Chloe Stone, P. Eng. – Project Manager XCG Consulting Limited



- The capacity of a landfill is usually restricted by:
 - Approved landfill footprint / setbacks;
 - Final approved grades; and
 - Regulatory requirements.





• Maximizing airspace via compaction – increasing waste density





• Maximizing capacity by reducing the amount of landfill cover soil





• Maximizing capacity via utilizing settlement





• Maximizing capacity filling methods





• Maximizing capacity filling methods





• Maximizing capacity during final cover design



Soil Based Cover

Geosynthetic Based Cover



- Existing Landfills present a challenge:
 - Often initially opened during a time when design guidelines were less detailed and/or strict
 - Often require innovative designs for expansion to allow for the continued development of the site while respecting current regulations
- Case Study: Nanaimo Regional Landfill
 - 2008 Design and Operations Plan, XCG identifies two areas where a berm construction and a piggybacking of a composite liner system over the existing waste could improve the environmental performance of the site and increase capacity.



Nanaimo Regional Landfill





- Nanaimo Regional Landfill
 - Site conditions as of January 31, 2008





- Nanaimo Regional Landfill Southwest Berm Extension
 - Optimize airspace by incorporating a "piggyback" liner over existing waste





Nanaimo Regional Landfill - Southwest Berm Extension







- Nanaimo Regional Landfill Southwest Berm Extension
 - Gained capacity = 325,000 cubic metres (6 additional years of landfilling)





- Nanaimo Regional Landfill North Berm Lateral Expansion
 - Address geotechnical stability issues associated with a smooth geomembrane use in historically lined areas
 - Optimize airspace
 - Improve drainage





• Nanaimo Regional Landfill - North Berm Lateral Expansion







- Nanaimo Regional Landfill North Berm Lateral Expansion
 - Gained capacity = 600,000 cubic metres (12 additional years of landfilling)





- Nanaimo Regional Landfill
 - Contours as of Jan 31, 2008



- Existing Site Conditions at Landfills present a challenge:
 - Natural impediments to landfill design often require innovative designs for expansion
 - Future landfill expansion many years into the future impact design decisions for current projects
- Case Study: Harmac Pulp and Paper Mill Landfill
 - In 2014 a conceptual design was completed by another engineering firm.
 XCG was brought in to complete the detailed design of the landfill expansion. Existing site conditions led to a number of major changes in the design of the expansion.



• Harmac Pulp and Paper Mill Landfill





- Harmac Pulp and Paper Mill Landfill
 - Conceptual Cell Design (by others)





- Harmac Pulp and Paper Mill Landfill
 - The natural impediment? Bedrock!







- Harmac Pulp and Paper Mill Landfill
 - XCG's Cell Design





- Harmac Pulp and Paper Mill Landfill
 - Initial Perimeter Berm Design





- Harmac Pulp and Paper Mill Landfill
 - Modified Perimeter Berm Design





- Harmac Pulp and Paper Mill Landfill
 - Gained Capacity = 300,000 cubic metres (additional 6 years of landfilling)







Chloe Stone, P. Eng. – Project Manager XCG Consulting Limited

