

Geology 1:50,000 scale - Artificial and made ground



15.2 Artificial and made ground (50k)

Records within 500m

1

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on [page 68](#) >

ID	Location	LEX Code	Description	Rock description
1	494m NE	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

This data is sourced from the British Geological Survey.

15.3 Artificial ground permeability (50k)

Records within 50m

0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.



Geology 1:50,000 scale - Superficial

15.4 Superficial geology (50k)

Records within 500m

0

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m

0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m

0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

15.7 Landslip permeability (50k)

Records within 50m

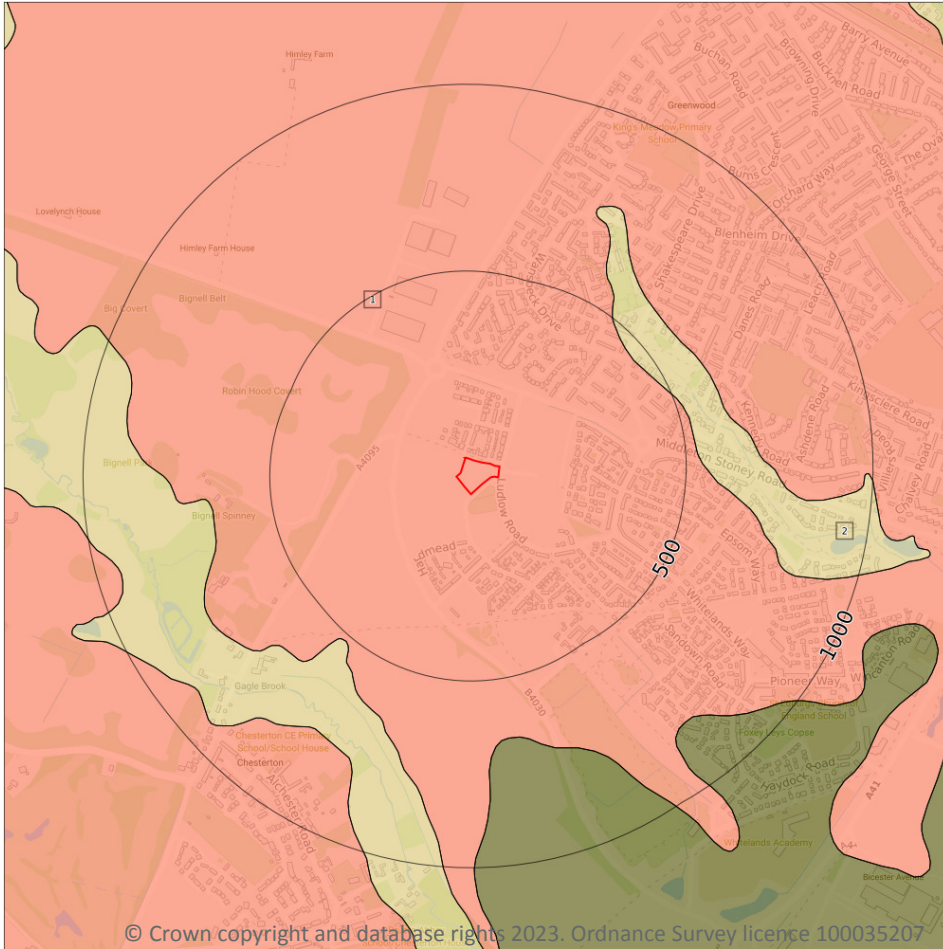
0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.



Geology 1:50,000 scale - Bedrock



- Site Outline
- Search buffers in metres (m)
- Bedrock faults and other linear features (50k)
- Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m

2

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on [page 71](#) >

ID	Location	LEX Code	Description	Rock age
1	On site	CB-LMST	CORNBRASH FORMATION - LIMESTONE	BATHONIAN
2	458m NE	FMB-LSMD	FOREST MARBLE FORMATION - LIMESTONE AND MUDSTONE, INTERBEDDED	BATHONIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m

1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Fracture	Very High	High

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m

0

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

This data is sourced from the British Geological Survey.



16 Boreholes

16.1 BGS Boreholes

Records within 250m

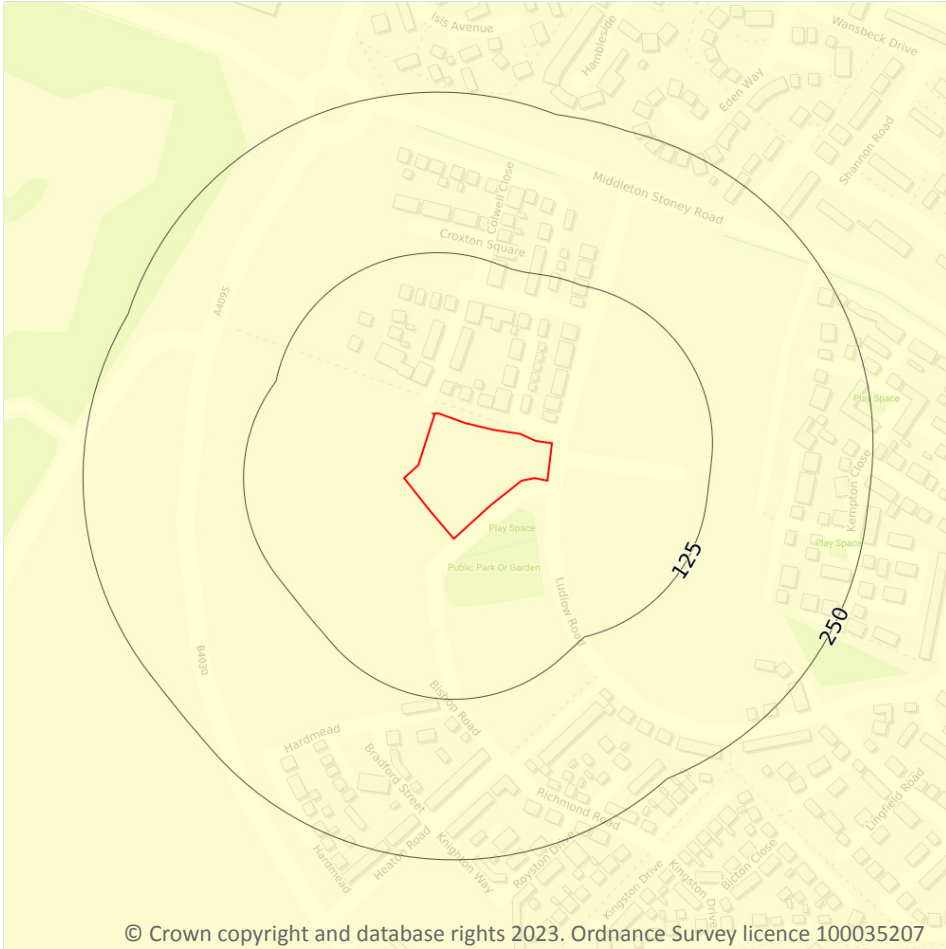
0

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

This data is sourced from the British Geological Survey.



17 Natural ground subsidence - Shrink swell clays



17.1 Shrink swell clays

Records within 50m

1

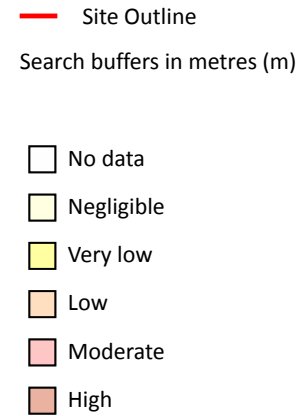
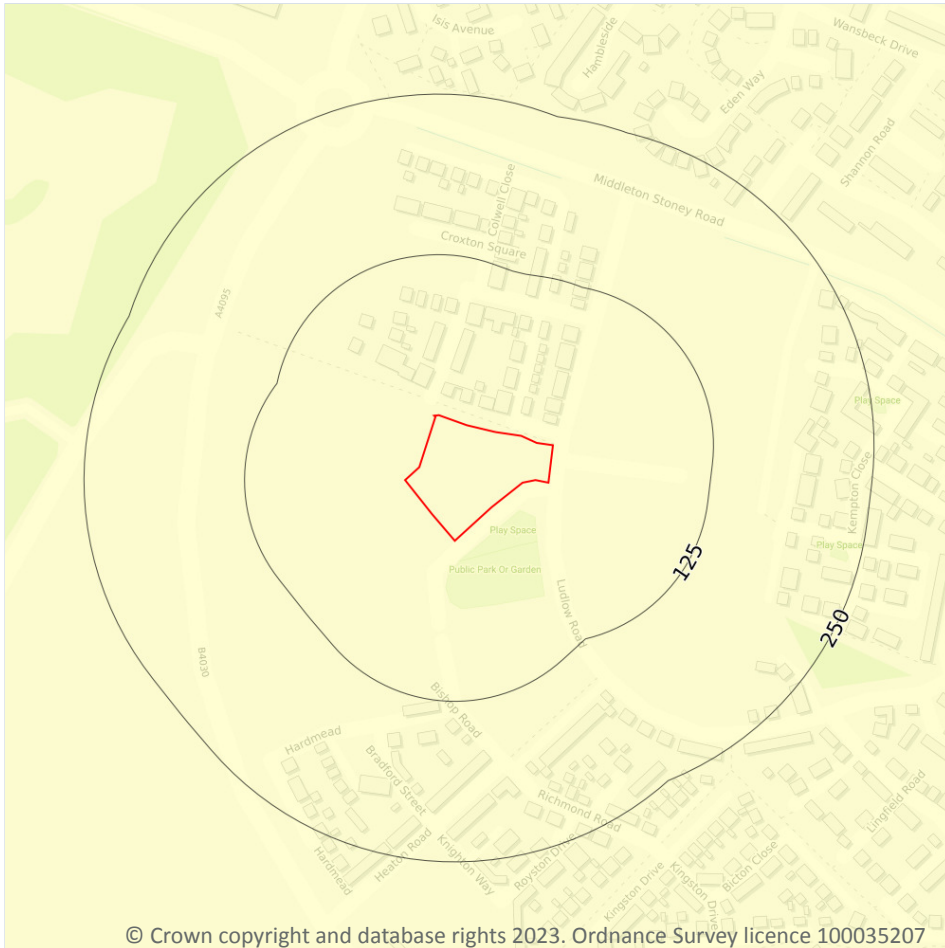
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on [page 74 >](#)

Location	Hazard rating	Details
On site	Negligible	Ground conditions predominantly non-plastic.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



17.2 Running sands

Records within 50m

1

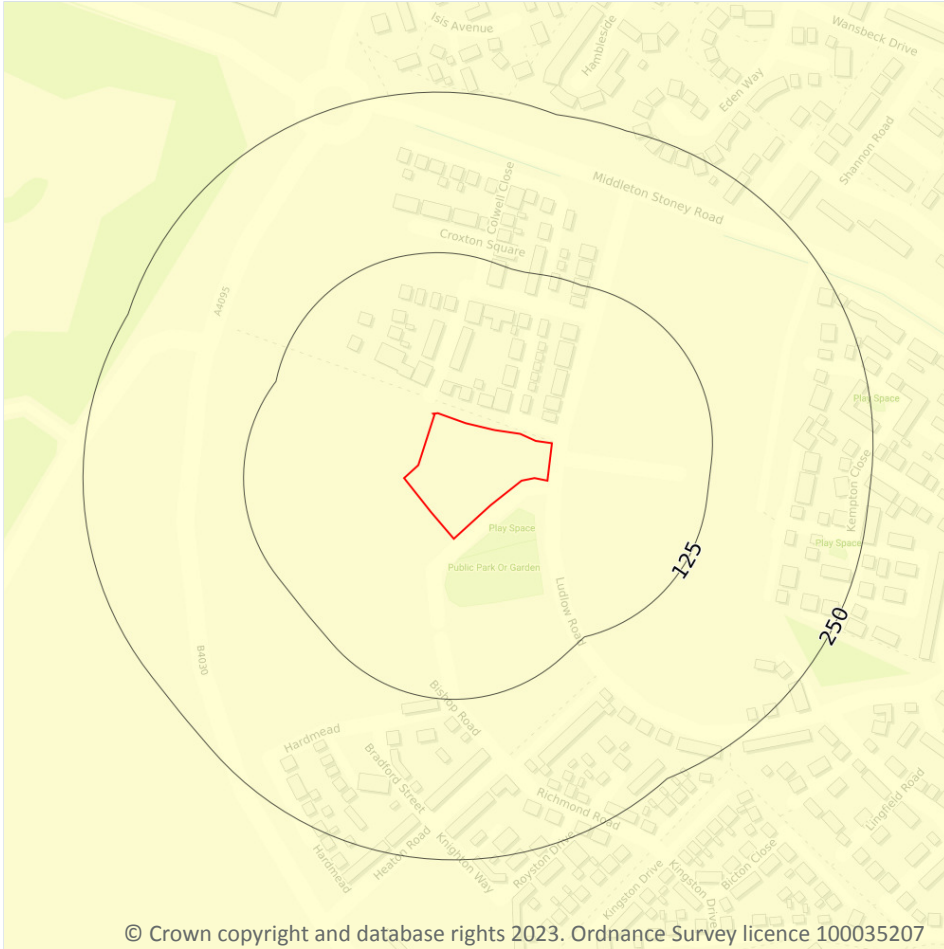
The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on [page 75 >](#)

Location	Hazard rating	Details
On site	Negligible	Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



17.3 Compressible deposits

Records within 50m

1

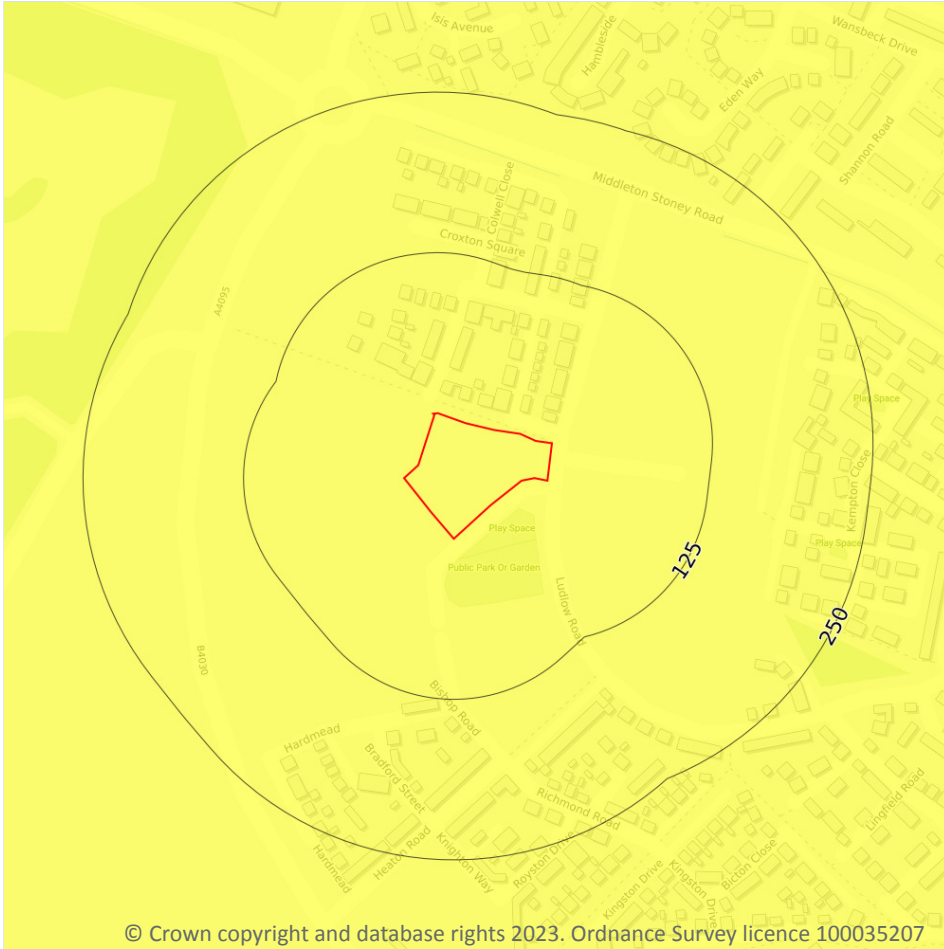
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on [page 76 >](#)

Location	Hazard rating	Details
On site	Negligible	Compressible strata are not thought to occur.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



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17.4 Collapsible deposits

Records within 50m

1

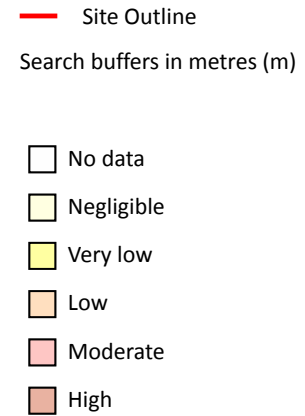
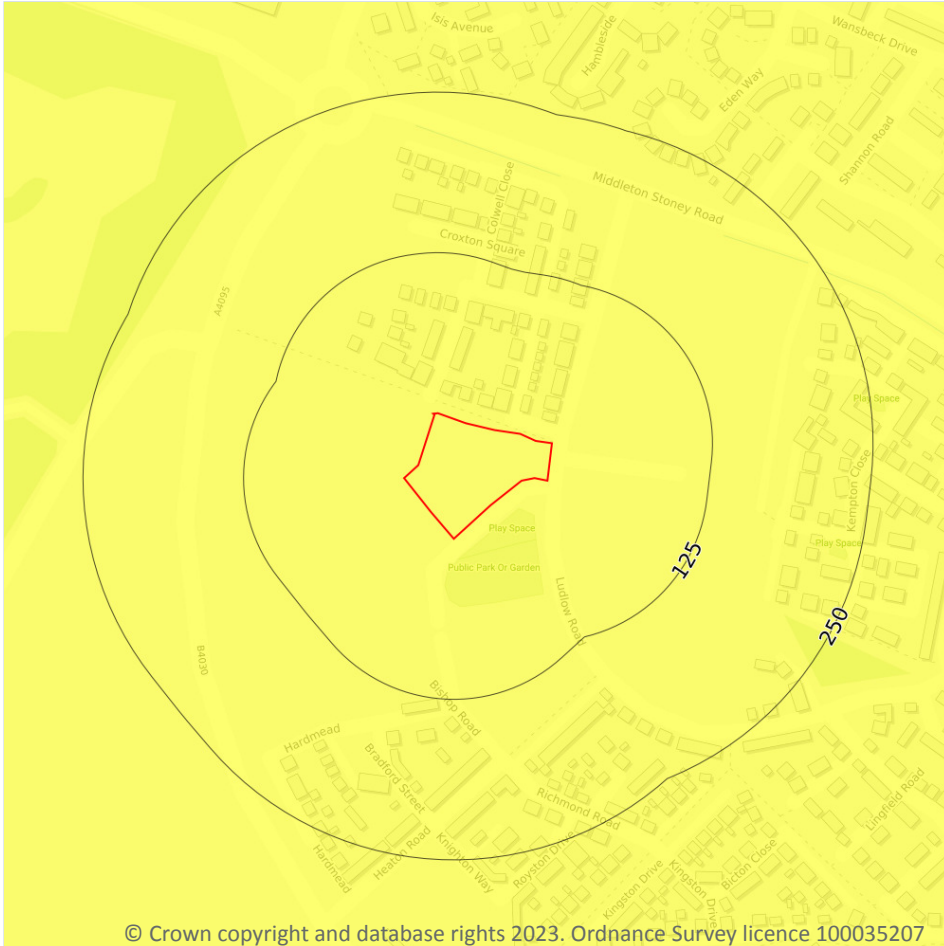
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on [page 77 >](#)

Location	Hazard rating	Details
On site	Very low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



17.5 Landslides

Records within 50m

1

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

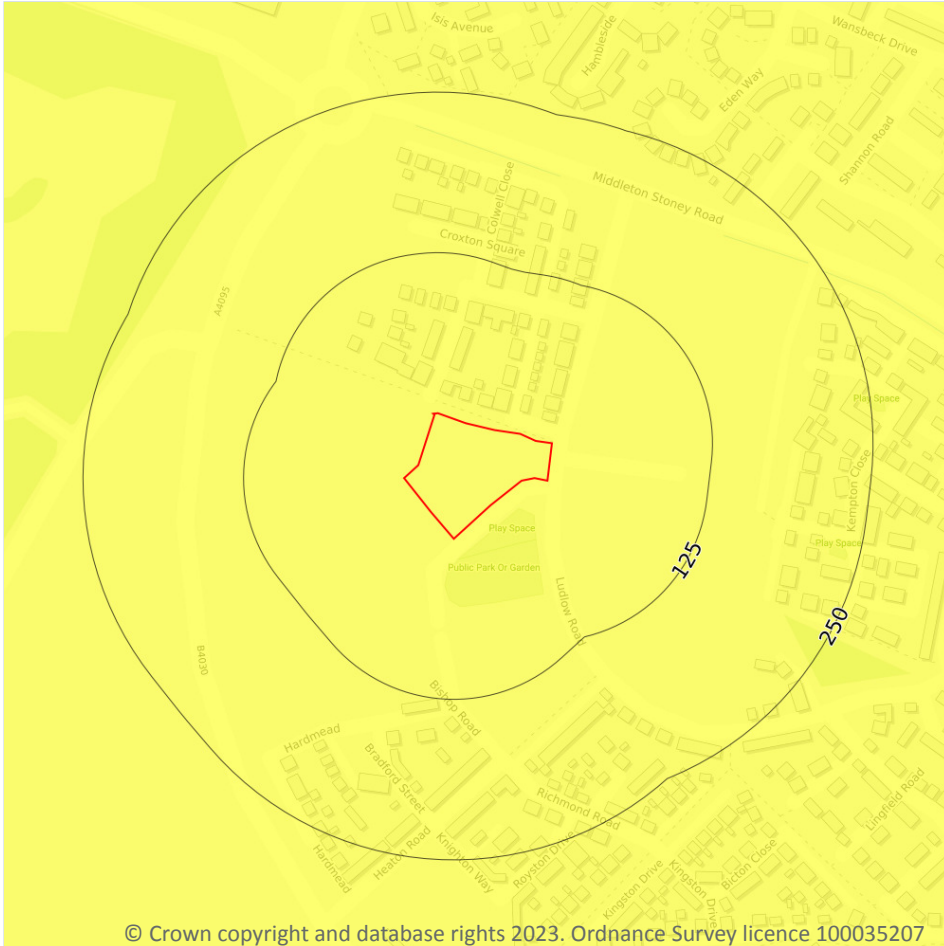
Features are displayed on the Natural ground subsidence - Landslides map on [page 78 >](#)

Location	Hazard rating	Details
On site	Very low	Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.

This data is sourced from the British Geological Survey.



Natural ground subsidence - Ground dissolution of soluble rocks



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17.6 Ground dissolution of soluble rocks

Records within 50m

1

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on [page 79](#)



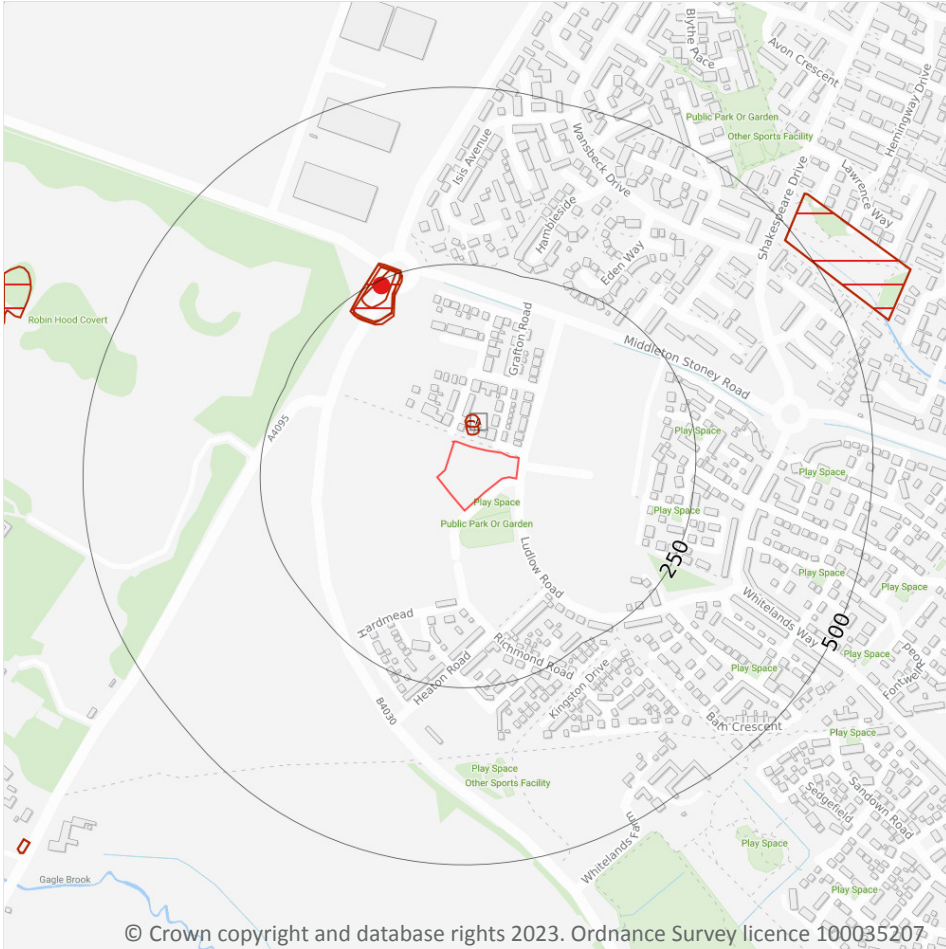
Location	Hazard rating	Details
On site	Very low	Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.



This data is sourced from the British Geological Survey.



18 Mining and ground workings



18.1 BritPits

Records within 500m

1

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

Features are displayed on the Mining and ground workings map on [page 81](#) >

ID	Location	Details	Description
B	243m NW	Name: King's End Farm Address: Chesterton, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.2 Surface ground workings

Records within 250m	6
----------------------------	----------

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining and ground workings map on [page 81 >](#)

ID	Location	Land Use	Year of mapping	Mapping scale
A	16m N	Unspecified Heap	1880	1:10560
A	26m N	Unspecified Heap	1882	1:10560
B	194m NW	Unspecified Old Quarry	1966	1:10560
B	200m NW	Unspecified Old Quarry	1950	1:10560
B	200m NW	Unspecified Old Quarry	1938	1:10560
B	220m NW	Unspecified Quarry	1898	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.3 Underground workings

Records within 1000m	0
-----------------------------	----------

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground mining extents

Records within 500m

0

This data identifies underground mine workings that could present a potential risk, including adits and seam workings. These features have been identified from BGS Geological mapping and mine plans sourced from the BGS and various collections and sources.

This data is sourced from Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m

0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m

0

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

This data is sourced from the British Geological Survey.

18.7 JPB mining areas

Records on site

0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.8 The Coal Authority non-coal mining

Records within 500m

0

This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure, and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the



Coal Authority and permission should be sought from Groundsure prior to any re-use.

This data is sourced from The Coal Authority.

18.9 Researched mining

Records within 500m

1

This data indicates areas of potential mining identified from alternative or archival sources, including; BGS Geological paper maps, Lidar data, aerial photographs (from World War II onwards), archaeological data services, websites, Tithe maps, and various text/plans from collected books and reports. Some of this data is approximate and Groundsure have interpreted the resultant risk area and, where possible, specific areas of risk have been captured.

Location	Mineral type
499m NE	Stone

This data is sourced from Groundsure.

18.10 Mining record office plans

Records within 500m

0

This dataset is representative of Mining Record Office and/or plan extents held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.11 BGS mine plans

Records within 500m

0

This dataset is representative of BGS mine plans held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.12 Coal mining

Records on site

0

Areas which could be affected by past, current or future coal mining.

This data is sourced from the Coal Authority.



18.13 Brine areas

Records on site	0
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The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.14 Gypsum areas

Records on site	0
-----------------	---

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.15 Tin mining

Records on site	0
-----------------	---

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

18.16 Clay mining

Records on site	0
-----------------	---

Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).

19 Ground cavities and sinkholes

19.1 Natural cavities

Records within 500m

0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

19.2 Mining cavities

Records within 1000m

0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

19.3 Reported recent incidents

Records within 500m

0

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

This data is sourced from Groundsure.

19.4 Historical incidents

Records within 500m

0

This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey mapping will necessarily be present within this dataset.



This data is sourced from Groundsure.

19.5 National karst database

Records within 500m

0

This is a comprehensive database of national karst information gathered from a wide range of sources. BGS have collected data on five main types of karst feature: Sinkholes, stream links, caves, springs, and incidences of associated damage to buildings, roads, bridges and other engineered works.

Since the database was set up in 2002 data covering most of the evaporite karst areas of the UK have now been added, along with data covering about 60% of the Chalk, and 35% of the Carboniferous Limestone outcrops. Many of the classic upland karst areas have yet to be included. Recorded so far are: Over 800 caves, 1300 stream sinks, 5600 springs, 10,000 sinkholes.

The database is not yet complete, and not all records have been verified. The absence of data does not mean that karst features are not present at a site. A reliability rating is included with each record.

This data is sourced from the British Geological Survey.



20 Radon



— Site Outline
Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

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20.1 Radon

Records on site

1

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on [page 88](#) >

Location	Estimated properties affected	Radon Protection Measures required
On site	Between 1% and 3%	None



This data is sourced from the British Geological Survey and UK Health Security Agency.



21 Soil chemistry

21.1 BGS Estimated Background Soil Chemistry

Records within 50m

4

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km². In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km²; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
3m NW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
8m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg

This data is sourced from the British Geological Survey.

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m

0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km²).

This data is sourced from the British Geological Survey.



21.3 BGS Measured Urban Soil Chemistry

Records within 50m

0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km².

This data is sourced from the British Geological Survey.



22 Railway infrastructure and projects

22.1 Underground railways (London)

Records within 250m

0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

22.2 Underground railways (Non-London)

Records within 250m

0

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

This data is sourced from publicly available information by Groundsure.

