Soil management – viewpoints from Finland

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Starting Points from National Level

- Surplus soils from construction sector in total 20-30 Mt/a
  - Even 10 times more than municipal waste (2.4-2.8 Mt/a)
  - Often regarded as waste -> treatment and reuse requires environmental permit
  - >90% of remediated sites based on excavation; land use change and site redevelopment major triggers for remediation
  - Note: Clean "non-waste" soil from one construction site to another ~ 30-40 Mt/a

- Due to permit obligation, excavated "soil waste" disposed/reused mainly in landfills (contaminated) or specific soil landfills (uncontaminated)
  - Use of virgin soil/rock; long transportation distances -> high CO₂ emissions; high costs etc.

More efficient and sustainable soil management in urban areas needed!
DEFINITION OF WASTE – WASTE ACT (646/2011) 
BASED ON WASTE DIRECTIVE 2008/98/EC

● Substance or object, which the holder discards, intends to discard or is required to discard

● Exclusions from the scope of WFD
  ○ “Uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated”;

● In the Finnish Waste Act exclusion for uncontaminated soil extended
  ○ “… on the site from which it was excavated or elsewhere”
  ○ Thus, most of the uncontaminated soils in construction sector are not wastes in the first place, and hence exclusion from the scope of waste regulation was not seen as needed…

● However, interpretation and application of the exception and waste definition varies, and practical guidelines on soil reuse have been missing
  ○ Above mentioned exclusion not in the Waste Act, but only in the rationale; people may not be aware of the exclusion
  ○ Variable interpretation and lack of guidance cause uncertainties and complicate planning
  ○ Too often this results in disposal instead of reuse

● In addition, some reusable soils considered as waste anyway
  ○ E.g. due to contamination or other inpurities
  ○ These amounts are also huge compared to many other waste streams
GOVERNMENT DECREE ON SOIL RECOVERY

- Promoting reuse/recovery of excavated "soil wastes" in earth construction
  - Based on notification, no need for environmental permit
  - Predefined applications with specific requirements on utilisation and temporary storage
  - Covers also soil stabilization/solidification with certain industrial wastes (e.g. fly ash)
  - Risk-based limit values for leaching (application specific) + concentration limit values
  - Requirements for quality assurance (incl. representative multi increment sampling)

- Draft Decree to stakeholder consultation October 2018
  - EU notification (3 months), Decree into force in spring 2019

- Many other policy measures and projects in development or in action
  - Circular economy and clean solutions strategic policy goals in the Finnish Government Programme -> Efficient soil/material management acknowledged as an important part of this

- Traffic lanes
- Field structures
- Noise barriers and other embankments
- Filling applications on land
- Uncontaminated soil waste
- Soil incl. hazardous substances and other inpurities
- Soil and dredged sediment stabilized with waste-derived binders
DEFINING AND CLASSIFYING SOIL WASTE ACCORDING TO THE DECREES

Amount of non-soil related materials

- Uncontaminated soil
- Uncontaminated soil waste
- Soil waste

Threshold value or background

Other conditions of the Waste Act

Limit value

Representative concentration of contaminants

Cannot be used according to the Decree without treatment

Uncontaminated soil waste

1...2 %

20 %
Approaches in Municipal Level - Helsinki

- Starting points for development
  - Most of the waste amounts generated in the city are soils from construction sites
  - City’s own soil landfills filling up or closing down in early 2010 -> increasing transportation
  - Fees for other soil landfills in the neighbouring areas also increasing
    → Increasing economic, environmental and social burden of soil management

- Strategic programme and measures for soil management in Helsinki (and the capital region), e.g.
  - Defining vision and objectives
  - Designated soil manager ("soil coordinator"); coordinating the data and "mass balances" within city’s own construction projects; soil, crushed rock, blast rock, sediments
  - Finding options, in advance, for soil reuse, treatment and temporary storages
  - Enhancing cooperation between different organizations in the city (e.g. spatial planning and construction sector)
  - Guidelines and protocols for the people involved, incl. constant evaluation of the progress with predefined indicators

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DEVELOPMENT PROGRAM FOR SOIL COORDINATION IN HELSINKI (2014-2017)

Excess soil to soil landfills (as waste) outside the city

<table>
<thead>
<tr>
<th>Year</th>
<th>Tons</th>
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<tbody>
<tr>
<td>2010</td>
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</tr>
<tr>
<td>2012</td>
<td>180 000</td>
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<tr>
<td>2013</td>
<td>10 000</td>
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<tr>
<td>2014</td>
<td>0</td>
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<td>2015</td>
<td>0</td>
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</tbody>
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The reuse of soils in construction projects in Helsinki (Picture: Jätkäsaari, Helsinki).

Development program (2014-2017) was launched

Land mass coordinator starts his work in 2014

Land mass coordination begins in 2011

Due to the results from Helsinki, many other "cities" in Finland are now developing their own strategic plans for more efficient soil management

Savings

- 32 milj. tonnes
- 4,5 milj. l.
- 11 300

Huge benefits also in individual projects

E.g. 70 000 truck loads of blast rock from Englantilaiskallio site to Koirasaari site

Cost savings (compared to situation where materials from/to outside the city): 20 M€
Example of sustainable land management in practice
Case West Harbour - Jätkäsaari

- Located in southern Helsinki
  - About 2.5 km from the city center
  - Area ca. 100 ha
  - Cargo harbour 1913 – 2008

- Construction of a new residential area 2008–2030
  - 17,000 residents, 6,000 jobs

Data and images: Kimmo Järvinen, Ramboll Finland Oy
Contamination and Risk Management in West Harbour

- Contamination due to long operational history and filling materials
  - Metals, petroleum hydrocarbons, PAHs
  - Contaminated soil in ground (C > soil guideline value) around 2 million tons

- Risk management combined with spatial planning from early stage
  - E.g. former landfill -> sports park
  - Designated reuse areas in the city/master plan
  - Local storage area for excavated soils and waste of 20 ha

- Based on risk assessment only 10-20% of the “contaminated” soil (> SGVs) need(ed) to be remediated/removed
  - Huge economic and environmental benefits

- Active cooperation between different authorities and other stakeholders during the whole project
EXTENSIVE REUSE OF SOIL, SEDIMENT AND WASTE

- > 90% of all the excavated contaminated soils reused (approx. 110 000 m$^3$) mainly in two park areas (that needed to be constructed anyway)
  - Technical requirements of the soil/waste confirmed for the purpose (no clay, organic matter)
  - Engineering structures of isolation comparable to landfill
  - No reuse of volatile or easily soluble contaminants
  - Monitoring network

Savings due to soil and waste reuse so far:
- 8,3 M€
- 165 000 L gasoline
- 410 t CO$_2$
Requirements for Efficient Soil Reuse

- **Policy instruments, e.g.**
  - Legislation that enables and promotes reuse
  - Regulations and guidelines regarding procedures and requirements
  - Taxation and/or restrictions on disposal of reusable soil

- **Market and acceptance, e.g.**
  - Technical expertise and facilities
  - High level of quality assurance
  - Economic benefits of reuse must be seen

- **Logistic measures, e.g.**
  - Local/regional treatment and storage sites
  - Soil data management, e.g. coordination of construction sites -> "supply and demand"

- **Proactive planning and cooperation, e.g.**
  - Combining spatial planning and redevelopment with soil management at early stage
  - Cross-sectoral dialogue between authorities, land developers, contractors etc.

→ Progress in Finland very positive lately both on national and regional level, but the work is by no means done yet!
THANK YOU!