

Sanitary Landfill Design

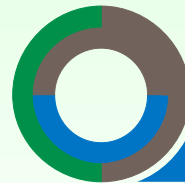
Municipal Solid Waste (MSW)

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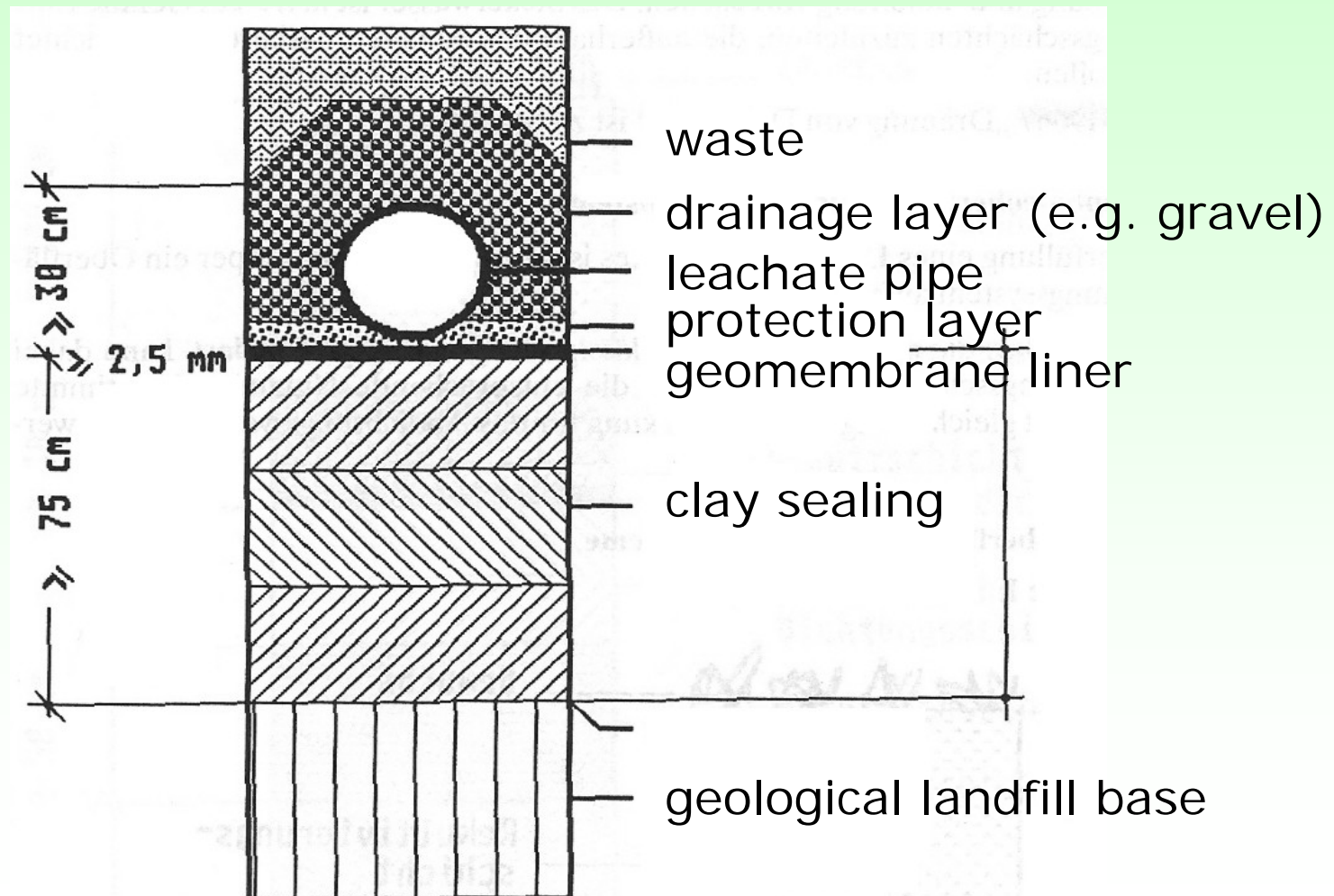
Waste and Water
Environmental Engineering

