Complex remediation and enabling works on a former gasworks/ironworks site

Cradley Heath, West Midlands

Client: **Vistry Partnerships**
Site area: **3.6ha**
Location: **Woods Lane, Cradley Heath**
Timeframe: **2 years** (remediation of gasworks approx. 3 months)
End use: **Residential**

Challenge

Remediation and enabling works on the 3.6ha site of a former gas works and galvanising ironworks. This was in preparation for 135 new homes and an apartment block, as well as hard surfacing for access roads and parking.

After Cradley Gas Works was demolished in approx. 1968, the site had been redeveloped and used for various commercial and industrial purposes.

Site investigations had been conducted in 2016/17, but there were significant gaps in the data. Challenges included:

- Extensive TPH, PAH, Cyanide and Phenol-impacted groundwater
- Elevated levels of TPH, PAH, Cyanide, Phenols and BTEX in soils, including the presence of slag and anthropogenic materials, such as plastics and metals.
- The site's position next to the River Stour (principle receptor)
- Spoil mounds associated with historic mine workings

The site's geology comprised of Made Ground consisting of cobbly/gravelly clay with clinker, slag, brick, ash, plastic and metal, with stiff clay at a depth of approx. 6.5m. Groundwater was present at circa 3.5mbgl but varied across the site.

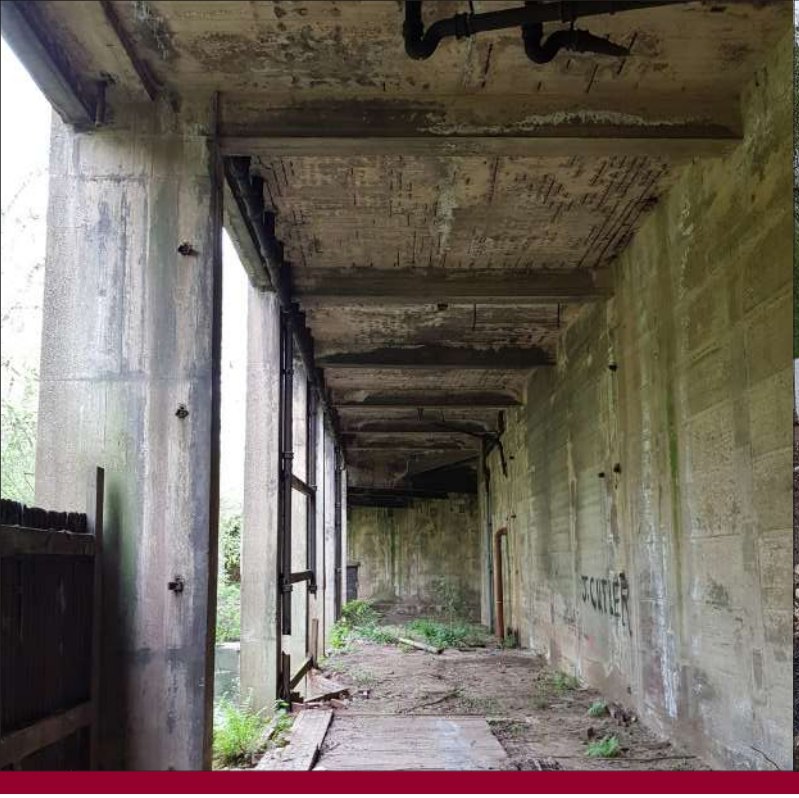
Solution

McAuliffe negotiated a **phased approach** to development, giving the client early access to the Western area of the site to begin construction works.

Our team commissioned further site investigations and additional groundwater testing, engaging with the Environment Agency (EA) to gain approval for our remediation strategy. Emphasis was placed on the heavily impacted former gasworks area in the Eastern portion of the site.

We completed a **Detailed Quantitative Risk Assessment** (DQRA), as the originally proposed generic targets were unachievable, based on the high level of groundwater contamination present and the proximity of the river (principle receptor). This had ruled out use of more aggressive remedial solutions such as insitu chemical oxidation.

Our team proposed installing a sheet pile groundwater **cut-off wall** to break the source – pathway – receptor (SPR) linkage to the river.



We commissioned groundwater modelling to validate the SPR linkage, based on very slow groundwater flow and high contamination levels, and to confirm that flow rates and volumes would not adversely impact the hydrogeological regime. There had been concern that groundwater could back up and lead to flooding.

Based on our findings, the EA **approved** the cut-off wall approach. This strategy was combined with removal of contaminated hotspots from the unsaturated zone, and Stabilisation/Solidification (S/S) treatment of gasholder infill materials, (particularly DNAPL in the form of coal tar), to prevent them acting as a continuing contaminant source.

We carried out S/S treatability studies to confirm the most suitable mix design, which would target the main contaminants of concern (CoC) and DNAPL in the gasholder infill materials. A range of mixes were trialled, based on our previous experience treating similar materials on other gasworks sites.

As part of our site-wide remediation works, we removed existing gas holder structures to enable **piling and services** for the future housing development.

During the process, S/S of the gasholder materials was done in situ, using homogenising buckets on excavators, to the full depth (4.5m and 6m). We excavated materials, then replaced them in layers with the binder reagents mixed into materials to create a homogenous mass.

Samples were taken in the 'wet' state for subsequent 28-day batch leachability testing, ensuring compliance with groundwater targets.

RESULTS

- The EA agreed our remedial solution provided the most efficient, practical and cost-effective approach to unlocking the site for development, negating risks to end-users and the river.
- Materials were validated against the derived remedial targets for the main CoC – both in terms of total contaminant mass and leachability – to ensure compliance.