



Site Background & History

The proposed development site, a former landfill, borders the existing Xcel Leisure Centre on Waterside Drive in Walton on Thames. Elmbridge Borough Council proposed developing the existing land to provide a Sports Hub, consisting of football and athletics facilities, see figure 1.

Site investigation undertaken by Leap Environmental recorded that the underlying soils were contaminated with asbestos, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons with hotspots of lead and BTEX compounds (benzene, toluene, ethylbenzene and xylenes). Analysis undertaken on the groundwater indicated

widespread contamination within the landfill mass, the principal contaminants detected were arsenic, boron, polycyclic aromatic hydrocarbons and total petroleum hydrocarbons, benzene, phenolic compounds and other semi volatile organic compounds (sVOCs)

Figure 1 – Proposed development.



A Remediation Options Appraisal of Best Available Technologies was undertaken by Leap Environmental to address the identified risks. This appraisal identified the requirement for Permeable Reactive Barrier between the Source (landfill) and the identified receptor (River Thames) to address the identified pathway.

Wilmott Dixon commissioned Envirotreat to design, gain regulatory approval and install a Permeable Reactive Barrier to address the risk identified by Leap Environmental and the Environment Agency.

Envirotreat initially attended site in November 2015 to undertake further site investigations to support their preliminary design. The purpose of this work being two-fold, one to gain a better understanding of the site geology to determine

best delivery technology and two for collection of soil / groundwater samples to undertake focused treatability tests.

These site trials indicated that the ground conditions would not allow for a conventional installation approach. To achieve the required depths to “toe” the Permeable Reactive Barrier into the underlying low permeability clay layer would require the use of a piling rig (specifically use of a continuous flight auger) to accomplish continuous soil mixing to required depth of up to 7 m below existing ground level. The actual barrier depth was confirmed by use of dynamic probing was undertaken to along the line of the barrier.

In accordance with the Environment Agency guidelines on the design and installation of Permeable Reactive Barriers, laboratory-based batch testing was undertaken on soil and groundwater samples collected from the site to demonstrate the efficacy of the proposed E-Clay formulation. Additionally, accelerated column testing was utilised to demonstrate the barrier performance over the required barrier design life. The laboratory findings and design details were presented to the Regulators (Environmental Agency) in the form of a Permeable Reactive Barrier Design Report for approval.

Enviro-treat prepared and submitted an application for the Deployment of their Environmental Permit (mobile treatment licence), a standard procedure on the basis the remediation works are deemed as a waste recovery operation and are regulated by the Environment Agency in England. This Deployment described in detail how Enviro-treat were going to undertake the works, monitor

and protect the environment prior, during and on completion of the remediation works.

Following approval from the Environment Agency in respect to the both the proposed Permeable Reactive Barrier Design Report and Licence Deployment, Enviro-treat commenced the barrier installation works (May 2016).

Figure 2 – Excavation of exploratory trial pits.



Methodology

Barrier Installation:

The barrier was installed in accordance with the Barrier Design Statement. The barrier was constructed by soil mixing in-situ soils with E-Clay reactive media using a continuous flight auger.

Enviro-treat was very conscious of the impact the proposed works might have on the local environment (residents, leisure centre users and general visitors) and therefore together with Wilmott Dixon formulated a strategy to

minimise any risks. This included a very comprehensive monitoring regime covering dust (using frisbee and Dustscan monitoring technique), asbestos air monitoring, vibration monitoring, noise, VOCs (portable PID), odours and general weather conditions (including wind and direction).

One key aim was to minimise lorry movements to and from the site during the preparation stage of the works, where there would be a requirement to import and create a piling platform along the whole length of the barrier installation. Envirotreat addressed this by only importing approximately 20% of the required recycled stone to form a working platform. This allowed for the creation of about 75 linear metres of the required 400 linear metres working platform, As the works continued Envirotreat lifted the piling platform stone to reuse in front of the piling rig

The required Permeable Reactive Barrier was 410 m in total and consisted of 630 concentric soil mixed piles.

