



The Bay Area Clean Water Agencies BACWA

Frequently Asked Questions: Reducing Incidence of Sanitary Sewer Overflows

Sanitary Sewer Overflows (SSOs) have a variety of causes. In addition, the impacts of SSOs vary, depending on the timing, duration, volume of wastewater flows and whether the public or surface water is exposed to the SSO.

What are sanitary sewers?

Sanitary sewers are the underground pipes that carry the flow of wastewater from all buildings, including our homes, businesses, schools, churches and government agencies, to a wastewater treatment plant. In most areas, sanitary sewers carry domestic and commercial wastewater and are independent of storm drains, which carry the runoff from rainfall. As they collect and transport water, sanitary sewer systems are also called “collection systems.”

How do Bay Area sanitary sewer systems work?

Sewer service laterals carry wastewater from each house or building to a sewer pipe under the street. These sanitary sewer pipes are called “mains” and the wastewater flows through these pipes into progressively larger pipes, which carry more and more wastewater and ultimately reach the wastewater treatment plant. Even though most wastewater treatment plants are located in low-lying areas and sewage flows by gravity to get there, sewer systems also include pumps or lift stations if it is necessary to move wastewater uphill on its way to the treatment plant.



Wastewater agencies in the Bay Area are spending millions of dollars each year to prevent sanitary sewer overflows.

What is a sanitary sewer overflow (SSO)?

A sanitary sewer overflow (SSO) is an unintentional release of sewage from a sanitary sewer into the environment.

Why are SSOs a concern?

The simple fact that wastewater is out of the pipe concerns all of us because it has the potential to impact public health and the water environment. Most SSOs are small and clean-up crews are able to recover the released wastewater before any people have contact or before it reaches a body of water. However, periodically a large overflow occurs and recovery and clean-up can be more involved, particularly if the overflow reaches a body

of water. In these less common situations, the overflow has the potential to temporarily affect aquatic life and, if the wastewater reaches a water body used for recreation, local agencies will notify the public that access should be restricted temporarily until there is no more risk to public health. SSOs also can cause private property damage if they occur along private sewer service laterals and domestic wastewater backs up in the building or releases outside above ground.

What causes sanitary sewer overflows?

SSOs occasionally occur in almost every sewer system for a variety of reasons, including the following:

Blockages	Grease build-up, debris and tree roots are the most common cause of SSOs in the Bay Area because these obstacles either block flow in the sewer (grease build-up and debris) or create cracks and leaks in the sewer (tree roots). While they don't always result in overflows, wastewater flow in a blocked sewer pipe will find the easiest point of relief. Sometimes the point of relief is a sewer lateral in which sewage travels back up into the connected building, like a home or business. As such, some local sewer authorities require that homes and businesses install a backflow prevention device.
Infrastructure failure	Sections of pipe can settle or shift so that pipe joints no longer match, leading to leaks and/or blockage. Broken or cracked pipes also allow for leaks in the pipes. Power or equipment failures can also prevent the system from functioning properly.
Infiltration and inflow (I/I)	During rainstorms or periods of continual wet weather, groundwater can infiltrate into sanitary sewers that have cracks or other structural deficiencies, potentially leading to system overload. Excess water also can inflow through roof or patio drains illegally connected to sewers, through broken or poorly connected sewer service laterals, or cracks in the sewer access holes in the street (i.e., manholes). I/I tends to increase as sewer systems age. To put this issue in perspective, some Bay Area communities rely on sewer system segments that were built 100 years ago.

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Capacity limitations	Pipes and pumps may be too small to accommodate all infiltration and inflow during large or successive storm events. To prevent overflows, most pipes are sized to provide some capacity during wet weather, but a sewer's capacity can be limited as a result of pipe failure, blockages, and/or growth in the service area that has taken up any wet weather capacity with regular dry weather wastewater flow.
Vandalism	Vandals open manhole covers and throw in wood, rocks, or other debris, which causes blockages.
Plumbers	When a plumber clears a homeowner's blocked private sewer service lateral, sometimes the debris becomes lodged in the sewer main downstream of the lateral. Plumbers' equipment also has been known to break during a repair and lodge in the main line.
Extreme storm events	During an extreme storm event the integrity and capacity of sewer pipes are tested. Sewer collection systems typically experience increased flows during wet weather, which may exceed the design capacity, as capacity is based on a specific size of storm event that happens more frequently than an extreme storm event. For example, a sewer collection system may be designed for a 10-year storm event, but a 50-year storm event would cause an overflow because there is insufficient capacity in the pipes to carry the increased wastewater flow generated during the extreme storm event.

How are agencies currently preventing SSOs?