University of Duisburg-Essen

www.uni-due.de/waste

Sanitary MSW Landfill Landfill Design

Base liner system



Sanitary MSW Landfill Landfill Design

Base liner system



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Base liner system

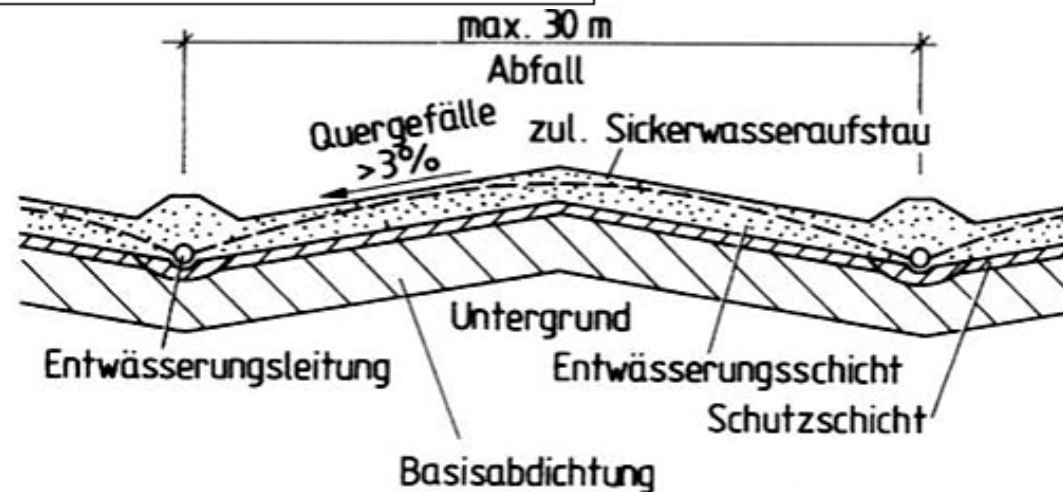
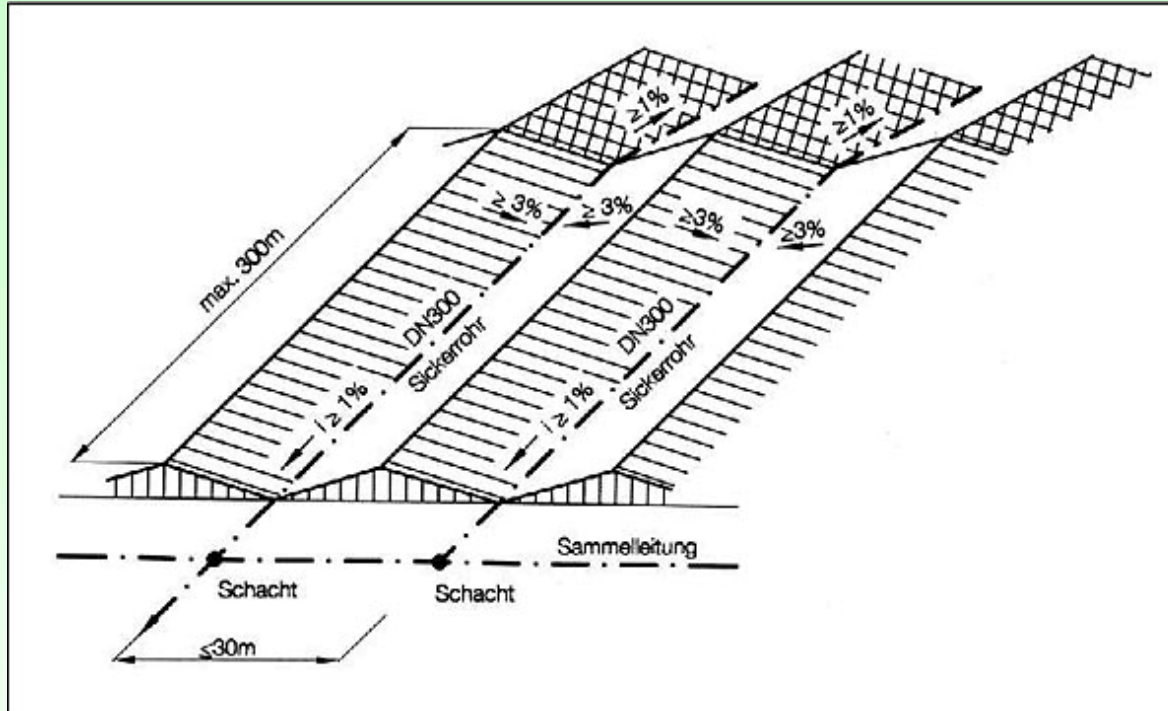


