



Sanitary Landfill Design, Operation and Closure Course: Cells, Leachate and Landfill Gas



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Introduction:

Sanitary landfill design, operation and closure for cells, leachate and landfill gas is a 1-week course for municipal, environmental and contractor engineers that ends with a Landfill Cell Development, Closure and Aftercare Plan. Poorly lined cells, loose working faces, uncontrolled leachate and venting methane turn disposal sites into long-term groundwater, fire and odour liabilities that outlast every operating contract. Nominees already supervise or design parts of a disposal site, and they learn through case study work on site layouts, monitoring records and gas well data. CoreConcept Training Center delivers this sanitary landfill engineering course.

Course Objectives:

- Assess candidate disposal sites using hydrogeology, buffer distances, access and airspace capacity criteria
- Specify composite liner systems with geomembrane, compacted clay or geosynthetic clay liner and leachate drainage layers
- Plan cell sequencing, working face size, compaction targets and daily and intermediate cover for an operating site
- Size leachate collection, storage and treatment options and set landfill gas well, flare and utilisation arrangements
- Prepare a rehabilitation approach for an uncontrolled dumpsite and design final capping with surface water control
- Produce a Landfill Cell Development, Closure and Aftercare Plan with monitoring points, triggers and responsibilities

Target Audience:

- Engineers responsible for municipal disposal site design, expansion and cell construction
 - Site engineers responsible for daily tipping, compaction and cover operations under contract
 - Environmental engineers responsible for groundwater, leachate and gas monitoring at disposal sites
 - Contractor engineers responsible for liner installation, quality assurance and earthworks on landfill cells
 - Technical staff responsible for closing legacy dumpsites and supervising aftercare works
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Course Outline:

Day 1: Disposal Site Context, Siting and Airspace Planning

- Waste Hierarchy Position of Engineered Disposal Versus Open Dumping
- Sanitary Landfill Anatomy From Subgrade to Final Cap
- Site Selection Matrix Using Hydrogeology and Buffer Distances
- Airspace Capacity Calculation From Tonnage and Compaction Density
- Existing Disposal Site Condition Survey and Gap Checklist

Day 2: Containment Engineering, Liners and Drainage Layers

- Composite Liner Design With Geomembrane and Compacted Clay
- Geosynthetic Clay Liner Selection and Hydraulic Performance
- Leachate Drainage Layer, Collection Pipes and Sump Layout
- Construction Quality Assurance for Geomembrane Seams and Testing
- Subgrade Preparation, Side Slope Stability and Anchor Trenches

Day 3: Cell Operation, Leachate and Landfill Gas Systems

- Cell Sequencing Plan and Working Face Sizing
- Compactor Passes, Lift Thickness and Density Verification
- Daily Cover and Alternative Daily Cover Material Selection
- Leachate Generation Water Balance and Treatment Option Screening
- Landfill Gas Well Field, Header Pipes and Flare Station

Day 4: Problem Sites, Gas Risk and Dumpsite Rehabilitation

- Landfill Fires, Slope Failures and Leachate Outbreak Responses
- Surface Emission and Perimeter Migration Monitoring Against Explosive Limits
- Gas Utilisation Choices Between Engines, Boilers and Upgrading
- Uncontrolled Dumpsite Rehabilitation by Relocation or Closure in Place
- Bioreactor Operation and Leachate Recirculation Risk Controls

Day 5: Case Study Work and the Closure and Aftercare Plan

- Case Site Review of Liner and Cell Records
 - Case Site Leachate and Gas Monitoring Data Interpretation
 - Final Capping Layer Design and Surface Water Diversion
 - Post-Closure Aftercare Monitoring Schedule and Completion Criteria
 - Landfill Cell Development, Closure and Aftercare Plan Completion
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Skills You Will Gain:

- Disposal Site Selection
- Liner System Specification
- Cell Sequencing
- Leachate Water Balance
- Landfill Gas Field Balancing
- Dumpsite Rehabilitation Planning
- Final Cap Design
- Aftercare Monitoring

Why Attend This Course:

- Deliver a Landfill Cell Development, Closure and Aftercare Plan to the disposal site manager and the municipal engineering lead
- Decide whether a full cell needs intermediate cover, gas wells or capping before the next lift is placed
- Avoid groundwater contamination, gas migration and fire incidents that trigger costly emergency works and site shutdowns
- Coach site crews and junior engineers on compaction checks, cover routines and monitoring rounds practised during the case work

Conclusion:

Back at work, the participant hands the Landfill Cell Development, Closure and Aftercare Plan to the disposal site manager and the municipal engineering lead. They use it to approve the next cell construction package, fix compaction and cover routines with the operating contractor, and budget capping and long-term monitoring for full areas. After the first quarter of use, the unit should compare measured airspace use, leachate volumes and gas readings against the plan and adjust cell sequencing, well spacing and monitoring frequency where results diverge.

Frequently Asked Questions FAQ:

What should participants know before a sanitary landfill design, operation and closure course?

Participants should understand basic civil or environmental engineering terms such as permeability, slopes and drainage. Experience on a disposal site helps but is not required, because the first day reviews landfill anatomy and airspace calculation.

How does a sanitary landfill design, operation and closure course differ from a general solid waste management course?

This course concentrates on the engineered disposal site itself: liners, cells, cover, leachate, gas, capping and aftercare. A general solid waste course covers collection, recycling, organics and circular business models, and treats landfill only as one residual option.

Why does sanitary landfill design give so much weight to leachate and landfill gas?

Leachate and landfill gas carry most of the long-term risk. Leachate can contaminate groundwater for decades, and methane can migrate, ignite or add to greenhouse emissions, so both need collection and monitoring long after tipping ends.

What do participants take back from the sanitary landfill design, operation and closure course?

Participants take back a Landfill Cell Development, Closure and Aftercare Plan covering cell sequencing, cover routines, leachate and gas arrangements, final cap design and a post-closure monitoring schedule with responsibilities.
