Shear strength and density of oil sands fine tailings for reclamation to a boreal forest landscape

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IOSTC 2016
Lake Louise
Design tailings deposits to meet the goals for the reclaimed landscape
The reclamation objective
Self-sustaining, locally common, boreal forest
Boreal forest
Fen (0m)  
AET<P

Shallow-water wetland (1 to 2m)  
AET>P

Marsh (<0.5 to 1.0m)  
AET>P

Lake (>2m)  
AET>P
Open water

- Fen (0m) AET<P
- Shallow-water wetland (1 to 2m) AET>P
- Marsh (<0.5 to 1.0m) AET>P
- Lake (>2m) AET>P
The 10% rule of thumb
Oil sands
fluid tailings types
Stronger denser oil sands tailings types

http://www.macleans.ca/wp-content/uploads/2014/06/MAC23_CSR01_POST.jpg
Strength and solids content

![Graph showing the relationship between peak undrained shear strength (kPa) and solids content. The graph includes different water types and capping & settling firm to stiff phases. The diagram highlights soil mechanics and fluid mechanics limits.]

**GOALS**

**WATER**

**TYPES**

**CAPPING & SETTLING**

**FIRM TO STIFF**
Strength and solids content
Capping methods

- Soft ground
- Sand beaching
- Raining in sand
- Floating coke cap
- Floating water cap

Standard earthworks techniques

- Plastic limit
- Liquid limit 2 to 5 kPa
Supporting topographic relief

Change to 3D Derrill drawing

Factor of safety

1.6
1.4
1.2
1.0
0.8

Undrained strength (kPa)

15 20 25 30 35
GOALS  WATER  TYPES  CAPPING & SETTLING  FIRM TO STIFF
GOALS WATER TYPES CAPPING & SETTLING FIRM TO STIFF