

CASE STUDY

BIOREMEDIATION OF THE  
FORMER REDLAND TILE WORKS,  
RUDD LANE, ROMSEY



## Project description

RSK was commissioned by Banner Homes to investigate and remediate the former Redland Tile Works in Rudd Lane, Romsey, to pave the way for a residential housing development. Tile manufacturing, which necessitated the use of sand pits, began in the 1940s and continued until the 1980s when the site became a car body repair garage and tool designer/manufacturer.

The surrounding area primarily consists of residential houses and farmland, although there are also extensive disused quarries that have been subject to landfilling to the east and south.

Seasonal ponds are present on the western portion of the site and there are numerous ponds/drains within the immediate vicinity.

A former canal track is approximately 700 m to the south-west, while the River Test is 500 m further in the same direction. Timsbury Lake is located 1 km to the south.

## Ground conditions

The site sits atop a geological formation known as the Lambeth Group, which is a complex of vertically and laterally varying gravels, sands, silts and clays approximately 20m in thickness. The Lambeth Group is situated directly above the Upper Chalk. The centrally located sand pits that were utilised during tile manufacturing were infilled, resulting in made ground consisting mainly of sandy fill and tile fragments.

Located within a zone 1/zone 2 source protection area, the site employed an abstraction borehole to remove water from the Upper Chalk area for potable supply. An unused groundwater abstraction borehole was also present.

Monitoring suggested that groundwater was moving in a south-westerly direction towards the River Test. Groundwater within the made ground and the Lambeth Group's granular surface was not considered to be in hydraulic continuity with the underlying Upper Chalk.



## Contamination analysis

Numerous potential sources of contamination were identified, including:

- backfill to former sand pit excavations
- several above-ground fuel tanks (some presumably the result of fly-tipping)
- numerous oil drums and containers
- metals drums containing swarf
- general fly-tipped material including containers, drums, demolition rubbish and gas cylinders.

Intrusive investigations targeting the general location of each potential contamination source identified three principal hot spots:

- Hot spot 1: total petroleum hydrocarbon (TPH) contamination within near-surface made ground. Approximate volume of soil requiring remediation: 150 m<sup>3</sup>.
- Hot spot 2: TPH contamination within made ground and the Lambeth Group, extending to approximately 2.0 m depth. Possibly associated with migration of contamination from former garage's French-drain system. Approximate volume of soil requiring remediation: 2600 m<sup>3</sup>.



- Hot spot 3: light non-aqueous phase liquids (LNAPL) and TPH contamination within proximity of soakaway pit. Approximately volume of soil requiring remediation: 650 m<sup>3</sup> (plus LNAPL recovery).

### Conceptual site model

Informed by data gleaned from its intrusive site investigations, RSK devised a refined conceptual site model that identified the following potential pollutant linkages:

- Future residents could be affected by identified hot spots via direct/indirect contact, ingestion, inhalation, dermal contact and ingestion (via root uptake in private gardens).
- 'Shallow' controlled waters (i.e. Lambeth Group minor aquifer, on-site ponds and River Test) could be affected via lateral/vertical migration of contamination.
- Future occupants could be affected by ground gas via accumulation and ingress into proposed buildings.
- Drinking water supply pipes could be affected by identified hot spots via direct contact and permeation.

## Remediation

### Site clearance and borehole decommissioning

Under RSK's supervision, all remaining site infrastructure was demolished and potentially polluting structures, storage tanks, drums and containers and drainage runs removed. Any potentially contaminated samples removed as a part of the site inspection were sent to RSK's in-house MCERTS accredited laboratory for speciated TPH-CWG and speciated PAH analysis.

### Removal of contamination hot spots

RSK carried out all remediation duties using our own plant, materials and personnel. We acted as remediation consultant and supervised excavation of the three hot spots.

The process of works was completed as follows:

- All soils from the three hot-spot areas exhibiting visual or olfactory evidence of gross contamination were excavated.
- All excavation areas were validated.
- Contaminated soils were placed in stockpiles with similar levels of contamination and tested. Grossly contaminated materials were placed in treatment beds comprising six windrows, each holding 2600 m<sup>3</sup> of soil. A total 800 m<sup>3</sup> of remaining excavated material was deemed suitable for immediate reuse on site. RSK added fertiliser to the windrows to encourage bacterial breakdown and aerated the soil on a monthly basis with a windrow-turning machine.
- Remediated soils were reused on site.
- Water found in the hot-spot areas was treated by passing it through an oil-water separator, two sand filters and a granular activated carbon filter prior to discharge (after chemical tests). The system recovered approximately 20 litres of LNAPL (weathered diesel and mineral oil) from the site.

## Post-remediation validation

### Soils

RSK continued to treat the excavated soil until the site-specific remedial targets were achieved. We attended the site to remove samples for independent laboratory testing to compare with the site-specific remedial targets. The concentrations were recorded as acceptable for reuse on the site.



### Groundwater

RSK installed several wells to monitor groundwater conditions over a nine-month period subsequent to the active soil remediation. To date, there has been no evidence of hydrocarbon contamination 'rebound'.

## Added value

- RSK's strategy of reusing material on site was more than half the price of resorting to landfill disposal for the contaminated material.
- Our strategy had to take into account the both the requirements of the client and local stakeholders (very sensitive 'NIMBY' neighbours). It included moving the treatment area to a distant part of the site, undertaking noise and dust surveys, and using silencers on the majority of remediation equipment. As a testament to the strategy's success, the programme was completed without receiving a single complaint.
- RSK's ability to offer the client a turnkey solution gave Banner Homes confidence that the remediation contractor would adhere to the consultant's specifications.
- A single point of contact was used ensuring client demands were responded to efficiently and accurately.
- RSK's project management framework enabled decision making to be undertaken in a swift and uncomplicated manner.

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For further information, please contact:

RSK: The Old School · Stillhouse Lane · Bedminster · Bristol · BS3 4EB · UK  
Tel: +44 (0)117 947 1007 · Contact: Simon Jackman · Email: [sjackman@rsk.co.uk](mailto:sjackman@rsk.co.uk)

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