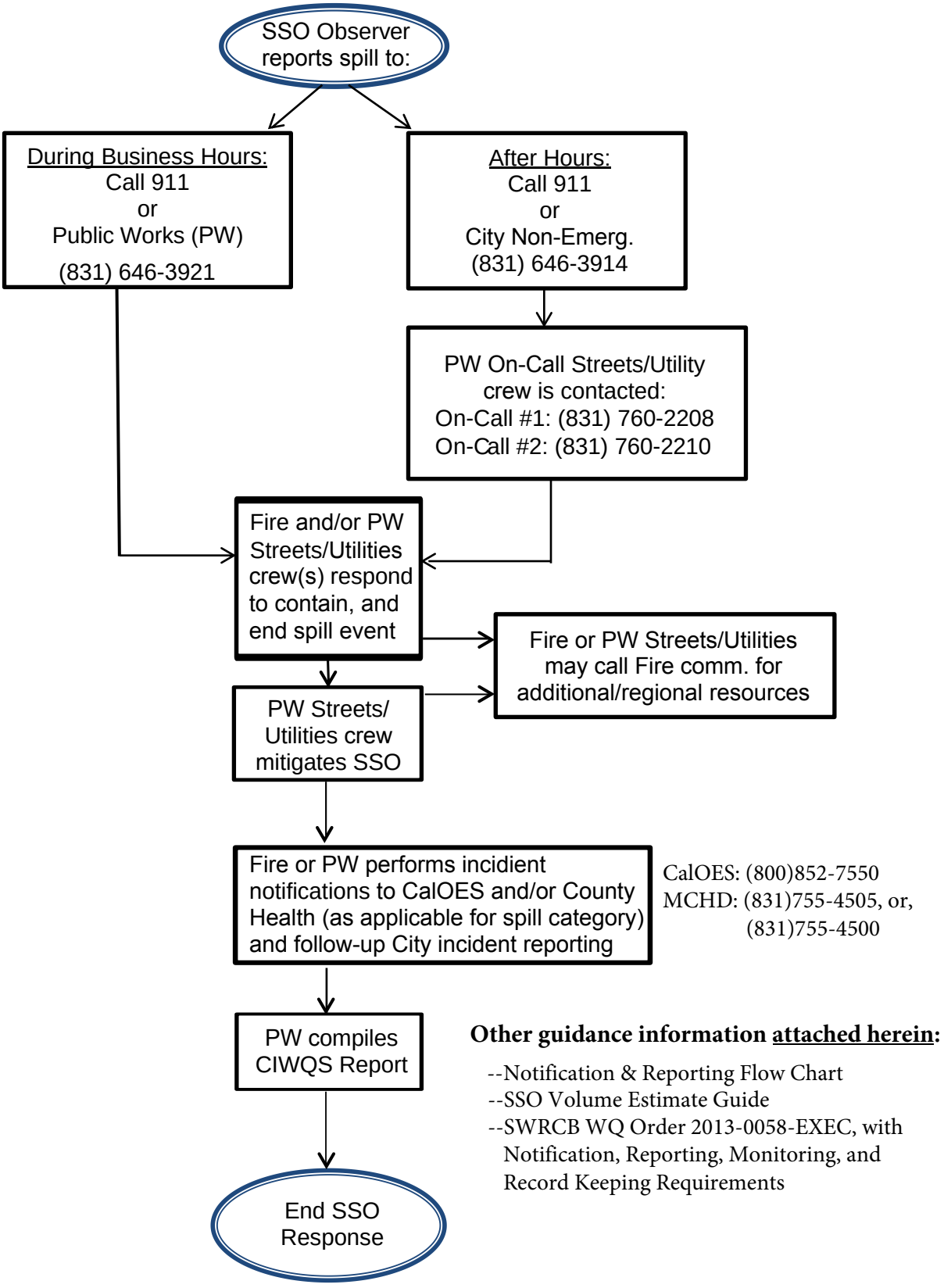
Appendix 15: Spill Emergency Response Plan (SERP)

Quick Reference - Appendix 15 (SERP)

City of Monterey
Sanitary Sewer Overflow (SSO)
Chain of Communication

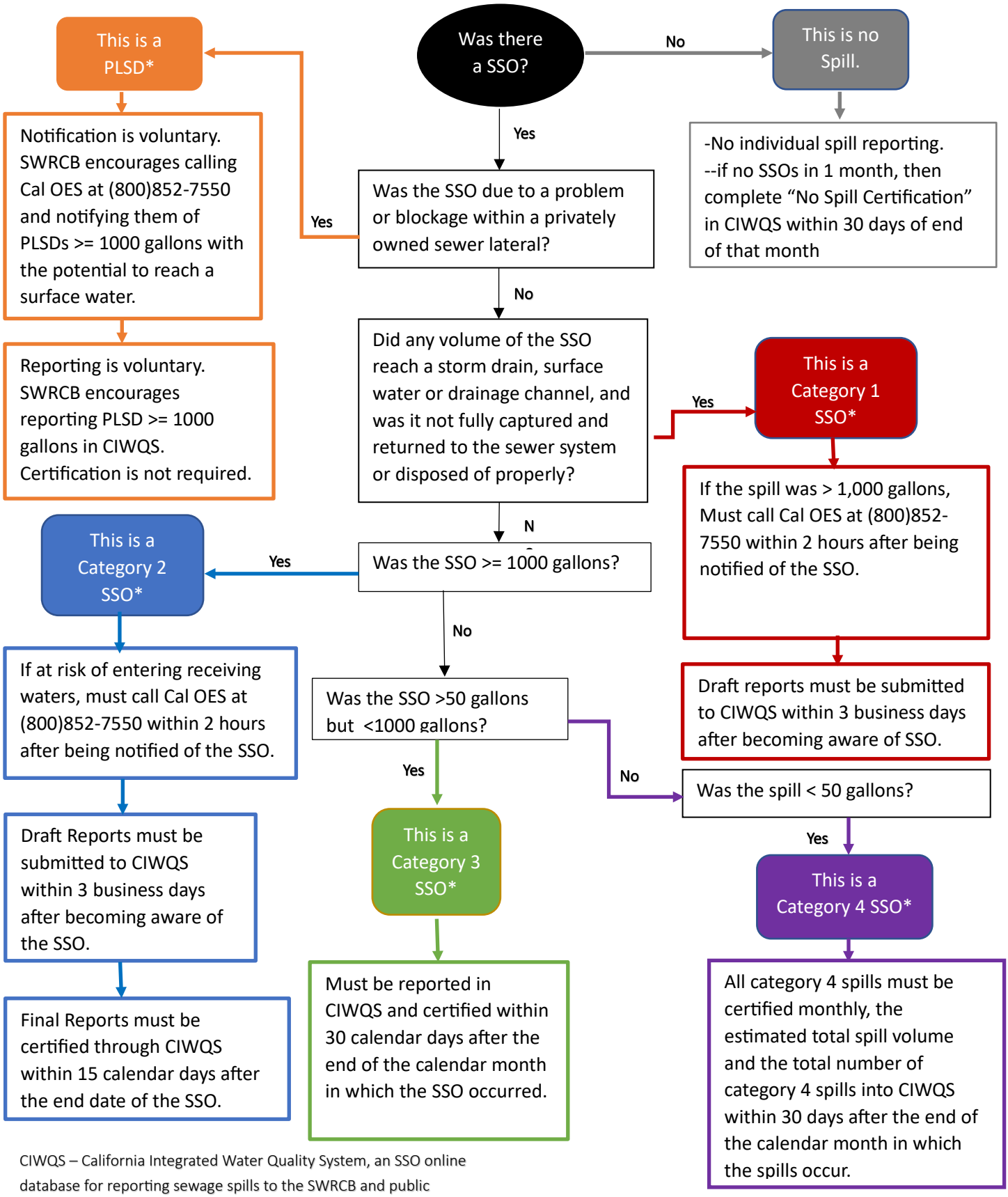


Other guidance information attached herein:

--Notification & Reporting Flow Chart
--SSO Volume Estimate Guide
--SWRCB WQ Order 2013-0058-EXEC, with Notification, Reporting, Monitoring, and Record Keeping Requirements

Quick Reference - Appendix 15 (SERP)

City of Monterey
Sanitary Sewer Overflow (SSO) or "Sewage Spill"
State Notification and Reporting Overview



CIWQS – California Integrated Water Quality System, an SSO online database for reporting sewage spills to the SWRCB and public

* Notify County Health: (831)755-4500 or (831)755-4505 if the spill presents any danger to the public.

Quick Reference - Appendix 15 (SERP)

Collection System Collaborative Benchmarking Group
Best Practices for Sanitary Sewer Overflow (SSO)
Prevention and Response Plan

Attachment D - Sample Templates for SSO Volume Estimation

TABLE 'A'

ESTIMATED SSO FLOW OUT OF M/H WITH COVER IN PLACE

24" COVER

Height of spout above M/H rim **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/4	1	0.001	
1/2	3	0.004	
3/4	6	0.008	
1	9	0.013	
1 1/4	12	0.018	
1 1/2	16	0.024	
1 3/4	21	0.030	
2	25	0.037	
2 1/4	31	0.045	
2 1/2	38	0.054	
2 3/4	45	0.065	
3	54	0.077	
3 1/4	64	0.092	
3 1/2	75	0.107	
3 3/4	87	0.125	
4	100	0.145	
4 1/4	115	0.166	
4 1/2	131	0.189	
4 3/4	148	0.214	
5	166	0.240	
5 1/4	185	0.266	
5 1/2	204	0.294	
5 3/4	224	0.322	6"
6	244	0.352	
6 1/4	265	0.382	
6 1/2	286	0.412	
6 3/4	308	0.444	
7	331	0.476	
7 1/4	354	0.509	
7 1/2	377	0.543	
7 3/4	401	0.578	8"
8	426	0.613	
8 1/4	451	0.649	
8 1/2	476	0.686	
8 3/4	502	0.723	
9	529	0.761	

36" COVER

Height of spout above M/H rim **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/4	1	0.002	
1/2	4	0.006	
3/4	8	0.012	
1	13	0.019	
1 1/4	18	0.026	
1 1/2	24	0.035	
1 3/4	31	0.044	
2	37	0.054	
2 1/4	45	0.065	
2 1/2	55	0.079	
2 3/4	66	0.095	
3	78	0.113	
3 1/4	93	0.134	
3 1/2	109	0.157	
3 3/4	127	0.183	
4	147	0.211	
4 1/4	169	0.243	
4 1/2	192	0.276	
4 3/4	217	0.312	6"
5	243	0.350	
5 1/4	270	0.389	
5 1/2	299	0.430	
5 3/4	327	0.471	
6	357	0.514	
6 1/4	387	0.558	8"
6 1/2	419	0.603	
6 3/4	451	0.649	
7	483	0.696	
7 1/4	517	0.744	
7 1/2	551	0.794	
7 3/4	587	0.845	10"
8	622	0.896	
8 1/4	659	0.949	
8 1/2	697	1.003	
8 3/4	734	1.057	
9	773	1.113	

Disclaimer:
This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

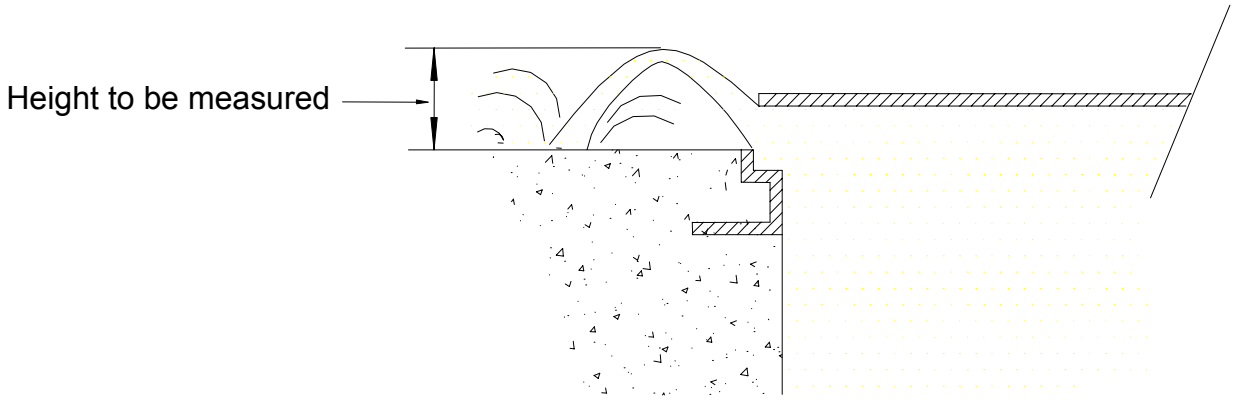
Collection System Collaborative Benchmarking Group
Best Practices for Sanitary Sewer Overflow (SSO)
Prevention and Response Plan

The formula used to develop Table A measures the maximum height of the water coming out of the maintenance hole above the rim. The formula was taken from hydraulics and its application by A.H. Gibson (Constable & Co. Limited).

