

LEVELED BOOK • R

What Happens When You Flush?

MULTI
LEVEL
O•R•U

Written by Lisa Meltzer

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Focus Question

Where does sewage go,
and how is it treated?

Words to Know

| | |
|----------------|------------------|
| digester | septic system |
| drainage field | sewage |
| filter | sewage treatment |
| organisms | plant |
| pollutants | sewerage systems |

Page 3: This pond at a sewage treatment plant helps bacteria grow. The bacteria in turn break down the sewage.

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Correlation

| LEVEL R | |
|-------------------|----|
| Fountas & Pinnell | N |
| Reading Recovery | 30 |
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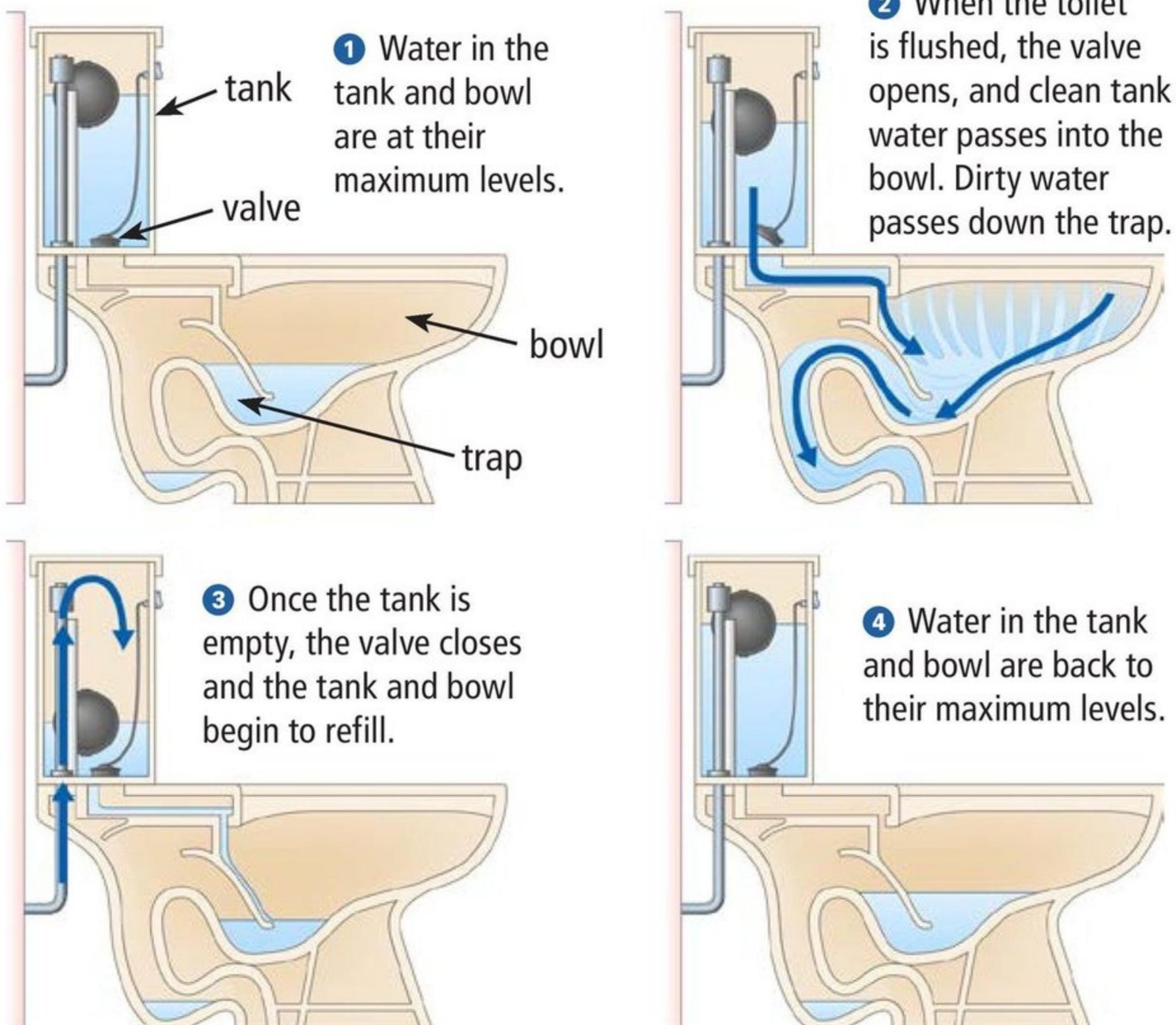
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Introduction

