



**PHASE II GEO-ENVIRONMENTAL SITE ASSESSMENT**

Lee Lane  
Royston  
South Yorkshire  
S71 4RT



Report Ref: 11-604-r0  
Date Issued: February 2016



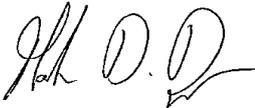
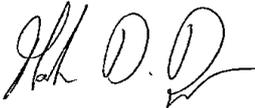
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## EXECUTIVE SUMMARY

<b>Site Address</b>	Land off Lee Lane, Royston, South Yorkshire, S71 4RT	
<b>Grid Reference</b>	434855, 411053	
<b>Site Area</b>	8.59 Ha	
<b>Current Site Use</b>	<p>The site is an irregular shaped parcel of agricultural land with associated hedgerows and field boundaries which is currently utilised for crop cultivation.</p> <p>The site is gently sloping from south to north, towards Lee Lane. Hedgerows and semi mature trees form the sites boundaries.</p> <p>A number of mature trees are present within the centre of the site. A telegraph pole is present at the north-eastern site boundary.</p> <p>Access to the site can be gained from a gate at the north east of the site from Lee Lane or from the north west from a public bridleway, adjacent to Lee Lane.</p>	
<b>Proposed Development</b>	<p>E3P understands that Strategic Land Group are considering the sale of the land at Lee Lane for future development a low rise residential dwellings.</p> <p>A proposed development layout has not been made available for the site, however, it is assumed that the proposed development will comprise low rise residential dwellings with associated garden and landscaped areas, estate roads, pavements and infrastructure.</p>	
<b>Environmental Setting</b>	<i>Drift Geology</i>	Till (Devensian – Clay) across the site.
	<i>Bedrock Geology</i>	Oak Rock – Sandstone.
	<i>Hydrogeology</i>	Secondary Unproductive strata (drift) overlying Secondary A aquifer (Solid). No groundwater abstractions have been identified within a 1km radius.
	<i>Hydrology</i>	Drain 113m North
	<i>Flood Risk</i>	Unaffected by flooding from rivers.
	<i>Subsidence Hazard</i>	Non- Identified
<b>Site History</b>	Historical mapping suggests that the site has always remained as agricultural field with associated field boundaries and hedgerows.	
<b>Utility Locations</b>	A full GPR survey has not been undertaken for the site, however a review of the online records indicate both surface and foul water sewers are present along Lee Lane. It should also be noted that overhead electrical service traverses the site from north to south.	

*Executive Summary..*

<p><b>Previous Reports</b></p>	<p>The phase I report undertaken by RSK covers a wider area in which the subject site is located within, the pertinent points within the report which relate to the subject site are present below;</p> <ul style="list-style-type: none"> <li> <i>During the site walkover no contaminative activates were identified within the subject site;</i></li> <li> <i>The site is underlain by Glacial till (clay) in the drift and oak rocks (sandstone) within the solid geology. The bedrock is classified as a Secondary A aquifer;</i></li> <li> <i>There are no recorded landfills within 250m of the subject site; and,</i></li> <li> <i>Groundwater is thought to flow in an easterly direction towards the Barnsley Canal circa 2km east of the site. The site does not lie within a SPZ, the nearest surface water course is an unnamed drain present to the north of the subject site.</i></li> </ul>
<p><b>Landfill Sites &amp; Ground Gases</b></p>	<p>No historic or current landfills are present within influencing distance of the subject site.</p>
<p><b>Radon</b></p>	<p>The estimated probability of the property being above the Action Level for radon is: 0-1%</p>
<p><b>Coal Mining / Land Stability</b></p>	<p>A coal authority consultant report was obtained for the site which states 6 worked seams are present under the site at depths greater than &lt;233m bgl. The CA report has also indicated that the is at low risk from probable unrecorded shallow working, no outcrops are recorded at the site, no mine entries are recoded within the subject site and no coal mining related hazards are recorded for the site.</p> <p>The site is deemed to be <b>Low Risk</b> in terms of the potential presence of shallow mine workings that have the potential to cause ground instability.</p>

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## APPENDICES

- Appendix I** Limitations
- Appendix II** Glossary
- Appendix III** Drawings

*Drawing No 11-604-001* – Site Location Plan  
*Drawing No 11-604-002* – Historical Features Plan  
*Drawing No 11-604-003* – Exploratory Hole Location Plan  
*Drawing No 11-604-004* – Depth of Topsoil  
*Drawing No 11-604-005* – Depth of Bedrock

- Appendix IV** E3P Exploratory Hole Logs
- Appendix V** Chemical Testing Results
- Appendix VI** Origin of Tier I Generic Assessment Criteria
- Appendix VII** Geotechnical Testing Results
- Appendix VIII** Dynamic Cone Penetrometer Test Certificates
- Appendix IX** Permeability Test Certificates
- Appendix X** Coal Authority and Radon Report

## 1. INTRODUCTION

### 1.1 Background

E3P has been commissioned by Strategic Land Group to undertake a detailed Phase II Geo-Environmental Site Investigation for a parcel of land to south of Lee Lane, Royston.

This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for the proposed low rise residential development.

The scope of work consisted of following elements.

-  Detailed review of historic information;
-  Design of suitable intrusive Ground Investigation;
-  Window sample probeholes with and construction of environmental monitoring installations;
-  Mechanically excavated trial pits;
-  In-situ Geotechnical Testing;
-  Chemical & Geotechnical Laboratory analysis;
-  Groundwater monitoring and sampling;
-  Ground gas monitoring;
-  Contamination Risk Assessment & Conceptual Site Model;
-  Geotechnical Assessment & Interpretation; and,
-  Factual and interpretive reporting.

### 1.2 Proposed Development

E3P understands that Strategic Land Group are considering the sale of the land at Lee lane for future development into residential dwellings. A proposed plot development layout has not been made available for the site, however, it is assumed that the proposed development will comprise low rise residential dwellings with associated garden and landscaped areas, estate roads, pavements and infrastructure.

### 1.3 Objectives

The objectives of the Geo-Environmental Investigation are to:

-  Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified;
-  Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
-  Provide recommendations regarding future works required.

#### **1.4 Previous Reports**

The following reports have previously been completed for the site:

**RSK** – *Preliminary Risk Assessment, Lee Lane Royston*. Ref: Report No. 301049 R01 – June 2012.

The pertinent points of the RSK report have been included within Section 2.1 of this report.

#### **1.5 Limitations**

The limitations of this report are presented in Appendix I.

#### **1.6 Confidentiality**

E3P has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.



## 2. E3P GROUND INVESTIGATION

### 2.1 Phase I Desk Study Summary

The phase I report undertaken by RSK covers a wider area in which the subject site is located within, the pertinent points within the report which relate to the subject site are present below;

-  During the site walkover no contaminative activates were identified within the subject site;
-  The site is underlain by Glacial till (clay) in the drift and oak rocks (sandstone) within the solid geology. The bedrock is classified as a Secondary A aquifer;
-  There are no recorded landfills within 250m of the subject site; and
-  Groundwater is thought to flow in an easterly direction towards the Barnsley Canal circa 2km east of the site. The site does not lie within a SPZ, the nearest surface water course is an unnamed drain present to the north of the subject site.

### 2.2 General Overview

A Ground Investigation has been designed based on the findings of the desk study with exploratory holes advanced to target specific potential contaminant sources summarised in Table 2.1. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between the 9<sup>th</sup> and 10<sup>th</sup> January 2017.

The works are summarised in Table 2.1 overleaf.

**Table 2.1 Summary of Fieldwork**

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (mbgl)	MONITORING WELLS RESPONSE ZONE (mbgl)
General Ground Conditions including the presence / nature of obstructions.	WS103	Window Sample Probehole/ Trial Pits	4.00	1.0-4.0
	WS105		3.80	1.0-4.0
	WS106		2.00	0.5-2.0
	WS108		4.45	N/A
	WS109		3.45	1.0-3.0
	WS112		4.00	1.0-4.0
	WS113		3.00	N/A
	WS114		3.00	N/A
	WS115		2.00	N/A
	TP102		2.30	N/A
	TP105		2.30	N/A
	TP107		2.00	N/A
	TP110		2.20	N/A
	TP111		1.50	N/A
	TP113		2.80	N/A
TP115	2.45	N/A		
TP117	1.85	N/A		
Former field boundaries General Ground Conditions including testing of clay soils for tree influence.	WS101	Window Sample Probehole/ Trial Pits	2.00	1.0-2.0
	WS102		0.90	0.5-0.9
	WS107		2.45	0.5-2.0
	WS104		4.00	1.0-4.0
	WS110		3.45	N/A
	WS111		4.95	1.0-4.9
	WS116		2.00	N/A
	WS117		2.45	N/A
	TP101		2.00	N/A
	TP103		2.00	N/A
	TP104		2.30	N/A
	TP106		2.00	N/A
	TP108		2.00	N/A
	TP109		2.20	N/A
	TP112		3.00	N/A
TP114	2.60	N/A		
TP116	1.85	N/A		

Mechanically excavated trial pits were advanced to investigate ground conditions and to retrieve environmental samples, spatially distributed to offer the maximum site coverage whilst also being advanced to target specific contaminant sources.

Window sample probeholes were advanced to undertaken in-situ detailed geotechnical testing, obtain environmental samples and install groundwater and ground gas monitoring wells.

The sampling locations are illustrated in Drawing 11-604-003 (Appendix III). The ground conditions encountered are indicated on the logs which are provided in Appendix IV.

Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged and samples of groundwater recovered for chemical analysis.

### **2.3 In-Situ Standard Penetration Testing (SPT)**

In-situ geotechnical testing was conducted using the Standard Penetration Test (SPT) and where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix VI and presented in Table 3.4 and discussed in Section 5.0.

### **2.4 In-Situ California Bearing Ratio (CBR)**

In-situ CBR tests were undertaken at selected locations using a TRL probe. Tests were undertaken at depths of between 300mm and 1m below ground level in order to intersect the likely pavement sub formation level. The results are presented in Table 3.8 and test certificates are included within Appendix VIII.

### **2.5 Permeability Tests**

Four BRE365 Soakaway tests were undertaken within environmental monitoring wells (SA101-SA104) in order to assess the likely permeability of the underlying strata to determine the potential suitability for soakaway drainage within the proposed development. The results are presented in Table 3.6 and the test certificates are included within Appendix IX.

### **2.6 Laboratory Analysis**

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

I2 Analytical undertook the analytical work and the testing results are included in Appendix V and discussed in Section 4.0

Selected samples were submitted to PSL Laboratory where the following geotechnical tests were undertaken:

 Atterberg Limits Determinations;

 Single Stage Triaxial Tests

Laboratory analysis sheets are included in Appendix VIII and are summarised in Section 4.0:

### 3. GROUND AND GROUNDWATER CONDITIONS

#### 3.1 Ground and Groundwater Conditions

##### 3.1.1 Summary of Ground Conditions

The Ground Investigation generally confirms the published geology and identifies the strata set out in Table 3.1 below:

**Table 3.1 Summary of Strata**

STRATA	GENERAL DESCRIPTION	TYPICAL DEPTH (mbgl):				LOCATION
		TOP:		BASE:		
		MIN:	MAX:	MIN:	MAX:	
<b>TOPSOIL</b>	Soft Brown slightly gravelly CLAY (topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.	0.00	0.00	0.30	0.55	TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109, TP110, TP111, TP112, TP113, TP114, TP115, TP116, TP117, WS101, WS102, WS103, WS104, WS105, WS106, WS107, WS108, WS109, WS110, WS111, WS112, WS113, WS114, WS115, WS116, WS117
<b>SAND</b>	Light brown clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sandstone.	1.40	3.40	2.30	4.00	TP103, TP105, TP107, TP108, TP110, TP112, TP113, T115, TP116, WS101, WS103, WS104, WS105, WS108, WS109, WS111, WS114,
<b>CLAY</b>	Stiff to very stiff light brown mottled grey slightly sandy gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.	0.45	1.30	0.80	3.60	TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109, TP110, TP111, TP112, TP113, TP114, TP115, TP116, TP117, WS101, WS102, WS103, WS104, WS105, WS106, WS107, WS108, WS109, WS110, WS111, WS112, WS113, WS114, WS115, WS116, WS117

STRATA	GENERAL DESCRIPTION	TYPICAL DEPTH (mbgl):				LOCATION
		TOP:		BASE:		
		MIN:	MAX:	MIN:	MAX:	
<b>SANDSTONE / SILTSTONE</b>	Sandstone / Siltstone	1.65	3.45	1.80	4.95	TP101, TP102, TP105, TP109, TP111, WS101, WS103, WS107, WS108, WS110, WS111, WS112, WS113, WS114, WS115, WS116, WS117

### 3.1.2 Made Ground

Made Ground was identified within one location WS117 present within the North Eastern sector of the site to a depth of 0.50m bgl which consisted of cobbles of brick and concrete.

### 3.1.3 Topsoil

Topsoil was encountered within every exploratory hole across site, topsoil was generally encountered as soft brown slightly gravelly clay with rootlets. Gravel within the topsoil matrix consisted of sub-angular to sub-rounded mudstone and sandstone. Topsoil was encountered to a maximum proven depth of 0.55m bgl however, topsoil was generally present between 0.30 and 0.40m bgl across the site.

### 3.1.4 Drift Deposits

Drift deposits were fairly varied across the site, predominantly comprising of stiff high strength brown mottled grey slightly sandy slightly gravelly clay with sandstone, mudstone and rare coal. Granular sand deposits were also encountered which often underlay the cohesive clay deposits. Granular deposits were encountered as light brown clayey gravelly fine to medium sand with medium to coarse sub-angular to sub-rounded of sandstone and siltstone.

### 3.1.5 Solid Geology

The solid bedrock geology was encountered between 1.65m and 4.95bgl, bedrock was encountered at shallower depths within the northern and southern sector of the site with the bedrock falling to in excess of >3.50m bgl within the centre and eastern sectors of the site. Bedrock was encountered as sandstone and siltstone.

### 3.1.6 Soil Consistency

Undrained shear strength values were measured using both field hand shear vane tests and laboratory undrained triaxial tests. Results of the tests are presented in Table 3.2 and Table 3.3 below which indicate the clay soils to vary between stiff and very stiff. Strength test data is generally consistent with the field descriptions of the soils given above.

**Table 3.2 Summary of Hand Shear Vane Tests**

LOCATION	DEPTH	SHEAR STRENGTH KPA	CALCULATED ALLOWABLE BEARING PRESSURE kN/m <sup>2</sup>
TP101	1.2	77.3	182
TP101	1.6	114.0	268
TP102	1	43.3	102
TP102	1.6	56.0	132
TP103	0.5	58.0	136
TP103	1	83.3	196
TP104	0.6	75.3	177
TP104	1.4	105.3	248
TP104	2.2	112.0	263
TP105	0.6	14.7	34
TP105	1.2	70.0	165
TP105	1.4	128.7	302
TP106	1.2	89.0	209
TP106	1.6	108.7	255
TP106	0.6	70.7	166
TP107	1.4	69.3	163
TP107	1	77.3	182
TP108	1.6	98.7	232
TP108	0.7	41.7	98
TP109	0.5	47.3	111
TP109	1	74.0	174
TP109	1.6	80.0	188
TP110	1.7	94.7	222
TP110	0.5	78.0	183
TP110	1	86.7	204
TP111	0.7	74.0	174
TP111	1	77.3	182
TP112	0.6	90.0	212
TP112	1.2	98.3	231
TP112	1.8	124.0	291
TP113	0.6	74.7	175
TP113	1.2	86.7	204
TP113	2.4	125.0	294
TP114	0.5	90.7	213
TP114	1	120.7	284
TP114	1.5	105.3	248
TP114	2	117.3	276
TP114	2.4	125.3	295
TP115	0.5	70.0	165
TP116	0.5	34.0	80
TP116	1.3	110.0	259
TP117	0.6	59.3	139
TP117	1.2	72.7	171
TP118	1	119.3	280
TP118	1.6	106.0	249
TP118	2.3	118.7	279
TP118	2.7	108.0	254

**Table 3.3 Summary of Undrained Shear Strength Test Results**

LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m <sup>2</sup> )	CONSISTENCY
WS103	1.50-2.00	Stiff brown CLAY.	86	Stiff
WS104	2.50-3.00	Stiff brown CLAY.	127	Stiff
WS109	0.50-1.00	Firm brown sandy very silty CLAY.	72	Firm

Results of the Standard Penetration Tests, including undrained shear strengths derived from SPTs are included on Table 3.4.

### 3.1.7 Side Stability and Ease of Excavation

The sides of the exploratory trial pit excavations appeared to be generally stable during excavation.

The natural strata was excavated with relative ease.



**Table 3.4 Standard/Cone Penetration Test Results**

BOREHOLES	DEPTH (mbgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N <sub>1</sub> ) <sub>60</sub>	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m <sup>2</sup> )
WS101	1	slightly sandy slightly gravelly CLAY	20	20.16	N/A	High strength	Very Stiff	100.81
WS101	1.7	slightly gravelly SAND	50	46.69	Dense	N/A	N/A	N/A
WS102	1	sandy gravelly CLAY	50	50.41	N/A	Very high strength	Very Stiff	252.04
WS103	1	slightly gravelly sandy CLAY	16	16.13	N/A	High strength	Very Stiff	80.65
WS103	2	slightly gravelly sandy CLAY	19	17.36	N/A	High strength	Very Stiff	86.79
WS103	3	SILTSTONE	19	16.52	Medium Dense	N/A	N/A	N/A
WS103	4	SILTSTONE	50	42.24	Dense	N/A	N/A	N/A
WS104	1	slightly gravelly sandy CLAY	12	12.10	N/A	Medium strength	Stiff	60.49
WS104	2	slightly sandy gravelly CLAY	17	15.53	N/A	High strength	Very Stiff	77.65
WS104	3	slightly sand gravelly CLAY	26	22.61	N/A	High strength	Very Stiff	113.05
WS104	4	SAND	50	42.24	Dense	N/A	N/A	N/A
WS105	1	slightly gravelly sandy CLAY	12	12.10	N/A	Medium strength	Stiff	60.49
WS105	2	CLAY	14	12.79	N/A	Medium strength	Stiff	63.95
WS105	3	CLAY	26	22.61	N/A	High strength	Very Stiff	113.05

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N <sub>1</sub> ) <sub>60</sub>	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m <sup>2</sup> )
WS105	4	SAND	50	42.24	Dense	N/A	N/A	N/A
WS106	1	slightly gravelly sandy CLAY	21	21.17	N/A	High strength	Very Stiff	105.86
WS106	1.5	gravelly SAND	50	47.51	Dense	N/A	N/A	N/A
WS107	1	slightly gravelly sandy CLAY	13	13.11	N/A	Medium strength	Stiff	65.53
WS107	1.7	SANDSTONE	50	46.69	Dense	N/A	N/A	N/A
WS108	1	SILTSTONE	15	15.12	Medium Dense	N/A	N/A	N/A
WS108	2	gravelly CLAY	27	24.67	N/A	High strength	Very Stiff	123.33
WS108	3	SAND	27	23.48	Medium Dense	N/A	N/A	N/A
WS108	4	SILTSTONE	50	42.24	Dense	N/A	N/A	N/A
WS109	1	clayey SAND	14	14.11	Medium Dense	N/A	N/A	N/A
WS109	2	gravelly CLAY	29	26.49	N/A	High strength	Very Stiff	132.46
WS109	3	SAND	50	43.48	Dense	N/A	N/A	N/A
WS110	1	SILTSTONE	13	13.11	Medium Dense	N/A	WS110	1
WS110	2	clayey gravelly SAND	21	19.18	Medium Dense	N/A	WS110	2
WS110	3	SILTSTONE	20	17.39	Medium Dense	N/A	WS110	3
WS111	1	SILTSTONE	14	14.11	Medium Dense	N/A	N/A	N/A
WS111	2	slightly clayey gravelly SAND	17	15.53	Medium Dense	N/A	N/A	N/A

BOREHOLES	DEPTH (mbgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N <sub>1</sub> ) <sub>60</sub>	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m <sup>2</sup> )
WS111	3	slightly clayey gravelly SAND	25	21.74	Medium Dense	N/A	N/A	N/A
WS111	4	SILTSTONE	24	20.28	Medium Dense	N/A	N/A	N/A
WS112	1	SILTSTONE	11	11.09	Medium Dense	N/A	N/A	N/A
WS112	2	CLAY	18	16.44	N/A	High strength	Very Stiff	82.22
WS112	3	CLAY	19	16.52	N/A	High strength	Very Stiff	82.62
WS113	1	slightly gravelly sandy CLAY	20	20.16	N/A	High strength	Very Stiff	100.81
WS113	2	SANDSTONE	31	28.32	Medium Dense	N/A	N/A	N/A
WS113	3	SANDSTONE	50	43.48	Dense	N/A	N/A	N/A
WS114	1	slightly gravelly sandy CLAY	10	10.08	N/A	Medium strength	Stiff	50.41
WS114	2	CLAY	16	14.62	N/A	Medium strength	Stiff	73.08
WS114	3	SANDSTONE	50	43.48	Dense	N/A	N/A	N/A
WS115	1	slightly gravelly sandy CLAY	13	13.11	N/A	Medium strength	Stiff	65.53
WS115	2	SANDSTONE	50	45.68	Dense	N/A	N/A	N/A
WS116	1	slightly gravelly sandy CLAY	17	17.14	N/A	High strength	Very Stiff	85.69
WS116	2	SANDSTONE	50	45.68	Dense	N/A	N/A	N/A
WS117	1	slightly gravelly sandy CLAY	13	13.11	N/A	Medium strength	Stiff	65.53
WS117	2	SANDSTONE	50	45.68	Dense	N/A	N/A	N/A

### 3.1.8 Soil Infiltration

Four BRE365 Soakaway tests were undertaken within environmental monitoring wells (SA101-SA104) in order to assess the likely permeability of the underlying strata to determine the potential suitability for soakaway drainage within the proposed development.

The results are presented in Table 3.6 below and the test certificates are included within Appendix IX.

**Table 3.6 Soil Infiltration Results**

LOCATION	DEPTH (m)	MATERIAL	TEST NO.	SOIL INFILTRATION RATE (m/s)
SA101	2.00	Stiff slightly sandy slightly gravelly CLAY	Test No.1	0.00E+00
SA102	2.00	Firm slightly sandy gravelly CLAY	Test No.1	0.00E+00
SA103	2.00	Stiff brown CLAY	Test No.1	0.00E+00
SA104	2.00	Stiff slightly sandy slightly gravelly CLAY	Test No.1	0.00E+00

Soil infiltration was taken over the wetted area from between 75% and 25% of the effective depth. All tests showed the cohesive drift deposits to have a poor soakage potential.

