acquisition</td>
</tr>
<tr>
<td>SECAP</td>
<td>System Evaluation and Capacity Assurance Plan</td>
</tr>
<tr>
<td>SMUD</td>
<td>Sacramento Municipal Utility District</td>
</tr>
<tr>
<td>SPCCP</td>
<td>Spill Prevention Control and Countermeasure Plan</td>
</tr>
<tr>
<td>SR</td>
<td>Service Request</td>
</tr>
<tr>
<td>SRCSD</td>
<td>Sacramento Regional County Sanitation District</td>
</tr>
<tr>
<td>SRV</td>
<td>Sewer Relief Valve</td>
</tr>
<tr>
<td>SRWQCB</td>
<td>State Regional Water Quality Control Board</td>
</tr>
<tr>
<td>SSMP</td>
<td>Sewer System Management Plan</td>
</tr>
<tr>
<td>SSO</td>
<td>Sanitary Sewer Overflow</td>
</tr>
<tr>
<td>SSOAP</td>
<td>Sanitary Sewer Overflow Assessment Program</td>
</tr>
<tr>
<td>Standards</td>
<td>Sacramento Area Sewer District Standards and Specifications</td>
</tr>
<tr>
<td>SWPPP</td>
<td>Storm Water Pollution Prevention Plan</td>
</tr>
<tr>
<td>SWRCB</td>
<td>State Water Resources Control Board</td>
</tr>
<tr>
<td>TVI</td>
<td>Televised Inspection</td>
</tr>
<tr>
<td>UCFMS</td>
<td>Under Capacity Failure Mode Strategy</td>
</tr>
<tr>
<td>USA</td>
<td>Underground Service Alert</td>
</tr>
<tr>
<td>VCP</td>
<td>Vitrified Clay Pipe</td>
</tr>
<tr>
<td>VFI</td>
<td>Visual Flow Inspections</td>
</tr>
<tr>
<td>WDR</td>
<td>Statewide General Waste Discharge Requirements for Sanitary Sewer Systems</td>
</tr>
<tr>
<td>WMR</td>
<td>Waste Management and Recycling Department</td>
</tr>
<tr>
<td>WO</td>
<td>Work Order</td>
</tr>
<tr>
<td>WQCMMS</td>
<td>Water Quality Computerized Maintenance Management System</td>
</tr>
<tr>
<td>WSCS</td>
<td>Wastewater Source Control Section</td>
</tr>
<tr>
<td>XPX</td>
<td>Collapsed Pipe</td>
</tr>
</tbody>
</table>
200 General and Stand Alone Sections

201 SSMP Communication Program

201.1 Purpose
The purpose of the Sewer System Management Plan (SSMP) Communication Program is to define the policy, describe the SSMP performance communication plan, and define the roles and responsibilities.

201.2 Background
The SSMP Communication Program is a requirement of the Statewide General Waste Discharge Requirements (WDR), Section 13 (xi).

201.3 SASD SSMP Communication Policy
The Sacramento Area Sewer District (SASD) will provide convenient public access to the current SSMP and any proposed revisions for continued public review and comment. Annually, SASD will provide communication to the public on the performance of SASD’s SSMP. SASD also produces an annual State of the District Report and publishes service level performance reports. Service levels are the key measures of how well SASD is implementing its SSMP.

201.4 SSMP Communication Program
SASD implements robust communications and outreach within its service area using a variety of methods. Many communication methods focus on public awareness of SASD’s SSMP, and others are general methods that help support and achieve performance in SASD’s SSMP.

To foster public awareness of the SSMP, SASD uses its website (www.sacsewer.com) as the primary source for public information. The website provides the public the ability to review and comment on the SSMP and the SASD’s annual service level performance. The website is advertised on nearly all of SASD’s customer and stakeholder communication materials. The website features a “Being a Sewer Steward” section where the public can easily navigate the dedicated SSMP pages.

The SSMP web pages provide public access to view and download the most current, approved version of the SSMP, along with any proposed revisions. The SSMP web pages provide the public a convenient way to provide input on the SSMP, any proposed revisions, and on performance of the SSMP. The public may comment by clicking “comment” button where their comments can be written and immediately submitted to SASD staff.

SASD posts updated service level performance information no less than annually.

SASD also coordinates with the cities it serves to promote SASD on their websites and newsletters.

Other general communication and outreach activities that help SASD achieve performance of its SSMP may vary from year to year, but generally include:

- A comprehensive Fats, Oils, and Grease (FOG) education program
- Presentations to community groups, local Boards and Councils
- Attendance at local community fairs and festivals
- Dissemination of brochures, fact sheets, promotional items
- Public outreach about rehabilitation, repair or other collection system improvement projects
- Media relations
- Website updates
• Specialized outreach for efforts such as backflow prevention devices and root foaming
• Advertising campaigns for public awareness

201.5. Detailed Group Responsibilities

The following groups and individuals are responsible for the corresponding areas of the implementation of the SSMP Communication Program.

Public Affairs Office (PAO)

PAO is responsible for the following tasks:

• Maintaining SASD’s website, including updating the SSMP web pages
• Advertising SASD’s website on customer and stakeholder communication materials (i.e. design and construction newsletters, service level report card, etc.)
• Coordinating with the cities SASD serves to promote awareness

SASD Engineering Section-Business Planning Group

SASD Engineering Section-Business Planning Group is responsible for the following tasks:

• Informing SASD’s Documentation group that there is an update to the SSMP. They also archive the document that has been updated and create a new PDF of the entire SSMP to be published and stored to maintain a record of what SSMP SASD was operating under at any given time.
• Providing the most current version of the SSMP, referenced documents, and any proposed revisions to PAO no less than 10 working days prior to website posting.
• Providing PAO with annual service level performance information as required by this policy and no less than 10 working days prior to website posting.

202 SSMP Audit Procedures

202.1. Purpose

The purpose of this document is to describe the internal evaluation process that will be applied to assist with meeting the Sewer System Management Plan (SSMP) Audit requirements.

202.2. Background

202.2.1 Regulatory Requirement

On May 2, 2006, the State Water Resources Control Board (SWRCB) enacted Order No. 2006-0003 (Order), Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WDR). The WDR requires any public agency that owns or operates a sanitary sewer system more than one mile in length that collects and/or conveys untreated or partially treated wastewater to a publicly owned treatment facility in the State of California to comply with the requirements of the WDR. The Sacramento Area Sewer District (District) operates a sanitary sewer system as described, therefore is subject to the WDR.

202.2.2 Sewer System Management Plan

The WDR requires each agency to prepare an SSMP. The SSMP is required to include these eleven elements:
I. Goals
II. Organization
III. Legal Authority
IV. Operations and Maintenance Program
V. Design and Performance Provisions
VI. Overflow Emergency Response Plan
VII. Fats, Oils and Grease (FOG) Control Program
VIII. System Evaluation and Capacity Assurance Plan
IX. Monitoring, Measurement, and Plan Modifications
X. SSMP Program Audits
XI. Communication Program

SWRCB WDR Order No. 2006-0003 Subsection (D.13) requires an internal audit occur at least every 2 years and a report must be prepared and kept on file. The District meets these requirements by conducting periodic internal audits, appropriate to the size of the system and the number of Sanitary Sewer Overflows (SSOs), through the District Process titled, “SSMP Audit Procedures” (this document).

202.2.3 Audit Objective

The evaluations are to assist the District in meeting the formal SSMP audit requirement and provide continuous improvement. The audit should focus on evaluating the effectiveness of the SSMP and the District’s compliance with the SSMP requirements, including identification of any deficiencies in the SSMP and steps to correct them.

202.2.4 Evaluation Approach and Structure

There are two parts to the audit:

- SSMP Compliance Review – Evaluation of the SSMP required and voluntary elements to determine compliance with the WDR requirements.
- SSMP Effectiveness Review – Evaluation of SASD’s data and processes used to determine the effectiveness of its SSMP in meeting the goals of the WDR.

The approach for the SSMP Compliance Review segment will be to ask specific questions relating to the eleven sections of the SSMP. The structure includes documenting the questions and responses to them in writing. Questions will be developed, and may vary from audit to audit. As SASD’s business practices and performance evolve, management may modify the questions accordingly to stimulate continuous improvement and ensure WDR compliance. The SSMP Effectiveness Review segment will consist of key SASD staff providing data analysis that SASD uses to analyze data, adapt to trends, and make decisions.

The written report of the audit will consist of three parts:

- The evaluation results of the SSMP required and voluntary elements in compliance with the WDR requirements.
- The evaluation results of the data and processes used to determine the effectiveness of the SSMP in meeting the goals of the WDR.
- An action plan identifying any deficiencies in the District’s SSMP and steps to correct them. Although many possible deficiencies may be identified, the plan should only include those actions expected to result in the most progress towards meeting the goals of the WDR prior to the District’s next internal audit.
202.3. Detailed Group Responsibilities

The following groups and individuals will be responsible for implementing the SSMP audit:

The Director of Operations will identify the key staff and management to be involved in the audit.

The key staff will be responsible for developing the SSMP audit questions, providing written responses to the questions based on the District’s SSMP and current practices, responding to the auditor/evaluator’s follow-up questions, and developing the draft action plan.

The auditor/evaluator role will be selected by the Director of Operations at each audit cycle. The evaluator is responsible for:

- Reviewing the SSMP audit questions for completeness and making comments on the questions.
- Performing the SSMP evaluation to determine:
  - if SASD shows SSMP compliance with the WDR
  - if SASD can demonstrate the effectiveness of the SSMP
- Providing follow-up questions to the written responses provided by the key staff.
- Reviewing the responses to the follow-up questions, and assisting the key staff in determining if the response is adequate.
- Assisting the key staff with preparation of the action plan.

202.4. Record Keeping Requirements

SASD maintains an SSMP Internal Audit SharePoint site that contains the audit report, findings, and action items list for each internal audit performed. Each action item is assigned to a manager for completion, and progress is tracked regularly at the OPT and recorded on the SharePoint site. SASD’s SSMP Audit Reports are available for public review by appointment only, requests for review can be made through the SASD website.

203 SASD Sewer Ordinance

Sacramento Area Sewer District Sewer Ordinance (Ordinance) can be found on the Sacramento Area Sewer District Intranet and on the Internet. The most current version of the Ordinance is available on SASD’s public website at http://www.sacsewer.com/ordinances.html

204 Sacramento Area Sewer District Standards and Specifications

Sacramento Area Sewer District Standards and Specifications can be found on the Sacramento Area Sewer District Intranet and on the Internet. A hard copy is available for viewing at 10060 Goethe Road, Sacramento 95827. The most current version of the Standards is available on SASD’s public website at http://www.sacsewer.com/devres-standards.html


Customer Call Handling and Service Request Creation Policy

Purpose

Document the policy for handling sewer problem customer calls and initiating service requests, and establish procedures for handling these activities.

Background/Procedures

The current Board-approved service level states that the District will respond to 95% of all customer service calls (that are determined to be Priority 1) within two hours, as a monthly average. This time is measured from when the call is first received by either District personnel or County Central to when District staff (typically an M&O Pre-Checker) arrives on site. It is, therefore, incumbent upon Dispatch staff to gather as much relevant information as possible from the caller and assign the service request as quickly and accurately as possible.

Policy

In order to comply with regulatory requirements and Board-approved service levels, Dispatch staff will promptly and professionally answer all incoming calls and prepare service requests in accordance with this document. Dispatch staff will complete the service request and assign it (usually to an M&O pre-checker) before taking another call.

Call Categories

Following is a table Dispatch staff will use to create SR’s to dispatch Priority 1 calls as shown.

<table>
<thead>
<tr>
<th>Reported Problem</th>
<th>Problem Description</th>
<th>Dispatch To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BIS</td>
<td>Backups-Into Structure (including burped toilets the splash onto the bathroom floor)</td>
<td>M&amp;O Pre-Checker</td>
</tr>
<tr>
<td>2. DAMAGED</td>
<td>Damage done by others (not SASD) to an SASD Asset. This call should accompany notification to SASD USA Group.</td>
<td>M&amp;O Pre-Checker</td>
</tr>
<tr>
<td>3. ODOR</td>
<td>Any type of odor complaint</td>
<td>M&amp;O Pre-Checker</td>
</tr>
<tr>
<td>4. OTHER</td>
<td>Any occasion that may require immediate attention but does not have a category (i.e. bugs/cockroaches coming out of cleanout or manhole; customers who have dug up their service lines for a cleanout installation and have an open excavation hole)</td>
<td>Typically M&amp;O Pre-Checker (possibly Customer Service Assistant (CSA))</td>
</tr>
<tr>
<td>5. OVRFLW</td>
<td>Sanitary Sewer Overflows of any type, i.e. out of a pipe, cleanout, manhole etc.</td>
<td>M&amp;O Pre-Checker</td>
</tr>
</tbody>
</table>
REPORTED PROBLEMS

<table>
<thead>
<tr>
<th>Reported Problem</th>
<th>Problem Description</th>
<th>Dispatch To</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. SAFETY</td>
<td>A safety concern (other than sunken or wet area) that is located in the street, curb or gutter</td>
<td>M&amp;O Pre-Checker</td>
</tr>
<tr>
<td>7. SAFETY</td>
<td>A safety concern (other than sunken or wet area) that is located in the Sidewalk, Back of Walk, or Yard</td>
<td>M&amp;O Eng. Tech</td>
</tr>
<tr>
<td>8. SLOWDRN</td>
<td>A complaint of the sewer system draining slowly</td>
<td>M&amp;O Pre-Checker</td>
</tr>
<tr>
<td>9. SUNKEN</td>
<td>Sunken areas within the street, curb or gutter</td>
<td>M&amp;O Pre-Checker</td>
</tr>
<tr>
<td>10. SUNKEN</td>
<td>Sunken areas within the sidewalk, back of walk, or yard</td>
<td>M&amp;O Eng. Tech</td>
</tr>
<tr>
<td>11. WET</td>
<td>A wet area within the street, curb, gutter, sidewalk, back of walk or yard that could be sewer related</td>
<td>M&amp;O Pre-Checker</td>
</tr>
</tbody>
</table>

ANY REPORTED PROBLEMS LISTED ABOVE RELATED TO PUMP STATIONS

- i.e. water / sewage flowing from site, odor complaint, audible alarm coming from site, person in station, fire, open gate, open building, etc. (M&O Facilities Supervisor)

Following is a table Dispatch staff will use to create SR’s to dispatch Priority 2 calls as shown. All priority 2 SR’s should be accompanied by a SR Communication (e-mail) sent from Maximo. Priority 2 call response time is within five (5) business days from the day the District receives the call.

### Table 206-2 Priority 2 Calls

<table>
<thead>
<tr>
<th>Reported Problem</th>
<th>Problem Description</th>
<th>Dispatch To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ADJUST</td>
<td>Asset (typically manhole or cleanout) too high or too low</td>
<td>M&amp;O Eng Tech</td>
</tr>
<tr>
<td>2. CFC</td>
<td>Noise from loose manhole lid that is not identified by the caller to be a safety concern</td>
<td>CSA</td>
</tr>
<tr>
<td>3. CFC</td>
<td>Loose or missing cleanout lid not identified by the caller to be a safety concern</td>
<td>M&amp;O Eng Tech</td>
</tr>
<tr>
<td>4. OTHER</td>
<td>Any occasion that may require urgent attention but not immediate</td>
<td>Typically M&amp;O Eng Tech or CSA</td>
</tr>
<tr>
<td>5. PLUMBER</td>
<td>After restoring service, a Plumber feels the District should review District Assets (i.e. plumber sees roots in SASD portion of line)</td>
<td>M&amp;O Eng Tech</td>
</tr>
</tbody>
</table>
### Reported Problem | Problem Description | Dispatch To
--- | --- | ---
6. PERSON | Compliments about past work or current work, staff etc. | M&O Manager
7. RESTORE | Site Restoration is being requested or question about restoration is being asked | M&O Manager

**COMPLAINTS to M&O Manager** (currently no “Complaint” Reported Problem in Maximo, so use Reported Problem above that best fits)
- Questions about work performed
- Questions about the work that is going to be performed
- Complaint about how District staff have been driving the crew trucks
- Complaint about employee behavior

**COMPLAINTS to Customer Service Liaison** (currently no “Complaint” Reported Problem in Maximo, so use Reported Problem above that best fits)
- Second or more requests for Site Restoration
- Escalating situation with Customer communication such as customer is notably upset, agitated, or frustrated in communicating (examples include extreme emotion displayed, shouting, accusations, threats to call media or elected officials or take legal action, etcetera)
- Exhausted talks with manager
- Claims related
- Dispute findings

**WORK PERFORMED BY CONTRACTORS ON SASD’S BEHALF (Future and Past) to Engineering Design Project Manager**

Examples would be LLORP Bundles, Pipe lining project, etc.

**ANY REPORTED PROBLEMS LISTED ABOVE RELATED TO PUMP STATIONS**
- i.e. graffiti or vandalism, general questions, construction access requests, utility questions, complaints about personnel, cleanup, annoyances, station landscaping non-urgent issues, etc. (M&O Facilities Supervisor)

### 206.5. Supplemental Materials
- Dispatch Guidelines
- SSOERPM
- Door Hangers

### 206.6. Detailed Group Responsibilities

The following groups and individuals will be responsible for the corresponding areas of the implementation of this process.

**Customer Care-Dispatch Group**

The Customer Care Dispatch staff is responsible for handling calls that come into the SASD emergency phone number (916) 875-6730 between 7:00AM and 3:30PM, Monday through Friday excluding Weekends and County of Sacramento observed Holidays.
Sacramento County-County Central

County Central is responsible for handling calls that occur outside of hours shown above, and will process calls for Priority 1 using the same protocols as describe in this document. County Central will ask customers to call back during regular SASD business hours (0700-1530) for Priority 2 issues.

Maintenance & Operations

- M&O Managers will e-mail “SASD Dispatch” Monday morning with a weekly schedule – no later than 7AM - a list of available pre-checkers and correct phone numbers for the week, including any absences, training, meetings, etc. that will cause a pre-checker to be unavailable between 7:00AM and 3:30PM (excluding normal lunch breaks.)
- M&O Managers will notify SASD Dispatch via “SASD Dispatch” e-mail AND phone the Customer Care Principal Engineering Technician (PET) and, if the PET does not answer, the Customer Care Supervisor, with any changes throughout the day.
- Dispatch staff will notify M&O Managers by phone when all pre-checkers are unavailable to take a call and may assign the service request to the Manager for further disposition.

207 Mapping Update Policy and Process

207.1. Purpose

The purpose of this policy is to set the standard for maintaining up to date maps of the sewer collection system and applicable storm water conveyance facilities as required by the Sewer System Management Plan (SSMP) regulatory requirements. This document describes the mapping update process.

207.2. Background

The Sacramento Area Sewer District (SASD) uses an electronic map to provide the sewer collection system mapping needs for SASD. SASD uses information from hard copy civil plan and profile drawings to create the various mapped assets such as manholes, main lines, and lower laterals. Information about existing assets gathered in the office and field is used to update existing mapped assets and related records. In addition to the sewer specific data, SASD utilizes the Sacramento County Department of Technology Geographic Information System (GIS) group’s product to provide the shared layers, such street centerlines, parcel boundaries, address information, and storm drain facilities. SASD utilizes a sewer specific viewer that displays the sewer assets over the shared layers to provide functional electronic maps. The asset information in the electronic map links to a scanned version of the original hard copy drawings, so more detailed engineering drawing is available when needed.

207.3. Policy

SASD shall have an up-to-date electronic map of the sewer collection system providing compliance with the most current version of the SASD’s SSMP.

207.4. Detailed Group Responsibilities

SASD’s Engineering Data Management Unit is responsible for creating and updating the electronic mapped assets of the sewer collection system. Data Management is responsible for responding to the update notifications (service requests for documentation updates) based on the following priority and timeline list, where complete means that the updates is reflected on the electronic map:
Complete priority 2 update notifications within 2 weeks of the update notification creation.
Complete priority 3 update notifications within 6 weeks of the update notification creation.
Complete priority 4 update notifications within 12 weeks of the update notification creation.

Different sources provide the notifications to the Data Management Unit.

**SASD’s Engineering Development Group** is responsible for obtaining drawings of any additions and changes to the collection system that originate from the development sector within SASD’s service area. The Development Group is responsible for providing update notifications when new project plans are approved, go under construction, and when the projects become operational. This group is also responsible for assuring that the dividing line between SASD’s responsibility and the responsibility of others are clearly identified on the drawings.

**SASD’s Engineering Design Group** is responsible for providing drawings of any changes and revisions to the sewer collection system that originate from relief or rehabilitation projects managed by the Design Group, and providing the associated update notifications as the projects proceed from design through completion. The Design Group is also responsible for providing update notifications when field findings do not match asset data records or maps.

**SASD’s Engineering GIS Unit** is responsible for ensuring mapped information is accessible to SASD staff by providing analysis, map viewers, and printed maps. In addition, the unit represents SASD’s geographic data needs to the Sacramento Regional GIS Cooperative.

**SASD’s Engineering TV Review and Preventive Maintenance Adjustment Unit** is responsible for providing update notifications to asset attributes when discrepancies are found between existing asset data records or maps and the current TV inspections.

**SASD’s M&O field staff** are responsible for providing update notifications when discrepancies between asset data records or maps and actual field conditions are found.

Storm water facilities information are maintained and provided by different storm water jurisdictions (Sacramento County Department of Water Resources [DWR], City of Elk Grove and City of Sacramento). SASD uses this information to complete the storm drain facilities mapping requirements based on the **Statewide General Waste Discharge Requirements (WDR)** and SASD’s **SSMP**.

The process diagram that follows shows the flow of work from the source that either:

- Originates the changes in the collection system through a development project or through a relief or rehabilitation project, or
- Finds the discrepancy in asset data records and actual conditions.

Each of these sources have staff trained to create an update notification and forward it with appropriate notations, plans, sketches, or details to the Data Management Unit for incorporation into the electronic mapping and asset data records.

The accuracy and completeness of the asset data records and mapping continually improves by this iterative documented and tracked method of identifying, notifying and updating SASD sewer collection system asset data records and mapping system.
208 SASD Training Policy

208.1. Purpose

This document establishes a training policy which meets the requirements of the State Water Resources Control Board Order No. 2006-0003-DWQ, Statewide Waste Discharge Requirements for Sanitary Sewer Systems (WDR) to ensure that all staff (including employees, contractors, or other agents) in sanitary sewer system operations and maintenance are adequately trained and possess adequate knowledge, skills, and abilities.

208.2. Background

Changes in regulatory requirements have increased the need for documented training programs that ensure both that the training is adequate and employees and contractors possess the knowledge skills and abilities needed. This policy establishes a centralized training program approach to address the training requirements included in such documents as the:

- State Water Resources Control Board Order No. 2006-0003 Statewide General Waste Discharge Requirements for Sanitary Sewer System (WDR), Provision D.8 and D.13,
- Sacramento Area Sewer District (SASD)’s Sewer System Management Plan (SSMP),
- Hazardous Material Plan (HMP),
- Spill Prevention Control and Containment Program (SPCCP),
- Storm Water Pollution Prevention Program (SWPPP), and
- Illness and Injury Prevention Plan (IIPP).
208.3. Policy
Staff will be adequately trained and possess knowledge, skills, and abilities as applicable to job assignment to ensure:

- Adherence to all Federal, State, County, and District laws and regulations.
- All duties are being performed safely.
- All duties are being performed following Standard Operating Procedures, where appropriate.

208.4. Detailed Group Responsibilities
The following groups and individuals will be responsible for the corresponding areas of the implementation of this process:

Training and Development Section
The Training and Development Section is responsible for managing and coordinating the training course implementation. This group is also responsible for tracking the training courses and hours logged for each staff.

Maintenance and Operations (M&O) Section
M&O will be responsible for training all appropriate staff on its Sections of the Sanitary Sewer Overflow (SSO) Emergency Response Procedures Manual (ERPM), job plans, and the on-the-job training. M&O is also responsible for providing subject matter experts for the creation of training and testing materials used to ensure adequacy of training and possession of the knowledge, skills, and abilities for SSO response, and sewer collection system maintenance, repair and cleaning activities.

Overflow Emergency Response Plan Manager
The Overflow Emergency Response Plan Manager is responsible for providing adequate training on the SSO ERPM to the Category 1 SSO responders in this Section.

208.5. Staff to be Trained
M&O Staff – Consisting of Underground Construction and Maintenance, Mechanical Maintenance, Sanitation District Construction and Maintenance, Electrician, and Control Systems employees and contractors.

Office Staff – Consisting of Management, Supervision, Administrative, and Engineering employees who may perform SSO response duties and/or field work.

208.6. Training Required
M&O Staff
- General Safety System/Equipment Related
- SSO ERPM, as needed for job assignment.
- Software needed for field work

Office Staff
- General Safety
- SSO ERPM, as needed for job assignment.
- Software needed for field work
- General SSO Awareness
208.7. Training Process

The existing training program has provided and continues to provide adequate training for employees and contractors. This program has been accomplished using the following methods:

**M&O Staff**

- Monthly safety tailgate meetings
- Quarterly for staff required to take SSO ERPM training
- Job Plans (written steps necessary to complete a sewer system maintenance and operation task)
- On-the-job for system/equipment-related training (pairing a new employee with an experienced journey-level craftsperson)

In order to more fully address the need to ensure the possession of adequate knowledge, skills, and abilities for system/equipment-related training, SSO ERPM training, and software used in-house training, SASD embarked upon developing and implementing a Competency-Based Training Program.

The Competency-Based Training Program objectives are to develop the following:

- Job Competency Requirements - Written documentation that compiles the knowledge and skills required to master the basics for a given system/piece of equipment.
- Standard Answers - Standards against which the employee will be measured.
- Standard Operating Procedures - Developed when an employee is required to follow specific steps each time they perform a task.
- Competency Assessments – Examination forms that assess whether or not the employee possesses the knowledge and skills to demonstrate competency in the work function(s).

The Competency-Based Training also includes:

- A Recertification process for follow-up/refresher training at standardized time intervals.
- Field-Experience/Qualifying Experience process which certifies that the job is being performed (in the field) within acceptable performance standards.

This program recognizes the needs of the affected Sections and will leverage the knowledge, skills, and abilities of Subject Matter Experts within the District.

**Office Staff**

- Monthly safety tailgate meetings
- Quarterly for staff required to take SSO ERPM training

209 Sewer System Management Plan (SSMP) Document Update and Storage Policy

209.1. Purpose

The purpose of this policy is to provide guidance on how to update and store the Sacramento Area Sewer District’s (District’s) Sewer System Management Plan (SSMP).

209.2. Background

To provide a consistent, statewide regulatory approach to address Sanitary Sewer Overflows (SSOs), the State Water Resources Control Board (State Water Board) adopted Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, Water Quality Order No. 2006-0003 (Sanitary Sewer
Order) on May 2, 2006. The Sanitary Sewer Order requires public agencies that own or operate sanitary sewer systems over 1 mile in length develop and implement SSMPs. At this time, the WDR requires that the SSMP be updated every five years, and must include any significant program changes. The WDR also requires that a copy of the certified SSMP shall be maintained at appropriate locations and shall be available to personnel and the public at all times.

The District will follow the intent of the WDRs when producing the documents that make up the SSMP. The District’s SSMP is intended to be a day-to-day working management plan that also meets the requirements of the WDR. In order to accomplish this goal, the District has arranged the SSMP to meet its business needs as a living management plan.

There are two parts to the overall SSMP. The first part is the Board approved SSMP document, this is referred to as the SSMP (see Definition). The second part is the collection of supporting Sections which are the Reference Document to the SSMP (see Definition).

This document is a Section of the Reference Document to the SSMP. The WDR has requirements for document update and storage, which this document is intended to satisfy.

### 209.3. Process

The SSMP and the Reference Document are required to be updated. The SSMP will be updated at least every five years. Each Section of the Reference Document shall be updated at least every two years.

New Sections will follow this policy when created.

Significant program changes will require an immediate SSMP update, above and beyond that required through the revision cycle. Program changes will occur through the Management Plan Assessment Program, which analyzes different programs for effectiveness. Staff program change requests to management will require that the updated SSMP and program change be approved at the same time. Changes directed by management will require that staff immediately begin the process of updating the SSMP. Preparation work may begin, but implementation of new programs is not allowed until the SSMP documentation has been completed.

When practical, data analysis that includes risk and cost analysis should support the SSMP update. The cost analysis will be presented as a 40 year Net Present Value (NPV). This is to aid in the decision making process through the Management Plan Assessment Program, which may also require the use of the Generic BCE Process to analyze different alternative solutions to a problem.

An Effectiveness Measure Section is required in each reference document. This Section will explain the way to analyze that document to see if it is meeting its purpose. In effect it will provide a performance measure. This will aid the Management Plan Assessment Program in its analysis of different programs effectiveness.

SSMP updates will include a change log that follows the template in Appendix A. The change log will consist of a list of what has changed from one version to the next and serves as a historical record of changes over time.

SSMP documents will follow the layout of this document. The SSMP is approved by the District’s Board and the reference documents are approved by the District Engineer or the Director of Operations.

Updates to the SSMP are required to follow the following process to ensure proper document storage and retrieval:

1. Native file checkout from FileNet and inclusion in SSMP Revision SharePoint site by the Engineering Business Planning Group.
2. Document revision will take place using the check in/check out process in SharePoint by the author.
3. After a document in the SSMP is approved and signed, the signed hard copy will be delivered to the Engineering Business Planning Group.
4. Scanning of the hard copy will be completed by the Engineering Business Planning Group.
5. Native document files will be moved from SharePoint into FileNet for archival by the Engineering Business Planning Group.
6. The SSMP will be checked out from FileNet, the changes will be noted and approved by a Legally Responsible Official (LRO) in the SSMP change log, and the updated approved SSMP document will be replaced by the Engineering Business Planning Group.
7. The updated SSMP file will be renamed with the new effective date and archived in FileNet by the Engineering Business Planning Group.
8. The Public Affairs Office (PAO), Information Technology (IT), and the Document room will be notified that an approved update to the SSMP is available by the Engineering Business Planning Group. The SSMP Communication Program will be followed when notifying the PAO.
9. The Document room will update the hard copy of the SSMP contained on site, PAO will update the SASD website following the SSMP Communication Program, and IT will update the link to the SSMP on the intranet page.
10. Business Planning Group has a responsibility to communicate with the District that the document has been updated and training may be required.

The above process is intended to ensure that a hard copy of the SSMP is available, that the intranet and internet versions of the SSMP are up to date, that the native files of the SSMP are stored securely, and that historical SSMP documents are available.

**Significant Program Changes** – Changes to a program or process that alters the 40-year net present value by more than 15%. Development of a new program or process will be considered a significant program change.

**209.4. Definitions used in Section 209**

**SSMP** – Board approved guidance document, will be referenced to as SSMP.

**SSMP Reference Document** – The collection of Sections that are referenced in the SSMP or are presented with it. The Table of Contents for the Reference Document to the SSMP is made of the collection of Reference Sections.

**Significant Program Changes** – Changes to a program or process that alters the 40-year net present value by more than 15%. Development of a new program or process will be considered a significant program change.

**209.5. Effectiveness Measure**

Effectiveness of this Policy is measured by how well the documents represent current business practices. If the information presented is up to date, has been analyzed, and is retrievable, then this document has fulfilled its purpose.
## Appendix A: Example Change Log

<table>
<thead>
<tr>
<th>Date of Approval</th>
<th>Approving Authority (Board / LRO)</th>
<th>Change Description</th>
<th>LRO Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/2/2009</td>
<td>Board</td>
<td>• Change</td>
<td></td>
</tr>
<tr>
<td>6/15/2011</td>
<td>LRO</td>
<td>• Change 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Change 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Change 3</td>
<td></td>
</tr>
</tbody>
</table>
300  Management Plan Assessment Program

300  Program Overview

300.1. Purpose
This program describes the activities that explain how the Sacramento Area Sewer District (District) manages decision-making processes and fiscal decision making. It also describes how the District meets the requirements of the Monitoring, Measurement, and Program Modification element of the Sewer System Management Plan (SSMP).

300.2. Background
This document is directly referenced in the Board Approved SSMP, and is one of the District’s system wide assessment programs. The assessment programs consist of strategies, programs, policies, systems, activities, and teams that drive the District’s routine day-to-day operations.

This program is intended to describe the following activities of the District:

- Meeting the requirements of the Monitoring, Measurement, and Program Modification element of the SSMP
- Describing how the District identifies and prioritizes system deficiencies
- Describing how the District implements short and long term rehabilitation, replacement, and capacity assurance projects

300.3. Program
The Sacramento Area Sewer District owns and operates a variety of physical assets. In support of the District’s goals of meeting SSMP regulatory requirements, achieving identified service level targets, and operating in a cost-effective manner, it has documented several efforts designed to optimize the management of its assets.

The Management Plan Assessment Program encompasses several separately described but interrelated activities. Component efforts, which are included either entirely or in part within the Management Plan Assessment Program, are documented below:

- Gravity Asset Management Strategy
- Pressurized Assets Management Strategy
- Sanitary Sewer Overflow (SSO) Assessment Program
- Structural Assessment Program
- Computerized Maintenance Management System
- Mapping Updates Policy and Process
- Decision making processes
- SSMP Program Audit
- Funding needs assessments
- Asset Management Plan
- Under Capacity Failure Mode Strategy

A major goal of the Gravity Asset Management Strategy and the Pressurized Assets Management Strategy is to reduce SSOs and to optimize maintenance activities within the collection system to find the most cost effective techniques to sustain the assets. An asset that has had a stoppage is addressed directly
through the District’s Sanitary Sewer Overflow (SSO) Assessment Program (and via the SSO Emergency Response Procedures Manual if a SSO or Backup Into Structure (BIS) has resulted). By recognizing common causes of SSOs, the District can focus efforts and financial resources on projects and programs that will prevent the most overflows.

