CASE STUDY

E-Clay Stabilisation

Former Gas Works, Gould Street, Manchester

Client

nationalgrid

Environmental Consultants

Entec

Remediation Technology Provider

envirotreat®

Site Background & History

The Gould Street site is owned by National Grid Properties and formerly operated as a gasworks. Dating from 1848, the site is located in a residential redevelopment within central Manchester and covers an area of 2.67 hectares.

Historical records indicated that as part of the gasworks decommissioning, some of the former gas holder bases were backfilled with spent oxide materials. The backfill was impacted with typical gasworks contaminants including hydrocarbons, metals, cyanide and ammonium. These elevated contaminant levels triggered the formation of the remediation requirement to reduce contaminant leachate levels to acceptable concentrations (derived from risk assessments).

The historical gas works is shown in Figure 1 below.

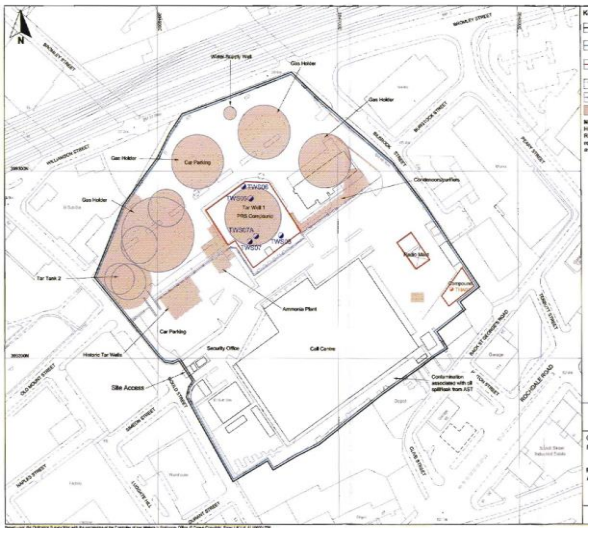
Figure 1 – Historical View of the Gasworks

Site Investigation

Entec UK carried out a site wide investigation in 2003 and a supplementray site investigation in 2009 to determine the extent of the contamination and the potential impact on the local environment. The reports concluded that PAHs, ammonium, benzene, cyanide and phenol posed an unacceptable risk to both human health and controlled waters.

The impacted areas and sources are shown in Figure 2 below.

Figure 2 – Contamination Sources



Sole Providers of E-CLAY® Technology

Stabilisation • Permeable Reactive Barriers • Bioremediation • Site Investigation / Consultancy

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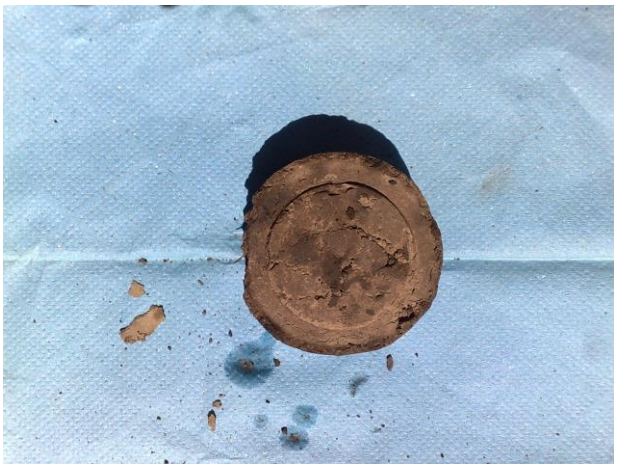
Envirotreat was initially engaged to carry out a bench scale treatability study to demonstrate the unique capability of E-Clay in the treatment of complex contaminated materials, in this case, gas works contamination.

The treatability work trialled a number of E-Clays and binders to confirm the optimum E-Clay formulation and binder mix which complied with the risk derived target values.

The optimum mix provided a dry friable material as shown in Figure 3 below

Figure 3 – Optimum Mix (Treatability Work)



Remediation Strategy

Based on the outcomes of the treatability trials and taking into account the potential for odour generation and the proximity of the site to adjacent commercial and residential units, the following remediation strategy was agreed:

- In-situ E-Clay Stabilisation of spent oxide material in the larger gasholder
- Ex-situ Stabilisation of spent oxide material from the two smaller gasholders
- Provision of a comprehensive Validation and Verification Report on completion

In-Situ E-Clay Stabilisation

Spent oxide materials identified within the larger gas holder were treated in-situ utilising a continuous flight auger [CFA] piling rig. The site specific E-Clay formulation was pumped through the hollow stem of the piling rig and soil mixed using the CFA. This is shown in Figure 4 below

Figure 4 – In-situ Stabilsiation using a CFA Rig

All drilling parameters (depth, flow rate etc) were recorded using the rig's computer system and were compliant with the overall quality control procedures.

Samples of the treated material were collected for validation purposes.

Ex-Situ Stabilisation

Spent oxide materials from the two smaller gas holders were treated ex-situ using conventional plant. These locations were considered far enough away from the adjacent residential properties to facilitate an ex-situ application.

Untreated and treated spent oxide material is shown in Figures 5 and 6 below.

Figure 5 – Spent Oxide

Figure 6 – Treated Spent Oxide

Validation

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

All samples were leached in accordance with the ISO EN 12457 standards series. All leachate values were compliant with the remediation target criteria.

The treated material was therefore considered suitable for reuse onsite (as a substitute for imported fill).

All leachate validation results for the E-Clay stabilised materials were below their respective remediation target criteria.