

Project

Environmental Protection – Permeable Reactive Barrier Design and Installation

Client



Installation



Project Consultant



In September 2005, a significant oil / fuel spillage occurred at the location shown in Figure 4.

Although remediation measures had been taken by the site owners to address the source contamination, it was considered necessary to additionally address dissolved phase contamination which had the potential to migrate offsite and potentially impact land earmarked for future development and the River Tees. Envirotreat were commissioned by Ash Remediation to design a permeable reactive barrier to address the identified dissolved phase contamination arising from the 2005 spillage and to provide the technology / proprietary materials for the barrier installation. Halcrow were engaged as project consultant by the Homes & Communities Agency.

The prime contaminants of concern were identified as Total Petroleum Hydrocarbons, BTEX and Naphthalene.

Envirotreat proposed and demonstrated that groundwater contamination could be addressed through the installation of a soil mixed reactive barrier. The barrier was designed and demonstrated as being effective by comprehensive laboratory trialling and modelling techniques. The objective of the barrier was to mitigate the risk of ongoing migration of contaminated groundwater to the identified downstream receptors by severing the pollution linkage pathway.

Envirotreat were required to provide the following:

- Envirotreat Reactive Barrier Technology
- Reactive Barrier Design
- Contaminant flux calculations to confirm barrier loading capability
- Borehole sampling to determine current status of groundwater contamination.
- Simple batch testing to confirm treatability

Figure 1 – North Shore Site



The area has been historically used as a steel mill as well as dockland. The area has been highlighted as part of a 23-hectare mixed use regeneration scheme which will transform Stockton Riverside (North Shore).

- Column testing to demonstrate long term performance
- ConSim Modelling
- P20 Modelling
- Regulatory Approvals
- Proprietary E-Clay Reactive Media

Following Environment Agency approval the reactive barrier system was installed in April / May 2011. The permeable reactive barrier installation was 330 metres in length and installed to an average depth of 6 metres. The location of the barrier is shown in Figure 4.

The barrier system was installed using a continuous flight auger rig equipped with a soil mixing injection and drilling head. The treatment slurries were injected through the auger stem and mixed with the soil medium to form overlapping soil mixed columns. Proprietary treatment [E-Clay] media were employed for effective treatment of the identified contaminants of concern within the contaminated groundwater.

Figure 2 – Installed Reactive Barrier



Strict Quality Control was adhered to throughout the installation process - this was achieved through the use of flow meters to measure the volumes of treatment slurry injected, digital gauges to monitor the drilling depth and data collection from the rig on-board computer.

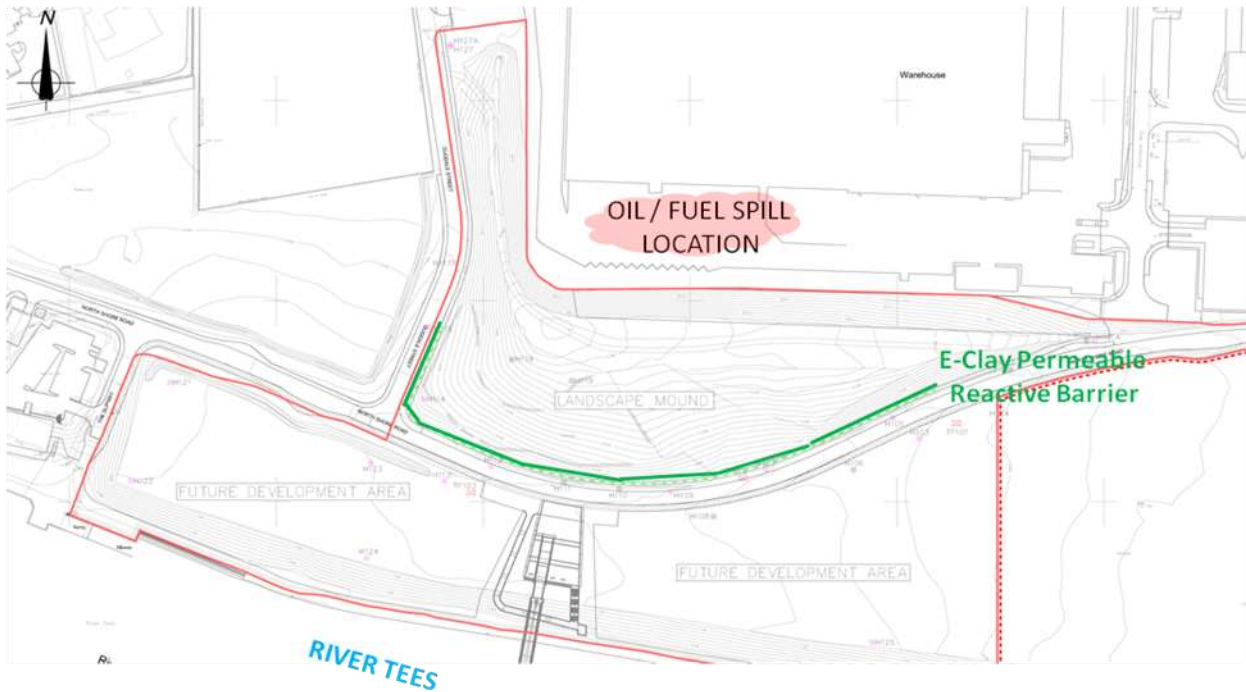
Figure 3 – Illustration of North Shore Development



Prior to installation Ash Remediation agreed a post installation monitoring regime with the Environment Agency to demonstrate the efficacy / performance of the barrier. This comprised of groundwater quality monitoring at designated borehole locations.

The monitoring has now been completed and the results have demonstrated that the barrier installation has been successful. The Environment Agency has approved the validation report produced on completion of the groundwater monitoring.

Figure 4 – Location of Source Contamination / Permeable Reactive Barrier Installation



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