

Landfill Disposal



What is a landfill?

A landfill is what most people would call a dump or a tip. It is not the usual dump that members of the public visit, it is a huge hole in the ground where the rubbish that we produce and put out for collection is disposed of and buried. There are also landraises where instead of filling a hole in the ground the rubbish is built up to produce a hill

A landfill is not just any hole in the ground; there are strict conditions that have to be met in order for it to be able to be used as a landfill site



Environmental Impact Study

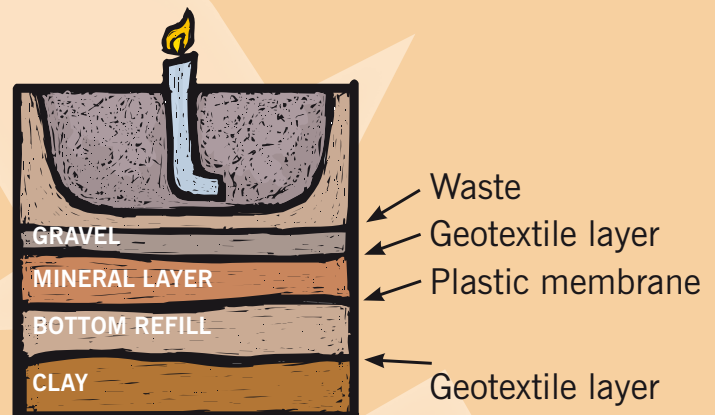
Before a landfill site can be used it has to go through an environmental impact study. This requires that the site be investigated for the following:

- The structure of the rocks below and around where the rubbish is going to be buried. The rocks need to be as watertight as possible so if there is leaking from the rubbish it does not drain down in to underground water (this is known as groundwater)
- How the water runs across the ground after it has rained. This is called surface water flow. It is important to prevent lots of water flowing into the area where the rubbish is. Landfill sites should not be located near rivers or streams, to prevent water pollution
- How a landfill site could affect wildlife and the local environment. It should not be located near the nesting sites of migrating birds or be near enough to affect local fisheries
- Historical or archaeological significance of the site

How is a landfill constructed?

Bottom Liner System

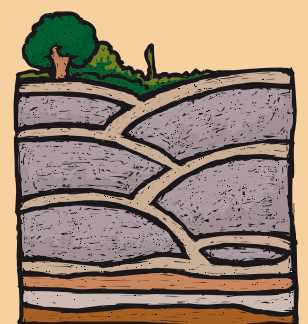
Cross Section of the bottom liner system



At the base of the hole is a 'bottom liner system' which ensures that what is placed in the landfill does not escape. It stops the rubbish from coming into contact with the soil and also groundwater. The bottom liner can be made up of a puncture resistant plastic, which can also be combined with clays that have been squashed down. A geotextile or fabric mat can also be used to protect the plastic liner from the rocks, which could tear it

Cells

The area in which the rubbish is being dumped is important, as this space is limited. The rubbish needs to be compacted to try and save as much space as possible. The rubbish is compacted into cells, the compaction is carried out by heavy vehicles: tractors, bulldozers and rollers. Once the cell is finished it needs to be covered. This is normally a covering of at least 6 inches of soil which is again compacted. The cells are arranged so that once a cell is completed a new cell begins next to it until all of that level has been completed and then the next layer on top of the old cells begins



Drainage

In order to try and keep the landfill as dry as possible it is necessary to minimise the amount of liquid entering the site in the waste. It is also important to keep rainwater out of the landfill. Storm drainage pipes and liners collect water from areas in the landfill directing it to drainage ditches, this prevents excessive amounts of water entering the site minimising leachate generation. Leachate is contaminated water (please see Leachate Collection System for an explanation of this term)

Leachate Collection System

It is not possible to keep all water out of the landfill so it is necessary to have a system in place to remove the water that drains through the cells of rubbish. As the water travels through the rubbish it picks up contaminants caused by rotting organic waste (e.g. vegetable peelings) and rusting metals etc. This water with all the dissolved contaminants is known as leachate and is very acidic. To collect the leachate, pipes with holes drilled in the top run throughout the landfill. The pipes then carry the leachate to a leachate collection pond and the liquid is left to allow the contaminants to settle

Methane Gas Collection System

The rubbish in a landfill site slowly decays due to bacteria. There is no oxygen present because the liners and caps are airtight - this environment is referred to as anaerobic. Anaerobic decomposition gives off a gas called landfill gas, which is made up of methane gas and carbon dioxide. Methane gas is flammable; it can be explosive or catch fire, so it has to be removed from the site. Pipes are placed in the landfill to trap and transport the gas out of the rubbish. At some sites the gas is vented, which means that the gas is burnt as a flare. Modern landfill sites now collect the methane as it is a valuable source of energy that can be used as a fuel

Groundwater Monitoring

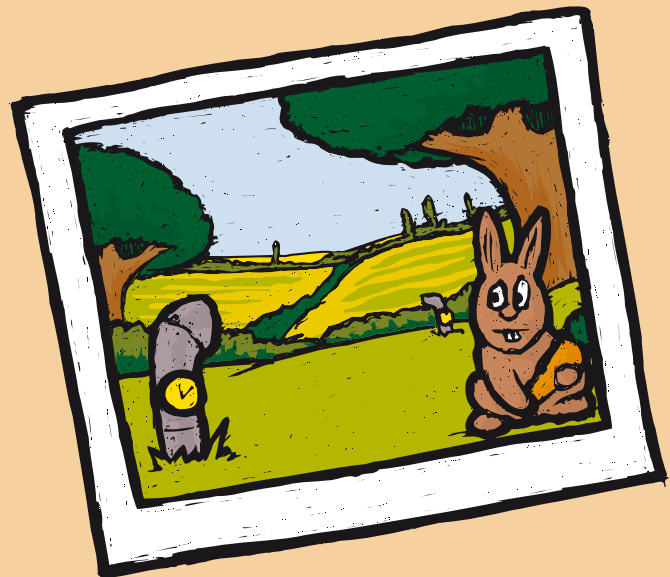
To make sure that no leachate escapes, the water in the soil surrounding the landfill sites has to be checked regularly. Pipes are sunk into the groundwater so that it can be tested

for contamination. The water is tested to make sure that it is not becoming acidic and the temperature of the water is tested as it becomes warmer when waste decomposes

Cap and Landfill Restoration

Once an area of the landfill has been completed it needs to have a permanent cover placed on it, this consists of a thick plastic sheet and then a 2-foot compacted layer of soil. Vegetation such as grass is then planted to prevent the soil being washed away and to restore the area helping to disguise that it was once a landfill site

Monitoring of the site must continue for up to 50 years and the operator is responsible for any problems that may occur after the site has closed



Weblinks

- <http://www.howstuffworks.com/landfill.htm>
 - Pictures & explanations
- <http://www.sita.co.uk/what-we-do/landfill>
 - Landfill Engineering
 - Green Energy
 - How a Landfill works video

The Structure of a Landfill Site

