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GEO-ENVIRONMENTAL INVESTIGATION REPORT

**Tolgate,
A2, Gravesend, Kent**

Report No: 12954 CL 002

September 2012

Client: BP Oil UK Ltd

Report Prepared By:

Report Reviewed By:

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Geo-environmental Investigation Report – BP Tolgate, A2, Gravesend, Kent

Environmental Investigation – Summary			
Sitework Completed			
Underground service drawing completed:	14 th August 2012	No of boreholes constructed/maximum depth drilled	6 to max. 6.4m 2 to max. 18m
Date investigation completed:	15-20 th August 2012	Number of monitoring wells installed /maximum depth	None installed
Date of groundwater monitoring visit:	Groundwater not encountered	Monitoring for hazardous ground gas completed?	Not within project scope

Encountered Hydrogeology/Geology				
Groundwater strike	None	Standing Groundwater		None Comment: Groundwater expected to be present at 40-45m bgl
Soil Stratigraphy	Geology	From	To	Description
	Top Soil / Made Ground	0.0m	0.3m	Topsoil/Tarmac/Loose to medium dense sandy or clayey GRAVEL
	Clay/Sand	0.3m	1.6m	Where present: FIRM brown CLAY or FIRM brown grey sandy CLAY to MEDIUM DENSE brown grey clayey SAND. Recorded in one western portion of site only (present in TP3, but not BH4, 5 or 6.)
	Upper Chalk	0.3m	3.0m	Structured white rubbly to blocky CHALK; weak to moderately weak, moderately weathered, with flint bands (Grade III-IV). Slightly sandy in places.
		3.0m	5.0m	Structureless white CHALK; comprised of chalk lumps in a comminuted matrix, very weak, completely weathered with occasional flints (Grade V). Slightly sandy in places.
		3.0m	>18m	White structured CHALK - no detailed description, sample too disturbed by drilling process. Assessment based upon SPT data (Section 4.3).

Results of Investigation - Environmental				
Visual/olfactory evidence of hydrocarbons?		None noted in any of the investigation locations		
Maximum TPH concentration detected	Soil	60.8mg/kg	Groundwater	Not encountered
Environmental Assessment Conclusions:	Our review of information, site inspection and the construction of the conceptual site model has not highlighted potentially viable pollutant linkages. We do not consider the low levels of hydrocarbon compounds identified pose an unacceptable risk to either future site users and/or environmental receptors associated with the site.			

Recommendations
Based upon the findings of our investigation and subsequent assessment we do not consider further investigation, assessment and or remedial works necessary at the site. If any areas of suspected contamination are identified during the proposed development works, we recommend that we are notified and attend site to further investigate and assess these areas.
Please refer to Section Seven for recommendations in full. Your attention is drawn to the Notice to Interested Parties included as Attachment One.

Geotechnical Investigation – Summary			
Temporary works - slope stability	Foundation excavations likely to be formed within:	Chalk	
	Likely to remain stable for short periods without support or being battered back	Yes	
	Note: We recommend that a detailed inspection of the side slopes be carried out in order to assess fully any support measures required.		
Temporary works - Dewatering	Anticipated depth to groundwater		>18m
	Anticipated permeability (based upon soakaway tests)	Shallow head Deposits (western corner of site)	Low
		Upper Chalk	Medium/High
	Dewatering likely to be required?		No
	Note: Seasonal fluctuations in groundwater level due to extended periods of heavy rain may lead to the presence of groundwater being present at shallow depths under the site.		
Protection of Buried Concrete	Site Classification (BRE Digest 1:2500) – based upon sulphate concentrations and pH values.	Class One	
	Standard Portland Cement likely to be suitable for use?	Yes	
Disposal of Excavated Spoil	Soil/leachate samples analysed for Waste Acceptance Criteria Suite?	Yes	
	Excavated soils from the site are likely to be classified as?	Inert	
	Note: We recommend that we classify all potentially impacted soils prior to disposal. All waste soils and fill must be disposed of at an appropriately licensed disposal site.		
Foundation Design	BP Standard Foundation design likely to be appropriate?	Yes	
	Note: We recommend that we inspect the base of all excavations to ensure that the soil matrix is consistent and will provide an appropriate minimum allowable bearing capacity for the proposed development structures.		
Additional Comments/Recommendations			
Additional comments regarding re-development works:	Water supply pipework be constructed from a hydrocarbon impervious material (e.g. ductile steel or plastic/aluminium composite) and installed within clean fill material. We recommend that appropriate engineering measures are implemented to ensure risk of future contamination impacting environmental receptors (most notably controlled waters) is mitigated.		
Please refer to Section Eight for recommendations in full. Your attention is drawn to the Notice to Interested Parties included as Attachment One.			

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Attachment One:	Notice to Interested Parties
Attachment Two:	Borehole Logs and Soil Infiltration Rate Calculations
Attachment Three:	Map Data and Environmental Data Report
Attachment Four:	Chemical Analysis Certificates
Attachment Five:	CBR test report

1 Introduction

1.1 The Purpose of This Assessment

We were commissioned by Bovis Lend Lease (Bovis) on behalf of BP Oil UK Ltd (BP) to undertake a geo-environmental investigation at the plot of land proposed for redevelopment as BP Tolgate Service Station. The main objectives of our investigations were as follows:

- To complete an environmental survey to determine whether the soil and/or groundwater underlying the site has been impacted with pollutants associated with past site uses and whether any contaminants present might pose an unacceptable (long-term) risk to future site users and/or any environmental receptors associated with the site;
- To provide the structural engineering consultant with information to assist in determining foundation details for the proposed structures;
- To provide the construction contractor with information to assist them in designing any excavation support systems;
- To complete waste classification analysis of representative soil samples from the site.

The site is located on the eastbound A2, south of Gravesend and currently comprises the derelict Tolgate Motel. We understand that BP's proposal for site development includes the construction of a sales building, a canopy-covered petrol and diesel forecourt for light vehicles, a second canopy-covered diesel forecourt for HGVs, a below ground tank farm comprising three 80,000litre tanks and associated petroleum infrastructure.

We were provided with preliminary site layout plans for the proposed development, drawn up by BP. The new filling station is to be constructed across the western half of the site and we therefore focussed our intrusive investigation in this area. We have undertaken limited intrusive works across the eastern half of the site for which no future use and/or development plans have yet been proposed/designed.

All the activities comprising this assessment were carried out in accordance with the procedures set out in our Quality Manual. Your attention is drawn to the Notice to Interested Parties included as Attachment One.

1.2 The Scope of This Assessment

Our assessment of the site was carried out in the following parts:

- A Preliminary Risk Assessment comprising a desk-based study to review site-specific information that is readily available in the public domain and assess potential pollutants, pathways and receptors associated with the site;
- An underground utilities survey of the site to locate existing underground services and ensure a safe working environment during drilling works;
- A walkover survey to identify visual signs of pollution or potentially polluting activities;
- An intrusive soil investigation comprising six shallow boreholes drilled with our Geoprobe rig and two deep boreholes drilled with our Comacchio Geo-205 rotary rig;
- In-situ geotechnical testing including Mackintosh Probe tests, Standard Penetration Tests (SPT), California Bearing Ratio (CBR) tests, and soil infiltration rate (soakaway) tests;
- Chemical analysis of representative soil samples for environmental, geotechnical and waste classification purposes;
- Development of a Conceptual Site Model to assess potential pollutants, pathways and receptors associated with the site and completion of qualitative risk assessment;
- Provision of recommendations relating to the geotechnical conditions and presence of potential pollutants identified during our investigation.

1.3 Previous Work

We are not aware of any previous reports or documents detailing the condition of the site.

2 Site Details

2.1 Site Description, Location and Setting

The site occupies approximately 1.19ha and comprises a former Motel, consisting of a complex of three buildings, and one temporary building (all of which are derelict), with associated car parking and access routes around the site.

The largest building, which formerly was used as the accommodation for the motel, forms an L-shape along the eastern and northern site boundaries. A second building was used for the motel restaurant, which is located on the north-western corner of the site. The third permanent building is located in the centre of the site and is surrounded by the access road for the main building.

Car parking is on the western side of the site, closest to the site's entranceway. The temporary structure is located to the north of a site access road that runs along the southern boundary. A site plan showing current site layout is included as Figure Two, in Section 4.

The site is located at National Grid Reference 564248 171223 at approximately 44m above Ordnance Datum. The site is situated on the A2, on the southern outskirts of Gravesend. The surrounding land use is predominantly agricultural with some residential and commercial development to the north east. Maps showing the site's location are included in Attachment Three.

Direction	Distance	Surrounding Land Uses
North	70m/70m	BP Tolgate Service Station/Residential housing
East	0m/120m	Agricultural land with residential housing beyond
South	5m	Access road and A2 dual carriageway, then agricultural land
West	70m	Access road from the A2 then agricultural land

Table One: Surrounding Land-Use

2.2 Future Development

We understand that BP proposes to redevelop the western half of the site for use as a petrol and diesel filling station with a large sales building, car parking, canopy-covered light vehicle and HGV forecourts, below ground tank farm and associated fuel and drainage infrastructure. The outline of the key infrastructure for the new filling station is shown, in relation to the existing site layout and our investigation points, on Figure Two on page 14.

We are not aware of any planning applications that have yet been submitted and as such the final site detail and layout may be subject to alteration. We have not seen any proposed plans for the northern half of the site.

2.3 Licenses and Permissions

We understand that this report is to be submitted in support of a planning application for the site's redevelopment, as detailed above. Whilst our assessment has not been compiled to directly satisfy any specific planning conditions the information contained in this report may assist in satisfying any such requirements. We note however that further works may be required in order to discharge all conditions associated with regard to the potential for contaminated land.

3 Environmental Desk Study

This section of our report summarises the site's environmental setting based on a review of readily available information for the site. We have used this information to identify potential contaminant sources and sensitive receptors, which we have subsequently used in conjunction with the results of our intrusive investigation to generate a Conceptual Site Model in Section (see Section 5).

3.1 Geology

We have assessed the geology of the site's locality from available BGS maps and memoirs. These show the geology to comprise (in succession, from the surface downward):

Unit I: Seaford Chalk Formation and Newhaven Chalk Formation Undifferentiated (Upper Chalk) – White cream chalk with flints and some sandy horizons, weathered near surface grading to competent chalk with depth. The estimated thickness of this unit under the site is over 100m.

Mapping also indicates a narrow band of Head Deposits, likely to be made up from a mixture of clay, silt, sand and/or gravel runs past the site's western boundary. The accuracy of mapping is not always accurate so regions of shallow head deposits may be encountered at the site.

The BGS maps also indicate that Made Ground and/or 'Worked Ground' may be present on the site. The composition of the Made Ground will depend upon where it was imported from and any Worked Ground is likely to be largely composed of material from the nearby Head Deposits and/or Upper Chalk.

3.2 Hydrogeology

3.2.1 Groundwater Sensitivity

The Environment Agency Groundwater Vulnerability Map shows the site location as overlying a Principal Aquifer. These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. We interpret this classification to refer to the underlying Upper Chalk.

From BGS logs of existing nearby boreholes, we determine that groundwater levels in the underlying Upper Chalk is approximately 45m below the sites ground surface.

The Environment Agency Groundwater Vulnerability Map also shows the site location as overlying a Secondary Aquifer (Undifferentiated) where Head Deposits are present. These are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

The Made Ground or Worked Ground present on the site is not assigned an aquifer classification by the Environment Agency. However these may be permeable deposits dependent upon their composition.

3.2.2 Public Water Abstractions and Source Protection Zones

The Environment Agency defines Source Protection Zones around groundwater abstractions used for public water supply. The Zones are defined by the estimated travel time of potential contaminants to the abstractions. This travel time can be influenced by factors such as the underlying geology or the volume of groundwater being abstracted. Source Protection Zones are therefore areas that may be considered to be particularly sensitive to groundwater impact.

The site is located within Zone II of a defined Source Protection Zone (SPZ). This is defined as the area within which contaminants in groundwater could impact the abstraction within 400 days, or 25% of the groundwater source zone whichever is greater. Based upon the SPZ classification maps we interpret the SPZ that the site resides within is associated with an abstraction located 1,165m to the west of the site. Details of this abstraction are shown in Table Two, overleaf.

Due to the site's location within a designated SPZ this abstraction, by definition, is considered at-risk of impact from any mobile contaminants present in groundwater beneath the site. Due to the depth of groundwater underlying the site location, however, we would consider the direct risk of impact from the proposed site to be limited.

Public Water Supply abstractions are located to the west and south of the site. The SPZ classification maps show that groundwater flow in the area is likely to the north, but this may be altered towards the west or south depending upon the area of influence of nearby abstractions.

3.2.3 Licensed Groundwater Abstractions

The following groundwater abstractions are currently licensed by the Environment Agency and located within 2km of the site:

Reference/name	Location	Distance and Direction from Site	Annual Volume (cubic metres)	End Use
01/164 (Expired)	Tolgate Junction	265m W	38,220	Dust Suppression
9/40/01/0511/G	Hazells Pumping Station, Northfleet	1,165m W	17,700,000	Potable Water Supply
9/40/01/0511/G	Northfleet Pumping Station	1,930m S	Unknown	Transfer Between Sources
9/40/01/0511/G	Northfleet Pumping Station	1,930m S	17,700,000	Potable Water Supply
9/40/01/0511/G	Northfleet Pumping Station	1,930m S	17,700,000	Potable Water Supply

Table Two: Licensed Groundwater Abstractions

Due to the location of the Tolgate Junction abstraction and the fact that the license has expired, we consider that this abstraction was purely for use during changes made to the A2 between 2007 and 2008. As such, we do not consider this abstraction to be active or at any potential risk.

The abstraction at Hazells Pumping Station is associated with the SPZ II within which the site lies and therefore, by definition, we consider this abstraction could potentially be at limited risk from any future contaminants originating at the site.

As the remaining abstractions are located to the south of the site and groundwater under the site is likely to be flowing to the west, towards the Hazells Pumping Station we do not consider these abstractions to be at any risk from the proposed site.

3.3 Hydrology

The nearest surface water to the site is a pair of balancing ponds approximately 80m to the west of the site. Other surface water features in the local area include a balancing pond to the south of the A2 and the Channel Tunnel rail-line, approximately 220m from the site boundary. There are no further surface water features within 2km of the site.

As balancing ponds are created for the purposes of surface run-off control, and because of the depth to groundwater under the site location, it is unlikely that any viable pathways exist from the site and surface water in the balancing ponds. We therefore do not consider these ponds to be at risk from any contaminants that may be present in shallow soils at the site.

We have not identified any surface water abstractions are licensed by the Environment Agency and located within 2km of the site.

3.4 Regulatory Comment

We have obtained the following information relating to the site:

3.4.1 Landfill Sites

The Environment Agency records show that there are no current or past landfill sites within 250m of the site. We therefore consider the risk of impact from hazardous gas to be low.

The site is therefore unlikely to be at-risk of impact from elevated concentrations of hazardous ground gases that are commonly associated with landfill sites e.g. methane or carbon dioxide. As such we do not consider monitoring or assessment are required as part of any future investigation works and no special precautions are likely required to prevent landfill gas infiltration into the current building or future developments at the site.

3.4.2 Radon Gas

The site is located in an area where the National Radiological Protection Board have determined that 1-3% houses exceed the recommended Action Level for radon for existing homes in the UK of 200Bqm⁻³ (averaged over a year).

This places the site in a low risk area for radon in commercial properties. No special precautions are required to prevent radon infiltration into commercial buildings at the site.

3.4.3 Flood Risk

The site is not located in an area that is designated by the Environment Agency as being potentially at risk of flooding.

3.4.4 Ecology

No designated ecological receptors were identified in the vicinity of the site.

3.4.5 Site History Review

Our review of the site history has been carried out through the study of Ordnance Survey Maps dating from the late 1800s to the present day and information from the Regulatory Authorities. The review has been used to identify potential historical sources of contamination or contaminative land uses that may have impacted soil or groundwater quality beneath the site.

3.4.6 Historic Maps

We have assessed the site's history from available Ordnance Survey maps of the locality. Selected historical maps are reproduced in Attachment Three and are commented on below.

- 1865-1897: An unnamed road crosses the site's western boundary and a trackway crosses the site diagonally from the northern corner to the eastern boundary. There are a small number of residential houses at a crossroads between the unnamed road and Watling Street, with the nearest building approximately 15m to the northwest. The site and surrounding area is otherwise undeveloped. There is some limited evidence of chalk extraction in the area, with two marked chalk pits within approximately 1km of the site; going out of use before 1895.
- 1907-1909: There are no significant changes to the site or the surrounding area.
- 1932-1933: Tolgate Inn is now present in the northern corner of the site with the building footprint as in the present day. There is a building on the southern half of the site, which does not appear to be associated with the Tolgate Inn and which appears to have two marked areas of ground associated with it to the east: these could represent a recreational facility. There is a round structure approximately 40m to the northwest of the site, associated with a cluster of small to medium-sized buildings. The area to the north of Watling Street has been developed with residential housing on large narrow plots of land. Approximately 50m to the north is a site which, based upon the double access to the site from the Watling Street, may be a garage.
- 1938-1939: An additional building is present next to the possible recreation ground building and is likely associated with the existing building. A pumping station with a tank has been built approximately 240m from the site boundary to the northwest.
- 1953-1955: The second building and the marked areas of ground on the south of the site are no longer shown. The unmarked garage is now labelled as the Tolgate Garage. Ponds are labelled 200m to the north of the site. A cluster of isolated buildings has been built approximately 500m to the west of the site, with an access road to Watling Street. There are no further significant changes to the surrounding area.

- 1969-1970: The eastern half of the site has been developed into the Tolgate Motel with undercover walkways linking it to the former Tolgate Inn public house building. The northwestern boundary of the site now forms part of the slip road from Watling Street, which is now part of the A2. As part of the new road network, a garage has been built 150m to the west of the site with contours showing the garage is on the other side of a topographical depression from the site. The Tolgate Garage to the north has been refurbished, changing its layout. Additional residential housing has been built approximately 150m to the north. The cluster of buildings 500m to the west is now labelled as a “disused camp”, presumably a military camp. Structuring to the southern portion of the camp suggests possible fuel tanks, located approximately 400m southwest of the site boundary.
- 1973: No significant changes are noted to the site of the surrounding area.
- 1981-1990: There are no significant changes noted to the site. The disused camp is now labelled as a riding school, although the unusual structuring to the south of the camp is still in place. The layout of the Tolgate Garage has been altered suggesting a refurbishment. No further significant changes noted to the surrounding area.
- 2002: No significant changes noted to the site. The riding school has been demolished to make way for the Channel Tunnel Rail Link, shown as under construction at the time of the map drawing. A superstore has been built approximately 500m to the northwest. A covered reservoir is shown approximately 1km to the east.
- 2012: No significant changes noted to the site. The A2 has been moved to the south of the site, alongside the Channel Tunnel Rail Link, causing the demolition of the garage to the west of the site. A balancing pond has been constructed 250m to the south of the site. No further significant changes noted to the surrounding area.

3.4.7 Environment Agency Pollution Incident Records

The Environment Agency's National Incidents Recording System does not show any pollution incidents within 250m of the site and there are no sites determined to be contaminated land within 500m of the site.

3.4.8 Planning Records

We have accessed the Gravesham Borough Council Planning Applications portal in order to review the planning applications associated with the site. This information often provides us with useful details about any previous alterations that have occurred at the site, and can occasionally yield site investigation reports undertaken during previous alterations to the site. We note however that whilst planning applications can be useful source of information it is not possible to verify the accuracy of information obtained or for example whether a particular development has been undertaken.

We have summarised the information relevant gathered from the planning application for the site in the following table.

Year	Planning Application Reference(s)	Relevant Information
1974 to 2006	Various Applications	Cosmetic and internal alterations to the hotel complex were proposed through numerous planning applications. The majority of these applications were permitted. We cannot confirm whether any of the works were carried out.

Table Three: Planning Application Search Information – August 2012 (continued overleaf)

Continued...

Year	Planning Application Reference(s)	Relevant Information
1990	19900470	Fine English Hotels submitted and was granted planning permission for demolition of part of the site with erection of two and three storey linked extensions to the existing hotel to increase capacity and facilities, and formation of associated car parking and a new vehicular access to Wrotham Road. The site did not undergo any demolition or refurbishment.
2001	20010475	The Tolgate Hotel submitted and was granted outline planning permission for the same proposal as submitted in 1990. The site did not undergo any demolition or refurbishment.
2005	20050136	The Tolgate Hotel requested and was granted an extension of the time period specified for the submission of reserved matters relating to the hotel extension (ref: 20010475) from three years to four years.
2006	20060823	The Highways Agency applied for and was granted a change of use of the hotel complex into temporary site offices for the "A2 Pepperhill to Cobham" road widening scheme. This included putting up 2m high hoarding around the site.

Table Three: Planning Application Search Information – August 2012

We did not find environmental reports associated with any of the planning applications for the site. This is likely to be due to the limited nature of the proposed alterations rather than the site not being considered an environmental risk by the Local Planning Authority.

3.4.9 Anecdotal Information

The security officer on site informed us of the presence of a former swimming pool in the centre of the site, which is now an area of concrete. It is likely to extend down to a maximum of 3m below ground level, but no information was available regarding how it was decommissioned.

3.4.10 Summary

We have identified the following potential historic sources of contamination or contaminative land uses, on or in the vicinity of the site that may have impacted soil or groundwater quality beneath the site:

- The site's use as temporary site office for the works on the A2;
- The petrol filling station to the north of the site;
- The former petrol filling station to the west of the site.

4 Results of our Investigation

4.1 Buried Utilities Survey

We carried out a survey using radio detection methods of utilities buried underneath the site on the 14th August 2012. Our survey was suitable for identifying power cables, metallic pipework and foul water drainage. The technique that we used is unable to detect any plastic pipework or fibre optic cabling that might be present. The results of our survey of the detectable underground services at the site are shown in Figure One on page 13.

We mitigated against the risk of hitting undetected services by using vacuum excavation techniques as a safe-digging alternative to hand-digging. Vacuum excavation cleared all locations down to 1.2m below ground level.

Site Walkover

The results of our walkover survey, assessing the site buildings, features and services are summarised below.

- The site comprises a motel complex composed of three buildings of varying age and one temporary building. The restaurant/pub building dates from approximately the 1930s. The other permanent buildings on site date from the 1960s. The temporary building has been present on site between 10 and 20 years.
- The site has been derelict for a number of years, however the buildings remain in reasonable condition. Weeds have broken through the hardstanding across the site and the soft-standing areas of the site are overgrown.
- The presence of several permanently parked vehicles was noted over the course of our site work. Two unmarked HGVs were parked to the northwest of the restaurant/pub building, and two site security vehicles of which one is on wheel-jacks and the other had a small volume of hydrocarbons emerging from beneath it.
- The former Motel's heating system was gas powered. There was no visible fuel storage associated with the site.
- Foul water from the two main building drains directly to the foul sewer located to the north of the site. A separate foul water drain takes wastewater from the security building and motel out-building on the south of the site, across the car park to a different exit point on the northern boundary.
- We were unable to trace surface water drainage routes.

4.2 Borehole Investigation

4.2.1 Description of Works Completed

We undertook an intrusive investigation of the site between the 15th August 2012 and the 20th August 2012.

Prior to drilling any hardstanding was broken out using water-flushed diamond coring. We then verified each location clear of below ground services to depths of 1.2m using vacuum excavation techniques.

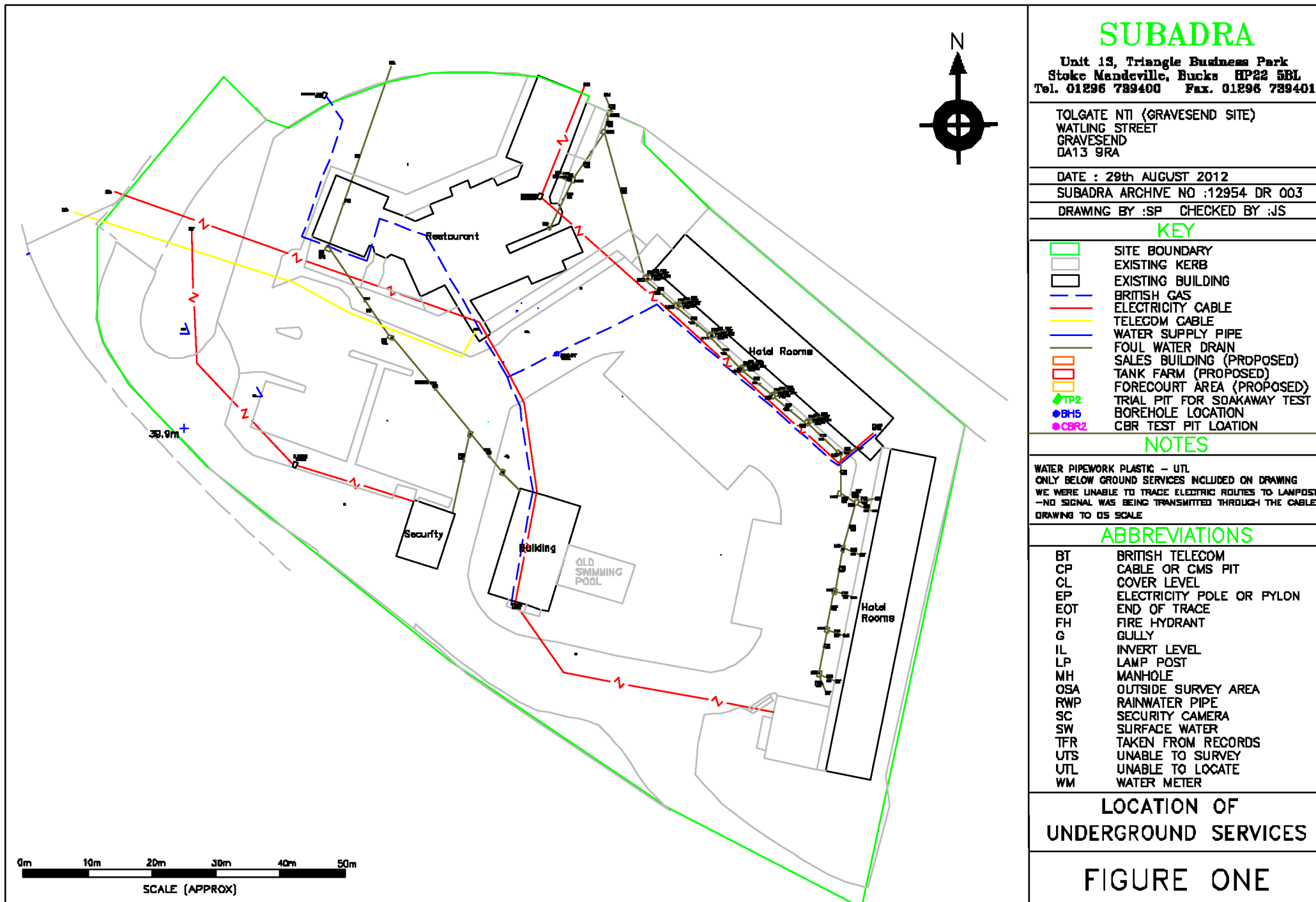
We investigated the soil and groundwater quality at the site by constructing six shallow boreholes using Geoprobe Direct Push and two deeper boreholes using Comacchio rotary auger methods. The shallow boreholes were constructed to a maximum target depth of 6.4m, while the deeper boreholes were constructed to a maximum target depth of 18m.