Therefore, considering the significant volumes of low permeability clay on the site, it is considered that soakaway drainage may not be suitable for the proposed development. However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365 – *Soakaway Design*.

### 3.1.9 Soil Plasticity

The Liquid and Plastic Limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of an average Plasticity Index (PI) for each “type” of clay, although judgement is applied where variable results are reported.

PI can be related to shrinkability (low, medium or high) and then to minimum founding depth.

E3P typically only consider a soil to be shrinkable if the proportion finer than 63µm is >35%.

PI results are compared against guidance given in the NHBC Standards, Chapter 4.2 (revised January 2014), which advocates the use of modified Plasticity Index (I’p), defined as:

$$I'p = Ip * (\% < 425\mu\text{m} / 100)$$

ie if PI is 30%, but the soil contains 80% < 425µm, then: I’p = 30 \* 80/100 = 24%.

It should be noted that in accordance with the requirements of BS 1377, the % passing the 425µm sieve is routinely reported by testing labs.

E3P apply engineering judgment where PI results are spread over a range of classifications. Consideration is given to the average values for each particular soil type (ie differentiate between residual soil and alluvium), the number of results in each class and • the actual values.

The Atterberg Limits determinations, summarised in Table 3.7 below, show the clay to be of intermediate plasticity.

**Table 3.7 Summary of Plasticity Index Test Results**

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PERCENTAGE PASSING 425MM SIEVE (%)	MODIFIED PLASTICITY INDEX
TP101	1.20	28	23	49	26	94	24.44
TP103	1.20	29	28	68	40	98	39.20
TP112	1.20	24	24	54	30	97	29.10
TP116	1.30	26	29	69	40	98	39.20
WS105	1.00	21	25	53	28	95	26.60
WS111	2.00	23	20	37	17	94	15.98
WS104	1.00	18	22	46	24	93	22.32

### 3.1.10 California Bearing Ratio

The California Bearing Ratio (CBR) for the soils were measured using an in situ TRL probe. The results are summarised in Table 3.8.

The result sheets are included in Appendix VIII and the locations are shown on Drawing 11-604-003 (Appendix III). CBR results have been averaged from the blow counts across the strata tested and any abnormally high blow counts ignored as these are likely to be from larger granular material and so represent anomalies.

**Table 3.8 Summary of DCP Results**

LOCATION	DEPTH (m)	STRATA	IN SITU OR LAB TEST	CBR (%)
DCP101	0.34-0.69	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	5.53
DCP102	0.29-0.70	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	4.15
DCP103	0.47-0.53	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	9.65
DCP104	0.19-0.61	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	7.10
DCP105	0.24-0.74	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	5.48
DCP106	0.10-0.71	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	6.01
DCP107	0.38-0.69	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	4.56
DCP108	0.30-.054	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	7.05
DCP109	0.34-0.71	Brown mottled grey slightly sandy gravelly CLAY.	In-Situ	5.83

It should be noted that the CBR's reported herein were obtained from soils in a highly undisturbed state, however if the topsoil and surface cover is removed during periods of wetter climatic condition, the formation will soften reducing the CBR.

### 3.1.11 pH and Sulphate

Chemical analyses for pH and soluble sulphate content contained in Appendix VII (summarised below in Table 3.9), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).

**Table 3.9 Summary of pH and Sulphate Data**

LOCATION	DEPTH (m)	SO <sub>4</sub> IN 2:1 WATER / SOIL (g/l)	pH VALUE	CLASSIFICATION
WS101	0.30	0.013	7.4	DS-1 – AC-1s
TP118	0.20	0.016	6.8	DS-1 – AC-1s
WS108	0.30	0.016	7.0	DS-1 – AC-1s
WS112	0.20	0.019	7.1	DS-1 – AC-1s
TP109	0.20	0.017	7.7	DS-1 – AC-1s
WS107	0.60	0.042	7.8	DS-1 – AC-1s
WS104	0.60	0.052	7.7	DS-1 – AC-1s
TP111	0.70	0.010	7.7	DS-1 – AC-1s
TP110	0.50	0.024	7.5	DS-1 – AC-1s
WS111	0.50	0.021	6.9	DS-1 – AC-1s
WS106	1.10	0.013	6.6	DS-1 – AC-1s
WS102	0.70	0.019	7.1	DS-1 – AC-1s

### 3.2 Groundwater Conditions

Groundwater was not encountered within any of the exploratory holes during the ground investigation.



## **4. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT**

E3P has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

### **4.1 Human Health Risk Assessment**

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

The results of this comparison have been summarised within Table 4.1 (overleaf).

**Table 4.1 Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use**

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	37	12	12	N/A	1	No Further Action
Cadmium	mg/kg	17	12	2.0	N/A	1	No Further Action
Chromium (VI)	mg/kg	6.1	12	<4.0	N/A	1	No Further Action
Lead	mg/kg	200	12	77	N/A	1	No Further Action
Mercury	mg/kg	11	12	0.4	N/A	2	No Further Action
Nickel	mg/kg	180	12	33	N/A	1	No Further Action
Selenium	mg/kg	250	12	1.8	N/A	1	No Further Action
Copper	mg/kg	2400	12	33	N/A	1	No Further Action
Zinc	mg/kg	3700	12	79	N/A	1	No Further Action
Cyanide - Total	mg/kg	791	12	2	N/A	1	No Further Action
Phenols - Total.	mg/kg	210	12	<1.0	N/A	1	No Further Action
Asbestos	Fibres	NFD	12	ND	N/A		No Further Action
Naphthalene	mg/kg	2.3	12	< 0.05	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	12	< 0.10	N/A	3	No Further Action
Acenaphthene	mg/kg	210	12	< 0.10	N/A	1	No Further Action
Fluorene	mg/kg	170	12	< 0.10	N/A	1	No Further Action
Phenanthrene	mg/kg	95	12	< 0.10	N/A	3	No Further Action
Anthracene	mg/kg	2400	12	< 0.10	N/A	3	No Further Action
Fluoranthene	mg/kg	280	12	< 0.10	N/A	3	No Further Action
Pyrene	mg/kg	620	12	< 0.10	N/A	3	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	12	< 0.10	N/A	3	No Further Action
Chrysene	mg/kg	15	12	< 0.05	N/A	3	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	12	< 0.10	N/A	3	No Further Action
Benzo(k)Fluoranthene	mg/kg	77	12	< 0.10	N/A	3	No Further Action
Benzo(a)Pyrene**	mg/kg	2.2	12	< 0.10	N/A	3	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27	12	< 0.10	N/A	3	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	12	< 0.10	N/A	3	No Further Action
Benzo(ghi)Perylene	mg/kg	320	12	< 0.05	N/A	3	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	12	< 1.0	N/A	2	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	12	< 0.1	N/A	2	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	12	< 0.1	N/A	2	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	74	12	< 2.0	N/A	2	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	140	12	< 4.0	N/A	2	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	260	12	< 1.0	N/A	1	No Further Action
TPH C21-C35 (aromatic)*	mg/kg	1100	12	3.5	N/A	1	No Further Action

**Notes**

Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation. Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance; NFD = No Fibres Detected

\* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C<sub>5</sub>-C<sub>12</sub>) and the Tier 1 values for aromatic compound for the non-volatile fractions (C<sub>12</sub>-C<sub>35</sub>). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

Referring to Table 10.1, the results of this direct comparison indicates that the data does not exceed any of the screening criteria for a residential end use. Furthermore no significant concentrations of VOC's were identified in the soils submitted for chemical analysis.

Chemical analysis of the natural topsoil and clay drift deposits have identified these soils to be acceptable for use within the proposed garden areas, however further chemical validation samples will be required to confirm this.

#### 4.2 Controlled Waters Risk Assessment

The site sensitivity with respect to controlled waters is summarised within Table 4.2

**Table 4.2 Controlled Waters Sensitivity Profile**

Risk Profile	Discussion	Sensitivity Rating & Rationale
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	No	Low
Distance to the closest groundwater abstraction point.	>1000m	Low
Aquifer Classification in Superficial Drift Deposits.	Secondary (undifferentiated)	Low to Moderate – Shallow low permeability clay soils interbedded by granular sands to depths in excess of 4.0m in parts of the site which may reduce the potential for mobile phase contaminants to migrate towards a viable receptor.
Aquifer classification in Bedrock.	Secondary A	Moderate
Viability for Anthropogenic soil in direct contact with aquifer (drift or bedrock).	No	Low – Made Ground deposits were only encountered within one isolated area on site to a depth of 0.50m bgl.
Is the site underlain by low permeability Drift to depths in excess of 10.0m?	No	No – The site is underlain by predominantly cohesive clays interbedded by granular sands to a proven depth of 4.45m bgl. Bedrock has been identified between 1.65 and 4.95m bgl across the site.
Is the site located within 50m of a surface watercourse?	No	No – The risk to a surface water is negligible given the absence of a viable receptor within influencing distance of the site.
<b>Summary</b>		
The ICSM developed within the context of the site setting has only identified a single viable pollutant risk which would be the downward migration of potentially mobile phase soluble contaminants towards the underlying Secondary A aquifer. However the overall sensitivity of this receptor is reduced given the absence of any groundwater abstraction and thus the potential for the creation of a complete pollutant linkage.		

To further refine the ICSM, E3P has undertaken an initial qualitative assessment of the soil data analysis to assess the potential for a source of separate phase or dissolved phase contamination originating from either a defined on-site source or from impacted soils. This assessment is summarised in Table 4.3.

**Table 4.3 Qualitative Risk to Controlled Waters from Soil Analytical Results**

<b>BTEX - &gt;1ppm</b>	The soil data analysis has not identified any detectable concentrations of TPH C5 to C6 that might otherwise be indicative of VOC impact
<b>Total VOC - &gt;1ppm</b>	
<b>Total SVOC - &gt;1ppm</b>	PAH analysis recorded concentrations below above the laboratory LOD.
<b>C5-C10 &gt;5ppm</b>	All concentrations are below the laboratory LOD.
<b>C10-C12 &gt;10ppm</b>	All concentrations are below the laboratory LOD.
<b>C12-C16 &gt;50ppm</b>	All concentrations are below the laboratory LOD.
<b>Phenols - &gt;2ppm</b>	All concentrations are below the laboratory LOD.
<b>Naphthalene - &gt;2ppm</b>	The most soluble SVOC (Naphthalene) has been identified at below laboratory LOD.
<b>Total PAH &gt;10ppm</b>	Concentrations of low solubility PAH compounds greater than 10mg/kg have not been detected in the soil analysis;
<b>PCB &gt; 1ppm</b>	No potential sources of PCB have been identified.
<b>Heavy metals - &gt;500ppm</b>	Concentrations of heavy metals are all below 500mg/kg

In due consideration of the ICSM which has identified a potential pollutant linkage associated with the migration towards the underlying Secondary A Aquifer, however this is reduced by the lack of any exceedance or contaminates above LOD. Groundwater analysis could not be completed due to no groundwater being present within the monitoring well, E3P is currently awaiting leachate analysis on the soils at the subject site. Once the results become available these will be issued as an addendum to this report.

However, based on the above, there is considered to be no unacceptable level of risk to the controlled water receptors.

#### 4.4 RB17 Ground Gas Assessment

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIEH Research Bulletin 17 *A Pragmatic Approach to Ground Gas Risk Assessment* (RB17). This approach is considered appropriate given the age and limited thickness of Made Ground identified.

The RSK Phase I report and subsequent ground investigation has identified the following potential sources of ground gas:

-  Shallow isolated Made Ground located within WS117 north eastern sector of the site associated with the present track into site.

Given the low sensitivity of the site with respect to hazardous ground gas, it was considered that a ground gas assessment undertaken in accordance with the latest guidance provided by CL:AIRE in their research bulletin RB17 would be suitable.

CL:AIRE Research Bulletin RB17 provides an alternative framework for the investigation and assessment of ground gas that takes into account other factors such as site history and the nature of the ground conditions beneath a site. It has been prepared to allow gas well installation and monitoring to be avoided where appropriate and may also be used in conjunction with gas monitoring to reduce the monitoring period or to avoid extra gas monitoring where anomalous results are recorded. The assessment is summarised in Table 4.4 overleaf:

**Table 4.4 RB17 Ground Gas Risk Assessment**

<b>E3P CL:AIRE RB 17 Ground Gas Risk Assessment</b>			
<b>Item</b>	<b>Outcome</b>	<b>Action</b>	<b>Risk Score</b>
<p>Have any credible <b>OFF SITE</b> ground gas sources been identified within the Desk Study &amp; ICSM that would include:</p> <ul style="list-style-type: none"> <li> Registered landfill within 250m;</li> <li> Historical landfill;</li> <li> Infilled pond within 50m;</li> <li> Infilled ground 100m.</li> </ul>	Yes	A historic ill is present 239m north of the site, however, the migration of hazardous ground gasses is not expected to affect the subject site due to the cohesive nature of the glacial till present at the site and within the surrounding area.	1
Is the site located within close proximity to a variable groundwater regime (river or tidal) that could potentially influence the ground gas regime.	No	None	1
Has a credible pathway for the migration of gas from historical mine workings been identified.	No	None	1
Average depth of Made Ground >5.0m	No	None	1
Average depth Made Ground >3.00m	No	None	1
Average Depth Made Ground >1.0m	No	Made ground has been encountered to a maximum depth of 0.60m bgl.	1
TOC <1	Yes	1 out 5 TOC <1.0%	1
TOC 1-3	Yes	4 out 5 TOC 1.0 – 3.0%	1
TOC >3	No	None	1
Made Ground In-situ >20 Years	No	None	1
Made Ground In-situ <20 Years	Yes	Isolated Made Ground associated with ta current track into the site.	1
Only natural soils with no potential to generate CH4	Yes	None	1
Radon Protection Measures Required	No	None	1
<b>Risk Score</b>			<b>13</b>

Notes for E3P RB17 Gas Risk Assessment

**Risk Score** – 1 = Low / 2 = Moderate / 3 = High

**Risk Profile**

Cumulative risk score is **<14** the site is deemed to be very low risk and thus conforms to **Characteristic Situation 1**.

Cumulative risk score is **>14 but <20** the site is deemed to be very low risk and thus conforms to **Characteristic Situation 2**.

Cumulative risk score is **>20** the site is deemed to be very low risk and thus conforms to **Characteristic Situation 3**.

The RB17 assessment indicates a cumulative score of 14 and that suggests Characteristic Situation 1 or Green.

It is therefore considered that no specialist mitigation measures are deemed necessary for the proposed residential dwellings.



#### 4.5 Conceptual Site Model

Following the completion of the intrusive site investigation, chemical analysis and risk assessment the conceptual model shown in Table 4.5 has been prepared for the site.

**Table 4.5 Conceptual Model**

SOURCE	EXPOSURE	POTENTIAL PATHWAY
<b>Human Health</b>		
<b>Heavy Metals and Non-Volatile PAHs, Volatile PAHs, TPHs and Asbestos</b>	Dermal Contact and Ingestion Consumption of Homegrown Produce Soil Ingestion, Dust inhalation, vapour Inhalation	Construction Workers Residential End Users
<p><b>Discussion:</b>  The Tier I Human Health Risk Assessment has not identified any concentrations of contaminants of concern which exceed the Tier I screening values for the protection of human health; as such the site poses no unacceptable degree of risk to future residential site users.</p>		
<b>Controlled Waters</b>		
<b>Mobile Contaminants</b>	Vertical / Lateral Migration	Secondary A
<p><b>Discussion:</b>  The site is considered to be at no unacceptable level of risk to controlled water receptors.</p>		
<b>Buildings and Infrastructure</b>		
<b>pH &amp; Sulphate</b>	Corrosion of Concrete	Foundations / Concrete
<p><b>Discussion:</b>  Chemical analyses for pH and soluble sulphate content shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).</p>		
<b>Ecology</b>		
<b>None Identified</b>	Lateral Migration	N/A
<p><b>Discussion:</b>  The existing field boundaries may provide habitat for nesting birds. A Habitat Survey may be required to support any future planning application.</p>		

## 5. GEOTECHNICAL ASSESSMENT

### 5.1 Proposed Development

E3P understands that Strategic Land Group are considering the sale of the land at Lee lane for future development into residential dwellings. A proposed plot development layout has not been made available for the site, however, it is assumed that the proposed development will comprise low rise residential dwellings with associated garden and landscaped areas, estate roads, pavements and infrastructure.

### 5.2 Summary of Ground Conditions

#### Made Ground

Made Ground was identified within one location WS117 present within the North Eastern sector of the site to a depth of 0.50m bgl which consisted of cobbles of brick and concrete.

#### Topsoil

Topsoil was encountered within every exploratory hole across site, topsoil was generally encountered as soft brown slightly gravelly clay with rootlets. Gravel within the topsoil matrix consisted of sub-angular to sub-rounded mudstone and sandstone. Topsoil was encountered to a maximum proven depth of 0.55m bgl however, topsoil was generally present between 0.30 and 0.40m bgl across the site.

#### Drift Deposits

Drift deposits were fairly varied across the site, predominantly comprising of stiff high strength brown mottled grey slightly sandy slightly gravelly clay with sandstone, mudstone and rare coal. Granular sand deposits were also encountered which often underlay the cohesive clay deposits. Granular deposits were encountered as light brown clayey gravelly fine to medium sand with medium to coarse sub-angular to sub-rounded of sandstone and siltstone.

#### Solid Geology

The solid bedrock geology was encountered between 1.65m and 4.95bgl, bedrock was encountered at shallower depths within the northern and southern sector of the site with the bedrock falling to in excess of >3.50m bgl within the centre and eastern sectors of the site. Bedrock was encountered as sandstone and siltstone.

### 5.3 Heave Precautions

The site has been proven to be underlain by clay soils which are susceptible to volumetric instability due to fluctuations in moisture content, particularly within influencing distance of trees as per the NHBC / LABC conjectured zones of influence.

As the clay is deemed to be of Medium Volume Change Potential Heave Precautions will be required to the internal face of the external load bearing walls (outside or within tree influence).

If a ground beam is to be constructed within the zone of tree influence, heave precautions are required to the underside of this and edge beams.

If the ground floor slab is to be constructed with a beam and block floor, a minimum sub-floor void of 200mm is required within any structures located in the zone of conjectured tree influence.



If the ground floor slab is constructed with a cast in-situ suspended floor slab heave precautions that can tolerate 50mm of clay swelling are required within any part of the floor slab to be located within the zone of influence of a tree.

A summary of heave precautions is present in Table 5.3.

**Table 5.3 Summary of Heave Precautions**

		MINIMUM VOID DIMENSION FOR FOUNDATIONS, GROUND BEAMS AND SUSPENDED IN-SITU CONCRETE GROUND FLOORS		MINIMUM VOID DIMENSIONS UNDER PRE-CAST CONCRETE AND SUSPENDED TIMBER FLOORS
Plasticity Index of Soil	Required Foundation Depth (m)	Thickness of Void Former Against Side of Foundation or Ground Beam (mm)	Thickness of Void Former on Underside of Edge Beam and Floor Slab (mm)	Void Dimension (mm)
High Plasticity (>40)	>2.50	Engineer Design		Engineer Design
	2.00-2.50	35	150	300
	1.50-2.00	25	75	
Moderate Plasticity (20-40)	>2.50	Engineer Design		Engineer Design
	2.00-2.50	25	100	250
	1.50-2.00	25	50	
Low Plasticity (<20)	2.00-2.50	-	50	200
	>2.00	No Special Precautions		

#### 5.4 Drainage

Soil infiltration was taken over the wetted area from between 75% and 25% of the effective depth. All tests showed the cohesive drift deposits to have a poor soakage potential.

Therefore, considering the significant volumes of low permeability clay on the site, it is considered that soakaway drainage may not be suitable for the proposed development.

#### 5.5 Concrete Durability

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

#### 5.6 Excavations

Trial Pits were generally stable in both granular and cohesive natural strata, as such it is considered that near surface excavations will be feasible. Areas where Made Ground exceeded 2.00m, excavations were generally less stable.

Site observations indicated that excavations should be feasible in the near surface with normal plant, however obstructions were identified in the near surface including former foundations and former floor slabs. It is anticipated that any obstructions will be grubbed out during the reduced level dig for the sub structure works.

However, due to the depth and variability of the Made Ground and likelihood of trench collapse it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations. Consideration should be given for the potential for dewatering gravels in the surrounding areas to the subject site that may cause structural damage to buildings sub-structures in close proximity to the site.

## 5.7 Coal Mining

A coal authority consultant report was obtained for the site which states 6 worked seams are present under the site at depths greater than <233m bgl. The CA report has also indicated that the site is at low risk from probable unrecorded shallow workings, no outcrops are recorded at the site, no mine entries are recorded within the subject site and no coal mining related hazards are recorded for the site.

The site is deemed to be **Low Risk** in terms of the potential presence of shallow mine workings that have the potential to cause ground instability.

## 5.8 Further Works

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

-  Plot Specific Foundation Schedule (upon receipt of the final development levels);
-  Arboricultural Survey;
-  Materials Management Plan;
-  Geotechnical Earthworks Strategy (Infrastructure).

## 5.9 Construction Activity and Inspection

The following activities and inspections should be incorporated in to the site works:

Due to the variability of the soils at the site it is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and pavement construction:

-  Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 utilised;
-  It is considered that de-watering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond;
-  Where access to confined spaces is required appropriate mitigation measures should be addressed within the Construction Stage Health and Safety Plan. Particular account should be taken of the gas results; and,
-  The presence of potential contamination and mitigation measures should be addressed as

part of the Construction Stage Health and Safety Plan and should include measures to design out the risks, reduce their impact and finally the use of Personnel Protective Equipment (PPE).



