



Plate 1 – The site prior to development

Completion Date:	February 2005
Development:	Commercial
Developer:	Homebase Limited
Remediation Contractor:	Stainsbury Grange
Consultant:	Resource & Environmental Consultants Limited (REC)
End Value:	£20M

Site Overview

The site in Kendal, Cumbria (plate 1) was formally utilised as a bonded warehouse and timber treatment facility. Elevated concentrations of Tributyl Tin (TBT) have been identified and the believed source is the former timber treatment tank. The site poses a major risk to the surrounding environment due to its close proximity to the River Kent and the elevated concentrations of TBT identified in groundwater across the site.

Following remediation, the site has been developed for a commercial end-use.

Objective

The overall remediation strategy proposed by Envirotreat was designed to address pathway contamination issues, with the intention of protecting surface water and groundwater receptors, namely the River Kent.

Methodology

The remedial operation involved the installation of an Envirotreat Soil Mixed Reactive Barrier System (SMRBS) utilising proprietary E-clays®, comprising both passive and active sections. The objective was to treat contaminated groundwater as it migrates off-site towards the River Kent (Plate 2).



Plate 2 – The nearby River Kent

The groundwater simulation program MODFLOW was utilised in order to demonstrate that there would be a minimal effect on the groundwater regime whilst effectively intercepting and treating the contaminated groundwater.

The SMRBS installation was carried out over a 2 week period, incorporating the installation of both the passive and active sections. Passive sections of barrier are designed to 'funnel' migrating groundwater towards the active section of the barrier system, where any contaminants within the groundwater are 'filtered out'.

The Envirotreat Technology was applied at the Kendal site using a Continuous Flight Auger (CFA) system based on advanced soil mixing techniques.

Stainsbury Grange provided the plant and equipment and the means of applying the technology, whilst Envirotreat designed the scheme and provided the proprietary technology for remediation.

The SMRBS comprised two sections of passive (impermeable) barrier and one downstream section of permeable reactive barrier (Figure 1). The permeable reactive sections contain the modified pillared E-clays, designed to chemically immobilise the prime pollutants of concern from within the ground water, whilst the passive sections of barrier comprise a clay and cement mix.

The barrier system was keyed into the underlying clay layer, to a nominal depth of 6.0m bgl to intercept migrating ground water off-site towards the river.

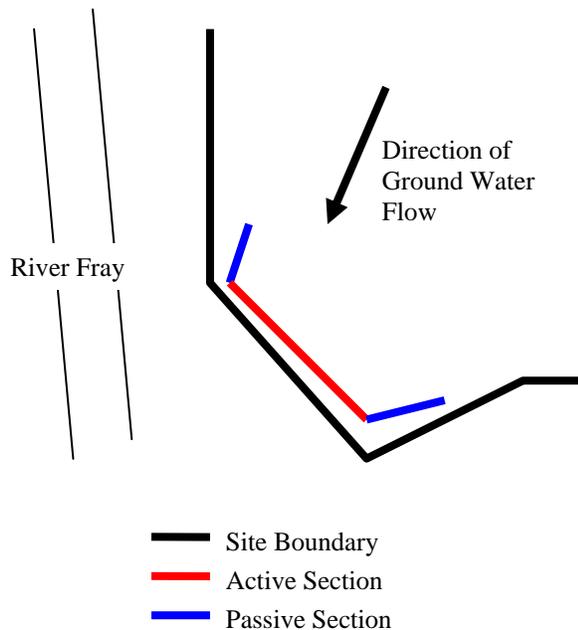


Figure 1 – SMRBS Layout

Validation

Validation of the Envirotreat SMRBS was undertaken through the installation of monitoring boreholes, these being located downstream of the barrier, as well as at the corners as a measure to ensure that no contamination is able to circumnavigate the barrier system.

Samples were obtained from each of the boreholes by Envirotreat on a monthly basis for an initial period of one year and submitted to a UKAS accredited laboratory (Plate 3).



Plate 3 – Sample collection during validation period

Results

Following the twelve months of monitoring, the Envirotreat SMRBS was demonstrated to be successfully immobilising the identified contaminants of concern, whilst having a negligible effect on the groundwater regime of the site.

Summary

Through SMRBS installation, Envirotreat enabled development to take place on this previously contaminated site, as well as protecting surrounding receptors from off-site migration of contaminated groundwater.