SWOOSH! You hear this sound every time you flush a toilet. But did you ever stop to wonder where everything that you flush down winds up?

Getting rid of waste takes more than just pushing the handle on a toilet. In fact, it is often a complex process. That process can stretch over (or under) many miles in your city or town.

First, the Flush

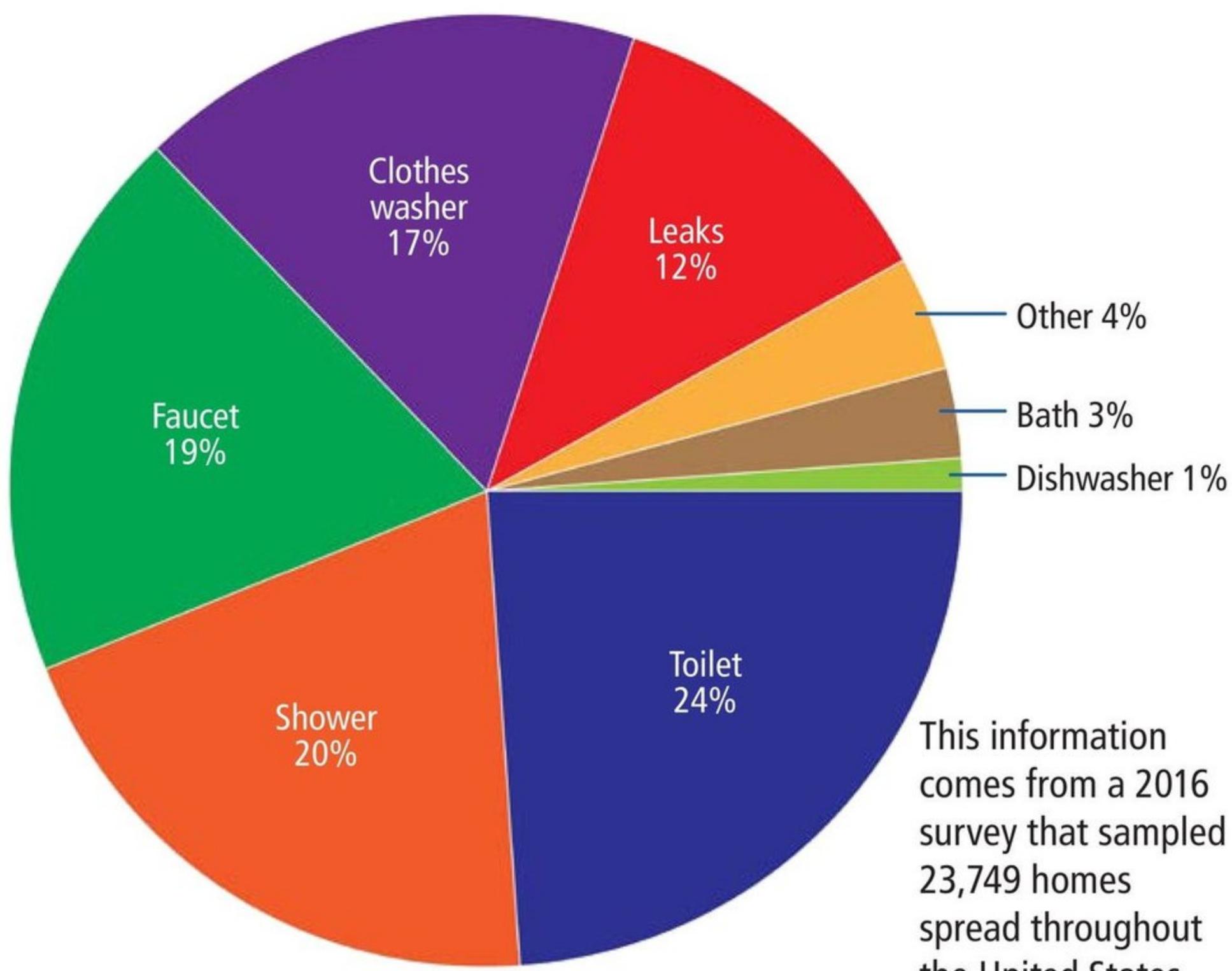


Where Does Waste Come From?

Where Does It Go?