## 6. CONCLUSIONS AND RECOMMENDATIONS

<b>Contaminated Land</b>	
<b>Human Health</b>	<p>The Tier I Human Health Risk Assessment has not identified any concentrations of contaminants of concern which exceed the Tier I screening values for the protection of human health; as such the site poses no unacceptable degree of risk to future residential site users.</p> <p>Chemical analysis indicates that existing topsoil deposits will be suitable for utilisation within the proposed garden and landscaped areas</p>
<b>Controlled Waters</b>	Low risk to controlled waters.
<b>Ground Gas</b>	E3P have completed an RB17 Ground Gas Risk Assessment for the site, it is considered that the site falls under Characteristic Situation 1 – GREEN, with no specialist precautions, deemed necessary.
<b>Potable Water</b>	Poly-Ethylene Pipe

**END OF REPORT**

## APPENDIX I LIMITATIONS



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



## APPENDIX II GLOSSARY



## TERMS

AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
Sp.TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCs	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation

## UNITS

m	Metres
km	Kilometres
%	Percent
%v/v	Percent volume in air
mb	Milli Bars (atmospheric pressure)
l/hr	Litres per hour
µg/l	Micrograms per Litre (parts per billion)
ppb	Parts Per Billion

mg/kg	Milligrams per kilogram (parts per million)
ppm	Parts Per Million
mg/m <sup>3</sup>	Milligram per metre cubed
m bgl	Metres Below Ground Level
m bcl	Metre Below Cover Level
mAOD	Metres Above Ordnance Datum (sea level)
kN/m <sup>2</sup>	Kilo Newtons per metre squared
µm	Micro metre



## APPENDIX III DRAWINGS

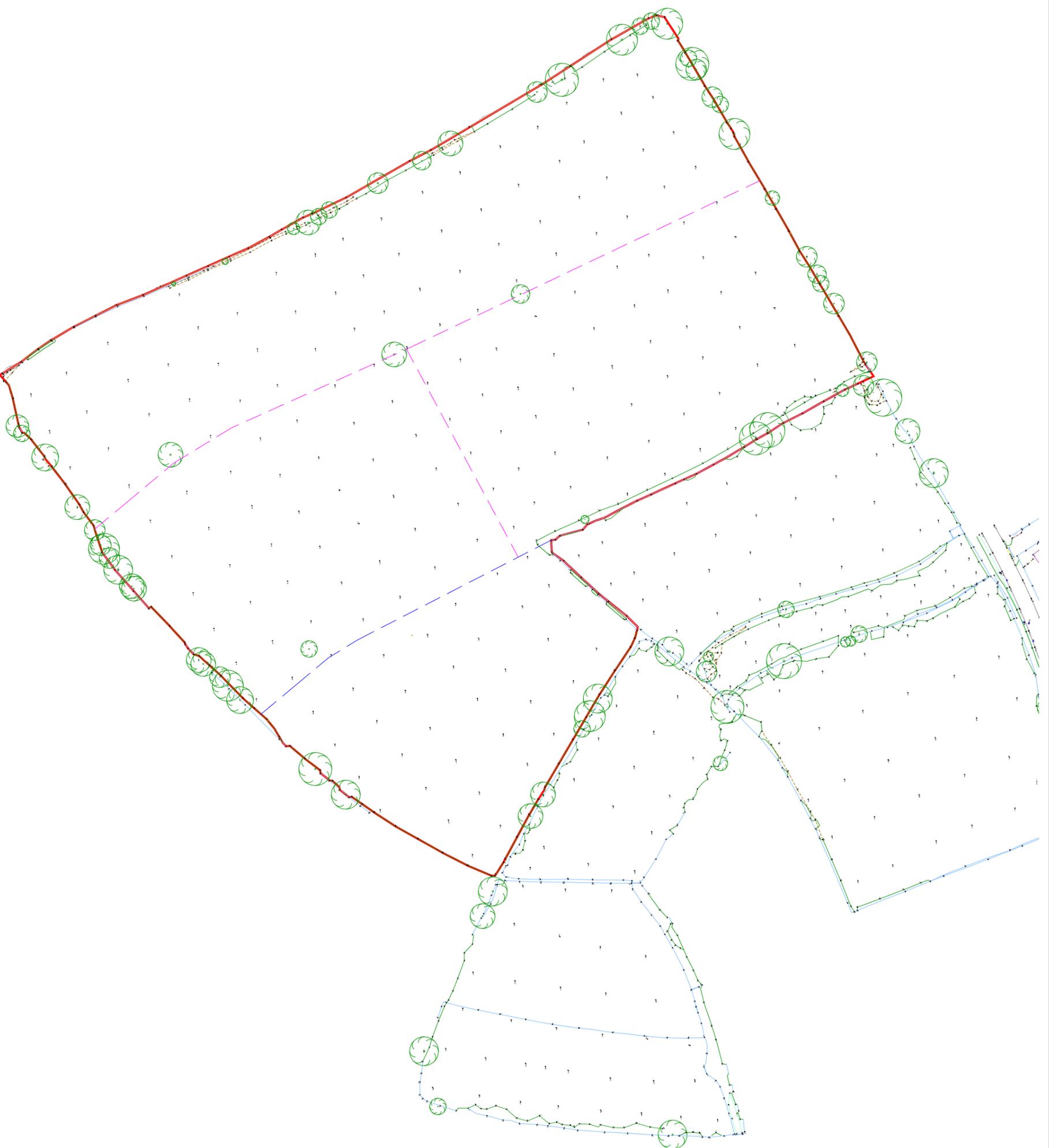




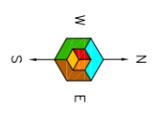
**Drawing 11-604-001**

**Site Location Plan**





- Historical Features**
- Former Field Boundaries (Pre 1854 - Pre 1980)
  - - - Former Field Boundaries (Pre 1854 - Pre 2006)



Phase	P1	Revision	07.02.2017	Issue	DRAFT	Drawn	RW	MD
		Date	07.02.2017	Date	07.02.2017	Authorised		

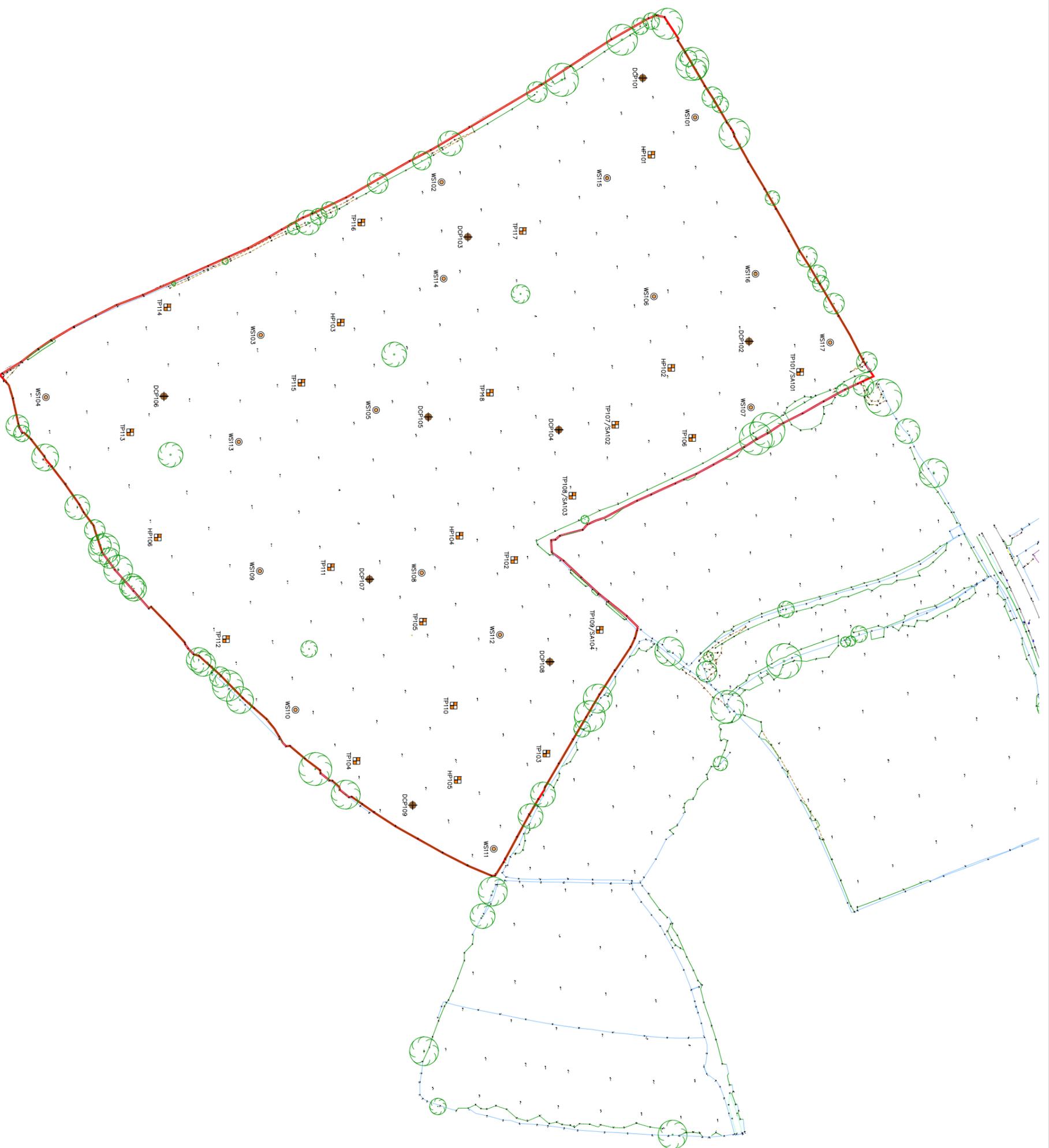
Client	Strategic Land Group		
	Job No:	11-604	
Drawing No:	002	Scale:	1:2000 @ A3

Job Title:	Lee Lane, Royston	Drawing Title:	Historical Features Plan
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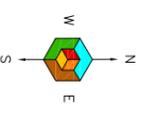


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- Location Symbols**
- WS101 Proposed Window Sample Probehole Location
  - TP101 Proposed Trial Pit Location
  - SA101 Proposed Soakaway Test Location
  - Approximate Location of Gas Service

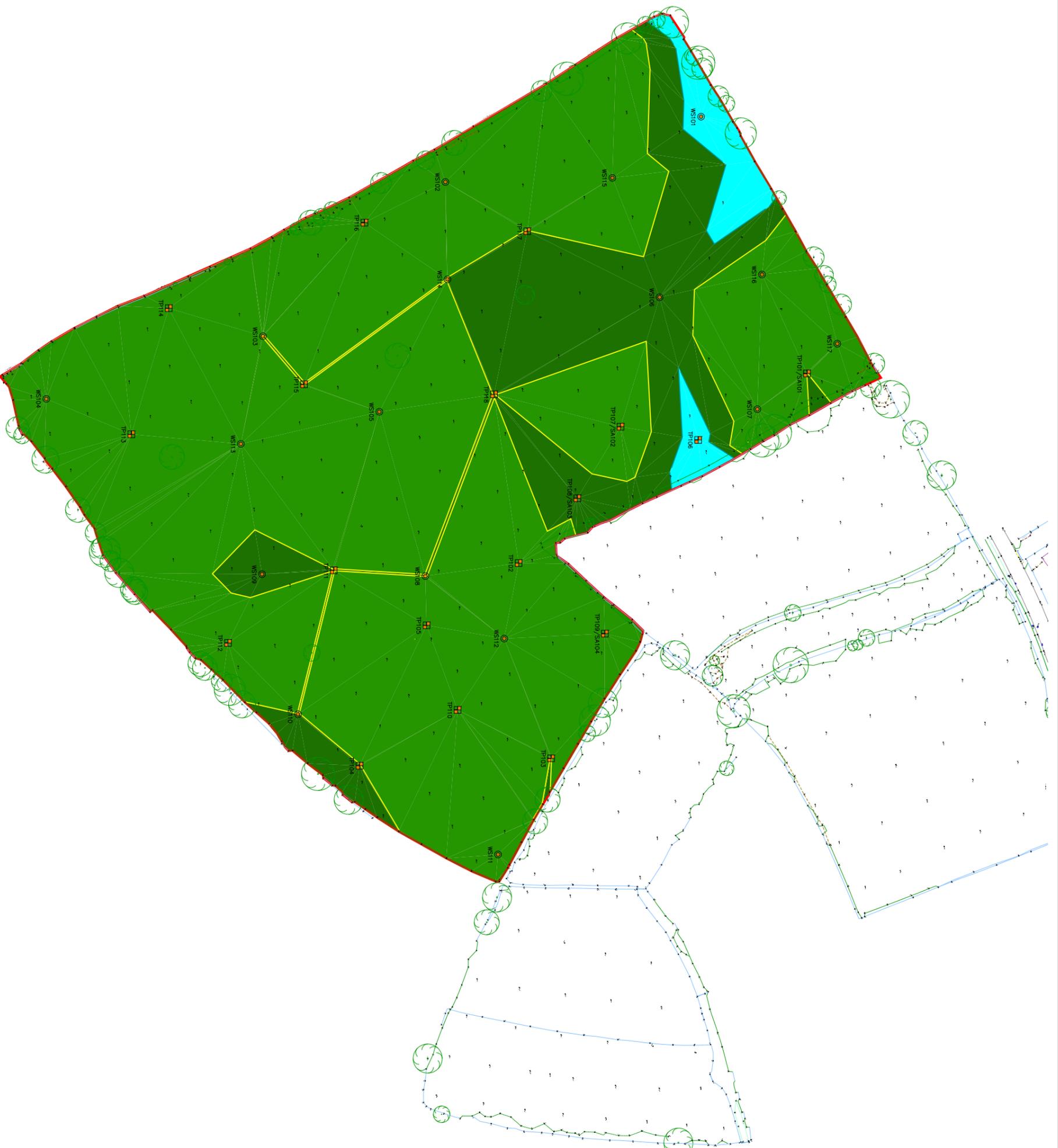


<p>Client: Strategic Land Group</p> <p>Job No: 11-604</p> <p>Drawing No: 003</p> <p>Scale: 1:2000 @ A3</p>		<p>Job Title: Lee Lane, Royston</p> <p>Drawing Title: Exploratory Hole Location Plan</p>						
Phase	P1	Date	08.02.2017	Issue	DRAFT	Drawn	RW	MD
Revision		Date		Issue		Drawn		Authorised



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**Key:**

**Location Symbols**

- WS101 Proposed Window Sample Probehole Location
- TP101 Proposed Trial Pit Location
- SA101 Proposed Soakaway Test Location

**Topsoil Depth (m)**

- Topsoil In Excess of 1.00m
- Depth of Topsoil Between 0.90 - 0.99m
- Depth of Topsoil Between 0.80 - 0.89m
- Depth of Topsoil Between 0.70 - 0.79m
- Depth of Topsoil Between 0.60 - 0.69m
- Depth of Topsoil Between 0.50 - 0.59m
- Depth of Topsoil Between 0.40 - 0.49m
- Depth of Topsoil Between 0.30 - 0.39m
- Depth of Topsoil Between 0.20 - 0.29m
- Depth of Topsoil Between 0.10 - 0.19m
- Depth of Topsoil Between 0.00 - 0.09m

Notes:

Phase	P1	Revision	-	Date	07.02.2017	Issue	DRAFT	RW	MD
Client	Strategic Land Group		Job No.	11-604	Date	07.02.2017	Scale	1:2000 @ A3	

Job Title:	Lee Lane, Royston	Drawing Title:	Depth of Topsoil Plan
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Key:

**Location Symbols**

- WS101 Proposed Window Sample Probehole Location
- TP101 Proposed Trial Pit Location
- SA101 Proposed Soakaway Test Location

**Bedrock Depth (m)**

- Bedrock In Excess of 5.00m
- Depth to Bedrock Between 4.50 - 4.99m
- Depth to Bedrock Between 4.00 - 4.49m
- Depth to Bedrock Between 3.50 - 3.99m
- Depth to Bedrock Between 3.00 - 3.49m
- Depth to Bedrock Between 2.50 - 2.99m
- Depth to Bedrock Between 2.00 - 2.49m
- Depth to Bedrock Between 1.50 - 1.99m
- Depth to Bedrock Between 1.00 - 1.49m
- Depth to Bedrock Between 0.50 - 0.99m
- Depth to Bedrock Between 0.00 - 0.49m

Notes:

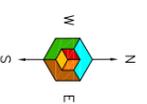
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Phase:	P1	Revision:	-
Date:	07.02.2017	Issue:	DRAFT
Drawn:	RW	MD	Authorised
Job No.:	11-604	Date:	07.02.2017
Drawing No.:	006	Scale:	1:2000 @ A3

Job Title:	Lee Lane, Royston	Drawing Title:	Depth of Bedrock Plan
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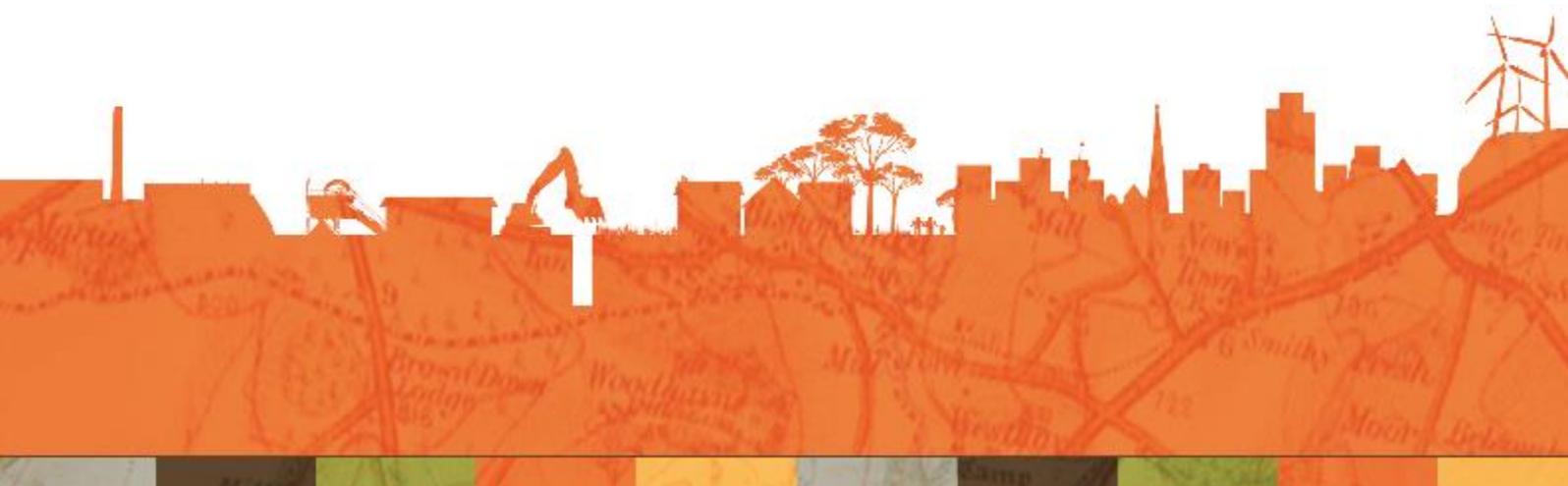


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## APPENDIX IV E3P EXPLORATORY HOLE LOGS





# Trial Pit Log

Trialpit No  
**TP101**  
Sheet 1 of 1

Project Name: Lee Lane

Project No.  
11604

Co-ords: -  
Level:

Date  
09/01/2017

Location: Royston

Dimensions (m):  
Depth 2.00  
2.3  
0.6

Scale  
1:25  
Logged  
A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	ES		0.40			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
			HVP=77				Stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.
			HVP=114				SANDSTONE.
				1.80			
				2.00			End of pit at 2.00 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP102**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:

Date  
09/01/2017

Location: Royston

Dimensions (m):  
Depth 2.30  
2.3  
0.6

Scale  
1:25  
Logged  
A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	ES	HVP=43  HVP=56	0.35			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
							Firm medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
				1.80			Grey SILTSTONE.
				2.30			End of pit at 2.30 m



Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP103**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

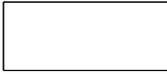
Co-ords: -  
Level:

Date  
09/01/2017

Location: Royston

Dimensions (m): 2.3

0.6



Scale  
1:25

Client: Kingsland Strategic Estates

Depth  
2.00

Logged  
A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.20	D	HVP=58	0.40			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.	
			HVP=83	0.90			Firm medium strength red brown slightly gravelly CLAY. Gravel is medium to coarse of coal and mudstone.	
					1.40			Stiff high strength brown CLAY.
					2.00			Light brown clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular of sandstone.
							End of pit at 2.00 m	



Remarks: Complete.

