2.12.2014

ABSOILS - VALUABLE PRACTICES FOR SOILS IN HELSINKI

SUSTAINABLE METHODS AND PROCESSES TO CONVERT ABANDONED LOW-QUALITY SOILS INTO CONSTRUCTION MATERIALS. 1.9.2010 – 30.6.2015

LIFE+2009 DEMONSTRATION PROJECT
LIFE09 ENV/FI/575

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LIFE09 ENV/FI/575 ABSOILS

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ABSOILS PROJECT IN A NUTSHELL

- Start: September 2010/ end: June 2015
- Co-ordinated by Ramboll Finland
- Project partners: Biomaa/Lemminkäinen and Rudus
- Supported by the Finnish Ministry of the Environment and the Uusimaa cities - Helsinki, Espoo and Vantaa
- Co-financed by the EU LIFE+ Environmental Policy & Governance programme (LIFE09 ENV/FI/000575)

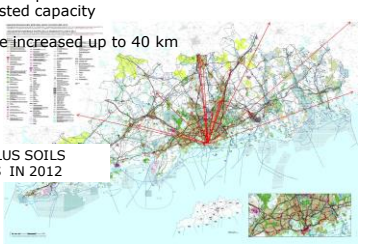
LIFE09 ENV/FI/575 ABSOILS

RAMBØLL Lemminkäinen Rudus

BACKGROUND

LIFE09 ENV/FI/575 ABSOILS

- Absoils project came as a response to the problem of surplus excavated soft soils resulting from infrastructure development
- In the year 2009 the annual generation of excavated soils in Helsinki was about 0,6 million m3. At that time, 70% of this amount was landfilled
- In 2012, the landfill for surplus soil masses in Helsinki was closed down due to its exhausted capacity
- Transportation distance increased up to 40 km



RELOCATION OF SURPLUS SOILS TO 23 LANDFILL SITES IN 2012

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NEEDS

- Practical examples and ways of applying the European policies and legislation concerning waste (soils and other waste such as fly ash which can be utilised as a binding agent)
- Success stories promoting waste recovery and sustainable recycling with a focus on life-cycle and life-cost thinking and the development of recycling markets – material efficiency /examples to follow
- Technical and environmental information related to redundant soils and their conversion into useful earth construction materials – quality assurance and follow-up data

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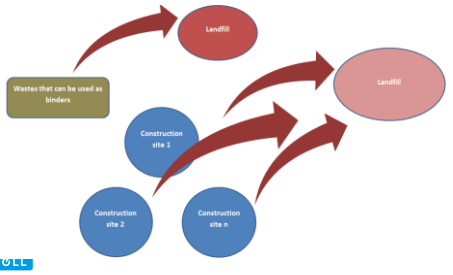
MATERIAL EFFICIENCY - CURRENTLY DOMINATING LINEAR MODEL

- based on the assumption that resources are abundant, available, easy to source and cheap to dispose



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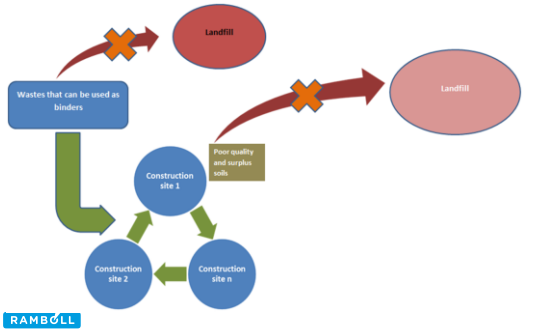
TARGET – CIRCULAR MODEL



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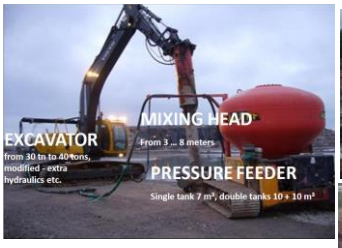
OBJECTIVES

- To provide technical and environmental **data and information** on materials, materials mixtures and additives, storage, treatment and transports of materials as well as the diverse stages of construction
- Piloting action to **demonstrate the practical implementation** of four types of civil-engineering applications as full-scale pilots based on the use of redundant soft soils: i.e. flood barriers, noise barriers, supporting banks and landscape construction.
- To **create and demonstrate a Model for Sustainable Regional Material Service System (RMSS)** for the metropolitan region allowing to direct the use of regionally produced and generated materials and aggregates to the short-term and long-term infrastructure construction projects with the assistance of practical logistics and Internet operated database.

PILOT APPLICATIONS


- **Flood barriers**
  - ✓ Dog Park in Espoo (2012/2013)
- **Noise barriers**
  - ➢ Jätkäsaari III in Helsinki (2014)
- **Supporting banks**
  - ✓ Arcada 2 in Helsinki (2011)
  - ✓ Dog Park in Espoo (2012/2013)
  - ➢ Honkasuo in Helsinki (2014/2015)
- **Landscape construction**
  - ✓ Jätkäsaari I and II in Helsinki (2011/2012/ 2013)
  - ✓ Dog Park in Espoo (2012/2013)

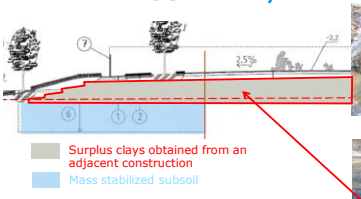
METHOD OF TREATMENT – STABILIZATION



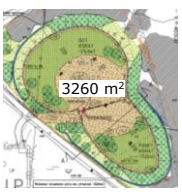

ARCADA 2, KYLÄSAARI, HELSINKI 2011

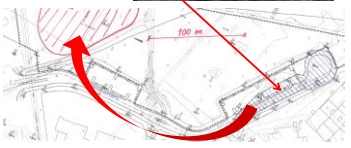
Surplus soft soil from some other construction site was transported to the target, stabilised and used as a light weight structure replacing blasted rock.


