

# Protection of a chalk stream using an injected permeable reactive barrier

# **CASE STUDY**

Integrated remediation of petroleum hydrocarbons in soils and groundwater



# **PROJECT BACKGROUND**

On the former site of a historic cardboard and plastics factory in Hertfordshire, UK, a series of fuel storage tanks had leaked over time, impacting the underlying soil and groundwater.

The site was to be redeveloped and although site use remained light industrial, the petroleum hydrocarbon contamination did require remediation. This was due to the risk the contamination posed to the environment, as immediately adjacent to the site is a sensitive and protected chalk stream.

Working with the Environmental Contractor Rake Remediation, REGENESIS helped devise an integrated remediation strategy that has been completed in two phases.





# A FULLY INTEGRATED REMEDIAL APPROACH

As part of the remedial design process, when REGENESIS looked at the different options for groundwater treatment, the proximity to the chalk stream was taken into account. By working with the anticipated radius of influence of the different products the injection points were off-set away from the stream with a good safety margin, to this sensitive receptor would not be affected by the works.



Site plan showing the contaminant plume and the location of the phase 1 and 2 remediation works

#### **PHASE 1 - IN SITU PERMEABLE REACTIVE BARRIER**

The first phase consisted of the installation of an in situ permeable reactive barrier, or 'in-situ PRB'.

This was designed as two rows of **ORC Advanced**<sup>®</sup> and a third row of **PetroFix**<sup>®</sup>, to protect the chalk stream from any incoming petroleum hydrocarbon contamination.





#### PHASE 2 - TARGETED EXCAVATION COUPLED WITH ENHANCED PHYSICAL ABSTRACTION

Once the in situ barrier was installed, Rake Remediation continued with the second phase of the works, starting with targeted excavation of grossly impacted soils, coupled with physical abstraction using pump and treat in the source area.

Once that P&T system reached an endpoint, the residual dissolved phase contamination left in the source area was treated via In Situ Chemical Oxidation (ISCO). The ISCO technology used for this is called **RegenOx®**, which was injected over a series of campaigns.



Graph showing the lower concentrations that can be achieved with RegenOx, once a pump and treat system stops being effective

## **EASE OF APPLICATION**



Rake Remediation's mixing area setup onsite for the injection of the PetroFix PRB

Rake Remediation carried out the application of the PetroFix and ORC Advanced barrier injections using a simple mixing plant and injection pump, managed by one person, and a direct push rig, manned by a second person.

The small footprint and short duration of the in situ works made it easy and straightforward to carry out, especially compared to a more traditional approach: In order to arrive to a similar site solution, the alternative would have been an engineered sheetpile wall with a funnel and gate system - a far more energy, time and labour intensive, with much higher associated H&S risks.



# RESULTS

Following completion of the onsite works, the environmental consultant, WDE Consulting, carried out several rounds of validation monitoring to ensure the remedial targets for soil and groundwater were achieved.



# CONCLUSION

Within a month after Rake Remediation completed the injection works, TPH concentrations dropped to non-detect (ND) downgradient of the permeable reactive barrier.

The combined approach of physical abstraction, limited excavation and ISCO in the source area, plus an injected barrier in the plume, has provided a powerful, safe and highly efficient remediation solution which continues to protect the sensitive chalk stream.

#### **PROJECT REFERENCE**

Mark Swanston Director Rake Remediation markswanston@rake-rem.co.uk

### **MORE INFORMATION**



WATCH THE PROJECT VIDEO



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#### CONTACT

europe@regenesis.com +44 (0)1225 61 81 61

#### WWW.REGENESIS.COM

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