22.3 Railway tunnels

Records within 250m

0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

22.4 Historical railway and tunnel features

Records within 250m

0

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

This data is sourced from Ordnance Survey/Groundsure.

22.5 Royal Mail tunnels

Records within 250m

0

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.



This data is sourced from Groundsure/the Postal Museum.

22.6 Historical railways

Records within 250m

0

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

This data is sourced from OpenStreetMap.

22.7 Railways

Records within 250m

0

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

This data is sourced from Ordnance Survey and OpenStreetMap.

22.8 Crossrail 1

Records within 500m

0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

22.9 Crossrail 2

Records within 500m

0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

22.10 HS2

Records within 500m

0

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 Ltd.



Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see <https://www.groundsure.com/sources-reference> ↗.

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Appendix B
HISTORICAL GROUND INVESTIGATION
REPORTS



UNITED
BY OUR
DIFFERENCE








KINGSMERE PHASE 2, BICESTER

Combined Phase I & Phase II Geo-Environmental Assessment Report
Countryside Properties (Bicester) Ltd

14/02/2013

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 3
Remarks	Draft	Updated following receipt of laboratory data from water samples	Updated following Client comments and additional gas monitoring
Date	06/02/13	14/02/2013	31/05/2013
Prepared by	O George	H Gardiner	H Gardiner
Signature			
Checked by	J Mortimer	S Jagger	K Hole
Signature			
Authorised by	P Dowson	P Dowson	P Dowson
Signature			
Project number	00028453	00028453	00028453
Report number	2	2	2
File reference	M:_SOIL & GROUNDWATER\Bids and Projects 1237\00028453 - Bicester Phase 2\6) Reporting\Report\00028453-002-051112-OEGREP-Bicester Phase 2-v1 2 Final.docx.doc	M:_SOIL & GROUNDWATER\Bids and Projects 1237\00028453 - Bicester Phase 2\6) Reporting\00028453-002-140213-HGREP-Bicester Phase 2-Rev1. docx	M:_SOIL & GROUNDWATER\Bids and Projects 1237\00028453 - Bicester Phase 2\6) Reporting\00028453-002-310513-HGREP-Bicester Phase 2-Rev 3. docx

KINGSMERE PHASE 2, BICESTER

Countryside Properties (Bicester) Ltd

14/02/2013

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Table of Contents

EXECUTIVE SUMMARY	5
1 INTRODUCTION.....	7
1.1 Authorisation.....	7
1.2 Background.....	7
1.3 Proposed Development.....	7
1.4 Objectives	7
1.5 Scope of Works.....	7
1.6 Previous Reports.....	8
1.7 Limitations.....	8
2 SITE CHARACTERISATION.....	9
2.1 Site Details.....	9
2.2 Geology and Hydrogeology.....	9
2.3 Radon	10
2.4 Hydrology.....	10
2.5 Site History.....	10
3 PRELIMINARY CONCEPTUAL SITE MODEL.....	12
3.1 General	12
3.2 Summary of Potential Sources.....	12
3.3 Summary of Potential Pathways	13
3.4 Summary of Identified Receptors.....	13
3.5 Plausible Pollutant Linkages	13
4 SITE INVESTIGATION.....	14
4.1 Fieldwork.....	14
4.2 Rationale for Exploratory Hole Locations.....	14
5 GROUND CONDITIONS.....	16
5.1 General	16
5.2 Summary of Ground Conditions.....	16
5.3 Visual and Olfactory Evidence of Contamination	17
5.4 Groundwater	17
5.5 Ground Gas	17
5.6 Infiltration Assessment.....	17
5.7 Geotechnical Soil Parameters.....	18
6 GEOTECHNICAL ASSESSMENT.....	20
6.1 General	20
6.2 Development Proposals.....	20
6.3 Preliminary Geotechnical Parameters and Ground Model ...	20
6.4 Foundations	21
6.5 Floor Slabs.....	21
6.6 Groundwater Control.....	21
6.7 Subgrade Assessment for Pavement Design.....	21
6.8 Buried Concrete	22
7 CONTAMINATION ASSESSMENT.....	23
7.1 Human Health Assessment - Overview.....	23
7.2 Risk Assessment Completed Within This Report.....	23
7.3 Assessment of the Analytical Results – Human Health.....	24
7.4 Metals and Inorganics.....	24

7.5	Organics.....	24
7.6	Herbicides and Pesticides	24
7.7	Controlled Waters.....	24
7.8	Water Quality Standards (WQS)	25
7.9	Assessment of the Analytical Results – Controlled Waters ..	25
7.10	Assessment of Potable Supply Pipes.....	25
7.11	Assessment of Ground Gas	25
7.12	Assessment of the Results – Ground Gas	26
8	REVISED CONCEPTUAL SITE MODEL.....	27
8.1	General	27
8.2	Contaminant Sources.....	27
8.3	Migration pathways	27
8.4	Receptors.....	27
8.5	Plausible Pollutant Linkage	27
9	CONCLUSIONS AND RECOMMENDATIONS.....	29
9.1	Ground Investigation	29
9.2	Land Contamination	29
9.3	Geotechnical	30
	Appendix A – Figures.....	31
	Appendix B – Exploratory Hole Logs from Previous Phases of Investigation.....	32
	Appendix C – WSP Borehole Logs	33
	Appendix D – Monitoring Results	34
	Appendix E – Geotechnical Laboratory Results	35
	Appendix F - Geotechnical plots	36
	Appendix G – WSP Risk Assessment Approach.....	37
	Appendix H - Chemical Laboratory Results.....	38
	Appendix I - Limitations	39

EXECUTIVE SUMMARY

WSP were instructed by Countryside Properties (Bicester) Ltd (the Client) to complete a Phase II Geo-Environmental and Geotechnical Assessment on Phase 2 of the Kingsmere Bicester development (the Site).

It is understood that the Site is to be developed for residential and light-commercial end-use. The assessment is required in order to identify potential ground related risks and present preliminary design options and solutions for the ground engineering aspects of the proposed scheme. As part of these works, the assessment will advise on potential environmental (contaminated land) risks associated with the proposed development and the prevalent ground, ground gas and groundwater conditions at the site. Previous phases of intrusive investigation have been undertaken by WSP across the site. Where applicable, this information has been used to supplement this investigation.

The site investigation works were completed between 1st and 10th October 2012 under the supervision of a WSP engineer.

Ground conditions at the Site were found to comprise a limited thickness of topsoil overlying strata of the Cornbrash Formation with Forest Marble Formation deposits at depth. The Cornbrash Formation was observed as either a very clayey gravel or a stiff to very stiff, gravelly clay. The Forest Marble Formation comprise very stiff, dark bluish grey clay to very weak mudstone with layers of strong, grey limestone. The ground conditions encountered at the site are consistent with the available published geology and with previous phases of investigation undertaken by WSP in the wider Kingsmere Bicester development.

Water seepages were noted in several exploratory holes at shallow depth and groundwater was encountered at depths of between 5.0m and 8.0m bgl. In several locations in the central region of the Site, groundwater was recorded to be under artesian pressure and rose to a maximum of 1.7m above ground level.

In-situ percolation tests were performed across the Site and indicate that the soils ranged from low permeability to practically impermeable, as defined in CIRIA C515. If soakaway drainage is proposed, it should be noted that there may be a requirement to provide a large storage capacity and it is recommended that additional testing is undertaken at the location of soakaway drains.

The concentration of arsenic in the near-surface soil at one location exceeds the residential GAC/SGV but all other determinands are below their respective residential GAC/SGV. It is considered that the localised exceedance of arsenic is naturally occurring as it is from a sample of natural soil with no observable anthropogenic source. It should also be noted that arsenic is generally slightly elevated within samples from across the site but below the residential GAC/SGV. If the area in which the elevated concentration of arsenic was recorded is to be within residential garden areas, it is recommended that a capping layer of 500mm clean topsoil is placed to provide an effective barrier between site end users and the shallow soils. This sample does not exceed commercial or public open space GAC and it is recommended that this sample should be re-appraised once the masterplan has been finalised.

Groundwater samples were collected from six of the monitoring installations and indicate that there has been some minor impactation, mainly in the northwestern part of the site, from heavy-end petroleum hydrocarbons, although it is noted that the concentrations decrease further across the east of the site. The concentrations of these heavy end aliphatics are above solubility limits, however, site investigation data including borehole logs, soil data and groundwater monitoring observations do not support the presence of a free-phase as no odour or visible sheen has been noted. As such, it is considered likely that at the reported concentrations, this is at worst a light sheen. It should be noted that there is no identified on-site source for petroleum hydrocarbons and an off-site source is suspected. The absence of lighter end hydrocarbons indicates that the source is no longer contributing to the contamination of groundwater. It is recommended that additional, targeted water sampling is undertaken to confirm and supplement the existing data. This may be done as part of any proposed remediation of the wider site.

Ground gas monitoring has been undertaken on three occasions following the installation of the monitoring standpipes where suitable groundwater conditions allow.

Based on the three rounds of ground gas monitoring completed, the risks from ground gas on the proposed development are considered to be very low and reference to the relevant guidance documents indicates that no special precautions would be required. Given the flooded boreholes, please note that the local authority may require further monitoring.

It is considered that the Cornbrash Formation strata are suitable to allow the use of traditional strip or trench-fill foundations. A nett allowable bearing capacity of 250 kN/m^2 may be used when footings are placed on granular Cornbrash Formation. Where footings are placed within cohesive Cornbrash Formation strata, they should be placed a minimum of 0.9m deep and a nett allowable bearing capacity of 150 kN/m^2 may be adopted. It is not anticipated that piled foundations will be necessary but if particularly high foundation loads are proposed, it is recommended that further assessment is undertaken.

Although it is appreciated modern building techniques include suspended ground floor slabs, ground bearing floor slabs may be used within residential properties with footings on granular Cornbrash Formation strata. A suspended ground floor slab with a minimum 250mm void should be installed in residential properties with foundations on cohesive Cornbrash Formation strata, in accordance with National House Building Council recommendations.

Floor slab loads for light industrial properties have not been provided but are assumed to be relatively light and it is considered that ground bearing floor slabs could be used and may be designed on a modulus of subgrade reaction of 20 MN/m^3 .

It is recommended that a CBR value of 3% is used for the preliminary design of road pavements on cohesive Cornbrash Formation strata and a CBR value of 4% is used for road pavements on granular strata. Further testing along the route of road pavements is recommended.

1 INTRODUCTION

1.1 Authorisation

WSP Environment & Energy (WSP) was instructed by Countryside Properties (Bicester) Ltd (the Client) to complete a combined Preliminary and Intrusive Geo-Environmental Assessment on Phase 2 of the Kingsmere Bicester development (the Site). Site location and layout plans are provided as Figures 1 and Figure 2 respectively within **Appendix A**.

1.2 Background

The Phase 2 development site is located within the north-western corner of a wider development area known as Kingsmere Bicester. It is understood that the wider site is due to be redeveloped in phases for residential purposes, together with schools and a local centre.

WSP have previously undertaken seven phases of site investigation on the wider development area. These investigations were preliminary in nature; the first focused on a broad review of site conditions and the subsequent four investigations were concerned with areas for residential and commercial development. The sixth and seventh investigations focused on the area of Made Ground adjacent to Howes Lane and the Farmhouse area.

With respect to the Phase 2 Site, WSP have concurrently produced a chapter within the Environmental Statement for the development as referenced below. Information contained within the Environmental Statement chapter has contributed to this assessment.

- WSP 00028453/001 (October 2012) Chapter 7: Ground Conditions. Phase 2, Kingsmere Bicester.

1.3 Proposed Development

It is understood that the Site will be developed for residential and light-commercial (retail) end-use.

1.4 Objectives

The assessment is required in order to identify potential ground related risks and present preliminary design options and solutions for the ground engineering aspects of the proposed scheme. As part of these works, the assessment will advise on potential environmental (contaminated land) risks associated with the proposed development and the prevalent ground, ground gas and groundwater conditions at the site.

1.5 Scope of Works

The following scope of works has been undertaken:

1.5.1 Preliminary Geo-Environmental Risk Assessment

- Review of readily available Ordnance Survey historical maps to identify former land uses and potential contaminative activities on and surrounding the Site;
- Review of relevant regulatory databases and contact with the local regulatory authorities including, the Local Authority Planning Department and Contaminated Land Officer (CLO) and the Environment Agency (EA) regarding any pertinent records held;
- Review of available published information relating to geology, hydrological features, hydrogeology, neighbouring land use and ecologically sensitive uses; and
- Develop a preliminary conceptual site model via the source-pathway-receptor pollutant linkage approach.

1.5.2 Intrusive Geo-Environmental Risk Assessment

- Preparation of site specific health and safety documentation;
- Utilities clearance survey of all proposed exploratory borehole locations to enable safe working;
- Fulltime, on-site supervision by an Engineer from WSP to undertake logging;

-
- Progression of 8 no. rotary cored boreholes to a maximum depth of 8.10m below ground level (m bgl) and eleven window sample boreholes including in-situ geotechnical testing, comprising Standard Penetration Tests (SPTs) and disturbed soil samples for laboratory testing. Upon completion, the boreholes were converted to dual purpose ground gas and groundwater monitoring wells;
 - Excavation of 20 no. trial pits to a maximum depth of 3.6m bgl and the recovery of disturbed soil samples for laboratory testing;
 - In-situ soakaway tests performed within 4 no. trial pits to assess whether soakaway drainage is feasible in the proposed development;
 - Analytical laboratory testing for a range of targeted organic and inorganic determinands;
 - Geotechnical laboratory analysis to determine the engineering properties of the materials at the Site; and
 - Monitoring of ground gas concentrations and groundwater levels.

1.6 Previous Reports

A number of intrusive investigations have been undertaken on surrounding land parcels. The relevant reports are referenced below. Where applicable, the results of the relevant exploratory holes have been incorporated into this assessment.

- WSP 00022478/003 (July 2011) Howes Lane, Southwest Bicester, Oxfordshire Phase II Geo-Environmental Assessment and DQRA

The Howes Lane assessment was undertaken specifically to target an area of Made Ground/Landfill within the north-western corner of the Phase 2 area. Site specific remedial solutions for this area of the site were produced to mitigate contamination risks posed to the proposed development (construction of a road over the Made Ground). Although a number of exploratory holes from the investigation are within the Phase 2 site boundary, the information within the Howes Lane report has not been incorporated into this assessment given the localised nature of the Made Ground and its remediation. It should be noted that where the Made Ground extended outside of the road alignment, the Made Ground has been removed and replaced with clean site won materials. Further consideration should be given in this area where building footprints encroach onto the area of clean infilled material.

- WSP 12370178/001/01 (July 2007) Whitelands Farm, South West Bicester Geo-Environmental and Geotechnical interpretative Report.

The relevant exploratory holes are TP02, TP05, TP06 and TP51. Exploratory hole logs are presented within **Appendix B**.

1.7 Limitations

The general limitations to the assessment are outlined in **Appendix I**.

It should be noted that access issues to the south western area of the site prevented the progression of boreholes BH708 and WS712, such that only trial pitting could be undertaken in this part of the site.

2 SITE CHARACTERISATION

2.1 Site Details

Table 2.1: Site Details

Site Address	Land known as Phase 2, Kingsmere, Bicester
Grid Reference	456613, 222337
Area	Approximately 32 ha.
Site Location	The Site is located to the southwest of Bicester, within the County of Oxfordshire. The A4095 forms a curved boundary from the north-western corner sweeping down to the southern point of the site. Vendee Drive/Middleton Stoney Road runs along the northern boundary and former agricultural land now being developed as South West Bicester Phase 1 and Kingsmere is present to the east of the site.
Summary of Surrounding Land Uses	The Site is predominantly surrounded by agricultural land but residential properties of Bicester are present immediately to the north and Phase I of the wider development is currently under construction to the east. The M40 motorway is located approximately 1.5 km to the west of the Site.

The layout of the site is presented as **Figure 2** within **Appendix A**.

2.2 Geology and Hydrogeology

With reference to the British Geological Survey (BGS) 1:50,000 Map Sheet 219 Buckingham (Solid and Drift) published in 2002, the site is indicated to be underlain by the following geological sequence.

Table 2.2: Geological Strata

Geological Unit	Description	Aquifer Status*
Cornbrash Formation	Rubbly grey to brown limestone	Secondary (A) Aquifer
Forest Marble Formation	Grey mudstone with beds of limestone	Secondary (A) Aquifer

Note:* with reference to the Environment Agency website

The BGS database of borehole records was accessed for details of suitable boreholes on and surrounding the site. A borehole progressed at Whitelands Farm, to the southeast of the Site, has been obtained from the British Geological Survey and is provided in **Appendix B**. The borehole record indicates that topsoil may be present to a depth of 0.3m with alternating horizons of limestone and clay proven to a depth of approximately 42m. The record also indicated that groundwater was encountered at approximately 7.6m below ground level.

The borehole record obtained from the BGS appears to confirm the published geology.

The following groundwater abstractions have been noted within 1km of the site.

Table 2.3: Summary of Active Licenced Groundwater Abstractions

Licence Number	Location	Start Date	Use
28/39/14/0123	On Site	1967	General Farming And Domestic

The Site is not indicated to be located within an Environment Agency Source Protection Zone (SPZ).

2.3 Radon

According to the information provided in BRE 211 (2007), the Site is not in a radon affected area as less than 1% of homes are above the action level. Therefore, radon protective measures are considered not necessary in the construction of new dwellings or extensions.

2.4 Hydrology

Surface water features located on or within 500m of the Site are listed below.

Table 2.4: On-site and Surrounding Key Surface Water Features

Surface Water Feature	Distance (m)	Direction	Water Quality*
Land Drain	Adjacent	northeast	NA
Land Drain	200	southwest	NA
Gagle Brook	250	southwest	Not classified

Notes: * Environment Agency (EA) general quality assessment (GQA) river quality classification chemistry/biology

2.5 Site History

A review of readily available Ordnance Survey historical maps has been undertaken to identify any former potentially contaminative uses of the site and its adjacent land uses/potential geotechnical constraints. A summary of pertinent information is provided in Table 2.5 and Table 2.6.

Table 2.5: Summary of On-site Land Uses

Land Use on Site	Dates
Agricultural fields including a number of footpaths traversing the land. Particular areas of interest include:	Pre 1881-Present
An old windmill is indicated in the north-western region of the Site.	Pre 1881-Pre 1899
An old quarry in the north-eastern part of the Site.	Pre 1881-Pre 1922
A wind pump shown in the south-eastern portion of the site close to Whitelands Farm buildings.	Pre 1967-Pre1984
A quarry is present right on the north-western boundary of the site which may encroach slightly onto the site itself.	Pre 1899-Pre 1967

Table 2.6: Summary of Off-site Land Uses

Land Use off-Site	Distance/Direction	Dates
Whitelands Farm	40 m southeast	Pre 1875-Present
Whitelands Cottages and a 'Pump'	200m east	Pre 1881-Present
Quarry	20 m northwest	Pre 1899-Pre 1967
Housing Estates	50m north 200m north-east	Pre 1984-Present Pre 1967-Present

3 PRELIMINARY CONCEPTUAL SITE MODEL

3.1 General

This section presents the characteristics of the Site, provides a systematic indication of the potential risks and enables uncertainties and further assessment needs, or other actions, to be identified with respect to contamination.

The conceptual model has been developed based on the proposed future residential and light commercial land use scenario.

3.2 Summary of Potential Sources

Tables 3.1 and 3.2 provide a summary of the potential sources of contamination identified in the Environmental Statement.

Table 3.1: Potential Sources of On-site Contamination

On Site			
Source	Contaminants of Concern	Potential Migration Pathway	Receptor
Made Ground; Potential areas of burning; & Agricultural use.	Metals (such as naturally occurring arsenic); Asbestos from former farm buildings; Polycyclic aromatic hydrocarbons (PAHs) from potential areas of fallow land burning; Ground gases; & Herbicides and pesticides (including persistent organic pollutants).	<u>Human Health</u> Inhalation of ground gases; Ingestion of soil and dust; & Direct contact with soil. <u>Controlled Waters</u> Leaching into groundwater & lateral migration.	Future Site Users (residential); & Construction & Maintenance Staff; Groundwater: Secondary (A) Aquifer; Surface water: Gagle brook.

Table 3.2: Potential Sources of Off-site Contamination

Off Site			
Source	Contaminants of Concern	Potential Migration Pathway	Receptor
Infilled quarry; & Made Ground	Metals and Inorganics (such as pH and sulphate) and asbestos; Total petroleum hydrocarbons (TPH); PAHs; Semi volatile organic compounds (SVOCs); & ground gas.	Migration of groundwater or gas onto site.	Future Site Users; Construction & Maintenance Staff; Groundwater: Secondary (A) Aquifer;

3.3 Summary of Potential Pathways

Based on the sources of contamination identified, the Site setting and the proposed future land use scenario the following pathways may exist at the site;

- Direct contact with contaminated soil and groundwater (dermal contact, inhalation of dust and/or ingestion);
- Lateral and vertical migration of groundwater through permeable strata; and
- Lateral migration of ground gases through the unsaturated zone.

3.4 Summary of Identified Receptors

The identified receptors, based on the proposed future land use scenario, comprise site users, construction workers, the Secondary (A) Aquifer beneath the site and Gaggle Brook.

3.5 Plausible Pollutant Linkages

Table 3.3 summarises the possible on-site pollutant linkages which have been identified:

Table 3.3: Plausible Pollutant Linkages

Media	Source	Pathway	Exposure route	Receptor
Soils	Contaminants associated with current and historical land uses.	Direct contact with soils and absorption through skin.	Direct contact and Ingestion.	Future site users, construction workers
		Ingestion and inhalation of contaminated dust/ground gases.	Ingestion.	
			Inhalation.	
		Aggressive ground/sulphate attack	Direct contact	Proposed development
Ingress into potable drinking water supplies				
Groundwater	Contaminants present in their dissolved phase.	Migration through the unsaturated zone.	Perched groundwater migration.	Secondary (A) Aquifer.
		Migration through the saturated zone.	Groundwater migration.	Secondary (A) Aquifer on-site and off-site, groundwater abstractions, land drains and Gaggle Brook.
		Direct contact with perched groundwater and absorption through skin.	Direct contact and ingestion.	Future site occupants and construction workers on and off site.

4 SITE INVESTIGATION

4.1 Fieldwork

The site investigation works were completed between 1st and 10th October 2012 under the supervision of a WSP engineer. The works were as detailed in **Section 1.5**. An exploratory hole location plan and detailed logs showing the ground conditions encountered are presented in **Appendix A** and **Appendix C** respectively.

The ground investigation was undertaken in accordance with techniques outlined in BS EN 1997-2, BS5930:1999 + A2:2010 Code of Practice for Site Investigations and BS10175: 2011 Code of Practice for the Investigation of Potentially Contaminated Sites. In advance of the works, each exploratory hole location was cleared of services by a specialist contractor, as detailed within the WSP Health, Safety and Environmental Plan.

4.2 Rationale for Exploratory Hole Locations

Table 4.1 below gives a summary of the exploratory holes completed as part of the ground investigation, along with the rationale for each technique.

Table 4.1: Exploratory Hole Rationale.

Element of investigation	Details	Rationale
Trial Pits and Soakaway Tests	TP701 to TP720. TP02, TP05, TP06 and TP51 (12370178/001/01, 2007)	To allow inspection of shallow soils and to allow the retrieval of samples for geotechnical and analytical laboratory testing. Soakaway tests were performed in trial pits TP701, TP705C, TP716 and TP720 to provide an indication of whether infiltration drainage may be feasible in the proposed development. A soakaway test was also previously undertaken in TP05.
Rotary Boreholes	BH701 to BH707.	Drilling of seven boreholes to a maximum depth of 8.1m bgl to provide geotechnical design parameters of the deeper strata and to allow the installation ground gas and groundwater monitoring wells.
Windowless Sample Boreholes	WS701 to WS711.	Progression of eleven windowless sample boreholes to investigate the near-surface soils and to provide geotechnical design parameters. Soil samples were recovered for analytical and geotechnical laboratory testing. Gas and groundwater monitoring wells were installed within four of the boreholes to target shallow, weathered strata.
In-situ Testing	Standard Penetration Tests (SPTs) were undertaken at 1.0m or 1.5m intervals within both rotary boreholes and windowless sample boreholes.	To provide geotechnical design parameters for foundation design.

Element of investigation	Details	Rationale
Installation of gas and groundwater monitoring wells	<p>Installations within five rotary boreholes with four response zones within the Forest Marble Formation and one along the boundary of the Cornbrash Formation and Forest Marble Formation.</p> <p>Installations within four windowless sample boreholes with response zones within the Cornbrash Formation.</p>	<p>To provide information to characterise the ground gas regime and groundwater conditions.</p>
Geotechnical Laboratory Testing	<p>Selected soil samples were submitted to Geo Site and Testing Services Ltd., a UKAS accredited laboratory, for geotechnical testing.</p>	<p>To determine geotechnical soil and rock parameters, to aid classification and to provide information for use in foundation design.</p> <p>Geotechnical testing included pH, sulphate, atterberg limits, moisture content, maximum dry density (2.5 kg hammer/vibrating hammer), particle size distribution, particle density, CBR (remoulded), and point load.</p>
Chemical Laboratory Analysis	<p>Selected soil samples were submitted to ALcontrol UK Ltd., a UKAS and MCERTS accredited laboratory, for chemical analysis.</p> <p>Groundwater samples were collected from 6 of the monitoring wells installed during the investigatory works and submitted to ALcontrol UK Ltd., a UKAS and MCERTS accredited laboratory, for chemical analysis.</p>	<p>To provide information on potentially contaminated material at the site and to allow the assessment of potential risks to identified receptors to be undertaken.</p> <p>Determinands tested for included; metals and semi-metals, pH, sulphate, soil organic matter, petroleum hydrocarbons, polycyclic aromatic hydrocarbons, volatile organic compounds and pesticides and herbicides.</p> <p>To provide information on the groundwater beneath the site and to allow the assessment of potential risks to controlled waters.</p> <p>Determinands tested for included; metals, ammoniacal nitrogen, hardness, pH, sulphate, petroleum hydrocarbons, volatile and semi-volatile organic compounds, pesticides and herbicides.</p>

5 GROUND CONDITIONS

5.1 General

The ground conditions encountered in the exploratory holes are broadly consistent with the geological sequence as described in the British Geological Survey map for the Site and are described below. In addition, the ground conditions encountered are consistent with previous phases of investigation undertaken previously by WSP across the Kingsmere development.

Made Ground was not observed across the Site. A thin horizon of topsoil was encountered across the Site beneath which is the Cornbrash Formation which was observed as very clayey gravel or a stiff to very stiff consistency, gravelly clay. Underlying the Cornbrash Formation is the Forest Marble Formation which was observed as alternating horizons of limestone and clay/mudstone.

In general, the depth to the base of the Cornbrash Formation/top of the Forest Marble Formation reduces to the southwest across the Site. In the northern part of the Site, the base of the Cornbrash Formation was recorded at 2m bgl and in the central and western areas of the Site the base of the Cornbrash Formation is up to 2.7m bgl. However, in the south-western part of the Site, the base of the Cornbrash Formation was recorded at 1.0m bgl. The base of the Forest Marble Formation was not proven.

5.2 Summary of Ground Conditions

The table below provides a summary of ground conditions encountered with the associated exploratory hole logs provided in **Appendix C**. A plan indicating the positions of the exploratory holes is provided as **Figure 2** within **Appendix A**.

Table 5.1: Summary of Ground Conditions

Strata	Depth range to top of stratum (m bgl)	Depth to base of stratum (m bgl)	Brief Description
Topsoil	Ground level	0.20 to 0.50	Topsoil was typically a dark brown slightly sandy slightly gravelly silty clay with frequent rootlets. The gravel fraction typically comprised fine to medium subangular limestone.
Cornbrash Formation	0.15 to 0.50	0.40 to 3.60*	Orange brown clayey to very clayey sandy fine to coarse subangular limestone GRAVEL. Locally the Cornbrash Formation was recorded as a stiff to very stiff consistency, orange brown, slightly sandy, gravelly to very gravelly CLAY. The gravel fraction typically comprised fine to medium subangular limestone and lithorelics.
Forest Marble Formation	0.80 to 3.00	> 8.10*	Alternating horizons of clay/mudstone and limestone. The clay horizons were generally recorded as a very stiff to hard, dark bluish grey, silty CLAY. In places the clay had not weathered back to clay and so was recorded as an extremely weak mudstone. The limestone horizons were generally recorded as a medium strong to strong, light grey fine grained limestone.

* Base not proven

5.3 Visual and Olfactory Evidence of Contamination

No visual or olfactory indicators of contamination were encountered during the ground investigation.

5.4 Groundwater

Minor seepages of water were noted in several exploratory holes at depths of between 0.6m bgl and 1.9m bgl.

Groundwater at the site was encountered at elevations of between 68.8m above Ordnance Datum (AOD) and 77.2m AOD during drilling within the Forest Marble Formation. In several instances within the central region of the Site, within BH704, BH705 and BH706, groundwater was observed to be under artesian pressure within the Forest Marble Formation and rose to a maximum height of 1.7m agl (above ground level).

Subsequent monitoring within the standpipes installed within several exploratory holes recorded groundwater between 0.5m and 3.0m bgl. Groundwater elevation is indicated to be between 80.70m AOD in the north of the site and 72.70m AOD in the southwestern region. Ground levels fall towards the southeast from approximately 82.5m AOD in the northwest to approximately 74m AOD in the southeast. From the monitoring undertaken it appears that groundwater follows the topography and flows to the southeast.

Groundwater samples were collected from six of the borehole standpipes installed during the investigatory works and tested for a range of determinands to enable an assessment of the risk to human health and controlled waters.

5.5 Ground Gas

Ground gas monitoring has been completed from monitoring standpipes on three occasions following the completion of the investigation. A full ground gas monitoring record is provided in **Appendix E**.

Where suitable groundwater conditions allow, a number of boreholes (BH706, BH707, WS702 and WS711) have been monitored to assess the representative ground gas condition at the site (provided in **Appendix E**), a brief summary of the monitoring is provided below and is discussed in detail in **Section 7.11**.