Example Overflow Estimation:

The maintenance hole cover is unseated and slightly elevated on a 24” casting. The maximum height of the discharge above the rim is 5 ¼ inches. According to Table A, these conditions would yield an SSO of 185 gallons per minute.

FLOW OUT OF M/H WITH COVER IN PLACE



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

Quick Reference - Appendix 15 (SERP)

Collection System Collaborative Benchmarking Group
Best Practices for Sanitary Sewer Overflow (SSO)
Prevention and Response Plan

TABLE 'B'

ESTIMATED SSO FLOW OUT OF M/H WITH COVER REMOVED

24" FRAME

Water Height above M/H frame **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/8	28	0.04	
1/4	62	0.09	
3/8	111	0.16	
1/2	160	0.23	
5/8	215	0.31	6"
3/4	354	0.51	8"
7/8	569	0.82	10"
1	799	1.15	12"
1 1/8	1,035	1.49	
1 1/4	1,340	1.93	15"
1 3/8	1,660	2.39	
1 1/2	1,986	2.86	
1 5/8	2,396	3.45	18"
1 3/4	2,799	4.03	
1 7/8	3,132	4.51	
2	3,444	4.96	21"
2 1/8	3,750	5.4	
2 1/4	3,986	5.74	
2 3/8	4,215	6.07	
2 1/2	4,437	6.39	
2 5/8	4,569	6.58	24"
2 3/4	4,687	6.75	
2 7/8	4,799	6.91	
3	4,910	7.07	

36" FRAME

Water Height above M/H frame **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/8	49	0.07	
1/4	111	0.16	
3/8	187	0.27	6"
1/2	271	0.39	
5/8	361	0.52	8"
3/4	458	0.66	
7/8	556	0.8	10"
1	660	0.95	12"
1 1/8	1,035	1.49	
1 1/4	1,486	2.14	15"
1 3/8	1,951	2.81	
1 1/2	2,424	3.49	18"
1 5/8	2,903	4.18	
1 3/4	3,382	4.87	
1 7/8	3,917	5.64	21"
2	4,458	6.42	
2 1/8	5,000	7.2	24"
2 1/4	5,556	8	
2 3/8	6,118	8.81	
2 1/2	6,764	9.74	
2 5/8	7,403	10.66	
2 3/4	7,972	11.48	30"
2 7/8	8,521	12.27	
3	9,062	13.05	
3 1/8	9,604	13.83	
3 1/4	10,139	14.6	
3 3/8	10,625	15.3	36"
3 1/2	11,097	15.98	
3 5/8	11,569	16.66	
3 3/4	12,035	17.33	
3 7/8	12,486	17.98	
4	12,861	18.52	
4 1/8	13,076	18.83	
4 1/4	13,285	19.13	
4 3/8	13,486	19.42	

Disclaimer:
This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

Quick Reference - Appendix 15 (SERP)

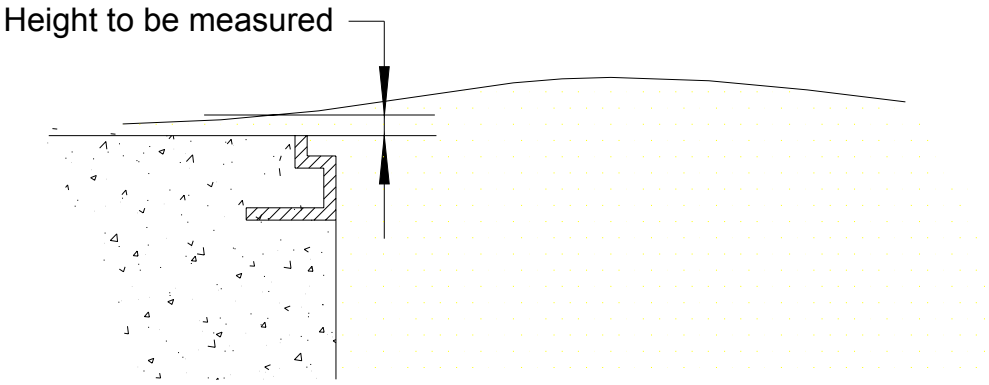
Collection System Collaborative Benchmarking Group
Best Practices for Sanitary Sewer Overflow (SSO)
Prevention and Response Plan

The formula used to develop Table B for estimating SSO's out of maintenance holes without covers is based on discharge over curved weir -- bell mouth spillways for 2" to 12" diameter pipes. The formula was taken from hydraulics and its application by A.H. Gibson (Constable & Co. Limited).

Example Overflow Estimation:

The maintenance hole cover is off and the flow coming out of a 36" frame maintenance hole at one inch (1") height will be approximately 660 gallons per minute.

FLOW OUT OF M/H WITH COVER REMOVED (TABLE "B")



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

TABLE 'C'

ESTIMATED SSO FLOW OUT OF M/H PICK HOLE

Height of spout above M/H cover **H** in inches	SSO FLOW **Q** in gpm
1/8	1.0
1/4	1.4
3/8	1.7
1/2	1.9
5/8	2.2
3/4	2.4
7/8	2.6
1	2.7
1 1/8	2.9
1 1/4	3.1
1 3/8	3.2
1 1/2	3.4
1 5/8	3.5
1 3/4	3.6
1 7/8	3.7
2	3.9
2 1/8	4.0
2 1/4	4.1
2 3/8	4.2
2 1/2	4.3
2 5/8	4.4
2 3/4	4.5
2 7/8	4.6
3	4.7
3 1/8	4.8
3 1/4	4.9
3 3/8	5.0
3 1/2	5.1
3 5/8	5.2
3 3/4	5.3
3 7/8	5.4
4	5.5
4 1/8	5.6
4 1/4	5.6
4 3/8	5.7
4 1/2	5.8
4 5/8	5.9
4 3/4	6.0
4 7/8	6.0
5	6.1

Height of spout above M/H cover **H** in inches	SSO FLOW **Q** in gpm	
5 1/8	6.2	
5 1/4	6.3	
5 3/8	6.3	
5 1/2	6.4	
5 5/8	6.5	
5 3/4	6.6	
5 7/8	6.6	
6	6.7	
6 1/8	6.8	
6 1/4	6.8	
6 3/8	6.9	
6 1/2	7.0	← Unrestrained M/H cover will start to lift
6 5/8	7.0	
6 3/4	7.1	
6 7/8	7.2	
7	7.2	
7 1/8	7.3	
7 1/4	7.4	
7 3/8	7.4	
7 1/2	7.5	
7 5/8	7.6	
7 3/4	7.6	
7 7/8	7.7	
8	7.7	
8 1/8	7.8	
8 1/4	7.9	
8 3/8	7.9	
8 1/2	8.0	
8 5/8	8.0	
8 3/4	8.1	
8 7/8	8.1	
9	8.2	
9 1/8	8.3	
9 1/4	8.3	
9 3/8	8.4	
9 1/2	8.4	
9 5/8	8.5	
9 3/4	8.5	
9 7/8	8.6	
10	8.7	

Note: This chart is based on a 7/8 inch diameter pick hole

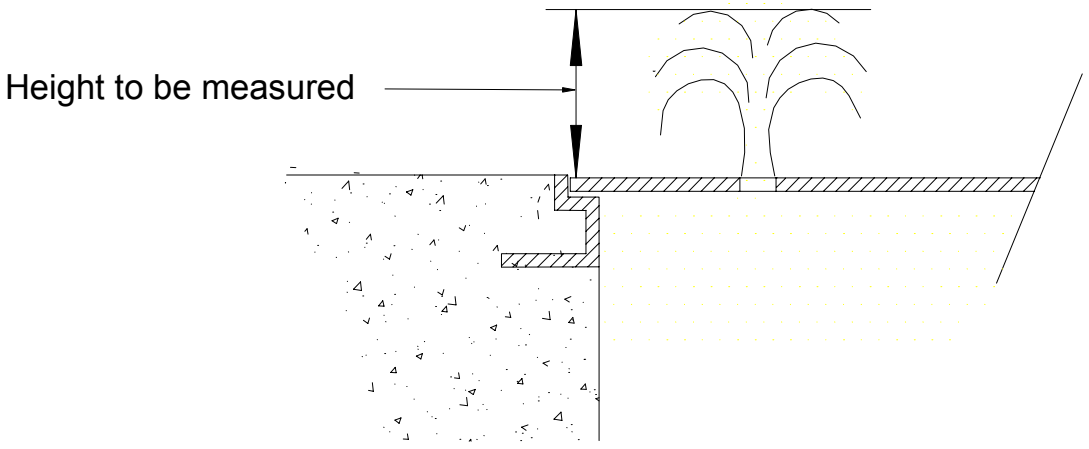
Disclaimer: This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

The formula used to develop Table C is Q=CcVA, where Q is equal to the quantity of the flow in gallons per minute, Cc is equal to the coefficient of contraction (.63), V is equal to the velocity of the overflow, and A is equal to the area of the pick hole.[2] If all units are in feet, the quantity will be calculated in cubic feet per second, which when multiplied by 448.8 will give the answer in gallons per minute. (One cubic foot per second is equal to 448.8 gallons per minute, hence this conversion method).

Example Overflow Estimation:

The maintenance hole cover is in place and the height of water coming out of the pick hole seven-eighths of an inch in diameter (7/8") is 3 inches (3”). This will produce an SSO flow of approximately 4.7 gallons per minute.

FLOW OUT OF VENT OR PICK HOLE (TABLE "C")



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

[2] Velocity for the purposes of this formula is calculated by using the formula h = v squared / 2G, where h is equal to the height of the overflow, v is equal to velocity, and G is equal to the acceleration of gravity.

Quick Reference - Appendix 15 (SERP)

Collection System Collaborative Benchmarking Group
Best Practices for Sanitary Sewer Overflow (SSO)
Prevention and Response Plan

Flow Estimation Pictures

Wastewater Collection Division
(619) 654-4160

Reference Sheet for Estimating Sewer Spills from Overflowing Sewer Manholes

All estimates are calculated in gallons per minute (gpm)


50 gpm


200 gpm


275 gpm


25 gpm


150 gpm


250 gpm


5 gpm


100 gpm


225 gpm

City of San Diego
Metropolitan Wastewater Department

All photos were taken during a demonstration using metered water from a hydrant in cooperation with the City of San Diego's Water Department.

rev. 4/99

Methods for Estimating Spill Volume

A variety of approaches exist for estimating the volume of a sanitary sewer spill. Three methods that are most often employed. The person preparing the estimate should use the method most appropriate to the sewer overflow in question and use the best information available.

Method 1 Eyeball Estimate

The volume of small spills can be estimated using an "eyeball estimate". To use this method imagine the amount of water that would spill from a bucket or a barrel. A bucket contains 5 gallons and a barrel contains 50 gallons. If the spill is larger than 50 gallons, try to break the standing water into barrels and then multiply by 50 gallons. This method is useful for contained spills up to approximately 200 gallons.

Method 2 Measured Volume

The volume of most small spills that have been contained can be estimated using this method. The shape, dimensions, and the depth of the contained wastewater are needed. The shape and dimensions are used to calculate the area of the spills and the depth is used to calculate the volume.

Step 1 Sketch the shape of the contained sewage (see Figure 1).

Step 2 Measure or pace off the dimensions.

Step 3 Measure the depth at several locations and select an average.

