

Regional Solid Waste Management Plan Review: *Engaging solutions for tomorrow*

Garbage School 301:
Landfill

Why Use Landfills?

- Some materials aren't easily recycled, used for energy, or composted
- Many treatment systems have residues that require disposal
- Large alternative treatment facilities may not be affordable
- Well designed, well run landfills have a limited environmental impact

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Types of Landfills

Increasing sophistication
↓

- Uncontrolled "Dumps"
- Natural Attenuation Sites
- Containment Sites

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A "Dump"

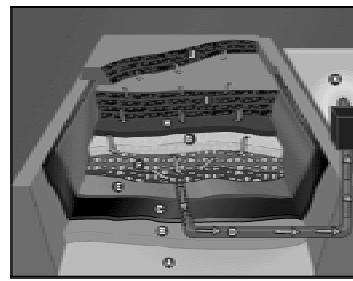


Modern Landfill Design

- Liner
- Leachate Management System
- Gas Management System
- Cap

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Schematic of Landfill



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Lining System

- Installed Barrier Layers
 - Natural soil liners
 - Geosynthetic
 - Composite liner
 - Double liner

OR

- Natural Attenuation Sites



Glenmore Landfill

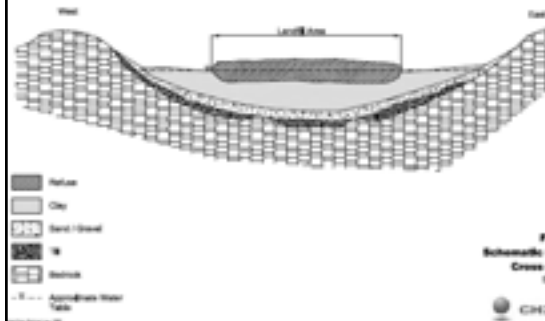
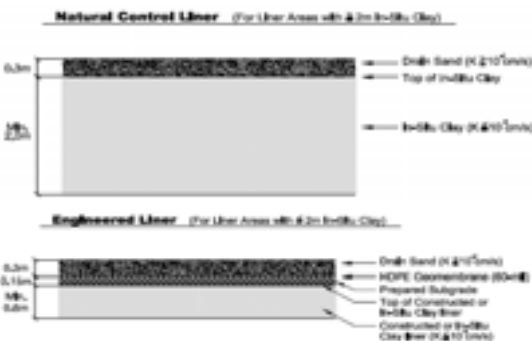


Figure 2-4
Schematic Geologic
Cross - Section
SCALE: 1:10
CH2M-HILL

Glenmore Expansion Area



Leachate Management

- Minimize water mixing with the waste
- Collect leachate from the contained area
 - Bottom drainage layer with pipe collection system
 - Vertical wells in waste
 - Perimeter leachate collector
- Monitor the leachate levels within the waste
- Leachate treatment and disposal



Glenmore Landfill

- New project to keep leachate and clean water separate (in progress)
 - Leachate fed to the sanitary sewer
 - Clean water directed to stormwater pond
- Leachate head monitoring



Glenmore Landfill Leachate Collection

- Northern Expansion Area
 - Bottom drainage layer with strip drains to collector pipes
- Existing Fill area
 - Perimeter leachate collector pipes
- Southern Slough Area
 - Bottom drainage layer with strip drains to collector pipes

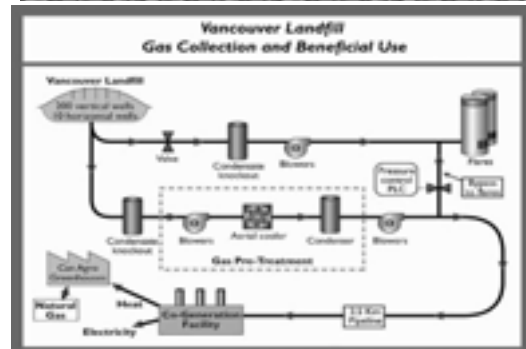


Gas Management

- MSW will always generate gas when landfilled
- The quantity of gas, and how soon it is made depends on:
 - Quantity of waste being landfilled
 - Moisture content of waste
 - Composition of waste
- The feasibility of collection depends on:
 - Generation rate
 - Geometry of the filled area
 - End use locally available for the gas



Gas Management in Vancouver



Glenmore Landfill Gas Management

- Landfill gas collection in the northern area and proposed southern area
- Progressive installation during filling
- Flare and microturbine on site



Landfill Cap

- Provides a final slope to improve drainage
- Reduces leachate generation
- Contains landfill gas for productive removal
- Allows for future use of land, e.g. golf course



Typical Landfill Cap



Capped Landfill



Land Use Options



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Operational Issues

- Waste control
- Daily waste handling
- Daily cover
- Intermediate cover
- Nuisance control
- Environmental controls and monitoring

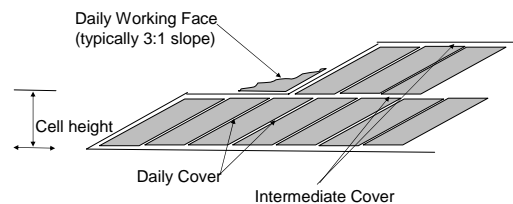
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Waste Control

- Acceptable wastes and banned wastes are detailed in the Operational Certificate (OC)
- Inspections of loads
- Weigh in, weigh out

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Daily Waste Handling



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Cover materials

- | | |
|---|--|
| <ul style="list-style-type: none">• Daily Cover<ul style="list-style-type: none">• Soil, tarps, spray mulch, film• Intermediate Cover<ul style="list-style-type: none">• Soil• Composted material | <ul style="list-style-type: none">• Objectives<ul style="list-style-type: none">• Reduce water entering landfill• Litter control• Odour control• Limit rodent and bird contact• Prevent fires• Visual |
|---|--|

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Environmental Controls

- Groundwater monitoring
- Surfacewater monitoring
- Leachate monitoring
- Waste tracking

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Landfill Objectives in SWMP

- Compaction performance
- Cover material specifications
- Size of cells
- Operator qualifications

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