



**BATTELLE**

# LANDFILL CONSTRUCTION AND OPERATIONS WORKSHOP

# LANDFILL CONSTRUCTION AND OPERATIONS WORKSHOP

No.	Module	Presenter
1	Importance of Proper Landfill Management	P. Ruesch
2	Landfill Construction Part I	M. Elizondo
3	Landfill Construction Part II	J. Davila
4	Landfill Operations Part I	M. Elizondo
5	Landfill Operations Part II	M. Elizondo
6	LFG Basics and GCCS	J. Davila
7	LFG Utilization Technologies	J. Davila
8	Open Dump Closure	P. Ruesch



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## Module 8

# Open Dump Closure

Paul Ruesch  
USEPA Region 5 – Chicago

# Objectives

- Protect public health & environment through proper closure of open dumps and future site use
- Prevent environmental risks and pollution
- Prevent environmental risks and pollution derived from future development

# Closure Measures

- Provide adequate cover to avoid waste exposure
- Avoid fires or explosions caused by presence of gases
- Provide for stormwater management
- Minimize environmental impacts caused by leachate
- Prevent groundwater contamination
- Take measures to stabilize waste and cover soil

# Management Measures After Closure

- Maintain final cover system
- Ongoing leachate management/treatment
- Continue environmental monitoring
  - Stormwater, LFG and groundwater
- Waste and slope stability monitoring

# Closure Levels - ISWM

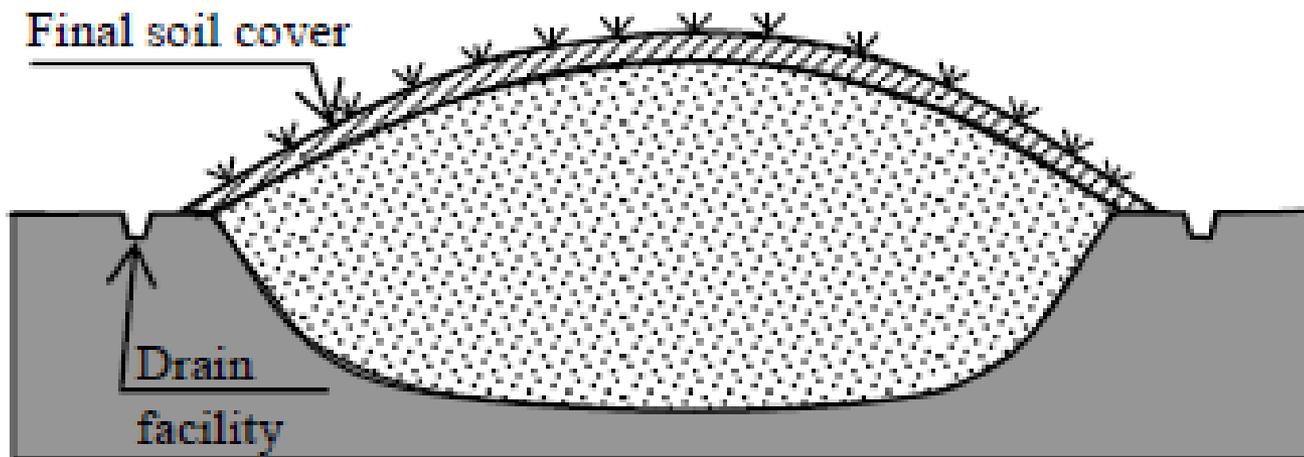
C1 - Minimum – provide final cover system and perimeter drainage system

C2: Low - similar to C1, plus system to maintain slopes with support at toe and LFG venting