Step 4 Convert the dimensions, including depth, to feet.

Step 5 Calculate the area in square feet using the following formulas:

Rectangle:	Area = length (feet) x width (feet)
Circle:	Area = diameter (feet) x diameter (feet) x 3.14
Triangle:	Area = base (feet) x height (feet) x 0.5

Step 6 Multiply the area (square feet) times the depth (in feet) to obtain the volume in cubic feet.

Step 7 Multiply the volume in cubic feet by 7.5 to convert it to gallons

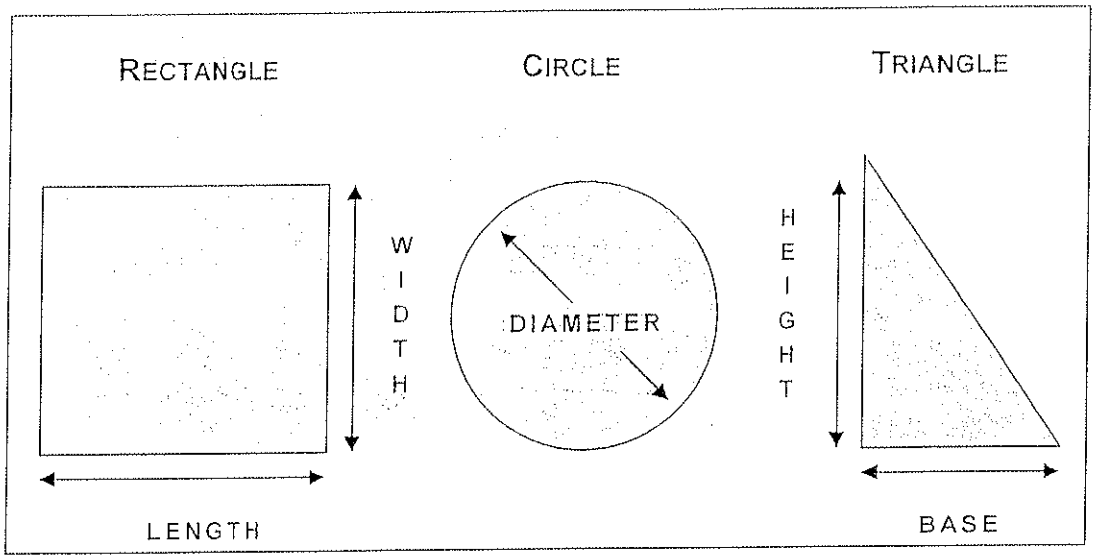
Method 3 Duration and Flowrate

Calculating the volume of larger spills, where it is difficult or impossible to measure the area and depth, requires a different approach. In this method, the separate estimates are made of the duration of the spill and the flowrate. The methods of estimating duration and flowrate are:

Duration: *The duration is the elapsed time from the time the spill started to the time that the flow was restored.*

SSO- WDR Compliance Workshop
Electronic Reporting: Reporting Requirements & Tips

Figure 1: Common Shapes and Dimensions



Start time: The start time is sometimes difficult to establish. Here are some approaches:

- Local residents can be used to establish start time. Inquire as to their observations. Spills that occur in rights-of-way are usually observed and reported promptly. Spills that occur out of the public view can go on longer. Sometimes observations like odors or sounds (e.g. water running in a normally dry creek bed) can be used to estimate the start time.
- Changes in flow on a downstream flowmeter can be used to establish the start time. Typically the daily flow peaks are "cut off" or flattened by the loss of flow. This can be identified by comparing hourly flow data during the spill event with flow data from prior days.
- Conditions at the spill site change over time. Initially there will be limited deposits of toilet paper and other sewage solids. After a few days to a week, the sewage solids form a light-colored residue. After a few weeks to a month, the sewage solids turn dark. The quantity of toilet paper and other materials of sewage origin increase over time. These observations can be used to estimate the start time in the absence of other information. Taking photographs to document the observations can be helpful if questions arise later in the process.
- It is important to remember that spills may not be continuous. Blockages are not usually complete (some flow continues). In this case the spill would occur during the peak flow periods (typically 10:00 to 12:00 and 13:00 to 16:00 each day). Spills that occur due to peak flows in excess of capacity will occur only during, and for a short period after, heavy rainfall.

End time: The end time is usually much easier to establish. Field crews on-site observe the "blow down" that occurs when the blockage has been removed. The "blow down" can also be observed in downstream flowmeters.

SSO- WDR Compliance Workshop
Electronic Reporting: Reporting Requirements & Tips

Flow Rate: The flowrate is the average flow that left the sewer system during the time of the spill. There are three common ways to estimate the flowrate:

- The San Diego Manhole Flowrate Chart: This chart, included as Appendix VII-G, shows sewage flowing from manhole covers at a variety of flowrates. The observations of the field crew can be used to select the appropriate flowrate from the chart. If possible, photographs are useful in documenting basis for the flowrate estimate.
- Flowmeter: Changes in flows in downstream flowmeters can be used to estimate the flowrate during the spill.
- Counting Connections: Once the location of the spill is known, the number of upstream connections can be determined from the sewer maps. Multiply the number of connections by 200 to 250 gallons per day per connection or 8 to 10 gallons per hour per connection.

  For example: 22 upstream connections x 9 gallons per hour per connection

  = 198 gallons per hour / 60 minutes per hour

  = 3.3 gallons per minute

Spill Volume: Once duration and flowrate have been estimated, the volume of the spill is the product of the duration in hours or days and the flowrate in gallons per hour or gallons per day.

For example:

Spill start time = 11:00

Spill end time = 14:00

Spill duration = 3 hours

3.3 gallons per minute X 3 hours X 60 minutes per hour

= 594 gallons

CITY OF MONTEREY
SPILL EMERGENCY RESPONSE PLAN
(SERP)

SUPPORTING MATERIALS FOR STATEWIDE SANITARY SEWER SYSTEMS

GENERAL ORDER 2022-0103 DWQ

JUNE 2023

INTRODUCTION:

The City of Monterey's Spill Emergency Response Plan (SERP) is a document that provides guidance to City personnel in responding to Sanitary Sewer Overflows (SSOs) as requred by the State Water Resources Control Board (SWRCB) Statewide Waste Discharge Requirements General Order for Sanitary Sewer Systems (Order). SSOs can occur when untreated wastewater is discharged from a sanitary sewer system into the environment before it reaches a wastewater treatment plant. These events can be caused by a variety of factors, including blockages in the sewer lines, excessive rainfall or flooding, and equipment failures.

SSOs can have serious environmental and public health consequences, including the contamination of waterways and the spread of disease. Therefore, it is essential that proper protocols are in place to respond to and contain SSOs. The City of Monterey's SERP outlines the steps that should be taken in the event of an SSO, including notification of appropriate personnel, containment of the spill, cleanup and disinfection of the affected area, and documentation and reporting.

In addition to this SERP, the City of Monterey has included reference material as appendices to the document. **Appendix A** contains the City's chain of communication flowchart. **Appendix B** contains, SWRCB Order Attachment E-2, which provides a Summary of Notification, Monitoring, and Reporting Requirements. Finally, **Appendix C** outlines a Biological Remediation Protocol, which can be a useful resource for addressing applicable SSOs.

Overall, the City of Monterey's SERP and attached reference material demonstrate a commitment to addressing SSOs and minimizing their impact on the environment and public health. It is important for all municipalities to have a comprehensive SERP in place to address SSOs and ensure an effective and efficient response.

The SERP regulatory requirements and their respective City response information follows.

REGULATORY REQUIREMENTS

SWRCB Order No. 2022-0103-DWQ Attachment D, section 6 outlines the requirement to be included in the Spill Emergency Response Plan (SERP): The SERP must include up-to-date

information to ensure prompt detection and response to spills to reduce spill volumes and collect information for prevention of future spills. The SERP must include procedures to:

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

SERP requirements (a) through (n) are detailed for the City of Monterey below.

(a) Notify primary responders, appropriate local officials, and appropriate regulatory agencies of a spill in a timely manner.

The City of Monterey's procedures for reporting and responding to SSOs are in compliance with regulatory requirements, including the requirement to notify primary responders, appropriate local officials, and regulatory agencies in a timely manner.

To ensure prompt reporting of SSOs, the City has established clear communication channels for members of the public and City personnel to report spills per the City Chain of Communicaiton (**Appendix A**). Additionally, the City has designated specific personnel with Monterey One Water to respond to Lift Station SSOs, further streamlining the response process.

Overall, the City's commitment to timely and effective SSO response is a critical component of protecting the environment and public health in the event of a spill. Below is a quick reference to primary responders and their contact numbers.

SANITARY SEWER PRIMARY RESPONDER CONTACT INFORMATION:		
Emergency Services	Business Hours/After Hours	9-1-1
Public Works Engineering Division	Business Hours	831-646-3921
City Non-Emergency	Business Hours/After Hours	831-646-3914
Public Works Streets Division	Business Hours	831-646-3927
Streets Standby 1	After Hours	831-760-2208
Streets Standby 2	After Hours	831-760-2210
Monterey One Water Maintenance Supervisor (Daryl Harris) – Lift Stations	Business Hours	831-886-6136
Office of Emergency Services (CalOES)	Business Hours/After Hours	800-852-7550
Monterey County Health Department (MCHD)	Business Hours/After Hours	831-755-4505 or 831-755-4500

(b) Notify other potentially affected entities (for example, health agencies, water suppliers, etc.) of spills that potentially affect public health or reach waters of the State.

In addition to notifying primary responders and regulatory agencies, the City recognizes the importance of notifying other potentially affected entities, such as Monterey County Health Department (MCHD), and California American Water (Cal Am), the water supplier, in the event of a Sanitary Sewer Overflow (SSO) may potentially impact surface waters or a potable water supply, with notification being made by either Fire or Public Works staff depending on who is leading the incident.

For Category 1 SSOs equal to or greater than 1,000 gallons discharged to surface water, or any volume of sewage spilled in a location where it will or has potential to discharge to surface water, the City will notify the California Office of Emergency Services (Cal OES) and obtains a control number. This step is important to ensure that the appropriate agencies are aware of the spill and can take action to minimize its impact on public health and the environment.

Cal OES will notify potentially affected entities based on the information reported. Below is a table referencing outside agency phone numbers for quick reference in the event of an SSO:

OUTSIDE AGENCY	PHONE NUMBER
California American Water (Cal Am)	800-272-1325
California Department of Fish and Wildlife (DFW)	831-649-2870
California Office of Emergency Services (CalOES)	800-852-7550
City of Pacific Grove, Public Works	831-648-5722
Monterey Bay National Marine Sanctuary (MBNMS)	800-853-1964 or 831-647-4203
Monterey County Environmental Health Department (MCHD)	831-755-4505 or 831-755-4500
National Response Center (NRC)	800-424-8802
Regional Water Quality Control Board (RWQCB) Region 3	805-549-3147
U.S. Army, Presidio of Monterey (POM)	831-242-7924 or 831-242-4132
United States Coast Guard (USCG)	831-647-7300
U.S. Navy, Naval Support Activity Monterey U.S. Navy, La Mesa Village	831-656-2526 831-333-4343

(c) Comply with the notification, monitoring and reporting requirements of this General Order, State law and regulations, and applicable Regional Water Board Orders.

It is essential for the City of Monterey to have a proper notification and reporting procedure in place in the event of Sanitary Sewer Overflows (SSOs). The Public Works Department oversees the CIWQS reporting for SSOs in the City and is responsible for ensuring compliance with notification, monitoring, reporting, and record-keeping requirements.

Data submitter's such as the Environmental Regulations Analyst and Environmental Regulations Manager initiate CIWQS reporting. Upon Environmental Regulations Manager review, the City's Public Works Director, as LRO (or their authorized designee) review and certify CIWQS reports for the City and can be contacted at Public Works Department 831-646-3921.