- Methane was recorded between 0% and 0.1% v.v;
- Carbon dioxide was recorded between <0.1% and 1.7% v.v;
- Oxygen ranged between 18.7% and 20.8% v.v; and
- Ground gas flow was recorded between <0.1litres per hour (l/hr) and 0.1 l/hr.

5.6 Infiltration Assessment

In-situ soakaway tests were performed in trial pits TP701, TP705C, TP716 and TP720 and records of the tests are provided in **Appendix D**.

The soakaway tests were proposed to be undertaken in accordance with BRE Digest 365 'Soakaway Design' 2007. Two tests were completed within trial pits TP701 and TP716, however the water within the remaining trial pits did not drain within the available time constraints.

It has therefore, not been possible to derive suitable soil infiltration rates for the strata in accordance with the guidance in the BRE Digest as the fall in water level and number of repeat tests within the pits was not sufficient. Preliminary, indicative infiltration rates based on an extrapolation of the tests performed are summarised as follows:

- TP701 – Soil infiltration rate of 3.6×10^{-5} m/s.
- TP705C – Insufficient data. Based on the limited data obtained, the anticipated soil infiltration rate is likely to be less than 1×10^{-9} m/s.
- TP716 – Soil infiltration rates of 1×10^{-4} and 4.2×10^{-5} m/s.

- TP720 – Insufficient data. Based on the limited data obtained, the anticipated soil infiltration rate is likely to be less than 1×10^{-9} m/s.
- TP05 (12370178/001/01, 2007) - Insufficient data. Based on the limited data obtained, the anticipated soil infiltration rate is likely to be less than 1×10^{-9} m/s.

It should be noted that the above infiltration rates are preliminary and indicative only and should not be used for the design of infiltration drainage.

On this basis, and with reference to CIRIA C515, the soils at the Site fall in the classification of low permeability to practically impermeable.

As indicated by the soakaway tests performed, infiltration rates are variable across the Site. Accordingly, should infiltration drainage be considered for the development, it is recommended that further soakaway tests be undertaken, in accordance with BRE 365: 2007, based on the final location, invert levels and required storage capacities of soakaway drains.

5.7 Geotechnical Soil Parameters

A summary of the geotechnical properties of the strata present at the site is given in the table below. A full copy of geotechnical laboratory data is presented in **Appendix F**.

Table 5.2: Summary of Geotechnical Properties

Geotechnical Properties	Stratum		
	Cornbrash Formation (Granular)	Cornbrash Formation (Cohesive)	Forest Marble Formation
SPT 'N' Value	18 – 50	11 - 50	17 – 50
Moisture content (%)	16 - 18	13 – 39	Not Tested
Plasticity Index (%)	N/A	24 – 35 (Intermediate to high plasticity)	Not Tested
Plastic Limit (%)	N/A	12 - 22	Not Tested
Bulk density (Mg/m ³)	2.19 – 2.22	2.22	Not Tested
Dry Density (Mg/m ³)	1.85 – 1.89	1.92	Not Tested
pH	7.53 – 8.53	7.26 – 8.38	Not Tested
Water Soluble Sulphate (g/l)	0.01 – 0.05	<0.01 – 0.06	Not Tested
Maximum Dry Density (2.5Kg Hammer Compaction (Mg/m ³))	2.07	1.91 - 2.06	Not Tested
Optimum Moisture Content (%)	12.9	11-15	Not Tested
Particle Density (mg/m ³)	2.65	2.65 – 2.71	Not Tested
Point Load Index (MPa)	N/A	2.28 – 4.59	Not Tested
California Bearing Ratio (top of sample (%))	1.0-1.5	1.8	Not Tested

With regard to the recorded CBR values within the granular Cornbrash Formation, it is believed that the test method, whereby only material passing the 20mm sieve forms the sample for testing, is not representative of the in-situ soil, which was predominantly comprised of gravel and cobbles. Therefore, it is considered that the in-situ CBR value of the granular Cornbrash Formation will be significantly higher than that reported above and it is recommended that in-situ CBR tests are undertaken along proposed access roads.

A plot of uncorrected SPT 'N' value verses depth for the strata encountered is presented in **Appendix F**.

6 GEOTECHNICAL ASSESSMENT

6.1 General

Under Eurocode 7 (EC7), WSP's Phase II Geo-Environmental Assessment would be equivalent to a Ground Investigation Report (GIR) with a preliminary geotechnical assessment appended. The preliminary geotechnical assessment will provide an outline ground engineering assessment and recommendations.

6.2 Development Proposals

It is understood that the Site is to be developed for residential and light-commercial use, together with a network of associated infrastructure including parking and roads. Structures are expected to vary but may be up to three-stores in height.

6.3 Preliminary Geotechnical Parameters and Ground Model

On the basis of the ground conditions encountered and the proposed development, it is considered that the Cornbrash Formation will provide the likely foundation stratum across the Site. As the Cornbrash Formation was recorded as a granular and cohesive material, the following parameters have been assigned to the two different materials and used within this geotechnical assessment.

Table 6.1: Characteristic Soil Properties

	Cornbrash Formation (Granular)	Cornbrash Formation (Cohesive)
Standard Penetration Test 'N' value*	30	20
Unit Weight (γ_s (kN/m³) Saturated)	20	20
Undrained Shear Strength c_u (kN/m³)	-	100
Effective Cohesion c' (kN/m²)	0	0
Angle of Shearing Resistance ϕ° (degrees)	35 ¹	25 ²

*Representative value used for the purposes of this assessment

Groundwater levels used in the design assessment have been based on records obtained during the ground investigation. Due to the variable nature of the groundwater recorded, for the purposes of this assessment, groundwater has been assumed to be 1m bgl.

¹ Peck, R.B., Hanson, W.E and Thornburn, R.A (1974) *Foundation Engineering*, John Wiley & Sons, New York

² NAVFAC DM7. (1971) *Design Manual: Soil Mechanics, foundations and earth structures*, U.S Department of the Navy, Washington, D.C

6.4 Foundations

It is considered that the strata of the Cornbrash Formation would be a suitable founding stratum for traditional strip or trench-fill foundations in the proposed development.

On the basis of the assessment, it is considered that, where the granular Cornbrash Formation is present, foundations may be designed on a net allowable bearing capacity of 250kN/m^2 . This assessment is based on an SPT 'N' value of 30 and, with reference to Terzaghi & Peck (1967), this should limit settlement to less than 25mm.

If cohesive Cornbrash Formation is observed at shallow depth, such as in the northern part of the Site, it is recommended that foundations are designed on a net allowable bearing capacity of 150kN/m^2 in order to limit settlement to less than 25mm.

As the cohesive Cornbrash Formation strata are of medium volume change potential, as defined in the National House Building Council (NHBC) Standards (2011), it is recommended that a minimum foundation depth of 0.9m bgl is adopted in residential properties, in accordance with NHBC requirements.

It should be noted that, due to the strength of the granular Cornbrash Formation, excavations with conventional plant may not progress beyond approximately 1.3m depth in the southern region of the Site.

6.5 Floor Slabs

Within residential properties with foundations on cohesive Cornbrash Formation strata, in accordance with NHBC Standards, it is recommended that a suspended ground floor slab with a minimum 250mm void is installed as a precaution against heave. It is appreciated that modern houses normally incorporate suspended floors but where footings are within granular Cornbrash Formation strata, no precautions against heave are required.

With regard to commercial properties, floor slab loads have not been provided but are assumed to be relatively light and it is considered that ground-bearing slabs could be used and may be designed on a modulus of subgrade reaction of 20MN/m^3 . Alternatively, suspended floor slabs may also be considered.

6.6 Groundwater Control

Groundwater seepages have been recorded at shallow depths and may be encountered during excavation of footings. However, such seepages should be adequately controlled by sump pumping.

6.7 Subgrade Assessment for Pavement Design

As discussed previously, the recorded CBR values within the granular Cornbrash Formation are believed to be unrepresentative of the in-situ soil, which predominantly composed of gravel and cobbles, and that the in-situ CBR value of the granular Cornbrash Formation will be significantly higher than that reported by the laboratory. Similarly, the CBR value for the remoulded cohesive Cornbrash Formation is considered to be lower than the in-situ value.

Considering the above, the assessment of subgrade condition has been undertaken in accordance with the recommendations presented in HD 26/06 and the Highways Agency Interim Advice Note IAN 73/06.

An assessment of the equilibrium subgrade stiffness (California Bearing Ratio (CBR)) for each of the likely strata to be encountered at road formation level has been carried out for the site and is outlined below. This assessment is based on the plasticity index of the sub-grade as set out in IAN 73/06.

As the regional groundwater level is likely to be about 1m below sub-formation level, a low groundwater level condition has been applied throughout. It is also considered reasonable to assume average construction conditions and a thin pavement.

The design equilibrium stiffness should be taken as equal to or below the lowest (most conservative) 3 point average of direct measurements and as such is considered to be conservative and low risk.

Subgrade stiffness in terms of CBR % may be converted to MPa by means of the equation given in both TRL1132 and IAN 73/06: $E = 17.6(\text{CBR})^{0.64}$. Both values have been used to populate Table 6.2 below:

Table 6.2: Design Subgrade Stiffness (CBR %) Assessment

Subgrade Material	Plasticity Index		Equilibrium CBR / Stiffness					Preliminary Design CBR / Stiffness	
	Range	Maximum Recorded	Estimated from PI		Assessed from Insitu Shear Strength			CBR (%)	Stiffness (MPa)
			CBR (%)	Stiffness (MPa)	C_u (kN/m ²)	CBR (%)	Stiffness (MPa)		
Cornbrash Formation (cohesive)	24-35	35	3	35	100	7	60	3	35
Cornbrash Formation (granular)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	43

It is recommended that confirmation of subgrade stiffness should be checked by means of in-situ CBR or plate bearing tests once the subgrade formation has been exposed along proposed roads. It is assumed that soft spots will be identified and treated on-site during construction works. Test frequencies should be stipulated in an Earthworks Specification.

6.8 Buried Concrete

In accordance with the assessment methodology outlined in British Research Establishment (BRE) Special Digest 1, relevant chemical test results from the ground investigation have been utilised to determine the Design Sulphate Class of the strata present. As the maximum concentration of sulphate recorded at the site is 60 mg/l, the following concrete classification is considered applicable.

Table 6.3: Design Sulphate Class

Stratum	Design Sulphate (DS) Class	Aggressive Chemical Environment Class (ACEC)
Cornbrash Formation	DS-1	AC-1

7 CONTAMINATION ASSESSMENT

7.1 Human Health Assessment - Overview

The presence of contaminated materials on a site is generally only of concern if an actual or potentially unacceptable risk exists. Part 2A was introduced into the EPA by the Environment Act 1995. Part 2A, its accompanying regulations and Statutory Guidance contained in DEFRA Contaminated Land Statutory Guidance (2012) presented the statutory definition of “contaminated land”. For the purposes of Part 2A, contaminated land is defined as: “any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land that::

- Significant harm is being caused or there is a significant possibility of such harm being caused; and
- Pollution of controlled waters is being, or is likely to be caused.

The Part 2A regime was designed and intended to encourage voluntary remediation rather than regulatory action and to work with the established role of planning and building control in those cases where the land is suitable for or scheduled for redevelopment.

DEFRA Contaminated Land Statutory Guidance (2012) makes clear that, where new development is taking place, it is the developer’s responsibility to ensure that development is safe and suitable for use for the purpose for which it is intended and thus to carry out any necessary remediation. In most cases the enforcement of remediation requirements is therefore through planning conditions and building control rather than through a Remediation Notice under Part 2A. The National Planning Policy Framework, states that ‘As a minimum, after carrying out the development and commencement of its use, the land should not be capable of being determined as contaminated land under Part 2A of the EPA 1990.’

A developer will need to satisfy the local authority that unacceptable risk from contamination will be successfully addressed through remediation without undue environmental impact during and following the development.

Legislation and guidance on the assessment of contaminated sites acknowledges the need for a tiered risk based approach. This report represents a Generic Quantitative Risk Assessment (GQRA) being a comparison of site contaminant levels against generic standards and compliance criteria including an assessment of risk using the source-pathway-receptor model.

The term pollutant linkage has been described in the Preliminary Conceptual Site Model (Section 3) above as has Source, Pathway and Receptors. Each of these three elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. Without a pollutant linkage, there is not a risk – even if a contaminant is present. Even where there is a pollutant linkage and therefore some measure of risk, the question still needs to be asked as to whether the level of risk justifies remediation. In the context of land contamination, ‘risk’ is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.

Further details of the WSP risk assessment approach are provided in **Appendix G**.

7.2 Risk Assessment Completed Within This Report

Compliance Criteria

The EA have produced a number of Soil Guideline Values (SGVs) and where these are not available and in order to provide a consistent methodology for the assessment of various contaminants a series of Generic Assessment Criteria (GAC) screening values have been calculated by WSP. These values have been

calculated using the EAs Contaminated Land Exposure Assessment software, CLEA V1.06, a computer modelling tool designed to assess human health related risks presented by contaminated soil.

Analysis of Data

This report includes a GQRA which is presented in the following sections. The assessment completed is based on the proposed development comprising residential properties with back gardens. In addition, no statistical analysis has been completed and recorded concentrations have been compared directly to relevant SGVs and GACs.

7.3 Assessment of the Analytical Results – Human Health

A total of eighteen samples, comprising six of topsoil and twelve of the Cornbrash Formation to a depth of 2.0m, were analysed for a range of metal, inorganic and organic determinands. Copies of the analytical results are provided in **Appendix H**.

7.4 Metals and Inorganics

With the exception of one sample from the southern region of the Site (TP713 at 0.5m depth), none of the samples tested recorded determinand concentrations above the relevant GAC/SGV for residential (with plant uptake) end use.

Location TP713 recorded an elevated arsenic concentration of 45.6 mg/kg which exceeds the published residential SGV of 32 mg/kg. It should be noted that this sample is from natural soil which contained no observable anthropogenic source of arsenic. Concentrations of arsenic elsewhere across the site are slightly elevated but are below the GAC such that it is considered that the exceedance is an isolated incident and, based on knowledge of the wider development area (incorporating Phase 1 of the development), it is assumed to be naturally occurring.

If the area in which the elevated concentration of arsenic was recorded is to be within residential garden areas, it is recommended that a capping layer of clean topsoil is placed to provide an effective barrier between site end users and the shallow soils (top 1m). It should be noted that this sample does not exceed commercial or public open space GAV and it is recommended that this result is reappraised once the masterplan has been finalised.

No asbestos was detected in seven samples screened.

7.5 Organics

Concentrations of organic determinands including Total Petroleum Hydrocarbons (TPH), Criteria Working Group (CWG), polycyclic aromatic hydrocarbons (PAH), semi-volatile organic compounds (SVOC) and volatile organic compounds (VOCs) were not detected above the relevant GAC.

7.6 Herbicides and Pesticides

All levels of herbicides and pesticides, including Persistent Organic Pollutants (POPs) were below their respective laboratory limits of detection.

7.7 Controlled Waters

Samples of groundwater were collected in December 2012 and were submitted for analytical laboratory testing. The results of the analytical testing are provided within **Appendix H**.

The results indicate that the majority of determinands are below the GAC for groundwater/drinking water. However, within BH701, BH702, BH707 and WS701, slightly elevated concentrations of some heavy-end petroleum hydrocarbons were recorded. Within BH701, the concentration of aromatic species C21-C35 was

recorded as 114 µg/l, which exceeds the GAC for groundwater/drinking water and aliphatic C21-C35 is above the limit of solubility. Within BH702 and BH707, concentrations of aliphatic C21-C35 are above the limit of solubility. Within WS701, the concentration of aliphatic C12-C16 petroleum hydrocarbons is below the GAC and for aliphatic C16-C21 and C21-C35 is above solubility limits.

7.8 Water Quality Standards (WQS)

Based on the 'prevent and limit' approach of the Water Framework Directive (2000/60/EC) and the identified receptors, the following Water Quality Standards (WQS) have been applied:

- UK Drinking Water Quality Standards 2000 (Amended 2004);
- Environmental Quality Standards (EQS). The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010; and
- World Health Organisation (WHO) Petroleum Products in Drinking Water, 2008.

7.9 Assessment of the Analytical Results – Controlled Waters

The analytical laboratory testing undertaken indicates that there has been some minor impactation, mainly in the northwestern part of the site, from heavy-end petroleum hydrocarbons, although it is noted that the concentration decreases further across the east of the site. The concentrations of these heavy end aliphatics are above solubility limits, however, site investigation data including borehole logs, soil data and groundwater monitoring observations do not support the presence of a free-phase as no odour or visible sheen has been noted. As such, it is thought that at the reported concentrations, this is at worst a light sheen. It should be noted that there is no identified on-site source for the petroleum hydrocarbons and an off-site source is suspected. The absence of lighter end hydrocarbons indicates that the source is no longer contributing to the contamination of groundwater.

Although the groundwater itself constitutes a receptor, the area in which the hydrocarbons have been detected is localised and concentrations of hydrocarbons appear to reduce towards the east, away from the suspected source. The Detailed Quantitative Risk Assessment (DQRA) completed for the adjacent development (report reference WSP 00022478/003 July 2011) derived a Tier 3 groundwater remedial target of 44,000µg/l, based on a theoretical compliance point located 250m from the site (note that the nearest water abstraction is 500m upgradient of the site). The same approach for this site would mean that the maximum reported concentration of 1,250µg/l (BH701) is an order of magnitude below the remedial target values in the DQRA and therefore, the risk posed to controlled waters is low. It is recommended that additional, targeted water sampling is undertaken in the northwestern part of the site to confirm the previous concentrations detected and to provide more data on the extent of hydrocarbon impactation within the groundwater. It may also be prudent to obtain a water sample, if possible, from the drain which runs along the northern boundary of the site to determine the presence of petroleum hydrocarbons.

7.10 Assessment of Potable Supply Pipes

On the basis of the analytical laboratory testing undertaken and with reference to UKWIR 10/MW/03/21, it is considered that normal plastic pipes may be used for the potable water supply.

7.11 Assessment of Ground Gas

A ground gas assessment has been undertaken within boreholes where groundwater conditions allow to assess potential risks associated with carbon dioxide and methane to future site users and to provide an initial view of the potential ground gas regime should future development be considered. The results obtained have been compared with relevant guidance that includes the following:

- The Building Regulations 2006, Approved Document C, Section 2;
- Assessing Risks Posed by Hazardous Gases to Buildings, CIRIA Report C665, 2007;
- BS 8485: 2007. Code of practice for the characterisation and remediation from ground gas in affected developments; and
- Protecting Developments from Methane, CIRA 149 Report 1995.

The CIRIA C665 method uses both gas concentrations and borehole flow rates to define a characteristic situation for a site based on the limiting borehole gas volume flow for methane and carbon dioxide. The limiting borehole gas volume flow is now renamed as the gas screening value and the calculation is carried out for both methane and carbon dioxide and the worst case value adopted.

7.12 Assessment of the Results – Ground Gas

Ground gas monitoring has been undertaken on three occasions following completion of the works in boreholes where high groundwater levels has not prevented potential ground gas within the unsaturated soils from entering the monitoring wells. The results are presented in **Appendix E**.

On this basis the ground gas regimes have been characterised as follows:

- CIRIA: Very Low Risk (Characteristic Situation 1).

Based on the three rounds of ground gas monitoring completed, the risks from ground gas on the proposed development are considered to be very low and reference to the relevant guidance documents indicates that no special precautions would be required. Please note that the appropriate regulators may require further monitoring.

8 REVISED CONCEPTUAL SITE MODEL

8.1 General

Following the results of the analytical laboratory testing and an assessment of the risk to Human Health and Controlled Waters, presented in **Section 7**, the following section provides a revised conceptual model for the Site.

8.2 Contaminant Sources

Based on the data available, it is considered that there are no identified on-site sources for the petroleum hydrocarbons detected. It has been noted that the concentrations of hydrocarbons in the groundwater decrease further to the east of the site.

Although arsenic was recorded at a concentration above the residential SGV in one location, as concentrations of arsenic within the other samples across the Site are below the residential SGV, it is considered that this is an isolated incidence and not characteristic of the Site. In addition, based on knowledge of the wider site and underlying geology, it is considered that this result is indicative of naturally occurring arsenic. It should be noted that this sample does not exceed commercial or public open space GAV and it is recommended that this result is reappraised once the masterplan has been finalised, and the land-use in that particular area confirmed.

8.3 Migration pathways

Given the proposed end use of the site, the following pathways have been confirmed or discounted.

Discounted Pathways

The following pathways have been discounted:

- Ingress into potable water supply pipes; and
- Sulphate and chemical attack on the built environment

Active Pathways

The following pathways are considered to be active (based on an isolated elevated concentration of arsenic in soil and heavy-end petroleum hydrocarbons in the groundwater):

- Ingestion of soil and dust;
- Dermal contact with soil; and
- Migration via the underlying soils and groundwater

8.4 Receptors

Potential receptors are considered to comprise the following:

- Future Site users;
- Underlying Secondary (A) aquifer;
- Land drains/brooks; and
- Construction workers.

8.5 Plausible Pollutant Linkage

On the basis of this assessment, one plausible pollutant linkage has been identified which involves the isolated concentration of arsenic recorded within soil for a residential end use. A development plan has not been provided, so it has not been possible to determine what will be present in the area of elevated arsenic. However, if the area in which the elevated concentration of arsenic was recorded will be beneath areas of

hardstanding such as houses or road pavements, as there is no pathway to humans, the linkage will be broken and the risk will be negligible. Furthermore, in these areas, as infiltration will be reduced by low permeability building materials, the risk to controlled waters will also be negligible.

If the area in which the elevated concentration of arsenic was recorded will be within residential garden areas, the pollutant pathway to humans will be valid. Accordingly, it is likely that a capping layer of clean topsoil would be required to form an effective barrier between site end users and the shallow soil.

With regard to the elevated concentrations of petroleum hydrocarbons in the northwestern part of the site, although the groundwater itself constitutes a receptor, the area in which the hydrocarbons have been detected is localised and the risk to the groundwater abstraction point is considered to be low. Accordingly, there is no valid pollutant linkage and the risk to other receptors from the detected hydrocarbons is considered to be low.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Ground Investigation

A Phase II Geo-Environmental and Geotechnical Assessment on Phase 2 of the Kingsmere Bicester development was undertaken between 1st and 10th October 2012 and comprised the progression of seven rotary boreholes, twenty trial pits and eleven windowless sample boreholes. Soakaway tests were performed in four of the trial pits and groundwater and ground gas monitoring standpipes were installed in selected boreholes. Data from previous WSP investigations have also been considered within this assessment where exploratory holes fall within the site boundary.

Ground conditions encountered at the Site are consistent with the published geological maps and comprise a thin horizon of topsoil overlying strata of the Cornbrash Formation with Forest Marble Formation at depth. The Cornbrash Formation was observed either as very clayey gravel or a stiff to very stiff consistency, gravelly clay. The Forest Marble Formation was recorded as very stiff clay to very weak mudstone with horizons of medium strong to strong, grey limestone. Made Ground was not encountered across the Site.

Water seepages were encountered in several trial pits and windowless sample boreholes and groundwater was encountered at depths of between 5.0m and 8.0m bgl. In several instances in the central region of the Site, groundwater was observed to be under artesian pressure.

Soakaway tests indicate that the soils at the Site are of low permeability to practically impermeable, as defined in CIRIA C515. If it is proposed to use soakaway drainage in the development, it is recommended that further tests are performed in the location of proposed drains to confirm suitability.

9.2 Land Contamination

Soil

With the exception of arsenic within a single soil sample, all determinands were below their respective residential GAC/SGV. The exceedance of arsenic is considered to be naturally occurring and not representative of the Site. However, there may be a requirement to provide a capping layer of clean topsoil to provide an effective barrier if the area in which the elevated concentration of arsenic was found will be within residential garden areas. It is considered that normal plastic pipes may be used for the potable water supply. It should be noted that this sample does not exceed commercial or public open space GAV and it is recommended that this result is reappraised once the masterplan has been finalised.

Ground Gas

Ground gas monitoring has been undertaken on three occasions following completion of the works in boreholes where high groundwater levels allow and indicates concentrations of methane and carbon dioxide are negligible. On the basis of the three rounds of ground gas monitoring completed so far, the risks from ground gas on the proposed development are considered to be very low and reference to the relevant guidance documents indicates that no special precautions would be required.

The number of viable ground gas monitoring wells has been reduced from the number initially installed. This is due to the adverse weather events that have been experienced recently which has led to an increased groundwater table, which in turn has meant that several of the boreholes are now unsuitable for ground gas monitoring as the high water table has screened out the previously unsaturated zone. Please note that further monitoring may be required by the appropriate regulators.

Groundwater

Heavy-end petroleum hydrocarbons have been detected in the groundwater samples obtained from the northwestern part of the site and concentrations suggest that there may be a free-phase product present. The risk to other receptors, however is considered to be low as there are no nearby groundwater abstraction points. Notwithstanding this, as groundwater samples have only been collected on one occasion, it is

recommended that additional, targeted sampling is undertaken in the northwestern part of the site to confirm and supplement the existing data. This may be done as part of any proposed remediation of the wider site.

9.3 Geotechnical

It is considered that the Cornbrash Formation strata are suitable to permit the use of traditional strip/trench-fill foundations in the proposed development.

Where granular strata of the Cornbrash Formation are present in excavations for footings, it is considered that a net allowable bearing pressure of 250 kN/m² may be adopted and ground bearing floor slabs may be used.

If cohesive strata of the Cornbrash Formation are observed at shallow depth, such as in the northern part of the Site, it is recommended that foundations are designed on a net allowable bearing capacity of 150 kN/m². In addition, a suspended floor slab with a minimum 250mm void should be installed. With regard to commercial properties, floor slab loads have not been provided but are assumed to be relatively light and it is considered that ground-bearing slabs could be used. Alternatively, suspended floor slabs may also be considered.

In accordance with BRE Special Digest 1, it is considered that the concrete should comprise design sulphate class DS-1 Aggressive Chemical Environment for Concrete (ACEC) class AC-1.

It is recommended that a CBR value of 3% is used for the preliminary design of road pavements on cohesive Cornbrash Formation strata and a CBR value of 4% is used for road pavements on granular strata. Further testing along the route of road pavements is recommended.

