

REC



Resource & Environmental Consultants Ltd

PHASE I & PHASE II GEO-ENVIRONMENTAL SITE INVESTIGATION

Oxford Road, Bicester

REC Report: 80137
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Prepared for:

Simpson Associates

8 Friday Street
Henley-on-Thames
RG9 1AH

7 Little London Court, Old Town, Swindon SN1 3HY
www.recltd.co.uk


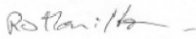

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National Consultancy, Locally Delivered



QUALITY ASSURANCE

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Prepared by	P. Hird		
Signature			
Checked by	R. Hamilton		
Signature			
Authorised by	S. Rhodes		
Signature			
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EXECUTIVE SUMMARY

Proposed Development

The site is to be re-developed as a hotel and restaurant with associated car parking and soft landscape areas.

Desk Study

Desk study has not identified any significant human health or ground water issues.

Exploratory Investigation

Five machine excavated trial pits and six window sample holes were advanced at the site with two monitoring wells installed giving general site coverage and targeting the location of the proposed structures.

Ground Conditions

Ground conditions were noted to comprise sandy clays and sandy gravels overlying weathered rockhead of limestone.

Environmental

For the purposes of the Tier 1 assessment REC have compared the laboratory test data directly to the relevant Tier 1 GAC value for the protection of human health. The results of this direct comparison indicates that the data does not exceed any of the screening criteria for the proposed commercial end use.

Geotechnical

It is recommended that strip foundations should be located into the underlying sandy gravel circa 1.00m bgl where the bearing capacity will be in excess of 100 kN/m². Should higher line loads be required, footing could be emplaced directly on to the weathered limestone rockhead at depths ranging from 2.00m to 2.70m.

Based upon the results of the chemical analyses for pH and soluble sulphate content, REC Ltd consider that all subsurface concrete should be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

A design CBR of 14% is recommended based on laboratory testing on re-compacted samples and in situ testing.

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Appendix II	Limitations
Appendix III	Figure 1 Site Location Plan Figure 2 Borehole location plan Figure 3 Proposed Development Plan
Appendix IV	REC Exploratory Hole Logs
Appendix V	Chemical Testing Results
Appendix VI	Origin of Tier I Values
Appendix VII	Geotechnical testing results

A CD containing all relevant environmental database information, historical & geological mapping and a complete PDF version of this report is attached to hard copy of the report.

1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd have been commissioned by Simpson Associates to undertake a combined Phase I desk study and Phase II Intrusive Investigation at a parcel of land off Oxford Road, Bicester

The scope of work consisted of an intrusive ground investigation, comprised six probeholes, with two being completed as environmental monitoring installations, and five machine excavated trial pits.

All acronyms used within this report are defined in the Glossary presented in Appendix I.

1.2 Proposed Development

REC understands that an 80 bed three storey hotel and separate restaurant/public house is planned with associated car parking and soft landscaping. REC has been provided with a proposed development plan prepared by Whitbread drawing number 2011/54/02 and is presented within Appendix III.

1.3 Objectives

The objectives of the geo-environmental investigation are to:

- Review historical plans, geology, hydrogeology, site sensitivity and any local authority information available in order to complete a Desk Study in line with CLR11;
- Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
- Assess the geotechnical information and provide preliminary recommendations in relation to foundations;
- Provide recommendations regarding future works required.

1.4 Limitations

The limitations of this report are presented in Appendix II.

1.5 Confidentiality

REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.

2.0 SITE SETTING

2.1 Site Description

Site Address	Oxford Road, Bicester
National Grid Reference	457606, 221772
Site Area	1.53ha

A site location map and site layout plans are presented in Appendix III.

2.2 Current Site Use

A walk over survey of the site was carried out on 21st July 2011, including an inspection of the external areas of the site.

Site Description

The site is a vacant rectangular plot within the Kings Mere development, the site is generally level with the site access leading from the Kings Mere development access via Bicester services north of the site. At present the site is thickly vegetated and surrounded by open fields with minor infra structure of the Kings Mere development and the A421 Oxford Road running along the eastern boundary.

No invasive plant species were identified during the site walkover.

Hazardous Materials Storage

No evidence of current underground storage tanks (USTs) or hazardous materials storage was observed on site.

Polychlorinated Biphenyls (PCBs)

No equipment that may potentially contain PCBs was observed at the site.

Waste Storage

No potentially contaminative waste streams are routinely produced on site.

Drainage Issues

No standing water was identified on site; furthermore a drainage survey was not undertaken as part of the site walkover.

Asbestos Containing Materials (ACMs)

During the site walkover no ACMs were noted.

2.3 Surrounding Area

The surrounding land uses are summarised below:

Direction	Land Use
North	Kings Mere Development at present vegetated fields with minor infrastructure
East	Oxford Road A412
South	Kings Mere Development at present vegetated fields with minor infrastructure
West	Kings Mere Development at present vegetated fields with minor infrastructure

3.0 Site History

3.1 Historical Development

A review of historical Ordnance Survey maps and information pertinent to the site and within a 250m radius is summarised in Table 3.1 (below).

Table 3.1 Summary of Potentially Contaminative Historical Land Uses

Map Edition	Historical Land Use	
	On Site	Off Site
1881	The site is occupied by agricultural land.	A road is located along the eastern boundary. A Farm is located 130m east of the site. The surrounding area is agricultural land
1900	No further changes	The town of Bicester is located 500m north of the site.
1922	No further changes	No Further changes
1950	No further changes	No further changes
1966	No further changes	The road east of the site appears to have been widened and is listed as the A421 Oxford Road.
1970	No further changes	No further changes
1983	No further changes	The farm east of the site has expanded.
1993	No further changes	The A421 has expanded with a roundabout located 60m north east and a supermarket 150m north east
1995	No further changes	Bicester services have been identified 100m north of the site.
2011	No further changes	No further changes

4.0 ENVIRONMENTAL SETTING

4.1 Geology & Hydrogeology

The British Geological Survey (BGS) map for the site indicates that the site is underlain by the following geological sequence:

Geological Unit	Classification	Description	Aquifer Classification
Drift	N/A	N/A	N/A
Solid	Kellaways Clay Member	Mudstone	Unproductive
Solid	Cornbrash Formation	Limestone	Secondary A

The Groundsure Report identifies three groundwater abstractions within a 1km radius of the subject site. The closest of which is located 345m northeast of the site and is operated Pringle Drive Filling Station for pollution remediation.

The site is not located within a Groundwater Source Protection Zone (SPZ).

4.2 Geotechnical Data

BGS information presented within the Groundsure report identifies following ground conditions:

Hazard	Designation
Shallow Mining	Not within an area affected by mineral extraction.
Collapsible Ground	Negligible
Compressible Ground	Negligible
Ground Dissolution	Very Low Hazard
Landslide	Very low Hazard
Running Sand	Negligible
Swelling / Shrinking Clay	Moderate Hazard

4.3 Hydrology

The closest surface watercourse to the site is a drain located 350m north of the site flowing west to east up gradient of the site.

An Environment Agency General Quality Assessment undertaken 615m south of the site grades a brook (Langford Brook) as B (Good).

The Groundsure report indicates that there are no Discharge Consents within a 250m radius of the site. The closest is located approximately 350m north east of the site and is held by The Service Station, Oxford Road for trade discharges and site drainage.

4.4 Radon Risk Potential

The Groundsure Report indicates that less than 1% of homes are above the Action Level and no special radon protective measures are necessary in the construction of new dwellings or extensions.

4.5 Industrial Land Uses

The site is located within a predominantly agricultural area with the town of Bicester located 500m north of the site and a supermarket located 300m north east.

The Groundsure Report indicates that there is one fuel station entries within 250m of the site boundary; located 115m northeast and is associated with Bicester services.

4.6 Sensitive Land Uses

The site is surrounded by agricultural fields with the future Kings Mere residential development located west of the site.

4.7 Environmental Sensitivity

Overall the site is considered to be of **moderate to high** sensitivity due to the following:

- The underlying strata are classified as a Secondary A;
- There is a large residential development planned west of the site.

5.0 CONSULTATIONS

5.1 Landfill Sites and Waste Treatment Sites

There are no known historical or operational landfills, waste treatment or waste transfer site located within 500m of the site.

5.2 Regulatory Database

The following information has been obtained from a commercially available environmental database. Table 5.1 below only includes records not otherwise detailed in this report. A full copy of the database is provided in the CD attached to the hardcopy of this report.

Table 5.1 Summary of Groundsure Data

	0-249m	250-500m	Details
Contaminated Land Register Entries and Notices	0	0	Not applicable (N/A)
Authorised industrial processes (IPC/IPPC/).	0	0	N/A
Licensed radioactive substances	0	0	N/A
Enforcements, prohibitions or prosecutions	1	1	Bicester Service 60m north of the site for vapour recovery process. Enforcement Data unknown.
Pollution Incidents	3	0	The three incidents were all connected with the incident occurring the 1 st October 2001 located 140m northeast of the site and involved spillage of food stuffs and oil (diesel) The EA classified the incident as a Category 3 to land – Minor Incident and Category 4 to water and air-No impact.
Consents issued under the Planning (Hazardous Substances) Act 1990	0	0	N/A
Control of Major Accident Hazard (COMAH) sites	0	0	N/A

6.0 INITIAL CONCEPTUAL SITE MODEL (CSM)

6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), REC Ltd have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area.

6.2 Contaminant Sources

On-site Potential Sources

Potential on-site sources of contaminants include:

- Petroleum hydrocarbons – Machinery may have been stored on site during the past use as agricultural land and may have involved spillages of fuel/lubricants although unlikely and such incidents are likely to be minor and concentrated.
- Hazardous ground gases – Ground gases such as methane and carbon dioxide may be present beneath the site, if underlying alluvium is identified, although unlikely.

Off-site Potential Sources

- Hazardous ground gases – Ground gases such as methane and carbon dioxide may be present beneath the site, if underlying alluvium is identified, although unlikely.

6.3 Potential Pathways

REC Ltd has identified the following possible pathways:

- Lateral and vertical migration of soluble and/or mobile hydrocarbon compounds into the adjacent underlying secondary A aquifer;
- Dermal contact and ingestion with impacted soils and / or groundwater during construction. Direct contact after construction is considered to be unlikely due to the majority of the site being surfaced with hard standing;
- Migration of hazardous ground gas and/or vapours via permeable strata and service ducts into indoor air or other enclosed spaces or excavations.

6.4 Potential Receptors

REC Ltd has identified the following possible receptors:

- Construction and future site occupants through asphyxiation of hazardous ground gases within excavations and enclosed spaces.
- Construction workers are not considered to be a plausible receptor as exposure will be managed through the use of appropriate PPE and hygienic working practices as required under HSE / CDM regulations. Furthermore, the length of any exposure is likely to be for a short duration;
- The underlying Secondary A Aquifer is potentially a receptor, particularly if any preferential pathways have been created during the construction of the current site.

7.0 SITE INVESTIGATION

7.1 Site Investigation

7.1.1 General

A ground investigation has been designed based on the findings of the desk study with exploratory holes advanced to target specific areas of concern summarised in Table 7.2. In addition, exploratory holes have also been advanced to provide information on baseline conditions across the site. The investigation has also been used to collect geotechnical information to assist in the design and construction of the development.

Exploratory fieldwork was completed between the 21st and 22nd July 2011. The works are summarised in Table 7.2.

Table 7.2 Summary of Fieldwork

Potential Source/Rational	Location Hole	Type	Maximum Depth (m bgl)	Monitoring Wells Response Zone
Hotel	WS101	Probehole	2.24	1.00-2.20
Hotel	WS102	Probehole	1.97	N/A
Hotel	WS103	Probehole	2.12	N/A
Site Coverage	WS104	Probehole	2.40	1.00-2.40
Restaurant	WS105	Probehole	2.70	N/A
Restaurant	WS106	Probehole	0.70	N/A
Restaurant	WS106a	Probehole	0.70	N/A
Site Coverage	TP101	Trial Pit	2.10	N/A
Site Coverage	TP102	Trial Pit	2.40	N/A
Site Coverage	TP103	Trial Pit	2.30	N/A
Site Coverage	TP104	Trial Pit	2.70	N/A
Site Coverage	TP105	Trial Pit	2.35	N/A

Notes

m bgl – metres below ground level.

The window sample probeholes were designed to provide geotechnical information and confirm the findings of the Initial Conceptual Site Model (ICSM) while spatially distributed to offer the maximum site coverage. Due to prevailing ground conditions, a trial pitting exercise was undertaken to advance the exploratory hole and identify shallow clay bands within the underlying Cornbrash. The sampling locations are illustrated in Figure 2 (Appendix III). The ground conditions encountered and details of monitoring well response zones are indicated on the logs which are provided in Appendix IV.

Return visits were made to monitor installations for groundwater level and gas concentrations. Groundwater samples were not collected as part of the risk assessment.

Soil samples destined for chemical analysis were collected at regular intervals in appropriate sampling containers. All samples were subsequently stored in cooled boxes prior to submission to Scientific Analysis Laboratories (SAL) for analysis in accordance with their UKAS accreditation where applicable. Results of the analysis are included in Appendix V. All samples were collected using appropriate PPE and sampling equipment that was cleaned at each sampling location. A detailed copy of REC Ltd sampling methodology, QA procedures and laboratory chain of custody forms can be provided upon request.

7.1.2 In-Situ Penetration Testing (SPT/CPT)

In-situ geotechnical testing was carried out in all exploratory hole locations to provide information on the geotechnical properties of the soils. The testing was conducted using the Standard Penetration Test and Cone Penetration Test (CPT) as appropriate. The results are shown in the probehole logs in Appendix IV and presented in Table 8.3 and discussed in Section 9.

7.2 Laboratory Analysis

Selected soil samples were submitted for a range of chemical analysis comprising, metals, pH, total sulphate, water soluble sulphate (2:1 extract), sulphide, cyanide, phenols, total and speciated poly-aromatic hydrocarbons (PAHs), organic carbon and total and speciated petroleum hydrocarbon (TPH).

Scientific Analysis Laboratories (SAL) Ltd of Braintree undertook the analytical work and the testing results are included in Appendix V and discussed in Section 9.

Selected samples were submitted to (PSL) laboratory where the following geotechnical tests were undertaken:

- Atterburg Limits Determinations;
- Particle Size Distribution Tests;
- Ratio (CBR) on re-compacted samples.
- Point Load Testing

8.0 GROUND AND GROUNDWATER CONDITIONS

8.1 Ground Conditions

8.1.1 Summary of Ground Conditions

The ground investigation generally confirms the published geology and identifies the strata set out in Table 8.1 below:

Table 8.1 Summary of Strata

Strata	Typical Description	Thickness (m)
Topsoil	Silty fine sand with frequent rootlets	0.20-0.45
Drift	Silty sandy gravelly CLAY. Gravel is fine to medium subangular of limestone.	0.20-0.60
Drift	Clayey gravelly SAND with cobbles of limestone. Gravel is fine to coarse subangular of limestone.	0.50
Drift	Sandy fine to coarse subangular GRAVEL of limestone with many cobbles of limestone.	1.20
Drift	Sandy gravelly CLAY gravel is fine to coarse angular to subangular of limestone	0.60
Weathered Cornbrash	Gravel, cobbles and boulders of limestone	Not proven

8.1.2 Made Ground

Made Ground was within one location (TP104) and consisted of slightly sandy clay with fragments of branches and timber.

8.1.3 Drift Deposits

Natural deposits generally comprised of silty sandy clay overlying silty sandy gravel with many cobbles of limestone which generally became more cobbly with depth up to a maximum depth of 2.70m bgl.

8.1.4 Solid Geology

Weathered rockhead (Cornbrash limestone) was encountered within all trial pits circa 2.00-2.70m bgl. Rockhead was subjected to a machine mounted hydraulic breaker within all trial pits without further advancement.

Table 8.2 Cone Penetration Test Results

Boreholes	Depth (m bgl) (i)	Material Field Description	CPT/SPT "N" Value	Corrected "N" Value (N ₁) ₆₀	Terzaghi & Peck Relative Density (Sands)	Eurocode Soil strength	Consistency (BS5930)	Terzaghi & Peck Approximate Undrained Shear Strength (kN/m ²)
WS101	1.20	Gravelly SAND	19	18.64	Medium Dense			
	2.00	GRAVEL	50	45.68	Very Dense			
WS102	1.00	Sandy GRAVEL	15	15.12	Medium Dense			
	1.90	GRAVEL	50	45.99	Very Dense			
WS103	1.00	Sandy GRAVEL	18	18.15	Medium Dense			
	2.00	GRAVEL	50	45.68	Very Dense			
WS104	1.00	Sandy GRAVEL	42	42.34	Very Dense			
	2.00	GRAVEL	50	45.68	Very Dense			
WS105	1.00	Silty SAND	37	37.30	Dense			
	2.00	Sandy CLAY	42	38.37		Very High Strength	Very Stiff	191.84
	2.60	GRAVEL	50	44.20	Very Dense			

8.1.5 Soil Infiltration

In-situ variable (falling) head tests were undertaken within the monitoring well installations located in two probeholes (WS101 and WS104). Groundwater was noted to be at a depth of approximately 1.70mbgl within WS101 and dry within WS104 therefore the tests were undertaken in the unsaturated zone. As a result the data has been interpreted as soakaway tests rather than a permeability tests. The results are presented in Table 8.4.

Table 8.3 Soil Infiltration Results

Location	Depth (m)	Material	Test No.	Soil Infiltration Rate (m/s)
WS101	1 to 2.00m	Gravelly SAND overlying sandy GRAVEL	Test No.1	3.37 ⁻⁴
WS104	1 to 1.90m	Sandy GRAVEL overlying gravelly silty SAND	Test No. 1	8.35 ⁻⁶

Soil infiltration was taken over the wetted area from between 75% and 25% of the effective depth. Effective depths were taken as being between 1m depth, which represents the base of the clay seal and also the likely pipe invert level and the base of the well.