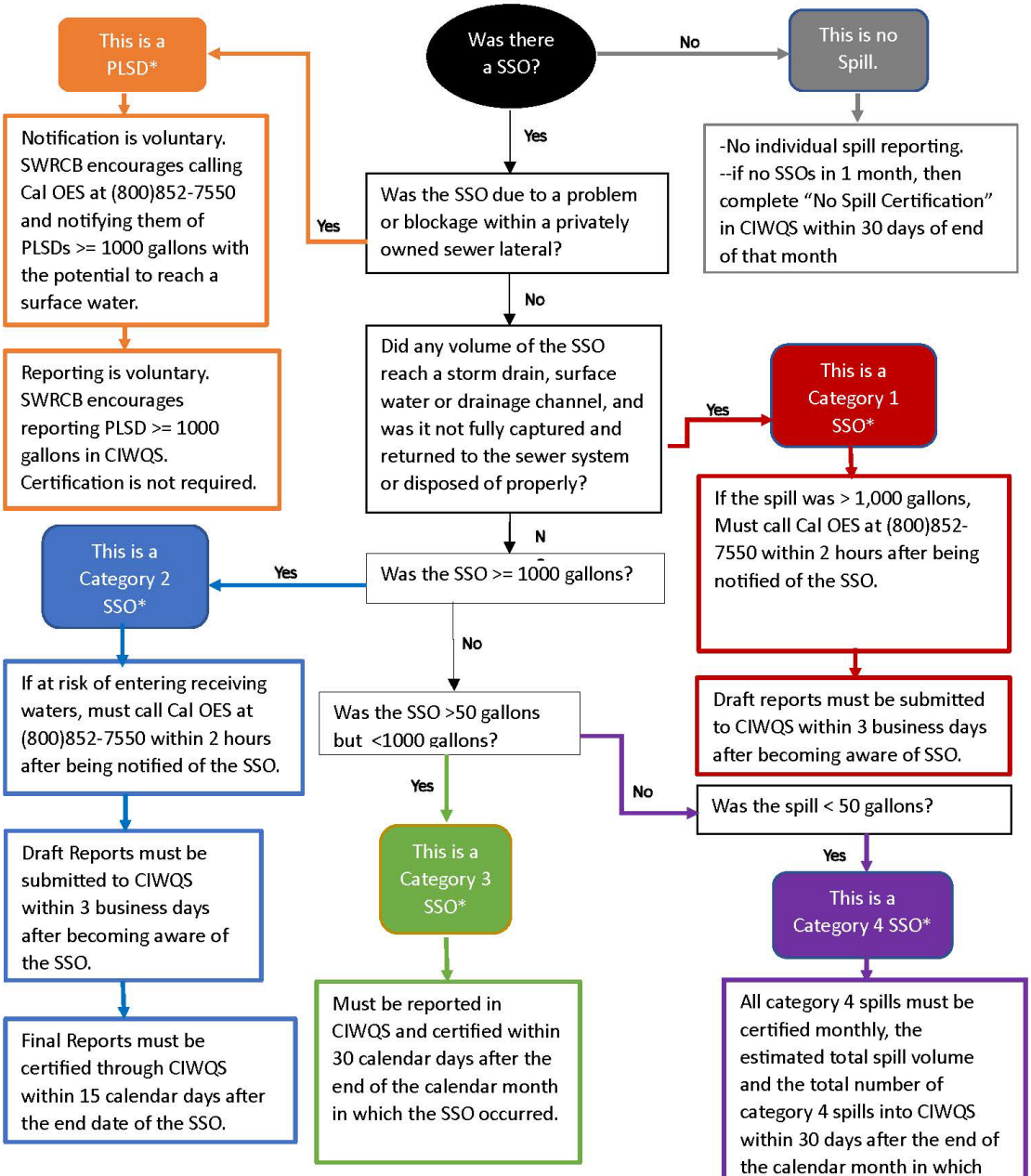
After drafting and certifying SSO Reports, the City keeps the SSO Identification Number and saves a copy of the SSO Report. For spills of 50,000 gallons or greater that discharge into a surface water, the Enrollee must submit a Spill Technical Report to the online CIWQS Sanitary Sewer System Database within 45 calendar days of the spill end date.

If no spills occur during a calendar month or only Category 4 and/or Enrollee-owned and/or operated lateral spills occur during a calendar month, the Enrollee must certify either a "No-Spill" certification statement or a "Category 4 Spills" and/or "Non-Category 1 Lateral Spills" certification statement within 30 calendar days after the end of each calendar month.

All enrollees must update their previous year's Annual Report by April 1 of each year, for each calendar year (January 1 through December 31).

The notification and reporting procedures for SSOs vary based on the category of the spill, and the Summary of Notification, Monitoring, and Reporting Requirements can be found in **Appendix B**. The following flowchart outlines a summary of those requirements.

City of Monterey
Sanitary Sewer Overflow (SSO) or "Sewage Spill"
State Notification and Reporting Overview



CIWQS – California Integrated Water Quality System, an SSO online database for reporting sewage spills to the SWRCB and public

* Notify County Health: (831)755-4500 or (831)755-4505 if the spill presents any danger to the public.

(d) Ensure that appropriate staff and contractors implement the Spill Emergency Response Plan and are appropriately trained.

Public Works Streets and Utilities Division are trained in SSO spill and emergency response including appropriate notifications and cleanup procedures through on-the-job training in accordance with SWRCB Order No. 2022-0103-DWQ Attachment D Element 4-4.2 Training. The City will maintain a log when applicable training is completed. Updated training records will be kept in the Public Works Departmentand maintained as required by the SWRCB Order.

A copy of this Spill Emergency Response Plan will also be provided to all contractors when working on the sanitary sewer system.

(e) Address emergency system operations, traffic control and other necessary response activities.

Emergency operations related to overflow response are overseen by the City of Monterey Fire Department, Police Department, and Public Works Department, as necessary. The Fire Department is typically the first responder to an incident when a call is made to 9-1-1. Their first order of business is to secure the area to prevent spill related traffic issues. Their second task is to stop any flows from entering storm drains by containment of the spill, if possible, until Public Works staff and vactor and jet truck equipment arrive. If additional emergency operations are required, the Police Department may be called in for backup and additional traffic control.

(f) Contain a spill and prevent/minimize discharge to waters of the State or any drainage conveyance system.

In addition to the initial assessment and immediate action, it is important to continue to contain the spill and prevent/minimize discharge to waters of the State or any drainage conveyance system. Here is a general plan for containing a spill:

1. Establish a safety perimeter: Ensure that the area around the spill is blocked off to prevent any public exposure. This can be done using cones, tape, or other barriers.
2. Assess the extent of the spill: Determine the size and extent of the spill, as well as any potential hazards, such as both vehicle and pedestrian traffic.
3. Contain the spill: If possible, use sandbags, absorbent materials, earthen dams, or booms to contain the spill and prevent it from spreading. This can be done by creating a perimeter around the spill or creating a dam at a low point for containment.

4. Minimize the discharge: Use a vacuum truck or other equipment to minimize the amount of wastewater that enters nearby waterways or drainage systems. This can be done by diverting the flow to a nearby manhole or other safe containment area.
5. Restore system flow by hydro jetting, rodding, open cut excavation, or by any other means to clear the blockage or failure point.
6. Notify regulatory agencies, such as the Monterey County Health Department about the spill and follow their instructions on how to properly dispose of the waste.
7. Cleanup and disinfection: Once the spill has been contained and the flow has been diverted, cleanup and disinfection can begin. This can be done using high-pressure hoses, vacuums, and other equipment to remove the waste and disinfect the affected area.

For SSO releases to surface waters, see **Appendix C** Biological Remediation Protocol For Sanitary Sewer Overflows.

(g) Minimize and remediate public health impacts and adverse impacts on beneficial uses of waters of the State.

In addition to the actions described above, the City takes steps to minimize public health impacts and adverse impacts on beneficial uses of waters of the State by implementing a comprehensive response, notification, and reporting system, which includes **Appendix C**, a Biological Remediation Protocol for Sanitary Sewer Overflows The City notifies regulatory agencies, including MCHD and CalOES as required by State regulations and ensures reporting requirements are met.

The Biological Remediation Protocol outlines an assessment process to determine the applicability of potential SSO remediation strategies and protocols that can be employed by the City to remediate SSOs that reach surface waters. The City also works closely with regulatory agencies as applicable on remediation efforts.

(h) Remove sewage from the drainage conveyance system.

Containment of SSOs is achieved by both Fire and Public Works Departments, depending on who may be first to the scene. If possible, overflows are blocked and/or diverted and contained before they reach storm drains or surface waters. Once contained and stopped the sewage is vacuumed and returned to the sewer, and the area where the overflow has occurred is cleaned. Typically, this is accomplished by flushing and vacuuming any wastewater for proper disposal, and using a sanitizing solution with a hand pump to sanitize hard surfaces where public contact may occur.

In the event that wastewater enters the drainage system, a vactor truck may be used to vacuum the sump at a downstream catchbasin, while clean water is used to flush the curb, gutter, and pipe upstream.

(i) Clean the spill area and drainage conveyance system in a manner that does not inadvertently impact beneficial uses in the receiving waters.

If the overflow reaches a storm drain or surface water, there are two (2) surface water remediation strategies that may be deployed - block and divert, or natural attenuation. Whenever deemed feasible by responding Fire or Streets field crews, wastewater will be contained and pumped back into the sewer. When conditions do not allow diversion, natural attenuation will be used. Refer to **Appendix C** the City's Biological Remediation Protocol for more information. Once containment has occurred, City crews will follow the spill downstream using Ammonia Test Strips to find the extent of the contamination. The City currently uses an Ammonia "Quick Dip" aquarium test strip for fresh and salt waters with a concentration range of 0-6.0 parts per million (ppm). These strips are utilized as an indicator of the presence or absence of sewage. The ammonia test strips indicate that anything at 0.1 ppm is in the "Stress" range.

As specified in the SWRCB Order 2022-0103 DWQ, Category 1 Spills of 50,000 gallons or greater spilled to surface waters require the City conduct water quality sampling. Currently, spills to the marine environment are evaluated by the Monterey County Environmental Health Department (MCHD), though can be sampled by the City. A spill which reaches the ocean may also result in a beach advisory or closure per MCHD. Fresh water spills are overseen by the City and MCHD on a case-by-case basis; MCHD may accompany City staff to sample spills when they are available on scene or may collect samples themselves. The City Fire Department, or Public Works Department typically shares details of cleaning or remediation actions with MCHD as requested.

(j) Implement technologies, practices, equipment, and interagency coordination to expedite spill containment and recovery.

The City of Monterey has an informal Mutual Aid agreement with the Seaside County Sanitation District (SCSD) to assist with personnel and equipment in the event of an emergency. Their contact information follows:

- SCSD Business Hours Contact: (831) 899-6700 or 911
- SCSD After Hours Contact: (831) 394-6811 or 911

Additionally, in the event of an emergency where a SSO may be eminent or when one is occurring and the City is in need of additional resources or services, outside vendors,

contractors and neighboring municipalities (through Statewide and regional mutual aid abilities) are contacted for assistance and/or equipment. A list of contractors, critical parts and equipment, vendors/suppliers, and regional mutual aid contacts can be found in the City of Monterey Sanitary Sewer Management Plan (SSMP) Appendix 13.

(k) Implement pre-planned coordination and collaboration with storm drain agencies and other utility agencies/departments prior, during, and after a spill event.

When a neighboring agency is impacted by a sewage spill originating from Monterey, they will be notified of the spill, actions taken, and potential downstream impacts. City emergency services coordinates and collaborates with partner and neighboring agencies, such as:

- California American Water Co.,
- City of Del Rey Oaks,
- City of Pacific Grove,
- City of Seaside,
- Monterey County,
- Monterey Regional Airport,
- Pacific Gas and Electric Co.,
- U.S. Navy, Naval Support Activity, Monterey,
- U.S. Coast Guard Station, Monterey, and,
- U.S. Army, Presidio of Monterey (POM).

(l) Conduct post-spill assessments of spill response activities.

Regularly, the City will review the sequence of events from notification to response, to final clean up. Part of the review will assess the effectiveness of the actions taken, and a discussion on actions that may improve future responses.

When structural damage is noted as the cause of a spill (e.g., a collapsed sewer main), an emergency work order may be issued to the City's on-call contractor to repair the pipe failure and restore flow.

