



## Environmental Management Services

### **Site Investigation & Remediation Case Study Phases I, II, III & IV**

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#### **Environmental Permitting**

We were commissioned by a metal processing plant to undertake a contaminated land site investigation in order to support the application for an Environmental Permit.

The phase II site investigation found heavy metal contamination in the groundwater with average concentrations across the site reaching 35 mg/l.

The river which ran along the site boundary was identified as a potential receptor. A pump and treat system was set up with an approximate reduction of 2.6kg/day from the river basin and, to date, a substantial reduction of over 70% on the river.





We were commissioned by a metal processing plant which has been in operation for over 50 years to undertake a contaminated land site investigation to support the application for an Environmental Permit associated with the processes involved on site in line with the Environmental Permitting (England and Wales) Regulations 2010.

The site is located on the edge of a residential area with a major river in close proximity to the site boundaries.

## Phase I Desktop Survey & Site Walkover

During the Phase I survey as much information on the history of the site was established in order to identify the likely contamination caused as a result of their current and past processes.

The historical layout of the site was ascertained through studying various site plans dating back to 1836 and confirmed during the site walkover. This allowed identification of probable contamination hotspots in order to design the investigation strategy in the phase II intrusive survey.





## Phase II Intrusive Site Investigation

Based on the information gathered in the phase I survey we were able to determine the potential areas of concern to target boreholes in order to investigate the suspected contamination.

A total of 60 boreholes were drilled and equipped with standpipes to allow for the collection of groundwater samples and the monitoring of fluctuations within the groundwater levels over time.

Multiple soil and groundwater samples were obtained and sent to a UKAS accredited laboratory for analysis with the requested analytical suite looking for key contaminants of concern identified within the Phase I investigation.



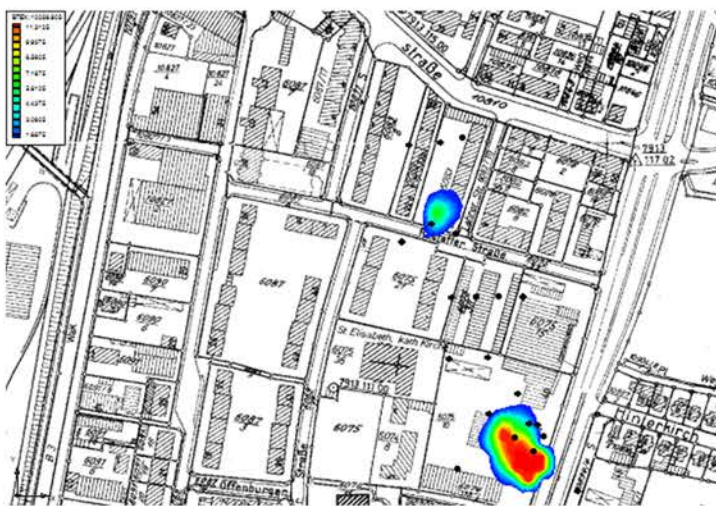
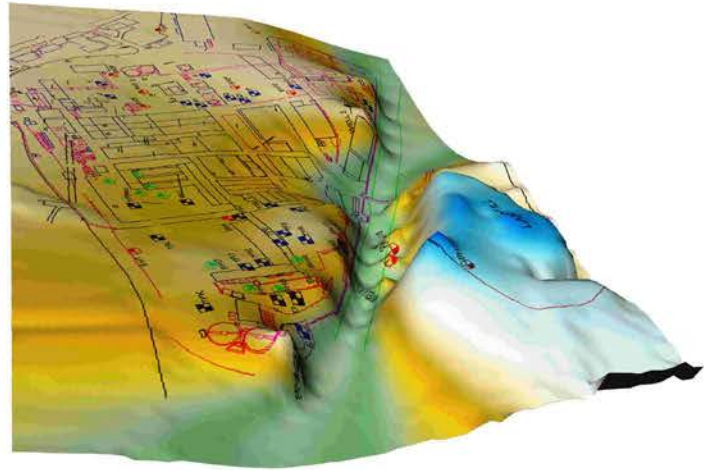
Two hotspots of contamination were identified on the site via the network of monitoring boreholes. The source of contamination was traced back to the demolition of two buildings formerly used as processing plants.

Heavy metal contamination was discovered in the groundwater with average concentrations across the site reaching 35 mg/l identifying the requirement for additional investigation works, leading to remediation of the groundwater.

## Phase III Remediation Design

The key objective for the client was to prevent off-site migration of the contaminant plume to the river. The significant data obtained during the Phase I & II investigations allowed for the construction of a groundwater fate and transport model.

This model predicted contaminant loadings on the river up to 50 years into the future as well as modelling a number of remediation options in order to reduce the loadings.



The preferred method for remediation was a Pump & Treat system utilising the on-site effluent treatment facility.

Capture zone analysis was conducted using particle tracking where the groundwater is seeded with theoretical contaminant particles, the location of which is tracked through time and under various pump regimes. This identified the optimum number and location of pumping boreholes as well as pumping rates.

A number of scenarios were considered and on a cost vs. benefit basis the optimum system was designed to intercept the most contaminated groundwater discharging into the river.



## Phase IV Remediation

We were commissioned to run the remediation project. A pump and treat system was installed which included the installation of:

- Two recovery wells (150mm x 25m deep).
- Two submersible pumps.
- Eight additional monitoring wells (50mm x 15m deep).
- Construction of two pump houses for associated control equipment.
- Completion of test pumping to assess aquifer stresses.
- Application for suitable groundwater abstraction permit.
- Continued dialogue with the Regulator at all stages.



Groundwater modelling ensured that the pump and treat remediation technology was installed in a manner that maximised remediation of the site in a cost effective manner.

The reduction of heavy metals on the river is monitored on a regular basis at stations up and down stream of the site.

The predicted results from the groundwater modelling equate to an approximate reduction of 2.6kg/day from the river basin and, to date, a substantial reduction of 72% on the river.