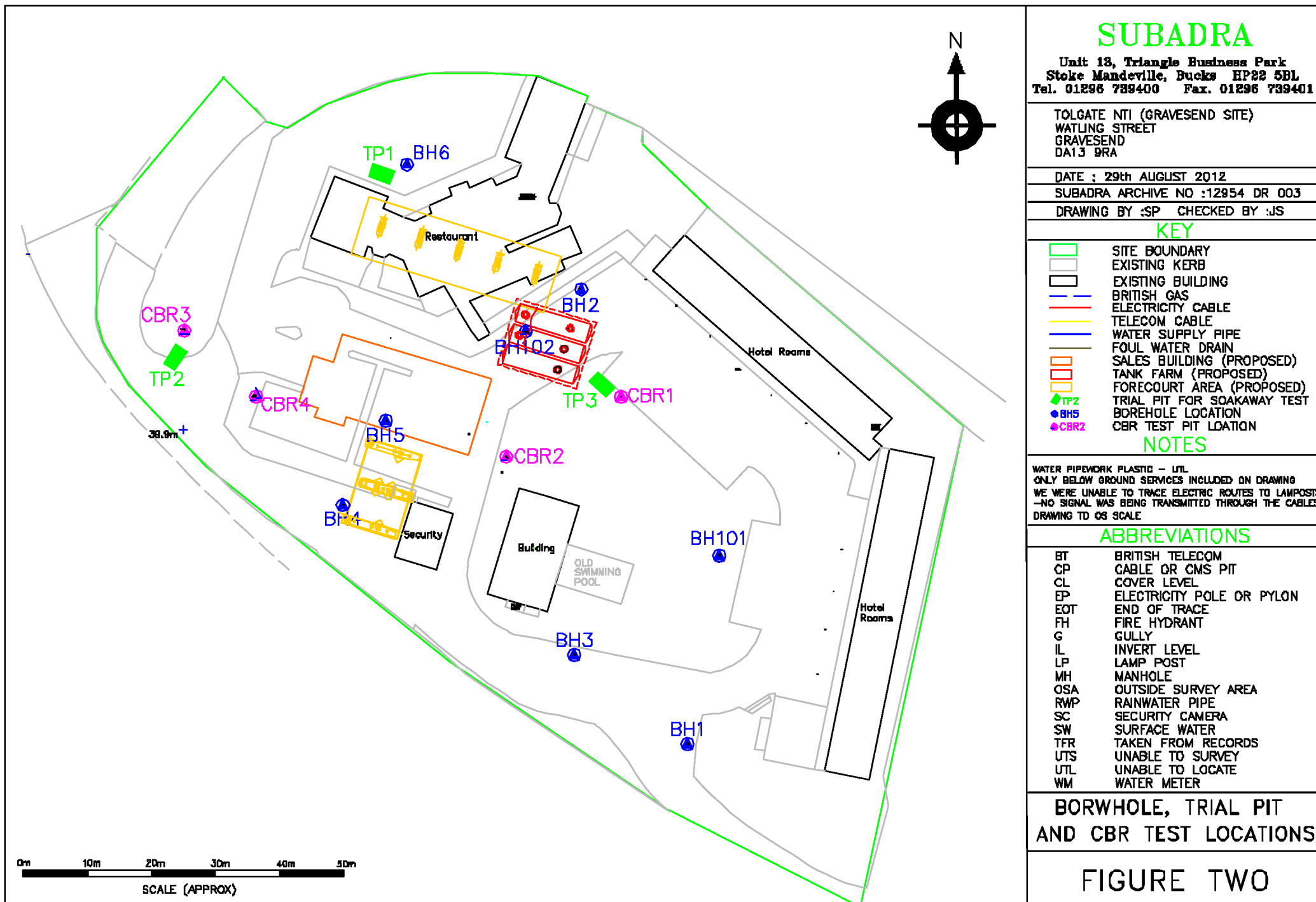
Representative soil samples were recovered from each borehole in sealed liners and logged onsite by a suitably qualified technician. Sub-samples were preserved in glass jars and stored in cool boxes during transportation to the laboratory for subsequent analysis.

None of the boreholes were completed as monitoring wells as we did not encounter groundwater.

4.2.2 Borehole Locations and Rationale

A summary of our borehole locations is provided in Table Four, shown on page 15. A site plan showing borehole locations is shown on Figure Two on page 14.





Target/Rationale	Borehole							
	BH1	BH2	BH3	BH4	BH5	BH6	BH101	BH102
General Site	X		X				X	
Light Vehicles Forecourt Area		X				X		X
New sales building					X			
Underground Tank Farm		X						X
HGV Forecourt Area				X	X			

Notes: Target areas based on proposed development drawing, see Figure One

Table Four: Borehole Locations

4.2.3 Soil Stratigraphy

The following strata were identified by the investigation.

Layer I /Made Ground – LOOSE brown grey rounded GRAVEL.

Layer IIa Upper Chalk – Structured white rubbly to blocky CHALK; weak to moderately weak, moderately weathered, with flint bands (Grade IV to Grade III). Slightly sandy in places.

Layer IIb Upper Chalk – Structureless white CHALK; comprised of chalk lumps in a comminuted matrix, very weak, completely weathered with occasional flints (Grade V). Slightly sandy in places.

Layer IIc Upper Chalk – White structured CHALK - no detailed description, sample too disturbed by drilling process. Assessment based upon SPT data (see Section 4.3).

The distribution of these strata between boreholes is summarised on the following table and detailed logs for each are included in Attachment Four.

Borehole	BH1		BH2		BH3		BH4	
Soil Layer	from	to	from	to	from	to	from	to
Layer I	0.0	0.3	0.0	0.2	0.0	0.2	0.0	0.2
Layer IIa	0.3	>4.0	0.2	2.8	0.2	3.8	0.2	3.0
Layer IIb	-	-	2.8	>5.0	3.8	>6.4	3.0	>6.2

Borehole	BH5		BH6		BH101		BH102	
Soil Layer	from	to	from	to	from	to	from	to
Layer I	0.0	0.2	0.0	0.2	0.0	0.3	0.0	0.3
Layer IIa	0.2	>2.9	0.2	3.8	0.3	2.3	0.3	2.0
Layer IIb	-	-	3.8	>4.8	2.3	>12.8	2.0	6.0
Layer IIc	-	-	-	-	-	-	6.0	>18.0

All dimensions in metres below ground level

Table Five: Intrusive Investigation - Soil Stratigraphy

The soil and bedrock we encountered on site was consistent with that expected from geological maps. The Upper Chalk was found to start within 0.3m of the ground surface in all eight drilling locations.

4.2.4 Groundwater

We did not encounter groundwater in any of the boreholes constructed.

4.2.5 Observed Contamination

We did not record any indications of contamination in soil or bedrock samples collected from the site.

4.3 Geotechnical Field and Lab Results

Where appropriate we have carried out on site testing of soil samples using a Mackintosh Probe or Standard Penetration Tests. The results of our geotechnical field tests are included in our borehole logs included in Attachment Two and are summarised in the table below.

Borehole (mAOD at ground level)	Depth (m)	Testing Method	Geological Unit	SPT (N)/ Su value (kPa)	Soil Strength
BH1 46.3m AOD	1.2	Mackintosh Probe	Upper Chalk	N >10	Medium Dense
	2.6		Upper Chalk	N >10	Medium Dense
	4.0		Upper Chalk	N >10	Medium Dense
BH2 43.3m AOD	2.0	Mackintosh Probe	Upper Chalk	N >10	Medium Dense
	2.6		Upper Chalk	N >10	Medium Dense
	5.0		Upper Chalk	N >10	Medium Dense
BH3 44.8m AOD	4.0	Mackintosh Probe	Upper Chalk	N >10	Medium Dense
	5.5		Upper Chalk	N >10	Medium Dense
	6.4		Upper Chalk	N >10	Medium Dense
BH4 43.1m AOD	3.8	Mackintosh Probe	Upper Chalk	N >10	Medium Dense
	6.2		Upper Chalk	N >10	Medium Dense
BH5 41.7m AOD	1.2	Mackintosh Probe	Upper Chalk	N >10	Medium Dense
	2.9		Upper Chalk	N >10	Medium Dense
BH6 41.4m AOD	No data				
BH101 46.3m AOD	1.5	Standard Penetration Test	Upper Chalk	N = 19	Medium Dense
	2.3		Upper Chalk	N = 27	Medium Dense
	3.8		Upper Chalk	N = 22	Medium Dense
	5.3		Upper Chalk	N = 25	Medium Dense
	6.8		Upper Chalk	N = 20	Medium Dense
	8.3		Upper Chalk	N = 21	Medium Dense
	11.3		Upper Chalk	N = 19	Medium Dense
	12.8		Upper Chalk	N = 21	Medium Dense

Table Six: Results of In-Situ Geotechnical Testing (continued overleaf)

Continued...

Borehole (mAOD at ground level)	Depth (m)	Testing Method	Geological Unit	SPT (N)/ Su value (kPa)	Soil Strength
BH102 42.6m AOD	2.0	Standard Penetration Test	Upper Chalk	N = 18	Medium Dense
	2.9		Upper Chalk	N = 17	Medium Dense
	4.0		Upper Chalk	N = 20	Medium Dense
	5.0		Upper Chalk	N = 20	Medium Dense
	6.0		Upper Chalk	N = 30	Dense
	7.5		Upper Chalk	N = 31	Dense
	9.0		Upper Chalk	N = 31	Dense
	11.0		Upper Chalk	N = 31	Dense
	13.0		Upper Chalk	N = 40	Dense
	14.5		Upper Chalk	N >50	Dense

Table Six: Results of In-Situ Geotechnical Testing

4.3.1 CBR Test Results

We carried out California Bearing Ratio (CBR) testing to obtain data on the superficial soils at locations across the site in order to assist in the design and construction of roads and/or pavements.

The results of the CBR tests we carried out are summarised below and are reported in full in Attachment Three. The CBR test locations are shown in Figure Two on page 14.

Test Number	Soil Description	Depth (m bgl)	mAOD from surface	Soil Moisture Content (%)	CBR (%)	
					2.5mm	5.0mm
One	Chalky Clay	0.4	44.03	16.05	17.81	17.59
Two	Chalky Clay	0.4	43.07	9.33	10.96	12.79
Three	Clay	0.4	39.96	12.80	11.14	12.03
Four	Clay	0.4	40.52	14.31	9.63	13.59

Note: m bgl: metres below ground level

Table Seven: Summary of CBR Test Results

4.4 Soakaway Test Results

We constructed three trial pits in order to undertake soak-away tests, which were completed in accordance with guidance set out in BRE Digest 365.

Our test locations are also shown on Figure Two. Details of the trial pits constructed are summarised in Table Eight overleaf. We used the data obtained to calculate soil infiltration rates, which are summarised in Table Nine, also overleaf, and full calculations are included in Attachment Two.

Item	Details	Data				
Geology encountered	Made Ground	MEDIUM DENSE red brown grey sandy GRAVEL. Gravel is red brick. OR MEDIUM DENSE orange beige white sandy clayey GRAVEL.				
	Clay/Sand	FIRM brown CLAY or FIRM brown grey sandy CLAY to MEDIUM DENSE brown grey clayey SAND.				
	Upper Chalk	White cream moderately weathered moderately weak rubbly to blocky CHALK (Grade IV to GRADE II) with flints and bands of FIRM brown CLAY present.				
Test Pit	One		Two		Three	
Groundwater	No groundwater encountered within pits					
Soil layer	from	to	from	to	from	to
Made Ground	(0.1)	(0.3)	0.3	1.0	(0.1)	(0.9)
Clay/Sand	-	-	1.0	>1.6	-	-
Upper Chalk	0.1	>2.0	-	-	0.1	>1.7

Notes: All dimensions in metres below ground level

Values in brackets indicate made ground present some, but not all, faces of the trial pit

Table Eight: Soil Stratigraphy in Trial Pits

Location	Layer	Soil Infiltration Rate
Test Pit One	Upper Chalk	2.19×10^{-4} m/sec
Test Pit Two	Clay/Sand	No measurable infiltration
Test Pit Three	Upper Chalk	8.08×10^{-5} m/sec

Table Nine: Soak-away Test Results

4.5 Chemical Analysis Results

Based upon the results of our desktop assessment and site walkover survey we have completed the following analysis on representative soil samples collected from the site:

Analysis	Rationale	No of samples
Total petroleum hydrocarbons (TPH) reported by carbon range	Representative of compounds present in petrol, diesel and lube oils	10
Benzene, toluene, ethylbenzene and xylenes (BTEX) and volatile TPH fractions	Representative of compounds present in petrol	10
Polycyclic aromatic hydrocarbons (PAHs)	Representative of compounds present in diesel and lube oil	8
Sulphates and pH	To assist in identifying hazardous ground conditions	16

Table Ten: Schedule of Analysis – Soil Samples

The results of the analyses are summarised below. Chemical Analysis Certificates are included in Attachment Four.

4.5.1 Chemical Analysis Results - Soil Samples

Sampling Location	Depth (m)	Total Petroleum Hydrocarbon Concentration (mg/kg)				
		>C ₈ -C ₁₀	>C ₁₀ -C ₁₂	>C ₁₂ -C ₁₆	>C ₁₆ -C ₂₁	>C ₂₁ -C ₃₅
BH1	2.8	<0.5	<0.5	<0.5	<0.5	<0.5
BH2	2.0	<0.5	<0.5	<0.5	<0.5	<0.5
BH3	3.2	<0.5	<0.5	<0.5	<0.5	<0.5
BH4	2.8	<0.5	<0.5	<0.5	<0.5	<0.5
BH5	2.0	<0.5	<0.5	<0.5	<0.5	<0.5
BH6	2.4	<0.5	<0.5	<0.5	<0.5	<0.5
CBR/1	0.0	<0.5	<0.5	2.51	10.7	47.6
CBR/2	0.0	<0.5	<0.5	<0.5	<0.5	19.7
CBR/3	0.0	<0.5	<0.5	<0.5	<0.5	16.4
CBR/4	0.0	<0.5	<0.5	<0.5	<0.5	13.0

Table Eleven: TPH Analysis Results – Soil

Sampling Location	Depth (m)	Concentration (mg/kg)						
		Total Petroleum Hydrocarbons			Benzene	Toluene	Ethyl-benzene	Total Xylenes
		C ₆ -C ₈	>C ₈ -C ₁₀	>C ₁₀ -C ₁₂				
BH1	2.8	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
BH2	2.0	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
BH3	3.2	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
BH4	2.4	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
BH5	2.0	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
BH6	2.0	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
CBR/1	0.3	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
CBR/2	0.3	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
CBR/3	0.3	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2
CBR/4	0.3	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.2

Table Twelve: BTEX and Volatile TPH Bands Analysis Results – Soil

Geo-environmental Investigation Report – BP Tolgate, A2, Gravesend, Kent

Sampling Location	Depth (m)	Polycyclic Aromatic Hydrocarbon Concentration (mg/kg)		
		Naphthalene	Benzo(a)pyrene	Total PAHs
BH1	1.9	<0.1	<0.1	<1.6
BH2	1.2	<0.1	<0.1	<1.6
BH3	1.2	<0.1	<0.1	<1.6
BH4	1.2	<0.1	<0.1	<1.6
BH5	1.2	<0.1	<0.1	<1.6
BH6	1.2	<0.1	<0.1	<1.6
CBR/2	0.3	<0.1	0.22	2.2
CBR/3	0.3	<0.1	0.99	9.9

Table Thirteen: PAH Analysis Results – Soil

Sampling Location	Depth (m)	Sulphates (g/l)	pH
BH1	2.4	0.03	-
	3.1	-	8.89
BH2	4.2	-	8.93
	5.0	<0.01	-
BH3	5.4	<0.01	-
	6.4	-	8.96
BH4	4.8	0.04	-
	5.8	-	8.88
BH5	2.0	-	8.95
	2.9	<0.01	-
BH6	4.0	<0.01	-
	4.8	-	8.71
BH101	1.3	0.04	8.87
	3.8	<0.01	9.05
	6.8	<0.01	8.82
	11.3	<0.01	8.89
BH102	2.9	<0.01	8.98
	4.0	0.01	8.88
	5.0	0.01	8.96
	6.0	0.01	8.98
	11.0	<0.01	8.87
	14.5	0.01	8.80

Table Fourteen: Sulphate and pH Analysis Results - Soil Samples

4.5.2 Chemical Analysis Results – Waste Classification

We have completed the following analysis, to supplement the organic compound data present above, to assist with classification of waste soils prior to disposal to landfill:

- Waste acceptance criteria (WAC) suite (two samples).
- Inorganic Contaminants Suite (including heavy metals).

The results of this analysis are included in Attachment Four.

5 **Conceptual Site Model**

5.1 Summary of Potential Sensitive Receptors

We consider potentially at-risk human receptors include:

- Future employees working on the proposed petrol filling station site;
- Occupants of neighbouring commercial and residential properties.

We consider potentially at-risk environmental receptors include:

- The underlying principal aquifer in the Upper Chalk;
- The potable water supply abstraction located 1,165m west of the site and the associated Source Protection Zone II.

5.2 Summary of Contaminant Sources

During our intrusive investigation we did not encounter olfactory or visual evidence of hydrocarbons at the site.

Analysis of soil samples identified low concentrations of TPH in the range C12-C35 in shallow soil samples (just below ground surface). These compounds are indicative of mineral oils or greases, rather than automotive fuels.

5.3 Data Gaps and Uncertainties

We note the following data gaps/uncertainties that have arisen during the course of our desktop survey and subsequent investigation:

- We did not encounter groundwater during our intrusive investigation up to 18m below ground level. Information from BGS boreholes in the vicinity of the site indicates that groundwater is likely to be present at depths of approximately 45m below ground level.
- We have not constructed boreholes to depths consistent with groundwater depth and have therefore not been able to obtain any groundwater samples for analysis to provide an indication of groundwater quality at the site.

5.4 Conceptual Site Model

We have used the information presented in the previous sections of this report to create a Conceptual Site Model. We have reviewed potential contaminants and their receptors together with any possible pathways that may link them. The resulting pollutant linkages are summarised in the table below.

Contaminant	Pathway	Receptor	Viable Pollutant Linkage?
Low concentrations of hydrocarbon compounds	Ingestion and dermal contact	On-site employees	No – proposed filling station site will be completely covered with hardstanding.
	Permeation of contaminants, particularly hydrocarbons, into drinking water supply service pipes		No – due to low concentrations of compounds identified and their relatively low volatility
	Volatilisation of hydrocarbons to indoor/outdoor air (either direct from soils or dissolved in groundwater)		
	Off-site migration of hydrocarbons: volatilisation to indoor/outdoor air (vapours from on-site soils or via lateral migration of dissolved compounds)	Off-site residents, approximately 80m to the north.	No – risk of hydrocarbon vapours being produced and subsequently migrating through shallow soil is considered negligible
	Downward migration of contaminants to groundwater	Underlying Chalk Aquifer (assumed >40m bgl)	Unlikely – hydrocarbon compounds identified were limited to shallow soil (chalk) and are unlikely to leach into groundwater
	Migration of dissolved contaminants off-site via groundwater	Potable water supply abstraction 1,165m west and associated SPZII	No – groundwater beneath the site not considered at risk of impact from the low levels of hydrocarbon compounds identified during our investigation.

Table Fifteen: Conceptual Site Model – Assessment of Viable Pollutant Linkages

Our qualitative assessment has confirmed that a viable pollutant linkage does exist at the site.

6 Environmental Assessment Conclusions and Recommendations

6.1 Recommendations Relating to Potential Contaminants

Our review of information, site inspection and the construction of the conceptual site model has not highlighted potentially viable pollutant linkages. We do not consider the low levels of hydrocarbon compounds identified pose an unacceptable risk to either future site users and/or environmental receptors associated with the site.

Based upon the findings of our investigation and subsequent assessment we do not consider further investigation, assessment and or remedial works necessary at the site.

We note, however, if any areas of suspected contamination are identified by the contractor carrying out the development works we recommend that we are notified and allowed to attend site to further investigate and assess these areas.

6.2 Recommendations Relating to the New Forecourt Infrastructure

6.2.1 Petroleum Installation within a Source protection Zone

Where groundwater resources are considered to be sensitive or vulnerable and particularly in groundwater source protection zones, the Environment Agency are likely to seek to ensure robust environmental controls are implemented to mitigate the risk of future contamination.

We therefore recommend that appropriate engineering measures be implemented to ensure risk of future contamination impacting environmental receptors (most notably controlled waters) is mitigated. These could include, but be not be limited to the following:

- Double skinned tanks with interstitial monitoring;
- Double skinned fuel lines;
- Double skinned drip-trays beneath off-set fill points;
- Continuous monitoring of wet-stock with third party data assessment.

Further information relating to the installation of petroleum storage facilities in sensitive areas can be found within the Environment Agency's 'Pollution Prevention Guidelines (PPG 27): Installation, decommissioning and removal of underground storage tanks: PPG 27, July 2007'. [Note: a new version of this document is due to be released during October 2012.]

Further information relating to industry best practice when constructing filling stations is environmentally sensitive locations can also be found in the Association for Petroleum & Explosives Administration's (APEA) 'Guidance for Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations (Revised June 2011)'.

7 Geotechnical Assessment and Recommendations

7.1 Preliminary Geotechnical Profile

We have assessed the underlying ground conditions encountered across the site in order to compile a preliminary geotechnical profile for the site that can be used for initial foundation design purposes. These values are conservative, with the lowest value taken. We recommend that the following geotechnical profile be used for initial foundation design purposes:

Soil Layer	Soil Type	Depth (m)	Bulk Density (estimated) (kN/m ³)	Angle of Internal Friction (degrees)	Undrained Shear Strength (kPa)
Made Ground	Gravel	0.0-0.3	No engineering properties		
Head Deposits	Clay/ Sand	0.3-1.6m*	2.1	-	75
Upper Chalk	Chalk	0.3 to 3.0	1.9	34	-
	Chalk	0.3 to 5.0m	1.9	33	-
	Chalk	5.0 to >18.5m	2.0	38+	-

Notes: * - western portion of site only (present in TP3, but not BH4, 5 or 6.)

Table Seventeen: Geotechnical Design Parameters

We have no information regarding acceptable settlement for BP's standard design. Therefore the allowable bearing capacity calculations have not taken this into account. We recommend that settlement calculations for the underlying soils be done prior to the allowable bearing capacities being fixed.

7.2 Foundation Design Recommendations

We have not been provided with detailed design drawings for the new filling station and therefore are unable to provide specific foundation design recommendations for any new buildings and/or infrastructure. However, we make the following general comments regarding foundation designs at the site, which may be applicable to the proposed development scheme.

- Shallow Made Ground is unlikely to provide sufficient bearing capacity for the proposed developments and should therefore be removed and replaced with a suitably inert backfill and compacted.
- The results of our investigation indicate shallow soils predominantly comprise chalk. The results of the in situ geotechnical testing (Makintosh and Standard Penetration tests) carried out on the chalk indicates that BP's standard foundation designs for the new sales building, canopy and tank farm are likely to be suitable for use at the site.
- The chalk was predominantly medium dense in nature, based upon the results of the in situ geotechnical testing completed. A more competent chalk was noted in BH102 from depths of ~5.0m with soil density increasing to dense. This more competent layer was not encountered in BH101, despite being extended to depths of 12m below ground level. This variation is attributed to the variation in levels across the site, which varies by over 6m.
- We identified a pocket of firm brown clay/sand in Trial Pit Two at depths of between 1.0 to >1.6m below surface, which was not present at other locations. This layer is likely to comprise Head Deposits, which BGS mapping shows there to be a narrow band located just past the site's western boundary. Such deposits can be variable in nature and local variations in its matrix are possible.
- We recommend that a suitably qualified geotechnical engineer inspects the base of any foundation excavations to ensure that the exposed base is consistent with the anticipated conditions and will provide an allowable bearing capacity of 100kPa.

7.2.1 Pavement Design

The results of our CBR tests indicate the CBR value of the Made Ground varies between 12% and 17.5%.

7.3 Recommendations Relating to the Proposed Development Works

We make the following additional general recommendation relating to the forthcoming development:

7.3.1 Temporary Works and Dewatering

Foundation excavations are likely to be formed within chalk. Side slopes constructed in weathered chalk are likely to remain stable for short periods without support or being battered back. However we recommend that a detailed inspection of the side slopes be carried out in order to assess fully any support measures required.

Groundwater was not encountered within the anticipated depths of the excavations. We therefore conclude that provision does not need to be made for any dewatering of excavations to founding depths.

Please note, however, that ponding of water within shallow excavations, due to extended periods of heavy rain, may lead to the presence of groundwater being present at shallow depths under the site.

7.3.2 Water Supply Pipework

Hydrocarbons present in shallow soils can permeate standard PVC water supply pipework and leach into drinking water leading to tainting and in extreme cases can pose a risk to human health.

Whilst we have not identified elevated concentrations of hydrocarbons within our recent investigation works, the use of hydrocarbon impervious material would mitigate future risk from site users. We therefore recommend that any new water supply pipework that is installed during the forthcoming development works be constructed from a hydrocarbon impervious material (e.g. ductile steel or plastic/aluminium composite) and installed within clean fill material as precautionary measure and to protect from possible future impact.

7.3.3 Protection of Buried Concrete

The sulphate concentrations and pH values indicate that the site falls within 'Class One' with respect to buried concrete (BRE Digest 1:2005). This indicates that the concentrations of sulphates in the underlying soils will not have an adverse affect on buried concrete. The ground beneath the site is classed as 'non-aggressive' and we consider standard Portland cement will be suitable for use.

7.3.4 Waste Classification of Soils

Based on the results of our investigation we consider that excavated soils that are sent to landfill are likely to be classified as inert waste.

Careful segregation of the various waste streams will minimise disposal costs. We are able to supervise these works if required.

We recommend that we classify all potentially impacted soils prior to disposal. All waste soils and fill must be disposed of at an appropriately licensed disposal site. A licence exempt site is unlikely to be acceptable for disposal of wastes from this site. A registered waste haulage contractor must transport all waste soils. It is the responsibility of the site owner to ensure that wastes are safely transported and disposed of.

7.3.5 Protection of Construction Workers

Construction and maintenance workers, particularly those working on below ground utilities, should be made aware of the hydrocarbon concentrations encountered in soil. Strict hygiene practices should be followed during any below ground works. To minimise potential exposure of workers to potential hydrocarbon contaminants, site clothing should be removed after each working period. A clean area should be made available with washing facilities for use after each shift. Changing and washing areas should be positioned to ensure that no field equipment enters the clean area. Eating, drinking and smoking should be restricted to the clean area.

Your attention is drawn to the Notice to Interested Parties included as Attachment One.

8 References

HSE (1991) "Protection of Workers and the General Public During the Development of Contaminated Land" HMSO, London

Construction (Design and Management) Regulations 1994. SI 1994/3140. The Stationery Office.

DEFRA and Environment Agency (2002a) "Priority Contaminants for the Assessment of Contaminated Land" Report CLR8, R&D Dissemination Centre, WRc plc, Swindon.

DEFRA and Environment Agency (2002b) "Assessment of Risks to Human Health from Land Contamination: An Overview of the Development of Soil Guideline Values and Related Research.", Report CLR 7 R&D Dissemination Centre, WRc plc, Swindon.

DEFRA and Environment Agency (2004) "Model Procedures for the Management of Land Contamination" Report CLR 11 Environment Agency, Bristol.

ATTACHMENT ONE: NOTICE TO INTERESTED PARTIES

NOTICE TO INTERESTED PARTIES

The purpose of our site assessment is to provide general information on the environmental and/or geotechnical conditions existing at the site and related to soil or groundwater. Where the Client or others specified the scope of the investigation, the validity of our conclusions may be limited by the scope of work completed. We are not responsible for any such limitations imposed by the scope of work.

Where stated in this report, we have used information supplied by third parties. While we have evaluated as far as possible the validity of this information, we cannot guarantee its accuracy in any way whatsoever.

No investigation technique is capable of completely identifying all of the contaminants that might be present in the soil or groundwater under a site. Where specified in our report, we have examined the ground by constructing a number of boreholes and/or trial pits. We recovered samples of soil and/or groundwater from available exposures.

The depth and spacing of our sampling locations were selected to ensure with a reasonable probability that they would be representative of the actual conditions across the whole site. However, safety considerations relating to existing site infrastructure may have restricted our ability to investigate all potential contaminant sources. Specifically, we were unable to investigate the soil and groundwater condition immediately adjacent to the underground petroleum installation and other buried services. These limitations must be borne in mind when considering the conclusions reached in this report.

Soil is intrinsically variable and the spread of contaminants within the soil is therefore subject to a degree of non-uniformity. For these reasons no sampling technique can completely eliminate the possibility of obtaining samples that are not representative of the actual conditions. Our sampling techniques are intended to reduce the possibility to an acceptable level.

