



Figure 1: The housing development at the Nuneaton site

Completion Date:	April 2005
Development:	Residential Development
Developer:	Bryant Homes
Remediation Contractor:	DSM Group
Consultant:	WSP Environmental
End Value:	£15M

Site Overview

The 1.14 hectare site in Nuneaton, West Midlands was previously occupied by a manufacturing factory. The site comprised factory and office buildings, car parking and a number of oil and chemical storage tanks.

Associated with the former storage and process areas were soils contaminated with Total Petroleum Hydrocarbon (TPH), Lead and Nickel (plate 1).

Following remediation, the site was developed into a residential housing estate (figure 1). The development comprised a mixture of traditional two storey houses and flats with associated residential gardens, managed landscaping and hardstanding car parking and access roads.



Plate 1: Contaminated soils observed on-site

Objective

The remediation strategy for the Nuneaton 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

Envirotrete employed an *ex-situ* soil mixing remediation strategy for the treatment of over 2650m³ of contaminated soils.

The works were conducted over a 4 week period under the auspices of Envirotreat's Mobile Process Licence (MPL). Specialist technology, materials and supervision were supplied by Envirotreat, whilst DSM Group supplied all the required plant and labour for application of the Envirotreat® Process.

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 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 fitted with specialist processing buckets (plate 2). These processing buckets have rotating blades at their bases which facilitate a high degree of mixing. These buckets were required as the contaminated soils were clay based.

Sole Providers of E-CLAY® Technology



Plate 2: The processing bucket mixing contaminated soils with E-clay® slurry

The soils were mixed in 10m³ 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 (plate 3) before being reused on-site as a substitute for imported clean fill.



Plate 3 – Temporary stockpiling of the treated material

Validation

Validation of the treated material was carried out on 16 No. batch samples, which were leached and analysed on behalf of Envirotreat by a UKAS accredited laboratory.

Results

In order to determine the target leachate values of the treated material, Site Specific Target Levels (SSTL) were required. The SSTL for TPH was derived from a Quantitative Risk Assessment and the SSTL's

for Lead and Nickel were attained from the Dutch Intervention Values (table 1).

SSTL Leachate (mg/l ¹)			
Aromatic TPH Fraction (C16 – C35)	Aliphatic TPH Fraction (C16 – C35)	Lead	Nickel
0.5	0.5	0.075	0.075

Table 1 – SSTLs adopted by Envirotreat

Table 2 illustrates the Maximum Contaminant Levels (MCL) of the identified pollutants prior to remediation and the results of the leachate analysis post-treatment.

Sample No.	Leachate (mg/l)		
	TPH (MCL-23,700mg/kg)	Lead (MCL-568mg/kg)	Nickel (MCL-114mg/kg)
1	<0.10	<0.05	<0.02
2	<0.10	<0.05	<0.02
3	<0.10	<0.05	<0.02
4	<0.10	<0.05	<0.02
5	<0.10	<0.05	<0.02
6	<0.10	<0.05	<0.02
7	<0.22	<0.05	<0.02
8	<0.08	<0.05	<0.02
9	<0.05	<0.05	<0.02
10	<0.13	<0.05	<0.02
11	<0.09	<0.05	<0.02
12	<0.18	<0.05	<0.02
13	<0.02	<0.05	<0.02
14	<0.03	<0.05	<0.02
15	<0.14	<0.05	<0.02
16	<0.11	<0.05	<0.02

Table 2 – Summary of treated soils leachate results.

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.