



Figure 1 - Site prior to remediation

Completion Date:	June 2010
Consultant:	Lithos Consulting
Main Contractor:	Professional Remediation

### Site Overview

Historically the site has been used for manufacturing and vehicle maintenance purposes. The identified contamination issues were consistent with previous usage of this nature. Over the years the site has been used as a woolen mill, a boot and shoe manufacturing works and additionally as a vehicle repair and servicing garage. The site occupies approximately 4 hectares.

It is understood that the site is being redeveloped to provide a mix of domestic dwellings (from one bedroom Mews homes up to executive five bedroom detached homes), associated gardens, public open space, adoptable roads and sewers.

### Objective

Lithos identified the remediation objectives as:

- Resolve contamination issues in order to protect receptors (address the source and indirectly pathway contamination issues to protect the identified groundwater and human health receptors) and render the site suitable for the proposed development.

- Provide a stable development platform (to agreed levels and gradients) for subsequent construction of the proposed development and associated infrastructure.
- Satisfy requirements of the Local Planning Authority and the National House Building Council (NHBC).

The identified contaminants of concern were Total Petroleum Hydrocarbons and Polyaromatic Hydrocarbons.

The outline proposal was to enable maximum re-use of material on site. Professional Remediation chose advanced stabilisation to effectively treat identified hydrocarbon contaminants of concern and to enable reuse on site, with the attendant cost savings. The agreed treatment strategy was to produce a chemically and physically stabilised treated material suitable for reuse on site (as a substitute for imported fill material).

### Methodology

The strategy involved the ex-situ stabilisation of approximately 300m<sup>3</sup> of contaminated soils. On the basis that treatment volumes were less than 1,000m<sup>3</sup> it was not necessary to carry out a full deployment of Envirotreat's Mobile Treatment Licence.

Professional Remediation was able to reduce volumes requiring treatment through delineation, effective stockpile management and onsite testing. Professional Remediation also carried out site clearance and processing of arisings (to maximise material recycling) in addition to asbestos and underground tank removal.

The methodology involved treating several stockpiles of contaminated soils excavated from the site as a whole (as identified by Lithos). These stockpiles were varied in nature and composition necessitating a treatment strategy incorporating a suitable E-Clay formulation for chemical stabilisation / immobilisation of hydrocarbon pollutants, in combination with cementitious additives to provide the requisite physical stabilisation.

The designated E-Clay formulation for this application was a modified reactive inorgano-organoclay, primarily focusing on the effective treatment of the contaminants of concern. The E-Clay formulation was confirmed by treatability trials undertaken by Envirotreat prior to onsite works.



Figure 2 - Stockpiled contaminated material

Treatment reagents comprised of E-Clays produced on site in slurry form and dry cementitious materials. The reagents were mixed with contaminated soils in 10m<sup>3</sup> batches. Following treatment the soils were stockpiled and allowed to fully cure. Validation samples were submitted for leachable contaminant analysis.



Figure 3 - Onsite treatment operation.

### Validation

Validation testing was carried out to confirm the efficacy of the treatment process.

Composite sampling of the treated material was carried out for each 250m<sup>3</sup> of material treated. A total of 300m<sup>3</sup> of material was treatment using advanced stabilisation. Two samples were collected which were subsequently leached using the CEN 12457 methodology and subsequently analysed at a suitable laboratory.

### Results

The results obtained demonstrated satisfactory leachate levels for reuse on-site. Contaminants of concern were successfully chemically stabilised / immobilised using the Envirotreat E-Clay Stabilisation Process.

Following successful validation the treated material was reused on site. The treated material was redeposited onsite in an area allocated for landscaping purposes.

Table 1 Leachate analysis.

Contaminant of Concern	Units	Sample 1	Sample 2
TPH aliphatic >C5-C6	ug/l	<0.1	<0.1
TPH aliphatic >C6-C8	ug/l	<0.1	<0.1
TPH aliphatic >C8-C10	ug/l	<0.1	<0.1
TPH aliphatic >C10-C12	ug/l	<0.1	<0.1
TPH aliphatic >C12-C16	ug/l	<0.1	<0.1
TPH aliphatic >C16-C21	ug/l	<0.1	<0.1
TPH aliphatic >C21-C35	ug/l	<0.1	<0.1
TPH aliphatic >C35-C44	ug/l	<0.1	<0.1
TPH aromatic >C5-C6	ug/l	<0.1	<0.1
TPH aromatic >C6-C8	ug/l	<0.1	<0.1
TPH aromatic >C8-C10	ug/l	<0.1	<0.1
TPH aromatic >C10-C12	ug/l	<0.1	<0.1
TPH aromatic >C12-C16	ug/l	<0.1	<0.1
TPH aromatic >C16-C21	ug/l	<0.1	<0.1
TPH aromatic >C21-C35	ug/l	<0.1	<0.1
TPH aromatic >C35-C44	ug/l	<0.1	<0.1
Total Petroleum Hydrocarbons	ug/l	<0.1	<0.1
Total Polyaromatic Hydrocarbons	ug/l	<0.1	<0.1