



ABSOILS - Sustainable methods and processes to convert abandoned low-quality soils into construction materials

With the contribution of the LIFE financial instrument of the
European Union
LIFE + 2009 DEMONSTRATION PROJECT





RAMBOLL **Rudus** **Lemminkäinen**



2010-2015

LIFE09 ENV/FI/575

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Absoils project in a nutshell

- Start: September 2010/ end: June 2015
- Co-ordinated by Ramboll Finland
- Project partners: Lemminkäinen (replacing Biomaa) 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)





Infrastructure development in Finland – challenges of surplus soils management

- shortage of available deposit sites in the cities
- long transportation distances to deposit sites
- high costs of transportation and mass replacement materials
- adverse impact on the environment: CO₂ emissions due to associated transportation, depletion of virgin materials



Needs

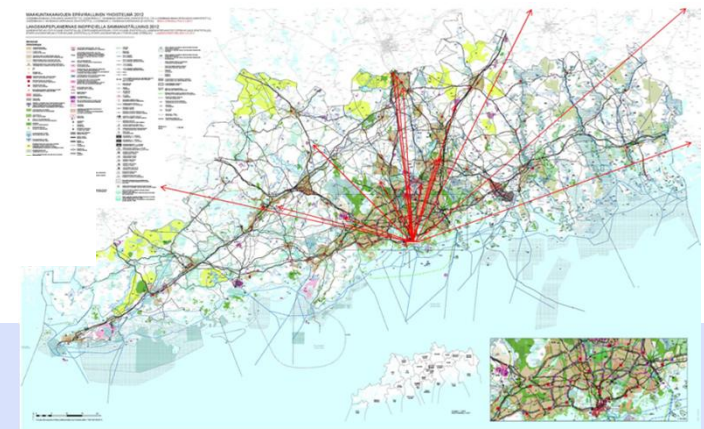
- Practical examples and ways of applying the European policies and legislation concerning waste (soils and other waste such as fly ash which can be utilised as a binding agent)
- Success stories promoting waste recovery and sustainable recycling with a focus on life-cycle and life-cost thinking and 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



Project background

- 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

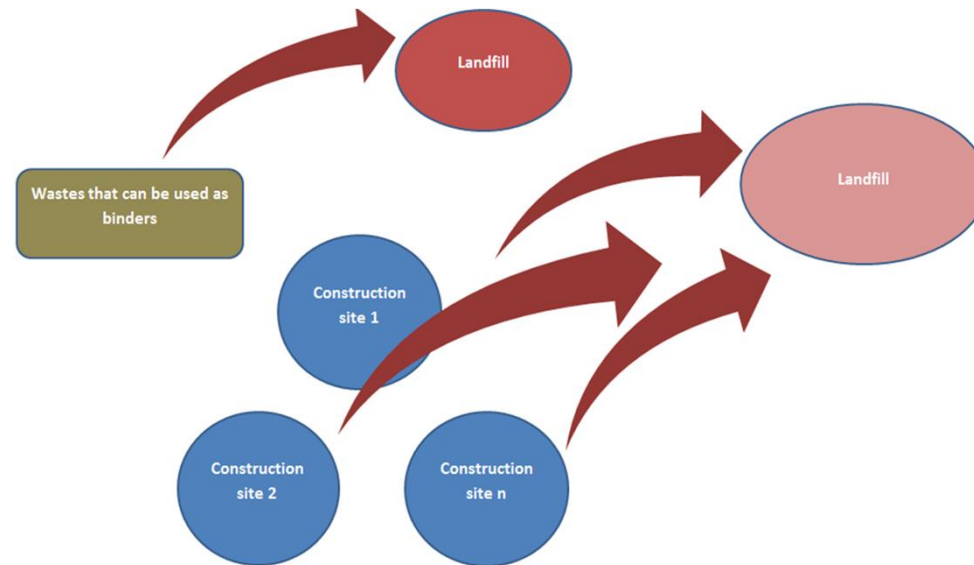
RELOCATION OF SURPLUS SOILS
TO 23 LANDFILL SITES IN 2012





