envirotreat®

Delivering land you can develop

CASE STUDY

E-Clay Stabilisation - Residential Development

Minsterley, Shropshire

Developer

TC HOMES

Site Background & History

The site is located on Station Road, Minsterley in Shropshire.The site comprises an 'L' shaped parcel of land - the site slopes towards the north and east by 3 to 4 metres. The site was previously used as a bus depot. It is bounded by a dairy to the west, agricultural land to the north and residential properties to the south and east. The site extends to approximately 5,000m^2.

Site Investigations / Contamination

Historical site investigations had shown the site to be impacted by hydrocarbon contamination associated with the site's former usage as a bus depot. The site investigations had identified a hydrocarbon contaminated 'hot-spot' in the centre of the site which posed a potential risk to both human and controlled water receptors.

Recent site investigations undertaken by GIP identified a surface water course located adjacent to the eastern site boundary – this watercourse is partially culverted and flows in a northerly direction. Minsterley Brook is located 220m to the north-west of the site (it is likely that the surface watercourse is a tributary of the Minsterley Brook) - a river quality survey of Minsterley Brook carried out in 2004 reported the watercourse quality as chemical grade B ('good') and biological grade A ('very good').

Development Proposal

The site is being redeveloped for a mixed end use (residential and commercial) comprising the construction of 16 No affordable houses and 2 No commercial units (see Figure 1 below.). TC Homes are developing the residential element.

Figure 1 – Proposed Development

Proposed Remediation Works

The Conceptual Site Model [CSM] identified risks to controlled waters from the leaching of total petroleum hydrocarbons [TPH] into groundwater.

Envirotreat produced a Remediation Strategy and Method Statement documenting the proposed works and gained regulatory approvals to undertake the works on behalf of TC Homes (the regulators were Shropshire Council [SC] and the Environment Agency)

The remediation works were undertaken to mitigate all identified pathway linkages between source and receptor by chemical immobilisation of contaminants within soils.

The overall remediation approach was as follows:

1. Source Delineation
2. Soil Stabilisation
3. Validation

Remediation activities were deemed complete once the delineated 'hot-spot' source area had been treated and validated.

envirotreat®

Delivering land you can develop

CASE STUDY

E-Clay Stabilisation - Residential Development

Minsterley, Shropshire

Source Delineation

The initial works involved trial pitting to delineate the 'hot-spot' contamination source.

A series of small trial pits were excavated around the identified hydrocarbon impacted area to determine the vertical and lateral extent of any contamination. A sample from the deepest recorded depth of contamination was used for base validation requirements (based on olfactory and VOC headspace analysis). Side validation samples were taken from the outer external face to confirm the lateral extent of the identified contamination (based on visual and VOC headspace analysis).

Laboratory analysis of the base and side validation samples confirmed that all samples were below the required remediation target criteria, confirming that the vertical and lateral extent of the hydrocarbon contamination had been effectively determined.

E-Clay Stabilisation

Identified contaminated soils were treated *in-situ* using the designated E-Clay formulation to address the identified hydrocarbon contamination at the site. The stabilisation works are shown in Figure 2 below.

The contaminated 'hot-spot' was treated in discrete areas of known volume to ensure the correct quantity of E-Clay addition was achieved (in slurry form).

Figure 2 – *In-situ* E-Clay Stabilisation

A known volume of E-Clay slurry was added to each area and mixed with the contaminated soils *in-situ* to the required depth using the excavator bucket (as shown in Figure 3 below).

Figure 3 – Addition of E-Clay Slurry / Soil Mixing

Discovery Strategy and 'Watching Brief'

A Discovery Strategy (as set out in the Remediation Strategy) was implemented during the delineation and treatment stages of the works. No unexpected contamination was encountered during this phase of the works.

In addition, Envirotreat attended site during the excavation of foundations and drainage / services as part of the agreed watching brief. Envirotreat collected further samples for assessment and submission for laboratory testing where required. No further contamination was noted on site as part of these works.

Environmental Monitoring

Envirotreat undertook environmental monitoring at key locations around the site during the remediation works.

The environmental monitoring comprised:

- Noise Monitoring
- VOC Monitoring (using a handheld MiniRea – a 1 ppm threshold was used)
- Dust Monitoring (using a Dustscan measuring Total, Respirable and PM 10, PM 2.5 and PM 1.0)

- Weather Monitoring

Background monitoring was undertaken prior to commencement to establish background levels.

None of the established thresholds were exceeded during the works.

Validation

Samples of treated material were assessed on-site and samples were submitted for laboratory assessment at i2 Analytical.

The testing and analysis confirmed that the treated materials were fully compliant with the designated reuse criteria and were therefore suitable for appropriate reuse on-site (as a replacement for imported clean materials).

Additional Works

Gas Membrane Validation

TC Homes commissioned Envirotreat to liaise with SC concerning the type of gas membrane required for each development unit.

Envirotreat confirmed the GIP recommendation that each property required the installation of a gas membrane.

GIP confirmed, *"There is a risk to Human Health from the concentrations of ground gases and volatile vapours recorded in the monitoring standpipes and protective measures will be required for the planned buildings.*

In accordance with British Standards Institution BS8485:2015 (modified in 2019), the highest recorded carbon dioxide levels together with the maximum peak gas flow rate would suggest a 'Characteristic Gas Situation' (CS) of '2' defined as a 'low' hazard potential (Table 2 of BS8485), therefore, protective measures are deemed necessary in the proposed buildings."

Further testing and assessment by Envirotreat demonstrated that a hydrocarbon resistant membrane was not required.

Envirotreat agreed the membrane design / installation and validation protocol with SC.

Envirotreat worked closely with TC Homes during the gas membrane installation to ensure that evidence was gathered to demonstrate that the gas membranes had been correctly installed in accordance with the manufacturer's requirements.

The gas membrane installations are shown in Figure 4 below.

Figure 4 – Gas Membrane Installation

Capping Layer Materials

Envirotreat will also be validating the materials used in garden / landscaping areas to confirm compliance with the designated acceptability criteria.