The application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365 – *Soakaway Design*.

8.1.6 Soil Plasticity

The Atterberg Limits determinations, summarised in Table 8.4 below, show the clay to be of low to medium plasticity.

Table 8.4 Summary of Plasticity Index Test Results

Location	Depth (m)	Natural Moisture Content (%)	Plastic Limit (%)	Liquid Limit (%)	Plasticity Index (%)	Percentage passing 425µm sieve (%)	Modified Plasticity Index
TP102	0.20	19	23	52	29	80	23.20
TP104	0.50	29	22	51	29	87	25.23
WS102	1.70	20	18	31	13	70	9.1
WS105	0.20	26	21	53	32	80	25.60
WS105	1.40-1.90	16	18	32	14	70	9.8

8.1.7 Point Load Test Results

Point Load determinations undertaken on limestone cobbles summarised in Table 8.5 overleaf show the average uniaxial compressive strength to be 33.11MPa which is consistent with weathered limestone values.

Table 8.5 Summary of Particle Size Distribution Tests Results

Location	Depth (m)	I _{s50} MPa	UCS MPa	Average UCS MPa
TP101	2.00-2.10	1.69	37.18	33.11
TP102	0.75-1.00	1.90	41.80	
TP104	2.70	1.94	42.68	
TP105	1.50-1.60	0.49	10.78	

8.1.8 Particle Size Distribution

The Particle Size Distribution tests have been undertaken on selected samples across the site. Results, which are, summarised in Table 8.5 below, show the granular materials to comprise of gravel with varying amounts of sand, clay and silt.

Table 8.6 Summary of Particle Size Distribution Tests Results

Location	Depth (m)	Strata Description
TP103	2.00-2.10	Brown sandy very clayey silty GRAVEL.
TP104	1.40	Brown sandy clayey silty GRAVEL.
TP105	1.50-1.60	Brown slightly sandy slightly clayey silty GRAVEL with many cobbles.
WS101	1.00-1.30	Brown very sandy clayey GRAVEL.
WS104	0.50-1.00	Brown sandy slightly clayey silty GRAVEL.

8.1.9 California Bearing Ratio

The California Bearing Ratio (CBR) for the soils were measured using laboratory testing and in-situ testing using a TRL DCP probe. The results are summarised in Table 8.7 below.

Laboratory CBR tests were undertaken on large disturbed samples re-compacted at natural moisture content using a 2.5kg rammer in order to mimic proof rolling of the sub formation. The CBR result is the average of the tests on the top and bottom of the sample.

Table 8.7 Summary of CBR Testing

Location	Depth (m)	Strata	CBR (%)
TP101	0.45-0.60	Gravelly sandy clay	19.75
TP102	0.75-1.00	Sandy clayey gravel	36.60
WS102	0.50-1.00	Gravelly sandy clay	40.35
C1	0.20	Gravelly sandy clay	14.57
C2	0.50	Gravelly sandy clay	34.95
C3	0.20	Gravelly sandy clay	14.08

8.1.10 pH and Sulphate

Chemical analyses for pH and soluble sulphate content contained in Appendix V (summarised overleaf in Table 8.8), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).

Table 8.8 Summary of pH and Sulphate Data

Location	Depth (m)	SO ₄ in 2:1 water / soil (g/l)	pH Value
TP104	0.20	0.01	8.1
WS101	0.50	0.01	8.5
WS105	1.00	0.02	8.3
WS105	2.50	0.02	8.3

8.2 Groundwater Conditions

Groundwater strikes were encountered as seepages between 1.50m bgl and 1.95m bgl. The depth of the seepages and the depth to which groundwater rose are shown on the exploratory hole records and summarised in Table 8.9 below:

Table 8.9 Summary Groundwater Strikes

Location	Depth to strike (m)	Depth to standing water (m)
TP101	1.95	N/A
WS101	1.50	1.90
WS102	1.90	N/A

Subsequent to the fieldwork, four groundwater monitoring surveys have been scheduled and completed. Monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free phase hydrocarbon product, if present. The groundwater levels recorded are summarised in Table 8.10.

8.3 Ground Gas

Four ground gas monitoring visits scheduled have been completed with monitoring commenced 29th July 2011 and completed 16th August 2011. Concentrations of methane (CH₄), carbon dioxide (CO₂) and Oxygen (O₂) were measured using an infra red gas analyser (GFM435) calibrated to a reference standard (before and after each survey) and gas flow rates were measured using an internal flow pod.

Gas measurements were recorded for a minimum of sixty seconds at each location, at which point the maximum concentration of CH₄ and CO₂ together with the lowest concentration of O₂ were recorded. The results of the ground gas monitoring are presented in Table 8.10 overleaf.

Table 8.10 Summary of Ground Gas and Groundwater Monitoring Results

Well	Date	CH ₄ Initial %v/v	CH ₄ Steady %v/v	CH ₄ GSV l/hr	CO ₂ Initial %v/v	CO ₂ Steady %v/v	CO ₂ GSV l/hr	O ₂ %v/v	Atmos (mb)	Atmos. Dynamic	Flow (l/hr)	Response Zone (mbgl)	Depth to Base (mbgl)	Depth to Water (mbgl)
WS101	29/07/11	0.6	0.6	<0.0006	<0.1	<0.1	<0.0001	20.1	1022	Falling	<0.1	1.00-2.00	1.994	0.501
	04/08/11	<0.1	<0.1	<0.0001	<0.1	<0.1	<0.0018	20.1	999	Rising	<0.1		2.010	1.71
	11/08/11	1.4	1.4	<0.0014	<0.1	<1.0	<0.0001	20.4	1001	Static	<0.1		2.000	0.900
	16/08/11	1.4	1.4	<0.0014	<0.1	<0.1	<0.0001	20.4	1006	Static	<0.1		2.001	1.63
WS104	29/07/11	0.3	0.3	<0.0003	2.2	2.2	<0.0022	17.4	1022	Falling	<0.1	1.00-2.40	2.389	Dry
	04/08/11	<0.1	<0.1	<0.0001	<0.1	<0.1	<0.0004	16.6	999	Rising	<0.1		2.380	Dry
	11/08/11	1.3	1.3	<0.0013	2.3	2.3	<0.0023	18.4	1001	Static	<0.1		2.400	1.400
	16/08/11	1.2	1.2	<0.0012	2.1	2.1	<0.0021	19.6	1006	Static	<0.1		2.400	Dry

9.0 TIER 1 QUALITATIVE RISK ASSESSMENT

REC has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

9.1 Human Health Risk Assessment

At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published by the EA (Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values (SGV) and where absent, General Acceptance Criteria (GACs) published by LQM/CIEH (2nd edition).

The results of this comparison have been summarised within Table 9.1 (overleaf).

Table 9.1 Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Commercial End Use.

Determinand	Units	GAC ^{V1}	n	MC	Loc. of MC	Pathway	Assessment
Arsenic	mg/kg	590	4	24	WS102	1	No Further Assessment
Cadmium	mg/kg	230	4	0.3	WS102	1	No Further Assessment
Chromium	mg/kg	30400	4	25	WS102	1	No Further Assessment
Chromium VI	mg/kg	35	4	<1	N/A	1	No Further Assessment
Lead	mg/kg	924	4	25	WS102	1	No Further Assessment
Mercury	mg/kg	410	4	<1.0	N/A	2	No Further Assessment
Nickel	mg/kg	1800	4	24	WS102	1	No Further Assessment
Selenium	mg/kg	13000	4	<3	N/A	1	No Further Assessment
Copper	mg/kg	71700	4	19	WS102	1	No Further Assessment
Zinc	mg/kg	665000	4	75	WS102	1	No Further Assessment
Cyanide - Total	mg/kg	16200	4	<1	N/A	1	No Further Assessment
Phenols - Total.	mg/kg	1100000	4	0.5	WS104	1	No Further Assessment
Naphthalene	mg/kg	200	2	<0.1	N/A	2	No Further Assessment
Acenaphthylene	mg/kg	84000	2	<0.1	N/A	3	No Further Assessment
Acenaphthene	mg/kg	85000	2	<0.1	N/A	1	No Further Assessment
Fluorene	mg/kg	64000	2	<0.1	N/A	1	No Further Assessment
Phenanthrene	mg/kg	22000	2	<0.1	N/A	3	No Further Assessment
Anthracene	mg/kg	530000	2	<0.1	N/A	3	No Further Assessment
Fluoranthene	mg/kg	23000	2	<0.1	N/A	3	No Further Assessment
Pyrene	mg/kg	54000	2	<0.1	N/A	3	No Further Assessment
Benzo(a)Anthracene	mg/kg	90	2	<0.1	N/A	3	No Further Assessment
Chrysene	mg/kg	140	2	<0.1	N/A	3	No Further Assessment
Benzo(b/k)Fluoranthene ⁽ⁱ⁾	mg/kg	100	2	<0.1	N/A	3	No Further Assessment
Benzo(a)Pyrene	mg/kg	14	2	<0.1	N/A	3	No Further Assessment
Indeno(123-cd)Pyrene	mg/kg	60	2	<0.1	N/A	3	No Further Assessment
Dibenzo(a,h)Anthracene	mg/kg	13	2	<0.1	N/A	3	No Further Assessment
Benzo(ghi)Perylene	mg/kg	650	2	<0.1	N/A	3	No Further Assessment
TPH C ₅ -C ₆ (aliphatic)	mg/kg	3400	2	<0.1	N/A	2	No Further Assessment
TPH C ₆ -C ₈ (aliphatic)	mg/kg	8300	2	<0.1	N/A	2	No Further Assessment
TPH C ₈ -C ₁₀ (aliphatic)	mg/kg	2100	2	<0.1	N/A	2	No Further Assessment
TPH C ₁₀ -C ₁₂ (aliphatic)	mg/kg	10000	2	<1	N/A	2	No Further Assessment
TPH C ₁₂ -C ₁₆ (aromatic)	mg/kg	36000	2	<1	N/A	1	No Further Assessment
TPH C ₁₆ -C ₂₁ (aromatic)	mg/kg	28000	2	<1	N/A	1	No Further Assessment
TPH C ₂₁ -C ₃₅ (aromatic)	mg/kg	28000	2	<1	N/A	1	No Further Assessment

Notes

PAH GAC based upon 2.5% SOM

Main Exposure Pathways: 1 = Soil Ingestion (including vegetables), 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation.

Abbreviations: HCV = Human Criteria Value, n = number of samples, MC = Maximum concentration; US95 = The upper 95th percentile bound of the samples.

- i. The Tier 1 GAC for the hydrocarbon fraction is derived from the LQM CIEH 2nd Edition "GAC for Human health Risk Assessment.
- ii. When screening PAH's, use HCV of Fluoranthene to be protective against odour and staining for Toxic compounds.
- iii. Seven carcinogenic PAH's – HCV developed from LQM CIEH 2nd Edition.
- iv. Methyl Mercury SGV
- v. Lead exposure SEGH calculation revised to reflect SR3

The results given in Table 9.1, do not exceed any of the screening criteria for a commercial end use.

9.2 Waste Acceptance Classification

Two samples were submitted for WAC testing which included a range of analysis required by the landfill operators before acceptance of waste soils excavated from site, the range of analysis included 10:1 inorganic leachate, TPH (C35-C40), BTEX, speciated PAH, PCBs and total organic carbon (TOC).

The results were compared against landfill waste acceptance criteria parameters to classify the soils into inert waste, stable non-reactive and hazardous waste accordingly. These parameters were created by the EU landfill directive and the directive is transposed into UK law through the Landfill Regulations 2002 active throughout England and Wales. The samples compared to these parameters are presented within Table 9.2 below.

Table 9.2 Summary of Waste Acceptance Criteria Parameters

Determinand	Units	Inert Waste	Stable non-reactive waste	Hazardous Waste	MC	Waste Criteria
Total Organic Carbon	%	3%	5%	6%	1.4	Inert
BTEX (sum)	mg/kg	6			<0.0040	Inert
PCB EC7 Sum	mg/kg	1.0			<0.0035	Inert
TPH C10-C40 Sum	mg/kg	500			<10	Inert
PAH Sum	mg/kg	100			<1.6	Inert
pH	mg/kg		>6.0		8.1	Inert
10:1 Leachate all below inert thresholds						

Notes

MC=Maximum concentration

This identifies the materials tested as being inert waste.

9.3 Ground Gas

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007). However, it is recommended that the ground monitoring be completed and that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on-site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

The Phase I report and subsequent ground investigation did not identify any significant sources of ground gas.

During the monitoring exercise to date, concentrations of methane upto 1.4% v/v were recorded within WS101; and concentrations of carbon dioxide (up to 2.3% v/v) were recorded in WS104 though these were all associated with low flow rates of less than 0.1litres/hr.

In accordance with the methodology outlined with the CIRIA publication C665, REC have utilised the results of the ground gas monitoring surveys to calculate a tentative Gas Screening Value (GSV). The maximum GSV calculated for methane was <0.0014 (WS101) and for carbon dioxide was <0.0023 (WS104).

The GSV has been compared to the criteria outlined with CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

CIRIA C665 states that the maximum GSV for carbon dioxide and methane is <0.07 l/hr for Characteristic Situation 1. Gas data recorded is below this threshold indicating that the site falls within Characteristic Situation 1 and that no special precautions are necessary for the propose development.

9.4 Conceptual Model

The assessment of the chemical and ground gas conditions have not identified any potentially significant pollutant linkages based on a commercial redevelopment of the site. It is therefore concluded that the site is suitable for redevelopment without the requirement for remedial action.

10.0 GEOTECHNICAL ASSESSMENT

10.1 Proposed Development

It is understood that the proposed development will comprise of a 80 bed hotel located within the southern sector of the site and a public house/restaurant within the northern sector respectively. Areas of predominantly hard standing parking areas and minor soft standing are located between the two structures with a more expansive area of soft standing located around the hotel. Details of the proposed loadings are not known and therefore a line loading of 100 kN/m has been assumed for preliminary assessment purposes only.

Given the nature of the proposed development it is considered that the structure meets the criteria of Geotechnical Category 1 of Euro Code 7.

10.2 Summary of Ground Conditions

Ground conditions identified at the site are summarised in Table 10.1 below:

Table 10.1 Summary of Ground Conditions

Strata	Typical Description	Thickness (m)
Topsoil	Silty fine sand with frequent rootlets	0.20-0.45
Drift	Silty sandy gravelly CLAY. Gravel is fine to medium subangular of limestone.	0.20-0.60
Drift	Clayey gravelly SAND with cobbles of limestone. Gravel is fine to coarse subangular of limestone.	0.50
Drift	Sandy fine to coarse subangular GRAVEL of limestone with many cobbles of limestone.	1.20
Drift	Sandy gravelly CLAY gravel is fine to coarse angular to subangular of limestone	0.60
Weathered Cornbrash	Gravel, cobbles and boulders of limestone	Not proven

10.3 Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works. This should include:

- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void in-filled with suitable compacted engineered fill;
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Buried structures and old foundations have been encountered on site. These should be excavated from below the proposed development foot print with the resulting void backfilled.

10.4 Foundation Conditions and Bearing Capacity

Strip Foundations

It is recommended that strip should be located into the underlying sandy gravel circa 1.00m bgl where the bearing capacity will be in excess of 100 kN/m². Should higher line loads be required, footing could be emplaced directly on to the weathered limestone rockhead at depths ranging from 2.00m to 2.70m.

Piled Foundations

Should a piled foundation be opted for, is recommended that end bearing piles are emplaced within the underlying limestone strata; however prior to this it is recommended that a rotary investigation of the underlying limestone strata is undertaken to investigate the potential of clay bands within the Cornbrash which may lead to failure.

Pile design should be undertaken by a specialist contractor to allow them to reduce the factor of safety based on their extensive pile testing data.

Recommendation

It is recommended that a strip foundation should be utilised at the site and would provide the most cost effective solution.

10.5 Ground Floor Slabs

A suspended floor slab is not necessary at the site due to the lack of made ground; however, if a piled solution is opted for, a suspended slab should be used to avoid differential settlement.

10.6 Pavement Construction

An assessment of the likely California Bearing Ratio (CBR) for the Made Ground has been assessed from the following sources:

- Laboratory CBR tests undertaken on re-compacted soil samples;
- In situ CBR test undertaken with a TRL DCP.

Based on this it is considered that a design CBR of 14% is used for the upper soils circa 200-600mm bgl.

Following excavation the sub formation should be proof rolled and any soft material inspected and removed.

10.7 Drainage

Tests indicate reasonable soil infiltration within the upper 1.50m. However, groundwater is relatively shallow and as such soakaways are likely to have limited storage capacity. Consideration could be given to other soakage based SuDS such as porous pavements.

Should excavation for drainage and sewers need to be advanced beyond 2.00m bgl, allowance for time breaking out should be given; in addition, arising from the excavations may be crushed and graded on site providing a sub-base material following sufficient grading testing.

10.8 Concrete Durability

Based upon the results of the chemical analyses summarised in Table 8.8 it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

10.9 Excavations

Site observations indicated that excavations should be feasible in the near surface with normal plant, and ground water was not encountered until 1.50m bgl where groundwater inflow may instigate collapse although excavations undertaken on site remained stable.

Due to the variability of the underlying soils it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA RR97. Consideration should also be given to ingress of ground gases, although no elevated concentrations were identified on site all such excavations should be tested with a suitable gas analyser as a precautionary before entering.

10.10 Minerals

No economically viable minerals have been identified below the site.

10.11 Further Works

If confirmation of the limestone stratum thickness is required it is recommended the three rotary core probholes are advanced 10m bgl in order to provide a detailed cross section of the underlying solid geology.