Material efficiency - currently dominating linear model

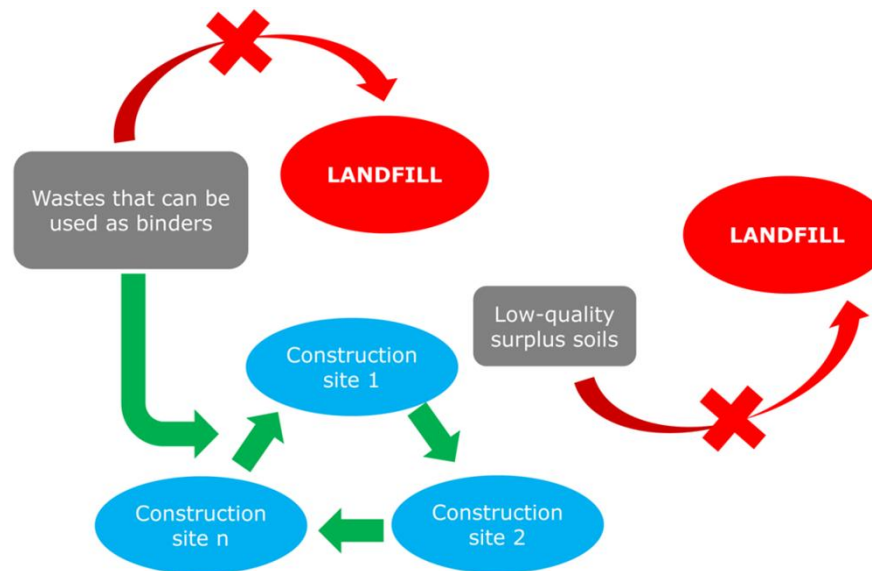
- based on the assumption that resources are abundant, available, easy to source and cheap to dispose





Target – circular model

- There is a more sustainable way to act – surplus low-quality soils and wastes from energy production can be processed with the mass stabilisation method into construction material





Project aims

- To address the challenges of the European policies and legislation concerning waste
- To promote waste recovery and sustainable recycling with a focus on life-cycle thinking and the development of recycling markets
- To tackle the challenges related to the redundant soils and their conversion into useful earth construction materials



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Objectives

- To provide technical, environmental and methodological 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 challenging types of civil-engineering applications in full-scale pilots based on the use of redundant soft soils: e.g. flood barriers, noise barriers, supporting banks and landscape construction.
- To create and demonstrate a Model for Sustainable Regional Material Service System (RMSS) for the Uusimaa region. The RMSS will 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)
 - Pirttiranta in Vantaa (2012)
- Noise barriers
 - Jätkäsaari 3 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)



Stabilisation methods used in ABSOILS

Column stabilisation
(in-situ)



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Process stabilisation" -
screener crusher (ex-situ)



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Mass stabilisation
(in-situ & ex-situ)



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Arcada 2, Kyläsaari, Helsinki 2011

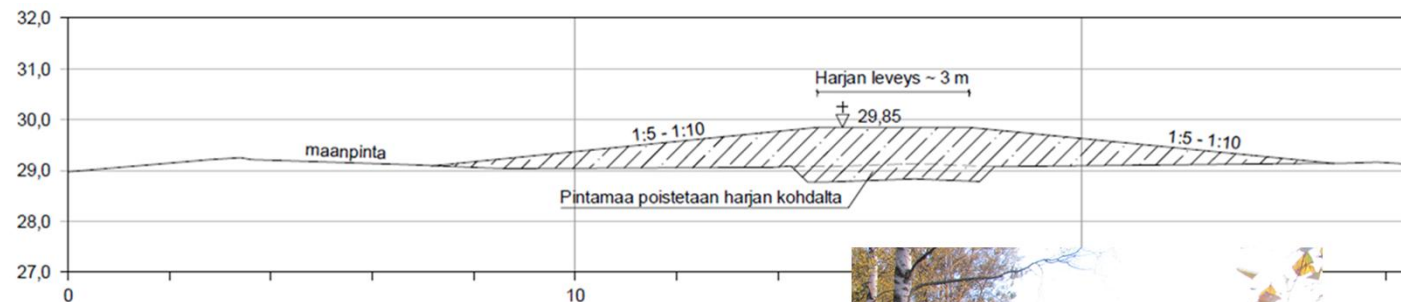
Surplus soft soil from some other construction site was transported to the target, stabilised and used as a light weight structure replacing blasted rock.





