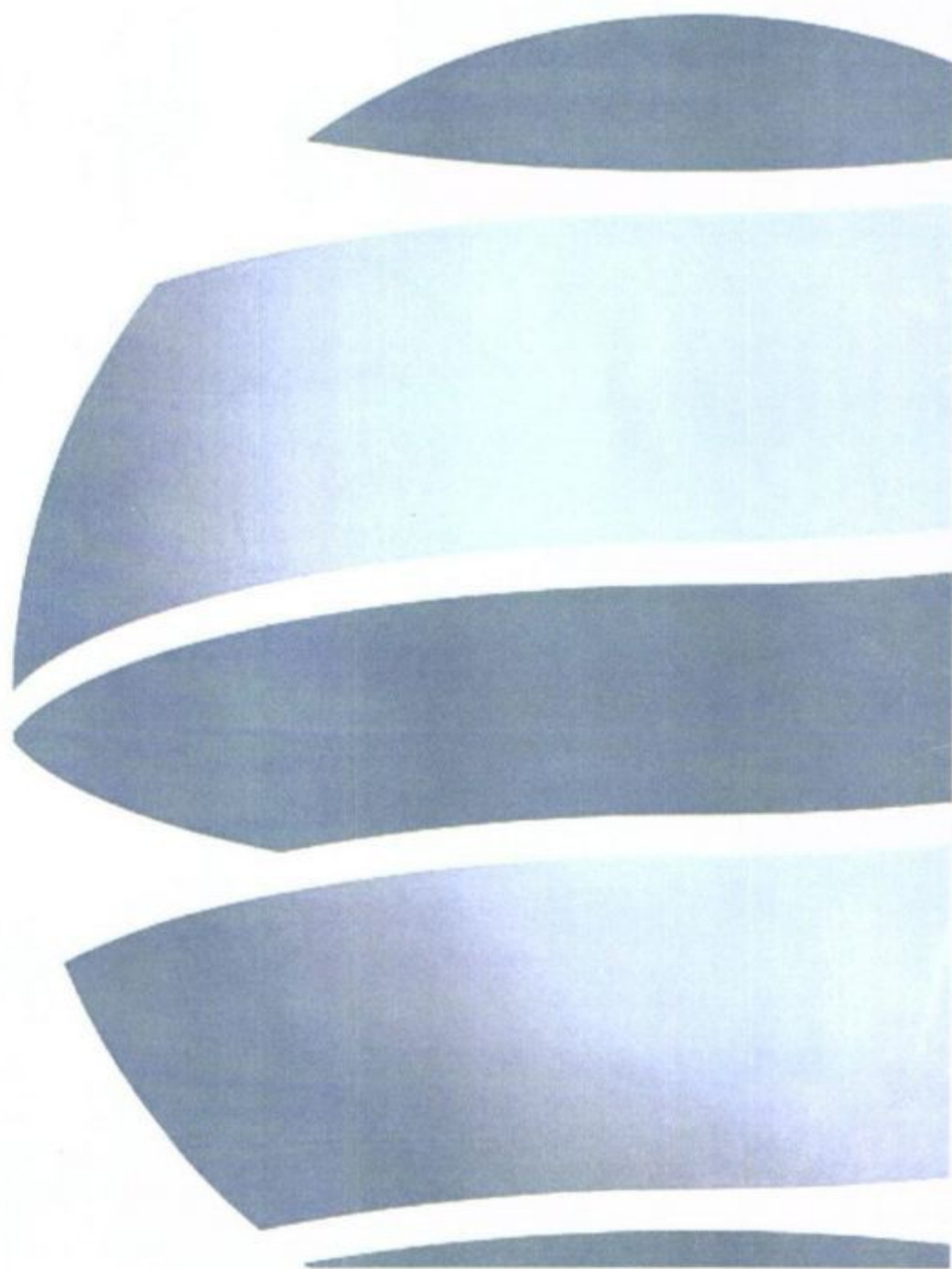




Geo-Environmental

GROUND INVESTIGATION REPORT
for the site at
LAND OFF NEW ROAD, HAVANT
on behalf of
COMPLETE COMMERCIALS LTD





Report: GROUND INVESTIGATION REPORT
Site: LAND OFF NEW ROAD, HAVANT
Client: COMPLETE COMMERCIALS LIMITED
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Environmental Consultants / Geotechnical Engineers / Site Investigations



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EXECUTIVE SUMMARY

Scope of works	To undertake a combined geotechnical and geo-environmental ground investigation.
Form of Development	Residential development (two storey housing) with gardens, access road(s) and associated infrastructure.
Site Description	The site comprised an irregularly shaped parcel of land. Changes in elevation were accommodated by retaining walls and ramps, with a general drop in ground level towards the west. At the time of the ground investigation the site was used for commercial vehicle sales with only very limited servicing activity. A portal framed steel structure was located in the eastern portion of the site and incorporated a single storey brick office to the south. The main building was used for parking, although there was some evidence that the eastern end of the building had probably been used for vehicle servicing. The majority of the site was laid to tarmac, with minimal vegetation along a bank along the western boundary and an overgrown area along the southern boundary. The site was bounded to the north by a Kwik Fit unit (believed formerly to be a petrol filling station) with New Road and public open space beyond; to the east and north by gardens, domestic garages and housing; and to the west by Staunton Road, with a watercourse (in concrete lined channel) at a lower elevation beyond.
Ground Conditions	The site was found to be underlain by a succession of Made Ground, Brickearth (only locally present), Head Gravel and with soils of the London Clay Formation at depth in some of the boreholes. Visual and olfactory (odour) evidence of hydrocarbons was noted within the Head Gravel in four of the boreholes, although these were not located within a single area of the site and as such could indicate more than one area impacted by hydrocarbons.
Groundwater	Groundwater was encountered within each of the boreholes during drilling and was recorded at depths in the range 1.22m to 2.70m bgl (equating to 3.18m to 3.74m AOD) within monitoring wells installed within three of the boreholes. Initial monitoring of groundwater elevation (m AOD) has indicated a probable hydraulic gradient falling towards the southwest.
Foundations	It is considered that strip or pad foundations terminating within the Head Gravel could be used for the form of development proposed.
Excavations	Shallow excavations could remain stable in the short term. Deeper excavations and those where water ingress occurs would require shoring and dewatering. Full or partial collapse was noted in the majority of the boreholes from depths of around 1.5m to 3.0m bgl.
Pavements	It is recommended that shallow soils are assumed to be frost susceptible for pavement design, thus requiring a minimum thickness of 450mm.
Sub-surface concrete	Sub-surface concrete should be design to Class DS1 of BRE Special Digest 1.
Land Gases	Whilst gas monitoring to date has not determined gas screening values of concern, marginally elevated Volatile Organic Compound (VOC) concentrations have been identified. Therefore, coupled with the apparently sporadic presence of hydrocarbons in the Head Gravels and groundwater beneath the site, it is considered that gas protection measures should be incorporated within all structures. Measures should include a passively ventilated void beneath a suspended ground floor slab, minimum penetration of the slab by services and a hydrocarbon membrane within the floor slab. All joints and penetrations through the membrane would need to be sealed to the membrane.
Radon Gas	No protection measures are required although the measures stated above would provide protection from radon.
Soil contamination	Testing of near surface soils has not identified the presence of gross contamination. However, it appears that soils at depth beneath the site have been impacted by



	hydrocarbons which are considered to derive from an off-site source.
Site workers	A COSHH assessment is recommended for all site workers and safe systems of work adopted.
End users	End users will require protection from hydrocarbon vapours which could be derived from impacted groundwater and associated residual smear zone in the soils at depth beneath the site. It is recommended that a minimum of 500mm of certified clean topsoil and subsoil is placed in all garden and soft landscaped areas.
Soft landscaping	A minimum cover of 500mm of certified clean Topsoil is recommended in all soft landscaped areas. X
Building Materials	In addition to buried concrete protection, consideration will be required for the selection of appropriate materials for buried services on the site given the presence of hydrocarbons within the ground.
Controlled waters	Groundwater flow is considered to be towards the south-west or south-south-west. Whilst groundwater contamination by hydrocarbons has been established, it is considered that the source of the contamination is from UST tank farms located to the north, i.e. up-gradient of the site. As such any remedial measures applied on site would be ineffective in the long term whilst the source remains. Thus it is considered that groundwater remediation is not required to be undertaken as part of the development. The Local Authority may consider that action is required, although under separate legal powers and these should be exercised on the polluter, i.e. the freeholder of the off-site source, should this be proved beyond doubt. ✓
Waste Disposal	Analytical results should be forwarded to proposed receiving disposal or treatment facilities to confirm waste classification.
Discovery strategy	A discovery strategy should be employed, so that any evidence of possible unidentified contamination can be dealt with appropriately
<i>This Executive Summary is intended to provide a brief summary of the main findings and conclusions of the investigation. For detailed information, the reader is referred to the main report ref. GE5529.</i>	



1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by Complete Commercials Ltd (the Client) to undertake an investigation of the geotechnical and geo-environmental factors pertaining to the proposed redevelopment of the site at Land off New Road, Havant (see Figure 1).

1.2 Form of Development

It is proposed to redevelop the site with two storey houses, private gardens and associated infrastructure.

1.3 Objectives

The data from the geotechnical investigation was to form the basis of an interpretation with respect to foundation design, pavement construction, concrete specification, excavation stability and other pertinent construction issues.

A desk study was prepared for the Client by a third party and has been referred to herein to support a Preliminary Risk Assessment (PRA) in accordance with CLR11 and to provide a basis for the scope and rationale of the Phase II ground investigation undertaken by Geo-Environmental. The data from Phase I and Phase II were then to form the basis of a subsequent Tier 1 Generic Quantitative Risk Assessment (GQRA). The objective of the risk assessments was to evaluate the risks posed to the proposed redevelopment, adjacent land uses and the wider environment, in the context of likely planning requirements, immediate liabilities under the Environment Act 1990 and risks posed to Controlled Waters under the Water Resources Act.

1.4 Standards

Where practicable, the ground investigation and subsequent geotechnical and environmental assessments were undertaken in accordance with the following documents and guidance:

- Model Procedures for the Management of Contaminated Land, CLR11, DEFRA and Environment Agency 2004
- Environment Agency Guidance on Requirements for Land Contamination Reports, Version 1 dated July 2005.
- BS10175:2001 - Investigation of Potentially Contaminated Sites - Code of Practice, BSI 2001.
- BS5930: 1999 - Code of Practice for Site Investigations, BSI 1999



- BS1377: 1990 - Soils for Civil Engineering Purposes, BSI1990
- NHBC Standards Chapter 4.1 Land Quality - Managing Ground Conditions, October 1999
- Planning Policy Statement 23 – Planning and Pollution Control
- Eurocode 7 – Geotechnical Design
- CIRIA C659 – Assessing risks posed by hazardous ground gases to buildings (2006)
- NHBC 10627-R01(04)- Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (2007)

1.5 Conditions

The data collected from the investigations have been used to provide an interpretation of the geotechnical and/or environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that either have not been revealed in the available records, or that occurs between or under points of physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

It should be noted that in particular the concentrations and levels of mobile liquid and gaseous materials are likely to vary with time. The results obtained may therefore only be representative of the conditions at the time of sampling. This report should not be taken as any guarantee that a site is free of hazardous or potentially contaminative materials.

Information contained in this report is intended for the use of the Client and Geo-Environmental can take no responsibility for the use of this information by any party for uses other than that described in this report. Geo-Environmental makes no warranty or representation whatsoever express or implied with respect to the use of this information by any third party. Geo-Environmental does not indemnify the Client or any third parties against any dispute or claim arising from any finding or other result of this investigation report or any consequential losses.

Assessment criteria or other parameters developed for the evaluation of contamination on this site are based on a number of assumptions regarding exposure and toxicology and exposure to contaminants and levels of adverse effects may therefore vary. Whilst every care and expertise has been employed in the development of such criteria, no liability is accepted in this respect. Other criteria or guidance on the development of assessment criteria may be published in the future and no liability is accepted in this respect.



2.0 DESK STUDY

A desk study (ref. 139/R01) was undertaken by Dig-Geotech Limited for the Client in February 2006 and reference should be made to this document for detailed information. A summary of the desk study is presented below.

2.1 Site Walkover Survey

The site comprised an irregularly shaped parcel of land. Changes in elevation were accommodated by retaining walls and ramps, with a general drop in ground level towards to the west.

At the time of the ground investigation the site was used for commercial vehicle sales with only very limited servicing activity. A portal framed steel structure was located in the eastern portion of the site and incorporated a single storey brick office to the south. The main building was used for parking, although there was some evidence that the eastern end of the building had probably been used for vehicle servicing at some time in the past. In addition, scars on the ground immediately to the north of the main structure in conjunction with scars and repairs to the building to the north suggested that the two structures had formerly been linked.

The majority of the site was laid to tarmac, with minimal vegetation along a bank along the western boundary and an overgrown area along the southern boundary. Some fly tipping was evident on tarmac at the eastern end of the site, i.e. adjacent to the main building.

The site was bounded to the north by a Kwik Fit unit (believed formerly to be a petrol filling station) with New Road and public open space beyond; to the east and north by gardens, domestic garages and housing; and to the west by Staunton Road, with a watercourse (in concrete lined channel) at a lower elevation beyond.

The subject site was accessed off Staunton Road.

Drainage

The fate of storm water run-off on site was unclear. A possible soakaway, with drainage linked to the main building, was identified close to the western boundary of the site and additionally a three chamber interceptor was located on the access spur from Staunton Road. The interceptors drained towards New Road.

It is noteworthy that interceptors are often constructed on the down-gradient side of a petrol filling station forecourt and whilst a low brick wall marked the boundary with the Kwik Fit site this appeared to be a relatively recent structure. Thus, it is considered probable that the interceptors were located on the western access/egress spur to the former petrol filling station forecourt (currently a client parking area to the front of the Kwik Fit garage).

The fate of foul drainage was not established.



2.2 Geology

British Geological Survey indicates that the geology of the site comprised a possible mantle of Brickearth over Head Gravel and London Clay Formation.

Brickearth comprises a geologically recent deposit of brown structureless sandy clay of limited thickness that usually overlies gravel deposits. Its name is derived from its former use in the manufacture of bricks. This former use has resulted in the wholesale removal of this stratum in some areas.

Head Deposits are drifts produced by solifluxion, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted sands gravels and chalk of local derivation. **Head Gravel** are probably the remnants of sheets of head which formerly covered the gently sloping Chalk dip-slopes. They contain angular flints surrounded cobbles and flint pebbles derived from Tertiary beds and it is possible that they represent deposits of several ages.

In the Hampshire Basin, the **London Clay Formation** differs from that found in and around London due to significant differences in sediment type and the environment at the time of deposition. The term London Clay is used to define the age of the formation rather than the soils within the formation. In general, it comprises interbedded firm to stiff grey clay, silt and sand. Concretions of argillaceous limestone in nodular form (Claystones) occur throughout the formation. Crystals of gypsum (Selenite) are often found within more clayey horizons, and precautions against sulphate attack to concrete are sometimes required.

Strata as described above could exhibit a greater lateral permeability than vertical permeability.

2.3 Hydrogeology

The solid geology underlying the site is classified as a Minor Aquifer. These can be fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and in providing base flow to rivers.

Whilst the Upper Chalk (a Major Aquifer and potable water resource) is present at depth beneath the site, it is offered protection from contamination on site by the London Clay Formation. In addition, the Upper Chalk is further separated and protected by the clayey strata of the Lambeth Group (Reading Beds) which underlie the London Clay Formation.

The overlying soils are assigned an Urban 'U' vulnerability classification which assumes a worst case sensitivity.

According to information provided by the Environment Agency the site is not situated within a Source Protection Zone (SPZ).



2.4 Hydrology

The nearest surface water feature was the Hermitage Stream which was located approximately 15m (at its closest point) to the west of the site. It should be noted that this section of the stream flowed in a concrete lined channel. The Stream flowed from north to south.

2.5 Radon

According to the data supplied by the Health Protection Agency:

- Less than 1% of homes are above the Action Level.
- No radon protection measures are necessary in the construction of new dwellings or extensions.

2.6 Environmental Data

Information presented within the Desk Study Report included a letter from Havant Borough Council's Contaminated Land Officer and details from the Petroleum Licensing Register.

It appears that the subject site was historically part of a larger site encompassing the now Kwik Fit site and was owned/operated by Hendy Ford for car servicing, probably sales and as a petrol filling station (PFS). A review of the historic layout indicates the PFS forecourt to be located within the Kwik Fit site, with only an access/egress spur crossing the north-western tip of the subject site.

Underground storage tanks (USTs) were installed, in the 1960s, 5m and 16m to the north of the subject site. As part of redevelopment works on the 'Kwik Fit' site in 1990, seven of the USTs were reportedly degassed and filled with concrete (associated pipework left in-situ). Replacement fuel USTs were installed within the 'Kwik Fit' site (stated 11m to the north of the subject site). The records indicate that since the 1960s at least nine USTs, with a combined capacity in excess of 30,000 gallons, have been installed and operated on the 'Kwik Fit' site (the USTs being within 20m of the subject site). These USTs comprise a potential source of significant mobile contamination which could migrate (assuming local groundwater flow is generally towards the south) on to the subject site.

2.7 Geotechnical Data

No significant geotechnical hazards were recorded for the site.



2.8 Land Gases

The desk study identified a former clay pit located approximately 100-150m to the south-east of the subject site. Information from Havant Borough Council indicated that the clay pit was infilled by 1932 and developed for housing in 1973. Given the time elapsed since filling and types of fill likely to have been placed, the gas generation and/or release potential for this area of filled land is considered negligible. As such, this is not considered to pose a significant risk of harm to the subject site or occupants thereof.

2.9 Historical Data

Historic mapping has shown the subject site to have become developed from open land within a general field system in 1858, to part of a commercial garage complex by 1972. The original garage buildings to the north of the subject site date from around the early 1960s. Over the mapping period, the surrounding land was shown to have become developed for residential use.

Hermitage Stream was shown to flow from north to south and its alignment may have been altered slightly at the under-bridge crossing with New Road to accommodate housing shown to the west from 1961 onwards. This would correlate with the concrete lined culvert section observed adjacent to the site.

2.10 Previous Ground Investigations

Geo-Environmental were not provided with the findings of any previous ground investigations, although there was some evidence of previous ground investigation (back filled trial pits) observed on site. It is understood from the desk study report that these could have been associated with a previous development proposal for the site. X

2.11 Generic Contamination

The desk study has identified that the site has been the subject of potentially contaminative activities and as a result, soils, groundwater and ground gas quality could have been impacted. In addition, the presence of a petrol filling station and UST tank farm 5-15m up-gradient (anticipated groundwater flow) of the site could have resulted in the site becoming impacted by mobile contaminants such as fuel hydrocarbons, BTEX and hydrocarbon degradation compounds.



3.0 PRELIMINARY ASSESSMENT

Based on the findings of the desk study, the following sections summarise the anticipated geotechnical and environmental factors likely to impact the site in the context of the proposed redevelopment. A justification and rationale for the subsequent ground investigation is given.

3.1 Geotechnical Factors

The following factors that might impact the geotechnical condition of the site were identified as part of the desk study:

- The possible presence of filled ground on the site, which may affect foundation design and construction.
- The possible presence of sub-surface structures on the site, the removal of which may result in areas of deep voids or filled ground.
- The presence of shallow groundwater and/or perched water beneath the site.
- The presence of laterally and vertically variable strata and the impact these could have on construction.

3.2 Environmental Conceptual Model

A Preliminary Risk Assessment ('PRA') and Conceptual Site Model ('CSM') have been prepared in accordance with CLR11 based on information obtained as part of the desk study. Possible risks associated with potential sources of contamination and sensitive receptors identified have been assessed following a source-pathway-receptor ('SPR') approach in accordance with current UK protocols.

A risk may only exist where a plausible SPR linkage is present and where the quantity or concentration of a contaminant is sufficient so as to pose harm. Under the statutory definition, "Contamination" may only strictly exist where contaminants pose a risk of harm to a receptor. Risk may be defined as a function of the magnitude and severity of any adverse effects arising from contamination.

For the purpose of the Preliminary Risk Assessment, risk is expressed as a function of the nature of the source, the sensitivity of a receptor, and the magnitude or likelihood of any associated pathway(s) between the source and receptor. The source, pathway(s) and receptor are each rated on a ten-point qualitative scale, with the overall level of risk being expressed as a multiple of those ratings. A summary of the criteria is given in Table 1.



Category	Individual Sources, Pathways and Receptors	Overall Risk Rating (product of SxPxR)
Negligible	0	<1
Very Low	1	1-5
Very Low to Low	1.5	6-9
Low	2	9-14
Low to Moderate	2.5	15-22
Moderate	3	22-35
Moderate to High	3.5	36-55
High	4	55-79
High to Very High	4.5	80-110
Very High	5	111-125

Table 1 Summary of Risk Ranking Scheme

Possible sources of contamination identified or discounted as part of the desk study are summarised in Table 2.

