LIFE09 ENV/FI/575 ABSOILS

Final Report/ Annex 34

Final Impact Monitoring Report
covering time from September 2010 to June 2015

Baseline

a. Environmental situation

The Uusimaa region and particularly the capital area of Finland undergo a process of rapid development. Excavation in thousands of construction sites generates huge amounts of surplus soil. At the Uusimaa region alone, the annually generated amount has been reaching about 4 million tonnes per year. The amount depends on the amount, sizes and types of construction projects. Typically, most of the abandoned soils at the Uusimaa region are clay.

A typical problem connected with the abandoned soils at Uusimaa is the shortage of available deposit sites in the largest cities like Helsinki, Espoo and Vantaa. The city of Helsinki has already run out of the disposal sites and the cities of Vantaa and Espoo are close to reaching their storage capacity and therefore, they have imposed a ban for receiving the abandoned soils from Helsinki. As a result new deposit sites should be found outside the city areas.

Consequently there are much more and longer transports of the abandoned soil masses, at the moment even more than 200 kilometres from the Uusimaa region. The transports may generate more than 2 tonnes CO2 per a big trailer lorry carrying 75 tonnes of soil. Annually this means even 120 000 tonnes CO2 from 4 million transported tonnes of abandoned soil from Uusimaa to other parts in Finland.

b. Knowledge, awareness and legislative aspects

According to the feedback received form the stakeholders and actors in the relevant fields, currently there is not enough knowledge and know-how on the possibilities and methods of using materials based on various types of abandoned soils for the construction of different types of civil engineering applications. There is also a lack of good examples to demonstrate the environmental and economic benefits based on the utilization of abandoned soils for the engineering purposes.

The construction sector needs the verification of the feasibility of the materials and applications based on abandoned soils in order to achieve an attitude shift. There is a need for a data how such materials fulfill the technical and environmental criteria set for intended applications. Also the economic factor plays an important role – in order to ensure the use of the materials obtained through stabilization of poor quality soils there is a need to prove their competitiveness with the conventional civil-engineering applications.

There is also a need to create an efficient and user-friendly system that will allow for monitoring the current and future sources of abandoned soils, in order to plan their effective utilization.

The situation is additionally affected by the legislative constraints that require the environmental permit for the use of ashes in the stabilization process, even if under certain conditions the use of ash ashes is allowed in constructions applications without an environmental permit.

2. The project impact:

a. On the environmental problems targeted

The most important impact on the environmental problems targeted have been reached by the implementation of the Applications and Piloting Actions .

The completed piloting actions (Arcada 2 and Jätkäsaari I and II) allowed for the stabilisation and utilisation of 142 000m^3 of the abandoned soils and sediments and decreased the need for landfilling of this amount.

Additionally, about 40 000 m^3 of rock aggregate material was recovered in the Arcada 2 pilot site by processing and reusing. This has, in turn, diminished the need for virgin rock material.

The stabilised masses from Jätkäsaari I and II were removed from the stabilisation basins and used for various construction purposes.

- Part of masses was used for the construction of an adjacent park.
- Part has been transported to another part of Helsinki called Vuosaari and used for the Vuosaari landfill filling and landscaping purposes (Ida Aalberg park).

Jätkäsaari also allowed for carrying out a trial field for the use of fly ash in the stabilisation process of the sediments. This is very important considering the future permit process for similar applications in Helsinki.

Kuva 23. Ida Aalbergin puiston puistosuunnitelma

Picture 1. Ida Aalberg park – the place of utilisation of the stabilised sediments from Jätkäsaari II.

Picture 2. Jätkässari II sediments applied in Ida Aalberg park.

Picture 3. Jätkäsaari II sediments applied in Vuosaari landfill structures.

The Pirttiranta pilot application allowed for the use of 4 000m^3 of abandoned soils.

The Dog Park allowed for the stabilisation of about 15 000 m^3 of abandoned clays. It also allowed for the use of fly ash and FGD which is very important from the point of view of permit applications.

The Jätkäsaari III pilot permits for the utilisation of the 90 000 m^3 of dredged soft sediment for various future engineering applications, thus allowing for the saving of the virgin materials that would have to be otherwise used for the construction of noise barriers.