The Structural Assessment Program and associated strategies are intended to evaluate the structural integrity of all District collection system assets. The program also aims to mitigate any potential structural failures in the system.

The Computerized Maintenance Management System (CMMS) is the repository for the District’s work orders (WOs), preventive maintenance (PM) schedules, and records of completed work. CMMS data is used in the decision making process to monitor and measure the effectiveness of the District’s Programs and Strategies including SSO trends. Reports from CMMS data are also used for service levels, failure modes, performance measures, and production rates.

The Mapping Updates Policy and Process describes how the District maintains up-to-date sewer and storm water maps. The District utilizes a Geographic Information System (GIS) to display location and some asset information about the sanitary sewer and storm water system.

The District uses several decision-making processes to sustain District assets and manage risk at a socially, environmentally, and economically appropriate level:

- **Organizational Planning Team (OPT)**
  
  The OPT objectives are to provide approval and direction on:
  
  - how to comply with the Statewide General Waste Discharge Requirements (WDR)
  - development of long-term asset plans, staffing plans, and associated cost projections
  - service level target attainment
  - projections for use in the revenue model
  - appropriate risk levels

- **Purchasing Authorization Levels**

  Two documents detail the purchasing authorization levels, the Procurement Policy and Process Procedures and Purchasing Authority Limits and the Project Authorization Process (forming the Project Authorization Committee).

  - **Procurement Policy and Process Procedures and Purchasing Authority Limits**
    
    The purpose of this document is to establish purchasing authority policy and update purchasing limits for goods and services needed by the District to conduct business in the most cost effective manner.
    
    - For goods and services below the Project Authorization Committee threshold

  - **Project Authorization Process (PAP)**
    
    The purpose of the PAP is to lay out the process to obtain management approval to proceed with capital and non-capital projects or programs that meet established criteria and financial thresholds. (See PAP guidelines).

- **Business Case Evaluations (BCEs)**

  The BCE process is described in the Generic BCE Process document. This process is meant to support optimized decision-making, adhering to the District’s asset management principles.

  - Equitable cost comparison (typically a 40 year net present value) for different alternatives
Selection based on lowest cost alternative including risk

- Collaboration and Innovation Team (CIT)
  The CIT was established to support the District’s mission by providing on-call resources to do the following:
  - Develop processes that are more efficient.
  - Investigate new products, equipment, or technologies not currently being used by the District that promise to enhance service levels or reduce life cycle cost.
  - Review and approve new suppliers of products, equipment, or services already in use.
  - Brainstorm ideas to address significant issues such as SSOs.

- Asset Management Roundtable Team
  The Asset Management Round Table’s (AMRT) primary focus is to communicate Asset Management (AM) concepts throughout SASD Operations. The AMRT will provide the following benefits to SASD:
  - Build upon already established AM principles and ensure they are being applied uniformly throughout SASD
  - Act as a central clearing house for resolving questions or concerns about the implementation of AM principles
  - Act as a liaison to ensure SASD’s Director of Operations and Section Managers are in agreement with AM principles and how they are implemented
  - Provide support to the SASD/SRCSD AM Coordination group and the Districts’ AM Steering Committee
  - Evaluate proposals for improvements to current AM processes
  - Provide input into SASD AM Plan

- SASD Management Meeting
  The SASD Management Meeting is a twice monthly meeting between the Director of Operations and her direct reports. The intention of the meeting is to have a management discussion forum.

The District’s SSMP Program Audit is designed to monitor the implementation and measure the effectiveness of each element of the SSMP, the District’s compliance with the SSMP requirements, and identify deficiencies in the SSMP and steps to correct them.

Funding Needs Assessments:

Programs and strategies for operating and maintaining the sewer collection system are regularly evaluated. Performance trends are presented to the OPT and reviewed. Through decision-making processes, a determination is made for investigation or changes to existing approaches and/or development of new ones. During the development of new approaches or changes to existing ones, the cost of the business change is estimated and projected. This information is then communicated to the District’s Chief Financial Officer for inclusion in the expense projections that make up the revenue needs projections.

Capacity assurance and the associated approach to forecasting capacity-related capital investment needs are addressed in the Under Capacity Failure Mode Strategy and the Sewer System Capacity Plan. The results from these evaluations are then used to estimate capital funding and operating funding needs for capacity related projects. The Asset Management Plan describes the projected funding needs for operations, and the renewal and rehabilitation of assets.
A detailed discussion of the funding needs assessments can be found in the SSMP.

### 300.4. Effectiveness Measure

This system wide Program is in place to guide the efforts of the District as a whole. Its effectiveness can be monitored through the District’s ability to meet its Service Levels as well as meeting the requirements of the of the Monitoring, Measurement, and Program Modification element of the SSMP.

## 301 Pump Station Condition Assessment Program

### 301.1. Purpose

The purpose of this program is to identify and record the condition of pump station components and provide a comprehensive assessment of those facilities. The findings will develop recommendations for any necessary repair, rehabilitation, or replacement. More internal details can be found in the comprehensive Pump Station Condition Assessment Strategy document which describes the proper responses to specific condition and performance ratings.

### 301.2. Background

Condition assessment is a proactive measure meant to identify the condition of an asset at a particular point in time. The information gathered enables the Sacramento Area Sewer District (SASD) to make cost effective maintenance and replacement decisions while minimizing risk of failure. Condition assessment is not meant to take the place of failure analysis, although information gathered during condition assessments is invaluable during the failure analysis process.

Condition assessment can be performed by both qualitative and quantitative measurements. Qualitative measurements consist of visual, sound, and touch assessments. Examples of this are conducting visual assessments of all components in the stations, collecting equipment information, photographs, and general observations. Quantitative measurements consist of physical measurements such as the ultrasonic test, which inspects the thickness of a wet pits’ metal walls.

After measurement, the condition assessment process moves into interpretation of the results. At this time, Maintenance and Operations (M&O) crews interpret the results and determine if more actions should be taken or if a work order for further evaluation is needed. Any failure found during condition assessment will be handled through the Generic BCE Process by way of a work order in the Computerized Maintenance Management System. The Sanitary Sewer Overflow (SSO) Emergency Response Procedures Manual will dictate the appropriate response if it is an emergency. As stated in the Asset Management Plan, “annual condition assessments are typically conducted in conjunction with routine equipment preventive maintenance and station inspections.” Proper condition assessments provide the information that will be used when making long range renewal and replacement revenue needs projections such as those in the Asset Management Plan. Condition assessment data is used in the Management Plan Assessment Program to monitor and measure the effectiveness of SASD’s Programs and Strategies.

### 301.3. Pump Station Condition Assessment Strategy

The pump station condition assessment strategy is a proactive approach to identify and rank the condition of SASD pump stations through a comprehensive condition assessment. There are five portions of the condition assessment which include: the selection process, condition assessment, condition and performance ranking, level of service standards, and recommendations.
A selection process determines the SASD pump stations and components that will be evaluated. The selection process consists of two portions, a data analysis and a workshop with SASD personnel. The selected stations will undergo the assessments outlined in **Pump Station Condition Assessment Strategy**.

After the selection of the highest ranked pump stations, the condition assessment will begin on those stations. The condition assessment at each pump station may consist of, but is not limited to, the following activities:

- **Visual Condition Assessment** - Visiting each station and conducting visual assessments of all components of the stations, collecting equipment information, photographs, and general observations.
- **Corrosion Field Survey** – A corrosion specialist will conduct inspections and collect field measurements of major structural components that are subject to corrosion at each pumping station.
- **Pump Performance Testing** - Collecting pressure readings on the discharge piping for each pump, and the corresponding pump start and stop times from the supervisory control and data acquisition (SCADA) system to calculate flows. Using this information, measure the actual performance against the manufacturer’s pump curve.
- **Camera Inspections** – To safely provide inspections within wet wells, a pole-mounted camera is used to collect video of the interior of the wet wells to conduct detailed non-destructive assessment of any defects that can be identified.

Assessment activities will be performed by a combination of in-house SASD staff, consultants, and specialists depending on the capabilities and availability of in-house staff. Other condition and performance testing methods are possible, and may be used in some cases. A detailed list of assessment activities are provided in Appendix B of the **Pump Station Condition Assessment Strategy**.

Major components found in each pump station will undergo condition and performance scoring during the condition assessment. The results of the visual observations, testing, and analysis activities will be used to score the major components of each pump station.

Level of Service (LOS) standards were established through a series of workshops and are defined as the minimum acceptable thresholds in five categories; safety, reliability, cost of maintenance, good neighbor, and efficiency (cost of operations). The LOS standards were established to better define the minimum performance for the entire pump station, as well as individual components, and can be found in the **Pump Station Condition Assessment Strategy**.

The condition and performance scores establish recommendations for each component based on the severity of the scores. These recommendations are defined by the region where the performance and condition ranking scores intersect. A graphic of the recommendations associated with each combination of condition and performance scores is provided in the **Pump Station Condition Assessment Strategy**.

After recommendations for each component have been made, staff will review the level of service for updates or changes. The review will ensure that the LOS based recommendations are cost effective and appropriate. The review may result in the deletion or addition of a LOS to address a recommendation that was not previously identified.
After the LOS standards are updated, staff can begin to develop and evaluate alternatives using the Project Development Plan (PDP). During PDP-1, staff will take into account all the recommendations and develop alternatives addressing the pump station as a whole. Staff may coordinate with consultant engineers to provide preliminary investigations into these alternatives. The chosen alternatives for each station will be further evaluated in PDP-2.

301.4. **Supporting Strategies, Systems, and Processes**

SASD strategies, systems, and processes that support the condition assessment strategy are listed below:

- **Pump Station Structural Assessment Strategy**
  The **Pump Station Structural Assessment Strategy** identifies methodologies to assess the pressurized system assets for risk of structural failure, and approaches to cost effectively minimize failures. The strategy contains monthly, semi-annual and annual preventive maintenance activities that include condition assessments. Examples are visual pump station inspections, visual pump station building inspections, and measured ultrasonic wall thickness testing for condition assessment.

- **Pump Station Component Failure Mode Strategy**
  The **Pump Station Component Failure Mode Strategy** identifies ways that non-structural pump station components may fail, and approaches to cost effectively minimize failures. There are monthly, semi-annual and annual preventive maintenance activities that include condition assessments. Examples are the removal of pumps for visual inspection and visual inspections of various components.

- **Pump Station and Force Mains Inventory and Expenditures List**
  SASD has developed an inventory and expenditure list for each pump station and pump station facility. The **Pump Station and Force Mains Inventory and Expenditures List** is a list of all the major components and facilities at each pump station, and includes the year the components were installed and the estimated design life. The spreadsheet also calculates the remaining useful life for each component.

- **Computerized Maintenance Management System (CMMS)**
  The Computerized Maintenance Management System (CMMS) is the repository for SASD’s work orders, job plans, preventive maintenance schedules, and records of findings.

- **Supervisory Control And Data Acquisition (SCADA) system**
  All SASD pump stations are monitored through a Supervisory Control and Data Acquisition (SCADA) system. The condition of the pump station is transmitted to a local server at different time intervals. This information is stored on the server and can be accessed at any time. The information is then used for trending the change in condition over time. Alarms are built into the system. The alarms are monitored on a 24-hour a day basis and are responded to as needed.

- **Generic BCE Process**
  The **Generic BCE Process** is a method used by SASD to find the most cost effective solution to a problem. The process uses the available information to develop a list of alternative solutions to a problem. The result of the process is the approval of a solution. Examples of a solution are changing the preventive maintenance frequency, changing the method of condition
assessment, adding additional preventive maintenance, or rehabilitation of an asset. The cost of the preventive maintenance or rehabilitation will also be analyzed along with the risk and consequence of failure.

- **Sewer Ordinance**
  The SASD Sewer Ordinance gives SASD the legal authority to access assets to perform condition assessments.

- **SASD Standards and Specifications**
  SASD Standards and Specifications provide the minimum standard for the planning, design, construction, and rehabilitation of SASD assets. These standards will allow SASD to perform condition assessment activities as needed. For example staff can assess a pump station component while keeping the station operational.

### **301.5. Effectiveness Measure**

The effectiveness of the Pump Station Condition Assessment Program will be measured by the time interval between evaluations and the cost of corrective maintenance work orders. The strategy will be deemed effective if a pump station is not reevaluated within 10 years and if the costs for corrective maintenance work orders decreases.

### **301.6. Detailed Group Responsibilities**

**Engineering-Operations Support**

The Operations Support group will be responsible for setting the Design Life, Useful Remaining Life, Preventive Maintenance (PM), Renewal / Replacement plan, Selection Process, Condition Assessment, Condition and Performance Ranking, LOS Standards, and Recommended Alternatives.

**Maintenance and Operations**

The Maintenance and Operations group will be responsible for conducting the PMs and for following the Renewal / Replacement plan.

### **302 Pressurized Asset Management Strategy**

#### **302.1. Purpose**

This Strategy documents how the Sacramento Area Sewer District (SASD) manages the performance of pressurized assets.

#### **302.2. Background**

This document is directly referenced in the Board approved Sewer System Management Plan (SSMP) and it is part of the Management Plan Assessment Program.

SASD owns and operates a variety of physical assets. In support of SASD’s goals of meeting SSMP regulatory requirements, achieving identified service level targets, and operating in a cost-effective manner, SASD has documented several practices designed to optimize the management of its pressurized collection system assets including force mains and pump station components. These practices include maintenance activities to prevent SSOs and assessment activities to find the most cost effective techniques and programs to reduce SSOs and sustain the asset.
There are a number of different failure modes within the pressurized collection system that can cause SSOs, or shortened asset life. It is important to monitor the most common causes of failure, recognize the consequence of failure, identify the best practices to prevent failures from occurring, and to focus efforts and financial resources on projects and programs that will prevent the most failures and sustain asset life.

This strategy does not cover SSO emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy. If a stoppage was caused by a structural problem, refer to the Structural Assessment Program.

### 302.3. Strategy

SASD uses several strategies, programs, and decision-making processes to sustain District assets and manage risk at a socially, environmentally, and economically appropriate level. The decision-making processes that are designed to sustain District assets are outlined and described in the Management Plan Assessment Program. A detailed discussion of the Funding Needs Assessments for long-term repair and rehabilitation can be found in the SSMP.

Different failure mode strategies and programs are monitored and evaluated for cost effective reduction of SSOs, mitigation of SSO risk, and reduction of SSO consequence, based on asset classification or failure mode or both asset classification and failure mode. Each strategy has its own effectiveness measure. This example list is not exclusive:

- Pump Station Component Failure Mode Strategy
- Pump Station Structural Assessment Strategy
- Pump Station Condition Assessment Program

The overall effectiveness of these strategies is tracked by the effectiveness measures in the associated documents. If any one of the strategies is determined to be ineffective it will be re-evaluated, and solutions will be presented to Management in accordance with the Management Plan Assessment Program.

The Pump Station Component Failure Mode Strategy and the Pump Station Structural Assessment Strategy outline the details of the preventative maintenance program for pressurized assets including force mains and pump station components. Preventative maintenance activities are performed on a predetermined schedule based on the asset performance history and risk, to prevent sewer overflows or functional failures.

The Pump Station Condition Assessment Program provides a comprehensive assessment of pump stations conditions. The findings will develop recommendations for any necessary repair, rehabilitation, or replacement.

The Under Capacity Failure Mode Strategy and the System Capacity Plan describe how SASD manages capacity assurance in the pressurized system.

The short-term repair and replacement process is described in the Generic BCE Process.

### 302.4. Effectiveness Measure

The effectiveness of this Strategy is measured by the reduction of SSOs in the pressurized collection system and sustaining asset life while managing risk at a socially, environmentally, and economically appropriate level.
303   Gravity Assets Management Strategy

303.1. Purpose
The Gravity Assets Management Strategy documents how the Sacramento Area Sewer District (District) manages the performance of gravity assets by reviewing system-wide Sanitary Sewer Overflow (SSO) Service Level performance trends and evaluating operational efficiency, maintenance activities, procedures, frequencies, and practices; along with these activities, costs are estimated and projected.

303.2. Background
This document is directly referenced in the Board approved Sewer System Management Plan (SSMP) and it is part of the Management Plan Assessment Program.

The District owns and operates a variety of physical assets. In support of the District’s goals of meeting SSMP regulatory requirements, achieving identified service level targets, and operating in a cost-effective manner, it has documented several efforts designed to optimize the management of its gravity collection system assets.

The goal of maintenance activities is to prevent SSOs. The goal of assessment is to find the most cost effective techniques and programs to reduce SSOs and sustain the asset, while managing risk at a socially, environmentally, and economically appropriate level.

There are a number of different failure modes within the gravity collection system that can cause SSOs, or shortened asset life. It is important to monitor the most common causes of failure, recognize the consequence of failure, identify the best practices to prevent failures from occurring, and to focus efforts and financial resources on projects and programs that will prevent the most failures and sustain asset life.

This strategy does not cover SSO emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy. If a stoppage was caused by a structural problem, refer to the Structural Assessment Program.

303.3. Strategy
The District uses several strategies, programs, and decision-making processes to sustain District assets and manage risk at a socially, environmentally, and economically appropriate level. The decision-making processes that are designed to sustain District assets are outlined and described in the Management Plan Assessment Program. A discussion of the Funding Needs Assessments for long-term repair and rehabilitation can be found in the SSMP.

Different failure mode strategies and programs are monitored and evaluated for cost effective reduction of SSOs, mitigation of SSO risk, and reduction of SSO consequence, based on asset classification or failure mode or both asset classification and failure mode. Each strategy has its own effectiveness measure. This example list is not exclusive:

- Main Line Stoppage Failure Mode Strategy
- Lower Lateral Stoppage Failure Mode Strategy
- Manhole Stoppage Failure Mode Strategy
- Damage by Others Failure Mode Strategy
- FOG (Fats, Oils, Grease) Program
- Root Control Program
The overall effectiveness of these strategies and programs are tracked by service level targets that have been approved by the Board of Directors. All overflow rate graphs and service level measurements are presented monthly to management, as described in the Management Plan Assessment Program. The Service Level Bands Policy has action guidelines to direct staff to appropriately respond to different service level trends annually.

The Lower Lateral Stoppage Failure Mode Strategy, the Manhole Stoppage Failure Mode Strategy, and the Main Line Stoppage Failure Mode Strategy outline the details of the preventive maintenance (PM) program for their respective asset types. These PM activities are performed on a predetermined schedule based on the asset performance history and risk, to prevent sewer overflows or functional failures.

The Under Capacity Failure Mode Strategy and the System Capacity Plan describe how the District manages capacity assurance in the gravity collection system.

The Structural Assessment Program is intended to reduce the probability of high consequence crush collapse failures.

The short term repair and replacement process is described in the following documents:

- Main Line Repair-Maintain-Replace Decision Policy
- Lower Lateral Repair-Maintain-Replace Decision Policy
- Generic BCE Process

303.4. Effectiveness Measure

The effectiveness of this Strategy is measured by the reduction of SSOs in the gravity collection system, achieving service level targets and sustaining asset life while managing risk at a socially, environmentally, and economically appropriate level.

304 Main Line Repair-Maintain-Replace Decision Policy

304.1. Purpose

The purpose of the Main Line Repair-Maintain-Replace Decision Policy is to document and ensure consistent decision-making processes to address problems observed in Main Lines (MLs). These decision-making processes are developed to identify the most economical solution, while considering risks.

304.2. Background

It is the policy of the Sacramento Area Sewer District (SASD) to identify and implement cost-effective solutions for maintaining its assets while considering risk. In August of 2005, SASD began performing business case evaluations (BCEs) to address problems with SASD’s assets, including MLs. BCEs provide a cost-based comparison between various alternatives proposed for resolving identified ML problems. These alternatives typically include status quo, re-evaluate at a future date, add or change a maintenance schedule, and perform a repair or replacement. The analysis conducted in numerous ML BCEs has provided cost and solution efficacy data that has been used to develop the following processes and procedures.

Any SSO response that may have resulted from any one of the defects outlined in this policy is governed by the SSO Emergency Response Procedures Manual (SSOERP).
304.3. Process
ML defects are found through televised inspections (TVIs). TVIs are performed as directed by the TVI Policy, SSOERPM, and the SASSD Television Inspection Manual (TVI Manual), which is available on SASD’s public website at https://www.sacsewer.com/standards-specifications.

Part 1 - TVI Observed Problems

1.0. ML TVI Review
Part 1 describes the process if there are defects or problems found in the main line through a ML TVI. This part also addresses any lower lateral problems found through the ML TVI.

1.1. Is there a ML problem?
Assess the ML for problems.

1.2. Is the ML Cracked or Missing or Broken or Collapsed?
If the ML is found to be cracked, broken, missing, or collapsed through the ML TVI then go to process Part 2.

1.3. Is there Grease?
This section describes the process if grease is found through a ML TVI.

1.3.1. Severity?
If the grease is light then document and end.
If the severity is moderate or severe then check for prior TVIs on the ML.

1.3.2. Initiate FOG Advisory
If the Grease is Severe then Initiate FOG advisory.
Refer to the Enforcement Response Process for FOG advisory and enforcement process.

1.3.3. Is this 1st Assessment TVI?
If prior TVIs are available then go to Flowchart Part 3.
If this is the first ML TVI then a second TVI is needed.

1.3.4. Write Priority 2 Cleaning Work Order (WO) and a Priority 4 TVI WO in 12 months
The review of the second TVI in 12 months is used to help determine the preventive maintenance (PM) interval for the ML.

1.4. Is Solids/Debris or Roots?
This section describes the process if Solids/Debris or Roots found through a ML TVI.

1.4.1. Severity?
If the Solids/Debris or roots are light then Document and end.
If the severity is moderate or severe then check for prior TVIs on the ML.

1.4.2. Is this 1st Assessment TVI?
If prior TVIs are available then go to flowchart Part 3.
If this is the first TVI then a second TVI is needed.

1.4.3. Write Priority 2 Cleaning WO and a Priority 4 TVI WO in 12 months
The review of the second TVI in 12 months is used to help determine the PM interval for the ML.
1.5. **Is there a LL Problem**
Is there a LL problem that can be seen from the ML TVI? A LL problem could potentially cause a problem in the ML.

1.5.1. Follow the LL Repair Maintain Replace Decision Policy
If a LL problem is observed, then follow the **LL Repair Maintain Replace Decision Policy – Process Part 2.0**.

*End of Process for Part 1*

**Part 2 - Cracked, Broken, Missing, and Collapsed Pipe**

Flowcharts Part 2a, 2b, and 2c show the assessment process for cracked, broken, missing, or collapsed pipe. The process can lead to a do nothing, a re-evaluation of the segment, a BCE as outlined by the **Generic BCE Process**, or a repair solution to address the defects covered under this policy.

**1.0 Generic BCE Process**
The **Generic BCE Process** outlines the process to perform a business case evaluation that is not covered by other policies, including this policy. This process is applied to problems that have been determined to require a detailed analysis to be performed in order to find the most economical solution while considering risk to address the problem.

**2.0 Covered by Main Line Repair Maintain Replace Decision Policy?**
Operations Support - Main Line TV & PM Adjustment unit and the BCE Decisions unit - use this Process when a cracked, broken, missing, or collapsed pipe is found in a ML during a TVI review. The ML TV & PM Adjustment unit reviews TVIs and identifies if there is a defect covered under this policy. The ML TV & PM Adjustment unit writes WOs to address defects found that need additional evaluation. The BCE Decisions Unit follows this Policy to analyze how to address the defect, either with the Repair Decision Flowchart, Part 4, or through the **Generic BCE Process**.

**2.1. Are There Multiple Defects?**
Multiple defects are not covered under this Policy. If multiple defects are found during the TVI review, a BCE is necessary to evaluate this special case. See multiple and continuous defect definitions in this Policy to determine whether it is considered a multiple defect.

2.1.1. **Is the ML Active?**
MLs that are not active may not need to be repaired. The **MLRMR Decision Policy** should only be used on active MLs.

2.1.2. **Write WO for BCE**
The **Generic BCE Process** is necessary to analyze the problem. A BCE WO will be written by the ML TV & PM Adjustment unit for BCE Decisions unit to evaluate the problem.

**2.2. Is the Pipe Lightly Cracked (CPL)?**
If the answer is yes then proceed to step 2.2.1.

Cracked pipe light, Moderate, and Severe are described in the **TVI Manual, Section 205 Continuous Defect Codes**.

2.2.1. **Does a Previous TVI Exist?**
Does a previous TVI exist?
2.2.2. Has the Condition of the Crack Changed?
Since a previous TVI exists, review the previous TVI to evaluate if the crack severity has changed.

2.2.3. Do Nothing
Since the condition of the crack has not changed since the last TVI was performed, there is no need to take action. Close the WO.

2.3. Is CPM?
Is the pipe moderately cracked, as described in the TVI Manual, Section 205.2?

2.3.1. Is Crack Below Spring Line?
Is the crack located below spring line?

2.3.2. Is There Infiltration?
Is there infiltration?

2.3.3. Are There #4 Roots or Greater at Crack?
As defined in the TVI Manual Section 204.9, under the Television Inspections, General Observation Codes, roots are rated on a scale of 1 to 9, representing the relative portion of the cross-sectional area of the pipe that is blocked by the roots.

Roots that grow into cracks can eventually grow wider and can worsen the structural condition of the defective area.

2.4. Is CPS?
Is the pipe severely cracked, as described in TVI Manual Section 205.2?

2.4.1. Is Crack Larger Than 1” Wide?
Is crack larger than 1” wide?

2.4.2. Is the ML Diameter Less Than 12”?
Is the ML diameter less than 12”?

2.4.3. Are There Visible Voids?
Are voids visible?

2.4.4. Is There Evidence of Soil Intrusion?
Is there evidence of soil intrusion?

2.4.5. Would PM Activity Cause Soil Intrusion?
Would a preventive maintenance (PM) activity cause soil intrusion?

2.4.6. Is Crack Below the Spring Line?
Is the crack located below the spring line?

2.4.7. Is There Infiltration?
Is there infiltration?

2.4.8. Are There #4 Roots or Greater at Crack?
As defined in the TVI Manual Section 204.9 Roots In Pipe. Under the Television Inspections, General Observation Codes, roots are rated on a scale of 1 to 9, representing the relative portion of the cross-sectional area of the pipe that is blocked by the roots.

Roots that grow into cracks can eventually grow wider and can worsen the structural condition of the defective area.
2.5. **Is BPX?**
Is there broken pipe, as described in the *TVI Manual* Section 204.3?

2.5.1. **Missing Pipe?**
Missing pipe is an additional condition of broken pipe, where a piece of broken pipe is missing, leaving a hole in the main line.

Is there missing pipe?

2.5.2. **Is Largest Hole Dimension ≥¼ Pipe Diameter?**
Is largest hole dimension ¼ pipe diameter or larger?

2.5.3. **Is ML Diameter Less Than 12”?**
Is the main line diameter less than 12”?

2.5.4. **Are There Visible Voids?**
Are voids visible?

2.5.5. **Is There Evidence of Soil Intrusion?**
Is there evidence of soil intrusion?

2.5.6. **Would PM Activity Cause Soil Intrusion?**
Would a PM activity cause soil intrusion?

2.5.7. **Missing Pipe Below the Spring Line?**
Is the missing pipe below the spring line?

2.5.8. **Is There Infiltration?**
Is there infiltration?

2.5.9. **Are There #4 Roots or Greater at Missing Pipe Area?**
As defined in the *TVI Manual* Section 204.9. Under the Television Inspections, General Observation Codes, roots are rated on a scale of 1 to 9, representing the relative portion of the cross-sectional area of the pipe that is blocked by the roots.

Roots that grow into missing pipe area can eventually grow wider and can worsen the structural condition of the defective area.

2.5.10. **BPX Stable?**
Stable, for the purpose of this Policy, is defined to be not easily moved or disturbed, and resistant to displacement. A PM cleaning activity will not disturb the broken pipe. Stable also assumes that the broken pipe is above the spring line, no evidence of infiltration occurring, and may have smaller than #4 roots.

Does the broken pipe appear to be stable?

2.6. **Is XPX?**
Is there collapsed pipe, as described in *TVI Manual* Section 204.4?

3.0 **Write TVI Work Order**
Another TVI will need to be performed to compare with the first TVI to monitor if there are any changes to the current condition of the defect. The Engineering Operations Support Group will write a new TVI WO to occur 5 years after previous TVI was performed. This future TVI will be evaluated when completed to determine if there has been a change in severity to the area of concern (cracked or missing pipe area).
4.0. **Write Work Order To Evaluate**

The Engineering Operations Support Group will write a WO for the BCE Group to evaluate the problem.

4.1. **BCE or Repair?**

Can the problem be addressed through the Repair Decision Flowchart (RDF), or does the problem have extenuating circumstances that require a BCE to be further evaluation through the Generic BCE Process, with manager approval?

The Engineering Operations Support Group performs an initial evaluation when they receive the WO to evaluate a problem. This is a preliminary check for significant or extenuating circumstances that would require a BCE to be performed versus using the RDF Part 4 to fix the defect. Some examples of significant or extenuating circumstances may be the location of the pipe where it may not be feasible for a dig and replace repair method due to existing structures above the pipe; or if there are surrounding sensitive areas, such as schools or hospitals, where a dig and replace repair may not be economical or feasible; or there is not sufficient space to perform a repair.

Should any extenuating circumstances exist such that the Engineering Operations Support Group feels that a repair from the RDF Part 4 is not the best solution, the BCE Decisions unit will present the problem to the Engineering Operations Support Group Manager and request approval to analyze the problem through the **Generic BCE Process**.

The Engineering Operations Support Group will use this policy’s RDF Part 4 to address the defective main line, if no extenuating circumstances exist that would require further evaluation through the **Generic BCE Process**.

The RDF prescribes three repair alternatives, depending on the condition of the defective main line; dig and replace (D&R), Cured In Place Pipe (CIPP), and a grout and CIPP method. The BCE Group will follow the RDF to repair the defective pipe.

5.0. **Is Repair an Emergency?**

In some instances, the defective area of the main line is stable (not easily moved or disturbed, and resistant to displacement) and not causing an immediate threat to the flow through the system, despite the apparent severity of the condition of the pipe. In other instances, the severity of the pipe condition is causing a blockage or has the potential to cause a blockage in the ML, which can possibly cause an SSO. This would be considered an emergency situation.

Is the defect condition severe enough where it is considered an emergency and needs to be repaired as soon as possible?

6.0. **Contact the M&O Pipelines Manager**

The Engineering Operations Support Group reviewing the ML TVI will contact the appropriate Maintenance and Operations (M&O) Pipelines Manager to alert for the need of an emergency repair.

7.0. **Perform Emergency Repair**

The M&O Pipelines Manager will assign SASD crews to perform the emergency repair.

*End of Process for Part 2*
**Part 3 - Preventive Maintenance**

Part 3 assesses the main line to initiate a PM schedule (if the stoppage interval is greater than 12 months), adjust the PM interval, change the job plan, recommend additional future TVI, or initiate the BCE process (if the stoppage interval is less than or equal to 12 months).

3.1. **Is the ML on PM?**
   If the ML is not on a PM then check its history for prior stoppages.
   - **3.1.1. Is ML on correct Job Plan?**
     - If the ML is on a PM then check if it’s on the correct job plan.
   - **3.1.2. Change Job Plan**
     - If the ML is not on the correct job plan then change the job plan.
   - **3.1.3. Is ML on Correct PM Frequency?**
     - If the ML is on the correct frequency then document and end.
   - **3.1.4. Increase to next higher frequency**
     - If the ML frequency is not sufficient then increase it to the next higher frequency.

3.2. **Prior Stoppages?**
   - If a prior stoppage go to step 3.3.
   - **3.2.1 Write Priority 2 Cleaning WO and a Priority 4 TVI WO in 12 months**
     - This TVI will be used to evaluate the ML for a PM Frequency.

3.3. **Evaluate ML history for stoppages interval**
   Determine the PM frequency (with the frequency less than the stoppage interval or estimated interval).
   - If the stoppage interval is less than or equal to 12 months then a BCE is required.
   - **3.3.1. BCE**
     - If the stoppage interval is less or equal 12 months then a BCE is required by Engineering Operations Support group.
     - The BCE may result in a repair, replace, or lining/grouting work order, or a service request (SR) to put the ML on a decided PM frequency.

3.4. **Put ML on PM**
   - If the stoppage interval is greater than 12 months then put the ML on PM schedule.

*End of Process for Part 3*

**Part 4 - Repair Decision**

The Repair Decision Flowchart Part 4, outlines the decisions that prescribe the proper repair for defects covered under this Policy. This part of the Policy is used by the BCE Decisions Unit to determine the respective repair to specific defects outlined in this policy.

4.0. **Repair Decision Flowchart**
   - The BCE will determine the repair method, using flowchart Part 4 – Repair Decision Flowchart of this Policy.
4.1.  **Is Pipe Flagged for Rehab/Relief Project?**

Is pipe flagged for a rehab or relief project? The Engineering Operations Support Group will check with Engineering Design Group if there are any current or upcoming rehabilitation or relief projects, under which this work may be performed.

4.1.1.  **Will Project Replace Line before Repair Target Date?**

The Engineering Operations Support Group will confirm with the Engineering Design Group if the work can be completed before the target date.

Will the project replace the main line before the repair target date?