Source	Likely	Comments	Rating
Vehicle repairs and servicing [Near surface soils]	Y	Considering the known uses of the subject site it is possible that contamination of near surface soils includes metals, metalloids, non-metals, inorganic substances, PAH and TPH. However, the presence of internal and external hardstanding would serve to reduce the potential for impact on near surface soils.	Moderate (3)
Off site UST tanks farms and associated infrastructure [hydrocarbons and vapours]	Y	Whilst these are off-site sources, any associated contamination would be mobile. Thus, it is possible that leaks from the USTs, pumps and fuel pipe work could have impacted the quality of soils and groundwater beneath the subject site. Additionally, if residual contamination is present in the soils or a free phase or dissolved phase plume is present in the groundwater, hydrocarbon vapours could be present in the subsurface. Consideration is given here to soil, water and vapour.	High (4)
ACM in structures	Y	ACMs could be present within some of the structures present on the site although pre-demolition investigation and removal of any ACM would remove the source.	Low (2)
Infilled clay pits	N	The nearest area of filled ground was 100m to the south-east. Whilst this could represent a source of landfill gas, the pits were filled in the 1930s and developed for housing in the 1970s. Given the age of filling, it is considered that the gas generation/release potential from this infilled land (off-site) is reduced.	Negligible (0)

Table 2 Possible Sources of Contamination

Furthermore, potential receptors associated with the site and its redevelopment, identified or otherwise discounted, are summarised in Table 3.



Receptor	Description	Comments	Rating
Site Workers	Persons involved in construction and future maintenance of the proposed development.	Ground workers could become exposed during demolition, construction and maintenance.	High (4)
End Users	Occupants of the proposed redevelopment.	Occupation of the proposed development including houses, gardens and any amenity soft landscaping.	High (4)
Soft Landscaping	Areas of planting including lawns, shrubs, trees, etc.	Specific locations of garden areas and soft landscaping have not been determined at this stage.	Moderate (3)
Built Environment	Buried concrete for foundations etc and plastics for potable water supply pipes may be laid in contact with contaminated soils.	Aggressive ground conditions are anticipated.	High (4)
Adjacent Land Users	Sensitive land uses identified within the immediately vicinity.	Housing present to the north with arable farmland to the east, A13 to the south and farmland to the west.	Moderate (3)
Groundwater	Controlled Waters contained within the aquifer(s) beneath the site	The site overlies a minor aquifer, but is outside of any SPZ and remote from any abstractions.	Moderate (3)
Surface Water	Controlled Waters within lakes, rivers and ponds, etc, or coastal waters.	Hermitage Stream 15m to the west of the subject site. Whilst flowing through a culverted section, the concrete base and walls would offer only limited protection to the stream.	Moderate (3)
Ecological receptors	Fauna and flora, RAMSAR Site, SPA, SSSI.	No significant ecological receptors have been identified.	Negligible (0)

Table 3 Possible Receptors of Contamination

Whilst the above sources and receptors have been identified, the following matrix illustrates the pathways by which a contaminant linkage might plausibly exist:



		Potential Sources			
		Near Surface Soils (3)	Petroleum Hydrocarbons (4)	Ground gas and hydrocarbon vapours (4)	Asbestos (2)
Potential Receptors	Site Workers (4)	Ingestion, Dermal Contact, Inhalation (4)	Ingestion, Dermal Contact, Inhalation (4)	Asphyxiation, Explosion (4)	Inhalation (4)
	End Users (4)	Ingestion, Dermal Contact, Inhalation (4)	Ingestion, Dermal Contact, Inhalation (4)	Asphyxiation, Explosion (4)	Inhalation (2)
	Soft Landscaping (Phytotoxicity) (3)	Plant Uptake (3)	Root uptake (3)	Root uptake (2)	N/A
	Building Materials (4)	Chemical Attack on Concrete and Water Supplies (4)	Chemical Attack on Concrete and Water Supplies (4)	Lateral Migration of Gases (4)	N/A
	Adjacent Land Uses (3)	Leaching, Lateral Migration (3)	Leaching, Lateral Migration (4)	Lateral Migration of Gases (4)	Inhalation (2)
	Groundwater (3)	Downward Migration to Water Table (3)	Downward Migration to Water Table (4)	N/A	N/A
	Surface Water (3)	Leaching, Lateral migration (3)	Leaching, Lateral migration (3)	N/A	N/A

Note: Landfill gas from off-site clay pit and ecological receptors are not considered further as they were (0) rated for sensitivity screening.

Table 4 Potential Pollutant Linkage Ratings

A summary of the preliminary risk ratings is given in the following matrix:

		Potential Sources			
		Near Surface Soils	Petroleum Hydrocarbons	Ground gas and hydrocarbon vapours	Asbestos
Potential Receptors	Site Workers	Moderate to High	High	High	Moderate
	End Users	Moderate to High	High	High	Low to Moderate
	Soft Landscaping (Phytotoxicity)	Moderate	Moderate to High	Moderate	Negligible
	Building Materials	Moderate to High	High	High	Negligible
	Adjacent Land Users	Moderate	Moderate to High	Moderate to High	Low
	Groundwater	Moderate	Moderate to High	Negligible	Negligible
	Surface Water	Moderate	Moderate to High	Negligible	Negligible

Table 5 Preliminary risk rating

3.3 Scope of Works

In summary, the following scope of works for the intrusive investigation was agreed with the Client.

- The construction of window sampler boreholes to provisional depths of up to 5m below existing ground level, together with sampling.
- The installation of dual purpose gas and water standpipes within selected boreholes, sealed using bentonite pellets and with filter pack response zones.
- Land gas and groundwater monitoring visits on three subsequent occasions.
- Geotechnical laboratory testing on recovered soil samples to support geotechnical interpretation.
- Geochemical laboratory testing on recovered soil and water samples to support a Tier 1 Risk Assessment.

3.4 Investigation Strategy

The Desk Study and Preliminary Risk Assessment identified a number of possible sources of contaminants and investigative positions were located both on a targeted basis in order to assess such possible areas of concern as well as to provide general coverage over the subject site. Table 6 summarises the strategy of the environmental investigation.

Environmental Area of Concern	Investigation	Positions
General ground conditions	Boreholes located across the site, coupled with sampling and laboratory analysis.	All
Ground gas and groundwater quality	Window sampling and monitoring well installation at selected positions.	WS1, WS6 and WS9
Impact from off-site USTs and associated infrastructure	Window sampling and monitoring well installation at selected positions.	WS1; WS9; WS10; WS11; WS12; WS13; WS14

Table 6 Summary of Environmental Investigation Strategy

Furthermore, the Desk Study identified possible areas of concern in terms of the geotechnical condition of the site. Table 7 summarises the geotechnical investigation strategy.

Geotechnical Factor	Investigation	Positions
Made Ground and competent strata at depth	Construction of window sample boreholes across the site with sampling and laboratory analysis.	All
Groundwater	Installation of monitoring wells in selected boreholes	WS1, WS6 and WS9

Table 7 Summary of the Geotechnical Investigation Strategy

4.0 ENCOUNTERED CONDITIONS

A factual record of the conditions encountered during the physical investigation of the site is presented in the following sections. Borehole locations are shown on Figure 2.

For further details of the ground conditions encountered, reference should be made to the engineer's records presented in Appendix A, the monitoring results presented in Appendix B, the geotechnical testing results in Appendix C and the contamination testing results in Appendix D.

The physical ground investigation works were undertaken mid May 2007 with the return monitoring undertaken on three occasions in May and June 2007. Both the geotechnical and contamination testing were undertaken by UKAS accredited laboratories.

Unless stated otherwise, all depths are reported as metres below ground level (m bgl).

4.1 Soils

The ground conditions encountered were in general accordance with those anticipated from the desk study, i.e. a mantle of Made Ground overlying a general succession of Brickearth, Head Gravel and London Clay Formation.

Top (m bgl)	Base (m bgl)	Description
0	0.05 – 0.45	Made Ground
0.05 – 0.45	0.75 – 1.20	Brickearth: firm to stiff brown silt, clay and sandy clay with a little flint gravel
0.10 – 1.20	1.60 – 4.80	Head Gravel: brown clayey sandy flint gravel; brown sand with flint gravel
1.60 – 4.80	5.00+	London Clay Formation: Grey and brown silty fine sand

Table 8 Summary of Ground Conditions

The junction between the Head Gravel and underlying London Clay Formation varied across the site, i.e. ranging from 0.17m AOD to 3.20m AOD (where established) and could indicate the presence of a terrace step or shallow buried channels extending into the London Clay Formation.

It should be noted that visual and olfactory (odour) evidence of hydrocarbon impact on soils at depth within the Head Gravel was identified in boreholes WS1; WS3; WS4; and WS10. In each case, the zone of impacted soils was approximately coincident with groundwater which could indicate a smear zone of (residual) hydrocarbon product. Testing of these soils was undertaken for detailed TPH breakdown (TPH CWG suite).



4.2 Groundwater

Groundwater was encountered within the majority of the window sample boreholes at varying depths. Standing water levels equated approximately to 3m AOD in the short term. Groundwater was encountered within monitoring wells during return visits as summarised in Table 9.

Borehole	Date	Standing depth (m bgl)	Standing level (m AOD)
WS1	25/05/07	1.73	3.24
	08/06/07	1.74	3.23
	22/06/07	1.57	3.40
WS6	25/05/07	2.65	3.23
	08/06/07	2.63	3.25
	22/06/07	2.70	3.18
WS9	25/05/07	1.52	3.44
	08/06/07	1.52	3.44
	22/06/07	1.22	3.74

Table 9 Summary of groundwater records

Groundwater levels indicate a probable hydraulic gradient falling towards the south-west or south-south-west, i.e. in the general direction of flow within Hermitage Stream. In addition, this means that the USTs associated with the former PFS use on the 'Kwik Fit' site are located upstream with regards to hydraulic gradient and thus contaminated groundwater could flow from the tank farm(s) onto the subject site.

Perched water could be present around obstructions or over low permeability soils.

It should be noted that changes in groundwater levels do occur for a number of reasons including effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a standpipe or piezometer installed within appropriate response zones.

4.3 Obstructions

Whilst no below ground artificial impenetrable solid obstructions were encountered within the boreholes, given the known history of the subject site the presence of solid obstructions or voids elsewhere on the site cannot be discounted.

Buried services tracing was undertaken prior to construction of the window sample boreholes and detected various buried services beneath the site as indicated in Figure 3. It should also be noted that buried services and structures which could not be detected or traced could be present elsewhere on site and due caution should be taken when undertaking excavation works.



4.4 Land Gases

Dual purpose gas and water monitoring standpipes were installed within boreholes WS1, WS6 and WS9. These positions were selected on the basis of initial findings during the walk-over survey and intrusive investigation to enable monitoring at locations where mobile contamination may be present, e.g. WS1, as well as enabling basic triangulation of wells for groundwater flow assessment.

The wells were monitored for methane, carbon dioxide and oxygen during May and June 2007.

Methane was not detected whilst carbon dioxide was detected up to 2.4% v/v and oxygen was recorded in the range 18.0% to 20.9% v/v. Borehole flows varied from 0.0ℓ/hr to 0.2ℓ/hr. In addition, monitoring of well vapours with a Photo-ionisation detector (PID) recorded total volatile organic compound (VOC) concentrations of up to 8.1ppm.

4.5 Chemical Analysis

In order to assess the general chemical quality of the strata encountered, samples of soils recovered from the boreholes were submitted for analysis for a range of potential contaminants selected on the basis of the findings of the desk study and supported by CLR publication CLR8 and Environment Agency R&D66 publication.

Soil samples were placed into plastic containers for general inorganic analysis and into amber jars for organic analysis. All water samples were collected in amber jars/bottles. Samples were stored in temperature controlled conditions from sampling until receipt at the laboratory from which time sample preparation and storage was determined by testing requirements and in line with the laboratory's protocols.

The general testing rationale used was based on providing information on contaminative status in the upper metre of ground across the site.

In addition, soil samples were selected for TPH CWG suite analysis from WS1; WS3; WS4; and WS10 where evidence of hydrocarbon impact was noted. Samples of groundwater were recovered from the monitoring wells installed within WS1, WS6 and WS9 and were analysed for a similar suite.

4.6 Geotechnical Testing

Atterberg Limit tests were undertaken on samples of more cohesive Brickearth and Head Gravel. The results are summarised in Table 10.



Water content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index Ip (%)	Ip' (%)
20 – 45	31 – 64	18 – 25	13 – 39	9 – 11

More cohesive samples from shallow depth. These were underlain by predominantly granular soils.
Ip' – modified plasticity index accounting for percentage passing 425 micron sieve.

Table 10 Atterberg Limit Results Summary

On the basis of modified plasticity index, the more cohesive samples analysed are non-shrinkable as defined in NHBC Standards. The Atterberg Limit Test results also indicate that shallow soils could be frost susceptible.

The results of grading analyses conducted on samples of Head Gravel showed the samples analysed to comprise clayey sandy gravel.

Water soluble sulphate and pH determinations were undertaken on samples recovered from the boreholes. The results indicate pH values of between pH7.4 and pH7.6 and water soluble sulphate concentrations ranging between 0.04g/ℓ and 0.10g/ℓ.

Further tests were undertaken as part of the contamination testing (see section 6.0), which ranged between pH5.0 to pH8.5 and total sulphate concentrations ranging between 171mg/kg to 930mg/kg.



5.0 ENGINEERING CONSIDERATIONS

Subsequent to the intrusive investigation of the site and receipt of the laboratory results, the following interpretative assessments have been made with respect to engineering considerations.

5.1 Shallow Foundations

The ground conditions encountered in the boreholes comprised Made Ground overlying Brickearth, Head Gravel and London Clay Formation. Given the inherent variability of Made Ground and the apparent ad hoc occurrence of the more cohesive Brickearth, it is considered that these strata are unsuitable to bear foundations. However, the underlying Head Gravel could be suitable for conventional strip or pad foundations for low to medium rise structures such as are proposed for this site.

On the basis of the information gathered by the ground investigation, it is considered that a net allowable bearing capacity of 130kPa could be given for the soils of the Head Gravel. For the allowable bearing capacity given, total settlement should not exceed 25mm. Foundations should be no less than 450mm in width.

Whilst the Brickearth and underlying Head Gravel are non-shrinkable, the Brickearth was found to extend to depths of up to 1.2m bgl and as such it is recommended that an allowance is made for foundations to extend to depths of 1.2m to 1.5m bgl in order to ensure they terminate wholly within the Head Gravel.

On the basis of the monitoring results available to date, it is unlikely that groundwater would be encountered in foundation excavations. However, as stated previously, groundwater levels do change over time and so verification may be required prior to construction.

The use of strip or trench fill foundations could simplify construction. Foundation excavations should be concreted or blinded as soon after excavation as possible. Where concreting could take place the following day it is recommended that excavations are not taken to full depth overnight and that the final 0.5m of cover is only removed immediately prior to concreting.

5.2 Excavations

Excavations within any Made Ground and superficial strata may be prone to instability and collapse and some form of temporary support may be required. However, for shallow excavations it may be possible to batter excavations slopes back to safe angles where required.

All excavations taken beneath the water table are likely to become highly unstable and will require the use of dewatering and full-trench support.

Appropriate Health and Safety precautions should be adopted where man entry into excavations is required.



5.3 Pavements

The Atterberg Limit test results indicate that soils within the upper metre of ground could be frost susceptible and thus a minimum pavement thickness of 450mm is recommended for roads and parking areas.

Any hard spots in the formation level such as old foundations may induce reflective cracking in the pavement and allowance should be made for removing any slabs or other hard spots etc that may be present.

5.4 Sub-Surface Concrete

The results of the water soluble sulphate and pH analyses fell into Class DS-1 of BRE Special Digest 1, with an ACEC class of AC-1. The advice of this publication should be taken for the design and specification of all sub surface concrete.

5.5 Soakaways

The existing development is believed to utilise a soakaway to discharge storm water run-off. As such it is anticipated that soakaways could be utilised on the proposed development. Soakaways are not recommended to be located closer than 5m from any structure.

Furthermore, it should be noted that in order to protect water resources, the Environment Agency might have special requirements for the protection of controlled waters including water seals, closed surface entries or interceptors. The consideration of the Agency should be sought in this respect. It is possible that the EA will not permit soakaways if contaminated groundwater is present as localised discharge from soakaways could serve to enhance mobilisation of contaminants.



6.0 ENVIRONMENTAL CONSIDERATIONS

A Generic Quantitative Risk Assessment (GQRA) incorporating the results of the desk study and ground investigation was undertaken in accordance with CLR11, the findings of which are presented in the following sections.

6.1 Outline Risk Assessment

A number of plausible SPR linkages were identified as part of the desk study, as summarised in Section 3. The investigation did not encounter conditions that warranted a revision of the preliminary Conceptual Site Model, although evidence of hydrocarbon impact within the Head Gravel and groundwater was encountered during the investigation.

6.2 Land Gases vs. Site Workers

Site workers may be affected by accumulations of gases within confined spaces such as manholes, chambers, deep excavations, trenches, or the like. Affects may include inhalation of asphyxiating or poisonous gases, or explosion of combustible gases. For a preliminary assessment, the results of the land gas monitoring have been compared against published occupational exposure limits.

A long-term time weighted 8-hour average (TWA) Workplace Exposure Limit (WEL) was set at 500ppm (0.5%v/v) for carbon dioxide by the Health and Safety Executive (2005). No respective TWA-WEL or short term ST-WEL was given for oxygen, although generally the safe working minimum concentration for oxygen is taken as 19.5%v/v. Furthermore, no TWA-WEL or ST-WEL was given for methane, although methane may be potentially explosive at concentrations in the order of 5% to 15% and may be toxic in concentrations exceeding 30%.

The gas monitoring undertaken to date has shown that carbon dioxide and methane were present generally in the ranges 0-2.4% and 0%, respectively. In addition, whilst oxygen concentrations were generally around 20-21%, a minimum concentration of 18.0% was recorded within the well installed in WS9. In addition, VOC concentrations up to 8.1ppm were detected within the monitoring wells.

On the basis of the monitoring to date, it is recommended that safe working practices are developed for any ground works on the site and that adequate protection is provided for ground workers during any ground works.

Additionally, site managers are responsible for the safety of persons in their employ and therefore any person working within any confined spaces should only do so after the appropriate health and safety assessments, training and development of safe working practices in accordance with the HSE guidance entitled "Work in Confined Spaces" have been undertaken. The concentrations of land gases and vapours recorded within the boreholes may not accurately reflect the conditions that may develop within some confined spaces such as manholes and chambers, which may be subject to the generation of gas from other sources and therefore pre-entry monitoring and safe



atmosphere verification with any confined space should be a mandatory requirement on this site.

6.3 Land Gases vs. End Users

Recommendations on acceptable gas levels recorded in the ground beneath or adjacent to buildings are given in a variety of publications. For the purpose of this assessment, the results have been evaluated in terms of CIRIA C659 [2006] and NHBC 10627-R01(04) [2007].

The gas assessment follows a perceived risk approach whereby the gassing regime is determined on a worst case basis using the monitoring data irrespective of location, date, ambient conditions and the like. The assessment also considered the impact of gas at pressure in the ground since a low concentration coupled with a high flow could present a greater hazard than a high concentration with little or no flow.

On the basis of the gas data collected to date and the gas assessment as set out above, gas screening values (GSVs) of 0ℓ/hr and 0.0048ℓ/hr were calculated for methane and carbon dioxide respectively. From these GSVs the site's gassing regime is considered representative of CS1 for which typically no gas protection measures are required. However, the monitoring has also detected low concentrations of VOC vapours which are considered most likely to be derived from soil and/or groundwater impacted by hydrocarbons. Thus, it is recommended that the following gas protection measures are incorporated within the proposed development to protect the development and end users thereof:

- Suspended ground floor slabs with passively ventilated sub-floor void;
- Minimum penetration of the floor slab by services;
- The provision of a gas membrane (suitable for protection against hydrocarbon and VOC vapours) across the floor slab and walls;
- All membrane joints and penetrations sealed into the membrane.

It should be noted that in the event of action being required to remediate hydrocarbon contaminated groundwater, the above gas/vapour protection measures should still be incorporated within the development.

6.4 Land Gases vs. Soft Landscaping

Carbon dioxide may be toxic to the root zones of plants, whilst microbial oxidation of methane may primarily result in a deficiency of oxygen and thus cause root asphyxiation. Where the oxygen concentration is low, only partial oxidation of methane may occur, which may result in intermediate gaseous compounds such as methanol, formaldehyde and formic acid. The effects from both elevated methane and carbon dioxide combined may be cumulative, especially at critical growth stages such as germination.

Slightly elevated carbon dioxide was detected, along with locally and marginally depleted oxygen concentrations and thus there could be a risk of harm to plants on the



site. Whilst a detailed arboricultural or ecological survey was outside of the scope of the works undertaken by Geo-Environmental, no significant evidence of harm to the existing vegetation was noted in close proximity to the site.

6.5 Land Gases vs. Adjacent Land Users

On the basis of the assessment undertaken, the site itself is not considered to pose a risk of harm to adjacent land users. Whilst protection measures have been recommended to protect the site's end users, the hazard posed by hydrocarbon contamination is considered to have migrated onto the site from the adjacent former PFS.

At this stage it is considered that no specific measures are required to protect adjacent land users from ground gas associated with the site.

6.6 Soil Contamination vs. Site Workers

Guideline concentrations for contamination with respect to the health of site workers are cited under HSE guidance document HSG66 entitled Protection of Workers and the General Public during the Development of Contaminated Land. However, these guidelines were formulated in 1979 and are therefore considered generally defunct given the considerable advancements in risk assessment made since that time. No other generic UK specific soil guideline concentrations were available at the time of preparing this report.

