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CASE STUDY

E-Clay Stabilisation / Site Validation

Community Housing Development

Client

Freebridge COMMUNITY HOUSING

Developer

chalcroft construction built on teamwork

Site Background & History

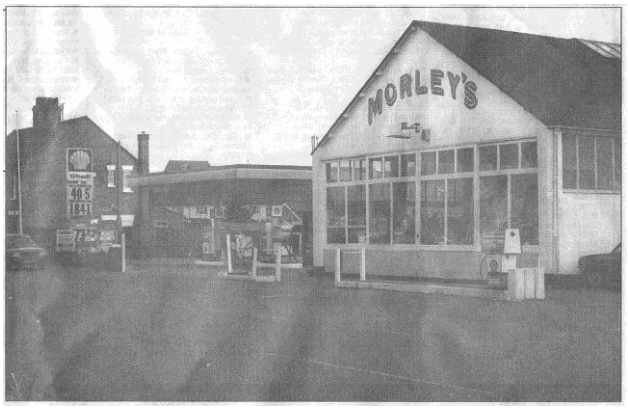
The site had been used as a petrol station from the 1920's through to the late 1990's and more recently as a car showroom with associated garages / workshops (see Figure 1 showing historical photograph). The site area is 0.39 Ha. Site investigation work confirmed the presence of significant hydrocarbon contamination consistent with previous site usage as a petrol station and garage. The identified contaminants of concern were predominantly Total Petroleum Hydrocarbons (TPH) and BTEX. Site investigation reports also indicated the presence of three underground storage tanks.

The client had planning permission to develop the site for residential end use (predominantly social housing units).

A number of remediation options were considered and precluded on the basis of cost and / or inability to achieve site remediation within the required timeframes. Working closely with Chalcroft, the Kings Lynn and West Norfolk Borough Council and the Environment Agency, Envirotreat developed a remediation strategy which was commercially viable and compliant with designated human health and environmental remediation criteria.

Previous site investigations had identified site end users and groundwater / surface waters (i.e. the Rivers Nar and Ouse) as potential receptors.

Figure 1 – Historical Photograph Showing the Petrol Station Operation at the Front of the Site



Remediation Objectives

Envirotreat were commissioned by Chalcroft to undertake the following:

1. Formulation and approval of a remediation strategy to satisfy planning and EA requirements including RTM [P20] and CLEA modelling as required
2. Management and validation of all on-site soil excavations
3. Management of all underground storage tank removals / excavations and associated cleaning / subsequent disposal including validation of surrounding soils
4. Management and implementation of the agreed remediation strategy for the excavation and treatment of contaminated soils and associated groundwaters utilising E-Clay Stabilisation
5. Management (and implementation) of the reuse of treated and validated soils on site – soils to be reused as a substitute for imported fill
6. Preparation and submission of a comprehensive validation report to satisfy the requirements of the Council and the EA
7. Discharge of relevant planning conditions

Methodology

Envirotreat produced a Method Statement outlining the site history, contamination issues, proposed remediation strategy & technical rationale, environmental protection measures required during remediation works and validation protocols for the treatment element of the works. It was necessary to formulate and agree separate validation protocols for the excavations and for the removal / retention of the underground storage tanks.

Following a consultation period with Kings Lynn & West Norfolk Borough Council and the Environment Agency, approval was obtained to undertake the proposed remediation works. Site specific leachate target criteria were agreed for the E-Clay stabilised soils and CLEA values were derived for the validation of excavations.

The first phase of the works involved the demolition of the existing building together with the excavation and crushing of concrete removed from hardstanding areas. Envirotreat carried out environmental monitoring during this phase of the works.

The second phase involved the excavation of contaminated soils and subsequent validation of the excavations (by laboratory analysis) utilising CLEA derived values. The excavated soils were stockpiled prior to treatment.

The third phase involved the *ex-situ* treatment of the contaminated soils utilising E-Clay Stabilisation. Treated soils were stockpiled in bunded areas pending validation. Following successful validation, the treated materials were reused [redeposited] on site.

Approximately 1,500m^3 of contaminated soils were excavated, treated and re-used on site.

Figure 2 shows the excavation of contaminated soils in the foreground and the *ex-situ* E-Clay stabilisation process in the background.

Figure 2 – On-Site Remediation

During the excavation element of the works it was expected that three underground fuel storage tanks would be identified and removed and that these tanks would have been previously rendered safe by cement slurrying techniques. In practice a total of nine underground fuel storage tanks were identified – the majority of these tanks had not been rendered safe and were either full or partially full of contaminated water and free product. Envirotreat were able to pump out the tank contents and incorporate into the treatment process (prior to the tanks being excavated). Eight of these nine tanks were subsequently excavated, cleaned and removed off-site for disposal. The cement slurry filled tanks were emptied and the contents were treated. A typical underground storage tank identified on site is shown in Figure 3.

Figure 3 – Typical Underground Fuel Storage Tank

The remaining tank (a 27,000 litre cement slurry filled petrol tank) was left *in-situ*. This was considered necessary due to the tank location being in close proximity to adjoining properties with the perceived risk of structural damage resulting from tank excavation. Envirotreat were able to demonstrate (through a combination of trial pit excavation / validation and exposing / treating the tank contents as necessary) that the tank would not pose a risk to the future development of the site.

Additional site works involved the remediation of the suspected Tidal Creek (which was historically linked to the Rivers Nar / Ouse and considered to be a possible preferential pathway). These works involved the identification of the creek as far as practically possible, followed by excavation, treatment of the soils / sedimental matter using a low permeability treatment media and re-emplacement thereby removing this suspected preferential pathway.

It was also considered essential to implement measures to prevent recontamination of the site. There was an identified risk of recontamination due to the presence of contaminated soils extending under the public highway which could not be accessed and excavated for treatment (most of the fuel storage tanks were located on the boundary of the site adjoining the highway and the soils underlying the highway were contaminated as a consequence). To address this identified risk Envirotreat installed a low permeability cut-off wall to isolate the remediated site from the potential ingress of contamination.

VOC and dust monitoring were undertaken throughout the remediation works.

The remediation works were undertaken within a four week timescale.

Validation

The works were undertaken in accordance with the approved Method Statement. It was agreed that the suitability of treated material for reuse on site would be determined by compliance with designated leachate target values. The treated materials were seen as a necessary part of the works - the material would replace the requirement to utilise imported fill to return the site to pre-remediation formation levels. The material was identified as having a specific purpose with any deficit of material resulting in the necessity to import fill.

Following a suitable period of “curing” representative samples of treated soils were leach tested and compared with the derived leachate target criteria for TPH and BTEX. A total of 16 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 proposed development is shown in Figure 4.

Figure 4 – Proposed Development

Conclusions

Envirotreat were able to demonstrate 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, the Kings Lynn and West Norfolk Borough Council and the Environment Agency.

The relevant planning conditions relating to contamination issues were discharged enabling the development to proceed.