Stability:





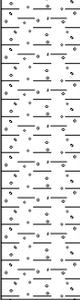
# Trial Pit Log

Trialpit No  
**TP104**  
Sheet 1 of 1

Project Name: Lee Lane      Project No. 11604      Co-ords: -  
Level:      Date 09/01/2017

Location: Royston      Dimensions (m): 2.3  
Depth 2.30      Scale 1:25

Client: Kingsland Strategic Estates      Logged A. Garitty

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	ES	HVP=75	0.40			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	1.00	D	HVP=105	1.30			Stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.
			HVP=112	2.30			Stiff high strength purple grey slightly gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and sandstone.
							End of pit at 2.30 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP105**  
Sheet 1 of 1

Project Name: Lee Lane      Project No. 11604      Co-ords: -      Date 09/01/2017  
Level:      Level:

Location: Royston      Dimensions (m): 2.3      Scale 1:25  
Depth 2.30      Logged A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
			HVP=15	0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
				0.80			Very soft very low strength brown slightly gravelly very sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal.
			HVP=70	1.00			Firm medium strength red brown mottled grey slightly gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal.
			HVP=129	1.50			Stiff high strength red brown mottled grey slightly gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal.
				1.80			Light brown clayey gravelly medium to coarse SAND. Gravel is medium to coarse sub-angular to sub-rounded of coal, mudstone and sandstone.
				2.30			SILTSTONE.
							End of pit at 2.30 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP106**  
Sheet 1 of 1

Project Name: Lee Lane      Project No. 11604      Co-ords: -      Date 10/01/2017  
Level:      Level:

Location: Royston      Dimensions (m): 2.3      Scale 1:25  
Depth 2.00      0.6

Client: Kingsland Strategic Estates      Logged A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.25	ES					Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.50	ES	HVP=71	0.55			Firm medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
	0.70	ES		1.00			Stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
			HVP=89	1.45			Stiff high strength purple grey slightly gravelly CLAY with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of coal and mudstone.
			HVP=109	1.70			Light brown clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sub-rounded of sandstone.
				2.00			End of pit at 2.00 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP107**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:

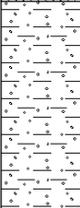
Date  
10/01/2017

Location: Royston

Dimensions (m): 2.3  
Depth 2.00

Scale 1:25  
Logged A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	ES		0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
			HVP=77	1.00			Stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
			HVP=69	1.65			Firm medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
				2.00			Dense light brown fine to medium SAND with gravel. Gravel is medium to coarse sub-angular to sub-rounded of sandstone.
							End of pit at 2.00 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP108**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:

Date  
10/01/2017

Location: Royston

Dimensions (m): 2.3

Depth 2.00

0.6

Scale 1:25  
Logged A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.45			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
			HVP=42				Firm medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
				1.40			Stiff high strength purple brown CLAY.
			HVP=99				Light brown clayey gravelly medium to coarse SAND. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and sandstone.
				1.85			
				2.00			End of pit at 2.00 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No

**TP109**

Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:Date  
10/01/2017

Location: Royston

Dimensions (m):

2.3

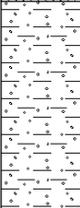
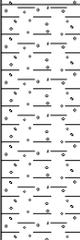
Scale  
1:25

Client: Kingsland Strategic Estates

Depth  
2.20

0.9

Logged  
A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES		0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.50	ES	HVP=47				Firm medium strength light brown mottled grey slightly gravelly sandy CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
			HVP=74	1.00			Stiff high strength light brown mottled grey slightly gravelly sandy CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
			HVP=80	1.80			Stiff purple brown CLAY.
				2.20			End of pit at 2.20 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No

**TP110**

Sheet 1 of 1

Project Name: Lee Lane

Project No.  
11604Co-ords: -  
Level:Date  
10/01/2017

Location: Royston

Dimensions (m): 2.3

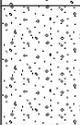
Scale  
1:25

Client: Kingsland Strategic Estates

Depth  
2.20

0.6

Logged  
A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.25	ES		0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.50	ES	HVP=78				Stiff high strength light brown mottled grey slightly gravelly sandy CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of coal, sandstone and mudstone.
			HVP=87				
			HVP=95	1.80			Brown gravelly clayey fine to medium SAND. Gravel is medium to coarse angular to sub-angular to sub-rounded of sandstone and coal.
				2.20			End of pit at 2.20 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP111**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:

Date  
10/01/2017

Location: Royston

Dimensions (m):  
Depth 1.50  
2.3  
0.6

Scale  
1:25  
Logged  
A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.70	ES	HVP=74 HVP=77	0.40 1.00 1.25 1.40 1.50		    	<p>Soft brown slightly gravelly CLAY (Topsoil) with rootlets and rare cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.</p> <p>Firm medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.</p> <p>Stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.</p> <p>Stiff purple grey slightly sandy gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal, mudstone and sandstone.</p> <p>SANDSTONE</p> <p>End of pit at 1.50 m</p>

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP112**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:

Date  
10/01/2017

Location: Royston

Dimensions (m): 2.3

Depth 3.00

0.6

Scale 1:25  
Logged  
A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.50	ES	HVP=90				Stiff high strength light brown mottled grey slightly gravelly sandy CLAY with cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
	1.20	D	HVP=98	1.00			Stiff high strength purple grey slightly gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal.
			HVP=124	1.90			Light brown clayey fine to medium SAND.
				3.00			End of pit at 3.00 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No

**TP113**

Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

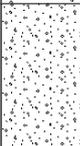
Co-ords: -  
Level:Date  
10/01/2017

Location: Royston

Dimensions (m): 2.3  
Depth 2.80Scale  
1:25

Client: Kingsland Strategic Estates

Logged  
A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
			HVP=75				Stiff high strength light brown mottled grey slightly gravelly sandy CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
			HVP=87	1.80			Brown gravelly clayey fine to medium SAND with cobbles of sandstone. Gravel is medium to coarse sub-angular to sub-rounded of coal, sandstone and mudstone.
			HVP=125	2.30			Stiff high strength purple grey CLAY.
				2.80			End of pit at 2.80 m

1

2

3

4

5

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP114**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:

Date  
10/01/2017

Location: Royston

Dimensions (m): 2.3  
Depth 2.60

Scale 1:25  
Logged A. Garrity

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES		0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.60	ES	HVP=91	0.80			Stiff high strength light brown mottled grey slightly gravelly sandy CLAY with cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
			HVP=121				Stiff high strength purple grey CLAY.
			HVP=105				
			HVP=117				
			HVP=125				
				2.60			End of pit at 2.60 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP115**  
Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:

Date  
10/01/2017

Location: Royston

Dimensions (m):  
Depth 2.45  
2.3  
0.6

Scale  
1:25  
Logged  
A. Garitty

Client: Kingsland Strategic Estates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
			HVP=70	0.40			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
				1.30			Firm medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
				2.10			Light brown gravelly clayey SAND. Gravel is medium to coarse sub-angular to sub-rounded of mudstone, sandstone and coal.
				2.45			Light brown clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sub-rounded of sandstone.
							End of pit at 2.45 m

Remarks: Complete.

Stability:





# Trial Pit Log

Trialpit No  
**TP116**  
Sheet 1 of 1

Project Name: Lee Lane      Project No. 11604      Co-ords: -  
Level:      Date 10/01/2017

Location: Royston      Dimensions (m): 2.3  
Depth 1.85      Scale 1:25

Client: Kingsland Strategic Estates      Logged A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES	HVP=34	0.30			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.70	ES					Soft low strength light brown mottled grey slightly sandy CLAY.
	1.30	D	HVP=110	1.20			Stiff high strength purple grey CLAY.
				1.60			Light brown clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sub-rounded of sandstone.
				1.85			End of pit at 1.85 m

Remarks: Complete.

Stability:





# Trial Pit Log

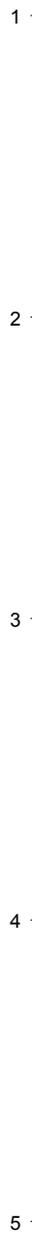
Trialpit No  
**TP117**  
Sheet 1 of 1

Project Name: Lee Lane      Project No. 11604      Co-ords: -      Date 10/01/2017  
Level:      Level:

Location: Royston      Dimensions (m): 2.3      Scale 1:25

Client: Kingsland Strategic Estates      Depth 1.85      Logged A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.25	ES		0.40			Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.60	ES	HVP=59				
			HVP=73	1.50			Light brown clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sub-rounded of sandstone and siltstone.
				1.85			End of pit at 1.85 m



Remarks: Complete.  
Stability:





# Trial Pit Log

Trialpit No

**TP118**

Sheet 1 of 1

Project Name: Lee Lane

Project No. 11604

Co-ords: -  
Level:Date  
10/01/2017

Location: Royston

Dimensions (m): 2.3

Scale  
1:25

Client: Kingsland Strategic Estates

Depth  
2.95

0.6

Logged  
A. Garrity

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES		0.40			Soft brown slightly gravelly CLAY (Topsoil) with rootlets and cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.
	0.60	ES		0.85			Light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.
			HVP=119				Stiff high strength purple grey CLAY.
			HVP=106				
			HVP=119				
			HVP=108				
				2.95			End of pit at 2.95 m

Remarks: Complete.

Stability:





# Borehole Log

Borehole No.

**WS101**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 09/01/2017 - 09/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES				Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.	
		0.70	PP	78	0.55		Very stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.	
		1.00	ES	N=20 (1,2/3,5,6,6)				
		1.20	PP	57				
		1.40	PP	131	1.45			
				50 (25 for 4mm/50 for 45mm)	1.80			Dense brown mottled grey slightly gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sub-rounded of coal and siltstone.
				2.00			Brown grey SILTSTONE. End of borehole at 2.00 m	



## Remarks

1. Refused on dense siltstone at 2.00m bgl. 2. Monitoring well installed.







# Borehole Log

Borehole No.

**WS103**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 09/01/2017 - 09/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.40		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
		0.80	PP	127 N=16 (2,3/3,4,4,5)	1.00		Light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of sandstone, mudstone and coal.	1	
		1.50	U				Very stiff high strength brown mottled grey gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of sandstone and mudstone.		
		1.80	PP	123 N=19 (3,3/4,4,5,6)				2	
		2.20	PP	221	2.40		SILTSTONE.		
		3.00	PP	204 N=19 (3,4/4,5,5,5)				3	
			50 (5,9/50 for 30mm)	4.00			4		
							End of borehole at 4.00 m	4	
								5	
								6	
								7	
								8	
								9	
								10	

## Remarks

1. Refused at 4.00m bgl. 2. Monitoring well installed.





# Borehole Log

Borehole No.

**WS104**

Sheet 1 of 1

Project Name  
Lee Lane

Project No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 09/01/2017 - 09/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.35		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
		0.60	ES						
		0.80	PP	102				Stiff medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.	1
		1.20	PP	N=12 (2,2/3,3,3,3)	1.05			Stiff brown mottled grey gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of mudstone, sandstone and coal.	1
		1.80	PP	164					2
		2.30	PP	N=17 (2,2/4,3,5,5)	2.00			Very stiff high strength grey slightly sandy slightly gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of sandstone.	2
		2.50	U						3
		3.40	PP	N=26 (3,3/4,6,8,8)	3.40			Dense light brown fine to medium SAND.	3
			50 (10,10/50 for 10mm)	4.00			End of borehole at 4.00 m	4	

Remarks

1. Refused at 4.00m bgl. 2. Monitoring well installed.





# Borehole Log

Borehole No.

**WS105**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 09/01/2017 - 09/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		1.50	U	N=12 (2,2/3,3,3,3)	0.30		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone. Stiff medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.	
				N=14 (2,2/3,3,3,5)	2.00		Stiff medium strength to very stiff high strength purple green CLAY.	
				N=26 (3,3/4,4,8,10)	3.40		Dense light brown fine to medium SAND.	
				50 (10,10/50 for 50mm)	3.80		End of borehole at 3.80 m	

Remarks  
Complete.



# Borehole Log

Borehole No.

**WS106**

Sheet 1 of 1

Project Name

Lee Lane

Project No.

11604

Co-ords: -

Hole Type

WS

Location:

Royston

Level:

Scale

1:50

Client:

Kingsland Strategic Estates

Dates:

09/01/2017 - 09/01/2017

Logged By

A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.45		MADE GROUND: Soft brown slightly gravelly clay (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and rare brick. Very stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.	
		0.50	U					
		1.10	ES	N=21 (7,4/4,5,5,7)	1.10		Dense light brown gravelly medium to coarse SAND. Gravel is medium to coarse sub-angular to sub-rounded of sandstone.	
				50 (25 for 50mm/50 for 50mm)	2.00		End of borehole at 2.00 m	

Remarks

1. Refused at 2.00m bgl. 2. Monitoring well installed.





# Borehole Log

Borehole No.

**WS107**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

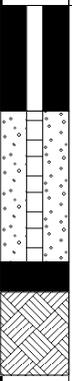
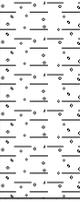
Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 10/01/2017 - 10/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30				
		0.50	PP	94				Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.	1
		0.60	ES	N=13 (2,3/4,3,3,3)					
			1.30	PP	172			Stiff medium strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal, sandstone and mudstone.	
				50 (7,15/50 for 10mm)	1.65			2	
					2.45			Weathered SANDSTONE.	3
								End of borehole at 2.45 m	4
									5
									6
									7
									8
									9
									10

Remarks

1. Refused at 2.45m bgl. 2. Monitoring well installed.





# Borehole Log

Borehole No.

**WS108**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 09/01/2017 - 09/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.40		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
		0.60	PP	196 N=15 (3,4/3,3,3,6)	1.20		Stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.	1	
		1.50	PP	204	2.40		Very stiff high strength brown mottled grey gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of mudstone, sandstone and coal.	2	
		2.00	PP	221 N=27 (7,4/6,6,7,8)  N=27 (7,6/5,6,7,9)	3.45		Medium dense light brown fine to medium SAND with occasional cobbles of sandstone.	3	
				50 (5,6/50 for 70mm)	4.45		SILTSTONE.	4	
							End of borehole at 4.45 m	5	
								6	
								7	
								8	
								9	
								10	

Remarks

Refused on siltstone at 4.45m bgl.





# Borehole Log

Borehole No.

**WS109**

Sheet 1 of 1

Project Name  
Lee Lane

Project No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 09/01/2017 - 09/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	U		0.45		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
		1.10	ES	N=14 (3,2/3,3,3,5)	0.85		Light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.	1	
		1.70	PP	151	1.55		Medium dense brown clayey fine to medium SAND.		
				N=29 (3,5/5,6,9,9)	2.10		Very stiff high strength brown mottled grey gravelly CLAY. Gravel is medium to coarse sub-angular to sub-rounded of mudstone, sandstone and coal.	2	
				50 (9,10/50 for 65mm)	3.45		Dense light brown fine to medium SAND.	3	
							End of borehole at 3.45 m	4	
								5	
								6	
								7	
								8	
								9	
								10	

Remarks

1. Complete. 2. Monitoring well installed.





# Borehole Log

Borehole No.

**WS110**

Sheet 1 of 1

Project Name  
Lee Lane

Project No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 10/01/2017 - 10/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
				N=13 (2,3/2,3,4,4)	1.20		Stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.	1	
					1.45		Light brown slightly gravelly medium to coarse SAND. Gravel is medium to coarse sub-angular to sub-rounded of coal.		
				N=21 (1,4/5,4,5,7)	2.20		Medium dense light brown slightly clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sub-rounded of coal.	2	
					2.90		Very stiff high strength purple grey CLAY.		
				N=20 (2,4/4,5,5,6)	3.45		Grey SILTSTONE.	3	
							End of borehole at 3.45 m	4	
				50 (4,5/50 for 70mm)				5	
								6	
								7	
								8	
								9	
								10	

Remarks  
Complete.





# Borehole Log

Borehole No.

**WS111**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 10/01/2017 - 10/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES	N=14 (3,3/3,3,3,5)	0.30		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone. Stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of coal and sandstone.	1	
				N=17 (3,4/3,4,4,6)	1.90		Medium dense light brown slightly clayey gravelly fine to medium SAND. Gravel is medium to coarse sub-angular to sub-rounded of coal.	2	
				N=25 (5,4/5,5,7,8)	3.20		Very stiff high strength purple grey CLAY.	3	
				N=24 (4,4/6,5,6,7)	3.90		Grey SILTSTONE.	4	
				50 (25 for 70mm/50 for 10mm)	4.95		End of borehole at 4.95 m	5	
								6	
								7	
								8	
								9	
								10	

## Remarks

1. Complete. 2. Monitoring well installed.





# Borehole Log

Borehole No.

**WS112**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 10/01/2017 - 10/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.	1	
		0.70	PP	57 N=11 (2,2/3,2,3,3)			Stiff high strength light brown mottled grey slightly gravelly sandy CLAY. Gravel is medium to coarse sub-angular to sub-rounded of sandstone and coal.		
		1.50	PP	3 N=18 (3,3/4,5,4,5) N=19 (4,3/4,4,6,5)	1.45		Very stiff high strength purple grey CLAY.	2 3	
				47 (25 for 50mm/47 for 10mm)	3.80 4.00		Yellow brown SILTSTONE. End of borehole at 4.00 m	4	

Remarks





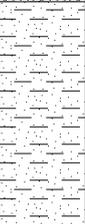
# Borehole Log

Borehole No.

**WS113**

Sheet 1 of 1

Project Name Lee Lane	Project No. 11604	Co-ords: -	Hole Type WS
Location: Royston	Level:		Scale 1:50
Client: Kingsland Strategic Estates	Dates: 13/01/2017 - 13/01/2017		Logged By A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30		 Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
				N=20 (3,3/4,3,5,8)			 Stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.	1	
				N=31 (7,5/6,7,8,10)	1.80		 Yellow SANDSTONE.	2	
				50 (8,10/50 for 70mm)	3.00		End of borehole at 3.00 m	3	
								4	
								5	
								6	
								7	
								8	
								9	
								10	

Remarks





# Borehole Log

Borehole No.

**WS114**

Sheet 1 of 1

Project Name  
Lee LaneProject No.  
11604

Co-ords: -

Hole Type  
WS

Location: Royston

Level:

Scale  
1:50

Client: Kingsland Strategic Estates

Dates: 13/01/2017 - 13/01/2017

Logged By  
A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.40		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
		0.60	PP	29				Stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.	1
		1.00	ES	N=10 (1,1/2,2,3,3)	1.40				
		1.20	PP	25				Stiff medium strength purple grey CLAY.	2
		1.60	PP	106	2.60				
				N=16 (4,3/3,3,5,5)					
		2.50	PP	106	2.85		Light brown medium to coarse SAND.		
				50 (25 for 10mm/50 for 20mm)	3.00		Yellow weathered SANDSTONE. End of borehole at 3.00 m	3	
								4	
								5	
								6	
								7	
								8	
								9	
								10	

Remarks





# Borehole Log

Borehole No.

**WS115**

Sheet 1 of 1

Project Name

Lee Lane

Project No.

11604

Co-ords: -

Hole Type

WS

Location: Royston

Level:

Scale

1:50

Client: Kingsland Strategic Estates

Dates: 13/01/2017 - 13/01/2017

Logged By

A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES	41	0.30		Soft brown slightly gravelly CLAY (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
		0.60	PP	N=13 (2,2/3,3,3,4)			Stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.	1	
		1.50	PP	147	1.65		Firm brown gravelly CLAY. Gravel is medium to coarse sub-angular of siltstone.		
				50 (11,10/50 for 70mm)	1.80		Dense grey SILTSTONE.	2	
					2.00		End of borehole at 2.00 m		

Remarks





# Borehole Log

Borehole No.

**WS116**

Sheet 1 of 1

Project Name Lee Lane	Project No. 11604	Co-ords: -	Hole Type WS
Location: Royston		Level:	Scale 1:50
Client: Kingsland Strategic Estates		Dates: 13/01/2017 - 13/01/2017	Logged By A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
				N=17 (4,5/4,4,4,5)	0.30		Soft brown slightly gravelly CLAY (Topsoil) with rootlets and occasional cobbles of sandstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
				50 (25 for 65mm/50 for 0mm)	1.80		Stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.	1	
					2.00		Yellow SANDSTONE.	2	
End of borehole at 2.00 m								3	
								4	
								5	
								6	
								7	
								8	
								9	
								10	

Remarks





# Borehole Log

Borehole No.

**WS117**

Sheet 1 of 1

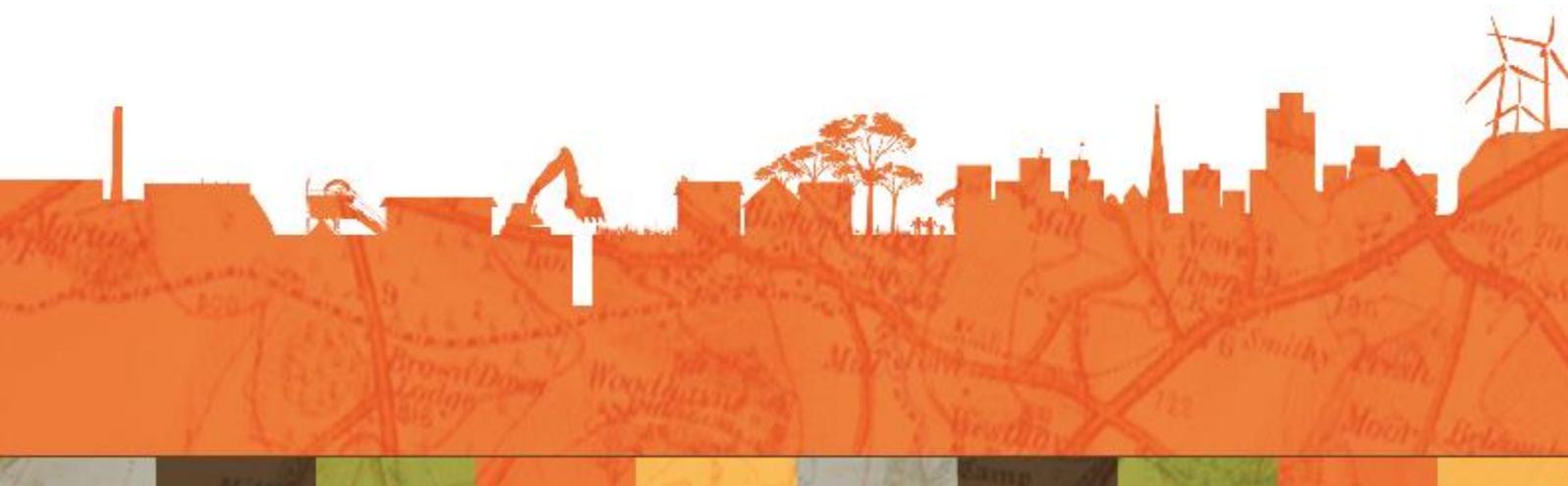
Project Name Lee Lane	Project No. 11604	Co-ords: -	Hole Type WS
Location: Royston		Level:	Scale 1:50
Client: Kingsland Strategic Estates		Dates: 13/01/2017 - 13/01/2017	Logged By A. Garitty

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40	ES		0.35				
		0.70	PP	33 N=13 (3,2/4,2,3,4)	0.50		MADE GROUND: Soft brown slightly gravelly clay (Topsoil) with rootlets. Gravel is medium to coarse sub-angular to sub-rounded of mudstone.		
				50 (25 for 125mm/50 for 0mm)	1.90		MADE GROUND: Cobbles of brick and concrete. Stiff high strength light brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles of mudstone. Gravel is medium to coarse sub-angular to sub-rounded of mudstone and coal.		1
					2.45		Grey SANDSTONE.		2
							End of borehole at 2.45 m		3
									4
									5
									6
									7
									8
									9
									10

Remarks



## APPENDIX V CHEMICAL TESTING RESULTS





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## **Analytical Report Number : 17-37320**

<b>Project / Site name:</b>	Lee Lane	<b>Samples received on:</b>	13/01/2017
<b>Your job number:</b>	11-604	<b>Samples instructed on:</b>	13/01/2017
<b>Your order number:</b>	11604-5201-AG	<b>Analysis completed by:</b>	20/01/2017
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	20/01/2017
<b>Samples Analysed:</b>	12 soil samples		

**Signed:** 

Rexona Rahman  
Reporting Manager  
**For & on behalf of i2 Analytical Ltd.**

**Signed:** 

Dr Irma Doyle  
Senior Account Manager  
**For & on behalf of i2 Analytical Ltd.**

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 17-37320

Project / Site name: Lee Lane

Your Order No: 11604-5201-AG

Lab Sample Number	685707			685708			685709			685710			685711		
Sample Reference	WS101			TP118			WS108			WS112			TP109		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.30			0.20			0.30			0.20			0.20		
Date Sampled	09/01/2017			10/01/2017			09/01/2017			10/01/2017			10/01/2017		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status												
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	25	22	22	20	19							
Total mass of sample received	kg	0.001	NONE	0.48	0.51	0.49	0.53	0.54							

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

**General Inorganics**

Parameter	Units	N/A	MCERTS	7.4	6.8	7.0	7.1	7.7
pH - Automated	pH Units	N/A	MCERTS	7.4	6.8	7.0	7.1	7.7
Total Cyanide	mg/kg	1	MCERTS	1	2	1	1	< 1
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	660	510	590	510	410
Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)	mg/kg	2.5	MCERTS	26	31	32	37	35
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.013	0.016	0.016	0.019	0.017
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	13.2	15.6	16.1	18.5	17.4
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	400	310	350	300	260
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	-

**Total Phenols**

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

**Speciated PAHs**

Parameter	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

**Total PAH**

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	< 1.60	< 1.60

Analytical Report Number: 17-37320

Project / Site name: Lee Lane

Your Order No: 11604-5201-AG

Lab Sample Number	685707				685708				685709				685710				685711			
Sample Reference	WS101				TP118				WS108				WS112				TP109			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.30				0.20				0.30				0.20				0.20			
Date Sampled	09/01/2017				10/01/2017				09/01/2017				10/01/2017				10/01/2017			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