Laboratory testing undertaken to date has not indicated the presence of gross contamination within near surface soils. However, four locations (WS1, WS3, WS4 and WS10) were found to have been impacted by hydrocarbons at depths in excess of 1.5m bgl and these locations should be considered hazardous with regards to ground workers who may come into contact (direct or indirect) with these soils. It is recommended that a full COSHH assessment is prepared in order to provide a robust assessment of safe working practices on the site. Any such assessment should account for the results of the laboratory testing.

This assessment has been prepared in order to provide an indication of possible risks posed to site workers for the purposes of environmental legislation. It remains the responsibility of the main contractor and their appointed sub-contractors to prepare their own further risk assessments in accordance with Health and Safety legislation in order to protect persons in their employ. Special consideration should be given to the provisions of the Construction (Design & Management) Regulations 1994, Health and Safety at Work Act and the Control of Substances Hazardous to Human Health regulations in order to protect the safety of persons in their employ. Additional guidance can be sought from the CIRIA publication entitled "A Guide for Safe Working on Contaminated Sites".



6.7 Soil Contamination vs. End Users

The presence of a possible contaminant does not necessarily imply that a site or area is contaminated or that there is any unacceptable risk to human health. A Preliminary Quantitative Risk Assessment has been undertaken in accordance with CLR11, in order to evaluate any unacceptable risks posed to human health with respect to the proposed redevelopment. It should be noted that this assessment is protective of the chronic long-term effects of contaminants, which is also likely to be protective of any possible immediate acute effects.

Non-targeted analysis was undertaken on a series of soil samples collected from shallow depth (0-1m bgl) across the site. In addition, specific soil samples were also targeted for analysis, e.g. where organoleptic evidence of hydrocarbon impact was recorded.

With regards to the non-targeted analysis, statistical outliers were identified for several PAH compounds from WS3 at 0.2m bgl and WS6 at 0.2m bgl. In both cases the concentrations reported were very low, i.e. just above detection limit and did not exceed relevant their SGV or GAC value where applicable. As such these outliers are not considered reflective of a contamination hazard. Statistical outliers for zinc were also identified in several near surface samples together with a statistical outlier for lead in the sample from WS8 at 0.2m. The outlier concentrations did not exceed the respective SGVs and thus do not warrant further consideration or remedial action.

In addition to the above, several statistical outliers were identified for TPH, as TPH C10-C40. No organoleptic evidence of hydrocarbons was identified in these samples during logging and sampling and it is possible that the concentrations (126-286mg/kg) reflect the presence of lighter end PAH compounds or other naturally occurring organic materials. The concentrations detected are not considered representative of gross contamination, nor would they reflect the source of the hydrocarbon impact at depth (as further supported by leachate test results). It would though be considered prudent to allow for localised removal of these soils from garden areas unless further more detailed analysis of samples from proposed garden areas is undertaken to demonstrate the absence of a hazard.

The mean value test did not identify any contaminants exhibiting upper bound values (Us_{95}) exceeding their relevant SGV or GAC value. As such, it is considered that no remedial action is required to protect end users from near surface soils. However, it is recommended as a matter of course for a minimum of 500mm of certified clean topsoil to be placed in all garden areas.

In the event that topsoil or subsoil are imported on to the development, their chemical suitability for the intended end use should be verified prior to importation. Importation of topsoil or subsoil from unverified or unsuitable sources could require their removal from site and replacement with suitable materials. As a matter of good practice, it is recommended that the location, approximate extent and thickness of any imported topsoil is recorded. Validation testing should also be undertaken.



With regards to targeted analysis, no concentrations of concern were identified with the exception of WS10 at 1.5m bgl, in which aliphatic hydrocarbon concentrations (in the range C8-C16) were considered to represent a potential hazard with respect to contact, ingestion and inhalation, although given the depth, the inhalation exposure was considered most probable. Protection measures are considered to be required with regards to potential soil vapour hazard and have been discussed in Section 6.3 above.

6.8 Soil Contamination vs. Soft Landscaping

ICRCL in publication 70/90 1990 entitled 'Notes on the Restoration and Aftercare of Metalliferous Mining Sites for Pasture and Grazing' provides assessment criteria for a number of potentially phytotoxic contaminants in terms of new planting. No other UK specific soil guideline concentrations were available to provide an assessment of possible phytotoxic effects on plant growth.

Given that a suitable averaging area for soft landscaping may vary considerably between the root zones of grasses to that of a juvenile immature tree, no appropriate averaging area was applicable to this assessment. Therefore, the results of the chemical analysis were evaluated for this SPR linkage singularly.

The results of the chemical analysis for determinands known to pose a potential phytotoxic risk to plant growth are summarised in Table 11, together with the respective adopted Generic Assessment Criteria (GAC) for plant growth.

Determinand	Phytotoxicity GAC Value (mg/kg)	In excess of GAC?
Zinc	1,000	No
Cadmium	50	No
Copper	250	No
Arsenic	1,000	No

Table 11 Summary of Plant Phytotoxicity Assessment

The phytotoxicity assessment indicated that no concentrations exceed the assessment criteria for phytotoxicity. The advice regarding imported topsoil as presented in Section 6.7 would also apply for soft landscaping.

6.9 Soil Contamination vs. Building Materials

Recommendations with respect to pH and sulphate in relation to buried concrete are made in Sections 4.6 and 5.6. It is noted that no special precautions in this respect are warranted (Class DS-1, AC-1).

Buried plastics laid in contact with contaminated soils may be susceptible to attack by aggressive chemicals; therefore, potable water supplies may potentially become contaminated or tainted. With respect to the Water Regulation Advisory Scheme (WRAS) guidance entitled The Selection of Materials for Water Supply Pipes to be laid in Contaminated Land, concentrations of arsenic and TPH within some of the investigative positions exceeded the standards. It is therefore likely that the local water utility provider will require potable water supplies to be protected and the utility company should be consulted in order to confirm their specific requirements in this respect. It is



possible that either copper or aluminium barrier pipe may be required. As a matter of good practice and to maximise the protection to maintenance workers, it is recommended that clean, granular backfill is used in service runs and that marker tapes are used for all buried services.

6.10 Soil Contamination vs. Adjacent Land Users

No plausible pollutant linkage is considered to exist which warrants remedial action to protect adjacent land users from soil based contamination within the subject site.

It is recommended that dust suppression techniques, e.g. damping down exposed soils, are employed during the demolition and construction phases on site in order to minimise the potential for airborne migration of specific hazards and to manage potential nuisance issues for adjacent land users.

6.11 Soil Contamination vs. Groundwater

Soil leachate tests were undertaken on samples of near surface soils, with results compared against Tier 1 screening criteria for the protection of controlled waters. The specific criteria used were Environmental Quality Standards for surface water and, in the absence of any specific guidance for the protection of groundwater per se, drinking water standards [The Water Supply (Water Quality) Regulations] were used. It should be noted that the use of drinking water standards is a highly conservative approach as they set out maximum permissible concentrations at consumers' taps and thus do not account for any processes such as dilution, attenuation or post abstraction processing.

For the general suites analysed, no concentrations of concern were identified with regards either to surface water or groundwater. However, leachate testing was also undertaken on samples of hydrocarbon impacted soils from WS10 and WS4. Whilst no individual concentrations of concern were identified in the sample from WS4, the sample from WS10 was found to exhibit TPH (C10-C21 aliphatic) exceeding the drinking water standard.

The test results are considered to indicate that whilst soils beneath the site have been impacted to some degree by hydrocarbons, the general quality of soil beneath the site is not the source of the impact and as such remedial action is not considered to be required to improve general soil quality beneath the site.

6.12 Groundwater Contamination vs. Site Workers

The establishment and enforcement of safe working practices and provision of suitable and adequate protection as discussed in Section 6.6 would be prudent.



6.13 Groundwater Contamination vs. End Users

End users would not come into direct contact with groundwater and thus the majority of potential pollutant linkages are incomplete. However, groundwater analysis has identified the presence of hydrocarbons which are considered to represent a potential vapour hazard. As such, in order to mitigate the potential pollutant linkage associated with vapour inhalation, the protection measures as set out in Section 6.3 should be incorporated within the development.

6.14 Groundwater Contamination vs. Soft Landscaping

No international standards exist with respect to the chemical quality of groundwater with respect to protecting soft landscaping from effects of contamination. In addition, vegetation on and in proximity to the site did not appear to be adversely affected by groundwater quality. Opportunities for contact by plant roots with groundwater are remote, particularly during critical juvenile stages of growth. In the absence of any plausible pollutant linkage, it is concluded that negligible risk is posed in this respect and that no specific remedial measures are required.

6.15 Groundwater Contamination vs. Building Materials

Buried concrete would require protection where in contact with groundwater. The results of laboratory testing on soil samples have indicated Class DS1 concrete design conditions and groundwater results do not show that this should be increased. However, the presence of elevated TPH concentrations in groundwater should be borne in mind for both buried concrete and services.

6.16 Groundwater Contamination vs. Adjacent Land Users

Surrounding land uses were identified to be broadly consistent with the current or proposed use of the subject site. With reference to previous sections, negligible risk was likely to be posed to end users on this site from general groundwater quality. Whilst groundwater quality beneath the site has been impacted by hydrocarbons, the source is considered to be off-site (see Section 6.17). At this stage it is considered that no specific measures are required to protect adjacent land users.

6.17 Groundwater Contamination vs. Controlled Waters

Groundwater samples were analysed from WS1, WS6 and WS9 which were located to provide coverage to aid triangulation and groundwater flow estimations, whilst also allowing some targeting following initial observations made during borehole construction, e.g. hydrocarbons in WS1.

There are no set standards for permissible concentrations within groundwater in the UK and as such consideration is given to most probable receptors for screening guidance.



Thus, groundwater results have been compared against Environmental Quality Standards (EQS) and Drinking Water Standards (DWS) guideline concentrations.

The Tier 1 screening assessment did not identify any specific concentrations of concern with regards to EQS although it should be noted that there is no guidance on TPH within EQS. With regards to DWS, concentrations of concern for a range of determinands were identified within the samples from WS1 and WS9 as listed below:

- WS1 – PAH (sum of 4); benzo(a)pyrene; TPH (C8-C10 and C16-C35).
- WS9 – PAH (sum of 4); benzo(a)pyrene; TPH (C12-C35, mainly C16-C35).

In addition, concentrations of VOCs (ethylbenzene; m & o xylene; trimethylbenzene; and 1,2,4trimethylbenzene) were detected in the sample from WS1. These VOCs were at generally very low concentration but are associated with the breakdown of TPH contamination.

The desk study did not identify any specific potential source for hydrocarbon contamination on the site, but did identify that UST tank farms were located from 5m beyond the northern site boundary, i.e. associated with a former PFS. Information presented within the desk study suggested that there may be two separate tank farms associated with the former PFS, now 'Kwik Fit' site. The subject site is underlain by London Clay Formation, a minor aquifer, and is not situated within a Source Protection Zone for groundwater abstraction. The ground investigation identified the presence of hydrocarbon impacted soils at various locations across the site. The spatial distribution of the impacted soils does not lend itself to a readily identifiable plume, although the variation in elevation of the junction between the Head Gravel and underlying London Clay Formation could complicate plume shape and flow.

Initial groundwater flow modelling respective to Ordnance Datum has indicated a probable groundwater flow direction towards the south-west or south-south-west, i.e. in a similar direction to surface water flow within Hermitage Stream. It should also be noted that this places the off-site UST tank farms up hydraulic gradient of the subject site.

The findings of the intrusive investigation combined with the analytical results indicate the presence of a plume of hydrocarbon contaminated groundwater, including soil smear zone, is present beneath the subject site. The most probable source of this contamination is from an up-gradient former PFS, as demonstrated with the highest TPH concentrations being recorded in WS1 which was down gradient and within approximately 20m of the off-site tank farm. A surface water course is located adjacent to and cross/partially down-gradient of the subject site. It is considered that any action taken on the part of the owner/developer of the subject site to mitigate the impact on groundwater beneath the subject site will ultimately be unviable without remedial action being taken on the up-gradient source, which is located off-site under third party land. Thus it is considered, that the developer should take measures to protect the development and associated receptors from any hazard associated with contaminated groundwater, whilst groundwater contamination is either remediated from source or the processes of attenuation and dilution are allowed to continue beneath the subject site. It is recommended that consultation is sought with the Environment Agency at an early stage in order to determine the regulatory requirement in this aspect.



6.18 Waste Disposal

Although not part of the environmental risk assessment, the following information has been provided with respect to the disposal of arisings generated as part of the proposed redevelopment.

Waste may be defined as any substance or object in Annex 1 of the Waste Framework Directive which the holder discards, intends to discard, or is required to discard. The holder of waste is anyone in possession of waste or generates it and therefore both the contractor and ultimately the developer are responsible for safe disposal of waste. Different classification systems exist for waste disposal and, whether soils on the site may be generally considered either contaminated or uncontaminated in terms of the redevelopment, this might not necessarily be the case with landfill operators.

The test results to date indicate that soils beneath the site would be likely to fall into the inert or non-hazardous waste categories. However, Waste Acceptance Criteria (WAC) analysis would be required to confirm the exact classification.

Other materials disposed of from site as part of the demolition or remediation process may require disposal separately. All materials containing dangerous substances, tar or bitumen, asbestos, mercury and PCBs are likely to be classified as Hazardous Waste and therefore susceptible to the relevant legislative controls.

6.19 Discovery Strategy

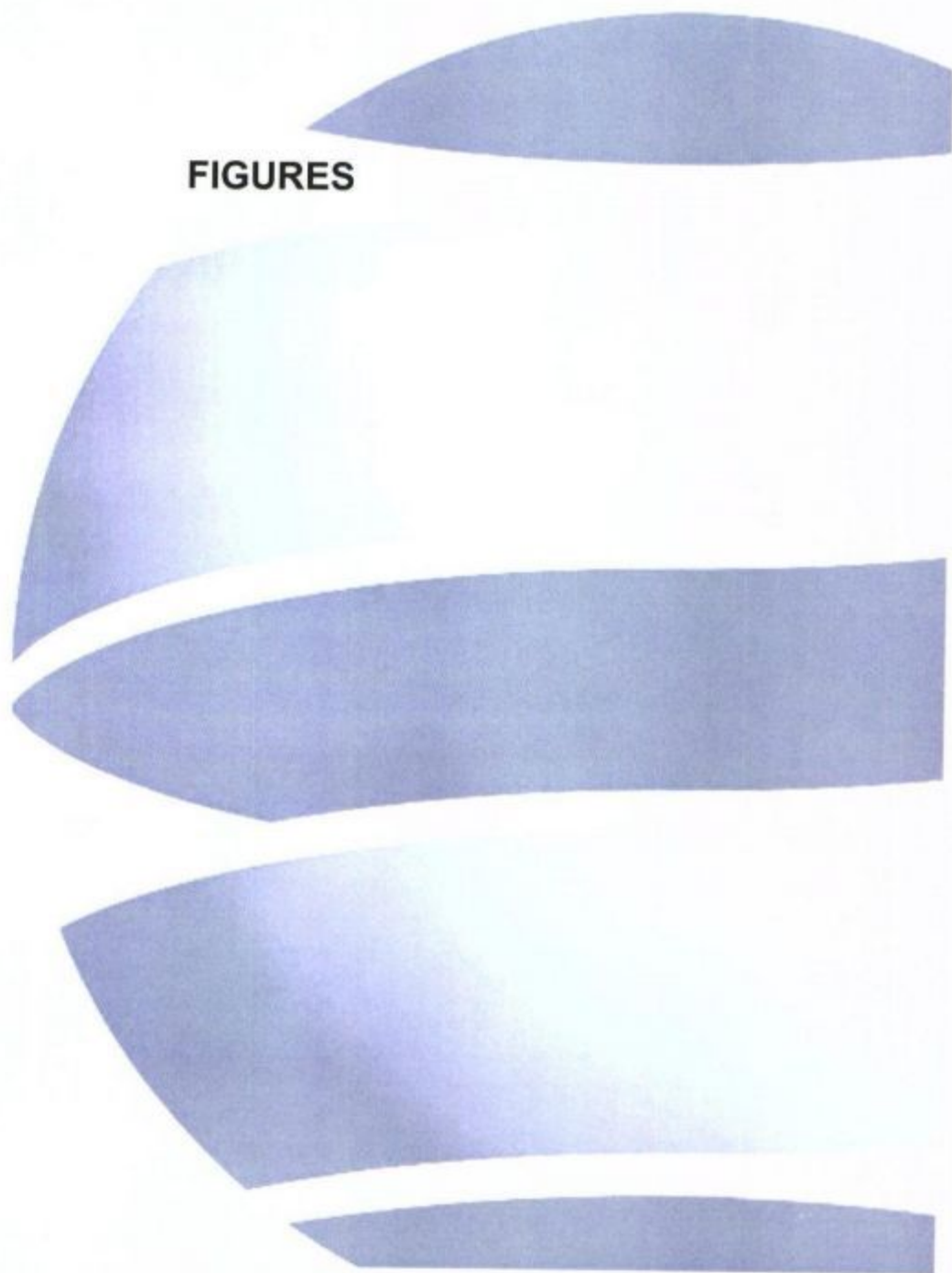
Whilst an investigation has been undertaken on the site, it remains possible that unexpected soil conditions may be encountered during the process of site demolition, clearance and construction.

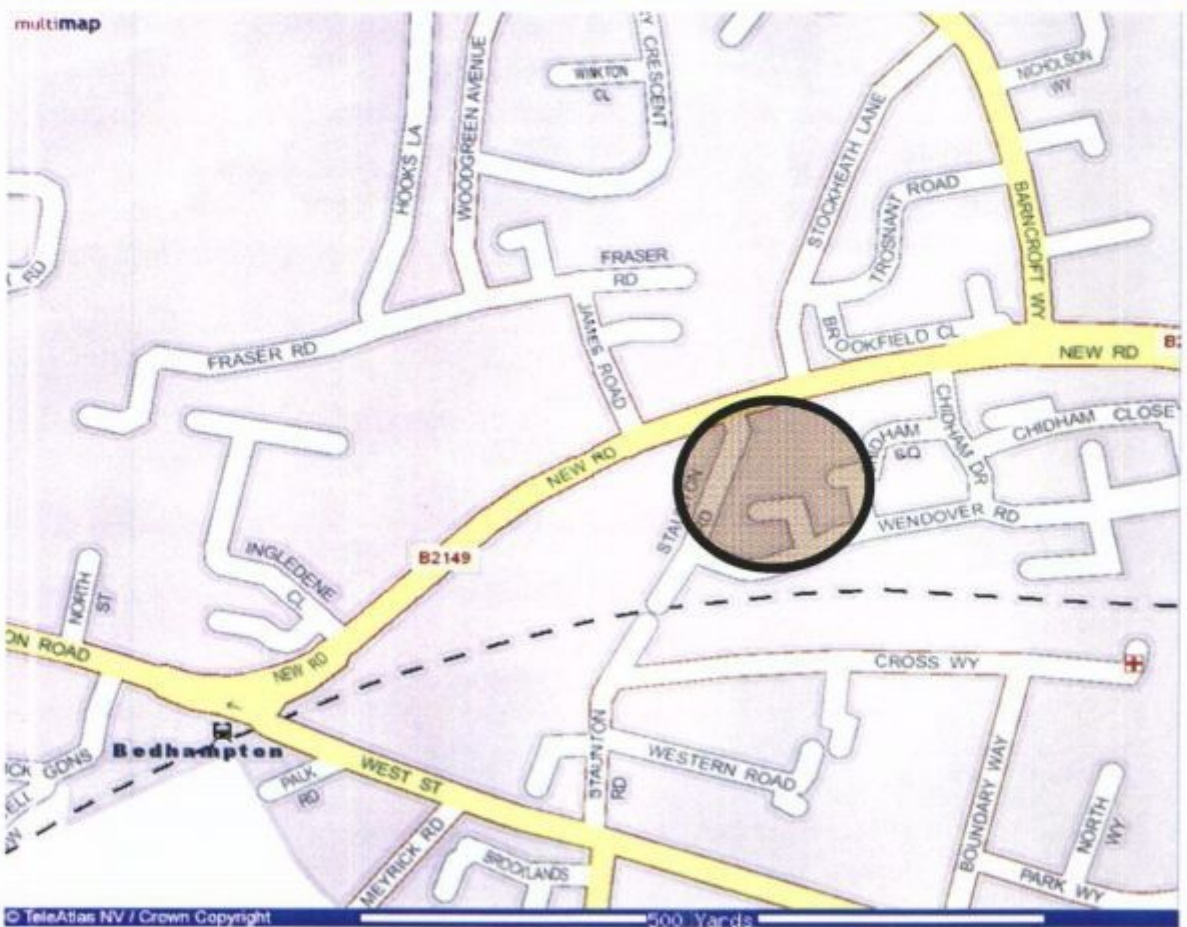
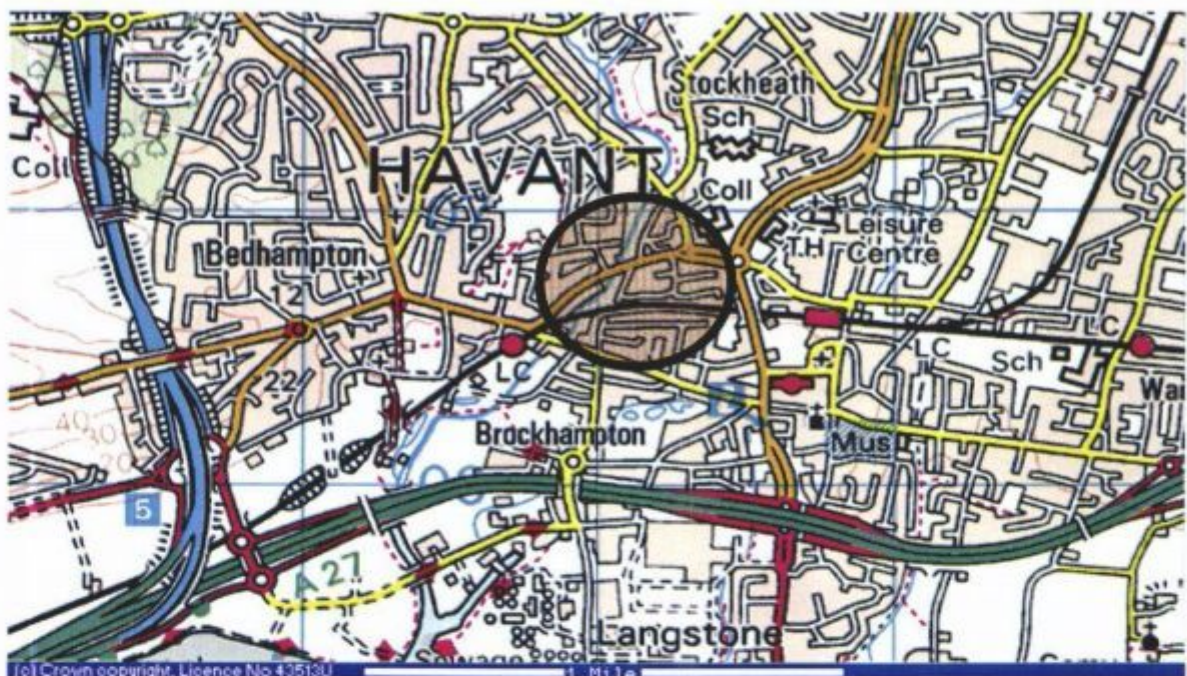
Examples may include oily pockets within the soil, pockets of cement boarding or fibrous materials within the soil, black ashy materials, soils exhibiting strong odours, brightly coloured materials and former structures or brickwork.

