



Plate 1 – Contaminated ground at Waterford.

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 CONSULTANT: EG Pettit & Co
 DEVELOPMENT: SUPERMARKET

Site Overview

At the Cork Road project, the E-Clay Stabilisation Technology was applied using an *in-situ* approach to remediate contaminated soil and groundwater at a site.

The contamination at the site was attributed to the Petrol Station located next to the site. It was considered that leaking pipe work and storage tanks were responsible for the ongoing hydrocarbon contamination to soil and groundwater.

Objective

The remediation strategy for the Cork Road site comprised a three stage approach. The first stage involved the installation of a slurry wall along the western and southern boundaries to prevent further ingress of contaminated groundwater from the petrol station. The second phase involved the bioremediation of contaminated materials associated with the slurry trench barriers and a 0.5m layer from across the top of the site. The final stage involved the chemical and physical stabilisation of soils below the building footprint.

Methodology

Enviro-treat employed an *in-situ* soil mixing strategy to remediate approximately 9,200m³ of contaminated soils at the site.

The works were conducted over a period of 3 months under a Site Specific Licence issued by the Environmental Protection Agency. Specialist technology, materials and supervision were supplied by Enviro-treat, whilst Keller Ground Engineering supplied all the required plant, and labour for application of the Enviro-treat stabilisation process.

The *in-situ* process allows for the remediation of contaminated soils to take place without the need for the contaminated soils to be excavated and stockpiled. The process involved the use of a Continuous Flight Auger to install soil mixed columns to depths ranging from 1m to 4.5m.

A slurry production unit was used to produce the E-clay slurry before being pumped through the hollow stem of the Auger (illustrated in Plate 2). The Auger is then drilled into the ground whilst continually injecting the treatment slurry until the desired depth of the column is reached, at which point the pumping is halted and the auger reversed.



Plate 2 – Continuous Flight Auger installing soil mixed column

By reversing the auger, the column is effectively mixed again and the amount of spoil brought to the surface reduced to a minimum. The process was then repeated utilising the overlapping column design illustrated in Figure 1.

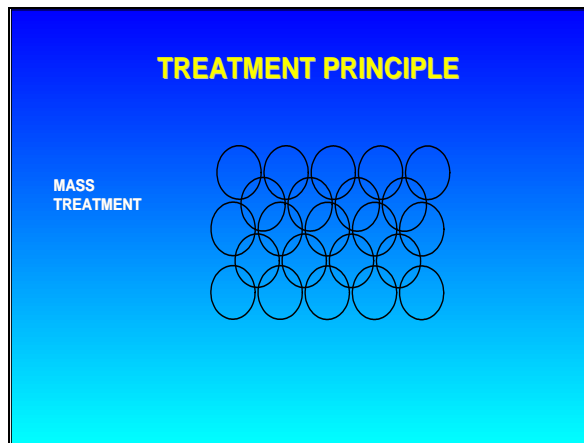


Figure 1 – Diagram showing overlapping column design.

Validation

Validation was initiated to evaluate the performance of the treatment process. A range of samples were collected and allowed to cure for a nominal period of a week, the samples were then leached and analysed by a UKAS accredited laboratory on behalf of Envirotreat.



Plate 3- *In-situ* mass treatment at Cork Road, Waterford

Results

Contaminant of concern	C ₀ Target Standard (mg/l)**	DRO Leachate Concentration (mgkg ⁻¹)
WAT 1	0.05	0.007
WAT 2	0.05	0.012
WAT 3	0.05	0.017
WAT 4	0.05	0.022
WAT 5	0.05	0.027
WAT 6	0.05	0.01
WAT 7	0.05	0.008
WAT 8	0.05	0.01
WAT 9	0.05	0.008
WAT 10	0.05	0.009
WAT 11	0.05	0.008
WAT 12	0.05	0.013
WAT 13	0.05	0.016
WAT 14	0.05	0.012
WAT 15	0.05	0.006
WAT 16	0.05	0.011
WAT 17	0.05	0.008
WAT 18	0.05	0.007
WAT 19	0.05	0.007
WAT 20	0.05	0.006

** SSSL adopted by Envirotreat was specified by the client

Table 1 – Summary of treated soils leachate results compared to the SSSL (as specified by the client).

Table 1 presents the Remediation Target level and the Leachate results for the 20 samples taken from the Waterford site. Hydrocarbon contamination was identified as the main contaminant of concern; in particular Diesel Range Organics (DRO). The remediation targets were specified by the client

The remediation project was successfully completed, with the results illustrating that the objective of protecting human health and identified groundwater receptors as being achieved.