**Heavy Metals / Metalloids**

	mg/kg	1	MCERTS	12	6.8	12	11	9.1
Arsenic (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (hexavalent)	mg/kg	1	MCERTS	22	18	21	16	18
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	25	28	19	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	38	77	39	36	28
Lead (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	0.4
Mercury (aqua regia extractable)	mg/kg	1	MCERTS	14	12	13	9.9	9.9
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.8	< 1.0	< 1.0	< 1.0
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	69	62	61	49	47
Zinc (aqua regia extractable)	mg/kg	1	MCERTS					

**Petroleum Hydrocarbons**

	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C5 - C6)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C6 - C8)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	2	ISO 17025	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C10 - C12)	mg/kg	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C12 - C16)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C16 - C21)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Analytical Report Number: 17-37320

Project / Site name: Lee Lane  
Your Order No: 11604-5201-AG

Lab Sample Number	685707				685708				685709				685710				685711			
Sample Reference	WS101				TP118				WS108				WS112				TP109			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.30				0.20				0.30				0.20				0.20			
Date Sampled	09/01/2017				10/01/2017				09/01/2017				10/01/2017				10/01/2017			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

**VOCs**

Compound	Units	Limit of detection	Accreditation Status	685707	685708	685709	685710	685711
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	NONE	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	-
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	NONE	-	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-



**Analytical Report Number: 17-37320**

**Project / Site name: Lee Lane**

**Your Order No: 11604-5201-AG**

Lab Sample Number	685707				685708				685709				685710				685711			
Sample Reference	WS101				TP118				WS108				WS112				TP109			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.30				0.20				0.30				0.20				0.20			
Date Sampled	09/01/2017				10/01/2017				09/01/2017				10/01/2017				10/01/2017			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

Analytical Report Number: 17-37320

Project / Site name: Lee Lane

Your Order No: 11604-5201-AG

Lab Sample Number				685712	685713	685714	685715	685716
Sample Reference				WS107	WS104	TP111	TP110	WS111
Sample Number				None Supplied				
Depth (m)				0.60	0.60	0.70	0.50	0.50
Date Sampled				10/01/2017	09/01/2017	10/01/2017	10/01/2017	10/01/2017
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	15	16	15	14
Total mass of sample received	kg	0.001	NONE	0.52	0.51	0.51	0.49	0.47

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

#### General Inorganics

	pH Units	N/A	MCERTS	7.8	7.7	7.7	7.5	6.9
pH - Automated								
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	170	160	180	130	300
Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)	mg/kg	2.5	MCERTS	84	100	20	47	41
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.042	0.052	0.010	0.024	0.021
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	41.8	52.4	10.0	23.7	20.6
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	69	95	84	87	150
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	-

#### Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

#### Speciated PAHs

	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene								
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

#### Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	< 1.60	< 1.60



Analytical Report Number: 17-37320

Project / Site name: Lee Lane  
Your Order No: 11604-5201-AG

Lab Sample Number	685712				685713				685714				685715				685716			
Sample Reference	WS107				WS104				TP111				TP110				WS111			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.60				0.60				0.70				0.50				0.50			
Date Sampled	10/01/2017				09/01/2017				10/01/2017				10/01/2017				10/01/2017			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	
<b>Heavy Metals / Metalloids</b>																				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.2	7.0	7.3	9.1	9.6												
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2												
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0												
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	23	20	24	18												
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	24	18	33	16												
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.1	16	17	21	22												
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3												
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	33	13	24	12												
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0												
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	33	65	38	65	41												

**Petroleum Hydrocarbons**

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
TPH (C6 - C8)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1										
TPH (C8 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1										
TPH (C10 - C12)	mg/kg	2	ISO 17025	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0										
TPH (C12 - C16)	mg/kg	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0										
TPH (C16 - C21)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
TPH (C21 - C35)	mg/kg	1	ISO 17025	3.5	< 1.0	< 1.0	< 1.0	< 1.0										

Analytical Report Number: 17-37320

Project / Site name: Lee Lane  
Your Order No: 11604-5201-AG

Lab Sample Number				685712	685713	685714	685715	685716
Sample Reference				WS107	WS104	TP111	TP110	WS111
Sample Number				None Supplied				
Depth (m)				0.60	0.60	0.70	0.50	0.50
Date Sampled				10/01/2017	09/01/2017	10/01/2017	10/01/2017	10/01/2017
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	< 1.0	-



**Analytical Report Number: 17-37320**

**Project / Site name: Lee Lane**

**Your Order No: 11604-5201-AG**

Lab Sample Number				685712	685713	685714	685715	685716
Sample Reference				WS107	WS104	TP111	TP110	WS111
Sample Number				None Supplied				
Depth (m)				0.60	0.60	0.70	0.50	0.50
Date Sampled				10/01/2017	09/01/2017	10/01/2017	10/01/2017	10/01/2017
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Analytical Report Number: 17-37320

Project / Site name: Lee Lane  
Your Order No: 11604-5201-AG

Lab Sample Number				685717	685718			
Sample Reference				WS106	WS102			
Sample Number				None Supplied	None Supplied			
Depth (m)				1.10	0.70			
Date Sampled				09/01/2017	09/01/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	16	13			
Total mass of sample received	kg	0.001	NONE	0.45	0.55			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			

#### General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6	7.1			
Total Cyanide	mg/kg	1	MCERTS	1	< 1			
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	210	150			
Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)	mg/kg	2.5	MCERTS	26	38			
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.013	0.019			
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	13.2	19.2			
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0			
Total Sulphur	mg/kg	50	MCERTS	150	65			
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.0	0.2			

#### Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			

#### Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			

#### Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60			



Analytical Report Number: 17-37320

Project / Site name: Lee Lane  
Your Order No: 11604-5201-AG

Lab Sample Number				685717	685718			
Sample Reference				WS106	WS102			
Sample Number				None Supplied	None Supplied			
Depth (m)				1.10	0.70			
Date Sampled				09/01/2017	09/01/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
<b>Heavy Metals / Metalloids</b>								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.7	4.4			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	18			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19	11			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	24	16			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	21			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	52	79			

**Petroleum Hydrocarbons**

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0			
TPH (C6 - C8)	mg/kg	0.1	NONE	< 0.1	< 0.1			
TPH (C8 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1			
TPH (C10 - C12)	mg/kg	2	ISO 17025	< 2.0	< 2.0			
TPH (C12 - C16)	mg/kg	4	ISO 17025	< 4.0	< 4.0			
TPH (C16 - C21)	mg/kg	1	ISO 17025	< 1.0	< 1.0			
TPH (C21 - C35)	mg/kg	1	ISO 17025	< 1.0	< 1.0			



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Project / Site name: Lee Lane  
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<b>Lab Sample Number</b>				685717	685718			
<b>Sample Reference</b>				WS106	WS102			
<b>Sample Number</b>				None Supplied	None Supplied			
<b>Depth (m)</b>				1.10	0.70			
<b>Date Sampled</b>				09/01/2017	09/01/2017			
<b>Time Taken</b>				None Supplied	None Supplied			
<b>Analytical Parameter (Soil Analysis)</b>	<b>Units</b>	<b>Limit of detection</b>	<b>Accreditation Status</b>					

<b>VOCs</b>								
Analytical Parameter	Units	Limit of detection	Accreditation Status	685717	685718			
Chloromethane	µg/kg	1	ISO 17025	-	-			
Chloroethane	µg/kg	1	NONE	-	-			
Bromomethane	µg/kg	1	ISO 17025	-	-			
Vinyl Chloride	µg/kg	1	NONE	-	-			
Trichlorofluoromethane	µg/kg	1	NONE	-	-			
1,1-Dichloroethene	µg/kg	1	NONE	-	-			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-			
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-			
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-			
Trichloromethane	µg/kg	1	MCERTS	-	-			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-			
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-			
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-			
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-			
Benzene	µg/kg	1	MCERTS	-	-			
Tetrachloromethane	µg/kg	1	MCERTS	-	-			
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-			
Trichloroethene	µg/kg	1	MCERTS	-	-			
Dibromomethane	µg/kg	1	MCERTS	-	-			
Bromodichloromethane	µg/kg	1	MCERTS	-	-			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-			
Toluene	µg/kg	1	MCERTS	-	-			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-			
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-			
Dibromochloromethane	µg/kg	1	ISO 17025	-	-			
Tetrachloroethene	µg/kg	1	NONE	-	-			
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-			
Chlorobenzene	µg/kg	1	MCERTS	-	-			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-			
Ethylbenzene	µg/kg	1	MCERTS	-	-			
p & m-Xylene	µg/kg	1	MCERTS	-	-			
Styrene	µg/kg	1	MCERTS	-	-			
Tribromomethane	µg/kg	1	NONE	-	-			
o-Xylene	µg/kg	1	MCERTS	-	-			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-			
Isopropylbenzene	µg/kg	1	MCERTS	-	-			
Bromobenzene	µg/kg	1	MCERTS	-	-			
n-Propylbenzene	µg/kg	1	ISO 17025	-	-			
2-Chlorotoluene	µg/kg	1	MCERTS	-	-			
4-Chlorotoluene	µg/kg	1	MCERTS	-	-			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-			
tert-Butylbenzene	µg/kg	1	MCERTS	-	-			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-			
sec-Butylbenzene	µg/kg	1	MCERTS	-	-			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-			
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-			
Butylbenzene	µg/kg	1	MCERTS	-	-			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-			
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-			



**Analytical Report Number: 17-37320**

**Project / Site name: Lee Lane**

**Your Order No: 11604-5201-AG**

<b>Lab Sample Number</b>				685717	685718			
<b>Sample Reference</b>				WS106	WS102			
<b>Sample Number</b>				None Supplied	None Supplied			
<b>Depth (m)</b>				1.10	0.70			
<b>Date Sampled</b>				09/01/2017	09/01/2017			
<b>Time Taken</b>				None Supplied	None Supplied			
<b>Analytical Parameter (Soil Analysis)</b>				<b>Units</b>	<b>Limit of detection</b>	<b>Accreditation Status</b>		



**Analytical Report Number : 17-37320**

**Project / Site name: Lee Lane**

\* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
685707	WS101	None Supplied	0.30	Brown loam and clay with gravel.
685708	TP118	None Supplied	0.20	Brown loam and clay with gravel.
685709	WS108	None Supplied	0.30	Brown loam and clay with gravel.
685710	WS112	None Supplied	0.20	Brown loam and clay with gravel.
685711	TP109	None Supplied	0.20	Brown loam and clay with gravel.
685712	WS107	None Supplied	0.60	Brown sandy clay.
685713	WS104	None Supplied	0.60	Brown clay and loam.
685714	TP111	None Supplied	0.70	Brown clay and sand.
685715	TP110	None Supplied	0.50	Brown clay and loam.
685716	WS111	None Supplied	0.50	Brown clay and sand.
685717	WS106	None Supplied	1.10	Brown sandy clay.
685718	WS102	None Supplied	0.70	Brown clay and sand.

**Analytical Report Number : 17-37320**

**Project / Site name: Lee Lane**

**Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)**

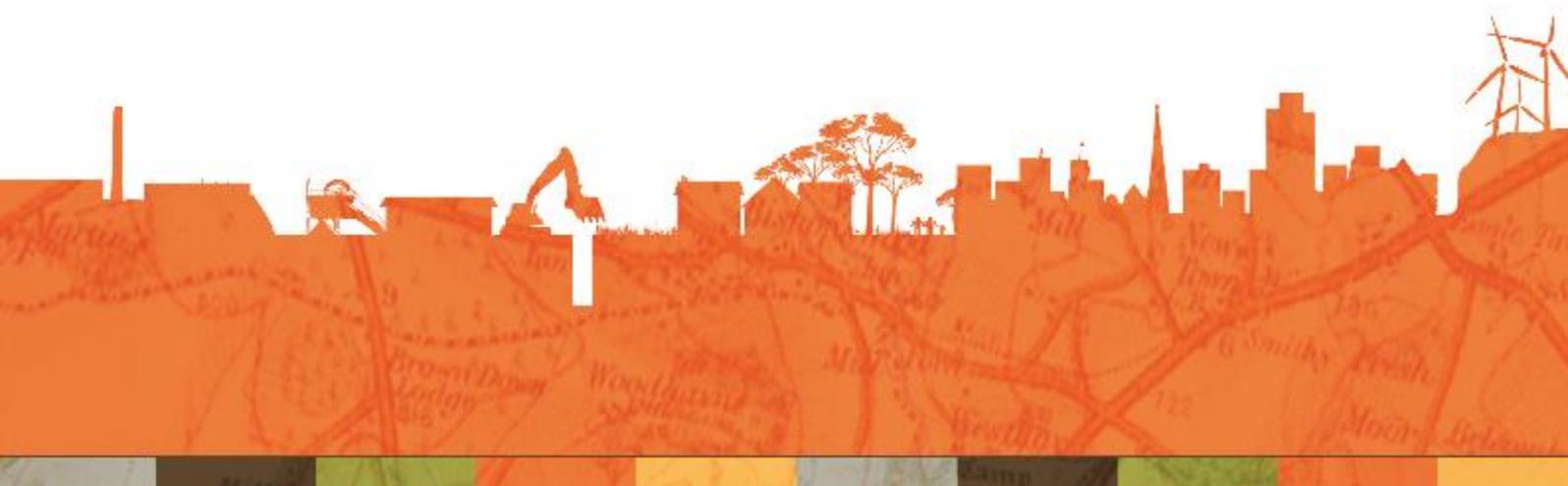
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	MCERTS
Total sulphate (as SO <sub>4</sub> in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L076-PL	D	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

**For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.**

**For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.**

**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**

**APPENDIX VI  
ORIGIN OF TIER I GENERIC  
ASSESSMENT CRITERIA**



CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	PC4SL - DEFRA
Cadmium	P4CSL - DEFRA
Chromium	P4CSL - DEFRA
Lead	P4CSL - DEFRA
Mercury	2014 LQM/CIEH S4ULs - methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide - Total	2014 LQM/CIEH S4ULs
Phenols - Total.	2014 LQM/CIEH S4ULs
Naphthalene	General Assessment Criteria (GAC) developed by CIEH / LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene <sup>f</sup>	
Chrysene	
Benzo(b/k)Fluoranthene <sup>(iii)</sup>	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C <sub>5</sub> -C <sub>6</sub> (aliphatic)	
TPH C <sub>6</sub> -C <sub>8</sub> (aliphatic)	
TPH C <sub>8</sub> -C <sub>10</sub> (aliphatic)	
TPH C <sub>10</sub> -C <sub>12</sub> (aliphatic)	
TPH C <sub>12</sub> -C <sub>16</sub> (aromatic)	
TPH C <sub>16</sub> -C <sub>21</sub> (aromatic)	
TPH C <sub>21</sub> -C <sub>35</sub> (aromatic)	



## APPENDIX VII GEOTECHNICAL TESTING RESULTS





# LABORATORY REPORT



4043

**Contract Number: PSL17/0168**

Report Date: 01 February 2017  
Client's Reference: 11-604/5202/A  
Client Name: E3P  
Heliport Business Park  
Liverpool Road  
Eccles  
Manchester  
M30 7RU

**For the attention of: Andrew Garrity**

Contract Title: Lee Lane, Royston  
Date Received: 16/1/2017  
Date Commenced: 16/1/2017  
Date Completed: 1/2/2017

**Notes: Opinions and Interpretations are outside the UKAS Accreditation**

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

Checked and Approved Signatories:

  
R Gunson  
(Director)

A Watkins  
(Director)

R Berriman  
(Quality Manager)

L Knight  
(Senior Technician)

S Royle  
(Senior Technician)

A Fry  
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,  
Doncaster DN4 0AR  
tel: +44 (0)844 815 6641  
fax: +44 (0)844 815 6642  
e-mail: [rgunson@prosoils.co.uk](mailto:rgunson@prosoils.co.uk)  
[awatkins@prosoils.co.uk](mailto:awatkins@prosoils.co.uk)

Page 1 of

# SUMMARY OF LABORATORY SOIL DESCRIPTIONS

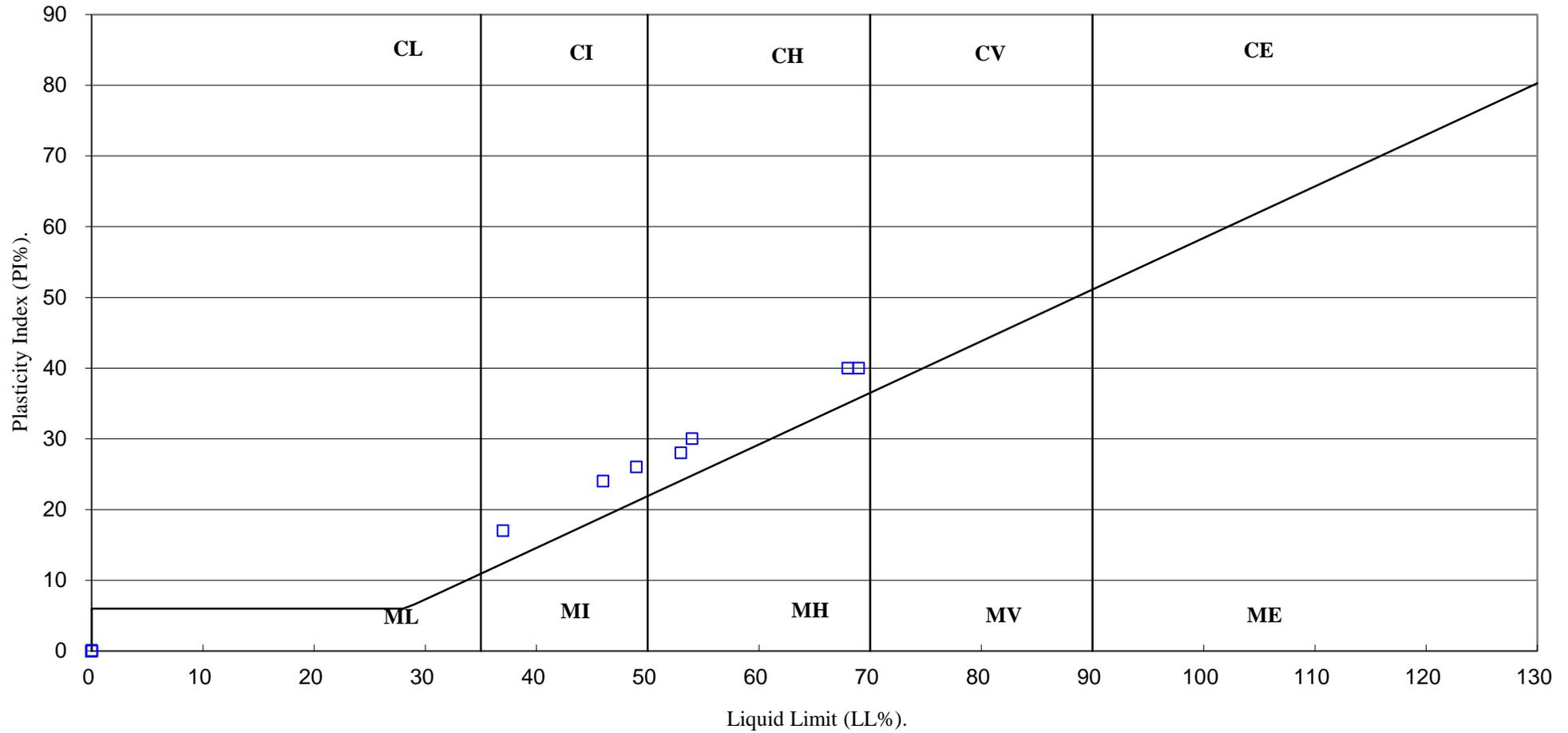
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP101		D	1.20		Brown mottled grey slightly gravelly sandy CLAY.
TP103		D	1.20		Brown slightly gravelly slightly sandy CLAY.
TP112		D	1.20		Brown slightly gravelly sandy CLAY.
TP116		D	1.30		Brown slightly gravelly slightly sandy CLAY.
WS103		U	1.50	2.00	Stiff brown CLAY.
WS104		U	2.50	3.00	Stiff brown CLAY.
WS109		U	0.50	1.00	Firm brown sandy very silty CLAY.
WS105		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS111		D	2.00	2.45	Brown slightly gravelly very sandy CLAY.
WS104		D	1.00	1.45	Brown slightly gravelly sandy CLAY.