Sewer collection systems are publicly owned and operated by public clean water agencies such as cities or special districts that are focused on protecting the public health and the environment. These clean water agencies employ trained and dedicated personnel to maintain the collection system. Well-managed collection systems receive thorough assessment of the condition, capacity and reliability of the entire system, including pipelines and pump stations. The results of the condition assessment are incorporated into a long-term capital plan, which includes annual repairs or replacements. Clean water agencies also regularly clean pipes, inspect the condition of local sewer systems using underground video equipment and prioritize needed repairs and replacements. Clean water agencies conduct programs to educate customers and plumbers about activities that can cause SSOs as well as encourage immediate reporting of potential or suspected overflows.

Who has jurisdiction over Bay Area sewer systems and wastewater treatment plants?

There are about 48 publicly owned wastewater treatment plants in the Bay Area that accept wastewater from sanitary sewers.¹ The majority of clean water agencies that own and operate treatment plants also own and

BACWA "No SSOs" Outreach Programs

BACWA and the Bay Area Pollution Prevention Group (BAPPG) are leading the way in educating food service facilities and homeowners on how to prevent SSOs caused by Fats, Oils and Grease (FOG) with a robust outreach program including advertising, educational materials, workshops and distribution of more than 50,000 commercial-grade scrapers to food service facility staff (used to dispose of FOG in the trash, versus down a drain). BACWA also is working with water agencies to educate plumbers about preventing SSOs.

For more information about these BACWA-sponsored programs, visit www.baywise.org.

operate at least a portion, if not all, of the collection/sanitary sewer systems that flow to the treatment plant. However, there are sewer systems that are owned and operated by separate public clean water agencies, often referred to as "satellite collection systems/agencies." There are about 70 of these public satellite collection system agencies in the Bay Area and each agency is responsible for the management of its own system. In other words, wastewater treatment plant operators do not have jurisdiction over satellite agencies. For example, The City of Berkeley owns and maintains its own sewer system, but conveys wastewater to the East Bay Municipal Utility District's (EBMUD) treatment plant for treatment and disposal.

How are SSOs regulated?

In 2006, the State Water Resources Control Board adopted general requirements for clean water agencies that own and operate collection systems.² The state requires that each clean water agency prepare a Sanitary Sewer Management Plan (SSMP) describing system-specific protocols for management, operations, maintenance, capacity improvements and spill prevention and response. The purpose of these plans is to prevent SSOs and enable clean water agencies to respond quickly when SSOs occur. In the San Francisco Bay Area, SSMPs were under development more than a year before the state requirements were adopted. If there is an SSO from a publicly owned sewer pipe that flows into a drainage channel or surface water, the clean water agency that owns the pipes must notify regulatory agencies, including the Regional Water Quality Control Board, the Office of Emergency Services and the local health department within two hours.

About BACWA

BACWA is a public joint powers authority whose members include public utilities that collect and treat municipal wastewater in the nine counties that surround the San Francisco Bay. BACWA is dedicated to working with our member agencies, the state and federal governments, as well as non-governmental organizations to deliver useful information about the water quality of the San Francisco Bay. BACWA works to ensure that water quality information is fully utilized to determine the health and needed protection of the San Francisco Bay. BACWA supports its public utility members, the public clean water agencies of the San Francisco Bay region, to promote understanding of the water quality needs and requirements of the region and to make water quality protection and enhancement a priority in our communities. For more information, visit www.bacwa.org.

1) San Francisco Bay Regional Water Quality Control Board.

2) State Water Resources Control Board Order No. 2006-0003-DWQ.

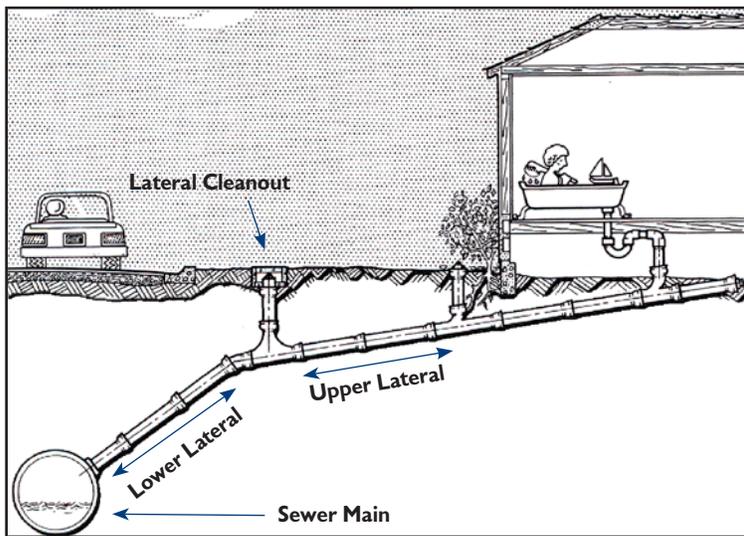


Sewer Service Laterals: What Are They and Who Is Responsible for Maintenance?

Private sewer service laterals, which typically are not under the jurisdiction of public wastewater agencies, are not always sufficiently maintained and can contribute to inflow and infiltration (I/I) problems, cause blockages and play a role in sanitary sewer overflows (SSOs).

