

## CASE STUDY

# GEOTECHNICAL AND ENVIRONMENTAL SUPPORT – LOGISTICS NORTH DEVELOPMENT, BOLTON, UK



### Project background

When Harworth Group wanted to restore and redevelop the recently closed Cutacre surface mining site near Bolton, UK, that had included one of Europe's largest colliery tips (6 million m<sup>3</sup> of spoil), it commissioned RSK to provide a broad range of geotechnical and environmental support services. The result is the Logistics North hub, now the northern base for a series of well-known commercial brands.

The 4-km<sup>2</sup> site has a complex mining history. The 19th and 20th centuries saw both deep-level underground and opencast surface mining. There was further surface mining from 2006 to 2011, during which over 12 million m<sup>3</sup> of overburden was relocated and used as backfill, and old colliery spoil was used as backfill in selected areas not proposed for development. The initial plan was to return the restored land to agricultural use. However, its strategic commercial development potential led to planning approval for the development of Logistics North and the surrounding Cutacre Country Park.



### RSK input

To support Harworth Group, the RSK team carried out

- an initial desk-based whole-site review identifying all the possible mining-related issues and geotechnical concerns, and the ground contamination potential
- a detailed assessment of the geotechnical and chemical properties of the historic fill used in both deep backfilled surface mining voids and colliery spoil tips, including material earmarked for reuse on-site, which was examined for its self-heating, combustion and heave potential
- long-term surcharge loading tests to measure the load-induced settlement in both old and recent opencast backfill. Borehole magnetic extensometers, vibrating-wire cells and a network of survey markers monitored the long-term settlement to identify how the backfill would respond to commercial development loadings.

- the installation of monitoring boreholes to measure groundwater quality and the soil-gas regime over a long period to prove that neither had adversely been affected by mining and restoration
- a hydrological assessment necessary in order to divert two streams running through the site.

When mining operations were completed, RSK

- designed, supervised and validated the earthworks to provide the final development platform
- undertook area-specific ground investigation and assessment work for individual plots, in some cases involving the design, supervision and validation of ground treatment and remedial work.



### Detailed aspects

**Colliery tip assessment** – Because large volumes of the old colliery tip material on-site had to be used as backfill, RSK assessed its reuse characteristics. It was used as deep fill within the country park area with a covering of reworked natural soil.

**Surcharge treatment of recent opencast backfill** – Proposed development areas that were recently surface mined were consolidated by surcharging as part of surface mining operations. So that all the induced settlement could be recorded, RSK carried out extensive monitoring before surcharging, during surcharging and for up to three years after. The methods included vibrating-wire plate cells, magnetic extensometers, extendable base plates, permanent ground markers and hydraulic profile gauges. The data showed that the surcharge treatment was successful and building development could start.

**Treatment of old opencast backfill** – Old (1950s) opencast backfill areas were treated using a range of methods, including high-energy impact compaction, surcharge treatment and localised excavation and replacement with engineered fill. The treatment decisions were plot-specific according to the ground

conditions identified during routine site investigation work and geotechnical modelling used to predict the settlement under the proposed structural loadings.

**Mine entries and shallow coal seams** – RSK located several old mineshafts that were then treated and capped. Shallow coal seams with historic underground workings underlie parts of the development area outside the opencast boundaries. The conditions here were examined and often required drilling and grouting consolidation treatment. RSK carried out the investigation work and put together the contract documents for ground treatment work, which it then supervised and validated. This work required close consultation with and permits from the Coal Authority.

**Earthworks** – When mining operations ended, all the main excavations were infilled but several earthworks phases were necessary to deliver the final site-wide landform. RSK helped to design the earthworks, produced engineering specifications, put the contract documents together and provided independent supervision and validation.

**Groundwater quality and assessment of the ground-gas regime** – RSK set up monitoring wells to assess the water quality and the ground gas regime during and after surface mining completion. Information gathered over several years confirmed that good water quality was maintained during both mining and development work; this was used as a baseline to support the plot-specific assessment work required by the regulators.

**Plot-specific assessment work** – Several development plots covered areas of up to 10 ha and would have buildings hundreds of metres in length. Consequently, ground condition assessments were necessary on a plot-by-plot basis, depending on the proposed development type, use and layout. RSK has carried out assessment work on individual plots and recommended bespoke ground treatment packages for the construction of specific platforms tailored to individual development proposals.



### Added value

Because of RSK's early engagement, restoration of this former surface mine site was completed before the individual land packages were either sold off and later developed for commercial and logistics use or developed by Harworth Group to form part of their development portfolio.

Logistics North is the largest live development site in north-west England, with already completed units ranging from 24,000 sq ft to 650,000 sq ft, currently employing more than 1500 people. Once complete, Logistics North is expected to deliver around 5000 jobs and 4 million sq ft of development for manufacturing and distribution commercial end-use. Logistics North plays a significant role in the distribution of goods for Aldi, Amazon and Whistl, with Lidl soon to follow. The site also supports a manufacturing base for MBDA, Komatsu, Northern Building Plastics, Vaclensa and Hardscape Products, and retail provision by Costa Coffee, Aldi and Greene King.



For further information, visit us at [www.rsk.co.uk](http://www.rsk.co.uk) or contact:

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