

PROJECT REFERENCE: 17.9607

September 2017

GROUND INVESTIGATION REPORT

Roselands, Arundel

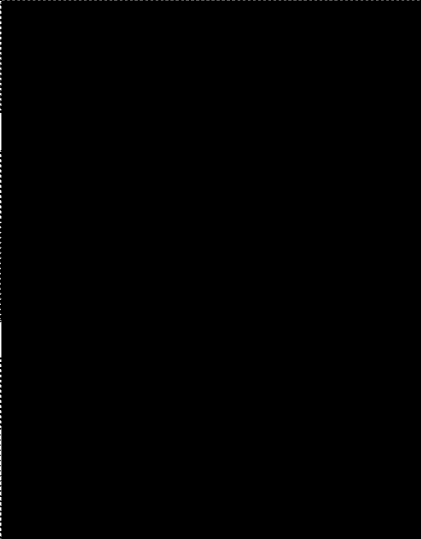
FOR

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Professional Interpretation

The recommendations made and opinions expressed in the report are based on the conditions revealed by the site works together with an assessment of the data from the insitu and laboratory testing or in respect of the desktop reports. No responsibility can be accepted for conditions that have not been revealed by the research, site works and testing.

The Client is advised that the conditions observed on site by Constructive Evaluation Limited at the time of any site survey may be subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance and they may subsequently have become evident. It is not possible to assess areas which are inaccessible or where access is not granted and CE accept no liability for risks subsequently identified therein.

The conceptual model, Risk assessment and sampling regime has been formulated in accordance with current UK guidance at time of production based upon the relevant information gained from Phase 1 and Phase 2 investigations. While the model and assessment offer opinions and interpretations of these guidelines, the comments made are for guidance only and no liability can be accepted for their accuracy. It is possible that aspects of desktop study may need to be altered to conform to the requirements of the statutory regulatory bodies.

Intrusive Field Operations

The data collected through direct operations in the production of this report has been so obtained, unless directly otherwise stated, in accordance with current UK guidance, law or accepted industry practice, including but not limited to: BS.5930: 1990 Code of Practice for Site Investigations (Amendment 2: 2010), & BS.10175: 2011 + A1: 2013 Investigations into Potentially Contaminated Sites. Exact exploratory locations will depend upon access conditions, site use and plant capability, CE do not accept liability for issues arising from material identified between or outside of the area of exploratory locations.

Laboratory Testing

Unless stated otherwise within the text, all geotechnical and material laboratory tests have been performed in accordance with the relevant British Standard Documents. Laboratory testing for contaminated land assessment is completed under the UKAS / MCERTS accreditation schemes, unless identified as otherwise in the report.

Human Health Risk Assessment Criteria

The Environment Agency has recently undertaken revision of the Soil Guideline Values (SGVs) which are partially complete. Where standards are available using the "new" approach, these have been utilised for correlative purposes. Where standards have not yet been revised, guidance following the "old" approach has been utilised. Please note that upon release of the remaining guidelines, the standards contained within this report may be subject to change. In addition, the second edition of the LQM ClEH guidance has now been released and will be utilised in favour of previously published guideline values.

Third Parties

The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from previous Site investigations and chemical testing laboratories. Constructive Evaluation Limited has assumed that such information is correct. Constructive Evaluation Limited cannot and does not guarantee the authenticity or reliability of the information it has relied upon and can accept no responsibility for inaccuracies with the data supplied by other parties.

The accuracy of the historical map extracts supplied can not be guaranteed and it should be noted that different conditions may have existed between mapping sheet editions. Therefore, there can be no certainty that all areas of contamination have been identified during the Phase 1 investigation.

Definitions

Reference to the word "contamination" in this report does not relate to the statutory definition of contaminated land under 1990 Environmental Protection Act unless otherwise stated. The definition used in this report is: "Land that contains substances that, when present in sufficient quantities or concentrations, are likely to cause harm, directly or indirectly, to man, to the environment, or on occasion to other targets" (NATO CCMS, 1985).