The so-far expected non-renewable materials savings allowed by the application of the Absoils project's solutions in the Honkasuo pilot are about 45 000 m^3.

According to the LCA results of the studied pilots, by substituting part of the cement with fly ash or with other industrial by-product, the environmental impacts can be significantly decreased. Cement manufacturing consumes a lot of energy and natural resources. In Finland, cement manufacturing constitutes 1,2 % of all greenhouse gas emissions. The environmental impacts from cement manufacturing are centralized especially to the area where the main ingredient, limestone, is quarried. Moreover, cement transportations and high temperatures (~1400-1500 °C) in rotary kilns generate a lot of airborne emissions and consume a lot of energy.

The utilization of surplus soils significantly decreases the depletion of natural resources, energy consumption and global warming potential. In Finland, the annual use of natural aggregates is approximately 22 ton/person. There is a shortage of rock material in the capital region, so the natural aggregates are transported from other counties. The transportation distances can be over 30 km. Transportation of 1 ton of natural aggregates consumes 7 kWh energy. As 1 kWh energy produces approximately 0,27 kg CO_2 emissions, 1 km more of a transportation distance results in 7 million kg of CO_2 emissions . The amount of surplus soils generated annually in Helsinki is approximately 100 000 – 150 000 m^3. The landfill capacity for surplus soils has been exhausted and part of the surplus soils are transported outside Helsinki. As the results of this study indicate, stabilization of soft surplus soils that allows for their utilization as earth construction materials is an environmentally feasible solution.

b. On the awareness, knowledge and legislation

Most of the project actions have contributed to reaching this objective. Through the Materials, Applications and Piloting actions, the Absoils project has provided valuable information on how to tackle the issue of abandoned soils in the Uusimaa region. This information of also of a great value to the environmental permit authorities as a reference point for processing future cases of similar type. In the long run, this should make the environmental permitting less timely.

Within the Management and Dissemination actions, the project team members have taken an active role in disseminating the information on the project and its objectives in discussions with various stakeholders both in Finland and internationally. This has increased the level of knowledge and raised the awareness of the importance of solving the issue of abandoned soils. The project has received a very positive

feedback from the Ministry of Environment and the representatives of the cities involved, as a pioneering initiative in this field.

The utilization of the abandoned soils by carrying out stabilization with the use of ashes which are classified as waste has been partially hindered by the need to apply for environmental permit. In most cases, the problem lies not in the fact that the permit is actually needed, but in the length of the permit application processing which results in a great deal of uncertainty about the schedule and plays a negative role in designing and planning.

From a legislative point of view, the utilization of ashes is nowadays possible in Finland on the basis of the decree number 403/2009 with only a notification to the authorities, if the fly ash alone is used as an own layer structure in road/field. However, if the fly ash is used as a binder in uncontaminated soil material the legislation requires an environmental permit.

The problem was communicated to the Ministry of Environment when the subject of the permit for the piloting in Espoo – the Dog Park was discussed. This has led to a discussion with a wider audience and the recognition of a need for a change. The Ministry of Environment hosted a seminar devoted to this issue on 19th September 2011 and the process of development of the legislation has been initiated. The project team was actively involved in this process by supplying the authorities with results and lessons learnt during the Absoils project. In December 2013, the project representatives took part in a discussion seminar concerning the Decree 403/2009 development. Currently, the works on the act amendment are being finalized and it is expected that the new act will enter into force at the beginning of 2016. This should make the use of fly ash as binder in mass stabilization as a way of soil improvement more easy. The project results have been also used for the purpose of development of the Act on Soil Excavation (555/1981) which is currently under review.