		Lee Lane, Royston	<b>Contract No:</b>
			<b>PSL17/0168</b>
			<b>Client Ref:</b>
			<b>11-604/5202/A</b>



# PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



**PSL**  
Professional Soils Laboratory

Lee Lane, Royston

**Contract No:**

**PSL17/0168**

**Client Ref:**

**11-604/5202/A**

# UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

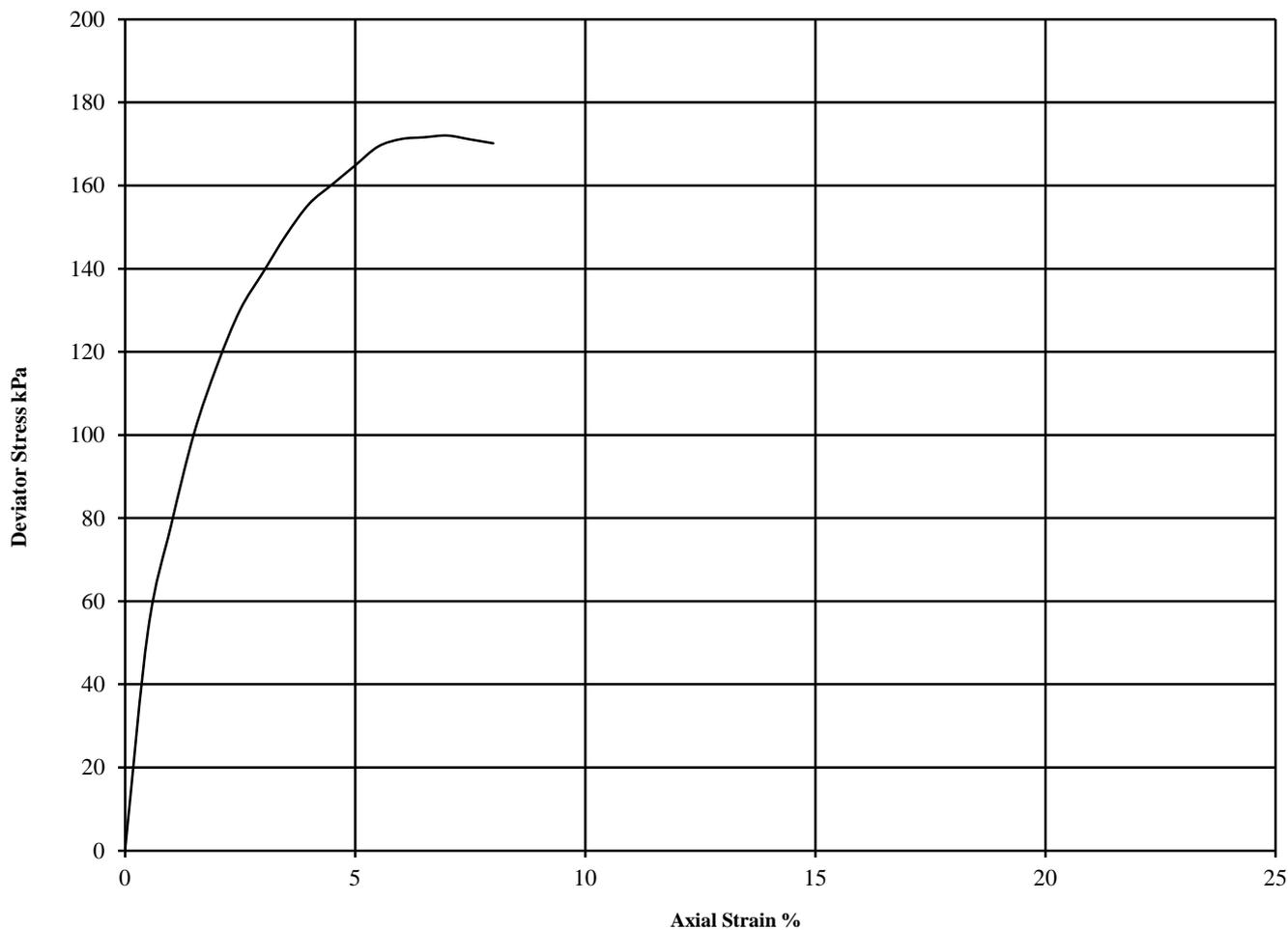
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: **WS103** Top Depth (m): **1.50**

Sample Number: Base Depth (m): **2.00**

Sample Type **U**



Diameter (mm):		75.0	Height (mm):			150.0	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m <sup>3</sup> )	Dry Density (Mg/m <sup>3</sup> )	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.48 See summary of soil descriptions	
				$\theta_3$	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				
1	28	1.99	1.56	30	172	86	7.0	Plastic		



Lee Lane, Royston

Contract No:  
**PSL17/0168**  
Client Ref:  
**11-604/5202/A**

# UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

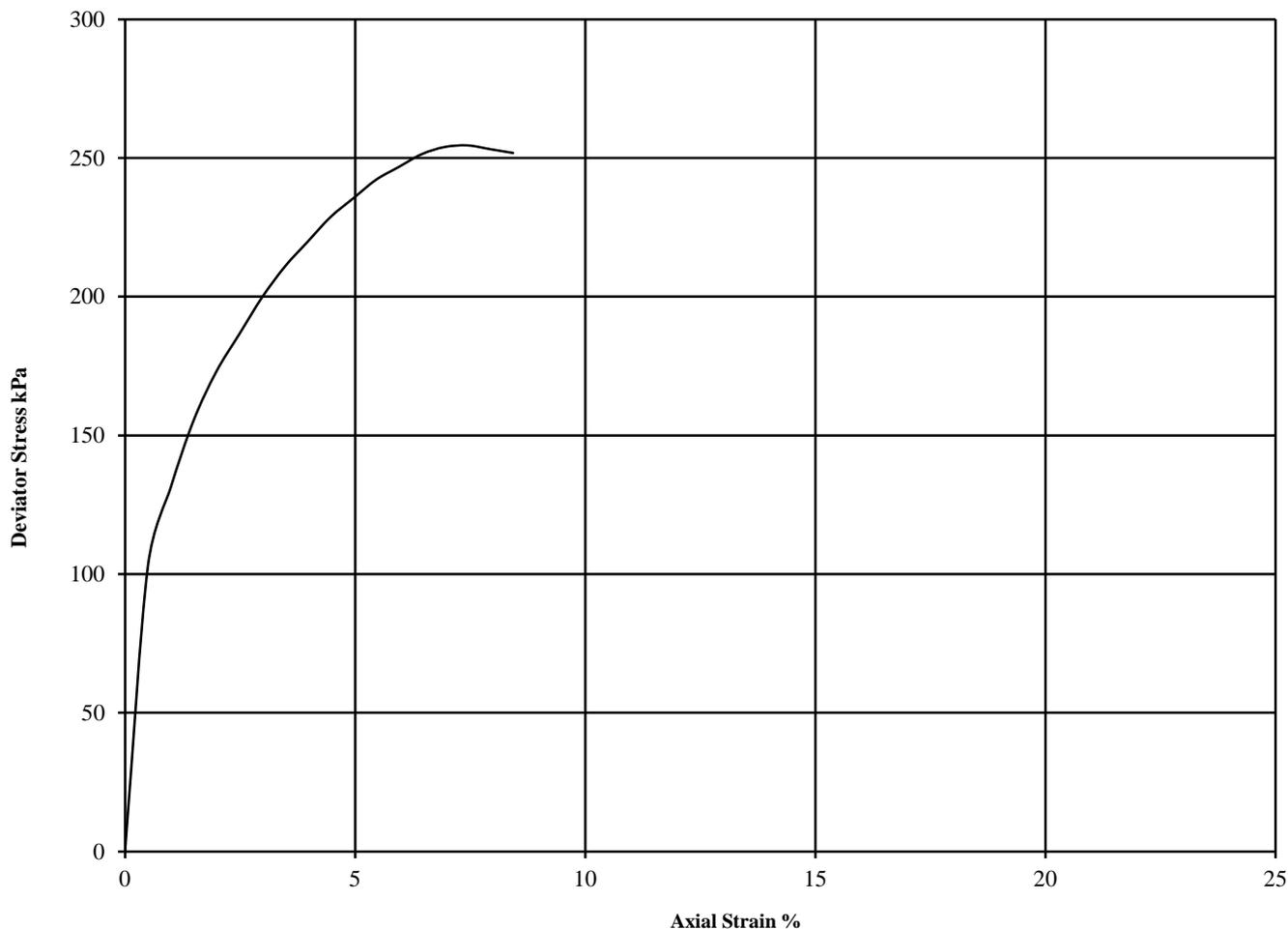
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: **WS104** Top Depth (m): **2.50**

Sample Number: Base Depth (m): **3.00**

Sample Type **U**



Diameter (mm):		62.0	Height (mm):		125.0	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.57 See summary of soil descriptions
			$\theta_3$	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				
1	26	1.91	1.52	50	255	127	7.4	Plastic	



Lee Lane, Royston

<b>Contract No:</b>
<b>PSL17/0168</b>
<b>Client Ref:</b>
<b>11-604/5202/A</b>

# UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

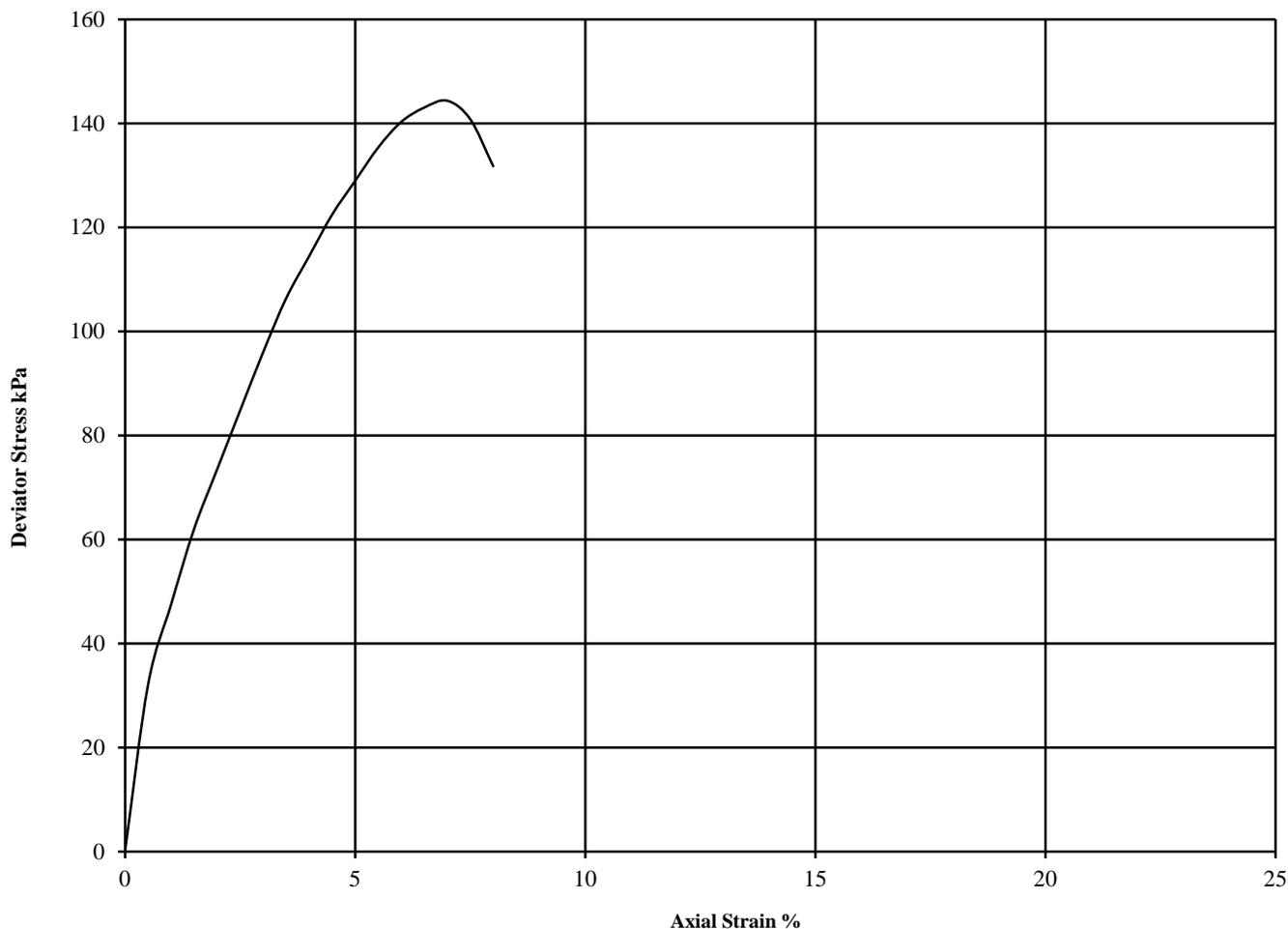
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: **WS109** Top Depth (m): **0.50**

Sample Number: Base Depth (m): **1.00**

Sample Type **U**



Diameter (mm):		82.0	Height (mm):		164.0	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m <sup>3</sup> )	Dry Density (Mg/m <sup>3</sup> )	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.44 See summary of soil descriptions
			$\theta_3$	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				
1	20	2.17	1.81	10	144	72	7.0	Brittle	



Lee Lane, Royston

<b>Contract No:</b>
<b>PSL17/0168</b>
<b>Client Ref:</b>
<b>11-604/5202/A</b>



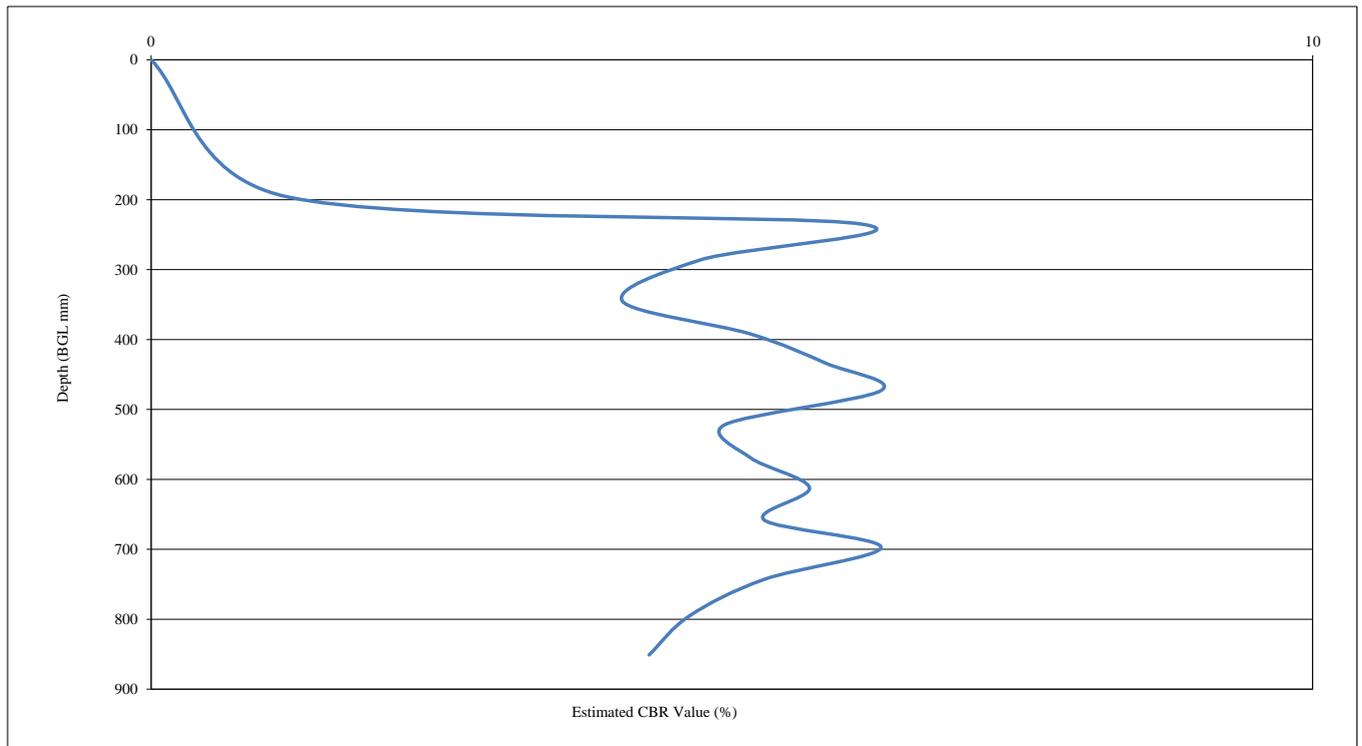


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP101	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	951		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	195	1	1	195.00	1.15
195	286	3	2	45.50	5.34
286	345	4	1	59.00	4.06
345	697	12	8	44.00	5.53
697	851	15	3	51.33	4.70

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

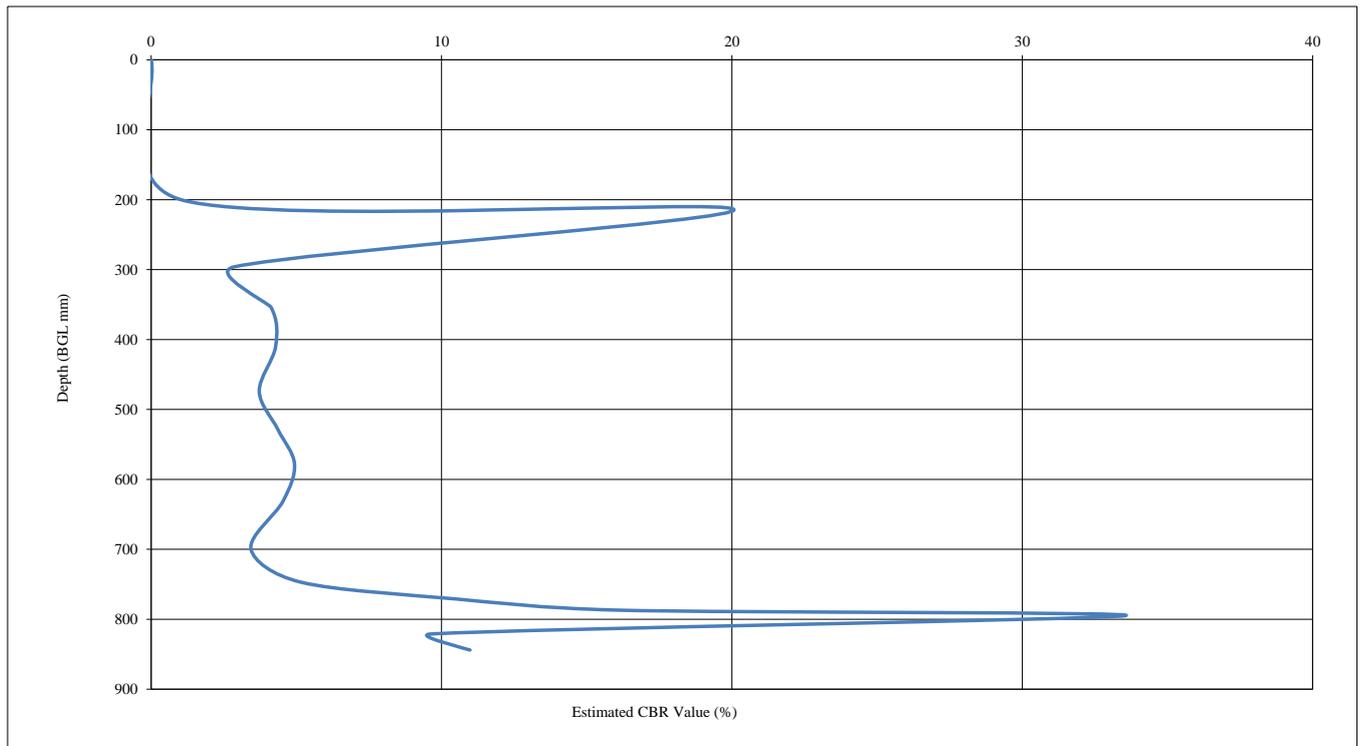


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP102	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	947		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	214	2	2	107.00	2.16
214	296	3	1	82.00	2.86
296	700	10	7	57.71	4.15
700	795	14	4	23.75	10.62
795	844	16	2	24.50	10.27

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

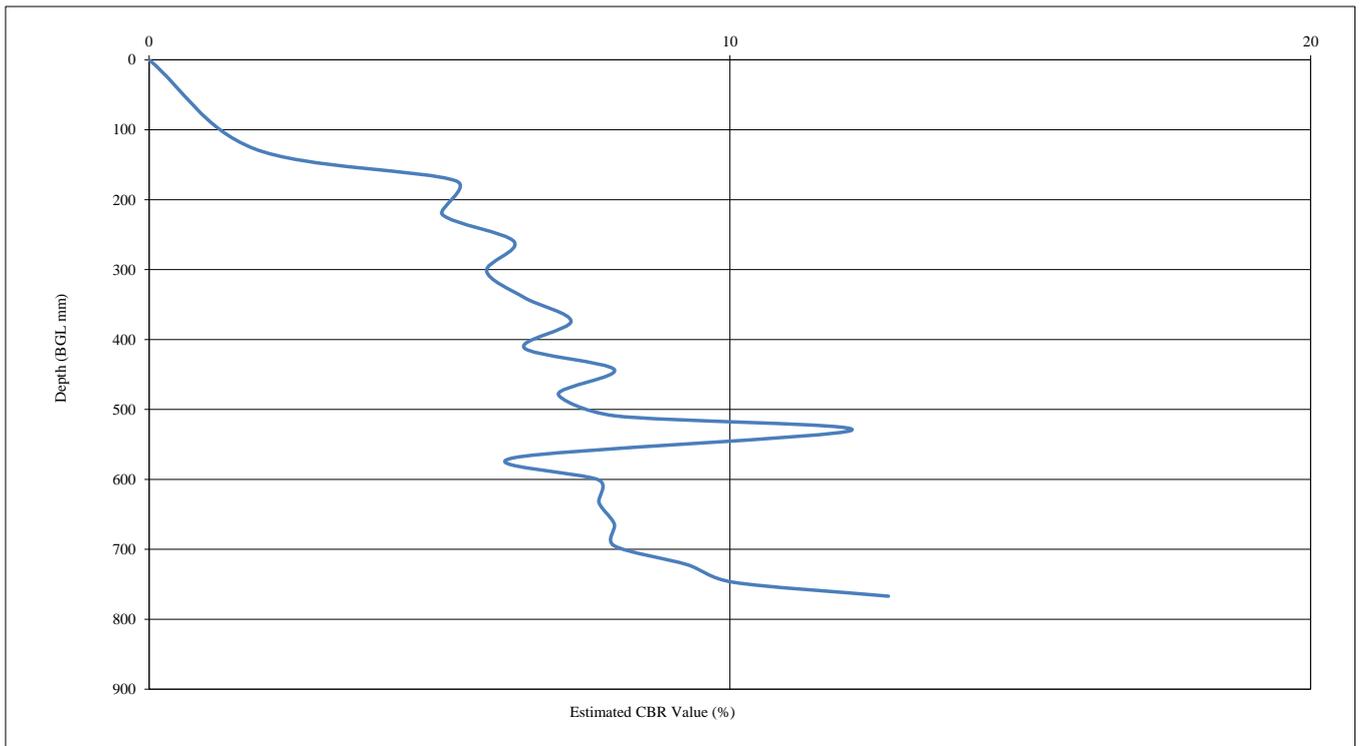


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP103	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	948		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	173	2	2	86.50	2.71
173	478	10	8	38.13	6.44
478	530	12	2	26.00	9.65
530	601	14	2	35.50	6.94
601	767	20	6	27.67	9.03