4.1.2.  **Coordinate With Engineering Design Group for Project**

The Engineering Design Group will be the Project Manager for the repair work. The Engineering Operations Support Group will coordinate with the Project Manager to include this main line repair work under a rehab/relief project.

4.2.  **Is Pipe Too Uneven For CIPP Patch?**

The defective area of the main line may have cracked or broken pipe edges or pieces that may be oriented such that it may be too severe and uneven for a CIPP patch repair. A dig and replace method of repairing the defective main line may be the preferred alternative.

Is pipe too uneven for CIPP patch?

4.2.1.  **Are There Visible Voids Around the Pipe?**

Voids that were detected from the TVI around the pipe would need to be grouted to minimize risk of loss of support around the main line, and other possible structural damage.

Are there visible voids around the pipe?

4.2.2.  **Is CIPP Patch Cost 15% Less Than Dig and Replace Cost?**

The Engineering Operations Support Group prepares cost estimates to compare and decide on the most economical alternative to repair the defective main line. The CIPP cost criteria of being less than 15% of dig and replace repair method is to account for additional risks associated with CIPP, future maintenance and potential unseen outside voids. The BCE Group consults with the Design Group for the latest costs to use for the BCE. Three cost estimates typically used are:

- CIPP Patch Repair
- Grout & CIPP Patch Repair
- Dig & Replace (D&R)

These estimates allow the Engineering Operations Support Group to make the most cost-effective decision by comparing the costs between the common methods of repairing the defective main line.

Is CIPP Patch Cost 15% Less Than Dig and Replace Cost?

4.2.3.  **Write WO For CIPP Patch**

The Engineering Operations Support Group will write a WO for the CIPP patch repair. The BCE group can directly assign this work to the Design Group.
4.2.4. **Is Grout & CIPP Patch Repair Cost 15% Less Than Dig and Replace Cost?**

Since there are visible voids and the pipe is still smooth enough for a CIPP repair, a Grout & CIPP Patch repair may be used, depending on the cost comparison to a D&R repair.

Is the grout & CIPP patch repair cost 15% less than the dig and replace cost?

4.2.5. **Write Work Order for Grout and CIPP Patch Repair**

The Engineering Operations Support Group will write a WO to for a grout and CIPP repair.

4.3. **Write WO for D&R**

The Engineering Operations Support Group will write a WO for D&R repair.

4.3.1 **Can M&O Perform the Work?**

The Engineering Operations Support Group will check with the Linear Repair Group to see if their schedule can accommodate the work or if they have the proper equipment to handle the job.

The Engineering Operations Support Group will assign the work order to the Linear Repair Group if they can perform the work.

Can M&O perform the work?

4.3.2 **Perform the Dig and Replace Repair**

The M&O Workload Planning & Scheduling Group will schedule the work for the M&O Repair and Maintenance Group to perform the work.

4.3.3. **Assign Work Order to Engineering Design Group**

The Engineering Operations Support Group or the M&O Repair and Maintenance Group will assign the work order to the Engineering Design Group. The BCE Group will arrange a meeting to discuss with the Engineering Design Group the problem found and the recommended repair.

5.0. **Complete Project**

Engineering Design Group will be responsible for completing the repair project and any necessary documentation.

6.0. **Perform Repair through Contractor**

The Engineering Design Group will coordinate the recommended repair through use of contractors. Engineering Design Group will be responsible for completing any necessary documentation.

**End of Process for Part 4**

304.4. **Pipe Defects Covered In This Policy**

**Defect Codes**

This policy covers ML defects. For a full list of defect codes and their definitions, refer to the TVI Manual, Section 204 Pipe Observations. This Section of the TVI Manual has a photo chart to show examples of severity levels of the various pipe defects, ranging from light (L), to moderate (M), to severe (S).
Multiple Defects

The TVI Manual does not define cracked, broken, missing, or collapsed pipe with multiple defects with a specific code. Multiple defects, for the sake of this Policy, are defined when a ML has two or more defects located more than 10 feet from each other. This applies to all defects defined in this Policy except the lightly cracked pipe (CPL). Defects include offset joints – medium and severe (OJM and OJS, respectively), tap defects (TD), corrosion (CR), and other defects (OTH X). The TVI Manual Section 202.11 does not have a specific code for liner defects like missing sections or bulging liners. Main lines with multiple defects defined in this policy are not covered under this policy.

Examples:

- If a main line has more than one instance of CPL throughout the pipe, regardless of distance between cracks, it will be treated as one continuous defect, CPL, as policy decisions are concerned.
- If a main line has CPL, and one other policy defect is found, it is not considered a multiple defect, as CPL is disregarded and the more serious defect is addressed by this policy.
- If a main line has OJS and BPX located more than 10 feet from each other, it is considered a multiple defect.
- If a main line has OJS and CPL, technically it is not a multiple defect, as CPL would be disregarded and OJS would be the main defect to address. However, OJS would not be covered under this policy.

These are not exclusive cases, but some common cases to help illustrate the definition of multiple defects, and how the CPL exception affects classifying defects for this policy.

Continuous Defects

To clarify the difference between multiple vs. continuous defects in this Policy, continuous defects are two or more cracked, broken, missing, or collapse defects within 10 feet of each other, and shall be treated as one defect, rather than a multiple defect. Continuous defects will be treated as one defect for the sake of this Policy. Use the most severe condition of a continuous defect when assessing the pipe through this Policy.

An exception to the within 10 feet rule is CPL. For example: If a ML has more than one instance of CPL throughout the pipe, regardless of distance between cracks, it will be treated as one defect, CPL, as policy decisions are concerned. CPL is excluded since there is a high occurrence of light cracks throughout the system and typically poses insignificant threat to the operation of the system.

304.5. Effectiveness Measure

This policy reflect the most cost effective solutions to a variety of main line problems. The effectiveness of this policy will be measured by the cost and effectiveness of addressing main line problems discovered in the field and through main line TVIs review.
304.6. TVI Observed Problems Flowchart
304.7  Cracked, Broken, Missing, and Collapsed Pipe Flowcharts
Main Line Repair-Maintain-Replace Decision Policy
Part 2b - Cracked, Broken, Missing, and Collapsed Pipe Assessment

From Part 2a
2.4 Is CPS? No
2.4 Is BPX? Yes
2.5 Go to Part 2c

2.4 Is Crack > 1"? No
2.4 Is Crack > 1"? Yes
2.4 Is Visible? No
2.4 Is Visible? Yes
2.4 Is ML Diameter < 12"? No
2.4 Is ML Diameter < 12"? Yes
2.4.1 Is Crack > 1"? No
2.4.1 Is Crack > 1"? Yes
2.4.2 Are There Visible Voiles? No
2.4.2 Are There Visible Voiles? Yes
2.4.3 Is There Evidence of Soil Intrusion? No
2.4.3 Is There Evidence of Soil Intrusion? Yes
2.4.4 Would PM Activity Cause Soil Intrusion? No
2.4.4 Would PM Activity Cause Soil Intrusion? Yes
2.4.5 Is Crack Below the Spring Line? No
2.4.5 Is Crack Below the Spring Line? Yes
2.4.6 Is There Infiltration? No
2.4.6 Is There Infiltration? Yes
2.4.7 Are There #4 Roots or Greater at Crack? No
2.4.7 Are There #4 Roots or Greater at Crack? Yes
2.4.8 Write TVW O (See Note 2)

5.0 Correct M&O Pipelines

6.0 M&O Maintenance & Repair - M&O Pipelines
7.0 Perform Emergency Repair

10.0 Engineering Support - BCE Decisions & Annual Workload Planning
11.0 BCE Process
4.1 BCE or Repair?
4.1 BCE or Repair?
BCE
Repair

3.0 Write TVW O (See Note 2)

Abbreviations and Defect Codes:
- CPL - Lightly Cracked Pipe
- CP - Moderately Cracked Pipe
- BPX - Broken Pipe
- XPM - Collapsed Pipe
- TVI - Television Inspection
- WO - Work Order
- BCE - Business Case Evaluation
- BCEBP - Sanitary Sewer Overflow/Emergency Response Procedure

Notes:
1. Cracked, broken, missing, or collapsed pipe with multiple defects are not covered under this policy. They will require a BCE.
2. Create TVI Work Order to generate 5 years after previous TVI.
Main Line Repair-Maintain-Replace Decision Policy
Part 2c - Cracked, Broken, Missing, and Collapsed Pipe Assessment

Note:
1. Cracked, broken, missing, or collapsed pipes with multiple defects are not covered under this policy. They will require a BCE.
2. Create TVI Work Order to generate 5 years after previous TVI.
Main Line Repair-Maintain-Replace Decision Policy
Part 3 - Preventive Maintenance

Part 1
3.1 Is ML on PM? No
   Yes
3.1.2 Change Job Plan
   No
   Yes
3.1.1 Is ML on correct Job Plan?
   No
   Yes
3.1.3 Is ML on correct PM Frequency?
   No
   Yes
   3.1.4 Increase to next higher frequency

3.2 Prior Stoppages?
   No
   Yes
3.2.1 Write Priority 2 Cleaning WO end a TV WO in 12 months
   Document & End
   3.3.1 BCE
3.3 Evaluate ML history for stoppage interval
(See Note 1)
   >12 months
   <=12 months
3.4 Put ML on PM
   Document & End

Abbreviations and Defect Codes:
TV = Television Inspection
WO = Work Order
PM = Preventive Maintenance

Note:
1. Always select the shortest stoppage interval when choosing a PM frequency
304.9. **Repair Decision Flowchart**

Main Line Repair-Maintain-Replace Decision Policy

Part 4 - Main Line Repair Decision Flowchart

From Z as 2b or 2c

1. **存在问题**
2. **维修计划**
3. **项目设计**

注意:
- CIPP 接头必须是 15% 以下,并应考虑更换的费用以避免更换。

程序: 维护及更换, 并考虑维护费用。
305 Lower Lateral Repair-Maintain-Replace Decision Policy

305.1. Purpose
The purpose of the Lower Lateral Repair-Maintain-Replace Decision Policy is to document decision-making for problems observed in lower laterals (LLs).

305.2. Background
It is the policy of the Sacramento Area Sewer District (SASD) to identify and implement cost-effective solutions for maintaining its assets. In August of 2005, SASD Asset Management Section began performing business case evaluations (BCEs) to address problems with SASD’s assets, including LL sewer service lines. LLs were previously referred to as “service lines” or “SLs”. BCEs provide a cost-based comparison between various alternatives proposed for resolving identified LL problems. These alternatives typically include status quo, re-evaluate at a future date, add or change a maintenance schedule, and perform a repair or replacement. The analysis conducted in numerous LL BCEs has provided cost and solution efficacy data that has been used to develop the following processes and procedures.

Any SSO response that may have resulted from any one of the defects outlined in this Policy is governed by the SASD SSO Emergency Response Procedures Manual (SSOERPM).

305.3. Process

Part 1 – Sunken Area, Void, and Cleanout Check

1.0. Start Part 1 - Sunken Area, Void, and Cleanout Check
See Process Flowchart Part 1 – Sunken Area, Void, and Cleanout Check

1.1. Is there a connection downstream of the Cleanout (CO)/Easement?
If there is a connection downstream of the CO/easement then a BCE is required.

1.2. BCE
Write a BCE Work order (WO). No other WOs or SRs shall be written.
Note for BCE staff:
Was there an SASD WO that required street excavation (via a repair or replace WO) since April 10, 2002? SASD must warranty all excavation repairs in County streets after April 10, 2002. The warranty will remain in effect for each excavation until such time as the affected street is completely resurfaced with a structural overlay. For more information regarding SASDs responsibility and pavement warranty, see the Agreement with Sacramento County Department of Transportation for Pavement Life Performance Warranty (approved by SASD’s Board of Directors on April 10, 2002).

1.3. Is the Televised Inspection (TVI) Complete?

1.4. Sunken Area or Voids?
This question usually stems from a service request (SR) via a service call, where M&O staff will verify if there is a sunken area or voids and its location.

1.5. LL Problem Causing Sunken Area or Voids?
Such problems are generally structural defects, which create voids for soil above the pipe to cave in, thus causing a sunken area at ground level. These types of defects will generally require a dig and repair.

1.6. LL Location?
Is the LL located in the street or the easement?

1.7. **Was there a WO to Repair LL in Last Year?**
Has there been a SASD WO to repair or replace the LL that required digging in the last year? SASD contractors warranty their repair work for one year after the repair.

1.8. **Write a Repair/Restoration WO**
Write a repair or restoration WO to repair the LL, and thus the sunken area. Depending on the length and location of the sunken area, a full line replacement may be the cost-effective solution. Discuss this decision with your supervisor, and if necessary, create a BCE.

1.9. **SASD CO Present?**
An SASD CO is a single direction cleanout located within the SASD easement or Right of Way.

1.10. **CO or Riser Problem?**
Is there a problem with the CO or riser (i.e. poor grade, broken pipe, CO high or CO low, broken or missing sewer relief valve (SRV) or Carson box, etc.)?

1.11. **Are there any other problems in the LL?**
If there are other problems in the LL then follow Part 2 - TVI Observed Problems.

1.12. **Write a WO to Fix CO and TVI after or Fix Riser Problem**
Write a WO to repair CO or Riser only if no other structural problems exist in the LL. A structural problem is considered to be any of the following: broken pipe, collapsed pipe, orangeburg pipe, moderate or severe cracked pipe, severe offset joint, severe swale, and moderate or severe oval pipe.

1.13. **LL Location?**
Is the LL located in the street or the easement?

1.14. **Depth ≥16 feet or Horizontal Length >10 feet?**
Horizontal length is measured from the bottom of the wye to the bend to the main.

1.15 **BCE**
Write a BCE WO. No other WOs or SRs shall be written. See section 1.2 of this Policy for additional information.

1.16 **Write a WOs to Replace LL and TVI after**
Write the necessary WOs and SRs based on your supervisor’s recommendation. Follow the TVI Policy and write a quality control TVI WO to TVI LL after replacement work is completed to verify that the quality of work performed is acceptable.

1.17 **Are there any other problems in the LL?**
If there are other problems in the LL then follow Part 2 - TVI Observed Problems.

1.18 **Write a WO to Install an SASD CO and TVI after**
Write a WO to install an SASD CO if no other problem exists in the LL more than 8 feet from the bottom of the wye. Follow the Televised Inspection Policy and write a quality control TVI WO to TVI LL after repair work is completed to verify that the quality of work performed is acceptable.

1.19 **Incomplete due to Method?**
An alternate method, such as using string to guide the camera past an offset, or using a reverse set up from a node may be required to complete an inspection. In some cases, cleaning is needed to enable a complete inspection to be recorded.

1.20 Write a WO to Rework TVI
1.21 Cause of TVI Not Complete?
   If the TVI is incomplete due to structural issue then go to Part 3.
1.22 Write WO to clean & TVI within the next 30 days
   End Process for Part 1

Part 2 – TVI Observed Problems

2.0 Start Part 2 – TVI Observed Problems
   See Process Flowchart Part 2 - TVI Observed Problems

2.1. LL Problems
   This section describes the process if there are defects or problems found in the LL through the TVI. This section also addresses any main line (ML) problems found through the LL TVI.

2.1.1. Is there a ML Problem?
   Is there a ML problem that can be seen from the LL TVI? A ML problem could potentially cause a problem in the LL.
   If the ML flow is stagnant or slow draining, write a WO to clean the ML and notify the ML TVI and PM Adjust Supervisor for possible PM or PM adjustment for the ML. No BCE required for this ML problem.

2.1.2. Is the Tap defective?
   If the tap is not defective then write a BCE WO.

2.1.3. BCE
   Write a BCE WO. No other WOs or SRs shall be written. See section 1.2 of this Policy for additional information.

2.1.4. Is the Location in the Street and either a Cul-de-sac (CDS) or Intersection (INT)?
   If the location is in the street in a CDS or INT then write a BCE WO.

2.1.5. Write WOs to Replace the Tap and TVI the LL after
   If the location is not in the street, in a CDS, or INT, then write a WO to replace the Tap and TVI the LL after.

2.2. Problems at Multiple Footages
   This section describes the process if multiple problems or defects are found through the LL TVI.

2.2.1. Two Structural Problems More Than Eight Feet Apart?
   A structural problem is considered any of the following: broken pipe, collapsed pipe, orangeburg pipe, moderate or severe cracked pipe, moderate or severe offset joint, severe swale, and moderate or severe oval pipe. When there are two structural problems less than eight feet apart, they are considered one problem.

2.2.2. One Structural Problem?
   Is there only one structural problem?

2.2.3. Is There a Need For Maintenance?
In addition to one structural problem, is there also a need to maintain the problem through scheduled preventive maintenance? A maintenance problem is considered any of the following: roots, grease, solids, and debris.

2.3. **Offset Joint Severe (OJS), Moderate or Severe Oval Pipe (OVM) or (OVS)**
This section describes the process if an offset OJS, or OVM or OVS, is found through the LL TVI.

2.3.1. **Can Maintenance Equipment Pass?**
Can maintenance equipment get past the OJS, OVM, or OVS? Can a cutter 2 inches smaller than the pipe diameter pass? If not, this becomes an emergency repair.

2.3.2. **Did OJS, OVM, or OVS Cause a Stoppage or Cause a Maintenance Issue?**
If the OJS, OVM, or OVS Cause a Stoppage or Cause a Maintenance Issue then got to Process Part 3.

2.3.3. **Create SR for Asset Alert noting OJS, OVM, or OVS**
Write an SR for an Asset Alert noting the OJS, OVM, or OVS and its footage. If an Asset Alert for that problem already exists, do not create another Asset Alert SR.

2.4. **Broken, Collapsed, Moderate or Severe Cracked, Orangeburg Pipe, or Voids**
If the pipe is broken, collapsed pipe, moderate or severe cracked pipe, orangeburg pipe, or voids surrounding the pipe are found through the LL TVI then go to Part 3.

2.5. **Grease**
This section describes the process if grease is found through the LL TVI.

2.5.1. **Severity?**
Is the grease severity Light, Moderate, or Severe?

2.5.2. **Create SR to Initiate FOG Process**
Refer to the Enforcement Response Process for FOG advisory and enforcement process.

2.5.3. **Has the LL been cleaned?**
If the LL has been cleaned then go to Part 3.

2.5.4. **Write WOs to Clean and TVI in 12 months after Cleaning**
Write WOs to clean the LL and TVI the LL 12 months after the cleaning to evaluate the build-up of grease.

2.6. **Swales, Reverse Grade, Solids, or Debris**
This section describes the process if swales, reverse grade, solids, or debris are found through the LL TVI.

2.6.1. **Is the Camera Underwater?**
Is the camera underwater, preventing a complete review of the condition of the LL?

2.6.2. **Is the Tap Location MH and LL diameter ≥6 inches?**
A BCE is required if the tap location is not a MH and the LL diameter is less than 6 in.

2.6.3. **BCE**
Write a BCE WO. No other WOs or SRs shall be written. See section 1.2 of this Policy for additional information.

2.6.4. **Write WO to TVI from MH with ML camera**
2.7. **Roots**

This section describes the process if roots are found through the LL TVI.

2.7.1. **Roots in the Upper Lateral (UL)?**

2.7.2. **Initiate UL Root Process**

Refer to the Enforcement Response Process and the Upper Lateral Root Process.

2.7.3. **Is LL problem Due to a ML Problem?**

If the ML flow is stagnant or slow draining, write a WO to clean the ML and notify the ML TVI and PM Adjust Supervisor for possible PM or PM adjustment for the ML. No BCE required for this ML problem. All other ML problems should go to BCE.

2.7.4. **BCE**

Write a BCE WO. No other WOs or SRs shall be written. See section 1.2 of this Policy for additional information.

2.7.5. **Cleaned in the last 5 years?**

Has the LL been cleaned in the last 5 years?

2.7.6. **Severity?**

Is the defect severity either Severe or Light/Moderate?

2.7.7. **Write WOs to clean and TVI 12 months after Cleaning**

2.7.8. **Cleaned After Current TVI?**

Was the LL cleaned through or after the current LL TVI?

2.7.9. **Write WO to Clean LL**

Write a WO to hydro clean the LL. Follow the TVI Policy and write a quality control TVI WO to TVI LL after cleaning is completed to verify that the quality of work performed is acceptable.

2.7.10. **TVI in 1 Year**

Write a WO to TVI the LL in 1 year.

2.7.11. **BCE**

Write a BCE WO. No other WOs or SRs shall be written. See section 1.2 of this Policy for additional information.

*End Process for Part 2*

**Part 3 – Preventive Maintenance and Repair Decisions**

3.0 **Start Part 3 – Preventive Maintenance (PM) and Repair Decisions**

See Process Flowchart Part 3 – Preventive Maintenance and Repair Decisions

3.1. **Determine PM Frequency**

Determine the preventive maintenance (PM) frequency (with the frequency less than the stoppage interval or estimated interval) or decide if the LL cannot be maintained.

SASD uses 12, 18, 24, 36, or 48 month PM frequencies. PM frequencies greater than 48 months would need supervisor approval.

The highest frequency for LLs located in easements is 36 months.

The highest frequency for LLs located in the street is 12 months.
PM frequencies higher than 36 or 12 months for LLs located in easements or streets, respectively, are considered on a case-by-case basis through a BCE by the Engineering Operations Support group.

A LL cannot be maintained if it has one of the following defects: broken pipe, collapsed pipe, orangeburg pipe, moderate or severe cracked pipe, severe offset joint, and moderate or severe oval pipe.

3.2. **Schedule or Adjust PM**
Schedule or adjust the PM that was determined in step 3.1 of this Policy. Write an SR to request that the LL be put on the appropriate PM schedule, or to request to adjust the existing PM schedule to a different, more appropriate frequency.

3.3. **LL Location?**
Is the LL located in the street or the easement?

3.4. **Are All Defects Located Between CO and Edge of Asphalt?**
If any part of the defect is located in the street, then the answer to this question is no.

3.5. **Write WOs to Repair Defects to Edge of Asphalt And a TVI after**
Follow the TVI Policy and write a quality control TVI WO to TVI LL after work is completed to verify that the quality of repair work performed is acceptable.

3.6. **Determine PM Frequency**
Determine the PM frequency (with the frequency less than the stoppage interval or estimated interval) or decide if the LL cannot be maintained.

The frequency limit for LLs located in the street is 12 months. The decision to put a LL on a PM frequency higher than 12 months can only be made by the Engineering Operations Support Group, after evaluating the LL problem through a BCE.

A LL cannot be maintained if it has one of the following defects: broken pipe, collapsed pipe, orangeburg pipe, moderate or severe cracked pipe, severe offset joint, and moderate or severe oval pipe.

3.7. **Horizontal Length Required to Repair LL**
Determine the horizontal length required to repair the LL that would eliminate the defects, and thus the need for a PM. Assume that the horizontal length of pipe to repair one defect is four feet.

**Example 1.** There are two joints that have roots, one at 15 ft. and the other at 30 ft. from the CO. The roots are growing at a rate that requires either a 12, 18 or 24 month PM. The total horizontal length required to repair both joints would be 8 feet because each defect requires 4 ft. of pipe removal. Thus the decision would be to schedule a PM.

**Example 2.** There are two joints that have roots, one at 17 ft. and the other at 22 ft. from the CO. The roots are growing at a rate that requires either a 12, 18, or 24 month PM. The total horizontal length required to repair both joints would be 5 feet, then go to step 3.8 to further evaluate for location of LL.

3.8. **Is LL Location a CDS or Intersection INT?**
A BCE is required if the LL is in a CDS or INT.
3.9. BCE
Write a BCE WO. No other WOs or SRs shall be written. See section 1.2 of this Policy for additional information.

3.10. Depth Required to Repair LL?
If the deepest portion of the LL required for repair is equal or more than 16 feet deep then a BCE is required.

3.11. Write WOs to Spot Repair LL And a TVI after
Only write this WO if all structural and/or maintenance problems in the LL will be resolved with this repair. Follow the TVI Policy and write a quality control TVI WO to TVI LL after work is completed to verify that the quality of repair work performed is acceptable.

3.12. Schedule or Adjust PM
Schedule or adjust the PM that was determined in step 3.6 of this Process. Write a SR to request that the LL be put on the appropriate PM schedule, or to request an adjustment to the PM schedule to a different, more appropriate frequency.

End Process for Part 3

Part 4 - Replace vs. Lining Decisions

4.0 Start Part 4 – Replace vs. Lining Decisions
See Process Flowchart Part 4 – Replace vs. Lining Decisions

4.1. LL Location?
Is the LL located in the street or the easement?

4.2. Are There Defects That Would Prevent Lining?
Refer to the Lining Training Guide for defects and other criteria that would prevent lining.

4.3. Is LL Location CDS or INT?
A BCE is required if the LL is located in a CDS or INT.

4.4. BCE
Write a BCE WO. No other WOs or SRs shall be written. See section 1.2 of this Policy for additional information.

4.5. Is LL Connected to MH?
A BCE is required if the LL is connected to a MH.

4.6. Depth of LL?
Is the tap depth <16 feet or ≥16 feet?

4.7. Is the ML Tap Defective?
Is the ML tap defective? ML tap defects include hammer, core, severely cracked, broken, missing, or tee taps with less than 20 equivalent single-family dwellings (ESDs) upstream of the LL

4.8. Write WO to Replace ML Tap
Write a WO to replace the ML tap when the LL is scheduled to be replaced

4.9. Write Dig and Replace LL WO and TVI after

4.10. Write a WO to Line LL

4.11. Are There Defects That Would Prevent Lining?
Refer to the Lining Training Guide for defects and other criteria that would prevent lining.

4.12 **Depth of LL?**
Is the tap depth <8 feet or ≥8 feet?

4.13 **Is the ML Tap Defective?**
Is the ML tap defective? ML tap defects include hammer, core, severely cracked, broken, missing, or tee taps with less than 20 equivalent single-family dwellings (ESDs) upstream of the LL.

4.14 **Write WO to Replace ML Tap**
Write a WO to replace the ML tap when the LL is scheduled to be replaced.

4.15 **Write Dig and Replace LL WO and TVI after**

*End Process for Part 4*

305.4 **Effectiveness Measure**
This Policy has been revised to reflect the most cost effective solutions to a variety of LL problems. The effectiveness of this Policy will continue to be measured by the cost and effectiveness of addressing routine LL problems discovered in the field and through LL TVI reviews.
305.5. Process Flowchart Part 1 – Sunken Area, Void, and Cleanout Check

Notes:
- Process each finding for the Lower Lateral.
- End process for all other problems that will be fully relieved by the repair, replacement, or liner.
- Document all Policy decisions as log notes.
- When in doubt as to which decision to make, create a BCE work order to address all problems.
- If any problem results in launching a DCC investigation, then no other work orders or service requests shall be written.
- Install an SASD CO, CO, or CC, or the lower problem only if no other problem exist in the LL.
- A structural problem is considered any of the following: loose pipe, collapsed pipe, invert pipe, or severe pipe, moderate or severe cracked pipe, severe offset pipe, severe cracks, or moderate or severe pipe. Structural problems cannot be maintained.
- Address any other problems observed in the field, including, but not limited to: broken or missing lid, no manhole box, high or low Manning, missing or out-of-date valves, etc.
- WO Priority depends on the urgency of the repair.

Lower Lateral
Repair-Maintain-Replace
Decision Policy
Process Flowchart – Part 1
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305.6. Process Flowchart Part 2 – TVI Observed Problems

- **Footnotes:**
  1. Can a cutter 2 inches smaller than the pipe diameter pass? If not, this becomes an emergency repair.
  2. A structural problem is considered any of the following: broken pipe, collapsed pipe, orange-brown pipe, moderate or severe leakage, root-infiltration, or void. A structural problem would lead to a TVI to determine if an FIC is necessary.
  3. See the EPRS Response Process for repair of Sewer laterals.
  4. Camera under a sewer is a sewer infrastructure to a degree that prohibits assessment of LL condition.
  5. If the LL flow is stagnant or slow moving, write a WO to clear the flow and notify the LL, TVI, and PRIME selection supervisor for possible PRIME or adjustment for the ML. No IG is required for the LL problem. All other LL problems should go to IG.
  6. Notes:
     - Provide each finding for the LL lateral repair.
     - If the problem is not covered in this policy, create a BGE to address all other problems.
     - Provide each finding for the LL lateral repair.
     - Create a BGE work order to address all other problems.
     - When in doubt of which decision to make, create a BGE work order to address all other problems.
     - Document all Policy decisions as part of all work orders.
     - If multiple stoppages at the LL, please write a WO to address all stoppages.
     - Document all Policy decisions as part of all work orders.
     - If multiple stoppages at the LL, please write a WO to address all stoppages.

- **Notes:**
  - Provide each finding for the LL lateral repair.
  - If the problem is not covered in this policy, create a BGE to address all other problems.
  - Provide each finding for the LL lateral repair.
  - Create a BGE work order to address all other problems.
  - When in doubt of which decision to make, create a BGE work order to address all other problems.
  - Document all Policy decisions as part of all work orders.
  - If multiple stoppages at the LL, please write a WO to address all stoppages.
  - Document all Policy decisions as part of all work orders.
  - If multiple stoppages at the LL, please write a WO to address all stoppages.

- **Version Date:** August 26, 2019

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**Lower Lateral Repair-Maintain-Replace Decision Policy Process Flowchart – Part 2**

**Part 2 – TVI Observed Problems**
Lower Lateral Repair-Maintain-Replace Decision Policy
Process Flowchart – Part 3

3.0 Start

3.1 Determine PM Frequency
24, 18, or 12 months, or LL Cannot be Maintained

3.2 Schedule or Adjust PM

48 or 36 months

3.3 LL Location?
Easement

3.4 Are All Defects Located Between CO and Edge of Asphalt?
No

3.5 Write WOs to Repair Defects to Edge of Asphalt and TVI after

Go to Part 4

3.6 Determine PM Frequency
24, 18, or 12 months

3.7 Horizontal Length Required to Repair LL?

48 feet

< 8 feet

Yes

3.8 Is LL Location CDS or INT?
No

3.9 BCE

≥ 16 feet

< 16 feet

3.10 Depth Required to Repair LL?

3.11 Write WOs to Spot Repair LL And TVI after

3.12 Schedule or Adjust PM

Document & End

Footnotes:
1. Depth refers to the deepest portion of the lateral required for repair.
2. The following defects cannot be maintained: broken pipe, collapsed pipe, orangeburg pipe, moderate or severe cracked pipe, severe offset joint, and moderate or severe oval pipe.

Notes:
- Process each finding for the Lower Lateral.
- End process for those other problems that will be fully relieved by the repair, replacement, or liner.
- Any existing PM schedule or need for a PM should be relieved by the repair, replace or lining action.
- Document all Policy decisions as log notes before closing work orders.
- When in doubt of which decision to make, create a BCE work order to address all problems.
- If any problem results in launching a BCE investigation, then no other work orders or service requests shall be written.

Part 3 – Preventive Maintenance and Repair Decisions
Lower Lateral Repair-Maintain-Replace Decision Policy

Process Flowchart – Part 4

Footnotes:
1. Refer to Lining Training Guide for restrictions.
2. Depth of LL for a replace or liner equals the mainline tap depth.
3. ML tap defects: hammer, core, severely cracked, broken, missing, or tee taps with less than 20 ESDs upstream of the LL.

Notes:
- Process each finding for the Lower Lateral.
- End process for those other problems that will be fully relieved by the repair, replacement, or liner.
- Document all Policy decisions as log notes before closing work orders.
- When in doubt of which decision to make, create a BGE work order to address the specific problem.
- If any problem results in launching a BGE investigation, then no other work orders or service requests shall be written.
- WO Priority depends on the urgency of the repair.

Part 4 – Replace vs. Lining Decisions
306 Generic BCE Process

306.1 Purpose

The purpose of this document is to record the common process and procedure for conducting Business Case Evaluations (BCEs).

306.2 Background

State Water Resources Control Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements For Sanitary Sewer Systems (WDR) (May 2, 2006), requires the Sacramento Area Sewer District (SASD) to prepare a plan to be implemented to reduce Sanitary Sewer Overflows (SSOs). This plan is referred to as the Sewer System Management Plan (SSMP).

This Generic Business Case Evaluation Process (Generic BCE Process) is directly referenced in the SASD’s Board of Directors (Board) Approved SSMP. This Generic BCE Process is intended to cover the WDR requirements to efficiently manage, maintain, and operate SASD’s sanitary sewer system, as well as provide guidelines for use in evaluating any other business case decisions through the use of BCEs.

306.3 Process

Flowchart 306.6 outlines the Generic BCE Process. The flowchart guides staff through the Generic BCE Process of the tasks and decisions generally conducted during BCE activities, which are described in the procedural narrative.

1.0 Initiation

Any SASD unit or management may identify any potential problem that requires BCE analysis and approval. These problems may include the following:

- Maintenance issues
- Operational issues
- Programmatic changes
- Design and Construction Activities
- Cost Improvement Strategies

2.0 Initial Problem Analysis

Potential problems that have been identified by any SASD unit are subject to review to determine the proper SASD unit(s) to solve the potential problem. Refer to Group Manager(s) to determine the proper resources to analyze the potential problem.

2.1 Review Problem

Review the problem statement presented. Determine if there is a valid problem to be addressed, and whether it is covered by a separate policy. Determine the assets involved, if applicable.