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Base liner system

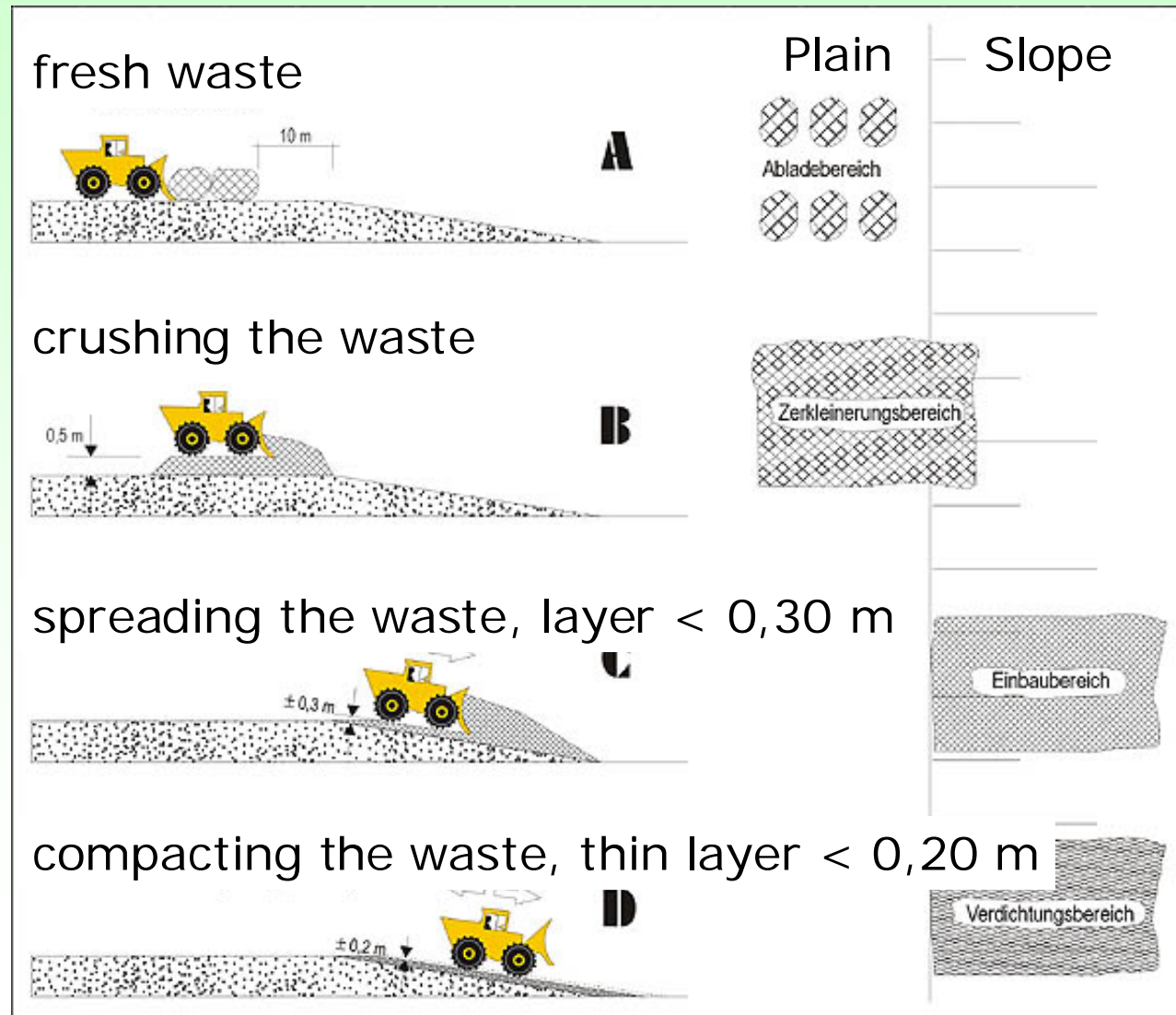
- Construction failures – reasons of damage
- Stone puncture (70%)
- Heavy equipment (16%)
- Welds (6%)
- Cuts (1%)
- Workers (6%)