Should previously undiscovered contamination be encountered during construction by the ground workers, this should be reported to the Site Manager immediately in order that any necessary inspection may be made. Records should be kept and samples submitted for analysis where conditions encountered are not as anticipated. The results of any such testing should be sent to the authorities for consultation.

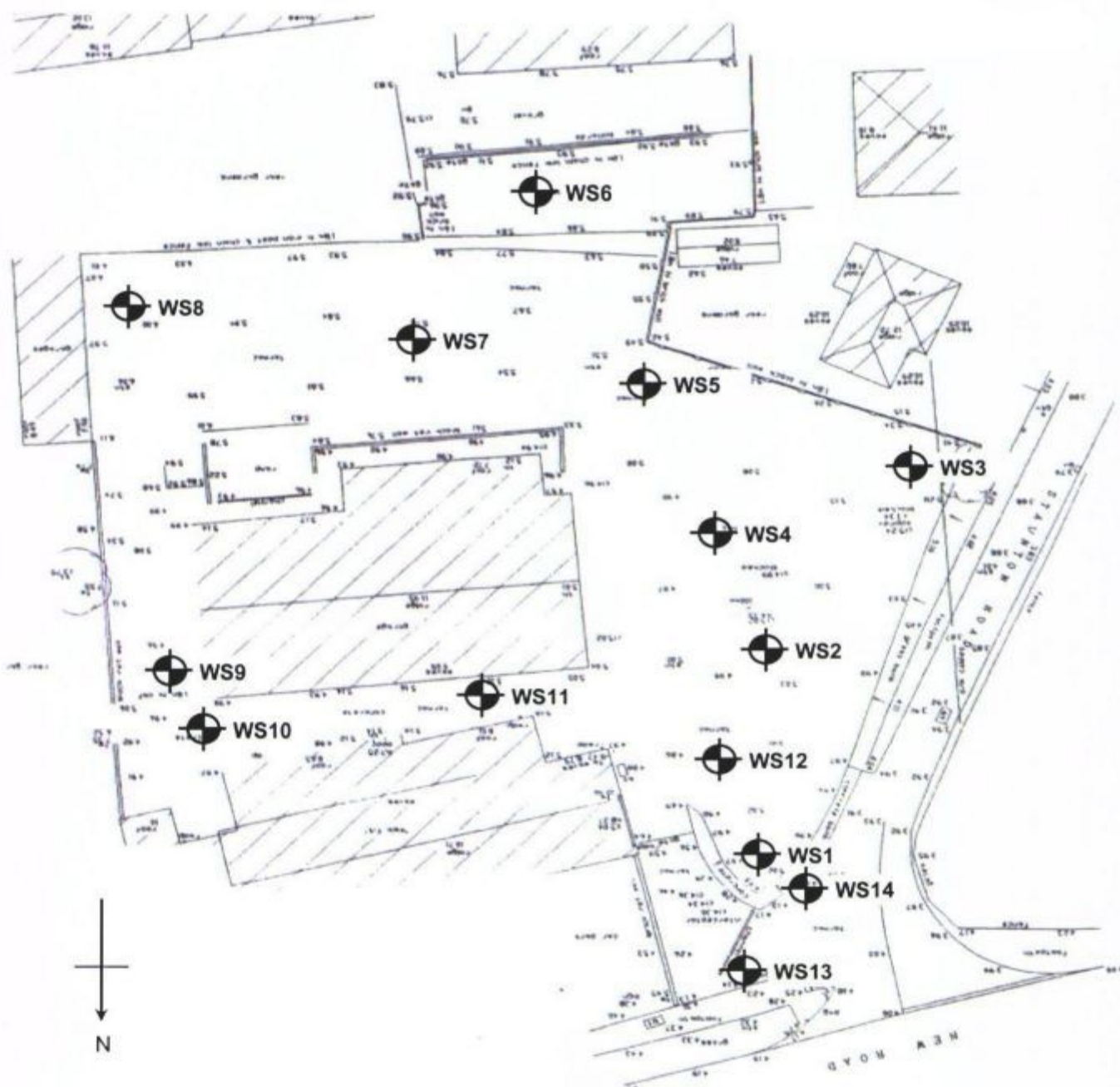
A copy of the discovery strategy should be lodged on site and provisions made to ensure that all workers are made aware of their responsibility to observe, report and act on any potentially suspicious or contaminated materials they may encounter.

FIGURES





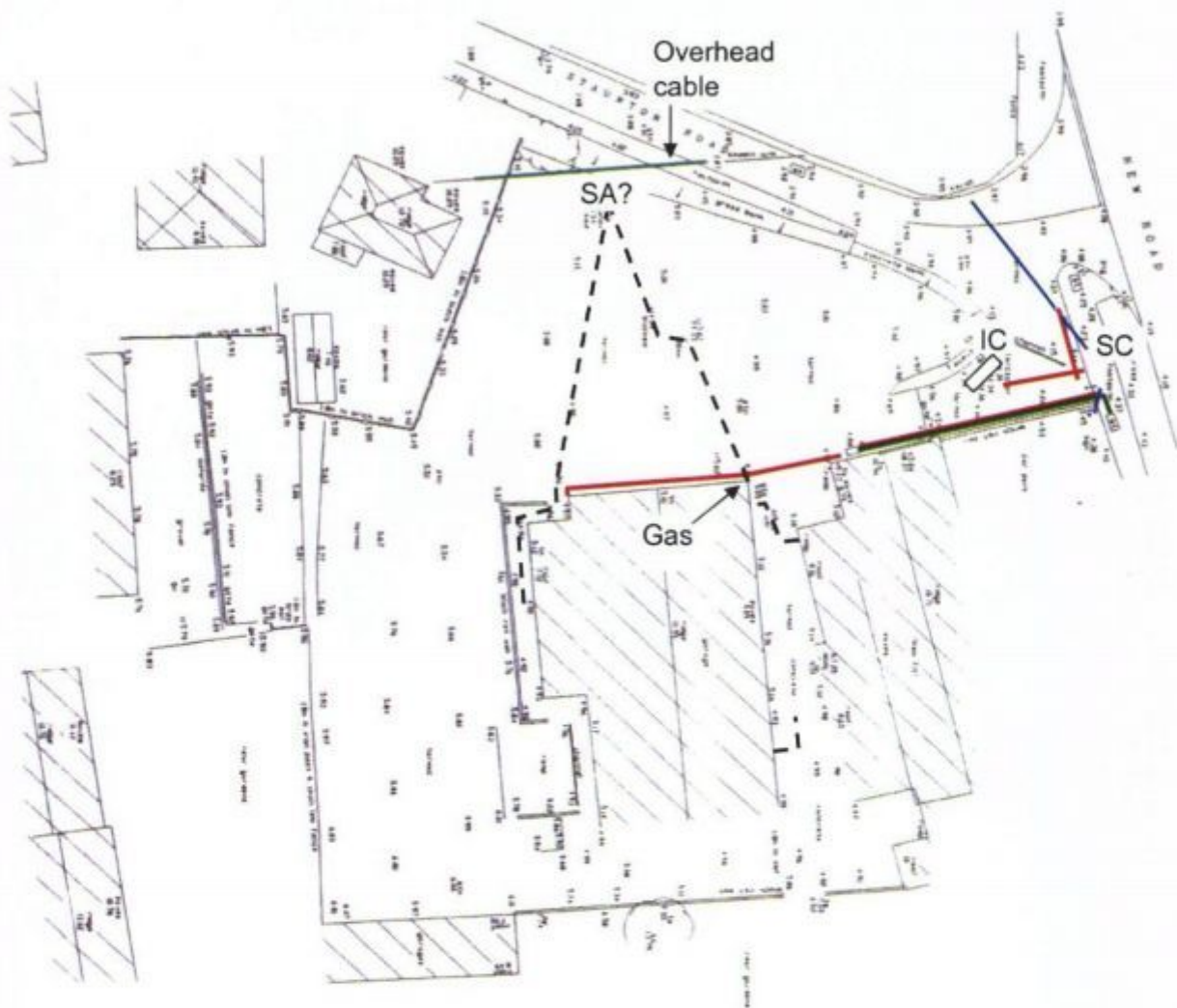
Project:	New Road, Havant			Title	Site Location Plan
Client:	Complete Commercials			Geo-Environmental Services Ltd	 Geo-Environmental
Ref No:	GE5529	Revision:	0	28 Crescent Road, Brighton, BN2 3RP	
Drawn:	GR	Date:	24/05/2007	T: 01273 699 399 F: 01273 699 388	
Figure:	1	Scale:	Not To Scale	E: mail@gesl.net W: www.gesl.net	



Note: Positions are indicative unless surveyed

Project: New Road, Havant		Title	Borehole Location Plan
Client: Complete Commercials		Geo-Environmental Services Ltd 28 Crescent Road, Brighton, BN2 3RP T: 01273 699 399 F: 01273 699 388 E: mail@gesl.net W: www.gesl.net	
Ref No: GE5529	Revision: 0		
Drawn: GR	Date: 24/05/2007		
Figure: 2	Scale: Not To Scale		





KEY:

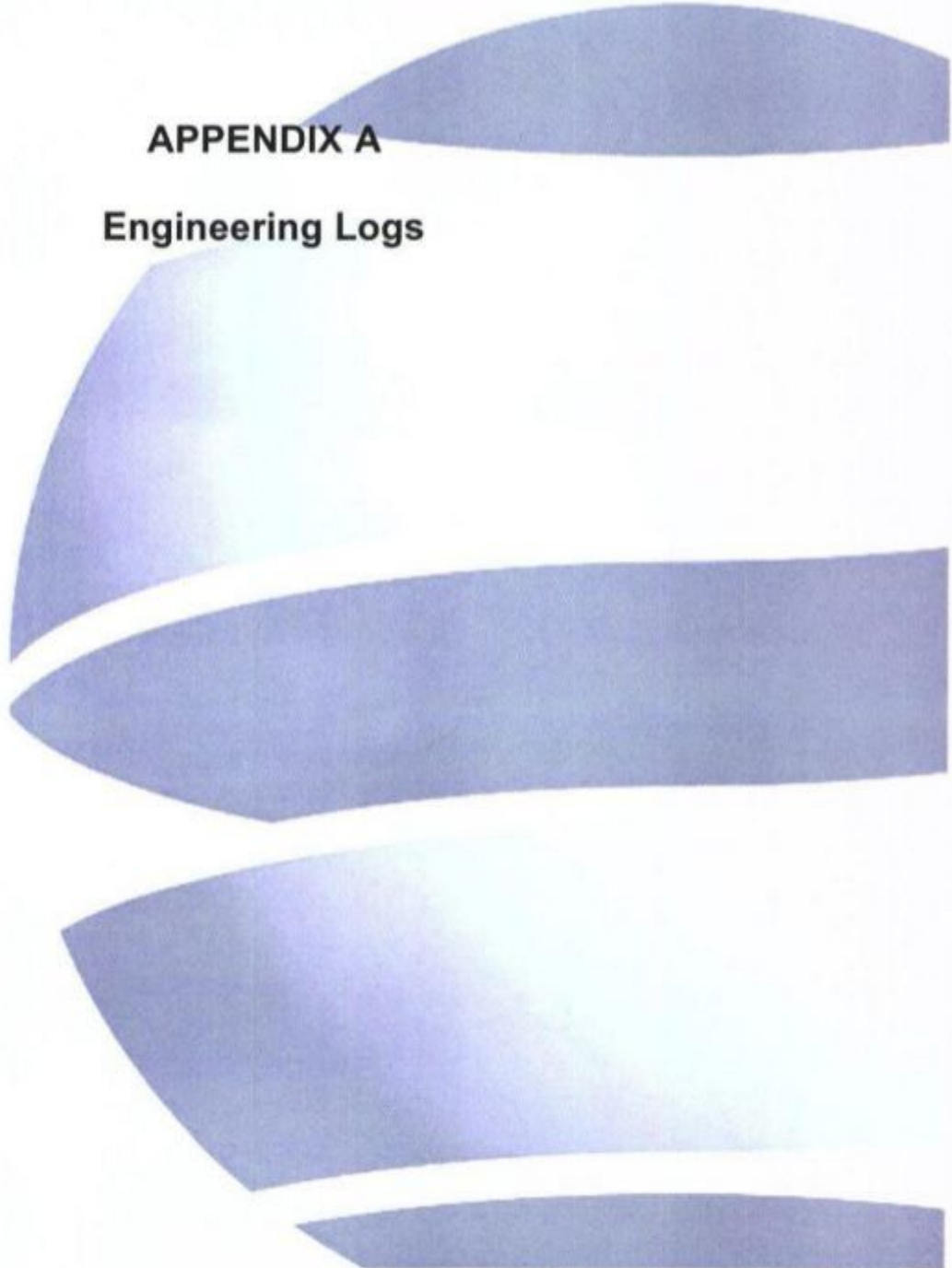
- site drainage (presumed route - unable to trace)
- BT
- Water
- Electricity
- SA? Possible Soakaway
- IC Interceptor (3 linked chambers falling to New Road)
- SC Stopcock

NOTE: A possible gas pipe was detected in the corner of the workshops as shown but could not be traced
Mains water supply could not be traced from water meters or stopcock on pavement
Extents of traceable or detectable services shown.

Note: Positions are indicative unless surveyed

Project: New Road, Havant		Title	Site Utilities Survey
Client: Complete Commercials		Geo-Environmental Services Ltd 28 Crescent Road, Brighton, BN2 3RP T: 01273 699 399 F: 01273 699 388 E: mail@gesl.net W: www.gesl.net	
Ref No: GE5529	Revision: 0		
Drawn: GR	Date: 24/05/2007		
Figure: 3	Scale: Not To Scale		





APPENDIX A

Engineering Logs

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA			
				Legend	mOD	mBGL	Water
0.20	D(1)	Tarmacadam (MADE GROUND)			4.92	0.05	
		Concrete (MADE GROUND)			4.87	0.10	
0.50	D(2)	Soft brown CLAY with a little to some fine to medium angular and sub-angular flint gravel (BRICKEARTH)				(0.50)	
					4.37	0.60	
1.00	D(3)	Soft brown fine to medium flint gravelly clayey SILT (BRICKEARTH)				(0.60)	
					3.77	1.20	
1.50	D(4)	Orange brown slightly clayey silty fine to coarse angular and sub-rounded flint GRAVEL (HEAD GRAVEL)				(1.00)	
2.00	D(5)				2.77	2.20	
2.50	J(6)	Light brown clayey silty fine to coarse angular and sub-angular GRAVEL of flint with strong hydrocarbon type odour (HEAD GRAVEL)				(0.80)	
3.00	J(7)				1.97	3.00	
3.50	J(8)	Orange brown clayey sandy medium to coarse angular and sub-rounded GRAVEL of flints (HEAD GRAVEL)				(0.80)	
4.00	D(9)				1.17	3.80	
4.50	D(10)	Orange brown and grey slightly silty fine to medium angular and sub-angular GRAVEL of flint (HEAD GRAVEL)				(1.00)	
5.00	D(11)				0.17	4.80	
		Dark grey silty fine SAND (LONDON CLAY FORMATION)				(0.30)	
					-0.03	5.00	
		End of Borehole at 5.00 m					

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=ivane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ▽=strike ▼=rest. OTHERS: (2.00)=strata

Stability: Partial collapse at 2m bgl during drilling	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS1
Groundwater: Strike at 2.00m; 1.90 after 60mins	Method:	Start: 17/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish: 17/05/2007	Size:
Remarks:	Client: Complete Commercials	Filled:	Depth: 5.00mBGL
		Eng:	Level: 4.970mOD
		Drawn: vg	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA			
				Legend	mOD	mBGL	Water
0.20	D(1)	Tarmacadam (MADE GROUND) Orange-brown clayey silty fine to coarse angular GRAVEL of flints. (HEAD GRAVEL)			4.90	0.10	
0.50	D(2)						
1.00	D(3)					(1.30)	
1.50	D(4)	Cream silty chalky fine to coarse angular GRAVEL of flint. (HEAD GRAVEL)			3.60	1.40	
2.00	D(5)						
2.50	D(6)					(1.80)	
3.00	D(7)	Light brown over grey silty fine SAND. (LONDON CLAY FORMATION)			2.00	3.00	
3.50	D(8)						
4.00	D(9)					(1.00)	
		End of Borehole at 4.00 m			1.00	4.00	

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ▽=strike ▼=rest OTHERS: (2.00)=strata

Stability: Partial collapse at 2.1m during drilling	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS2
Groundwater: Strike at 4.00m; 2.00 after 30mins	Method:	Start: 17/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish: 17/05/2007	Size:
Remarks:	Client: Complete Commercials	Filled: -	Depth: 4.00mBGL
		Eng:	Level: 5.000mOD
		Drawn: vg	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION	STRATA			
			Legend	mOD	mBGL	Water / S/Pipe
0.20	D(1)	Tarmacadam. (MADE GROUND)		5.15	0.10	
		Crushed concrete with abundant brick and gravel rubble. (MADE GROUND)			(0.30)	
0.50	D(2)	Firm light brown and grey fine to coarse angular and sub-angular gravelly SILT. (BRICEARTH)		4.85	0.40	
					(0.60)	
1.00	D(3)	Orange brown slightly clayey silty fine to coarse angular and sub-rounded flint GRAVEL with hydrocarbon odour at 2.2m (HEAD GRAVEL)		4.25	1.00	
					(1.50)	
1.50	D(4)					
2.00	D(5)					
2.50	J(6)	Dark grey silty fine SAND with hydrocarbon odour (LONDON CLAY FORMATION)		2.75	2.50	▼
3.00	J(7)				(1.50)	▽
3.50	J(8)					
4.00	J(9)	Dark brown silty fine SAND (LONDON CLAY FORMATION)		1.25	4.00	
4.50	D(10)				(1.50)	
5.00	D(11)	End of Borehole at 5.00 m		0.25	5.00	

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ▽=strike ▼=rest OTHERS: (2.00)=strata

Stability: Partial collapse at 2.3m bgl	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS3
Groundwater: Strike at 3.00m; 2.20 after 20mins	Method:	Start: 17/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish: 17/05/2007	Size:
Remarks:	Client: Complete Commercials	Filled: -	Depth: 5.00mBGL
		Eng:	Level: 5.250mOD
		Drawn: vg	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION	STRATA			
			Legend	mOD	mBGL	Water / S/Pipe
0.20	D(1)	Tarmacadam. (MADE GROUND)		4.95	0.05	
		Limestone sub-base. (MADE GROUND)		4.90	0.10	
		Crushed concrete with abundant brick and gravel rubble. (MADE GROUND)		4.80	0.20	
0.50	D(2)	Orange brown slightly clayey silty fine to coarse angular and sub-rounded GRAVEL of flint. (HEAD GRAVEL)				
1.00	D(3)	Dark grey-green slightly silty fine SAND with hydrocarbon odour (LONDON CLAY FORMATION)				
1.50	D(4)					
2.00	J(5)					
2.50	J(6)					
3.00	J(7)					
		End of Borehole at 3.00 m				

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=splt-spoon CPT=cone WATER: ∇=strike ▼=rest OTHERS: (2.00)=strata