WSP ENVIRONMENT & ENERGY

Appendix A – Figures

Appendix B – Exploratory Hole Logs from Previous Phases of Investigation

Appendix C – WSP Borehole Logs

Appendix D – Monitoring Results

Appendix E – Geotechnical Laboratory Results



Appendix F - Geotechnical plots

Appendix G – WSP Risk Assessment Approach

Appendix H - Chemical Laboratory Results

Appendix I - Limitations

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Appendix A – Figures



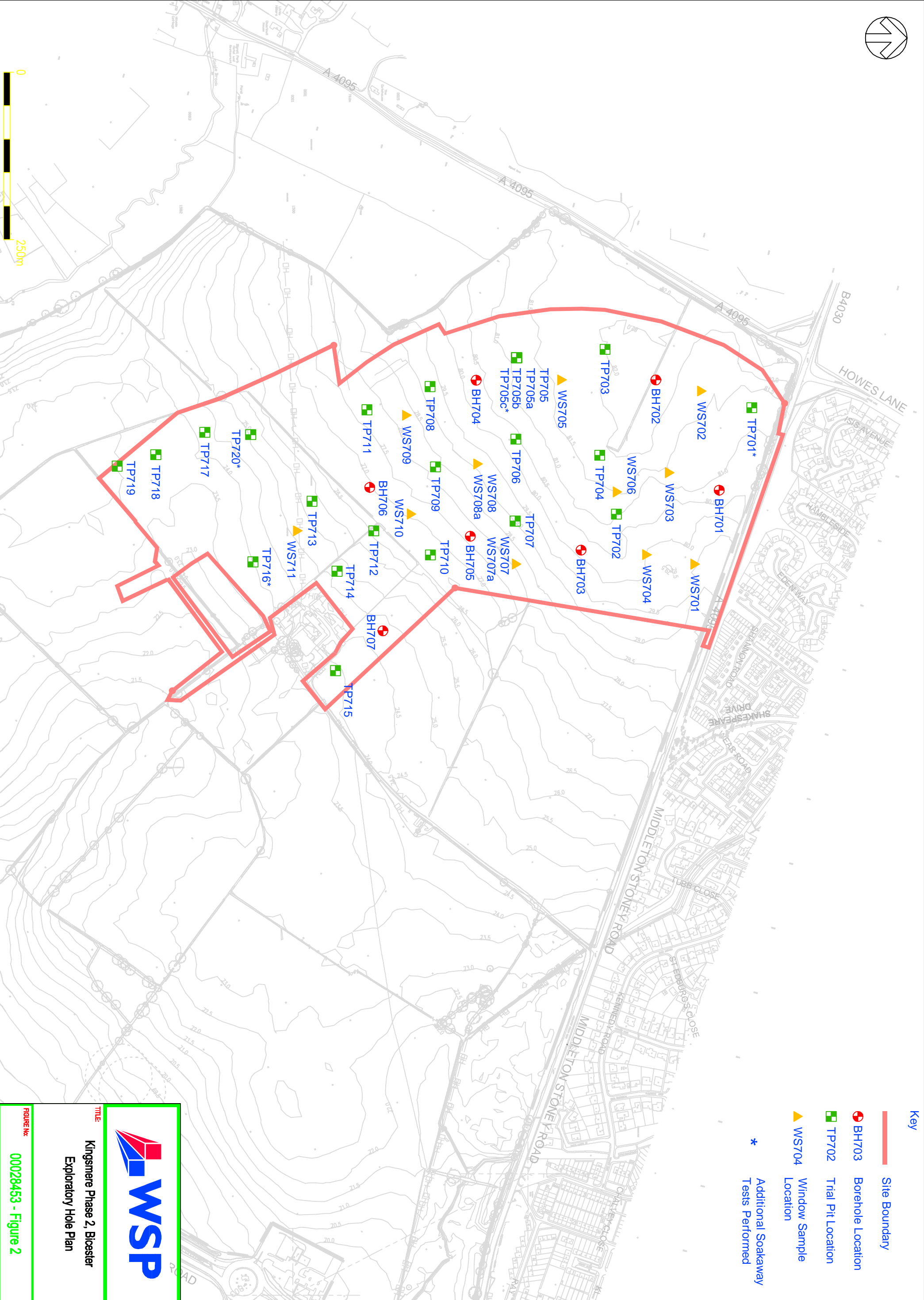
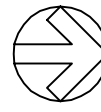
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Map data ©2013 Google, Imagery ©2013 DigitalGlobe, Getmap



TITLE:
Kingsmere Phase 2, Bicester

FIGURE No:
Site Location Plan



Key

- Site Boundary
- BH703 Borehole Location
- TP702 Trial Pit Location
- ▲ WST04 Window Sample Location

* Additional Soakaway Tests Performed

TITLE
Kingsmere Phase 2, Bicester
Exploratory Hole Plan

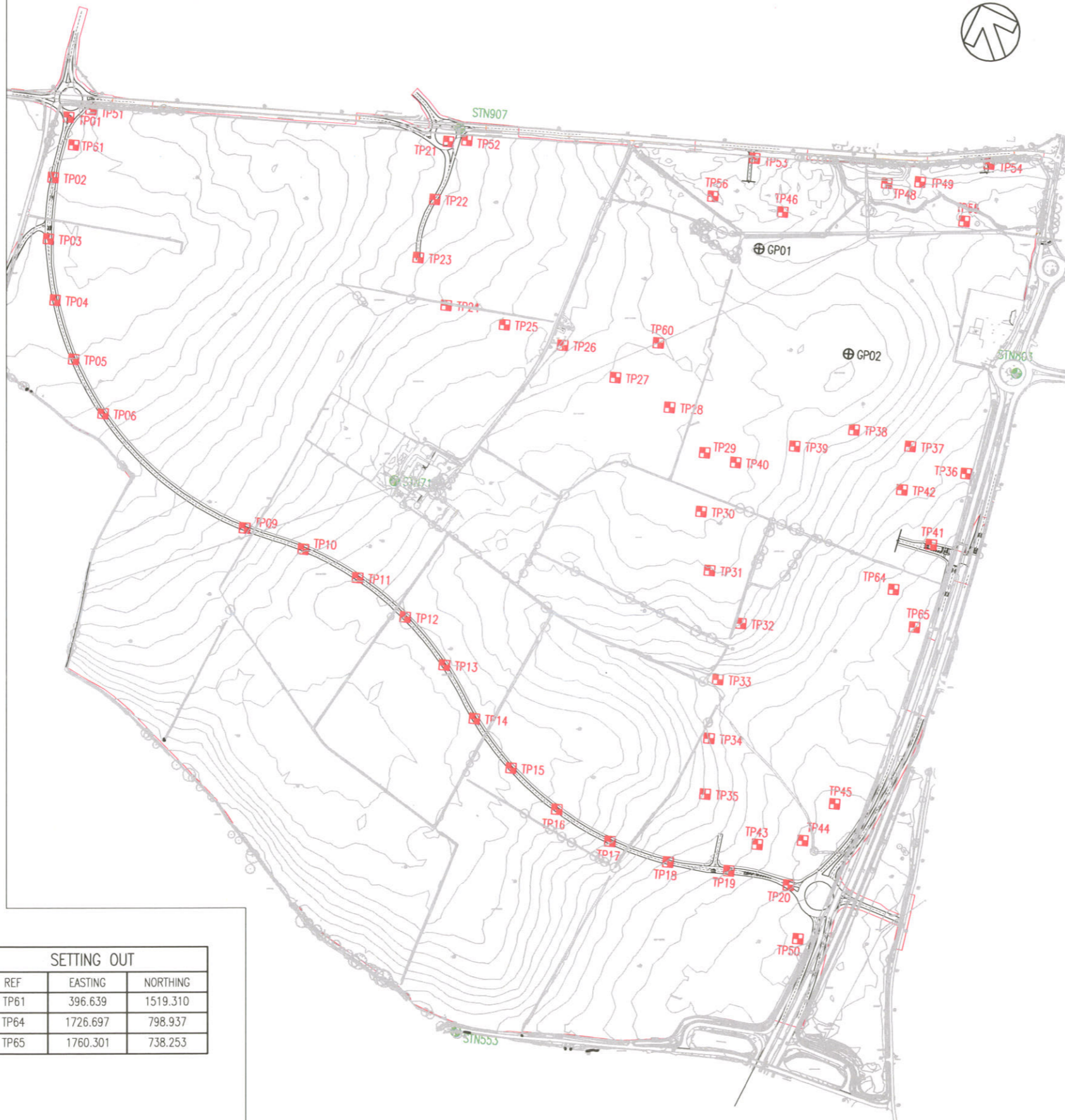
FIGURE NO.
00028453 - Figure 2

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SETTING OUT		
REF	EASTING	NORTHING
STN553	1016.322	88.302
STN712	916.336	975.659
STN803	1924.877	1147.554
STN907	1022.797	1545.722
TP01	388.393	1564.488
TP02	363.364	1466.499
TP03	355.557	1367.362
TP04	366.391	1268.204
TP05	396.652	1172.631
TP06	444.601	1085.135
TP09	673.676	899.786
TP10	768.341	865.575
TP11	856.315	819.048
TP12	933.771	756.131
TP13	997.543	678.493
TP14	1046.649	592.161
TP15	1106.268	512.272
TP16	1180.499	445.232
TP17	1266.226	394.121
TP18	1360.011	360.419
TP19	1458.453	345.980
TP20	1555.672	323.017
TP21	1004.165	1524.450
TP22	981.908	1430.860
TP23	955.084	1336.341
TP24	1000.827	1259.248
TP25	1095.657	1227.510
TP26	1189.847	1194.407
TP27	1274.853	1141.739
TP28	1362.461	1093.588
TP29	1419.218	1020.134
TP30	1413.540	925.323
TP31	1427.248	830.193
TP32	1478.193	744.978
TP33	1440.593	654.276
TP34	1426.230	559.482
TP35	1419.821	469.609
TP36	1843.597	985.752
TP37	1753.826	1029.812
TP38	1662.457	1057.083
TP39	1565.986	1030.753
TP40	1469.514	1004.423
TP41	1787.374	871.368
TP42	1740.403	959.651
TP43	1504.859	388.797
TP44	1578.937	395.023
TP45	1630.783	453.766
TP46	1546.623	1409.303
TP48	1715.659	1455.161
TP49	1769.459	1456.982
TP50	1571.158	236.642
TP51	425.010	1576.912
TP52	1034.327	1526.320
TP53	1500.660	1496.156
TP54	1880.844	1486.160
TP55	1840.663	1393.754
TP56	1432.626	1434.561
TP60	1344.400	1197.679

SETTING OUT		
REF	EASTING	NORTHING
TP61	396.639	1519.310
TP64	1726.697	798.937
TP65	1760.301	738.253

ANOMALY SETTING OUT		
REF	EASTING	NORTHING
GP01	1508.115	1349.799
GP02	1653.438	1179.620



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DO NOT SCALE

NOTES

KEY

- TP TRIAL PIT LOCATION.
- STN SURVEY STATION LOCATION (REFER TO NATIONWIDE SURVEYS DRAWING WSP0503 DATED JAN 2006)
- GP TRIAL PIT INVESTIGATION PIPE/ANOMALY. REFER TO GEOPHYSICAL SURVEY FROM ENVIRO STATEMENT FIG 5.4

REV	DATE	BY	DESCRIPTION	CHK	APD
F	09/07/07	PJ	TRIAL HOLES NO 07, 08, 47, 57, 58, 59, 62, 63 REMOVED.	JM	JM
E	01/05/07	GD	TRIAL HOLES ADDED FOR ANOMALY	JM	JM
D	20/04/07	GD	ARCHAEOLOGICAL SENSITIVE AREAS ADDED	JM	JM
C	12/04/07	GD	ADDITIONAL TRIAL PIT SETTING OUT ADDED	JM	JM
B	22/03/07	DAH	TRIAL PIT SETTING OUT ADDED	TFK	TFK
A	14/03/07	DAH	INITIAL ISSUE	TFK	TFK

DRAWING STATUS:

FOR INFORMATION ONLY



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<http://www.wspgroup.com>

CLIENT:

COUNTRYSIDE PROPERTIES

ARCHITECT:

PROJECT:

SOUTH WEST BICESTER

TITLE:

FIGURE 2:
TRIAL PIT LOCATION PLAN

SCALE @ A3: AS SHOWN	CHECKED: TFK	APPROVED: TFK
CAD FILE: 1546-SI-01	DESIGN-DRAWN: DAH	DATE: July 2007
PROJECT No: 11011546	DRAWING No: 1546/SI/01	REV: F

SETTING OUT CO-ORDINATES TO NATIONWIDE SURVEYS LOCAL GRID

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Appendix B – Exploratory Hole Logs from Previous Phases of Investigation



WSP Environmental

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Fax:

BOREHOLE LOG

Project Southwest Bicester				BOREHOLE No CP101	
Job No 12370399-001	Date 05-01-10 05-01-10	Ground Level (m) 78.800	Co-Ordinates () E 456805.000 N 222568.000		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1


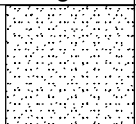
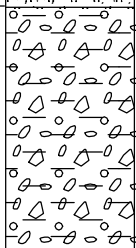
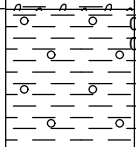
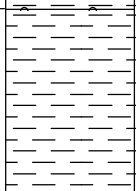
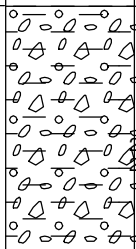
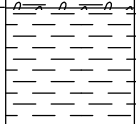
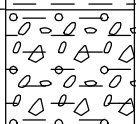
SAMPLES & TESTS			STRATA				Legend	Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Depth (Thickness)	DESCRIPTION			
0.00-0.30	B		↓	78.50	(0.30) 0.30	Corn over soft medium brown slightly gravelly CLAY. Gravel is subangular to angular, fine to coarse of limestone. (TOPSOIL)	[Pattern]	[Pattern]	
0.30-0.90	B			↓					Dense yellow brown clayey GRAVEL. Gravel is subangular to angular, fine to coarse of limestone. (CORNBRASS FORMATION)
0.90-1.00	D					0.90 - 1.10 Hard going.	[Pattern]		
1.10	C	25,50 N=50/ 30				(1.60)			
1.40-1.70	D		↓				[Pattern]		
1.70	C	25,50 N=50/ 50			76.90	1.90			
1.70-1.90	B		↓			Very stiff grey SILT/CLAY with limestone bands. (DRILLERS DESCRIPTION - FOREST MARBLE FORMATION?)	[Pattern]		
1.90-2.50	B								
2.50-2.95	U								
2.95	D		↓				[Pattern]		
2.95-3.50	B								
3.50	S	4,5,6 9,15,15 N=45	↓				[Pattern]		
3.50-3.95	D								
3.95-4.40	B		↓				[Pattern]		
4.40	S	5,7,9 10,10,15 N=44							
4.40-4.85	D								
4.85-5.00	B		↓				[Pattern]		
5.00-5.25	D								
5.25	C	25 33,17 N=25/ 30		73.55	5.25	Refusal at 5.25m bgl - Hole terminated.			

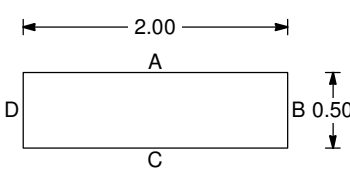

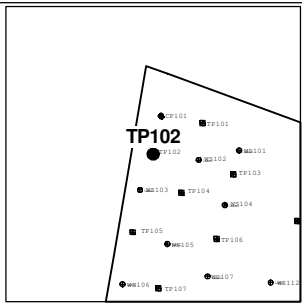
Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
05-01-10	00.00	5.36	1.50		3.90	1.4	1.9	1.00			
						5	5.25	0.50			
Date	Time	Strike	Minutes	Standing	Casing						
05-01-10		1.50	20	1.00	1.20						
05-01-10		4.50	20	3.90	1.50						

All dimensions in metres Scale 1:37.5	Contractor / Driller Dynamic Sampling Uk	Method/Plant Used Pilcon 1500	Logged By C. Walker
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TRIAL PIT LOG


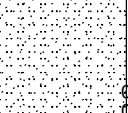
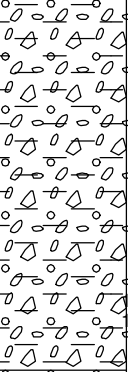
Project Southwest Bicester				TRIAL PIT No TP102	
Job No 12370399-001	Date 05-01-10 05-01-10	Ground Level (m) 79.000	Co-Ordinates () E 456,796 N 222,523		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

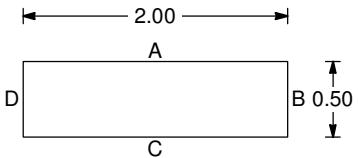

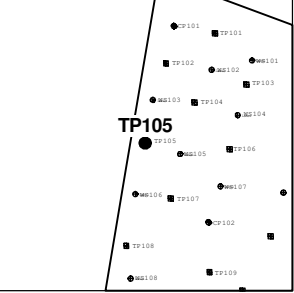
Water	Depth (thickness)	No	Red'cd Level	STRATA		SAMPLES		HSV	
				DESCRIPTION	Legend	Depth	Type	Depth	Result kN/m2
	0.00-0.30 (0.30)		78.70	Corn over soft brown slightly gravelly CLAY with occasional rootlets. Gravel is angular, fine of limestone. Occasional cobbles of limestone. (TOPSOIL)					
	0.30-0.90 (0.60)		78.10	Yellow brown grey slightly clayey GRAVEL. Gravel is angular, fine to coarse of limestone. Frequent cobbles of limestone. (CORNBRAH FORMATION)					
	0.90-1.25 (0.35)		77.75	Soft yellow brown grey slightly gravelly friable CLAY. Gravel is angular, fine of limestone and shell. (CORNBRAH FORMATION)		0.90-1.10 0.90-1.10	B ES		
	1.25-1.70 (0.45)		77.30	Very stiff laminated grey mottled orange brown and light grey friable CLAY. (FOREST MARBLE FORMATION)				1.40 1.40 1.40	184 196 220
	1.70-2.30 (0.60)		76.70	Light grey brown mottled yellow orange very clayey GRAVEL. Gravel is angular, fine to coarse of limestone. Frequent cobbles of limestone. (FOREST MARBLE FORMATION)		2.00-2.10 2.00-2.10	B ES		
	2.30-2.60 (0.30)		76.40	Very stiff laminated blue grey mottled orange brown CLAY. (FOREST MARBLE FORMATION)				2.40 2.40	196 204
	2.60-2.90 (0.30)		76.10	Light grey mottled orange brown clayey GRAVEL. Gravel is subangular to angular, fine to coarse with cobbles of limestone. (FOREST MARBLE FORMATION)					
	2.90			Refusal at 2.90m bgl -Pit terminated.					

Shoring/Support: None Stability: Sides stable to base. 			GENERAL REMARKS Seepage at 1.0m bgl. 19mm hand shear vane used.
All dimensions in metres Scale 1:18.2	Contractor	Method/ Plant Used JCB	Logged By C. Walker

TRIAL PIT LOG

Project Southwest Bicester				TRIAL PIT No TP105	
Job No 12370399-001	Date 05-01-10 05-01-10	Ground Level (m) 78.700	Co-Ordinates () E 456,771 N 222,428		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1


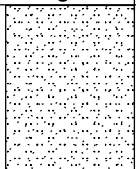
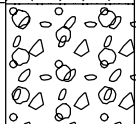
Water	Depth (thickness)	No	Red'cd Level	STRATA		SAMPLES		HSV	
				DESCRIPTION	Legend	Depth	Type	Depth	Result kN/m2
	0.00-0.30 (0.30)		78.40	Corn over soft brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular to angular, fine to medium of limestone. (TOPSOIL)		0.20-0.30 0.20-0.30	B ES		
	0.30-1.20 (0.90)		77.50	Orange brown slightly sandy slightly clayey GRAVEL. Gravel is subangular to angular, fine to coarse with cobbles of limestone. (CORNBURASH FORMATION)		0.00-1.10 0.00-1.10	B ES		
	1.20			Refusal at 1.20m bgl - Pit terminated.					

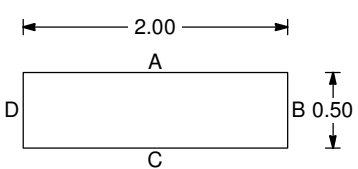
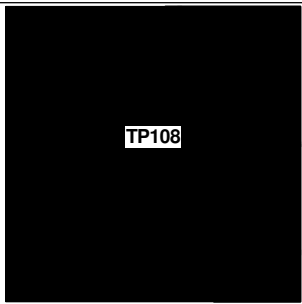

<p>Shoring/Support: None Stability: Sides stable to base.</p> <div style="text-align: center;">  </div>				<p style="text-align: center;">GENERAL REMARKS</p> <p>Seepage at 1.20m bgl.</p>
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All dimensions in metres Scale 1:18.2	Contractor	Method/ Plant Used JCB	Logged By C. Walker
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TRIAL PIT LOG

Project Southwest Bicester				TRIAL PIT No TP108	
Job No 12370399-001	Date 18-01-10 18-01-10	Ground Level (m) 77.000	Co-Ordinates () E 456,748 N 222,304		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

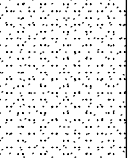
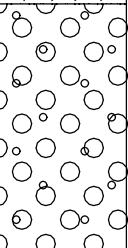
Water	Depth (thickness)	No	Red'cd Level	STRATA		SAMPLES		HSV	
				DESCRIPTION	Legend	Depth	Type	Depth	Result kN/m2
	0.00-0.40 (0.40)			Grass over soft orange brown slightly sandy CLAY. Sand is fine to coarse. Frequent rootlets. (TOPSOIL)		0.30	ES1		
	0.40-0.70 (0.30)		76.60	Orange brown slightly clayey slightly sandy cobbly GRAVEL limestone. (CORNBRAsh FORMATION)		0.50	ES2		
	0.70		76.30	Refusal at 0.70m bgl - Pit terminated.		0.60	B3		

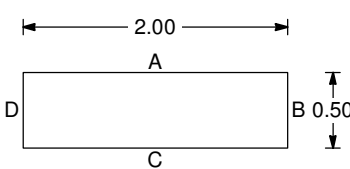
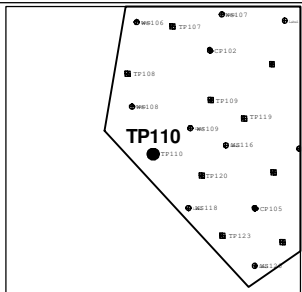
<p>Shoring/Support: None Stability: Sides stable to base.</p> <div style="text-align: center;">  </div>				<p>GENERAL REMARKS</p> <p>Inflow at 0.80m bgl.</p>
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All dimensions in metres Scale 1:18.2	Contractor	Method/ Plant Used JCB	Logged By H Gardiner
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TRIAL PIT LOG

Project Southwest Bicester				TRIAL PIT No TP110	
Job No 12370399-001	Date 18-01-10 18-01-10	Ground Level (m) 75.500	Co-Ordinates () E 456,779 N 222,208		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

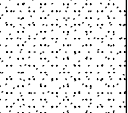
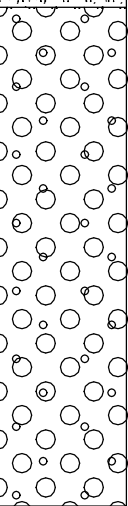
Water	Depth (thickness)	Red'cd Level	STRATA		Legend	SAMPLES		HSV	
			DESCRIPTION			Depth	Type	Depth	Result kN/m2
	0.00-0.40 (0.40)	75.10	Soft orange brown slightly sandy CLAY. Sand is fine to coarse. Occasional rootlets. (TOPSOIL)			0.20	ES1		
	0.40-1.00 (0.60)	74.50	Brown yellow slightly clayey gravelly COBBLES of limestone. Gravel is subangular, fine to coarse of limestone. (CORNBRAsh FORMATION)			0.50 0.70	ES2 B3		
	1.00		Refusal at 1.00m bgl - Pit terminated.						

<p>Shoring/Support: None Stability: Sides stable to base.</p> <div style="text-align: center;">  </div>		<p style="text-align: center;">GENERAL REMARKS</p>
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All dimensions in metres Scale 1:18.2	Contractor	Method/ Plant Used JCB	Logged By H Gardiner
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TRIAL PIT LOG

Project Southwest Bicester				TRIAL PIT No TP123	
Job No 12370399-001	Date 18-01-10 18-01-10	Ground Level (m) 74.300	Co-Ordinates () E 456,862 N 222,109		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

Water	Depth (thickness)	Red'cd Level	STRATA		SAMPLES		HSV	
			DESCRIPTION	Legend	Depth	Type	Depth	Result kN/m2
	0.00-0.30 (0.30)	74.00	Soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular, fine to coarse of limestone. Sand is fine to coarse. Occasional rootlets. (TOPSOIL)		0.20	ES1		
	0.30-1.50 (1.20)	72.80	Yellow brown slightly clayey slightly sandy gravelly COBBLES of limestone. Gravel is subangular, fine to coarse of limestone. (CORNBRAH FORMATION) 0.30 - 0.90 Soft orange brown sandy gravelly clay.		0.60 0.90 1.40	ES2 B3 B4		
	1.50		Refusal at 1.50m bgl - Pit terminated.					

Shoring/Support: None
Stability: Sides stable to base.



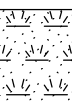
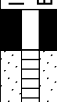





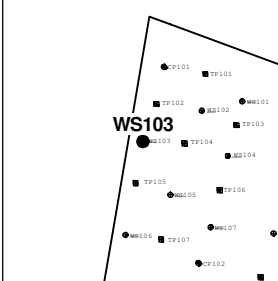
GENERAL REMARKS

All dimensions in metres Scale 1:18.2	Contractor	Method/ Plant Used JCB	Logged By H Gardinert
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WINDOW SAMPLE LOG

Project Southwest Bicester				BOREHOLE No WS103	
Job No 12370399-001	Date 26-01-10 26-01-10	Ground Level (m) 79.100	Co-Ordinates () E 456780.000 N 222479.000		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1


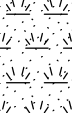



SAMPLES & TESTS					STRATA						
Depth	Type No	Test Result	HSV Depth	Result kN/m2	Water	Reduced Level	Depth (Thickness)	DESCRIPTION	Legend	Geology	Instrument/Backfill
0.00	ES							Grass over soft to firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular, fine to medium of limestone. Frequent rootlets. (TOPSOIL)			
0.10	D					78.85	(0.25)				
0.30	ES		0.20	25				Very dense orange brown slightly clayey gravelly COBBLES of limestone. Gravel is subangular, fine to coarse of limestone. (CORNBRASSH FORMATION) 0.50 - 1.00 No recovery,			
0.40	D		0.20	62.5							
0.50		25.50 N=50/ 25	0.20	37.5		78.15	0.95	Refusal at 0.95m bgl - Hole terminated.			

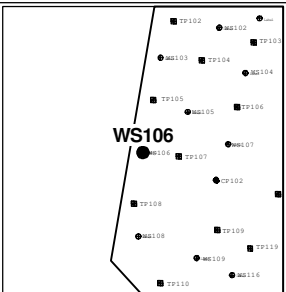
Boring Progress and Water Observations							GENERAL REMARKS	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt		Seepage at 0.40m bgl.	
Date	Time	Strike	Minutes	Standing	Casing			
26-01-10		0.40						

All dimensions in metres Scale 1:18.75	Contractor / Driller GSS	Method/Plant Used Competitor Dart 130	Logged By H Gardiner
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WINDOW SAMPLE LOG

Project Southwest Bicester				BOREHOLE No WS106	
Job No 12370399-001	Date 25-01-10 25-01-10	Ground Level (m) 78.000	Co-Ordinates () E 456759.000 N 222366.000		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

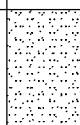



SAMPLES & TESTS					STRATA						
Depth	Type No	Test Result	HSV Depth	Result kN/m2	Water	Reduced Level	Depth (Thickness)	DESCRIPTION	Legend	Geology	Instrument/Backfill
0.10	ES						(0.30)	Grass over soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular, fine to medium of limestone. Frequent rootlets. (TOPSOIL) 0.05 - 1.00 No recovery.			
0.20	D					77.70	0.30	Very dense orange brown slightly clayey gravelly COBBLES of limestone. Gravel is subangular, fine to coarse of limestone. (CORNBURASH FORMATION)			
0.30	D										
0.50		20.50 N=50/ 10					(0.65)				
						77.05	0.95	Refusal at 0.95m bgl - Hole terminated.			


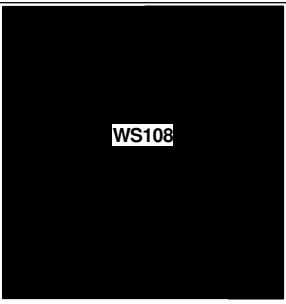
Boring Progress and Water Observations							GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt		Seepage at 0.20m bgl.
Date	Time	Strike	Minutes	Standing	Casing		
25-01-10		0.20					

All dimensions in metres Scale 1:18.75	Contractor / Driller GSS	Method/Plant Used Competitor Dart 130	Logged By H Gardiner
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WINDOW SAMPLE LOG

Project Southwest Bicester				BOREHOLE No WS108	
Job No 12370399-001	Date 25-01-10 25-01-10	Ground Level (m) 76.600	Co-Ordinates () E 456753.000 N 222264.000		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

SAMPLES & TESTS					Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	HSV Depth	Result kN/m2		Reduced Level	Depth (Thickness)	DESCRIPTION	Legend		
0.20 0.20 0.20 0.20	D ES D ES		0.20 0.20	112.5 100	↓	76.30	(0.30) 0.30	Grass over firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular, fine to medium of limestone. Frequent rootlets. (TOPSOIL)			
0.60		4,11,14 8,16,75 N=123/ 165				75.55	(0.75) 1.05	Very dense orange brown slightly clayey gravelly COBBLES of limestone. Gravel is subangular, fine to coarse of limestone. (CORNBURASH FORMATION) 0.60 - 1.00 No recovery.			
								Refusal at 1.045m bgl - Hole terminated.			

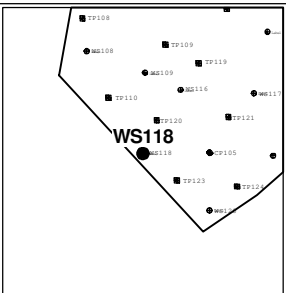
Boring Progress and Water Observations						 	GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt		
Date	Time	Strike	Minutes	Standing	Casing		
25-01-10		0.10					

All dimensions in metres Scale 1:18.75	Contractor / Driller GSS	Method/Plant Used Competitor Dart 130	Logged By H Gardiner
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WINDOW SAMPLE LOG

Project Southwest Bicester				BOREHOLE No WS118	
Job No 12370399-001	Date 25-01-10 25-01-10	Ground Level (m) 76.600	Co-Ordinates () E 456821.000 N 222142.000		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

SAMPLES & TESTS					STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	HSV Depth	Result kN/m2	Water	Reduced Level	Depth (Thickness)	DESCRIPTION		
0.20 0.25	ES D				↓	76.30	0.30	Grass over soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular, fine to medium of limestone. Frequent rootlets. (TOPSOIL)		
0.50	ES							Very dense orange brown slightly clayey gravelly COBBLES of limestone. Gravel is subangular, fine to coarse of limestone. (CORNBURASH FORMATION)		
0.80	D						(1.15)	0.90 - 1.00 No recovery.		
1.00		9,16,30 20 N=50/ 95			↓	75.15	1.45	Refusal at 1.45m bgl - Hole terminated.		

Boring Progress and Water Observations							GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt		Seepage at 1.20m bgl.
Date	Time	Strike	Minutes	Standing	Casing		
25-01-10		1.20					

All dimensions in metres Scale 1:18.75	Contractor / Driller GSS	Method/Plant Used Competitor Dart 130	Logged By H Gardiner
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WINDOW SAMPLE LOG

Project Southwest Bicester				BOREHOLE No WS120	
Job No 12370399-001	Date 25-01-10 25-01-10	Ground Level (m) 74.000	Co-Ordinates () E 456900.000 N 222073.000		
Supervising Engineer Helen Gardiner			Client Countryside Properties Ltd		Sheet 1 of 1

SAMPLES & TESTS					STRATA						
Depth	Type No	Test Result	HSV Depth	Result kN/m2	Water	Reduced Level	Depth (Thickness)	DESCRIPTION	Legend	Geology	Instrument/Backfill
0.10	ES				↓		(0.35)	Grass over soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular, fine to medium of limestone. Frequent rootlets. (TOPSOIL)			
0.20	D			73.65		0.35					
0.40	ES							Very dense orange brown slightly clayey gravelly COBBLES of limestone. Gravel is subangular, fine to coarse of limestone. (CORNBRASS FORMATION)			
0.50	D							0.75 - 1.00 No recovery.			
1.00	D	8,9,9 8,8,8 N=33					(1.50)	1.40 - 2.00 No recovery.			
1.40		2,13,50 N=50/ 20									
						72.15	1.85	Refusal at 1.85m bgl - Hole terminated.			

Boring Progress and Water Observations							GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt		
Date	Time	Strike	Minutes	Standing	Casing		
25-01-10		0.70					

All dimensions in metres Scale 1:18.75	Contractor / Driller GSS	Method/Plant Used Competitor Dart 130	Logged By H Gardiner
-------------------------------------------	-----------------------------	------------------------------------------	-------------------------

RECORD OF WELL (SHAFT OR BORE)

(attach copy of analysis if available)

For Survey use

British Geological Survey

British Geological Survey

SP52SE 3.

British Geological Survey

EXACT SITE OF WELL

At Whitelands Farm, Bicester,

219/10
SP52/24 10

Town or Village Bicester.

