

Services to the Insurance Industry

kerosene Contamination Under a Residential property. Somerset

A very strong smell of hydrocarbon vapours was noted inside a bungalow in Somerset just before Christmas 2008. Ecologia were called and immediately installed an emergency sub-floor vapour extraction system, which allowed the homeowners to return to the property in time for Christmas and to remain in the property whilst site investigation and remedial design work were undertaken.

The source of the oil vapours was found to be a leak from an oil tank on an adjacent unoccupied property. The oil had migrated under the affected bungalow along the course of a old backfilled rhine (ditch) which ran under the rear of the bungalow.

Following an intrusive site investigation, in-situ remediation was assessed not to be viable, as fluctuating water levels had resulted in a large quantity of free phase oil becoming entrained in silty material within the backfilled rhine. Remediation works were further complicated by an unusual foundation construction; the rear of the property was constructed over a weak concrete 'bridge' which spanned the backfilled rhine. Very soft underlying ground did not allow for reinstatement using piled or strip foundations. A remedial approach was therefore devised in close consultation with the appointed structural engineers, Latter Ramsay & Ptnrs.

The rear elevation of the bungalow and the concrete raft spanning the backfilled rhine were removed to provide access to remove the heavily contaminated water, silt, clay, boulders and building rubble in the backfilled rhine. Large boulders and bricks were carefully sorted and segregated within the excavation and disposed of as inert waste in roll/on off skips. An oil/water separator system was set-up in the front garden; oil and oily water from the excavation were removed by an automated vacuum pumping system (Ecovac) and conventional electric submersible pumps. The treated water was pumped through an activated carbon filter and discharged to surface water under a consent from the Environment Agency. The system was used throughout the work to remove free product and de-water the excavations.

A large quantity of heavily contaminated, wet, silty material remained and this was stabilised within the excavation prior to removal. The excavation works progressed to the stage whereby the oily contents of the rhine were completely removed and the clay walls were exposed. Soil validation testing revealed that some minor contamination remained present under inaccessible parts of the bungalow. Concentrations were generally well below Ecologia's screening values for acceptable contamination under a property; however, a precautionary approach was taken. Seven 100 mm diameter vent pipes were installed through the original concrete slab under bungalow and vented through the external wall cavity.

The design of the reinstated ground bearing slab had to be carefully considered due to the very soft ground and the need to avoid differential settlement with the existing building. A scheme was devised whereby the rhine was partly backfilled with a specialist lightweight aggregate which was in turn overlaid with a conventional granular fill. A reinforced concrete raft was formed over the backfilled rhine and the void space subsequently injected with a specialist geotechnical resin (Uretek) via 30 pre-drilled pressure injection points.

On final reinstatement of the building, indoor hydrocarbon vapour monitoring was undertaken using thermal desorption tubes and CG_MS analysis. This demonstrated that all human health risks associated with the oil leak had been removed and the remediation scheme was successful.



Sorting / segregation of material within the excavation. Rear of bungalow removed.



Injection of Uretek low density resin into void space under ground bearing slab



Rear of bungalow re-built on completion