2.1.1 Is There a Problem?

The Engineering - Operations Support, BCE Decisions and Annual Workload Planning group (BCE Group) typically perform an initial evaluation of potential problems to decide how to approach the potential problem. The BCE Group evaluates potential problems to determine if there are existing policies to address the issue, including this Process, or if there is not a problem.
The BCE Group may determine that there is not a problem. For example, the Television Review & PM Program Adjustments group (TV Group) may have flagged a potential problem to be further evaluated by the BCE Group. The BCE Group may determine that there is not a problem, either the work order (WO) was created in error, the line may be inactive, it may be an emergency (where it would be addressed under the Sanitary Sewer Overflow Emergency Response Procedures Manual), or it may be privately owned, for example.

Is there a problem that requires proceeding with either the BCE Process or the Project Development Plan Process?

2.1.2 Covered by Another Policy?

Is the problem covered by another policy, procedure, or guidelines?

(For example: Lower Lateral Repair-Replace-Maintain Policy; Main Line Repair-Maintain-Replace Decision Policy; or Pump Stations and Facilities Business Case Evaluation Policy.)

2.1.3 Follow Separate Policy

Follow separate policy and end this process.

2.2 BCE or PDP?

The difference between a BCE and PDP is based on whether it is a Capital Improvement Project (CIP) and what the solution cost for the problem is.

2.2.1 Capital Improvement Project?

Is the solution to the problem a Capital Improvement Project?

2.2.2 Solution Cost ≥ $1.0M?

Is it apparent that the solution cost is a CIP and solution cost greater than or equal to $1.0 M?

3.0 BCE Process

This Section details the BCE process.

3.1 Research and Investigate

Research the history of the involved assets for information pertinent to the identified problem. Other supporting data and solutions input may be obtained from other groups, as outlined in 5.0 Data & Solutions Support. Business Planning is responsible for technical support to other units implementing this Process.

3.1.1 Documentation Process

Typical BCES originated from a customer or SASD Staff that reports an issue, request information, or requests some sort of service. SASD Maintenance & Operations Section (M&O) generates many of these types of Service Requests (SRs) or WOs in Maximo to capture the nature of the problem. If, after further investigation (for example: television inspection, or site visit) reveals that a BCE is necessary to
determine the best economic solution for the problem, a Maximo BCE WO may be
generated to flag the potential problem for further evaluation.

Although most of these BCEs are covered by other existing policies or strategies, there
are BCEs that are not covered by those existing policies or strategies. These particular
BCEs are covered under this **Generic BCE Process**.

BCE WO may be the first time a potential problem may be documented. The potential
problem is then described and recorded into a Maximo BCE WO and routed to the
appropriate group to be evaluated.

In some cases, the BCE may not be appropriate to be tracked in Maximo (for example,
a policy revision). Consult the effective Group Manager(s) on their internal
documentation practices. Typical documentation management practices may
include: preparing any physical files, preparing electronic files in SASD’s shared
folders, preparing database entries, or conducting other methods of document
management.

### 3.1.2 Research and Document History

Conduct and document descriptive, quantitative, and historical research as
appropriate to the asset or process under review.

For example, for pipelines, research and record asset age, size, depth, dimensions,
etc. Use Maximo, Water Quality Computerized Maintenance Management System,
Geographic Information System (GIS), and any other available data source to attain
the necessary asset information required to proceed.

### 3.1.3 Research and Document Findings

For BCEs related to currently owned assets, research and document the detailed
findings and results for the asset. For example, for pipeline assets, document all
stoppages, repairs, preventive maintenance schedules, cleanings, televised
inspections, customer service requests, and any other relevant information regarding
the involved asset(s).

Review and document findings from any testing activities, pilot programs, or other
empirical evaluations of the asset type or process under review.

### 3.2 Prepare NPV and BCE Report

Prepare the BCE report by identifying, analyzing, documenting, and recommending alternate
solutions, typically based on a 40-year Net Present Value (NPV). Exceptions to the 40-year
NPV can be made on a case-by-case basis. Use any pertinent information found in
3.1 Research and Investigate to prepare the BCE report. Other supporting data and solutions
input may be obtained from other groups, as outlined in 5.0 Data & Solutions Support.

#### 3.2.1 Define Alternatives

For BCEs evaluating current assets, identify and define alternatives for:

- status quo
- maintenance
- repairs
- rehabilitation
replacement
and any other viable option, as appropriate

For each alternative defined, consider the lifecycle costs, risks, and mitigation measures. Capture the lifecycle costs for each alternative for the NPV analysis, typically a 40-year NPV is used. Exceptions to the 40-year NPV can be made on a case-by-case basis. See 3.2.2 Prepare NPV.

For purchase evaluations, document equipment options, sourcing options, purchase/lease/rental and any other acquisition options. Document lifetime ownership costs, including servicing, disposal, and replacement cycles.

3.2.2 Prepare NPV

For each alternative identified in 3.2.1 Define Alternatives, a lifecycle cost is necessary for comparison, typically using a 40-year NPV, unless another time span is more appropriate to use for analysis. Exceptions to the 40-year NPV can be made on a case-by-case basis.

Examples of lifecycle costs to consider for each alternative are maintenance, labor, material purchase, risk, equipment, salvage costs, and any other costs that may be particular to the alternative solution. Cite sources of information used to prepare lifecycle costs.

Lifecycle costs are typically compiled per year, so that the yearly cost can be analyzed through an NPV. Compare all alternatives using the chosen NPV criteria.

See Sample BCE NPV appended to this document.

3.2.3 Prepare BCE Report

The BCE Report contains the Sections:

- **Problem Statement** – State the nature of the problem.
- **Background** – Give an overview of the history, backup information, failure modes, associated risk, preventive maintenance, or any other supporting information in this Section. State specific constraints that may be present.
- **Alternatives** – General statement of how many alternatives were analyzed for the BCE, and what type of NPV was used, typically a 40-year NPV.
- **Alternative 1 - Status Quo** – Description of the Status Quo alternative is always listed first. See 3.2.1 Define Alternatives
- **Alternative n** – Description of each alternative analyzed for the BCE. See 3.2.1 Define Alternatives (where n is any number of alternatives.)
- **Recommendation** – State the recommended alternative, and a brief description of the alternative.

Prepare a cover letter for the BCE addressed to the approving authority. Briefly state the problem, how many alternatives were analyzed, and the recommended alternative. The signature blocks that follow the problem statement include the Staff member submitting and recommending the alternative solution, the Staff member’s supervisor (if BCE was not prepared by a supervisor), any affected manager(s), and the approving authority to whom the BCE is addressed. Attach the BCE Report and the supporting BCE NPV to the cover letter.
See the Sample Generic BCE Cover Letter, Sample Generic BCE Report, Sample Generic BCE NPV, and Sample Generic BCE Lifecycle Costs Sheet appended to this document.

3.3 BCE Approval Process

Based on the recommended solution, existing policies, procedures, processes, or guidelines may govern the approval process for your particular BCE.

- **Project Authorization Committee (PAC)**

  PAC approval is required if the initial investment exceeds $1.0M or if the NPV is greater than $2.0 M over 5 years. New recurring expenses shall be based on the following:

  - NPV will be calculated for 5 years of costs and include the initial investment, staff costs, M&O replacements, and salvage value.

  Refer to the most current version of the Project Authorization Process for clarification if PAC is necessary for BCE approval.

- **Pre Project Authorization Committee (PrePAC)**

  PrePAC was born out of the PAC to give upper level management a chance to comment and approve the BCE presentation before it went to PAC. SASD Director of Operations may approve a BCE at this level if the solution cost is within his approval authority limit. If the BCE solution cost is above the Director’s approval limit, the Director may recommend the BCE presentation proceed to the PAC process.

The BCE approval process is dependent on the nature of the solution (operational or capital), the solution cost, or both.

Table 306-1 below outlines the approval authority levels of the BCE approval process. Based on the solution and its cost, use the cited source document to verify the correct approving authority level. (The most current approval limits should be confirmed by the user at the time of use of this document.)

### Table 306-1 BCE Approval Limits

<table>
<thead>
<tr>
<th>Approving Authority Level</th>
<th>Operational BCE Approval Limits</th>
<th>Capital Improvement BCE Approval Limits</th>
<th>Source (Operational/ Capital)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor(s)</td>
<td>Up to and including $2,500*</td>
<td>Up to and including $2,500*</td>
<td>Generic BCE Process/ Generic BCE Process</td>
</tr>
<tr>
<td>Group Manager(s)</td>
<td>Up to and including $100,000</td>
<td>Up to and including $20,000**</td>
<td>Organizational Planning Team (OPT)/ Generic BCE Process</td>
</tr>
<tr>
<td>Section Manager(s)</td>
<td>Up to and including $250,000</td>
<td>Up to and including $100,000**</td>
<td>OPT/Generic BCE Process</td>
</tr>
</tbody>
</table>
### Approving Authority Level

<table>
<thead>
<tr>
<th>Approving Authority Level</th>
<th>Operational BCE Approval Limits</th>
<th>Capital Improvement BCE Approval Limits</th>
<th>Source (Operational/Capital)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of SASD Operations through PrePAC***</td>
<td>Up to $1.0M****</td>
<td>Up to $1.0M****</td>
<td>OPT/Generic BCE Process</td>
</tr>
<tr>
<td>District Engineer through Project Authorization Committee</td>
<td>Exceeds $1.0M, Or if NPV &gt; $2.0M over 5 years****</td>
<td>(under Project Development Plan Procedures)</td>
<td>Project Authorization Process</td>
</tr>
</tbody>
</table>

* Supervisor(s) approval limits are defined in this revision of the [Generic BCE Process](#).  

** These approval limits were originally defined in this [Generic BCE Process](#) document and are still effective for capital solution costs. This [Generic BCE Process](#) document defines these approval limits. Should there be a change in these approval limits, the approval limits for these approving authority levels must be changed in this [Generic BCE Process](#) document to reflect the most current approval levels.  

*** SASD Director of Operations has the discretion to approve a BCE within this dollar amount or refer the BCE to go through the PrePAC approval process.  

**** PAC approval limit was raised in 2011 from $250K to $1.0M, and refers to the initial investment costs. NPV expenditure level criteria was added in 2012.  

The Board approval may be necessary for final approval. Approving Authority and/or appropriate manager(s) will follow the Board meeting procedures if necessary.  

Also, typical to the approval process, it is assumed that manager(s) below the Approving Authority Level have already recommended the BCE as ready to be presented for approval. For example, if the Approving Authority Level was determined to be SASD Director of Operations, the affected Section Manager(s), Group Manager(s), Supervisor(s), Underground C & M Supervisor(s), or Supervising Engineering Technician(s) that may have been involved in development of the BCE, have already recommended the BCE for the higher approval level.  

#### 3.3.1 BCE Approved?

After presenting the BCE to the appropriate approving authority level or process, was the BCE approved?  

#### 3.4 BCE Follow-up

Complete the paperwork, work order entries, and other items necessary to complete the approved BCE and execute the approved actions. Refer to Section 3.1.1 Documentation Process, if necessary.
3.4.1 Update Asset Inventory (if necessary)

From the originating Service Request, if applicable, create any Work Orders based on the approval, if necessary. For BCEs pertaining to current assets, create Service Request(s) to update asset attributes, including asset information, activity instructions, special instructions regarding problems with the asset, and any other updated information. When creating Service Requests, follow the latest Maximo Non-Emergency Service Request Templates, updated May 25, 2011.

3.4.2 Create Maximo Work Orders (if necessary)

The staff lead of the BCE is responsible for the creation of Maximo Work Orders, if necessary, for activities approved.

3.4.3 Scan & Save Recommendation Sheet

Scan signed and completed BCE recommendation/approval sheets and associated papers as necessary, and save appropriately per current document management practices. Refer to Section 3.1.1 Documentation Process, if necessary.

3.4.4 Close Documentation Process

Close documentation process per current document management practices. For example, complete BCE Work Order(s), Service Request(s), follow PrePAC or PAC procedures, or any other task to finalize the documentation process.

3.4.5 Complete File

Complete BCE file(s) per current documentation management practices.

3.5 Detailed Design/Construct Project (if necessary)

Project Lead is responsible for providing a detailed design and directs construction of the project, if necessary.

Project Lead may have to collaborate with other groups, and/or consultants as necessary.

3.6 Final Cost Verification BCE (if necessary)

Project Lead may have to prepare a final cost verification BCE that compares actual with projected costs.

Provide verification to group that prepared original BCE (if different from Project Lead). Refer to Section 3.1.1 Documentation Process, if necessary.

4.0 Project Development Plan (PDP) Procedures

Refer to the Project Development Plan Procedures for Capital Improvement Projects and end this Generic BCE Process. Verify the most recent version of the PDP Procedures before proceeding.

5.0 Data & Solutions Support

Input to research and range of solution alternatives, including identification of alternatives, associated risks, and modeling are available from sources such as the SASD Design, M&O, and Business Planning. Additional solutions input may be drawn from sources such as research activities, vendors, field testing, pilot programs.
If additional information is necessary from other SASD groups or vendors, check with the effected Group Manager(s) for available resources to meet the project needs. Define the information necessary to address your BCE needs.

Data and solutions support typically are performed to support Sections 3.1 Research and Investigate and 3.2 Prepare BCE Report and NPV of this Process.

6.0 Document Investigation & Findings

When a decision is made to discontinue a BCE, document the investigation and findings in Maximo, if necessary or follow current documentation management practices.

7.0 End

End the Generic BCE Process.

306.4. Definitions Used in Section 306

Business Case Evaluation - A BCE is an evaluation of alternatives to a problem. A BCE is used to economically compare alternatives against each other to provide a basis for selecting a preferable, cost effective alternative solution. BCE alternatives typically include status quo, repair, maintain, replace, or other alternatives that may be appropriate, and consider risks involved with each alternative, if any. Typically, a 40-year net present value (NPV) is used to compare alternatives, but may be adjusted if a different NPV time span is more appropriate.

Capital Asset - see latest version of the Capital Asset Policy for definition.

Solution Cost - Solution process steps and approval levels are based upon the cost of the solution. In the case of a capital solution, the solution cost is the total cost of the recommended alternative and the projected alternative's maintenance and operations cost, usually presented in a 40-year NPV. If the solution is a combination of capital and operational costs, the affected supervisor(s) or group manager(s) will decide if the solution is to be considered as a capital or an operational solution, in order to determine the proper approval authority level, as outlined in 3.3 BCE Approval Process of this Process.

For operational solutions, the solution cost is the difference between the lifecycle status quo (exclusive of risk) and the solution lifecycle costs, usually projected as a 40-year NPV. For example: For an operational recommended solution with a 40-year NPV of $21,000 and a status quo 40-year NPV of $5,000, the solution cost would be $16,000.

Capital BCE Approval Limits - Section Managers are authorized with approval limits for capital solution costs up to and including $100,000. Group Managers are authorized with approval limits for capital solution costs up to and including $20,000. These costs are typically based on a 40-year NPV. This document defines these approval limits. Should these limits change, this document must be updated to reflect those changes.

(Authorized purchase limits for managers and supervisors remain the same, as listed in the Procurement Policy & Process Procedures and Purchasing Authority Limits. These limits are not to be confused with capital or operational BCE approval limits that govern the approval process in this Process.)

Operational BCE Approval Limits - Section Managers and Group Managers have been authorized for operational BCE solution costs, up to and including $250,000 and $100,000, respectively. These costs are typically based on a 40-year NPV. These limits were approved by the SASD's Organizational Planning
Team (OPT) on February 15, 2011, and are defined in this document. These limits should be verified as current at the time of use of this document.

306.5.  **Effectiveness Measure**

The effectiveness of the **Generic BCE Process** is how well the process determines the most cost effective solution to a problem.
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Identify potential problem(s), may Include:
- Maintenance or Operational
- Programmatic Changes
- Design & Construction Activities
- Cost Improvement Strategies

Provides input to range of solutions. Identifies project related risks with alternative solutions.

Any SASD Unit Project Lead

1.0 Initiation

2.0 Initial Problem Analysis

2.1 Review Problem

2.1.1 Is There a Problem?

Yes

No

2.1.2 Covered by Another Policy?

Yes

No

No

Yes

2.1.3 Follow Separate Policy

2.1.4 Research and Investigate

2.1.5 Prepare NPV

2.1.6 Prepare BCE Report

3.0 BCE Process

3.1 Research and Investigate

3.1.1 Documentation Process

3.1.2 Research and Investigate

3.1.3 Prepare NPV

3.1.4 Prepare BCE Report

3.2 Prepare NPV and BCE Report

3.3 BCE Approval Process

3.3.1 BCE Approved?

Yes

No

3.3.2 Follow up

3.4 BCE Follow-up

3.4.1 Complete File

3.4.2 Create Maximum Work Orders (if necessary)

3.4.3 Scan & Save Recommendation Sheet

4.0 PDP Procedures

4.1 Research and Investigate

4.2 Prepare NPV and BCE Report

5.0 Data & Solutions Support

5.1 Data & Solutions Support

6.0 Document Investigation & Findings

7.0 End
306.7. Generic Business Case Evaluation (BCE) Process Appendix

Sample Generic BCE Cover Letter

[Date]

To: [Approving Authority]
    [Title of Approving Authority]

Subject: Business Case Evaluation for [Name of BCE]

[Briefly state the problem, including the affected asset(s), if any. State the number of alternatives analyzed for this BCE. State the recommended alternative solution, briefly describing the recommended solution.]

Approval Recommended: ____________________________

[Signature of Staff member who prepared report], [Section and Group title] [Date]

Approval Recommended: ____________________________

[Staff member’s Supervisor’s Name (if BCE was not prepared by a Supervisor)], [Title] [Date]

(If necessary, add additional signature blocks if additional levels of approval recommendations are necessary.)

Approved by: ____________________________

[Approving Authority Name], [Title] [Date]
Sample Generic BCE Report

Business Case Evaluation

[Name of BCE]

Problem Statement

[State your problem here.]

Background

[Describe the problem.]

Alternatives

[State the number of alternatives evaluated and the how they were compared to each other to determine the best alternative solution to the problem, a 40-year NPV is typically used. State any significant circumstances or considerations to summarize the alternatives.]

Alternative 1 – [Title of Alternative 1]

[Alternative 1 description. Include a statement about whether this is the preferred alternative or not]

Alternative 2 – [Title of Alternative 2]

[Alternative 2 description.]

Alternative [n] – [Title of Alternative n]

[Alternative n description, with n being any number. The number of alternatives evaluated varies case by case.]

Recommendation

[State the recommended Alternative and a brief description of what the recommended Alternative entails.]
**Sample Generic BCE Net Present Value**

(This Sample Generic BCE Cover Letter uses brackets ([ ]) to show where particular information needs to be customized.)

**Table 306-1 40 Year NPV**

<table>
<thead>
<tr>
<th>Year</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative n*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Status Quo</td>
<td>Alternative Title</td>
<td>Alternative Title</td>
</tr>
<tr>
<td>1</td>
<td>Cost</td>
<td>Cost</td>
<td>Cost</td>
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<tr>
<td>2</td>
<td>Cost</td>
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<td>39</td>
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<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>%***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Row and Column headings are shown for this example only.

Typically, use 40 years for the NPV cost analysis. Adjust as necessary if using a different time span. "Cost" can vary depending on the Alternative solution conditions.

*n varies depending on the number of alternatives to be evaluated per BCE

**The NPV Cost Calculation = NPV (Discount Rate, Year 2 through 40 Costs) + Year 1 Costs. For example: for the Status Quo NPV Cost in cell B44, the equation would be: =NPV($B$45,B5:B43)+B4

***Discount Rate - This rate is typically set by the Chief Financial Officer/Finance Office. Check with Supervisor as to what is the current discount rate to be used for NPV analysis.
### Sample Generic BCE Lifecycle Costs Sheet

#### Table 306-2 Costs Summary

<table>
<thead>
<tr>
<th>Costs Summary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Replacement Costs</strong></td>
<td></td>
</tr>
<tr>
<td>Replacement cost</td>
<td>$</td>
</tr>
<tr>
<td>Replacement cost</td>
<td>$</td>
</tr>
<tr>
<td><strong>Total Replacement Costs</strong></td>
<td>$</td>
</tr>
<tr>
<td><strong>Installation Costs</strong></td>
<td></td>
</tr>
<tr>
<td>Number of crew</td>
<td>#</td>
</tr>
<tr>
<td>Hourly Rate</td>
<td>$/hour</td>
</tr>
<tr>
<td>Required installation hours</td>
<td>#</td>
</tr>
<tr>
<td>Other material costs</td>
<td>$</td>
</tr>
<tr>
<td><strong>Total Installation Costs</strong></td>
<td>$</td>
</tr>
<tr>
<td><strong>Maintenance Costs</strong></td>
<td></td>
</tr>
<tr>
<td>Number of Mechanics</td>
<td>#</td>
</tr>
<tr>
<td>Hourly Rate</td>
<td>$/hour</td>
</tr>
<tr>
<td>Hours per year</td>
<td>#</td>
</tr>
<tr>
<td>Number of Electricians</td>
<td>#</td>
</tr>
<tr>
<td>Hourly Rate</td>
<td>$/hour</td>
</tr>
<tr>
<td>Hours per year</td>
<td>#</td>
</tr>
<tr>
<td><strong>Total Maintenance Costs</strong></td>
<td>$</td>
</tr>
</tbody>
</table>

#### Summary of Total Costs

<table>
<thead>
<tr>
<th>Costs Summary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Replacement Costs</td>
<td>$</td>
</tr>
<tr>
<td>Total Installation Costs</td>
<td>$</td>
</tr>
<tr>
<td>Total Maintenance Costs</td>
<td>$</td>
</tr>
</tbody>
</table>

All entries on this sample lifecycle costs sheet is an example only. This sample lifecycle costs sheet is not intended to exclusively represent all cost necessary for BCE evaluations. Staff preparing the lifecycle costs sheet(s) should account for all costs necessary for each identified BCE alternative.
This Page is Intentionally Left Blank
400  Structural Assessment Program

400  Program Overview

400.1. Purpose

The purpose of this document is to describe the strategies the Sacramento Area Sewer District (District) implements to identify and mitigate failure modes that lead to structural failures of sewer collection system assets.

400.2. Background

The District owns and operates a variety of physical assets. In support of the District’s goals of meeting regulatory requirements, achieving identified service level targets, and operating in a cost-effective manner, it has documented several efforts designed to assess the structural condition of its assets and determine appropriate solutions for any identified problems.

The Structural Assessment Program is intended to evaluate the structural integrity of all District collection system assets such as manholes, pipes, and pump stations. The Program is further intended to mitigate any potential structural failures in the system. It is divided into three different structural failure modes: Loss of Support, Crush Collapse, and Pump Station. These failure modes each have a strategy that may be further broken down and refined as needed for different asset types or unique situations.

A structural failure, which has caused a stoppage, is addressed directly through the District’s SSO Assessment Program (via the Sanitary Sewer Overflow Emergency Response Procedures Manual) if a Sanitary Sewer Overflow (SSO) or Backup Into Structure (BIS) has occurred.

This document is directly referenced in the Sewer System Management Plan (SSMP), and is one of the District’s system wide assessments. The assessment programs consist of strategies that drive the District’s routine day-to-day operations.

400.3. Program

The Structural Assessment Program encompasses several separately documented but sometimes-interrelated failure modes. Each failure mode has an associated strategy, which is listed below:

- Loss of Support Failure Mode Strategy
  - Strategy to reduce the frequency of SSOs due to loss of support failure mode.
  - Inspection strategies.

- Crush Collapse Failure Mode Strategy
  - Strategy to cost effectively reduce the risk of crush collapse failures.
  - Inspection strategies.

- Pump Station Structural Assessment Strategy
  - Strategy to cost effectively mitigate the risk of pressurized asset structural failures.
  - Inspection strategies.

400.4. Effectiveness Measure

The effectiveness of this document is based upon the structural integrity of the District’s assets. Any structural failure in the system will initiate a review of this document and the strategies contained within it.
401  Loss of Support Failure Mode Strategy

401.1. Purpose
This document defines strategies used to cost effectively reduce loss of support failures.

401.2. Background
Loss of support failures are caused by a pipeline’s loss of contact with bedding material or loss of other support structures. Examples of bedding material are crushed rock and soil. Examples of other support structures are piers and hangers. Erosion of bedding or corrosion of support may cause loss of support. The loss of support allows the pipe to separate, fall, or break, which may result in a Sanitary Sewer Overflow (SSO). The consequence of failure is dependent on both the type of asset and its location relative to a waterway.

Loss of support failures can occur within creeks. Creek characteristics change frequently with storm events and debris build-up on obstructions may cause velocity changes that can alter the width and depth of the creek.

SASD has numerous pipelines that cross creeks. The Creek Protection Project was created to reduce the risk of SSOs on pipes that cross creeks and include aerial creek crossings, covered creek crossings, exposed creek crossings, and parallel pipelines within creeks. The Sacramento Area Sewer District (SASD) implemented visual inspections on pipelines that cross creeks, based on County Geographic Information System (GIS) data, in order to reduce the risk of failures. SASD completed field investigations of the creek crossings. Based on these site visits, SASD prioritized the sites that were the most compromised and could potentially cause discharge of sewage into a creek. The Creek Protection Project has reactive elements and proactive elements.

Two approaches will be used to reduce loss of support failures: reactive approach and proactive approach.

Table 401-1 Loss of Support Failure Mode Strategy Approaches

<table>
<thead>
<tr>
<th>Reactive activities</th>
<th>Proactive activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creek Projects</td>
<td>Creek Protection Plans &amp; Inspections</td>
</tr>
<tr>
<td>Functional Renewal driven by proactive strategies</td>
<td>Condition Assessments</td>
</tr>
</tbody>
</table>

A loss of support failure due to construction activities is covered under the Damage by Others Failure Mode Strategy.

This Strategy covers SASD gravity system assets (main lines, manholes and lower laterals). Loss of support in force mains is covered under the Pump Station Structural Assessment Strategy.

Any loss of support failure occurring outside of a creek will be analyzed by the Generic Business Case Evaluation Process (Generic BCE Process).

This Strategy is directly referenced in the Board Approved Sewer System Management Plan (SSMP) as part of the Structural Assessment Program.

This Strategy does not cover initial SSO emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy.
401.3. Definitions used in Section 401

**Creek** – A low-lying area that may or may not have an active stream flowing within it. For the purposes of this document, low-lying areas will include any depression, gully, ravine, or canyon.

**Aerial crossings** – A sewage pipe that is above the creek floor and may or may not have support structures in the creek. The material of the crossing is typically some type of ductile iron or steel pipe.

**Covered crossings** – A sewage pipe that is buried as it crosses the creek.

**Exposed crossings** – A sewage pipe that is exposed on the floor of the creek. The crossing may or may not be in a carrier pipe or encased in concrete that protects the pipe and provides support.

**Parallel pipeline** – A pipeline within a creek and that extends in the same direction as the creek.

**Crossing** – A pipeline traversing a creek.

401.4. Strategy

The following approaches will be used to prevent loss of support failures in aerial creek crossings, covered creek crossings, or exposed creek crossings.

**Proactive Approach:**

1. **Aerial Crossings**

   Aerial crossings are visually inspected for corrosion, erosion and structural issues.

   1.1. Annual Visual Inspections

   • Aerial crossings are inspected at a minimum of once a year. Depending on the likelihood and consequence of failure, the frequency of visual site inspection may be adjusted.

   Results of the visual inspections may result in a BCE or adding the site to the Creek Protection Project.

2. **Creek Protection Project**

   Engineering Design is responsible for the Creek Protection Project.

   2.1. Creek Criticality Model

   • Created to rank waterways with three levels of criticality, high, medium, and low.
   • Components such as, but not limited to, waterway capacity, environmental sensitivity, size and condition of the crossing or adjacent pipeline, location of drainage inlets, and use of water supply or public facility were weighted and used to determine the risk assessment for each waterway.

   2.2. Creek Protection Plans

   • Medium and high critical waterways have creek protection plans. These plans includes standard information that applies to all waterways within the plan area followed by detailed mapping for each waterway and include but not limited to:
     - Access points
     - Creek protection
     - Emergency bypass pumping
     - Emergency environmental waterway permit requirements
3. **Strategy/Program for Parallel Sewer Pipelines along Waterways**

Sewer pipelines along waterways are assessed and have the potential to be inspected for erosion and structural issues.

### 3.1. Desktop Assessment

- All pipelines within 25 feet of the waterway centerline as determined by GIS mapping receive desktop assessment. Assessment includes:
  - Review of aerial photo to determine waterway characteristics
  - Review of aerial photo to determine pipeline and waterway relationship
  - Review of as-builds (if available)
  - Review of Computerized Maintenance Management System (CMMS) records
- Pipelines found to have potential erosion or structural issues are inspected.

### 3.2. Field Assessment (Inspection)

3.2.1. Pipelines determined by desktop assessment to have the potential for issues will be visually inspected.

Results of the visual inspections may result in a BCE or adding the site to the **Creek Protection Project**.

4. **Standards and Specifications (Standards)**

4.1. Design **Standards** are written such that newly aerial and exposed crossings are not allowed without a deviation. Any deviations are processed through the **Request for Deviation for Standards and Specifications**.

4.2. The **Standards** contain several other proactive approaches to help minimize loss of support. For example, trench dams, trench foundation, and bedding specifications are designed to help minimize loss of support failures.

**Reactive Approach:**

1. **Aerial Crossings**

Pipelines with a change in pipe material that is close to the bank are especially susceptible to creek erosion since the pipe material change relies on the bank material for support; the distance from the creek edge and the change in pipe material may change over time. In addition, aerial crossings may have debris accumulate that can cause lateral loads that exceed design capacity. High water in the creek may also cause excessive lateral loads on the aerial crossing.

1.1. Failure Analysis

The **Generic BCE Process** will be employed to analyze any problem found at the aerial crossing. The resulting recommendations may include any one or a combination of the following:

- Perform a repair
- Add or change a Preventive Maintenance (PM) schedule
• Replace the asset

1.2. Post Storm Visual Inspections

• Aerial creek crossings that are below the high water line will be inspected within five business days following a storm greater than the 2-year return period (6 or 24-hour duration) storm as determined following the methodology in SASD’s Master Plan 2006 Update.

• Aerial creek crossings above the high water line will be inspected within five business days following a storm greater than the 5-year return period (6 or 24-hour duration) storm as determined following the methodology in SASD’s Master Plan 2006 Update.

Using the methodology described above, the following rain events will trigger inspections:

**Table 400-2 Rainfall Event Triggers**

<table>
<thead>
<tr>
<th>Inspection Criteria</th>
<th>Storm Return Period</th>
<th>Storm Duration</th>
<th>Total Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below the high water line</td>
<td>2-Year</td>
<td>6 Hour</td>
<td>1.12 in</td>
</tr>
<tr>
<td></td>
<td>2-Year</td>
<td>24 Hour</td>
<td>2.08 in</td>
</tr>
<tr>
<td>Above the high water line</td>
<td>5-Year</td>
<td>6 Hour</td>
<td>1.49 in</td>
</tr>
<tr>
<td></td>
<td>5-Year</td>
<td>24 Hour</td>
<td>2.77 in</td>
</tr>
</tbody>
</table>

The California Department of Water Resources rain gauge number 131 in Fair Oaks, California is used as the reference rain gauge to determine the rainfall for any given period.

2. Creek Protection Project

2.1. Priority Design Sites – Several creek crossings were deemed high priority and as a result may have one or more of the following performed:

• Repair crossing – reinforce existing crossing
• Rehabilitate crossing
• Pipeline relocation
• Erosion control system - when erosion damage is identified, the appropriate erosion control system will be installed or maintained
• Install or maintain protective coatings

2.2. Visual Inspections

• High priority sites are inspected after a 2-year return period (6 or 24-hour duration) storm.

**401.5. Effectiveness Measure**

The effectiveness of this Strategy is based on the number of loss of support failures. These failures are documented in the Computerized Maintenance Management System.
402 Crush Collapse Failure Mode Strategy

402.1. Purpose

The purpose of this document is to establish the strategy that is used to cost effectively reduce the frequency of crush collapse caused sanitary sewer overflows (SSOs).

402.2. Background

The Crush Collapse Failure Mode Strategy is intended to assess the structural integrity of the gravity assets in the Sacramento Area Sewer District’s (SASD’s) collection system. Pump Station and Force Main strategies are covered in the Pump Station Structural Assessment Strategy.

SASD realizes that crush collapse failures can cause SSOs, interruptions in service, and environmental consequences. The Crush Collapse Failure Mode occurs when degradation of the assets or excessive forces have occurred causing cracking and breaking of the pipe or manhole, potentially leading to the asset collapsing. Strategies to reduce the frequency of SSOs can be proactive or reactive, as defined by the Maintenance Terminology Definitions approved by the Organizational Planning Team.

The cost of consequence is the cost associated with an SSO (initial response, cleanup activities, reporting, etc.), as well as environmental and social costs. Environmental and social aspects are evaluated on a case-by-case basis, and where quantifiable are added to the base costs. Any SSO that may have resulted from the crush collapse failure is responded to per the SSO Emergency Response Procedures Manual.

402.3. Strategy

Crush collapse failures within SASD’s gravity assets can happen in lower laterals, main lines, or manholes. The following Strategies apply to all three asset classes.

Reactive Approach

1. Televised Inspection Policy (TVI Policy)

   The TVI Policy helps determine when an asset that has had an SSO due to a crush collapse failure will be inspected with closed-circuit television equipment. The portions of TVI Policy that react to gravity asset’s SSO include the following:

   1.1. The Stoppage Follow-up (Failure Analysis) guidelines of TVI Policy prescribe when, why, and who will perform the TVI under certain conditions.

   1.2. Per TVI Policy, the TVI will be reviewed. Review of the TVI may indicate more evaluation of a problem is needed. TVI reviewers create work orders that include Business Case Evaluations (BCEs) and future TVIs.