County Oxon ^{5671 2207} ~~SP.5676 2203~~ Six-inch quarter sheet 23 SW/W

For Mr. Messrs. A.D. Woodley Ltd., contractor, consultant, etc. :- Own

Address (if different from above)

Level of ground surface above sea-level (O.D.) 76 ft. If well-top is not at ground level, state how far (above; below)

SHAFT ft.; diameter ft.; Details of headings

British Geological Survey

British Geological Survey

British Geological Survey

BORE 138 ft.; diameter of bore: at top 6" ins.; at bottom 6 ins.

Details of permanent lining tubes 60ft. 6" plain tube, 78ft. 6" perforate

Water struck at depths of 110 ft. below

TEST CONDITIONS

Rest-level of water 25 ft. ~~below~~ well-top. Suction at 130ft. Yield on 8 hour day

pumping at 1000 galls. per hour with depression to 80 ft. below well-top.

Recovery to rest-level in 25 mins. Capacity of pump 1000 g.p.h. Date of measurements

Description of permanent pumping equipment:

NORMAL CONDITIONS

Make and/or type Motive power

Capacity gallons per hour. Suction at ft.

Amount pumped galls. per day. Estimated consumption galls.

Well made by G. Lines Son Ltd. Solihull Date of well

Information from

ADDITIONAL NOTES

Sited by O on 6' map Oxon 23 SW/W - 16.10.53. Rk.

British Geological Survey

British Geological Survey

British Geological Survey

10 3/48 A. & E. W. Ltd. Gp. 685

British Geological Survey

British Geological Survey

British Geological Survey

RECORD OF WELL (SHAFT OR BORE)

For Survey use on

N.

(attach copy of analysis if available)

*This site has a grid address that is
SP 52 249203 FARM*

219/19

EXACT SITE OF WELL

Town or Village **BICESTER**

SP 52 / 24

County **OXON. SP. 5676 2203**

Six-inch quarter sheet **23 SW/4**

For Mr.

State whether owner, tenant, builder, contractor, consultant, etc. :-

Address (if different from above)

Level of ground surface above sea-level (O.D.) ft.

If well-top is not at ground level, state how far {above; ... {below;

SHAFT ft. ; diameter ft. ;

Details of headings

BORE ft. ; diameter of bore : at top ins. ; at bottom ins.

Details of permanent lining tubes

Water struck at depths of ft. below v

TEST CONDITIONS

Rest-level of water ft. above well-top. below

Suction at ft.

Yield on hours' days'

pumping at galls. per with depression to ft. below well-top.

Recovery to rest-level in mins. hours

Capacity of pump g.p.h.

Date of measurements

Description of permanent pumping equipment :

NORMAL CONDITIONS

Make and/or type Motive power

Capacity gallons per hour.

Suction at ft.

Amount pumped galls. per day. Estimated consumption galls. p

Well made by Date of well

Information from

ADDITIONAL NOTES

*well & wind pump.
Said to be deeper than Chesterton
bore 219/143 O.D. c 255 feet.
Yields sufficient water, except
when wind fails.
Electric pumps then used.
Information and site obtained in field*

& E.W.Ltd. Cp.685

(For Survey use only) GEOLOGICAL CLASSIFICATION		THICKNESS		DEPTH		
						Feet ...
NATURE OF STRATA		SP 52 SE / 3				
		If measurements start below ground surface, state how far ...				
Carrick	Top Soil	1	-	1	-	
	Shale Ironstone	8	-	9	-	
	Yellow Clay	3	-	12	-	
	Limestone with odd layers Blue Clay.	40	-	52	-	
	Blue Clay	15	-	67	-	
	Limestone	3	-	70	-	
	Blue Clay	30	-	100	-	
	Limestone	2	-	102	-	
	Blue Clay	8	-	110	-	
	Limestone	2	-	112	-	
	Black Clay	10	-	122	-	
	Blue Clay	16	-	138	-	
	With a filtration of green sand at approximately 110ft.					

Appendix C – WSP Borehole Logs



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ROTARY DRILLHOLE LOG

Hole No. **BH701**

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**01-10-12
01-10-12**

Contractor / Driller C.J. Associates	Method/Plant Used Comacchio 300	Logged By OEG	Co-Ordinates (NGR) E 456573.687 N 222632.413	Ground Level (m AOD) 80.830
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RUN DETAILS				STRATA										Install / Backfill
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa)	Elev. (mAOD)	Depth (Thickness)	Discontinuities	Detail	Description	Main	Legend	Geology	Dia. mm
				(20) (S)		80.58	0.25			Brown slightly silty slightly gravelly CLAY. (TOPSOIL)			TS	
							(0.65)			Light brown and grey slightly sandy very clayey angular and subangular fine to coarse limestone GRAVEL. (WEATHERED CORNBURASH FORMATION)			CB	
						79.93	0.90	0.60 Becoming orangish brown		Orangish brown slightly clayey gravelly angular and subangular COBBLES. Gravel and cobbles are limestone. Gravel is medium to coarse limestone. (WEATHERED CORNBURASH FORMATION)			CB	
						79.63	1.20			Stiff yellowish brown slightly sandy very gravelly CLAY. Gravel is fine to medium subangular limestone. (WEATHERED CORNBURASH FORMATION)			CB	
2.30				(50/0.169) (S)		78.83	2.00			Stiff yellowish brown slightly sandy very gravelly CLAY. Gravel is fine to medium subangular limestone. (WEATHERED CORNBURASH FORMATION)			FMB	
						78.53	2.30			Stiff to very stiff dark green mottled bluish grey slightly gravelly silty CLAY. Gravel is fine to medium subrounded limestone. (FOREST MARBLE FORMATION)			FMB	
3.00	20	15	0			77.83	3.00			Medium strong to strong light brown and grey fine grained LIMESTONE. Very close drilling induced fractures. 20% TCR, 15% SCR, 0% RQD, FI NI/40/50. (FOREST MARBLE FORMATION)			FMB	
3.10				(50/0.022) (S)		77.73	3.10			Firm dark bluish grey slightly gravelly CLAY. Gravel is medium subangular limestone. (FOREST MARBLE FORMATION)			FMB	
							(1.70)			Medium strong to strong grey fine and medium grained LIMESTONE. Close subhorizontal fractures with occasional clay filling. 100% TCR, 100% SCR, 20% RQD, FI NI/50/120. (FOREST MARBLE FORMATION)			FMB	
4.80	100	100	20	(50/0.026) (S)		76.03	4.80			Medium strong dark grey medium grained LIMESTONE. Fractures very close. Abundant shell fragments. (FOREST MARBLE FORMATION)			FMB	
						75.93	4.90			Hard, dark green silty CLAY. Upper 100mm recovered as an extremely weak mudstone. ...becoming an extremely weak mudstone below 6.3m. (FOREST MARBLE FORMATION)			FMB	
6.50				(30) (S)		74.33	6.50			Medium strong light grey fine grained LIMESTONE. Close drilling induced fractures. Upper 200mm extremely weathered hard to very weak clay/mudstone with pockets of clayey gravel. 100% TCR, 100% SCR, 100% RQD, FI 150/150/150. (FOREST MARBLE FORMATION)			FMB	
7.15	100	100	100	(50/0.026) (S)		73.68	7.15	6.80 Becoming closely bedded below 6.8m		Hard dark bluish grey CLAY. (FOREST MARBLE FORMATION)			FMB	
							(0.85)						FMB	
				(50/0.276) (S)		72.83	8.00						END	

08 WSP DRILLHOLE/ROTARY LOG 00028453.KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia
01-10-12	00.00	8.00	3.00	300		2.40	8.00	Air/Mist	Good	3.00	300
Chiselling			Water Added			General Remarks					
From	To	Hours	Tool	From	To						
				2.4	8						
Scale 1:62.5		Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									



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ROTARY DRILLHOLE LOG

Hole No.
BH702

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**02-10-12
 03-10-12**

Contractor / Driller
C.J. Associates

Method/Plant Used
Comacchio 300

Logged By
HG

Co-Ordinates (NGR)
**E 456408.816
 N 222537.843**

Ground Level (m AOD)
82.223

RUN DETAILS				STRATA										Install / Backfill Dia. mm
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa)	Elev. (mAOD)	Depth (Thickness)	Discontinuities	Detail	Description	Main	Legend	Geology	
				(33) (S)		81.72	(0.50) 0.50			Grass and stubble over brown silty CLAY with frequent rootlets and rare coarse angular and subangular limestone gravel. (TOPSOIL)			TS	
				(36) (S)		80.72	(1.00) 1.50			Stiff light brown mottled orangish brown slightly sandy very gravelly CLAY. Gravel is fine to medium angular to subangular limestone. Limestone cobbles at 1.2m. (WEATHERED CORNBASH FORMATION)			CB	
				(50/0.247) (S)		79.57	(1.15) 2.65			Stiff light greenish brown mottled light bluish grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium subrounded limestone lithorelics and with occasional fine to coarse subangular limestone gravel below 2.0m. (WEATHERED CORNBASH FORMATION)			CB	
				(50/0.05) (S)		79.22	(0.55) 3.00			Very weak limestone recovered as mottled brown silty angular and subangular fine and medium limestone GRAVEL. (CORNBASH FORMATION)			CB	
3.55				(39) (S)		78.67	(1.45) 3.55			Very stiff dark bluish grey silty CLAY. Slightly shelly. (FOREST MARBLE FORMATION)			FMB	
	100	60	60	(50/0.029) (S)		77.22	(1.20) 5.00			Medium strong grey fine and medium grained LIMESTONE. Fractures very close to close. Some drilling induced fractures and some natural fractures. TCR 100%, SCR 60%, RQD 60%, FI NI/50/160. (FOREST MARBLE FORMATION)			FMB	
5.00				(50/0.029) (S)		76.02	(1.00) 6.20			Very stiff dark green silty CLAY. (FOREST MARBLE FORMATION)			FMB	
				(50/0.211) (S)		75.82	(0.60) 6.40			Medium strong light grey fine grained MUDSTONE. Recovered as a clayey fine to coarse subangular gravel. Abundant clay matrix. (FOREST MARBLE FORMATION)			FMB	
6.40	100	90	90			74.82	(0.60) 7.40			Strong, light grey, fine grained, LIMESTONE, fractures wide, subhorizontal fractures. Potential fracture zone 6.7-6.8m with very gravelly clay infill. TCR 100%, SCR 90%, RQD 90%, FI NI/100/800. (FOREST MARBLE FORMATION)			FMB	
7.40						74.22	(0.60) 8.00			Hard, dark green mottled orangish brown silty CLAY. (FOREST MARBLE FORMATION)			FMB	
													END	

08 WSP DRILLHOLE/ROTARY LOG 00028453.KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia
02-10-12	00.00	8.00	3.50	300		3.50	8.00	Air/Mist	Good	3.50	300
Chiselling			Water Added			General Remarks					
From	To	Hours	Tool	From	To						
				3.5	8						
Scale 1:62.5		Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									



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ROTARY DRILLHOLE LOG

Hole No. **BH703**

Project **Kingsmere Bicester Phase 2**

Sheet **1 of 1**

Job No **00028453/001** Client **Countryside Properties Ltd**

Date **03-10-12**
03-10-12

Contractor / Driller **C.J. Associates** Method/Plant Used **Comacchio 300** Logged By **OEG** Co-Ordinates (NGR) **E 456663.190**
N 222425.952 Ground Level (m AOD) **80.158**

RUN DETAILS				STRATA										Install / Backfill
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa)	Elev. (mAOD)	Depth (Thick-ness)	Discontinuities	Detail	Description	Main	Legend	Geology	Dia. mm
				(11) (S)	1	79.96	0.20			Grass and stubble over brown silty CLAY with frequent rootlets and rare coarse angular and subangular limestone gravel.			TS	
				(25) (S)		79.56	0.60			(TOPSOIL)			CB	
				(25) (S)	1	78.96	1.20			Grey sandy angular and subangular fine to coarse limestone GRAVEL.			CB	
				(25) (S)		78.46	1.70			(WEATHERED CORNBURASH FORMATION)			CB	
2.90				(25) (S)	1	77.26	2.90			Stiff orangish brown mottled bluish grey gravelly CLAY. Frequent fine subrounded white limestone lithorelics. Rare limestone cobbles.			CB	
3.20	100	0	0	(25) (S)		76.96	3.20			(WEATHERED CORNBURASH FORMATION)			CB	
3.60				(46) (S)	1	76.56	3.60			Very stiff light greyish green becoming dark greyish green very gravelly CLAY with slightly shelly and rare limestone cobbles. Gravel is fine to medium tabular limestone.			FMB	
3.70	100	0	0	(46) (S)		76.46	3.70			(WEATHERED CORNBURASH FORMATION)			FMB	
4.50				(50/0.154) (S)	1	75.66	4.50			Extremely weak light brown MUDSTONE recovered as fine to medium subangular gravel. TCR 100% SCR 0% RQD 0%, NON INTACT.			FMB	
5.00	100	75	90	(50/0.154) (S)		75.16	5.00			(FOREST MARBLE FORMATION)			FMB	
6.20				(50/0.031) (S)	1	74.16	6.00			Very stiff bluish grey mottled dark green slightly silty CLAY.			FMB	
6.50	100	100	100	(50/0.031) (S)		73.96	6.20			(FOREST MARBLE FORMATION)			FMB	
6.70	100	100	80	(50/0.039) (S)	1	73.66	6.50			Very weak, bluish grey, MUDSTONE, TCR 100%, SCR 0%, RQD 0%, NON INTACT. Recovered as fine to coarse subangular tabular gravel.			FMB	
				(50/0.039) (S)		73.46	6.70			(FOREST MARBLE FORMATION)			FMB	
						72.16	8.00			Very stiff to hard, bluish grey slightly silty CLAY.			FMB	
										Grey fine and medium grained LIMESTONE. Fractures very close to close, 0° dip, TCR 100%, SCR 75%, RQD 90%, FI 30/100/200.			FMB	
										(FOREST MARBLE FORMATION)			FMB	
										Very stiff grey slightly silty CLAY.			FMB	
										(FOREST MARBLE FORMATION)			FMB	
										Very weak grey LIMESTONE, Non intact. recovered as a fine to coarse subangular gravel.			FMB	
										(FOREST MARBLE FORMATION)			FMB	
										Strong light grey fine grained LIMESTONE. Close drilling induced fractures 0° dip. TCR 100%, SCR 100%, RQD 100%, FI 170/200.			FMB	
										(FOREST MARBLE FORMATION)			FMB	
										Strong, grey, fine and medium grained, LIMESTONE, fractures close, 0° dip, drilling induced fractures. TCR 100% SCR 100% RQD 80%.			FMB	
										(FOREST MARBLE FORMATION)			FMB	
										Very stiff, dark bluish grey mottled dark green slightly silty CLAY.			END	
										(FOREST MARBLE FORMATION)			END	

08 WSP DRILLHOLE/ROTARY LOG 00028453.KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia
03-10-12	00.00	8.00	4.50	300		4.50	8.00	Air/Mist	Good	4.50	300
Chiselling			Water Added			General Remarks					
From	To	Hours	Tool	From	To						
				4.5	8						
Scale 1:62.5		Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									



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ROTARY DRILLHOLE LOG

Hole No.
BH704

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**08-10-12
 10-10-12**

Contractor / Driller C.J. Associates	Method/Plant Used Comacchio 300	Logged By OEG	Co-Ordinates (NGR) E 456409.253 N 222269.168	Ground Level (m AOD) 80.335
------------------------------------------------	-------------------------------------------	-------------------------	------------------------------------------------------------	---------------------------------------

RUN DETAILS				STRATA										Install / Backfill
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa)	Elev. (mAOD)	Depth (Thickness)	Discontinuities	Detail	Description	Main	Legend	Geology	Dia. mm
				(18) (S)		79.84	0.50			Stubble over brown slightly sandy silty CLAY with occasional rootlets and medium subangular limestone gravel. (TOPSOIL)			TS	
				(22) (S)		79.49	0.85			Orangish brown and grey slightly clayey slightly sandy fine to coarse subangular limestone GRAVEL. (WEATHERED CORNBASH FORMATION)			CB	
				(38) (S)		79.04	1.30			Orangish brown very clayey fine to coarse subangular limestone GRAVEL with occasional limestone lithorelics. (WEATHERED CORNBASH FORMATION)			CB	
				(50/0.274) (S)		78.59	1.75			Very stiff light greenish brown slightly sandy very gravelly CLAY. Gravel is fine to coarse subangular limestone. Rare limestone cobbles. (WEATHERED CORNBASH FORMATION)			CB	
4.35				(50/0.183) (S)		78.09	2.25			Extremely weak light brown LIMESTONE recovered as light brown silty fine to medium subangular gravel. (CORNBASH FORMATION)			FMB	
				(50/0.026) (S)		77.49	2.85			Very stiff dark green mottled orangish brown gravelly CLAY. Gravel is fine subangular limestone lithorelics. (FOREST MARBLE FORMATION)			FMB	
				(50/0.085) (S)		77.24	3.10			Very weak grey fine grained LIMESTONE. (FOREST MARBLE FORMATION)			FMB	
	90	80	100			75.99	4.35			Very stiff dark bluish grey silty CLAY with frequent mudstone lithorelics. ...locally slightly sandy (FOREST MARBLE FORMATION)			FMB	
5.35						75.54	4.80			...becoming an extremely weak MUDSTONE below 3.5m			FMB	
	100	85	90			74.44	5.90			Strong grey fine grained LIMESTONE. (FOREST MARBLE FORMATION)			FMB	
6.25						73.69	6.65			Very stiff to hard dark green silty CLAY. (FOREST MARBLE FORMATION)			FMB	
	90	90	90			72.54	7.80			...locally an extremely weak dark green MUDSTONE			FMB	
7.25						72.34	8.00			Strong grey fine grained LIMESTONE. (FOREST MARBLE FORMATION)			FMB	
8.00										Extremely weak to weak dark green MUDSTONE			FMB	
										Strong dark grey shelly medium grained LIMESTONE. (FOREST MARBLE FORMATION)			FMB	END

08 WSP DRILLHOLE/ROTARY LOG 00028453.KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia
08-10-12	00.00	4.00	3.00	300		4.35	8.00	Air/Mist	good	3.00	300
10-10-12	00.00	8.00	3.00								
Chiselling				Water Added		General Remarks					
From	To	Hours	Tool	From	To						
				4.35	8						
Scale 1:62.5		Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									



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ROTARY DRILLHOLE LOG

Hole No.
BH705

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**05-10-12
08-10-12**

Contractor / Driller C.J. Associates	Method/Plant Used Comacchio 300	Logged By HG	Co-Ordinates (NGR) E 456642.514 N 222260.370	Ground Level (m AOD) 77.714
------------------------------------------------	-------------------------------------------	------------------------	------------------------------------------------------------	---------------------------------------

RUN DETAILS				STRATA								Install / Backfill	
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa)	Elev. (mAOD)	Depth (Thickness)	Discontinuities	Description	Main	Legend	Geology	Dia. mm
				(15) (S)		77.51	0.20		Reddish brown slightly sandy slightly gravelly CLAY. (TOPSOIL)			TS	
							(0.60)		Light grey slightly clayey sandy fine and medium tabular GRAVEL. (WEATHERED CORNBURASH FORMATION)			CB	
						76.91	0.80		Stiff consistency brown mottled orange and grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium angular weathered limestone. (WEATHERED CORNBURASH FORMATION)			CB	
				(14) (S)		76.21	1.50		Stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium weathered limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)			CB	
				(17) (S)			(1.20)		Stiff bluish grey CLAY with occasional organic material. (FOREST MARBLE FORMATION)			FMB	
				(38) (S)		73.71	4.00	3.90 - 4.00 Very weak limestone.	Stiff to very stiff bluish grey silty CLAY. (FOREST MARBLE FORMATION)			FMB	
							(0.85)		4.60 - 4.85 Very weak limestone.			FMB	
				(50/0.042) (S)		72.86	4.85	4.85 - 5.00 No recovery.	Strong dark grey fine grained shelly LIMESTONE. Horizontal very close fractures. TCR- 100 % SCR- 100% RQD-0%. (FOREST MARBLE FORMATION)			FMB	
						72.61	5.10		Strong light grey fine grained LIMESTONE. Horizontal medium fractures. TCR-100% SCR- 100% RQD 100% FI 70/300. (FOREST MARBLE FORMATION)			FMB	
						72.18	5.53	5.53 - 5.60 Recovered as non intact weak light blue grey limestone.	Very stiff to hard light bluish grey CLAY. (FOREST MARBLE FORMATION)			FMB	
				(50/0.037) (S)		71.71	6.00		Strong light grey fine grained shelly LIMESTONE. Horizontal medium fractures. TCR - 60% SCR-100%. RQD-100% FI 300. (FOREST MARBLE FORMATION)			FMB	
						71.41	6.30	6.50 - 6.80 No recovery.	Strong light grey fine grained LIMESTONE. Close subhorizontal fractures . TCR 100% SCR 80% RQD- 50% FI-100. (FOREST MARBLE FORMATION)			FMB	
							(0.47)		Very stiff to hard green CLAY interbedded with weak limestone. (FOREST MARBLE FORMATION)			FMB	
				(50/0.031) (S)		70.71	7.00	7.00 - 7.20 Dark grey.	Strong light grey fine grained LIMESTONE. Horizontal close fractures. TCR-100% SCR- 100% RQD-100% FI100.			FMB	
						69.81	7.90					FMB	
						69.71	8.00					FMB	

08 WSP DRILLHOLE/ROTARY LOG 00028453.KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia
08-10-12	00.00	8.00	3.00	300	0	5.00	8.00	Air/Mist	Good	3.00	300
Chiselling						Water Added					
From	To	Hours	Tool	From	To	General Remarks					
				5	8	Artesian between 6.50-8.00m bgl.					
Scale 1:62.5		Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									



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ROTARY DRILLHOLE LOG

Hole No. **BH706**

Project **Kingsmere Bicester Phase 2**

Sheet **1 of 1**

Job No **00028453/001** Client **Countryside Properties Ltd**

Date **04-10-12
05-10-12**

Contractor / Driller **C.J. Associates** Method/Plant Used **Comacchio 300** Logged By **OEG** Co-Ordinates (NGR) **E 456569.523
N 222110.076** Ground Level (m AOD) **76.934**

RUN DETAILS				STRATA										Install / Backfill
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa)	Elev. (mAOD)	Depth (Thick-ness)	Discontinuities	Detail	Description	Main	Legend	Geology	Dia. mm
3.00				(50/0.166) (S)	1	76.63	0.30			Stubble over brown slightly sandy clayey SILT with frequent rootlets. Rare fine and medium subangular limestone gravel. (TOPSOIL)		TS		
						76.23	0.70			Orangish brown clayey slightly sandy fine to coarse subangular limestone GRAVEL with occasional cobbles. (WEATHERED CORNBURASH FORMATION)		CB		
						75.93	1.00			Orangish brown very clayey sandy medium subangular GRAVEL. Gravel is limestone gravel and lithorelics. (WEATHERED CORNBURASH FORMATION)		CB		
4.00	60	70	60	(23) (S)	2		(2.00)			Stiff to very stiff consistency dark bluish grey silty CLAY with occasional mudstone lithorelics. (FOREST MARBLE FORMATION)		FMB		
						73.93	3.00			Strong greyish green fine grained LIMESTONE. (FOREST MARBLE FORMATION)		FMB		
						73.83	3.10			Very stiff dark bluish grey silty CLAY. (FOREST MARBLE FORMATION)		FMB		
						73.73	3.20			Strong greyish green fine grained LIMESTONE. (FOREST MARBLE FORMATION)		FMB		
5.10	100	90	80	(25) (S)	3		(1.50)			Extremely weak to very weak grey MUDSTONE. (FOREST MARBLE FORMATION)		FMB		
						72.03	4.90			Very stiff to hard greyish green silty CLAY. (FOREST MARBLE FORMATION)		FMB		
						71.73	5.20			Strong grey fine grained LIMESTONE. (FOREST MARBLE FORMATION)		FMB		
6.60	100	90	90	(50/0.028) (S)	4		(1.20)			Extremely weak dark grey MUDSTONE. (FOREST MARBLE FORMATION)		FMB		
						70.53	6.40			Strong grey fine grained LIMESTONE. (FOREST MARBLE FORMATION)		FMB		
8.10	90	80	80	(50/0.021) (S)	5		(1.30)					FMB		
						69.23	7.70			Stiff to very stiff consistency dark green and dark bluish grey silty CLAY with frequent mudstone lithorelics. (FOREST MARBLE FORMATION)		FMB		
				(40) (S)	6	68.83	8.10					FMB		
													END	

08 WSP DRILLHOLE/ROTARY LOG 00028453.KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia
04-10-12	00.00	2.00	1.60	300		3.00	8.10	Air/mist	good	3.00	300
05-10-12	00.00	8.10	3.00								
Chiselling				Water Added		General Remarks					
From	To	Hours	Tool	From	To						
				3	8.1						
Scale 1:62.5		Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									



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ROTARY DRILLHOLE LOG

Hole No.
BH707

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd


Date
04-10-12
04-10-12





Contractor / Driller C.J. Associates	Method/Plant Used Comacchio 300	Logged By OEG	Co-Ordinates (NGR) E 456783.771 N 222129.800	Ground Level (m AOD) 74.617
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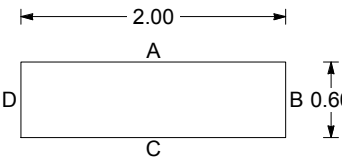
RUN DETAILS				STRATA										Install / Backfill
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa)	Elev. (mAOD)	Depth (Thickness)	Discontinuities	Detail	Description	Main	Legend	Geology	Dia. mm
				(50/0.173) (S)		74.32	0.30			Grass and stubble over brown slightly sandy silty CLAY with frequent rootlets and rare coarse angular and subangular limestone gravel. (TOPSOIL)		TS		
						74.12	0.50			Brown very clayey angular and subangular fine and medium limestone GRAVEL. (WEATHERED CORNBURASH FORMATION)		CB		
							(1.50)			Orangish brown and grey slightly sandy clayey angular and subangular fine to coarse limestone GRAVEL. (WEATHERED CORNBURASH FORMATION)		CB		
				(42) (S)		72.62	2.00			Soft to stiff orangish brown slightly sandy gravelly CLAY. Gravel is fine to medium subrounded limestone. (WEATHERED CORNBURASH FORMATION)		CB		
						72.32	2.30			Very stiff dark grey slightly silty CLAY with rare fine to medium mudstone gravel. (FOREST MARBLE FORMATION)		FMB		
4.20				(28) (S)			(1.90)							
				(46) (S)		70.42	4.20			Weak dark grey MUDSTONE. Wide horizontal fractures. FI NI/100/200 (FOREST MARBLE FORMATION)		FMB		
5.00	80	80	80	(21) (S)		69.62	5.00			Very stiff dark bluish grey slightly silty CLAY. (FOREST MARBLE FORMATION)		FMB		
5.90						68.72	5.90			Medium strong to strong grey fine grained LIMESTONE. Horizontal medium drilling induced fractures. FI NI/200/350/450. (FOREST MARBLE FORMATION)		FMB		
7.10	90	80	80	(50/0.039) (S)		67.52	7.10			Very stiff to hard dark bluish grey slightly silty CLAY with rare carbonaceous material. Frequent mudstone lithorelics. (FOREST MARBLE FORMATION)		FMB		
						66.92	7.70			Very stiff dark green slightly sandy slightly silty CLAY. (FOREST MARBLE FORMATION)		FMB		
				(33) (S)		66.62	8.00					END		


08 WSP DRILLHOLE/ROTARY LOG 00028453.KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12


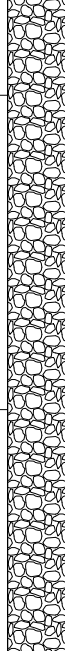


Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia
04-10-12	00.00	8.00	4.00	300	4.26	4.00	8.00	Air/Mist	Good	3.00	300
Chiselling				Water Added		General Remarks					
From	To	Hours	Tool	From	To						
				4	8						
Scale 1:62.5		Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									

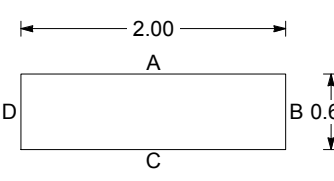
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP701
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 03-10-12 03-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456450.441 N 222681.117	Ground Level (m AOD) 81.171


SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.20 0.20 0.20	B D ES					80.87	(0.30) 0.30	Brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular limestone. Frequent roots and rootlets. (TOPSOIL)		TS	
0.60 0.60 0.60	B D ES					80.02	(0.85) 1.15	Recovered as yellow brown slightly sandy slightly gravelly clayey COBBLES of LIMESTONE. Gravel is subangular, tabular of limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB	
					↓ 1 =			End of trial pit at 1.15m bgl - Refusal on hard strata. Soakaway test performed in pit.		END	






	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.60m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation degrees from north				1.15			
General Remarks End of trial pit at 1.15m bgl - Terminated on hard strata. Slight seepage at 1.15m bgl. Soakaway test performed in pit.								
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							

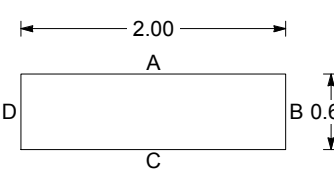
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG		Hole No. TP702	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 01-10-12 01-10-12	
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456609.522 N 222478.777	Ground Level (m AOD) 81.095


SAMPLES & TESTS						STRATA					Install / Backfill	
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.20 0.20 0.20	B D ES					80.70	0.40	Orangish brown, slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.60 0.60 0.60	B D ES					(1.30)		Soft light yellow to grey slightly sandy, very gravelly CLAY. Gravel is fine to medium, subangular weak weathered limestone. (WEATHERED CORNBASH FORMATION)		CB		
2.00 2.00	B D	2.00	2.25			79.40	1.70	Firm orangish grey very gravelly CLAY. Gravel is rounded fine limestone. (WEATHERED CORNBASH FORMATION)		CB		
						78.40	2.70				END	


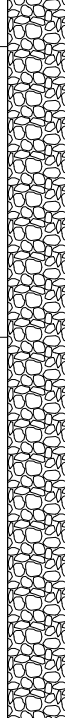


	Length	2.00m	Shoring/Support: None	Water Strikes					
	Width	0.60m		Stability:	Date	Time	Strike	Minutes	Standing
	Orientation	degrees from north	Minor sidewall collapse.	01-10-12	10.33	1.70			
Scale 1:31.25				General Remarks End of trial pit at 2.70m bgl - Terminated on hard strata. Seepage at 1.70m bgl.					
Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									

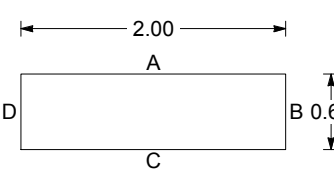
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG		Hole No. TP703	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 01-10-12 01-10-12	
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456363.240 N 222461.806	Ground Level (m AOD) 81.927


SAMPLES & TESTS						STRATA				Install / Backfill	
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend		Geology
0.10 0.10 0.10	B D ES				↓ Water	81.73	0.20	Grass and stubble over orangish brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		UNKNOWN	
0.50	B			81.33		0.60	Dark reddish brown clayey tabular limestone COBBLES. (WEATHERED CORNBURASH FORMATION)		CB		
1.00 1.00 1.00	B D ES			80.43		1.50	Very soft to soft orangish yellow gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to medium limestone. (WEATHERED CORNBURASH FORMATION)		CB		
1.60 1.60	B D			79.53		2.40	Firm to stiff mottled orangish brown/light grey slightly gravelly CLAY. Gravel is subangular fine to medium limestone. (WEATHERED CORNBURASH FORMATION)		CB		
										END	



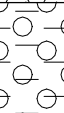
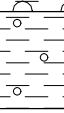
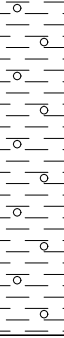
	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.60m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation degrees from north			01-10-12	11.57	1.40		
Scale 1:31.25			Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.					
			General Remarks End of trial pit at 2.40m bgl - Terminated on hard strata.					