CE Ltd 2014

1.0 INTRODUCTION

Constructive Evaluation (CE) Limited were instructed by Birchside Management Ltd (EQ12000, dated 24th July 2017) working on the specification provide by Gurney Consulting Engineers (the 'Engineer') to carry out a Ground Investigation at Roselands, Station Approach, Arundel Station, Arundel, West Sussex, BN18 9JL.

The investigation was requested by the client in respect to the proposed demolition of the existing single storey brick structure, with a new two storey timber framed building, over roughly the same footprint.

The purpose of this investigation is to provide information on the underlying soil and groundwater conditions, to provide sufficient information for the design of the foundations and the associated works.

The investigation comprised of the completion of two windowless sample boreholes, to a maximum depth of 7.45mbgl using a Dart windowless sample rig. In addition, one heavyweight dynamic probe was completed to a depth of 30.00mbgl.

Selected geotechnical and environmental samples were taken for laboratory analysis.

The following report describes the works undertaken, presents copies of the results obtained and provides recommendations.

2.0 SITE LAYOUT

The site is located southeast of Arundel Town Centre, opposite Arundel train Station and is centred on an approximate National Grid Reference of TQ 02402 06515.

Access to the property is gained via the entrance to the station and car park, leading from the A27 – 'The Causeway'. The site is formed by a triangular plot of land, with hedging marking the southern and western boundaries; the front of the property faces directly onto the station car park. The existing property is comprised of a single storey brick built structure with a small garden to the rear, surfaced in concrete.

Directly behind the site is a drainage ditch, which leads to a series of waterways, northwest of the site, likely related to the flood plain of the River Arun.

The surrounding area comprises largely, with exception to the station and car park, a building merchants and a hotel, of agricultural fields and the flood plain to the River Arun,

The site location plan is located in Appendix A, with site photographs found in Appendix C

3.0 PHYSICAL SETTING

3.1 Geology

The relevant British Geological Survey data for the site to lie on Superficial Deposits of Alluvium and Raised Marine Deposits, overlying the bedrock geology of the Lambeth Group.

Alluvium – Described normally as a soft to firm unconsolidated, compressible silty clay, but contains layers of silt, peat, sand and gravel.

Raised Marine Deposits – Comprising of Gravel, Sand, Silt and Clay, with organic debris (plant matter and shells, now found above the level of present shoreline as a result of earth movement or a general fall in sea level.

Lambeth Group – A succession of deposits, comprising of the formally named Woolwich and Reading Beds and the Upnor Formation. The beds generally consist of clays and sands in variable proportions. Estuarine shells are often found, particularly within the Woolwich formation. The Reading Formation consists dominantly of interleaved red and variegated clays and sands. The Upnor Formation mainly consists of glauconitic fine to medium grained sand with beds and stringers of well-rounded, black flint pebbles.

4.0 FIELDWORKS

The following intrusive works were carried out over two visits; Thursday 10th August 2017 and Friday 18th August 2017, supervised by an Engineering Geologist from CE. The GI was undertaken in accordance with specification provided by the client, and in relation to statutory guidance including BS5930: 1999 Code of Practice for Site Investigations (Amendment 3: 2015).

- Prior to any excavations taking place supplied service plans were consulted, a Cable Avoidance Tool (CAT) was used to check for the position of any underlying electrical services and service covers were lifted, where possible. The exploratory hole location were indicated on a plan supplied by Gurney Consulting Engineers. Hand excavated trial pits were then completed to a depth of 1.00mbgl, prior to any drilling work commenced.
- Two windowless sample boreholes (WS1&WS2) were completed to maximum depth of 7.45mbgl using an Archway Dart tracked windowless sampling rig. The soils encountered were logged, insitu testing completed, representative geotechnical and environmental soil samples taken and any groundwater conditions noted as per the provided specification.
- One heavyweight dynamic probe test (DP1) was completed to a maximum depth of 30.00mbgl using a Geotool probe. This test was completed in order to establish the soil conditions at depth.
- Once complete, the exploratory hole was backfilled with arisings and made good to existing levels and finishes.