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Waste operations



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Waste operations



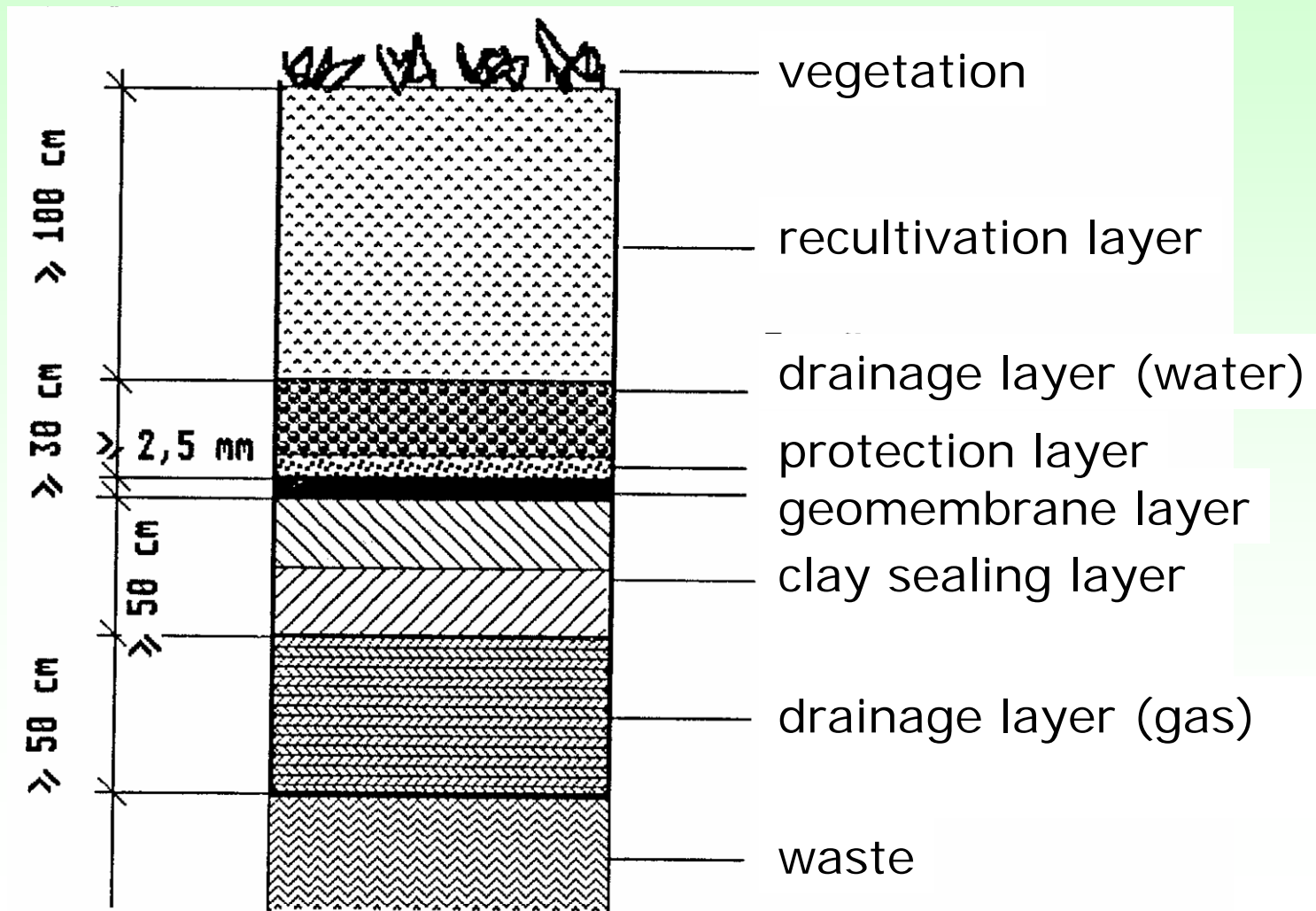
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Waste operations