When excessive rags, or Fats, Oil, and Grease (FOG) are noted as causing a spill, the City may follow up with outreach to surrounding businesses and residents, and/or the frequency of hydro jetting and inspection may also increase.

When roots are encountered, the City may add the line to the sewer root foaming preventative maintenance program.

(m) Document and report spill events as required in this General Order.

The City will follow the requirements outlined in the SWRCB Order. Details of the SERP requirements can be found in the following sections of the Order:

- Specifications 5.12 SERP,
- Specifications 5.13 Comply w/ E1 & Spill Categories,
- Attachment D Element 6,
- Attachment E1 Notification, Monitoring & Reporting Requirements, and,
- Attachment E2 Summary of Notification, Monitoring and Reporting Requirements.

(n) Annually, review and assess effectiveness of the Spill Emergency Response Plan, and update the Plan as needed.

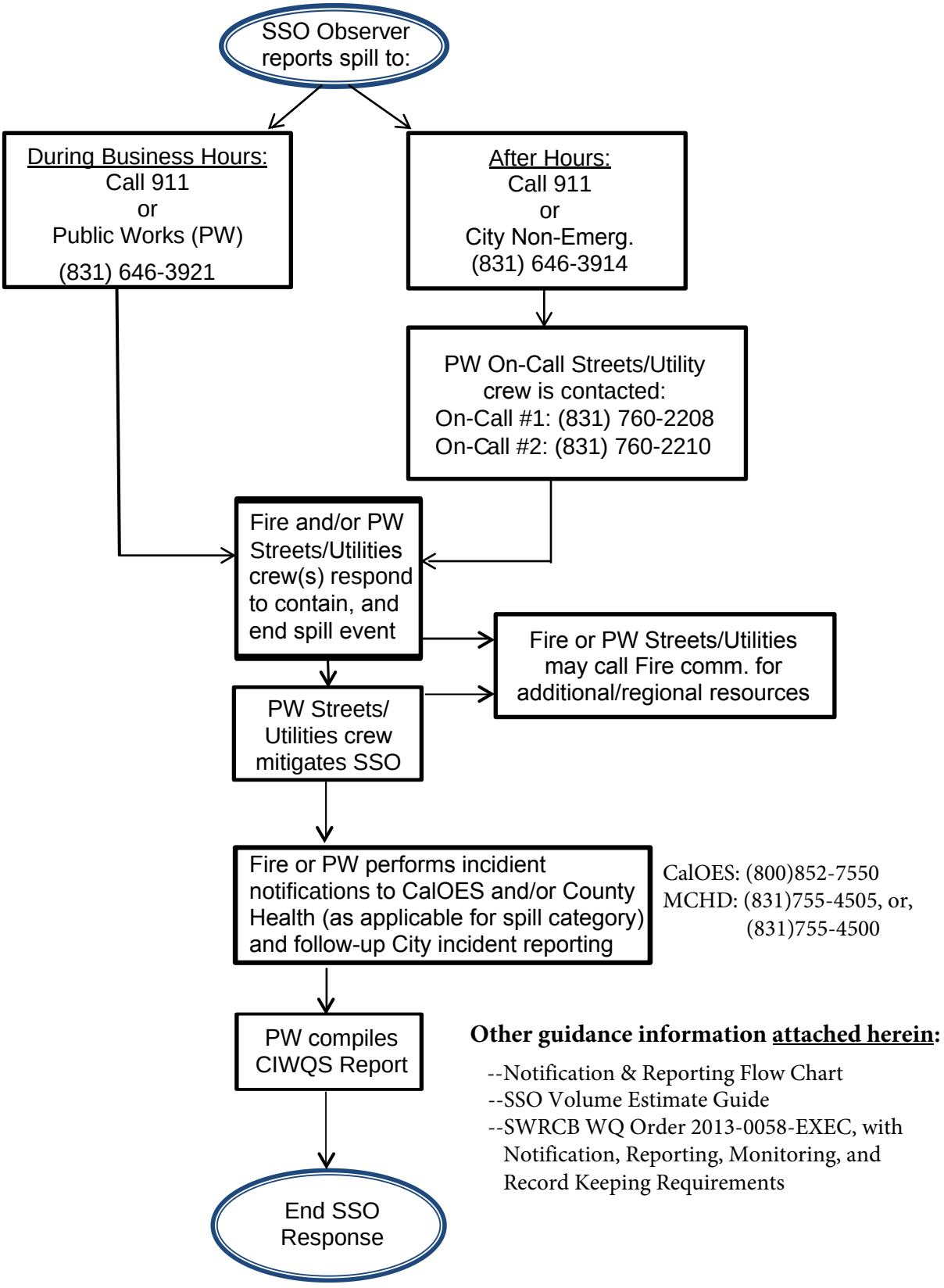
This Spill Emergency Response Plan shall be reviewed by City Staff annually and updated as needed. Any updates or changes will be logged using the SSMP update log template found in Appendix 20 of the SSMP.

Appendix A to SERP:

Chain of Communication

Appendix A

City of Monterey
Sanitary Sewer Overflow (SSO)
Chain of Communication



Other guidance information attached herein:

--Notification & Reporting Flow Chart
--SSO Volume Estimate Guide
--SWRCB WQ Order 2013-0058-EXEC, with Notification, Reporting, Monitoring, and Record Keeping Requirements

Appendix B to SERP:

Notification, Monitoring, and Reporting Requirements

ATTACHMENT E2 – SUMMARY OF NOTIFICATION, MONITORING AND REPORTING REQUIREMENTS

This Attachment provides a summary of notification, monitoring and reporting requirements, by spill category, and for Enrollee-owned and/or operated laterals as required in Attachment E1 of this General Order, for quick reference purposes only.

Table E2-1

Spill Category 1: Spills to Surface Waters

Spill Requirement	Due	Method
Notification	**Within two (2) hours** of the Enrollee's knowledge of a Category 1 spill of 1,000 gallons or greater, discharging or threatening to discharge to surface waters: Notify the California Office of Emergency Services and obtain a notification control number.	California Office of Emergency Services at: (800) 852-7550 (Section 1 of Attachment E1)
Monitoring	• Conduct spill-specific monitoring; • Conduct water quality sampling of the receiving water within **18 hours** of initial knowledge of spill of 50,000 gallons or greater to surface waters.	(Section 2 of Attachment E1)
Reporting	• Submit Draft Spill Report **within three (3) business days** of the Enrollee's knowledge of the spill; • Submit Certified Spill Report **within 15 calendar days** of the spill end date; • Submit Technical Report **within 45 calendar days** after the spill end date for a Category 1 spill in which **50,000 gallons or greater** discharged to surface waters; and • Submit Amended Spill Report **within 90 calendar days** after the spill end date.	(Section 3.1 of Attachment E1)

Table E2-2

Spill Category 2: **Spills of 1,000 Gallons or Greater That Do Not Discharge to Surface Waters**

Spill Requirements	Due	Method
Notification	**Within two (2) hours** of the Enrollee's knowledge of a Category 2 spill of 1,000 gallons or greater, discharging or threatening to discharge to waters of the State: Notify California Office of Emergency Services and obtain a notification control number.	California Office of Emergency Services at: (800) 852-7550 (Section 1 of Attachment E1)
Monitoring	Conduct spill-specific monitoring.	(Section 2 of Attachment E1)
Reporting	• Submit Draft Spill Report **within three (3) business days** of the Enrollee's knowledge of the spill; • Submit Certified Spill Report **within 15 calendar days** of the spill end date; and • Submit Amended Spill Report **within 90 calendar days** after the spill end date.	(Section 3.2 of Attachment E1)

Table E2-3
Spill Category 3: Spills of Equal or Greater than 50 Gallons and Less than 1,000 Gallons That Does Not Discharge to Surface Waters

Spill Requirements	Due	Method
Notification	Not Applicable	Not Applicable
Monitoring	Conduct spill-specific monitoring.	(Section 2 of Attachment E1)
Reporting	• Submit monthly Certified Spill Report to the online CIWQS Sanitary Sewer System Database within **30 calendars days** after the end of the month in which the spills occur; and • Submit Amended Spill Reports **within 90 calendar days** after the Certified Spill Report due date.	(Section 3.3 and 3.5 of Attachment E1)

Table E2-4
Spill Category 4: Spills Less Than 50 Gallons That Do Not Discharge to Surface Waters

Spill Requirements	Due	Method
Notification	Not Applicable	Not Applicable
Monitoring	Conduct spill-specific monitoring.	(Section 2 of Attachment E1)
Reporting	• If, during any calendar month, Category 4 spills occur, certify monthly, the estimated total spill volume exiting the sanitary sewer system, and the total number of all Category 4 spills into the online CIWQS Sanitary Sewer System Database, within 30 days after the end of the calendar month in which the spills occurred. • Upload and certify a report, in an acceptable digital format, of all Category 4 spills to the online CIWQS Sanitary Sewer System Database, by February 1st after the end of the calendar year in which the spills occur.	(Section 3.4, 3.6, 3.7 and 4.4 of Attachment E1)

Table E2-5
Enrollee Owned and/or Operated Lateral Spills That Do Not Discharge to Surface Waters

Spill Requirements	Due	Method
Notification	**Within two (2) hours** of the Enrollee's knowledge of a spill of 1,000 gallons or greater, from an enrollee-owned and/or operated lateral, discharging or threatening to discharge to waters of the State: Notify California Office of Emergency Services and obtain a notification control number. Not applicable to a spill of less than 1,000 gallons.	California Office of Emergency Services at: (800) 852-7550 (Section 1 of Attachment E1)
Monitoring	Conduct visual monitoring.	(Section 2 of Attachment E1)
Reporting	• Upload and certify a report, in an acceptable digital format, of all lateral spills (that do not discharge to a surface water) to the online CIWQS Sanitary Sewer System Database, by February 1st after the end of the calendar year in which the spills occur. • Report a lateral spill of any volume that discharges to a surface water as a Category 1 spill.	(Sections 3.6, 3.7 and 4.4 of Attachment E1)

Appendix C to SERP:

Biological Remediation Protocol

DUDEK

Appendix C

Biological Remediation Protocol

For Sanitary Sewer Overflows

Prepared for:

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May 2019

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Table of Contents

SECTIONS

Biological Remediation Protocol i
Table of Contents i
1 Introduction 1
2 SSO Response and Assessment 2
2.1 Description of Potential SSO Types 2
2.2 Standard SSO Response 2
2.3 SSO Surface Water Remediation Assessment Process 3
2.3.1 SSO Size 3
2.3.2 SSO Location 3
2.3.3 Weather Conditions 4
2.3.4 Background Surface Water Characteristics 4
3 Surface Water Remediation Options 5
3.1 General Discussion of Remediation Strategies 5
3.1.1 Surface Water Remediation Strategy: Block and Divert 5
3.1.2 Surface Water Remediation Strategy: Natural Attenuation 6
3.2 City of Monterey Surface Water Remediation Scenario Description 6
3.3 Site-Specific Remediation Protocols 6
3.3.1 Scenario 1 Protocol – SSO to Creek 6
3.3.2 Scenario 2 Protocol – SSO to Lake or Pacific Ocean 7
4 Summary 9
5 Works Cited 9

TABLES

2-1 SSO Classification 2

FIGURES

2-1 SSO Surface Water Remediation Assessment Process 3

APPENDICES

A Local Surface Waters
B Sewer System Assets
C Information on SSO Biological Impacts
D SSO to Creek Protocol Logic Flowchart
E Regulatory Agency Contact Information

1 Introduction

This document outlines a Biological Remediation Protocol for Sanitary Sewer Overflows (SSOs) for the City of Monterey (City) sanitary sewer collection system. The protocol contributes to the suite of activities the City is performing to reduce and address SSO releases to surface waters.

The City Biological Remediation Protocol was developed based on information about receiving water characteristics within City jurisdiction (**Appendix A**), the City's sanitary sewer system (**Appendix B**), typical SSO pollutants and a summary of potential SSO impacts to receiving waters (**Appendix C**). This document provides an assessment process to determine the applicability of potential SSO remediation strategies and protocols for strategies that can be employed by the City to remediate SSOs that reach surface waters.

2 SSO Response and Assessment

This section discusses categories of SSOs based on size of spill and fate of spill material in the environment. The City's current SSO response actions and procedures are presented and a process to assess remediation techniques is also outlined.

