

O₂ Saturated Water Injection (SWI) - Former Aluminium Works

SITE:

Former Aluminium Works, Newport, Gwent

CLIENT:

Tamdown Regeneration/Confidential

CONTRACT:

£300K ICE Design and Construct contact to carry out remediation of hydrocarbon impacted groundwater.

CHALLENGE:

The previously demolished works required treatment of two separate plume areas, Area A - East Works and Area B – Effluent Plant. The estimated areas of the plumes were 20,000m² for Area A and 10,000m² for Area B. Both Plumes were contaminated with soluble rolling oils at varying concentrations, up to 240,000µg/l.

The site presented numerous challenges including; the close proximity of the primary receptor (river Ebbw), extensive area of two separate plumes, oil saturated soils, localised free-product and variable ground conditions with significant in-ground obstructions.

During on-going works the high dissolved iron loading created significant fouling of the pump and treat equipment which had to be mitigated throughout the operational phase. The dissolved iron also competed with the endogenous biomass for recirculated O₂

SOLUTION:

The following integrated groundwater treatment solution was designed and implemented:

- Installation of groundwater pumping + recirculation systems across two separate plumes. Total of 34 recirculation points installed insitu using Sonic Drilling techniques.
- Pump & treatment of a total of **23million litres** of contaminated groundwater's from the source zones of both plumes, over a 10 month period.
- On-site treatment of abstracted groundwater through removal of free and dissolved phase (TPH) prior to recirculation. Removal of **306kgs** of dissolved hydrocarbon mass (equivalent to **408litres free oil**) during the process.
- Injection of a significant quantity of oxygen and bio-nutrients into the aquifer to promote and enhanced natural attenuation of hydrocarbon using the *Groundwater Pressurised Remediation Optimiser (gPRO™)* System. Hydrocarbon degrading bacteria, *Pseudomonas spp* were also utilised as an inoculum during recirculation in certain areas to boost biomass populations.
- A total of **1.6 tonnes** of oxygen was dosed into the aquifer at a rate of 6-7kgs/day.

VERIFICATION & CLOSURE:

The works were monitored throughout the remediation phase for TPH concentrations as well as monitored natural attenuation (MNA) parameters. Monitoring results confirmed the remedial target criteria of 500 µg/l was achieved in 11 out of 12 monitoring wells, the only exception being an area where significant free free phase contamination was previously present. However a 99% TPH reduction was still achieved at this location following treatment.

