

Case Study: Former Dye Factory

Innovative Multiple Technology Remediation



Site:

- A former dye manufacturing facility that had been decommissioned and currently being used as a car park
- Trichlorobenzene (TCB) impact identified within 4 source zones across the site, including: unsaturated soils, adjacent river bed, shallow groundwater within drift aquifer and deep groundwater within drift aquifer
- Residual free phase DNAPL identified within drift aquifer adjacent to river
- QDS Environmental Ltd engaged to design and implement remediation strategy in order to achieve the site remediation criteria
- Extensive in-house laboratory and on-site trials conducted prior to remediation works

- River Sediment Replacement
- Zero Valent Iron (ZVI) injection along with organic substrate
- Installation of Cofferdam and bespoke river wall stabilisation system
- Soil removal and disposal



Source Zone 1: Unsaturated Soils

- Excavation and segregation of impacted material above the water table.
- Treatment of impacted perched water within the source zone.
- Off site disposal of heavily impacted soils
- Backfill of excavation to required standard for future development of the site



Remediation Method:

Multiple technologies, including innovative techniques, operated simultaneously, within tight constraints in order to treat source areas and recover maximum mass of TCB.

Technologies included:

- Surfactant Flushing
- Emulsified Vegetable Oil (EVO) Injection (including on-site anaerobic bio-augmentation)

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Source Zone 2: River Sediment

- Excavation of contaminated river bed in sections using a lagoon box
- Hydraulic control to prevent cross contamination with silt and impacted water
- Installation of impermeable bentonite layer to prevent further upward migration of contaminants
- Reinstatement of river bed with imported virgin material
- Injection of 2 ZVI layers beneath impermeable bed resulting in de-chlorination of any residual contamination



Source Zone 3: Shallow Groundwater:

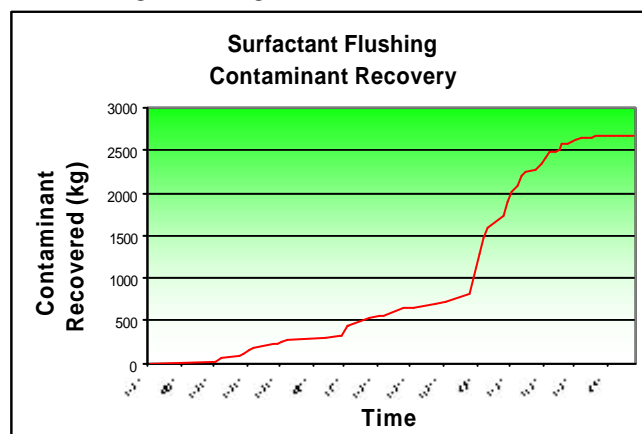
- Localised area of impact
- Installation of cofferdam enabling deep excavation works for removal of source soils
- Highly Impacted material removed and segregated for off-site disposal
- Tensor system installed to improve stability of historic river wall adjacent to work area

Source Zone 4: Deep Groundwater

- Zone divided into 2, the Active Source and Passive Source
- Active Source was treated via surfactant flushing to increase solubility of the residual free phase and adsorbed TCB from within the aquifer matrix
- Hydraulic Control Barrier prevented off site migration of mobilised contaminants
- Passive Source was treated by in-situ bioremediation
- Combination of EVO and bacterial substrate injected throughout source area stimulating anaerobic biodegradation of TCB

Results

- 4500 tonnes (1500 tonnes from the river bed) of highly impacted 'untreatable' soil disposed off-site
- Solubility of TCB increased by 8400% allowing 2655kg of TCB to be efficiently recovered via surfactant flushing
- 2,655 kg of contaminant recovered via surfactant flushing
- Regulator sign off achieved



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