

CLEAN AND GREEN

The Water Planet

If you look at our planet from space you see that most of the earth's surface is covered with water. Water supports the richness and diversity of life. All the water that will ever exist on earth exists now. Of all the water on earth, only a tiny fraction — about 3% — is fresh water. Some of this scarce resource is frozen in glaciers and ice caps, and some fills lakes and flows in rivers, but most fresh water is located underground.

YOU ARE HERE



Nature's Nitrogen Cycle

Nitrogen makes up about 78% of the air we breathe. It is an essential building block for all living things. People and animals, however, cannot absorb the nitrogen they need directly from the air. Nitrogen must first be transformed into compounds which are used by the plants we eat. Only two natural phenomena can make this "fix" — lightning and bacteria. Once nitrogen's nutrients have passed through the food chain, nature uses other bacteria to break down waste and to return nitrogen back to the atmosphere.

Too Much of a Good Thing

The nitrogen cycle is nature's way of cleansing itself. Nitrogen in the air is harmless but too much nitrogen in water — in the form of nitrate — can pollute the environment and be a health concern in drinking water. Groundwater is vulnerable to the disposal of toxic substances and waste on the land surface. The natural balance of the nitrogen cycle can be overwhelmed by overuse of chemical fertilizers which contain artificially "fixed" nitrogen and by nitrates concentrated in animal and human waste.

PRECIPITATION PATHWAYS

When snow and rain fall to the ground, the water does not stop moving. Some flows to streams, lakes or oceans; some is used by trees and plants; some evaporates and returns to the atmosphere; and some soaks into the ground.

LIGHTNING'S POWERFUL FLASH

The enormous energy of lightning breaks nitrogen molecules and enables their atoms to combine with oxygen in the air forming nitrogen oxides. These dissolve in rain, forming nitrates, that are carried to the earth for plants to absorb and use for growth.

RECHARGING RESOURCES

Groundwater is replenished by surface water. Pumping groundwater faster than the rate of recharge can deplete the supply, and concentrates contaminants.

A Green Solution to a Big Problem

In typical septic systems, wastewater flows from the septic tank directly to a leach field, but here at the Shandon rest area two unique "nitrate-removal" steps have been added to the wastewater cleaning process.

7 RECIRCULATING GRAVEL FILTER

Wastewater is pumped from the septic tank to a recirculation tank which slowly circulates the wastewater, multiple times, through a deep gravel filter bed. Beneficial bacteria that cling to the many gravel surfaces digest wastewater impurities and more pathogens are neutralized.

6 KEEP ON TRUCKIN'

Although the bacteria in the septic tank do a good job, they can't process everything. When sludge accumulates to a high level in the tank, it is pumped out and transported to a larger sewer treatment facility.

5 DOWN THE DRAIN... AND THEN WHAT?

Located in the countryside, far from a sewage treatment plant, means this rest stop must use a septic tank. All waste from the sinks and toilets flows by gravity to the underground tank, where it separates into solids (sludge), liquids, and floatables (scum). Beneficial bacteria in the tank begin to break down the sludge and scum into liquid form. The oxygen-free conditions in the septic tank also help kill disease germs found in sewage.

4 REST STOP RESTROOMS

Hundreds of thousands of people visit the Shandon rest area every year. That means there is a lot of sewage (also called wastewater) from toilets, urinals, sinks, and drinking fountains that has to be disposed of. The average human body processes about 9 pounds of nitrogen — consumed in food — each year. Human waste contains concentrated amounts of nitrogen.

3 PRESSURE POINT

Well water fills a large pressurized storage tank which pushes the water through pipes to rest area buildings, drinking fountains, hose bibs and fire hydrants. Water for landscaping flows directly from the well to the irrigation system.

2 WELL, WELL, WELL

A well is a hole dug or drilled into the earth to reach an aquifer. Groundwater seeps into a perforated pipe placed in the well to stabilize the hole. Screens filter the water as it is brought to the surface by an electric pump.

9 LEACH FIELD

In the leach field, wastewater is piped into underground absorption chambers — multiple rows of perforated pipe surrounded by gravel. There bacteria continue cleaning the water. Some water evaporates while the rest soaks back into the ground.