C3: medium – similar to C2, plus leachate treatment or recirculation system

C4: high - similar to C3, plus measures to monitor control groundwater pollution

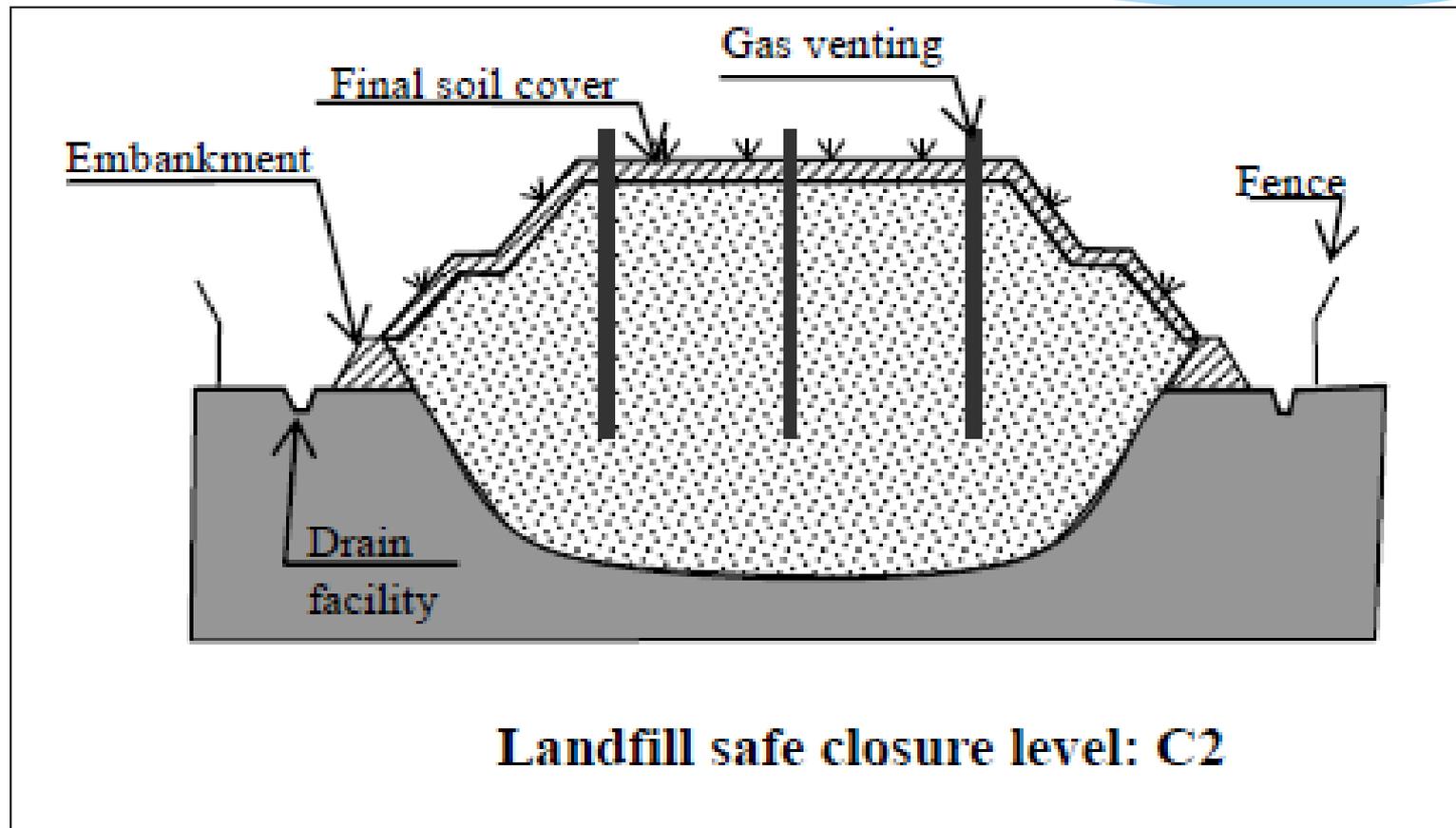
# C1 - Minimum – provide final cover system and perimeter drainage system



