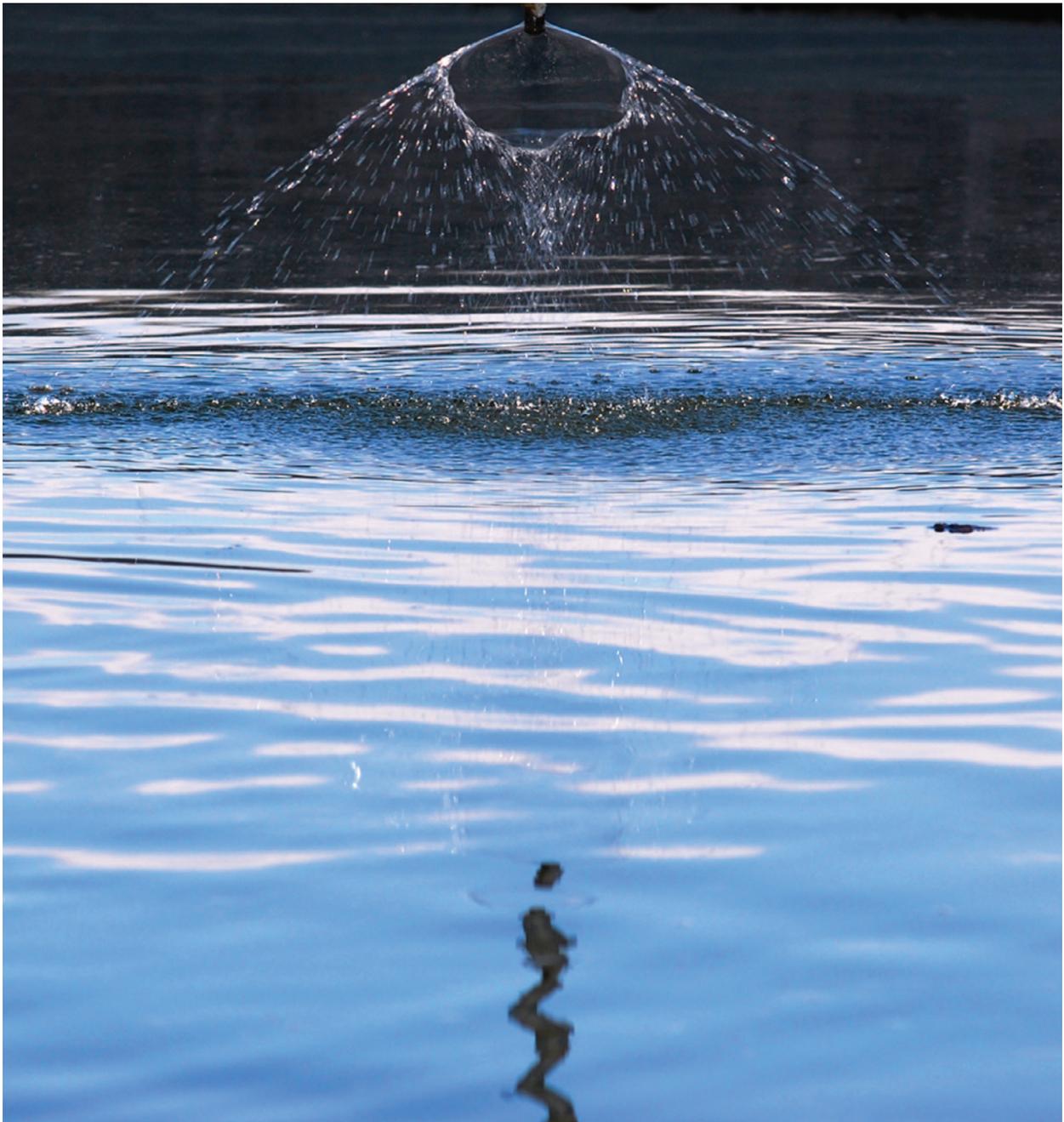


Abridged Edition

L A Y P E R S O N ' S   G U I D E   T O

# California Wastewater

*Prepared by the Water Education Foundation*



# Contents

The *Layperson's Guide to California Wastewater* is prepared and distributed by the Water Education Foundation as a public information tool. It is part of a series of Layperson's Guides that explore pertinent water issues in an objective, easy-to-understand manner.