2. Generic Business Case Evaluation Process (Generic BCE Process)

   If a problem is not covered by a separate policy or procedure then the Generic BCE Process will be used.

Proactive Approach

1. TVI Policy

   1.1. Per the TVI Policy, TVIs will be reviewed. This includes any proactive TVI as follow-up work resulting from SASD’s maintenance programs.
2. **Standards**

2.1. The **Standards** provide minimum requirements to be applied to assets dedicated to the public for operation and maintenance, requiring the approval of the Sacramento Area Sewer SASD, or to be installed within existing or new public rights-of-way or easements. These **Standards** are written to provide for the safety and general welfare of the public that will be using the sewer facilities. Included are requirements such as minimum depth of cover that are intended to protect the pipe from crush collapse failures. These **Standards** regulate and guide the planning, design, and construction of all assets within SASD service area.

2.2. Any deviations are processed through the **Request for Deviation from Standards and Specifications**.

2.3. Quality control is employed by plan review and inspections. Plans are submitted to SASD and are reviewed based on the **Development Services Procedures Manual**. An SASD representative conducts inspections during construction, minimizing potential problems that could impede flow, and other possible construction defects.

The following Strategies are broken up between the different asset classes, as the strategies are significantly different in each.

402.3.1 **Lower Lateral Strategy**

**Lower Lateral Proactive Approach:**

1. **Lower Lateral Area Inspection Program**

   Annually SASD selects a predetermined number of lower laterals to TVI. More program details are outlined in the **Lower Lateral Stoppage Failure Mode Strategy**.

   1.1 The TVI will be reviewed. If follow-up work is needed, it will be processed through the **Lower Lateral Repair-Maintain-Replace Decision Policy**.

402.3.2 **Main Line Strategy**

**Main Line Proactive Approach:**

1. **Structural Assessment Program**

   In order to reduce the probability of a high consequence crush collapse failure of main line sewers, SASD developed the Structural Assessment Model. This model identifies main lines that should be inspected for the crush collapse failure mode based on risk analysis and cost benefit.

**Program Details:**

The useful life for unlined Reinforced Concrete Pipe (RCP) and Ductile Iron is defined as 45 years. For vitrified clay pipe (VCP) the useful life is defined as 100 years. For other pipe materials, the useful life is defined as 50 years. The useful lifespan for sewer pipes is set by the **Capital Asset Policy**.

The risk analysis is developed by assessing the costs of repairing the crush collapse failure, mitigating the environmental damages, including any social consequences. This risk cost is then compared to the cost of cleaning and inspecting the pipe based off an age driven likelihood of failure. Any pipelines identified by the structural assessment model will have work orders written for them per the following procedures:
• **Update and Run Structural Assessment Model**
  - **Model Updates**
    SASD’s Engineering Operations Support group updates the model. Updates are made to labor and equipment rates, cost curve values, intangible cost values, and Weibull equation parameters, as necessary.
  - **Model Runs**
    The Engineering Operations Support Group runs the model and evaluates the output.

• **Generate List and Map of Lines to Inspect**
  - **List of Line Segments**
    The Engineering Operations Support Group creates a list of line segments to be inspected.

• **Generate Work Orders**
  The Engineering Operations Support Group will write the following work orders in Maximo:
  - **Cleaning Work Orders**
    Cleaning work orders will be created on an as needed basis. Those lines where the TVI cannot be completed with the quality that is defined in the SASD’s Standards Television Inspection Section will be cleaned.
  - **TVI Work Orders**

• **Plan, Schedule, and Complete Work Orders**
  - **Plan and Schedule**
    The M&O Workload Planning and Scheduling Group schedules the TVI so that it is completed by the target completion date.
  - **Completion of work is captured in Maximo.**

• **Review TVI**
  Completed TVIs are reviewed by Operations Support Group. Follow the **TVI Policy**.

**402.3.3 Manhole Strategy**

**Manhole Reactive Approach:**

**Inside Drop Repair/Replace**

Broken/missing inside drops are found during work done through SASD’s maintenance programs. Inside drops are repaired if they are damaged, broken, or disconnected. Missing inside drops are reinstalled. If corrosion or erosion of the manhole wall is found, then a BCE work order is written to evaluate the manhole for repair. If the defect in the drop results in build-up of severe to moderate solids, then a priority 2 manhole work order is written to clean the Manhole, along with a priority 4 work order to repair/install the drop.

**402.4 Effectiveness Measure**

The effectiveness of this Strategy is tracked by a reduction in the number of SSOs caused by crush collapse failures.
403 Pump Station Structural Assessment Strategy

403.1 Purpose
This strategy identifies methodologies to assess the pressurized system structural assets for risk of failure and discusses approaches to cost effectively minimize failures.

403.2 Background
Pump station structural components failure may result in sanitary sewer overflows (SSOs). Pump station structural components include wet-wells, force mains, combination air release valves (CARV), dry-pits, valve vaults, force main vaults, and buildings. Possible failure modes include, but are not limited to, corrosion, erosion, crush/collapse and damage.

This strategy only covers pump station structural component failures, all other pump station component failures are covered under the Pump Station Component Failure Mode Strategy.

Although, the Sacramento Area Sewer District’s (SASD’s) number of overflows due to a structural failure of a pressurized system asset is small, the consequence may be high due to the flow rate and pressure of sewage in the assets.

This strategy does not cover initial SSO emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy.

This strategy is directly referenced in the Board Approved Sewer System Management Plan (SSMP) as part of the Structural Assessment Program and as part of the Pressurized Assets Management Strategy.

For clarity, this strategy will use pump station to refer to both sewer pump and sewer lift stations and all their associated appurtenances.

Two approaches will be used to reduce pump station structural failures: reactive and proactive. The Maintenance Terminology Definition document, approved by the Organizational Planning Team, defines reactive and proactive activities.

403.3 Strategy
This strategy incorporates reactive and proactive approaches for minimizing pump station structural failures.

Reactive Approach:

1. SCADA

   1.1. The Supervisory Control and Data Acquisition (SCADA) system alerts SASD of any unusual operating patterns at a pump station. Component alarms can be an indirect indicator for a structural problem. For example, if a pump runs longer than normal, a pump cycle duration alarm will be sent to SASD staff, who will then respond and determine the nature of the problem.

2. Failure Analysis

   When structural failures occur the pump station structural assets are inspected and tests are performed to determine the failure cause. The outcome of the failure analysis may fall under the Management Plan Assessment Program.
2.1. Generic Business Case Evaluation Process (Generic BCE Process)

The **Generic BCE Process** may be used to analyze any structural problem. The resulting recommendations may include any one or a combination of the following:

- Add or change a Preventive Maintenance (PM) schedule
- Perform a repair
- Replacement
- Change operating practices

Engineering Operations Support is responsible for creating Business Case Evaluations for any major repairs, replacement, or change in operating procedures. Operations Support also assists M&O in terms of engineering review of procedure changes and addition or modification of structural components.

**Proactive Approach:**

1. Facilities Scheduled Maintenance

   1.1. Facilities Scheduled Maintenance is in place to prevent failures through regularly scheduled maintenance. PM activities and frequencies vary by structural component. There are several PM activities that relate to structural items at a pump station. Below are the most common PM’s, but the list is not inclusive of all PM work performed on pump stations. Any damage found during the PM is documented in a corrective maintenance work order and the **Generic BCE Process** may be used to determine the most cost effective alternative to mitigate the structural deficiency.

**Program details:**

- **Pump Station Monthly and Annual Inspections** – The monthly and annual PM includes a visual inspection of viewable components and any indication of structural deterioration is evaluated. A sample of the procedures performed at each pump station inspection is listed below.

  o Safety inspection: Complete confined space entry form. Wear all required Personal Protective Equipment (PPE) such as; hard hat, rubber gloves, and safety glasses, goggles, face-shield.
  o General maintenance inspection: Check building condition. Observe area for vandalism.
  o SSO Inspection: Look for possible signs of SSO at wet well.
  o Force Main inspections: Force mains are visually inspected by walking or driving the length of the pipe line and checked for sink holes, leaking CARV, or leakage along the force main.
    - CARV inspections: These inspections are for testing, cleaning, and flushing the CARV assets on the force mains.
  o Pump and valve inspection: Open inspection access hole and check for plugging pump, worn wear rings
  o Sealed water lines and filter inspection: Check water lines and filter.
  o Sump pump inspection: Remove and inspect sump pump and float for corrosion and damage. Clean sump pump area.
  o Compressor or wet well transducer inspection: If a bubbler system is installed, test compressor for proper operation. Clean air filters as needed. If a wet well transducer is installed, check transducer and clean as needed (no rags or debris on transducer or drop cable)
o Wet well inspection: Visually inspect all hardware such as; pump rails, brackets, clamps and piping for corrosion.
o Blower/fan operational check: Check for proper air flow. Check for loud noises and excessive vibrations

- **Ultrasonic wall thickness testing** – SASD owns and operates 11 metal walled pump stations. Due to sewer gases and the electrical potential in the soil, the metal walls may corrode. The test checks the thickness of metal walled pump stations and force mains in order to estimate the rate of corrosion. A sample of the procedures performed at each ultrasonic wall thickness test is listed below.
o Safety inspection: Complete confined space entry form. Wear all required PPE such as; hard hat, rubber gloves, and safety glasses, goggles, face-shield.
o General maintenance inspection: Check building condition. Observe area for vandalism.
o SSO Inspection: Look for possible signs of SSO at wet well.
o Calibrate the unit: Turn the unit on by pressing ON/OFF button. Plug the transducer into the unit. Wipe the surface of the transducer to remove any debris.
o Taking measurements: Apply approximately two drops or more of coupling gel to the transducer surface. Press the transducer with the gel side flat against the surface that is being measured. Repeat steps until all desired data points are collected.

- **Aerial Force Main Crossings** – The following three force mains (Table 403-1) have been identified as having an aerial crossing over a waterway. They are assessed using the following PM schedule (Table 403-2).

**Table 403-1 Arial Force Main Crossings**

<table>
<thead>
<tr>
<th>Station</th>
<th>FM Length (ft)</th>
<th>Diameter at crossing</th>
<th>Material</th>
<th>Crossing Length (ft)</th>
<th>Location of Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>S132</td>
<td>35,933</td>
<td>22”</td>
<td>HDPE</td>
<td>200</td>
<td>NW Intersection of Sunrise Blvd and Kiefer Blvd (over utility bridge, contained within 36” steel casing)</td>
</tr>
<tr>
<td>S102</td>
<td>1,350</td>
<td>4”</td>
<td>Aluminum</td>
<td>60</td>
<td>1000 feet east of pump station (supported by piers)</td>
</tr>
<tr>
<td>S070 (Two Force Mains)</td>
<td>2,891</td>
<td>8” &amp; 10”</td>
<td>Ductile Iron*</td>
<td>150</td>
<td>Sunrise Blvd crossing over the Folsom South Canal north of White Rock Rd (attached to the west side of bridge)</td>
</tr>
</tbody>
</table>

* Aerial crossing is ductile iron pipe; underground portion of pipe on both sides of the crossing is PVC

**Table 403-2 Arial Force Main Preventive Maintenance Schedule**

<table>
<thead>
<tr>
<th>Station</th>
<th>Aerial Force Main Preventive Maintenance</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>S132</td>
<td>1. Visually inspect the visible containment pipe for possible failures at joints and supports from the ground.</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>2. Inspect slope for erosion and stability.</td>
<td>Annually</td>
</tr>
<tr>
<td>Station</td>
<td>Aerial Force Main Preventive Maintenance</td>
<td>Frequency</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>S102</td>
<td>1. Visually inspect pipe joints and supports without removing wrap.</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>2. Inspect polyvinyl protective tape and re-wrap as necessary.</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>3. Inspect concrete pipe supports.</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>4. Inspect slope for erosion and stability.</td>
<td>Annually</td>
</tr>
<tr>
<td>S070 (Two Force Mains)</td>
<td>1. Ultrasonic wall thickness testing.</td>
<td>10 years</td>
</tr>
<tr>
<td></td>
<td>2. Visually inspect visible pipe joints, pipe supports and sewer crossing warning sign for damage</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>3. Inspect slope for erosion and stability.</td>
<td>Annually</td>
</tr>
</tbody>
</table>

The force mains for S132, S102, and S070 are visually inspected after rainfall events based on the trigger found in the Loss of Support Failure Mode Strategy. The post rainfall visual inspections are performed by the Operations Support group.

2. **Pump Station and Force Mains Inventory and Expenditures**

SASD has developed an inventory and expenditure list for each pump station. The inventory and expenditure list contains a list of the major structural components, for example a wet well at each pump station, and includes the year the structural components were installed, the estimated life-cycle, and estimates the remaining useful life to structural failure for each structural component.

3. **Standards and Specifications (Standards)**

3.1. The Standards provide minimum requirements for the planning, design, construction, and inspection of SASD’s sewer system. SASD has outlined the requirements for new and replacement pump stations. The Standards were established to standardize pump station design and equipment, and so that all stations would have similar operation and maintenance characteristics.

3.2. Any design deviations to the Standards are processed through the Request for Deviation from Standards and Specifications.

3.3. Quality control is employed by the Development Group who reviews designs for pump stations for conformance to the Standards. An SASD representative conducts inspections during construction, minimizing potential problems. Additionally, pump stations are tested using the Pump Station Startup Checklist prior to acceptance by SASD.

**403.4. Effectiveness Measure**

The effectiveness is shown by trending pump station structural failures on an as needed basis. SASD staff query data as needed for pump station structural failures and compare it to historical data to measure the trending behavior. If there is an increase in structural failures this Strategy will be re-evaluated, and solutions to reduce structural failures will be presented to Management in accordance with the Management Plan Assessment Program.
500  Sanitary Sewer Overflow (SSO) Assessment Program

500  Program Overview

500.1. Purpose

The purpose of this document is to describe the SSO Assessment Program of the Sacramento Area Sewer District (District).

500.2. Background

This document is directly referenced in the Sewer System Management Plan (SSMP), and is one of the District’s system wide assessments. The assessment programs consist of strategies that drive the District’s routine day-to-day operations.

The District owns and operates a variety of physical assets. In support of the District’s goals of meeting regulatory requirements, achieving identified service level targets, and operating in a cost-effective manner, it has documented several efforts designed to take all feasible steps to eliminate Sanitary Sewer Overflows (SSOs). The SSO Assessment Program is used to identify strategies the District implements to identify and mitigate failure modes that cause SSOs.

All SSO response in the District follows the Sanitary Sewer Overflow Emergency Response Procedures Manual. This Program does not cover initial SSO emergency response.

500.3. Program

The SSO Assessment Program contains both failure mode strategies that are broken down by asset type and programs that are intended to limit specific causes of stoppages independent of asset type.

The SSO Assessment Program encompasses several separately documented but sometimes-interrelated failure modes. Each failure mode has an associated strategy, which is a reference document to the SSMP. The strategies listed below:

- **Main Line Stoppage Failure Mode Strategy**
  - Strategy to cost-effectively reduce Main Line SSO’s.

- **Lower Lateral Stoppage Failure Mode Strategy**
  - Strategy to cost-effectively reduce Lower Lateral SSO’s.

- **Manhole Stoppage Failure Mode Strategy**
  - Strategy to reduce the frequency of Manhole SSO’s.

- **Pump Station Component Failure Mode Strategy**
  - Strategy to cost-effectively sustain the pressurized collection system.

- **Damage by Others Failure Mode Strategy**
  - Strategy to cost-effectively reduce SSO’s caused by damage from others.

- **Under Capacity Failure Mode Strategy**
  - Strategy to ensure consistency in the evaluation of potential capacity deficiencies.

The District has documented that Fats, Oils, and Grease (FOG) and root stoppages are the cause of the vast majority of stoppages in the system, independent of asset type. So, in addition to the above
strategies, a program was created to limit FOG stoppages and a program was created to limit root stoppages. These programs are part of the overall SSO Assessment Program and are reference documents to the SSMP. The programs are listed below:

- **FOG Control Program**
  - Program to limit the amount of FOG discharged to the sewer system.

- **Root Control Program**
  - Program to limit the number of Root caused stoppages.

### 500.4 Effectiveness Measure

The effectiveness of the SSO Assessment Program is based on how the District is meeting the Service Levels that relate to SSOs. Meeting the Main Line Overflow Rate, Lower Lateral Overflow Rate, and BIS Rate Service Levels indicate that this Program is effective. Not meeting the Service Levels will mean that the Program is not functioning as it should. The effectiveness is monitored through the Management Plan Assessment Program.

### 501 Main Line Stoppage Failure Mode Strategy

#### 501.1 Purpose

The purpose of this document is to define the strategy that is used to cost effectively reduce the frequency of sanitary sewer overflows (SSOs) caused by main line stoppages.

#### 501.2 Background

This document is directly referenced in the Board Approved Sewer System Management Plan (SSMP) as part of the SSO Assessment Program and as part of the Gravity Asset Management Strategy. Main line stoppages are blockages in the pipe that impede the movement of sewage through the collection system. Blockages can be composed of one or a combination of roots, grease, and debris. Strategies to reduce the frequency of SSOs due to stoppages can be proactive or reactive, as defined by the Maintenance Terminology Definitions approved by the Organizational Planning Team (OPT).

This strategy does not cover SSO emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual (SSOERPM) and the Customer Call Handling and Service Request Creation Policy. If a stoppage was caused by a structural problem, refer to the Structural Assessment Program. If an overflow was caused by a capacity constraint, refer to the Under Capacity Failure Mode Strategy.

Stoppages in a main line can result in an SSO. The consequence of failure is the cost associated with an SSO (initial response, cleanup activities, reporting, etc.), as well as environmental and social risk costs. Environmental and social aspects are evaluated on a case-by-case basis, and where quantifiable are added to the base costs.

#### 501.3 Strategy

Two approaches will be used to reduce main line stoppages: reactive and proactive.

**Reactive Approach:**

The reactive approach is performing corrective work after a stoppage or defect has occurred. The SSOERPM lays out the initial SSO response and cross-references the policies below:
1. **Televised Inspection Policy (TVI Policy)**

The **TVI Policy** defines when a main line that has had a stoppage will be inspected with Closed Circuit Television Inspection (CCTV) equipment. Major portions of the **TVI Policy** that address a main line stoppage include:

1.1. The stoppage follow-up (failure analysis) guidelines of the **TVI Policy** prescribes when, why and who will perform the televised inspection (TVI) under certain conditions.

1.2. The TVI will be reviewed. Review of the TVI may create future actions that may include Business Case Evaluation (BCE), future TVI, or Preventive Maintenance (PM) changes.

2. **Generic Business Case Evaluation Process (Generic BCE Process)**

If a problem is not covered by a separate policy or procedure, then a business case evaluation is conducted as described in the **Generic BCE Process**.

3. **Sacramento Area Sewer District Sewer Ordinance (SASD Ordinance)**

3.1. The **SASD Ordinance** establishes penalties for violations, including illegal discharges that have resulted in a stoppage.

**Proactive Approach:**

Before a stoppage has occurred, the following tools are in place to attempt to reduce the risk of an SSO in the main line.

1. **SASD Standards and Specifications (Standards)**

1.1. Written to reduce SSOs caused by inadequate design.

   The **Standards** are written to reduce SSOs caused by inadequate design. The **Standards** provide minimum requirements during planning, design, construction, and rehabilitation of the sewer collection system dedicated to SASD for operation and maintenance, requiring the approval of SASD, or to be installed within existing or new public rights-of-way or easements. These **Standards** are written to provide for the safety and general welfare of the public that will be using the sewer facilities. Included are requirements such as minimum pipe sizes and slopes that are intended to keep a scouring velocity in the system, as well as proper placement requirements that are intended to minimize pipe irregularities and root intrusion locations.

1.2. Any deviations are processed through the **Process for Deviation from District Standards and Specifications**.

1.3. Quality control is employed by plan review and inspections. Plans are submitted to SASD through the local jurisdiction and are reviewed per the **Development Services Procedures Manual**. Inspections are conducted by an SASD representative during construction and include testing to verify joint integrity and a TVI to check for offset joints, sags, and other possible construction defects that could impede flow.

2. **FOG Program**

2.1. The public outreach component is used to reduce grease entering the system.

   SASD uses a variety of approaches to educate the public about fats, oils, and grease (FOG) control. These approaches include televised public outreach through local channels, public service announcements on the local radio stations, FOG decals on all
SASD’s vehicles, FOG prevention information booths at local schools, conventions, conferences, and community fairs; providing education and information to owners and property managers and property maintenance personnel through partnership with the California Apartment Association (CAA); ongoing enhancement of the www.stoptheclog.com information website, and FOG prevention information inserted with monthly County utility billing pamphlets.

3. SASD Ordinance

3.1. The SASD Ordinance forbids activities that are known to cause SSOs. The SASD Ordinance defines uniform requirements for design, construction, and use of the sewer system. The SASD Ordinance provides for the enforcement of these requirements and defines responsibility for sewer collection system maintenance.

The SASD Ordinance prohibits activities that may damage sewers or obstruct flow that may cause an SSO. The SASD Ordinance also prohibits discharges that may cause SSOs such as: large flows exceeding quantities normally allowed for permitted use; cementitious materials; garbage; any substance that may cause damage to the structural integrity of the sewer system; fats, oils, and grease in amounts that can cause a build-up in the sewer system and alter flows in the system. Prohibited activities and discharges can be anything that can cause an SSO, and are not limited to those listed above.

4. Main Line Maximum Interval Cleaning Program (MMICP):

4.1. As presented to the Project Authorization Committee (PAC) meeting on August 19, 2009, there is a correlation between stoppages and age of main lines. The average age of a main line when a first stoppage occurs is approximately 25 years. All main line pipes 12-inch in diameter and smaller that have not been cleaned or inspected in a 25-year period shall be cleaned under the MMICP.

Program Details:

- All main lines 12-inch in diameter and smaller that have not been cleaned or inspected in a 25-year period shall be cleaned under the MMICP.
- The effectiveness of this program will be evaluated positively with a reduction in the total stoppages in main lines that are cleaned under this program.

5. Main Line Scheduled Maintenance Program (MLSM Program)

5.1. The MLSM Program is focused on preventing future stoppages by cleaning main lines regularly that have known, but maintainable sewer issue such as roots, grease, and debris. Main lines can be placed on preventive maintenance (PM) from the TVI Review Group or from the Generic BCE Process. Best judgment and cost analysis is used along with previous history to determine the maintenance interval and the job plan.

Program Details:

- A PM interval is determined by several factors listed below:
  - The history of the main line is reviewed to see if there are recurring problems (roots, grease, or debris).
• If there is a prior stoppage history, the shortest stoppage interval will be used as the minimum PM interval if it is applicable.

• A first stoppage on a main line is followed by a TVI in 12 months to determine if it needs to be put on a PM as well as the PM interval.

  o Main lines which are 6-inch in diameter, are not on MLSM Program already, and are 40 years old will be placed on a 48-month PM.

  o All main line schedules will be adjusted per the Incorrect Cleaning Frequency Failure Mode Strategy, or if not applicable the TVI Policy.

• PM job plan is chosen.

  o Appropriate job plan will be determined depending on the findings; roots, grease, or debris.

  o New technologies are introduced and piloted successfully through the Collaboration and Innovation Team (CIT), which is documented in the Management Plan Assessment Program.

  o Change in PM job plan may also fall under the direction of the TVI Policy.

• The effectiveness of this program is measured by the number of repeat stoppages on the main lines that were due to the PM failure. The lower the number, the more effective the program. Repeat stoppages will require an investigation of the event. Failure to prevent a future stoppage due to frequency failure and incorrect job plans are the fault of this program. Failures due to other causes such as operator error, equipment malfunction, late PM, or damage by others will require mitigation measures such as increased training, or equipment changes, and are outside of this program. Corrective action is taken to ensure a repeat stoppage does not occur.

6. Main Line Visual Flow Inspection Program (VFI Program):

6.1. The VFI Program is focused on reducing main line overflows by visually inspecting the flow in the line at a manhole. The program requires at least 90% of the main lines that are not scheduled to be cleaned or inspected in a calendar year to be visually inspected per the Visual Flow Inspection (VFI Program).

Program Details:

• Compare the flow with the VFI Normal Flow Depth chart.

  o If the flow is determined to be stagnant or surcharged:
    ▪ The main line with the issue will be cleaned within 4 hours. A follow-up TVI WO is written.

    ▪ The TVI will be reviewed. Review of the TVI may create future actions that may include Business Case Evaluation (BCE), future TVI, or adding the main line to the MLSM Program.

  o If the flow is determined to be slow flow:
    ▪ The main line will be scheduled to be cleaned within the next 5 days. A follow-up TVI WO is written.
The TVI will be reviewed. Review of the TVI may create future actions that may include Business Case Evaluation (BCE), future TVI, or adding the main line to the MLSM Program.

If the main line experiences a second slow drain within 10 years of the first cleaning, the main line will be assigned to the MLSM Program.

- If the flow is determined stagnant, surcharged or slow, and the main line with the issue was on Area Scheduled Maintenance (ASM, a former Program no longer used), then the main line shall be assigned to MLSM Program.

- The effectiveness of this program will be evaluated by trending the main line overflow rate on main lines that are not on MLSM Program or have not been TVI’d or cleaned that year.

7. **Quality Control for Sewer Pipe Cleaning Procedure/Policy:**

   7.1. The Quality Control for Sewer Pipe Cleaning Procedure/Policy details how SASD spot checks main line cleaning using CCTV to ensure adequate cleaning.

8. **Incorrect Cleaning Frequency Failure Mode Strategy:**

   8.1. The Incorrect Cleaning Frequency Failure Mode Strategy describes the standardized cleanliness rating method, which is used to describe the extent and nature of materials removed during the main line cleaning process. The cleanliness rating is recorded in the Computerized Maintenance Management System (CMMS).

9. **Main Line PM Setting Program:**

   9.1. This program is focused on reducing main line stoppages by re-cleaning all 8-inch and smaller diameter main lines that were cleaned through the Main Line Consent Decree Program. This program replaces the Main Line Consent Decree Program and will remain in effect from August 18, 2015 to 2020.

**Program Details:**

- Re-clean all 8-inch and smaller diameter main lines that were cleaned through the Main Line Consent Decree Program but are not in the MLSM Program.
  
  - Re-clean by 2020.
  
  - Exclude main lines that had a first cleaning through the Main Line Consent Decree Program with no observation issues.

- Use observation codes from second cleaning to determine if the main line should be added to the MLSM Program.
  
  - Any 8-inch and smaller main line not added to the MLSM Program will have its next cleaning as part of the MMICP.

- The effectiveness of this program will be evaluated positively with a reduction in the total stoppages on main lines that are 8-inch and smaller in diameter.
**501.4. Effectiveness Measure**

The effectiveness of this Strategy is tracked by the main line overflow rate service level. Per the Board Approved SSMP, SASD trends and prominently displays the main line overflow rate graphs. The rate is presented to management, and staff may receive direction to make any needed changes to the documents contained here, as described in the Management Plan Assessment Program.

**502 Lower Lateral Stoppage Failure Mode Strategy**

**502.1. Purpose**

The purpose of this document is to define the strategy that is used to cost effectively reduce the frequency of sanitary sewer overflows (SSOs) caused by lower lateral stoppages.

**502.2. Background**

This document is directly referenced in the Board Approved Sewer System Management Plan (SSMP) as part of the SSO Assessment Program and as part of the Gravity Asset Management Strategy.

Lower lateral stoppages are blockages in the pipe that impede the movement of sewage through the collection system. Blockages can be composed of one or a combination of roots, grease, and debris. Strategies to reduce the frequency of SSOs due to stoppages can be proactive or reactive, as defined by the Maintenance Terminology Definitions approved by the Organizational Planning Team.

This Strategy does not cover SSO emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy. If a stoppage was caused by a structural problem, refer to the Structural Assessment Program.

Stoppages in lower laterals can result in SSOs. The consequence of failure is the cost associated with an SSO (initial response, cleanup activities, reporting, etc.), as well as environmental and social risk costs. Environmental and social aspects are evaluated on a case-by-case basis, and where quantifiable are added to the base costs.

The Sacramento Area Sewer District Sewer Ordinance (SASD Ordinance) (effective on February 9, 2018) defines the portion of the lateral that is the lower lateral.

**502.3. Strategy**

Two approaches will be used to reduce lower lateral stoppages: reactive and proactive.

**Reactive Approach:**

The reactive approach is performing corrective work after a stoppage or defect has occurred. The SSOERPM lays out the initial SSO response and cross-references the policies below:

1. **Televised Inspection Policy (TVI Policy)**

   The TVI Policy defines when a lower lateral that has had a stoppage will be inspected with Closed Circuit Television Inspection (CCTV) equipment. Major portions of the TVI Policy that address a lower lateral stoppage include the following:

   1.1. The stoppage follow-up (failure analysis) guidelines of the TVI Policy prescribes when, why and who will perform a televised inspection (TVI) under certain conditions.
1.2. The TVI will be reviewed. Review of the TVI may create future actions that may include Business Case Evaluations (BCEs), future TVIs, or Preventive Maintenance (PM) changes.

2. **Generic Business Case Evaluation Process (Generic BCE Process)**

   If a problem is not covered by a separate policy or procedure, such as the Lower Lateral Repair-Maintain-Replace Decision Policy, then a business case evaluation is conducted as described in the Generic BCE Process.

3. **SASD Ordinance**

   3.1. The SASD Ordinance establishes penalties for violations, including illegal discharges that have resulted in a stoppage.

**Proactive Approach:**

Before a stoppage has occurred, the following tools are in place to reduce the SSO risk in the lower lateral.

1. **Lower Lateral Scheduled Maintenance Program (LLSM Program)**

   1.1. The LLSM Program is a program focused on preventing future stoppages by cleaning lower laterals regularly that have known, but maintainable sewer issue such as roots, grease, and debris. Lower laterals can be placed on preventive maintenance (PM) from the Lower Lateral Repair-Maintain-Replace Decision Policy or from a Generic BCE Process decision. Best judgment and cost analysis is used along with previous history to determine the maintenance interval.

   **Program details:**

   - A PM interval is determined by several factors listed as follows.
     - The history of the lower lateral is reviewed to see if there are recurring issues (roots, grease, or debris).
       - If there is a prior stoppage history, the shortest stoppage interval will be used as the minimum PM interval if it is applicable.
       - A first stoppage on a lower lateral is followed by a TVI in 12 months to determine if it needs to be put on a PM as well as the PM interval.
     - A PM job plan is chosen.
       - Appropriate job plan will be determined depending on the findings; roots, grease, or debris.
       - New technologies are introduced and piloted through the Collaboration and Innovation Team (CIT), which is documented in the Management Plan Assessment Program.
     - The effectiveness of this program is measured by the number of repeat stoppages on lower laterals that were due to the PM failure. The lower the number, the more effective the program. Repeat stoppages will require an investigation of the event. Failure to prevent a future stoppage due to frequency failure and incorrect job plans are the fault of this program. Failures due to other causes such as operator error, equipment malfunction, late PM, or damage by others will require mitigation measures such as increased training, or equipment changes, and are outside of this program. Corrective action is taken to ensure a repeat stoppage does not occur.

2. **Lower Lateral Area Inspection Program (LLAIP)**
2.1. The LLAIP is focused on reducing lower lateral overflows and BISs by concentrating the TVIs and cleanout install efforts in geographical locations (grids) prioritized according to overflow ratio (BIS ratio and overflow ratio overlap). The highest overflow ratio grids will be completed first. This process is based on the assumption that areas that have had past overflows and BISs have a higher risk of future occurrences.

Program details:

- **LLAIP - CCTV**
  - Annually SASD selects a predetermined number of sites (grids) to visit and survey based on each grid’s overflow ratio.
  - If a cleanout is not found during the field survey, it will be recorded that a cleanout was not found. The program manager will then add the lower lateral on a list to have a cleanout installed in the future as part of LLAIP – Cleanout Install.
  - A sewer relief valve (SRV) will be installed if possible during the CCTV inspection if one doesn’t exist. No construction work would be done, only replacing of the cap. If an SRV cannot be installed, it will be recorded that an SRV wasn’t installed.
  - Lower laterals will be cleaned as needed to complete the CCTV inspection.
  - For each location visited the following information will be recorded:
    - Each house address on the street
    - If a cleanout exists
    - The cleanout location
    - If a TVI inspection was performed
    - If a functioning SRV is on the cleanout
    - Description of any repairs needed after the CCTV inspection
  - Cleanout location will be determined per the Locate, Measure, and Document Existing District Cleanouts Procedure.
  - Follow up work from TVI inspections will be processed through the Lower Lateral Repair-Maintain-Replace Decision Policy. As part of this program follow-up work will be tracked and completed by SASD M&O staff or contracted out as needed.

- **LLAIP - Cleanout installs**
  - Annually SASD selects a predetermined number of lower laterals to write cleanout install work orders based on budget and grid location.
    - If a cleanout is found buried, the cleanout is to be raised to grade and a carson box is to be installed.
    - If a cleanout does not exist, one is to be installed.
  - Lower laterals will have a functioning SRV installed if a functioning SRV does not exist.
  - Record the cleanout location.
    - Cleanout location will be determined per the Locate, Measure, and Document Existing District Cleanouts Procedure.
• The effectiveness of this **LLAIP** program will be determined by evaluating the month to month trends of the BIS Rate and Lower Lateral Overflow Rate. Downward trends during the initial years and a holding pattern after that, means that the program is working. An upward trend will require a reworking of the program.