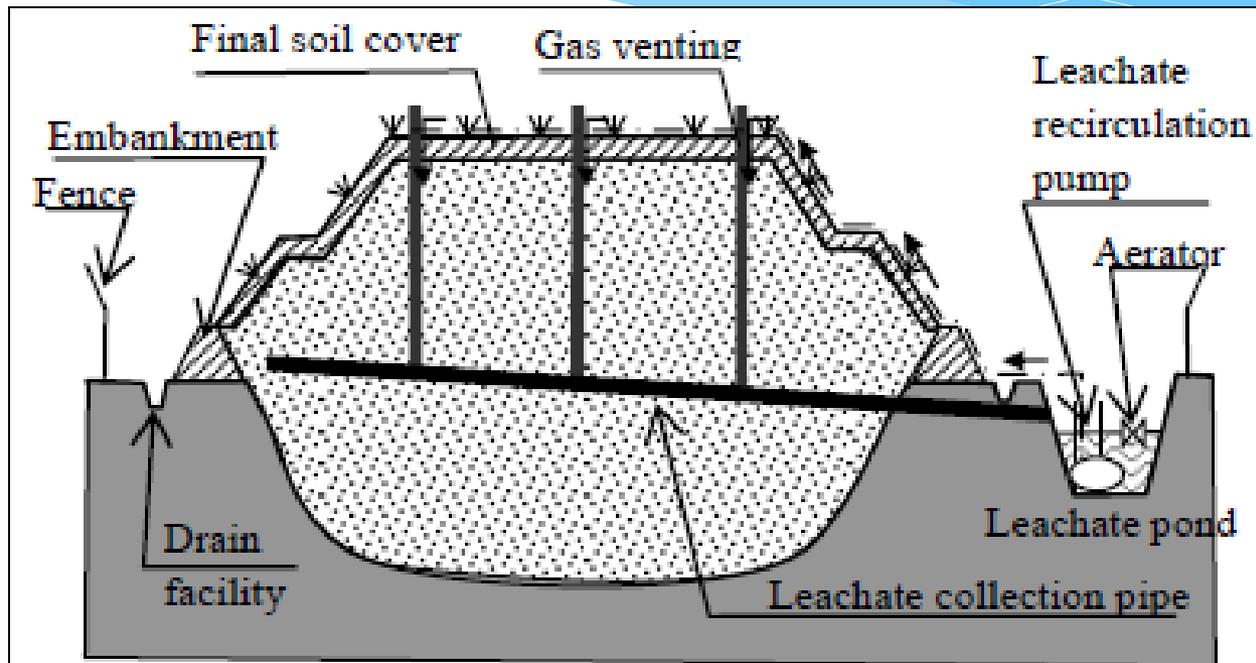
**Landfill safe closure level: C1**

C2: Low - similar to C1, plus system to maintain slopes with support at toe and LFG venting

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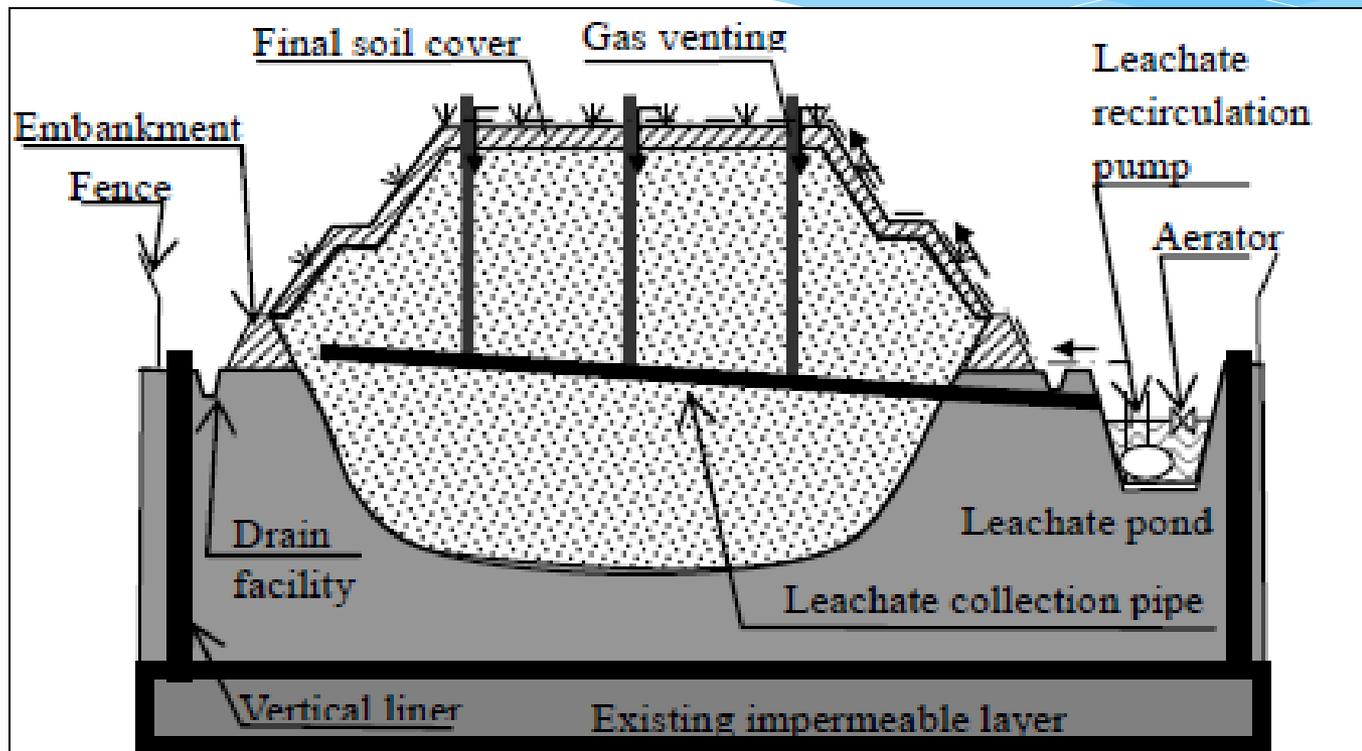