The mission of the Water Education Foundation, an impartial, nonprofit organization, is to create a better understanding of water resources and foster public understanding and resolution of water resource issues through facilitation, education and outreach.

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*The unabridged guide includes these additional sections:*

- **Legal and Regulatory Primer**
- **Collection and Conveyance**
- **Treatment and Disposal**
- **Current Challenges**
- **Case Studies**

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## Editor's Note

This is an abridged version of the *Layperson's Guide to California Wastewater*. The complete 28-page guide is available through the Water Education Foundation website under the Products Link at [www.watereducation.org](http://www.watereducation.org)

Often referred to as mini-textbooks, the Foundation's popular Layperson's Guide series offers readers an easy-to-understand, broad overview and perspective on a variety of important water topics. The pamphlets, which range from 20 to 28 pages, are periodically updated to include the most recent information. The guides can be purchased as a set or individually. Currently 17 titles are available.

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## On the Cover:

The secondary clarifier at the Western Water Recycling Facility.  
Photo by Western Municipal Water District, Michael J. Elderman Photography

# Introduction

Several years ago when the *British Medical Journal* polled its readers, including Americans, on the most important medical milestone since 1840 (the year the journal was first published), they chose the introduction of clean water and sewage disposal – “the sanitary revolution.” Imagine that sanitation got more votes than the discovery of antibiotics and the development of anesthesia.

In the developing world, inadequate sanitation remains a major problem. According to a report, “Progress on Drinking Water and Sanitation 2012,” issued by UNICEF and the World Health Organization, “Only 63 percent of the world now have improved sanitation access, a figure projected to increase only to 67 percent by 2015, well below the 75 percent aim in the Millennium Development Goals. Currently 2.5 billion people still lack improved sanitation.” Water For People cites similar statistics.

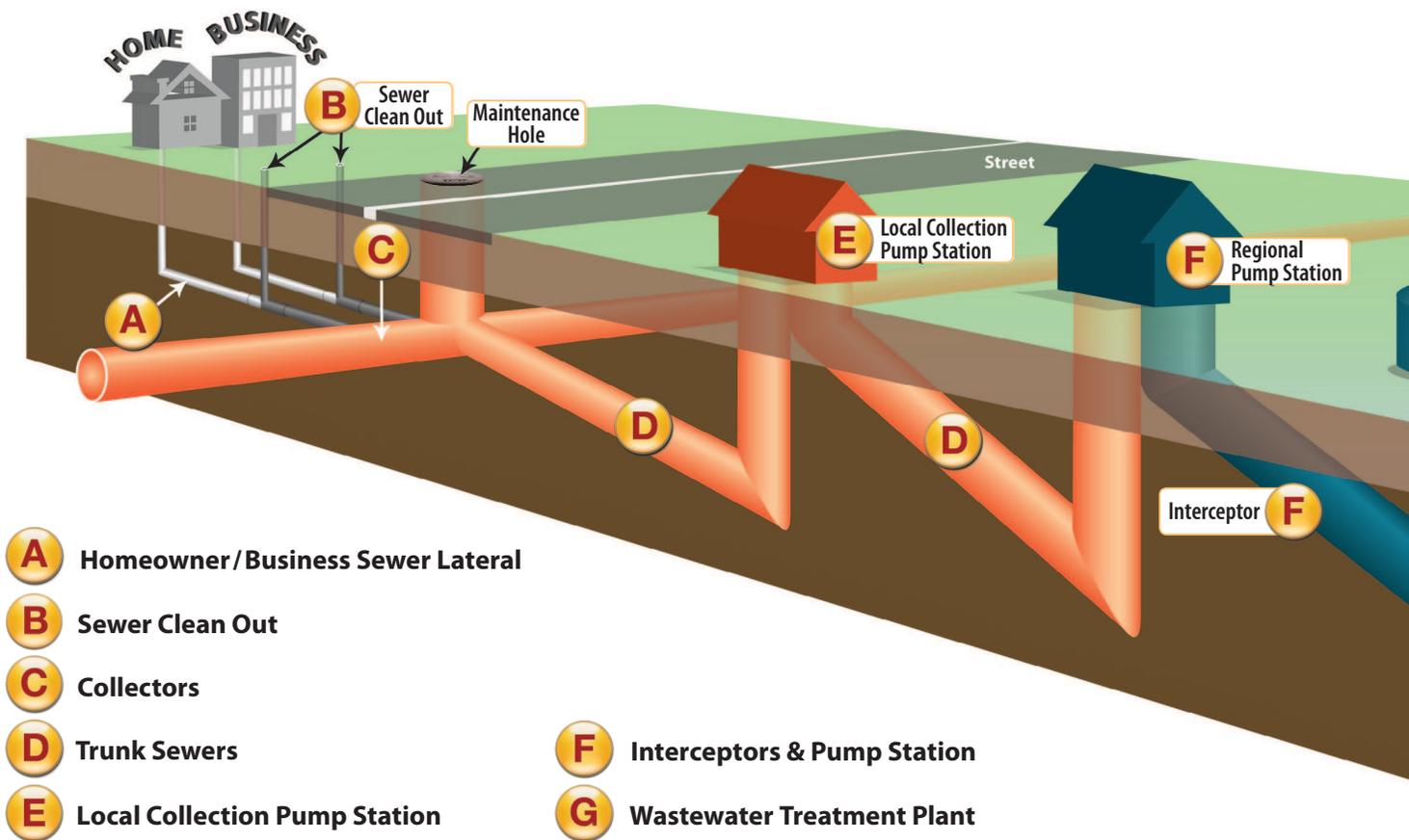
But what is the situation on the home front?