3. **Televised Inspection Policy (TVI Policy)**

   3.1. The TVI Manual directs inspection of the visible portion of the lower laterals during CCTV inspections. If problems are detected during the CCTV inspection, a BCE is performed following the Generic BCE Process unless covered under the Lower Lateral Repair-Maintain-Replace Decision Policy.

4. **SASD Standards and Specifications (Standards)**

   4.1. The **Standards** are written to reduce SSOs caused by inadequate design. These **Standards** provide minimum requirements during planning, design, construction, and rehabilitation of the sewer collection system dedicated to SASD for operation and maintenance, requiring the approval of SASD, or to be installed within existing or new public rights-of-way or easements. These **Standards** are written to provide for the safety and general welfare of the public that will be using the sewer facilities. Included are requirements such as minimum pipe sizes and slopes that are intended to maintain a scouring velocity in the system, as well as proper placement requirements that are intended to minimize pipe irregularities and root intrusion locations.

   4.2. Any deviations are processed through the **Process for Deviation from District Standards and Specifications**.

   4.3. Quality control is employed by plan review and inspections. Plans are submitted to SASD through the local jurisdiction and are reviewed based on the **Development Services Procedures Manual**. Inspections are conducted by an SASD representative during construction, minimizing potential problems such as offset joints, or sags in the pipe alignment that could impede flow, and other possible construction defects.

5. **FOG Program**

   5.1. The public outreach component is used to reduce fats, oils, and grease (FOG) from entering the system. SASD uses a variety of approaches to educate the public about FOG control. These approaches can include televised public outreach through local channels; public service announcements on the local radio stations; FOG decals on all SASD vehicles; FOG prevention school assemblies, information booths at local schools, conventions, conferences, and community fairs; providing education and information to owners and property managers and property maintenance personnel through partnership with the California Apartment Association (CAA); ongoing enhancement of the [www.stoptheclog.com](http://www.stoptheclog.com) information website; and FOG prevention information inserted with monthly County utility billing statements.

6. **SASD Ordinance**

   6.1. The **SASD Ordinance** forbids activities that are known to cause stoppages. The **SASD Ordinance** defines uniform requirements for design, construction, and use of the sewer system. The **SASD Ordinance** provides for the enforcement of these requirements and defines responsibility for sewer collection system maintenance. The **SASD Ordinance** prohibits activities that may damage sewers or obstruct flow that may cause a stoppage. The
SASD Ordinance also prohibits discharges that may cause stoppages such as; large flows exceeding quantities normally allowed for permitted use; cementitious materials; or garbage. The SASD Ordinance prohibits any substance that may cause damage to the structural integrity of the sewer system such as hazardous waste, chemicals, or petroleum. The SASD Ordinance also prohibits fats, oils, and grease in amounts, either alone or combined with other discharges, that cause any build-up in any portion of SASD sewer collection system. Prohibited activities and discharges can also be anything that can cause a stoppage, and not limited to that listed above.

502.4. Effectiveness Measure
The effectiveness of this Strategy is tracked by the Lower Lateral Overflow Rate and Backups Into Structure Rate Service Levels. The Strategy will be evaluated only on overflows or BISs that are caused by roots, grease, or debris. The Board Approved SSMP directs SASD to trend and prominently display the Lower Lateral Overflow Rate graphs. The Backup-Into-Structures Rate is also affected by lower lateral stoppages. Both rates are presented monthly to management, and staff receives direction to make any changes to the documents contained within this Strategy, as described in the Management Plan Assessment Program.

503 Manhole Stoppage Failure Mode Strategy

503.1. Purpose
The purpose of this document is to define the strategy that is used to cost-effectively reduce the frequency of Sanitary Sewer Overflows (SSOs) caused by manhole stoppages.

503.2. Background
This document is directly referenced in the Board Approved Sewer System Management Plan (SSMP) as part of the SSO Assessment Program and as part of the Gravity Assets Management Strategy.

Manhole stoppages are blockages in the manhole that impede the movement of sewage through the collection system. Blockages can be made up of one or a combination of roots, grease, or debris, or any combination of these. Strategies to reduce the frequency of SSOs due to stoppages can be proactive or reactive, as defined in the Maintenance Terminology Definitions approved by the Organizational Planning Team.

This strategy does not cover SSO emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy. If a stoppage was caused by a structural problem, refer to the Structural Assessment Program.

Stoppages in a manhole may result in an SSO. The consequence of failure is the cost associated with an SSO (initial response, cleanup activities, reporting, etc.), as well as environmental and social risk costs. Environmental and social aspects are evaluated on a case-by-case basis, and where quantifiable are added to the base costs.

503.3. Strategy
Two approaches are used to reduce manhole stoppages: reactive and proactive.

Reactive Approach:
The reactive approach is performing corrective work after a stoppage or defect has occurred. The **SSOERPM** lays out the initial SSO response and cross-references the policies below:

1. **Televised Inspection Policy (TVI Policy)**
   
The **TVI Policy** defines when a manhole that has had a stoppage will be inspected by Closed Circuit Television Inspection (CCTV) equipment. Major portions of the **TVI Policy** that address a manhole stoppage include the following:

   1.1. The Stoppage Follow-up (Failure Analysis) guidelines of the **TVI Policy** prescribe when, why, and who will perform a televised inspection (TVI) under certain conditions.

   1.2. The TVI will be reviewed. Review of the TVI may create future actions, that may include Business Case Evaluations (BCEs), future TVIs, or Preventive Maintenance (PM) changes.

2. **Generic Business Case Evaluation Process (Generic BCE Process)**
   
   If a problem is not covered by a separate policy or procedure, then a business case evaluation is conducted as described in the **Generic BCE Process**.

3. **Sacramento Area Sewer District Sewer Ordinance (SASD Ordinance)**

   3.1. The **SASD Ordinance** establishes penalties for violations, including illegal discharges that have resulted in a stoppage.

**Proactive Approach:**

Before a stoppage has occurred, SASD employees use the following tools to reduce the risk of SSOs.

1. **Manhole Scheduled Maintenance Program (MHSM Program)**

   1.1. The **MHSM Program** is focused on preventing future stoppages by cleaning manholes regularly that have known, but maintainable sewer issues such as roots, grease, and debris. Manholes can be placed on preventive maintenance (PM) from the **TVI Policy** or from the **Generic BCE Process**. Best judgment and cost analysis is used along with previous history to determine the maintenance interval and the job plan.

**Program Details:**

- A PM interval for the manhole is determined by several factors listed below: chosen for the manhole.
  - The history of the manhole is reviewed to see if there are recurring problems (roots, grease, or debris).
    - If there is prior stoppage history, the shortest stoppage interval will be used as the minimum PM interval.
    - A first Stoppage on a manhole is followed by a TVI in 12 months to determine if it needs to be put on a PM as well as the PM interval.
  - A PM job plan is chosen.
    - Appropriate job plan will be determined depending on the findings; roots, grease, or debris.
    - Through the Collaboration and Innovation Team (CIT) new technologies are introduced and piloted successfully. Current pilot programs include the application of epoxy coating to an eroded manhole to extend its useful life.
o Manhole schedules will be adjusted per of the TVI Policy.

- The program’s effectiveness is measured by the number of repeat stoppages on the manholes that were due to the PM failure. Repeat stoppages will require an investigation of the event. Failure to prevent a future stoppage due to frequency failure and incorrect job plans are the fault of this program. Failures due to other causes such as operator error, equipment malfunction, late PM, or damage by others will require mitigation measures such as increased training, or equipment changes, and are outside of this program. Corrective action is taken to ensure a repeat stoppage does not occur.

2. FOG Program
2.1. The public outreach component is used to reduce grease entering the system. Historically, SASD has taken a variety of approaches to educate the public about Fats, Oils, and Grease (FOG) control and includes the following; public service announcements on local TV channels; public service announcements on local radio stations; FOG decals on all SASD vehicles; FOG prevention information booths at local schools, conventions, conferences, and community fairs; providing education and information to owners and property managers and property maintenance personnel through partnership with the California Apartment Association (CAA); ongoing enhancement of the www.stoptheclog.com information website; and FOG prevention information inserted with monthly County utility billing pamphlets.

3. Main Line Maximum Interval Cleaning Program (MMICP)
3.1. This program is defined in the Main Line Stoppage Failure Mode Strategy. Manholes are opened and visually inspected during main line cleaning.

4. Main Line Scheduled Maintenance Program (MLSM Program)
4.1. This program is defined in the Main Line Stoppage Failure Mode Strategy. Manholes are opened and visually inspected during main line cleaning.

5. Visual Flow Inspections (VFI)
5.1. This program is defined in the Main Line Stoppage Failure Mode Strategy. Manholes are opened and visually inspected during flow inspections.

6. Standards and Specifications (Standards)
6.1. The Standards are written to reduce SSOs caused by inadequate design. The Standards provide minimum requirements during planning, design, construction, and rehabilitation of the sewer collection system dedicated to SASD for operation and maintenance, requiring the approval of the SASD, or to be installed within existing or new public rights-of-way or easements. These Standards are written to provide for the safety and general welfare of the public that will be using the sewer facilities. Included are requirements such as manhole type and channeling requirements with minimum slope.

6.2. Any deviations to the Standards are processed through the Process for Deviation from District Standards and Specifications for Deviation from District Standards and Specifications.

6.3. Quality control is employed by plan review and inspections to ensure that the Standards are implemented correctly. Plans are submitted to SASD through the local jurisdiction and are reviewed per the Development Services Procedures Manual. Inspections are conducted by an SASD representative during construction and include testing to verify manhole sections are sealed and a visual inspection to check for construction defects.
6.4. The Standards state that if a manhole is accessed to perform a TVI of a lower lateral or main line, a manhole TVI shall also be performed as part of the inspection.

7. SASD Ordinance

7.1. The SASD Ordinance forbids activities that are known to cause SSOs. The SASD Ordinance defines uniform requirements for design, construction, and use of the sewer system. The SASD Ordinance provides for the enforcement of these requirements and defines responsibility for sewer collection system maintenance. The SASD Ordinance prohibits activities that may damage sewers or obstruct flow that may cause an SSO. The SASD Ordinance also prohibits discharges that may cause SSOs such as: large flows exceeding quantities normally allowed for permitted use; cementitious materials; garbage; any substance that may cause damage to the structural integrity of the sewer system; fats, oils, and grease in amounts that can cause a build-up in the sewage system and alter flows in the system. Prohibited activities and discharges can also be anything that can cause an SSO, and not limited to that listed above.

8. Quality Control for Sewer Pipe Cleaning Procedure/Policy:

8.1. This program is defined in the Main Line Stoppage Failure Mode Strategy. Manholes that are accessed to perform a TVI of a main line will also have a manhole TVI performed as part of the inspection.

9. Incorrect Cleaning Frequency Failure Mode Strategy:

9.1. This program is defined in the Main Line Stoppage Failure Mode Strategy. Manholes that are accessed to perform a TVI of a main line will also have a manhole TVI performed as part of the inspection.

503.4. Effectiveness Measure

The effectiveness is shown by trending manhole stoppages on an annual basis. SASD staff query data annually for manhole stoppage failures and compare it to the previous year’s data to measure a trending behavior. If there is an increase in manhole stoppage failures from the previous year this Strategy will be re-evaluated, and solutions to reduce manhole stoppage failures will be presented to Management in accordance with the Management Plan Assessment Program.

504 Pump Station Component Failure Mode Strategy

504.1. Purpose

The purpose of this strategy is to identify circumstances in which non-structural pump station components may fail and approaches to cost effectively minimize failures.

504.2. Background

This Strategy is referenced in the Board Approved Sewer System Management Plan (SSMP) as part of the SSO Assessment Program and as part of the Pressurized Assets Management Strategy.

Two approaches will be used to reduce pump station component failures: reactive and proactive. The Maintenance Terminology Definition document defines reactive and proactive activities. The following table provides examples of reactive and proactive activities found within the document.
504-1 Pump Station Component Failure Mode Strategy Approaches

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This Strategy does not cover initial Sanitary Sewer Overflow (SSO) emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy.

For clarity, this Strategy will use pump station to refer to both sewer pump and sewer lift stations.

Pump station component failures may result in SSOs. Pump station component structural failures are covered under the Pump Station Structural Assessment Strategy.

Aerial force main crossings that have been identified in the Creek Protection Project (Project) are not covered by this document.

504.3. Definitions used in Section 504

Pump Station Component – Any item relating to the pressurized sewer system.

Pump Station Component Failure – Any failure in a pressurized asset that is not structural.

504.4. Strategy

This Strategy incorporates reactive and proactive approaches for minimizing pump station component failures in the most cost-effective way.

Reactive Approach:

1. Failure Analysis

When failures occur the pump station components are inspected, the operating conditions are evaluated, and tests are performed to determine the failure cause. Depending on the failure cause, the Sacramento Area Sewer District (SASD) may make changes to maintenance activities, frequencies, system design, operating practices, repair, or replace components. The outcome of the failure analysis may fall under the Management Plan Assessment Program.

1.1. Generic Business Case Evaluation Process (Generic BCE Process)

The Generic BCE Process may be employed to analyze the problem causing the SSO. The resulting recommendations may include any one or a combination of the following:

- Add or change a Preventive Maintenance (PM) schedule.
- Perform a repair on the component
- Replace the component
- Change operating practices.
2. **Computerized Maintenance Management System (CMMS)**

   2.1 Pump station component failures are recorded in the SASD’s CMMS. CMMS is used as a repository for the SASD’s work orders.

3. **Supervisory Control and Data Acquisition (SCADA)**

   3.1 The SCADA system alerts SASD of any unusual operating pattern at a pump station. For example, if a pump fails to start, an alert will be sent, allowing SASD staff to respond and determine the nature of the problem.

**Proactive Approach:**

1. **Pump Station and Force Mains Inventory and Expenditures**

   1.1 SASD has developed an inventory and expenditure list for each pump station. The inventory and expenditure list contains a list of all the major components at each pump station, and includes the year the components were installed, the estimated life-cycle estimates the remaining useful life for each component. Maintenance costs for each of the major components are incorporated in the inventory and expenditure list and the list is shared with Mechanical.

2. **Facilities Scheduled Maintenance**

   2.1 The Facilities Scheduled Maintenance program is an existing program that has been in place to put pump station components onto a regularly scheduled maintenance frequency to prevent failures.

   **Program details:**

   - A PM frequency may be determined by several factors which are listed below. PM changes may fall under the Management Plan Assessment Program.
     - Manufacturers recommended maintenance frequency
     - The component history is reviewed to check for recurring issues.
     - The Generic BCE Process may set the maintenance frequency.
   - A PM activity is chosen
     - Manufacturers recommended maintenance method.
     - The component history is reviewed to check for recurring issues.
   - The effectiveness of this program is measured by the number of failures of components that are a part of this program.

3. **SCADA**

   3.1 The SCADA system alerts SASD of any unusual operating patterns at a pump station. For example, high level wet well alerts are set to allow sufficient time for SASD staff to respond to the problem before an SSO occurs.

4. **Sacramento Area Sewer District Standards and Specifications (Standards)**

   4.1 SASD has outlined the requirements for new and replacement pump stations. These Standards were established to standardize equipment, so that all stations would have similar operation and maintenance characteristics. The design Standards require two hours
emergency storage capacity (using Peak Wet Weather Flow (PWWF) estimates) or the station must be equipped with a stationary generator. This allows SASD time to repair equipment failure or set up bypass pumping before an SSO occurs.

4.2 Any deviations are processed through the Request for Deviation from Standards and Specifications.

4.3 Any design deficiencies are identified and processed through the Standards and Specifications Policy.

4.4 Quality control is employed by plan review and inspections. Plans are submitted to SASD through the County Land Development Department and are reviewed based on the Development Services Procedures Manual.

5. Utility Reliability

5.1 SASD relies on electrical power to operate the pump stations. Electrical power is supplied by the different utility companies in the area of the pump station. Since SASD does not have control over electrical power, SASD has four approaches to handling electrical power outages. The following options are used depending on the downtime and cost effectiveness of each option:

- Install stationary generators.
- Install bypass pumping at the station.
- Deliver a portable generator to the stations as needed.
- Install additional storage capacity.

504.5 Effectiveness Measure

The effectiveness of this Strategy is tracked by the number of SSO’s due to pump station component failures. Pump station component failures are documented in CMMS. This strategy is evaluated for cost effective operations, mitigation of SSO risk, and reduction of SSO consequence.

505 Damage By Others Failure Mode Strategy

505.1 Purpose

This document defines strategies used to mitigate and reduce damage by others to Sacramento Area Sewer District (District) assets.

505.2 Background

Damage caused by others include accidental events such as pipeline breaks caused by contractors or other utilities striking a District asset, unintentional damage such as a vehicle striking a perimeter fence, and intentional damage such as vandalism or the dumping of debris into District manholes.

This Strategy incorporates reactive and proactive approaches for mitigating and reducing damage by others failure in the most cost-effective way.

This Strategy is directly referenced in the Board Approved Sewer System Management Plan (SSMP) as part of the SSO Assessment Program and as part of the Gravity Assets Management Strategy.
This Strategy does not cover initial Sanitary Sewer Overflow (SSO) emergency response. All SSO responses follow the Sanitary Sewer Overflow Emergency Response Procedures Manual and the Customer Call Handling and Service Request Creation Policy.

505.3. Strategy

Two approaches will be used to reduce damage by others: reactive and proactive. These approaches are defined and broken down in the Maintenance Terminology Definitions that was approved by the Organizational Planning Team (under the Management Plan Assessment Program).

Reactive Approach:

After damage to an asset has occurred, the District investigates and attempts to mitigate the damage and reduce the risk of future damage to the asset through the use of:

1. **Underground Facility Damage Investigation Process**
   
   The Underground Facility Damage Investigation Process specifies the process for investigating underground facility damage incidents, determining their causes, and identifying the persons or groups responsible for the damage.

2. **Generic Business Case Evaluation Process (Generic BCE Process)**
   
   The Generic BCE Process may be used to analyze the cost of repairing damage or reduce the risk of future damage.

   2.1 Vandalism - Specific assets may be modified to prevent repeat incidents of vandalism or other intentional damage. For example, a manhole into which debris has been dumped or whose cover has been stolen may be re-fit with a bolted-down cover.

3. **Sacramento Area Sewer District Sewer Ordinance (Ordinance)**
   
   The District’s Ordinance provides it the legal authority to take effective actions when damage occurs to District assets.

Proactive Approach:

Before damage to an asset has occurred, the District attempts to reduce risk of damage occurring through the use of:

1. **Underground Service Alert (USA)**
   
   The District participates in the Underground Service Alert (USA), a facility damage prevention service. USA’s purpose is to receive planned excavation reports from public and private excavators, and to transmit those planned excavation reports to all participating members of USA who may have underground facilities at the location of the excavation. The USA Members will mark or stake their facility, provide information or give clearance to dig.

2. **Sacramento Area Sewer District Standards and Specifications (Standards)**
   
   The District Standards include requirements intended to reduce the chance of intentional damage to District assets, such as pump station perimeter fences. Other Standards are intended to reduce the chance of accidental damage, such as requirements for installing locator balls and locator ribbon on newly installed pressurized pipelines.

3. **Standards and Specifications Strategy**
The Standards and Specifications Strategy provides a way to document deviations to the Standards. In addition, requests and suggestions for changes, interpretations, or modifications to the Standards may arise from a variety of sources. These may be “internal” requests from other units within the District or other public agencies. Suggested changes may also come from “external” sources, such as developers or District customers.

4. Sacramento Area Sewer District Sewer Ordinance (Ordinance)

The Ordinance contains several proactive approaches to ensure the safety of the District’s assets. One example is the Access Request. A request for access shall be submitted to the District for approval before opening, entering, connecting, or disturbing the existing District-owned and operated sewer collection system facilities. On approval of the access request, the District will issue an access permit.

505.4. Effectiveness Measure

The effectiveness of this Strategy is tracked by the reduced number of occurrences of damage by others.

506 Under Capacity Failure Mode Strategy

506.1. Purpose

The purpose of this document is to guide staff through the Under Capacity Failure Mode Strategy (UCFMS) to ensure consistency in the evaluation of potential capacity deficiencies and the development of alternative solutions in the Sacramento Area Sewer District (District) collection system.

506.2. Background

State Water Resources Control Board Order No. 2006-0003 requires wastewater collection agencies to develop and implement a system-specific Sewer System Management Plan (SSMP). This UCFMS was developed, in part, to support the System Evaluation and Capacity Assurance Plan (SECAP) portion of the District’s SSMP.

The District’s System Capacity Plan (formerly referred to as the Master Plan) is updated about every 5 years. The System Capacity Plan has two major components: an evaluation of the existing system’s capacity performance and identification of potential relief projects, and design of a sewer trunk system to serve future development. The evaluation of the existing system’s capacity performance in the System Capacity Plan is intended to identify areas of potential capacity deficiencies, which then undergo further investigation through this UCFMS. The UCFMS supports the System Evaluation and Capacity Assurance Plan portion of the District’s SSMP.

The District’s UCFMS has introduced the concept of a capacity target (or capacity service level). The capacity target is bounded by high and low limits (shown in figure 506-1). The District design criteria establish the high limit of our capacity target. Performance exceeding our design criteria is unnecessary and costly. The low limit of this capacity target was not defined prior to development of this strategy. The District needed to adopt minimum performance criteria to set the minimum capacity level the District would provide to meet desired capacity service levels (and regulatory requirements) at the least cost. Through continuous simulation modeling and a statistical analysis of the District system’s response to actual storms, the District developed performance storms to be used to establish the low limit of the capacity target (refer to report titled “Summary of Findings from Continuous Simulation Modeling for SASD Performance Storm Development” dated January 18, 2008). When system performance drops below the low limit of the capacity target, a corrective action is necessary to return capacity performance
to within the capacity target range. The **corrective action trigger** defines when the system has dropped below the low limit of the capacity target performance.

![Figure 506-1 Capacity Target Performance Range](image)

The **UCFMS** generally starts with the **System Capacity Plan**. The **System Capacity Plan** uses a hydraulic model of the District trunk system and design flow parameters to identify potential capacity deficiencies. The design flow parameters are consistent with the District Design Standards, modified for use in a hydraulic model. So, the **System Capacity Plan** identifies portions of our system that may not meet our design **Standards**. For funding projections only, the **System Capacity Plan** develops relief projects to address each capacity deficiency and categorizes the projects based on anticipated need. These potential capacity deficiencies undergo further investigation through this **UCFMS**. Recognizing that the District **System Capacity Plan** may not identify all potential capacity deficiencies, observed overflows (non-stoppage and/or pipe condition related overflows) and model predicted overflows by new development will undergo investigation through this strategy.

The **UCFMS** investigation includes the collection of flow meter and rain data to calibrate a project-specific hydraulic model. Calibration generally consists of the adjustment of model flow parameters (including flow factors, groundwater infiltration, rainfall dependent inflow and infiltration, and pipe friction factors) and the incorporation of critical collection system to better match model predictions with actual flow meter data. This calibrated project-specific model is used to evaluate the capacity performance of the project system. If the corrective action trigger has been met (i.e., the capacity performance of the system has dropped below the low limit of the District capacity target), a relief project is needed and the “do nothing” alternative for the project area is not acceptable.

Relief projects for areas that meet the District corrective action trigger will be further developed through the **District Project Development** process. In general, a relief project must return the capacity performance of the project system to within the capacity target range by increasing system capacity and/or decreasing system flow. Problems identified within the system during the investigation phase (e.g., high rainfall-dependent inflow and infiltration, maintenance issues, and pipe condition) will be considered in the development of project alternatives. Project alternatives to be investigated generally
include pipe upsizing, flow diversion, inflow and/or infiltration reduction, and/or storage. Varying criteria (including storms of varying characteristics, and land use assumptions ranging from existing to build-out) may be used to determine the scope of the project, and to study the sensitivity of the alternative to the criteria and present alternatives with a range of risks for the District and the Project Authorization Committee (PAC) to consider.

506.3. Definitions Used in Section 506

**Capacity Target** – The capacity target represents SASD’s desired capacity service level. The capacity target is bounded by high and low limits. SASD design criteria and the design storm are used to establish the high limit, while the low limit is established using SASD’s performance criteria and the performance storms.

**Investigative Trigger** – The investigative trigger is reached when, after a preliminary capacity evaluation or observations, further investigation is warranted to mitigate the risk of a capacity failure. SASD has three investigative triggers, summarized below.

1. A System Capacity Plan model predicted overflow during the 10-year design storm under existing and/or near-term land use conditions (identified as a Category 1 project in the System Capacity Plan).

2. The evaluation of new development indicates the additional flow may result in capacity deficiencies in the existing system, creating a Category 1 project.

3. A reported overflow or surcharge occurring during a storm event which generates a peak flow less than the SASD performance storms and the resulting investigation by SASD M&O staff indicates the cause is not maintenance related. This indicates a capacity deficiency may exist and an evaluation is necessary. This investigative trigger method recognizes the hydraulic model may not discover all potential capacity deficient areas and allows for the observation of an actual overflow or surcharge to trigger further investigation.

**Corrective Action Trigger** – The corrective action trigger is defined as a calibrated project-specific model predicted overflow during either performance storm under existing or near-term land use conditions.

**Near-term land use conditions** – An assumed land use condition that considers any properties proposed for development (as provided by SASD Development Services) in the next 5 years as being developed for the purposes of flow generation in the SASD hydraulic model.

**Existing land use conditions** – Land use conditions reflected in the County GIS system as of the time the project-specific hydraulic model is constructed.

**Design Storm** – The SASD design storm is a synthetic storm that embeds 10-year return frequency peak 1-hour, peak 2-hour, and peak 3-hour rainfall intensities into one 6-hour duration event. The design storm (and the SASD design standards) is used to establish the high limit of the SASD capacity target.

**Performance Storm (Minimum Performance Storms)** – The performance storms (or minimum performance storms) are used to establish SASD’s minimum capacity performance level, or the low limit of the SASD capacity target. SASD will assure the system can convey flows generated during a performance storm without overflows. The SASD performance storms are real storm events selected through continuous simulation modeling and a statistical analysis of the SASD system’s response to actual storms (refer to report titled “Summary of Findings from Continuous Simulation Modeling for SASD Performance Storm Development” dated January 18, 2008). The current SASD performance storms are
5-year return frequency events from February 7, 1983, and January 21, 1997. Performance storms will be reviewed and updated (if necessary) with each System Capacity Plan effort.

506.4 Process

1.0 Investigative Trigger Met?

The evaluation of potential capacity deficiencies through the UCFMS begins with the investigative trigger. The investigative trigger has been established to identify portions of the collection system that may be capacity deficient (i.e., not meet the minimum capacity target level) under existing and/or near-term conditions and warrant further investigation. This further investigation is deemed cost justified to mitigate the risk of a capacity failure. Potential capacity deficient areas are identified through the System Capacity Plan (formerly referred to as Master Plan), the evaluation summary, the three investigative triggers are:

1. System Capacity Plan model predicted overflow during the 10-year design storm under existing and/or near-term land use conditions (identified as a Category 1 project in the System Capacity Plan) (0.1).

2. The evaluation of new development (0.2) indicates the additional flow may result in capacity deficiencies in the existing system.

3. All reported flow surcharge or overflow events are investigated by the District Maintenance and Operations (M&O) staff. If a reported overflow or surcharge event occurs during a storm that generates a peak flow less than the District performance storms and the investigation (0.3) indicates the cause is not maintenance related, a capacity deficiency may exist and need to be evaluated. This investigative trigger method recognizes the hydraulic model may not discover all potential capacity deficient areas and allows for the observation of an actual overflow or surcharge event to trigger further investigation.

2.0 Review Revenue Model

Asset Management will review the Revenue Model to determine if the project is correctly entered in the Revenue Model with the appropriate preliminary budget, funding source, and schedule. If the project is not entered in the Revenue Model, then Asset Management will enter project information in the Revenue Model with the appropriate preliminary budget, funding source, and schedule as identified by the Design Group.

3.0 Project Initiation

The goal of project initiation is to inform the Project Authorization Committee (PAC) of potential capacity deficiencies in the project area and to define the service area, problem statement, and Project Development Plan (PDP) budget, scope of work, and schedule for more in-depth investigation.

4.0 Flow Monitoring Data Collection and Evaluation

The investigation of potential capacity deficiencies begins with flow monitoring. Flow meters are installed in the project area to characterize flow throughout the project area. The locations of flow meters are critical, and consideration should be given to varying land uses, system configuration, and pump station influences, etc. Flow monitoring and rain data are used to develop flow parameters (domestic flow factor, unit flow hydrographs, rainfall dependent inflow and infiltration (RDI&I) percentages, friction factor, etc.) for use in model calibration (refer to Model Calibration
process). The calibrated model is used to evaluate the true hydraulic performance of the collection system under various flow scenarios.

5.0 Adequate Storm Data Collected for Model Calibration?
A model should be calibrated to multiple storm events over a wet season. It is preferable to have the model calibrated to storms that have return frequencies 1-year or larger because the model will be used for large storm simulations. If storm data is inadequate, additional storm data should be collected over an additional wet season in order to calibrate the model.

6.0 Build & Calibrate Existing Model
A model built from the latest system data will be used to evaluate the system’s existing hydraulic performance. The model should consist of all sewers and facilities that are critical to the hydraulic performance evaluation and all model data should be reviewed and validated.

Model calibration is a process to determine a system’s flow parameters by best fitting modeling data to flow-monitoring data. Flow parameters include domestic flow factor, base flow factor, fast response component, slow infiltration, rapid infiltration, diurnal curves, and so on. A system can be divided into multiple mini-systems defined by flow-monitoring basins, and flow parameters will be determined for each mini-system starting from upstream to downstream through model calibration. At least one wet season of flow data is recommended to calibrate the model to take into account the system’s initial loss and the system’s responses to different types of storms.

Once a model is calibrated, the model results should be further verified with observed overflows or surcharges, this can be obtained through additional flow-monitoring or from Computerized Maintenance Management System (CMMS). If discrepancies are found between model prediction and observation, additional investigation should be considered.

7.0 Construct Near-Term Model
The District Development Services should be consulted for information on any proposed development occurring in the next five years that may contribute additional flow to the system in areas under investigation. Near-term projects (infrastructure projects) that will impact the system’s flow should be identified also. The information collected will be used to construct the near-term model that is developed from the existing model. The near-term model will be used to evaluate the system’s hydraulic performance at near-term conditions.

8.0 Assess Hydraulic Performance
The project-specific calibrated models developed in the previous steps will be used to assess the system’s hydraulic performance at existing and near-term conditions. The calibrated model results for the District’s performance storms (5-year return frequency storms from February 7, 1983 and January 21, 1997) will be used to determine if the system meets the corrective action trigger.

9.0 Significant Surcharging?
Did the existing model predict significant surcharging under either of the District’s performance storms? If yes, the system is hydraulically deficient. The capacity constrained pipes should be maintained and cleaned frequently, as needed, to provide maximum pipe capacity.

10.0 Preventive Maintenance (PM) Program Review
Asset Management will review the maintenance histories of critical capacity constrained pipes identified through modeling, and develop or adjust preventive maintenance schedules based on pipe conditions. The goal of this procedure is to ensure that capacity constrained main lines can
operate at full capacity during storm events.

11.0 Adequate Flow-Monitoring Data to Assess Problem?

What is the confidence level for what is predicted by the existing model? Is the model accurate enough to evaluate the system’s hydraulic performance and identify problems within the system? Does the model data agree with all other available data? If not, the defined flow-monitoring basin(s) may need to be further divided into smaller flow-monitoring basins to acquire more accurate data. Additional storm data should be collected to better calibrate the model and verify previous model’s prediction.

12.0 Corrective Action Trigger Met?

The corrective action trigger represents the minimum capacity target level acceptable for the District. Confirmation that a system’s capacity performance falls below the minimum capacity target level requires a corrective action to bring the performance within the acceptable capacity target range. The District’s corrective action trigger for the UCFMS is an accurate calibrated, project-specific model predicted overflow during either of the District’s performance storms under existing or near-term land use (development) conditions.

13.0 Rainfall-Dependent Infiltration and Inflow (RDII) >= 5%

The District investigates any rainfall-dependent infiltration and inflow (RDII) that equals or exceeds 5% per this strategy. For any systems found to have RDII >= 5% (high RDII), the District shall evaluate RDII reduction vs. no RDII reduction options to determine if it is cost effective to reduce any RDII. All costs for both conveyance and treatment of RDII should be included in the analysis. Because the Project Development Plan Phase #1 (PDP-1) evaluation will determine the cost effectiveness of RDII reduction, physical inspections such as Closed-Circuit Television (CCTV) survey and smoke testing (as part of RDII reduction) is minimized.

14.0 PDP-1 RDII Investigation

If any part(s) of a system have RDII>= 5% and the system meets the corrective action trigger, the PDP-1 evaluation must consider RDII reduction alternatives (or a combination of RDII reduction and relief alternatives). The alternative analysis objective is to bring the system’s performance to within the District’s acceptable capacity target range. See 15.0 for more information on project development.

15.0 Review Existing Records and Develop Project Alternatives

15.0.1 Review Existing Records

Available pipe condition and maintenance records should be reviewed to better understand the performance and maintenance history of the system. This information could be used in the development of project alternatives. Additionally, costs spent to maintain portions of the project system could be considered a benefit of some proposed relief project alternatives (if maintenance needs are reduced).