Stability: Partial collapse at 1.9m bgl	Type: Hydraulic Window Sampler Geoprobe	Ref. GE5529	Position: WS4
Groundwater: Strike at 3.00m; 1.90 after 30mins	Method:	Start: 17/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish: 17/05/2007	Size:
Remarks:	Client: Complete Commercials	Filled: -	Depth: 3.00mBGL
		Eng:	Level: 5.000mOD
		Drawn: vg	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA				
				Legend	mOD	mBGL	Water	S/Pipe
0.20	D(001)	Concrete slab: (MADE GROUND)			5.68	0.20		
		Reworked dark brown gravelly SILT: (MADE GROUND)			5.48	0.40		
0.50	D(002)	Dark brown SILT (BRICK EARTH)						
1.00	D(003)							
		Brown and light brown silty chalky fine to medium GRAVEL (HEAD GRAVEL)			4.68	1.20		
1.50	D(005)							
2.00 - 3.00	D(004)	Orange brown and brown mottled silty clayey chalky GRAVEL of flint (HEAD GRAVEL)			3.88	2.00		
3.00 - 4.00	D(006)	Brown slightly fine to medium sandy fine to coarse angular and sub-angular GRAVEL of flint (HEAD GRAVEL)			2.88	3.00		
		no recovery			1.68	4.00		
		End of Borehole at 5.00 m			0.88	5.00		

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=splt-spoon CPT=cone WATER: ▽=strike ▼=rest OTHERS: (2.00)=strata

Stability: Partial collapse at 3m bgl	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS6
Groundwater: Strike at 3.00m; 2.80 after 5mins	Method:	Start: 18/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish: 18/05/2007	Size:
Remarks:	Client: Complete Commercials	Filled:	Depth: 5.00mBGL
		Eng:	Level: 5.88mOD
		Drawn:	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION	STRATA			
			Legend	mOD	mBGL	Water
0.20	D(001)	Tarmacadam, (MADE GROUND) Dark brown flint gravelly CLAY (BRICK EARTH)		5.65	0.05	
0.50	D(002)					
1.00	D(003)					
1.50	D(004)					
2.00	D(005)					
2.50 - 3.00	D(006)					
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA			
				Legend	mOD	mBGL	Water
0.20	D(1)	Tarmacadam. (MADE GROUND)			5.97	0.05	
0.50	D(2)	Stiff light brown mottled silty CLAY with occasional fine brick fragments. (MADE GROUND)			5.57	0.45	
1.00	D(3)	Stiff brown silty CLAY with occasional fine to coarse angular gravel of flints. (BRICKEARTH)			5.22	0.80	
1.50	D(4)	Firm to stiff light brown and orange-brown fine to medium angular gravelly CLAY. (BRICKEARTH)			4.82	1.20	
2.00	D(5)	Orange brown clayey fine to coarse angular and sub-angular GRAVEL of flint. (HEAD GRAVEL)			4.22	1.80	
2.50 - 3.00	D(6)	Cream and light brown mottled very chalky clayey medium to coarse flint gravelly SAND with fine and medium gravel size fragments of weak chalk (HEAD GRAVEL)			3.52	2.50	
		Dense brown sandy flint GRAVEL (HEAD GRAVEL)			3.02	3.00	
		End of Borehole at 3.00 m					

SAMPLES: C=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ▽=strike ▼=rest OTHERS: (2.00)=strata

Stability: Collapse to 2.85m bgl on completion	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS8
Groundwater: Strike at 3.00m; 2.70 after 180mins	Method:	Start: 30/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish:	Size:
Remarks:	Client: Complete Commercials	Filled:	Depth: 3.00mBGL
		Eng:	Level: 6.020mOD
		Drawn:	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA			
				Legend	mOD	mBGL	Water
0.20	D(1)	Tarmacadam. (MADE GROUND)			4.91	0.05	
		Greyish brown mottled fine sandy GRAVEL with abundant concrete fragments. (MADE GROUND)			4.71	0.25	
0.50	D(2)	Brown mottled clayey fine to medium angular GRAVEL of flint. (HEAD GRAVEL)				0.40	
		Light brown and cream mottled very chalky fine to coarse angular and sub-angular GRAVEL of flints. (HEAD GRAVEL)			4.31	0.65	
1.00	D(3)					1.00	
1.50	D(4)						
2.00	D(5)	Orange-brown mottled clayey fine to medium sandy fine to coarse angular to sub-rounded GRAVEL of flint. (HEAD GRAVEL)			3.31	1.65	
						1.00	
2.50	D(6)						
3.00	D(7)	Grey-green mottled silty fine SAND. (LONDON CLAY FORMATION)			2.31	2.65	
						0.30	
3.50	D(8)	Grey-green mottled fine SAND. (LONDON CLAY FORMATION)			1.90	3.00	
						1.00	
4.00	D(9)						
		End of borehole at 4.00 m			0.90	4.00	

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ∇=strike ▼=rest OTHERS: (2.00)=strata

Stability: Partial collapse upon withdrawing sampler from approx. 2m bgl	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS9
Groundwater: Strike at 3.00m; 2.20 after 10mins	Method:	Start: 18/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish:	Size:
Remarks:	Client: Complete Commercials	Filled:	Depth: 4.00mBGL
		Eng:	Level: 4.96mOD
		Drawn:	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION	STRATA				
			Legend	mOD	mBGL	Water	S/Pipe
0.20	D(1)	Concrete slab. (MADE GROUND)		4.87	0.10		
0.50	D(2)	Orange brown mottled fine to medium angular sandy GRAVEL of flints. (HEAD GRAVEL)					
					(1.40)		
1.00	D(3)						
1.50	P(4)	Light brown clayey fine to medium GRAVEL of flints with a strong hydrocarbon type odour (HEAD GRAVEL)		3.47	1.50	▼	
2.00	P(5)				(1.00)	↗	
2.50	P(6)	Brown and grey mottled silty sandy fine to medium angular GRAVEL (HEAD GRAVEL)		2.47	2.50		
2.80	P(7)	End of Borehole at 2.80 m		2.17	2.80		

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ↗=strike ▼=rest OTHERS: (2.00)=strata

Stability:	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS10
Groundwater: Strike at 2.00m; 1.45 after 20mins	Method:	Start: 18/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish:	Size:
Remarks:	Client: Complete Commercials	Filled:	Depth: 2.80mBGL
		Eng:	Level: 4.970mOD
		Drawn:	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA			
				Legend	mOD	mBGL	Water
0.20	D(1)	Tarmacadam. (MADE GROUND)			5.07	0.05	
		Concrete slab. (MADE GROUND)			4.92	0.20	
0.50	D(2)	Light brown sandy fine GRAVEL rubble with aggregate fragments. (MADE GROUND)			4.62	0.30	
		Firm to stiff orange brown mottled flint gravelly CLAY (BRICKEARTH)					
1.00	D(3)						
		Orange-brown locally sandy clayey fine to medium angular angular flint GRAVEL (HEAD GRAVEL)			4.12	1.00	
1.50	D(4)						
2.00	D(5)						
		Orange-brown sandy clayey fine to medium angular GRAVEL of flint (HEAD GRAVEL)			3.12	2.00	
2.50	D(6)						
		Firm to stiff orange brown very fine to coarse flint gravelly CLAY (HEAD GRAVEL)			2.32	2.80	
3.00	D(7)				2.12	3.00	
		End of Borehole at 3.00 m					

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ∇=strike ▼=rest OTHERS: (2.00)=strata

Stability: Boreholes collapsed to 2.8m bgl on completion	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS11
Groundwater: Strike at 3.00m; 1.75 after 120mins	Method:	Start: 18/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish:	Size:
Remarks:	Client: Complete Commercials	Filled:	Depth: 3.00mBGL
		Eng:	Level: 5.120mOD
		Drawn:	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA			
				Legend	mOD	mBGL	Water
							S/Pipe
0.20	D(1)	Tarmacadam. (MADE GROUND)			4.95	0.05	
		Concrete slab (MADE GROUND)				(0.20)	
0.50	D(2)	Firm orange-brown fine to medium gravelly CLAY (BRICK EARTH)			4.75	0.25	
						(0.75)	
1.00	D(3)						
		Orange brown clayey fine to coarse flint GRAVEL (HEAD GRAVEL)			4.00	1.00	
1.50	D(4)					(1.00)	
2.00	D(5)						
		Brown clayey fine sandy fine to medium angular GRAVEL of flint (HEAD GRAVEL)			3.00	2.00	
2.50	D(6)					(1.00)	
3.00	D(7)						
		End of Borehole at 3.00 m			2.00	3.00	

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: ▽=strike ▼=rest OTHERS: (2.00)=strata

Stability: Partial collapse from 1.8m bgl during drilling	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS12
Groundwater: Strike at 2.00m; 1.80 after 20mins	Method:	Start: 18/05/2007	Scale: 1:30
		Finish:	Size:
Plant:	Project: New Road, Havant	Filled:	Depth: 3.00mBGL
		Eng:	Level: 5.000mOD
Remarks:	Client: Complete Commercials	Drawn:	Figure: FIG
		Chd:	Sheet: Sheet 1 of 1

SAMPLING & TESTING		STRATA DESCRIPTION		STRATA			
				Legend	mOD	mBGL	Water
0.20	D(1)	Tarmacadam. (MADE GROUND)			3.95	0.05	
		Concrete slab. (MADE GROUND)			3.85	0.15	
0.50	D(2)	Brown and orange-brown very soft clayey fine to coarse angular to subrounded flint GRAVEL (HEAD GRAVEL)					
1.00	D(3)						
1.50	D(4)						
2.00	D(5)						
2.50	D(6)	Brown slightly silty clayey fine sandy fine to medium angular GRAVEL of flint (HEAD GRAVEL)			1.85	2.15	
3.00	D(7)						
		End of Borehole at 3.00 m			1.00	3.00	

SAMPLES: D=disturbed B=bulk U=undisturbed TESTS: MAC=macintosh IVAN=vane HPEN=penetrometer SPT=split-spoon CPT=cone WATER: =strike =rest OTHERS: (2.00)=strata

Stability:	Type: Hydraulic Window Sampler Geoprobe	Ref: GE5529	Position: WS14
Groundwater: Strike at 3.00m; 2.35 after 25mins	Method:	Start: 18/05/2007	Scale: 1:30
Plant:	Project: New Road, Havant	Finish: -	Size:
Remarks:	Client: Complete Commercials	Filled: ☒	Depth: 3.00mBGL
		Eng:	Level: 4.000mOD
		Drawn:	Figure: FIG
		Ckd:	Sheet: Sheet 1 of 1

APPENDIX B

Land Gas and Groundwater Monitoring

Geo-Environmental Services Ltd

28 Crescent Road Brighton East Sussex BN2 3RP

T: 01273 699 399 F: 01273 699 388 E: mail@gesl.net W: www.gesl.net

Environmental Consultants | Geotechnical Engineers | Site Investigations



Geo-Environmental

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	25/05/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS1

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

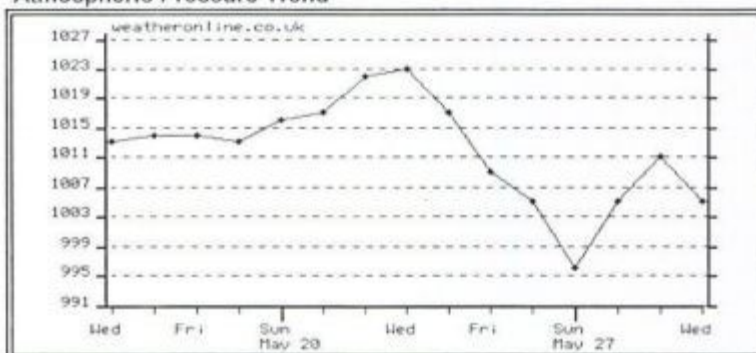
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Oxygen	O ₂ (%)	20.9	20.9	20.9	20.8	20.8	20.9	20.8	N/A

Other Results

VOC's	(ppm)	8.1
Atmospheric Pressure	mBar	1005
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.2
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	1.73
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	2.60

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
---------------	---------------

Weather Conditions

Hot and sunny

Remarks

Atmospheric pressure data from Solent MRSC monitoring station

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.9	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	0.0%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%

Geo-Environmental Services Ltd

28 Crescent Road Brighton East Sussex BN2 3RP

T: 01273 699 399 F: 01273 699 388 E: mail@gesl.net W: www.gesl.net

Environmental Consultants | Geotechnical Engineers | Site Investigations



Geo-Environmental

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	25/05/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS6

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

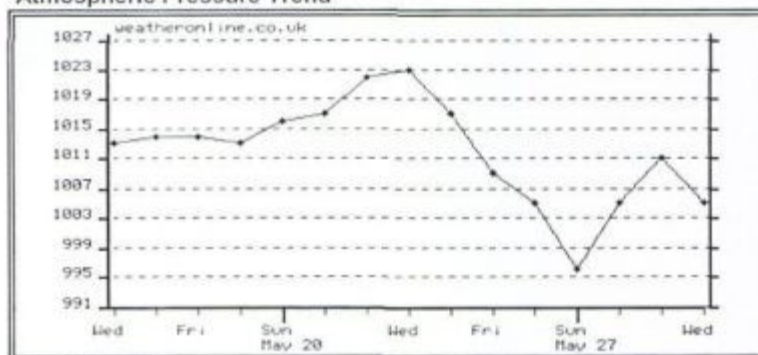
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.0	0.1	0.4	0.2	0.4	0.0	0.001
Oxygen	O ₂ (%)	20.8	20.7	20.4	20.0	20.1	20.8	20.0	N/A

Other Results

VOC's	(ppm)	2.0
Atmospheric Pressure	mBar	1005
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.2
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	2.65
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	2.75

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
---------------	---------------

Weather Conditions

Hot and sunny

Remarks

Atmospheric pressure data from Solent MRSC monitoring station

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.7	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	-1.0%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%

Geo-Environmental Services Ltd

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Geo-Environmental

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	25/05/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS9

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

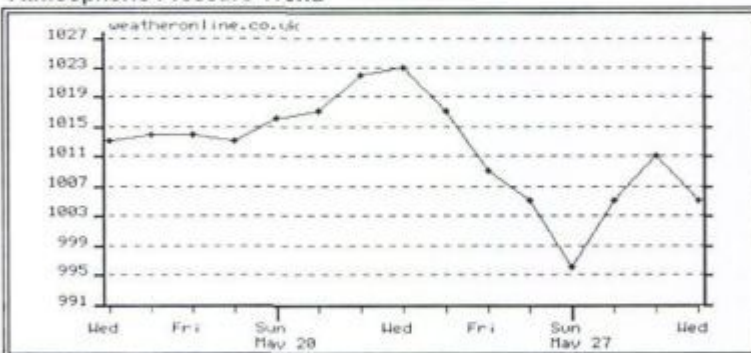
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.8	1.7	2.3	2.4	2.4	0.0	0.005
Oxygen	O ₂ (%)	20.6	19.4	18.9	18.2	18.0	20.6	18.0	N/A

Other Results

VOC's	(ppm)	3.6
Atmospheric Pressure	mBar	1005
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.2
Minimum flow rate	Min (l/hr)	0.2
LNAPL	(mbgl)	
Water Level	(mbgl)	1.52
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	2.50

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
---------------	---------------

Weather Conditions

Hot and sunny

Remarks

Atmospheric pressure data from Solent MRSC monitoring station

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	21.0	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	0.5%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	08/06/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:
WS1

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

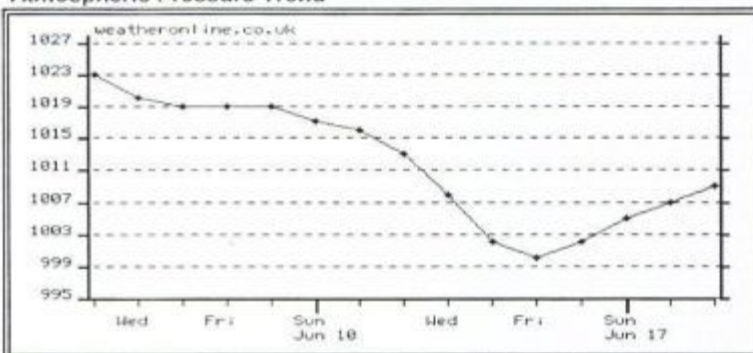
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.2	0.6	1.7	1.9	1.9	0.0	0.000
Oxygen	O ₂ (%)	20.9	20.7	20.3	19.1	18.8	20.9	18.8	N/A

Other Results

VOC's	(ppm)	2.9
Atmospheric Pressure	mBar	1016
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.0
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	1.74
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	3.02

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
3 litres	1 litre

Weather Conditions

Sunny

Remarks

Atmospheric pressure lot uses data from Solent MRSC

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.8	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	-0.5%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	08/06/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS6

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

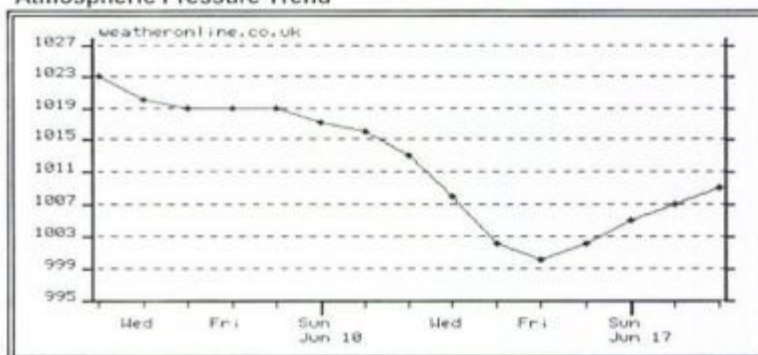
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.0	0.1	1.4	1.5	1.5	0.0	0.000
Oxygen	O ₂ (%)	20.7	20.7	20.7	18.8	18.8	20.7	18.8	N/A

Other Results

VOC's	(ppm)	1.5
Atmospheric Pressure	mBar	1016
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.0
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	2.63
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	2.75

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
1 litre (purged dry)	1 litre

Weather Conditions

Sunny

Remarks

Atmospheric pressure lot uses data from Solent MRSC

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.8	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	-0.5%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	08/06/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS9

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

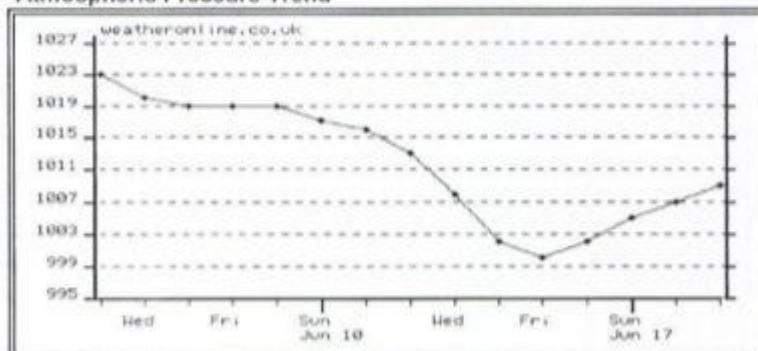
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.1	0.6	1.6	1.9	2.2	2.2	0.1	0.000
Oxygen	O ₂ (%)	20.7	19.3	18.0	17.2	16.8	20.7	16.8	N/A

Other Results

VOC's	(ppm)	3.3
Atmospheric Pressure	mBar	1017
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.0
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	1.52
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	2.45

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
3 litres	1 litre

Weather Conditions

Sunny

Remarks

Atmospheric pressure lot uses data from Solent MRSC

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.7	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	-1.0%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%



FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	22/06/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS1

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

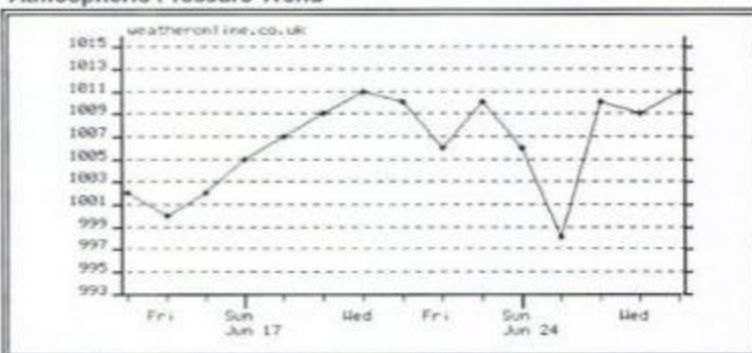
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Oxygen	O ₂ (%)	20.8	20.8	20.8	20.8	20.8	20.8	20.8	N/A

Other Results

VOC's	(ppm)	3.5
Atmospheric Pressure	mBar	1004
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.2
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	1.57
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	3.02

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
---------------	---------------

Weather Conditions

cloud and rain

Remarks

Atmospheric pressure data from Solent MRSC monitoring station

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.7	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	-1.0%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%

Geo-Environmental Services Ltd

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Geo-Environmental

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	22/06/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS6

