CASE STUDY

Soil Mixed Reactive Barrier

St. Peter's Wharf, Maidstone

Client / Developer

Blenheim House construction

Environmental Consultants

Waterman

Remediation Contractor

envirotreat®

Site Overview

The site was approximately 0.8 hectare and situated adjacent to the River Medway on the location of a former gasworks and brewery. It was extensively contaminated with hydrocarbons and to a lesser extent cyanide from the gas production process.

Contaminants of concern in soils and groundwater were identified as TPH, PAH, heavy metals and cyanide (typical for an historical gas works).

Objective

The remediation strategy for the Maidstone 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/surface water receptors; in particular the adjacent River Medway (figure 4).

The agreed remediation strategy was source treatment by E-Clay stabilisation and groundwater treatment through the design and installation of an E-Clay Permeable Reactive Barrier.

Treatability trials were undertaken at the request of the Environment Agency together with groundwater modelling via Modflow.

Figure 1 - Excavation of the gasholder base

Methodology

The remediation work was conducted in two stages; the first phase was based on excavating and treating materials from the former gasholder bases and from hotspots in the vicinity of the former purifier boxes. During the second phase a reactive soil mixed barrier system was installed adjacent to the River Medway, the function of which was to protect the river from groundwater contamination.

Phase 1 involved the excavation and *ex-situ* treatment of a total of 4,690 m³ of contaminated material from the gas holders and purifier boxes. The material was contaminated with typical gasworks pollutants, including PAH, TPH, Ammonia, Cyanide, Heavy Metals and Phenol.

The contaminated soils were excavated, stockpiled and treated on-site (see figure 2) using the Envirotreat E-Clay technology.

The material was tested for leachate against pre-agreed clean up criteria before being reused on site, here it was redeposited in the void spaces left by the former gasholder bases.

Figure 2 - The processing bucket mixing contaminated soils with E-clay slurry

Phase 2 works consisted of installing a 120m long reactive barrier system. This was installed using soil mixing techniques along the river retaining wall and across the site to intercept contaminated groundwater as it flowed towards the River Medway (figure 3). Along the river wall and between the historical gas work purifier boxes the barrier was designed to be of low permeability. The next (second) interlocking section, installed perpendicular to the river, was designed to be permeable and reactive towards the groundwater contaminants. This section was installed using a pillared organoclay (E-Clay). This allowed groundwater to pass through while ensuring that contaminants were retained within the barrier by the E-Clay.

Figure 3 - Barrier installation using a CFA and piling rig.

Validation

Validation of the treated material was carried out on 47 No. batch samples, which were leached and analysed on behalf of Envirotreat by a UKAS laboratory.

Results

The results of the leachate analysis indicated that the main objective of chemically and physically stabilising the excavated 'contaminated' soils from St Peters Wharf, Maidstone has been achieved. The treatment operation was designed to reduce the leaching potential from the identified contamination by the immobilisation of leachable pollutants within the soils.

Figure 4 - The main receptor the River Medway; floating spill booms were used as a precautionary measure.

The CEN validation results showed that the contaminants of concern have been immobilised within the treated material to below Site Specific Target Levels in all of the samples taken during the course of the treatment and recovery operation, therefore the treatment objective has been achieved.

Envirotreat successfully completed the remediation works at St Peters Wharf, treating a total of 4,690 m^3 of soils contaminated with TPH, PAH, heavy metals and Total Cyanide.

The reactive barrier system performance was monitored for two-year post remediation by independent consultants.

The scheme was subsequently signed off by the regulators.

Figure 5 – Barrier location plan.