Comments

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

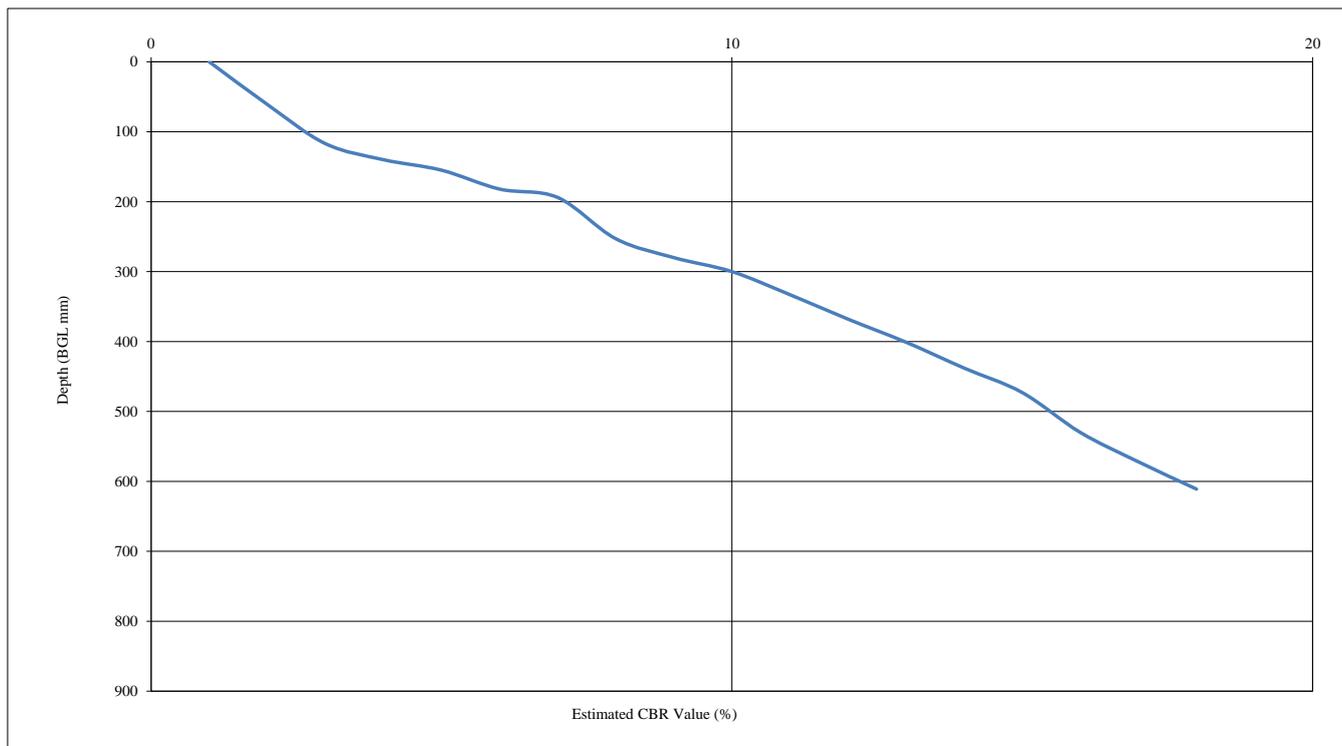


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP104	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	962		

**Estimated California Bearing Ratio Graph**



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	117	2	2	58.50	4.09
117	194	7	5	15.40	16.78
194	611	19	12	34.75	7.10

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

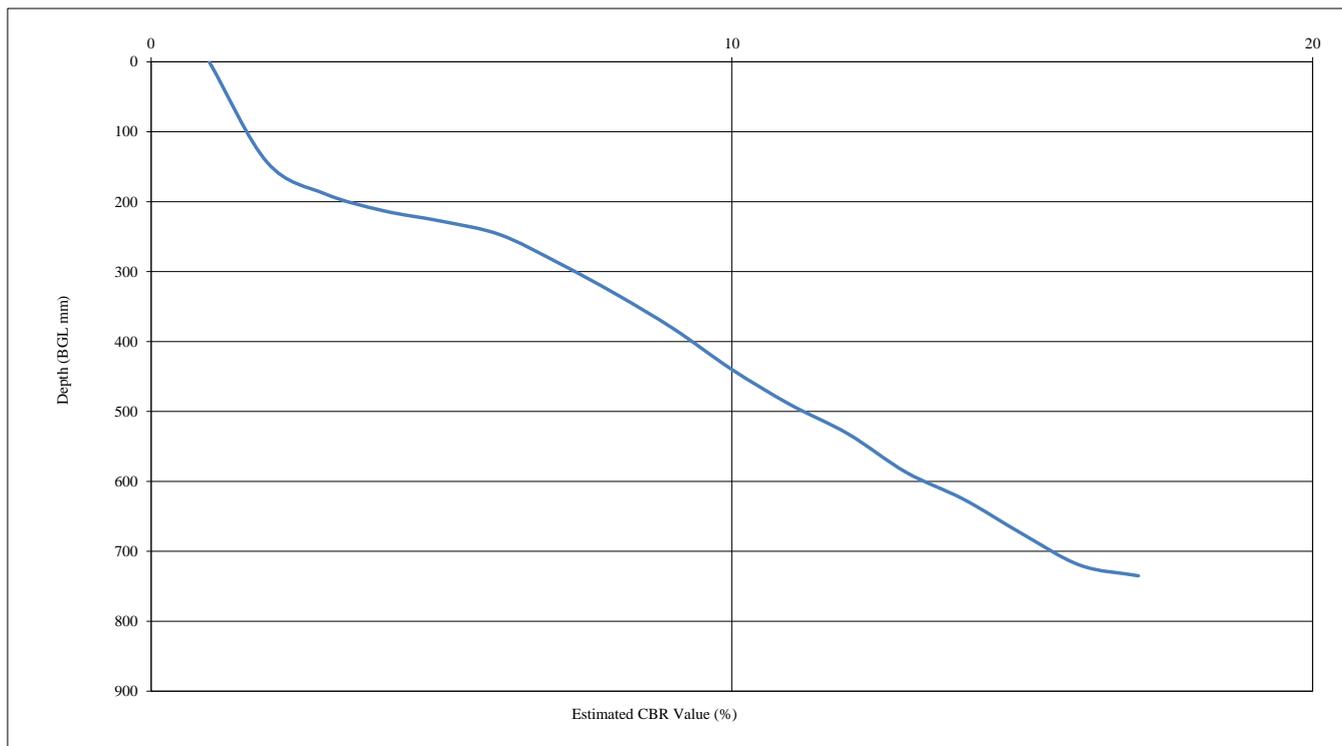


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP105	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	967		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	144	1	1	144.00	1.58
144	247	5	4	25.75	9.75
247	735	16	11	44.36	5.48

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

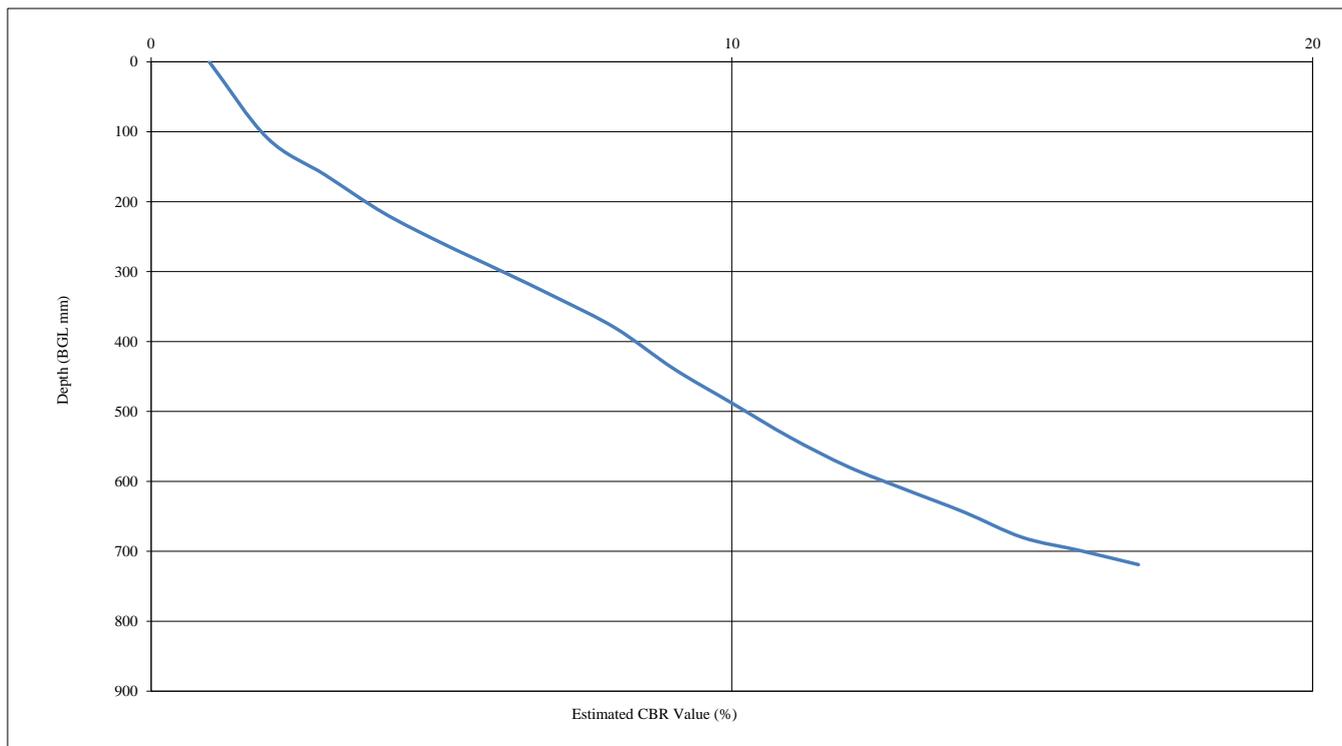


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP106	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	952		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	109	1	1	109.00	2.12
109	719	16	15	40.67	6.01

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

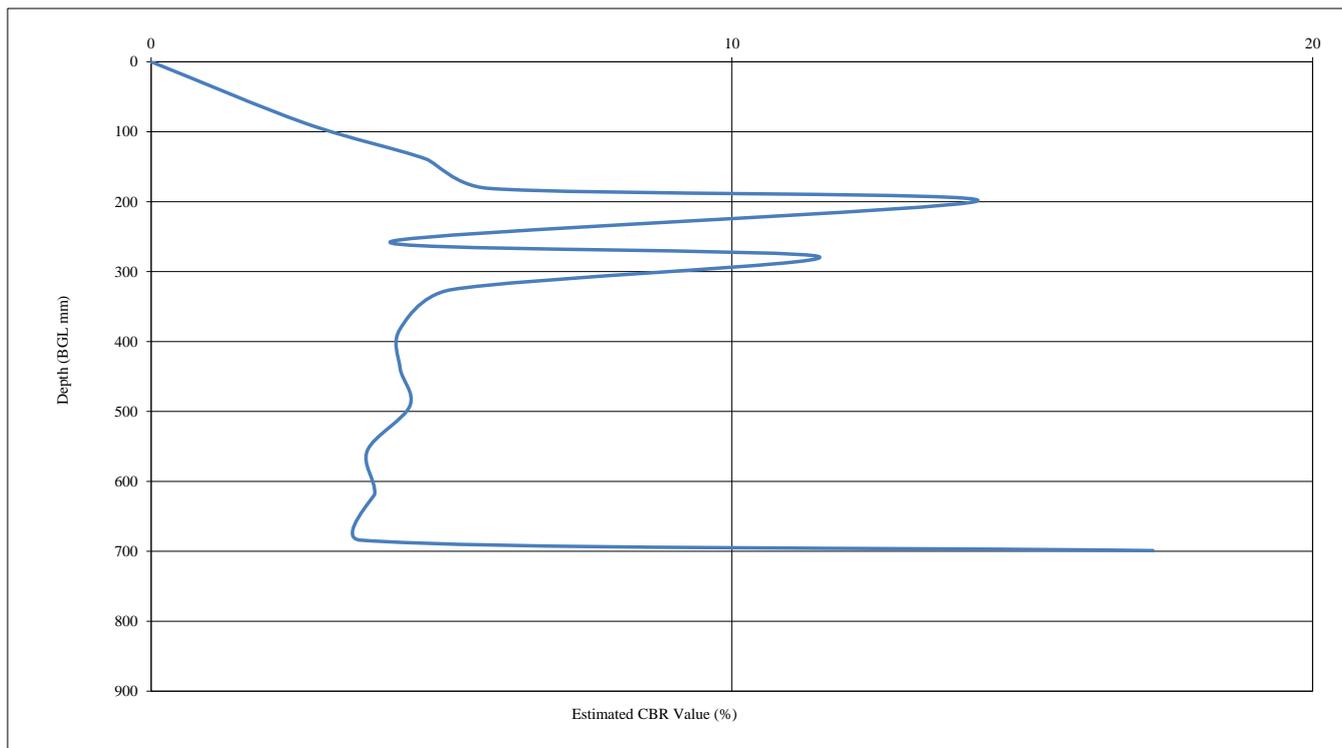


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP107	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	951		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	139	2	2	69.50	3.41
139	199	4	2	30.00	8.29
199	326	7	3	42.33	5.76
326	382	8	1	56.00	4.29
382	699	14	6	52.83	4.56

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

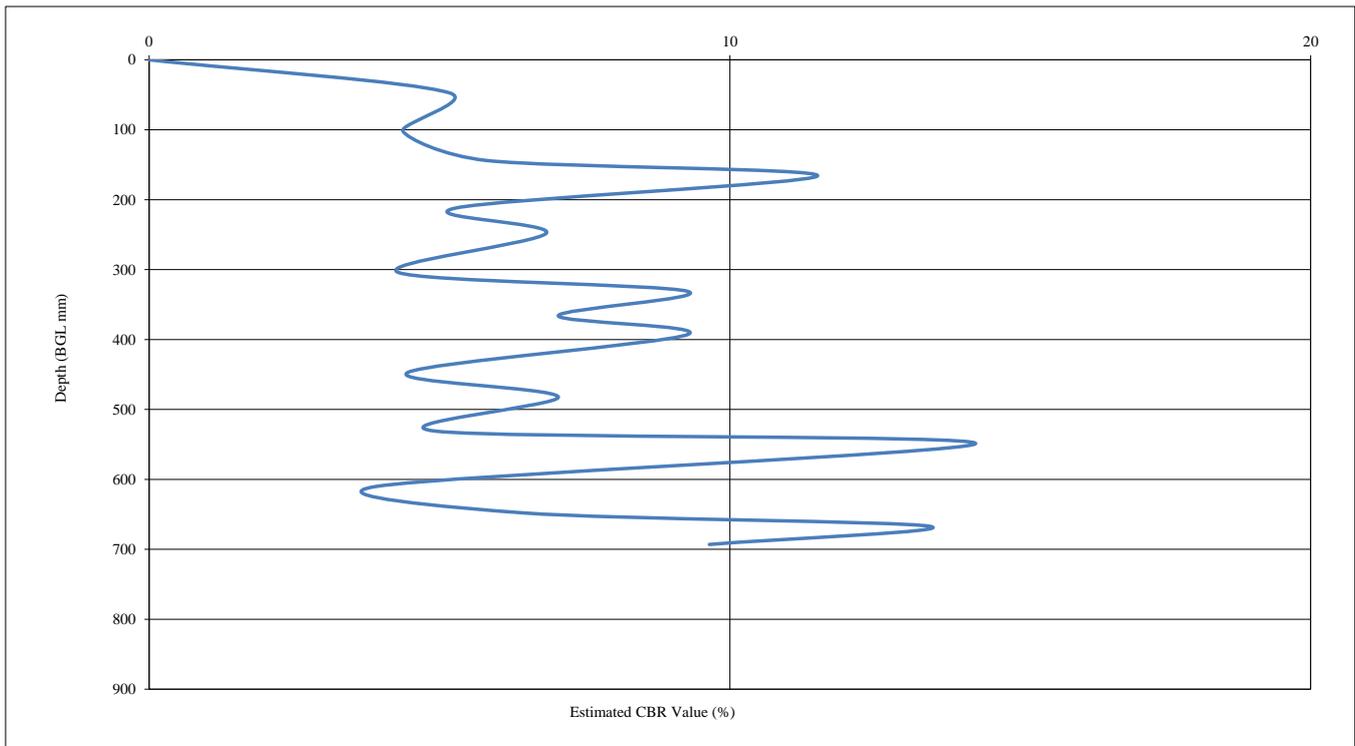


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP108	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	948		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	102	2	2	51.00	4.73
102	166	4	2	32.00	7.75
166	304	7	3	46.00	5.28
304	549	14	7	35.00	7.05
549	693	18	4	36.00	6.84

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017

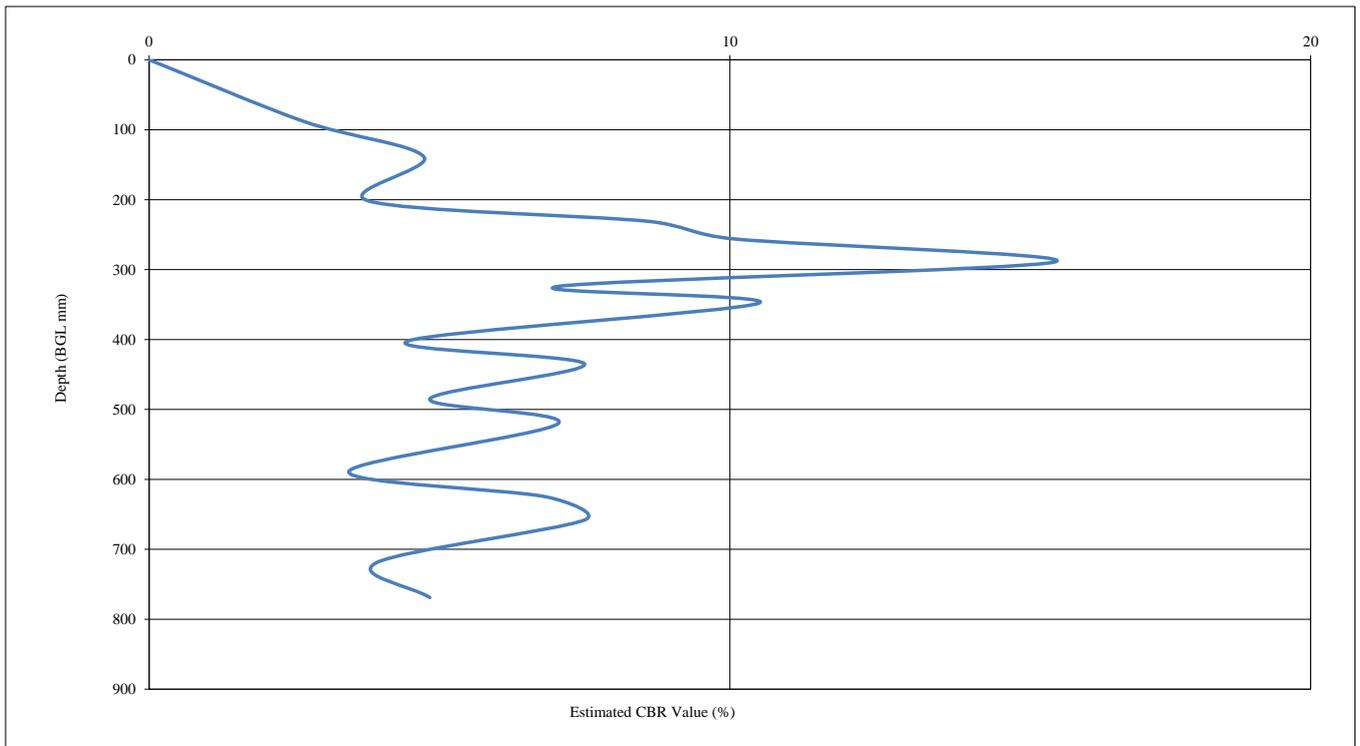


**Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)**

*In Accordance with TRL Report PR/INT/277/04*

<b>Site Name</b>	Lee Lane	<b>Test Date:</b>	02/02/2017
<b>Site Ref</b>	11-604	<b>Test Location:</b>	Royston
<b>Test No.:</b>	DCP109	<b>Easting:</b>	-
<b>Initial Depth (mm BGL):</b>	0	<b>Northing:</b>	-
<b>Final Depth (mm BGL):</b>	953		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	202	3	3	67.33	3.53
202	289	7	4	21.75	11.65
289	324	8	1	35.00	7.05
342	719	17	9	41.89	5.83
719	769	18	1	50.00	4.83

**Comments**

<b>Site Engineer:</b>	<b>Checked By:</b>	<b>Date:</b>	<b>Approved By:</b>	<b>Date:</b>
JN	RW	08/02/2017	MD	08/02/2017



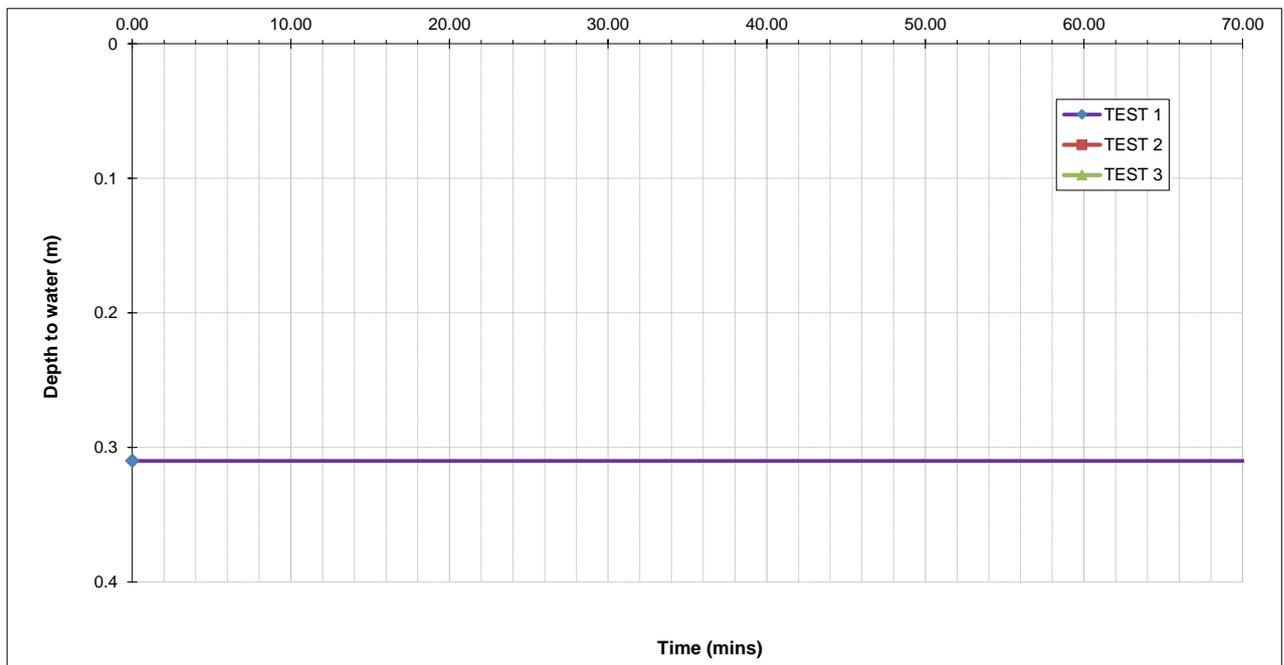


**Site:** Lee Lane Royston  
**Job Number:** 11604  
**Date of Test:** 13/01/2016

**Trial Pit Number:** SA101  
**Length:** 2.00 m  
**Width:** 0.30 m  
**Depth:** 2.00 m  
**Groundwater Level:** N/A m

	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.00	0.31	0.00		0.00	
	1440.00	0.31				
Effective Storage Depth	m	1.69				
75% Effective Storage Depth	m	1.27				
(i.e. depth below GL)	m	0.73				
25% Effective Storage Depth	m	0.42				
(i.e. depth below GL)	m	1.58				
Effective Storage Depth 75%-25%	m	0.85				
Time to fall to 75% effective depth	mins	N/A				
Time to fall to 25% effective depth	mins					
V (75%-25%)	m3	0.51				
a (50%)	m2	4.49				
t (75%-25%)	mins	0.00				
<b>SOIL INFILTRATION RATE</b>	m/s	<b>0.00E+00</b>				