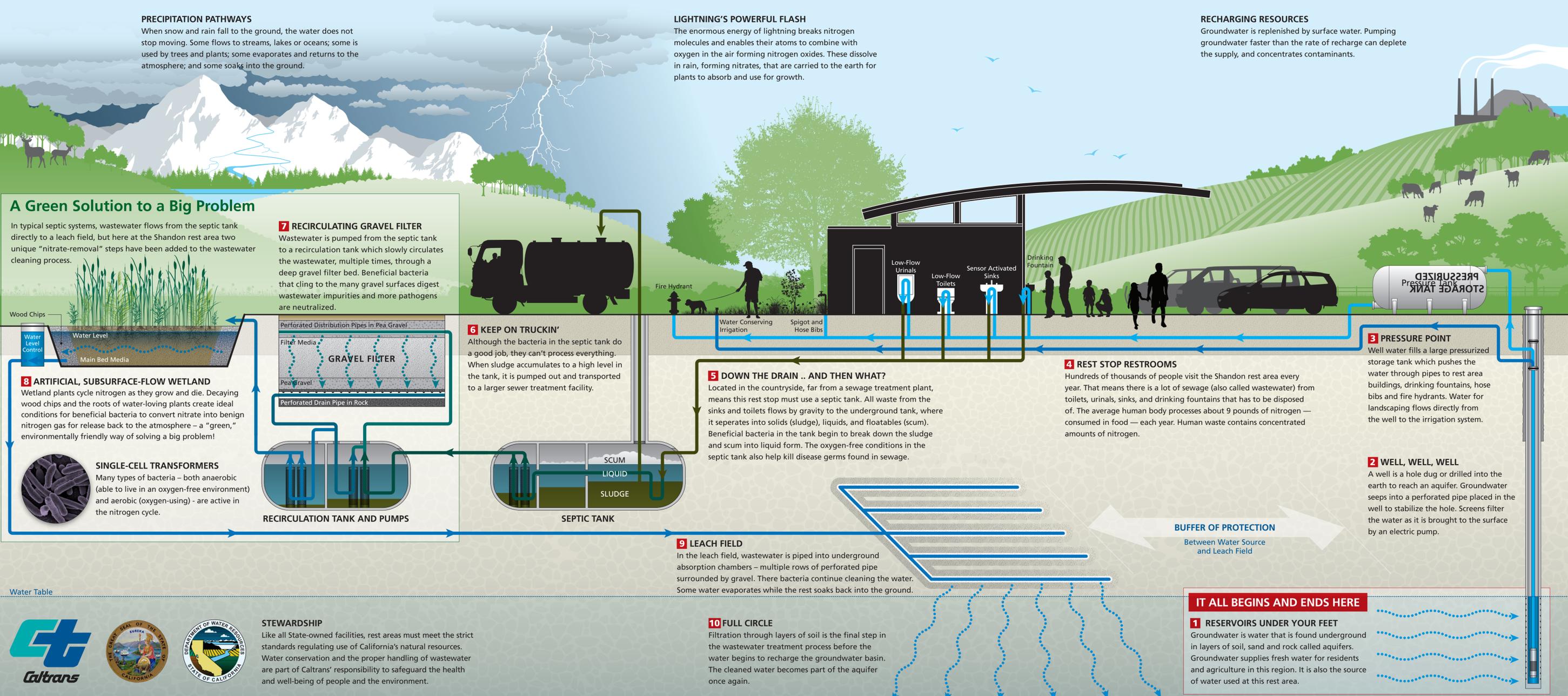
10 FULL CIRCLE

Filtration through layers of soil is the final step in the wastewater treatment process before the water begins to recharge the groundwater basin. The cleaned water becomes part of the aquifer once again.

IT ALL BEGINS AND ENDS HERE

1 RESERVOIRS UNDER YOUR FEET

Groundwater is water that is found underground in layers of soil, sand and rock called aquifers. Groundwater supplies fresh water for residents and agriculture in this region. It is also the source of water used at this rest area.



Water Table



STEWARDSHIP

Like all State-owned facilities, rest areas must meet the strict standards regulating use of California's natural resources. Water conservation and the proper handling of wastewater are part of Caltrans' responsibility to safeguard the health and well-being of people and the environment.