



Figure 1: The housing development at the site

Completion Date:	April 2002
Development:	Residential Development
Developer:	Laing Homes Ltd
Remediation Contractor:	McNamara
Consultant:	WSP Environmental
End Value:	£3.5M

### Site Overview

Historically, the 1.5 acre site in Chineham, Basingstoke was utilised as an engineering processing plant. In association with this plant were oil storage tanks and underground sumps.

These previous uses of the site resulted in widespread soil contamination. Elevated levels of hydrocarbons and heavy metals were identified up to a maximum depth of 1.5m bgl (figure 2).



Figure 2: Contaminated soils with free phase hydrocarbon - typical of the contamination throughout the site.

Ultimately, the site was to be developed into a housing estate. Seven detached houses were constructed with end values ranging from £400,000 - £475,000.

### Objective

The remediation strategy for the Chineham site was designed to address the on-site source Contamination and indirectly, the pathway Contamination issues with the intention of protecting the surrounding environment and site end user.

### Methodology

Envirotrat employed an *ex-situ* soil mixing remediation strategy for the treatment of over 1200m<sup>3</sup> of contaminated soils.

The works were conducted over a 7 week period under the auspices of Envirotreat's Mobile Process Licence (MPL). Specialist technology, materials and supervision were supplied by Envirotreat, whilst McNamara supplied all the required plant and labour for application of the Envirotreat® Process.



Figure 3: Excavation of contaminated soils in view of the new housing development.

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The identified contamination was excavated (figure 3) Stockpiled and treated on-site using the Enviro-treat E-clay technology. The treatment operation utilised 1 No. slurry production units and 2 No. mixing zones.

The slurry production set up comprised of a 1000L paddle mixer where the E-clay reagents were combined before being pumped across to the mixing zone. The excavators mounted with a conventional bucket then mixed the E-clay slurry and contaminated soils (figure 4).

The soils were mixed in 5m<sup>3</sup> batches to allow known quantities of contaminated soils to be combined with known quantities of the E-clay slurry. The treated soils were then temporarily stockpiled before being reused on-site as a substitute for imported clean fill, thus preventing the need for offsite disposal.



Figure 4 - Set-up of the excavators and skips to mix the contaminated soils with the E-clay® slurry.

As with all Enviro-treat projects, the Chineham remediation scheme required both foresight and attention to detail. The housing developers were keen on the imminent construction the show homes which, along with the limited site space gave rise to a number of potential issues.

Enviro-treat approached this situation in a logical and professional which allowed the construction phase to run concurrently with the remediation works. This was made possible by down sizing the mixing skips and excavators and by periodical movement of the treatment zone. This flexible approach employed by Enviro-treat proved to be successful as the housing development and the remediation ran in harmony (however, down sizing of the excavators and skips did reduce the throughput of the Enviro-treat treatment process).

### Validation

Validation of the treated material was carried out on 23 no. batch samples, which were leached and analysed on behalf of Enviro-treat 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. The Site Specific Target Levels (SSTL) has been derived from the Dutch Intervention Values as agreed with the Environment Agency.

Contaminant of concern	MCL in soils prior to clean up (mg/kg <sup>-1</sup> )	Leachate (mg l <sup>-1</sup> )	
		SSTL*	Mean Treated Soil
Arsenic	148	0.06	<0.005
Cadmium	46	0.006	<0.0009
Lead	9570	0.075	<0.016
Copper	177,100	0.075	<0.053
Nickel	576	0.075	<0.013
Zinc	117,600	0.8	<0.022
TPH	83,000	600	<395

\* SSTL adopted by Enviro-treat 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.

The remediation project was successfully completed, with the results illustrating that the objective of protecting the surrounding environment and site end user had been achieved. The contaminants of concern have been fully addressed with leachate levels falling below the agreed SSTL's, thus allowing the material to be re-deposited on-site (figure 5).



Figure 5 - Treated soils re-deposited on-site

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