

# Brent Cross Cricklewood regeneration ground investigation, UK



## Project background

The Brent Cross Cricklewood regeneration project is a high-profile £4 billion scheme for a new town centre in North London with a transformed Brent Cross Shopping Centre at its heart.

A ground investigation was required to provide information on the ground conditions for the detailed design of the first phase of the work, which is mainly infrastructure work, including new road layouts, a bus station, two new bridges over the A406 North Circular and rerouting of the River Brent.

The site comprises the land surrounding the roads and junctions of the M1, A41, A406 and A5 in the Brent Cross area. The site conditions for each location therefore varied significantly from open car parks and motorway slip roads, to children's play parks, industrial estates and residential garages.

## Services provided

A combined Structural Soils (an RSK company) and RSK team carried out a detailed ground investigation on this very large urban site (about 6 km<sup>2</sup>) with significant logistical challenges in two phases: March/May, and August/September 2014. The total contract value was about £1.7 million. All the work was managed by Structural Soils and RSK staff from a site compound in an overflow car park of Brent Cross Shopping Centre.

Work on permitting started months before the site work and included an acoustic survey by the RSK acoustics team of the area for the London Borough of Barnet, an Environment Agency licence for working adjacent to the River Brent, and significant liaison with large (Network Rail, Transport for London, the London Borough of Barnet, the Highways Agency) and small landowners.

The investigation involved more than 300 exploratory holes using various techniques. The 108 boreholes were drilled using cable percussion methods into the London Clay, and most were then extended further into the London Basin sequence using rotary wireline techniques. This enabled the acquisition of high-quality cores and Class 1 samples for logging and testing. The cores were logged and photographed in detail by a team of up to 10 people based in a dedicated core store at the RSK offices in Hemel Hempstead.

Static cone penetrometer testing and self-boring pressuremeter testing were also carried out during the works to determine the in situ parameters for the ground conditions.

To enable the site designer to work around the existing structures, Structural Soils also created large-scale, shored observation trenches for examining the foundation structures of overpasses, bridges and tunnels in very challenging environments.

Despite the disruptive nature of the work and the ground investigation being the first phase in a high-profile project, no negative feedback was received from landowners or members of the public. It was this track record and RSK's good relationships with the landowners that led, in large part, to RSK winning the second phase of work without an open tender process.

The fieldwork element of the investigation was followed by an extensive phase of laboratory testing and factual reporting.

The work was closely monitored by the client's consulting engineer, URS. The company was very pleased with the teamwork ethic and the excellent communication to ensure that all the necessary information was acquired during the ground investigation work.

## Additional services

Various aspects of the project required services beyond the call of a standard UK ground investigation, including

- obtaining permits from many landowners, from individual house owners to large landowners such as Network Rail and Transport for London
- the logistical challenges related to carrying out large amounts of investigation work in a busy urban environment
- an in-depth study of complex service drawings and full ground-penetrating radar scanning of all locations
- the planning, organising and implementing of traffic management and night shifts on the M1, A5 and A406 roads in the area.



Brent Cross overflow car parks with four rotary wireline drilling rigs and the pressuremeter testing team

## Challenges faced

The large area and urban nature of the site provided several significant challenges to overcome to make the project successful.

Moving the large rotary rigs and servicing them meant that the site team required the use of a large tractor-trailer with a dedicated escort vehicle and often utilised a lorry-mounted rig. The variation in site conditions also meant that each rig move presented different risks; consequently, every move was preceded by a documented rig move briefing.

The urban nature of the site also created significant risks relating to buried services. To mitigate these risks, a team from RSK SafeGround was on-site throughout the work clearing every location for services and unexploded ordnance. There were numerous locations where boreholes had to be moved to avoid large services. There were even a few unexploded ordnance scares, but these turned out to be grenade-shaped glass bottles.

## In summary

- More than 300 exploratory holes around one of the busiest road junctions in North London
- Structural Soils acted as principal contractor
- Well-organised permits and logistics despite numerous landowners and tight programme restrictions
- A wide range of drilling techniques and in situ testing for obtaining Class 1 samples and ground parameters down to 60 m
- A detailed logging, testing and sampling regime for creating a comprehensive study of the London Basin sequence of the area
- The management of a large team of Structural Soils and RSK staff and multiple subcontractors



A rotary rig in use at the Brent Cross investigation

## Investigation techniques

- About 750 m of cable percussive drilling
- More than 1700 m of rotary wireline coring of the London Basin sequence
- Trial pitting and window sampling for geoenvironmental sampling
- Large, shored observation trenches for studying existing highway structures
- 250 m of static cone penetrometer testing and self-boring pressuremeter testing
- Continuous scanning for unexploded ordnance during site work
- Two unexploded ordnance triangulation studies
- Comprehensive monitoring of vibrating wire piezometers and gas and groundwater standpipes
- More than £150,000 worth of geotechnical and chemical testing of samples



Boreholes were drilled into the London Clay using cable percussion rigs

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