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Improving Dam Safety in Finland

14.9.2023 Eija Isomäki, Kainuu ELY Centre

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Dam Safety in Finland - Basics

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Dam Safety Legislation

- Dam Safety Act, 2009, val
  - enacted by the parliament of Finlar
  - it has been translated in English:
    - English: http://www.finlex.fi/en/
- Dam Safety Decree, 2010
  - defines implementation of Dam Saf
  - enacted by The Ministry of Agricult
  - it has been translated in English:
    - English: http://www.finlex.fi/en/laki/kaannokset/2010/en20100319
- Dam Safety Guide, 2012
  - it has been published in the interne
  - for the implementation of dam safe
  - general recommendations that are
  - it has been translated in Swedish a
  - dam safety guide in the internet: ww ht

Legislation shall be applied to:
*basically every dam, regardless of its height
*water storage dams
*flood embankments / levees
*waste dams which are used to impound liquids or solids that are harmful or dangerous to health or the environment (incl. tailings dams)

The Dam Safety Guide is designed to support the tasks of dam owners and others who work at dams. The guide takes up the designing and construction of dams, classification, dam safety documentation as well as the dam break hazard analysis and the emergency action plan. It explains matters in connection with dam maintenance, use, monitoring and inspections as well as the obligations of the dam owner.

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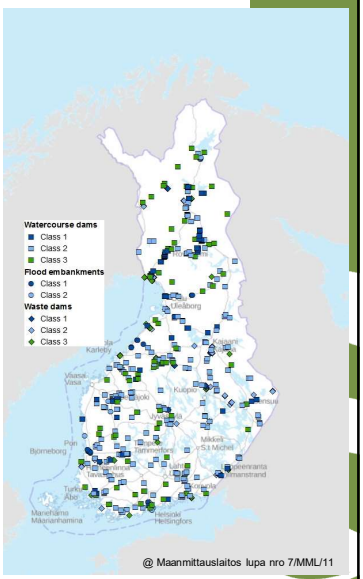
Dams in Finland

- **56 large dams (ICOLD criterion)**
  - **mostly embankment dams**
  - **usually connected with hydro power station**
- **Classified dams:**
  - **Class 1 100 dams**
  - **Class 2 253 dams**
  - **Class 3 100 dams**
  - **Total 453 dams**
  - ➢ **About 132 (of 453) are waste dams**



4

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Dam Safety Legislation

Dams are classified according to the hazard they pose if accident happens

- Class 1 dam, which in the event of an accident causes danger to human life and health or considerable danger to the environment or property
- Class 2 dam, which in the event of an accident may cause danger to health or greater than minor danger to the environment or property
- Class 3 dam, which in the event of an accident may cause only a minor danger. (Section 11).

There are no limitations of the height of the dam

5

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Dam safety information system

- Information system includes information all classified dams in Finland.
- DSA (2009) Section 33 – Information systems
  - The information system has been built for common tool to the authority and dam owner. However the dam owner can see only the information of his own dam.
  - The dam owner is responsible for maintaining the documents for the information system. These documents are listed in the Dam Safety Decree:
    - contact information
    - hydrological parameters
    - permit applications
    - design documents
    - monitoring program
    - dam break flood analysis
    - emergency action plan
    - description about safety measures
    - documents about periodic inspection
    - documents about the dam condition

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Basically no new dams being built

- Last hydropower dam was taken into operation 2001. 2017 one permit was given but the company has not made the final decision.
- New flood embankments and tailings dams have been built during the past years.
- Quite a few renovation works are being done every year.

7

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Latest projects

8

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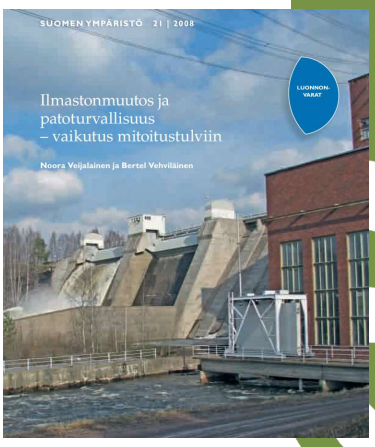
Climate change and dam safety – effect on design floods

- Published 2008
- These calculations have been recalculated. The new calculations have been made for watercourses.
- The results are to be published soon.



9

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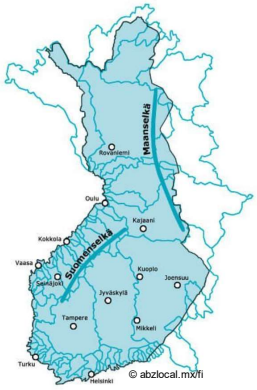
Emergency planning for the watercourse

- Including evaluation of the sufficiency of emergency action plans and flood management plans.
- Also considering climate change
- Things to be taken into account: domino effect, fragile ice, climate change, changing floods



10

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Case: Melo, RD pile wall

- The pile wall is placed on the upper basin side of the dam
- No need to lower the water level in the upper pool
- Did not affect the production of the power plant