2.1 Description of Potential SSO Types

For purposes of reporting sewer spills, regulatory agencies have used a category-based classification system to define characteristics of SSOs. Criteria used to differentiate the SSO types include size of spill and fate of spill material in the environment. A general summary of the category-based classification system is presented in **Table 2-1**.

Table 2-1: SSO Classification

CATEGORY	GENERAL DEFINITIONS
1	Discharges of untreated or partially treated wastewater of any volume that: • Reach surface water and/or reach a drainage channel tributary to a surface water; or • Reach a municipal separate storm sewer system (MS4) and are not fully captured ○ Any volume of wastewater not recovered from the MS4 is considered to have reached surface water
2	Discharges of untreated or partially treated wastewater of 1,000 gallons or greater that do not reach surface water, a drainage channel, or a municipal separate storm sewer system unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.
3	All other discharges of untreated or partially treated wastewater

Source: Order No. WQ-2013-0058-EXEC [1]

2.2 Standard SSO Response

The City's Sewer System Management Plan (SSMP) includes procedures and protocols (SSMP Appendix 15 [2]) that form an Overflow Emergency Response Plan (OERP) which standardizes the City's response actions to the report of a possible sanitary sewer overflow or spill.

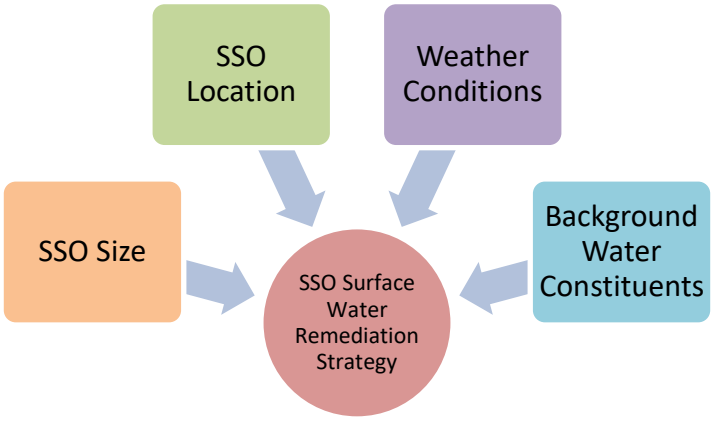
2.3 SSO Surface Water Remediation Assessment Process

The extent of needed surface water remediation resulting from an SSO depends on numerous factors such as:

- Size of spill
- Location of spill
- Weather conditions (wet or dry)
- Background water constituents in water body receiving SSO

A graphical representation of the City's SSO Surface Water Remediation Assessment Process is presented in **Figure 2-1**. Details of the specific assessment components to determine the proper SSO remediation strategy to use to remediate the environmental impacts of the spill are presented below.

Figure 2-1: SSO Surface Water Remediation Assessment Process



2.3.1 SSO Size

The flowrate and duration of the spill will determine the volume of sewage discharge to surface waters. Larger spills are more likely to impact waterbodies, especially water bodies with small flowrates or volumes such as creeks. SSO size will also determine the time required for the process of natural attenuation to remediate affected waters.

2.3.2 SSO Location

The location of the spill will determine how long it will take for the City staff to arrive at the spill location and correct the spill. Safety is of primary importance to City operations. City staff will perform a preliminary assessment of general aspects related to safety in response to reported SSOs including, but not limited to: traffic, topography, access, flowing water and other hazards. The location will also determine which surrounding areas will most likely be impacted by the spill. An SSO release to larger receiving water bodies such as a lake or the Pacific Ocean could lessen the potential for impacts and increase the possibility of natural attenuation remediation benefits.

2.3.3 Weather Conditions

Wet weather conditions will dilute the concentration of the SSO release and generally serve to mix receiving waters during storm conditions. Wet weather can also increase the flow rate of creeks. In some cases, wet weather conditions may improve natural attenuation processes. In addition, urban runoff conveys pollutants such as metals, bacteria, nutrients, and trash to receiving waters during wet weather events. The combination of SSO, urban runoff, and receiving water volumes will make up the final compilation of water in the receiving waters during wet weather. Ultimately, wet or dry weather conditions will impact the feasibility of certain remediation actions.

2.3.4 Background Surface Water Characteristics

Water bodies within the City's jurisdictional area may have flow, analytical chemistry, residence time and other surface water characteristic data that may be used to assess the extent and magnitude of potential SSO impacts to surface waters. For example, the Pacific Ocean tides and water temperatures can be gauged by National Oceanic and Atmospheric Administration (NOAA) station ID 9413450, located near the outlet of the Monterey Harbor.

If historical water quality monitoring data is available, it may used to determine whether the relative levels of impact pollutants in the water body are from the sewage spill or from other sources. It should be noted that bathymetric, access, and tidal flushing conditions are anticipated to limit the feasibility and effectiveness of potential lake and Pacific Ocean aeration efforts.

Once the City has implemented the OERP, the SSO Surface Water Remediation Assessment Process will be used to assess the need for a general approach for surface water remediation strategies based on the size, location, weather conditions, safety, and surface water characteristics specific to the SSO.

3 Surface Water Remediation Options

This section outlines remediation strategies, various SSO scenarios within the City's area, and site-specific remediation protocols.

3.1 General Discussion of Remediation Strategies

Two (2) remediation strategies were identified as potentially feasible options to remediate SSO releases to surface waters within City jurisdiction. The options include: to block and divert flow in isolated drainages during baseflow conditions, and natural attenuation of the SSO in high volume and/or tidal surface waters. A summary of the two (2) remediation strategies are listed below.

At any point of remediation, certain instances may require outside consultants (e.g. biological monitors) to assist the City in monitoring the situation and provide guidance as to what actions should be taken.

3.1.1 Surface Water Remediation Strategy: Block and Divert

The "block and divert" remediation strategy involves installing a temporary physical dam (e.g. sandbags) in an isolated surface water such as a creek area to block flow and then divert blocked flow with pumps to nearby sanitary sewer. Implementation of this strategy will be dependent on the results of the SSO Surface Water Remediation Assessment Process to determine the feasibility and estimated effectiveness of blocking and diverting flows based on the size, location, weather conditions, safety, and, if available, surface water characteristics adjacent and downstream of the SSO entry location.

Factors that should be considered to determine whether the "block and divert" remediation strategy is feasible to implement and will provide a meaningful reduction of impacts to surface waters include:

- Safety of crews for the installation of temporary barriers,
- City owned vactor trucks have a maximum tank capacity of 1,200 gallons,
- Proximity of SSO to allow pumps to safely and expediently dispose of spill directly to sewer infrastructure, and
- Large magnitude spills may be challenging to isolate with a temporary barrier.

In addition, an appropriate location downstream that allows for adequate access, minimal biological disturbance from the creation of the blockage area, and does not create traffic or other safety hazards must be identified. If during the SSO Surface Water Remediation Assessment Process, the spill has been found to have fully seeped into the creek soil, the "block and divert" remediation strategy will not be used. Based on evaluation of these factors, the City will determine if the "block and divert" remediation strategy is applicable and will provide meaningful reductions to biological or other impacts from the SSO.

It is recognized that implementation of this option may require authorization from applicable resource agencies to allow for placement of "temporary fill" in the creek bed, depending on substrate and other factors. As the need to

implement the "block and divert" remediation strategy is determined, the City will determine if any emergency action necessitates other regulatory agency emergency notifications. Potential regulatory agencies that might need to be notified of the implementation of the "block and divert" remediation strategy are listed in **Appendix E**. The City Public Works Environmental Regulations Office will assist with these determinations.

3.1.2 Surface Water Remediation Strategy: Natural Attenuation

The natural attenuation remediation strategy relies on natural processes such as ultraviolet light disinfection from sunlight, settling of materials into the bottom soil, biological uptake and tidal mixing to clean up or attenuate pollution in soil and waterbodies. Implementation of this strategy will be dependent on the results of the SSO Surface Water Remediation Assessment Process that determine the size, location, weather conditions and surface water characteristics adjacent and downstream of the SSO entry location. A number of environmental factors influence the rate and extent of natural attenuation processes. Specific to surface waters within City jurisdiction, in general wet weather flows can provide a high level of dilution in creek and lake areas. Importantly, tidal flushing of the Pacific Ocean results in residence times of less than one week. By implementing OERP, the City will limit the volume of SSOs that reach surface waters. For SSOs to surface waters in which 50,000 gallons or greater are spilled to surface waters, the City will perform water quality monitoring as required per Order No. WQ 2013-0058-EXEC [1], or as these State regulations are amended thereto.

3.2 City of Monterey Surface Water Remediation Scenario Description

Given the local waterbodies relationship to the City service area and assets, two (2) representative scenarios were identified for the purposes of planning potential remediation activities for SSOs that reach surface waters. The scenario selection was based on the two (2) most probable scenarios that would result in an SSO release to surface waters. The two (2) scenarios include:

- **Scenario 1:** An SSO to a creek, and
- **Scenario 2:** An SSO to a lake or the Pacific Ocean.

Protocols for implementation of remediation strategies for the two (2) scenarios are detailed in **Section 3.3**. An illustrative logic flow chart of the SSO to Creek Protocol (**Scenario 1**) protocol can be seen in **Appendix D**.

3.3 Site-Specific Remediation Protocols

This section details protocols for implementation of remediation strategies for the two (2) surface water remediation scenarios identified in **Section 3.2**.

3.3.1 Scenario 1 Protocol – SSO to Creek

Step 1: Begin implementation of the SSO Spill Response Protocol or Overflow Emergency Response Plan (OERP) outlined in Appendix 15 of the City's SSMP [2]. During this response, perform the SSO Surface Water Remediation Assessment Process outlined in **Section 2.3** of this document.

Step 2: After the SSO Surface Water Remediation Assessment Process has been completed, use the spill size and location to determine how much of the spill entered the creek.

Step 3: Verify the notification and water quality monitoring requirement per Order No. WQ-2013-0058-EXEC [1] are met (see i and ii bullets below).

i. If the volume spilled into the creek is 1,000 gallons or greater, verify that the California Office of Emergency Services (CalOES) has been notified per Order No. WQ 2013-0058-EXEC [1].

ii. If the volume spilled into the creek is 50,000 gallons or greater, water quality monitoring per Order No. WQ 2013-0058-EXEC [1] or as amended by the State thereto must be performed.

Step 4: Per the SSO Surface Water Remediation Assessment Process, determine if the spill volume to the creek is visible (i.e. the spill has not fully seeped into the creek bed soil) and an appropriate location downstream of the original spill location (i.e. a location with adequate access, minimal biological disturbance during the creation of the blockage area, and no creation of a traffic or other safety hazard) can be identified.

Step 5: If through *Step 4*, it is determined that the "block and divert" remediation strategy is feasible to implement and will provide a meaningful reduction of negative impacts, continue to *Step 6.*

If "block and divert" remediation strategy is not feasible or will not provide a meaningful reduction of negative impacts, a reasonable effort to collect floatables and rake solids should be made and then allow natural attenuation to remediate the spill (do not continue to *Step 6*).

Step 6: Notify City Public Works Environmental Regulations Office of the spill and the location that the "block and divert" strategy will be used. As applicable, the City Public Works Environmental Regulations Office may notify the agencies necessary (**Appendix E**) to obtain permits to place of "temporary fill" in the creek bed.

Step 7: An appropriate temporary barrier structure will be installed at the downstream end of this impacted area of the stream to stop and contain the spread of the spill. The temporary barrier should be implemented in an accessible area that provides minimal biological impact and will not cause or contribute to traffic or other safety hazards.

Step 8: Once contaminated creek flow has been successfully blocked by the temporary barrier, vactor trucks or other pumping devices will be used to divert the blocked contaminated flow to nearby sanitary sewer. This process is continued until the volume of water estimated to have been affected by the SSO is diverted to the sanitary sewer.

Step 9: Once the estimated SSO volume and affected creek flow has been diverted to the sanitary sewer, the temporary barrier will be removed and the area repaired to ambient conditions. Proper disposal of impounded material and potential mitigation for biological impacts of the placement material will follow requirements of the local municipal jurisdiction and/or applicable regulatory permits. When needed, walking paths and walkways adjacent to the affected area will be sanitized.