Human waste is called **sewage**. In most homes, it is created by using the toilet, taking showers, doing the dishes, washing clothes, or doing anything that makes water dirty. The average American turns about 100 gallons (380 L) of water into sewage each day. Factories and restaurants create sewage, too. In time, all this sewage could reach our drinking water, making it unsafe.

What Makes Up My Sewage?





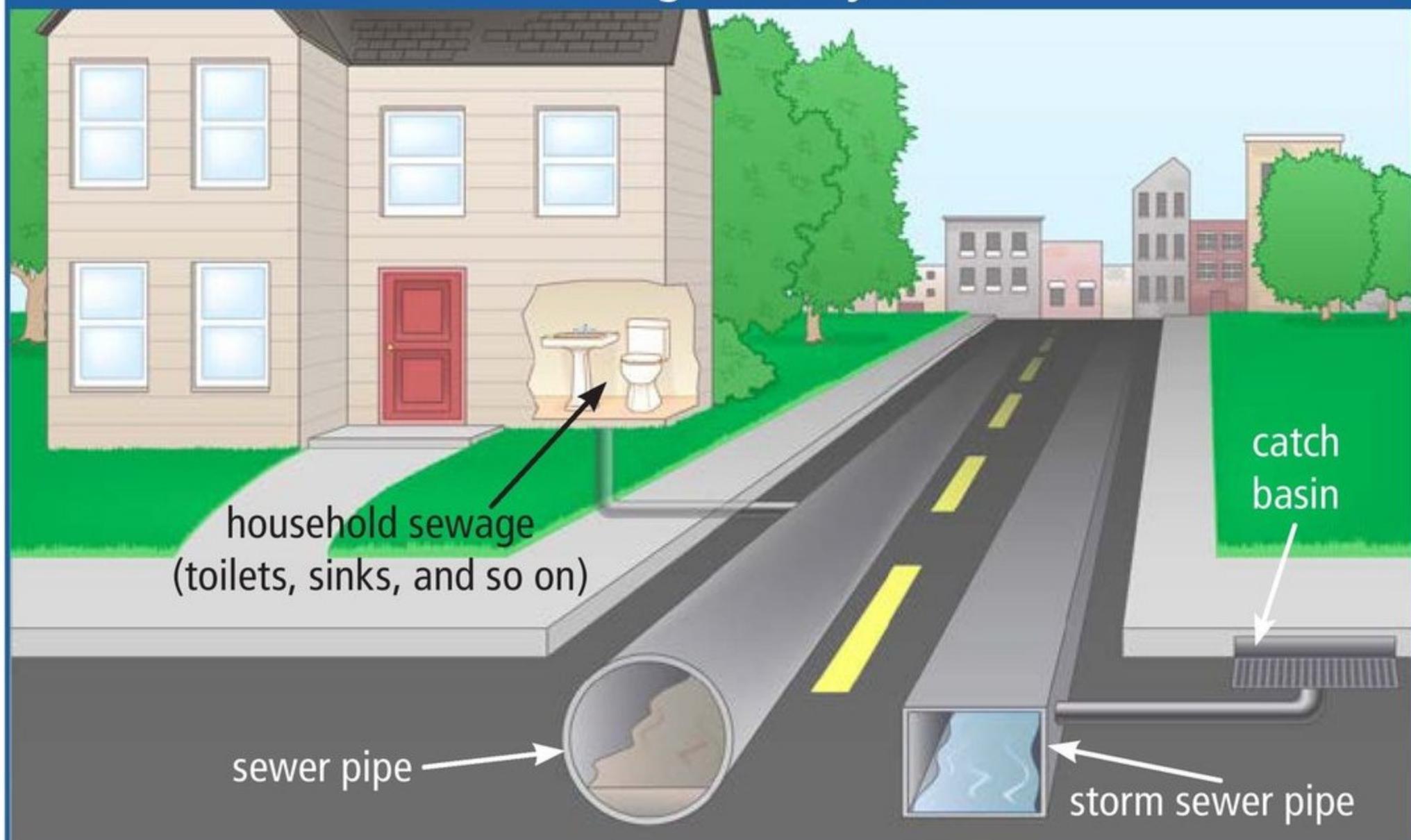
A boy drinks from a water pipe crossing an uncovered sewage canal.

