

23rd September 2011

E-E1453/LJP



Matthew Kennett
Arun Civic Centre
Maltravers Road
Littlehampton
West Sussex
BN17 5LF

Dear Matthew

Re: MANOR ROAD GARAGE – VALIDATION REPORT

This letter contains the results of the validation works undertaken at the above site.

General Background

Opus (of which G&E has now been fully incorporated into) has undertaken two phases of ground investigation at the above site. The site investigations identified a locally significant petroleum hydrocarbon contamination 'hotspot' beneath the south of the site around previously located Underground Fuel Storage Tanks (UGSTs).

The two phases of site investigations by Opus delineated the petroleum hydrocarbon contamination 'hotspot' within the superficial deposits to be approximately 10m long (north-south) and 12m wide (west-east) beneath the south of the site. Elevated TPHCWG fraction concentrations had additionally been detected within groundwater that was located within the 'hotspot'.

The 'hotspot' occupied the area between the former Opus window sample holes WS05 (north-west), WS17 (north-east), extending down to the southern site boundary and included further window sample holes WS01, WS02 and WS17.

Details of the desk study and the two Opus ground investigations pertaining to the site are presented within the following Opus reports:

- G&E Desk Study Report (referenced GE1353/LJP) dated 16th March 2009;
- G&E Site Investigation Report (referenced GE1390/LJP) dated January 2010;
- Opus Further Site Investigation and Groundwater Quantitative Risk Assessment (referenced EE1390) dated 12th July 2010.

The Groundwater Quantitative Risk Assessment as referenced above included the derivation of soil and groundwater remedial target values. The Risk Assessment was forwarded to the Environment Agency for their review and comments.



The findings and results of the two Opus ground investigations and the detailed Controlled Waters Quantitative Risk Assessment highlighted the necessity for remedial work to remove the likely sources of contamination in order to reduce to an acceptable level any risks to the potential receptors of contamination, including, in particular, the theoretical groundwater compliance point located 50m to the south of the source area.

GB Forecourts Ltd was contracted by our Client to undertake the groundwater remediation works. This included the removal of the 3 no. UGSTs, pump island and associated pipework, placement of the ORC AdvancedTM and the installation of two groundwater monitoring wells. Site checks of these works were undertaken by Lydia Parry of Opus, who in addition checked groundwater levels and collected groundwater samples as part of the groundwater remediation strategy. Groundwater analysis data was periodically sent to Simon Deacon of the Environment Agency for his review and comment.

WAC Analysis and Waste Soil Removal

A site visit was undertaken on the 13th January 2011. During this visit two soil samples were collected from trial pits that were excavated beneath the former locations of the UGSTs.

The identification of the sample, type of material and waste classification with comments are summarised as follows.

Soil sample ID	Type of Waste	Comments
Tanks 2.6m (Tanks 1 and 2)	Stable non-reactive	BTEX (Sum 120mg/kg) exceeds inert waste landfill criteria of 6.0mg/kg. Phenols (1.3mg/kg) slightly exceeds inert waste landfill criteria of 1.0mg/kg.
Tanks 2.4-2.4m (Tank 3)	Inert	

Based on these results the soils excavated from the remediation area were disposed of to a licensed non-hazardous landfill. Copies of the waste transfer notes are enclosed for your reference.

A further soil sample was taken from the former waste oil storage area located to the rear of the garage where the surrounding soil had been impacted by oil contamination as reported in the Opus site investigation report dated January 2010 ref GE1390/LJP Rev A.

The results of the WAC analysis reported that this material fell into the hazardous waste category. A copy of the waste transfer note is enclosed for the waste oil impacted material removed from site.

The haulage companies listed below were used for the disposal of waste spoil from site and are all registered waste carriers with the Environment Agency. Their details are as follows:

- Penfold Verrall Ltd (carrier registration certificate no. CB/PN5576SW) for non-hazardous waste
- South Coast Skips Ltd (reg no: KEN/472025) for hazardous waste

Excavation works

The underground tanks identified as Tanks 1 – 3, the pump island and associated pipework were excavated and removed from site. Photographs of the removed tanks are enclosed for your reference. The TPH contamination was visually observed commencing at a depth of 2.6m.

The building's listed status inhibited the building becoming damaged during redevelopment. Therefore a no-dig zone was marked out that included those soils within 2.5m of the garage frontage and 3.0m of the southern site boundary. Contaminated soils were excavated to a maximum depth of 3m bgl within the area shown on drawing FA EG-1390.00/108/P2.

To assist with bioremediation of the TPH impacted 'hotspot', an Oxygen Releasing Compound ORC Advanced™ was selected to treat the soils in-situ. The ORC Advanced™ was added to the base of the excavation at 3.0m depth.

Two monitoring wells were installed by the remediation contractor. The wells were installed hydraulically downgradient of the TPH 'hotspot' for the purpose of assessing the natural attenuation within the groundwater on site over a period of five months.

Groundwater Monitoring

Groundwater samples were placed in amber glass jars and vials as required, filled to the brim, fitted with hydrocarbon vapour proof lids and sealed tightly to provide an accurate representation of all hydrocarbon fractions present within the samples.

The validation samples were clearly labelled with the site name, sample location and date and stored in cool boxes with chilled ice packs to preserve the integrity of the samples.

The groundwater validation samples were analysed for speciated TPH analysis using the CWG Methodology, as well as BTEX and MTBE analysis, at the MCERTS and UKAS accredited laboratory Scientific Analysis Laboratories.

The results of the groundwater monitoring event reported that the TPH concentrations had significantly reduced with the majority of TPH fractions reported below the relevant RTV. Furthermore the conditions are suitable for aerobic degradation with relatively high levels of dissolved oxygen reported for both monitoring wells.

This information was sent to the Environment Agency who confirmed in their letter ref. HA/2010/110758/03-L01, dated 2nd September 2011 that no further remediation or monitoring was required for controlled waters.

Hydrocarbon Proof Membrane

Site checks were periodically undertaken for the purpose of observing the installation of the hydrocarbon proof membrane.

During initial visits the ground floor had been primed for the membrane to be laid down on. On consequent visits the membrane had been installed.

The Visqueen GX Geomembrane System gas proof membrane was chosen to be used on site. The construction detail of the gas protection system used is shown in the drawing enclosed in addition to selected photographs of the membrane being placed on site.

Topsoil

A copy of the topsoil analysis results for the imported topsoil was supplied to Opus. On reviewing the topsoil analysis certificate we can confirm that the results indicate that the topsoil is suitable for use for a residential land use and therefore is suitable for use at the site.

We therefore request your confirmation that the planning conditions relating to contaminated land for the site have been satisfied and can now be discharged. Please do not hesitate to contact the undersigned if you have any queries regarding the above.

Yours sincerely,

On behalf of **Opus International Consultants (UK) Ltd**



Lydia Parry

Enc. Copies of Tim O'Hare Associates Laboratory Topsoil Testing Certificate
Copies of Waste Transfer Notes
Photographs of the hydrocarbon proof membrane

C.c Mr Anthony Harrison – Globe Estates (Southern) Ltd