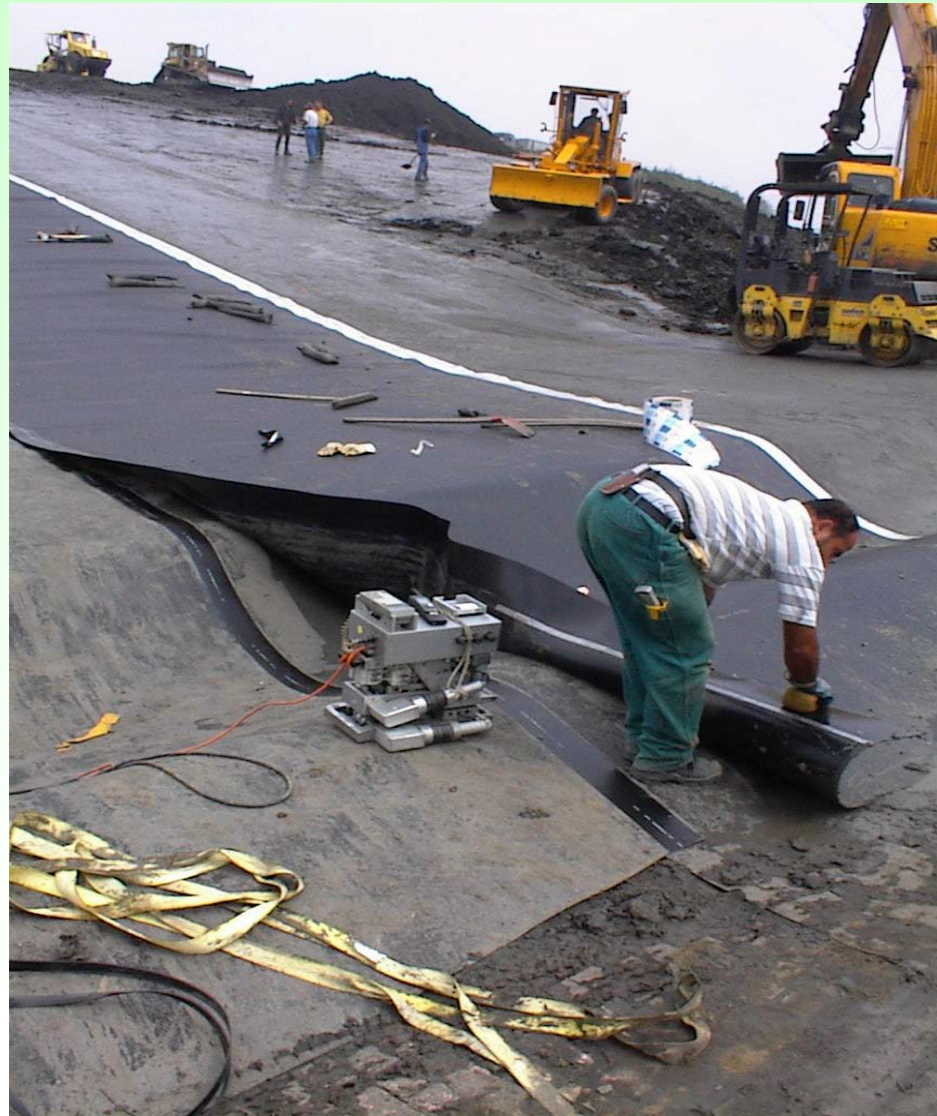
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Final Cap or Final Cover Layer



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Final Cap or Final Cover Layer