The site layout plan indicating the position of the test location is provided in Appendix A, with photographs taken during the investigation in Appendix C.

5.0 GROUND CONDITIONS

5.1 Soils

The following strata conditions were encountered during the intrusive works:

Concrete – The initial surface material in both locations was described as a light grey concrete, with 50-60% aggregate of fine to coarse flint. No steel was noted on inspection and a thickness of 100mm was recorded in both locations.

Made Ground – The immediate soils beneath the concrete in both locations was described as a black silty ashy gravelly Sand. The gravel portion was described as flint, chalk, charcoal and concrete. This material was described to a maximum depth of 0.70mbgl in WS1.

Further Made Ground soils were described generally as a very soft dark brown or brown sandy gravelly silty Clay. The gravel portion was again described as flint, brick and occasional clinker/charcoal. Within WS2 this was limited to flint and brick fragments, with occasional cobbles of brick. This material was encountered to a maximum depth of 1.00mbgl in WS1 in 1.40mbgl in WS2.

Within WS1, soils below 1.00mbgl to 1.50mbgl were described as a dark brown and bluish grey frequently brown mottled gravelly silty Clay. Again the gravel portion was described as flint and brick. An organic odour was noted within this material during logging, and therefore it is considered that this material has been re-worked during ground workings on site.

Organic Clay –The underlying natural soils were described as a soft to firm becoming very soft bluish grey mottled brown organic silty Clay, with rare fine to coarse gravels of chalk. A moderate, becoming strong organic odour was noted with depth. This material is considered representative of Alluvium.

5.2 Groundwater

Groundwater was encountered in both locations during the investigation. A standing level on completion of the boreholes was recorded as 3.50mbgl in WS1 and 1.50mbgl in WS2.

5.3 Visual and Olfactory Observations

Other than the anthropogenic material noted within the Made Ground soils, no olfactory evidence of contamination was noted during logging.

6.0 LABORATORY AND INSITU TESTING

6.1 Geotechnical Testing

6.1.1 Atterberg Limits and Natural Moisture Content

Four samples were submitted for determination of their Natural Moisture Content (NMC) and Plasticity Index Analysis (PI).

Natural Moisture Content values were found to range between 24% and 64%. Liquid Limit values between 35% and 87% were recorded, with plastic limit values between 15% and 35%. The portion retained on the 425µm sieve was recorded to be between 1-30%. Subsequent Plasticity Index values between 20% and 52% were calculated for the samples tested.

Based on these results this material is considered Intermediate to very high Plasticity. Based on NHBC guidelines, this material is considered low to high volume change potential.

6.1.2 *Water Soluble Sulphates and pH*

Six samples between depths of 0.20m and 3.50mbgl were submitted for determination of pH and Water Soluble Sulphate concentration.

Water soluble sulphate concentrations within the Made Ground and natural soils were found to range between 22mg/l and 1350mg/l, with a pH levels between 7.2 and 9.7.

6.2 **Environmental Testing**

Two environmental samples were submitted to QTS Environmental, a UKAS and MCERTS accredited laboratory testing facility. These samples were scheduled for a screen of contaminants.

The testing screen completed comprised of a focused suite of heavy metals, hydrocarbons including speciated Total Petrol Hydrocarbons (TPH CWG aromatic/aliphatic split), BTEX, MTBE, speciated Polycyclic Aromatic Hydrocarbons (PAH), as well as a background suite of pH, SOM, total cyanide, and total phenols. In addition, Made Ground samples were submitted for an asbestos screen.

The results of this laboratory testing have been compared to the available Soil Guideline Values (SGVs) as well as the CIEH 'S4UL' guideline values for inorganic and organic contaminants in soils.