3.3.2 Scenario 2 Protocol – SSO to Lake or Pacific Ocean

Step 1: Begin implementation of the SSO Spill Response Protocol or Overflow Emergency Response Plan (OERP) outlined in Appendix 15 of the City's SSMP [2]. During this response, perform the SSO Surface Water Remediation Assessment Process outlined in **Section 2.3** of this document.

Step 2: After the SSO Surface Water Remediation Assessment Process has been completed, use the spill size and location to determine the volume of SSO release to the lake or Pacific Ocean.

Step 3: Verify the notification and water quality monitoring requirement per Order No. WQ-2013-0058-EXEC [1] are met (see i and ii bullets below). Notification to the City Harbormaster must be made for any SSO releases to the Monterey Harbor per the Harbor Business Response Plan in Appendix 15 of the City SSMP [2]. The City Harbormaster will notify the Coast Guard National Response Center (NRC) and the California Office of Emergency Services (CalOES) for spills in Monterey Harbor.

i. If the volume spilled into the creek is 1,000 gallons or greater, verify that CalOES has been notified per Order No. WQ 2013-0058-EXEC [1].

ii. If the volume spilled into the creek is 50,000 gallons or greater, water quality monitoring per Order No. WQ 2013-0058-EXEC [1] or as amended by the State thereto must be performed.

It should be noted that some local surface waters (see **Appendix A** of this document) have existing background levels of pollutants that are not caused by an SSO. For example, El Estero Lake has historical high background levels of bacteria and therefore, high levels of bacteria measured in El Estero Lake do not necessarily mean an SSO has created these high bacteria levels. High bacteria levels may be caused by the presence of migratory birds in El Estero Lake.

Step 4: Where feasible, remove floatables and then allow natural attenuation to remediate the spill.

In general, the physical characteristics of the lake and Pacific Ocean limit the applicability of the "block and divert" remediation strategy. The City will rely on various natural attenuation processes to limit SSO impacts to the lake or Pacific Ocean. Natural processes within the lake or Pacific Ocean include:

- Ultraviolet disinfection from sunlight
- Soil attenuation
- Tidal mixing (Pacific Ocean only)
- Fresh water dilution from creeks (during wet weather)
- Biological uptake and degradation

4 Summary

This document presents a summary of the City sewer system surrounding local surface waters (**Appendix A**), service area, assets and operation maintenance procedures (**Appendix B**). Typical pollutants and impacts from SSOs are also presented (**Appendix C**). The City's OERP provides a framework for operational response to SSOs to minimize SSO releases to surface waters. The SSO Biological Remediation Protocol is based on an assessment process to determine the size, location, weather conditions and surface water characteristics adjacent to and downstream of an SSO. Two (2) remediation protocols for SSO releases to surface waters are presented.

The City recognizes the difficulty of implementing feasible and meaningful remediation measures for SSOs that release to surface waters. The City has invested in a number of redundant systems and infrastructure at facilities to prevent sewer spills. These improvements include stand-by backup pumps and emergency generators designed to prevent SSOs from occurring. Importantly, the City also recognizes that prevention of SSOs through ongoing regular maintenance, proactive asset management, and assessment, and effective implementation of the SSMP and OERP are likely the most effective remediation measures available.

5 Works Cited

[1] State of California Water Resources Control Board, Order No. WQ 2013-0058-EXEC, 2013.
[2] City of Monterey, Sewer System Management Plan, 2018.

Appendix A

Local Surface Waters

This appendix lists typical waterbodies within the City of Monterey (City) boundary and the pollutants found in them as listed on the 303(d) list.

1 Local Surface Waters

There are three (3) distinct types of waterbodies within the City boundary (as seen in the **Figure 1.1** below):

1. **Ephemeral Creeks:** Creeks that are mostly dry unless a significant rain occurs.
2. **Lakes:** Two freshwater lakes.
    - *El Estero Lake:* A lake under City Jurisdiction that has serves as habitat for migratory birds and has historically has high levels of bacteria.
    - *Del Monte Lake:* A lake under the jurisdiction of the U.S. Navy[1].
3. **Pacific Ocean:** The saltwater Pacific Ocean contains Monterey Harbor. Monterey Harbor is within the jurisdiction of the Environmental Protection Agency (EPA) and the State of California[2].

Section 303(d) of the Federal Clean Water Act (CWA) and 40 Code of Federal Regulations (CFR) Section130.7 require states to identify water bodies that do not meet water quality standards and are not supporting their beneficial uses. Such waters are placed on the Section 303(d) List of Water Quality Limited Segments, generally referred to as the 303(d) List. This list was reviewed as part of the assessment of receiving water conditions within City jurisdiction.

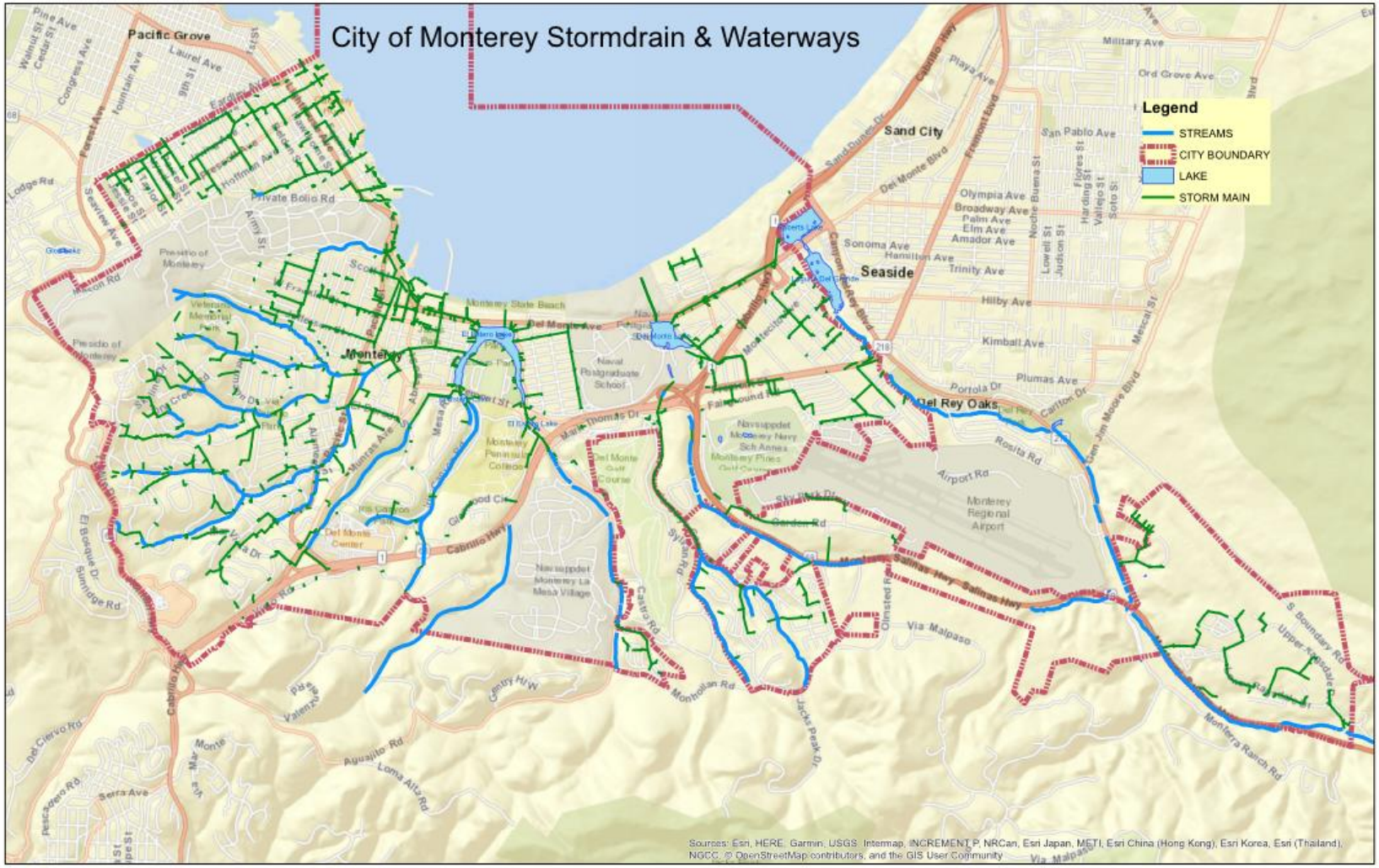
There were two (2) local waterbodies that were listed on the 303(d) list:

1. **Majors Creek:** An ephemeral creek listed with *E. coli*, copper, lead, and zinc impairments.
2. **Monterey Harbor:** A portion of the Pacific Ocean listed with Polychlorinated biphenyls (PCBs), arsenic, copper, toxicity, and dissolved oxygen impairments.

[1] Note: Since this Del Monte Lake is not within City Jurisdiction, the City is not required to perform remediation actions within this lake.

[2] The City Harbormaster coordinates with the Coast Guard National Response Center (NRC) and the California Office of Emergency Services (CalOES) for spills to the Pacific Ocean per the Harbormaster Business Plan in Appendix 15 of the April 2018 City of Monterey Sewer System Management Plan.

Figure 1-1: City of Monterey Stormdrain and Waterways



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Appendix B

Sewer System Assets

This appendix describes the condition and emergency equipment used to prevent spills at the City of Monterey's (City's) most vulnerable collection system assets, lift stations, and highlights where to find descriptions operations and maintenance of the City's other sewer collection system assets.

1 Lift Stations

The City owns seven (7) lift stations (shown in **Figure 2-1** below and described in Appendix 12 of the City's 2018 SSMP[1]) that are operated and maintained by Monterey One Water (M1W). All seven (7) of these list stations were rehabilitated between 2014 and 2016. Mesa lift station has a gravity overflow to handle emergency flow when its single pump is not running. Pebble lift station has an emergency generator to keep its single pump running during a power outage. The other five (5) of the lift stations have two pumps; one duty pump and one standby pump. If the duty pump fails, the standby pump will run while repairs or maintenance is performed on the duty pump. Therefore, every lift station is in good condition and has a backup operation plan in the case of an emergency to prevent SSOs occurring at lift stations.

2 Other Sewer Collection System Assets

More information about the City's sewer collection system assets and how they are operated and maintained can be found in the City's 2018 SSMP[1].

[1] City of Monterey, Sewer System Management Plan, 2018

Figure 2-1: City of Monterey Sewer Collection System Assets

COUNT	SHORT NAME	HANSEN CODE	ASSET_TYPE
1	MESA	E05-SLS8	SLS
2	PEBBLE	D03-SLS7	SLS
3	DLI 2	PD02-SLS5	SLS
4	DLI 1	PD01-SLS2	SLS
5	MYERS	C08-SLS4	SLS
6	218/68	H12-SLS1	SLS
7	LAGUNA GRANDE	D09-SLS9	SLS

City of Monterey
Inventory of Sewer Liftstations

Appendix C

Information on SSO Biological Impacts

This appendix highlights typical wastewater pollutants, the possible impacts of those pollutants to waterbodies, and a summary of factors that may affect the extent of those impacts.

1. Pollutants

General water quality pollutants commonly found in a SSO discharge include:

- Microbial pathogens
- Oxygen depleting substances (measured as BOD_5)
- Total Suspended Solids (TSS)
- Toxics
- Nutrients
- Floatables

Pollutants concentrations in SSOs can vary depending on spill location and recent system inputs prior to the spill. For example, spills occurring closer to industrial dischargers are more likely to have higher concentrations of toxic metals and during flu season, the sewer is more likely to contain microbial pathogens because of inputs from sick individuals. Additional information related to SSO discharge pollutants is presented below.

1.1 Microbial Pathogens

Microbial pathogens are microorganisms that at high concentrations can cause disease. The three (3) major categories of microbial pathogens present in SSOs are bacteria, viruses, and parasites. In the natural environment, various processes can inactivate pathogens, turning them into non-pathogenic organic matter. These natural processes include ultraviolet light from sunlight, heat, and predation by microbial predators.