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

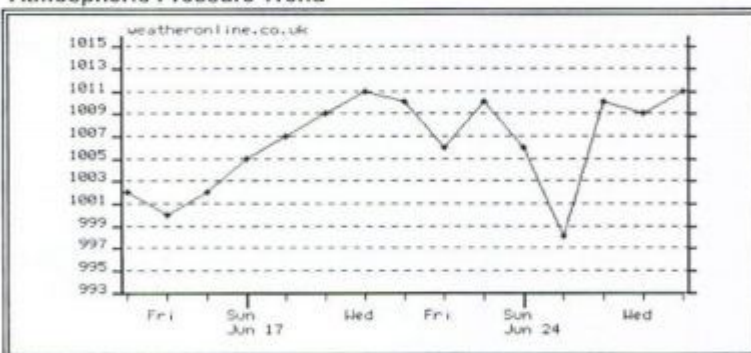
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.0	0.0	2.3	2.4	2.4	0.0	0.000
Oxygen	O ₂ (%)	20.8	20.8	20.8	19.0	18.8	20.8	18.8	N/A

Other Results

VOC's	(ppm)	0.0
Atmospheric Pressure	mBar	1003
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.0
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	2.70
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	2.76

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
---------------	---------------

Weather Conditions

cloud and rain

Remarks

Atmospheric pressure data from Solent MRSC monitoring station

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.8	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	-0.5%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%

FIELD MONITORING RECORD SHEET

Project Details

Site Name	New Road, Havant	Date	22/06/2007
Reference	GE5529	Field Engineer	Chris Rowley

Position:

WS9

Equipment

GA 94 Landfill Gas Analyser, Single Phase Dipmeter, Bailers

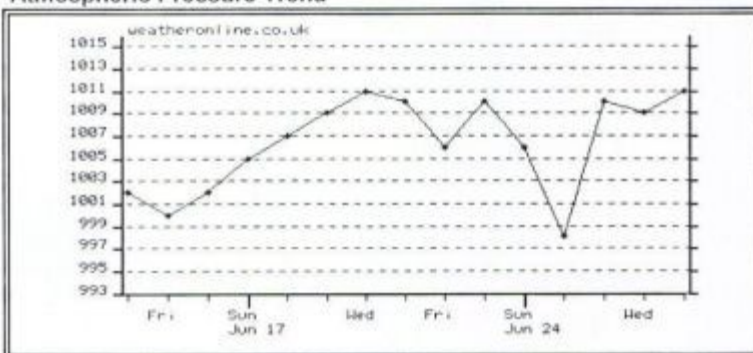
Monitoring Results

Time of Reading:	Seconds	10s	20s	30s	60s	120s	MAX	MIN	FLUX
Methane	CH ₄ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Carbon Dioxide	CO ₂ (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000
Oxygen	O ₂ (%)	20.8	20.8	20.8	20.8	20.8	20.8	20.8	N/A

Other Results

VOC's	(ppm)	1.5
Atmospheric Pressure	mBar	1003
Hydrogen Sulphide	H ₂ S (%)	
Maximum flow rate	Max (l/hr)	0.0
Minimum flow rate	Min (l/hr)	0.0
LNAPL	(mbgl)	
Water Level	(mbgl)	1.22
DNAPL	(mbgl)	
Standpipe depth	(mbgl)	2.47

Atmospheric Pressure Trend



Sampling Details

Volume Purged	Sample Volume
---------------	---------------

Weather Conditions

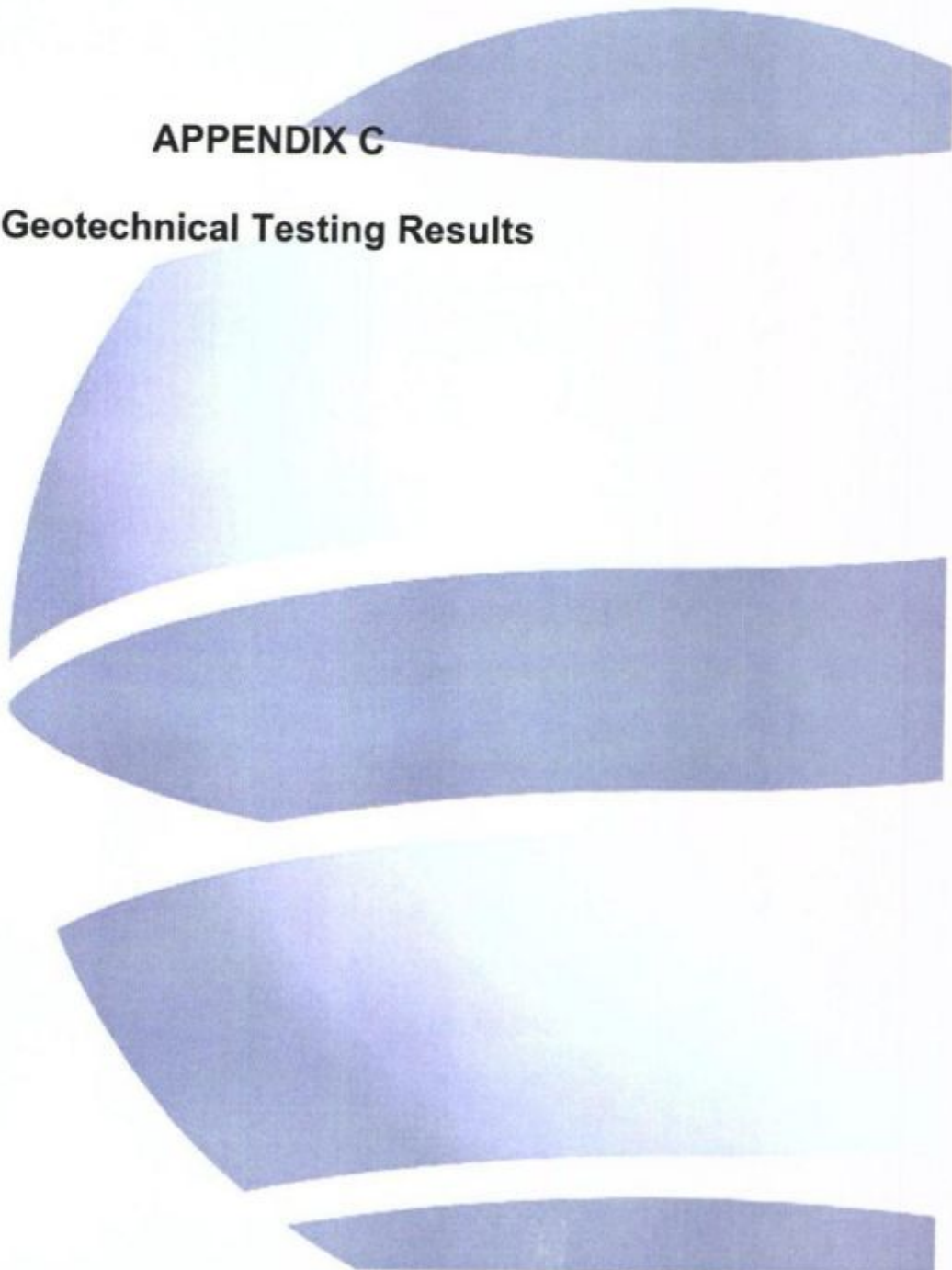
cloud and rain

Remarks

Atmospheric pressure data from Solent MRSC monitoring station

Calibration Data

		CO ₂	CH ₄	O ₂	VOC's
Atmosphere	Reading	0.0	0.0	20.8	0.0
	Target	0.0	0.0	20.9	0.0
	Error	0.0%	0.0%	-0.5%	0.0%
Calibration cylinder	Reading	50.0	50.0	0.0	100.0
	Target	50.0	50.0	0.0	100.0
	Error	0.0%	0.0%	0.0%	0.0%



APPENDIX C

Geotechnical Testing Results

Project Name: New Road Havant		Date received: 01/06/2007	K4 SOILS 
		Date sampled: 04/06/2007	
Client: GESL		Date tested: 11/06/2007	
Project No: GE5529	Our job/report no: 5589	Date reported: 18/06/2007	

Borehole No:	Sample No:	Depth (m)	Description	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425 mm (%)	Remarks
WS11		0.50	Brown and yellowish brown CLAY with calcareous deposits and some f.m.c gravel	45	64	25	39	22	
WS3		0.50	Greyish brown slightly sandy CLAY with little f.m. gravel	21	31	18	13	76	
WS5		0.50	Greyish brown slightly sandy CLAY with little f.m. gravel	21	36	19	17	75	
WS8		1.00	Brown CLAY with much f.m.c gravel	20	58	23	35	26	

	Summary of Test Results		Checked and Approved Initials: kp Date: 18/06/2007
	BS 1377 : Part 2 : Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method.		
	BS 1377 : Part 2 : Clause 5 : 1990 Determination of the plastic limit and plasticity index.		
	BS 1377 : Part 2 : Clause 3.2 : 1990 Determination of the moisture content by the oven-drying method.		

Project Name: New Road Havant					K4 SOILS LABORATORY
Client: GESL		Project No: GE5529			
		Reference: 5589			
Borehole No:	Sample No:	Depth m	Description	pH	Sulphate content (g/l)
WS2		1.50	Greyish brown clayey SAND with some f.m. gravel and occasional chalk fragments	7.4	0.04
WS7		1.50	Grey brown slightly clayey SAND with some f.m.c gravel	7.4	0.04
WS8		1.00	Brown CLAY with much f.m.c gravel	7.6	0.10
WS9		1.00	Grey brown clayey sandy GRAVEL with occasional chalk fragemnts	7.4	0.08
Summary of Test Results Date 18/06/2007 BS 1377 : Part 3 :Clause 5 : 1990 Determination of sulphate content of soil and ground water : gravimetric method					Checked and Approved Initials : kp



PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref

5589

Borehole / Pit
No

WS7

Location

New Road Havant

Sample No

Depth

1.50 m

Visual Soil
Description

Grey brown clayey sandy GRAVEL

Sample type



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	79		
28	72		
20	65		
14	56		
10	51		
6.3	44		
5	41		
3.35	39		
2	35		
1.18	30		
0.6	26		
0.425	24		
0.3	22		
0.212	21		
0.15	20		
0.063	18		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	64.9
Sand	17.5
Silt & Clay	17.6

Grading Analysis	
D100	50.0
D60	16.6
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY

Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU.
E-mail: k4soils@aol.com

Approved Signatories: K.Phaure(Tech.Mgr)

J.Phaure(Lab.Mgr) Bhavika.R.(Qual.Mgr)

Test results relate only to the sample numbers shown above.

Checked and Approved

Initials: kp

Sheet3/3

Date: 18/06/2007

MSF-11 / R9

All samples connected with this report, incl any on 'hold' will be disposed off according to Company Policy. Acopy of this policy is available on request



PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref

5589

Borehole / Pit
No

WS9

Location

New Road Havant

Sample No

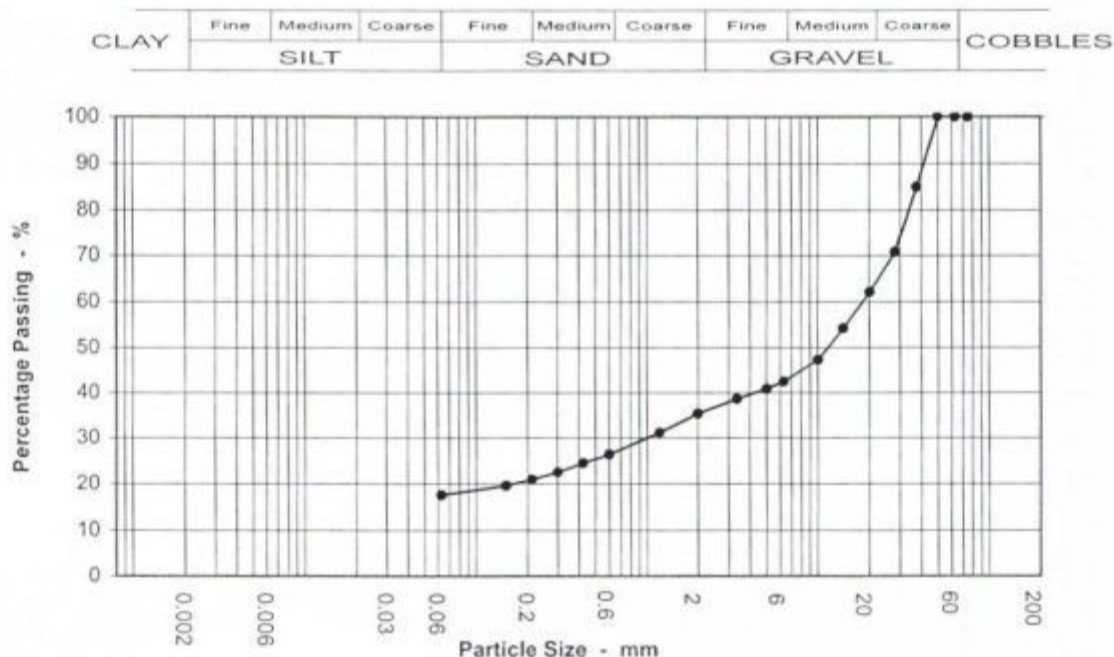
Visual Soil
Description

Grey brown clayey sandy GRAVEL with occasional
chalk fragemnts

Depth

1.00 m

Sample type



Seiving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	85		
28	71		
20	62		
14	54		
10	47		
6.3	42		
5	41		
3.35	39		
2	35		
1.18	31		
0.6	26		
0.425	24		
0.3	23		
0.212	21		
0.15	20		
0.063	18		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	64.7
Sand	17.8
Silt & Clay	17.5

Grading Analysis	
D100	50.0
D60	18.4
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY

Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU.
E-mail: k4soils@aol.com

Approved Signatories: K.Phaure(Tech.Mgr)

J.Phaure(Lab.Mgr) Bhavika.R.(Qual.Mgr)

Test results relate only to the sample numbers shown above

Checked and Approved

Initials: kp

Sheet3/3

Date: 18/06/2007

MSF-11 / R9

All samples connected with this report ,incl any on 'hold' will be disposed off according to Company Policy. Acopy of this policy is available on request



PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref

5589

Borehole / Pit
No

WS11

Location

New Road Havant

Sample No

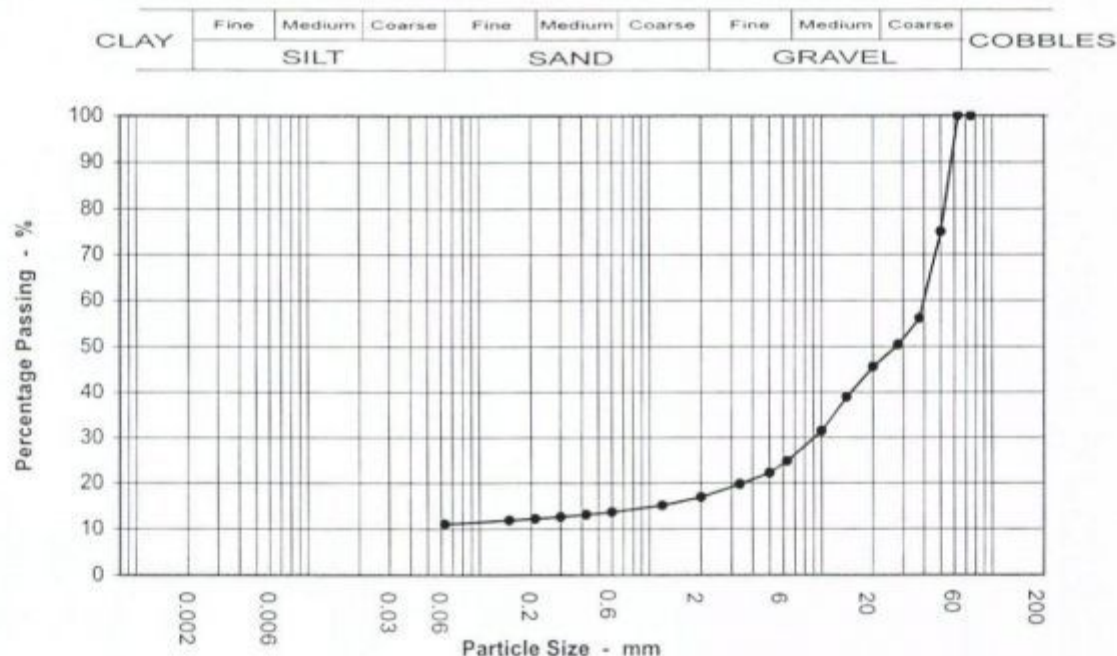
Depth

1.50 m

Visual Soil
Description

Brown clayey slightly sandy GRAVEL

Sample type



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	75		
37.5	56		
28	50		
20	46		
14	39		
10	31		
6.3	25		
5	22		
3.35	20		
2	17		
1.18	15		
0.6	14		
0.425	13		
0.3	13		
0.212	12		
0.15	12		
0.063	11		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	83.1
Sand	5.9
Silt & Clay	11.0

Grading Analysis	
D100	63.0
D60	40.1
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY

Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU.
E-mail: k4soils@aol.com

Approved Signatories: K.Phaure(Tech.Mgr)

J.Phaure(Lab.Mgr) Bhavika.R.(Qual.Mgr)

Test results relate only to the sample numbers shown above

Checked and Approved

Initials: kp

Date: 18/06/2007

Sheet3/3

MSF-11 / R9

All samples connected with this report, incl any on 'hold' will be disposed off according to Company Policy. Acopy of this policy is available on request

APPENDIX D

Contamination Testing Results

Project:	New Road, Havant
Ref:	GE5529
Client:	Complete Commercials Ltd

Dataset All data

Location	WS3	WS4	WS5	WS6	WS7	WS7	WS8	WS9	WS10	WS12
Depth	0.20m	0.50m	0.20m	0.20m	0.20m	0.50m	0.20m	0.50m	0.20m	0.50m
Stratum	Made Gnd	Head Gr	Brickearth	Made Gnd	Brickearth	Brickearth	Made Gnd	Head Gr	Head Gr	Brickearth
arsenic	9.30	8.60	12.10	8.40	6.80	13.10	12.60	8.40	12.50	5.60
boron	0.40	0.50	1.20	0.90	1.00	0.80	0.70	0.70	1.40	0.50
cadmium	0.24	0.24	0.76	0.38	0.29	0.42	0.80	0.52	0.57	0.20
chromium	18.20	24.30	33.00	20.00	18.40	39.30	17.60	28.00	34.00	18.10
copper	13.50	16.40	27.70	23.30	15.90	20.10	35.70	20.30	21.90	11.90
lead	32.60	29.20	95.60	79.10	36.50	24.90	120.00	40.50	43.90	13.10
mercury	0.02	0.04	0.13	0.10	0.05	0.04	0.11	0.03	0.05	0.02
nickel	10.10	15.00	12.30	11.50	12.00	29.70	11.90	27.20	28.10	11.40
selenium	0.20	0.32	0.32	0.28	0.23	0.32	0.24	0.15	0.21	0.12
zinc	63.90	171.00	153.00	151.00	67.20	95.80	200.00	76.20	111.00	43.60
tph [c10-c40]	286.00	70.00	126.00	64.00	59.00	56.00	169.00	102.00	204.00	55.00
naphthalene	0.20	0.20	0.20	0.20	0.60	0.40	0.30	0.30	0.20	0.40
acenaphthylene	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
acenaphthene	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
fluorene	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
phenanthrene		0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
anthracene	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
fluoranthene		0.20	0.20		0.20	0.20	0.20	0.20	0.20	0.20
pyrene		0.20	0.20		0.20	0.20	0.20	0.20	0.20	0.20
benzo(a)anthracene		0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
chrysene		0.10	0.10		0.10	0.10	0.10	0.10	0.10	0.10
benzo(b)fluoranthene		0.10	0.10		0.10	0.10	0.10	0.10	0.10	0.10
benzo(k)fluoranthene		0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
benzo(a)pyrene		0.10	0.10		0.10	0.10	0.10	0.10	0.10	0.10
indeno(1,2,3-cd)pyrene		0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
dibenzo(ah)anthracene	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
benzo(ghi)perylene		0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
phenol	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00





Project: New Road, Havant
 Ref: GE5529
 Client: Complete Commercials Ltd

Dataset All data

	Mean Value Test					Maximum Value Test				
	n	x	s	t	Us ₉₅	y	Sy	ymax	T	Tcrit
arsenic	10	9.74	2.66	1.833	11.28	0.97	0.13	1.12	1.15	2.04
boron	10	0.81	0.32	1.833	1.00	-0.12	0.18	0.15	1.53	2.04
cadmium	10	0.44	0.22	1.833	0.57	-0.40	0.21	-0.10	1.42	2.04
chromium	10	25.09	8.00	1.833	29.73	1.38	0.13	1.59	1.61	2.04
copper	10	20.67	7.10	1.833	24.78	1.29	0.14	1.55	1.80	2.04
lead	10	51.54	34.70	1.833	71.66	1.63	0.29	2.08	1.56	2.04
mercury	10	0.06	0.04	1.833	0.08	-1.32	0.29	-0.89	1.48	2.04
nickel	10	16.92	7.99	1.833	21.55	1.19	0.19	1.47	1.52	2.04
selenium	10	0.24	0.07	1.833	0.28	-0.64	0.14	-0.49	1.01	2.04
zinc	10	113.27	52.66	1.833	143.79	2.01	0.22	2.30	1.35	2.04
tph [c10-c40]	10	119.10	78.20	1.833	164.43	2.00	0.26	2.46	1.75	2.04
naphthalene	10	0.30	0.13	1.833	0.38	-0.56	0.17	-0.22	1.94	2.04
acenaphthylene	10	0.10	0.00	1.833	0.10	-1.00	0.00	-1.00	-	2.04
acenaphthene	10	0.10	0.00	1.833	0.10	-1.00	0.00	-1.00	-	2.04
fluorene	10	0.10	0.00	1.833	0.10	-1.00	0.00	-1.00	-	2.04
phenanthrene	9	0.20	0.00	1.86	0.20	-0.70	0.00	-0.70	-	1.98
anthracene	10	0.10	0.00	1.833	0.10	-1.00	0.00	-1.00	-	2.04
fluoranthene	8	0.20	0.00	1.895	0.20	-0.70	0.00	-0.70	-	1.91
pyrene	8	0.20	0.00	1.895	0.20	-0.70	0.00	-0.70	-	1.91
benzo(a)anthracene	9	0.10	0.00	1.86	0.10	-1.00	0.00	-1.00	-	1.98
chrysene	8	0.10	0.00	1.895	0.10	-1.00	0.00	-1.00	-	1.91
benzo(b)fluoranthene	8	0.10	0.00	1.895	0.10	-1.00	0.00	-1.00	-	1.91
benzo(k)fluoranthene	9	0.10	0.00	1.86	0.10	-1.00	0.00	-1.00	-	1.98
benzo(a)pyrene	8	0.10	0.00	1.895	0.10	-1.00	0.00	-1.00	-	1.91
indeno(1,2,3-cd)pyrene	9	0.10	0.00	1.86	0.10	-1.00	0.00	-1.00	-	1.98
dibenzo(ah)anthracene	10	0.10	0.00	1.833	0.10	-1.00	0.00	-1.00	-	2.04
benzo(ghi)perylene	9	0.10	0.00	1.86	0.10	-1.00	0.00	-1.00	-	1.98
phenol	10	1.00	0.00	1.833	1.00	0.00	0.00	0.00	-	2.04