Comparisons were made against Generic Assessment Criteria (GAC) for the 'Residential, without home-grown produce' land use given the current and proposed end use.

The SGV values for lead have been withdrawn however, an alternative regulatory framework is provided by the C4SL system (Category 4 Screening Level), this provides threshold levels for various land uses below which soils are considered 'not contaminated'. Comparisons were made on the basis of 'Residential, without home-grown produce' land use given the current usage.

It should be noted that a Stage 1 Desktop Study and Walkover Survey was not requested as part of the Site Investigation therefore no Site Conceptual Model & Risk Assessment has been formulated to identify source-pathway-receptor relationships. This report therefore does not constitute a full environmental assessment given that a Phase 1: Desktop Study and Walkover Report has not been completed.

For full details of all results, please refer to the laboratory certificates found in Appendix D.

6.3 **Insitu Testing**

6.3.1 *Standard Penetration Testing (SPT's)*

Standard Penetration testing was completed throughout the drilling of WS1 and WS2 at 1.00m centres from the base of the starter pit to the end of the exploratory holes. This form of testing is completed using a 63.5kg drop hammer weight, over a 750mm drop, measuring the blow counts for six, 75mm increments. The first two values are recorded as seating blows, with the remaining four values, added together to provide an 'N-value'. The table over page summarises the results obtained:

Depth	Material	Stratum	SPT N-Value
1.00-1.50m	Gravelly silty CLAY	Made Ground	5-6
1.50-7.45m	Organic silty CLAY	Organic Deposits	0-2

For full details please refer to the logs in Appendix B.

6.3.2 Dynamic Probing Heavyweight (DPH)

Dynamic probing Heavyweight (DPH) was carried out subsequent to the initial windowless sampling boreholes, close to WS1, to a maximum depth of 30.00mbgl. This testing utilises a 50kg drop weight, falling from a 500mm height and the number of hammer blows required to achieve each 100mm penetration (N100 value) is recorded.

N100 values of N100=0-1 are recorded to approximately 7.00mbgl, at which point a very slight increase is seen to N100=2. From this point a very gradual increase per metre rod is observed to a depth of ~20.00mbgl. This increase is likely a result of skin friction of the rods, rather than a measureable increase as a result of stronger soil conditions.

Below ~20.00mbgl, N100 values are seen to improve from N100=11-12 at 20.00mbgl to N100=46 at 30.00mbgl.

For full details please refer to the logs found in Appendix B.

7.0 DISCUSSION OF GROUND CONDITIONS

7.1 Soil Engineering Properties

The investigation was requested by the client in respect to the proposed demolition of the existing single storey brick structure, with a new two storey timber framed building, over roughly the same footprint. However at the time of writing the design of the proposed structure had not been provided to CE.

Based on the stratigraphic records compiled from the exploratory holes, the existing concrete hardstanding is underlain by Made Ground composed initially of a black silty ashy gravelly Sand to a maximum depth of 0.70mbgl. Beneath this, further Made Ground soils were described largely as a very soft dark brown or brown locally organic sandy gravelly silty Clay, to a maximum depth of 1.50mbgl in WS1.

SPT's within this material indicate SPT N-values of N=5-6, indicative of soft consistency soils.

The underlying natural soils were described as a soft to firm becoming very soft bluish grey mottled brown organic silty Clay, with rare fine to coarse gravels of chalk. A moderate, becoming strong organic odour was noted with depth. This material is considered representative of Alluvium.

SPT results within this material are found to be N=0-2 indicative of very soft consistency, with a negligible cohesion. The majority of results self-penetrated the full length of the test.

Laboratory testing of the shallow Made Ground cohesive soils indicate this material is considered Intermediate Plasticity, with the Alluvial soils very high plasticity. In accordance with NHBC guidelines, these soils are considered low to high volume change potential.