Figure 3 – Schematic of soil mixed column installation.

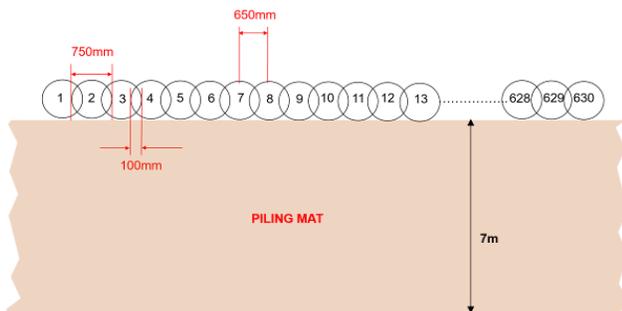
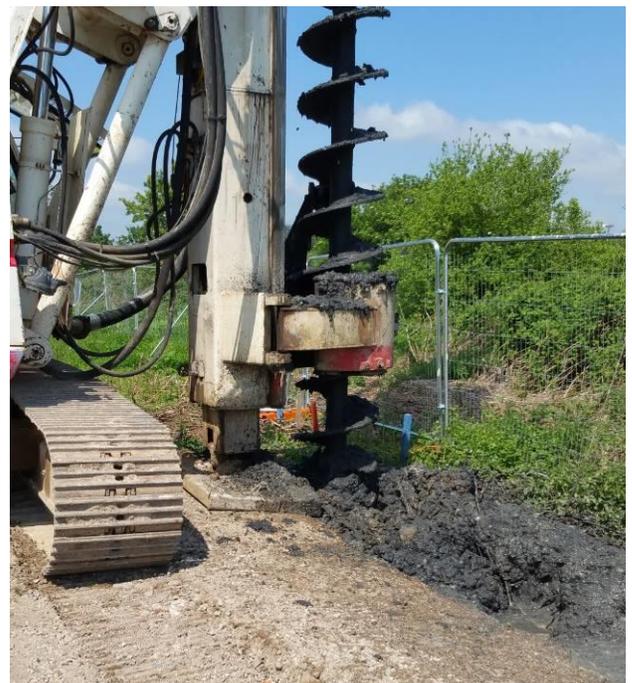


Figure 4 – E-Clay preparation area.



Figure 5 – CFA Rig installing E-Clay Permeable Reactive Barrier.



The barrier was installed to depths of between 7.0 m to 10.0 m bgl, depending on the depth of the underlying low permeability clay.

Figure 6 –E-Clay Permeable Reactive Barrier installation.



Validation

The works were undertaken in accordance with the approved Permeable Reactive Barrier Design document and in accordance with the Envirotreat Remediation Method Statement.

A full record of each installed pile was collated by the piling rig operator - this was checked daily by the Project Manager. The following parameters were assessed as part of the QA / QC parameters in respect to the piling rig installation.

- Number and location of piles installed, cross checked against actual length of barrier section installed
- Depth of pile installed, cross checked against anticipated depth (dynamic probing) and piling rig torque at depth

- Anticipated E-Clay requirement against actual usage
- Plant / Equipment daily checks

Subsequent ongoing groundwater monitoring by Leap Environmental has confirmed the efficacy of the installed Permeable Reactive Barrier.

Conclusions

The facility was officially opened on Thursday 14 September 2017.

Figure 7 – Part of the completed facility.



Andy Norman (Regional Manager) Leap Environmental Ltd. stated:

“Envirotreat was brought onto the project for their expertise in managing risks to sensitive controlled waters receptors. The Environment Agency was concerned that the development could not be undertaken without potentially polluting the nearby River Thames. Through the installation of a Permeable Reactive Barrier, Envirotreat overcame this objection and allowed the project to proceed. Their work was undertaken in a timely, professional manner and received prompt regulatory sign-off.”