10.12 Construction Activity and Inspection

It is considered that the following considerations and recommendations be incorporated in to the site works:

- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA 97 utilised;
- It is considered that de-watering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond;
- Where access to confined spaces is required appropriate mitigation measures should be addressed within the Construction Stage Health and Safety Plan. Particular account should be taken of the gas results;

11.0 CONCLUSIONS & RECOMMENDATIONS

Environmental

For the purposes of the Tier 1 assessment REC have compared the laboratory test data directly to the relevant Tier 1 GAC value for the protection of human health. The results of this direct comparison indicates that the data does not exceed any of the screening criteria for a commercial end use.

Geotechnical

It is recommended that strip foundations should be located into the underlying sandy gravel circa 1.00m bgl where the bearing capacity will be in excess of 100 kN/m². Should higher line loads be required, footing could be emplaced directly on to the weathered limestone rockhead at depths ranging from 2.00m to 2.70m.

Based upon the results of the chemical analyses for pH and soluble sulphate content, REC Ltd consider that all subsurface concrete should be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

A design CBR of 14% is recommended for the upper 600mm bgl soils.

APPENDIX I
LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. In addition to the above REC Ltd note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.
7. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
8. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
9. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
10. This report presents an interpretation of the geotechnical information established by excavation, observation and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that man made deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation.
11. REC can not be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.
12. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
13. This investigation has been undertaken to reasonably characterise existing sub-surface conditions and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II
GLOSSARY

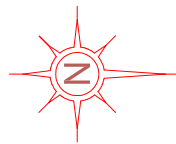
TERMS

AST	Above ground Storage Tank
UST	Underground Storage Tank
EA	Environment Agency
CSM	Conceptual Site Model
GL	Ground Level
ND	Not Detected
NR	Not Recorded
BSI	British Standards Institute
BGS	British Geological Survey
CLEA	Contaminated Land Exposure Assessment
SGV	Soil Guideline Value
GAC	General Assessment Criteria
CIEH	Chartered Institute of Environmental Health
PID	Photo Ionisation Detector
CIRIA	Construction Industry Research Association
GSV	Gas Screening Value
EQS	Environmental Quality Standard
DWS	Drinking Water Standard
PAH	Poly Aromatic Hydrocarbon
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
VOC	Volatile Organic Compound
SVOC	Semi Volatile Organic Compound
SPT	Standard Penetration Test
VCCs	Vibro Concrete Columns
QA	Quality Assurance

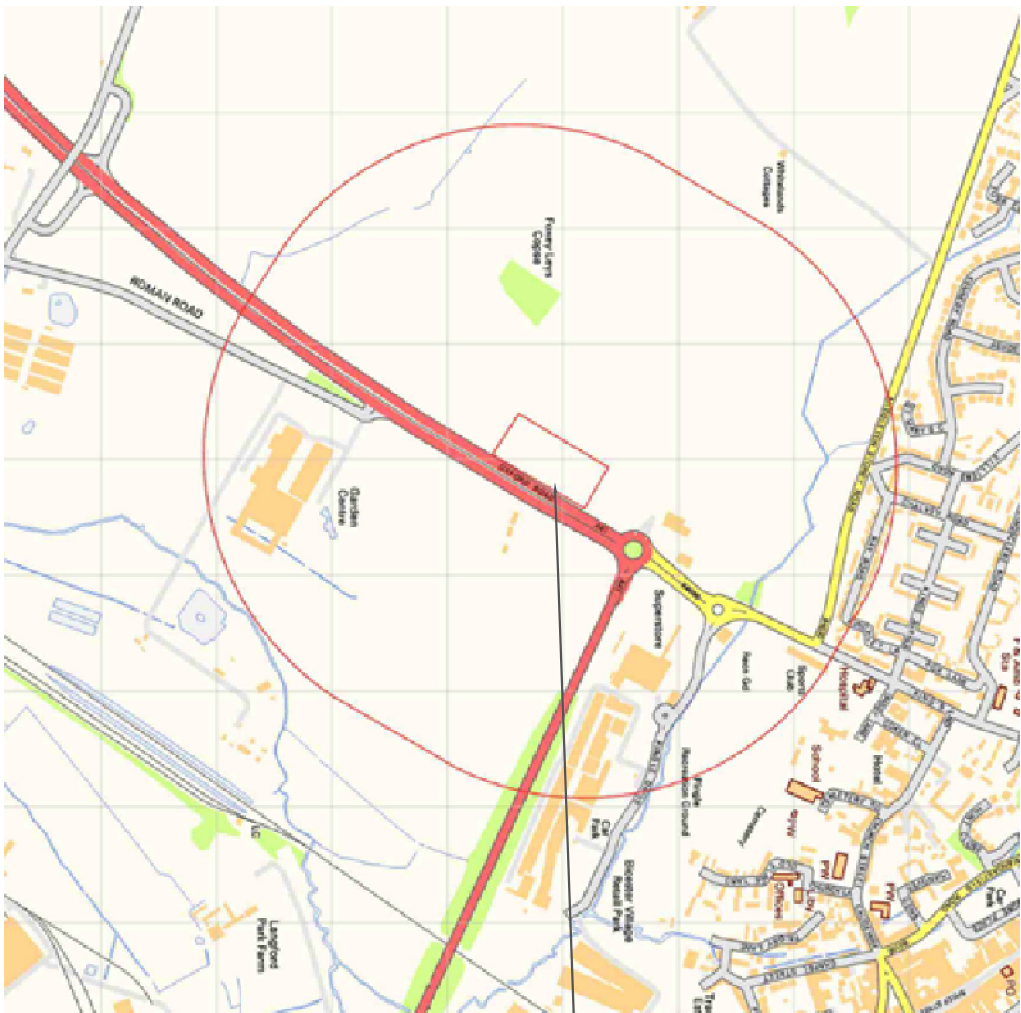
UNITS

m	Metres
km	Kilometres
%	Percent
%v/v	Percent volume in air
mb	Milli Bars (atmospheric pressure)
l/hr	Litres per hour
µg/l	Micrograms per Litre (parts per billion)
ppb	Parts Per Billion
mg/kg	Milligrams per kilogram (parts per million)
ppm	Parts Per Million
mg/m ³	Milligram per metre cubed
m bgl	Metres Below Ground Level
m bcl	Metre Below Cover Level
mAOD	Metres Above Ordnance Datum (sea level)
kN/m ²	Kilo Newtons per metre squared
µm	Micro metre

APPENDIX III
FIGURES



Legend:



Site Location



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Resource and Environmental Consultants Ltd

7 Little London Court
Old Town Swindon
SN1 3HY
Tel: 01793651555
E-mail: sales@rectd.co.uk Website:
www.rectd.co.uk

Job Title

Oxford Road, Bicester

Client

Simpson
Associates

Job No: 80137

Drawn by: P. Hird

Approved by: S. Rhodes

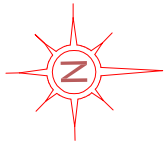
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DATE
15/08/11

Notes:

Drawing Title

Site Location Plan
Figure 1

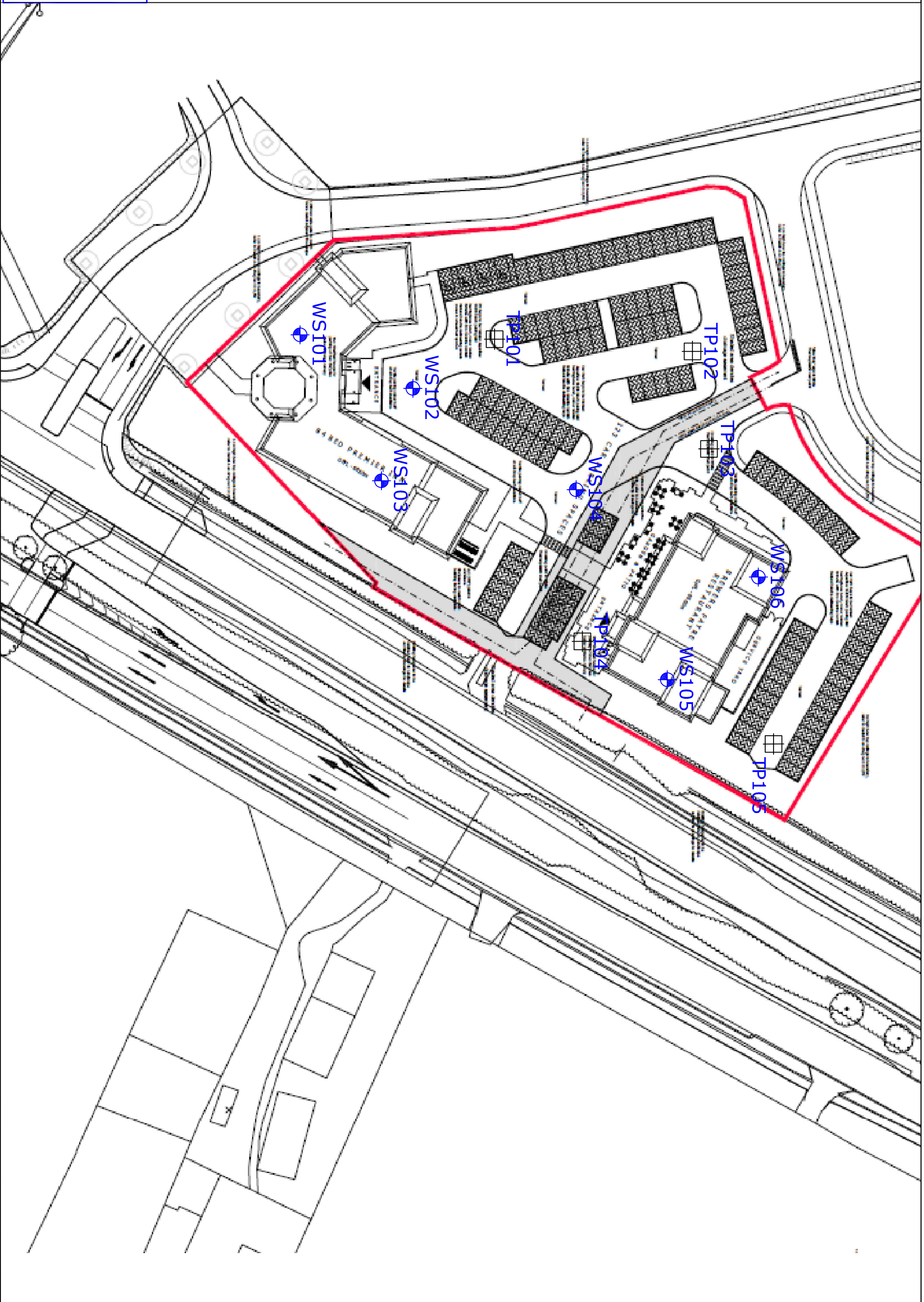


Legend:

- Site Boundary
- ◆ Window Sample Probehole Locations
- Trial Pit Location

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Resource & Environmental Consultants Ltd

Resource and Environmental Consultants Ltd
 Unit 58 Shrivvenham Hundred Business Park
 Swindon
 SN6 8TY
 Tel: 01793 784 935
 E-mail: sales@rectd.co.uk Website: www.rectd.co.uk

Job Title
**Oxford Road,
 Bicester**

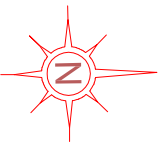
Client
**Simpson
 Associates**

Job No: 80137
 Drawn by: P Hird
 Approved by: S. Rhodes
 Scale: NTS @ A3


27/01/12

Notes:

Drawing Title
**Figure 2
 Exploratory Hole
 Location Plan**

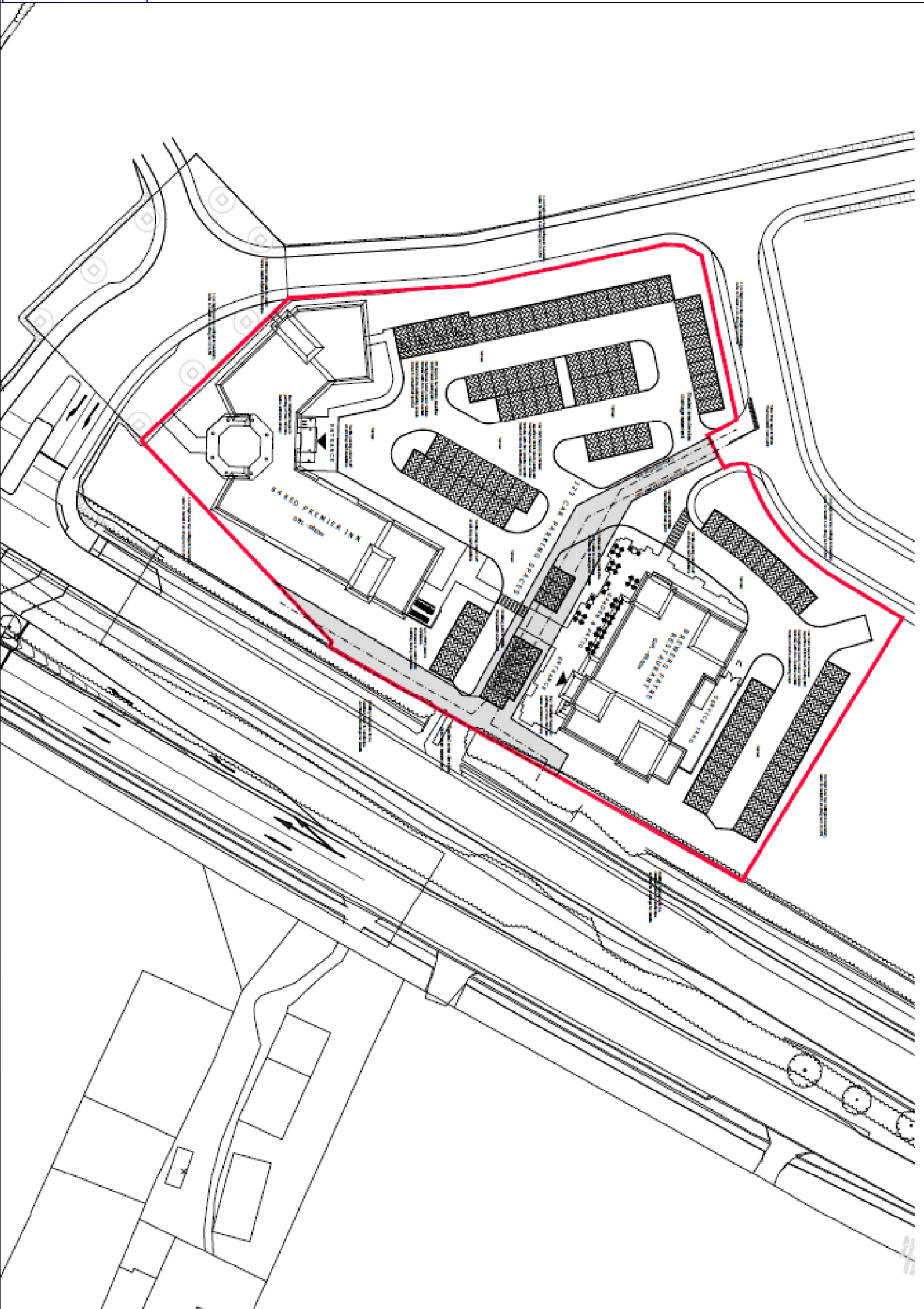


Legend:

 Site Boundary

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APPENDIX IV
REC EXPLORATORY LOGS

Trial Pit Record

Trial Pit Number: TP101

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 22/07/2011

Date Completed: 22/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Excavation Method: JCB 3CX



Osprey House
Pacific Quay
Broadway
Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
www.recitd.co.uk

SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	Water Level (mbgl)	P.I.D (ppm)					Field / Laboratory Testing
							0	25	50	75	100	
0.0 - 0.45		Brown silty sandy TOPSOIL with frequent rootlets.	0.45	ES D	0.20 0.20	Water strike at 1.95m bgl.						
0.45 - 0.60		Orange/brown silty fine to medium SAND with occasional large cobbles and fine to coarse gravel of angular limestone.	0.60	B	0.45-0.60							
0.60 - 0.90		Brown/grey silty fine to coarse angular GRAVEL with small to large cobbles of limestone.	0.90	ES D	1.00 1.00							
0.90 - 1.00		Brown silty gravelly fine to coarse SAND. Gravel is fine to coarse, angular to sub-angular of limestone.	1.00									
1.00 - 1.80		Soft grey/brown very mottled sandy silty CLAY with occasional cobbles of limestone.	1.80	B B	1.90-2.00 2.00-2.10							
1.80 - 1.90		Soft grey/brown very mottled sandy clayey fine to coarse SAND with pockets of sandy grey/brown mottled clay.	1.90									
1.90 - 2.10		Light brown fine to coarse angular GRAVEL with cobbles and boulders of limestone. Recovered from weathered bedrock layer.	2.10									
2.10 - 5.0		Trial pit complete at 2.10m bgl after 10 minutes of breaking.										

Key

B. Bulk (Bag)
W. Water
U100. 100mm Undisturbed
U38. 38mm Undisturbed Sample
SPT. Standard Penetration Test

D. Disturbed
G. Amber Glass Jar / Bottle
CPT. Cone Penetration Test
U100. Blows (Recovery mm)
V. 40ml Glass Vial

T. Plastic Tub
N. 'N' Value
HV. Hand Shear Vane
PID. Photo Ionisation Detector
ES. Environmental Sample

Notes

Dimensions:
Services: Prior to excavation the trial pit location was scanned with a Cable Avoidance Tool (CAT).
Stability: Stable
Groundwater: Water strike at 1.95m bgl

Date: 26/07/2011
Status: Prelim 1

Trial Pit Record

Trial Pit Number: TP102

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 22/07/2011

Date Completed: 22/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Excavation Method: JCB 3CX



Osprey House
Pacific Quay
Broadway
Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
www.recitd.co.uk

SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	Water Level (mbgl)	P.I.D (ppm)					Field / Laboratory Testing
							0	25	50	75	100	
0.0 - 0.40		Dark brown sandy TOPSOIL with occasional small limestone cobbles.	0.40	D	0.20							
0.40 - 0.75		Brown slightly silty fine to coarse, angular to sub-angular GRAVEL. Gravel is fine of limestone.	0.75	ES	0.50							
0.75 - 1.00		Brown gravelly fine to coarse SAND with cobbles of limestone. Gravel is fine to coarse, angular to sub-angular of limestone.	1.50	B	0.75-1.00							
1.00 - 1.50		Brown clayey very sandy fine to coarse, angular to sub-angular GRAVEL of limestone with many cobbles of limestone.	2.30	D	1.90							
1.50 - 2.30		Light brown grey very hard cobbles of LIMESTONE (weathered bedrock).	2.30	D	2.30							
2.30 - 2.40		Trial pit complete at 2.40m bgl after 10 minutes of breaking.										

