CASE STUDY

E-Clay Stabilisation / Culvert Replacement

Remediation of Former Industrial Site, Glasgow

Client

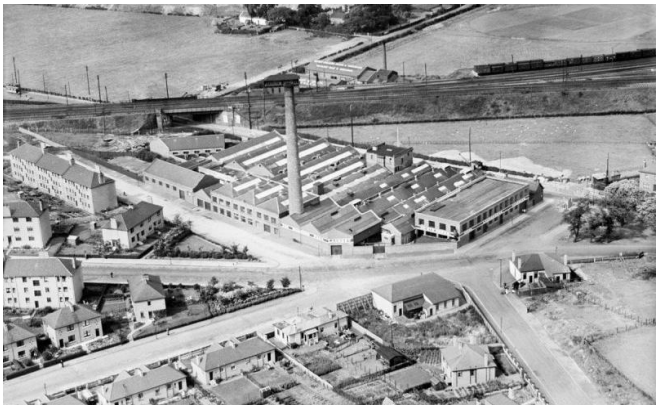
Environmental Consultants

Regulators

Site Background & History

The site is located at 200, Cambuslang Road in Rutherglen, Glasgow. The site historically comprised of a laundry facility (including dry cleaning capabilities), a lorry yard and a timber treatment facility. The historical site is shown in Figure 1 below.

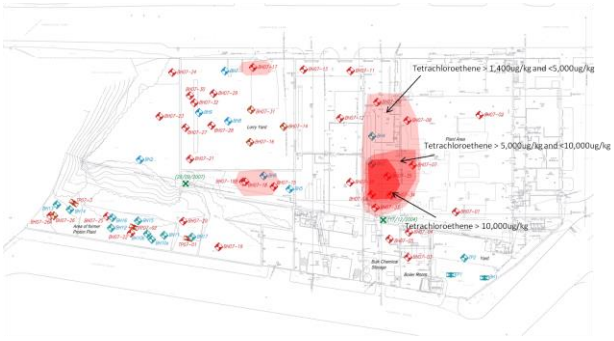
Figure 1 – Historical Site



The identified contamination on the site reflected the diverse nature of the historical activities on the site. The identified pollutants included chlorinated hydrocarbons, petroleum hydrocarbons and tributyltin associated with dry cleaning processes, the lorry yard and the timber treatment facility respectively.

Chlorinated hydrocarbons were identified in the area of the site predominantly occupied by the laundry – Tetrachloroethene [TCE] was present in concentrations exceeding 10,000ug/kg in the prime contamination area – see Figure 2 below.

Figure 2 – TCE Contamination



Petroleum hydrocarbons were identified in the area of the site predominantly occupied by the lorry yard and the timber treatment facility – petroleum hydrocarbons were present in concentrations exceeding 12,000mg/kg in the prime contamination areas – see Figure 3 below. Tributyltin was also identified in the former 'Protim' timber treatment facility.

Figure 3 – Hydrocarbon Contamination

The site was being developed by Lidl GmbH as a retail store with associated car parking and hardstanding – it was therefore considered that the risks to human health would be addressed by providing a 'pathway break' and by the implementation of necessary gas protection measures within the retail store building.

The prime environmental concern was the protection of the water environment. There were two identified receptors – the Scion Burn which was flowing through the centre of the site in a box culvert and the River Clyde located approximately 400m to the north of the site. The River Clyde was considered to be prime receptor for the area as a whole (groundwater flows were assumed to be in a northerly direction as a consequence).

The Scion Burn was considered to be of prime importance as the box culvert was clearly damaged in a number of locations and as a consequence there was every possibility that the burn was being directly impacted by contaminated groundwater present on the site. It was also evident that the flow of the burn was being constrained by blockages (primarily caused by the brick culvert collapsing in places). It was therefore an implicit requirement of the remediation works that the culvert was repaired / replaced to protect the Scion Burn from the risk of contamination and to enable the burn to flow through the site without constraint. It was considered that the box culvert could not be economically or practically repaired and it was therefore decided to replace the culvert as part of the remediation works. The culvert was also realigned with the approval of SEPA to enable the store development to proceed – the location of the realigned culvert is shown in Figure 4 below.