According to 2012 statistics from the U.S. Environmental Protection Agency (EPA), in the 40 years since its passage [in 1972], the Clean Water Act has kept tens of billions of pounds of sewage, chemicals and trash out of the nation’s waterways; 92 percent of Americans have

round-the-clock access to safe, clean drinking water that meets national health standards; and more than two-thirds of America’s assessed waterways meet water quality standards.

In California, 100,000 miles of sanitary sewers and more than 900 wastewater treatment plants manage the approximately 4 billion gallons of wastewater generated every day by the state’s citizens, businesses and visitors, according to the 2012 California Infrastructure Report Card prepared by the American Society of Civil Engineers (ASCE). “This engineered wastewater infrastructure serves their ratepayers and customers and visitors very well in their mission to protect public health and the environment,” the report card noted in an excerpt.

The state’s wastewater collection, conveyance, treatment, reuse and disposal services are provided primarily by a variety of public agencies, including cities, counties, joint powers authorities and special districts such as sanitary, sanitation and community services districts. In addition, there are some privatized systems, and where treatment plants are not available or feasible, such as in sparsely populated rural areas, individualized on-site sanitation systems like septic tanks and leach lines are used.



Very complicated and technical state and federal government laws and regulations protect the water quality of California's more than 1.6 million acres of lakes, more than 1.3 million acres of bays and estuaries, 211,000 miles of rivers and streams and 1,100 miles of coastline.

Depending on geography, a mixture of pipes, hydraulic structures and pumping facilities collect and convey the wastewater from residences, schools and businesses to treatment facilities that use physical, biological, chemical and advanced processes to reduce or remove organic matter, solids, nutrients, disease-causing organisms and other pollutants before discharging the treated wastewater into rivers, oceans, lakes, and other water bodies or onto land.

Used water (wastewater) from activities such as flushing toilets, bathing and washing clothes contains harmful bacteria and viruses that can cause diseases. Before being returned to the environment, it must be cleaned (treated) to meet standards set by state and federal government agencies.