Groundwater levels and soil vapour levels that we report were accurate at the time of the investigation. Groundwater and soil vapour levels are variable. Long term monitoring may be required to ensure that the levels recorded during our investigation are representative of long term and possible 'worst case' conditions.

This investigation was carried out to assess the significance of contamination resulting from use of the site as identified in this report. Unless we have indicated otherwise, no assessment of the potential impact of any other previous uses has been made. No investigation was carried out to determine whether or not any deleterious or hazardous materials have been used in the construction of the buildings present on the site.

We do not accept any responsibility for the cost of remedial works or other costs incurred in whatever way whatsoever as a result of any omissions, errors or other shortcomings in this report unless we have been given reasonable opportunity to verify ourselves that such faults exist and we have been given a reasonable opportunity to carry out works to remedy such faults ourselves using the most practicable means available to us. We do not accept liability for any consequential losses incurred by you while we carry out any remedial works we deem necessary.

This report has been prepared for BP Oil UK Ltd. Use of, and reliance on, this report by other third parties will be at such third parties own risk, and we are unable to accept any liability or responsibility to third parties.

Neither the whole nor any part of this report, or any reference to it, may be included in any published document circular or statement or published in any way without our prior written approval.

This report and its contents, together with any supporting correspondence or other documentation, remain the property of Subadra Consulting Limited until paid for in full.

**ATTACHMENT TWO: BOREHOLE LOGS
AND SOIL INFILTRATION CALCULATIONS**

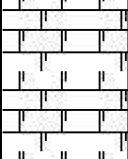
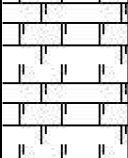
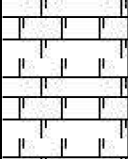
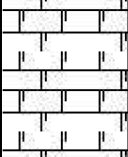
Borehole No. One

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	15th August 2012
Project Code	BP12954	Ground Level	46.3m AOD
Coordinates	564267, 171173	Equipment	0-1.2m Vac-Ex/Geoprobe (Direct Push)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.3m MADE GROUND LOOSE brown grey GRAVEL. Gravel is rounded.
1				S1 @ 1.2m	Metals	N > 10	0.3 to 4.0m UPPER CHALK White slightly to moderately weathered CHALK: weak to moderately weak. blocky to rubbly open closely spaced fragments with flints at 2.0, 3.3, and 4.0m (Grade III to Grade IV). Slightly sandy at 1.5m. Borehole terminated at 4.0m.
2				S2 @ 1.9m	PAH		
				S3 @ 2.4m	SO4	N > 10	
3				S4 @ 2.8m	BTEX/TPH		
				S5 @ 3.1m	pH		
4				S6 @ 3.9m		N > 10	
5							Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.
6							

Borehole terminated at: 4.0m

Hydrocarbon odour/staining: None noted

Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. Two

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	15th August 2012
Project Code	BP12954	Ground Level	43.3m AOD
Coordinates	564250, 171244	Equipment	0-1.2m Vac-Ex/Geoprobe (Direct Push)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.2m TARMAC
							0.2 to 2.8m UPPER CHALK White moderately weathered CHALK; weak to moderately weak blocky to rubbly open closely spaced fragments (Grade III to Grade IV).
1				S1 @ 1.2m	PAH/Metals	N > 10	
2				S2 @ 2.0m	BTEX/TPH		
				S3 @ 2.6m	WAC	N > 10	
3				S4 @ 3.4m			2.8 to 5.0m UPPER CHALK Structureless CHALK composed of very weak white completely weathered fragments with flints at 4.5m (Grade V). Borehole terminated at 5.0m.
4				S5 @ 4.0m			
				S6 @ 4.2m	pH		
5				S7 @ 5.0m	SO4	N > 10	Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.
6							

Borehole terminated at: 5.0m

Hydrocarbon odour/staining: None noted

Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. Three

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	15th August 2012
Project Code	BP12954	Ground Level	44.8m AOD
Coordinates	564249, 171187	Equipment	0-1.2m Vac-Ex/Geoprobe (Direct Push)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.2m TARMAC
1				S1 @ 1.2m	PAH/Metals		0.2 to 3.8m UPPER CHALK White moderately weathered CHALK; weak to moderately weak blocky to rubbly open closely spaced fragments (Grade III to Grade IV). Orange sandy lens at 1.5m.
2				S2 @ 2.0-2.8m	WAC		
3				S3 @ 3.2m	BTEX/TPH		
4				S4 @ 4.0m		N > 10	3.8 to 6.4m UPPER CHALK Structureless white CHALK composed of very weak completed weathered fragments with flints at 4.3m (Grade V). Sand lens at 5.8m.
5				S5 @ 4.2m			
6				S6 @ 4.8m			
7				S7 @ 5.4m	SO4	N > 10	Borehole terminated at 6.4m. Unable to progress borehole any further due to obstruction: suspected large flint gravel.
				S8 @ 6.4m	pH	N > 10	Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.

Borehole terminated at: 6.4m

Hydrocarbon odour/staining: None noted

Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. Four

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	15th August 2012
Project Code	BP12954	Ground Level	43.1m AOD
Coordinates	564213, 171210	Equipment	0-1.2m Vac-Ex/Geoprobe (Direct Push)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.2m TARMAC
1				S1 @ 1.2m	PAH/Metals		0.2 to 3.0m UPPER CHALK White moderately weathered CHALK: weak to moderately weak blocky to rubbly, open closely spaced fragments (Grade III to Grade IV). Sandy lens at 2.0m.
2				S2 @ 2.4m	BTEX/		
3				S3 @ 2.8m	TPH		
4				S4 @ 3.1-3.8m		N > 10	3.0 to 6.2m UPPER CHALK Structureless white CHALK composed of very weak completely weathered fragments with flints at 3.1m (Grade V). Slightly blocky at 6.2m. Borehole terminated at 6.2m.
5				S5 @ 4.8m	SO4		
6				S6 @ 5.8m	pH		
7						N > 10	Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.

Borehole terminated at: 6.2m

Hydrocarbon odour/staining: None noted

Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. Five

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	15th August 2012
Project Code	BP12954	Ground Level	41.7m AOD
Coordinates	564220, 171223	Equipment	0-1.2m Vac-Ex/Geoprobe (Direct Push)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.2m TARMAC
1				S1 @ 1.2m	PAH/Metals	N > 10	0.2 to 2.9m UPPER CHALK White moderately weathered CHALK: weak to moderately weak blocky to rubbly, closely spaced to no spacing fragments (Grade IV). Borehole terminated at 2.9m.
2				S2 @ 2.0m	BTEX/TPH/pH		
3				S3 @ 2.9m	SO4	N > 10	
4							Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.
5							
6							
7							

Borehole terminated at: 2.9m

Hydrocarbon odour/staining: None noted

Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. Six

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	20th August 2012
Project Code	BP12954	Ground Level	41.4m AOD
Coordinates	564223, 171263	Equipment	0-1.2m Vac-Ex/Geoprobe (Direct Push)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.2m TARMAC
1				S1 @ 1.2m	PAH/Metals		0.3 to 3.8m UPPER CHALK White moderately weathered CHALK composed of weak to moderately weak blocky to rubbly open closely spaced fragments with flints at 2.0m and 3.6m (Grade III to Grade IV).
2				S2 @ 2.0m	BTEX		
3				S3 @ 2.4-2.9m	TPH		
4				S4 @ 3.6m			2.3 to 12.8m UPPER CHALK Structureless white CHALK composed of very weak completely weathered fragments (Grade VI). Slightly sandy at 4.5m.
5				S5 @ 4.0m	SO4		
6				S6 @ 4.8m	pH		
7							Borehole terminated at 4.8m.
							Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.

Borehole terminated at: 4.8m

Hydrocarbon odour/staining: None noted

Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. 101

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	20th August 2012
Project Code	BP12954	Ground Level	46.3m AOD
Coordinates	564272, 171202	Equipment	0-1.2m Vac-Ex/Comacchio 205 (Rotary)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.3m TARMAC
1				S1 @ 1.5m	SO4/pH	N = 19	0.3 to 2.3m UPPER CHALK Structureless white CHALK composed of weak highly weathered fragments with flints (Grade VI). Sandy in places.
2				S2 @ 2.3m		N = 27	
3							2.3 to 12.8m UPPER CHALK Structureless white CHALK composed of weak moderately weathered fragments with flints (Grade VI). Slightly sandy at 6.8m and 11.3m.
4				S3 @ 3.8m	SO4/pH	N = 22	
5							Borehole terminated at 12.8m.
6				S4 @ 5.3m		N = 25	
7				S5 @ 6.8m	SO4/pH	N = 20	
8							
9							
10							
11				S7 @ 11.3m	SO4/pH	N = 19	
12							
13				S8 @ 12.8m		N = 21	
14							
15							

Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.

Borehole terminated at: 12.8m

Hydrocarbon odour/staining: None noted

Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. 102

SUBADRA

Consultants in the Earth Sciences

Unit 13, Triangle Business Park, Stoke Mandeville
Tel. 01296 739400 Fax. 01296 739401.

Project Name	Tollgate, Kent	Date	20th August 2012
Project Code	BP12954	Ground Level	42.6m AOD
Coordinates	564242, 171236	Equipment	0-1.2m Vac-Ex/Comacchio 205 (Rotary)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
0		DRY					0.0 to 0.3m TARMAC
1							0.3 to 14.5m UPPER CHALK Structureless white CHALK composed of very weak to weak highly to moderately weathered fragments with flints (Grade V). Slightly blocky in places Slightly sandy at 6.0m, 7.5m and 9.0m.
2				S1 @ 2.0m		N = 18	
3				S2 @ 2.9m	SO4/pH	N = 17	
4				S3 @ 4.0m	SO4/pH	N = 20	
5				S4 @ 5.0m	SO4/pH	N = 20	
6				S5 @ 6.0m	SO4/pH	N = 30	
7							
8				S6 @ 7.5m		N = 31	
9				S7 @ 9.0m		N = 31	
10							
11				S8 @ 11.0m	SO4/pH	N = 31	
12							
13				S9 @ 13.0m		N = 40	
14				S10 @ 14.5m	SO4/pH	N >50	
15							

Note: Vacuum Excavation (an excavation technique that removes soil using a high pressure suction hose, employed as a safe digging alternative to hand-digging) used to 1.2m below surface. Samples and soil descriptions may have been affected by this process and actual site conditions may vary from those described.

Borehole terminated at: 18.0m

Hydrocarbon odour/staining: None noted

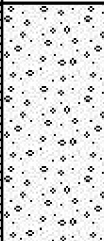
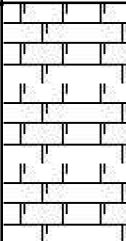
Groundwater monitoring well installed to: None installed

Groundwater encountered at: None encountered

Dwn: SP

Ckd: KM

Borehole No. 102		SUBADRA Consultants in the Earth Sciences Unit 13, Triangle Business Park, Stoke Mandeville Tel. 01296 739400 Fax. 01296 739401.	
Project Name	Tollgate, Kent	Date	20th August 2012
Project Code	BP12954	Ground Level	42.6m AOD
Coordinates	564242, 171236	Equipment	0-1.2m Vac-Ex/Comacchio 205 (Rotary)

Depth (m)	Monitoring Well	Water Level	Log	Sample	Chemical Analysis Scheduled	SPT ('N') or Su (kPa)	Description
16							14.5 to 18.0m UPPER CHALK Rock-rolling techniques used from 14.5m. Geological description based on driller's interpretation. Borehole terminated at 18m.
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

Borehole terminated at: 18.0m	
Hydrocarbon odour/staining: None noted	
Groundwater monitoring well installed to: None installed	Dwn: SP
Groundwater encountered at: None encountered	Ckd: KM

Trial Pit One

29th August 2012

Site Name Tollgate
Project No. 12954
Client BP Oil UK Ltd

DETAILS OF SOIL INFILTRATION TEST

Length (m) 1.500
Width (m) 0.600
Depth (m) 2.000

Depth at start of test (m)= 1.750
Depth at end of test (m)= 2.000
Effective storage depth (m)= 0.250

Time - t (minute)	Depth - (m)	Effective Depth - p (%)
0.000	1.750	100.000
1.000	1.794	82.400
2.000	1.825	70.000
3.000	1.845	62.000
5.000	1.885	46.000
8.000	1.945	22.000
10.000	1.980	8.000
15.000	2.000	0.000

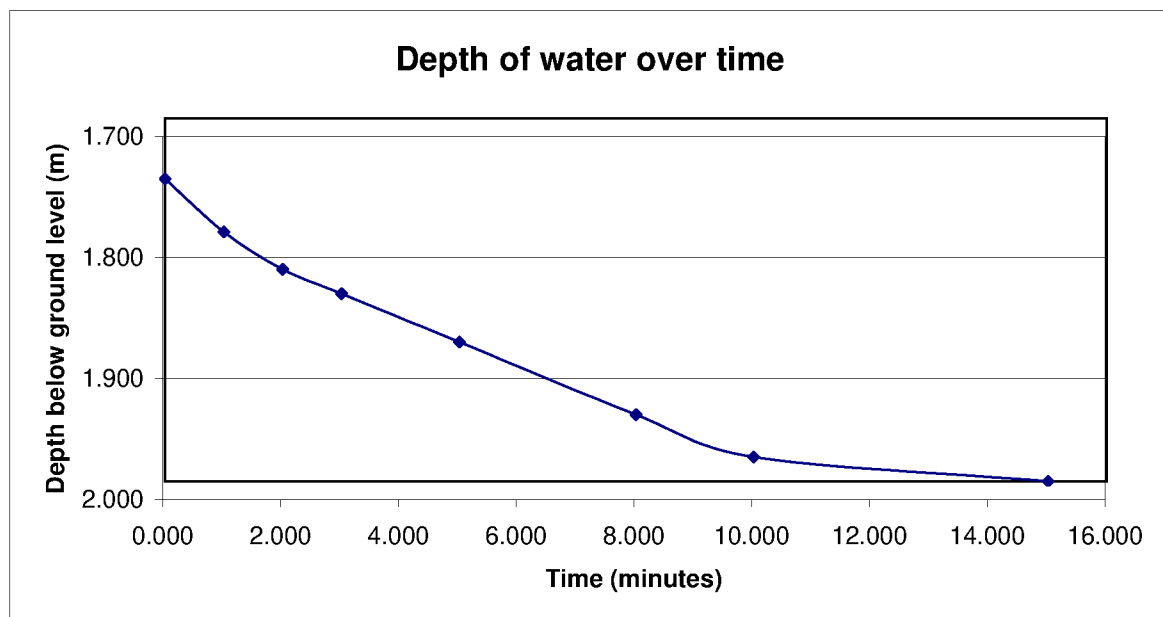
CALCULATION OF SOIL INFILTRATION RATE

Soil infiltration rate, $f = V_{p75-25} / (ap_{50} \times tp_{75-25})$

tp75 (mins) = 1.50
tp 25 (mins) = 7.50

Vp75-25 0.113
ap50 1.425
tp75-25 6.000

Soil infiltration rate (m/day)= 18.947
Soil infiltration rate (m/min)= 1.316E-02
Soil infiltration rate (m/sec)= 2.193E-04



Trial Pit Three

29th August 2012

Site Name Tollgate
Project No. 12954
Client BP Oil UK Ltd

DETAILS OF SOIL INFILTRATION TEST

Length (m) 1.500
Width (m) 0.600
Depth (m) 1.700

Depth at start of test (m)= 1.494
Depth at end of test (m)= 1.693
Effective storage depth (m)= 0.199

Time - t (minute)	Depth - (m)	Effective Depth - p (%)
0.000	1.494	100.000
1.000	1.508	93.204
2.000	1.540	77.670
3.000	1.544	75.728
5.000	1.570	63.107
8.000	1.594	51.456
10.000	1.619	39.320
16.000	1.635	31.553
20.000	1.672	13.592
25.000	1.693	3.398

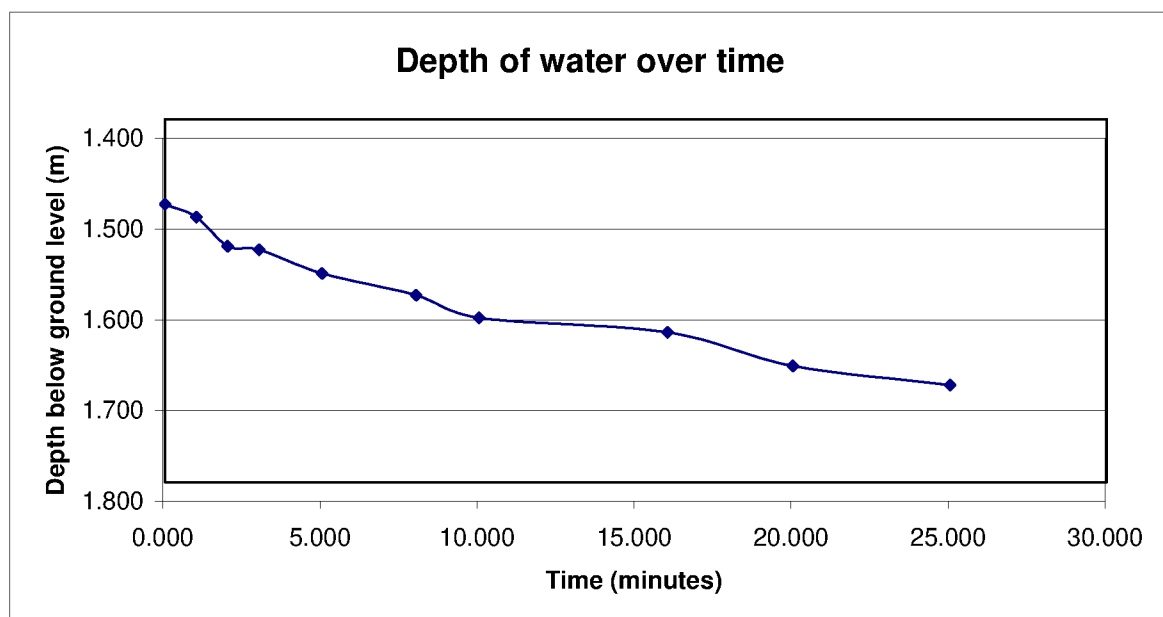
CALCULATION OF SOIL INFILTRATION RATE

Soil infiltration rate, $f = V_{p75-25} / (ap_{50} \times tp_{75-25})$

tp75 (mins) = 3.00
tp 25 (mins) = 17.50

Vp75-25 0.093
ap50 1.318
tp75-25 14.500

Soil infiltration rate (m/day)= 6.985
Soil infiltration rate (m/min)= 4.851E-03
Soil infiltration rate (m/sec)= 8.085E-05



ATTACHMENT THREE:
MAP DATA AND ENVIRONMENTAL DATA REPORT

Site Details:

DA13 9RA

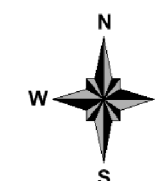
Client Ref: EMS_175297_258286
Report Ref: S EMS-175297_258286
Grid Ref: 564248, 171223

Map Name: National Grid

Map date: 1970

Scale: 1:1,250

Printed at: 1:2,500



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Production date: 08 August 2012

To view map legend click here [Legend](#)



Site Details:

DA13 9RA

Client Ref: EMS_175297_258286

Report Ref: S EMS-175297_258286

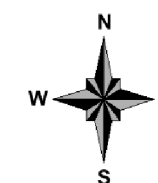
Grid Ref: 564248, 171223

Map Name: County Series

Map date: 1938

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1938
Revised 1938
Edition N/A
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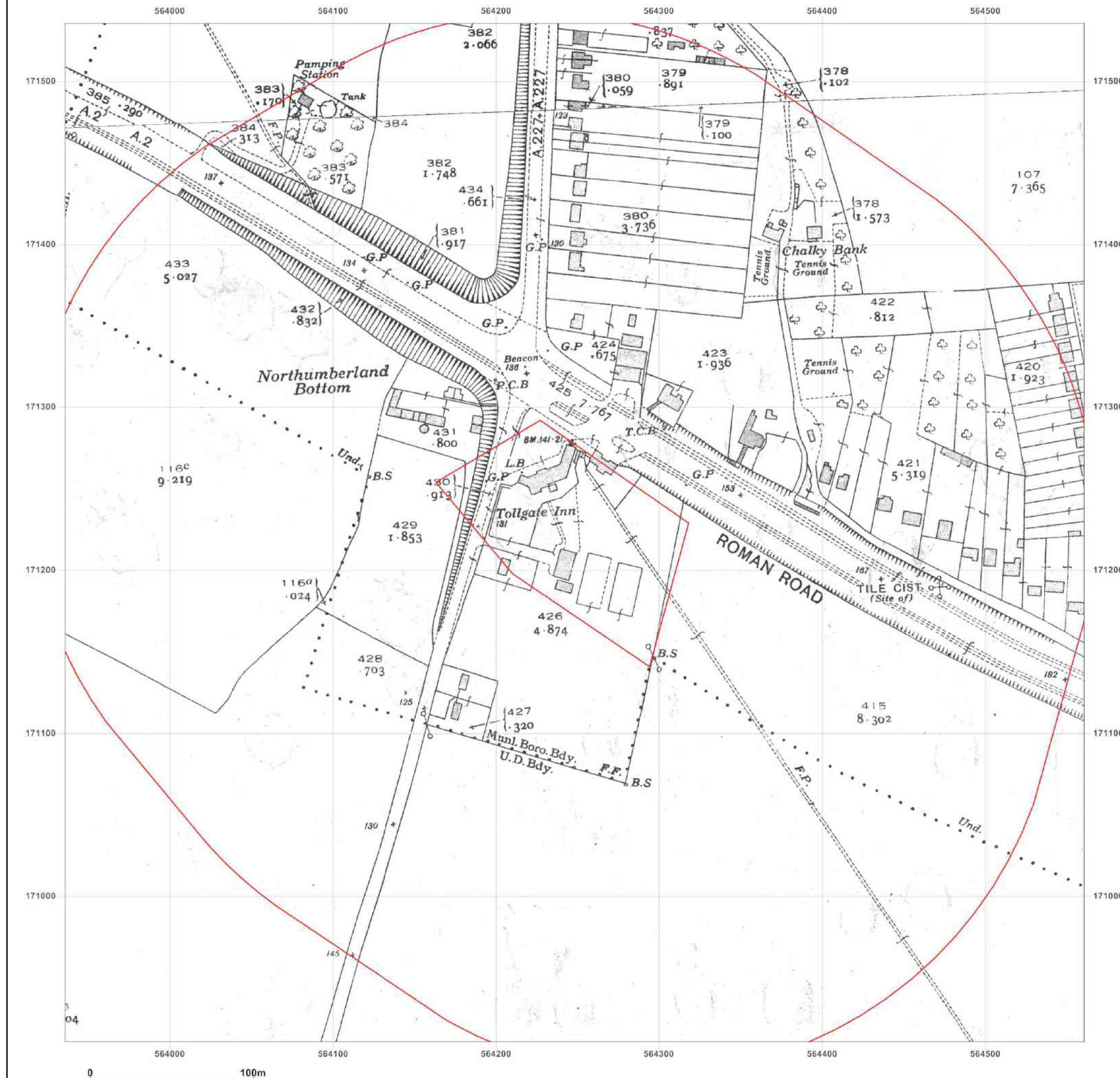


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Production date: 08 August 2012

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Aerial Photograph of Study Site



Site Name: DA13 9RA
Grid Reference: 564248,171223
Size of Site: 1.19 ha

Aerial photography supplied by Getmapping PLC.
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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Report Section	Number of records found within (X) m of the study site boundary					
1. Environmental Permits, Incidents and Registers	on-site	0-50	51-250	251-500	501-1000	1000-1500
1.1 Industrial Sites Holding Environmental Permits and/or Authorisations						
Records of historic IPC Authorisations	0	0	0	0	-	-
Records of Part A(1) and IPPC Authorised Activities	0	0	0	0	-	-
Records of Water Industry Referrals (potentially harmful discharges to the public sewer)	0	0	0	0	-	-
Records of Red List Discharge Consents (potentially harmful discharges to controlled waters)	0	0	0	0	-	-
Records of List 1 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of List 2 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of Part A(2) and Part B Activities and Enforcements	0	0	3	0	-	-
Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	1	-	-
Records of Licensed Discharge Consents	0	0	1	2	-	-
Records of Planning Hazardous Substance Consents and Enforcements	0	0	0	0	-	-
1.2 Records of COMAH and NIHHS sites	0	0	0	0	-	-
1.3 Environment Agency Recorded Pollution Incidents						
National Incidents Recording System, List 2	0	0	0	-	-	-
National Incidents Recording System, List 1	0	0	0	-	-	-
1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0	0	0	-	-
2. Landfill and Other Waste Sites	on-site	0-50	51-250	251-500	501-1000	1000-1500
2.1 Landfill Sites						
Environment Agency Registered Landfill Sites	0	0	0	0	0	-
Landfill Data – Operational Landfill Sites	0	0	0	0	0	-
Environment Agency Historic Landfill Sites	0	0	0	1	0	0
Landfill Data – Non-Operational Landfill Sites	0	0	0	0	0	-
BGS/DoE Landfill Site Survey	0	0	0	0	0	0
GroundSure Local Authority Landfill Sites Data	0	0	0	0	0	0
2.2 Landfill and Other Waste Sites Findings						
Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	-	-
Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	-	-
Environment Agency Licensed Waste Sites	0	0	0	0	0	0

3. Current Land Uses	on-site	0-50	51-250	251-500	501-1000	1000-1500
3.1 Current Industrial Sites Data	0	0	8	-	-	-
3.2 Records of Petrol and Fuel Sites	0	1	1	0	-	-
3.3 Underground High Pressure Oil and Gas Pipelines	0	0	0	0	-	-

4. Geology	Description
4.1 Are there any records of Artificial Ground and Made Ground present beneath the study site? *	Yes
4.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site? *	Yes
4.3 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
Source: Scale: 1:50,000 BGS Sheet 271	

* This includes an automatically generated 50m buffer zone around the site.

5. Hydrogeology and Hydrology	on-site	0-50	51-250	251-500	501-1000	1001-2000
5.1 Are there any records of Productive Strata in the Superficial Geology within 500m of the study site?				Yes		
5.2 Are there any records of Productive Strata in the Bedrock Geology within 500m of the study site?				Yes		
5.3 Groundwater Abstraction Licences (within 2000m of the study site).	0	0	0	1	0	4
5.4 Surface Water Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	0
5.5 Potable Water Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	3
5.6 Are there any Source Protection Zones within 500m of the study site?					Yes	
5.7 River Quality						
Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	No	No
5.8 Detailed River Network entries within 500m of the site	0	0	0	0	-	-
5.9 Surface water features within 250m of the study site	No	No	Yes	-	-	-

6. Flooding	
6.1 Are there any Environment Agency indicative Zone 2 floodplains within 250m of the study site?	Yes
6.2 Are there any Environment Agency indicative Zone 3 floodplains within 250m of the study site?	Yes
6.3 Are there any Flood Defences within 250m of the study site?	No
6.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
6.5 Are there any areas used for Flood Storage within 250m of the study site?	No
6.6 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Very Low
6.7 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

7. Designated Environmentally Sensitive Sites	on-site	0-50	51-250	251-500	501-1000	1001-2000
7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
7.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0

7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
7.3 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
7.4 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
7.5 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
7.6 Records of Ramsar sites	0	0	0	0	0	0
7.7 Records of World Heritage Sites	0	0	0	0	0	0
7.8 Records of Environmentally Sensitive Areas	0	0	0	0	0	0
7.9 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
7.10 Records of National Parks	0	0	0	0	0	0
7.11 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
7.12 Records of Nitrate Vulnerable Zones	1	0	0	0	0	1

8. Natural Hazards

8.1 What is the maximum risk of natural ground subsidence? High

9. Mining

9.1 Are there any coal mining areas within 75m of the study site? No

9.2 What is the risk of subsidence relating to shallow mining within 150m of the study site? Low

9.3 Are there any brine affected areas within 75m of the study site? No

Using this Report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between GroundSure and the Client. The document contains the following sections:

1. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

2. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

3. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure underground oil and gas pipelines.

4. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

5. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

6. Flooding

Provides information on surface water flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

7. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites. These searches are conducted using radii of up to 500m.

8. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence.

9. Mining

Provides information on areas of coal and shallow mining.

10. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, GroundSure provide a free Technical Helpline (08444 159000) for further information and guidance.

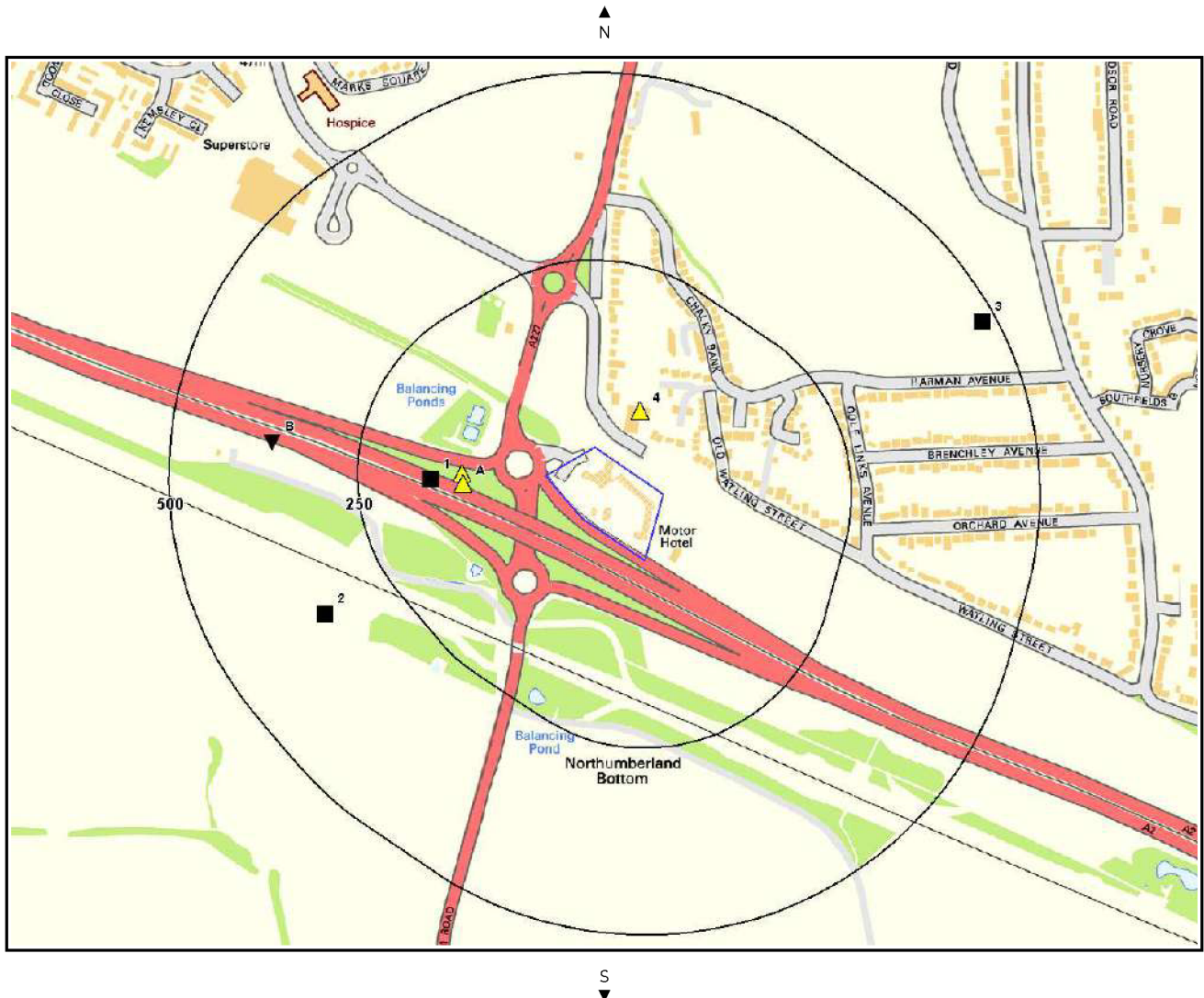
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Environmental Permits, Incidents and Registers Map



Authorisations, Incidents and Registers Legend

Enabled by Ordnance Survey

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- | | | |
|-------------------------------|--|---|
| Site Outline | Recorded Pollution Incident | RAS 3 & 4 Authorisations |
| Dangerous Substances (List 1) | Part A(1) Authorised Processes and Historic IPC Authorisations | Part A(2) and Part B Authorised Processes |
| Dangerous Substances (List 2) | Water Industry Referrals | COMAH / NIHHS Sites |
| Licenced Discharge Consents | Sites Determined as Contaminated Land | Hazardous Substance Consents and Enforcements |
| Red List Discharge Consents | | |

1.Environmental Permits, Incidents and Registers

1.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

Records of historic IPC Authorisations within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(1) and IPPC Authorised Activities within 500m of the study site: **0**

Database searched and no data found.

Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: **0**

Database searched and no data found.

Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site: **0**

Database searched and no data found.

Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: **3**

The following Part A(2) and Part B Activities are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
4	72.0	NE	564287, 171338	Address: Tollgate Service Station, A2 Watling Street, Gravesend, Kent, DA11 7NP (A227 on slip) Process: Petrol Storage Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

5A	111.0	W	564053, 171241	Address: Singlewell Service Station, A2 Watling Street, Gravesend, Kent, DA13 9ra (singlewell Road Off Slip) Process: Petrol Storage Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
6A	112.0	W	564051, 171255	Address: Turnpike Service Station, Wrotham Road, Meopham, Kent, DA13 9RE Process: Petrol Storage Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

Records of Category 3 or 4 Radioactive Substance Licences within 500m of the study site: 1

The following RAS Licence (3 or 4) records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance [m]	Direction	Address	Operator	Type	Permission Number	Dates	Status
8B	366.0	W	Alfred Mcalpine And Amec Joint Venture, Site Office, northumberland Bottom, wrotham Road, Gravesend, Kent, DA13 9RE	Alfred Mcalpine And Amec Joint Venture	Keeping And Use Of Mobile Radioactive Sources (was Rsa60 Section 3)	BF4415	Date of Approval:- Effective from:- Last date of update: 20 01-06-01	-

Records of Licensed Discharge Consents within 500m of the study site: 3

The following Licensed Discharge Consents records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
1	153.0	W	564010, 171250	Address: Turnpike Filling Station, Turnpike Filling Station, Wrotham Road, Gravesend, Kent Effluent Type: Trade Discharges - Process Effluent - Not Water Company Permit Number: P05820 Permit Version: 1	Receiving Water: Into Land Status: Revoked (wra 91, S88 & Sched 10 As Amended By Env Act 1995) Issue date: 30/6/1995 Effective Date: 30/6/1995 Revocation Date: 27/4/2007
2	346.0	SW	563870, 171070	Address: A.mcalpine-amec Joint Venture, A.mcalpine-amec Joint Venture, Ctrl Contract 330 Site Office, Northumberland Bottom, Wrotham Road Gravesend Kent, DA13 9RE Effluent Type: Trade Discharges - Site Drainage Permit Number: P07541 Permit Version: 1	Receiving Water: Into Land Status: Revoked (wra 91, S88 & Sched 10 As Amended By Env Act 1995) Issue date: 13/4/1999 Effective Date: 13/4/1999 Revocation Date: -
3	481.0	NE	564740, 171460	Address: Park Cottage, Park Cottage, Collier Street, Paddock Wood Kent Effluent Type: Sewage Discharges - Final/treated Effluent - Not Water Company Permit Number: P03453 Permit Version: 1	Receiving Water: Freshwater River Status: Post Nra Legislation Where Issue Date > 31-aug-89 (historic Only) Issue date: 28/1/1991 Effective Date: 28/1/1991 Revocation Date: -

Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: 0

Database searched and no data found.

1.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site:**0**Database searched and no data found.

1.3 Environment Agency Recorded Pollution Incidents

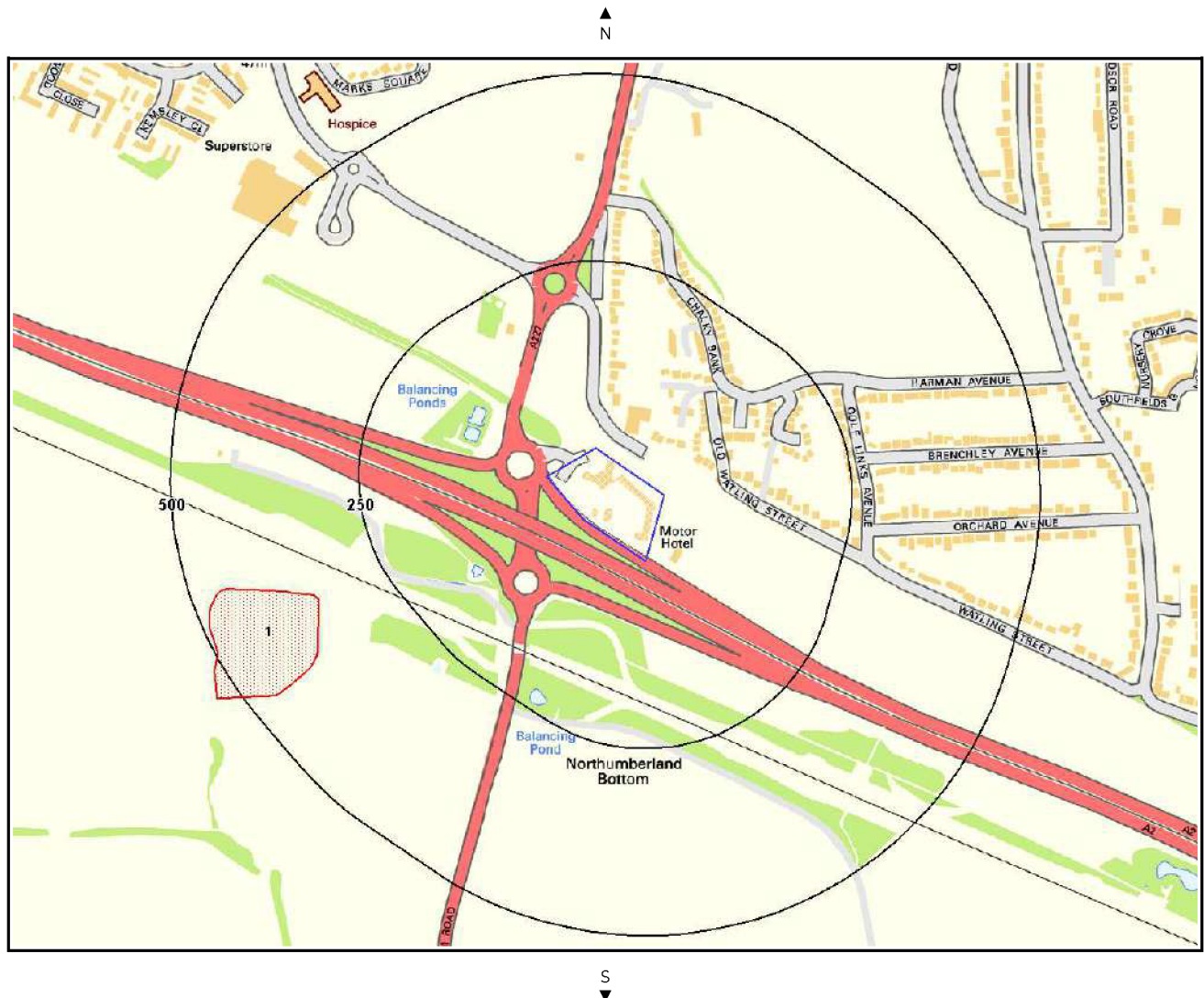
Records of National Incidents Recording System, List 2 within 250m of the study site:**0**Database searched and no data found.

Records of National Incidents Recording System, List 1 within 250m of the study site:**0**Database searched and no data found.

1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site?**0**Database searched and no data found.

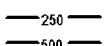
2. Landfill and Other Waste Sites Map



Landfill & Other Waste Sites Legend

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- | | | |
|--|---|--|
|  Site Outline |  E.A. Active Landfill |  Operational Waste Treatment Licence |
|  Search Buffers (m) |  E.A. Historic Landfill (Area Data) |  Closed Waste Treatment Licence |
| |  E.A. Historic Landfill (Point Data) |  REGIS Waste Licence |
| |  BGS / DoE Survey Landfill |  Operational Landfill |
| |  Local Authority Landfill (Area Data) |  Closed Landfill |
| |  Local Authority Landfill (Point Data) | |

2. Landfill and Other Waste Sites

2.1 Landfill Sites

Records from Environment Agency landfill data within 1000m of the study site: 0

Database searched and no data found.

Records of operational landfill sites sourced from Landmark within 1000m of the study site: 0

Database searched and no data found.

Records of Environment Agency historic landfill sites within 1500m of the study site: 1

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details
1	345.0	SW	563700, 171000	Site Address: Tollgate Stables, Tollgate, Kent Waste Licence: Yes Site Reference: GR9 Waste Type: Inert Regis Reference: - Licence Issue: 01-Jan-1976 Licence Surrendered: Licence Hold Address: - Operator: -

Records of non-operational landfill sites sourced from Landmark within 1000m of the study site: 0

Database searched and no data found.

Records of BGS/DoE non-operational landfill sites within 1500m of the study site: 0

Database searched and no data found.

Records of Local Authority landfill sites within 1500m of the study site: 0

Database searched and no data found.

2.2 Other Waste Sites

Records of operational waste treatment, transfer or disposal sites within 500m of the study site: 0

Database searched and no data found.

Records of non-operational waste treatment, transfer or disposal sites within 500m of the study site: 0

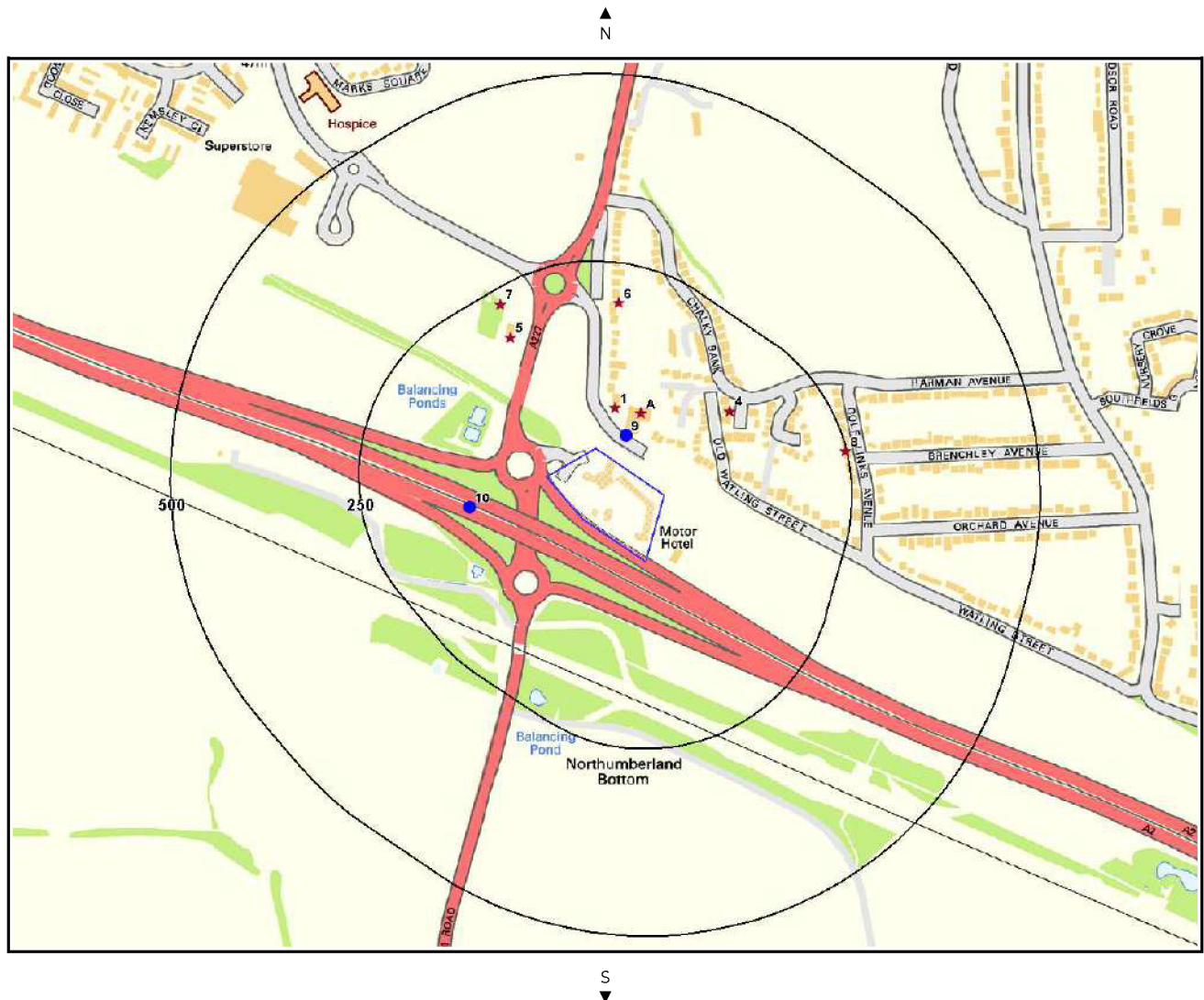
Database searched and no data found.

Records of Environment Agency licensed waste sites within 1500m of the study site: 0

Report Reference: [S EMS-175297_258287](#)

Database searched and no data found.

3. Current Land Use Map



Current Land Use Legend



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- | | | | |
|---|--------------------|---|--|
|  | Site Outline |  | Current Industrial Sites |
|  | Search Buffers (m) |  | Petrol & Fuel Sites |
| | |  | Underground High Pressure Oil & Fuel Pipelines |

3. Current Land Uses

3.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

8

The following records are represented as points on the Current Land Uses map.

ID	Distance	Direction	Company	Address	Activity	Category
1	60.0	NE	Electricity Sub Station	DA11	Electrical Features	Infrastructure and Facilities
2A	72.0	NE	Tollgate Filling Station	Watling Street, Gravesend, DA11 7NP	Petrol and Fuel Stations	Road and Rail
3A	72.0	NE	Tollgate Filling Station	Watling Street, Gravesend, DA11 7NP	Petrol and Fuel Stations	Road and Rail
4	142.0	NE	Westfield Technical Services Ltd	2, Wentworth Close, Gravesend, DA11 7NL	Civil Engineers	Engineering Services
5	185.0	NW	Electricity Sub Station	DA11	Electrical Features	Infrastructure and Facilities
6	196.0	N	B & W Products	398, Wrotham Road, Gravesend, DA11 7PF	General Construction Supplies	Industrial Products
7	230.0	NW	Tank	DA11	Tanks (Generic)	Industrial Features
8	247.0	E	Gravesend Elite Travel	15, Golf Links Avenue, Gravesend, DA11 7PA	Vehicle Hire and Rental	Hire Services

3.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

2

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance	Direction	NGR	Company	Address	LPG	Status
9	37.0	NE	564268, 171309	BP	Tollgate Filling Station, Watling Street, Watling Street, Wrotham Road, Gravesend, Kent, DA11 7NP	Yes	Open
10	111.0	W	564060, 171213	BP	Turnpike Garage, Wrotham Road, Wrotham Road, Northfleet, Gravesend, Kent, DA13 9RE	Not Applicable	Obsolete

3.3 Underground High Pressure Oil and Gas Pipelines

Records of high pressure underground pipelines within 500m of the study site:

0

Database searched and no data found.

4. Geology

4.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

LEX Code	Description	Rock Type
MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
WGR-OPEN	WORKED GROUND (UNDIVIDED)	VOID
WGR-OPEN	WORKED GROUND (UNDIVIDED)	VOID

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

4.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
HEAD-CSSG	HEAD	CLAY, SILT, SAND AND GRAVEL

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

4.3 Bedrock and Solid Geology

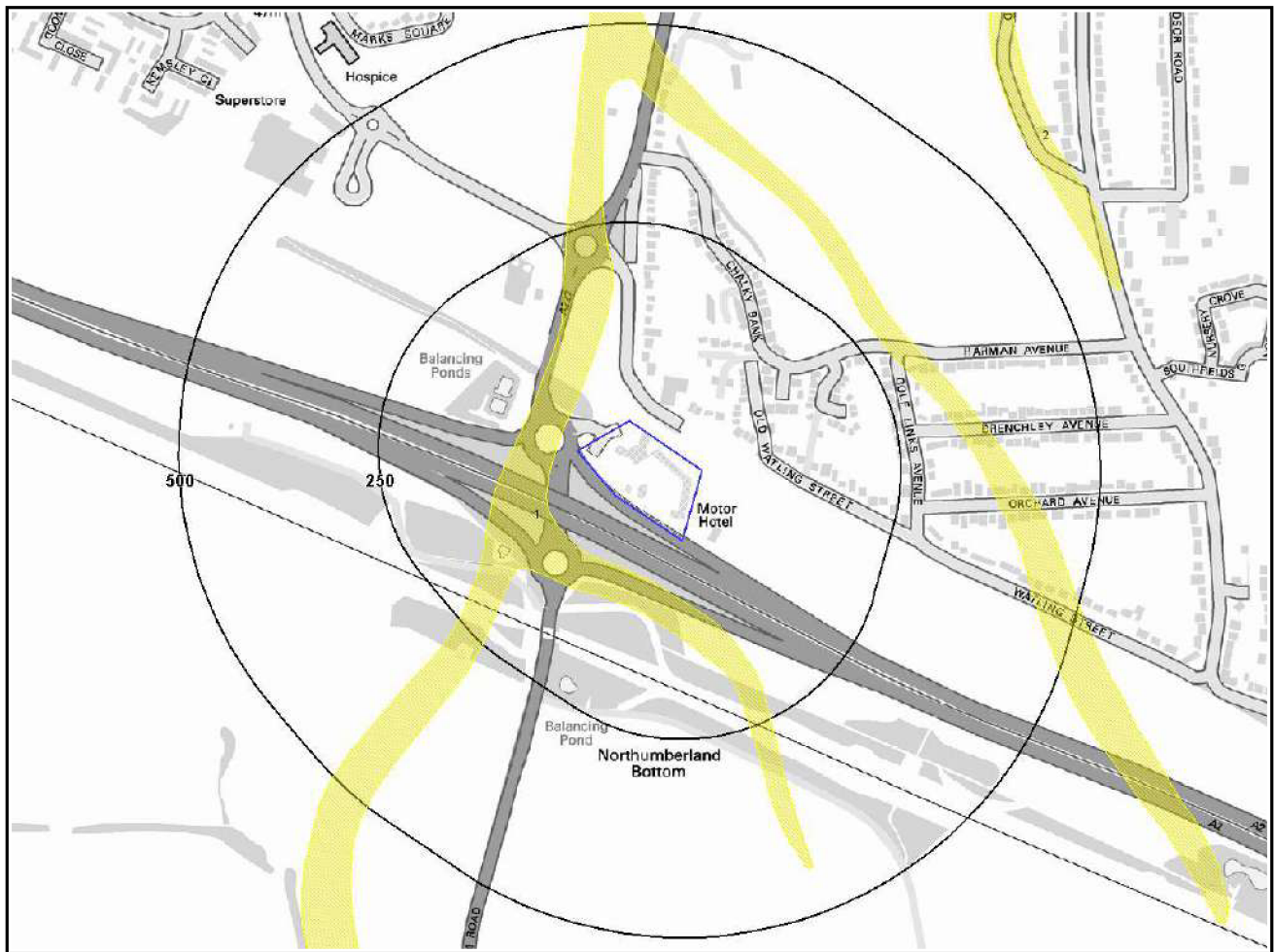
The database has been searched on site, including a 50m buffer.

LEX Code	Description	Rock Type
SNCK-CHLK	SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)	CHALK

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

For more detailed geological and ground stability data please refer to the "GroundSure GeoInsight". Available from our website.