Key

B. Bulk (Bag)

W. Water

U100. 100mm Undisturbed

U38. 38mm Undisturbed Sample

SPT. Standard Penetration Test

D. Disturbed

G. Amber Glass Jar / Bottle

CPT. Cone Penetration Test

U100. Blows (Recovery mm)

V. 40ml Glass Vial

T. Plastic Tub

N. 'N' Value

HV. Hand Shear Vane

PID. Photo Ionisation Detector

ES. Environmental Sample

Notes

Dimensions:

Services: Prior to excavation the trial pit location was scanned with a Cable Avoidance Tool (CAT).

Stability: Stable

Groundwater: None encountered

Date: 26/07/2011

Status: Prelim 1

Trial Pit Record

Trial Pit Number: TP103

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 22/07/2011

Date Completed: 22/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Excavation Method: JCB 3CX



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Pacific Quay
Broadway
Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
www.recitd.co.uk

SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	Water Level (mbgl)	P.I.D (ppm)					Field / Laboratory Testing
							0	25	50	75	100	
		Brown sandy clayey TOPSOIL.	0.45	ES	0.20							
1.0		Light grey slightly sandy fine to coarse, angular to sub-angular GRAVEL of limestone with many cobbles and boulders of limestone up to 0.40m in diameter.	1.50	ES D	1.50 1.50							
2.0		Yellow/brown slightly clayey sandy fine to coarse GRAVEL. Gravel is fine to coarse of limestone.	2.30	B	2.00-2.10							
3.0		Trial pit terminated at 2.30m bgl due after 10 minutes of breaking on weathered limestone bedrock.										
4.0												
5.0												
6.0												

Key

- | | | |
|--------------------------------|-----------------------------|--------------------------------|
| B. Bulk (Bag) | D. Disturbed | T. Plastic Tub |
| W. Water | G. Amber Glass Jar / Bottle | N. 'N' Value |
| U100. 100mm Undisturbed | CPT. Cone Penetration Test | HV. Hand Shear Vane |
| U38. 38mm Undisturbed Sample | U100. Blows (Recovery mm) | PID. Photo Ionisation Detector |
| SPT. Standard Penetration Test | V. 40ml Glass Vial | ES. Environmental Sample |

Notes

Dimensions:
Services: Prior to excavation the trial pit location was scanned with a Cable Avoidance Tool (CAT).
Stability: Stable
Groundwater: None encountered

Date: 26/07/2011
Status: Prelim 1

Trial Pit Record

Trial Pit Number: TP104

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 22/07/2011

Date Completed: 22/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Excavation Method: JCB 3CX



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Broadway
Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	Water Level (mbgl)	P.I.D (ppm)					Field / Laboratory Testing
							0	25	50	75	100	
0.00 - 0.40		MADE GROUND: Soft dark brown slightly organic slightly sandy clay with numerous tree branches/timber pieces approximately 0.40m in length.	0.20	ES	0.20							
0.40 - 1.00		MADE GROUND: Soft brown very slightly sandy slightly gravelly clay with tree branches and occasional limestone cobbles.	0.70	ES D	0.50 0.50							
1.00 - 1.40		Light grey very slightly sandy fine to coarse, angular to sub-angular GRAVEL of limestone with cobbles and boulders (0.40m-0.50m across). Cobbles are angular of limestone.	1.40	B	1.40-1.80							
1.40 - 2.70		Light yellow clayey cobbly sandy GRAVEL of limestone. Becoming more cobbly with depth. Grading to gravelly sand and cobbles and in some places more cobbly.	2.70	D	2.50							
2.70 - 6.00		Trial pit terminated at 2.70m bgl after 10 minutes breaking on weathered limestone bedrock.										

Key

B. Bulk (Bag)

W. Water

U100. 100mm Undisturbed

U38. 38mm Undisturbed Sample

SPT. Standard Penetration Test

D. Disturbed

G. Amber Glass Jar / Bottle

CPT. Cone Penetration Test

U100. Blows (Recovery mm)

V. 40ml Glass Vial

T. Plastic Tub

N. 'N' Value

HV. Hand Shear Vane

PID. Photo Ionisation Detector

ES. Environmental Sample

Notes

Dimensions:

Services: Prior to excavation the trial pit location was scanned with a Cable Avoidance Tool (CAT).

Stability: Stable

Groundwater: None encountered

Date: 26/07/2011

Status: Prelim 1

Trial Pit Record

Trial Pit Number: TP105

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 22/07/2011

Date Completed: 22/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Excavation Method: JCB 3CX



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Pacific Quay
Broadway
Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	Water Level (mbgl)	P.I.D (ppm)					Field / Laboratory Testing
							0	25	50	75	100	
0.0 - 0.35		Firm dark brown slightly cobbly slightly organic clayey TOPSOIL.	0.35	ES	0.20							
0.35 - 1.00		Firm orange/brown very clayey slightly gravelly SAND. Gravel is fine angular to sub-angular of limestone.	1.00	D	0.50							
1.00 - 1.75		Light grey slightly clayey slightly sandy fine to coarse, angular to sub-angular GRAVEL of limestone with cobbles of limestone.	1.75	B	1.50-1.60							
1.75 - 2.35		Light brown very slightly clayey cobbly SAND.	2.35	D	2.00							
2.35 - 6.0		Trial pit terminated at 2.35m bgl after 10 minutes breaking on weathered limestone.										

Key

B. Bulk (Bag)
W. Water
U100. 100mm Undisturbed
U38. 38mm Undisturbed Sample
SPT. Standard Penetration Test

D. Disturbed
G. Amber Glass Jar / Bottle
CPT. Cone Penetration Test
U100. Blows (Recovery mm)
V. 40ml Glass Vial

T. Plastic Tub
N. 'N' Value
HV. Hand Shear Vane
PID. Photo Ionisation Detector
ES. Environmental Sample

Notes

Dimensions:
Services: Prior to excavation the trial pit location was scanned with a Cable Avoidance Tool (CAT).
Stability: Stable
Groundwater: None encountered

Date: 26/07/2011
Status: Prelim 1

Borehole Record - Window Sample

Probehole Number: WS101

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 21/07/2011

Date Completed: 21/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Drilling Equipment: Mini tracked window sampler rig



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Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
www.rectld.co.uk

SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	In-Situ Testing SPT / U100	Water Level (mbgl)	Monitoring Installation / Backfill
		Brown very slightly organic sandy TOPSOIL.	0.30	ES D	0.50 0.50	5/6/6/5/4/4 N=19	Water strike at 1.50m bgl.	
		Soft orange/brown very sandy CLAY.	0.50					
		Orange/brown slightly clayey gravelly fine to medium SAND. Gravel is medium and angular of limestone.	1.00	B	1.00-1.30			
1.0		Orange/brown SAND and gravel. Sand is fine. Gravel is fine and angular of limestone.	1.55	SPT	1.20			
		Orange/brown very sandy gravelly CLAY with occasional fine to coarse, angular gravel of limestone.	1.90	D	1.50			
		Grey, angular LIMESTONE cobbles.	2.24	ES SPT	1.80 2.00	5/4/17/23 over 15mm		
		Terminated at 2.24m bgl due refusal.						
3.0								
4.0								
5.0								

Key

B. Bulk (Bag)

W. Water

U100. 100mm Undisturbed

U38. 38mm Undisturbed Sample

SPT. Standard Penetration Test

D. Disturbed

G. Amber Glass Jar / Bottle

CPT. Cone Penetration Test

U100. Blows (Recovery mm)

V. 40ml Glass Vial

T. Plastic Tub

N. 'N' Value

HV. Hand Shear Vane

PID. Photo Ionisation Detector

ES. Environmental Sample

Notes

Groundwater: Water strike at 1.50m bgl after drilling

Services: Prior to drilling the location was scanned with a cable avoidance tool (CAT).

Addition of water: None

Casing diameter:

Date logged: 26/07/2011

Status: Prelim 1

Borehole Record - Window Sample

Probehole Number: WS102

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 21/07/2011

Date Completed: 21/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Drilling Equipment: Mini tracked window sampler rig



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Manchester, M50 2UE
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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	In-Situ Testing SPT / U100	Water Level (mbgl)	Monitoring Installation / Backfill
0.00		Brown very slightly organic sandy TOPSOIL.	0.30	D	0.20			
0.30		Orange/brown silty, fine to coarse SAND.	0.60	ES B SPT	0.50 0.50-1.00 0.70	17/8 over 35mm 17/12/13/8 over 45mm	Water strike at 1.90m bgl.	
0.60		Light grey silty sandy fine to coarse, angular to sub-angular GRAVEL of limestone with cobbles of limestone.	1.10	D SPT	1.00 1.00	8/6/5/3/4/3 N=15		
1.10		Light grey silty gravelly fine to coarse SAND. Gravel is fine to coarse, angular to sub-angular of limestone.	1.40	ES D	1.50 1.70			
1.40		Soft to firm yellow/brown sandy mottled grey CLAY.	1.97	SPT	1.90	25 over 45mm/ 50 over 25mm		
1.97		Terminated at 1.97m bgl due refusal.						

Key

B. Bulk (Bag)

W. Water

U100. 100mm Undisturbed

U38. 38mm Undisturbed Sample

SPT. Standard Penetration Test

D. Disturbed

G. Amber Glass Jar / Bottle

CPT. Cone Penetration Test

U100. Blows (Recovery mm)

V. 40ml Glass Vial

T. Plastic Tub

N. 'N' Value

HV. Hand Shear Vane

PID. Photo Ionisation Detector

ES. Environmental Sample

Notes

Groundwater: Water strike at 1.90m bgl

Services: Prior to drilling the location was scanned with a cable avoidance tool (CAT).

Addition of water: None

Casing diameter:

Date logged: 26/07/2011

Status: Prelim 1

Borehole Record - Window Sample

Probehole Number: WS103

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 21/07/2011

Date Completed: 21/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Drilling Equipment: Mini tracked window sampler rig



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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	In-Situ Testing SPT / U100	Water Level (mbgl)	Monitoring Installation / Backfill
0.00		Firm brown slightly gravelly sandy CLAY with occasional rootlets. Gravel is fine to coarse, angular to sub-angular of limestone.	0.50	WAC	0.00-0.50			
0.50				B	0.50-1.00			
1.00		Sandy silty fine to coarse, angular to sub-angular GRAVEL of limestone with occasional small cobbles. Completely weathered limestone layers.	1.40	SPT	1.00	5/8/7/5/3/3 N=18		
1.40			1.60	ES	1.40			
1.60		Brown/yellow very sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to sub-angular of limestone.	2.00	D SPT	1.80 2.00	18/7 over 20mm/ 50 over 30mm		
2.00		Firm yellow/brown sandy mottled grey CLAY.						
Terminated at 2.00m bgl due refusal.								
3.0								
4.0								
5.0								
6.0								

Key

B. Bulk (Bag)

W. Water

U100. 100mm Undisturbed

U38. 38mm Undisturbed Sample

SPT. Standard Penetration Test

D. Disturbed

G. Amber Glass Jar / Bottle

CPT. Cone Penetration Test

U100. Blows (Recovery mm)

V. 40ml Glass Vial

T. Plastic Tub

N. 'N' Value

HV. Hand Shear Vane

PID. Photo Ionisation Detector

ES. Environmental Sample

Notes

Groundwater: None encountered

Services: Prior to drilling the location was scanned with a cable avoidance tool (CAT).

Addition of water: None

Casing diameter:

Date logged: 26/07/2011

Status: Prelim 1

Borehole Record - Window Sample

Probehole Number: WS104

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 21/07/2011

Date Completed: 21/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Drilling Equipment: Mini tracked window sampler rig



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Broadway
Manchester, M50 2UE
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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	In-Situ Testing SPT / U100	Water Level (mbgl)	Monitoring Installation / Backfill
0.00		Firm brown sandy gravelly CLAY with occasional cobbles of limestone. Gravel is fine to coarse angular of limestone.	0.60	WAC	0.00-0.50			
0.50		Light brown sandy fine to coarse, angular to sub-angular GRAVEL of limestone.		B	0.50-1.00			
1.00		Light brown and grey gravelly, very silty, clayey SAND and grey/brown laminations in places.	1.70	SPT	1.00	10/11/13/11/9/9 N=42		
2.00		Terminated at 2.40m bgl due refusal.	2.40	ES	1.50			
2.40				D	1.80			
2.00				SPT	2.00	4/8/8/9/22/11 over 28mm		
3.00								
4.00								
5.00								
6.00								

Key

- | | | |
|--------------------------------|-----------------------------|--------------------------------|
| B. Bulk (Bag) | D. Disturbed | T. Plastic Tub |
| W. Water | G. Amber Glass Jar / Bottle | N. 'N' Value |
| U100. 100mm Undisturbed | CPT. Cone Penetration Test | HV. Hand Shear Vane |
| U38. 38mm Undisturbed Sample | U100. Blows (Recovery mm) | PID. Photo Ionisation Detector |
| SPT. Standard Penetration Test | V. 40ml Glass Vial | ES. Environmental Sample |

Notes

Groundwater: None encountered
 Services: Prior to drilling the location was scanned with a cable avoidance tool (CAT).
 Addition of water: None
 Casing diameter:

Date logged: 26/07/2011
 Status: Prelim 1

Borehole Record - Window Sample

Probehole Number: WS105

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 21/07/2011

Date Completed: 21/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Drilling Equipment: Mini tracked window sampler rig



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Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	In-Situ Testing SPT / U100	Water Level (mbgl)	Monitoring Installation / Backfill
		Soft to firm brown slightly gravelly CLAY. Gravel is fine to coarse, angular to sub-angular of limestone.	0.50	D	0.20			
		Light brown silty SAND and GRAVEL. Gravel is fine to coarse with occasional cobbles of limestone.	1.00	D	0.80			
1.0		Light yellow/brown silty fine to medium SAND.	1.40	ES SPT	1.00 1.00	11/11/11/7/10/9 N=37		
		Firm brown/yellow very silty sandy gravelly CLAY. Gravel is fine, angular to sub-angular of limestone.	1.90	B	1.40-1.90			
2.0		Light grey sandy fine to coarse GRAVEL of limestone.		SPT	2.00	4/4/6/6/14/16 N=42		
		Soft to firm light yellow/brown very silty sandy CLAY.	2.60	ES SPT	2.50 2.60	23/2 over 10mm/ 50 over 55mm		
3.0		Terminated at 2.60m bgl due refusal.						
4.0								
5.0								

Key

- | | | |
|--------------------------------|-----------------------------|--------------------------------|
| B. Bulk (Bag) | D. Disturbed | T. Plastic Tub |
| W. Water | G. Amber Glass Jar / Bottle | N. 'N' Value |
| U100. 100mm Undisturbed | CPT. Cone Penetration Test | HV. Hand Shear Vane |
| U38. 38mm Undisturbed Sample | U100. Blows (Recovery mm) | PID. Photo Ionisation Detector |
| SPT. Standard Penetration Test | V. 40ml Glass Vial | ES. Environmental Sample |

Notes

Groundwater: None encountered
 Services: Prior to drilling the location was scanned with a cable avoidance tool (CAT).
 Addition of water: None
 Casing diameter:

Date logged: 26/07/2011
 Status: Prelim 1

Borehole Record - Window Sample

Probehole Number: WS106

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 21/07/2011

Date Completed: 21/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Drilling Equipment: Mini tracked window sampler rig



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Broadway
Manchester, M50 2UE
Tel: 0161 868 1300 / Fax: 0161 868 1301
www.rectld.co.uk

SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	In-Situ Testing SPT / U100	Water Level (mbgl)	Monitoring Installation / Backfill
0.0 - 0.30		Firm brown slightly gravelly clayey TOPSOIL.	0.30	ES D	0.40 0.40			
0.30 - 0.70		Sandy silty GRAVEL. Gravel is fine to coarse, angular of limestone.	0.70					
0.70 - 6.0		Terminated at 0.70m bgl due to rig refusal.						

Key

B. Bulk (Bag)

W. Water

U100. 100mm Undisturbed

U38. 38mm Undisturbed Sample

SPT. Standard Penetration Test

D. Disturbed

G. Amber Glass Jar / Bottle

CPT. Cone Penetration Test

U100. Blows (Recovery mm)

V. 40ml Glass Vial

T. Plastic Tub

N. 'N' Value

HV. Hand Shear Vane

PID. Photo Ionisation Detector

ES. Environmental Sample

Notes

Groundwater: None encountered

Services: Prior to drilling the location was scanned with a cable avoidance tool (CAT).