treatment experts are working hard to solve this problem, but it is a huge task.

Fortunately, the sewer pipes in our homes don't just empty into our drinking water. Instead, in many cities and towns, all of this dirty water ends up in the local sewerage system. Small sewer pipes join up to form bigger and bigger pipes. Some are so big that humans can walk through them!

More than two billion people around the globe have no flush toilets or **sewerage systems**. Most of their waste either piles up on the land or runs into lakes and rivers. Millions of people die each year from diseases that come from sewage. Sewage

Two Underground Systems



Sewer pipes carry waste to the sewage treatment plant. Some storm sewer pipes carry rainwater to the plant as well. Others carry rain directly to creeks, ponds, and other waterways.

Inside the Treatment Plant

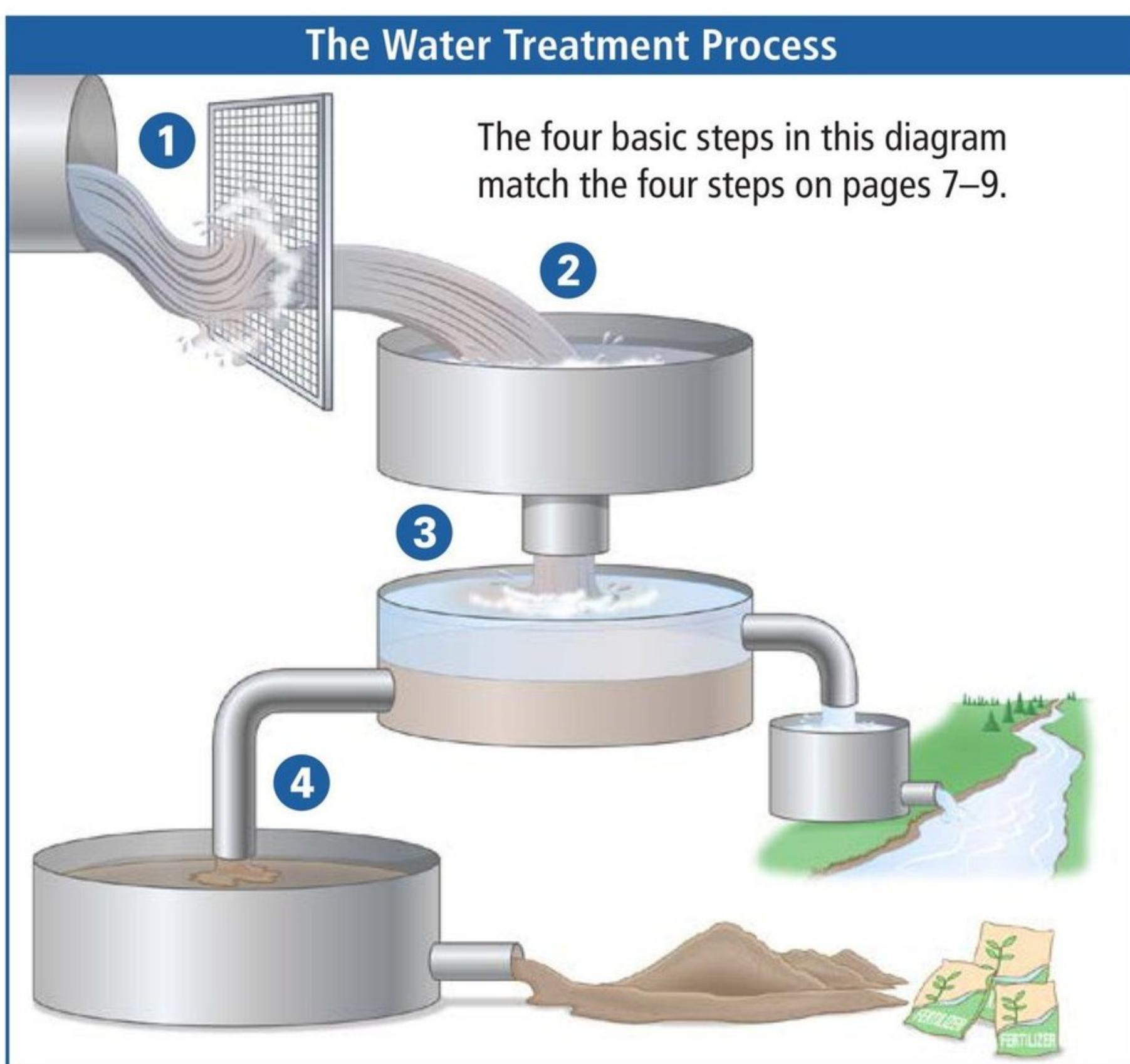
The sewage moves through this large group of pipes to a **sewage treatment plant**. Here, the water is cleaned. **Organisms** that can cause disease and other **pollutants** are removed.

Not all sewage treatment systems are alike. One common type cleans sewage in the following way:

STEP 1 A big screen (think of a giant kitchen strainer) removes large items such as rocks, sticks, and garbage. That way, they don't jam the treatment plant's machines.

STEP 2 What is left over after this process is called *sludge*, which is thick, dirty water. The treatment plant pumps air into the sludge, which helps bacteria grow. These helpful bacteria eat the sludge to break it down.

STEP 3 Next, the broken-down sludge is sent to another machine. Here, all of the solid waste settles to the bottom. The water at the top is sent to a **filter** that cleans it further.



The tanks many city plants require are huge. San Francisco, California, has a water treatment plant that handles 60 million gallons (227 million L) a day and 250 million gallons (946 million L) on rainy days.

Once it's safe, this water can be sent to a local waterway—a stream, lake, or the sea.