C3: medium – similar to C2, plus leachate treatment or recirculation system



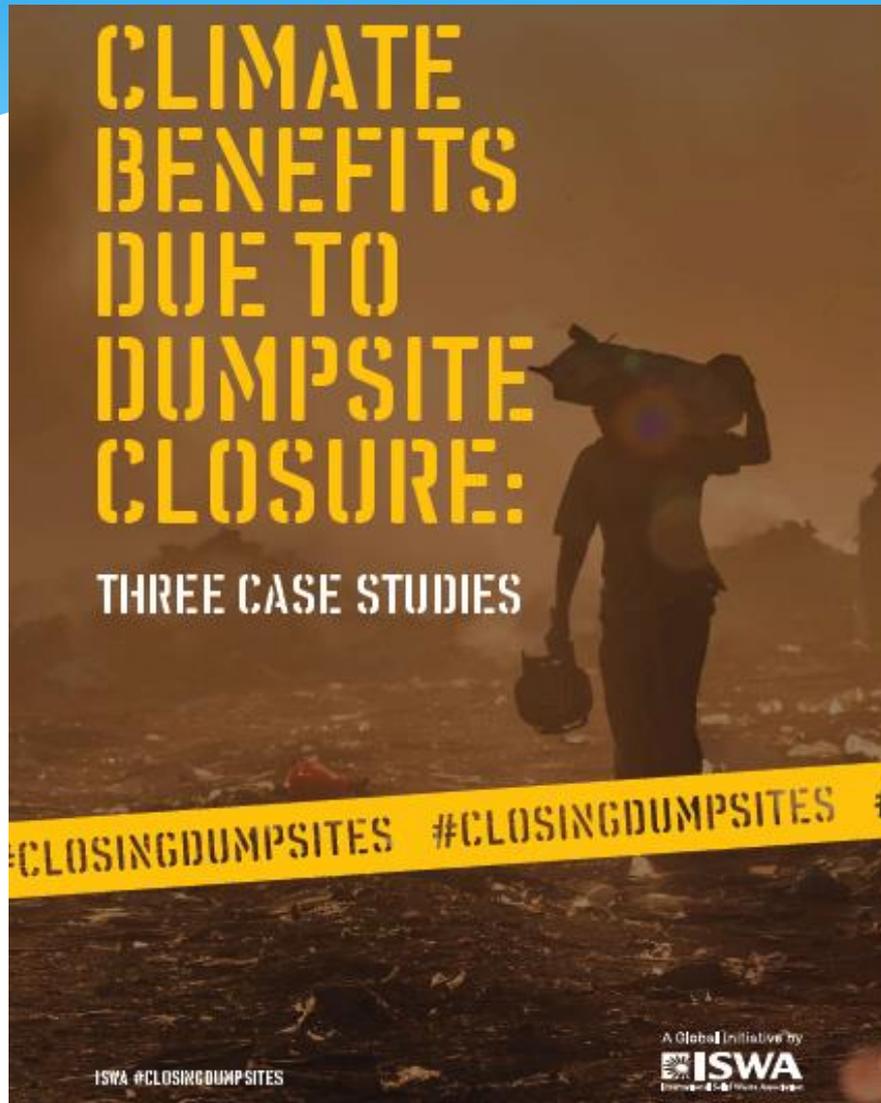
**Landfill safe closure level: C3**

C4: high - similar to C3, plus measures to monitor control groundwater pollution



**Landfill safe closure level: C4**

# References



## A Guide for the Management of Closing and Closed Landfills in New Zealand

Published in May 2001 by  
Ministry for the Environment  
PO Box 10-362, Wellington, New Zealand

