Plate 1: The site prior to remediation

Completion Date:	February 2003
Development:	Residential & Leisure
Developer:	Barratt Homes/ London Borough of Richmond
Remediation Contractor:	Jarvis Construction
Consultant:	Hyder Consulting
End Value:	£10M

Site Overview

The 1.2 hectare site is part of a school development scheme (the school is being built on an adjacent site) contaminated with waste material from incinerator processes. The site itself (plate 1) borders a former domestic waste incinerator and the site was redeveloped for housing and leisure facilities.

The identified contaminants are related to the incinerator waste and they include heavy metals, PAH's and hydrocarbons.

Objective

The remediation strategy for the site was designed to address the on-site source contamination and indirectly, the pathway contamination issues with the intention of protecting both human health and groundwater receptors.

Methodology

Envirotreat employed an *ex-situ* soil mixing remediation strategy for the treatment of over 6500m^3 of contaminated soils.

The works were conducted over a 9 week period under the auspices of Envirotreat's Mobile Process Licence (MPL). Specialist technology, materials and supervision were supplied by Envirotreat, whilst Jarvis Construction supplied all the required plant and labour for application of the Envirotreat® Process.

Plate 2: Set-up of the slurry production mixers

The contaminated soils were excavated, stockpiled and treated on-site using the Envirotreat E-clay® technology. The Envirotreat treatment plant comprised slurry production units and mixing zones.

The slurry production set up (plate 2) comprised 2 No. 1000L paddle mixers (where the E-clay® reagents were combined before being pumped across to the mixing zones) and 2 No. excavators

Plate 3: The processing bucket mixing contaminated soils with E-clay® slurry

fitted with specialist processing buckets (plate 3). These processing buckets have rotating blades at their bases which facilitates a high degree of mixing. These buckets were required as the contaminated soils were clay based.

The soils were mixed in 5m^3 batches to allow known quantities of contaminated soils to be combined with known quantities of E-clay® slurry. The treated soils were then temporarily stockpiled before being reused on-site as a substitute for imported clean fill (plate 4).

Plate 4 – Deposition of treated material

Validation

Validation of the treated material was carried out on 26 No. batch samples, which were leached and analysed on behalf of Envirotreat by a UKAS accredited laboratory.

Results

Table 1 illustrates the Maximum Contaminant Levels (MCL) of the identified pollutants prior to remediation and the results of leachate analysis post-treatment. It can be seen that the mean leachate value for copper is above the SSTL. However, taking into account the 95th percentile rule, the leachate fell below the SSTL. This was accepted by the Environment Agency.

Contaminant of concern	MCL in soils (mg/kg^{-1})	Leachate (mgl^{-1} unless stated)	
		SSTL*	Mean Treated Soil
Arsenic	150	0.06	<0.016
Boron	22	2	<0.052

* SSTL adopted by Envirotreat is equivalent to Dutch Intervention Values.

Table 1 – Summary of treated soils leachate results compared to SSTL derived from the Dutch Intervention Values (as agreed with the Environment Agency)

Contaminant of concern	MCL in soils (mg/kg^{-1})	Leachate (mgl^{-1} unless stated)	
		SSTL*	Mean Treated Soil
Cadmium	8.5	0.006	<0.0004
Chromium	120	0.03	<0.025
Copper	3200	0.075	<0.079
Nickel	200	0.075	<0.023
Lead	6600	0.075	<0.018
Zinc	9000	0.8	<0.021
TPH	8300	0.6	0.20
Total PAH	370	0.082	0.003

Table 1 Continued

It must be noted that the water used in the production of the E-clay slurry was from a household supply (containing copper). The copper found in the tap-water was attributed to the raised levels within a minority of the validation samples. Out of 41 samples tested, none exceeded the UK Drinking Water Standards.

The remediation project was successfully completed, with the results illustrating that the objective of protecting human health and groundwater receptors had been achieved. The contaminants of concern have been fully addressed with leachate levels falling below the agreed SSTL's.

Following successful remediation, the development was completed and the site was valued in excess of £10m (plate 5).

Plate 5 – The housing development.