

# ISCO and Enhanced Aerobic Bioremediation during Residential Development

## Excavation works minimised to allow development without interruption in Norfolk, UK



### Summary

REGENESIS was approached by an Environmental Consultant who was assessing remediation options for a former industrial site which was due to be redeveloped for housing. The previous site use had resulted in the underlying superficial soils and groundwater becoming impacted with Petroleum Hydrocarbons. REGENESIS suggested that the site would require some excavation of the most grossly contaminated secondary sources area, followed by In Situ Chemical Oxidation (ISCO) and Enhanced Natural Attenuation (ENA) in the residual source areas and the downgradient plume.

Due to the complex nature of the geology (continuous gravelly sandy lenses interbedded with clays) there was a need to target the most permeable layers with ISCO using RegenOx, to rapidly reduce the high concentrations and residual adsorbed contaminants. ORC Advanced was then emplaced in these zones to provide a controlled release of oxygen and further reduce concentrations in the groundwater within both high and low permeability sediments, preventing 'rebound' due to back-diffusion.

REGENESIS completed the works over four injection campaigns. Our specialist injection equipment was used to apply RegenOx and ORC-Advanced into the subsurface.

### Design & Application

- A 50m<sup>2</sup> excavation was completed within the source area to remove the most grossly impacted soils down to groundwater level. ORC-Advanced Pellets were then applied across the base of excavation to expedite the biological degradation of residual petroleum hydrocarbons
- Installation of 26 injection wells across gravelly sandy lenses to ensure targeted injection of RegenOx and ORC-Advanced

### What's Special?

While it was possible to undertake the injection work using a direct push application method. REGENESIS suggested that the Environmental Consultant oversee the installation of the 26 No. injection wells and use information gathered from this exercise, to provide us with higher resolution characterisation of the impacted area, to allow for more targeted treatment by our in-house injection team.

### Remediation Details

#### Site Type:

Residential

#### Project Driver:

Redevelopment

#### Remediation Approach:

In Situ Chemical Oxidation (ISCO) and Enhanced Natural Attenuation (ENA)

#### Technologies:

RegenOx<sup>®</sup>, ORC-Advanced<sup>®</sup>, ORC-Advanced<sup>®</sup> Pellets

### Geology

	Bedrock
X	Gravel
X	Sand
X	Silt
X	Clay

### Medium

X	Groundwater
	Saturated Soil
	Vadose Zone

### COC

X	Petro HCs
	Petro LNAPL
	Chlorinated VOCs
	Metals

#### COC Concentration Levels:

1,000 mg/kg  
6 mg/L

#### Treatment Level:

2-4m BGL

#### Treatment Area (m<sup>2</sup>):

500m<sup>2</sup>

#### Remediation Cost: £39k