ISBN 0-478-24021-X  
ME number 390

This document is available on the Ministry for the Environment's Web site:  
<http://www.mfe.govt.nz>



Ministry for the  
**Environment**  
*Māori Mā Te Tāiao*

# Example: San Cristobal, DR



Existing Dump Area

Expansion Area

# Site Visits/Public Comment

## *July 2017*



Mayor José Nelson Guillén Valdez  
San Cristóbal Municipality



Community Meeting

# Work Plan

- **Needs Assessment**
- **Dump Improvement Plan**
  - Obtain & review historical information
  - Estimate waste volume
  - Immediate recommendations/actions to improve current operations and conditions
  - Conceptual design including conceptual drawings

# Scavengers



# Leachate Management



# Site Plan



# Site Characterization



# Groundwater Testing

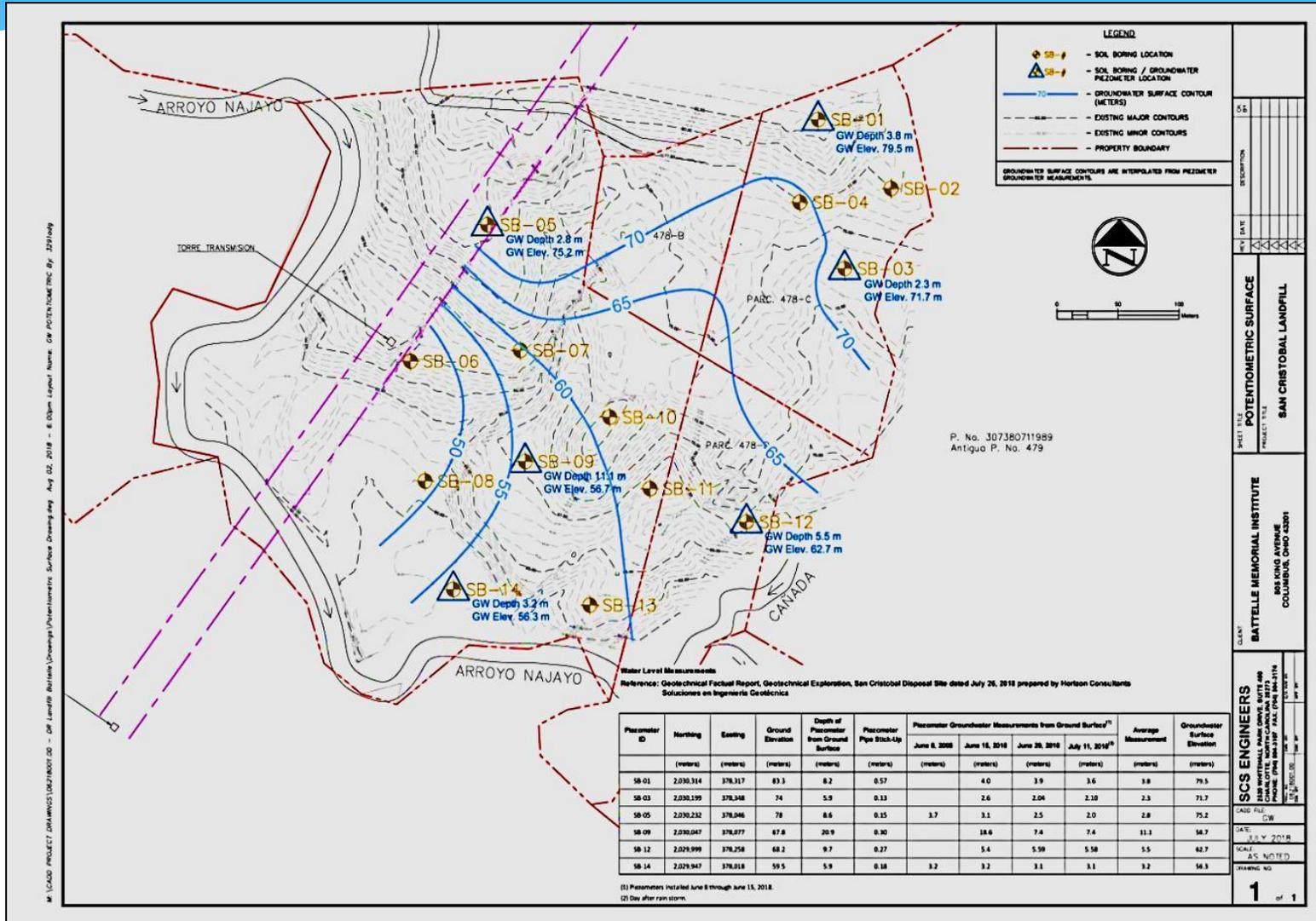


# Soil Samples



- Grain Size (ASTM D 422 y D 1140)
- USCS Soil Classification (ASTM D 6913)
- Natural Moisture (ASTM D 2216)
- Standard Proctor (ASTM D 698)
- Atterberg Limits (ASTM D 4318)
- Hydraulic Flexible Wall (ASTM D 5084)
- Triaxial Consolidated (ASTM D4767)
- In-Situ Slug Test (ASTM D 4044) in 6 probes

