CASE STUDY

Ex-Situ E-Clay Stabilisation

Chapel Hill, Lisburn

Client

Consultants

Site Overview

The site is located on Chapel Hill in Lisburn, Northern Ireland. The client was Maxol Oil and the consultants were RAW Consulting (now part of the RSK Group).

The site was previously occupied by a petrol filling station and a vehicle service/repair garage, with associated underground fuel storage tanks – these tanks were decommissioned and removed from site prior to remediation works being carried out.

Site investigations had identified the presence of elevated concentrations of hydrocarbons in the soil, comprising both diesel and gasoline range organics. The soil contamination was identified to depths of up to 3m below ground level within the central area of the site. A remediation strategy was developed for the site to enable reuse for commercial purposes.

The overall remediation strategy was designed to address both human and groundwater receptors. The remedial operation involved the *ex-situ* treatment of the identified source contamination material (primarily to protect groundwater receptors). The risks to human health would be primarily addressed by 'pathway' breaks (provision of buildings and hardstanding as part of the envisaged commercial redevelopment of the site) and by the source treatment works.

The site contamination is shown in Figure 1 below.

Figure 1 – Site Contamination

Methodology

It was agreed to carry out ex-situ treatment of the source contamination using Envirotreat's chemical stabilisation technology (E-clays®). The envisaged volume requiring treatment was 735m^3.

The works were carried out over a period of three weeks under the auspices of Envirotreat's Mobile Process Licence [MPL]. Specialist technology, materials and supervision were supplied by Envirotreat, whilst RAW Consulting supplied the required plant and labour for the remediation process.

The soils were mixed in 5m^3 batches to enable known quantities of contaminated soils to be mixed with the designated E-clay (produced on-site in slurry form) along with controlled additions of cementitious materials (added in dry form) – the mixing was carried out in a skip using an excavator bucket and continued until a homogenous mix was produced. The addition of E-Clay slurry and the mixed material is shown in Figures 2 and 3 below.

The treated soils were then temporarily stockpiled as shown in Figure 4 below. The treated material was reused on-site following successful validation – the treated material was reused as a substitute for imported clean fill, preventing the need for offsite disposal and reducing the requirement to import materials.

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Figure 2 – Addition of E-Clay Slurry

Figure 3 – Mixed Treated Materials

Figure 4 – Stockpiled Treated Materials

Validation

The remediation target criteria are summarised in Table 1 below.

Table 1 – Remediation Target Criteria

Determinant	Leachate Target Value (ug/l)	Leachability Intervention Value (ug/l)
TPH	N/A	600
Benzene	0.2	30
Toluene	0.2	1000
Ethyl Benzene	0.2	150
Xylene	0.2	1000

Validation testing was carried out to confirm the performance of the treatment process. The sampling frequency was one composite sample for every 50m^3 treated. Following curing, the treated samples were leached using the NRA leaching methodology and analysed for the identified contaminants of concern (TPH and BTEX). The leachate results are summarised in Table 2 below.

Table 2 – Leachate Results

	TPH	Benzene	Toluene	Ethyl Benzene	Xylene
All ug/kg					
Untreated	670000	10	12	6.5	31
All ug/l					
LIS001	<10	<10	<10	<10	<10
LIS002	<10	<10	<10	<10	<10
LIS003	<10	<10	<10	<10	<10
LIS004	<10	<10	<10	<10	<10
LIS005	<10	<10	<10	<10	<10
LIS006	<10	<10	<10	<10	<10
LIS007	<10	<10	<10	<10	<10
LIS008	<10	<10	<10	<10	<10
LIS009	<10	<10	<10	<10	<10
LIS010	<10	<10	<10	<10	<10
LIS011	<10	<10	<10	<10	<10
LIS012	<10	<10	<10	<10	<10
LIS013	<10	<10	<10	<10	<10
LIS014	<10	<10	<10	<10	<10
LIS015	<10	<10	<10	<10	<10

The validation results confirmed that the contaminants of concern had been successfully treated (all leachate results were below the analytical limits of detection). This provided the necessary protection of groundwater and enabled the treated soils to be reused on-site. The commercial development is shown in Figure 5 below.

Figure 5 – Commercial Development