



Figure 1 – Petrol Station Prior to Redevelopment



The client's representative (Pickton Jones Asset Management) engaged Envirotreat to develop a remediation strategy that would address the identified hydrocarbon contamination issues. The preferred remediation strategy was a combination of E-Clay Stabilisation for the source treatment requirement and the installation of an E-Clay 'Activated' Permeable Reactive Barrier to treat potentially contaminated groundwater migrating from the site toward the adjacent Mill Pond. Equally, a "watching brief" protocol was adopted to negate the Regulatory requirement for further site investigation.

The remediation strategy was considered to be commercially viable and provided a remediation solution which addressed the identified remediation requirements in an acceptable timeframe for the development. Other remediation options were precluded on the basis of cost and / or inability to achieve site remediation within the required timeframes.

The necessary approvals for the proposed remediation strategy were obtained from Birmingham City Council and the Environment Agency that enabled discharge of the relevant planning conditions.

Site Background & History

The site was formerly a petrol filling station situated in Four Oaks, Sutton Coldfield, Birmingham. The client, The Co-Operative (Coop) had previously obtained planning permission to develop the site for the construction of a new convenience store and associated parking.

The site is relatively small occupying an overall area of 0.21 acres. Previous site investigations undertaken by Soil Environment Services (Desk Study) and Ground Investigation Specialists (bore hole installations) identified the presence of hydrocarbon contamination in both soil and groundwater consistent with the previous usage of the site as a petrol station. The prime contaminants of concern were Total Petroleum Hydrocarbons [TPH] and BTEX compounds.

The presence of three underground fuel storage tanks was also confirmed by the desk study work and Fire Service.

Remediation Objectives

Envirotreat was commissioned to undertake the following:

1. Implementation of the approved remediation strategy to satisfy planning and EA requirements;
2. Demolition of existing steel framed canopy and kiosk building;
3. Management and validation of all on-site soil excavations
4. Management of underground storage tank removals / excavations and associated cleaning / subsequent disposal including validation of surrounding soils
5. Design, management and implementation of the approved source treatment strategy involving the excavation, treatment and subsequent reuse on-site (as a substitute for imported fill) of contaminated soil and associated groundwaters utilising E-Clay Stabilisation
6. Design, management and implementation of the approved groundwater [pathway] treatment by the installation of an E-Clay Permeable Reactive Barrier
7. Preparation and submission of a comprehensive Validation Report to satisfy the requirements of the Council and the EA

Methodology

Envirotreat produced a Method Statement & Remediation Strategy Document summarising the site history and contamination issues, the approved remediation strategy & technical rationale, the necessary environmental protection measures required during the remediation works and the agreed validation protocols for the treatment element of the works.

Demolition

The first phase of the works involved the demolition of the existing steel framed canopy and kiosk building together with the excavation of the concrete slabs. The demolition works were undertaken by Envirotreat.

Figure 2 – Canopy Demolition



Figure 3 – Kiosk Demolition



Concrete Slab Removal

Once the above ground structures had been demolished and the arisings removed from site, the existing concrete slabs and foundations were broken out and removed from site. These were recycled to a further Enviro-treat remediation project to be crushed and reused there as part of the required sub-base.

Figure 4 – Concrete Slab Removal



Underground Tank Removal

The underground storage tanks were then assessed and removed - this phase included the excavation of contaminated soils and subsequent validation of the excavations. The excavated soils were stockpiled pending treatment. It was necessary to carry out intensive environmental monitoring during this phase of the works due to close proximity of residential properties.

The tank excavation works are shown in figures 5 and 6 below

Figure 5 – Excavation of Underground Tanks



Enviro-treat pumped out the liquid tank contents (water) and incorporated into the treatment process. All the tanks were subsequently excavated, cleaned, tested and removed for offsite disposal.

Figure 6 – Excavation of Underground Tanks



Source Treatment – E-Clay Stabilisation

Contaminated soils and groundwater around the underground tanks were confirmed to be contaminated with fuel oils (TPH) consistent with the historical tank usages. These soils (and groundwater) were treated by E-Clay stabilisation. The soils remaining in the void from the tank excavation is shown in figure 7 below.

Figure 7 – Contaminated Soils Remaining in the Excavated Tank Void



Once complete, representative samples were collected from the stabilised soils for validation purposes.

Treated soils were backfilled into the excavations in layers and rolled.

E-Clay PRB Installation

The permeable reactive barrier was installed along the eastern and northern site boundaries to intercept and treat the natural flow of any residual contaminated groundwater migrating from the site toward the Mill Pond. The barrier was installed using a trenching technique – the soils were mixed with a slurry of the designated pillared E-Clay to produce the Permeable Reactive Barrier. The barrier was installed to a depth of approximately 4m to toe into the impermeable underlying strata.

The installation of the permeable reactive barrier is shown in Figure 8 below.

Figure 8 – PRB installation (trench excavation)



VOCs, noise and dust monitoring was undertaken throughout the remediation works in accordance with the approved Remediation Method Statement and Environmental Risk Assessment.

A further requirement of enabling works package was the installation of a suitable formation platform to enable the new development to be constructed off a reinforced raft foundation. Using existing and imported materials Envirotreat designed and produced a foundation platform suitable for end use.

Validation

The works were undertaken in accordance with the approved Method Statement and Remediation Strategy.

Representative samples of the sides and bases of the excavations were taken (following the removal of the individual tanks) – these

samples were tested to confirm the delineation of identified contamination.

It was agreed that the suitability of treated material for reuse on site would be determined by compliance with designated leachate target values. This negated the requirement to remove hazardous soils offsite and the import “clean” replacement material.

A total of 6 samples were tested and all leachate values were compliant with the remediation criteria. The treated material was therefore considered suitable for reuse on site and re-emplaced in the void spaces created by the validated excavations as a substitute for imported fill.

The results have demonstrated satisfactory compliance with the designated remediation target criteria.

Conclusions

Enviro-treat successfully demonstrated through a comprehensive Validation Report that the overall remediation strategy had been successfully implemented.

The prime drivers for the remediation works were the protection of human health and controlled waters.

The Validation Report was approved by the NHBC, Birmingham City Council and the Environment Agency. The relevant planning conditions relating to contamination issues were discharged enabling the development to proceed. The completed development is shown in figure 9 below.

The strategy implemented at Clarence Road resulted in significant cost and time saving to the client.

Figure 9 – The Completed Development