Pirttiranta, Vantaa, 2012

- Area prone to flooding
- Utilisation of surplus clays generated in Vantaa for the construction of flood embankment



Initial situation



Flood embankment constructed with surplus clays





Perkkaa Dog Park, Espoo 2012-2013



Perkkaa Dog Park – quality control

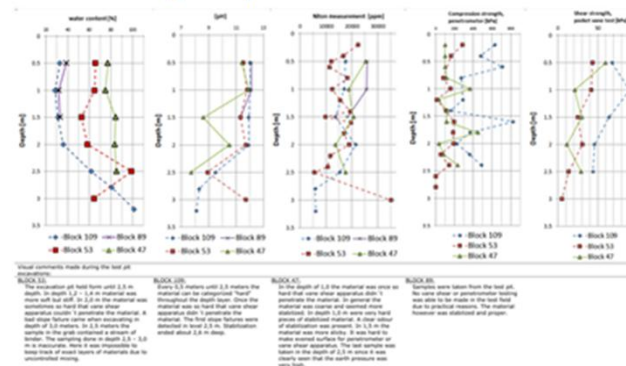
Mass stabilisation 15.01.2013



Installing lysimeters 11.2.2013



Quality control 2013

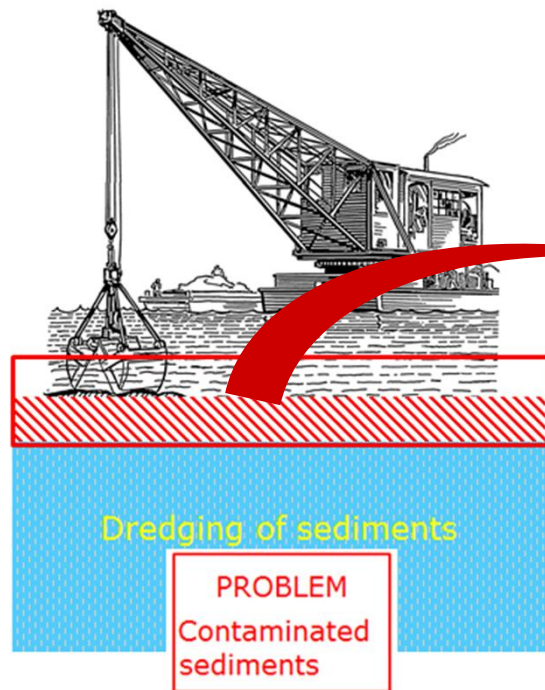


Measuring lysimeter in ready Dog Park
12.2.2012





Jätkäsaari I, II, III 2011-2014



Mass stabilisation



Utilisation as earth construction material





Jätkäsaari pilots – binders and volumes

Phase	Volume m ³	
Jätkäsaari I	20.000	Spring 2011
Jätkäsaari II	80.000	Autumn 2012
Jätkäsaari III	21.000	Winter 2014

Dredging 06/2013

Mass and screener crusher stabilization spring 2014

Binders:

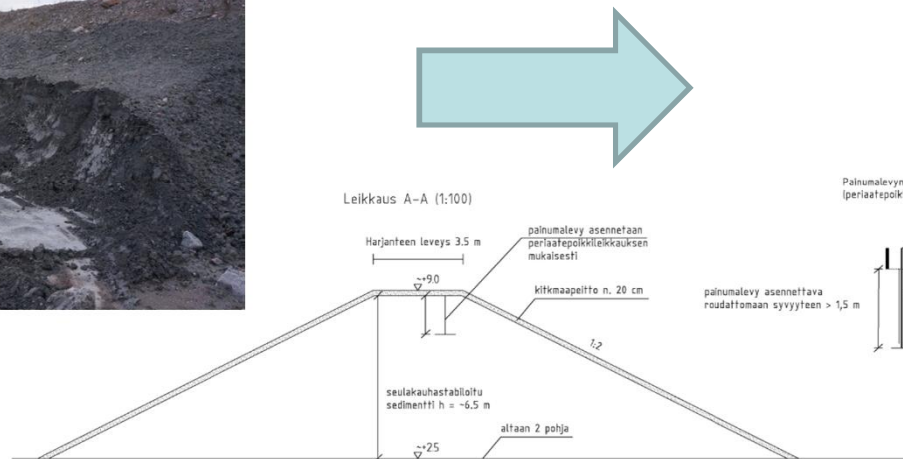
- Fly ash
- Lime Cement
- Flue gas desulphurisation product (FGD)
- CEM II/B-M (S-LL) 42,5 N
- Oil Shale ash





Noise barrier, Jätkäsaari 2014-2015

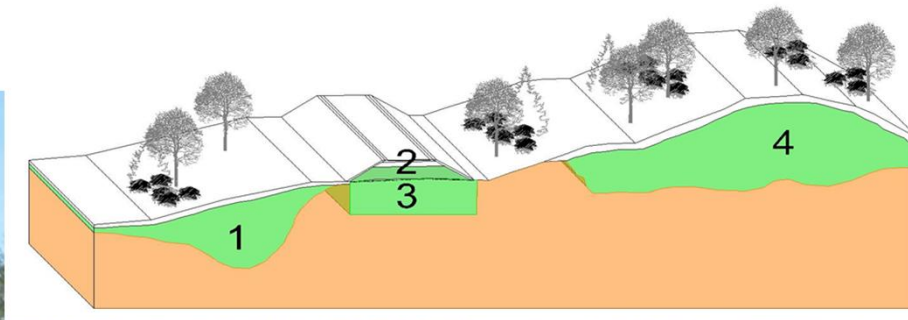
- Trial noise barrier constructed with stabilised sediments; after the trial period stabilised material will be used in a real location in Helsinki