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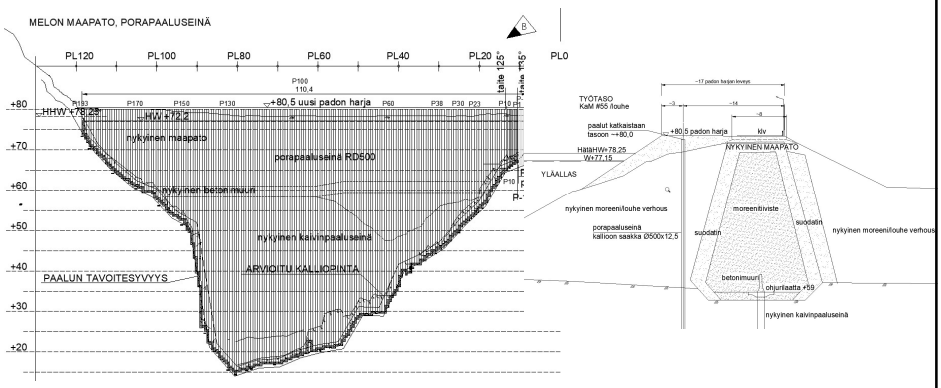
Case: Melo, RD pile wall



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Case: Melo, RD pile wall

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Case: Melo, RD pile wall

POHJOLAN VOIMA OYJ, Matti
Åman, 6.11.2022

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Technology

15

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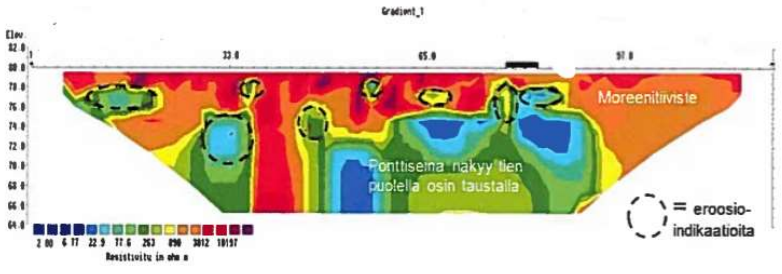
For a small country we have many highly developed techniques to examine dams

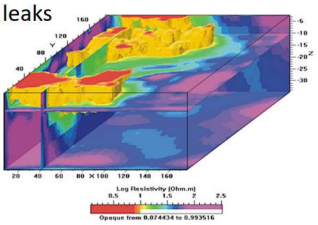


16

Deep Scan Tech Ltd

Non-invasive 3D scanning for securing clean and resilient environment

- Deep Scan Tech is a technology company specializing in 3D scans of everything underground. Deep Scan Tech uses its novel scanning solution that combines electric tomography and other investigation methods to provide our clients unique and comprehensive understanding of everything below the surface.
- Examples of what can be seen with Deep Scan Tech's 3D Scans:
  - ✓Moisture – e.g. detecting sources of humidity and leaks
  - ✓Soil types – sand, rock, clay, etc.
  - ✓Infrastructure – e.g. finding unmarked pipelines, cables, etc. or examining the condition of foundations also under existing structures
  - ✓Pollutants – e.g. defining limits of contaminated land areas



17

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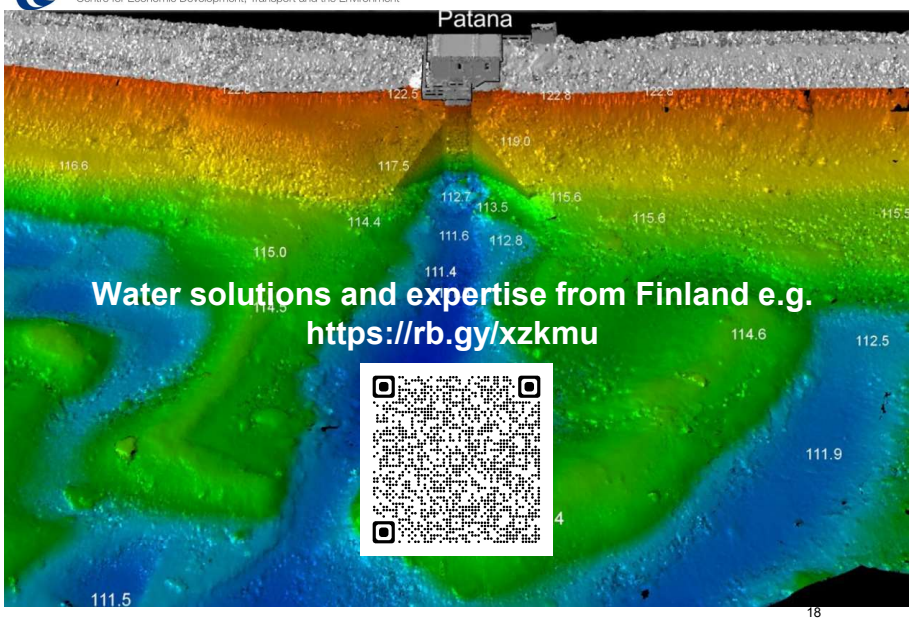

Water solutions and expertise from Finland e.g. https://rb.gy/xzkmu

18

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Thank You! Xiexie!

Eija Isomäki
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Secretary of FINCOLD, www.fincold.org

19