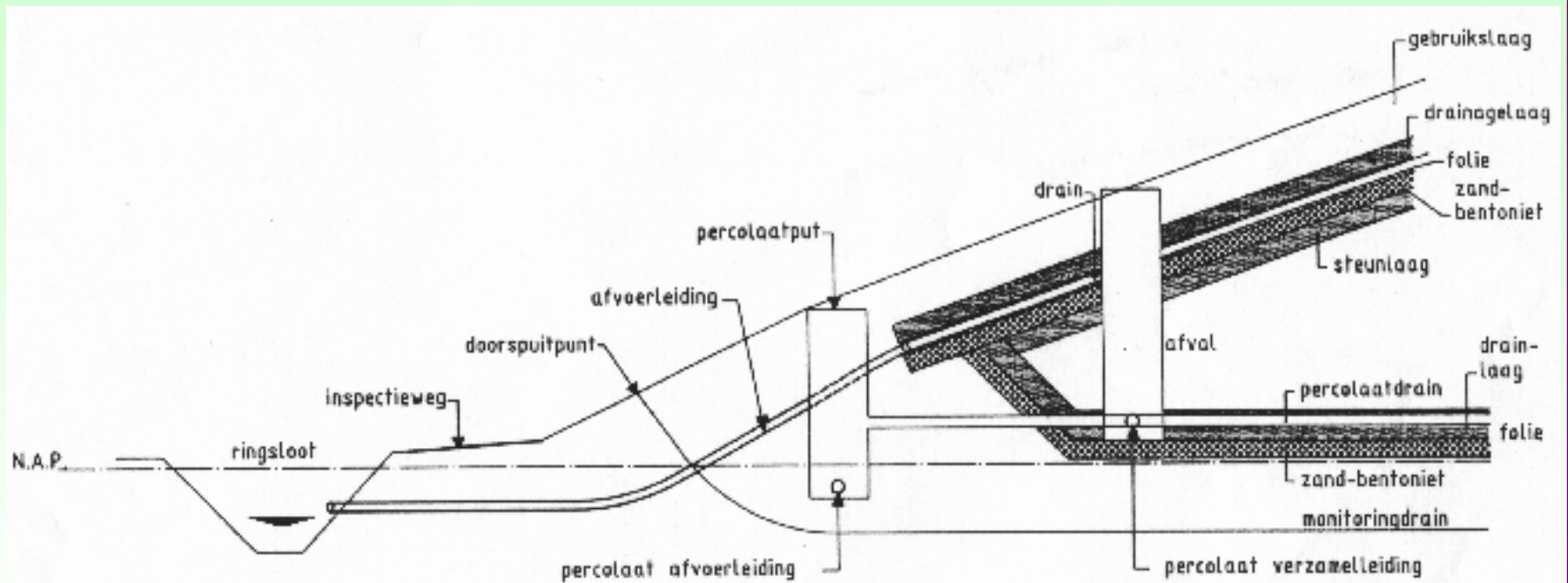
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Final Cap or Final Cover Layer



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Toe design



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Degasification System

- Collectors for landfill gas in the landfill body vertical and horizontal elements
- Collecting pipes from the landfill body to substations
- Gas transport pipes from substations to central gas station
- Condensate trap at deepest point of gas collection system
- Compressor station
- High temperature flare and Combined Heat and Power Plant (CHP)
- Power feeding to grid or own utilization of power

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Materials for sealing layers

- Natural mineral material
Very low permeability, high clay content, high content of swelling material (like smectites)
- Sand-bentonite mixtures
specified sand
water
bentonite (swelling material)
- Geomembrane HDPE
thickness
density
mechanical properties
resistance (UV, chemical, biological, stress-cracking)

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Degasification System



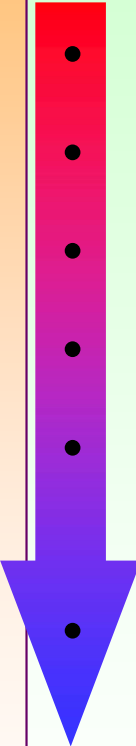
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Degasification System



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Leachate collection and treatment

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- Leachate pipes at the base liner of the landfill
 - Steady decline to a low point outside the landfill body
 - Collecting in a circular pipeline around the landfill
 - Intermediate storage in a leachate pond
 - Leachate treatment plant or disposal to a waste water treatment plant
 - Introducing into water, a river or a sewer

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Leachate collection and treatment



Leachate pipe

Intermediate Storage



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Leachate collection and treatment



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Leachate collection and treatment

Multi-Stage Leachate Treatment Plant

- Biological Pre-Treatment (Tanks or Basins)
Nitrification and De-Nitrification
- Membrane Filtration
7 Bar excess pressure, retention of bacteria
- Chemical Wet-Oxidation
Ozone treatment, cracking of long-chain hydrocarbons
- Biological Retreatment
percolation or trickling filter

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Entrance and administration building