ANALYTICAL REPORT												
Report Number	38393-07	F249	GLYN EVANS									
Date Received	05-JUN-2007		GEO-ENVIRONMENTAL SERVICE									
Date Reported	14-JUN-2007		28 CRESCENT ROAD									
Project	GE5529		BRIGHTON									
Reference	NEW ROAD HAVANT		EAST SUSSEX									
Order Number	GE5529		BN2 3RP									
Laboratory Reference			CTAM4744	CTAM4745	CTAM4746	CTAM4747	CTAM4748	CTAM4749	CTAM4750	CTAM4751	CTAM4752	CTAM4753
Sample Reference			WS3 0.20	WS4 0.50	WS5 0.20	WS6 0.20	WS7 0.20	WS7 0.50	WS8 0.20	WS9 0.50	WS10 0.20	WS12 0.50
Determinand	Unit	Method	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
pH (value)		398	7.9	5.0	7.4	7.8	7.3	6.2	7.6	7.5	8.5	7.4
Organic Matter by LOI	% w/w	255	3.3	3.7	5.3	4.4	3.6	5.7	4.6	3.9	5.5	2.3
Organic Carbon	% w/w (By calc.)		1.9	2.1	3.1	2.5	2.1	3.3	2.7	2.3	3.2	1.3
Copper	mg/kg	300	13.5	16.4	27.7	23.3	15.9	20.1	35.7	20.3	21.9	11.9
Zinc	mg/kg	300	63.9	171	153	151	67.2	95.8	200	76.2	111	43.6
Lead	mg/kg	300	32.6	29.2	95.6	79.1	36.5	24.9	120	40.5	43.9	13.1
Arsenic	mg/kg	300	9.3	8.6	12.1	8.4	6.8	13.1	12.6	8.4	12.5	5.6
Cadmium	mg/kg	300	0.24	0.24	0.76	0.38	0.29	0.42	0.80	0.52	0.57	0.20
Nickel	mg/kg	300	10.1	15.0	12.3	11.5	12.0	29.7	11.9	27.2	28.1	11.4
Barium	mg/kg	300	78.3	57.4	115	136	94.6	111	186	75.1	132	39.4
Chromium	mg/kg	300	18.2	24.3	33.0	20.0	18.4	39.3	17.6	28.0	34.0	18.1
Mercury	mg/kg	454	0.02	0.04	0.13	0.10	0.05	0.04	0.11	0.03	0.05	<0.02
Selenium	mg/kg	455	0.20	0.32	0.32	0.28	0.23	0.32	0.24	0.15	0.21	0.12
Hot Water Soluble Boron	mg/kg	84	0.4	0.5	1.2	0.9	1.0	0.8	0.7	0.7	1.4	0.5
Total Sulphate	mg/kg	397	661	270	355	925	304	343	355	171	930	205
Acid Volatile Sulphide	mg/kg	352	2	<1	4	2	2	1	8	<1	39	<1
Elemental Sulphur	mg/kg	410	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Total Phenols Index	mg/kg	464	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Cyanide	mg/kg	462	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TPH [C10-C40]	mg/kg	383	286	70	126	64	59	56	169	102	204	55
Naphthalene	mg/kg	349	<0.2	<0.2	<0.2	<0.2	0.6	0.4	0.3	0.3	0.2	0.4
Acenaphthylene	mg/kg	349	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	349	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	349	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	349	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2


Compliant Laboratory


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ANALYTICAL REPORT												
Report Number	38393-07	F249	GLYN EVANS									
Date Received	05-JUN-2007	GEO-ENVIRONMENTAL SERVICE										
Date Reported	14-JUN-2007	28 CRESCENT ROAD										
Project	GE5529	BRIGHTON										
Reference	NEW ROAD HAVANT	EAST SUSSEX										
Order Number	GE5529	BN2 3RP										
Laboratory Reference		CTAM4744	CTAM4745	CTAM4746	CTAM4747	CTAM4748	CTAM4749	CTAM4750	CTAM4751	CTAM4752	CTAM4753	
Sample Reference		WS3 0.20	WS4 0.50	WS5 0.20	WS6 0.20	WS7 0.20	WS7 0.50	WS8 0.20	WS9 0.50	WS10 0.20	WS12 0.50	
Determinand	Unit	Method	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Anthracene	mg/kg	349	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	349	1.4	<0.2	0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Pyrene	mg/kg	349	1.1	<0.2	0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)anthracene	mg/kg	349	0.6	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	349	0.6	<0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	349	0.8	<0.1	0.2	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	349	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	349	0.5	<0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	349	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-Benzo(a)anthracene	mg/kg	349	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	349	0.3	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAH [EPA-16]	mg/kg	349	6.3	<2	<2	<2	<2	<2	<2	<2	<2	<2
Asbestos	0*#		Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent



ANALYTICAL NOTES	
Report Number 38393-07 Date Received 05-JUN-2007 Date Reported 14-JUN-2007 Project GE5529 Reference NEW ROAD HAVANT Order Number GE5529	F249 GLYN EVANS GEO-ENVIRONMENTAL SERVICE 28 CRESCENT ROAD BRIGHTON EAST SUSSEX BN2 3RP
Method Reference	Description The pH value of the soil is determined potentiometrically in a water solution. The organic matter is determined by the Loss on Ignition at 430°C. The result is converted to organic carbon by calculation. Total metals are determined using ICP-OES on an acid digest of the sample. Mercury is determined by hydride generation AFS on an acid digest of the sample. Selenium is determined by hydride generation AFS on an acid digest of the sample. Boron is extracted by boiling in water at (1:2 wt/vol ratio) and determined by ICP-OES. Sulphate is determined by ICP-OES from an acid digest (total) or a water extraction (1:2). Hydrogen sulphide is released into solution by the addition of acid on marble chips and the concentration determined colorimetrically at 670nm. Elemental sulphur is extracted into solvent and determined by HPLC at 263 nm. Phenols are extracted by steam distillation and determined colorimetrically. Cyanide is extracted from the sample by steam distillation and determined by automated colorimetry. Total petroleum hydrocarbons are extracted in hexane and determined by GC-FID (C10-C40). Polyaromatic hydrocarbons (PAHs) are extracted into solvent and determined by GC-MS.
Notes	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter or corrected dry matter basis. A portion of the sample will be stored for 3 weeks from the reported date. Tests marked * are outside the current scope of UKAS accreditation. Tests marked # have been subcontracted (* not UKAS accredited). This test report shall not be reproduced, except in full, without the written approval of the laboratory.
Analysis Notes	
Sample Storage	
Accreditation	
Document Control	



ANALYTICAL NOTES	
Report Number 38393-07	F249 GLYN EVANS
Date Received 05-JUN-2007	GEO-ENVIRONMENTAL SERVICE
Date Reported 14-JUN-2007	28 CRESCENT ROAD
Project GE5529	BRIGHTON
Reference NEW ROAD HAVANT	EAST SUSSEX
Order Number GE5529	BN2 3RP
Notes	
Reported by <i>Dr S Pitcher</i> Principal Scientist Natural Resource Management Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS Tel: 01344 885338 Fax: 01344 890972 email: enquiries@nrm.uk.com	



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Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

Please quote above code for all enquiries

NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38388

Sample Matrix : SOIL

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS on 'as received' basis.

Laboratory Reference	Sample Reference	TPH	TPH	TPH	TPH
		Aliphatic >C5-C6 mg/kg	Aliphatic >C6-C8 mg/kg	Aliphatic >C8-C10 mg/kg	Aliphatic >C10-C12 mg/kg
4738	WS4 2.00	<0.1	<0.1	<0.1	<0.1
4739	WS9 0.50	<0.1	<0.1	<0.1	<0.1
4740	WS10 1.50	<0.1	<0.1	8.4	22
4741	WS1 2.50	<0.1	<0.1	<0.1	<0.1

Released by *Dr S Pitcher*

Principal Scientist

Date 14/06/07

Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

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NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38388

Sample Matrix : SOIL

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS on 'as received' basis.

Laboratory Reference	Sample Reference	TPH	TPH	TPH	TPH
		Aliphatic	Aliphatic	Aliphatic	Aromatic
		>C12-C16 mg/kg	>C16-C21 mg/kg	>C21-C35 mg/kg	>C5-C7 mg/kg
4738	WS4 2.00	<0.1	<0.1	<0.1	<0.1
4739	WS9 0.50	<0.1	<0.1	<0.1	<0.1
4740	WS10 1.50	51	62	480	<0.1
4741	WS1 2.50	<0.1	<0.1	<0.1	<0.1

Released by *Dr S Pitcher*

Principal Scientist

Date 14/06/07

Purchase Order : GE5529

GLYN EVANS
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28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

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NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38388

Sample Matrix : SOIL

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS on 'as received' basis.

Laboratory Reference	Sample Reference	TPH	TPH	TPH	TPH
		Aromatic	Aromatic	Aromatic	Aromatic
		>C7-C8	>C8-C10	>C10-C12	>C12-C16
		mg/kg	mg/kg	mg/kg	mg/kg
4738	WS4 2.00	<0.1	<0.1	<0.1	<0.1
4739	WS9 0.50	<0.1	<0.1	<0.1	<0.1
4740	WS10 1.50	<0.1	<0.1	<0.1	<0.1
4741	WS1 2.50	<0.1	<0.1	<0.1	<0.1

Released by *Dr S Pitcher*

Principal Scientist

Date 14/06/07

Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

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NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38388

Sample Matrix : SOIL

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS on 'as received' basis.

Laboratory Reference	Sample Reference	TPH	TPH	Total
		Aromatic	Aromatic	Petroleum
		>C16-C21 mg/kg	>C21-C35 mg/kg	Hydrocarbons mg/kg
4738	WS4 2.00	<0.1	<0.1	<20
4739	WS9 0.50	<0.1	<0.1	<20
4740	WS10 1.50	<0.1	<0.1	620
4741	WS1 2.50	<0.1	<0.1	<20

Released by *Dr S Pitcher*

Principal Scientist

Date 14/06/07



Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

Please quote above code for all enquiries

NEW ROAD, HAVANT

GE5529

VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS4 2.00

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4738

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,1,1,2-Tetrachloroethane	<2	ug/kg
1,1,1-Trichloroethane	<1	ug/kg
1,1,2-Trichloroethane	<10	ug/kg
1,1-Dichloroethane	<1	ug/kg
1,1-Dichloroethene	<1	ug/kg
1,1-Dichloropropene	<1	ug/kg
1,2,3-Trichlorobenzene	<2	ug/kg
1,2,4-Trichlorobenzene	<1	ug/kg
1,2,4-Trimethylbenzene	<1	ug/kg
1,2-Dibromo-3-chloropropane	<50	ug/kg

Released by Dr S Pitcher Principal Scientist Date 14/06/07

Natural Resource Management Ltd, Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel +44 (0) 1344 886338 Fax + 44 (0) 1344 890972 E-Mail enquiries@nrm.uk.com Web www.nrm.uk.com

Registered in England No. 2577148. Registered office: Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS

Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

Please quote above code for all enquiries

NEW ROAD, HAVANT

GE5529

VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS4 2.00

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4738

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,2-Dibromoethane	<5	ug/kg
1,2-Dichlorobenzene	<1	ug/kg
1,2-Dichloroethane	<2	ug/kg
1,2-Dichloropropane	<1	ug/kg
1,3,5-Trimethylbenzene	<1	ug/kg
1,3-Dichlorobenzene	<1	ug/kg
1,3-Dichloropropane	<2	ug/kg
1,4-Dichlorobenzene	<1	ug/kg
2-Chlorotoluene	<1	ug/kg
4-Chlorotoluene	<1	ug/kg

Released by *Dr S Pitcher* Principal Scientist Date *14/06/07*

Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

Please quote above code for all enquiries

NEW ROAD, HAVANT

GE5529

VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS4 2.00

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4738

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS on 'as received' basis.

Determinand	Value	Units
4-Isopropyltoluene	<1	ug/kg
Benzene	<1	ug/kg
Bromobenzene	<1	ug/kg
Bromochloromethane	<1	ug/kg
Bromodichloromethane	<5	ug/kg
Bromomethane	<20	ug/kg
Chlorobenzene	<1	ug/kg
Chloroethane	<2	ug/kg
Chloromethane	<1	ug/kg
cis-1,2-Dichloroethene	<1	ug/kg

Released by Dr S Pitcher Principal Scientist Date 14/06/07

Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

Please quote above code for all enquiries

NEW ROAD, HAVANT

GE5529

VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS4 2.00

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4738

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Dibromochloromethane	<10	ug/kg
Dibromomethane	<10	ug/kg
Dichlorodifluoromethane	<1	ug/kg
Ethylbenzene	<1	ug/kg
Hexachlorobutadiene	<1	ug/kg
Isopropylbenzene	<1	ug/kg
m- & p-Xylene	<1	ug/kg
Naphthalene	<1	ug/kg
n-Butylbenzene	<1	ug/kg
n-Propylbenzene	<1	ug/kg

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Principal Scientist

Date *14/06/07*

Purchase Order : GE5529

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NEW ROAD, HAVANT

GE5529

VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS4 2.00

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4738

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
o-Xylene	<1	ug/kg
sec-Butylbenzene	<1	ug/kg
Styrene	<1	ug/kg
tert-Butylbenzene	<1	ug/kg
Tetrachloroethene	<1	ug/kg
Tetrachloromethane	<1	ug/kg
Toluene	<1	ug/kg
trans-1,2-Dichloroethene	<1	ug/kg
Tribromomethane	<10	ug/kg
Trichloroethene	<1	ug/kg

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VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS4 2.00

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4738

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Trichlorofluoromethane	<1	ug/kg
Trichloromethane	<1	ug/kg
Vinyl Chloride	<1	ug/kg

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NEW ROAD, HAVANT

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VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS9 0.50

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4739

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,1,1,2-Tetrachloroethane	<2	ug/kg
1,1,1-Trichloroethane	<1	ug/kg
1,1,2-Trichloroethane	<10	ug/kg
1,1-Dichloroethane	<1	ug/kg
1,1-Dichloroethene	<1	ug/kg
1,1-Dichloropropene	<1	ug/kg
1,2,3-Trichlorobenzene	<2	ug/kg
1,2,4-Trichlorobenzene	<1	ug/kg
1,2,4-Trimethylbenzene	<1	ug/kg
1,2-Dibromo-3-chloropropane	<50	ug/kg

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Sample Reference :

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Sample Matrix : SOIL

Laboratory References

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Sample Number	4739

Date Received	05-JUN-2007
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Date Reported	14-JUN-2007
---------------	-------------

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,2-Dibromoethane	<5	ug/kg
1,2-Dichlorobenzene	<1	ug/kg
1,2-Dichloroethane	<2	ug/kg
1,2-Dichloropropane	<1	ug/kg
1,3,5-Trimethylbenzene	<1	ug/kg
1,3-Dichlorobenzene	<1	ug/kg
1,3-Dichloropropane	<2	ug/kg
1,4-Dichlorobenzene	<1	ug/kg
2-Chlorotoluene	<1	ug/kg
4-Chlorotoluene	<1	ug/kg

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The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
4-Isopropyltoluene	<1	ug/kg
Benzene	<1	ug/kg
Bromobenzene	<1	ug/kg
Bromochloromethane	<1	ug/kg
Bromodichloromethane	<5	ug/kg
Bromomethane	<20	ug/kg
Chlorobenzene	<1	ug/kg
Chloroethane	<2	ug/kg
Chloromethane	<1	ug/kg
cis-1,2-Dichloroethene	<1	ug/kg

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Date *14/06/07*

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ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Dibromochloromethane	<10	ug/kg
Dibromomethane	<10	ug/kg
Dichlorodifluoromethane	<1	ug/kg
Ethylbenzene	<1	ug/kg
Hexachlorobutadiene	<1	ug/kg
Isopropylbenzene	<1	ug/kg
m- & p-Xylene	<1	ug/kg
Naphthalene	<1	ug/kg
n-Butylbenzene	<1	ug/kg
n-Propylbenzene	<1	ug/kg

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ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
o-Xylene	<1	ug/kg
sec-Butylbenzene	<1	ug/kg
Styrene	<1	ug/kg
tert-Butylbenzene	<1	ug/kg
Tetrachloroethene	<1	ug/kg
Tetrachloromethane	<1	ug/kg
Toluene	<1	ug/kg
trans-1,2-Dichloroethene	<1	ug/kg
Tribromomethane	<10	ug/kg
Trichloroethene	<1	ug/kg

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Date *14/06/07*

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VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS9 0.50

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4739

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Trichlorofluoromethane	<1	ug/kg
Trichloromethane	<1	ug/kg
Vinyl Chloride	<1	ug/kg

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Date *14/06/07*

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NEW ROAD, HAVANT

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VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS10 1.50

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4740

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,1,1,2-Tetrachloroethane	<2	ug/kg
1,1,1-Trichloroethane	<1	ug/kg
1,1,2-Trichloroethane	<10	ug/kg
1,1-Dichloroethane	<1	ug/kg
1,1-Dichloroethene	<1	ug/kg
1,1-Dichloropropene	<1	ug/kg
1,2,3-Trichlorobenzene	<2	ug/kg
1,2,4-Trichlorobenzene	<1	ug/kg
1,2,4-Trimethylbenzene	<1	ug/kg
1,2-Dibromo-3-chloropropane	<50	ug/kg

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VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS10 1.50

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4740

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,2-Dibromoethane	<5	ug/kg
1,2-Dichlorobenzene	<1	ug/kg
1,2-Dichloroethane	<2	ug/kg
1,2-Dichloropropane	<1	ug/kg
1,3,5-Trimethylbenzene	<1	ug/kg
1,3-Dichlorobenzene	<1	ug/kg
1,3-Dichloropropane	<2	ug/kg
1,4-Dichlorobenzene	<1	ug/kg
2-Chlorotoluene	<1	ug/kg
4-Chlorotoluene	<1	ug/kg

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Date *14/06/07*

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WS10 1.50

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Report Number	38388
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The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
4-Isopropyltoluene	1.2	ug/kg
Benzene	<1	ug/kg
Bromobenzene	<1	ug/kg
Bromochloromethane	<1	ug/kg
Bromodichloromethane	<5	ug/kg
Bromomethane	<20	ug/kg
Chlorobenzene	<1	ug/kg
Chloroethane	<2	ug/kg
Chloromethane	<1	ug/kg
cis-1,2-Dichloroethene	<1	ug/kg

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The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Dibromochloromethane	<10	ug/kg
Dibromomethane	<10	ug/kg
Dichlorodifluoromethane	<1	ug/kg
Ethylbenzene	<1	ug/kg
Hexachlorobutadiene	<1	ug/kg
Isopropylbenzene	2.6	ug/kg
m- & p-Xylene	<1	ug/kg
Naphthalene	<1	ug/kg
n-Butylbenzene	6.8	ug/kg
n-Propylbenzene	4.3	ug/kg

Released by Dr S Pitcher Principal Scientist Date 14/06/07

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The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
o-Xylene	<1	ug/kg
sec-Butylbenzene	10	ug/kg
Styrene	<1	ug/kg
tert-Butylbenzene	1.5	ug/kg
Tetrachloroethene	<1	ug/kg
Tetrachloromethane	<1	ug/kg
Toluene	<1	ug/kg
trans-1,2-Dichloroethene	<1	ug/kg
Tribromomethane	<10	ug/kg
Trichloroethene	<1	ug/kg

Released by *Dr S Pitcher* Principal Scientist Date *14/06/07*

Purchase Order : GE5529

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Sample Reference :

WS10 1.50

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4740

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Trichlorofluoromethane	<1	ug/kg
Trichloromethane	<1	ug/kg
Vinyl Chloride	<1	ug/kg

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Date 14/06/07

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NEW ROAD, HAVANT

GE5529

VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS1 2.50

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4741

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,1,1,2-Tetrachloroethane	<2	ug/kg
1,1,1-Trichloroethane	<1	ug/kg
1,1,2-Trichloroethane	<10	ug/kg
1,1-Dichloroethane	<1	ug/kg
1,1-Dichloroethene	<1	ug/kg
1,1-Dichloropropene	<1	ug/kg
1,2,3-Trichlorobenzene	<2	ug/kg
1,2,4-Trichlorobenzene	<1	ug/kg
1,2,4-Trimethylbenzene	<1	ug/kg
1,2-Dibromo-3-chloropropane	<50	ug/kg

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Date *14/06/07*

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GEO-ENVIRONMENTAL SERVICE
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EAST SUSSEX
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NEW ROAD, HAVANT

GE5529

VOLATILE ORGANIC COMPOUNDS

Sample Reference :

WS1 2.50

Sample Matrix : SOIL

Laboratory References

Report Number	38388
Sample Number	4741

Date Received	05-JUN-2007
Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
1,2-Dibromoethane	<5	ug/kg
1,2-Dichlorobenzene	<1	ug/kg
1,2-Dichloroethane	<2	ug/kg
1,2-Dichloropropane	<1	ug/kg
1,3,5-Trimethylbenzene	<1	ug/kg
1,3-Dichlorobenzene	<1	ug/kg
1,3-Dichloropropane	<2	ug/kg
1,4-Dichlorobenzene	<1	ug/kg
2-Chlorotoluene	<1	ug/kg
4-Chlorotoluene	<1	ug/kg

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GLYN EVANS
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The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
4-Isopropyltoluene	<1	ug/kg
Benzene	<1	ug/kg
Bromobenzene	<1	ug/kg
Bromochloromethane	<1	ug/kg
Bromodichloromethane	<5	ug/kg
Bromomethane	<20	ug/kg
Chlorobenzene	<1	ug/kg
Chloroethane	<2	ug/kg
Chloromethane	<1	ug/kg
cis-1,2-Dichloroethene	<1	ug/kg

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The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Dibromochloromethane	<10	ug/kg
Dibromomethane	<10	ug/kg
Dichlorodifluoromethane	<1	ug/kg
Ethylbenzene	<1	ug/kg
Hexachlorobutadiene	<1	ug/kg
Isopropylbenzene	<1	ug/kg
m- & p-Xylene	<1	ug/kg
Naphthalene	<1	ug/kg
n-Butylbenzene	<1	ug/kg
n-Propylbenzene	<1	ug/kg

Released by Dr S Pitcher Principal Scientist Date 14/06/07

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The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
o-Xylene	<1	ug/kg
sec-Butylbenzene	<1	ug/kg
Styrene	<1	ug/kg
tert-Butylbenzene	<1	ug/kg
Tetrachloroethene	<1	ug/kg
Tetrachloromethane	<1	ug/kg
Toluene	<1	ug/kg
trans-1,2-Dichloroethene	<1	ug/kg
Tribromomethane	<10	ug/kg
Trichloroethene	<1	ug/kg

Released by *Dr S Pitcher*

Principal Scientist

Date *14/06/07*

Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
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Report Number	38388
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Date Reported	14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS on 'as received' basis.