15.0.2 Develop Project Alternatives

If a system meets the corrective action trigger, various types of alternatives will be evaluated at the PDP-1 planning level. This evaluation will recommend cost effective alternatives that will be further evaluated in the Project Development Plan Phase #2 (PDP-2) stage. Every project area is unique. Problems identified within the system during the investigation phase (e.g., high rainfall-dependent inflow and infiltration, maintenance issues, and pipe condition)
will be considered in the development of alternatives. Several alternatives should be
developed and evaluated based on cost, risk, hydraulic performance, maintenance and
operational issues, structural performance, the ability to serve potential new developments
(if any), and any benefits and/or deficiencies the alternative may present. If any part(s) of the
system have RDII >= 5%, the RDII reduction options (or combined RDII reduction and relief
options) must be considered. All alternatives must bring the system’s performance to within
the District’s acceptable capacity target range.

Planning horizons

Consideration should be given to future developments and system changes when developing
project alternatives. An existing model and future model(s) will be created based on the best
available information to develop project alternatives. Some assumptions will be made to
model the future scenario(s). If flows will substantially increase over time, project phasing
should be considered. A 40-year life cycle cost analysis will be conducted to evaluate different
alternatives.

Design criteria for system upgrade vs. design criteria for future development facilities

Design criteria for system upgrades should meet the District’s minimum capacity target level.
Design criteria for future facilities should be consistent with the District Sewer Design Manual.

Refer to the District Project Development Plan Phase #1 procedure for additional information
on project alternative development.

16.0 PDP-1 Report

A PDP-1 report summarizes the investigation findings and recommendations. The results from the
PDP-1 report are presented to the PAC. If corrective actions are recommended, the presentation
will request the PAC’s approval of the recommended action items. Otherwise, a simple report to
the PAC will be adequate to close the PDP-1 process. Refer to the District’s Project Development
Plan Phase #1 procedure for details on development of a PDP-1 report.

17.0 PAC Presentation and Approval

Refer to the August 2009 SRCSD-SASD Project Authorization Process document for additional
information on the PAC procedures and presentation requirements.

18.0 Update Revenue Model

Asset Management will review the Revenue Model to determine if the project is correctly entered
in the Revenue Model with the appropriate budget, funding source, and schedule and
modify/update as necessary.

19.0 RDII >=5%

See 13.0.

20.0 PDP-1 RDII Investigation

If any part(s) of a system have RDII>= 5% and the system does not meet the corrective action trigger,
the “Do Nothing” option (no RDII reduction option) and RDII reduction options will be evaluated to
determine the cost effectiveness of RDII reduction. A 40-year life cycle analysis will be used to
evaluate different options.
21.0 Evaluate Need for Continued Flow Monitoring

Depending on the surcharge condition of a system, flow-monitoring may be continued to monitor the system’s high flow conditions and changes that may occur in the system. If any observed overflows (capacity-related overflows) occur during a storm smaller than the District’s performance storms, the District will re-open the under-capacity failure investigation.

22.0 PDP-1 report

See 16.0.

23.0 PAC Presentation and Approval

See 17.0.

24.0 Update System Capacity Plan & Revenue Model

After the completion of PDP-1, the System Capacity Plan should be updated with the information collected during the under-capacity failure investigation.

Asset Management will review the Revenue Model to determine if the project is correctly entered in the Revenue Model with the appropriate budget, funding source, and schedule and modify/update as necessary.

25.0 PDP-2

The purpose of a PDP-2 is to further develop PAC approved PDP-1 alternatives. In PDP-1 alternatives should be developed to a level of detail that allows staff and the PAC to differentiate between alternatives. Quantitative and qualitative elements need to be considered. Often risk costs need to be evaluated and a sensitivity analysis needs to be performed to achieve a disparity between alternatives.

26.0 Update Revenue Model

If approved by the PAC and the Funding Committee, Asset Management will review the Revenue Model to determine if the project is correctly entered in the Revenue Model with the appropriate budget, funding source, and schedule and modify/update as necessary.

27.0 Project Design and Construction

Often placement of a project onto the Capital Improvement Project allows staff to proceed with design and construction. Projects may require additional approvals by the District management and the District Board of Directors. Refer to the District’s Project Management Manual for additional guidance.
506.5. Process Flowchart

Legend:
- Process
- Decision
- Data
- Subprocess
- Refined Alternative Analysis, Design, & Construction
- System Capacity Plan (formerly Master Plan)

Initial Screening:
- Investigative Trigger Met?
  - Yes: Exit From Under-Capacity Failure Mode Strategy
  - No: Sur/SSO Investigation

PDP-1 Hydraulic Performance Assessment:
- RDII >= 5%
  - Yes: PDP-1 Corrective Action Trigger Met
  - No: RDII = 0

PDP-1 Corrective Action Trigger Met:
- RDII = 5%
  - Yes: Update Revenue Model
  - No: Refined Alternative Analysis, Design, & Construction

Refined Alternative Analysis, Design, & Construction:
- System Capacity Plan & Revenue Model Updated
  - Yes: Exit From Under-Capacity Failure Mode Strategy
  - No: Refined Alternative Analysis, Design, & Construction
507 Incorrect Cleaning Frequency Failure Mode Strategy

507.1. Purpose

This strategy is directed at reducing the number of Sanitary Sewer Overflows (SSOs) experienced by main lines currently placed on the Main Line Scheduled Maintenance Program (MLSM Program). It is specifically directed at overflows attributed to main lines placed on incorrect cleaning frequencies, or that over time, require adjustments to its cleaning frequency.

507.2. Background

The four primary causes of failure for main lines currently on the MLSM Program are the following:

- Incorrect cleaning frequency
- Incorrect cleaning activity selected for the main line
- Incorrect maintenance solution selected for the recurring SSO (i.e. choosing a cleaning activity instead of a repair/renewal solution)
- Poor cleaning technique resulting in the main line needing to be cleaned prior to the next expected cleaning interval.

The following strategy focuses on reducing main line SSOs attributed to incorrect cleaning frequency.

This strategy consists of using Sacramento Area Sewer District’s (SASD’s) standard methods to record the cleanliness of a pipe at the time of the MLSM cleaning; collect and report data; outline criteria for decision making and adjusting cleaning frequencies, and measures effectiveness.

507.3. Strategy

507.3.1 Standard Measures for Recording Main Line Cleaning Observations

A majority of SASD’s main line cleanings are completed using high velocity/vacuum cleaning equipment, such as high velocity jetters, easement carts, and Minuteman trucks. Section 7: Standard Measure of Observed Results of SASD’s Intro to HVVC Training Manual outlines standard measures for recording field observations of the line at the time of the cleaning. Documented cleaning observations include None, Light, Moderate, or Heavy for debris, grease, and roots, which help evaluate future maintenance activities and frequencies needed for the main line. This strategy uses the same observation methods and codes as the Intro to HVVC Training Manual.

507.3.2 Data Collection and Reporting

Main line data is collected for all MLSM cleaning activities by using the Maximo database, selecting CLEANOBS (Pipeline Cleaning Observations) as the problem code, and then by completing the Failure Reporting field for each category of Grease, Roots, and Solids/Debris.

The MLSM Frequency Adjustment Report will be produced on a monthly basis. This report will query all lines on the MLSM Program for up to three of the most recent MLSM cleaning work orders. CLEANOBS data categorized from these work orders are used to report any main lines needing cleaning frequency adjustments based on the criteria shown in Table 507-1. Main lines on the MLSM Program with a stoppage occurring within the three most recent MLSM cleaning work orders will be removed from the list. Their cleaning frequency will be adjusted according to the Main Line Stoppage Failure Mode Strategy.
507.3.3 Decision Making Criteria

The Main Line Stoppage Failure Mode Strategy will take precedence over the Incorrect Cleaning Frequency Failure Mode Strategy; actions taken based on an actual stoppages will be based on the Main Line Stoppage Failure Mode Strategy and not from the results of the cleanliness data alone. The following table provides the criteria for adjusting main line cleaning frequencies:

### Table 507-1 Frequency Adjusted Decision Making Criteria

<table>
<thead>
<tr>
<th>If this cleanliness rating occurs...</th>
<th>2 consecutive None results in all three categories</th>
<th>3 consecutive Light or None results in all three categories</th>
<th>2 Heavy results in any one category</th>
<th>Any other results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Then adjust frequency as follows...</td>
<td>Decrease to next lower frequency</td>
<td>Decrease to next lower frequency</td>
<td>Increase to next higher frequency</td>
<td>Continue current maintenance frequency</td>
</tr>
</tbody>
</table>

The Operations Support Group is responsible for taking action within 30 days of publishing the monthly MLSM Frequency Adjustment Report. Any main line cleaning frequency changes are to follow the criteria shown in Table 507-1.

507.4. Effectiveness Measure

The effectiveness of this strategy is determined by a reduction of MLSM Program stoppages due to incorrect cleaning frequency. MLSM Program stoppages will be reviewed on a monthly basis. In addition, each year the Frequency Adjustment Decision Making Criteria will be reviewed relative to the effectiveness of the strategy, and changes will be made as necessary.

508 Underground Facility Damage Investigation Process

508.1. Purpose

To ensure consistency in the investigation and reporting of damages to any Sacramento Area Sewer District (District) facility during an excavation process. This information will assist the District in knowing who is financially responsible for the damage and assist in the recovery of all associated costs.

508.2. Background

The reason in investigating underground facility damages is to identify the root cause, and person/group responsible for the damages. This information will assist District in knowing who is financially responsible for the damage and assist in the recovery of all associated costs. The collection of underground facility damage data is to analyze data, to learn why events occur, and how actions by industry can prevent them in the future; thereby, ensuring the safety and protection of people and the infrastructure. Damages will be reduced through effective practices and procedures with the collection of data that allows the District to identify root causes, perform trend analysis, and help educate contractors, employees as well as the public.

508.3. Process

The District will investigate and report all excavation damages that occur to any District owned underground facility. This is an Inherently Reactive process.

Detailed group responsibilities are listed below:
1. **Maintenance & Operations – Customer Service Group**

The Customer Service Quality Control (QC) group will be responsible for performing (collecting and reporting) all underground facility damage reports and maintaining the District’s in house database. A final copy of the report will be provided to all key stake holders.

2. **Maintenance & Operations – Linear Group**

The M&O linear staff that find and or receive notification of an underground facility damage will be required to fill out an Underground Facility Damage Report Form (Located at P:\Shared\Underground_Facility_Damage_Report) with the following available information:

- Date and Time of Notification
  - By whom, when and how
- Type of Utility Damaged
- Location of Damage
- Description of Damage
- Were there other Damages
- Contractor and or Person Performing Work
- Who the Work is Being Done For
- Nature of Work Being Performed
- Representative’s Name and Title
- Was a Underground Service Alert (USA) Called in, USA Ticket Number
- If there are USA Sewer Marks, are the Marks in the Location of the Damage
  - Within 2ft of the marks, plus the size of pipe if the size was identified
- Pictures of the Damage and Repair
- Pictures of any USA Marks
  - To include the relationship of the marks to damage

The M&O linear staff will provide a copy of the Underground Facility Damage Report as well as the photos electronically to the Customer Service QC group the next business day.

3. **Customer Care – Underground Service Alert (USA) Group**

The M&O Customer Service Group will send an e-mail to the Customer Care USA Group requesting that they perform a search of the current or past USA ticket database to locate the USA ticket covering the area where the damage occurred. This search will be performed back a minimum of 5 years from the date the damage was identified. If a USA ticket was located, a copy of the ticket (to include the District’s Actions) will be sent electronically to the Customer Service QC group along with their Investigation report. If no ticket is located, they will send a copy of their Investigation report stating their actions and findings no later than five working days after the date of the request.

4. **Customer Care – Dispatch Group**

The Dispatch Operator will create a service request when being notified of damage to a District underground facility by the following:

- Property Owner
- Contractor
- Other Facility Owner
500 SSO Assessment Program

Reference Document for SSMP

- County Inspector (CMID)

  The service request needs to contain the following information:

  - Date and time of Notification
  - Type of Utility Damaged (if known)
  - Location of Damage (address)
  - Contractor and or Person performing Work
  - Who the Work is Being Done For
  - Representative’s Name and Title
  - Was a USA called in, USA Ticket Number

  The dispatcher will notify the responsible M&O linear staff as well as the USA Group supervisor.

5. Engineering – Operations Support Group

  The Operations Support Group when receiving information of an excavation damaged facility from a televised inspection (TVI) will notify the Customer Service group to start an investigation.

6. Internal Services Department – Administration – Admin Fiscal Group – Goethe Rd

  The Admin Fiscal Group will review and process the cost recovery damage report form. This form will be forwarded back to the M&O Customer Service Group for review and signatures.

7. Maintenance & Operations – Customer Service Group

  The Customer Service QC group will forward the entire packet to the Customer Care Manager with a recommendation to pursue cost recovery if the investigation supports it.

8. Customer Care – Manager

  The Customer Care Manager or his/her delegate will pursue cost recovery and refer the matter to the District’s Third Party Adjustor as necessary.

509 Televised Inspection Policy

509.1 Purpose

The purpose of this document is to provide direction for when Televised Inspections (TVIs) of main lines, lower laterals, and manholes are required.

509.2 Background

It is Sacramento Area Sewer District (SASD) policy to perform TVIs of sewer pipes for structural assessment, overflow and stoppage failure analysis, research for business case evaluations (BCEs) and project investigations, quality control of preventive maintenance (PM), repairs replacements, and Service Requests (SR) assigned to Maintenance and Operations (M&O). Inspections can reduce the risks associated with failures due to structural defects, sanitary sewer overflows (SSOs), stoppages, faulty repairs, and inadequate cleanings. The following process implements this policy for both lower laterals and main lines.

Main line preventive maintenance (PM) frequency changes and removals will be first completed under the Incorrect Cleaning Frequency Failure Mode Strategy. The TVI Policy will only be used to change or remove PM schedules when there is not enough data to follow the Incorrect Cleaning Frequency Failure
**Mode Strategy.** See the Main Line Stoppage Failure Mode Strategy for details of the main line scheduled maintenance program.

The results from TVIs conducted per this policy will be reviewed and may be subject to further analysis if defects are found. Further analysis will follow the Main Line Repair-Maintain-Replace Decision Policy, Lower Lateral Repair-Maintain-Replace Decision Policy, and the Generic Business Case Evaluation Process (Generic BCE Process).

Detailed instructions for conducting TVIs can be found in Section 333 of SASD’s Standards and Specifications (Standards). The Standards contain the defect codes for TVIs. TVI defect codes are used by Maintenance and Operations (M&O) staff and Contractors to provide consistent inspection results and are used as a decision making tool to evaluate the condition of the sewer pipe. Per the Standards Granite XP is the repository of all completed TVIs and includes defect code information.

**509.3. Process**

(Refer to process flowchart 509.5)

1. **Structural Assessment Model**
   Televised Inspections (TVIs) shall be performed per the documentation of the Structural Assessment Model, located within the Crush Collapse Failure Mode Strategy. Work orders (WO)(s) will be produced with a specified target completion date by Engineering Operations Support group while the M&O Workload Planning and Scheduling Group is responsible for assigning the work and setting the scheduled completion date. M&O Maintenance & Repair Group or Engineering Design is responsible for completing the work by the scheduled completion date.

   1.1. **Write TVI WO**
      The Engineering Operations Support Group writes the WO(s), as needed to TVI the specified lines.

   1.2. **Schedule & Assign WO(s) to Supervisor or Engineering Design**
      The M&O Workload Planning and Scheduling Group schedules the TVI WO(s) within the target completion date and assigns an M&O supervisor or Engineering Design. The Engineering Design Group manages TVI contractors and will verify completion of contracted work.

   1.3. **Conduct TVI**
      Perform TVI(s) as directed by the TVI WO(s) and complete by the target completion date.

      *End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, Main Line Repair-Maintain-Replace Decision Policy.*

2. **Stoppage Follow-up (Failure Analysis)**
   Follow-up TVIs are required for all overflows and stoppages in the SASD’s system.

   The target completion for the TVI is dependent on:
   - Asset type;
   - Whether there was a backup into structure (BIS);
   - Whether there was an emergency repair;
   - Private SSO or SASD responsibility; and
   - Category of the overflow (Category 1 or not).
Multiple TVIs may be required. Stoppage follow-up TVIs are described as follows (refer to the Televised Inspection Policy Process Flowchart):

2.1. Private SSO?

Is the SSO classified as a Private SSO that is originating from a non-District-owned asset?

2.2. Private LL or ML SSO/Stoppage?

Is this Private SSO originating from a stoppage/blockage in a private LL or a private ML?

2.3. BIS?

Is this Private LL SSO resulting in a BIS?

2.4. SASD Cleanout?

Is there a usable SASD Cleanout ready to perform a TVI? If there is not a usable SASD Cleanout an M&O staff will install one prior to the TVI. The Cleanout install is governed by the **Lower Lateral Repair-Maintain-Replace Policy**.

2.5. TVI Lower Lateral Within 1 Business Day

TVI the lower lateral within one business day. The purpose of the TVI is to establish responsibility for and cause of the SSO/stoppage. The TVI WO will be written by the M&O staff responding to the SSO/stoppage and completed by the M&O staff responding to the SSO/stoppage or any other M&O staff who can complete the TVI within 1 business day.

*End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, *Lower Lateral Repair-Maintain-Replace Decision Policy.*

2.6. TVI Lower Lateral Within 5 Business Days

TVI the lower lateral within five business days. A cleanout will be installed prior to the TVI being performed. The purpose of the TVI is to establish responsibility for and cause of the SSO/stoppage. The TVI WO will be written by M&O staff responding to the SSO/stoppage and completed by the M&O staff responding to the stoppage or any other M&O staff who can complete the TVI within 5 business days.

*End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, *Lower Lateral Repair-Maintain-Replace Decision Policy.*

2.7. Write WO to TVI Lower Lateral within 2 Weeks

Write a WO to TVI the lower lateral with a target completion date within 2 weeks. The purpose of the TVI is for quality control of the cleaning. The TVI WO will be written by the M&O staff responding to the SSO/stoppage and forwarded to the M&O Workload Planning & Scheduling Group for scheduling, and then performed by the staff of the M&O supervisor assigned by the M&O Workload Planning & Scheduling Group or by a TVI contractor managed by the Engineering Design Group.

2.8. No TVI of Private ML Unless Requested by EMD

With a Private SSO originating from a blockage/stoppage of a private main line, no TVI is conducted unless specifically requested by the County Environmental Management Division (EMD) to do so.
End Process.

2.9. TVI as Needed to Locate or Evaluate SSO/Stoppage

During the response to an SSO event originating within an SASD owned asset, conduct TVI(s) as needed to determine the location of the stoppage, evaluate the asset condition and cause of the stoppage, and support mitigation of the SSO event.

2.10. LL or ML SSO/Stoppage?

Is the SSO/stoppage located within a LL or a ML?

2.11. Category 1 SSO?

Did the stoppage result in a Category 1 SSO?

2.12. BIS?

Did the SSO/stoppage result in a BIS?

2.13. TVI Within 1 Business Day After Breaking SSO/Stoppage

TVI within one business day after breaking the stoppage. The purpose of the TVI is to determine the cause of the SSO/stoppage. The TVI WO will be written by M&O staff responding to the SSO/stoppage and completed by the M&O staff responding to the SSO/stoppage or any other M&O staff who can complete the TVI within 1 business day.

2.14. Write WO to TVI within 2 Weeks after Cleaning

Write a WO to TVI the affected asset(s) within 2 weeks after follow-up cleaning. The purpose of the TVI is for quality control of the cleaning. The TVI WO will be written by the M&O staff responding to the SSO/stoppage and forwarded to the M&O Workload Planning & Scheduling Group for scheduling, and then the TVI will be performed by the staff of the M&O supervisor assigned by the M&O Workload Planning & Scheduling Group.

2.15. Category 1 SSO?

Did the stoppage result in a Category 1 SSO?

2.16. BIS?

Did the SSO/stoppage result in a BIS?

2.17. SASD Cleanout?

Is there a usable SASD Cleanout ready to perform TVI? If there is not a usable SASD cleanout an M&O staff will install one prior to the TVI. The Lower Lateral Repair-Maintain-Replace Decision Policy governs the Cleanout install.

2.18. TVI Within 5 Business Days After Breaking SSO/Stoppage

TVI within five business days after breaking stoppage. A cleanout will be installed prior to the TVI being performed. The purpose of the TVI is to establish responsibility for and cause of the SSO/stoppage. The TVI WO will be written by M&O staff responding to the SSO/stoppage and completed by the M&O staff responding to the stoppage or any other M&O staff who can complete the TVI within 5 business days.

2.19. Write WO to TVI within 2 Weeks after Cleaning
Write a work order (WO) to TVI the affected asset(s) within 2 weeks after follow-up cleaning. The purpose of the TVI is for quality control of the cleaning. The TVI WO will be written by the M&O staff responding to the SSO/stoppage and forwarded to the M&O Workload Planning & Scheduling Group for scheduling, and then the TVI will be performed by the staff of the M&O supervisor assigned by the M&O Workload Planning & Scheduling Group.

2.20. Repair/Replace Work Done?

Was any repair or replacement work performed on an SASD asset(s) during the SSO/stoppage event? If there was repair/replacement work performed then End Process here. Risk of a new SSO/stoppage has been minimized. Section 5 of this Policy governs repair/replacement work TVIs.

2.21. SSO/Stoppage Interval <7 Months?

Does the affected asset have a SSO/stoppage interval of less than 7 months?

2.22. Write WO to TVI within 12 Months After Cleaning

Write a WO to TVI the affected asset(s) within 12 months, at the shortest stoppage interval, after the follow-up cleaning. The purpose of the TVI is to establish any needed maintenance interval. The TVI WO will be written by the Ops Support Group and then scheduled by the M&O Workload Planning & Scheduling Group.

2.23. Schedule and Assign WO(s) to Supervisor or Engineering Design

The M&O Workload Planning & Scheduling Group schedules the TVI WO(s) within the target completion date and assigns a supervisor or Engineering Design.

2.24. Conduct TVI

Perform TVI(s) as directed by the TVI WO(s) and complete by the target completion date.

End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, Lower Lateral Repair-Maintain-Replace Policy.

3. Project or BCE Investigation

If a TVI is needed to assess the line as part of a Generic BCE Process or project, write a WO for a TVI. The person in the Engineering Operations Support Group working on the BCE is responsible for writing the WO with an appropriate target completion date.

If a TVI cannot be performed on a lower lateral due to a missing cleanout or problems with the cleanout, install or repair the cleanout and riser, then perform the TVI.

If the TVI cannot be completed due to problems with the main line or lower lateral, keep the recording up to the point where the camera cannot pass. Attempt to do a reverse setup or lateral launch (as appropriate) to complete as much of the inspection as possible.

3.1. Write/Review Generic BCE Process WO

The Engineering Operations Support Group writes TVI WO(s) as needed for evaluating a project or conducting a BCE investigation.

3.2. Schedule & Assign WO(s) to Supervisor or Engineering Design
The M&O Workload Planning & Scheduling Group schedules the TVI WO(s) within the target completion date and assigns a supervisor or Engineering Design. The M&O Workload Planning and Scheduling Group also schedules/assigns any cleanout install/repair WO(s) needed to complete assigned TVI(s).

3.3. LL or ML?
Is the investigation on a lower lateral or main line?

3.4. SASD Cleanout?
Is there a usable SASD cleanout present through which the TVI can be conducted?

3.5. MH Tap?
Is the lower lateral connected to a manhole tap through which the TVI can be conducted?

3.6. Can TVI be done by Lateral Launch?
In the absence of a usable SASD cleanout or a manhole tap, can the TVI be conducted via lateral launch from the main line?

3.7. Write WO to Install/Fix Cleanout
Write a WO to install a new SASD cleanout or repair an existing cleanout. The M&O staff assigned the TVI WO will write a separate work order to install an SASD cleanout.

3.8. Conduct TVI
Perform TVI(s) as directed by the TVI WO(s) and complete by the target completion date.

End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, Lower Lateral Repair-Maintain-Replace Decision Policy.

4. Quality Control – Preventive Maintenance Evaluations
Maintenance evaluation TVIs shall be performed for two purposes:

1. Random quality assurance inspection of pipe cleaning activities
2. Evaluate effectiveness of cleaning frequency and methodology

The Quality Control for Sewer Pipe Cleaning Procedure/Policy governs quality control of preventive maintenance (PM) evaluations. The Engineering Operations Support Group is responsible for writing the WO with a target completion date. The M&O Workload Planning and Scheduling Group is responsible for assigning an M&O Supervisor or Engineering Design and setting the scheduled completion date. The assigned M&O Supervisor and M&O staff are responsible for completing the work by the scheduled completion date. The Engineering Design Group manages TVI contractors and will verify completion of contracted work.

4.1. Write TVI WO for QC of Maintenance
The M&O Ops support Group writes WO(s) for quality control of maintenance activities.

4.2. Schedule & Assign WO(s) to M&O Supervisor or Engineering Design
The M&O Workload Planning & Scheduling Group schedules the TVI WO(s) within the target completion date and assigns an M&O supervisor or Engineering Design. The Engineering Design Group manages TVI contractors and will verify completion of contracted work.
4.3. **Conduct TVI**

Perform TVI(s) as directed by the TVI WO(s) and complete by the target completion date.

*End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, Main Line Repair-Maintain-Replace Decision Policy.*

5. **Quality Control – Repairs & Replacements**

The SASD Standards and Specifications Section 332.6 governs quality control of repairs and replacements. Following the repair or replacement of a lower lateral or main line, a TVI shall be performed for quality control of the repair or replacement.

Target Completion Date: Within 2 weeks of the repair or replacement.

The Engineering Operations Support Group is responsible for writing the WO with target completion date. The M&O Workload Planning and Scheduling Group is responsible for assigning an M&O Supervisor or Engineering Design and setting the scheduled completion date. The assigned M&O Supervisor and M&O staff are responsible for completing the work by the scheduled completion date. The Engineering Design Group manages TVI contractors and will verify the completion of contracted work. For emergency repair/replacement work in response to an SSO, see the SSO Emergency Response Procedures Manual.

5.1. **Write TVI WO for QC of Repairs/Replacement Work**

The Engineering Operations Support Group writes WO(s) for quality control of non-emergency repairs and replacements.

5.2. **Schedule & Assign WO(s) within 2 weeks to M&O Supervisor or Engineering Design**

The M&O Workload Planning & Scheduling Group schedules the TVI WO(s) within the target completion date and assigns an M&O Supervisor or Engineering Design. The TVI will be completed within 2 weeks of the completion of repair or replacement work.

5.3. **Conduct TVI**

Perform TVI(s) as directed by the TVI WO(s) and complete by the target completion date.

*End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, Lower Lateral Repair-Maintain-Replace Decision Policy.*

6. **Preventive Maintenance Schedule Changes and Removal**

The Incorrect Cleaning Frequency Failure Mode Strategy governs ML PM frequency changes and removals. The TVI Policy will only be used to change or remove PM schedules when there is not enough data to follow the Incorrect Cleaning Frequency Failure Mode Strategy.

6.1. **Modify or Remove a PM Schedule/Activity**

BCE derived decisions to modify or remove PM activity on an asset are generated by the Engineering Operations Support Group. Policy-derived decisions to modify or remove PM activity on an asset also are generated by the Engineering Operations Support Group.

The TVI Policy will only be used to change or remove PM schedules when there is not enough data to follow the Incorrect Cleaning Frequency Failure Mode Strategy.
6.2. **Schedule & Assign WO(s) to M&O Supervisor or Engineering Design**

The M&O Workload Planning & Scheduling Group schedules the TVI WO(s) within the target completion date and assigns an M&O Supervisor or Engineering Design.

6.3. **Conduct TVI**

Perform TVI(s) as directed by the TVI WO(s) and complete by the target completion date.

End Process.

7. **Service Requests (SR)(s) Assigned to M&O**

Follow-up TVI(s) may be performed for priority 1 & 2 SRs to evaluate the condition of SASD’s assets as a result of customer service calls. WO(s) will be produced with a specified target completion date by M&O field staff while the M&O Workload Planning and Scheduling Group is responsible for assigning the work and setting the scheduled completion date. M&O Maintenance & Repair / LL Maintenance & Repair and Emergency Response or Engineering Design is responsible for completing the work by the scheduled completion date.

7.1. **Write TVI WO**

The M&O Field staff writes the WO(s), as needed to TVI the specified lines.

7.2. **Schedule & Assign WO(s) to M&O Supervisor or Engineering Design**

The M&O Workload Planning and Scheduling Group schedules the TVI WO(s) within the target completion date and assigns an M&O supervisor or Engineering Design. The Engineering Design Group manages TVI contractors and will verify completion of contracted work.

7.3. **Conduct TVI**

Perform TVI(s) as directed by the TVI WO(s) and complete by the target completion date.

*End Process. Results from TVIs conducted per this policy shall be submitted to the appropriate review and assessment policy or procedure, for example, Lower Lateral Repair Maintain-Replace Decision Policy*

**509.4. Detailed Group Responsibilities**

The following groups will be responsible for the corresponding areas of the implementation of this procedure:

**Engineering Operations Support - BCE Decisions & Annual Workload Planning**

The BCE Decisions & Annual Workload Planning Group is responsible for writing the work orders as specified above, writing TVI work orders associated with stoppages and overflows handled by contractors, and coordinating clarification on any questions regarding this policy and its implementation.

**Maintenance & Operations - Workload Planning & Scheduling**

The Workload Planning & Scheduling Group is responsible for scheduling work by the target completion dates so that either Maintenance & Operations staff or Engineering Design complete the work prior to the target date. The Engineering Design Group manages TVI contractors and will verify completion of contracted work.

**Maintenance & Operations - Maintenance & Repair / LL Maintenance & Repair and Emergency Response**
The M&O Maintenance & Repair / LL Maintenance & Repair and Emergency Response Group or Engineering Design is responsible for completing the TVI work by the scheduled completion date. The M&O Supervisors responding to overflows/stoppages are responsible for ensuring that all required WOs are written at the time of or immediately after the overflow response. M&O Supervisors are also responsible for writing TVI work orders associated with stoppages and overflows handled by contractors.
509.5. Process Flowchart

**Televised Inspection Policy**

**Process Flowchart**

- Follow-up TVIs are required for all overflows/stoppages in the District’s system and will be completed by the prescribed time.
- Refer TVI results to applicable review & assessment policy/procedure, for example, Lower Lateral Repair-Maintain-Replace Policy.

**TVI Categories**

1. Structural Assessment (Critical Sewer Model)
   - 1.1 Write TVI WO
   - 1.2 Schedule & Assign WO(s) to Supervisor or Engineering Design
   - 1.3 Conduct TVI
   - 1.4 Conduct TVI
   - 1.5 Conduct TVI
   - 1.6 Conduct TVI
   - 1.7 Conduct TVI

2. Stoppage Follow-up (Failure Analysis)*
   - 2.1 Private LL or ML Spill?
   - 2.2 SASD Cleanout?
   - 2.3 TVI Lower Lateral Within 1 Business Day
   - 2.4 SASD Cleanout?
   - 2.5 TVI Lower Lateral Within 5 Business Days
   - 2.6 TVI Lower Lateral Within 1 Business Day
   - 2.7 Write WO to Install/Fix Cleanout
   - 2.8 No TVI or Private ML Spill Requested by EMD
   - 2.9 TVI as Needed to Locate or Evaluate SSO/Stoppage
   - 2.10 LL or ML SSO/Stoppage?
   - 2.11 Repair/Replace Work Done?
   - 2.12 TVI Within 5 Business Days After Breaking SSO/Stoppage
   - 2.13 TVI Within 5 Business Days After Cleaning
   - 2.14 Write WO to TVI within 2 Weeks After Cleaning
   - 2.15 Category 1 SSO?
   - 2.16 BIS?
   - 2.17 SASD Cleanout?
   - 2.18 TVI Within 5 Business Days
   - 2.19 Write WO to TVI within 2 Weeks after Cleaning
   - 2.20 Repair/Replace Done?

3. Project or BCE Investigation
   - 3.1 Write BCE WO
   - 3.2 Schedule & Assign WO(s) to Supervisor or Engineering Design
   - 3.3 LL or ML?
   - 3.4 District Cleanout?
   - 3.5 MH Tap?
   - 3.6 Can TVI be done by Lat/Launch?
   - 3.7 Write WO to Install/Fix Cleanout
   - 3.8 Conduct TVI
   - 3.9 TVI as Needed to Locate or Evaluate SSO/Stoppage
   - 3.10 Category 1 SSO?
   - 3.11 Repair/Replace Work Done?
   - 3.12 TVI Within 1 Business Day
   - 3.13 TVI Within 1 Business Day
   - 3.14 Write WO to TVI within 12 Months after Cleaning
   - 3.15 LL or ML SSO/Stoppage?
   - 3.16 BIS?
   - 3.17 SASD Cleanout?
   - 3.18 TVI Within 5 Business Days
   - 3.19 Write WO to TVI within 2 Weeks after Cleaning
   - 3.20 Repair/Replace Done?

