

How Do Modern Landfills Work?

In the U.S., we generate trash at a rate of approximately 4.5 pounds per day per person, which translates to about 262 million tons per year, according to the Environmental Protection Agency (EPA).

Of the 262 million tons of trash, approximately 26% is recycled, 9% composted, 13% is burned and recovered as energy, and the remaining 52% is buried in landfills.

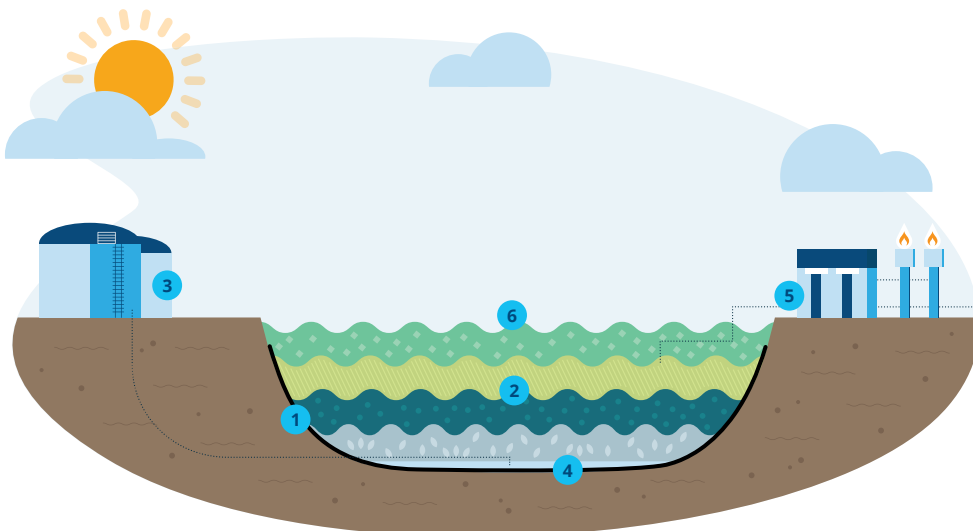
What Did We Do with Our Trash?

How we dispose of waste has historically been a problem for society. For hundreds of years, people used garbage dumps to get rid of their trash. These dumps were nothing more than pits or fields where people left their garbage, and were usually located just outside the town. People tossed all sorts of waste into these dumps, which became breeding grounds for disease-carrying pests. Rainwater flushed filthy and sometimes poisonous liquids from the dump into nearby streams and groundwater supplies that people used for drinking, cooking, bathing, and washing clothes.

From Dumps to Modern Landfills

While we still bury much of our garbage, it now goes into sanitary landfills. The U.S. Environmental Protection Agency (EPA), responsible for protecting human health and the environment, has authority over landfills. EPA regulations cover every aspect of landfills, from building them to closing them when they are full. Building a landfill takes careful planning, starting with its location, and begins only after the site passes strict legal, environmental, and engineering tests. From start to finish, construction of a landfill may take as long as five years.

Basic Parts of a Landfill



While open dumps are the oldest, and possibly the easiest, form of waste disposal, they are no longer allowed in the U.S. because of the pollution problems they create.

The U.S. produces about 220 million tons of garbage per year.

- 1 Bottom liner system** – separates trash and subsequent leachate from groundwater
- 2 Cells** – where the trash is stored within the landfill
- 3 Storm water drainage system** – collects rainwater that falls on the landfill
- 4 Leachate collection system** – collects water in the landfill itself that contains contaminating substances, called leachate
- 5 Methane collection system** – collects methane gas that is formed during the breakdown of trash; many modern landfills also have systems for treating the gas so it can be used as fuel
- 6 Covering or cap** – seals off the top of a landfill section when it is full; monitoring of the surrounding groundwater continues for up to 30 years

Protecting the Surrounding Environment

These are some of the major factors involved in building and maintaining landfills. The EPA regulations address all these and more.

- **Location** – Must be built in suitable geological areas away from faults, wetlands, floodplains, high risk of earthquakes, and other problematic land features.
- **Design** – Includes several layers of liners to protect the soil and groundwater. The landfill's bottom and sides are first covered with compacted clay and a synthetic protective liner. These protect contaminants from entering the groundwater and underlying soil. Another protective design feature is division of the landfill into a series of individual cells. Only a few cells are filled with trash at any one time, minimizing exposure to wind and rain.
- **Leachate and methane collection and removal systems** – Different networks of drains and pipes collect the leachate and methane produced by the landfill. Leachate is the liquid produced by all decomposing waste, and methane is a gas that is produced by decomposing organic waste. Organic waste includes animals, plants, and any materials made from them, such as paper. The leachate is pumped to the surface and treated so the water can be reused. In most modern landfills, the methane gas is used as an energy source. It can be treated and sold as fuel, or used as fuel by the landfill to generate electricity and steam for the facility.
- **Operating practices** – Include compacting and covering waste at the end of each day with several inches of soil to reduce odor and control pests. These “daily covers” become part of the landfill's liner system.
- **Groundwater monitoring** – As the main source of drinking water in many communities, groundwater must be continually monitored to keep it clean and pure. Ground wells are drilled into and around the landfill to monitor water quality and to detect any contamination.
- **Closure and after-closure care** – When a landfill is closed because it is full, it is sealed and covered with a final cap of clay and dirt. However, monitoring of the landfill's surrounding groundwater continues for as long as 30 years to ensure that no contamination has occurred.

Closed landfill sites can be landscaped to blend in with their surroundings, or specially developed to provide an asset to a community. They have been turned into everything from parks to parking lots, golf courses to ski slopes. Here are some especially interesting ones:

- Much of New York City is built on landfills. Some were purposely created along shoreline to widen the island. The newest addition, Battery Park City, was built on top of soil and construction waste from building the original World Trade Center 1973.
- Mile High Stadium in Denver, home to the Denver Broncos pro football team from 1960 to 2000, was built on a former landfill. So was Chicago's original Comiskey Park, home to the Chicago White Sox pro baseball team from 1910 through 1990.
- The Rock, a ski resort in Wisconsin, was built on an old garbage dump, while Michigan's Mt. Brighton was built using hundreds of tons of excess road debris from nearby construction work. And in Virginia, Fairfax County is considering a proposal to build an indoor snow sports facility complete with ski slopes, including one that would become the world's longest, at 1,700 feet.