What is a sewer lateral?

The private sewer service lateral (also known as a private lateral) is a pipe that takes an individual building's wastewater to the public sewer main in the street. These private laterals are owned by the building owner and are essential for directing wastewater away from homes, churches, schools and businesses to a publicly owned wastewater collection and treatment system.



A sewer lateral is the pipe that connects indoor plumbing to the sewer main.

As illustrated in the diagram, there are both upper and lower private laterals. The upper lateral runs from the home or business to a cleanout at the sidewalk or sometimes the property line. The lower lateral runs from the cleanout to the sewer main in the street. If no cleanout is in place, the private lateral is usually not considered split between upper and lower portions.

Who is responsible for private laterals?

In most communities, the entire private lateral is owned and maintained by the property owner. However, about 15 percent of the public wastewater agencies/public clean water agencies in the San Francisco Bay Area own and/or maintain the lower portion of the lateral closest to the sewer main.¹ In those cases, the property owner is responsible only for the upper lateral. The transition from upper to lower lateral may be defined by the property line or a cleanout near the property line, sometimes located in or at the edge of a sidewalk.

In California, public agencies are required by the State Water Resources Control Board² to manage and maintain the public portion of wastewater systems to minimize the likelihood of sanitary sewer overflows. Regular maintenance of agency-owned sewer lines typically includes scheduled cleaning, inspection and rehabilitation or replacement of defective lines to make them structurally sound and watertight. However, no similar statewide program exists for property owners to regularly clean, inspect and otherwise maintain the private laterals. Most often, property owners only attend to laterals in cases of complete stoppages or emergency failure.

Why are unmaintained sewer laterals cause for concern?

Many older homes still rely on original sewer laterals that over time have become cracked, disjuncted or damaged by roots, earth settlement or grease blockages.

Unmaintained private laterals that become blocked or fail can contribute to SSOs of the public sewer system or to sewage backups into the building served by the private lateral. Some of the causes for concern for unmaintained private laterals are described below:

- Root intrusion into the private lateral can contribute to SSOs in two ways. One way is that extra water can enter the sewer

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1) Estimated using Regional Water Board SSO reporting system registration data.

2) State Water Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WDR).

system through cracks in private laterals created by roots. This extra groundwater and storm water seeps in or “infiltrates” the public sewer mains, with the potential to cause wastewater collection and treatment system overloads such as SSOs. The other way is when a plumber cleans out a lateral blocked by roots, the plumber sometimes will push the root mass into the public sewer main. This mass can then cause a blockage in the public sewer main, cause wastewater to back up and result in an SSO.

- Earth settlement that results in cracks and leaks in the private lateral allows for the “inflow” of groundwater into the private lateral. This additional groundwater flows into the public sewer main, increases the wastewater flow in the collection system and has the potential to overload the system, creating SSOs.
- If roof drains, irrigation drains and driveway drains are connected (illegally) to the private lateral, this increases the “infiltration” of rain water into the public sewer system, which can lead to system overloads.
- Grease build-up in the private lateral (like plaque in a person’s artery) can cause blockages that potentially result in on-site SSOs or backups of wastewater into the building that is served by the blocked private lateral.

The combination of inflow and infiltration from private laterals, across a wide area (neighborhoods or commercial districts), can significantly increase the wastewater flow in the public sewer main and to the treatment plant. Infiltration and inflow from private laterals are currently a major source of SSOs in some communities.

Fats, Oils and Grease (FOG)

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What is the magnitude of the sewer lateral problem?

The magnitude varies considerably among different systems. It is estimated that private laterals can constitute as much as 50 percent of the total length of all the pipelines in some wastewater systems. Therefore, it is likely that poorly maintained laterals can contribute significantly to I/I problems or produce blockages and resulting SSOs. This is especially true during wet weather if roof or driveway drains are illegally adding flow to the private laterals.

What are strategies for managing sewer laterals?

Property owners should be encouraged to inspect their private lateral upon property transfer and then at least once every five to 10 years to determine if it is defective or if a blockage is building up in the line. If problems exist, a contractor should be hired to correct the problem.

Some public clean water agencies have implemented private lateral inspection and replacement programs with a variety of approaches, including:

- Enacting local ordinances requiring lateral inspection and repair upon certain triggers, such as at property transfer or remodels exceeding a specific square footage or number of plumbing fixtures.
- Providing grant or loan money for property owners to repair laterals at a reduced cost.
- Seeking out property owners to volunteer for inspection and repair of their laterals by the public agency (which then performs the work).

It should also be noted, however, that many public clean water agencies have not yet pursued regulatory or maintenance programs for private laterals for various reasons, including:

- I/I from private laterals is not a high priority for a particular community, for example, if the system is relatively new or for some other reason is not subject to excessive I/I.
- Additional costs and labor associated with implementing private lateral programs may be prohibitive.
- Real estate industry organizations have been resistant to programs for private lateral inspection and repair, especially if they are at the point-of-sale of property.

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