Mother Nature has natural cleansing processes of sunlight, plants, bacteria and filtration by soils. However in a heavily populated world, Mother Nature's capabilities are not enough. As a result, wastewater treatment systems are essential. They typically work by enhancing, speeding up and simulating the filtration, decomposi-

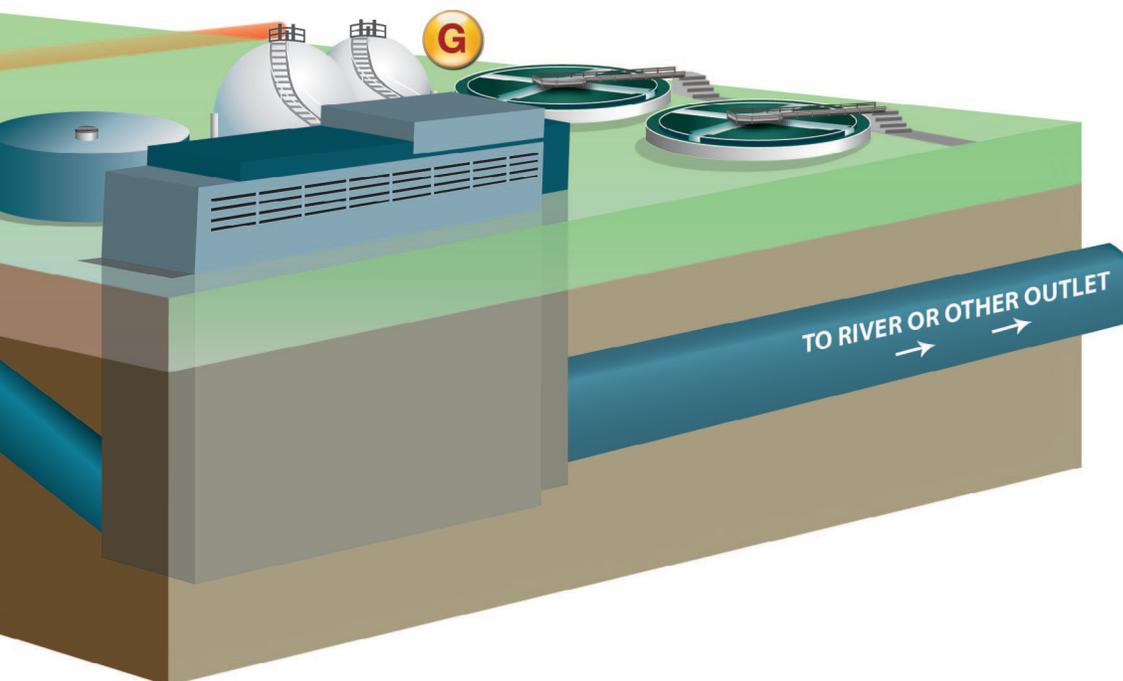
tion and disinfection processes that occur naturally in the environment.

With sanitation as vital today as in the past, the California wastewater community is at a crossroads.

Infrastructure designed and built a generation ago with funding from the federal government must be expanded, upgraded or rebuilt to provide the most reliable and efficient services possible. The large federal and state grants of past decades are generally not available today, so new sources of financing mechanisms must be found to pay for these large capital improvement projects with as little impact to ratepayers as possible.

Increasing population demands on current system capacities and maintaining and upgrading facilities to comply with current and future regulatory requirements, including emerging contaminants, are among the other issues facing the wastewater community. Climate change and extreme weather events are also concerns that may lead to the need for future projects.

This guide, part of an ongoing series by the Water Education Foundation, provides an overview of basic background information on California laws and regulations, wastewater collection and treatment processes, history, current challenges, and case studies. Related issues are discussed in the *Layperson's Guide to Water Recycling*.



*In this diagram for the layperson, the general process of wastewater collection, conveyance, treatment and disposal are illustrated.*

## Glossary

**Biosolids** – The solid organic material that is separated during the wastewater treatment process, treated according to regulations to the point that it is a usable product, and then recycled.

**Clarify** – To make clear or pure by separating and eliminating suspended solid material.

**Coagulation** – The clumping together of solids so they can more easily be settled out or filtered out of water.

**Collection System** – The sewer system of pipes that carries wastewater from homes and businesses to a treatment plant or reclamation plant.