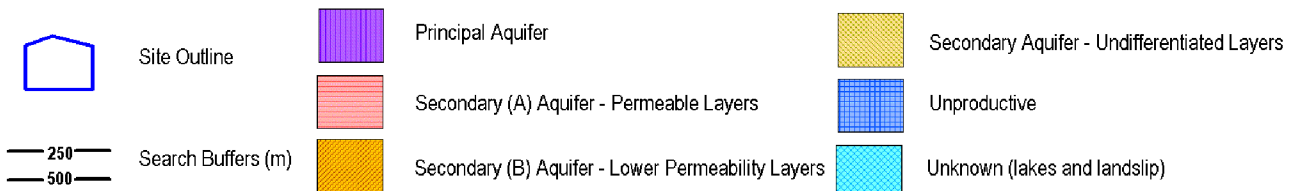
5a. Hydrogeology - Aquifer Within Superficial Geology



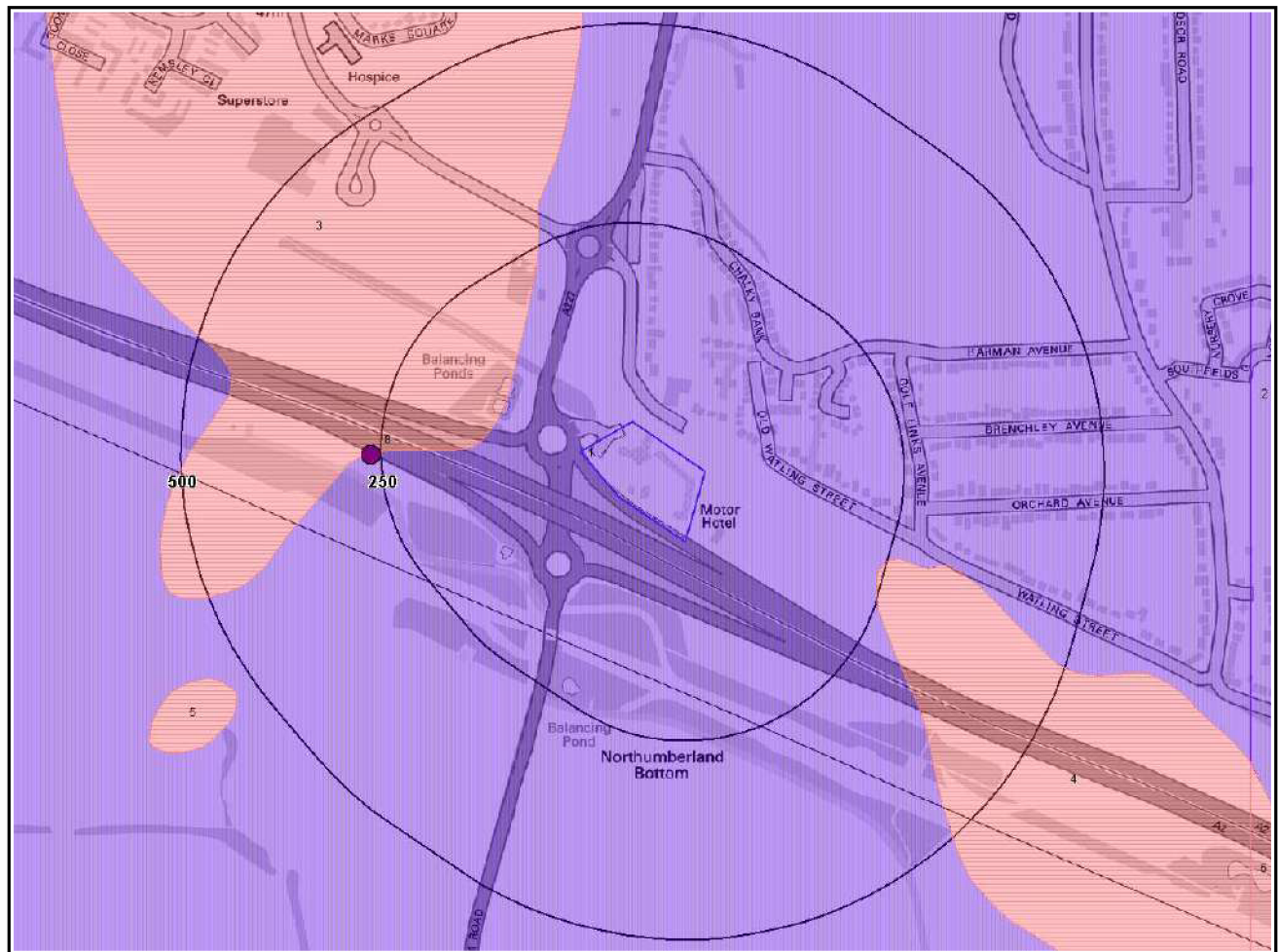
Aquifer Within Superficial Geology Legend



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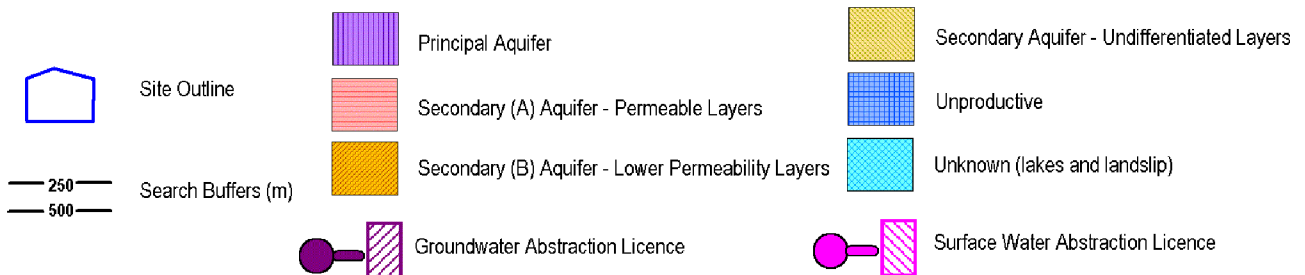
5b. Hydrogeology - Aquifer Within Bedrock Geology and Abstraction Licenses



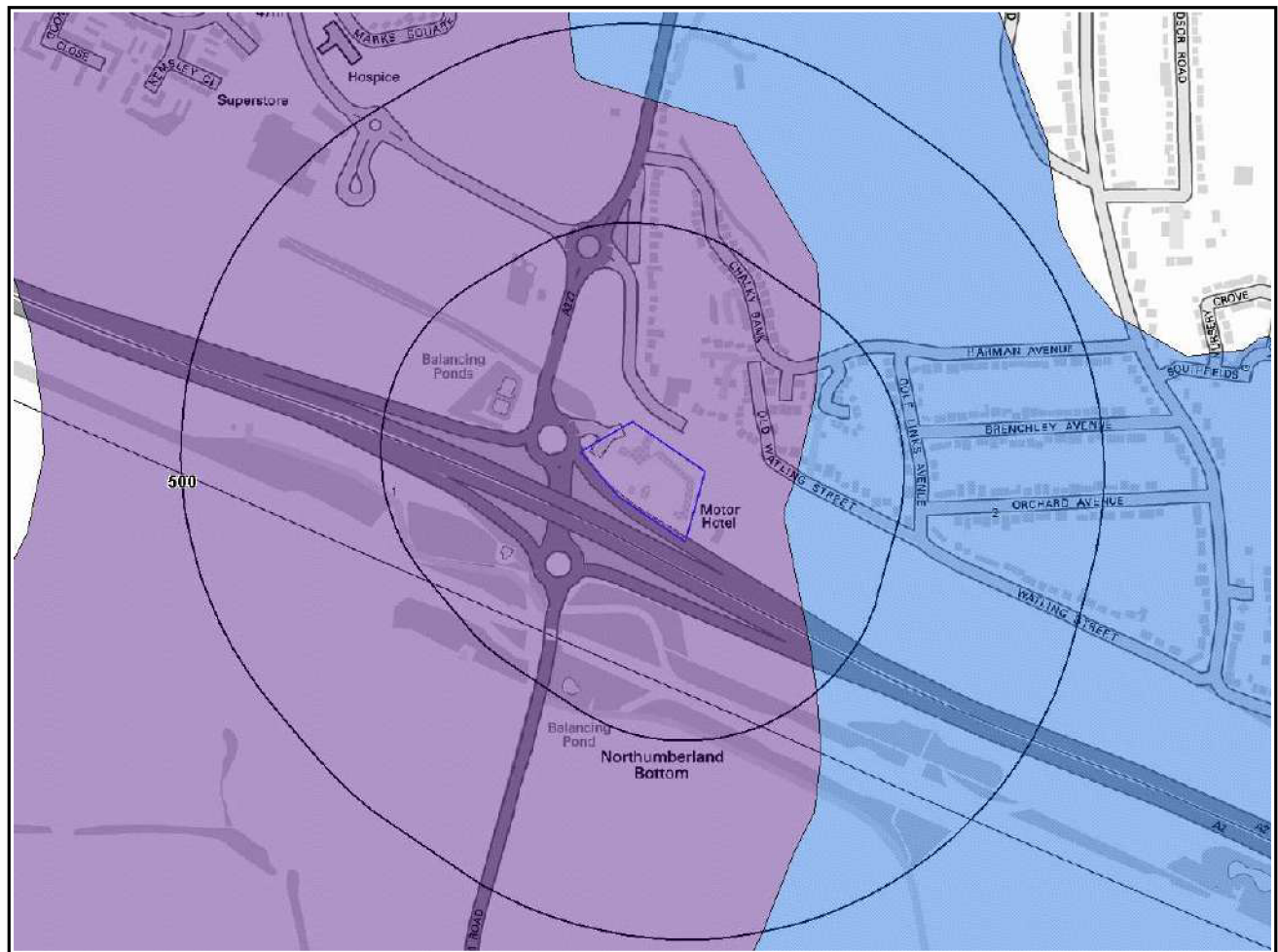
Aquifer Within Bedrock Geology Legend



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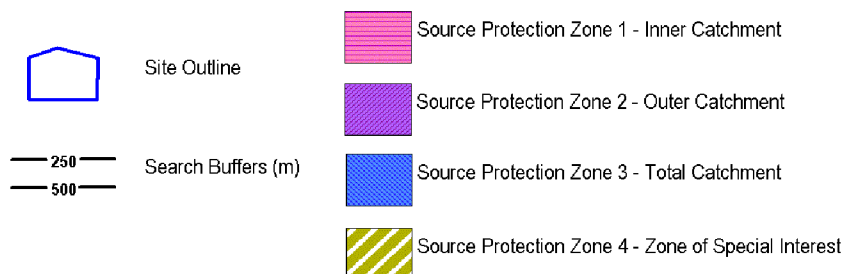
5c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



SPZ and Potable Water Abstraction Licenses
Legend

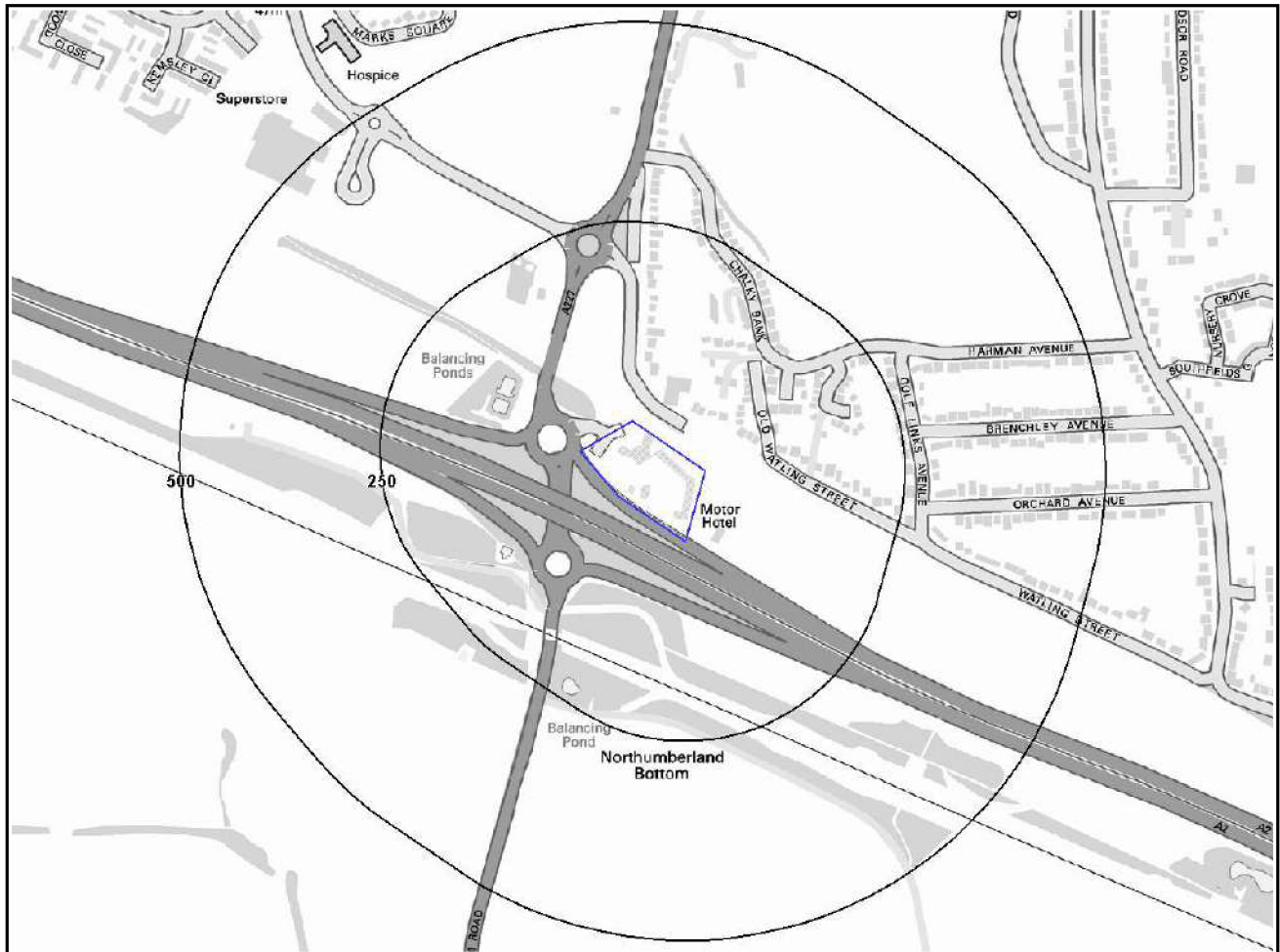


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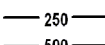


Search Buffers (m)

5d. Hydrology – Detailed River Network and River Quality



Hydrology Legend

	Site Outline		Primary River		Canal
			Secondary River		Canal Tunnel
			Tertiary River		Extended Culvert (greater than 50m)
	Search Buffers (m)		Lake/Reservoir		D/S of High Water Mark
			Underground River (inferred)		D/S seaward extension
			General Quality Assessment: Chemistry		General Quality Assessment: Biology

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5. Hydrogeology and Hydrology

5.1 Aquifer within Superficial Deposits

Are there records of productive strata within the superficial geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (5a):

ID	Distance [m]	Direction	Designation	Description
1	26.0	W	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

5.2 Aquifer within Bedrock Deposits

Are there records of productive strata within the bedrock geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (5b):

ID	Distance [m]	Direction	Designation	Description
1	0.0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
3	111.0	NW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
4	242.0	E	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

5.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? **Yes**

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (5b):

ID	Distance	Direction	NGR	Details
----	----------	-----------	-----	---------

8	263.0	W	563900, 171250	Licence No: 01/164 Details: Dust Suppression Direct Source: Southern Region Groundwater Point: Tollgate Junction Data Type: Point	Annual Volume (m³): 38220 Max Daily Volume (m³): 156 Original Application No: 169K0075 Original Start Date: 1/11/2007 Expiry Date: 31/10/2008 Issue No: 1 Version Start Date: 1/11/2007 Version End Date:
Not shown	1164.0	W		Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Boreholes, Wells And Adits At Hazells Ps, Northfleet Data Type: Region	Annual Volume (m³): 17700000 Max Daily Volume (m³): 96000 Original Application No: 169/0639D Original Start Date: - Expiry Date: - Issue No: 100 Version Start Date: 27/11/2006 Version End Date:
Not shown	1932.0	S		Licence No: 9/40/01/0511/G Details: Transfer between sources Direct Source: Southern Region Groundwater Point: Lower Greensand Boreholes, Wells And Adits At Northfleet Ps Data Type: Region	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 169/0639D Original Start Date: - Expiry Date: - Issue No: 100 Version Start Date: 6/12/1988 Version End Date:
Not shown	1932.0	S		Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Chalk Boreholes, Wells And Adits At Northfleet Ps Data Type: Region	Annual Volume (m³): 17700000 Max Daily Volume (m³): 96000 Original Application No: 169/0639D Original Start Date: - Expiry Date: - Issue No: 100 Version Start Date: 27/11/2006 Version End Date:
Not shown	1932.0	S		Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Lower Greensand Boreholes, Wells And Adits At Northfleet Ps Data Type: Region	Annual Volume (m³): 17700000 Max Daily Volume (m³): 96000 Original Application No: 169/0639D Original Start Date: - Expiry Date: - Issue No: 100 Version Start Date: 27/11/2006 Version End Date:

5.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site?

No

Database searched and no data found.

5.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site?

Yes

The following Potable Water Abstraction Licences records are represented as points, lines and regions on the SPZ and Potable Water Abstraction Licences Map (5c):

ID	Distance	Direction	NGR	Details	
Not shown	1164.0	W	562950, 171340	Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Boreholes, Wells And Adits At Hazells Ps, Northfleet Data Type: Region	Annual Volume (m³): 17700000 Max Daily Volume (m³): 96000 Original Application No: 169/0639D Original Start Date: - Expiry Date: - Issue No: 100 Version Start Date: Version End Date:

Not shown	1932.0	S	563900, 169250	Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Chalk Boreholes, Wells And Adits At Northfleet Ps Data Type: Region	Annual Volume (m ³): 17700000 Max Daily Volume (m ³): 96000 Original Application No: 169/0639D Original Start Date: - Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1932.0	S	563900, 169250	Licence No: 9/40/01/0511/G Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Lower Greensand Boreholes, Wells And Adits At Northfleet Ps Data Type: Region	Annual Volume (m ³): 17700000 Max Daily Volume (m ³): 96000 Original Application No: 169/0639D Original Start Date: - Expiry Date: - Issue No: 100 Version Start Date: Version End Date:

5.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site?

Yes

The following Source Protection Zones records are represented on the SPZ and Potable Water Abstraction Map (5c):

ID	Distance	Direction	Type	Description
1	0.0	On Site	2	Outer Catchment
2	108.0	E	3	Total Catchment

5.7 River Quality

Is there any Environment Agency information on river quality within 1500m of the study site?

No

Biological Quality:

Database searched and no data found.

Chemical Quality:

Database searched and no data found.

5.8 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site?

No

Database searched and no data found.

5.9 Surface Water Features

Are there any surface water features within 250m of the study site?

Yes

The following surface water records are not represented on mapping:

Distance to Surface Water (m)	on-site	0-50	51-250
-------------------------------	---------	------	--------

Report Reference: S EMS-175297_258287

Surface water features within 250m of the study site	No	No	Yes
--	----	----	-----

NW



SV



E



Site Outline

— 250 —
— 500 — Search Buffers (m)

Zone 2 Floodplain

Zone 3 Floodplain

Flood Storage Area

Area Benefiting from Flood Defences

Flood Defences

6. Flooding

6.1 Zone 2 Flooding

Zone 2 floodplain estimates the annual probability of flooding as one in one thousand (0.1%) or greater from rivers and the sea but less than 1% from rivers or 0.5% from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 2 floodplain? **Yes**

The following floodplain records are represented as green shading on the Flood Map:

ID	Distance	Direction	Update	Type
1	48.0	NW	04-Jul-2012	Zone 2 - (Fluvial Models)

6.2 Zone 3 Flooding

Zone 3 estimates the annual probability of flooding as one in one hundred (1%) or greater from rivers and a one in two hundred (0.5%) or greater from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 3 floodplain? **Yes**

The following floodplain records are represented as blue shading on the Flood Map:

ID	Distance	Direction	Update	Type
3	48.0	W	04-Jul-2012	Zone 3 - (Fluvial Models)

6.3 Flood Defences

Are there any Flood Defences within 250m of the study site? **No**

6.4 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? **No**

6.5 Areas used for Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? **No**

6.6 Groundwater Flooding Susceptibility Areas

Are there any British Geological Survey groundwater flooding susceptibility flood areas within 50m of the boundary of the study site? **Yes**

Report Reference: S EMS-175297_258287

What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Very Low

6.7 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result?

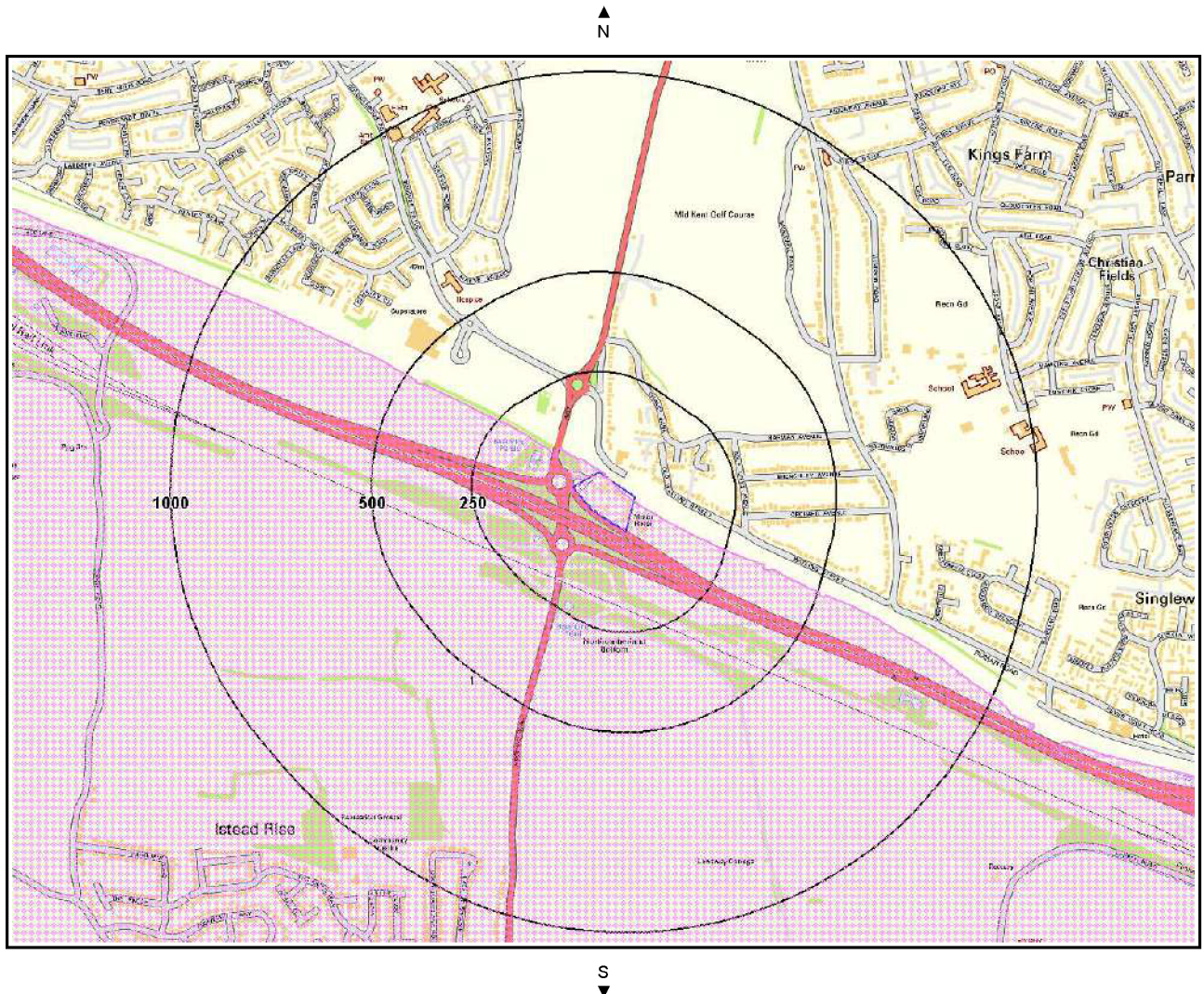
High

Notes:

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The **confidence rating** is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

7.Designated Environmentally Sensitive Sites Map



Designated Environmentally Sensitive Sites Legend

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	Site Outline		SAC		SSSI		NNR		World Heritage Sites
	Search Buffers (m)		SPA		Ramsar		LNR		Environmentally Sensitive Areas
			Areas of Outstanding Natural Beauty		Nitrate Sensitive Areas		National Parks		

7. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site? **Yes**

Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site: **0**

Database searched and no data found.

Records of National Nature Reserves (NNR) within 2000m of the study site: **0**

Database searched and no data found.

Records of Special Areas of Conservation (SAC) within 2000m of the study site: **0**

Database searched and no data found.

Records of Special Protection Areas (SPA) within 2000m of the study site: **0**

Database searched and no data found.

Records of Ramsar sites within 2000m of the study site: **0**

Database searched and no data found.

Records of Local Nature Reserves (LNR) within 2000m of the study site: **0**

Database searched and no data found.

Records of World Heritage Sites within 2000m of the study site: **0**

Database searched and no data found.

Records of Environmentally Sensitive Areas within 2000m of the study site: **0**

Database searched and no data found.

Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site: **0**

Database searched and no data found.

Records of National Parks (NP) within 2000m of the study site: **0**

Database searched and no data found.

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Records of Nitrate Sensitive Areas within 2000m of the study site: **0**

Database searched and no data found.

Records of Nitrate Vulnerable Zones within 2000m of the study site: **2**

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance	Direction	NVZ Type	Data Source
1	0.0	On Site	NVZ Area	DEFRA
Not shown	1141.0	S	NVZ Area	DEFRA

8. Natural Hazards Findings

8.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a GroundSure GeoInsight, available from our website. The following information has been found:

8.1.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

8.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

8.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? **High**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very significant soluble rocks are present, with a high possibility of localised subsidence occurring naturally or in adverse conditions such as high surface or subsurface water flow. Obtain specialist advice to advise on need for stabilisation work and/or land management plan to maintain stability. Do not dispose of drainage into the ground. For new build a specialist land stability assessment is necessary. Investigation, remediation and/or mitigation works may be necessary to stabilise the area. Construction work may cause subsidence. Surface drainage must not affect the karst system or groundwater. Increased construction costs are likely. For existing property increase in insurance risk due to potential soluble rocks hazards. Potential of groundwater pollution.

8.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

8.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site?

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

8.1.6 Running Sand

What is the maximum Running Sand* hazard rating identified on the study site?

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site.

9. Mining

9.1 Coal Mining

Are there any coal mining areas within 75m of the study site?

No

Database searched and no data found.

9.2 Shallow Mining

What is the subsidence hazard relating to shallow mining on-site*?

Low

*Please note this data is searched with a 150m buffer.

9.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site?

No

Database searched and no data found.

10. Contacts

GroundSure Helpline

Telephone: 08444 159 000
 info@4c.groundsure.com



British Geological Survey (England & Wales)

Kingsley Dunham Centre
 Keyworth, Nottingham NG12 5GG
 Tel: 0115 936 3143. Fax: 0115 936 3276. Email:
 enquiries@bgs.ac.uk
 Web: www.bgs.ac.uk
 BGS Geological Hazards Reports and general geological
 enquiries



Environment Agency

National Customer Contact Centre
 PO Box 544
 Rotherham
 S60 1BY
 Tel: 08708 506 506
 Web: www.environment-agency.gov.uk
 Email: enquiries@environment-agency.gov.uk



Health Protection Agency

Chilton, Didcot, Oxon, OX11 0RQ
 Tel: 01235 822622 www.hpa.org.uk/radiation
 Radon measures and general radon information and
 guidance



The Coal Authority

200 Lichfield Lane, Mansfield, Notts NG18 4RG
 Tel: 0845 762 6848
 DX 716176 Mansfield 5
 Web: www.groundstability.com



Ordnance Survey

Romsey Road
 Southampton SO16 4GU
 Tel: 08456 050505



Local Authority

Authority: Gravesham Borough Council
 Phone: 01474 33 70 00
 Web: www.gravesham.gov.uk
 Address: Civic Centre, Windmill Street, Gravesend, DA12
 1AU

Get Mapping PLC

Virginia Villas, High Street, Hartley Witney, Hampshire RG27
 8NW
 Tel: 01252 845444



Acknowledgements

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Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, English Nature who retain the Copyright and Intellectual Property Rights for the data.

PointX © Database Right/Copyright, Thomson Directories Limited © Copyright Link Interchange Network Limited © Database Right/Copyright and Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028].
 This report has been prepared in accordance with the GroundSure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

1 Definitions

In these conditions unless the context otherwise requires:

"Beneficiary" means the Client or the customer of the Client for whom the Client has procured the Services.

"Commercial" means any building which is not Residential.

"Commission" means an order for Consultancy Services submitted by a Client.

"Consultancy Services" mean consultancy services provided by GroundSure including, without limitation, carrying out interpretation of third party and in-house environmental data, provision of environmental consultancy advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Contract" means the contract between GroundSure and the Client for the performance of the Services which arises upon GroundSure's acceptance of an Order or Commission and which shall incorporate these conditions, the relevant GroundSure User Guide, proposal by GroundSure and the content of any subsequent report, and any agreed amendments in accordance with clause 11.

"Client" means the party that submits an Order or Commission.

"Data Provider" means any third party providing Third Party Content to GroundSure.

"Data Report" means reports comprising factual data with no professional interpretation in respect of the level of likely risk and/or liability available from GroundSure.

"GroundSure" means GroundSure Limited, a company registered in England and Wales under number 03421028 and whose registered office is at Greater London House, Hampstead Road, London NW1 7EJ.

"GroundSure Materials" means all materials prepared by GroundSure as a result of the provision of the Services, including but not limited to Data Reports, Mapping and Risk Screening Reports.

"Intellectual Property" means any patent, copyright, design rights, service marks, moral rights, data protection rights, know-how, trade mark or any other intellectual property rights.

"Mapping" an historical map or a combination of historical maps of various ages, time periods and scales available from GroundSure.

"Order" means an order form submitted by the Client requiring Services from GroundSure in respect of a specified Site.

"Order Website" means online platform via which Orders may be placed.

"Report" means a Risk Screening Report or Data Report for commercial or residential property available from GroundSure relating to the Site prepared in accordance with the specifications set out in the relevant User Guide.

"Residential" means any building used as or suitable for use as an individual dwelling.

"Risk Screening Report" means one of GroundSure's risk screening reports, comprising factual data with interpretation in respect of the level of likely risk and/or liability, excluding "Consultancy Services".

"Services" means the provision of any Report, Mapping or Consultancy Services which GroundSure has agreed to carry out for the Client/Beneficiary on these terms and conditions in respect of the Site.

"Site" means the landsite in respect of which GroundSure provides the Services.

"Third Party Content" means any data, database or other information contained in a Report or Mapping which is provided to GroundSure by a Data Provider.

"User Guide" means the relevant current version of the user guide, available upon request from GroundSure.

2 Scope of Services

2.1 GroundSure agrees to carry out the Services in accordance with the Contract and to the extent set out therein.

2.2 GroundSure shall exercise all the reasonable skill, care and diligence to be expected of experienced environmental consultants in the performance of the Services.

2.3 The Client acknowledges that it has not relied on any statement or representation made by or on behalf of GroundSure which is not set out and expressly agreed in the Contract.

2.4 Terms and conditions appearing on a Client's order form, printed stationery or other communication, including invoices, to GroundSure, its employees, servants, agents or other representatives or any terms implied by custom, practice or course of dealing shall be of no effect and these terms and conditions shall prevail over all others.

2.5 If a Client/Beneficiary requests insurance in conjunction with or as a result of the Services, GroundSure shall use reasonable endeavours to procure such insurance, but makes no warranty that such insurance shall be available from insurers or offered on reasonable terms. GroundSure does not endorse or recommend any particular insurance product, policy or insurer. Any insurance purchased shall be subject solely to the terms of the policy issued by insurers and GroundSure will have no liability therefor. The Client/Beneficiary should take independent advice to ensure that the insurance policy requested and/or offered is suitable for its requirements.