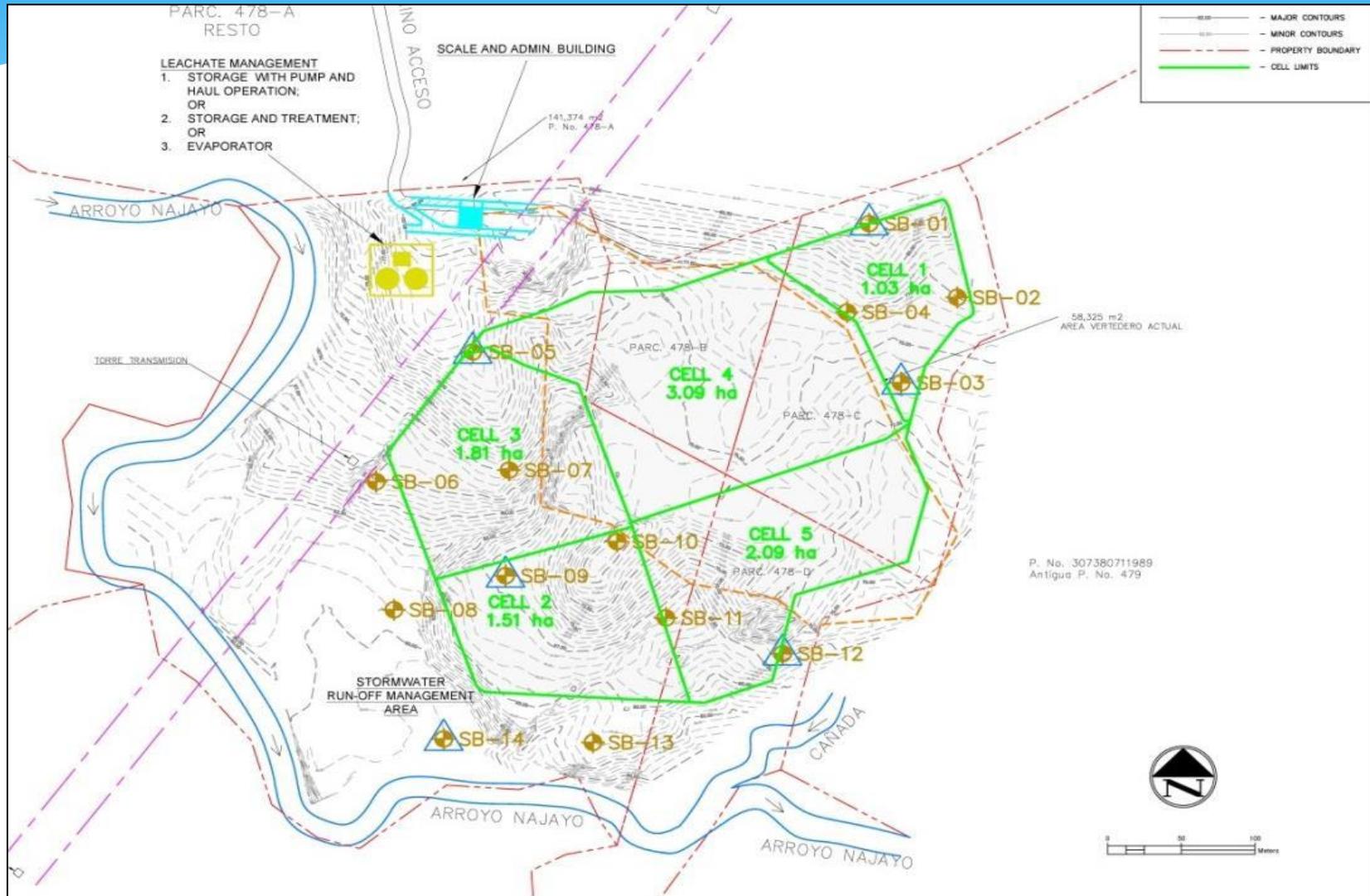
# Potentiometric Surface



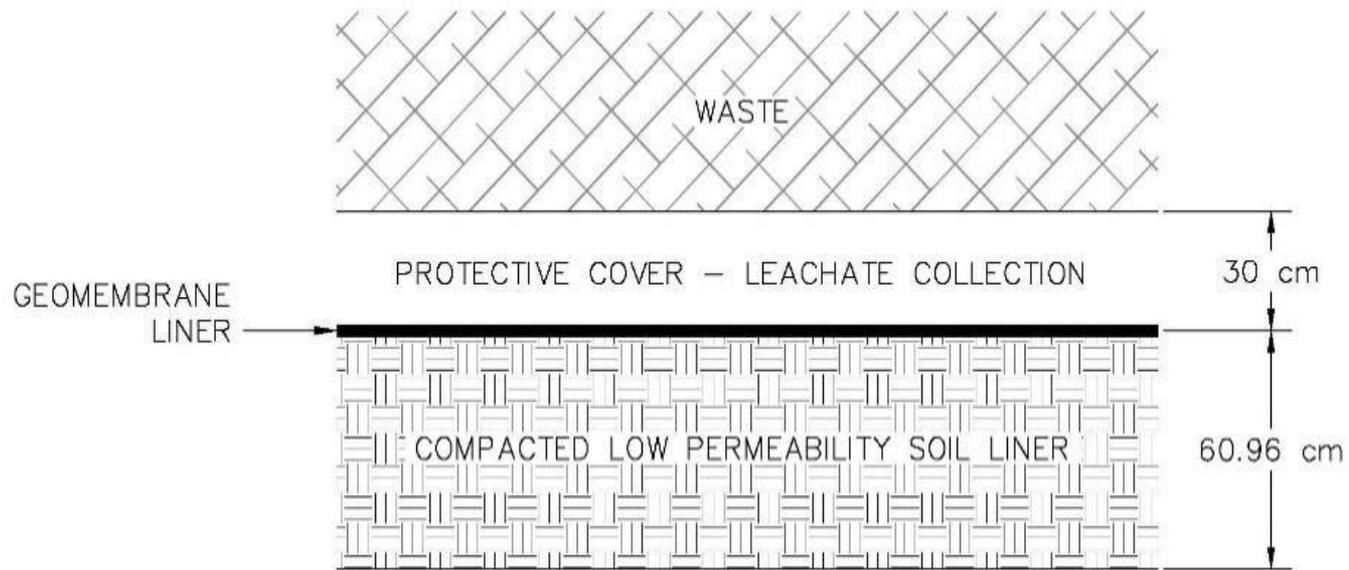
# Best Practices

- Access road and access control
- Active disposal area
- Heavy equipment
- Records
- Stormwater and leachate management
- Fire control
- Scavengers
- Operations and maintenance

# Conceptual Cell Layout



# Liner System



# Report

- I. Introduction
- II. Site background
- III. Design & operational objectives
- IV. Immediate actions/considerations to improve operations
- V. Improvement plan/landfill expansion
- VI. Open dump improvement plan
- VII. Estimated capital costs
- VIII. Contract guidance
- IX. Bibliography/reference documents

# Thank You

## Module No. 8 Open Dump Closure

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