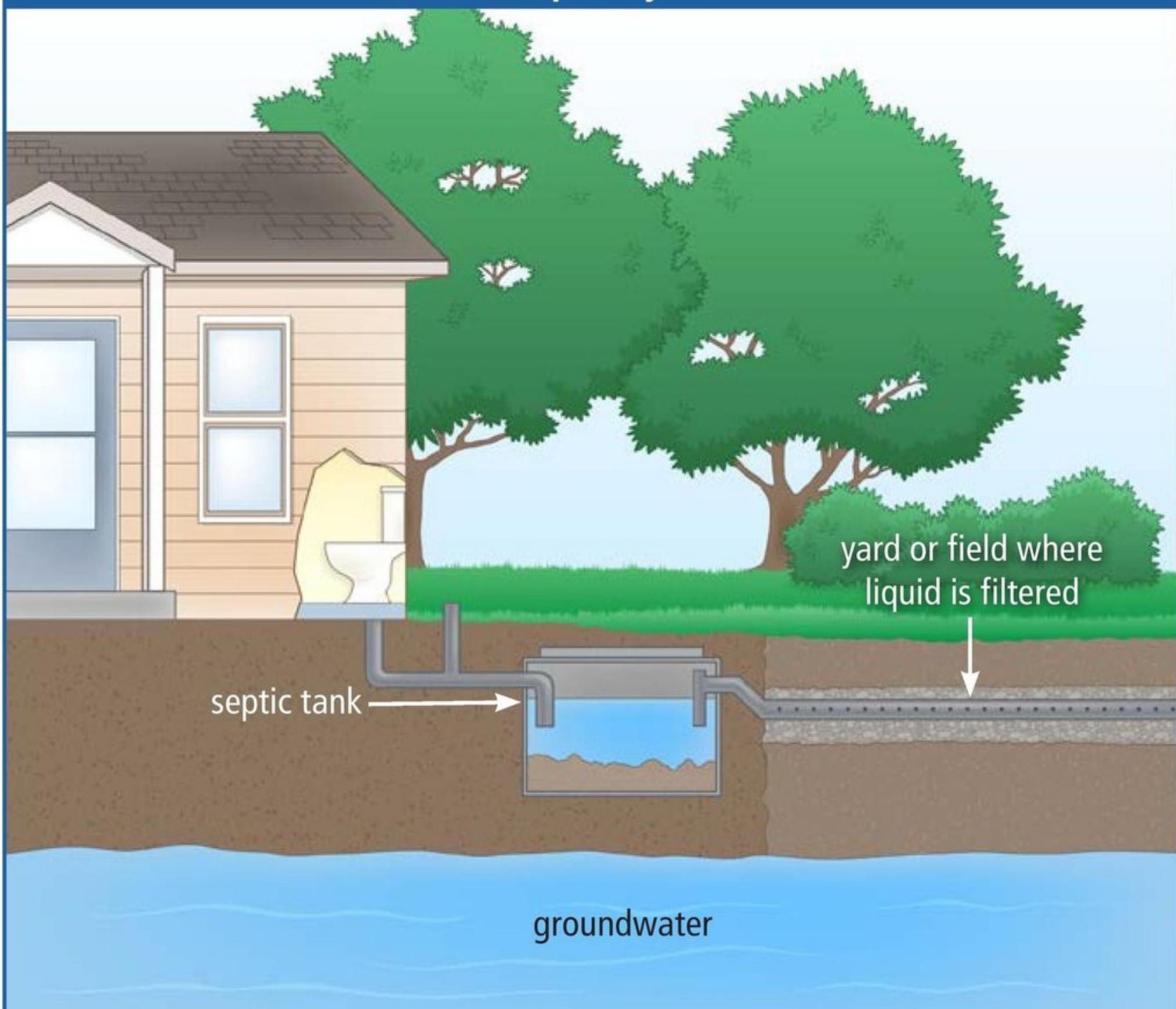
STEP ④ Meanwhile, the solids are sent to a giant tank called a **digester**. Here, a second kind of helpful bacteria eats—and digests—much of the sludge.

The digester breaks down the solid sludge even further and pulls more water from it. About half of the sludge turns into gas, some of which the treatment plant uses to help power its machines. The other half of the sludge is dried. It's often used on farm fields because it adds organic matter and fertilizer to poor soils.



Reclaimed water irrigates a golf course in the desert southwest. Reusing sewer water saves precious fresh water. A desert golf course can use the same amount of water in one day that a family of four does in five years.

The Septic System



Septic systems send liquid to the soil, which filters it. Solids stay in the tank.