**Combined Sewer** – A wastewater collection system that carries both raw sewage and stormwater to a treatment plant.

**Disinfection** – Final step in the treatment process. Commonly, chlorine is added to the treated wastewater to kill disease-causing organisms. There are other alternatives for achieving disinfection, including ultraviolet light.

**Effluent** – Treated wastewater flowing out of a treatment plant.

**Filtration** – The process of water passing through porous material such as sand or synthetic membranes to trap and remove particles.

**Influent** – Untreated wastewater that enters a wastewater treatment plant.

**Primary Treatment** – First major treatment in a wastewater treatment facility that removes solids and floating matter using screening, skimming and sedimentation.

**Publicly Owned Treatment Works (POTWs)** – Public wastewater systems built, operated and maintained by government agencies. They include sewer pipes, maintenance holes (formerly called manholes), pumps, treatment plants and other related infrastructure.

**Reverse Osmosis** – A method of removing very small particles, including salts or other ions, from water by forcing water through a semi-permeable membrane.

**Secondary Treatment** – The biological portion of wastewater treatment that relies on the growth of microorganisms to clean the wastewater after primary treatment. Several different types of secondary processes can be used, including activated sludge, trickling filters, pond systems and wetland systems.

**Sedimentation** – The settling of solids in a body of water using gravity.

**Sludge** – The organic solid waste material that settles out in the wastewater treatment process. If sludge is converted into a usable end product, it is no longer called sludge.

**Tertiary Treatment** – Additional treatment processes used to clean wastewater even further following primary and secondary treatment. Normally implies the removal of nutrients, such as phosphorous and nitrogen, and a high percentage of suspended solids. Also known as advanced treatment.

**Wastewater** – The mixture of used water and human waste carried away by drains and sewers.

**Water Recycling** – The treatment of wastewater to make it suitable for a beneficial reuse, such as landscape irrigation or groundwater recharge. A separate *Layperson's Guide to Water Recycling* has been published by the Water Education Foundation and is available at [www.watereducation.org](http://www.watereducation.org)



## Resources

**Bay Area Clean Water Agencies** – A local government agency created by a joint powers agreement in 1984. Its membership includes wastewater agencies that provide sanitary sewer services to more than 7 million people living in the nine-county San Francisco Bay Area. Principal members include the Central Costa County Sanitation District, the city of San Jose, East Bay Dischargers Association, East Bay Municipal Utility District and San Francisco Public Utilities District. <http://bacwa.org>

**California Association of Sanitation Agencies** – A statewide trade association of municipalities, special districts and joint powers agencies that provide wastewater collection, treatment and water recycling services. CASA was founded in 1955 and CASA members represent more than 90 percent of the sewered population of California. [www.casaweb.org](http://www.casaweb.org)

**Central Rural Water Association** – Provides on-site technical assistance and specialized training for rural water and wastewater systems. <http://www.calruralwater.org>

**Central Valley Clean Water Association** – A regional association representing wastewater treatment and collection system agencies in the Central Valley. <http://www.cvcwa.org>

**California Water Environment Association** – A statewide nonprofit public benefit association whose mission is to protect the water environment by educating, training and certifying the competency of individuals who work in the water quality field. Approximately 80 percent of CWEA's more than 9,000 members work for municipal wastewater agencies and collection systems, both large and small, throughout California. [www.cwea.org](http://www.cwea.org)

**Southern California Alliance of Publicly Owned Treatment Works** – A nonprofit corporation of more than 90 wastewater treatment and collection system agencies and one large regional water treatment agency. Together, its membership collects and/or treats the wastewater for more than 16 million Southern Californians in seven counties. [www.scap1.org](http://www.scap1.org)

**My Water Quality Website** – Sponsored by the California Water Quality Monitoring Council, a joint partnership between the California Environmental Protection Agency, the California Natural Resources Agency, and several stakeholder organizations from both inside and outside state government. State legislation in 2006 mandated water quality monitoring and assessment activities be coordinated and information be made available to decision makers and the public via the Internet. <http://www.CaWaterQuality.net>