Additon of water: None

Casing diameter:

Date logged: 26/07/2011

Status: Prelim 1

Borehole Record - Window Sample

Probehole Number: WS106A

Project Number: 80137

Contract Name: Oxford Road, Bicester

Client: Simpson Associates

Engineer: Peter Goodfellow

Date Started: 21/07/2011

Date Completed: 21/07/2011

Elevation AOD (m): N/A

Co-ordinates: N/A

Drilling Equipment: Mini tracked window sampler rig



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www.rectld.co.uk

SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	In-Situ Testing SPT / U100	Water Level (mbgl)	Monitoring Installation / Backfill
		Firm brown slightly gravelly clayey TOPSOIL.	0.30					
		Sandy silty GRAVEL. Gravel is fine to coarse, angular of limestone.	0.70					
1.0		Terminated at 0.70m bgl due to rig refusal.						
2.0								
3.0								
4.0								
5.0								
6.0								

Key

B. Bulk (Bag)

W. Water

U100. 100mm Undisturbed

U38. 38mm Undisturbed Sample

SPT. Standard Penetration Test

D. Disturbed

G. Amber Glass Jar / Bottle

CPT. Cone Penetration Test

U100. Blows (Recovery mm)

V. 40ml Glass Vial

T. Plastic Tub

N. 'N' Value

HV. Hand Shear Vane

PID. Photo Ionisation Detector

ES. Environmental Sample

Notes

Groundwater: None encountered

Services: Prior to drilling the location was scanned with a cable avoidance tool (CAT).

Additon of water: None

Casing diameter:

Date logged: 26/07/2011

Status: Prelim 1

APPENDIX V
CHEMICAL TESTING RESULTS



Scientific Analysis Laboratories

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 328646
Fax : 01376 552923

Scientific Analysis Laboratories is a
limited company registered in England and
Wales (No 2514788) whose address is at
Hadfield House, Hadfield Street, Manchester M16 9FE

Report Number: 245149-1

Date of Report: 03-Aug-2011

Customer: Resource Environmental Consultants Ltd
2nd Floor
7 Little London Court
Old Town
Swindon
SN1 3HY

Customer Contact: Mr Peter Goodfellow

Customer Job Reference: 80137

Customer Site Reference: Premier Inn development land, near
Bicester Service Station, Oxford Road,
Bicester

Date Job Received at SAL: 27-Jul-2011

Date Analysis Started: 27-Jul-2011

Date Analysis Completed: 03-Aug-2011

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs



1650

Report checked
and authorised by :
Luke Rayner
Project Manager

Issued by :
Luke Rayner
Project Manager

SAL Reference: 245149								
Project Site: Premier Inn development land, near Bicester Service Station, Oxford Road, Bicester								
Customer Reference: 80137								
Soil Analysed as Soil								
REC Suite C (Banded TPH C5-C35)								
SAL Reference			245149 006	245149 009	245149 015	245149 016		
Customer Sample Reference			TP104 @ 0.20m	WS101 @ 0.50m	WS105 @ 1.00m	WS105 @ 2.50m		
Date Sampled			22-JUL-2011	21-JUL-2011	21-JUL-2011	21-JUL-2011		
Determinand	Method	Test Sample	LOD	Units				
TPH (C5-C6)	T54	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
TPH (C6-C8)	T54	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
TPH (C8-C10)	T54	AR	100	µg/kg	<100	<100	<100	<100
TPH (C10-C12)	T8	AR	1	mg/kg	<1	<1	<1	<1
TPH (C12-C16)	T8	AR	1	mg/kg	<1	<1	<1	<1
TPH (C16-C21)	T8	AR	1	mg/kg	<1	<1	<1	<1
TPH (C21-C35)	T8	AR	1	mg/kg	<1	<1	<1	<1

SAL Reference: 245149								
Project Site: Premier Inn development land, near Bicester Service Station, Oxford Road, Bicester								
Customer Reference: 80137								
Soil Analysed as Soil								
REC002 (SE)								
SAL Reference			245149 006	245149 009	245149 015	245149 016		
Customer Sample Reference			TP104 @ 0.20m	WS101 @ 0.50m	WS105 @ 1.00m	WS105 @ 2.50m		
Date Sampled			22-JUL-2011	21-JUL-2011	21-JUL-2011	21-JUL-2011		
Determinand	Method	Test Sample	LOD	Units				
Arsenic	T257	A40	2.0	mg/kg	24	14	10	8.5
Cadmium	T257	A40	0.1	mg/kg	0.3	0.1	<0.1	<0.1
Chromium	T257	A40	0.5	mg/kg	25	16	9.1	6.6
Copper	T257	A40	2	mg/kg	19	12	9	7
Lead	T257	A40	2	mg/kg	25	11	7	7
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	24	23	13	11
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3
Zinc	T257	A40	2	mg/kg	75	37	12	10
Chromium VI	T82	A40	1	mg/kg	<1	<1	<1	<1
pH	T7	A40			8.1	8.5	8.3	8.3
SO4(Total)	T102	A40	0.01	%	0.07	0.06	0.11	0.11
(Water Soluble) SO4-- expressed as SO4	T242	A40	0.01	g/l	0.01	0.01	0.02	0.02
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1	<1	<1
Phenols(Mono)	T4	AR	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5

Index to symbols used in 245149-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T102	ICP/OES (HCl extract)
T4	Colorimetry
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T54	GC/MS (Headspace)
T8	GC/FID
T7	Probe
T245	ICP/OES(Aqua Regia Extraction)
T82	ICP/OES (Sim)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C5-C6)	T54	AR	0.1	mg/kg	N	006,009,015-016
TPH (C6-C8)	T54	AR	0.1	mg/kg	N	006,009,015-016
TPH (C8-C10)	T54	AR	100	µg/kg	N	006,009,015-016
TPH (C10-C12)	T8	AR	1	mg/kg	U	006,009,015-016
TPH (C12-C16)	T8	AR	1	mg/kg	U	006,009,015-016
TPH (C16-C21)	T8	AR	1	mg/kg	U	006,009,015-016
TPH (C21-C35)	T8	AR	1	mg/kg	U	006,009,015-016
Arsenic	T257	A40	2.0	mg/kg	U	006,009,015-016
Cadmium	T257	A40	0.1	mg/kg	U	006,009,015-016
Chromium	T257	A40	0.5	mg/kg	U	006,009,015-016
Copper	T257	A40	2	mg/kg	U	006,009,015-016
Lead	T257	A40	2	mg/kg	U	006,009,015-016
Mercury	T245	A40	1.0	mg/kg	U	006,009,015-016
Nickel	T257	A40	0.5	mg/kg	U	006,009,015-016
Selenium	T257	A40	3	mg/kg	U	006,009,015-016
Zinc	T257	A40	2	mg/kg	U	006,009,015-016
Chromium VI	T82	A40	1	mg/kg	N	006,009,015-016
pH	T7	A40			U	006,009,015-016
SO4(Total)	T102	A40	0.01	%	U	006,009,015-016
(Water Soluble) SO4-- expressed as SO4	T242	A40	0.01	g/l	U	006,009,015-016
Cyanide(Total)	T4	AR	1	mg/kg	U	006,009,015-016
Phenols(Mono)	T4	AR	0.5	mg/kg	U	006,009,015-016





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Scientific Analysis Laboratories

Certificate of Analysis

3 Crittall Drive
Springwood Industrial Estate
Braintree
Essex
CM7 2RT
Tel : 01376 328646
Fax : 01376 552923

Report Number: 245148-1

Date of Report: 10-Aug-2011

Customer: Resource Environmental Consultants Ltd
2nd Floor
7 Little London Court
Old Town
Swindon
SN1 3HY

Customer Contact: Mr Peter Goodfellow

Customer Job Reference: 80137

Customer Site Reference: Premier Inn development land, near Bicester Service Station, Oxford Road, Bicester

Date Job Received at SAL: 27-Jul-2011

Date Analysis Started: 27-Jul-2011

Date Analysis Completed: 10-Aug-2011

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs



Report checked
and authorised by :
Luke Rayner
Project Manager

Issued by :

Waste Acceptance Criteria

Customer Sample Reference : WS103 @ 0.00-0.50m

SAL Sample Reference : 245148 001

SAL Reference : 245148

Project Site : Premier Inn development land, near Bicester
Service Station, Oxford Road, Bicester

Customer Reference : 80137

Test Portion Mass (g) : 175

Date Sampled : 21-JUL-2011

Soil Summary						Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol					
pH	Probe	0.0		U	8.0		>6.0		
Loss on Ignition @450C	Ign 450C/Grav	0.1	%	U	7.0			10.0	
Total Organic Carbon	OX/IR	0.1	%	WN	1.4	3.0	5.0	6.0	
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0				
BTEX (Sum)	Calc	0.0040	mg/kg	U	<0.0040	6.0			
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	WU	<0.00035	1.0			
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	U	<10	500.0			

10:1 Leachate						Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol					
Antimony	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	<0.020	0.06	0.7	5.0	
Arsenic	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	<0.020	0.5	2.0	25.0	
Barium	Calc / ICP/OES(Sim)(PreconcB)	0.10	mg/kg	N	0.32	20.0	100.0	300.0	
Cadmium	Calc / ICP/OES(Sim)(PreconcB)	0.010	mg/kg	N	<0.010	0.04	1.0	5.0	
Chloride	Calc / IC (D)	1.0	mg/kg	N	6.3	800.0	15000.0	25000.0	
Chromium	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	<0.020	0.5	10.0	70.0	
Copper	Calc / ICP/OES(Sim)(PreconcB)	0.10	mg/kg	N	<0.10	2.0	50.0	100.0	
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	10	500.0	800.0	1000.0	
Fluoride	Calc / IC (D)	0.50	mg/kg	N	4.1	10.0	150.0	500.0	
Lead	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	<0.020	0.5	10.0	50.0	
Mercury	Calc / AAS (CV)	0.0020	mg/kg	N	<0.0020	0.01	0.2	2.0	
Molybdenum	Calc / ICP/OES(Sim)(PreconcB)	0.050	mg/kg	N	<0.050	0.5	10.0	30.0	
Nickel	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	0.025	0.4	10.0	40.0	
Phenols(Mono)	Calc / Colorimetry (CE)	0.050	mg/kg	N	0.056	1.0			
Selenium	Calc / ICP/OES(Sim)(PreconcB)	0.050	mg/kg	N	<0.050	0.1	0.5	7.0	
SO4--	Calc / IC (D)	1.0	mg/kg	N	12	1000.0	20000.0	50000.0	
Total Dissolved Solids	Calc / Grav (4 Sig)(11)	100	mg/kg	N	<100	4000.0	60000.0	100000.0	
Zinc	Calc / ICP/OES(Sim)(PreconcB)	0.050	mg/kg	N	0.44	4.0	50.0	200.0	

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as amended)

Note:- Sample failed to produce sufficient eluate within the specified time after vacuum filtration for 1 hour and centrifugation for 30 minutes. Therefore, the exact application of the two-step leaching test is precluded on technical grounds. (ref: Section 5.2.4 BS EN 12457-3:2002) Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : WS104 @ 0.00-0.50m

SAL Sample Reference : 245148 002

SAL Reference : 245148

Project Site : Premier Inn development land, near Bicester
Service Station, Oxford Road, Bicester

Customer Reference : 80137

Date Sampled : 21-JUL-2011

Test Portion Mass (g) : 175

Soil Summary						Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol					
pH	Probe	0.0		U	8.2		>6.0		
Loss on Ignition @450C	Ign 450C/Grav	0.1	%	U	5.5			10.0	
Total Organic Carbon	OX/IR	0.1	%	WN	0.9	3.0	5.0	6.0	
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0				
BTEX (Sum)	Calc	0.0040	mg/kg	U	<0.0040	6.0			
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	WU	<0.00035	1.0			
TPH (C10-C40)	GC/FID (SE)	10	mg/kg	U	<10	500.0			

10:1 Leachate						Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	Technique	LOD	Units	Symbol					
Antimony	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	0.046	0.06	0.7	5.0	
Arsenic	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	0.034	0.5	2.0	25.0	
Barium	Calc / ICP/OES(Sim)(PreconcB)	0.10	mg/kg	N	0.36	20.0	100.0	300.0	
Cadmium	Calc / ICP/OES(Sim)(PreconcB)	0.010	mg/kg	N	<0.010	0.04	1.0	5.0	
Chloride	Calc / IC (D)	1.0	mg/kg	N	11	800.0	15000.0	25000.0	
Chromium	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	0.028	0.5	10.0	70.0	
Copper	Calc / ICP/OES(Sim)(PreconcB)	0.10	mg/kg	N	<0.10	2.0	50.0	100.0	
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	10	500.0	800.0	1000.0	
Fluoride	Calc / IC (D)	0.50	mg/kg	N	3.0	10.0	150.0	500.0	
Lead	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	0.034	0.5	10.0	50.0	
Mercury	Calc / AAS (CV)	0.0020	mg/kg	N	<0.0020	0.01	0.2	2.0	
Molybdenum	Calc / ICP/OES(Sim)(PreconcB)	0.050	mg/kg	N	<0.050	0.5	10.0	30.0	
Nickel	Calc / ICP/OES(Sim)(PreconcB)	0.020	mg/kg	N	<0.020	0.4	10.0	40.0	
Phenols(Mono)	Calc / Colorimetry (CE)	0.050	mg/kg	N	0.12	1.0			
Selenium	Calc / ICP/OES(Sim)(PreconcB)	0.050	mg/kg	N	<0.050	0.1	0.5	7.0	
SO4--	Calc / IC (D)	1.0	mg/kg	N	9.8	1000.0	20000.0	50000.0	
Total Dissolved Solids	Calc / Grav (4 Sig)(11)	100	mg/kg	N	<100	4000.0	60000.0	100000.0	
Zinc	Calc / ICP/OES(Sim)(PreconcB)	0.050	mg/kg	N	0.30	4.0	50.0	200.0	

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as amended)

Note:- Sample failed to produce sufficient eluate within the specified time after vacuum filtration for 1 hour and centrifugation for 30 minutes. Therefore, the exact application of the two-step leaching test is precluded on technical grounds. (ref: Section 5.2.4 BS EN 12457-3:2002) Results are derived from a single step leaching at L/S 10/1 as prescribed by the EA guidance. (Ref Section C4.1.1 Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures Version 1 April 2005, Environment Agency)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

SAL Reference: 245148						
Project Site: Premier Inn development land, near Bicester Service Station, Oxford Road, Bicester						
Customer Reference: 80137						
Soil Analysed as Soil						
BTEX						
SAL Reference			245148 001		245148 002	
Customer Sample Reference			WS103 @ 0.00-0.50m		WS104 @ 0.00-0.50m	
Test Sample			AR		AR	
Date Sampled			21-JUL-2011		21-JUL-2011	
Determinand	Method	LOD	Units	Symbol		
Benzene	GC/MS (Headspace)	1	µg/kg	U	(13) <1	(13) <1
EthylBenzene	GC/MS (Headspace)	1	µg/kg	U	<1	<1
Meta/Para-Xylene	GC/MS (Headspace)	1	µg/kg	U	1	<1
Ortho-Xylene	GC/MS (Headspace)	1	µg/kg	U	<1	<1
Toluene	GC/MS (Headspace)	1	µg/kg	U	<1	<1

SAL Reference: 245148						
Project Site: Premier Inn development land, near Bicester Service Station, Oxford Road, Bicester						
Customer Reference: 80137						
Soil Analysed as Soil						
PCBs EC7 congeners(28,52,101,118,138,153,180)						
SAL Reference			245148 001		245148 002	
Customer Sample Reference			WS103 @ 0.00-0.50m		WS104 @ 0.00-0.50m	
Test Sample			AR		AR	
Date Sampled			21-JUL-2011		21-JUL-2011	
Determinand	Method	LOD	Units	Symbol		
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.05	µg/kg	WU	<0.05	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	WU	<0.05	<0.05
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.05	µg/kg	WU	<0.05	<0.05
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.05	µg/kg	WU	<0.05	<0.05
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.05	µg/kg	WU	<0.05	<0.05
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.05	µg/kg	WU	<0.05	<0.05
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.05	µg/kg	WU	<0.05	<0.05

SAL Reference: 245148						
Project Site: Premier Inn development land, near Bicester Service Station, Oxford Road, Bicester						
Customer Reference: 80137						
Soil Analysed as Soil						
Total and Speciated USEPA16 PAH (SE)						
SAL Reference			245148 001		245148 002	
Customer Sample Reference			WS103 @ 0.00-0.50m		WS104 @ 0.00-0.50m	
Test Sample			AR		AR	
Date Sampled			21-JUL-2011		21-JUL-2011	
Determinand	Method	LOD	Units	Symbol		
Naphthalene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Acenaphthene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Fluorene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Anthracene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1
Pyrene	GC/MS	0.1	mg/kg	N	<0.1	<0.1
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Chrysene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	<0.1	<0.1

Index to symbols used in 245148-1

Value	Description
A40	Assisted dried < 40C
8:1	Leachate to BS EN 12457-3 (8:1)
AR	As Received
2:1	Leachate to BS EN 12457-3 (2:1)
13	Results have been blank corrected.
W	Analysis was performed at another SAL laboratory
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

ph, LOI & TOC were performed on assisted dried samples (<40 degree centigrade). All other results relate to samples as received.