Bacteria

Bacteria are microscopic, unicellular organisms. Two broad categories of bacteria are associated with wastewater: indicator bacteria and pathogenic bacteria. The presence of indicator bacteria is used to indicate the likely presence of disease-causing, fecal-borne microbial pathogens that are more difficult to detect. Enteric (intestinal) bacteria commonly used as indicators include total coliform, fecal coliform, *E. Coli*, and enterococci.

Pathogenic bacteria are also common in human waste and are capable of causing disease. Examples of pathogenic bacteria associated with SSOs are *Campylobacter, Salmonella, Shigella, Vibrio cholera*, and *Yersina*.

Viruses

Viruses are submicroscopic infectious agents that require a host in which to reproduce. More than 120 enteric viruses may be found in sewage (National Academy of Sciences (NAS), 1993). Examples of viruses associated with SSOs include poliovirus, infectious hepatitis virus, and coxsackie virus.

Parasites

Parasites are organisms that live in and obtain nutrients from a host organism of another species. The common parasites of human health concern in untreated wastewater are parasitic protozoa and helminths.

1.2 Oxygen Depleting Substances

Oxygen-demanding substances in water or wastewater are usually organic matter. The amount of oxygen-demanding organic matter in water or wastewater is measured as biological oxygen demand or BOD_5.The organic matter in sewage is a mix of human excreta, kitchen waste, and other substances discharged into sewer systems.

1.3 Total Suspended Solids

Total Suspended Solids (TSS) is a measure of the small particles of solid pollutants that are in water or wastewater that can be trapped by a filter. TSS in wastewater includes materials such as decaying plant and animal matter and silt. TSS is naturally removed from waters by settling or flushing into other waterways.

1.4 Toxics

Toxics are chemicals or chemical mixtures that, under certain circumstances of exposure, present an environmental or human health risk. Toxics include metals, hydrocarbons, and synthetic organic chemicals. These toxics can be naturally removed from water by adsorption, as well as biological and photochemical decomposition.

1.5 Nutrients

Nutrients in untreated wastewater are nitrogen and phosphorus. Wastewater nitrogen usually comes from human excreta (urea) and from food wastes. Wastewater phosphorus usually comes from certain soaps or detergents. Nitrogen leaves water by being assimilated into organisms or as nitrogen gas. Phosphorus leaves water by being assimilated into organisms or through settling.

1.6 Floatables

Floatables is the term used to describe the trash, debris, and other visible material discharged when sewers overflow. Possible floatables in SSOs include sanitary products and other wastes commonly flushed down a toilet. Floatables are difficult to remove from water, but some floatables are able to degrade when exposed to the natural elements.

2 Potential Impacts

This section explains how typical SSO pollutants could cause biological impacts.

2.1 Microbial Pathogens

Pathogens can cause disease in aquatic biota and illness in humans. Some pathogens only harm specific types of organisms. Cross-contamination of pathogens from a non-susceptible species to a species that is susceptible to infection by the pathogens is possible. Methods of cross-contamination include consumption of the non-susceptible species and contact with the non- susceptible species by the susceptible species.

While indicator bacteria indicate the likely presence of microbial pathogens and are not necessarily harmful themselves, pathogenic bacteria can cause human health impacts; most often gastrointestinal illness, but also pneumonia, bronchitis, and swimmer's ear.

When viruses reproduce inside of their host, whether animal, plant, or human, the reproduction process can manifest in illness in a variety of forms (EPA, 1999).Generally, viruses destroy host cells causing the host to become ill.

Parasitic protozoa such as *Giardia, Cryptosporidium*, and *Entamoeba* are known to cause acute and chronic diarrhea in humans (National Academy of Sciences (NAS), 1993).

Through receiving nourishment from their host, helminths disrupt their hosts' nutrients absorption, causing weakness and possibly disease.

2.2 Oxygen Depleting Substances

When significant amount of BOD_5 are discharged into a waterbody, dissolved oxygen is usually depleted through the uptake of oxygen by bacteria that utilize decaying organic matter. The depletion of dissolved oxygen in water bodies can be harmful or fatal to aquatic life and cause impacts such as fish kills. These harmful impacts can be lessened by natural dilution and mixing. By distributing the oxygen depleting substances throughout a large volume of water, oxygen consuming bacteria will be in a less concentrated area and dissolved oxygen levels will remain within the range required for aquatic life.

2.3 Total Suspended Solids

High concentrations of TSS in waterbodies can harm aquatic life; clog fish gills, reduce growth rates, decrease resistance to disease, impair reproduction and larval development, and reduce the volume of aquatic habitat through deposition.

2.4 Toxics

The environmental effects of toxics can be chronic (long-term) or acute (short-term). Chronic effects are subtle and difficult to identify, but can be observed by lower productivity and biomass (number of organisms), bioaccumulation of chemicals, or reduced biological diversity. Acute effects can be observed as immediate fish kills or severely reduced biologic diversity.

2.5 Nutrients

Excess amounts of nutrients can cause rapid growth of algae and nuisance plants, as well as eutrophic conditions that lead to oxygen depletion.

2.6 Floatables

Floatables can harm wildlife through entanglement or ingestion. Floatables can also impact recreational beneficial uses of surface waters.

3 Factors that Affect Extent of Impacts

Multiple factors need to be understood to determine the biological impacts that are caused from SSOs. Pollutant concentrations in SSOs vary in both space and time. Pollutant levels in an individual SSO are dependent on discharge characteristics into the sewer system, time of spill, as well as the amount and type of Infiltration/Inflow (I/I) in the subject sewer system. I/I is generally higher in wet weather.

Along with pollutant concentrations in the SSO, other factors that affect the likelihood that an organism will be adversely impacted by a pollutant. These other factors include how much of the SSO volume reaches a waterbody, the concentration of pollutants already in the receiving waterbody, the volume of water and residence time in the receiving waterbody, the duration of contact between the pollutant and the organism, the type of contact (skin contact versus ingestion), and the immune system of the organism.

Depending on the factors listed above, an SSO may or may not result in an exceedance of water quality objectives in the receiving water. Recent modeling efforts by the EPA, presented in Table 3-1, have predicted how stream flowrate (which is related to waterbody volume) and percentage of a medium strength wastewater (10,000,000 CFU/ 100 mL) spill that is delivered to the stream affects the likelihood that the wastewater spill would cause a water quality standard violation.

Table 3-1: Estimated Percentage of Time SSOs Would Cause Water Quality Standard Violation

Flow rate of stream [cfs]	Small Volume 10% delivery	Medium Volume 50% delivery	Large Volume 100% delivery
100	36%	58%	68%
1,000	13%	27%	36%
10,000	3%	9%	13%

Source: Adapted, EPA (2004) (Environmental Protection Agency , 2004)

This table displays how increased natural mixing and flushing (higher flowrates) as well as dilution (smaller spill volumes in larger stream volumes) reduce the adverse impacts caused by SSOs. Also illustrated in Table 3-1 is the fact that the likelihood that an SSO will cause adverse water quality and biological impacts varies greatly due to a suite of incident-specific and environmental variables.

4 Works Cited

Environmental Protection Agency . (2004). *Impacts and Control and CSOs and SSOs.*

EPA. (1999). *Review of Potential Modeling Tools and Approaches to Support the BEACH Program.* Office of Science and Technology.

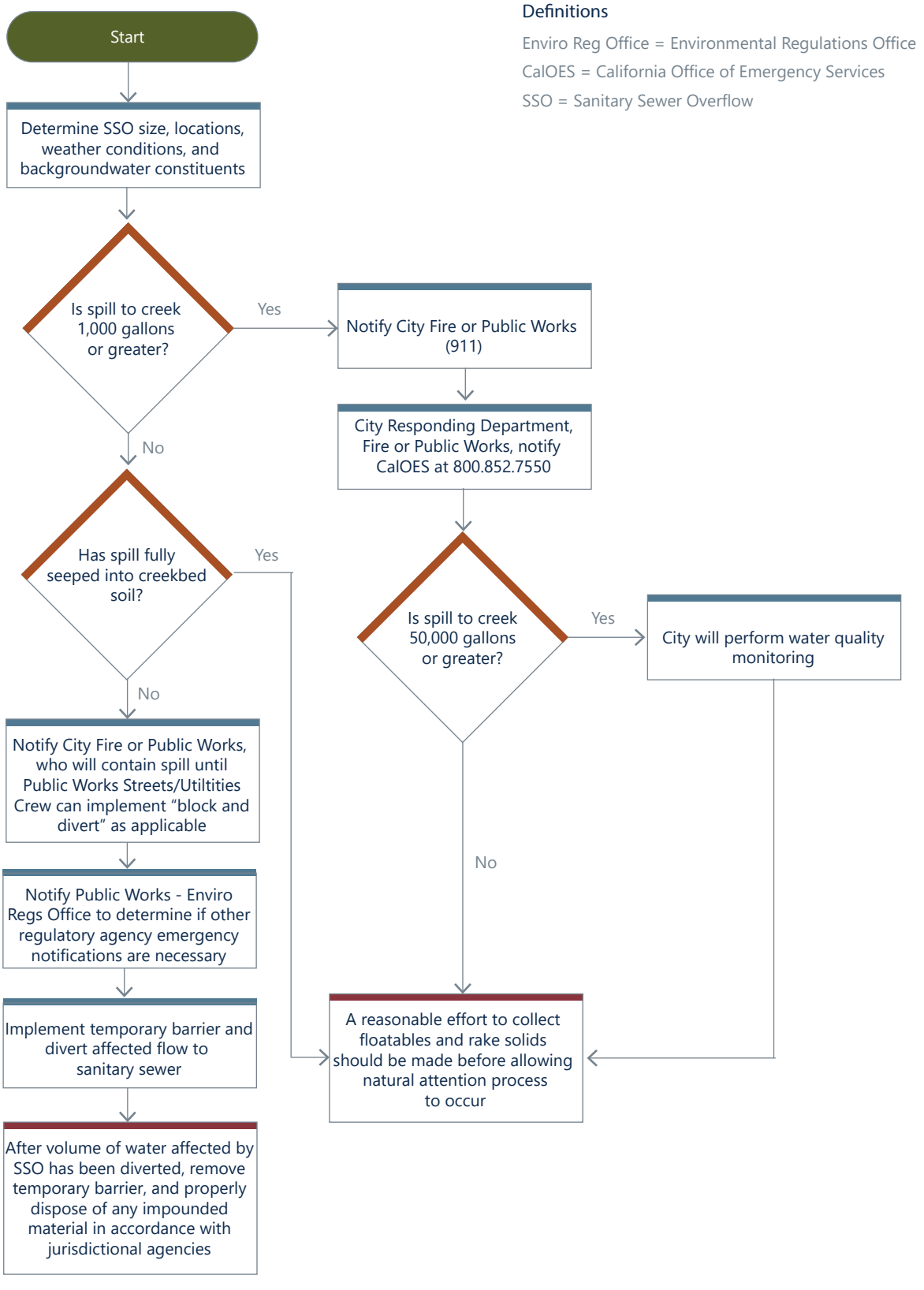
National Academy of Sciences (NAS). (1993). *Managing Wastewater in Coastal Urban Areas.* Washington DC: National Academies Press.

Appendix D

SSO to Creek Protocol Logic Flowchart

City of Monterey
SSO to Creek Protocol Logic Flowchart

Appendix C



Appendix E

Regulatory Agency Contact Information

Appendix C

Agency	District	Phone No.	Address
Regional Water Quality Control Board (RWQCB)	Region 3	805-549-3147	895 Aerovista Pl, Suite 101, San Luis Obispo, CA 93401
California Department Fish and Wildlife (CDFW)	Region 4	559-243-4005 ext. 151	1234 E. Shaw Ave, Fresno, CA 93710
United States Army Corp of Engineers (USACE)	San Francisco District	415-503-6702 (general) 415-503-6773 (permit) 415-503-6771 (enforcement)	450 Golden Gate Ave, 4th floor, San Francisco, CA 94102 1455 Market Street, 16th floor, San Francisco, CA 94103
California Coastal Commission (CCC)	Central Coast District	831-427-4863	725 Front Street #300, Santa Cruz, CA 95060