2.6 GroundSure's quotations/proposals are valid for a period of 30 days only. GroundSure reserves the right to withdraw any quotation at any time before GroundSure accepts an Order or Commission. GroundSure's acceptance of an Order or Commission shall be effective only where such acceptance is in writing and signed by GroundSure's authorised representative or where accepted via GroundSure's Order Website.

3 The Client's obligations

3.1 The Client shall ensure the Beneficiary complies with and is bound by the terms and conditions set out in the Contract and shall provide that GroundSure may in its own right enforce such terms and conditions against the Beneficiary pursuant to the Contracts (Rights of Third Parties) Act 1999. The Client shall be liable for all breaches of the Contract by the Beneficiary as if they were breaches by the Client. The Client shall be solely responsible for ensuring that the Report/Mapping ordered is appropriate and suitable for the Beneficiary's needs.

3.2 The Client shall (or shall procure that the Beneficiary shall) supply to GroundSure as soon as practicable and without charge all information necessary and accurate relevant data including any specific and/or unusual environmental information relating to the Site known to the Client/Beneficiary which may pertain to the Services and shall give such assistance as GroundSure shall reasonably require in the performance of the Services (including, without limitation, access to a Site, facilities and equipment as agreed in the Contract).

3.3 Where Client/Beneficiary approval or decision is required, such approval or decision shall be given or procured in reasonable time as not to delay or disrupt the performance of any other part of the Services.

3.4 The Client shall not and shall not knowingly permit the Beneficiary to, save as expressly permitted by these terms and conditions, re-sell, alter, add to, amend or use out of context the content of any Report, Mapping or, in respect of any Services, information given by GroundSure. For the avoidance of doubt, the Client and Beneficiary may make the Report, Mapping or GroundSure's findings available to a third party who is considering acquiring the whole or part of the Site, or providing funding in relation to the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.5 The Client is responsible for maintaining the confidentiality of its user name and password if using GroundSure's internet ordering service and accepts responsibility for all activity that occurs under such account and password.

4 Reliance

4.1 Upon full payment of all relevant fees and subject to the provisions of these terms and conditions, the Client and Beneficiary are granted an irrevocable royalty-free licence to access the information contained in a Report, Mapping or in a report prepared by GroundSure in respect of or arising out of Consultancy Services. The Services may only be used for the benefit of the Client and those persons listed in clauses 4.2 and 4.3.

4.2 In relation to Data Reports, Mapping and Risk Screening Reports, the Client shall be entitled to make Reports available to (i) the Beneficiary, (ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate), (iv) the first purchaser or first tenant of the Site (v) the professional advisers and lenders of the first purchaser or tenant of the Site. Accordingly GroundSure shall have the same duties and obligations to those persons in respect of the Services as it has to the Client and those persons shall have the benefit of any of the Client's rights under the Contract as if those persons were parties to the Contract. For the avoidance of doubt, the limitations of GroundSure's liability as set out in clauses 7 and 11.6 shall apply.

4.3 In relation to Consultancy Services, reliance shall be limited to the Client, Beneficiary and named parties on the Report.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise agreed in writing with GroundSure, any other party considering the information supplied by GroundSure as part of the Services, including (but not limited to) insurance underwriters, does so at their own risk and GroundSure has no legal obligations to such party unless otherwise agreed in writing.

4.5 The Client shall not and shall not knowingly permit any person (including the Beneficiary) who is provided with a copy of any Report, (except as permitted herein or by separate agreement with GroundSure) to: (a) remove, suppress or modify any trade mark, copyright or other proprietary marking from the Report or Mapping; (b) create any product which is derived directly or indirectly from the data contained in the Report or Mapping; (c) combine the Report or Mapping with, or incorporate the Report or Mapping into any other information data or service; or (d) re-format or otherwise change (whether by modification, addition or enhancement) data or images contained in the Report or Mapping.

4.6 Notwithstanding clause 4.5, if the Client acts in a professional capacity, it may make reasonable use of a Report and/or findings made as a result of Consultancy Services to advise Beneficiaries. However, GroundSure shall have no liability in respect of any opinion or report given to such Beneficiaries by the Client or a third party.

5 Fees and Disbursements

5.1 GroundSure shall charge the Client fees at the rate and frequency specified in the Contract together, in the case of Consultancy Services, with all proper disbursements incurred by GroundSure in performing the Services. For the avoidance of doubt, the fees payable for the Services are as set out in GroundSure's written proposal, Order Website or Order acknowledgement form. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services.

5.2 Unless GroundSure requires prepayment, the Client shall promptly pay all fees disbursements and other monies due to GroundSure in full without deduction, counterclaim or set off together with such value added tax or other tax as may be required within 30 days from the date of GroundSure's invoice or such other period as may be agreed in writing between GroundSure and the Client ("**Payment Date**"). GroundSure reserves the right to charge interest which shall accrue on a daily basis from 30 days after the date of Payment Date until the date of payment (whether before or after judgment) at the rate of five per cent per annum above the Bank of England base rate from time to time.

5.3 In the event that the Client disputes the amount payable in respect of GroundSure's invoice it shall notify GroundSure no later than 28 days after the date thereof that it is in dispute. In default of such notification the Client shall be deemed to have agreed the amount thereof. As soon as reasonably practicable following receipt of a notification in dispute of any disputed invoice, a member of the management team at GroundSure shall contact the Client and the parties shall use all reasonable endeavours to resolve the dispute.

6 Intellectual Property and Confidentiality

6.1 Subject to the provisions of clause 4.1, the Client and the Beneficiary hereby acknowledge that all Intellectual Property in the Services and Content are and shall remain owned by either GroundSure or the Data Providers and nothing in these terms purports to transfer or assign any rights to the Client or the Beneficiary in respect of the Intellectual Property.

6.2 The Client shall acknowledge the ownership of the **Third Party Content** where such **Third Party Content** is incorporated or used in the Client's own documents, reports, systems or services whether or not these are supplied to a third party.

6.3 Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client acknowledges that the proprietary rights subsisting in copyright, database rights and any other intellectual property rights in respect of any data and information contained in any Report are and shall remain (subject to clause 11.1) the property of GroundSure and/or any third party that has supplied data or information used to create a Report, and that these conditions do not purport to grant, assign or transfer any such rights in respect thereof to a Client and/or a Beneficiary.

6.5 The Client shall (and shall procure that any recipients of the Report as permitted under clause 4.2 shall):

(i) not remove, suppress or modify any trademark, copyright or other proprietary marking belonging to GroundSure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

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- (iii) not create any product or report which is derived directly or indirectly from the data contained in the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);
 - (iv) not combine the Services with or incorporate such Services into any other information data or service; and
 - (v) not reformat or otherwise change (whether by modification, addition or enhancement), data contained in the Services (save that those acting in a professional capacity to the Beneficiary shall not be in breach of this clause 6.5(v) where such reformatting is in the normal course of providing advice based upon the Services), in each case of parts (iii) to (v) inclusive, whether or not such product or report is produced for commercial profit or not.
- 6.6 The Client and/or Beneficiary shall and shall procure that any party to whom the Services are made available shall notify GroundSure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.
- 6.8 Save as otherwise set out in these terms and conditions, any information provided by one party ("**Disclosing Party**") to the other party ("**Receiving Party**") shall be treated as confidential and only used for the purposes of these terms and conditions, except in so far as the Receiving Party is authorised by the Disclosing Party to provide such information in whole or in part to a third party.

7 Liability

THE CLIENT'S ATTENTION IS DRAWN TO THIS PROVISION

- 7.1 Subject to the provisions of this clause 7, GroundSure shall be liable to the Beneficiary only in relation to any direct losses or damages caused by any negligent act or omission of GroundSure in preparing the GroundSure Materials and provided that the Beneficiary has used all reasonable endeavours to mitigate any such losses.
- 7.2 GroundSure shall not be liable for any other losses or damages incurred by the Beneficiary, including but not limited to:
- (i) loss of profit, revenue, business or goodwill, losses relating to business interruption, loss of anticipated savings, loss of or corruption to data or for any special, indirect or consequential loss or damage which arise out of or in connection with the GroundSure Materials or otherwise in relation to a Contract;
 - (ii) any losses or damages that arise as a result of the use of all or part of the GroundSure Materials in breach of these terms and conditions or contrary to the terms of the relevant User Guide;
 - (iii) any losses or damages that arise as a result of any error, omission or inaccuracy in any part of the GroundSure Materials where such part is based on any Third Party Content or any reasonable interpretation of Third Party Content. The Client accepts, and shall procure that any other Beneficiary shall accept, that it has no claim or recourse to any Data Provider in relation to Third Party Content; and/or
 - (iv) any loss or damage to a Client's computer, software, modem, telephone or other property caused by a delay or loss of use of GroundSure's internet ordering service.
- 7.3 GroundSure's total liability in contract, tort (including negligence or breach of statutory duty), misrepresentation, restitution or otherwise, arising in connection with the GroundSure Materials or otherwise in relation to the Contract shall be limited to £10 million in total (i) for any one claim or (ii) for a series of connected claims brought by one or more parties.
- 7.4 For the duration of the liability periods set out in clauses 7.5 and 7.6 below, GroundSure shall maintain professional indemnity insurance in respect of its liability under these terms and conditions provided such insurance is readily available at commercially viable rates. GroundSure shall produce evidence of such insurance if reasonably requested by the Client. A level of cover greater than GroundSure's current level of cover may be available upon request and agreement with the Client.
- 7.5 Any claim under the Contract in relation to Data Reports, Mapping and Risk Screening Reports, must be brought within six years from the date when the Beneficiary became aware that it may have a claim and in no event may a claim be brought twelve years or more after completion of such a Contract. For the avoidance of doubt, any claim in respect of which proceedings are notified to GroundSure in writing prior to the expiry of the time periods referred to in this clause 7.5 shall survive the expiry of those time periods provided the claim is actually commenced within six months of notification.
- 7.6 Any claim under the Contract in relation to Consultancy Services, must be brought within six years from the date the Consultancy Services were completed.
- 7.7 The Client accepts and shall procure that any other Beneficiary shall accept that it has no claim or recourse to any Data Provider or to GroundSure in respect of the acts or omissions of any Data Provider and/or any Third Party Content provided by a Data Provider.
- 7.8 Nothing in these terms and conditions:
- (i) excludes or limits the liability of GroundSure for death or personal injury caused by GroundSure's negligence, or for fraudulent misrepresentation; or
 - (ii) shall affect the statutory rights of a consumer under the applicable legislation.

8 GroundSure right to suspend or terminate

- 8.1 In the event that GroundSure reasonably believes that the Client or Beneficiary as applicable has not provided the information or assistance required to enable the proper performance of the Services, GroundSure shall be entitled on fourteen days written notice to suspend all further performance of the Services until such time as any such deficiency has been made good.
- 8.2 GroundSure may additionally terminate the Contract immediately on written notice in the event that:
- (i) the Client shall fail to pay any sum due to GroundSure within 28 days of the Payment Date; or
 - (ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an Administration Order made against it or if a Receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or
 - (iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or
 - (iv) the Client or the Beneficiary breaches any material term of the Contract (including, but not limited to, the obligations in clause 4) incapable of remedy or if remediable, is not remedied within 14 days of notice of the breach.

9 Client's Right to Terminate and Suspend

- 9.1 Subject to clause 10.2, the Client may at any time after commencement of the Services by notice in writing to GroundSure require GroundSure to terminate or suspend immediately performance of all or any of the Services.
- 9.2 The Client waives all and any right of cancellation it may have under the Consumer Protection (Distance Selling) Regulations 2000 (as amended) in respect of the Order of a Report/Mapping. This does not affect the Beneficiary's statutory rights.

10 Consequences of Withdrawal, Termination or Suspension

- 10.1 Upon termination or any suspension of the Services, GroundSure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client/Beneficiary any property of the Client/Beneficiary in GroundSure's possession or control.
- 10.2 In the event of termination/suspension of the Contract under clauses 8 or 9, the Client shall pay to GroundSure all and any fees payable in respect of the performance of the Services up to the date of termination/suspension. In respect of any Consultancy Services provided, the Client shall also pay GroundSure any additional costs incurred in relation to the termination/suspension of the Contract.

11 General

- 11.1 The mapping contained in the Services is protected by Crown copyright and must not be used for any purpose outside the context of the Services or as specifically provided in these terms.
- 11.2 GroundSure reserves the right to amend these terms and conditions. No variation to these terms shall be valid unless signed by an authorised representative of GroundSure.
- 11.3 No failure on the part of GroundSure to exercise and no delay in exercising, any right, power or provision under these terms and conditions shall operate as a waiver thereof.
- 11.4 Save as expressly provided in clauses 4.2, 4.3, 6.3 and 11.5, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.
- 11.5 The Secretary of State for Communities and Local Government acting through Ordnance Survey may enforce breach of clause 6.1 of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
- 11.6 GroundSure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:
- (i) the Client or Beneficiary's failure to provide facilities, access or information;
 - (ii) fire, storm, flood, tempest or epidemic;
 - (iii) Acts of God or the public enemy;
 - (iv) riot, civil commotion or war;
 - (v) strikes, labour disputes or industrial action;
 - (vi) acts or regulations of any governmental or other agency;
 - (vii) suspension or delay of services at public registries by Data Providers; or
 - (viii) changes in law.
- 11.7 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.
- 11.8 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email and on the second working day after the day of posting if sent by first class post.
- 11.9 The Contract constitutes the entire contract between the parties and shall supersede all previous arrangements between the parties.
- 11.10 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.
- 11.11 These terms and conditions shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with these terms and conditions shall be subject to the exclusive jurisdiction of the English courts.
- 11.12 If the Client or Beneficiary has a complaint about the Services, notice can be given in any format eg writing, phone, email to the Compliance Officer at GroundSure who will respond in a timely manner.

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ATTACHMENT FOUR: CHEMICAL ANALYSIS DATA

Laboratory Analysis Report

Report Number 003424

Sampling Date 15th August 2012

Report Date 28th August 2012

Client	Site Name/Address
BP Oil UK Ltd 500-600 Witan Gate Central Milton Keynes Buckinghamshire MK9 1ES	Gravesend Service Station Watling Street (A2/A227) Gravesend Kent DA13 9RA

Number of Samples	Sample Type	Analysis Completed	Blind Testing	UKAS	MCERTS
6	Soil	IH QM:E9.4 based on TNRCC 1005 by GC-FID	RT Corp	Yes	No

QM E9.4: IH TPH Banded method C8 - C35 - Solvent (pentane) extraction then Liquid injection into GC-FID.
Samples were prepared and analysed 22-8-12

Analysis Report Approved By

Katherine Clark
Duty Reporting Manager



Glossary of Terms Used in This Report

Blank - A sample known to contain none of the compounds being analysed, and used to confirm that the analytical instrument is not giving false positives during analysis.

Blind Testing: Name of any blind testing scheme participated in. The laboratory's accuracy is reported as a Z score; the lower the Z score the more accurate the analysis, with a score of less than 2 considered excellent.

CRM - Certified Reference Material. A sample prepared by an accredited source and containing a known concentration of a given compound or compounds, which can be used to validate an analysis method.

Duplicate - A duplicate sample, used to give a measure of the repeatability of a given analysis.

External Calibration - External calibration samples are samples containing a known concentration of the compounds being analysed. They are added to the analysis sequence after every nth sample being analysed and provide confirmation that the instrument remains within its calibration range.

IRM - In house reference material. A sample prepared by our laboratory and containing a known concentration of a given compound or compounds, which can be used to validate an analysis method.

Linearity - The linearity of a given analytical method is the range of concentrations between which the analytical instrument's response is directly proportional to the concentration being analysed, and hence the range of concentrations that the instrument can be said to give quantitative results.

LOD - The lowest response for any given compound generated at the instrument's detector, that can be differentiated from the instrument's baseline noise.

LOQ - Limit of quantification. This is the lowest concentration that a given compound can be both detected and its concentration accurately measured in a sample.

MCERTS - An accreditation scheme created by the Environment Agency for the analysis of soil samples used to determine land quality. The scheme does not apply to analysis of soil samples used for waste classification purposes or to the analysis of water samples.

Method Calibration - The means by which an analytical method is calibrated. Usually this involves analysing a number of external calibration samples, containing different concentrations of the compounds to be analysed.

Precision - A measure of the repeatability of the analysis.

Sample - The material provided by the client to the laboratory for analysis.

Sensitivity - The smallest increment in analytical result that can be reliably quantified.

Spike - Also known as an internal calibration, a spike sample is a sample to be analysed which has a known concentration of another compound added. This provides a check on that the compounds being analysed are being correctly extracted from the sample matrix.

UKAS - The UK's implementation of ISO17025, the international standard accreditation for laboratory analysis

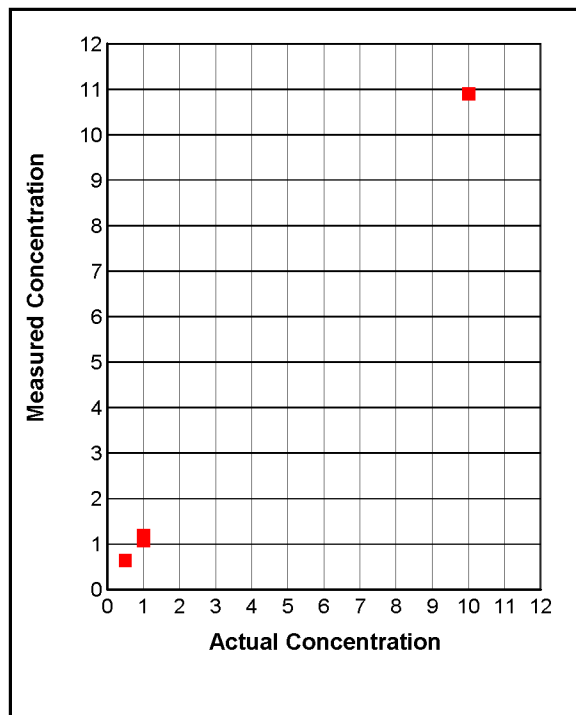
Quality Control/Quality Assurance Information

TPH Banded - Soil

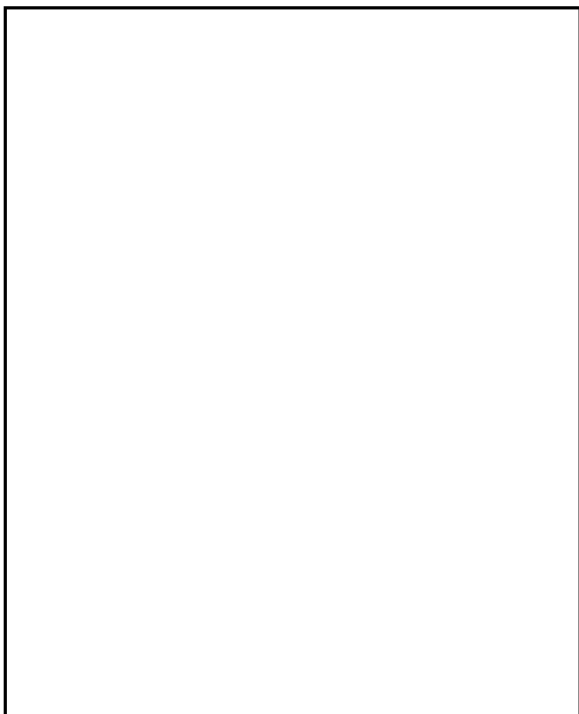
Our laboratory carries out a wide variety of verification analyses in order to ensure the validity of the analysis results we produce.

Samples are analysed in batches, usually according to the sample chain of custody form we receive. However, we also add additional samples into the sample sequence. These additional samples may include blanks, calibration samples, in-house reference material samples and duplicate samples. In addition to this, each sample is 'spiked' with a known concentration of a compound. In the case of this analysis, we use a combination of 2-fluorobiphenyl and 1-chlorooctadecane. The results of the analyses we have carried out on the additional quality assurance samples during the ten days prior to the samples reported here are shown in the accompanying graphs. Results are reported in mg/kg for the C8-C10 band.

These provide a visual indication of the stability of our laboratory analysis.



Calibration Samples - Previous 10 days



Spike Samples - Previous 10 days



Reference Material - Previous 10 days

Gravesend Service Station

Summary of Results

TPH Banded - Soil

Accreditation	UKAS	Blind Testing	RT Corp		
Results Reported As	Dry Weight	Last Three Z Scores	-1.24	-0.36	-1.19

Analysis Method Parameters			
Reporting Units	mg/kg	Limit of Detection	0.05mg/kg
Linearity	2,000mg/kg	Limit of Quantification	0.1mg/kg
Sensitivity	0.1mg/kg	Precision	+/-0.1mg/kg

Sample Location	Sample	Depth	Total Petroleum Hydrocarbons				
			C8-C10	>C10-C12	>C12-C16	>C16-C21	>C21-C35
BH1/4	sBP12954.001001	2.80	<0.5	<0.5	<0.5	<0.5	<0.5
BH2/2	sBP12954.001002	2.00	<0.5	<0.5	<0.5	<0.5	<0.5
BH3/3	sBP12954.001003	3.20	<0.5	<0.5	<0.5	<0.5	<0.5
BH4/3	sBP12954.001005	2.80	<0.5	<0.5	<0.5	<0.5	<0.5
BH5/2	sBP12954.001006	2.00	<0.5	<0.5	<0.5	<0.5	<0.5
BH6/3	sBP12954.001008	2.40	<0.5	<0.5	<0.5	<0.5	<0.5

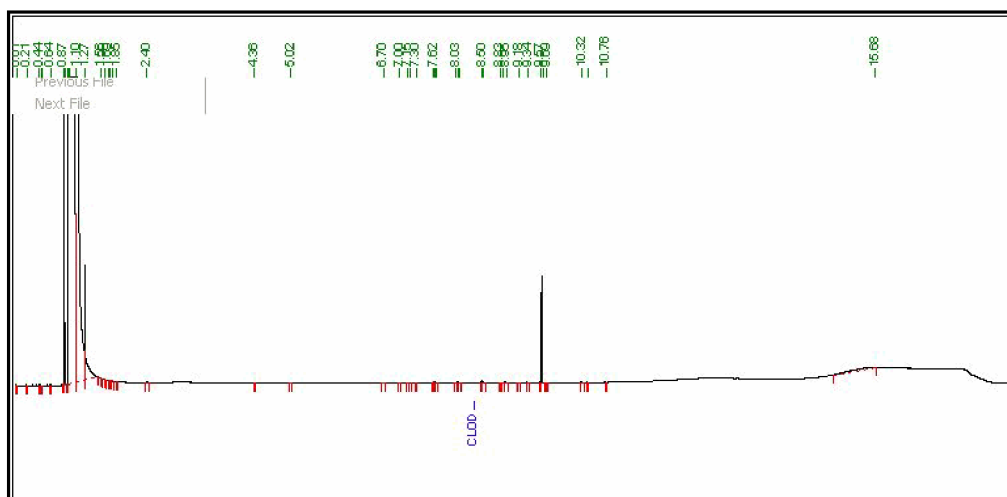
Individual Sample Results

TPH Banded - Soil

Sample Location	BH1/4	Results Reported As	Dry Weight
Sample	sBP12954.001001	Reporting Units	mg/kg
Depth(m)	2.80	Date Received	20/08/2012
Chain of Custody No.	6,051	Date of Sampling	15/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
WW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
42.31	38.75	30.45	10	10.48	0.90	0.00	<0.5	<0.5	<0.5	<0.5	<0.5

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gas Chromatogram for Sample

Gravesend Service Station

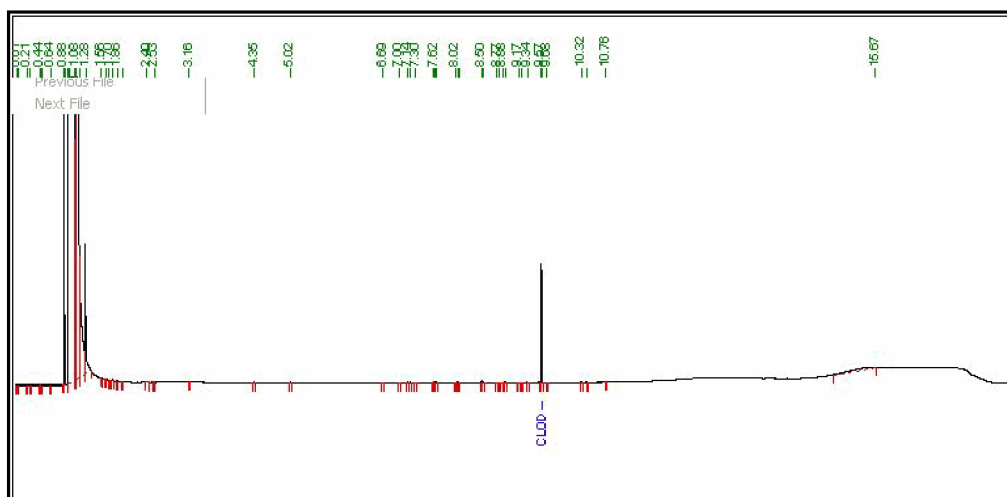
Individual Sample Results

TPH Banded - Soil

Sample Location	BH2/2	Results Reported As	Dry Weight
Sample	sBP12954.001002	Reporting Units	mg/kg
Depth(m)	2.00	Date Received	20/08/2012
Chain of Custody No.	6,051	Date of Sampling	15/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
WW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
42.05	38.89	26.49	10	10.39	1.00	0.00	<0.5	<0.5	<0.5	<0.5	<0.5

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gravesend Service Station

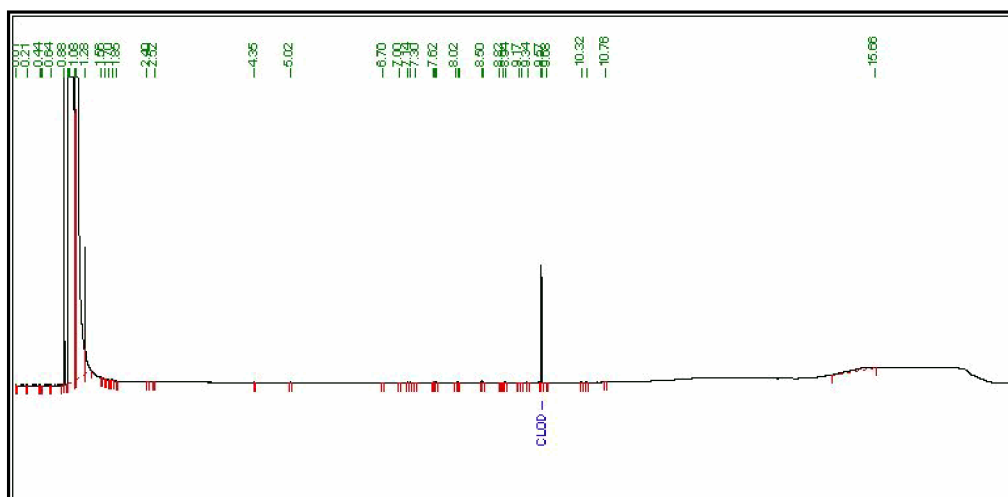
Individual Sample Results

TPH Banded - Soil

Sample Location	BH3/3	Results Reported As	Dry Weight
Sample	sBP12954.001003	Reporting Units	mg/kg
Depth(m)	3.20	Date Received	20/08/2012
Chain of Custody No.	6,051	Date of Sampling	15/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
WW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
42.27	38.75	30.06	10	10.18	1.01	0.00	<0.5	<0.5	<0.5	<0.5	<0.5