APPENDIX VI
ORIGIN OF TIER I VALUES

ORIGIN OF REC TIER I VALUES

Constituent	Origin of Risk Assessment Value
Arsenic	2009 SGV
Cadmium	LQM CIEH 2 nd Edition 2009
Chromium	LQM CIEH 2 nd Edition 2009
Lead	2003 EA SGV – CLEA 1.06 not appropriate
Mercury	2009 SGV
Nickel	2009 SGV
Selenium	Soil guideline value, DEFRA/Environment Agency
Copper	LQM CIEH 2 nd Edition 2009
Zinc	LQM CIEH 2 nd Edition 2009
Cyanide - Total	CLEA 1.06 Derived Value
Phenols - Total.	LQM CIEH 2 nd Edition 2009 – 1% SOM
Naphthalene	General Assessment Criteria (GAC) developed by CIEH / LQM the using CLEA 1-06 with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene ⁽ⁱ⁾	
Chrysene	
Benzo(b/k)Fluoranthene ⁽ⁱⁱⁱ⁾	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C ₅ -C ₆ (aliphatic)	
TPH C ₆ -C ₈ (aliphatic)	
TPH C ₈ -C ₁₀ (aliphatic)	
TPH C ₁₀ -C ₁₂ (aliphatic)	
TPH C ₁₂ -C ₁₆ (aromatic)	
TPH C ₁₆ -C ₂₁ (aromatic)	
TPH C ₂₁ -C ₃₅ (aromatic)	

APPENDIX VI
GEOTECHNICAL TESTING RESULTS



LABORATORY REPORT



4043

Contract Number: PSL11/1891

Client's Reference:

Report Date: 08 August 2011

Client Name: REC Resource & Environmental Consultants Ltd
45 Bridgeman Terrace
7 Little London Court
Old Town
Swindon
SN1 3HY

For the attention of: Peter Goodfellow

Contract Title: Premier Inn development land, near Bicester service station, Oxford road,
Bicester

Date Received: 02-August-11
Date Commenced: 02-August-11
Date Completed: 08-August-11

Notes: Observations and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:


R Gunson
(Director)

A Watkins
(Director)

M Beastall
(Laboratory Manager)

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP101		B	0.45-0.60	Brown very gravelly sandy CLAY.
TP102		B	0.75-1.00	Brown sandy very clayey GRAVEL.
TP102		D	0.20	Dark brown gravelly sandy CLAY.
TP103		B	2.00-2.10	Brown sandy very clayey silty GRAVEL.
TP104		B	1.40-1.80	Brown sandy clayey silty GRAVEL.
TP104		D	0.50	Grey mottled brown slightly gravelly slightly sandy CLAY.
TP105		B	1.50-1.60	Brown slightly sandy slightly clayey silty GRAVEL with many cobbles.
WS101		B	1.00-1.30	Brown very sandy clayey GRAVEL.
WS102		B	0.50-1.00	Brown gravelly slightly sandy CLAY.
WS102		D	1.70	Pale brown mottled grey very gravelly very sandy silty CLAY.
WS104		B	0.50-1.00	Brown sandy slightly clayey silty GRAVEL.
WS105		B	1.40-1.90	Pale brown mottled grey very gravelly sandy silty CLAY.
WS105		D	0.20	Dark brown mottled grey gravelly slightly sandy CLAY.

 Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
	<i>[Signature]</i>	03/08/11	<i>[Signature]</i>	08/08/11	<i>[Signature]</i>	08/08/11
	PREMIER INN DEVELOPMENT LAND, BICESTER.					Contract No:
					Client Ref:	80137


SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % <small>Clause 3.2</small>	Bulk Density Mg/m ³ <small>Clause 7.2</small>	Dry Density Mg/m ³ <small>Clause 7.2</small>	Particle Density Mg/m ³ <small>Clause 8.</small>	Liquid Limit % <small>Clause 4.3/4.4</small>	Plastic Limit % <small>Clause 5.</small>	Plasticity Index % <small>Clause 6.</small>	% Passing .425mm	Remarks
TP102		D	0.20	19				52	23	29	80	High plasticity CH.
TP104		D	0.50	29				51	22	29	87	High plasticity CH.
WS102		D	1.70	20				31	18	13	70	Low plasticity CL.
WS105		B	1.40-1.90	16				32	18	14	70	Low plasticity CL.
WS105		D	0.20	26				53	21	32	80	High plasticity CH.

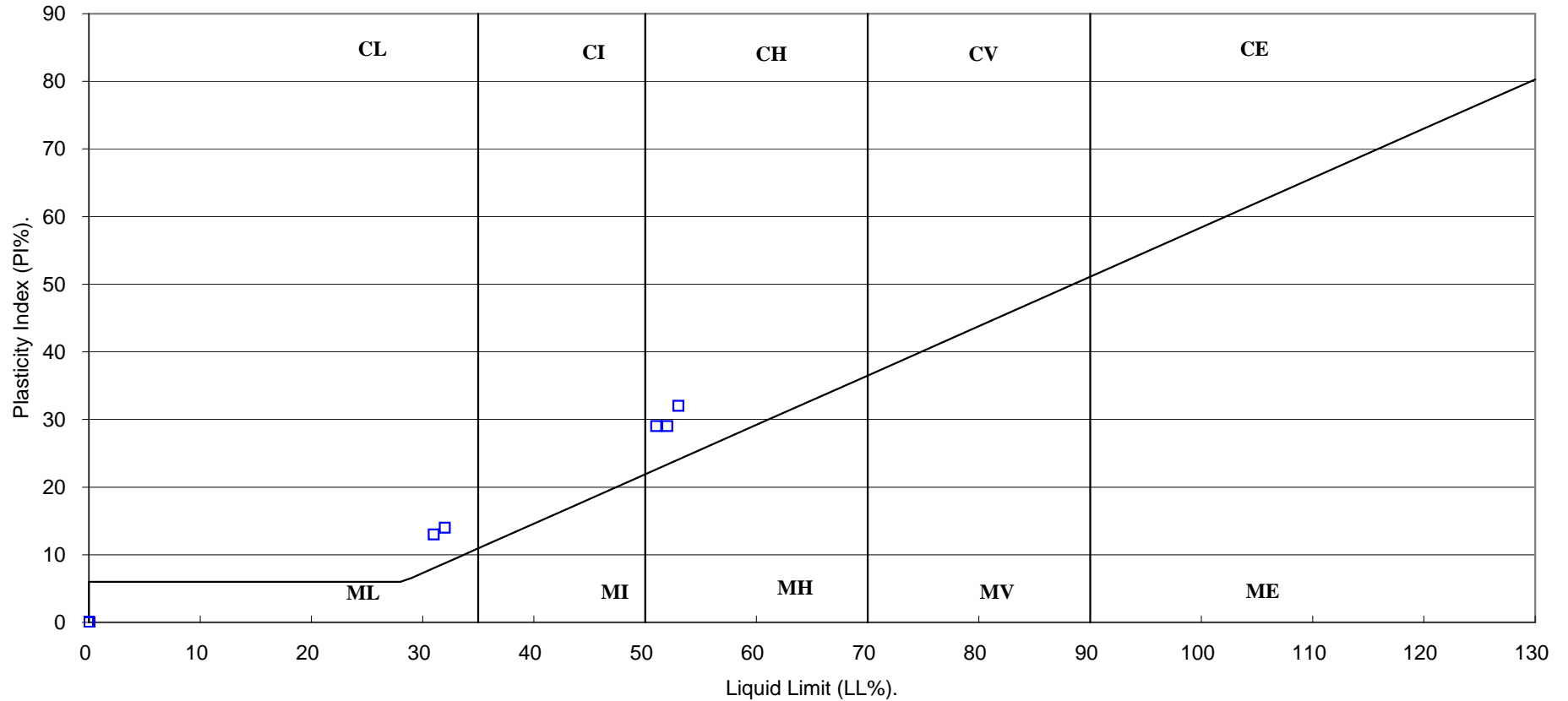
SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

	Compiled by	Date	Checked by	Date	Approved by	Date
	<i>[Signature]</i>	03/08/11	<i>[Signature]</i>	08/08/11	<i>[Signature]</i>	08/08/11
	PREMIER INN DEVELOPMENT LAND, BICESTER.					Contract No:
					Client Ref:	80137

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



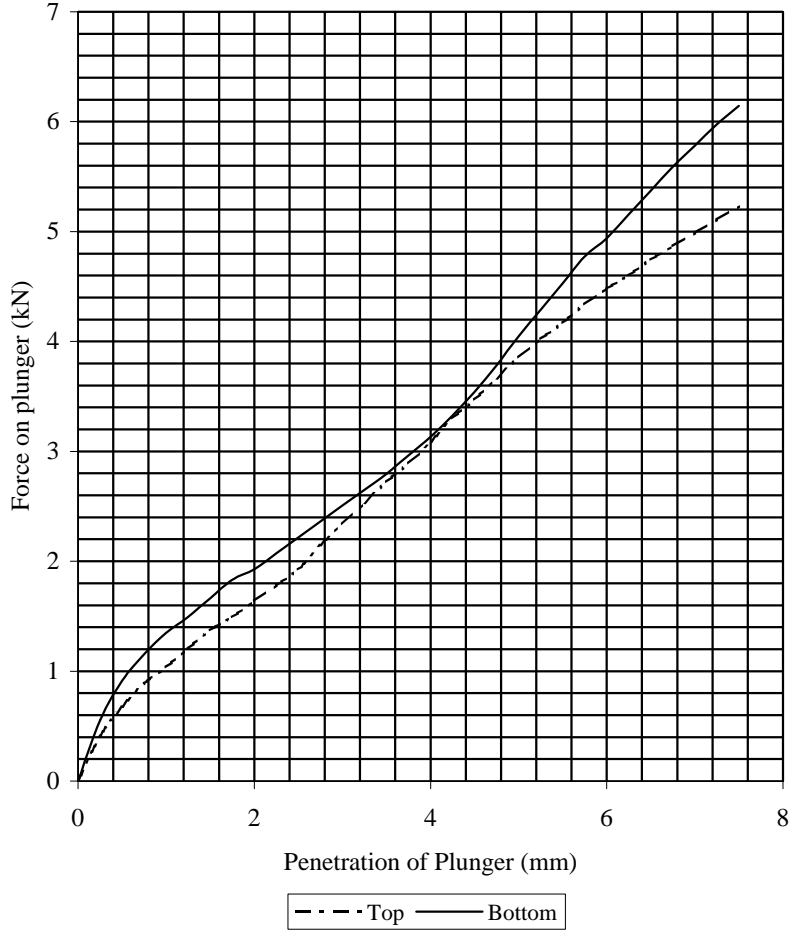
Compiled by	Date	Checked by	Date	Approved by	Date
<i>[Signature]</i>	03/08/11	<i>[Signature]</i>	08/08/11	<i>[Signature]</i>	08/08/11
PREMIER INN DEVELOPMENT LAND, BICESTER.				Contract No:	PSL11/1891
				Client Ref:	80137

California Bearing Ratio Test.

Non Compliance with BS 1377 : Part 4 : 1990

Hole Number: **TP101** Depth (m): **0.45-0.60**

Sample Number: Sample Type: **B**



Initial Sample Conditions		Test Conditions		Method of compaction 2.5Kg Rammer			
Moisture Content:	13	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	1.99	Soaking Time hrs	0	Sample Top	13	Sample Top	19.3
Dry Density Mg/m3:	1.76	Swelling mm:	0	Sample Bottom	13	Sample Bottom	20.2
Percentage retained on 20mm BS test sieve:	39	Remarks: See Summary of Soil Description.					

Checked by	Date	Approved By	Date
<i>H. B. S.</i>	08/08/11	<i>H. B. S.</i>	08/08/11

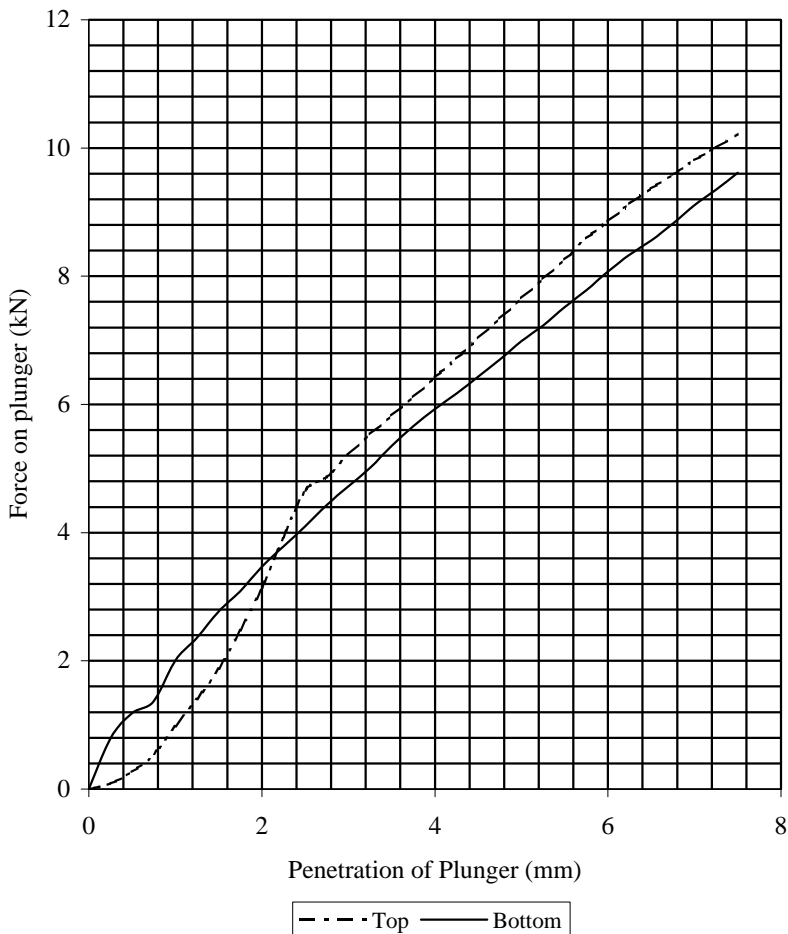
	PREMIER INN DEVELOPMENT LAND, BICESTER.	Contract No. PSL11/1891
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California Bearing Ratio Test.

Non Compliance with BS 1377 : Part 4 : 1990

Hole Number: **TP102** Depth (m): **0.75-1.00**

Sample Number: Sample Type: **B**



Initial Sample Conditions		Test Conditions		Method of compaction 2.5Kg Rammer			
Moisture Content:	11	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	2.17	Soaking Time hrs	0	Sample Top	11	Sample Top	38.3
Dry Density Mg/m3:	1.97	Swelling mm:	0	Sample Bottom	10	Sample Bottom	34.9
Percentage retained on 20mm BS test sieve:	73	Remarks: See Summary of Soil Description.					

Checked by	Date	Approved By	Date
<i>M.S.</i>	08/08/11	<i>M.S.</i>	08/08/11

	PREMIER INN DEVELOPMENT LAND, BICESTER.	Contract No. PSL11/1891
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Particle Size Distribution Test

BS1377 : Part 2 : 1990

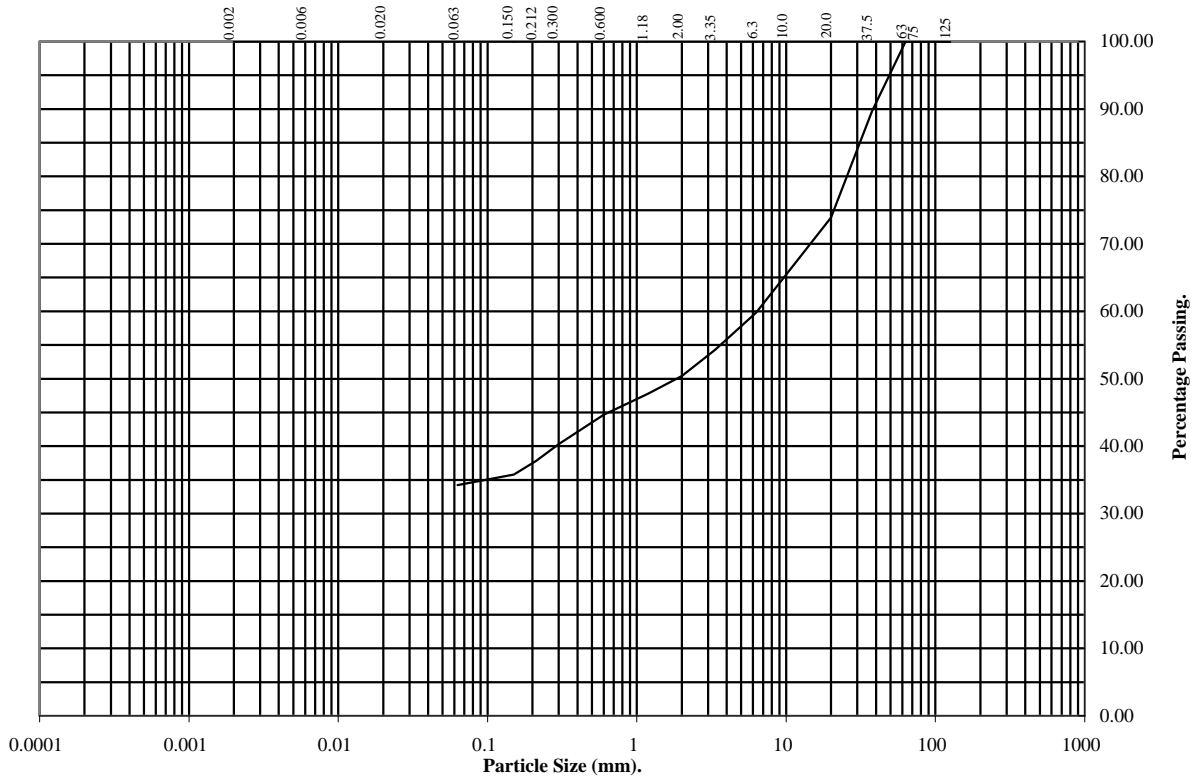
Wet Sieve, Clause 9.2

Hole Number: TP103

Depth (m): 2.00-2.10

Sample Number:

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	90
20	74
10	65
6.3	60
3.35	54
2	50
1.18	48
0.6	45
0.3	40
0.212	38
0.15	36
0.063	34

Soil Fraction	Total Percentage
Cobbles	0
Gravel	50
Sand	16
Silt / Clay	34

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
<i>H.S.</i>	08/08/11	<i>H.S.</i>	08/08/11

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**PREMIER INN DEVELOPMENT LAND,
BICESTER.**