The Septic System—Another Way to Deal with Waste

Many homes in the country are far apart from each other. Building a sewerage system large enough to serve homes so far away from one another wouldn't make much sense. Instead, these homes send human waste into a **septic system**. This is a small sewage treatment system that serves only one home. It consists of a septic tank and a **drainage field**.

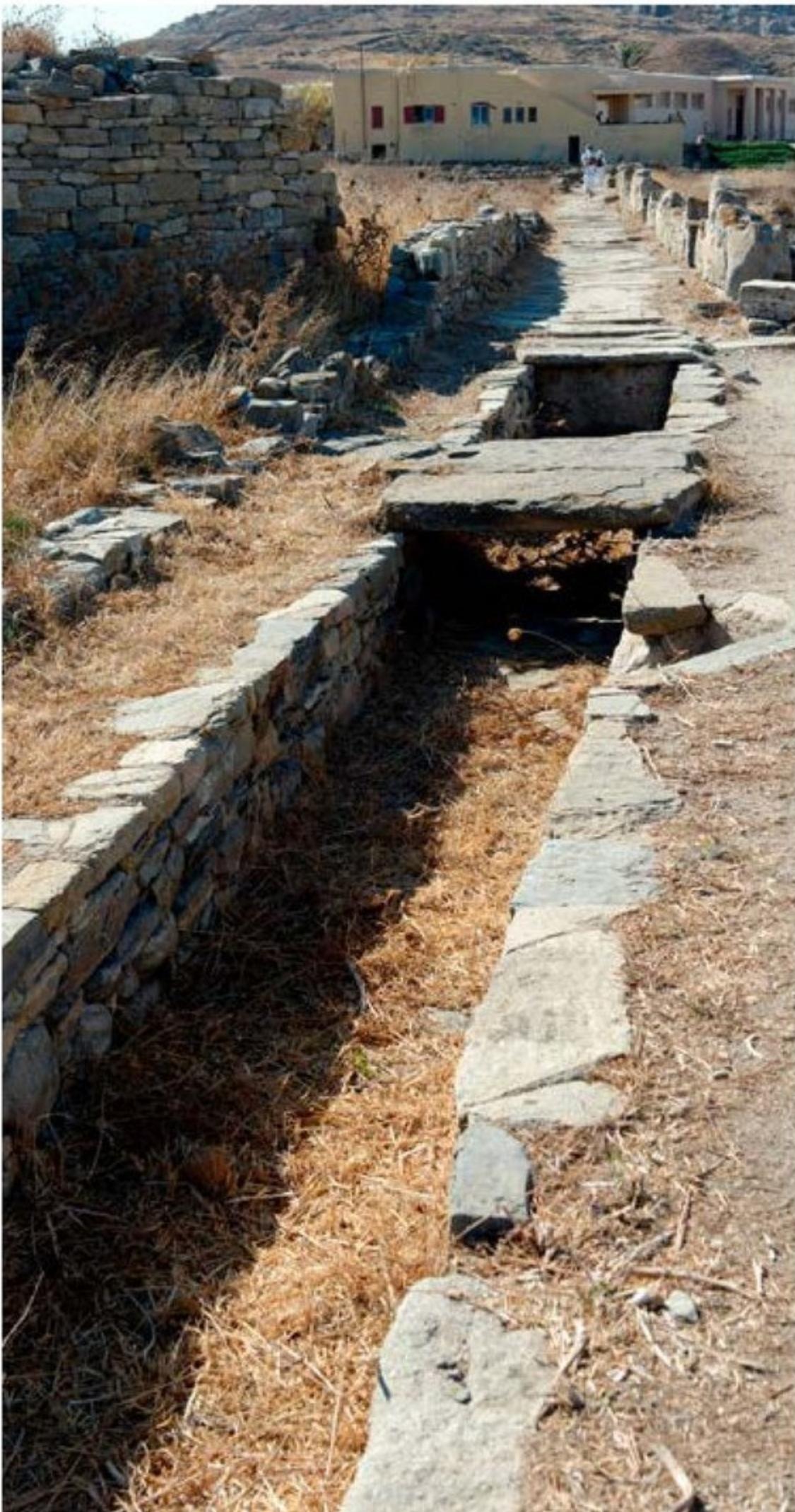
Both the septic tank and drainage field are located in the yard near the home. The septic tank is buried underground. Any waste from the home runs straight into the tank. Inside the tank, the solids separate from the liquid and drop to the bottom. The liquid runs out through underground pipes into the drainage field and spreads into the soil. The liquid is filtered as it moves through the soil, which pulls out harmful pollutants before they reach drinking water.