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gas Chromatogram for Sample

Gravesend Service Station

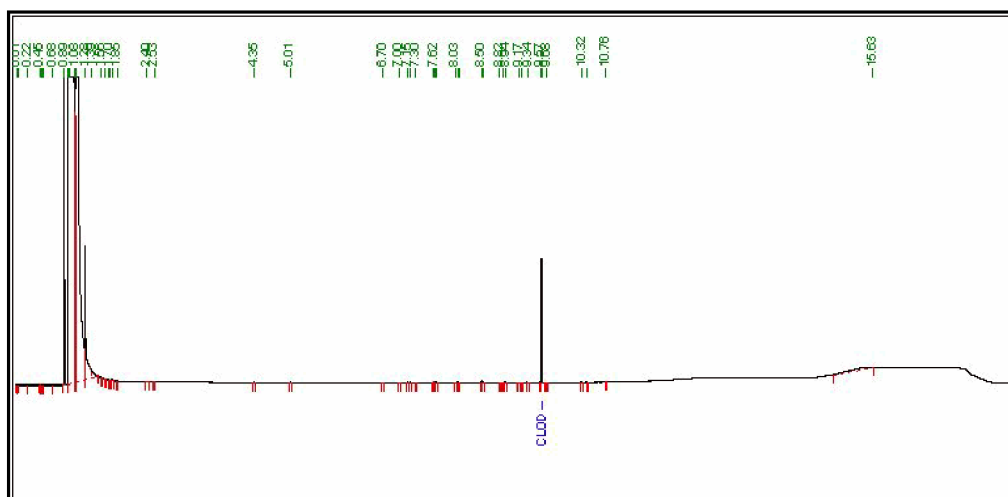
Individual Sample Results

TPH Banded - Soil

Sample Location	BH4/3	Results Reported As	Dry Weight
Sample	sBP12954.001005	Reporting Units	mg/kg
Depth(m)	2.80	Date Received	20/08/2012
Chain of Custody No.	6,051	Date of Sampling	15/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
WW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
32.46	29.19	27.18	10	10.37	1.04	0.00	<0.5	<0.5	<0.5	<0.5	<0.5

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gravesend Service Station

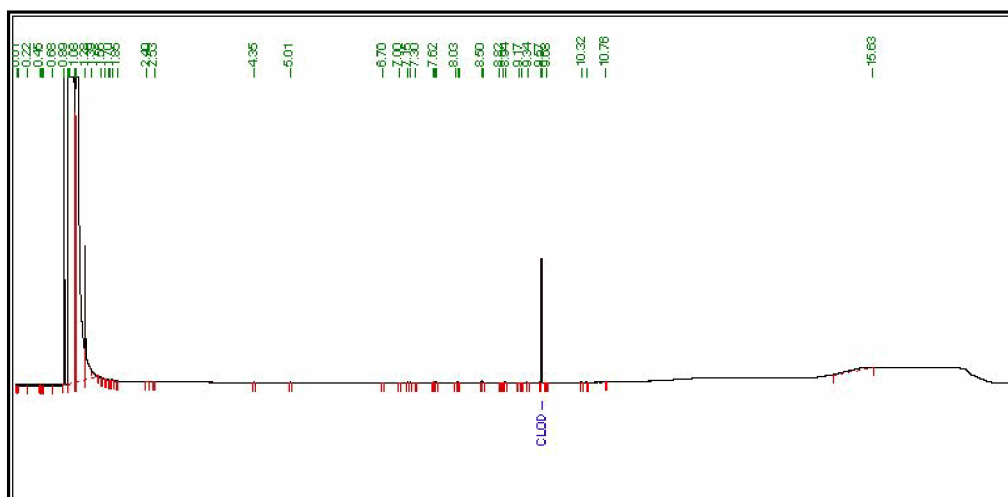
Individual Sample Results

TPH Banded - Soil

Sample Location	BH5/2	Results Reported As	Dry Weight
Sample	sBP12954.001006	Reporting Units	mg/kg
Depth(m)	2.00	Date Received	20/08/2012
Chain of Custody No.	6,051	Date of Sampling	15/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
WW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
32.48	28.93	30.09	10	10.03	1.08	0.00	<0.5	<0.5	<0.5	<0.5	<0.5

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gravesend Service Station

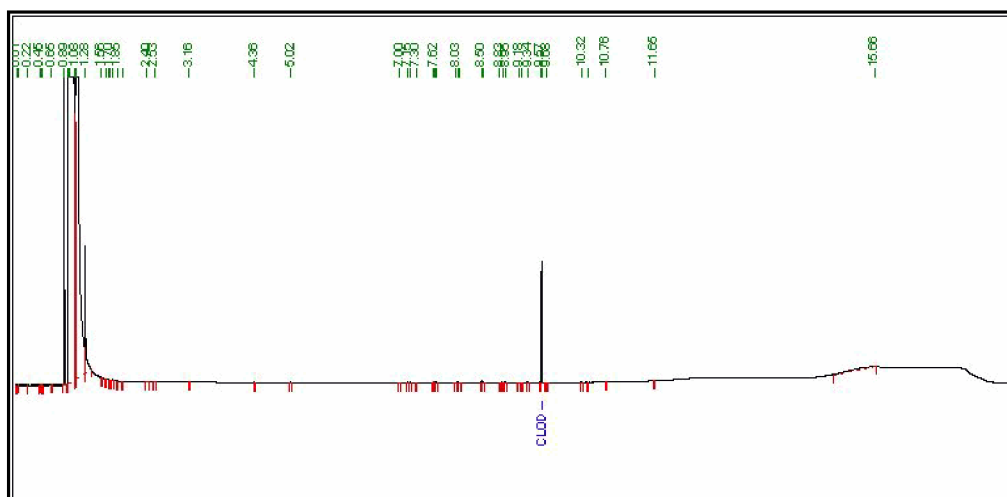
Individual Sample Results

TPH Banded - Soil

Sample Location	BH6/3	Results Reported As	Dry Weight
Sample	sBP12954.001008	Reporting Units	mg/kg
Depth(m)	2.40	Date Received	20/08/2012
Chain of Custody No.	6,051	Date of Sampling	15/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
WW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
32.54	29.11	28.63	10	10.05	1.09	0.00	<0.5	<0.5	<0.5	<0.5	<0.5

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gravesend Service Station

End of Report

Laboratory Analysis Report

Report Number 003425

Sampling Date 20th August 2012

Report Date 28th August 2012

Client	Site Name/Address
BP Oil UK Ltd 500-600 Witan Gate Central Milton Keynes Buckinghamshire MK9 1ES	Gravesend Service Station Watling Street (A2/A227) Gravesend Kent DA13 9RA

Number of Samples	Sample Type	Analysis Completed	Blind Testing	UKAS	MCERTS
4	Soil	IH QM:E9.4 based on TNRCC 1005 by GC-FID	RT Corp	Yes	No

QM E9.4: IH TPH Banded method C8 - C35 - Solvent (pentane) extraction then Liquid injection into GC-FID.
Samples were prepared and analysed 21-8-12

Analysis Report Approved By

Katherine Clark
Duty Reporting Manager



Glossary of Terms Used in This Report

Blank - A sample known to contain none of the compounds being analysed, and used to confirm that the analytical instrument is not giving false positives during analysis.

Blind Testing: Name of any blind testing scheme participated in. The laboratory's accuracy is reported as a Z score; the lower the Z score the more accurate the analysis, with a score of less than 2 considered excellent.

CRM - Certified Reference Material. A sample prepared by an accredited source and containing a known concentration of a given compound or compounds, which can be used to validate an analysis method.

Duplicate - A duplicate sample, used to give a measure of the repeatability of a given analysis.

External Calibration - External calibration samples are samples containing a known concentration of the compounds being analysed. They are added to the analysis sequence after every nth sample being analysed and provide confirmation that the instrument remains within its calibration range.

IRM - In house reference material. A sample prepared by our laboratory and containing a known concentration of a given compound or compounds, which can be used to validate an analysis method.

Linearity - The linearity of a given analytical method is the range of concentrations between which the analytical instrument's response is directly proportional to the concentration being analysed, and hence the range of concentrations that the instrument can be said to give quantitative results.

LOD - The lowest response for any given compound generated at the instrument's detector, that can be differentiated from the instrument's baseline noise.

LOQ - Limit of quantification. This is the lowest concentration that a given compound can be both detected and its concentration accurately measured in a sample.

MCERTS - An accreditation scheme created by the Environment Agency for the analysis of soil samples used to determine land quality. The scheme does not apply to analysis of soil samples used for waste classification purposes or to the analysis of water samples.

Method Calibration - The means by which an analytical method is calibrated. Usually this involves analysing a number of external calibration samples, containing different concentrations of the compounds to be analysed.

Precision - A measure of the repeatability of the analysis.

Sample - The material provided by the client to the laboratory for analysis.

Sensitivity - The smallest increment in analytical result that can be reliably quantified.

Spike - Also known as an internal calibration, a spike sample is a sample to be analysed which has a known concentration of another compound added. This provides a check on that the compounds being analysed are being correctly extracted from the sample matrix.

UKAS - The UK's implementation of ISO17025, the international standard accreditation for laboratory analysis

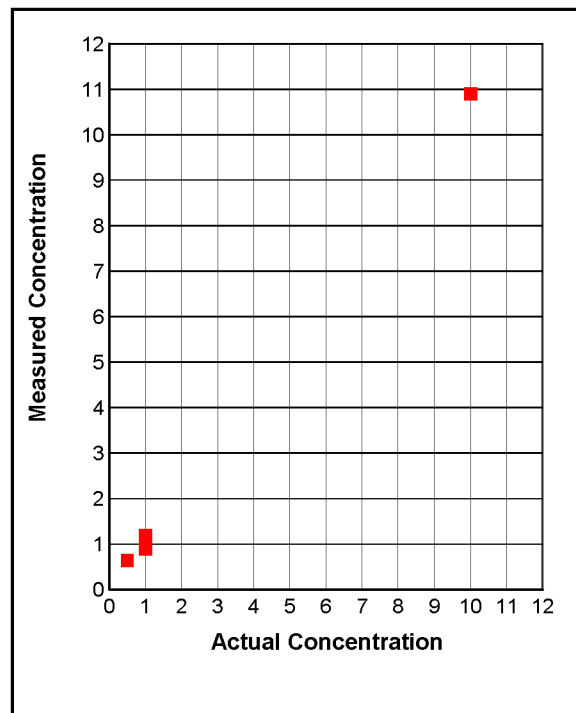
Quality Control/Quality Assurance Information

TPH Banded - Soil

Our laboratory carries out a wide variety of verification analyses in order to ensure the validity of the analysis results we produce.

Samples are analysed in batches, usually according to the sample chain of custody form we receive. However, we also add additional samples into the sample sequence. These additional samples may include blanks, calibration samples, in-house reference material samples and duplicate samples. In addition to this, each sample is 'spiked' with a known concentration of a compound. In the case of this analysis, we use a combination of 2-fluorobiphenyl and 1-chlorooctadecane. The results of the analyses we have carried out on the additional quality assurance samples during the ten days prior to the samples reported here are shown in the accompanying graphs. Results are reported in mg/kg for the C8-C10 band.

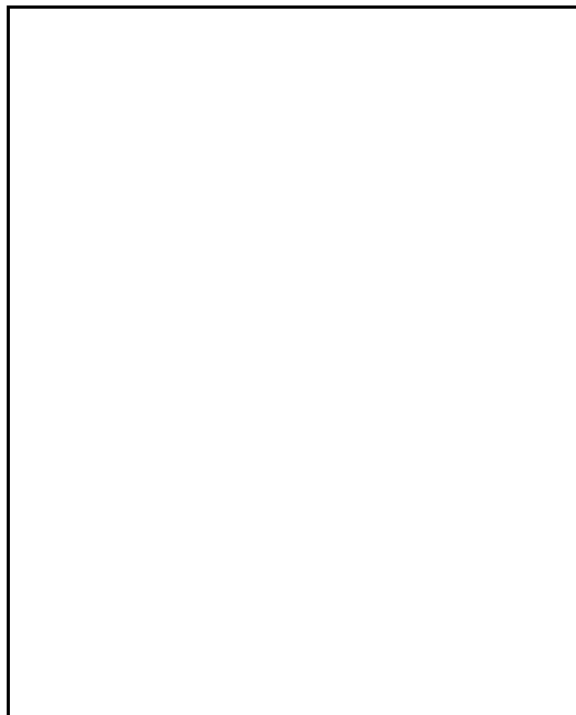
These provide a visual indication of the stability of our laboratory analysis.



Calibration Samples - Previous 10 days



Spike Samples - Previous 10 days



Reference Material - Previous 10 days

Gravesend Service Station

Summary of Results**TPH Banded - Soil**

Accreditation	UKAS	Blind Testing	RT Corp		
Results Reported As	Dry Weight	Last Three Z Scores	-1.24	-0.36	-1.19

Analysis Method Parameters			
Reporting Units	mg/kg	Limit of Detection	0.05mg/kg
Linearity	2,000mg/kg	Limit of Quantification	0.1mg/kg
Sensitivity	0.1mg/kg	Precision	+/-0.1mg/kg

Sample Location	Sample	Depth	Total Petroleum Hydrocarbons				
			C8-C10	>C10-C12	>C12-C16	>C16-C21	>C21-C35
CBR/1	sBP12954.002001	0.00	<0.5	<0.5	2.51	10.7	47.6
CBR/2	sBP12954.002002	0.00	<0.5	<0.5	<0.5	<0.5	19.7
CBR/3	sBP12954.002003	0.00	<0.5	<0.5	<0.5	<0.5	16.4
CBR/4	sBP12954.002004	0.00	<0.5	<0.5	<0.5	<0.5	13.0

Gravesend Service Station

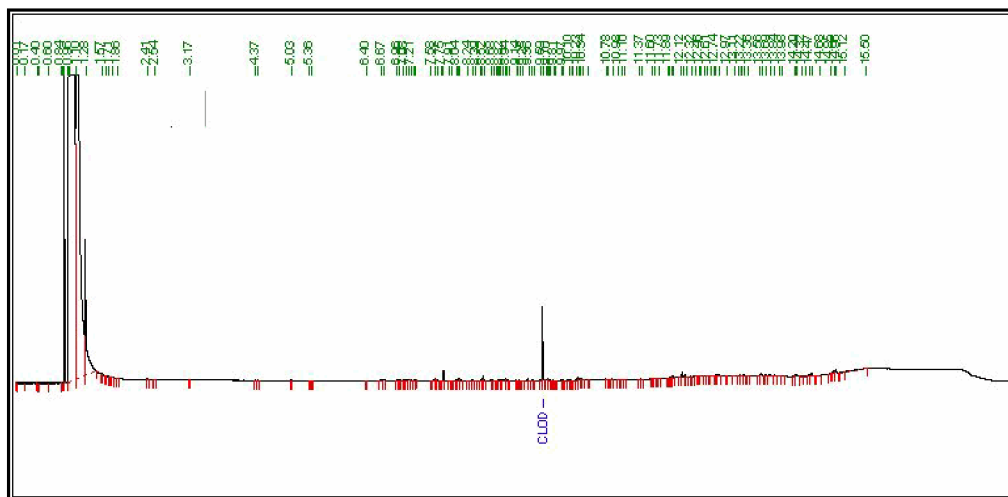
Individual Sample Results

TPH Banded - Soil

Sample Location	CBR/1	Results Reported As	Dry Weight
Sample	sBP12954.002001	Reporting Units	mg/kg
Depth(m)	0.00	Date Received	21/08/2012
Chain of Custody No.	6,053	Date of Sampling	20/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
VW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
42.09	40.01	16.05	10	10.17	0.64	0.00	<0.5	<0.5	2.51	10.7	47.6

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gas Chromatogram for Sample

Gravesend Service Station

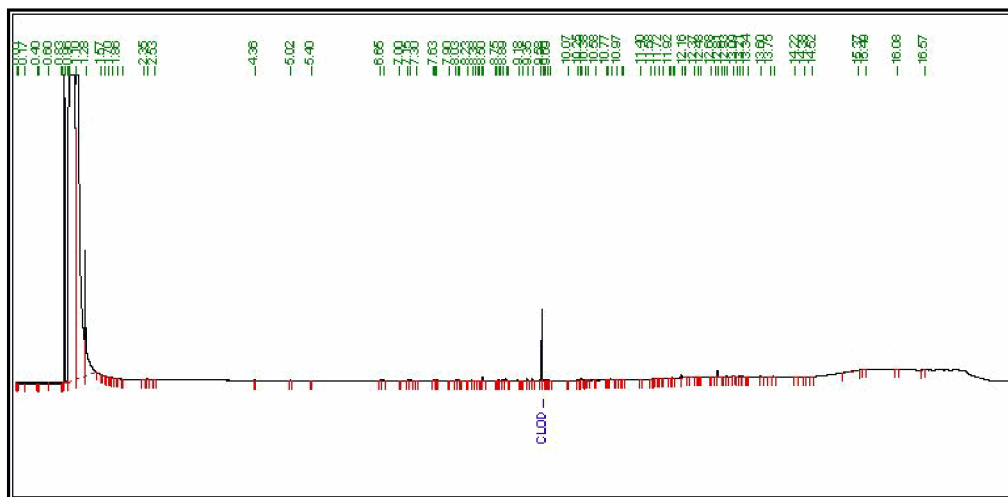
Individual Sample Results

TPH Banded - Soil

Sample Location	CBR/2	Results Reported As	Dry Weight
Sample	sBP12954.002002	Reporting Units	mg/kg
Depth(m)	0.00	Date Received	21/08/2012
Chain of Custody No.	6,053	Date of Sampling	20/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
VW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
42.07	40.78	9.33	10	10.1	0.62	0.00	<0.5	<0.5	<0.5	<0.5	19.7

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gravesend Service Station

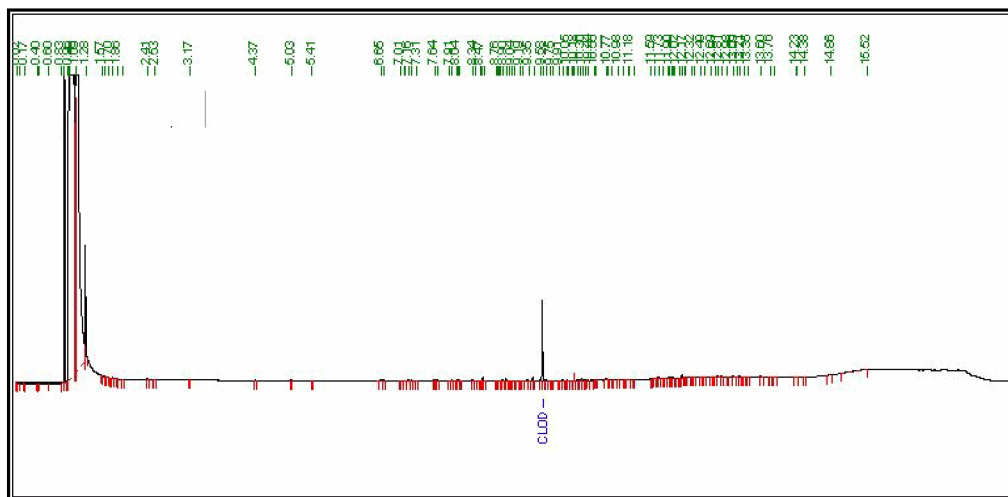
Individual Sample Results

TPH Banded - Soil

Sample Location	CBR/3	Results Reported As	Dry Weight
Sample	sBP12954.002003	Reporting Units	mg/kg
Depth(m)	0.00	Date Received	21/08/2012
Chain of Custody No.	6,053	Date of Sampling	20/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
VW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
42.29	40.56	12.80	10	10.19	0.70	0.00	<0.5	<0.5	<0.5	<0.5	16.4

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gravesend Service Station

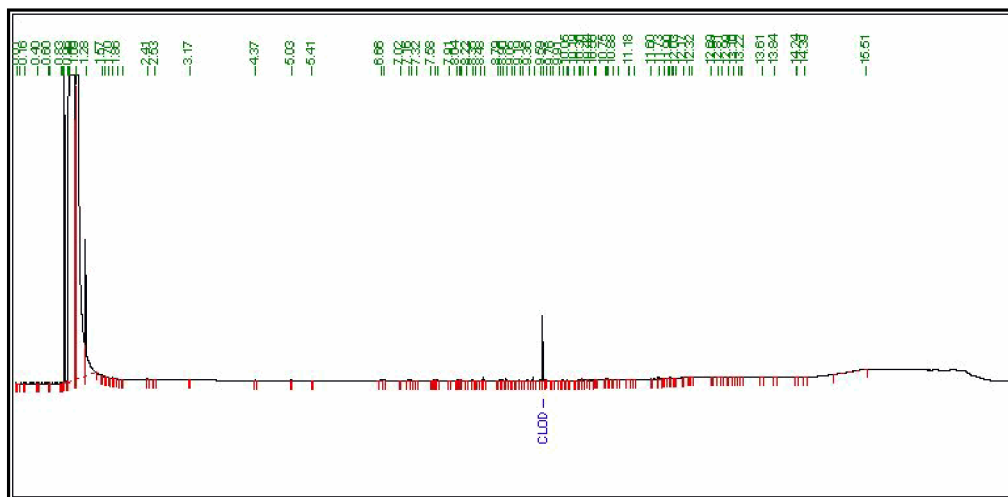
Individual Sample Results

TPH Banded - Soil

Sample Location	CBR/4	Results Reported As	Dry Weight
Sample	sBP12954.002004	Reporting Units	mg/kg
Depth(m)	0.00	Date Received	21/08/2012
Chain of Custody No.	6,053	Date of Sampling	20/08/2012
Accreditation	UKAS	Date of Analysis	22/08/2012

Moisture Content			VES (ml)	ES (g)	CRF	BSV	Results				
WW (g)	DW (g)	MC (%)					C8-C10	>C10- C12	>C12-C16	>C16-C21	>C21-C35
41.96	40.07	14.31	10	10.19	0.58	0.00	<0.5	<0.5	<0.5	<0.5	13.0

Note: WW denotes wet weight; DW denotes dry weight; MC denotes moisture content; CRF denotes calibration recovery factor; BSV denotes blank subtraction value



Gas Chromatogram for Sample

Gravesend Service Station

End of Report



Kirsten Mills
Subadra Consulting Ltd
Unit 13
Triangle Business Park
Stoke Mandeville
Buckinghamshire
HP22 5BL

QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 851105
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 12-10734

Site Reference: Gravesend Service Station

Project / Job Ref: BP12954

Order No: None Supplied

Sample Receipt Date: 20/08/2012

Sample Scheduled Date: 20/08/2012

Report Issue Number: 1

Reporting Date: 28/08/2012

Authorised by:

Russell Jarvis
Director

On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director

On behalf of QTS Environmental Ltd



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105



Soil Analysis Certificate						
QTS Environmental Report No: 12-10734	Date Sampled	15/08/12	15/08/12	15/08/12	15/08/12	15/08/12
Subadra Consulting Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Gravesend Service Station	TP / BH No	BH1	BH1	BH2	BH2	BH3
Project / Job Ref: BP12954	Additional Refs	S1	S3	S1	S7	S1
Order No: None Supplied	Depth (m)	1.20	2.40	1.20	5.00	1.20
Reporting Date: 28/08/2012	QTSE Sample No	50776	50778	50779	50781	50782

Determinand	Unit	MDL	Accreditation				
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	NONE		0.03		< 0.01
Arsenic (As)	mg/kg	< 2	MCERTS	< 2		< 2	< 2
Barium (Ba)	mg/kg	< 5	NONE	13		12	11
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5		< 0.5	< 0.5
W/S Boron	mg/kg	< 1	NONE	< 1		< 1	< 1
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5		< 0.5	< 0.5
Chromium (Cr)	mg/kg	< 2	MCERTS	< 2		< 2	< 2
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2		< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	< 4		< 4	< 4
Lead (Pb)	mg/kg	< 3	MCERTS	< 3		< 3	< 3
Mercury (Hg)	mg/kg	< 1	NONE	< 1		< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3		< 3	< 3
Selenium (Se)	mg/kg	< 3	NONE	< 3		< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	5		3	3
Zinc (Zn)	mg/kg	< 3	MCERTS	6		9	7

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

Stone content is classified as material greater than 10mm in diameter

Subcontracted analysis ^(S)



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105



Soil Analysis Certificate						
QTS Environmental Report No: 12-10734	Date Sampled	15/08/12	15/08/12	15/08/12	15/08/12	15/08/12
Subadra Consulting Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Gravesend Service Station	TP / BH No	BH3	BH4	BH4	BH5	BH5
Project / Job Ref: BP12954	Additional Refs	S7	S1	S5	S1	S3
Order No: None Supplied	Depth (m)	5.40	1.20	4.80	1.20	2.90
Reporting Date: 28/08/2012	QTSE Sample No	50784	50785	50786	50787	50788

Determinand	Unit	MDL	Accreditation				
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	NONE	< 0.01		0.04	< 0.01
Arsenic (As)	mg/kg	< 2	MCERTS		< 2		< 2
Barium (Ba)	mg/kg	< 5	NONE		10		7
Beryllium (Be)	mg/kg	< 0.5	NONE		< 0.5		< 0.5
W/S Boron	mg/kg	< 1	NONE		< 1		< 1
Cadmium (Cd)	mg/kg	< 0.5	MCERTS		< 0.5		< 0.5
Chromium (Cr)	mg/kg	< 2	MCERTS		< 2		< 2
Chromium (hexavalent)	mg/kg	< 2	NONE		< 2		< 2
Copper (Cu)	mg/kg	< 4	MCERTS		< 4		< 4
Lead (Pb)	mg/kg	< 3	MCERTS		< 3		< 3
Mercury (Hg)	mg/kg	< 1	NONE		< 1		< 1
Nickel (Ni)	mg/kg	< 3	MCERTS		< 3		< 3
Selenium (Se)	mg/kg	< 3	NONE		< 3		< 3
Vanadium (V)	mg/kg	< 2	NONE		< 2		< 2
Zinc (Zn)	mg/kg	< 3	MCERTS		7		8

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

Stone content is classified as material greater than 10mm in diameter

Subcontracted analysis ^(S)



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105



Soil Analysis Certificate

QTS Environmental Report No: 12-10734	Date Sampled	15/08/12	15/08/12			
Subadra Consulting Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Gravesend Service Station	TP / BH No	BH6	BH6			
Project / Job Ref: BP12954	Additional Refs	S1	S5			
Order No: None Supplied	Depth (m)	1.20	4.00			
Reporting Date: 28/08/2012	QTSE Sample No	50789	50790			

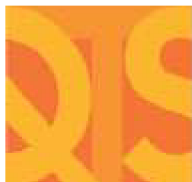
Determinand	Unit	MDL	Accreditation					
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	NONE		< 0.01			
Arsenic (As)	mg/kg	< 2	MCERTS	< 2				
Barium (Ba)	mg/kg	< 5	NONE	9				
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5				
W/S Boron	mg/kg	< 1	NONE	< 1				
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5				
Chromium (Cr)	mg/kg	< 2	MCERTS	< 2				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	< 4				
Lead (Pb)	mg/kg	< 3	MCERTS	< 3				
Mercury (Hg)	mg/kg	< 1	NONE	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3				
Selenium (Se)	mg/kg	< 3	NONE	< 3				
Vanadium (V)	mg/kg	< 2	NONE	2				
Zinc (Zn)	mg/kg	< 3	MCERTS	8				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

Stone content is classified as material greater than 10mm in diameter

Subcontracted analysis ^(S)



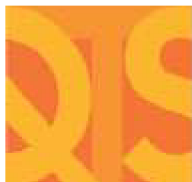
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Soil Analysis Certificate - Speciated PAHs					
QTS Environmental Report No: 12-10734	Date Sampled	15/08/12	15/08/12	15/08/12	15/08/12
Subadra Consulting Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Gravesend Service Station	TP / BH No	BH1	BH2	BH3	BH4
Project / Job Ref: BP12954	Additional Refs	S2	S1	S1	S1
Order No: None Supplied	Depth (m)	1.90	1.20	1.20	1.20
Reporting Date: 28/08/2012	QTSE Sample No	50777	50779	50782	50785

Determinand	Unit	MDL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 12-10734	Date Sampled	15/08/12				
Subadra Consulting Ltd	Time Sampled	None Supplied				
Site Reference: Gravesend Service Station	TP / BH No	BH6				
Project / Job Ref: BP12954	Additional Refs	S1				
Order No: None Supplied	Depth (m)	1.20				
Reporting Date: 28/08/2012	QTSE Sample No	50789				