The culvert realignment works were undertaken in parallel with the remediation works – there was minimal overlap as the culvet realignment only directly affected one area of the site impacted by contamination (the 'Protim' timber treatment area).

Figure 4 – Location of Realigned Culvert

Remediation Works

Envirotreat were invited by Mason Evans Partnership [MEP] to develop a remediation solution for the site which would address the identified contamination issues and enable the store to be developed with the support of the regulatory bodies (South Lanarkshire Council [SLC] and SEPA). The remediation target criteria had been previously been determined and agreed with SLC and SEPA.

Envirotreat prepared a Site-Specific Working Plan [SSWP] documenting the remediation works to be undertaken including the reuse criteria for the project. The SSWP was submitted to SEPA for approval prior to commencement – the remediation works were undertaken under the auspices of Envirotreat's Mobile Plant Licence regulated by SEPA.

The approved remediation strategy involved the excavation of contaminated soils and associated groundwater, ex-situ treatment by E-Clay Stabilisation and re-emplacement following successful validation (i.e. demonstrating compliance with the designated remediation target criteria).

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MEP was engaged by Lidl to provide an overall supervisory role for the remediation works. This included groundwater monitoring post-remediation to confirm compliance with the designated remediation target criteria for the site.

Envirotreat initially undertook the focused excavation of a series of trial pits to delineate the contamination source in each area of the site (predominantly in the identified contaminated areas of the site as shown in Figures 2 and 3 above).

MEP was engaged to carry out the necessary validation of the trial pit excavations (to confirm that all contaminated materials had been effectively removed) and to determine the overall extent of the required remediation works.

Groundwater was observed in all of the excavations - the recharge was slow and non-directional indicating that the groundwater was most likely perched in nature.

The excavations are shown in Figure 5 below.

Figure 5 – Site Excavations

The excavated materials were stockpiled pending subsequent treatment *ex-situ* utilising E-Clay Stabilisation.

Ex-Situ Remediation

The *ex-situ* remediation works involved the treatment of contaminated soils and associated groundwater in 10m^3 batches utilising a mixing bin - see Figure 6 below. The treatment process involved mixing the contaminated materials with the designated E-Clay in slurry form and cementitious materials in dry form. The contaminated materials were mixed with the treatment materials to produce a homogeneous mass. Representative samples were taken throughout the treatment process – these samples were combined to produce composite samples for validation purposes.

Figure 6 – *Ex-Situ* Treatment of Contaminated Soils

A comprehensive environmental monitoring programme was implemented due to the close proximity of several sensitive receptors. Dust, odours, noise and VOCs were monitored around the site during the remediation works.

Validation

Representative composite samples (equivalent to a minimum of one sample per 250m^3 of treated material) of treated material were leach tested and compared with the designated remediation target criteria.

A total of 8 samples were tested and all leachate values were compliant with the remediation target criteria.

The treated material was therefore considered suitable for reuse onsite and re-emplaced in the void spaces created by the excavations as a substitute for imported fill.

Groundwater monitoring boreholes were installed on the northern side of the site. MEP has carried out groundwater monitoring over a 9 month period following completion of the remediation works. The monitoring results have confirmed compliance with the designated groundwater remediation target criteria.

Conclusions

Envirotreat were able to demonstrate that the overall remediation strategy had been successfully implemented.

The prime driver for the remediation works was the protection of the water environment.

The necessary approvals were obtained from South Lanarkshire Council and SEPA to enable the Lidl retail store to be developed. The completed retail store is shown in Figure 7 below.

Figure 7 – Completed Lidl Store