<b>DESIGN SOIL INFILTRATION RATE, f</b>	<b>0.00E+00</b>
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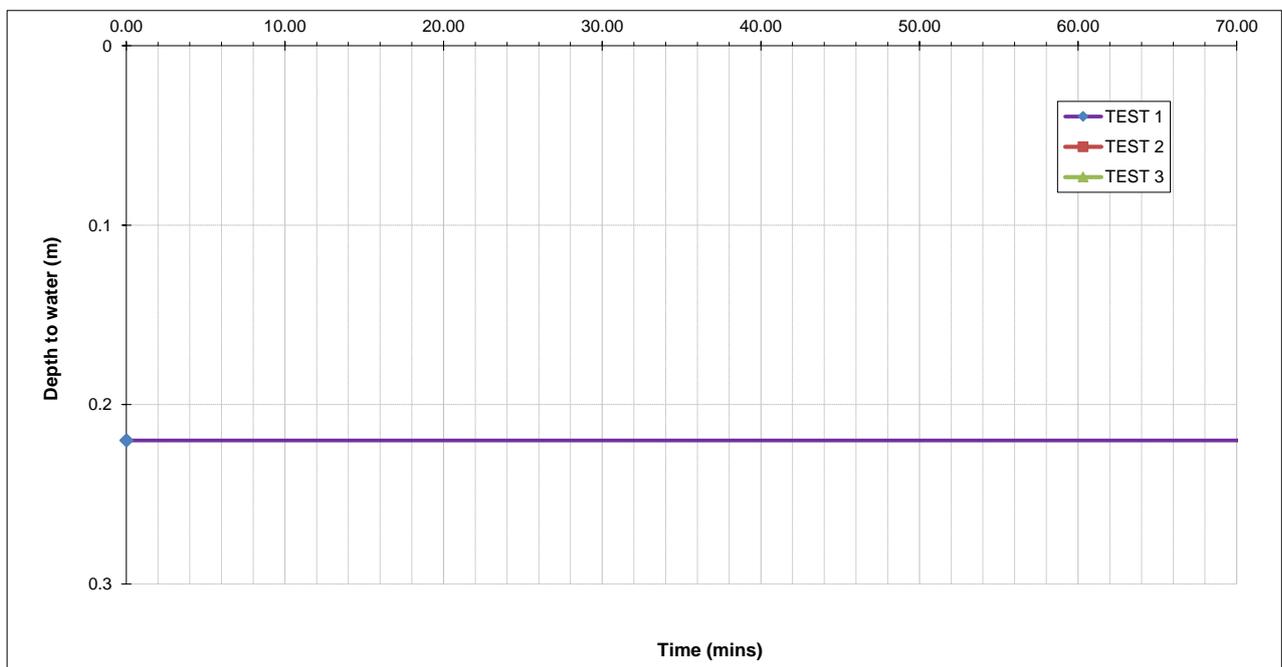


**Site:** Lee Lane Royston  
**Job Number:** 11604  
**Date of Test:** 13/01/2016

**Trial Pit Number:** SA102  
**Length:** 2.00 m  
**Width:** 0.30 m  
**Depth:** 2.00 m  
**Groundwater Level:** N/A m

	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.00	0.22	0.00		0.00	
	1440.00	0.22				
Effective Storage Depth	m	1.78				
75% Effective Storage Depth	m	1.34				
(i.e. depth below GL)	m	0.67				
25% Effective Storage Depth	m	0.45				
(i.e. depth below GL)	m	1.56				
Effective Storage Depth 75%-25%	m	0.89				
Time to fall to 75% effective depth	mins	N/A				
Time to fall to 25% effective depth	mins					
V (75%-25%)	m3	0.53				
a (50%)	m2	4.69				
t (75%-25%)	mins	0.00				
<b>SOIL INFILTRATION RATE</b>	m/s	<b>0.00E+00</b>				

<b>DESIGN SOIL INFILTRATION RATE, f</b>	<b>0.00E+00</b>
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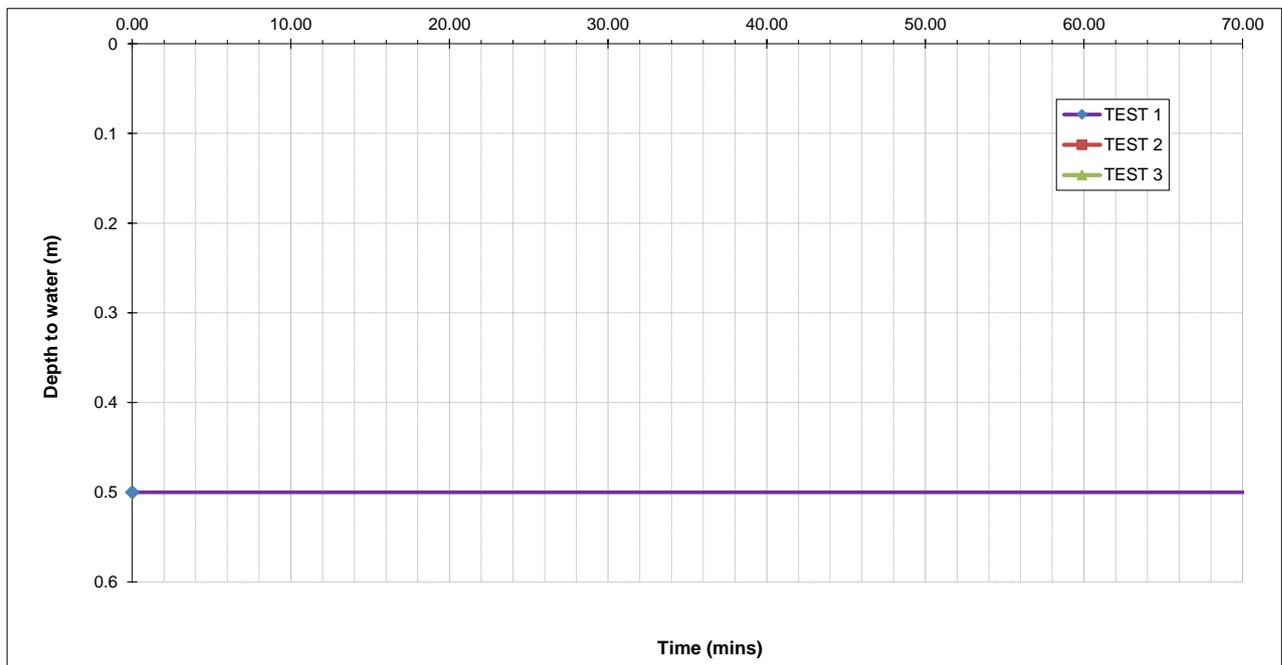


**Site:** Lee Lane Royston  
**Job Number:** 11604  
**Date of Test:** 13/01/2016

**Trial Pit Number:** SA103  
**Length:** 2.00 m  
**Width:** 0.30 m  
**Depth:** 2.00 m  
**Groundwater Level:** N/A m

	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.00	0.5	0.00		0.00	
	1440.00	0.5				
Effective Storage Depth	m	1.50				
75% Effective Storage Depth	m	1.13				
(i.e. depth below GL)	m	0.88				
25% Effective Storage Depth	m	0.38				
(i.e. depth below GL)	m	1.63				
Effective Storage Depth 75%-25%	m	0.75				
Time to fall to 75% effective depth	mins	N/A				
Time to fall to 25% effective depth	mins					
V (75%-25%)	m3	0.45				
a (50%)	m2	4.05				
t (75%-25%)	mins	0.00				
<b>SOIL INFILTRATION RATE</b>	m/s	<b>0.00E+00</b>				

<b>DESIGN SOIL INFILTRATION RATE, f</b>	<b>0.00E+00</b>
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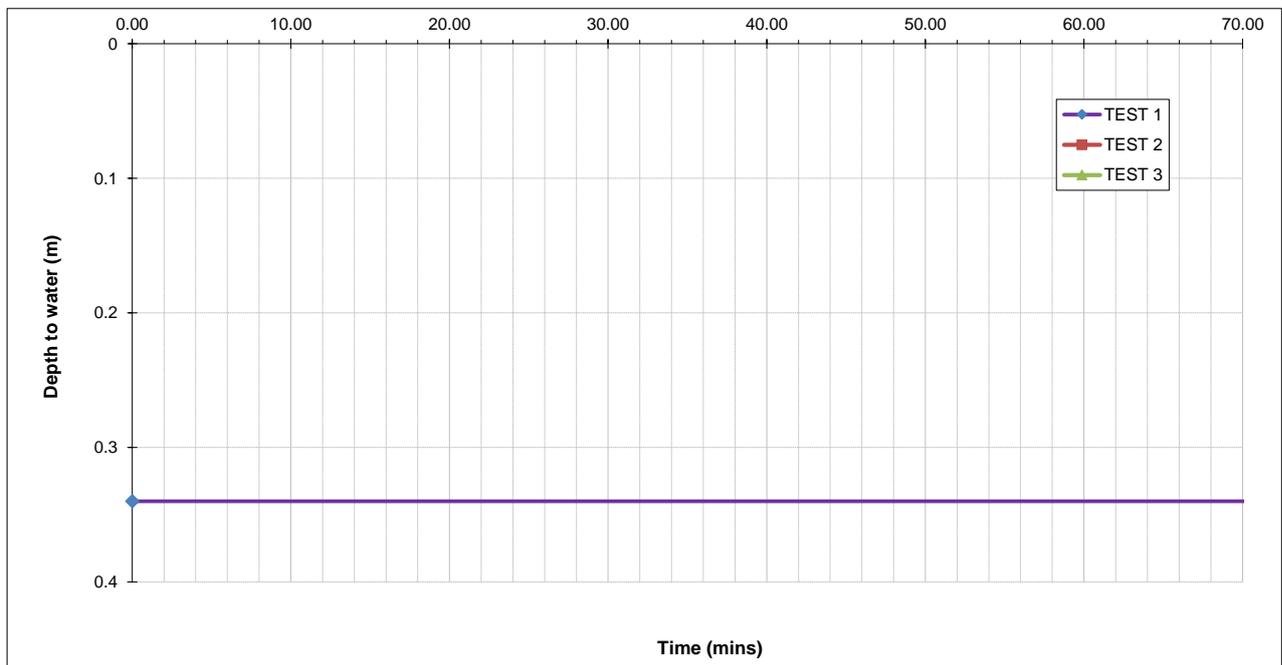


**Site:** Lee Lane Royston  
**Job Number:** 11604  
**Date of Test:** 13/01/2016

**Trial Pit Number:** SA104  
**Length:** 2.00 m  
**Width:** 0.30 m  
**Depth:** 2.00 m  
**Groundwater Level:** N/A m

	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.00	0.34	0.00		0.00	
	1440.00	0.34				
Effective Storage Depth	m	1.66				
75% Effective Storage Depth (i.e. depth below GL)	m	1.25				
25% Effective Storage Depth (i.e. depth below GL)	m	0.76				
Effective Storage Depth 75%-25%	m	0.42				
Time to fall to 75% effective depth	mins	N/A				
Time to fall to 25% effective depth	mins					
V (75%-25%)	m3	0.50				
a (50%)	m2	4.42				
t (75%-25%)	mins	0.00				
<b>SOIL INFILTRATION RATE</b>	m/s	<b>0.00E+00</b>				

<b>DESIGN SOIL INFILTRATION RATE, f</b>	<b>0.00E+00</b>
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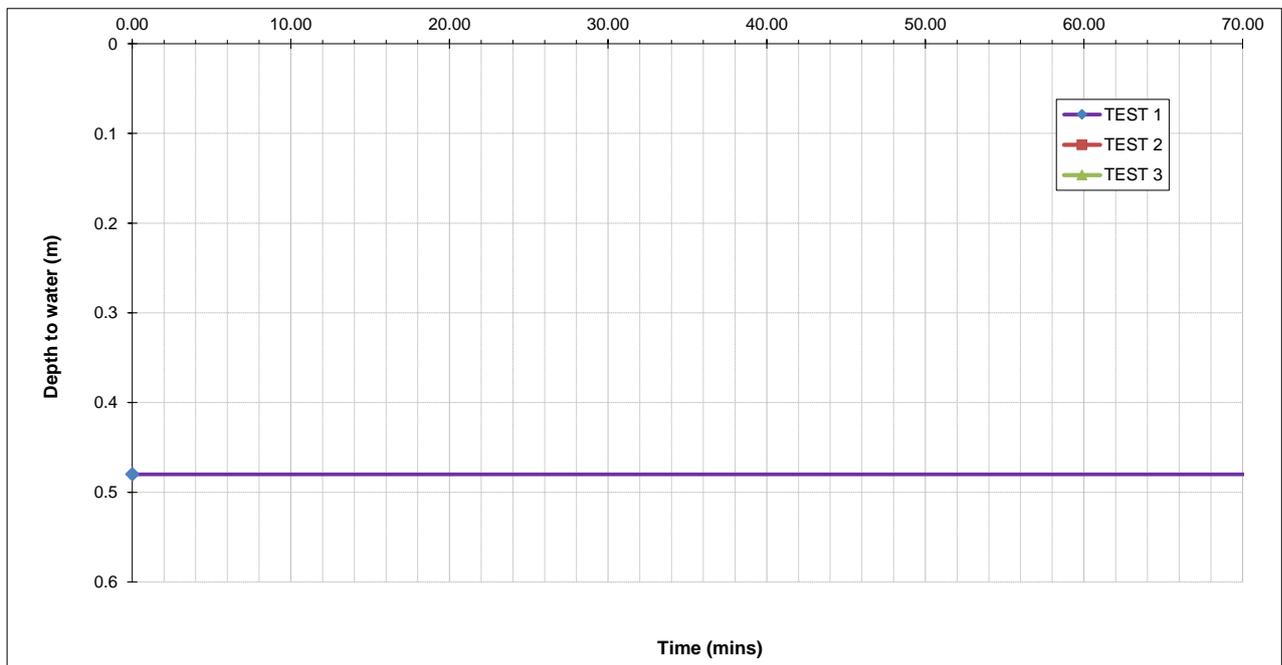


**Site:** Lee Lane Royston  
**Job Number:** 11604  
**Date of Test:** 13/01/2016

**Trial Pit Number:** SA105  
**Length:** 2.00 m  
**Width:** 0.30 m  
**Depth:** 2.00 m  
**Groundwater Level:** N/A m

	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.00	0.48	0.00		0.00	
	1440.00	0.48				
Effective Storage Depth	m	1.52				
75% Effective Storage Depth	m	1.14				
(i.e. depth below GL)	m	0.86				
25% Effective Storage Depth	m	0.38				
(i.e. depth below GL)	m	1.62				
Effective Storage Depth 75%-25%	m	0.76				
Time to fall to 75% effective depth	mins	N/A				
Time to fall to 25% effective depth	mins					
V (75%-25%)	m3	0.46				
a (50%)	m2	4.10				
t (75%-25%)	mins	0.00				
<b>SOIL INFILTRATION RATE</b>	m/s	<b>0.00E+00</b>				

<b>DESIGN SOIL INFILTRATION RATE, f</b>	<b>0.00E+00</b>
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The Coal  
Authority

Resolving the **impacts** of mining

# Non-Residential Coal Mining Consultants Report



1 LEE LANE, ROYSTON, BARNESLEY, BARNESLEY, S71 4RT

Date of enquiry: 08 February 2017  
Date enquiry received: 08 February 2017  
Issue date: 08 February 2017

Our reference: 51001367578001  
Your reference: 11604-5364-RH

# Non-Residential Coal Mining Consultants Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

## Client name

E3P

## Enquiry address

1 LEE LANE, ROYSTON, BARNSELY, BARNSELY, S71  
4RT

## How to contact us

0345 762 6848 (UK)  
+44 (0)1623 637 000 (International)

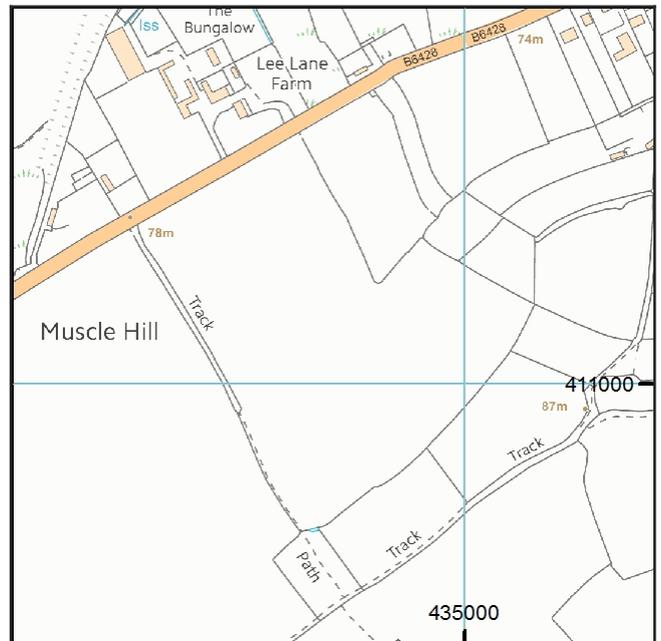
200 Lichfield Lane  
Mansfield  
Nottinghamshire  
NG18 4RG

[www.groundstability.com](http://www.groundstability.com)

 /company/the-coal-authority

 /thecoalauthority

 /coalauthority



Approximate position of property



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# Detailed findings

## Past underground coal mining

Colliery	Seam	Mineral	Panel	Depth (m)	Direction to working	Disposition	Extraction thickness (cm)	Year
unnamed	KENT THICK	Coal	652D	186	SW	0.5	109	1973
unnamed	KENT THICK	Coal	652B	215	NE	0.2	110	1974
unnamed	WARREN HOUSE	Coal	651L	233	Beneath Property	0.0	144	1920
unnamed	LOW BARNSELY	Coal	651T	235	Beneath Property	0.0	157	1912
unnamed	WARREN HOUSE	Coal	652G	251	Beneath Property	0.0	144	1932
unnamed	LOW BARNSELY	Coal	652L	251	W	0.5	157	1912
unnamed	BARNSELY	Coal	651Q	256	S	0.6	304	1901
unnamed	LOW BARNSELY	Coal	652K	258	Beneath Property	0.0	157	1912
unnamed	WARREN HOUSE	Coal	652E	298	Beneath Property	0.0	144	1920
unnamed	TOP HAIGH MOOR	Coal	651V	300	Beneath Property	0.0	97	1956
unnamed	LOW HAIGH MOOR	Coal	651Y	306	SW	0.3	74	1958
unnamed	TOP HAIGH MOOR	Coal	652P	313	Beneath Property	0.0	94	1964
unnamed	LOW HAIGH MOOR	Coal	652U	325	SW	0.2	74	1959
unnamed	LOW HAIGH MOOR	Coal	652T	328	Beneath Property	0.0	81	1947
unnamed	TOP HAIGH MOOR	Coal	652Q	333	NW	0.5	94	1954
unnamed	LIDGETT	Coal	6521	336	Beneath Property	0.0	74	1941
unnamed	LIDGETT	Coal	6522	341	SW	0.1	82	1940
unnamed	LOW HAIGH MOOR	Coal	652W	344	NW	0.3	81	1945
unnamed	LIDGETT	Coal	6530	350	Beneath Property	0.0	82	1943
unnamed	LIDGETT	Coal	6532	366	N	0.4	82	1938
unnamed	LOW FENTON	Coal	6526	447	SW	0.0	165	1974
unnamed	FENTON	Coal	R37	459	SW	0.1	180	1975
unnamed	FENTON	Coal	6533	463	Beneath Property	0.0	180	1978
unnamed	MIDDLETON MAIN	Coal	6539	472	NW	0.7	127	1963
unnamed	MIDDLETON MAIN	Coal	6528	479	SW	0.2	106	1965

Colliery	Seam	Mineral	Panel	Depth (m)	Direction to working	Disposition	Extraction thickness (cm)	Year
unnamed	MIDDLETON MAIN	Coal	653A	521	SW	0.3	127	1964
unnamed	MIDDLETON MAIN	Coal	6534	524	Beneath Property	0.0	84	1973
unnamed	MIDDLETON MAIN	Coal	6535	544	N	0.2	84	1971

### Probable unrecorded shallow workings

None.

### Outcrops

None recorded.

### Spine roadways at shallow depth

None recorded.

### Future underground mining

None recorded.

### Licence details (AOR)

None recorded.

### Section 46 notices

None recorded.

### Geology

Faults under or close to the property recorded.

### Mine entries

None recorded.

### Court orders

None recorded.

### Worked out opencast sites

None recorded.

### Coal mining related hazards

None recorded.

## Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994.

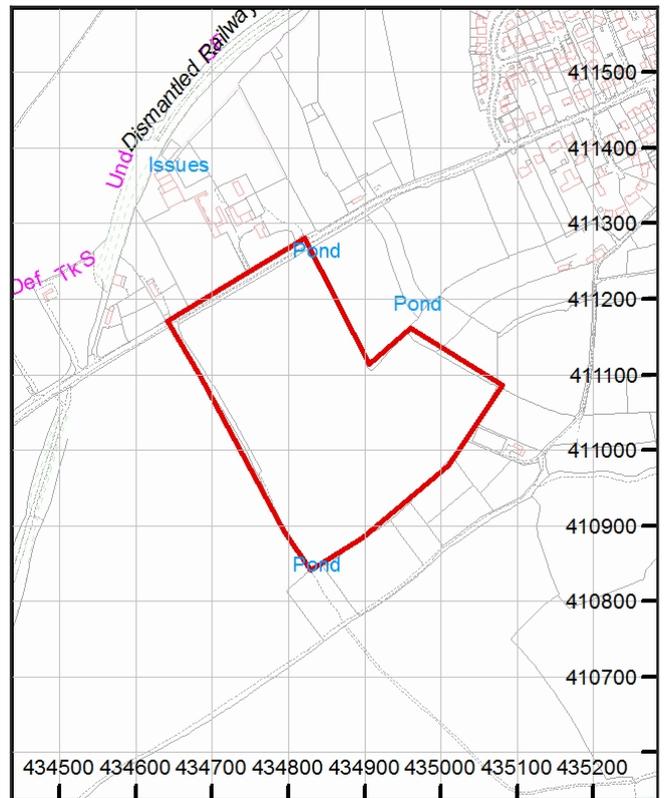
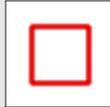
There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

# Enquiry boundary

## Key

Approximate position of enquiry boundary shown



## How to contact us

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NG18 4RG

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