4. Quality Control – Preventive Maintenance Evaluations
   - 4.1 Write TVI WO
   - 4.2 Schedule & Assign WO(s) to Supervisor or Engineering Design
   - 4.3 Conduct TVI
   - 4.4 Conduct TVI
   - 4.5 Conduct TVI

5. Quality Control – Repairs & Replacements
   - 5.1 Write TVI WO
   - 5.2 Schedule & Assign WO(s) to Supervisor or Engineering Design
   - 5.3 Conduct TVI
   - 5.4 Conduct TVI
   - 5.5 Conduct TVI

6. Preventive Maintenance Schedule Changes & Removal
   - 6.1 Modify or Remove a PM Schedule Activity
   - 6.2 Schedule & Assign WO(s) to Supervisor or Engineering Design
   - 6.3 Conduct TVI
   - 6.4 Conduct TVI
   - 6.5 Conduct TVI

7. Service Requests Assigned to M&O
   - 7.1 Write TVI WO
   - 7.2 Schedule & Assign WO(s) to Supervisor or Engineering Design
   - 7.3 Conduct TVI

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* TVIs are required for all overflows/stoppages in the District’s system and will be completed by the prescribed time. Refer TVI results to applicable review & assessment policy/procedure, for example, Lower Lateral Repair-Maintain-Replace Policy.
510  Quality Control for Sewer Pipe Cleaning Procedure/Policy

510.1. Purpose

The purpose of this document is to define the procedure to evaluate the effectiveness of the Sacramento Area Sewer District’s (SASD’s) main line scheduled maintenance (MLSM) preventative maintenance (PM) activities completed by SASD Maintenance and Operations (M&O) field staff and any private cleaning companies under contract with SASD. The main objective of this procedure is to verify that SASD main lines on PM are being cleaned adequately. To do this, three major factors will be addressed;

1. The specified activity (jetting, rodding, and balling).
2. The equipment being used in the completion of the MLSM PM’s.
3. The operator of the equipment.

510.2. Background

Historically, SASD has maintained an informal review of the quality of the PM work being completed within the collection system. An unspecified number of television inspection (TVI) work orders were created to review the effectiveness of PM activities, and occasionally feedback was provided to the maintenance manager, activity supervisor, and/or specific operator(s).

This Procedure outlines specific guidelines and procedures for the amount of PM work to be reviewed, the appropriate percentage of each PM activity, and a system for the equal review of the various operators and/or equipment. Although implementation of this policy is slightly different for SASD staff and private companies under contract with SASD, each will be held to the same quality control standards.

510.3. SASD M&O Quality Control Procedure

1. The M&O Workload Planning & Scheduling (P&S) Section will create a methodology for tracking the Quality Control (QC) of MLSM PM work orders completed by SASD field staff and SASD contractors in the computerized maintenance management system (CMMS). A minimum of three percent (3%) of the total number of MLSM PM work orders completed by SASD M&O will be inspected monthly. Quality Control will be completed utilizing closed circuitry television (CCTV) to ensure adequate cleaning is being performed. When cleaning is found to be inadequate, a work order to re-clean the line segment will be created and assigned to the same supervisor, crew and equipment that completed the original work order. In addition, an additional QC TV work order will be created and completed. Both the re-work and QC work orders will be completed and reviewed within thirty (30) days.

2. SASD M&O management, with the assistance of P&S, will establish percentages of the total number of MLSM TVI work orders to be completed in each activity and adjust as needed based on previous results. A higher than average failure rate in a specific activity or by a certain piece of equipment or SASD staff member will result in higher frequency of review until the cause is identified and issue resolved. Conversely, low rates of failure identified by activity, equipment and/or operator may result in less frequent reviews.

3. SASD M&O P&S will develop a method and/or query by which work orders will be created within SASD’s CMMS which will take into account the percentages of each activity to be televised and spread that work out between the various operators and/or equipment. This will ensure that SASD staff and the various pieces of equipment completing MLSM work orders are reviewed on as equal basis as possible. With the exception of higher or lower failure rates resulting in higher or lower review frequencies as stated in the paragraph above.
4. SASD M&O P&S Group will assign the MLSM PM QC work orders at the beginning of each month. The target completion date for the QC TVI will be no more than thirty (30) calendar days from the completion date of the initial cleaning work order.

5. SASD M&O Maintenance & Repair Group will consider the MLSM PM TVI work orders as priority work and complete them on or before the assigned target completion date. When completed, all work orders will be processed and moved through the review process as quickly as possible.

6. SASD Engineering-TV Review & PM Program Adjustment Group will receive the completed TVI recordings and review within 14 days after the work order is received, providing feedback to the SASD management team on the effectiveness of the cleaning being done and noting any deficiencies identified by activity, operator(s), and/or the equipment utilized. The group will also be responsible for creating any required re-cleaning and follow up QC TV work orders.

7. SASD M&O Management will relay QC work order results back to the area supervisors, doing the necessary preliminary review to identify what SASD staff member completed each PM work orders found to be deficient and any additional work orders pending on the asset.

8. SASD M&O Supervisory staff will relay QC work order information to the field staff, work with individual staff to identify the root cause of all PM failures and report back all findings to management. If a vehicle is found to be the cause of a failure, the supervisor will work with management and the appropriate vendor and/or County Fleet Services to address the vehicle deficiency. If the problem is identified as an equipment issue (nozzle, cutter, etc.) the supervisor will work with management and the appropriate vendor to repair, exchange and/or replace the equipment as necessary. If the deficiency is identified as an operator issue, the supervisor will work with the operator to emphasize proper technique. Supervisors will ensure all re-cleaning work orders are assigned to the staff and equipment that completed the original work order. If the re-cleaning work is also found to be inadequate, the identified operator and crew will be re-trained within thirty (30) days. Continued and/or repeated technique failures by individual SASD field staff will be addressed by supervision and/or management as it is deemed appropriate and necessary. Re-training will not be required in instances where staff associated with deficient work has been re-assigned to a different activity.

510.4. Contract QC Procedure

SASD Engineering-Design Group staff will bundle and distribute mainline PM work orders to designated third party contractors or to Scheduling and Planning for completion of work orders by M&O staff. The use of a third party contractor and/or SASD field staff will complete the required number of QC work orders as assigned to be in compliance with the 3% minimum. Deficient cleaning will be addressed with the contractor on a case by case basis with a minimum of re-cleaning each segment. Continued deficiencies will be addressed by SASD Engineering Design staff with the contracted company up to and including termination of the contract. Mainline PM work orders created and bundled by SASD Engineering Design staff assigned to M&O will follow the SASD M&O QC procedures listed previously in this document.

510.5. Detailed Group Responsibilities

The following groups will be responsible for the corresponding areas of the implementation of this procedure.

Maintenance & Operations Workload Planning & Scheduling Group – Planning & Scheduling Group will create a methodology for tracking completed MLSM PM TVI review. The group will develop a set of
queries or reports within SASD’s CMMS to create TVI work orders for the review of MLSM work orders completed by SASD field staff.

Planning & Scheduling Group will review the MLSM TVI work orders completed by SASD field staff, providing feedback to M&O management and supervisors on equipment and operator performance. Planning and scheduling staff will also review the TVI work orders completed by private companies under contract with SASD and provide feedback to the responsible SASD Project Manager.

Maintenance & Operations-Maintenance & Repair Group – M&O Maintenance & Repair Group will complete MLSM quality control (QC) work orders as assigned.

Engineering-Design Group – Engineering-Design Group oversees the private companies under contract with SASD to complete main line cleaning. Design staff will develop a methodology to select specific main lines and create TVI work orders for a third party contractor to complete. Design staff will oversee the third party contractor performing main line QC work orders.

511 SASD Comprehensive FOG Control Program

511.1 Purpose

The purpose of this document is to capture all of Sacramento Area Sewer District’s (District’s) data, efforts and achievements related to compliance with the State Water Resources Control Board Order No. 2006-003-DWQ Statewide General Wastewater Discharge Requirements (WDR) for Wastewater Collection Agencies – Sewer System Management Plan (SSMP), Section D.13 (v) – Legal Authority and Section D.13 (vii) – FOG Control Program.

511.2 Background

The District provides local collection services to more than one million people in the Sacramento region. The District is the largest contributing agency to the Sacramento Regional County Sanitation District (SRCSD). SRCSD is responsible for operation and maintenance of the larger pipelines and the Sacramento Regional Wastewater Treatment Plant (SRWTP).

District Key Facts

- 270 square mile service area
- 3,000 miles of main lines
- 1300 miles of lower laterals
- 65,000 manholes
- 107 pump stations
- 320,000 customer accounts
- 1.2 million population served
- 274 employees
- $112,000,000 operating budget

The District recognizes that fats, oils and grease (FOG) represent a major challenge in its efforts to operate its collection in a manner that meets regulatory requirements, achieves identified service level targets, and is cost effective. Past estimates have placed the systematic impact of FOG at hundreds of stoppages per year and the combined cost of FOG-related damage claims and FOG-related maintenance activities on the order of hundreds of thousands of dollars per year. The “Grease Source Control Program Summary Report 2004; FOG Information, July 2004,” indicated that approximately 80% of grease related SSOs were
located in residential areas and that the bulk of the District’s claims costs were also directly related to residential areas.

Around that same time frame, SRCSD performed a series of data analyses and determined that, because the interceptor and treatment plant system is not negatively impacted by FOG, SRCSD is not required to maintain a FOG program under the WDR.

Prior to that determination, SRCSD had collaborated with its contributing agencies including the District, City of Folsom, City of Sacramento and City of West Sacramento, to create a regional outreach and educational campaign with consistent key messages, instructions and requirements for both residents and food service establishments. In addition, FOG Control Information kits were designed, printed and made available to each contributing agency to disseminate as they saw fit.

SRCSD, not having FOG problems in their system, ceased providing region-wide FOG outreach coordination in April 2009. Since then, the District has assumed the responsibility and costs associated with maintaining the Stop the Clog website (stoptheclog.com), which contains much of the same information and materials originally produced by SRCSD, as well as new campaign materials that are available to any interested party and can be downloaded from the website.

The District has a myriad of tools, including data collection and analysis software and a well trained staff that is capable of performing complex data analysis to identify locations within the District’s service area where FOG is most problematic. The Maintenance & Operations (M&O) and Engineering staffs are well versed in proper cleaning techniques and rehabilitation and repair work, and combine their resources and knowledge to achieve the District’s vision to “Provide the best value of any sewage collection utility in California, as measured by cost and level of service.” The District has well documented policies, procedures, practices, strategies and programs that are written to identify, determine the source, and provide an approach to minimize, reduce or prevent a recurrence of an SSO caused by FOG, roots or debris, or other reasons.

Data analysis performed in 2001, 2004 and 2011 all reached the same conclusion: The majority of FOG-related stoppages occurred in the District’s residential areas. Therefore, the District’s FOG source control and reduction efforts remain focused on stoppages and SSO’s in the main lines located in residential areas more than commercial sites where food preparation and/or food service establishments (FSE) are typically located.

In order to increase the staff awareness of system-wide SSO performance, the District trends and prominently posts the mainline and lower lateral overflow rate graphs in its two office buildings. In addition, performance measures such as work orders completed on time, production rates, and costs per unit completed are trended, and reported monthly.

511.3. Keeping the SASD Comprehensive FOG Control Program Relevant

The District is committed to keeping the SASD Comprehensive FOG Control Program relevant and up-to-date by providing a separate, companion document that describes program achievements since the last writing, and goals for the upcoming program period. The achievements and goals will not be deleted, rather they will be delineated by year so there is a running history since the creation of this document in 2013.

This document shall serve as a repository of evidence of on-going activities performed by the District to achieve the requirements and intent of the above-referenced regulations. The District uses asset management principles to determine the effectiveness of various programs and strategies that are aimed at reducing Sewer System Overflows (SSO’s) caused by Fats, Oils, and Grease (FOG).
511.4. Program

The following is a description of SASD Comprehensive FOG Control Program which addresses all Sections (a through g) of the SSMP Section D.13 (vii) – Fog Control Program.

Proactive Approach:

1. An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG

   Public education and outreach remains a key component of the District’s FOG control efforts.

   - Each year, the District enters into a contract that provides professional consulting services to sustain ongoing marketing, communications, public education and outreach and media relations efforts to support the FOG Awareness and Prevention Campaign. The contract contains a scope of work that describes the goals and objectives during the contract period.
   - Each holiday season (November through December), the District and its consultant(s) conduct an elaborate campaign push throughout the District service area. For example, in 2012, the campaign consisted of news releases, appearances on local TV news shows, electronic billboard ads, Facebook ads, Sacramento Bee sticker ads, utility bill inserts, and radio spots. We even produced a U-Tube video that made its debut in late 2011.
   - SSO data analysis continues to reach the same conclusion as it relates to FOG stoppages. The majority of FOG stoppages occur in residential areas of the District service area.

2. A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area.

   The District’s stoptheclog.com website has an entire Section dedicated to educating FSE owner/operators and employees on the proper techniques and Best Management Practices (BMP) for the disposal of FOG. The materials can be printed and used by FSE owners, operators, managers, staff and other interested parties such as local environmental health or food safety concerns to train and remind them of the BMP’s. The resources include information and instruction sheets on the proper storage and disposal of FOG, proper care of grease removal devices and grease bins, local grease disposal options and other educational data. In addition, there is a quiz to evaluate staff’s understanding of proper FOG disposal as well as an employee set of materials. Furthermore, there is a video and an 11” x 17” BMP poster which can be displayed and referred to as needed.

   FSE’s that are found to be the source of an SSO are put on an investigation and visitation schedule and are given the FOG Control Program Information Kit which contains the above-described materials.

   The District engages the services of SRCSD’s Wastewater Source Control Systems (WSCS) staff to inspect and enforce the provisions of the SASD Sewer Ordinance and Enforcement Response Plan. WSCS staff is notified by the District when the cause of a FOG-related SSO can be traced to a FSE. WSCS staff then follows its internal FOG Incident Response Standard Operating Procedures, a copy of which can be found in the Appendix Section of this document.

   The District and WSCS staff have monthly meetings scheduled to review the status of open FOG Incident cases and discuss what enforcement actions may be necessary to ensure compliance.
3. **The District Standards and Specifications**

The District’s Standards and Specifications provides minimum standards and specifications to be used by both Contractors and the District during planning, design and construction of sewer collection systems that are to be or are dedicated to the District for operations and maintenance, or require the approval of the District, or are to be installed within existing or new public rights-of-way or easements. The Standards and Specifications are necessary to provide for the safety and general welfare of the public that use the sewer facilities.

The Standards and Specifications include details such as minimum pipe slope to keep scouring velocity and exclude swales which can lead to FOG buildup.

The Standards and Specifications document includes a Section that describes the purpose and requirements for pipeline cleaning. Section 331.1 states, “Pipeline cleaning is performed as part of the District’s maintenance programs. All pipelines are to be inspected for structural condition or rehabilitated shall be cleaned prior to commencing work... The pipelines shall be cleaned by removing all sludge, dirt, sand, grease, rocks, roots and other material and obstructions from the pipelines and the manholes.” In addition, the document provides general procedures and codes required to perform a Television Inspection.

4. **Building Code, Uniform Plumbing Code, CA Plumbing Code**

There are many different state and federal codes and regulations that govern building plumbing and fixtures, FSE’s, and sewer pipelines. Each is designed to provide for the health and safety of the public. In addition to the state and federal codes and regulations and the WDR and SSMP, the District sewer collection system is safeguarded by codes and regulations that must be adhered to by various departments within the County of Sacramento. These include:

4.1 **Sacramento County’s Environmental Management Department** performs plan reviews to ensure compliance with health and safety regulations. The Application for Food Facility Plan Review includes two references specifically related to proper FOG handling and disposal including Section 114201 which describes location and installation requirements for grease traps/interceptors, and Section 11425.8 that describes the requirement for separate rendering containers for inedible kitchen grease.

4.2 **The County of Sacramento Building Permits and Inspection Division** also has a role in ensuring proper installation of grease traps/installations as required by the Uniform Plumbing Code and other State regulations.

4.3 Residents within Sacramento County are allowed to place used cooking oil at curb side for pick up by Sacramento County’s Waste Management and Recycling (WMR) Department on the same pick up schedule as mixed recycling. WMR’s public website has guidelines for proper containment and placement of used oils. WMR disposes of the used oils at one of the region’s FOG disposal sites as shown on the stoptheclog.com website.

5. **SASD Policies, Procedures and Practices**

The assessment programs are designed to investigate any shortcomings in meeting the District’s approved Service Levels or regulatory requirements, including this **FOG control program**. These assessments are broken into the following three categories:

- Structural Assessment
- SSO Assessment
Management Plan Assessment

The assessment programs consist of strategies that drive the District’s operation and maintenance practices, FOG control program, system evaluation and capacity assurance plan, and monitoring, measurement, and program modifications.

The District uses system-wide assessment programs to:

- monitor and analyze trends on service levels and performance measures
- review the results the work done to accomplish a strategy
- make PM schedule, strategy modifications or other corrections, depending on trends and target performance level
- evaluate and manage risk associated with failing to meet service levels, regulatory requirements, community/social needs and business goals
- address capital and operating needs and project revenue and funding needs
- monitor the result of these changes

The assessment programs incorporate the following concepts:

- Investigatory triggers
  - the point at which further investigation is warranted as the predicted performance or response is above or below the required range, and
- Action triggers
  - the point at which a capital investment is required or a change in operation and maintenance practice, staffing, policy, or procedure is required as the investigation and cost analysis has determined performance is outside of the acceptable range

The District uses strategies to address actions taken to mitigate the risks associated with specific failure modes and to address performance deficiencies, or cost inefficiencies. These strategies address:

- pipeline loss of support failure mode
- pipeline crush collapse failure mode
- pipeline stoppage failure mode
- pump station and force main failure modes
- under capacity failure mode
- management assessment strategies for performance and efficiencies

One of the results of the strategies is to study the investigatory triggers to assess asset plan and staffing plan projections.

Detailed descriptions of key programs and plans are listed below:

5.1 Structural Assessment Program

The District owns and operates a variety of physical assets. Each asset type has its own degradation pattern that leads to various modes of structural failures. The Structural Assessment Program document describes the strategies the District implements to identify and mitigate failure modes that lead to structural failures of sewer collection assets such as
manholes, pipes, and pump stations. If a structural failure causes a stoppage, the SSO Assessment Program is employed.

5.2 SSO Assessment Program

The SSO Assessment Program is used to document strategies the District implements to identify and mitigate failure modes that cause SSOs.

This program is divided into different types of strategies addressing SSO-producing failure modes. These strategies are further divided by procedures and practices when different asset classes have different required methodology needed to determine investigatory and action triggers. The District’s supporting information can be found in the following:

- Main Line Stoppage Failure Mode Strategy
- Lower Lateral Stoppage Failure Mode Strategy
- Manhole Stoppage Failure Mode Strategy
- Pump Station Component Failure Mode Strategy
- Damage by Others Failure Mode Strategy
- Under Capacity Failure Mode Strategy

In addition to the above strategies, the Root Control Program and this Comprehensive FOG Control Program describe actions taken to address the impact that roots and FOG have on the system.

5.3 Management Plan Assessment Program

The Management Plan Assessment Program contains strategies, programs, policies, systems, activities and teams that drive the District’s day-to-day operations and references both reactive and proactive actions to reduce the likelihood of SSO’s.

The purpose of the Management Plan Assessment Program document is to describe how the District identifies and prioritizes system deficiencies and implements short and long term rehabilitation, replacement, and capacity assurance projects. The document describes the overall program the District uses to manage decision making processes such that attention is focused on assets at risk of failing in any of the failure modes identified to date, and how various revenue scenarios are evaluated, and how a schedule for developing the funds needed is updated each year.

The District’s computerized maintenance management system (CMMS) documents work orders, preventive maintenance schedules, and the records of completed work. Reports from the CMMS are used to provide the data for trending the system performance. The performance trends for the SSO related service levels, failure modes, and performance measures drive the priority for District actions.

5.4 Asset Management Plan

The District has a comprehensive Asset Management Plan which demonstrates responsible management and sustainability of District assets. The Plan includes, but is not limited to, asset analysis, risk management, financial management, decision making and quality management.
6. Requirements to Install Grease Removal Devices (such as traps or interceptors), design standards for removal devices, maintenance requirements, BMP requirements, record keeping, and reporting requirements.

The following codes, ordinances, procedures and protocols – all of which are referenced elsewhere in this document – contribute to the adherence of this Section of the SSMP.

- District Standards and Specifications
- Uniform Plumbing Code
- CA Plumbing Code
- Health & Safety Code
- County Building Code
- County Environmental Health Department requirements
- SASD & SRCSD Sewer Ordinances
- Stoptheclog.com website
- FOG Control Program Information Kits
- WSCS’ FOG Response Log

Reactive Approach:

1. The legal authority to prohibit discharges to system and measures to prevent SSO’s caused by FOG

1.1 Governance

The District is governed by a 10-member Board of Directors made up of five members of the Sacramento County Board of Supervisors, as well as representatives from the five cities it serves – Citrus Heights, Elk Grove, Rancho Cordova, and a portion of the cities of Sacramento and Folsom.

The District Board of Directors is responsible for administering all provisions of the District Sewer Ordinance (Ordinance) and shall exercise these responsibilities according to the purpose and intent of the Ordinance in a fair and objective manner. Except as otherwise provided in the Ordinance, the Board has delegated to the District Engineer the responsibility to administer, implement and enforce the provisions of the Ordinance. The District Engineer may delegate duties, except termination of service, to subordinate staff.

1.2 Sewer Ordinance

The Sacramento Area Sewer District Sewer Ordinance and the Sacramento Regional County Sanitation District Consolidated Ordinance provide the District with the Legal Authority to:

- prevent illegal discharges
- require that sewers and connections be properly designed and constructed
- ensure access for maintenance, inspection, or repairs for portions of laterals
- limit the discharge of fats, oils, and grease (FOG) and other debris that may cause blockages
- enforce any violation of its sewer ordinance
- prohibit discharges to the system and identify measures to prevents SSO’s and blockages caused by FOG
• inspect grease producing facilities

The Ordinance defines uniform requirements for design, construction, and use of the sewer collection system, provides the enforcement of these requirements, establishes penalties for violations, and defines responsibility for sewer collection system maintenance. The Ordinance provides protection of the system from damage, and protects the health and safety of the public and the District’s employees responsible for its maintenance, and the environment.

Because the District collects wastewater and diverts it to the conveyance and treatment systems of the SRCSD, users are required to comply with the provisions of the SRCSD Consolidated Ordinance in addition to the provisions of the District Ordinance.

1.3 Enforcement Response Plan

The District’s Enforcement Response Plan (ERP) was approved by the Board of Directors in January 2013. The ERP describes procedures when users are not in compliance with the provisions of the District and SRCSD ordinances. The procedures can generally be applied to all users of the system in conformance with both ordinances, including those subject to the requirements of the Federal pre-treatment program (typically referred to as industrial users) and those discharging under a Wastewater Discharge Permit (WDP).

The ERP does not expand the authority described in the Ordinance. It is used by staff to identify, document, track and respond to non-compliance and to select the enforcement action most appropriate for a given violation. The ERP ensures that consistent, timely, fair and equitable enforcement procedures are implemented for instances of non-compliance.

1.4 Sewer System Overflow Emergency Response Procedures Manual

The Sewer System Overflow Emergency Response Procedures Manual (SSO ERPM) provides specific steps to take when an SSO occurs and identifies requirements for incident investigations, TV Inspections, and instructions for staff to request public education/outreach for FOG-caused SSO’s.

There are other policies that provide District staff the ability to analyze and mitigate future.

2. Authority to inspect grease producing facilities, enforcement authorities, and whether (the District) has sufficient staff to inspect and enforce the FOG Ordinance

2.1 Authority to inspect and enforce

- The District & SRCSD Ordinances
- The District & SRCSD Enforcement Response Plans
- WSCS’ Fog Incident Response Standard Operating Procedures
- Sacramento County Environmental Health Department policies and procedures
- Sacramento County Building Inspection Department policies and procedures

4.1 Sufficient staff to inspect and enforce

As noted above, the majority of FOG-related SSO’s occur in residential areas, thus our SASD Comprehensive FOG Control Program places greater emphasis on public outreach and education. The majority of funding for the FOG program goes to Media and Public Relations contractors. The contract(s) is managed by the FOG Program Manager in consultation with the District Communications and Media Officer. The District engages staff from WSCS to investigate and enforce Food Service Establishment (FSE) FOG incidents, and is able to fund
additional human resources if data analysis indicates a need for an increased level of inspection and enforcement. Therefore, the District has sufficient resources to ensure adequate inspection and enforcement.

5. **An identification of sanitary sewer system Sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each Section**

FOG blockages and FOG-related SSO’s happen throughout our service area and are most often found in single-family residential areas. Therefore, the **SASD Comprehensive FOG Control Program** incorporates all disciplines in reducing blockages and SSO’s caused by FOG.

Because the majority of the District’s FOG stoppages occur in residential areas, reducing FOG loading by increasing source control efforts is difficult. That is why the District has clear and defined procedures to analyze data and make necessary repairs, cleaning methods or cleaning schedule adjustments.

The District understands that importance of a broader examination of the underlying causes of a blockage or SSO. The various strategies, policies and procedures described herein illustrate our commitment to both proactive and reactive approaches related to performing thorough investigations subsequent to a blockage or SSO.

A post-blockage/SSO investigation is conducted after each such incident to determine the underlying cause before deciding on a corrective measure to be taken to prevent recurrence. Potential underlying causes of a FOG stoppage include:

- Site condition (root intrusion, sag, debris, etc.)
- Inadequate cleaning schedule
- Improper cleaning technique
- Excessive grease discharge from connected parcels
- Excessive grease discharge from parcels in the upstream shed
- Cold weather (causes FOG to solidify more readily)

The investigation process allows the District to make smart preventative maintenance decisions to reduce the risk of repeated FOG-related stoppages as well as identify any potential systematic weaknesses that should be addressed. Furthermore, the District has robust TV inspection, data analysis, cleaning schedule and technique policies and procedures to mitigate repeat FOG events.

6. **Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system**

The District will continue to closely monitor and analyze FOG stoppage data and utilize sound asset management principals and best management practices to identify and mitigate sources of FOG-related stoppages. As delineated in Section (3) above, the District’s commitment goes beyond developing source control measures in the most common FOG-incident locations in its service area.

511.5. **Effectiveness Measure**

The effectiveness of this program will be determined by a periodic analysis of FOG stoppage data, and statistics provided by the public outreach and education consultant.
511.6. Detailed Group Responsibilities

The following groups and individuals will be responsible for the corresponding areas of the implementation of this program:

**SASD Public Affairs Office**

The District Public Affairs Office is responsible for providing support and co-managing the consultant contract for the Public Outreach and Education portion of the FOG program.

**SASD Business Planning**

The District Business Planning staff captures and produces complex FOG stoppage data for analysis.

**SASD Operations Support and M&O Staff**

The Televised Inspection (TVI) reviewers in the SASD Operations Support unit, as well as M&O staff are responsible for identifying, properly documenting and preparing Service Requests or Work Orders or other established means of notifying the Safety and Regulatory Compliance staff or WSCS when inspection or enforcement may be warranted.

**SASD Safety and Regulatory Compliance**

District-Safety and Regulatory Compliance is also responsible for the development of certain component elements within this program. Business Implementation is typically responsible for the day-to-day application of the assessment and problem analysis activities described in the individual components.

**SASD Wastewater Source Control Section (WSCS)**

WSCS provides inspection and enforcement support as requested by SASD.

512 Root Control Program

512.1. Purpose

The purpose of this document is to describe the Root Control Program of the Sacramento Area Sewer District (SASD).

512.2. Background

SASD recognizes that root intrusion represents a major challenge in its efforts to operate its gravity collection system (system) in a manner that meets regulatory requirements, achieves identified service level targets, and is cost effective.

Historical stoppage and overflow data shows that roots growing into the system cause a large number of the stoppages and Sanitary Sewer Overflows (SSOs) in SASD’s system. Stoppages in SASD’s system cause the vast majority of overflows. Aggressive management of root intrusion in SASD’s system will reduce the number of root-related SSO’s.

The main tool that SASD uses to combat root is mechanical cleaning. Gravity sewer lines can be cleaned with a tool that has a spinning cutter on the front (rodding), by pushing through the line with a ball (balling), by cleaning with a hydraulically pressurized nozzle (jetting), and by cleaning with a hydraulically pressurized nozzle with chains attached (flailing).

SASD has tried a variety of techniques to control root intrusion, in addition to the methods discussed above. The following chronology provides a few milestones in the SASD’s Root Control Program history:
In September of 1973, SASD, (as CSD-1) published a study on the Chemical Control of Roots. At the time, SASD was already cleaning roots out of underground sewer pipelines mechanically. The introduction to this document states, “Collection systems, as we know them today, well engineered, efficient and an absolute necessity to public health, continue to be plagued by root intrusion.” This study concluded that chemical root control was an effective method for controlling root intrusion in the system. However, the risks associated with the chemicals were thought to outweigh the benefits.

In 1997, a second small pilot of chemical root control was undertaken on 87 pipeline segments. The pilot was executed in a way that did not provide a conclusive result of the effectiveness and value of chemical root control in SASD’s system.


In October of 2009, SASD again began a substantial pilot study designed to statistically test chemical root control cost effectiveness relative to mechanical root control. This pilot is being done under a strict inspection and monitoring protocol in order to provide more conclusive results than previous studies have attained.

In April of 2012, SASD added a private root problem enforcement process to provide an enforcement trigger to maintain compliance with the Sewer Ordinance by advising owners of private root problems and enforcing corrective action.

In April of 2013, SASD expanded the use of chemical root control application. In this expansion, SASD applied chemical root control on assets that were identified with less aggressive root intrusion.

In August of 2013, SASD board approved the Main Line Lining for Root Mitigation - Project 1. This project was part of the effort to reduce root related maintenance and operations costs. Lining pipelines to mitigate root intrusion can be a cost effective option. Select main lines were lined with a cured-in-place liner.

In August 2016, SASD approved the Enforcement Response Process to align and more consistently document processes for enforcement efforts related to roots, FOG, unpermitted connections, prohibited discharges and easement access. The private root problem enforcement process implemented in 2012 is incorporated in this Enforcement Response Process.

512.3. Characterization of Roots within SASD’s Service Area

The entire SASD service area is susceptible to root intrusion. There are some areas of the system that televised inspection (TVI) data has shown to be more susceptible to root intrusion. Roots that are removed from the system tend to re-grow and need to be removed again later. The Management Plan Assessment Program continues to monitor trends in root-related SSOs in order to find and implement improvements that will further reduce the number of root-related SSOs.

512.4. Program

The Root Control Program aims at reducing the impacts of root intrusion in SASD’s system. This includes both a reactive approach and a proactive approach. The reactive approach aims at responding to and dealing with SSO’s in a quick and effective way and enforcing corrective action of private root problems. This minimizes the impacts of root intrusion that has occurred. The proactive approach aims at stopping root intrusion before it becomes a problem. Finding innovative root control techniques, appropriate
mechanical cleaning methods, applying physical pipeline rehabilitation, and maintaining SASD Standards and Specifications are all part of this approach.

Reactive Approach:

SASD provides 24-hour emergency response. SASD personnel who respond to SSO’s use the Sanitary Sewer Overflow Emergency Response Procedures Manual to direct their response activities.

The reactive approaches to root stoppage failures in the system are listed in the Lower Lateral Stoppage Failure Mode Strategy, the Main Line Stoppage Failure Mode Strategy, and the Manhole Stoppage Failure Mode Strategy depending on what type of asset has the stoppage. See the specific strategy for the detailed reactive approach. Generally, the approaches in each of these strategies include the following elements:

- Post stoppage TVI and review, which can lead to placement in a program or the Generic BCE Process
- Problem and solution analysis through the Generic BCE Process; solutions can be anything from periodic mechanical cleaning, to asset rehabilitation, to asset replacement
- Changes to the SASD Standards and Specifications, because the way they are written allows construction that enables root intrusion
- Changes to the Asset Management Plan
- Penalties for violations to the Sewer Ordinance, which forbids activities that might damage the system and enable root intrusion

Enforcement Response Process

SASD has set strategies to minimize root intrusion into SASD’s system. The Sewer Ordinance states that the owner has the sole responsibility for clearing stoppages, inspecting, maintaining, and repairing the upper lateral, including backflow prevention devices. The Sewer Ordinance gives SASD authority to monitor discharge and take enforcement action for inadequate control of fats, oil, and grease and ineffective facility maintenance practices.

Generally, the Enforcement Response Process for private root intrusion includes the following elements:

- Advisory letters are sent to give the owner knowledge of roots entering the lower lateral from their upper lateral
- Follow up evaluations occur to confirm that the owner has taken corrective action
- Notice of violation letters are sent if owner has not performed corrective action, or if the roots from the upper lateral caused a stoppage in SASD’s lower lateral

Proactive Approach:

Root control methods that show promise to reduce root-related SSOs are taken through a pilot test phase. Approved methods will be incorporated into the appropriate stoppage failure mode strategy.

The proactive approaches to root stoppage failures in the system are listed in the Lower Lateral Stoppage Failure Mode Strategy, the Main Line Stoppage Failure Mode Strategy, and the Manhole Stoppage Failure Mode Strategy depending on what the asset is in question. See the specific strategy for the detailed Proactive Approach. Generally, the approaches in each of these strategies include the following elements:
- **SASD Standards and Specifications** are written so that constructed pipelines will be more resistant to root intrusion
- The **Sewer Ordinance** is written to forbid activities that might damage the system and enable root intrusion
- Proactive cleaning programs exist to remove roots before they cause a stoppage which could lead to an SSO

### 512.5. Detailed Group Responsibilities

The following groups and individuals will be responsible for the corresponding areas of the implementation of this program:

**Engineering Operations Support-Lower Lateral TVI Review**

Engineering Operations Support-Lower Lateral TVI Review is responsible for identifying the roots protruding from the upper lateral, creating advisory and enforcement service requests, and creating follow-up television inspections.

**Maintenance and Operations (M&O)**

SASD-M&O is typically responsible for the day-to-day application of the assessment and problem analysis activities described in the individual components.

**Safety & Regulatory Compliance**

SASD-Safety & Regulatory Compliance is responsible for upper lateral advisory and enforcement service request reports, determining if compliance has been achieved, creating, filing, and sending advisory and enforcement letters.