Determinand	Value	Units
Trichlorofluoromethane	<1	ug/kg
Trichloromethane	<1	ug/kg
Vinyl Chloride	<1	ug/kg

Released by *Dr S Pitcher* Principal Scientist Date *14/06/07*



ANALYTICAL REPORT									
Report Number	38394-07	F249	GLYN EVANS	CTAM4754	CTAM4755	CTAM4756	CTAM4757		
Date Received	05-JUN-2007		GEO-ENVIRONMENTAL SERVICE						
Date Reported	25-JUN-2007		28 CRESCENT ROAD						
Project	GE5529		BRIGHTON						
Reference	NEW ROAD, HAVANT		EAST SUSSEX						
Order Number	GE5529		BN2 3RP						
Laboratory Reference									
Sample Reference				WS3 0.20	WS4 0.50	WS7 0.50	WS12 0.50		
Determinand	Unit	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL		
pH Leachate		8.2	7.3			8.0	8.3		
Arsenic Leachate	ug/l	2.5	<1			<1	2.3		
Cadmium Leachate	ug/l	<0.1	0.3			<0.1	<0.1		
Chromium Leachate	ug/l	4.2	1.2			<1	2.5		
Lead Leachate	ug/l	0.5	0.7			<0.1	0.6		
Mercury Leachate	ug/l	0.08	<0.05			<0.05	<0.05		
Selenium Leachate	ug/l	0.6	0.1			0.2	0.8		
Copper Leachate	ug/l	2.5	4.6			1.8	4.7		
Boron Leachate	ug/l	5.6	15.1			10.9	10.1		
Nickel Leachate	ug/l	1.3	2.6			1.3	1.3		
Zinc Leachate	ug/l	6.5	110			5.4	19.8		
Hexavalent Chromium Leachate	mg/l	<0.1	<0.1			<0.1	<0.1		
Barium Leachate	ug/l	5.9	7.3			<5	<5		
Beryllium Leachate	ug/l	0.05	<0.05			<0.05	0.06		
Vanadium Leachate	ug/l	3.5	1.8			<1	4.4		
Sulphide Leachate	mg/l	<1	<1			<1	<1		
Sulphur Leachate	ug/l	3300	4700			3500	3400		
Sulphate Leachate	mg/l	6.1	10.1			6.1	6.4		
Total Cyanide Leachate	mg/l	<0.1	<0.1			<0.1	<0.1		
Total Phenols Leachate	mg/l	<0.1	<0.1			<0.1	0.2		
TPH Leachate	ug/l	<10	<10			<10	<10		
Total PAH Leachate	ug/l	<2	<2			<2	<2		
Naphthalene Leachate	ug/l	<0.1	<0.1			<0.1	<0.1		
Acenaphthylene Leachate	ug/l	<0.1	<0.1			<0.1	<0.1		
Acenaphthene Leachate	ug/l	<0.1	<0.1			<0.1	<0.1		



ANALYTICAL REPORT									
Report Number	38394-07	F249	GLYN EVANS						
Date Received	05-JUN-2007	GEO-ENVIRONMENTAL SERVICE							
Date Reported	25-JUN-2007	28 CRESCENT ROAD							
Project	GE5529	BRIGHTON							
Reference	NEW ROAD, HAVANT	EAST SUSSEX							
Order Number	GE5529	BN2 3RP							
Laboratory Reference		CTAM4754	CTAM4755	CTAM4756	CTAM4757				
Sample Reference		WS3 0.20	WS4 0.50	WS7 0.50	WS12 0.50				
Determinand	Unit	SOIL	SOIL	SOIL	SOIL				
Fluorene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Phenanthrene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Anthracene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Fluoranthene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Pyrene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Benzo[a]anthracene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Chrysene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Benzo[b]fluoranthene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Benzo[k]fluoranthene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Benzo[a]pyrene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Indeno[1,2,3-cd]pyrene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Dibenzo[a,h]anthracene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Benzo[g,h,i]perylene Leachate	ug/l	<0.1	<0.1	<0.1	<0.1				
Analysis Notes	The sample submitted was of adequate size to complete all analysis requested.								
Sample Storage	The results as reported relate only to the item(s) submitted for testing.								
Document Control	A portion of the sample will be stored for 3 weeks from the reported date.								
Reported by	This test report shall not be reproduced, except in full, without the written approval of the laboratory.								
<i>Dr S Pitcher</i> Principal Scientist Natural Resource Management Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS Tel: 01344 886338 Fax: 01344 890972 email: enquiries@nrm.uk.com									

Purchase Order : GE5529

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

Please quote above code for all enquiries

NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38390

Sample Matrix : SOIL LEACHATE

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS *on 'as received' basis.*

Laboratory Reference	Sample Reference	TPH Aliphatic >C5-C6 mg/kg	TPH Aliphatic >C6-C8 mg/kg	TPH Aliphatic >C8-C10 mg/kg	TPH Aliphatic >C10-C12 mg/kg
4742	WS4 2.00	<0.1	<0.1	<0.1	<0.1
4743	WS10 1.50	<0.1	<0.1	<0.1	3.5

Released by *Dr S Pitcher*

Principal Scientist

Date *14/06/07*

GLYN EVANS
GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
BN2 3RP

F249

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NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38390

Sample Matrix : SOIL LEACHATE

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS *on 'as received' basis.*

Laboratory Reference	Sample Reference	TPH Aliphatic >C12-C16 mg/kg	TPH Aliphatic >C16-C21 mg/kg	TPH Aliphatic >C21-C35 mg/kg	TPH Aromatic >C6-C7 mg/kg
4742	WS4 2.00	<0.1	<0.1	<0.1	<0.1
4743	WS10 1.50	11	7.5	<0.1	<0.1

Released by *Dr S Pitcher*

Principal Scientist

Date 14/06/07

Purchase Order : GE5529

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BRIGHTON
EAST SUSSEX
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F249

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NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38390

Sample Matrix : SOIL LEACHATE

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS *on 'as received' basis.*

Laboratory Reference	Sample Reference	TPH Aromatic >C7-C8 mg/kg	TPH Aromatic >C8-C10 mg/kg	TPH Aromatic >C10-C12 mg/kg	TPH Aromatic >C12-C16 mg/kg
4742	WS4 2.00	<0.1	<0.1	<0.1	<0.1
4743	WS10 1.50	<0.1	<0.1	<0.1	<0.1

Released by *Dr S Pitcher*

Principal Scientist

Date *14/06/07*

Purchase Order : GE5529

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GEO-ENVIRONMENTAL SERVICE
28 CRESCENT ROAD
BRIGHTON
EAST SUSSEX
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NEW ROAD, HAVANT

GE5529

ANALYTICAL REPORT

Laboratory Reference

Report Number 38390

Sample Matrix : SOIL LEACHATE

Date Received 05-JUN-2007

Date Reported 14-JUN-2007

The sample submitted was of adequate size to complete all analysis requested.

This analysis was subcontracted.

ANALYTICAL RESULTS on 'as received' basis.

Laboratory Reference	Sample Reference	TPH	TPH	Total
		Aromatic >C16-C21 mg/kg	Aromatic >C21-C35 mg/kg	Petroleum Hydrocarbons mg/kg
4742	WS4 2.00	<0.1	<0.1	<20
4743	WS10 1.50	<0.1	<0.1	22

Released by *Dr S Pitcher*

Principal Scientist

Date

14/06/07



The Harley Reed Building
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Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BA
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Facsimile (01424) 729911

THE ENVIRONMENTAL LABORATORY LTD

F.A.O. Gavin Roberts
Geo-Environmental Services Ltd
28 Crescent Road, Brighton
East Sussex
BN2 3RP

Reporting Date: 02/07/2007

ANALYTICAL REPORT No. AR8981

Samples Received By:-	Laboratory Courier
Samples Received:-	13/06/07
Your Ref No:	GE5529
Site Location:	New Road, Havant
No Samples Received:-	3

Report Checked By:-

S. 2

Steve Knight
Director

Authorised By:-


Cliff P.V. Knight BSc, EurChem, CChem FRSC
Managing Director

Any comments, opinions, or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



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F.A.O. Gavin Roberts
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The Harley Reed Building, Unit C, Drury Lane, Postwood Industrial Estate, St Leonard's on Sea, East Sussex, TN38 9BA
Tel: 01424 718618 Fax: 01424 729911

ANALYTICAL REPORT No. AR8981

Location: New Road, Havant

ELAB

Your Ref No: GE5529

Reporting Date: 02/07/07

WATERS

	TP/BH Our ref	WS1## 44285	WS6 44286	WS9 44287
Arsenic*	(µg/l)	5	<5	<5
Barium*	(µg/l)	76	38	37
Beryllium*	(µg/l)	<5	<5	<5
Cadmium*	(µg/l)	<1	<1	<1
Chromium*	(µg/l)	<5	<5	<5
Lead*	(µg/l)	<1	<1	<1
Mercury*	(µg/l)	<0.1	<0.1	<0.1
Nickel*	(µg/l)	8	<5	<5
Copper*	(µg/l)	<5	<5	<5
Zinc*	(µg/l)	7	8	9
Selenium*	(µg/l)	<5	<5	<5
Vanadium	(µg/l)	<5	<5	<5
Hexavalent Chromium	(µg/l)	<20	<20	<20
Boron*	(µg/l)	181	35	141
pH Value*	(Units)	8.2	8.6	8.6
Sulphate*	(mg/l)	18	27	66
Chloride*	(mg/l)	59	40	30
Total Cyanide*	(µg/l)	<5	<5	<5
Sulphide	(mg/l)	<0.1	<0.1	<0.1
Total Monohydric Phenols	(µg/l)	<0.5	<0.5	<0.5
Elemental Sulphur	(mg/l)	<0.1	<0.1	<0.1
TOC*	(mg/l)	3.1	2.1	1.6

** Sample contained a very high percentage of suspended solids / sediment

* = UKAS Accredited test

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THE ENVIRONMENTAL LABORATORY LTD

The Hanley Reed Building, Unit C, Drury Lane, Portsmouth Industrial Estate, St Leonards-on-Sea, East Sussex, TN38 9BA

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ANALYTICAL REPORT No. AR8981

Location: New Road, Havant

F.A.O. Gavin Roberts
Geo-Environmental Services Ltd
28 Crescent Road, Brighton
East Sussex
BN2 3RP

ELAB

Your Ref No: GE5529

Reporting Date: 02/07/07

Waters

	TP/BH	WS1##	WS6	WS9
	Our ref	44265	44266	44267
Naphthalene	(µg/l)	<0.01	<0.01	<0.01
Acenaphthylene	(µg/l)	<0.01	<0.01	<0.01
Acenaphthene	(µg/l)	<0.01	<0.01	<0.01
Fluorene	(µg/l)	0.06	<0.01	<0.01
Phenanthrene	(µg/l)	1.23	<0.01	0.21
Anthracene	(µg/l)	1.82	<0.01	0.09
Fluoranthene	(µg/l)	0.09	<0.01	0.06
Pyrene	(µg/l)	3.60	<0.01	0.13
Benz[a]anthracene	(µg/l)	4.63	<0.01	0.37
Chrysene	(µg/l)	12.34	<0.01	0.13
Benz[b]fluoranthene	(µg/l)	5.66	<0.01	0.09
Benz[k]fluoranthene	(µg/l)	3.20	<0.01	0.65
Benz[a]pyrene	(µg/l)	1.99	<0.01	0.09
Indeno[1,2,3-cd]pyrene	(µg/l)	0.98	<0.01	0.03
Dibenz[ah]anthracene	(µg/l)	0.65	<0.01	<0.01
Benz[ghi]perylene	(µg/l)	0.03	<0.01	<0.01
Total PAH	(µg/l)	36.28	<0.01	1.85

Sample contained a very high percentage of suspended solids / sediment

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THE ENVIRONMENTAL LABORATORY LTD

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Tel: 01424 718618 Fax: 01424 729911

ANALYTICAL REPORT No. AR8981

Location: New Road, Havant

ELAB

Your Ref No: GE5529

Reporting Date: 02/07/07

TPH CWG - Waters

Aromatic

TPH/BH Our ref	WS1##	WS6	WS9
(µg/l)			
>C ₅ -C ₇	<10	<10	<10
>C ₇ -C ₉	<10	<10	<10
>C ₉ -C ₁₀	256	<10	<10
>C ₁₀ -C ₁₂	<10	<10	<10
>C ₁₂ -C ₁₄	466	<10	220
>C ₁₄ -C ₂₁	1412	<10	682
>C ₂₁ -C ₃₅	71290	54	1609

Aliphatic

TPH/BH Our ref	WS1##	WS6	WS9
(µg/l)			
>C ₅ -C ₉	<10	<10	<10
>C ₉ -C ₁₀	<10	<10	<10
>C ₁₀ -C ₁₂	5216	<10	<10
>C ₁₂ -C ₁₄	<10	<10	14
>C ₁₄ -C ₂₁	3810	<10	744
>C ₂₁ -C ₃₅	29869	<10	2369
	6813	78	9441

Total Petroleum Hydrocarbons (C₅ - C₄₀)*

TPH/BH Our ref	WS1##	WS6	WS9
(µg/l)			
	119132	132	15079

** Sample contained a very high percentage of suspended solids / sediment

Accredited for TPH only, not banding

* = UKAS Accredited test

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ANALYTICAL REPORT No. AR8981

Location: New Road, Havant

F.A.O. Gavin Roberts
Geo-Environmental Services Ltd
28 Crescent Road, Brighton
East Sussex
BN2 3RP

Your Project No: GE5529

Reporting Date: 02/07/07

VOC ANALYSIS (Water)

	TP/BH	WS1##	WS6	WS9
	Our ref	44285	44286	44287
1,2-Dichloroethene	(µg/l)	<1	<1	<1
1,1-Dichloroethane	(µg/l)	<1	<1	<1
1,2-Dichloroethene	(µg/l)	<1	<1	<1
2,2-Dichloropropane	(µg/l)	<1	<1	<1
Bromochloromethane	(µg/l)	<1	<1	<1
Chloroform	(µg/l)	<1	<1	<1
Carbontetrachloride	(µg/l)	<1	<1	<1
1,1,1-Trichloroethane	(µg/l)	<1	<1	<1
1,1-Dichloro-1-Propene	(µg/l)	<1	<1	<1
Benzene	(µg/l)	<1	<1	<1
1,2-Dichloroethane	(µg/l)	<1	<1	<1
Trichloroethylene	(µg/l)	<1	<1	<1
Dibromomethane	(µg/l)	<1	<1	<1
1,2-Dichloropropane	(µg/l)	<1	<1	<1
Bromodichloromethane	(µg/l)	<1	<1	<1
1,3-Dichloro-1-propene	(µg/l)	<1	<1	<1
Toluene	(µg/l)	<1	<1	<1
Tetrachloroethylene	(µg/l)	<1	<1	<1
1,3-dichloro-1-propene	(µg/l)	<1	<1	<1
1,1,2-Trichloroethane	(µg/l)	<1	<1	<1
Dibromochloromethane	(µg/l)	<1	<1	<1
1,3-Dichloropropane	(µg/l)	<1	<1	<1
Dibromoethane	(µg/l)	<1	<1	<1
Chlorobenzene	(µg/l)	<1	<1	<1
Ethylbenzene	(µg/l)	7	<1	<1
m-Xylene	(µg/l)	6	<1	<1
o-Xylene	(µg/l)	2	<1	<1
Styrene	(µg/l)	<1	<1	<1
Bromobenzene	(µg/l)	<1	<1	<1
Propylbenzene	(µg/l)	<1	<1	<1
2-Chlorotoluene	(µg/l)	<1	<1	<1
1,2,4-Trimethylbenzene	(µg/l)	6	<1	<1
4-Chlorotoluene	(µg/l)	<1	<1	<1
t-Butylbenzene	(µg/l)	<1	<1	<1
Trimethylbenzene	(µg/l)	2	<1	<1
1-methylpropylbenzene	(µg/l)	<1	<1	<1
o-Cymene	(µg/l)	<1	<1	<1
1,4-Dichlorobenzene	(µg/l)	<1	<1	<1
Butylbenzene	(µg/l)	<1	<1	<1
1,2-Dibromo-3-chloropropane	(µg/l)	<1	<1	<1
Hexachlorobutadiene	(µg/l)	<1	<1	<1
1,2,3-Trichlorobenzene	(µg/l)	<1	<1	<1
1,2,4-Trichlorobenzene	(µg/l)	<1	<1	<1
1,1,1,2-tetrachloroethane	(µg/l)	<1	<1	<1
1,1,1,2,2-tetrachloroethane	(µg/l)	<1	<1	<1
methylstyrene	(µg/l)	<1	<1	<1
1,3-Dichlorobenzene	(µg/l)	<1	<1	<1
1,2-Dichlorobenzene	(µg/l)	<1	<1	<1

Sample contained a very high percentage of suspended solids / sediment



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THE ENVIRONMENTAL LABORATORY LTD

WATER SAMPLE RECEIPT AND TEST DATES

Our Analytical Report Number AR8981
Your Ref No: GE5529
Sample Receipt Date: 13/06/07
Reporting Date: 02/07/07
Registered: 13/06/07
Prepared: 14/06/07
Analysis complete: 02/07/07

WATER TEST METHOD SUMMARY

PARAMETER	Method Number	Technique
Arsenic*	101	ICPMS
Barium*	101	ICPMS
Beryllium*	101	ICPMS
Cadmium*	101	ICPMS
Chromium*	101	ICPMS
Lead*	101	ICPMS
Mercury*	101	ICPMS
Nickel*	101	ICPMS
Copper*	101	ICPMS
Zinc*	101	ICPMS
Selenium*	101	ICPMS
Vanadium	101	ICPMS
Hexavalent Chromium	110	Colorimetry
Boron*	101	ICPMS
pH Value*	113	Probe
Sulphate*	131	Ion Chromatography
Chloride*	131	Ion Chromatography
Total Cyanide*	106	Colorimetry
Sulphide	151	Colorimetry
Total Monohydric Phenols	121	HPLC
Elemental Sulphur	-	HPLC
TOC	102	TOC Analyser
TPH (C6-C40)*	117	Gas Chromatography
TPH CWG	117	Gas Chromatography
VOC	98	GCMS
SVOC	152	GCMS
PCB 7 Congeners	97	GCMS

* = UKAS Accredited test

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