The septic tank collects all of the solid sludge, which builds up over time. When there is too much sludge in the tank, a septic business must pump it out.

Gurgling toilets and slow drains are two signs that it's time to pump out your septic tank.

Sewage Through the Ages



An ancient sewer canal still remains in modern Greece.

out of windows and onto the streets (and sometimes people). However, it polluted the nearby water with harmful bacteria that carried deadly diseases. The water made people sick.

Think the modern sewerage systems are gross? Think again. The first sewerage systems were built thousands of years ago in places such as ancient Greece and Rome. These early systems sent human waste and storm water away from cities—and directly into nearby waterways. This was far better than flinging buckets of waste

Over the centuries, little by little, humans got better at handling their sewage. Large cities such as New York still had a hard time with their waste, though.

New York City was growing fast in the 1800s, and there were no sewage treatment plants. Instead, each home had an outhouse, which was sometimes just a hole in the ground. Since there was no way to flush, human waste would pile up in the hole. When the hole was full, a night-soil man came to remove the backed-up waste. He came at night so people would not have to see him taking buckets to the street and dumping them in his cart. When the night-soil man's cart was full, he would usually dump it in the nearest river.



Before modern plumbing, many people used outhouses like this one. Some outhouses had two seats. Others had two stories!

Some night-soil men got lazy and just dumped their carts into the streets. Some people allowed their outhouses to spill over and wash into the streets. There were no storm sewers back then for the waste to wash down, so it would pile up where people walked and children played. The smell was awful.



A night-soil crew in England moves waste around 1870.



Men work in the New York City sewer around 1911.

In the mid-1800s, experts began to understand that streets flowing with waste were also flowing with deadly diseases. New York began building sewer systems so the waste would have somewhere to go. By 1914, New York City had nearly 850 miles (1,368 km) of sewers.

Today in the United States, waste disappears down toilets and sinks as if by magic. Now you know how it really works, though. So, the next time you flush, take a moment to thank your modern sewerage system!

Glossary

| | |
|------------------------------------|---|
| digester (n.) | a large tank in a sewage treatment plant where microorganisms break down solid waste (p. 9) |
| drainage field (n.) | an open area of land where the liquid waste from a septic tank drains (p. 10) |
| filter (n.) | a porous material that is used to remove something unwanted from a liquid or gas that is passed through it (p. 8) |
| organisms (n.) | living things (p. 7) |
| pollutants (n.) | dirt or debris in the air, water, or ground that makes it unclean (p. 7) |
| septic system (n.) | a system for treating and disposing of sewage that uses a septic tank and drainage field (p. 10) |
| sewage (n.) | human waste that is carried away from buildings through a system of pipes (p. 5) |
| sewage treatment plant (n.) | a place where sewage is cleaned and processed to make it safe for the environment (p. 7) |
| sewerage systems (n.) | networks of drains, pipes, and pumps that collect water and sewage and carry it away (p. 6) |

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A *Reading A-Z Level R Leveled Book*

Word Count: 1,020

Connections

Writing and Art

Draw a diagram of the route sewage takes after a toilet is flushed. Label your diagram and write a step-by-step explanation of the process.

Social Studies

Write a paragraph describing how modern sewerage systems have solved sewage problems of the past. Discuss your ideas with a partner.

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