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG		Hole No. TP704	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 01-10-12 01-10-12	
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456521.546 N 222453.904	Ground Level (m AOD) 81.887

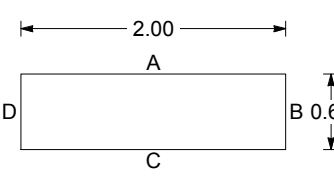
SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
					↓ Water	81.69	0.20	Orangish brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.80	ES						(1.20)	Firm orangish brown gravelly CLAY with abundant cobbles. Cobbles are angular, tabular limestone. (WEATHERED CORNBURASH FORMATION)		CB	
1.00 1.00	B D					80.49	1.40	Firm to stiff light grey to greyish blue mottled orange slightly sandy slightly gravelly CLAY. Gravel is subangular, fine to medium limestone. (WEATHERED CORNBURASH FORMATION)		CB	
2.00 2.00	B D						(1.60)			CB	
						78.89	3.00				END


	Length	2.00m	Shoring/Support: None	Water Strikes					
	Width	0.60m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation	degrees from north			01-10-12	11.21	1.20		
Scale 1:31.25				Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.					
				General Remarks End of trial pit at 3.00m bgl - Terminated on hard strata.					




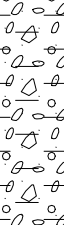



 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG		Hole No. TP705	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 01-10-12 01-10-12	
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456375.727 N 222329.723	Ground Level (m AOD) 81.279

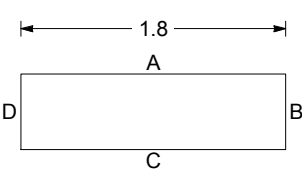
SAMPLES & TESTS						STRATA				Install / Backfill	
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend		Geology
0.50	B D ES		1.50			81.08	0.20	Grass and stubble over orangish brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.50						0.50	80.58	0.70	Dark reddish brown clayey tabular limestone COBBLES. (WEATHERED CORNBURASH FORMATION)		
0.50	1.50	1.50	80.18	1.10	Very soft to soft, orangish yellow gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to medium limestone. (WEATHERED CORNBURASH FORMATION)		CB				
1.50	1.50	1.50	78.78	2.50	Firm to stiff, light grey mottled orangish brown slightly gravelly CLAY. Gravel is subangular, fine to medium limestone. Occasional black staining. (WEATHERED CORNBURASH FORMATION)		CB				
2.50	B D									END	


08 WSP TP LOG STANDARD_00028453_KINGSMERE BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12





	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.60m		Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	Stability: Collapse from 0.60m bgl.	General Remarks End of trial pit at 2.50m bgl - Terminated on hard strata. Pit dry.					
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							

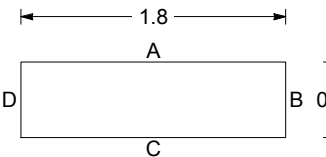
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP705A
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 08-10-12 08-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456375.727 N 222329.723	Ground Level (m AOD) 81.279

SAMPLES & TESTS						STRATA					Install / Backfill	
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
						81.08	0.20	Brown slightly sandy CLAY with frequent rootlets. Grass and stubble over.		UNKNOWN		
							(1.00)		Orangish brown slightly sandy slightly clayey angular and subangular fine to coarse GRAVEL with frequent cobbles. Gravel ad cobbles are tabular limestone. (WEATHERED CORNBURASH FORMATION)		CB	
							80.08	1.20	Stiff light bluish grey very gravelly CLAY. Gravel is subangular, fine to medium limestone. (WEATHERED CORNBURASH FORMATION)		CB	
							79.68	1.60			END	


	Length 1.80m	Shoring/Support: None	Water Strikes					
	Width 0.80m		Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	Stability: Spalling 0.60m Face C			1.10			Fast seepages all faces
Scale 1:31.25			Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.					



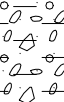

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP705B
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 08-10-12 08-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456375.727 N 222329.723	Ground Level (m AOD) 81.279

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
						80.98	(0.30) 0.30	Grass and stubble over brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
					↓	80.58	(0.40) 0.70	Orangish brown slightly sandy clayey angular and subangular fine to coarse tabular limestone GRAVEL. (WEATHERED CORNBRAH FORMATION)		CB		
					↓	80.18	(0.40) 1.10	Very stiff light bluish grey speckled white slightly silty slightly gravelly CLAY. Gravel is fine to medium subrounded limestone lithorelics. (WEATHERED CORNBRAH FORMATION)		CB		
										END		

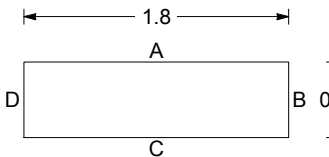
	Length 1.80m	Shoring/Support: None	Water Strikes					
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation degrees from north				0.60 1.00			
General Remarks End of pit at 1.1m bgl								
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							


08 WSP TP LOG STANDARD_00028453_KINGSMERE_BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12



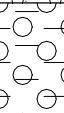
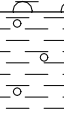


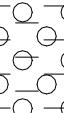
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP705C
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 08-10-12 08-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456375.727 N 222329.723	Ground Level (m AOD) 81.279

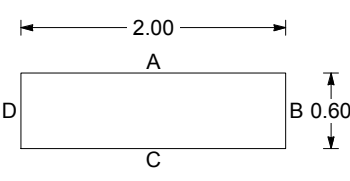
SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kNm/m ²)	P Pen (kNm/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
						80.98	0.30	Grass and stubble over brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
						80.38	0.90	Orangish brown slightly sandy clayey angular and subangular fine to coarse GRAVEL with frequent cobbles. Gravel and cobbles are tabular limestone. (WEATHERED CORNBRAsh FORMATION)		CB	
						80.18	1.10	Stiff to very stiff light bluish green and white slightly gravelly slightly silty CLAY with frequent limestone lithorelics and rare cobbles. Gravel is medium to coarse subangular limestone. Cobbles are limestone. (WEATHERED CORNBRAsh FORMATION)		CB	
										END	

08 WSP TP LOG STANDARD_00028453_KINGSMERE BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12


	Length 1.80m	Shoring/Support: None	Water Strikes					
	Width 0.80m		Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	Stability: Stable	General Remarks Pit dry. Soakaway test performed in pit.					
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							



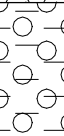
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG		Hole No. TP706	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 01-10-12 01-10-12	
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456497.419 N 222328.655	Ground Level (m AOD) 80.409

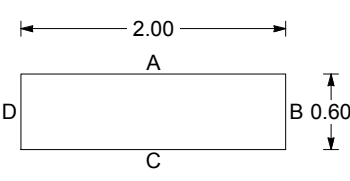
SAMPLES & TESTS						STRATA				Install / Backfill	
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend		Geology
0.20 0.20 0.20	B D ES					80.11	(0.30) 0.30	Grass and stubble over orangish brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
						79.61	(0.50) 0.80	Dark reddish brown clayey tabular limestone COBBLES. (WEATHERED CORNBRAsh FORMATION)		CB	
0.80 0.80	B D						(0.70)	Firm orangish yellow slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular, fine to medium limestone. (WEATHERED CORNBRAsh FORMATION)		CB	
1.50 1.50 1.50	B D ES					78.91	1.50	Firm to stiff light grey mottled orangish brown slightly gravelly CLAY. Gravel is subangular, fine to medium of weak weathered limestone. (WEATHERED CORNBRAsh FORMATION)		CB	
							(1.90)			CB	
3.00 3.00	B D					77.01	3.40	3.30 Becoming gravelly. Gravel is rounded and fine.		CB	
3.40 3.40	B D					76.81	3.60	Stiff bluish grey mottled orange slightly sandy gravelly CLAY with frequent cobbles. Gravel is angular, fine to coarse of strong limestone. Sand is fine to coarse. (WEATHERED CORNBRAsh FORMATION)		CB	
										END	


	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.60m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation degrees from north			01-10-12	13.47	1.40		
Scale 1:31.25			General Remarks End of trial pit at 3.60m bgl - Terminated on hard strata. Pit dry.					
Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								



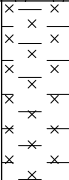
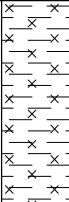
08 WSP TP LOG STANDARD_00028453_KINGSMERE BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP707
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 01-10-12 01-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456619.839 N 222327.504	Ground Level (m AOD) 78.975

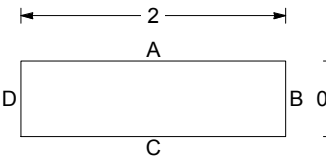
SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.50 0.50	B D					78.78	0.20	Grass and stubble over orangish brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
							(0.60)	Dark orangish brown clayey tabular limestone COBBLES. (WEATHERED CORNBURASH FORMATION)		CB		
						78.18	0.80			END		


	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.60m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation degrees from north	General Remarks End of trial pit at 0.80m bgl - Terminated on hard strata. Pit dry.						
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							




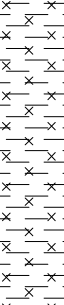
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP708
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 01-10-12 01-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456418.857 N 222200.386	Ground Level (m AOD) 79.275

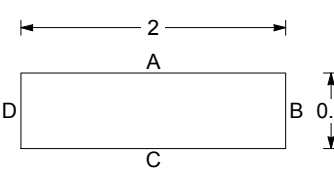
SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.40	ES					78.98	(0.30)	Stubble over orangish brown slightly sandy clayey SILT with frequent rootlets. (TOPSOIL)		TS		
							(1.30)	Firm light brown and white clayey SILT with rare coarse gravel and rare cobbles. Cobbles are limestone. Abundant fine white lithorelics. (WEATHERED CORNBASH FORMATION)		CB		
1.10	B					77.68	1.60	Very stiff to hard bluish grey silty CLAY with numerous cobbles. Cobbles are angular tabular limestone. (WEATHERED CORNBASH FORMATION)		CB		
							(0.90)					
						76.78	2.50			END		

08 WSP TP LOG STANDARD_00028453_KINGSMERE BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12


	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.80m		Stability: Stable	Date 02-10-12	Time 10.09	Strike 1.90	Minutes	Standing
	Orientation degrees from north		General Remarks End of trial pit at 2.5m bgl - Terminated on hard strata. Pit dry.					
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							




 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP709
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 02-10-12 02-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456538.888 N 222208.384	Ground Level (m AOD) 78.248

SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.30	ES				↓	77.90	0.35 (0.35)	Dark brown slightly sandy clayey SILT with rare coarse gravel. (TOPSOIL)		TS	
0.60	B			77.65		0.60 (0.25)	Orangish brown slightly clayey gravelly COBBLES. (WEATHERED CORNBURASH FORMATION)		CB		
				76.35		1.90 (1.30)	Very stiff, bluish grey to orangish brown slightly sandy silty CLAY with frequent cobbles. Cobbles are limestone. Terminated on hard strata. (WEATHERED CORNBURASH FORMATION)		CB		
										END	


	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.70m		Stability: Stable	Date	Time	Strike 1.00	Minutes	Standing
	Orientation degrees from north	General Remarks End of trial pit at 1.90m bgl - Terminated on hard strata. Pit dry.						
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							




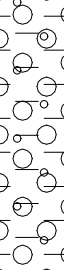
08 WSP TP LOG STANDARD_00028453_KINGSMERE_BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12

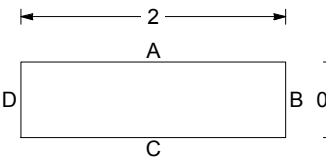
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP710
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 01-10-12 01-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456670.522 N 222200.786	Ground Level (m AOD) 76.663

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.10	B					76.46	0.20	Grass and stubble over orangish brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.10	ES							Orangish brown clayey tabular limestone COBBLES. WEATHERED CORNBASH FORMATION)		CB		
0.50	B						(0.90)					
					↓ 1	75.56	1.10				END	


	Length	2.00m	Shoring/Support: None	Water Strikes						
	Width	0.60m		Stability:	Date	Time	Strike	Minutes	Standing	Remarks
	Orientation	degrees from north	Stable	01-10-12	15.29	1.10				Seepage.
Scale 1:31.25				General Remarks End of trial pit at 1.10m bgl - Terminated on hard strata. Pit dry.						
Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.										





 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP711
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 02-10-12 02-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456453.585 N 222105.883	Ground Level (m AOD) 77.705

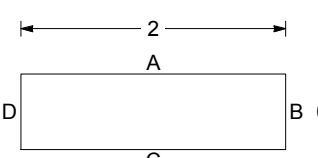
SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.80	B					77.51	0.20	Stubble over dark brown slightly sandy clayey SILT with frequent rootlets. (TOPSOIL)		TS	
							(1.20)	Orangish brown and grey slightly clayey gravelly angular and subangular limestone COBBLES. Gravel is fine to coarse angular and subangular limestone. (WEATHERED CORNBURASH FORMATION)		CB	
						76.31	1.40			END	


	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation degrees from north			02-10-12	10.42	1.30		
General Remarks End of trial pit at 1.40m bgl - Terminated on hard strata. Pit dry.								
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							


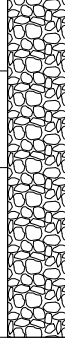


08 WSP TP LOG STANDARD_00028453_KINGSMERE_BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12

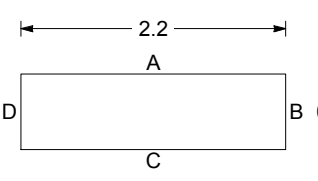
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP712
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 02-10-12 02-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456634.450 N 222116.027	Ground Level (m AOD) 76.824

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.60	ES					76.52	(0.30) 0.30	Grass over reddish brown slightly sandy slightly silty CLAY with abundant rootlets and frequent medium to coarse subangular limestone gravel. (TOPSOIL)		TS		
						76.02	(0.50) 0.80	Reddish brown slightly gravelly clayey fine to coarse SAND with numerous rootlets. (SUBSOIL)		TS		
1.40	B					75.32	(0.70) 1.50	Reddish brown and grey sandy angular and subangular medium and coarse GRAVEL with abundant cobbles. Gravel and cobbles are tabular limestone. (WEATHERED CORNBRASS FORMATION)		CB		
										END		


	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 0.80m		Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	Stability: Stable	General Remarks End of trial pit at 1.50m bgl - Terminated on hard strata. Pit dry. Soakaway test performed in pit.					
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							





 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG		Hole No. TP713	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 02-10-12 02-10-12	
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456590.284 N 222023.855	Ground Level (m AOD) 75.748

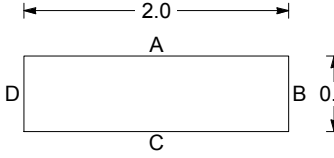
SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.50	ES					75.45	(0.30) 0.30	Grass and stubble over dark brown slightly gravelly very clayey SILT with frequent rootlets. Gravel is fine to medium subangular limestone. (TOPSOIL)		TS	
						75.05	(0.40) 0.70	Brown and grey slightly sandy clayey angular and subangular COBBLES. (WEATHERED CORNBRAsh FORMATION)		CB	
						74.35	(0.70) 1.40	Brown and grey slightly sandy gravelly BOULDERS with abundant cobbles. Cobbles and gravel are tabular limestone. (WEATHERED CORNBRAsh FORMATION)		CB	
										END	

	Length 2.20m	Shoring/Support: None	Water Strikes					
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing
	Orientation degrees from north	General Remarks End of trial pit at 1.40m bgl - Terminated on hard strata. Pit dry.						
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							


08 WSP TP LOG STANDARD_00028453_KINGSMERE_BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12



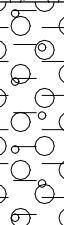
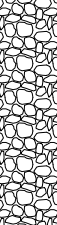
 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP714
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 02-10-12 02-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456694.876 N 222061.325	Ground Level (m AOD) 75.132

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.50	ES					74.83	(0.30) 0.30	Grass over reddish brown slightly clayey silty fine and medium SAND with frequent rootlets. (TOPSOIL)		TS		
1.00	B					74.13	(0.70) 1.00	Orangish brown and grey slightly silty sandy angular and subangular fine to coarse GRAVEL with frequent cobbles. Gravel and cobbles are tabular limestone. (WEATHERED CORNBURASH FORMATION) 0.80 Frequent boulders		CB		
						73.93	1.20	Orangish brown and grey slightly silty sandy angular and subangular fine to coarse COBBLES with abundant boulders. Cobbles and boulders are tabular limestone. (WEATHERED CORNBURASH FORMATION)		CB		
										END		

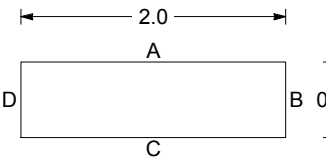
	Length 2.00m	Shoring/Support: None	Water Strikes						
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	General Remarks End of trial pit at 1.20m bgl - Terminated on hard strata. Pit dry.							
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								


08 WSP TP LOG STANDARD_00028453_KINGSMERE BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12


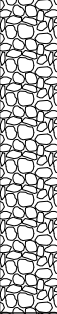

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP715
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 02-10-12 02-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456843.283 N 222058.886	Ground Level (m AOD) 73.643

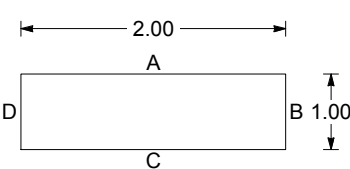
SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
						73.34	0.30	Grass and stubble over brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.60 0.70	ES B					72.34	1.30	Orangish brown and grey slightly clayey gravelly angular and subangular COBBLES. Gravel is fine to coarse. Gravel and cobbles are tabular limestone. (WEATHERED CORNBRASS FORMATION)		CB		
										END		

08 WSP TP LOG STANDARD_00028453_KINGSMERE_BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12


	Length 2.00m	Shoring/Support: None	Water Strikes							
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing	Remarks	
	Orientation degrees from north	General Remarks End of trial pit at 1.30m bgl - Terminated on hard strata. Pit dry.								
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.									




 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP716
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 03-10-12 03-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456680.896 N 221935.636	Ground Level (m AOD) 74.067

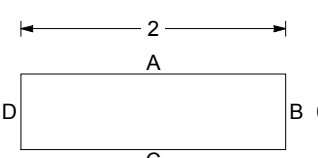
SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.80	B D					73.67	0.40	Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular, tabular of limestone. (TOPSOIL)		TS		
0.80						72.77	1.30	Yellowish brown slightly clayey sandy gravelly tabular limestone COBBLES. Gravel is subangular, fine to coarse limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB		
												END

	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 1.00m		Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	Stability: Stable	General Remarks End of trial pit at 1.30m bgl - Terminated on hard strata. Pit dry.					
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.							


08 WSP TP LOG STANDARD 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

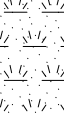
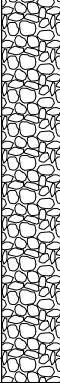

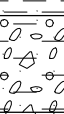

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP717
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 02-10-12 02-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456487.261 N 221863.542	Ground Level (m AOD) 74.176

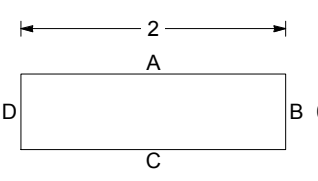
SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.40	ES B					73.78	0.40	Brown slightly sandy silty CLAY with frequent rootlets and frequent straw. (TOPSOIL)		TS	
0.50						73.18	1.00	Orangish brown slightly clayey gravelly COBBLES. (WEATHERED CORNBRASS FORMATION)		CB	
										END	

	Length 2.00m	Shoring/Support: None	Water Strikes						
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	General Remarks End of trial pit at 1.0m bgl - Terminated on hard strata. Pit dry.							
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								


08 WSP TP LOG STANDARD_00028453_KINGSMERE_BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12

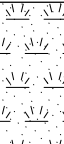
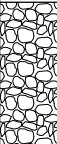
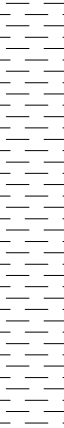


 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP718
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 02-10-12 02-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456520.582 N 221790.305	Ground Level (m AOD) 73.738

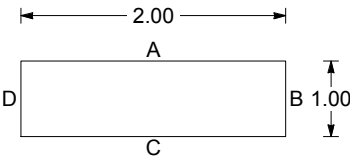
SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.70 0.80	B ES					73.24	0.50	Brown slightly sandy slightly silty CLAY with frequent rootlets. (TOPSOIL)		TS	
						72.64	1.10	Stiff brown mottled orangish brown slightly sandy CLAY with occasional roots and rootlets. Locally greenish grey. (WEATHERED CORNBURASH FORMATION)		CB	
						72.24	1.50	Orangish brown clayey sandy fine to coarse angular to subangular limestone GRAVEL. (WEATHERED CORNBURASH FORMATION)		CB	
						72.14	1.60	Bluish grey slightly clayey slightly sandy tabular angular and subangular limestone COBBLES. Occasional limestone boulders. (WEATHERED CORNBURASH FORMATION)		CB END	

	Length 2.00m	Shoring/Support: None	Water Strikes						
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	General Remarks End of pit at 1.6m bgl - Terminated on hard strata. Minor seepage at base of pit							
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								


08 WSP TP LOG STANDARD 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12


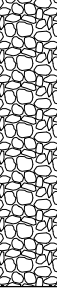


 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG		Hole No. TP719	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 03-10-12 03-10-12	
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By HG	Co-Ordinates (NGR) E 456537.700 N 221732.641	Ground Level (m AOD) 73.926

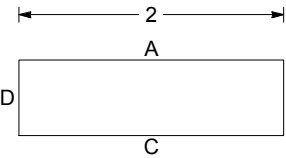
SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology		
0.40 0.40 0.40	B D ES					73.33	0.60	Brown slightly sandy CLAY. Sand is fine to medium. (TOPSOIL)		TS		
1.40 1.40 1.40	B D ES						(1.80)	Firm to stiff mottled orangish brown CLAY. Occasional lenses of fine to medium sand. Rare black organic material. (WEATHERED CORNBURSH FORMATION)		CB		
2.30 2.30	B D					71.53	2.40			END		

	Length 2.00m	Shoring/Support: None	Water Strikes					
	Width 1.00m		Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	Stability: Stable			2.40			Seepage
Scale 1:31.25			General Remarks End of pit at 2.4m bgl - Terminated on hard strata.					
Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								

08 WSP TP LOG STANDARD 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 16/11/12

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	TRIAL PIT LOG			Hole No. TP720
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 08-10-12 08-10-12
Contractor / Driller	Method/Plant Used JCB 3CX	Logged By OEG	Co-Ordinates (NGR) E 456490.568 N 221932.119	Ground Level (m AOD) 74.996

SAMPLES & TESTS						STRATA					Install / Backfill
Depth	Type	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
						74.65	0.35	Brown slightly sandy CLAY with frequent rootlets and straw. (TOPSOIL)		TS	
						74.30	0.70	Orangish brown slightly sandy clayey angular and subangular fine to medium limestone GRAVEL. (WEATHERED CORNBURASH FORMATION) ...locally a stiff consistency bluish green silty clay with occasional fine to medium subangular limestone gravel.		CB	
						73.80	1.20	Orangish brown slightly clayey gravelly angular and subangular COBBLES with frequent boulders. Gravel, cobbles and boulders are limestone. (WEATHERED CORNBURASH FORMATION)		CB	
										END	

	Length 2.00m	Shoring/Support: None	Water Strikes						
	Width 0.80m		Stability: Stable	Date	Time	Strike	Minutes	Standing	Remarks
	Orientation degrees from north	General Remarks Terminated on hard strata. Soakaway test performed in base of pit.							
Scale 1:31.25	Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								

08 WSP TP LOG STANDARD_00028453_KINGSMERE_BICESTER.GPJ_WSPTEMPLATE1.03.GDT_16/11/12



WSP Environmental Limited
 Mountbatten House
 RG21 4HJ
 Telephone: 01256 318800
 Fax: 01256 318700

WINDOW SAMPLE LOG

Hole No.
WS701

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
03-10-12
03-10-12

Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By JEM	Co-Ordinates (NGR) E 456684.124 N 222594.486	Ground Level (m AOD) 79.568
------------------------------------------------	--------------------------------------------	-------------------------	------------------------------------------------------------------	---------------------------------------


SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.30-1.00	ES	.					79.27	0.30	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
1.00-1.45	D (S)	3,4,4 6,7,11 N=28.					78.47	1.10	Firm to stiff orangish brown to light grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB	
1.10-1.50	ES	.						(0.90)	Stiff to hard fissured grey mottled orangish brown slightly sandy gravelly blocky CLAY. Gravel is fine to coarse subrounded to subangular limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB	
2.00	D (S)	4,4,5 16,29 N=50/ 0,225.					77.57	2.00			END	







08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	WINDOW SAMPLE LOG		Hole No. WS702	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 03-10-12 03-10-12	
Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By JEM	Co-Ordinates (NGR) E 456425.417 N 222604.322	Ground Level (m AOD) 81.606

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.10-0.30	ES						81.31	(0.30) 0.30	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
							80.91	(0.40) 0.70	Grey mottled brownish orange slightly clayey sandy subangular and subrounded medium and coarse limestone GRAVEL. (WEATHERED CORNBRAsh FORMATION)		CB	
1.00	D (S)	6,17,18 32 N=50/ 0.145.				↓	80.61	(0.30) 1.00	Very dense, orangish brown to grey slightly sandy clayey subangular and subrounded medium and coarse GRAVEL. Sand is fine to coarse. (WEATHERED CORNBRAsh FORMATION)		CB	
											END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						03-10-10	11.57	0.90	05		
						General Remarks Terminated on hard strata.					
Scale 1:37.5			Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12



WSP Environmental Limited
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 RG21 4HJ
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WINDOW SAMPLE LOG

Hole No.
WS703

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**03-10-12
03-10-12**

Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By JEM	Co-Ordinates (NGR) E 456547.518 N 222556.384	Ground Level (m AOD) 81.465
------------------------------------------------	--------------------------------------------	-------------------------	------------------------------------------------------------	---------------------------------------

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.10-0.40	ES	.					81.07	0.40	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
0.60	D (S)	11, 14, 23 12, 7, 10 N=52.					80.47	1.00	Very dense, grey mottled brownish orange slightly clayey sandy subangular and subrounded medium and coarse limestone GRAVEL. (WEATHERED CORNBURASH FORMATION)		CB	
1.20-1.50	ES	.					80.27	1.20	Firm to stiff, orangish brown to light grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB	
2.00	D (S)	2.45 50 N=55/ 0.15.					79.67	1.80	Stiff to hard grey mottled orangish brown slightly sandy CLAY with rare gravel. Gravel is fine to coarse subrounded to subangular limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB	
							79.47	2.00	Stiff to hard fissured grey mottled orangish brown CLAY with rare gravel. Gravel is fine to coarse subrounded to subangular limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		END	

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



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WINDOW SAMPLE LOG

Hole No.
WS704

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
03-10-12
03-10-12

Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By JEM	Co-Ordinates (NGR) E 456670.113 N 222522.256	Ground Level (m AOD) 79.893
------------------------------------------------	--------------------------------------------	-------------------------	------------------------------------------------------------------	---------------------------------------

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.40-0.90	ES	.					79.49	0.40	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
0.90-1.50	ES	.					78.99	0.90	Firm to stiff, orangish brown to light grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular limestone. Sand is fine to coarse. (WEATHERED CORNBRAH FORMATION)		CB	
1.00-1.45	D (S)	1,2,2 3,4,5 N=14.					78.39	1.50	Stiff to hard fissured grey mottled orangish brown blocky CLAY with rare gravel. Gravel is fine to coarse subrounded to subangular limestone. Sand is fine to coarse. (WEATHERED CORNBRAH FORMATION)		CB	
							78.09	1.80	Firm to stiff friable grey mottled orangish brown gravelly SILT. (WEATHERED CORNBRAH FORMATION)		CB	
2.00	D (S)	3,13,50 N=50/ 0.07.					77.89	2.00	Very stiff to hard fissured grey mottled orangish brown slightly sandy CLAY with rare gravel. Gravel is fine to coarse subrounded to subangular limestone. Sand is fine to coarse. (WEATHERED CORNBRAH FORMATION)		CB	
											END	

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



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WINDOW SAMPLE LOG

Hole No.
WS705

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
03-10-12
03-10-12

Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By JEM	Co-Ordinates (NGR) E 456408.858 N 222395.554	Ground Level (m AOD) 81.642
------------------------------------------------	--------------------------------------------	-------------------------	------------------------------------------------------------------	---------------------------------------

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.30-0.50	ES	.					81.14	0.50	Brown slightly gravelly CLAY with rare rootlets. (TOPSOIL)		TS	
							80.74	0.90	Grey mottled brownish orange slightly clayey sandy subangular and subrounded medium and coarse limestone GRAVEL. (WEATHERED CORNBURASH FORMATION)		CB	
1.00	D (S)	4.6,4 3.4,7 N=18.					80.34	1.30	Medium dense orangish brown to grey slightly sandy clayey subangular and subrounded medium and coarse limestone GRAVEL. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB	
1.50-2.00	ES	.					79.64	2.00	Stiff to hard grey mottled orangish brown slightly sandy CLAY with rare gravel. Gravel is subrounded to subangular fine to coarse limestone. Sand is fine to coarse. (WEATHERED CORNBURASH FORMATION)		CB	
2.00	D (S)	5,20.31 19 N=50/ 0.105.									END	

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					
Scale 1:37.5			Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								



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WINDOW SAMPLE LOG

Hole No.
WS706

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
03-10-12
03-10-12

Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By JEM	Co-Ordinates (NGR) E 456576.200 N 222478.100	Ground Level (m AOD) 81.000
------------------------------------------------	--------------------------------------------	-------------------------	------------------------------------------------------------------	---------------------------------------

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.40	ES	.				1 ↓	80.60	0.40	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
0.60-1.00	ES	.					80.45	0.55	Very soft to soft, dark orange to brown slightly sandy CLAY with rare fine gravel. (WEATHERED CORNBRAH FORMATION)		CB	
1.00	D (S)	3,3,3 3,4,5 N=15.					79.90	1.10	Light grey mottled orangish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse subangular of limestone. (WEATHERED CORNBRAH FORMATION)		CB	
							79.60	1.40	Very soft, brown sandy CLAY with rare fine gravel. (WEATHERED CORNBRAH FORMATION)		CB	
2.00	D (S)	2,2,4 8,12,28 N=52/ 0,265.					79.00	2.00	Stiff to hard fissured grey mottled orangish brown CLAY with rare gravel. Gravel is fine to coarse subrounded to subangular limestone. Sand is fine to coarse. (WEATHERED CORNBRAH FORMATION)		CB	
											END	

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						03-10-12		0.60			
						General Remarks Terminated on hard strata. Borehole coordinates and elevation estimated from topographical survey.					

