



Ville Niutanen

# **Mass stabilization of Sampaanlahti bay, Rauma, Finland. Utilisation of forest industry by-products as a binder material for mass stabilization**

Lemminkäinen



# UPM Rauma, Forest industry integrate

- Sampaanala bay, an old waterway transportation route of raw wood to the heart of the integrate.
- Purpose of mass stabilisation – bottom structures for new storage field





# Stage 1, mass stabilisation of basin A

Stabilised area : 3,5 hectares

Depth of stabilisation: 3 ... 7 meters

Volume of mass stabilisation: 145 000 m<sup>3</sup>

Preload embankment: 1000 mm







# Stage 1, mass stabilisation of basin A

- Very soft conditions
- Base material had high organic content
  - → difficult for binders and curing
- Testing field for different binders December 2012
  - → gave sufficient results for using forest industry by products
- January 2013 mass stabilisation started
  - → base material improvement by kaolin and fly ash
  - → cement + dry fly ash 50/50 – 260 kg/m<sup>3</sup>



## Stage 1, mass stabilisation of basin A

- Working order:
  - Screening the debris (wood, cables, etc)
  - Improving the base material – kaolin, fly ash
  - Pre mixing
  - Mass stabilisation with cement – dry fly ash mix
  - Geotextile installation
  - Preload embankment – fly ash / bottom ash



# Stage 1, mass stabilisation of basin A – binder management

- Cement – daily need appr. 70 ... 100 tn
- Dry fly ash – daily need appr. 150 tn.
- Fly ash and kaolin from UPM monofill storage, distance 15 km – daily need 400 tn.





# Stage 1, mass stabilisation of basin A

- Material flows of stabilising basin A
  - ❑ Cement – appr. 15 000 tn
  - ❑ Fly ash products – appr. 120 000 tn
  - ❑ Kaolin + other – appr. 170 000 tn





# Stage 1, mass stabilisation of basin A

Stage 1, mass stabilisation of basin A and preparation of basin B







## Stage 2, mass stabilisation of basin B



Water pools made to basin B, mass stabilised kaolin clay



## Stage 2, field structures of basin A.





# Lemminkäinen

Ville Niutanen

Lemminkäinen Infra Oy  
GSM +358 40 511 1893  
Ville.Niutanen@lemminkainen.com  
[www.lemminkainen.fi](http://www.lemminkainen.fi)