The project was increasing its impact on the awareness of the stakeholders and target audience by the organization of the Roadshows in 2013, 2014 and 2015. (two events:

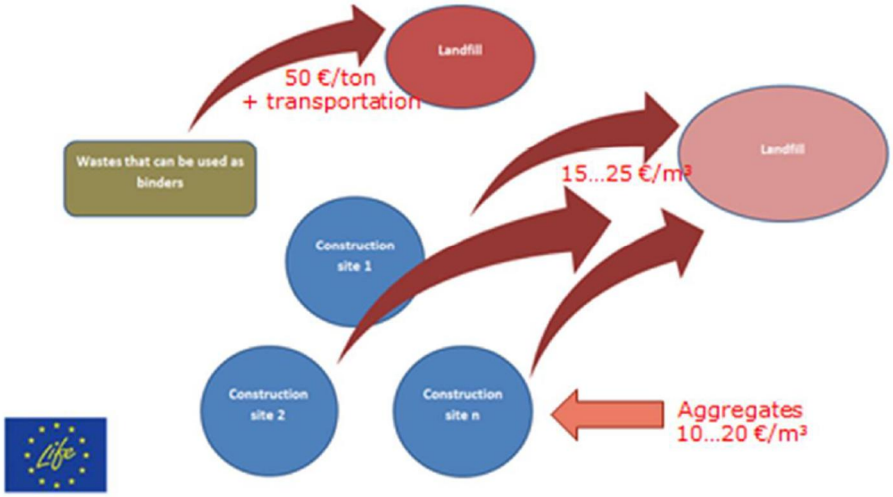
It has been transferring the knowledge and experience obtained in the capital area of Finland to the other regions. Moreover, the project has been active in international networking by being in contact with the BIMMS project network in Sweden and by establishing new promising contacts with the Polish ash producers sector. The project team also joined the SMOCS project continuation network which gives a chance to share experience considering stabilisation of dredged sediments.

The Swedish Simm-Ccentre project partners were actively involved in marketing the Absoils project international seminar among the Swedish stakeholders and they were among the speakers of the event. During the second day of the seminar, the participants were also thinking of how to proceed with the cooperation after the end of the Absoils project and how the EU funding could potentially be used for this purpose. The cooperation with the Swedish Simm-Ccentre project will continue as the Swedish

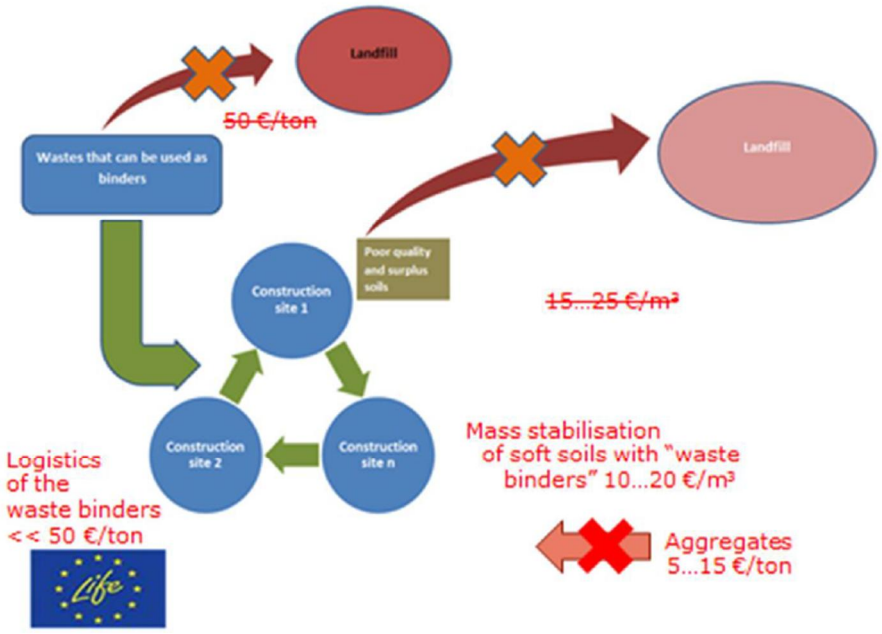
partners are interested in applying the Absoils project soft soil improvement methods in Sweden.

There is also good cooperation with the Estonian Waste Recycling Competence Center. The project team participated and was network during their international event in October, 2014. In case of Estonia, the Absoils project was also cooperating with the LIFE OSAMAT project and the experience and lessons learnt were actively shared.

The project has been fostering the change in the mind-set of the planners, designers, constructors and permit authorities. An alternative model of handling soil resources has been offered to the traditional model of handling abandoned masses. The pictures below illustrate the difference.



Picture 4 . Traditional way of handling surplus soils in the infrastructure construction.



Picture 5 . Alternative and innovative way of handling surplus soils promoted by the project.