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



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WINDOW SAMPLE LOG

Hole No.
WS707

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**03-10-12
03-10-12**

Contractor / Driller
C.J. Associates

Method/Plant Used
Competitor 130

Logged By
JEM

Co-Ordinates (NGR)
**E 456684.054
N 222327.464**

Ground Level (m AOD)
78.083

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
							77.68	0.40	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
							77.58	0.50	No recovery.		NODATA	
											END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12



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WINDOW SAMPLE LOG

Hole No.
WS707a

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**03-10-12
 03-10-12**

Contractor / Driller
C.J. Associates

Method/Plant Used
Competitor 130

Logged By
JEM

Co-Ordinates (NGR)
**E 456684.054
 N 222327.464**


Ground Level (m AOD)
78.083




SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.50	D (S)	10,15,39 11 N=50/ 0.085.						(0.40)	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
							77.68	0.40				
							77.58	0.50				

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
General Remarks Terminated on hard strata.											

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	WINDOW SAMPLE LOG			Hole No. WS708
	Project Kingsmere Bicester Phase 2			Sheet 1 of 1
Job No 00028453/001	Client Countryside Properties Ltd			Date 03-10-12 03-10-12
Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By JEM	Co-Ordinates (NGR) E 456534.486 N 222269.967	Ground Level (m AOD) 79.237

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
							78.94	0.30	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
							78.84	0.40	No recovery.		UNKNOWN	
											END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					
Scale 1:37.5			Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.								

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12



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WINDOW SAMPLE LOG

Hole No.
WS708a

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
**03-10-12
 03-10-12**

Contractor / Driller
C.J. Associates

Method/Plant Used
Competitor 130

Logged By
JEM

Co-Ordinates (NGR)
**E 456534.486
 N 222269.967**

Ground Level (m AOD)
79.237

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.40	(S)	17.8.50 N=50/ 0.06.					78.84	0.40	Brown slightly gravelly CLAY with rare rootlets (TOPSOIL).		TS	
0.60	D						78.64	0.60	Grey mottled brownish orange slightly sandy subangular and subrounded medium and coarse GRAVEL with rare clay. (WEATHERED CORNBURSH FORMATION)		CB	
											END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



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WINDOW SAMPLE LOG

Hole No.
WS709

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
04-10-12
04-10-12

Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By OEG	Co-Ordinates (NGR) E 456461.667 N 222163.596	Ground Level (m AOD) 78.248
------------------------------------------------	--------------------------------------------	-------------------------	------------------------------------------------------------------	---------------------------------------

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.40	(S)	25,30 20 N=50/ 0.11.					78.05	0.20	Grass and stubble over brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is fine to medium subangular tabular limestone gravel. Rare coarse subangular limestone gravel. (TOPSOIL)		TS	
							77.85	0.40			CB	
									Light brown and orangish brown slightly clayey slightly sandy angular and subangular fine and medium limestone GRAVEL. (WEATHERED CORNBURASH FORMATION)		END	

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
General Remarks Terminated on hard strata.											

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



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WINDOW SAMPLE LOG

Hole No.
WS710

Project
Kingsmere Bicester Phase 2

Sheet
1 of 1

Job No
00028453/001

Client
Countryside Properties Ltd

Date
04-10-12
04-10-12


Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By OEG	Co-Ordinates (NGR) E 456609.306 N 222170.394	Ground Level (m AOD) 77.071
------------------------------------------------	--------------------------------------------	-------------------------	------------------------------------------------------------------	---------------------------------------






SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.40	(S)	25,50 N=50/ 0.075.					76.92	0.15	Grass and stubble over brown slightly sandy silty CLAY with frequent rootlets and medium to coarse gravel. (TOPSOIL)		TS	
							76.72	0.35	Stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular limestone.		CB	
							76.57	0.50	(WEATHERED CORNBRASSH FORMATION) Very dense light brown clayey sandy medium subangular limestone GRAVEL. (WEATHERED CORNBRASSH FORMATION)		CB END	

08 WSP WINDOW SAMPLE LOG 00028453 KINGSMERE BICESTER.GPJ WSPTEMPLATE1.03.GDT 12/12/12

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					

Scale 1:37.5
 Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

 WSP Environmental Limited Mountbatten House RG21 4HJ Telephone: 01256 318800 Fax: 01256 318700	WINDOW SAMPLE LOG		Hole No. WS711	
	Project Kingsmere Bicester Phase 2		Sheet 1 of 1	
Job No 00028453/001	Client Countryside Properties Ltd		Date 04-10-12 04-10-12	
Contractor / Driller C.J. Associates	Method/Plant Used Competitor 130	Logged By OEG	Co-Ordinates (NGR) E 456634.450 N 222000.548	Ground Level (m AOD) 75.039

SAMPLES & TESTS							STRATA					Install / Backfill Dia. mm
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m ²)	P Pen (kN/m ²)	Water	Elev. (mAOD)	Depth (Thickness)	Description	Legend	Geology	
0.60	(S)	10,7,7 20,23 N=50/ 0.18.					74.64	0.40	Grass and stubble over brown slightly sandy silty CLAY with frequent rootlets and frequent fine to coarse tabular limestone gravel (TOPSOIL)		TS	
							74.44	0.60	Brown and grey slightly sandy angular and subangular fine to coarse limestone GRAVEL. (WEATHERED CORNBRASSH FORMATION)		CB	
											END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing
						General Remarks Terminated on hard strata.					

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

Appendix D – Monitoring Results

Groundwater and Ground Gas Monitoring Summary



Site Name	Kingsmere Bicester, Phase II Complete Results
Client	Countryside Properties Ltd
Job No.	00028453/001

Start Date	09/11/2012
End Date	14/12/2012
No. Visits	3

	Borehole	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow (l/hr)		Standing Water Level (m)		Gas Screening Value Methane (l/hr)	Gas Screening Value Carbon Dioxide (l/hr)
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
1	BH701	0.0	0.1	0.1	0.4	20.5	20.9	-0.2	0.0	1.10	1.55		
2	BH702	0.0	0.1	0.1	0.6	19.3	20.8	-0.2	0.0	1.45	1.63		
3	BH703	0.0	0.0	0.0	0.5	20.7	20.9	-0.3	0.0	3.02	3.80		
4	BH706	0.0	0.0	0.0	0.9	20.6	21.0	-0.8	0.1	1.43	1.88		0.0009
5	BH707	0.0	0.0	0.2	1.5	18.7	20.3	0.0	0.1	1.56	1.92		0.0015
6	WS701	0.0	0.1	0.0	1.2	19.2	21.1	-0.5	0.1	0.46	0.72	0.0001	0.0012
7	WS702	0.0	0.1	0.0	1.7	19.0	20.8	-0.2	0.0	0.71	1.19		
8	WS706	0.0	0.1	0.0	1.1	18.2	21.0	-1.1	0.0	0.89	1.20		
9	WS711	0.0	0.0	0.0	1.7	19.7	20.4	-0.4	0.0	1.00	1.19		
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Groundwater and Ground Gas Monitoring Summary



Site Name	Kingsmere Bicester, Phase II Complete Results
Client	Countryside Properties Ltd
Job No.	00028453/001

Start Date	09/11/2012
End Date	14/12/2012
No. Visits	3

	Borehole	Standing Water Level (m)		Response Zone		Thickness of Product (mm)		PID Readings ppmV		H2S ppm	CO ppm	Was the well ever flooded?	Was Product >1mm detected?
		MIN	MAX	TOP	BASE	MIN	MAX	MIN	MAX	MAX	MAX		
1	BH701	1.1	1.6	6.5	8.0	0	0	0	0	1	0	Yes	No
2	BH702	1.5	1.6	4.0	8.0	0	0	0	0	1	0	Yes	No
3	BH703	3.0	3.8	4.0	8.0	0	0	0	0	0	0	Yes	No
4	BH706	1.4	1.9	1.0	5.8	0	0	0	0	0	0	No	No
5	BH707	1.6	1.9	1.0	8.0	0	0	0	0	0	0	No	No
6	WS701	0.5	0.7	1.0	2.0	0	0	0	0	0	1	Yes	No
7	WS702	0.7	1.2	0.3	1.0	0	0	0	0	0	2	No	No
8	WS706	0.9	1.2	1.0	2.0	0	0	0	0	1	0	Yes	No
9	WS711	1.0	1.2	0.3	0.6	0	0	0	0	0	0	No	No
10													
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Groundwater and Ground Gas Monitoring Summary



Site Name	Kingsmere Bicester, Phase II Complete Results
Client	Countryside Properties Ltd
Job No.	00028453/001

Start Date	09/11/2012
End Date	14/12/2012
No. Visits	3

Visit No.	Visit Date	Pressure Trend	Start mB	End mB
1	09/11/2012	No Change	1003	1003
2	07/12/2012	Not Recorded		
3	14/12/2012	Falling	973	
4			1013	1011
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	Minimum mB	Maximum mB
Barometric Pressure	973	1013

Gas Screening Value (GSV) Calculation

	GSV Max per hole* (l/hr)	GSV using Max Values** (l/hr)	Maximum Values (% v/v)
Carbon Dioxide	0.0015	0.0017	1.7

Methane	0.0001	0.0001	0.1
---------	--------	---------------	-----

Max Flow (l/hr)	0.1
-----------------	-----

Key	Methane Column	Carbon Dioxide Column	Depth to Water Column	Gas Flow
	n/a	n/a	Response Zone Part Flooded	n/a
	> 1% v/v	> 5% v/v	Response Zone Totally Flooded	>70 l/hr

*GSV Max Per Hole is the maximum calculated GSV using data specific to each borehole over the monitoring period.

**GSV Using Max Values is a worst case estimated of the GSV using Maximum Concentration and Maximum Flow for the whole data set.

CIRIA C665 - Table 8.5 (Refer to CIRIA document for full table and notes) (2007)

	Characteristic Situation (CIRIA R149)	Comparable PIT gas regime	Risk Classification	Gas Screening Value (l/hr)	Additional Factors
	1	A	Very Low Risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5% otherwise consider increase to Characteristic Situation 2
	2	B	Low Risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to Characteristic Situation 3
	3	C	Moderate Risk	<3.5	
	4	D	Moderate to High Risk	<15	Quantitative Risk Assessment required to evaluate scope of protection measures
	5	E	High Risk	<70	
	6	F	Very High Risk	>70	

NHBC Report No. 4 - Table 14.1 (Refer to NHBC document for full table) (March 2007)

Traffic Light Classification	Methane		Carbon Dioxide	
	Typical Max Concentration (%v/v)	Gas Screening Value (l/hr)	Typical Max Concentration (%v/v)	Gas Screening Value (l/hr)
Green				
Amber	1	0.13	5	0.78
Amber 2	5	0.63	10	1.6
Red	20	1.6	30	3.1

Notes:

- The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst case temporal conditions that the site may be expected to encounter will be the decider as to what Traffic Light is allocated.
- Borehole Gas Volume Flow Rate, in litres per hour is defined as Wilson and Card (1999), is the borehole flow rate multiplied by the concentrations in the air stream of the particular gas being considered;
- The typical Maximum Concentration can be exceeded in certain circumstances should the conceptual model indicate that it is safe to do so;
- The Gas Screening Value Threshold should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

Groundwater and Ground Gas Monitoring Summary



Site Name	Kingsmere Bicester, Phase II Representative
Client	Countryside Properties Ltd
Job No.	00028453/001

Start Date	09/11/2012
End Date	14/12/2012
No. Visits	3

	Borehole	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow (l/hr)		Standing Water Level (m)		Gas Screening Value Methane (l/hr)	Gas Screening Value Carbon Dioxide (l/hr)
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
1	BH706	0.0	0.0	0.3	0.9	20.6	20.8	0.0	0.1	1.79	1.88		0.0009
2	BH707	0.0	0.0	0.6	1.5	18.7	19.2	0.0	0.0	1.57	1.92		
3	WS702	0.0	0.1	0.1	1.7	20.0	20.8	0.0	0.0	0.71	1.19		
4	WS711	0.0	0.0	1.7	1.7	19.7	19.7	0.0	0.0	1.00	1.19		
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Groundwater and Ground Gas Monitoring Summary



Site Name	Kingsmere Bicester, Phase II Representative
Client	Countryside Properties Ltd
Job No.	00028453/001

Start Date	09/11/2012
End Date	14/12/2012
No. Visits	3

	Borehole	Standing Water Level (m)		Response Zone		Thickness of Product (mm)		PID Readings ppmV		H2S ppm	CO ppm	Was the well ever flooded?	Was Product >1mm detected?
		MIN	MAX	TOP	BASE	MIN	MAX	MIN	MAX	MAX	MAX		
1	BH706	1.8	1.9	1.0	5.8	0	0	0	0	0	0	No	No
2	BH707	1.6	1.9	1.0	8.0	0	0	0	0	0	0	No	No
3	WS702	0.7	1.2	0.3	1.0	0	0	0	0	0	2	No	No
4	WS711	1.0	1.2	0.3	0.6	0	0	0	0	0	0	No	No
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Groundwater and Ground Gas Monitoring Summary



Site Name	Kingsmere Bicester, Phase II Representative
Client	Countryside Properties Ltd
Job No.	00028453/001

Start Date	09/11/2012
End Date	14/12/2012
No. Visits	3

Visit No.	Visit Date	Pressure Trend	Start mB	End mB
1	09/11/2012	No Change	1003	1003
2	07/12/2012	Not Recorded		
3	14/12/2012	Falling	973	
4				
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	Minimum mB	Maximum mB
Barometric Pressure	973	1003

Gas Screening Value (GSV) Calculation

	GSV Max per hole* (l/hr)	GSV using Max Values** (l/hr)	Maximum Values (% v/v)
Carbon Dioxide	0.0009	0.0017	1.7

Methane	0	0.0001	0.1
---------	---	---------------	-----

Max Flow (l/hr)	0.1
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Key	Methane Column	Carbon Dioxide Column	Depth to Water Column	Gas Flow
	n/a	n/a	Response Zone Part Flooded	n/a
	> 1% v/v	> 5% v/v	Response Zone Totally Flooded	>70 l/hr

*GSV Max Per Hole is the maximum calculated GSV using data specific to each borehole over the monitoring period.

**GSV Using Max Values is a worst case estimated of the GSV using Maximum Concentration and Maximum Flow for the whole data set.

CIRIA C665 - Table 8.5 (Refer to CIRIA document for full table and notes) (2007)

	Characteristic Situation (CIRIA R149)	Comparable PIT gas regime	Risk Classification	Gas Screening Value (l/hr)	Additional Factors
	1	A	Very Low Risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5% otherwise consider increase to Characteristic Situation 2
	2	B	Low Risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to Characteristic Situation 3
	3	C	Moderate Risk	<3.5	
	4	D	Moderate to High Risk	<15	Quantitative Risk Assessment required to evaluate scope of protection measures
	5	E	High Risk	<70	
	6	F	Very High Risk	>70	

NHBC Report No. 4 - Table 14.1 (Refer to NHBC document for full table) (March 2007)

Traffic Light Classification	Methane		Carbon Dioxide	
	Typical Max Concentration (%v/v)	Gas Screening Value (l/hr)	Typical Max Concentration (%v/v)	Gas Screening Value (l/hr)
Green				
Amber	1	0.13	5	0.78
Amber 2	5	0.63	10	1.6
Red	20	1.6	30	3.1

Notes:

- The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst case temporal conditions that the site may be expected to encounter will be the decider as to what Traffic Light is allocated.
- Borehole Gas Volume Flow Rate, in litres per hour is defined as Wilson and Card (1999), is the borehole flow rate multiplied by the concentrations in the air stream of the particular gas being considered;
- The typical Maximum Concentration can be exceeded in certain circumstances should the conceptual model indicate that it is safe to do so;
- The Gas Screening Value Threshold should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

Pit dimensions (m)

Pre-test

	depth	width	length
at ground level	0.00	1.10	2.80
at base	2.40	1.10	2.80

Post test

(assumed)

	depth	width	length
at ground level	0.00	1.10	2.80
at base	2.40	1.10	2.80

Water level data

Depth to water prior to test	dry
Depth to water start of test	0.56 m
Depth to water at end of test	0.95 m
Assumed empty depth	0.95 m

Test Data

Elapsed time (minutes)	Water level (m bgl)
0	0.56
1.0	0.58
2.0	0.59
3.0	0.60
5.0	0.60
6.0	0.61
7.0	0.62
8.0	0.63
9.0	0.63
10.0	0.64
15.0	0.64
20.0	0.64
30.0	0.66
60.0	0.74
120.0	0.80
180.0	0.83
240.0	0.87
300.0	0.89
360.0	0.94
420.0	0.95

Analysis

effective depth of top of soakaway	0.56 m
75% effective depth	1.02 m
50% effective depth	1.48 m
25% effective depth	1.94 m

Volume of pit at 75% effective depth (v_{75})	4.25 m ³
Volume of pit at 25% effective depth (v_{25})	1.42 m ³
Gravel placed in pit (1 if yes, 0 if no)	0
Volume outflowing $v_{75} - v_{25}$	2.83 m ³

Base area	3.08 m ²
sidewall area from base to 50% depth	7.18 m ²
Ap50	10.26 m ²

Time at 75% full (t_{p75}) Not Reached minutes

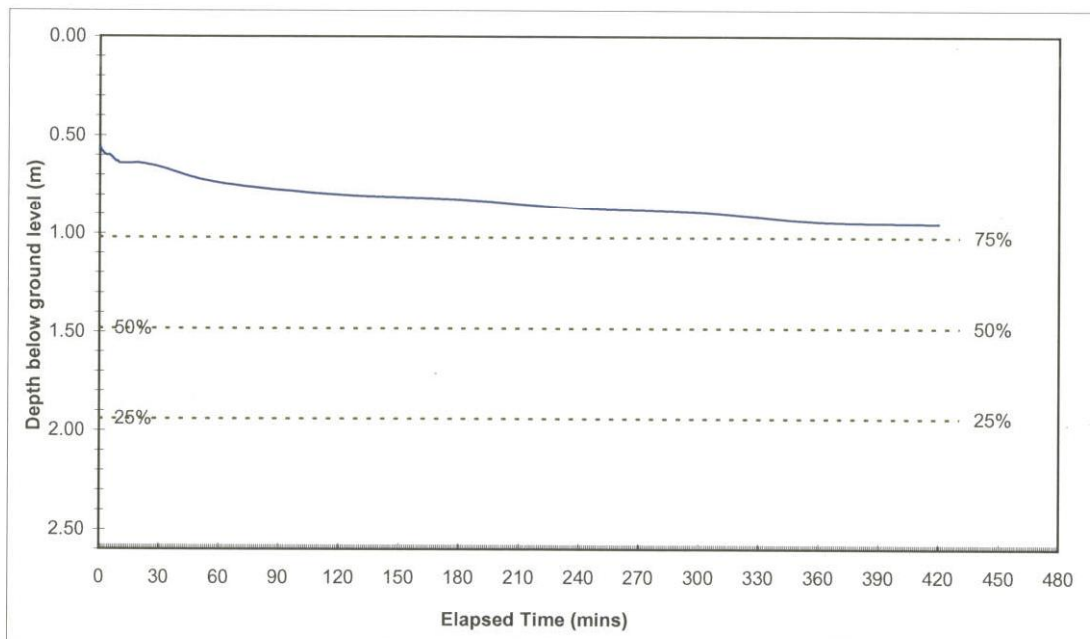
Time at 25% full (t_{p25}) Not Reached minutes

Time to drain from 75 to 25% full ($t_{p75} - t_{p25}$) N/A

extrapolation

Soil infiltration factor, f

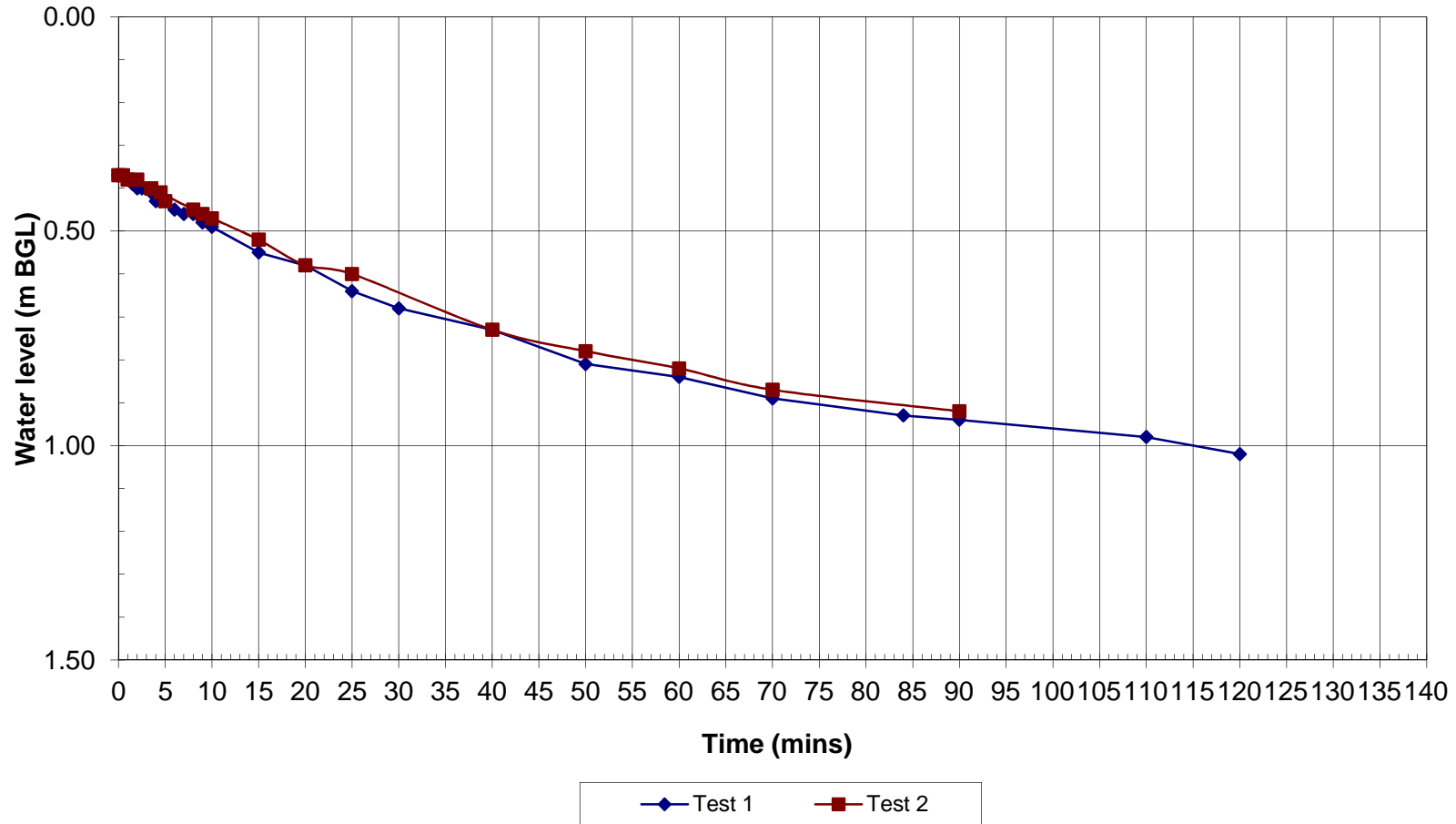
Too Low to Determine



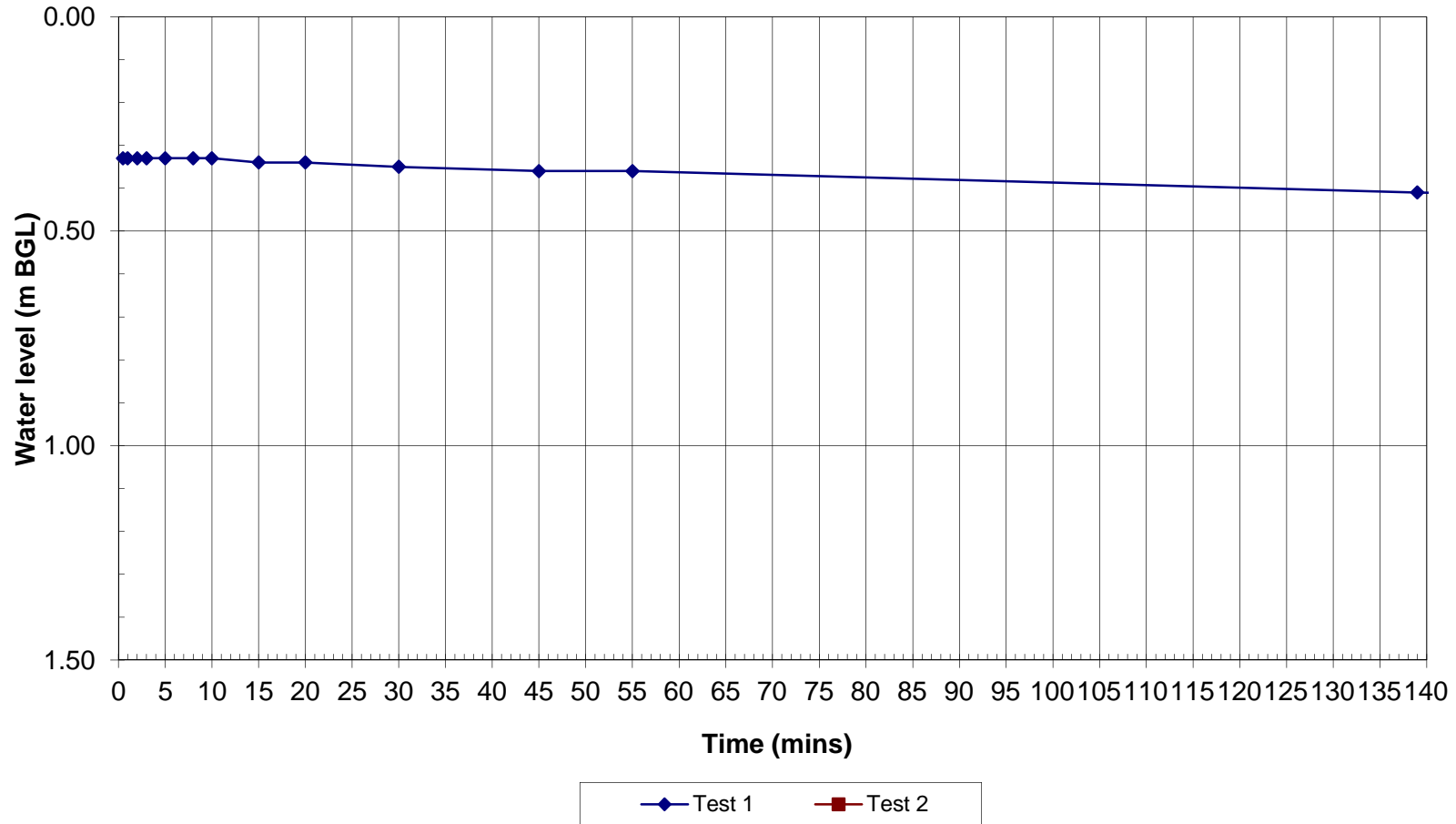
Notes

- Test carried out 9th May 2007
- Pit generally rectangular in plan
- Trial pit soakage test analysis - after BRE Digest 365 (2003)

