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Assignment: **General** Science and Ability

Topic: Criteria for Selection of Landfill **site**  
and Land Filling Method

## Landfilling:

Landfilling is considered as a waste treatment process, with its own inputs and outputs, rather than as a final disposal method of solid waste. Landfilling essentially involves long-term storage for inert materials along with relatively uncontrolled decomposition of biodegradable waste.

### Criteria for Selection of Land fill Site

Landfill site for solid wastes should be selected on following criteria.

• Land area and volume should be sufficient enough to provide landfill capacity so that the projected need can be fulfilled for several years. This way the cost coming on that procedure can be justified.

• The landfill site should not be at locations where suitable buffer zones between landfill site and population are not available.

• The landfill area having steep gradient (where stability of slope could be problematic) should not be selected.

• The water level in ground water table should be sufficient below the base of any excavation to enable landfill development.

• The land which is significant environmentally (lands of biodiversity); the sensitive ecological area of such a land should be present within potential area of landfill site.

Public and private irrigation water supply wells should be well away from the boundaries of landfill site because these supply wells will be at risk of contamination.

Land area should not be very close to significant water bodies (water courses or dams).

There will be the risk of contamination of water bodies, which can be hazardous for aquatic life.

No residential development should be near the boundaries of landfill site. The waste disposal site must be very away from residential or commercial areas and water resources.

Landscaping and protective shelf should be included in the design so that to minimize the visibility of operations.

Unstable areas that have significant seismic risk which could cause destruction of berms are not recommended for landfill site.

There should not be fault lines and significantly fractured geological structure.

These fault lines can allow the unpredictable movement of gas within 500 meters of perimeter of proposed landfill development.

Groundwater quality should not be disturbed during the site developmental phase. There should be monitoring facilities at site in order to ensure that ground water quality is maintained.

In areas under the laws of concerned municipality it should be responsibility

Attempt by giving headings or in points form.

of municipality to identify landfill site and handover to operators for operations.

Selection of landfill site should be based upon the examination of environmental issues.

The landfill site should be near the waste recycling facility otherwise, the waste recycling facility should be planned as integral part of landfill site.

Biomedical wastes should be disposed off in accordance with guidelines issued by Ministry of Health, Government of Pakistan.

Landfill site should be away from airports. There is need of approval of airbase authorities like civil aviation authorities of government of Pakistan for setting up of landfill site in case if site is to be locating within ten kilometer of an airport boundary.

### Land Filling Method

Modern landfills aren't all identical in design, but most utilize similar technologies, though the exact sequence and type of materials used may differ from site to site. Some basic parts of a landfilling are the following:

#### Bottom Liner System

A landfill's major purpose and one of its biggest challenges is to contain the trash so that the trash doesn't cause problems in the environment. The bottom liner, made of thick plastic, prevents the

trash from coming in contact with the outside soil, particularly the groundwater.

### Cells

Trash is compacted by heavy equipment into areas, called cells, which typically contain a day's worth of refuse to get the most use of the volume of space in the landfill. Once the cell is made, it is covered with 6 inches (15 centimeters) of soil and compacted further.

### Stormwater Drainage

To keep rainwater out, a landfill has a storm drainage system to route the runoff into drainage ditches and away from the buried trash. Concrete, plastic or metal culverts underneath nearby roads and stormwater basins, which can reduce the suspended sediment in the water to minimize soil loss from the landfill, are other parts of the system.

Plastic drainage pipes and storm liners collect water from areas of the landfill and channel it to drainage ditches surrounding the landfill's base. The ditches are either concrete or gravel lined and carry water to collection ponds to the side of the landfill. In the collection ponds, suspended soil particles are allowed to settle and the water is tested for leachate chemicals. Once settling has occurred and the water has passed tests, it is then pumped or allowed to flow off-site.

## Leachate Collection System

No system to exclude water from the landfill is perfect and water does get into the landfill. The water percolates through the cells and soil in the landfill similar to how water percolates through ground coffee in a drip coffee maker.

As the water trickles through the trash, it picks up contaminants ~~is~~ called leachate and is ~~fairly~~ acidic.

To collect ~~leachate~~, perforated pipes run throughout the landfill. These pipes then drain into a leachate pipe, which carries leachate to a leachate collection pond.

## Methane Collection System

Bacteria break down the trash in the absence of oxygen (anaerobic) because the landfill is airtight. A byproduct of this anaerobic breakdown is landfill gas, which contains approximately 50 percent methane and 50 percent carbon dioxide with small amounts of nitrogen and oxygen.

Methane is a ~~serious~~ issue for landfills because it's ~~a~~ potent greenhouse gas, some 28 ~~to 35~~ times more effective than carbon dioxide at trapping heat in the atmosphere. And landfills are the third largest source of methane emissions in the U.S., accounting for about 15 percent of the gas that escaped into the atmosphere in 2019.

### Covering or Cap

Putting down a covering of compacted soil seals the trash from the air and prevents pests (birds, rats, mice, flying insects, etc.) from getting into the trash.

At New York's Fresh Kills Landfill, trash is covered with at least 2 feet (0.61 meters) of soil, graded between 4 and 33 percent to help with stormwater drainage. That layer is topped by additional layers of synthetic fabric and plastic and a layer of soil to allow vegetation to grow atop the landfill.

### Groundwater Monitoring

At many points surrounding the landfill are groundwater monitoring stations. These are pipes that are sunk into the groundwater so water can be sampled and tested for the presence of leachate chemicals. The temperature of the groundwater is also measured. Because the temperature rises when solid waste decomposes, an increase in groundwater temperature could indicate that leachate is seeping into the groundwater. Also, if the PH of the groundwater becomes acidic, that could indicate seeping leachate.

Notes are lengthy for 5 marks question. Shorten them.