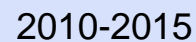




Utilisation of stabilised sediments from Jätkäsaari II

- Stabilised sediments were used as material for landscaping purposes in Ida Aalberg Park in Helsinki







Dissemination

- Project webpage:
http://projektit.ramboll.fi/life/absoils/index_eng.htm
- DVD presentation (available at project website)
- European Guidelines on the methods of converting abandoned soils into useful construction materials (at website)
- Conference papers, conference presentations, networking, publications, media articles
- Road shows: 2013-2014
- International Workshop in Finland, September 2014



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Helsingin kaupunki



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ABSOILS - LIFE09 ENV/FI/000575

Sustainable Methods and Processes to Convert Abandoned Low-Quality Soils into Construction Materials

ABSOILS is a LIFE+ project which demonstrates conversion of abandoned and low-quality soils - such like soft clays - into construction materials. The ABSOILS project is carried out in co-operation among the beneficiaries: Biomas, Rudus and Ramboll Finland. It is also supported by the Finnish Ministry of the Environment and the Uusimaa cities -



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2010-2015



Examples of scientific articles on the project

Forsman, J., Lindroos, N. and Korkiala-Tanttu, L. 2015. Three mass stabilization phases in the West Harbour of Helsinki, Finland – geotechnical and environmental properties of mass stabilized dredged sediments as construction material. Deep Mixing conference, San Francisco USA, June 2nd - 5th, 2015.

Niemelin, T., Ronkainen, M. , Forsman, J., Kreft-Burman, K. and Suominen, M. 2015. Streamlined Life Cycle Case Studies: Utilising Surplus Soils in Civil Engineering Applications in Three Different Pilot Cases. WASCON June 10-12th 2015.

Niemelin, T., Ronkainen, M. , Forsman, J., Kreft-Burman, k. and Lahtinen, P. 2014. LIFE CYCLE CASE STUDY: UTILISING SURPLUS SOILS FOR CONSTRUCTING AN URBAN AREA IN A FLOOD PRONE ZONE. AvniR conference, France , 2014

Lahtinen, P.,Forsman, J., Kiukkonen, P., Kreft-Burman, K. and Niutanen, V. 2014
MASS STABILISATION AS A METHOD OF TREATMENT OF CONTAMINATED SEDIMENTS. South Baltic Conference on Dredged Materials in Dike Construction. Rostock, 10-12 April 2014

Forsman, J., Kreft-Burman, K., Lindroos, N., Hämäläinen, H., Niutanen, V., Lehtonen, K., EXPERIENCES OF UTILISING MASS STABILISED LOW-QUALITY SOILS FOR INFRASTRUCTURE CONSTRUCTION IN THE CAPITAL REGION OF FINLAND – CASE ABSOILS PROJECT, Baltic Road Conference, Vilnius 2013

Kreft-Burman, K., Lahtinen, P., Ollila, S., Forsman, J., Niutanen, V., Lehtonen, K., Absoils - Sustainable Methods and Processes to Convert Abandoned Low-Quality Soils into Construction Materials, WASCON conference, Gothenburgh, Sweden 2012

Forsman, J., Korhonen, O., Havukainen, J., Kreft-Burman, K., MASS STABILISATION IN CONSTRUCTION OF SOFT SUBSOILS AND IN ENVIRONMENTAL GEOTECHNICS AT CITY OF HELSINKI Rostock 12 th Baltic Sea Geotechnical Conference, 31 May – 2 June 2012



Project impacts

- The most important impact on the environmental problems targeted have been reached by the implementation of the Applications and Piloting Actions allowing for the utilisation of considerable amounts of surplus soils
- Saving of natural resources owing to the re-use of poor quality soils and avoiding mass replacement
- Decreased CO2 emissions due to less material transportation
- Increased awareness of the stakeholders and target audience
- Transfer of knowledge and experience obtained during project application
- Providing environmental permit authorities with reference data for processing future cases of similar type
- Providing the stakeholders with the RMSS – material logistics tool
- Successful example to follow

The project team expresses its gratitude to the Commission for the possibility to implement the Absoils project