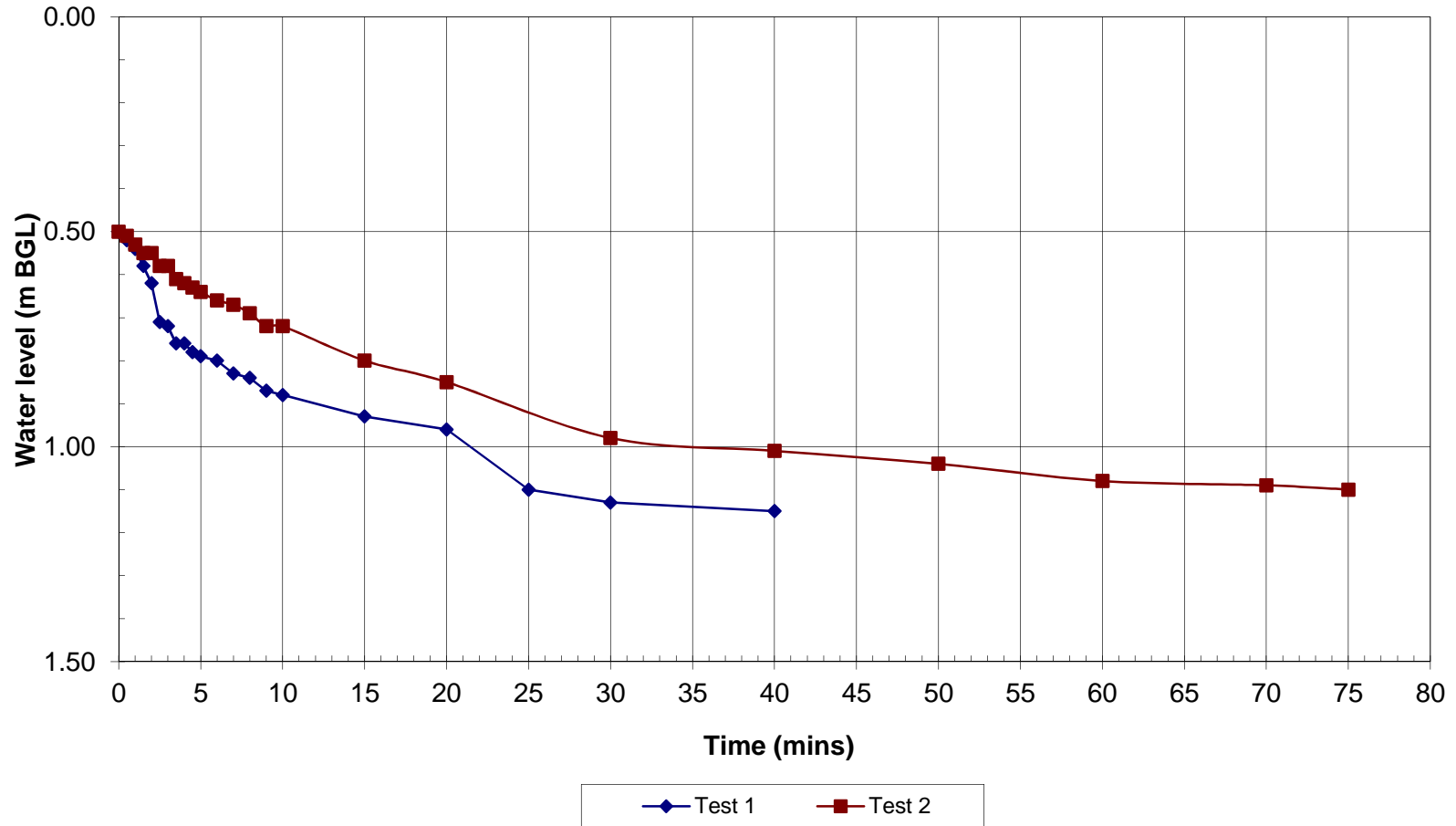
Soakaway TP701



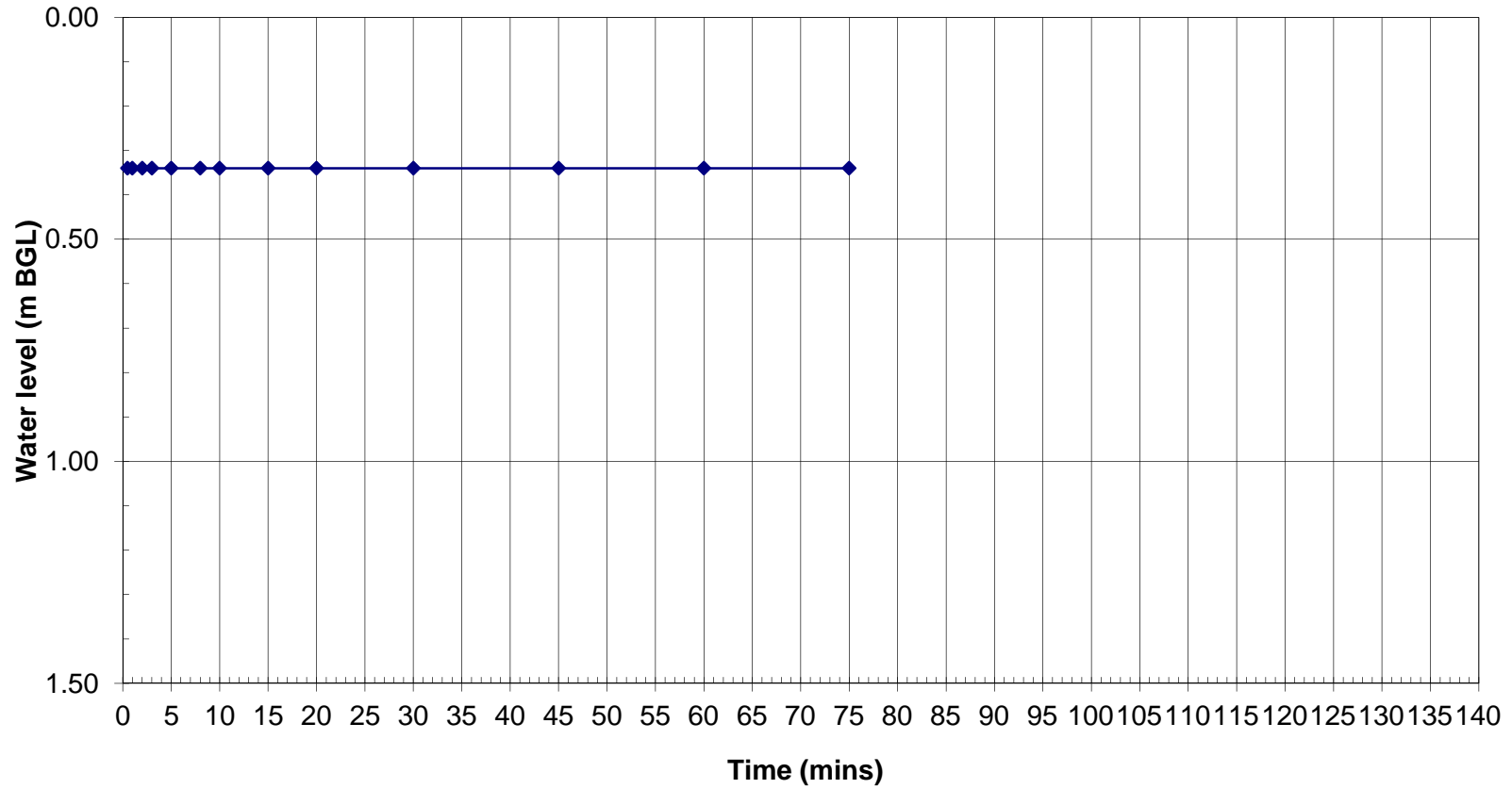
Soakaway TP705C



Soakaway TP716



Soakaway TP720



—◆— Test 1 —■— Test 2

Appendix E – Geotechnical Laboratory Results



WSP Environmental
Mountbatten House
Basing View
Basingstoke
Hampshire
RG21 4HJ

Attention: Helen Gardiner

CERTIFICATE OF ANALYSIS

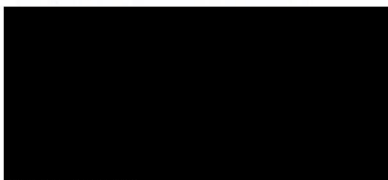
Date: 06 November 2012
Customer: H_WSP_BAS
Sample Delivery Group (SDG): 121024-16
Your Reference: 28453
Location: Kingsmere Bicester Phase 2
Report No: 200581

We received 77 samples on Wednesday October 24, 2012 and 33 of these samples were scheduled for analysis which was completed on Tuesday November 06, 2012. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager



SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
6391158	BH701	B1	0.40	
6391169	BH702	B1	0.50	
6391181	BH702	B2	1.50	
6391192	BH703	B1	0.50	
6391206	BH703	B2	1.50	
6391218	BH707	B1	0.70	
6391159	TP701	B2	0.60	
6391229	TP701	B1	0.20	
6391238	TP701	B1	0.20	
6391239	TP701	B2	0.60	
6450905	TP701	B	1.00	
6391160	TP702	B1	0.20	
6391161	TP702	B1	0.20	
6391162	TP702	B2	0.60	
6391163	TP702	B2	0.60	
6391164	TP702	B3	2.00	
6391165	TP702	B3	2.00	
6391166	TP703	B1	0.10	
6391167	TP703	B1	0.10	
6391168	TP703	B2	0.50	
6391171	TP703	B2	1.00	
6391172	TP703	B3	1.00	
6391173	TP703	B3	1.60	
6391174	TP703	B4	1.60	
6391175	TP704	B1	1.00	
6391176	TP704	B1	1.00	
6391177	TP704	B2	2.00	
6391178	TP704	B2	2.00	
6391179	TP705	B1	0.50	
6391180	TP705	B1	0.50	
6391182	TP705	B2	1.50	
6391183	TP705	B2	1.50	
6391184	TP705	B3	2.50	
6391185	TP705	B3	2.50	
6391186	TP706	B1	0.20	
6391187	TP706	B1	0.20	
6391188	TP706	B2	0.80	
6391189	TP706	B2	0.80	
6391190	TP706	B3	1.50	
6391191	TP706	B3	1.50	
6391193	TP706	B4	3.00	
6391194	TP706	B4	3.00	
6391195	TP706	B5	3.40	
6391196	TP706	B5	3.40	
6391198	TP707	B1	0.50	
6391201	TP707	B1	0.50	
6391202	TP708	B2	1.10	
6391203	TP709	B1	0.60	
6391204	TP710	B1	0.10	
6391205	TP710	B1	0.10	
6391207	TP710	B2	0.50	
6391208	TP711	B1	0.80	
6391209	TP712	B1	1.40	
6391210	TP714	B1	1.00	
6391212	TP715	B1	0.70	
6391213	TP716	B1	0.80	



CERTIFICATE OF ANALYSIS

SDG:	121024-16	Location:	Kingsmere Bicester Phase 2	Order Number:	
Job:	H_WSP_BAS-71	Customer:	WSP Environmental	Report Number:	200581
Client Reference:	28453	Attention:	Helen Gardiner	Superseded Report:	
6391214	TP716	B1	0.80		
6391215	TP717	B1	0.50		
6391216	TP719	B1	0.40		
6391217	TP719	B1	0.40		
6391219	TP719	B2	1.40		
6391220	TP719	B2	1.40		
6391221	TP719	B3	2.30		
6391222	TP719	B3	2.30		
6391223	WS701	B1	1.00		
6391224	WS701	B2	2.00		
6391225	WS702	B1	1.00		
6391226	WS703	B1	0.60		
6391227	WS703	B2	2.00		
6391228	WS704	B2	1.00		
6391230	WS704	B2	2.00		
6391231	WS705	B1	1.00		
6391232	WS705	B2	2.00		
6391234	WS706	B1	1.00		
6391235	WS706	B2	2.00		
6391236	WS707a	B1	0.50		
6391237	WS708a	B1	0.60		

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table with columns: Lab Sample No(s), Customer Sample Reference, AGS Reference, Depth (m), Container, Geotechnical Testing*. Includes a legend for 'SOLID' results (Test, No Determination Possible) and a grid of test results marked with 'X'.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table with columns for Results Legend, Customer Sample R, and various sample IDs (TP701, TP702, TP703). Rows include component analysis such as CBR Remoulded*, Moisture Content (GEOTECH)*, and WS Sulphate (GEOTECH)*.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table with columns for Results Legend, Customer Sample R, and various sample IDs (TP704, TP705, TP706). Rows include parameters like CBR Remoulded*, Moisture Content, Particle Density, etc., with LOD/Units and Method columns.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table with columns for Results Legend, Customer Sample R, and various sample IDs (TP706, TP707, TP707, TP708, TP709, TP710). Rows include parameters like CBR Remoulded*, Moisture Content, Compaction, etc.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table with columns for Results Legend, Customer Sample R, and sample IDs TP711 through TP716. It includes detailed metadata like Depth (m), Sample Type, Date Sampled, Date Received, SDG Ref, Lab Sample No.(s), and AGS Reference. Below this is a table of test components such as CBR Remoulded*, Moisture Content (GEOTECH)*, Particle Density*, Plasticity Index 4 point*, Point Load Axial*, PSD Wet/Dry sieve*, pH (GEOTECH)*, and WS Sulphate (GEOTECH)*, with LOD/Units and Method columns.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table with columns for Results Legend, Customer Sample R, and various sample identifiers (TP717, TP719, WS701, WS702). Rows include component analysis such as Moisture Content, Compaction, Particle Density, Plasticity Index, Point Load Axial, PSD, pH, and WS Sulphate.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table with columns: Results Legend, Customer Sample R, WS703, WS704, WS706, Component, LOD/Units, Method. Rows include Moisture Content (GEOTECH)*, Plasticity Index 4 point*, pH (GEOTECH)*, WS Sulphate (GEOTECH)*.



CERTIFICATE OF ANALYSIS

Validated

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Table of Results - Appendix

Table with 5 columns: Method No, Reference, Description, Wet/Dry Sample 1, Surrogate Corrected. Row 1: SUB, Subcontracted Test

1 Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.



CERTIFICATE OF ANALYSIS

SDG: 121024-16
Job: H_WSP_BAS-71
Client Reference: 28453

Location: Kingsmere Bicester Phase 2
Customer: WSP Environmental
Attention: Helen Gardiner

Order Number:
Report Number: 200581
Superseded Report:

Test Completion Dates

Lab Sample No(s)	6391239	6450905	6391162	6391168	6391171	6391172	6391175	6391176	6391179	6391180
Customer Sample Ref.	TP701	TP701	TP702	TP703	TP703	TP703	TP704	TP704	TP705	TP705
AGS Ref.	B2	B	B2	B2	B2	B3	B1	B1	B1	B1
Depth	0.60	1.00	0.60	0.50	1.00	1.00	1.00	1.00	0.50	0.50
Type	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH
Geotechnical Testing*	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012

Lab Sample No(s)	6391188	6391189	6391196	6391198	6391201	6391202	6391203	6391207	6391208	6391209
Customer Sample Ref.	TP706	TP706	TP706	TP707	TP707	TP708	TP709	TP710	TP711	TP712
AGS Ref.	B2	B2	B5	B1	B1	B2	B1	B2	B1	B1
Depth	0.80	0.80	3.40	0.50	0.50	1.10	0.60	0.50	0.80	1.40
Type	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH
Geotechnical Testing*	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012

Lab Sample No(s)	6391210	6391212	6391213	6391214	6391215	6391219	6391220	6391222	6391223	6391225
Customer Sample Ref.	TP714	TP715	TP716	TP716	TP717	TP719	TP719	TP719	WS701	WS702
AGS Ref.	B1	B1	B1	B1	B1	B2	B2	B3	B1	B1
Depth	1.00	0.70	0.80	0.80	0.50	1.40	1.40	2.30	1.00	1.00
Type	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH	GEOTECH
Geotechnical Testing*	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012	06-Nov-2012

Lab Sample No(s)	6391227	6391228	6391235
Customer Sample Ref.	WS703	WS704	WS706
AGS Ref.	B2	B2	B2
Depth	2.00	1.00	2.00
Type	GEOTECH	GEOTECH	GEOTECH
Geotechnical Testing*	06-Nov-2012	06-Nov-2012	06-Nov-2012



Laboratory Report



Contract Number: 17490

Client's Reference: SDG121024-16 PO156281

Report Date: 05-11-2012

Client Name: ALcontrol Laboratories

Contract Title: Kingsmere Bicester Phase 2

For the attention of: HAWARDEN

Date Received: 08-10-2012

Date Commenced: 08-10-2012

Date Completed: 05-11-2012

Test Description	Quantity	Checked	Approved
Moisture Content *	16		
Plasticity 4 Point Limit *	16		
PSD-Wet Sieve/Dry Sieve *	6		
Sedimentation *	4		
Ph Limit	16		
WS Sulphate	16		
Particle Density *	6		

Test Description	Quantity	Checked	Approved
CBR Remoulded *	8		
Compaction 2.5kg Rammer	3		
Compaction - Vibrating Hammer Method *	2		
Point Load Axial/Diametrical	7		

Notes: Observations and Interpretations are outside the UKAS Accreditation

*** - Denotes test included in laboratory scope of accreditation**

- Denotes test carried out by approved contractor

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.

Approved Signatories:

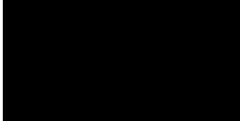
Paul Evans (Quality Manager), Emma Williams (Office Manager),

Benjamin Sharp (Laboratory Coordinator), Alex Wynn (Business Development Manager).

Summary of Laboratory Sample Descriptions

Hole Number	Sample Number	Sample Type	Depth (m)	Description of Sample*
TP701			0.60	Brown silty clayey sandy GRAVEL with many cobbles
TP702			0.60	Brown silty clayey gravelly (fine to coarse) clayey SILT.
TP703			0.50	Brown gravelly silty CLAY
TP703			1.00	Brown gravelly silty CLAY
TP703			1.00	Brown silty sandy very gravelly (fine to coarse) CLAY
TP704			1.00	Brown gravelly silty CLAY
TP704			1.00	Brown silty sandy very gravelly (fine to coarse) CLAY
TP705			0.50	Brown silty sandy very gravelly (fine to coarse) CLAY
TP706			0.80	Brown gravelly silty CLAY
TP706			0.80	Brown gravelly silty CLAY
TP706			3.40	Greenish brown silty CLAY
TP707			0.50	Brown silty sandy very gravelly (fine to coarse) CLAY
TP708			1.10	Brown silty sandy very gravelly (fine to coarse) CLAY
TP709			0.60	Brown gravelly silty CLAY
TP710			0.50	Brown silty sandy very gravelly (fine to coarse) CLAY
TP711			0.80	Brown gravelly silty CLAY
TP712			1.40	Brown silty clayey sandy GRAVEL with many cobbles
TP714			1.00	Brown silty sandy very gravelly (fine to coarse) CLAY
TP715			0.70	Brown silty clayey sandy GRAVEL with many cobbles
TP716			0.80	Brown silty clayey sandy GRAVEL with many cobbles
TP716			0.80	Brown gravelly silty CLAY
TP717			0.50	Brown silty clayey sandy GRAVEL with many cobbles
TP719			1.40	Greenish brown silty CLAY
TP719			1.40	Brown silty sandy very gravelly (fine to coarse) CLAY
TP719			2.50	Grey silty CLAY
WS701			1.00	Brown slightly gravelly sandy silty CLAY
WS702			1.00	Greenish brown silty CLAY
WS703			2.00	Brown gravelly sandy SILT
WS704			1.00	Greenish brown silty CLAY
WS706			2.00	Brown silty CLAY

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory


 Checked by

5/11/12
 Date


 Approved by

5/11/12
 Date



Kingsmere Bicester Phase 2

Contract No.:
 17490-241012
 Client ref:
 SDG 121024-16

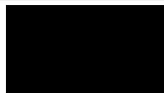
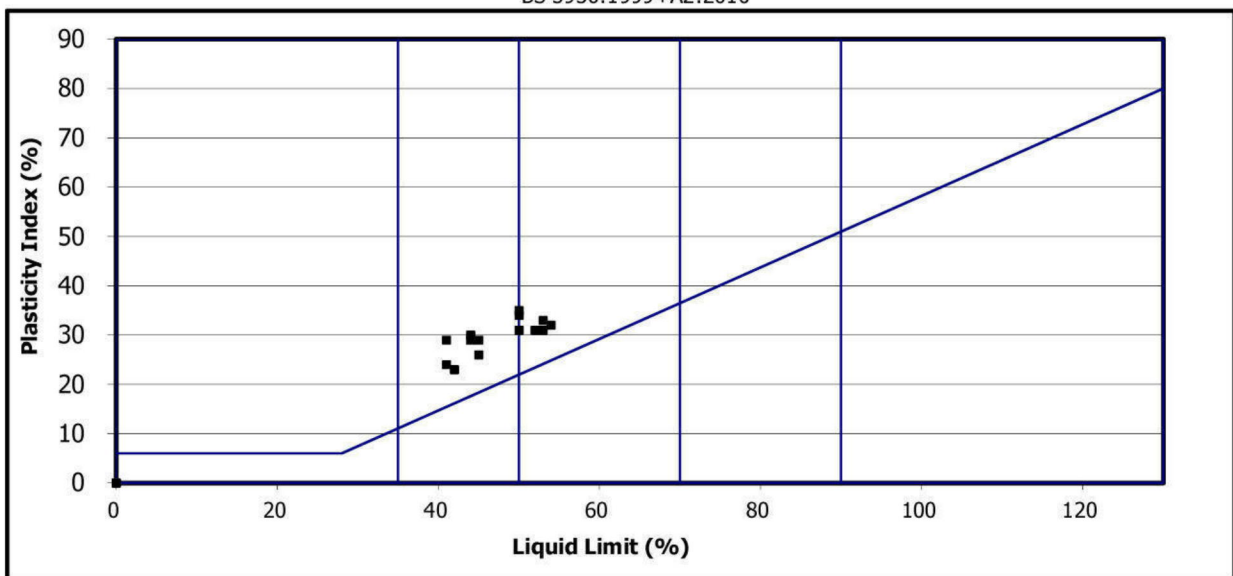
**Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5**

Client ref: SDG 121024-16
Location: Kingsmere Bicester Phase 2
Contract Number: 17490-241012

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
TP703		1.00	14	50	19	31	80	CI/H Inter/High Plasticity
TP704		1.00	19	44	14	30	80	CI Intermediate Plasticity
TP706		0.80	36	54	22	32	95	CH High Plasticity
TP706		3.40	13	41	12	29	60	CI Intermediate Plasticity
TP709		0.60	19	41	17	24	60	CI Intermediate Plasticity
TP711		0.80	17	44	15	29	70	CI Intermediate Plasticity
TP712		1.40	10	45	16	29	70	CI Intermediate Plasticity
TP716		0.80	26	45	19	26	60	CI Intermediate Plasticity
TP717		0.50	32	53	20	33	90	CH High Plasticity
TP719		1.40	39	53	22	31	90	CH High Plasticity
TP719		2.30	15	42	19	23	80	CI Intermediate Plasticity
WS701		1.00	20	50	16	34	90	CI/H Inter/High Plasticity
WS702		1.00	10		NP		25	
WS703		2.00	15		NP		25	
WS704		1.00	30	52	21	31	80	CH High Plasticity
WS706		2.00	25	50	15	35	90	CI Intermediate Plasticity

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

BS 5930:1999+A2:2010



Checked By



Approved By:

Date Approved: 2.11.12



Certificate of Analysis

Date: 02/11/2012

Client: Alcontrol

Our Reference: 17490-081012

Client Reference: SDG121024-16

Contract Title: Kingsmere Bicester Phase 2

Description: (Total Samples) 16

Date Received: 24/10/2012

Date Started: 27/10/2012

Date Completed: 02/11/2012

Test Procedures: (B.S. 1377 : PART 3 : 1990)

Notes:

Solid samples will be disposed 1 month and liquids 2 weeks

Approved By:



Authorised Signatories:

Emma Williams
Laboratory Office Manager

Wayne Honey
Laboratory Technician

Paul Evans
Quality Manager

Contract No: 17490-081012
Client Ref: SDG121024-16
Location: Kingsmere Bicester Phase 2
Date: 02/11/2012

SUMMARY OF CHEMICAL ANALYSIS

(B.S. 1377 : PART 3 : 1990)

Hole Number	Sample Number	Depth m	Sulphate Content SO ₃ (as SO ₄)			Chloride Content		pH Value @ 25°C	Organic Matter Content %	Loss on Ignition %	Remarks
			Acid Soluble Sulphate as % SO ₄ Clause 5.5.	Aqueous Extract Sulphate as g/l SO ₄ Clause 5.5.	Ground-water g/l Clause 5.4.	Soluble Chloride as % equiv. NaCl Clause 7.3	Ground-water g/l Clause 7.2				
TP703		1.00		0.02 (0.02)			7.73				
TP704		1.00		0.03 (0.03)			8.16				
TP706		0.80		0.03 (0.03)			8.38				
TP706		3.40		0.02 (0.02)			7.87				
TP709		0.60		0.01 (0.02)			7.26				
TP711		0.80		0.05 (0.07)			8.23				
TP712		1.40		0.01 (0.02)			8.17				
TP716		0.80		0.03 (0.03)			8.41				
TP717		0.50		0.01 (0.02)			7.53				
TP719		1.40		0.05 (0.06)			8.15				
TP719		2.30		0.02 (0.02)			7.63				
WS701		1.00		<.01 (<.01)			8.20				
WS702		1.00		0.02 (0.02)			8.53				
WS703		2.00		0.01 (0.02)			8.08				
WS704		1.00		0.01 (0.02)			8.24				
WS706		2.00		0.06 (0.07)			8.36				

NCP - No Chloride present

SUMMARY OF SOIL CLASSIFICATION TESTS

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

Hole Number	Sample Number	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>				Remarks
TP703		1.00				2.65				
TP704		1.00				2.71				
TP707		0.50				2.65				
TP708		1.10				2.66				
TP716		0.80				2.65				
TP719		1.40				2.67				



Checked By

06/11/12

Date



Approved By

06/11/12

Date



Kingsmere Bicester Phase 2

Contract No.
17490-081012
Client Ref No.
SDG121024-16

Page of

Test Report: Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:

SDG121024-16

Location:

Kingsmere Bicester Phase 2

Contract Number:

17490-081012

Hole Number

TP701

Sample Number:

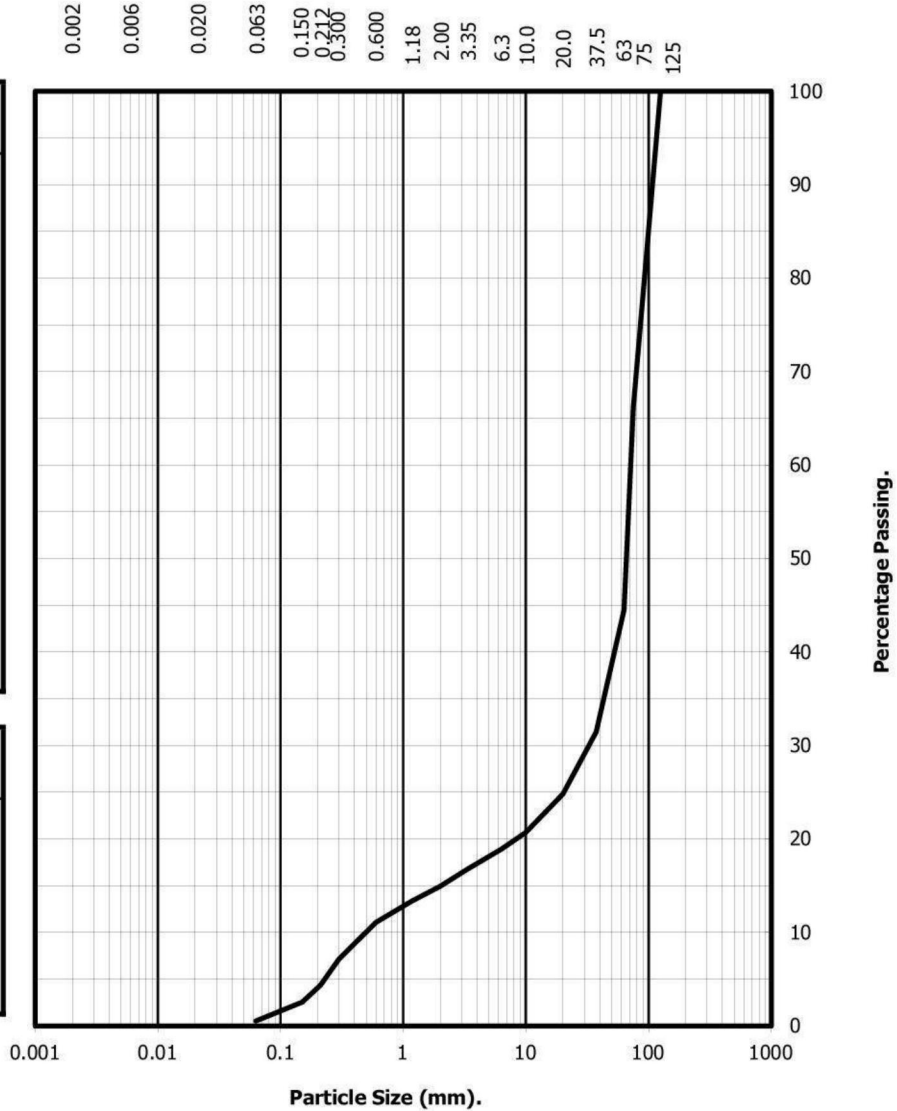
Depth (m) :

0.60

Sample Type

BS Test Sieve	Percentage Passing
125	100
75	66
63	44
37.5	31
20	25
10	21
6.3	19
3.35	17
2.00	15
1.18	13
0.60	11
0.300	7
0.212	4
0.150	3
0.063	1

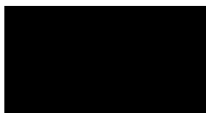
Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



Soil Fraction	Cobbles	Gravel	Sand	Silt and Clay
Total Percentage	56	29	14	1

Remarks:

- not determined



Checked By



Approved By:

Date Approved:

5.11.12