**Contract No.:
PSL11/1891**

Particle Size Distribution Test

BS1377 : Part 2 : 1990

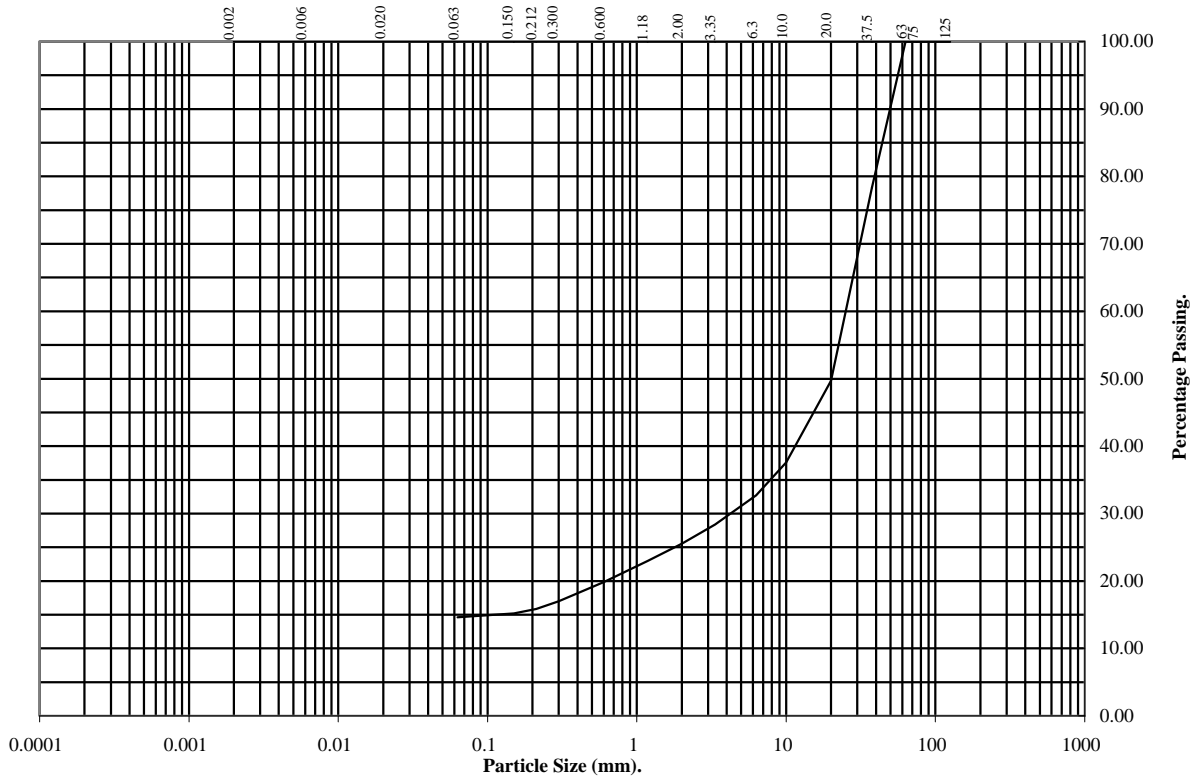
Wet Sieve, Clause 9.2

Hole Number: TP104

Depth (m): 1.40

Sample Number:

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	78
20	50
10	38
6.3	33
3.35	28
2	26
1.18	23
0.6	20
0.3	17
0.212	16
0.15	15
0.063	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	74
Sand	11
Silt / Clay	15

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
<i>H.S.</i>	08/08/11	<i>H.S.</i>	08/08/11

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**PREMIER INN DEVELOPMENT LAND,
BICESTER.**

**Contract No.:
PSL11/1891**

Particle Size Distribution Test

BS1377 : Part 2 : 1990

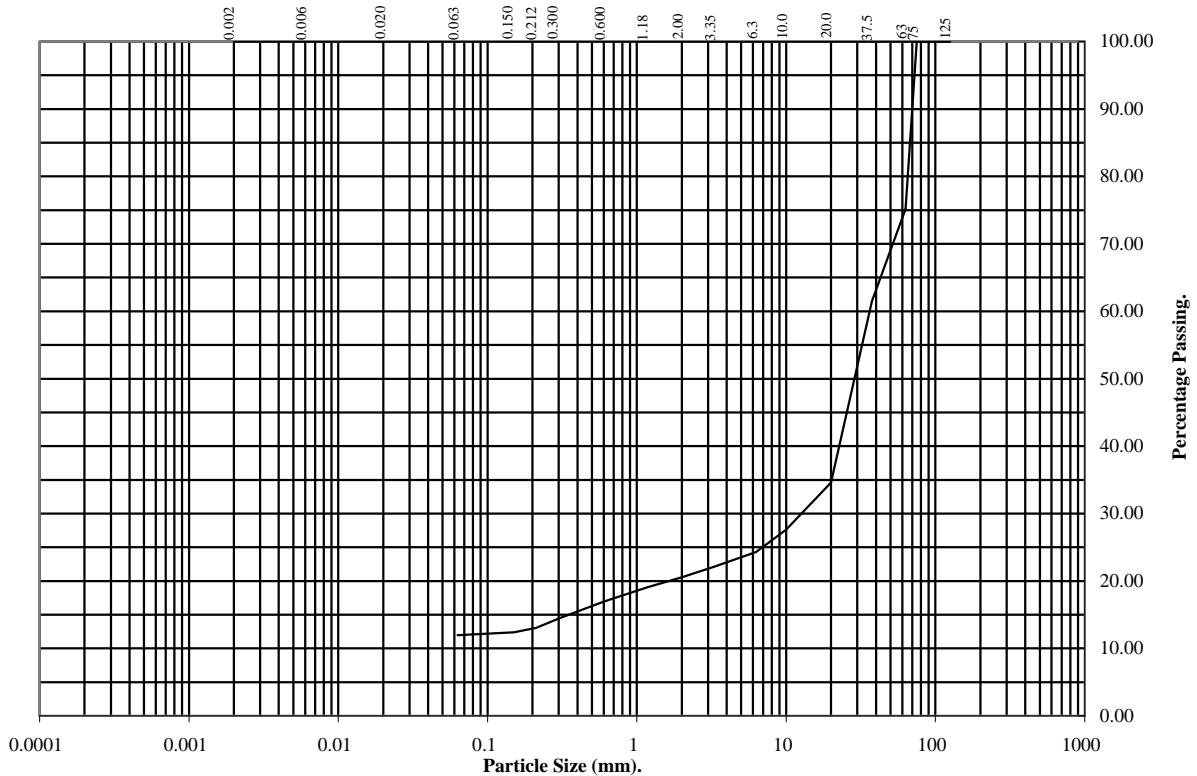
Wet Sieve, Clause 9.2

Hole Number: TP105

Depth (m): 1.50-1.60

Sample Number:

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	75
37.5	62
20	35
10	28
6.3	24
3.35	22
2	21
1.18	19
0.6	17
0.3	14
0.212	13
0.15	12
0.063	12

Soil Fraction	Total Percentage
Cobbles	25
Gravel	54
Sand	9
Silt / Clay	12

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
<i>H.S.</i>	08/08/11	<i>H.S.</i>	08/08/11

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Contract No.:
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Particle Size Distribution Test

BS1377 : Part 2 : 1990

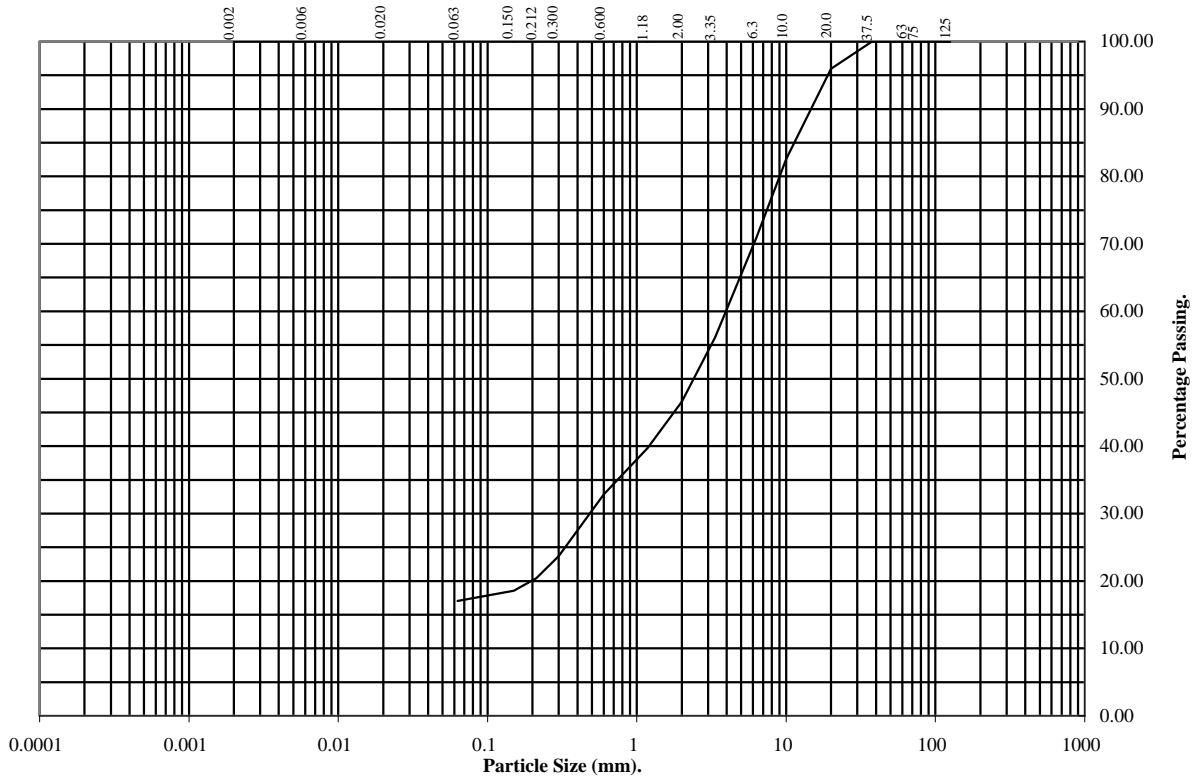
Wet Sieve, Clause 9.2

Hole Number: **WS101**

Depth (m): **1.00-1.30**

Sample Number:

Sample Type: **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	83
6.3	71
3.35	56
2	47
1.18	40
0.6	33
0.3	24
0.212	20
0.15	19
0.063	17

Soil Fraction	Total Percentage
Cobbles	0
Gravel	53
Sand	30
Silt / Clay	17

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
<i>H.S.</i>	08/08/11	<i>H.S.</i>	08/08/11

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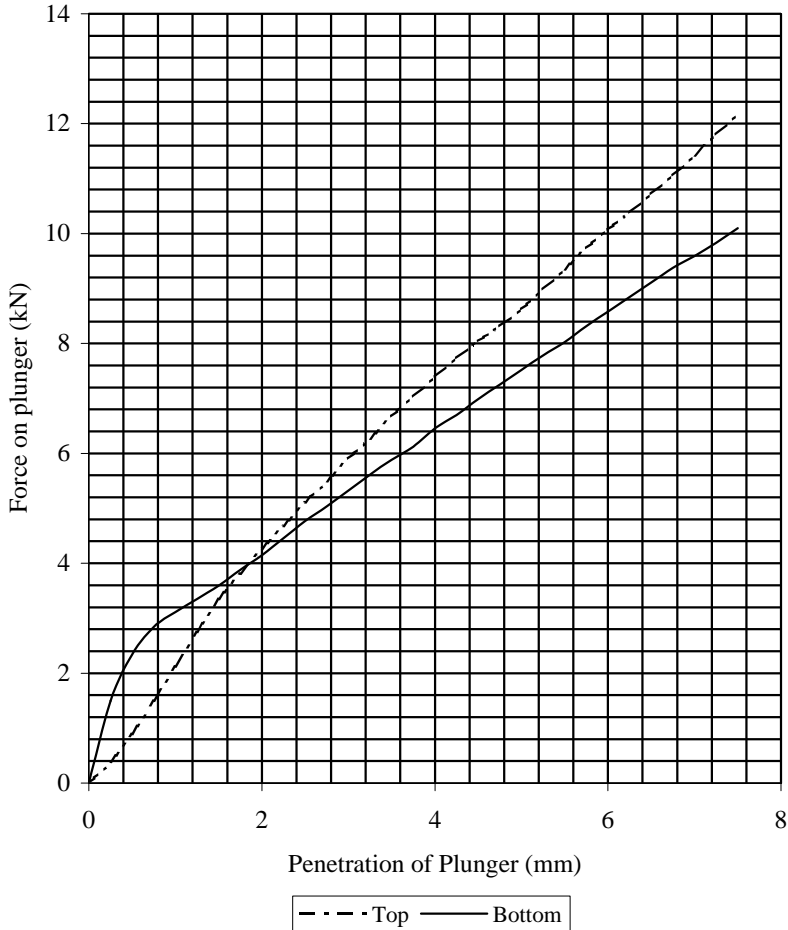
**Contract No.:
PSL11/1891**

California Bearing Ratio Test.

BS 1377 : Part 4 : 1990

Hole Number: **WS102** **Depth (m):** **0.50-1.00**

Sample Number: **Sample Type:** **B**



Initial Sample Conditions		Test Conditions		Method of compaction 2.5Kg Rammer			
Moisture Content:	6.4	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	2.10	Soaking Time hrs	0	Sample Top	6.3	Sample Top	43.1
Dry Density Mg/m3:	1.98	Swelling mm:	0	Sample Bottom	6.5	Sample Bottom	37.6
Percentage retained on 20mm BS test sieve:	11	Remarks: See Summary of Soil Description.					

Checked by	Date	Approved By	Date
<i>M.S.</i>	08/08/11	<i>M.S.</i>	08/08/11

<p>PSL Professional Soils Laboratory</p>	<p>PREMIER INN DEVELOPMENT LAND, BICESTER.</p>	<p>Contract No. PSL11/1891</p>
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Particle Size Distribution Test

BS1377 : Part 2 : 1990

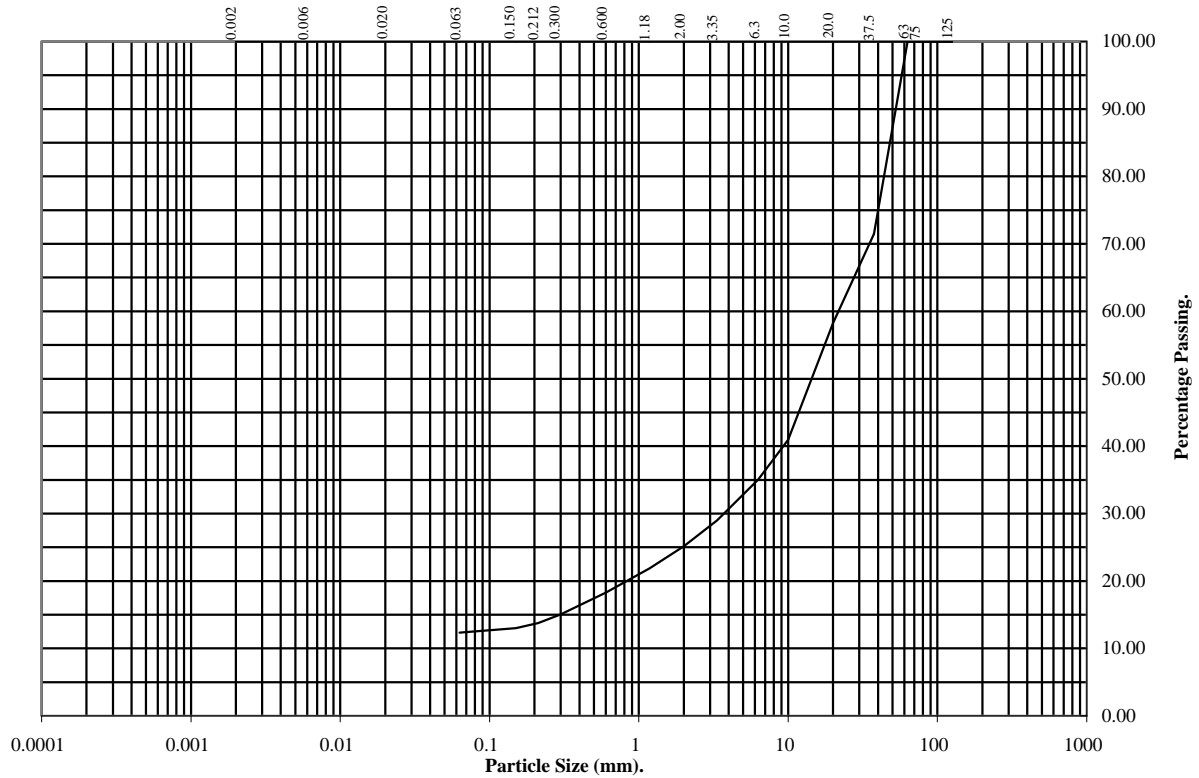
Wet Sieve, Clause 9.2

Hole Number: **WS104**

Depth (m): **0.50-1.00**

Sample Number:

Sample Type: **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	71
20	58
10	41
6.3	35
3.35	29
2	25
1.18	22
0.6	18
0.3	15
0.212	14
0.15	13
0.063	12

Soil Fraction	Total Percentage
Cobbles	0
Gravel	75
Sand	13
Silt / Clay	12

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
<i>H.S.</i>	08/08/11	<i>H.S.</i>	08/08/11

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**PREMIER INN DEVELOPMENT LAND,
BICESTER.**

**Contract No.:
PSL11/1891**

SUMMARY OF POINT LOAD TEST RESULTS

POINT LOAD TEST - ISRM

Trial Pit	Depth	Test Type	Orientation Par / Perp	Dimensions (mm)		Area (mm ²)	D _e ²	D _e (mm)	Failure Load (P)		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks	Rock Type
				W	D				MPa	kN						
TP101	2.0-2.1	I	N/A	43	50	2500	2737.47	52.32	3.400	4.54	1.658	1.021	1.69	Valid		SANDSTONE
TP102	0.75-1.0	I	N/A	58	45	2025	3323.16	57.65	4.440	5.93	1.784	1.066	1.90	Valid		SANDSTONE
TP104	2.70	I	N/A	55	48	2304	3361.35	57.98	4.560	6.09	1.811	1.069	1.94	Valid		SANDSTONE
TP105	1.5-1.6	I	N/A	38	29	841	1403.11	37.46	0.585	0.78	0.557	0.878	0.49	Valid		SANDSTONE