PERKKAA DOG PARK 1/2





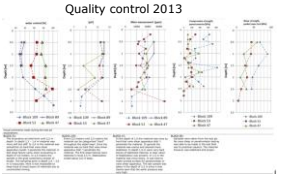




PERKKAA DOG PARK 2/2

Mass stabilisation 15.01.2013

Quality control 2013



Installing lysimeters 11.2.2013

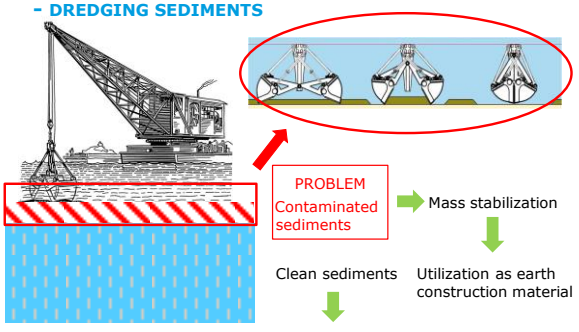
Measuring lysimeter in ready Dog Park 12.2.2012

WEST HARBOUR NEW HOUSING AREA, CONSTRUCTION ONGOING

Helsingin kaupunki http://www.uuttahelsinkia.fi/jatkasaari/perustiedot/webcam-jatkasaareen

JÄTKÄSAARI I, II AND III
MASS STABILIZATION OF SOFT SOILS AT THE SITE

4. JÄTKÄSAARI
- DREDGING SEDIMENTS



PROBLEM
Contaminated sediments

Mass stabilization

Clean sediments

Utilization as earth construction material

Deposit to sea

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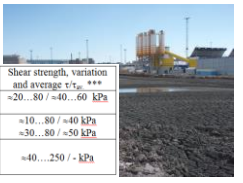
JÄTKÄSAARI
- 3 PHASES (I, II AND III)



Phase / Year*	V [m³]	w [%]	H_b [%]	Binder	Binder amount [kg/m³]	Shear strength, variation and average c/τ_{av} ***
I / 2010 / 2011	20.000	70…100	3…4	C	60	≈20…80 / ≈40…60 kPa
II / 2012 / 2012	90.000	26…159	1.5…8.7	C C+FA	40…80 (av. ≈70) 40 + 150…500**	≈10…80 / ≈40 kPa ≈30…80 / ≈50 kPa
III / 2014 /2014	21.000	58…100	2.6…4.0	C+FA, LC+FA C/LC+FA+FGD OSA5, OSA8	50 + 150 50 + 75 + 75 150	≈40….250 / - kPa

Dredging 06/2013/ Phase IIII

Mass and screener crusher stabilization spring 2014

Binders:
- Fly ash
- Lime Cement
- Flue gas desulphurisation product (FGD)
- CEM II/B-M (S-LL) 42,5 N
- Oil Shale ash

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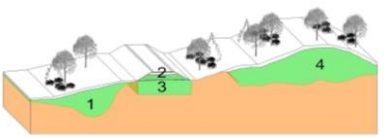
JÄTKÄSAARI III
- MASS STABILISATION METHODS

IDA AALBERG PARK



STAGES OF THE DEVELOPMENT OF THE SURPLUS SOILS STRATEGY FOR THE CITY OF HELSINKI

- 2011 Report on the present state
  - Volumes of excavated soils and the associated transport needs were analysed
- 2012 Alternative visions discussed
  - 0: Handling not coordinated
  - 1: Recovery 100 %
  - 2: Filling to quarries
  - 3: Sea filling
  - The impacts of the alternative solutions were defined for the near future (2012-2020) and in the long run (2020-2050)
  - Impact evaluation was carried out
- 2013 Definition of the strategy
- 2014 Decision-making process and strategy adoption – city government

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SURPLUS SOILS MANAGEMENT

1. **Guidance and control of design and construction**
2. **Soil flow coordination**: there is communication among construction and storage sites.
3. **Sites for temporary storage and processing** - effective utilisation and refining
4. **Development projects**, e.g. Absoils, UUMA 2; - developing and fostering new methods
5. **Securing the existence of disposal areas**
6. **Avoiding mass exchange – soil treatment on site**
7. **Soils management and logistics in master planning stage**

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SOIL REUSE DEVELOPMENT TRENDS

- City of Helsinki – volumes of excavated soils landfilled
  - 2009 – 600 000 t
  - 2010 - 500 000 t
  - 2012 - 180 000 t
  - 2013 - 10 000 t
- The operational objective of the Public Works Department in Helsinki for the year 2015 is:

At least 70% of surplus soils generated during the construction of streets and parks in Helsinki to be utilised in other construction sites in the city.

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CHALLENGES

- Setting temporary storages – not very straightforward; not at my back yard attitude
- Limited time of storage
- Refining soft poor quality soils into construction material requires the use of binders
- If cement only (no need for a permit) – very high price of the binder in comparison to the price of obtained material
- The use of fly ashes and FGD – environmental permit needed – this is still seen as dumping attempt by the permit authorities
- Might also result in protest of the habitants

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