Determinand	Unit	MDL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			

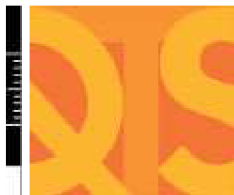
Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C



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Waste Acceptance Criteria Analytical Certificate									
QTS Environmental Report No: 12-10734		Date Sampled		15/08/12		Landfill Waste Acceptance Criteria Limits Inert Waste Landfill Stable Non- reactive HAZARDOUS waste in non- hazardous Landfill Hazardous Waste Landfill 3% 5% 6% -- -- 10% 6 -- -- 1 -- -- 500 -- -- 100 -- -- -- >6 -- -- To be evaluated To be evaluated			
Subadra Consulting Ltd		Time Sampled		None Supplied					
Site Reference: Gravesend Service Station		TP / BH No		BH2					
Project / Job Ref: BP12954		Additional Refs		S3					
Order No: None Supplied		Depth (m)		2.60					
Reporting Date: 28/08/2012		QTSE Sample No		50780					
Determinand	Unit	MDL							
TOC	%	< 0.1	0.2						
Loss on Ignition	%	< 0.01	0.70						
BTEX	mg/kg	< 0.05	< 0.05						
Sum of PCBs	mg/kg	< 0.7	< 0.7						
Mineral Oil	mg/kg	< 6	< 6						
Total PAH	mg/kg	< 1.7	< 1.7						
pH	pH Units	N / a	7.0						
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1						
Eluate Analysis			2:1 mg/l	8:1 mg/l	10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)			
Arsenic		< 0.01	< 0.01		< 0.2	0.5	2	25	
Barium		0.03	0.02		0.1	20	100	300	
Cadmium		< 0.0005	< 0.0005		< 0.02	0.04	1	5	
Chromium		< 0.005	< 0.005		< 0.2	0.5	10	70	
Copper		< 0.01	< 0.01		< 0.5	2	50	100	
Mercury		< 0.005	< 0.005		< 0.01	0.01	0.2	2	
Molybdenum		0.002	< 0.001		< 0.1	0.5	10	30	
Nickel		< 0.007	< 0.007		< 0.2	0.4	10	40	
Lead		< 0.005	< 0.005		< 0.2	0.5	10	50	
Antimony		< 0.005	< 0.005		< 0.06	0.06	0.7	5	
Selenium		< 0.005	< 0.005		< 0.1	0.1	0.5	7	
Zinc		< 0.005	< 0.005		< 0.2	4	50	200	
Chloride		< 10	< 10		< 120	800	15000	25000	
Fluoride		< 0.5	< 0.5		< 1	10	150	500	
Sulphate		7	< 1		< 20	1000	20000	50000	
TDS		52	32		175	4000	60000	100000	
Phenol Index		< 0.01	< 0.01		< 0.5	1	-	-	
DOC		2	3.4		15.4	500	800	1000	
Leach Test Information									
Sample Mass (kg)		0.22							
Dry Matter (%)		78.5							
Moisture (%)		21.6							
Stage 1									
Volume Eluate L2 (litres)		0.31							
Filtered Eluate VE1 (litres)		0.16							
Results are expressed on a dry weight basis, after correction for moisture content where applicable Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepancies with current legislation									



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Waste Acceptance Criteria Analytical Certificate										
QTS Environmental Report No: 12-10734		Date Sampled		15/08/12		Landfill Waste Acceptance Criteria Limits Inert Waste Landfill Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill Hazardous Waste Landfill 3% 5% 6% -- -- 10% 6 -- -- 1 -- -- 500 -- -- 100 -- -- -- >6 -- -- To be evaluated To be evaluated				
Subadra Consulting Ltd		Time Sampled		None Supplied						
Site Reference: Gravesend Service Station		TP / BH No		BH3						
Project / Job Ref: BP12954		Additional Refs		S2						
Order No: None Supplied		Depth (m)		2.00 - 2.80						
Reporting Date: 28/08/2012		QTSE Sample No		50783						
Determinand	Unit	MDL								
TOC	%	< 0.1	0.3							
Loss on Ignition	%	< 0.01	0.70							
BTEX	mg/kg	< 0.05	< 0.05							
Sum of PCBs	mg/kg	< 0.7	< 0.7							
Mineral Oil	mg/kg	< 6	< 6							
Total PAH	mg/kg	< 1.7	< 1.7							
pH	pH Units	N / a	7.7							
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1							
Eluate Analysis			2:1 mg/l	8:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)			
Arsenic		< 0.01	< 0.01		< 0.2	0.5	2	25		
Barium		0.03	0.02		0.1	20	100	300		
Cadmium		< 0.0005	< 0.0005		< 0.02	0.04	1	5		
Chromium		< 0.005	< 0.005		< 0.2	0.5	10	70		
Copper		< 0.01	< 0.01		< 0.5	2	50	100		
Mercury		< 0.005	< 0.005		< 0.01	0.01	0.2	2		
Molybdenum		0.003	0.001		< 0.1	0.5	10	30		
Nickel		< 0.007	< 0.007		< 0.2	0.4	10	40		
Lead		< 0.005	< 0.005		< 0.2	0.5	10	50		
Antimony		< 0.005	< 0.005		< 0.06	0.06	0.7	5		
Selenium		< 0.005	< 0.005		< 0.1	0.1	0.5	7		
Zinc		< 0.005	< 0.005		< 0.2	4	50	200		
Chloride		15	< 10		< 120	800	15000	25000		
Fluoride		< 0.5	< 0.5		< 1	10	150	500		
Sulphate		5	< 1		< 20	1000	20000	50000		
TDS		76	42		234	4000	60000	100000		
Phenol Index		< 0.01	< 0.01		< 0.5	1	-	-		
DOC		2	2.7		12.3	500	800	1000		
Leach Test Information										
Sample Mass (kg)		0.23								
Dry Matter (%)		77.1								
Moisture (%)		23								
Stage 1										
Volume Eluate L2 (litres)		0.31								
Filtered Eluate VE1 (litres)		0.17								

Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepancies with current legislation

SUBADRA

Consultants in the Earth Sciences

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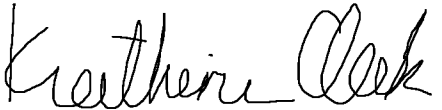
e-mail: consultants@subadra.com

website: www.subadra.com

4th October 2010, Third Version

Determination of pH in soil.

IH Method – Based on BS ISO 10390:2005

Project Name and Number:	Gravesend BP12954		
Date Test Commenced:	20-8-12		
Analysis report authorised by:		Katherine Clark Laboratory Manager Subadra Consulting Limited	
Date of Issue:	22-8-12		
Additional comments: Water blank pH = 8.10 Buffer solution 4 pH =4.01 Buffer solution 7 pH =6.99 Buffer solution 10 pH = 9.98			

Sample Location	Sample No.	Depth (m)	pH
BH1	5	3.1	8.89
BH2	6	4.2	8.93
BH3	8	6.4	8.96
BH4	6	5.8	8.88
BH5	2	2.0	8.95
BH6	6	4.8	8.71

End of document

4th October 2010, Third Version

Determination of pH in soil.

IH Method – Based on BS ISO 10390:2005

Project Name and Number:	BP12954 Gravesend		
Date Test Commenced:	29-8-12		
Analysis report authorised by:		Katherine Clark Laboratory Manager Subadra Consulting Limited	
Date of Issue:	30-8-12		
Additional comments: Water blank pH = 8.43 Buffer solution 4 pH = 4.0 Buffer solution 7 pH = 7.01 Buffer solution 10 pH = 10.01			

Sample Location	Sample No.	Depth (m)	pH
BH101	1	1.30	8.87
BH101	3	3.80	9.05
BH101	5	6.80	8.82
BH101	7	11.30	8.89
BH102	2	2.90	8.98
BH102	3	4.0	8.88
BH102	4	5.0	8.96
BH102	5	6.0	8.98
BH102	8	11.0	8.87
BH102	10	14.5	8.80

End of document

ATTACHMENT FIVE: CBR TEST REPORT

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Environmental - Geotechnical - Laboratory - Foundations

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www.subadra.com

California Bearing Ratio (CBR) Test Report (In accordance with BS1377: Part 9: 1990)

BP Tolgate
A2, Gravesend, Kent

Report No: 12954 CL 003

September 2012

Client: BP Oil UK Ltd

Report Prepared By:

pp



Steven Partridge

Report Reviewed By:



Duncan Eastland

CBR Test Report – BP Tolgate, A2, Gravesend, Kent

1. Scope

Our assessment of the site was carried out in the following parts:

- A review of the client's requirements and a site walkover;
- Construction of hand pits to depths of 300mm below current ground levels at four locations across the site;
- In situ CBR testing at the base of each pit;
- Soil moisture content analysis on soil samples collected from each location;
- Completion of this factual report.

2. Objective

The purpose of this assessment was to identify and quantify the consistency of surficial soils at locations across the site chosen by the client in order to aid in the design and construction of roads and/or pavements. All the activities comprising this assessment were carried out in accordance with the procedures set out in our Quality Manual. Your attention is drawn to the Notice to Interested Parties included as Attachment One.

3. Results

The results of all the tests we carried out are summarised below and are reported in full in Attachment Three. A CBR test location plan is included as Attachment Two.

Test Number	Soil Description	Depth (m bgl)	Soil Moisture Content (%)	CBR (%)	
				2.5mm	5.0mm
CBR1	Brown clayey sand with chalk and stones	0.3	5.6	17.81	17.59
CBR2	Brown clayey sand with chalk	0.3	4.7	10.96	12.79
CBR3	Brown clayey sand	0.3	9.8	11.14	12.03
CBR4	Brown clayey sand with vegetation and chalk	0.3	10.9	9.63	13.59

mbgl: meters below ground level

Table One: Summary of CBR Test Results

ATTACHMENT ONE: NOTICE TO INTERESTED PARTIES

Notice to Interested Parties

The purpose of this report is to detail the results of CBR testing we have carried out at the site. Where stated in this report, we have used information supplied by third parties. While we have evaluated as far as possible the validity of this information, we can not guarantee its accuracy in any way whatsoever.

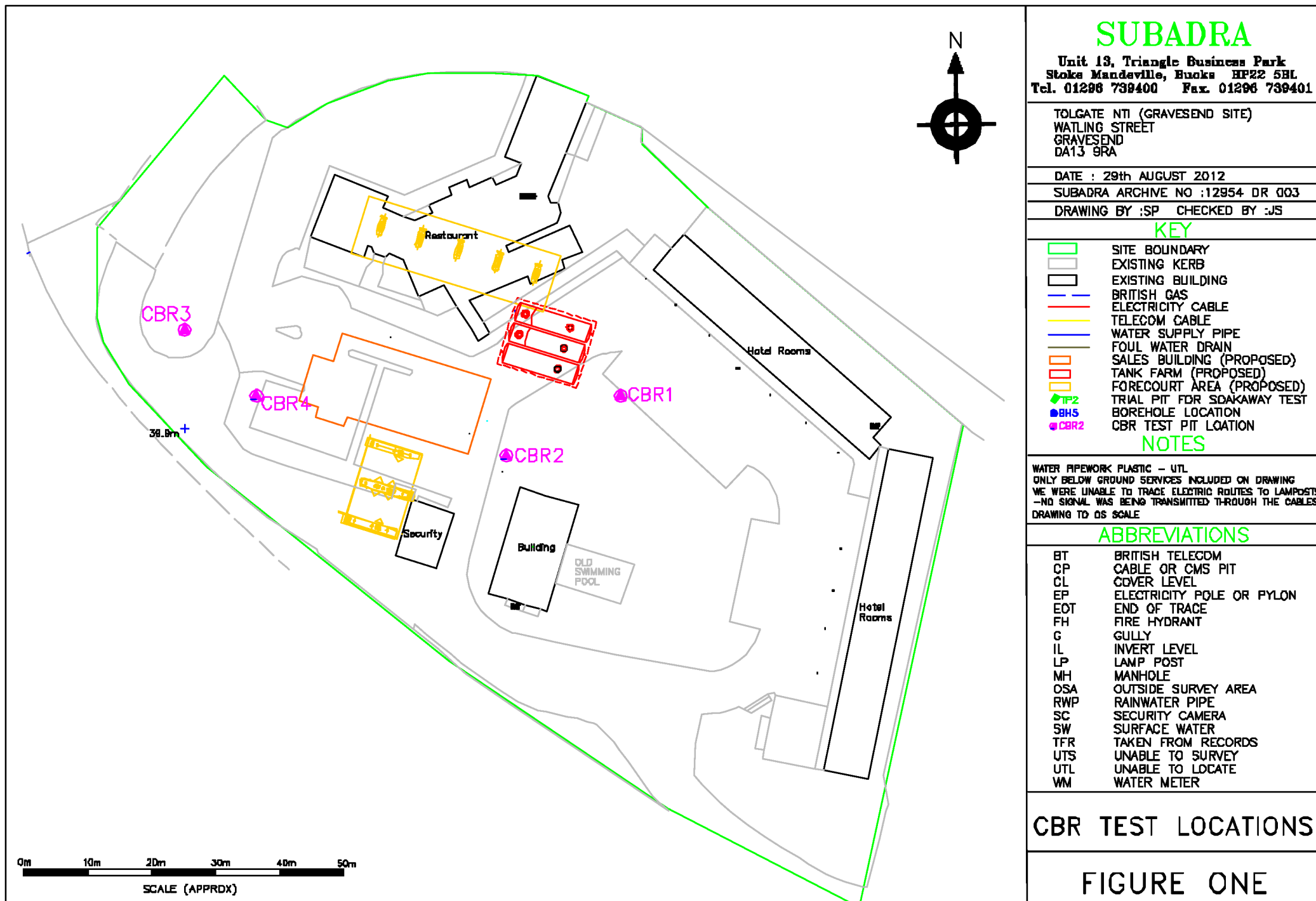
Tests have been carried out at locations chosen by the client. We make no warranty that the soils tested at these locations are typical of the soils elsewhere at the site. Soil is intrinsically variable for this reason no sampling technique can completely eliminate the possibility of obtaining samples that are not representative of the actual conditions. Our sampling techniques have simply reduced the possibility to an acceptable level.

We do not accept any responsibility for the cost of any remedial works or other costs incurred in whatever way whatsoever as a result of any omissions, errors or other shortcomings in this report unless we have been given reasonable opportunity to verify ourselves that such faults exist and we have been given a reasonable opportunity to carry out works to remedy such faults ourselves using the most practicable means available to us. We do not accept liability for any consequential losses incurred by you while we carry out any remedial works we deem necessary.

This report has been prepared for BP Oil UK Ltd. Use of, and reliance on, this report by other third parties will be at such third parties own risk, and we are unable to accept any liability or responsibility to third parties. Neither the whole nor any part of this report, or any reference to it, may be included in any published document circular or statement or published in any way without our prior written approval.

This report and its contents, together with any supporting correspondence or other documentation, remain the property of Subadra Consulting Limited until paid for in full.

ATTACHMENT TWO: SITE PLAN



ATTACHMENT THREE: CBR TEST REPORTS

CBR Test Location: One

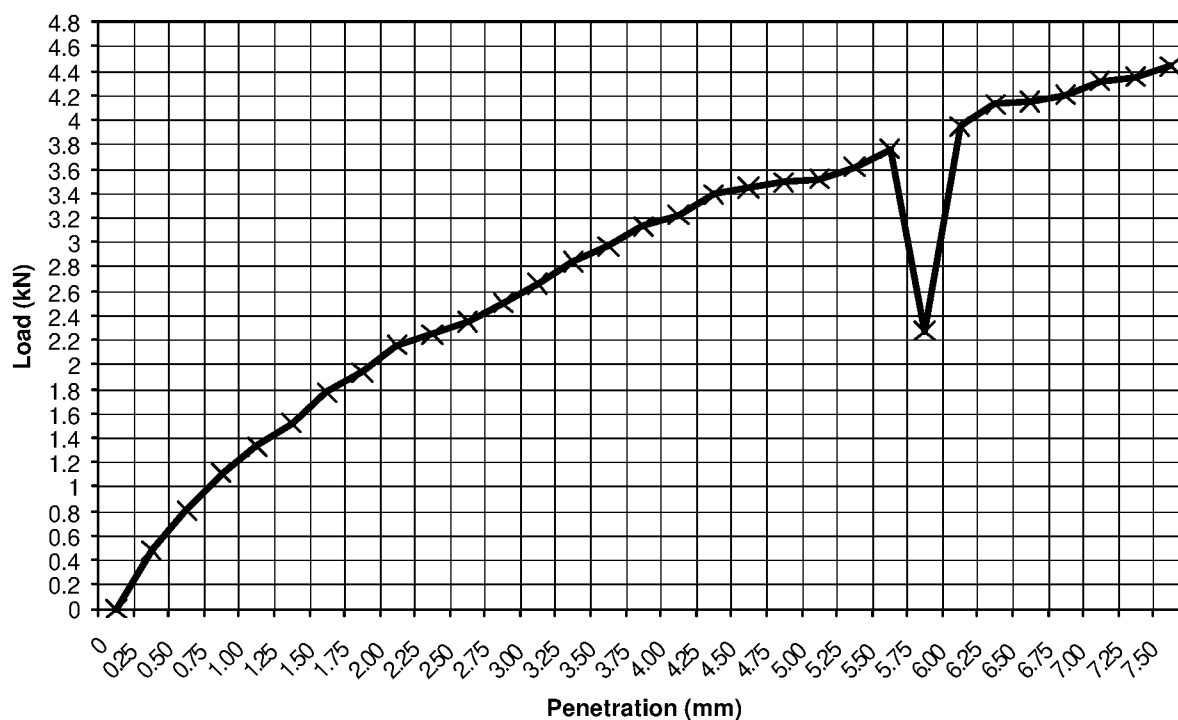
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Tel. 01296 739400 Fax. 01296 739401
e-mail: consultants@subadra.com

Project Name	BP Tolgate, Gravesend	Date	10 th August 2012
Project Code	BP12954	Equipment	Impact CBR Kit
Coordinates	564256.79;171227.19	Test Completed By	Steven Partridge
Ground level (gl)	44.03	Test Depth Below gl	0.3m
Test Method	The method of testing for this is based upon the regulations set down in ISO 17025 (29 th June 2005) and in BS1377: Part 9: 1990. These are followed in our internal manuals (CBR method Statement and CBR protocol- available at request) to conform to the standards		

Sample Description	Brown clayey sand with chalk and stones
California Bearing Ratio	The CBR for this test point is 17.59
Moisture Content	The moisture content for this test point is 5.6%
Reaction Load	The reaction load for this test point was approximately 2,500kg. Due to the apparent strength of the material, based on visual and simple hand held tests, the reaction load was adequate for the test.
Surcharge Weights	The weight of surcharge disks used around the penetration rod was 4kg.
20mm particles	There were not any 20mm particles directly under the penetration rod.
Weather	The weather on the test day was dry, hot and sunny.

Graphical Representation



CBR Test Location: Two

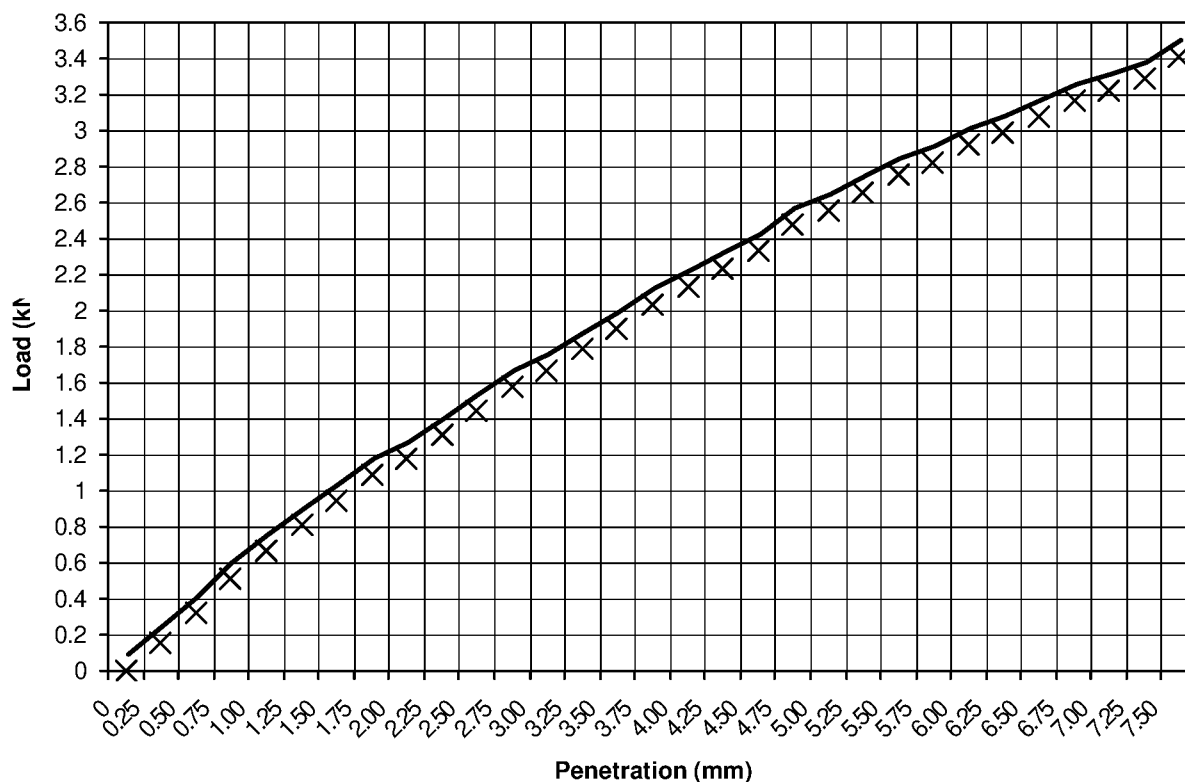
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e-mail: consultants@subadra.com

Project Name	BP Tolgate, Gravesend	Date	10 th August 2012
Project Code	BP12954	Equipment	Impact CBR Kit
Coordinates	564239.03;171217.70	Test Completed By	Steven Partridge
Ground level (gl)	43.07	Test Depth Below gl	0.3m
Test Method	The method of testing for this is based upon the regulations set down in ISO 17025 (29 th June 2005) and in BS1377: Part 9: 1990. These are followed in our internal manuals (CBR method Statement and CBR protocol- available at request) to conform to the standards		

Sample Description	Brown clayey sand with chalk
California Bearing Ratio	The CBR for this test point is 12.79
Moisture Content	The moisture content for this test point is 4.7%
Reaction Load	The reaction load for this test point was approximately 2,500kg. Due to the apparent strength of the material, based on visual and simple hand held tests, the reaction load was adequate for the test.
Surcharge Weights	The weight of surcharge disks used around the penetration rod was 4kg.
20mm particles	There were not any 20mm particles directly under the penetration rod.
Weather	The weather on the test day was dry, hot and sunny.

Graphical Representation



CBR Test Location: Three

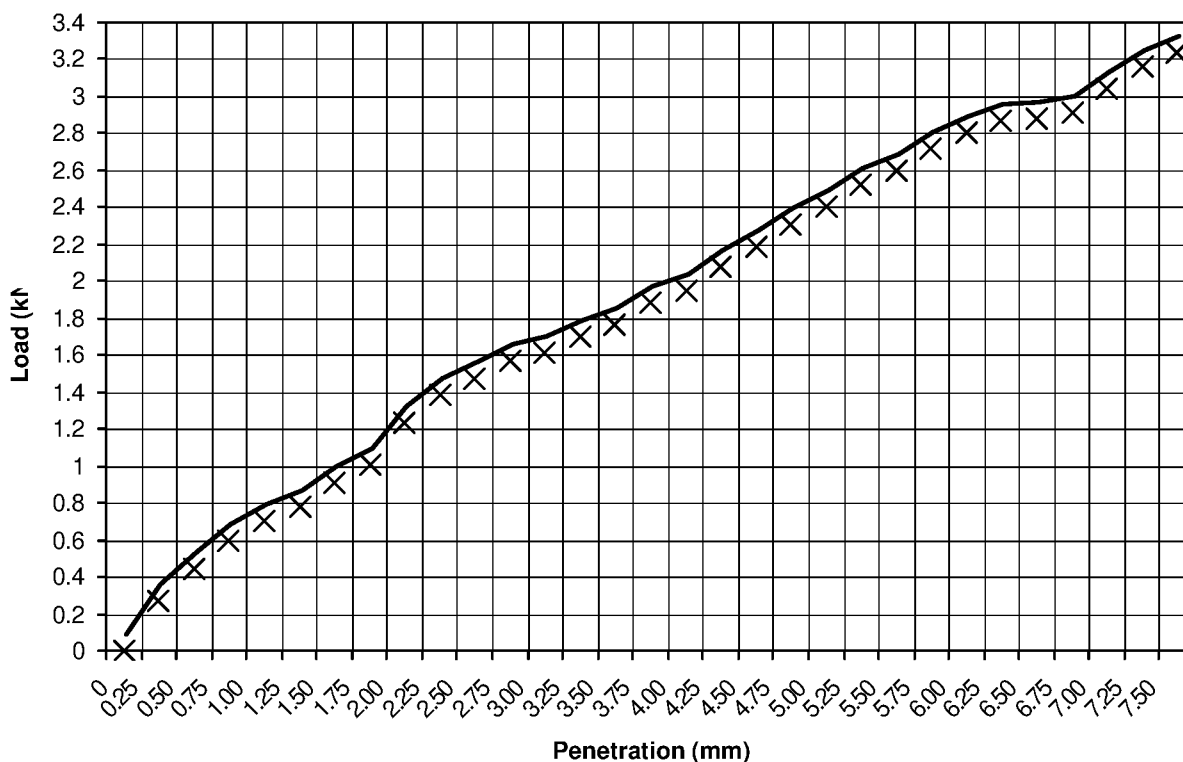
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Tel. 01296 739400 Fax. 01296 739401
e-mail: consultants@subadra.com

Project Name	BP Tolgate, Gravesend	Date	10 th August 2012
Project Code	BP12954	Equipment	Impact CBR Kit
Coordinates	564188.64;171237.58	Test Completed By	Steven Partridge
Ground level (gl)	39.96	Test Depth Below gl	0.3m
Test Method	The method of testing for this is based upon the regulations set down in ISO 17025 (29 th June 2005) and in BS1377: Part 9: 1990. These are followed in our internal manuals (CBR method Statement and CBR protocol- available at request) to conform to the standards		

Sample Description	Brown clayey sand
California Bearing Ratio	The CBR for this test point is 12.03
Moisture Content	The moisture content for this test point is 9.8%
Reaction Load	The reaction load for this test point was approximately 2,500kg. Due to the apparent strength of the material, based on visual and simple hand held tests, the reaction load was adequate for the test.
Surcharge Weights	The weight of surcharge disks used around the penetration rod was 4kg.
20mm particles	There were not any 20mm particles directly under the penetration rod.
Weather	The weather on the test day was dry, hot and sunny.

Graphical Representation



CBR Test Location: Four

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e-mail: consultants@subadra.com

Project Name	BP Tolgate, Gravesend	Date	10 th August 2012
Project Code	BP12954	Equipment	Impact CBR Kit
Coordinates	564199.79;171227.14	Test Completed By	Steven Partridge
Ground level (gl)	40.52	Test Depth Below gl	0.3m
Test Method	The method of testing for this is based upon the regulations set down in ISO 17025 (29 th June 2005) and in BS1377: Part 9: 1990. These are followed in our internal manuals (CBR method Statement and CBR protocol- available at request) to conform to the standards		

Sample Description	Brown clayey sand with vegetation and chalk
California Bearing Ratio	The CBR for this test point is 13.59
Moisture Content	The moisture content for this test point is 10.9%
Reaction Load	The reaction load for this test point was approximately 2,500kg. Due to the apparent strength of the material, based on visual and simple hand held tests, the reaction load was adequate for the test.
Surcharge Weights	The weight of surcharge disks used around the penetration rod was 4kg.
20mm particles	There were not any 20mm particles directly under the penetration rod.
Weather	The weather on the test day was dry, hot and sunny.

Graphical Representation