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular



**Premier Inn Development Land,
near Bicester service station**

Contract No:

PSL11/1891

Client Ref:

Checked by *A. [Signature]*

Date 01/08/11

Approved by *A. [Signature]*

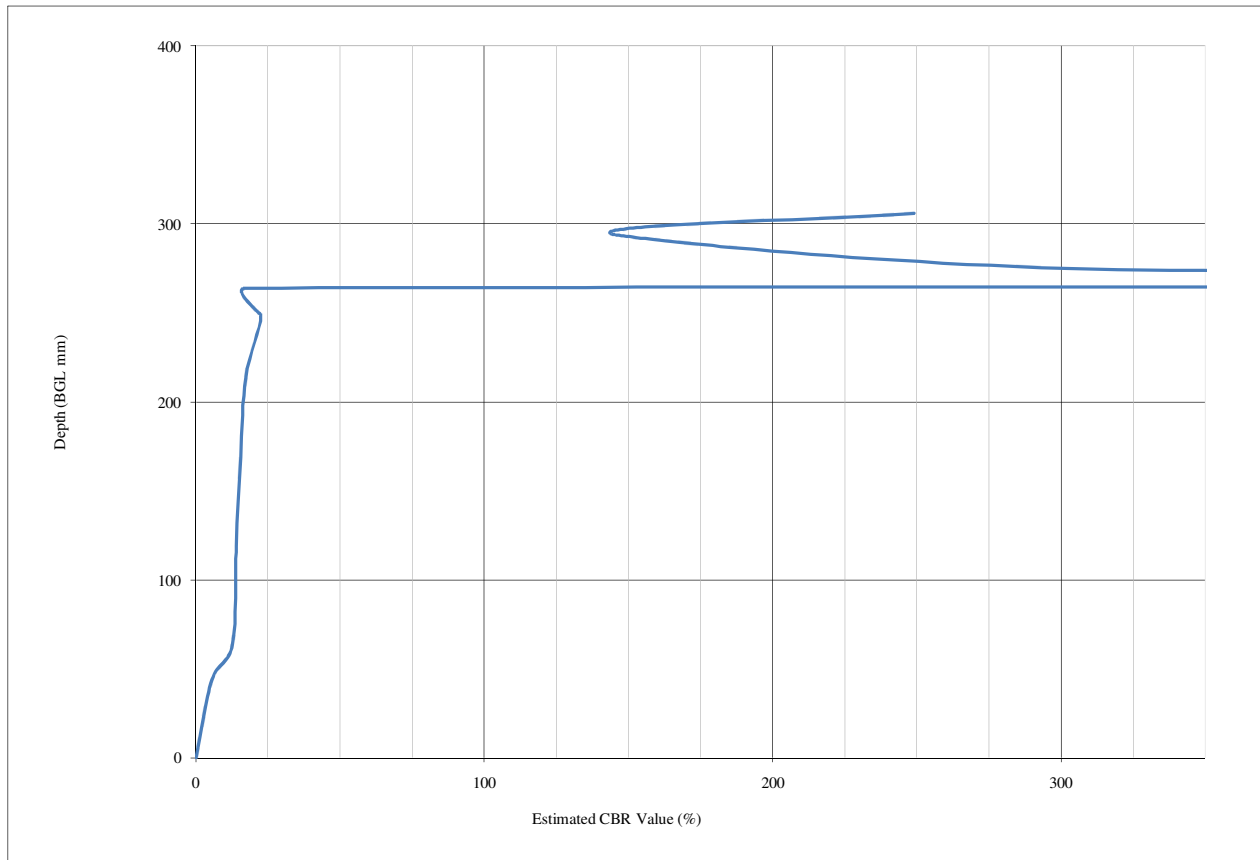
Date 03/08/11

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In accordance with TRL Report PR/INT/277/04

Site Name	Oxford Road, Bicester	Test Date:	04/08/2011
Site Ref	80137	Test Location:	C1
Test No.:	CBR1	Easting:	
Initial Depth :	0mm	Northing:	
Final Depth (mm BGL):	306mm		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	264	15	15	17.60	14.57
264	352	94	79	1.11	269.45

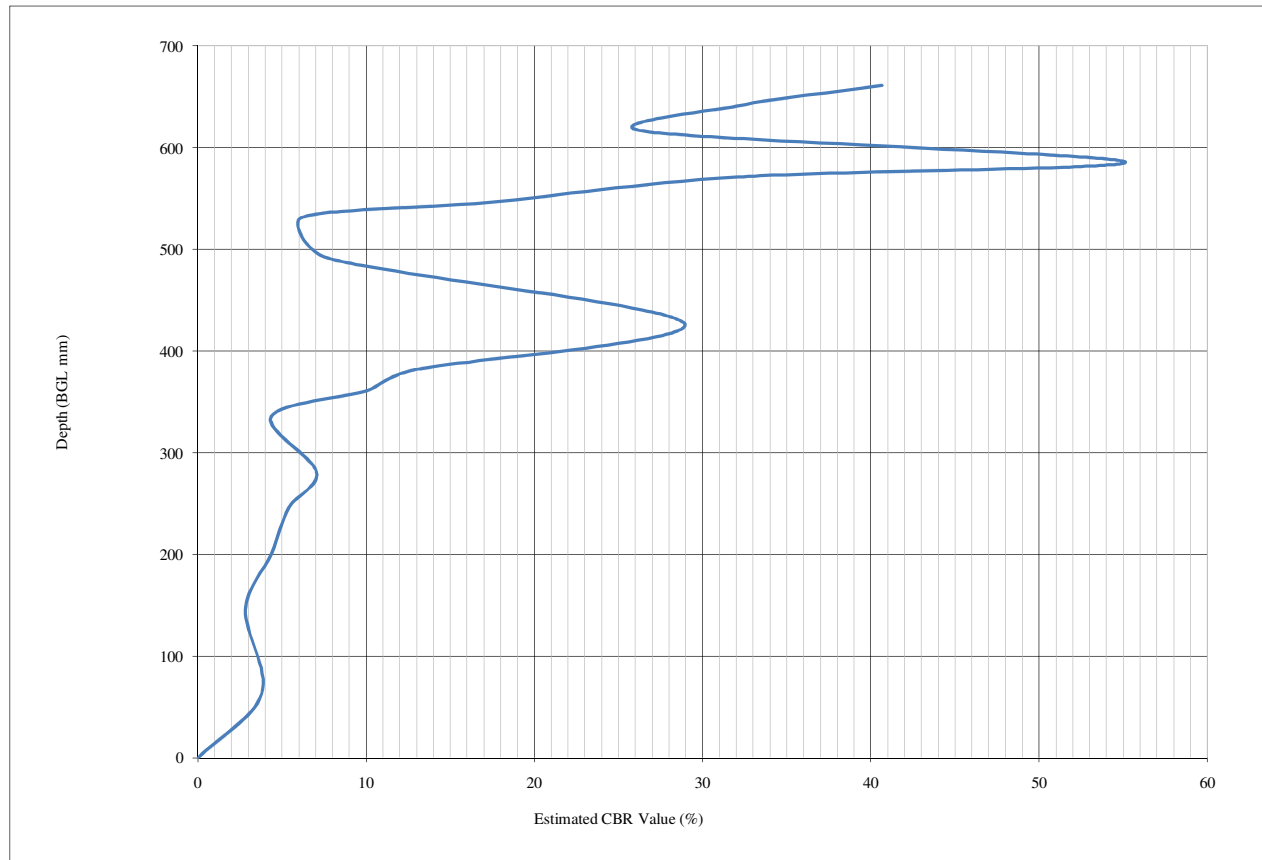
Average CBR Value of 14.57% at 200mm bgl

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In accordance with TRL Report PR/INT/277/04

Site Name	Oxford road, Bicester	Test Date:	04/08/2011
Site Ref	80137	Test Location:	C2
Test No.:	CBR2	Easting:	
Initial Depth :	0mm	Northing:	
Final Depth (mm BGL):	661mm		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	381	3	8	47.63	5.09
381	781	55	52	7.69	34.95

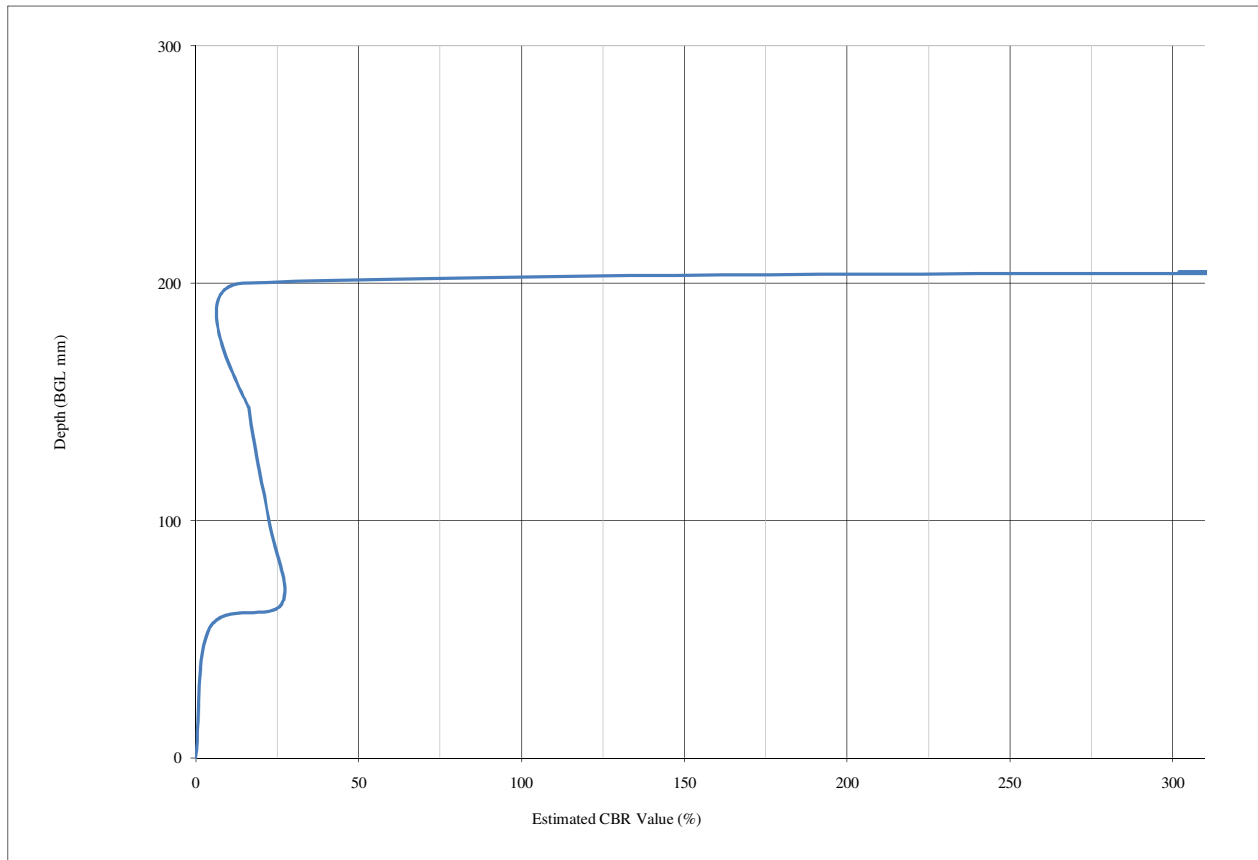
Average CBR Value of 34.95% at 500mm bgl

Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In accordance with TRL Report PR/INT/277/04

Site Name	Oxford Road, Bicester	Test Date:	04/08/2011
Site Ref	80137	Test Location:	C3
Test No.:	CBR3	Easting:	
Initial Depth :	0mm	Northing:	
Final Depth (mm BGL):	205mm		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	200	11	11	18.18	14.08
200	205	20	9	0.56	562.11

Average CBR Value of 14.08% at 200mm bgl

Standpipe Soakaway Test - WS101

Field Data

Recorded Time			Total Time Seconds	Depth mm bgl
Hours	Minutes	Seconds		
0	0	0	0	1560
0	1	0	60	1660

Well Details

Borehole depth ¹	1.71	m
Borehole Diameter	105	mm
Standpipe diameter	50	mm
Base of seal ²	0.5	m
Depth to groundwater ¹	1.71	m

Effective Depth

Depth to Base ¹	1.71	m
Depth to Top ²	1.56	m

Soil Infiltration Rate Calculations

Volume outflowing between 75% and 25% effective depth

Vp 75 depth	1.6725	m
Vp 75 time ³	60	sec

Vp 25 depth	1.5975	m
Vp 25 time ⁴	5	sec

Infiltration volume	2.98E-04	m ³
Time	-55	sec

Wetted Area	-0.01608	m ²
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Soil Infiltration Rate 3.37E-04 m/s

Notes

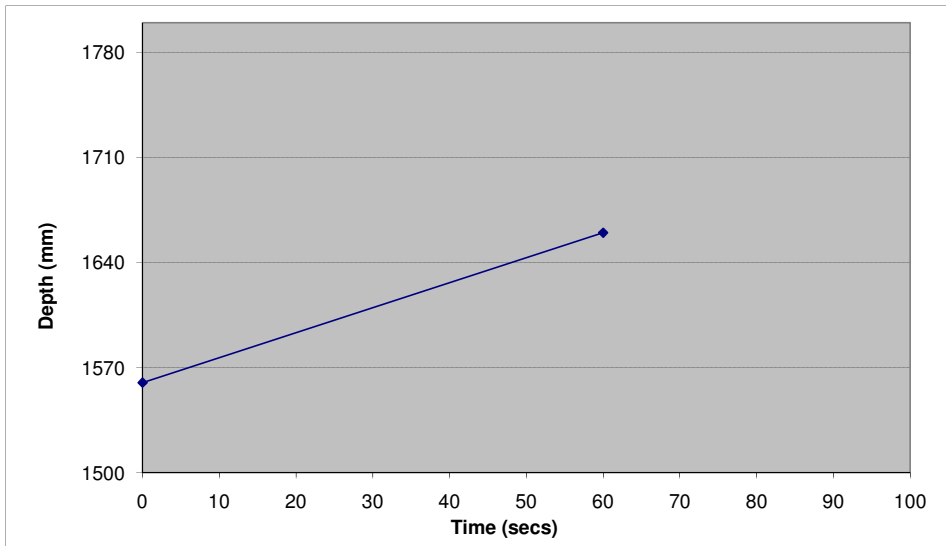
Blue cells to be filled in

¹ borehole base or groundwater, whichever is the shallower

² Top of the soakaway is the base of the clay seal or invert, whichever is the deeper

³ Read from data or graph adjacent

⁴ Read from data or graph adjacent



Standpipe Soakaway Test - WS104

Field Data

Recorded Time			Total Time Seconds	Depth mm bgl
Hours	Minutes	Seconds		
0	0	0	0	0
0	1	0	60	580
0	1	30	90	800
0	2	0	120	1070
0	2	30	150	1110
0	5	0	300	1290
0	7	0	420	1430
0	19	0	1140	1680
0	30	0	1800	1900

Well Details

Borehole depth ¹	2.38	m
Borehole Diameter	105	mm
Standpipe diameter	50	mm
Base of seal ²	0.5	m
Depth to groundwater ¹	2.38	m

Effective Depth

Depth to Base ¹	2.38	m
Depth to Top ²	1	m

Soil Infiltration Rate Calculations

Volume outflowing between 75% and 25% effective depth

Vp 75 depth	2.035	m
Vp 75 time ³	1800	sec

Vp 25 depth	1.345	m
Vp 25 time ⁴	300	sec

Infiltration volume	2.74E-03	m ³
Time	-1500	sec

Wetted Area	-0.21898	m ²
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Soil Infiltration Rate 8.35E-06 m/s

Notes

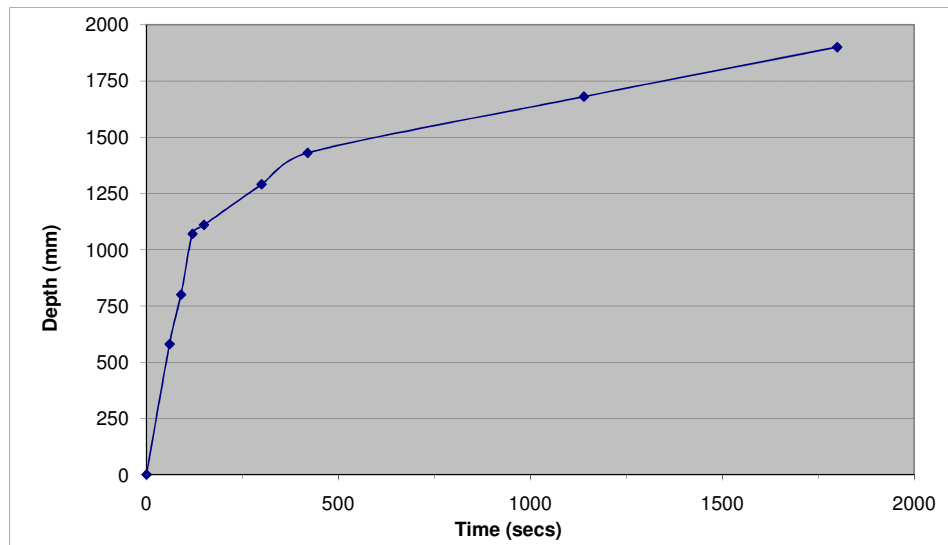
Blue cells to be filled in

¹ borehole base or groundwater, whichever is the shallower

² Top of the soakaway is the base of the clay seal or invert, whichever is the deeper

³ Read from data or graph adjacent

⁴ Read from data or graph adjacent



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