CASE STUDY

GEOTEchnical, eNVironmental and dEvElopment Support at sharlston Surface mining Site
Project description

In September 2007, RSK was commissioned by UK Coal to undertake environmental site investigations and remediation at Sharlston colliery following several previous site investigations and a risk assessment by other consultants.

The site had been used as a colliery since the 1850s and progressively expanded its operations over 140 years to include multiple shafts, buildings, tanks, pits and railways. The site covered an area of approximately 59 ha primarily surrounded by farmland and open spaces and with residential properties bounding it to the west and south-east.

UK Coal was to operate the site over a period of 27 months commencing in late 2007 and extract approximately 400,000 t of coal using surface mining methods along with red shale and fireclay. The site contained contaminated ground as a result of former land uses, including a colliery, a gasworks and coke ovens. The remediation and treatment of the contamination were to be concurrent with the mining operation.

Planning approval for the reclamation scheme was granted to UK Coal in 2007. As part of its planning obligations, UK Coal was required to submit detailed proposals for the removal, containment or treatment of contaminated land within the site in the form of a report within six months of the start of preparatory works.

Condition 53 stated, “...within 6 months of commencement of site preparation operations, as specified in condition 2, a detailed scheme for the removal, containment or treatment of contaminated land together with a timetable for works (the Remediation Method Statement) should be submitted to and approved in writing by the Local Planning Authority. Upon completion of the works set out in the Remediation Method Statement, a closure report, providing verification that the required works to remediate the site have been closed out, should be submitted to and approved in writing by the Local Planning Authority”.

Site investigation

From September to November 2007, RSK carried out a site investigation that included sinking probe holes and excavating trial pits to assess the extents of contamination in four potentially contaminated areas at the site and to identify the potential impacts on local watercourses from the proposed site activities. As a result, several areas of potential concern requiring remediation were identified:

- maximum lead concentrations in soil of 4367 mg/kg
- maximum arsenic concentrations in soil of 294 mg/kg
- maximum polycyclic aromatic hydrocarbon concentrations in soil of 2127 mg/kg

Furthermore, a potential risk was identified to controlled waters from surface runoff from site activities.
Development of the site management plan

After the quantitative risk assessment, risks to human health were identified from three hot spots. Although the risks were not from materials within the former gasworks area, RSK recommended that the site be dug over to ensure that no deleterious materials had been missed during the intrusive site investigations. Potential environmental risks arising from on-site activities to controlled waters were also identified.

RSK developed and recommended mitigation measures to deal with the complete pollutant linkages identified. These comprised

- controlled excavation, stockpiling and placement of material deeper than 1 m below ground level of the contaminated material identified during the human health risk assessment
- selective coal washing of all colliery spoil heaps to extract the coal. The residual material was to be deposited deeper than 1 m below the final restoration level.
- placement of a cover layer of either soil making material improved for re-vegetation or clean overburden
- placement of colliery spoil farther than 250 m from nearby surface watercourses
- groundwater monitoring throughout the surface mining operations
- surface water monitoring throughout the surface mining operations
- developing a surface water management plan for the duration of site operations.

Implementation of the site management plan

Remediation of the areas of potential concern

Under supervision and services provided by RemedX (an RSK company), the remediation of the three hot spots and the former gasworks area was undertaken utilising plant and operators provided by UK Coal.

The process of works was as follows:

- All soil and materials within the four hot spots were excavated and placed at depths greater than 1 m below the final restoration level within the open cast mining areas.
- All the excavated areas were validated.
- Grossly contaminated material (approximately 200 t) was placed in a quarantine area where it was assessed before disposal of at a suitable receiving landfill.
- The remaining infrastructure, potentially contaminative structures and tanks were demolished and removed.
- Water found in the hot spots was treated by passing it through an oil–water separator, two sand filters and a granular-activated carbon filter before discharge (after chemical analysis). Approximately 50 m³ of contaminated water was treated through the system.
Groundwater monitoring
Over the life of the site, RSK undertook ground- and surface water monitoring to determine the environmental impact of the site on the surrounding water environment. RSK did not identify any significantly adverse environmental impacts to controlled waters from on-site activities.

Housing area
A small area of Sharlston colliery (approximately 1.5 ha) was set aside for future residential development. During the intrusive site investigation, elevated concentrations of arsenic above the generic assessment criteria for human health were recorded within the housing development area. To increase the value of the land, RSK recommended
- an overview by a suitably experienced environmental engineer of the site levelling works
- the collection of soil samples over the newly formed surface level on a 25-m grid
- the submission of samples to a UKAS-accredited laboratory for MCERTS accredited testing. The suite of laboratory analyses would comprise the following determinands: arsenic, boron, cadmium, chromium, copper, iron, lead, mercury, nickel, vanadium and zinc, and bio-accessibility testing for arsenic, where appropriate.

Added value
- RSK’s strategy of removal and replacement of materials from the areas of potential concern was just over half the cost of disposing of the materials to landfill.
- RSK’s risk assessment approach and subsequent remedial works rendered the potential housing area suitable for residential use and significantly increased the value of the land to UK Coal.
- RSK’s strategy had to consider the requirements of the client, the local authorities and the local stakeholders (residents). RSK did not receive any complaints from local residents, and, through constant liaison with the local authority and the needs of the client, successfully executed the investigative and remedial works at Sharlston colliery.
- RSK was able provide both consulting and remediation solutions to meet the demands of the client and resolve issues efficiently and effectively.
- RSK’s management plan enabled decision making to be undertaken swiftly and in an uncomplicated manner.
- RSK’s management plan ensured the health and safety of all involved in the site works. RSK is proud of its health and safety record, and no reported incidents resulted from its activities at Sharlston colliery.