Groundwater was encountered in both locations during the investigation. A standing level on completion of the boreholes was recorded as 3.50mbgl in WS1 and 1.50mbgl in WS2.

7.2 Foundation Designs

The Made Ground soils encountered are not considered suitable for any structural loads. Made Ground soils of this origin are frequently present in a weak and variable condition such that unacceptable settlement would be anticipated even under light loading intensities.

The underlying natural soils are also not considered to be a suitable founding stratum, due to their extremely low strength. Total and differential settlements for even light loads within this material would be way beyond tolerate limits, and would almost certainly result in shear failure.

As such, the use of a piled foundation would be recommended for the new construction. We would suggest that the results of this investigation are forwarded to a specialist piling contractor for review, to ensure that they have the require information for the design of these structures.

Consideration to negative skin friction of the pile shafts should be taken into account when design these structures.

7.3 Excavations and Groundwater

It is likely that excavations of less than 1.20mbgl may require support to their faces due to the granular nature of the Made Ground. Should excavations be taken below this, particularly due to the granular natural soils below 1.20mbgl then adequate support should be provided in order to satisfy statutory safety regulations.

Groundwater was encountered at depth of 2.80mbgl during drilling work. This is considered to be the approximate level of the culvert water level. However, groundwater levels are dependent upon seasonal variations and levels may change after periods of heavy rainfall or prolonged drought. As such if groundwater is encountered within any excavations during the construction phase it should be dealt with appropriately and removed using good engineering practices.

The design of any temporary retaining structures to support excavation faces should be made assuming the following moderately conservative parameters:

Material	Effective angle of friction (ϕ')	Effective Cohesion; c' (kPa)	Bulk Density kN/m^3
Made Ground (Granular)	28-30	0	17-18
Made Ground (Cohesive)	25-26	0	15-16
Organic silty Clay (Alluvium)	21-22	0	12-13

7.4 Sulphates and pH

Sulphate concentrations within the soils tested were found to 22mg/l and 1350mg/l, with a pH levels between 7.2 and 9.7, suggesting that a design class of DS-2 and a sub class of AC-2 should be adopted for buried concrete structures within these soils, (Reference made to current BRE SD1 Guidelines) based on the soils tested.

8.0 CONTAMINATION CONCLUSIONS

It should be noted that a Stage 1 Desktop Study and Walkover Survey was not requested as part of the Site Investigation therefore no Site Conceptual Model & Risk Assessment has been formulated to identify source-pathway-receptor relationships. This report therefore does not constitute a full environmental assessment given that a Phase 1: Desktop Study and Walkover Report has not been completed.

8.1 Soils Results

All organic and inorganic determinants were found to be below the relevant and available guideline values using the Residential, without home-grown produce setting.

For full details of all results please refer to the laboratory certificates found in Appendix D.

8.2 CONTAMINATION RECOMMENDATIONS

The following recommendations are based on the plans proposed at the time of writing this report and may be subject to change after the completion of the further investigation works.

8.2.1 Guideline Exceedance

All organic and inorganic results were found to be below the relevant guidelines. However there may be areas of potentially contaminated land across the site not identified by this phase of investigation.

8.2.2 Watching Brief

We would recommend that a watching brief is maintained on site, particularly during the ground works stage. This must be undertaken as part of the good working practices and in case there are any areas of unidentified contamination.

During any ground works, an appraisal of the exposed soils should be made by the on-site manager. If any material is noted to show visual and/ or olfactory signs of contamination this material should be stockpiled separately and tested prior to its appropriate removal off site or re-use where necessary. A suitably qualified environmental specialist should be contacted to advise what further work is required.

8.2.3 Waste Disposal

As surplus arisings will likely be generated as part of the build programme, it is recommended that a copy of the laboratory results (**Appendix D**) are given to the waste contractors and/or landfill operators involved to discuss the requirements with regards to removal of surplus subsoils from the site and the acceptance of the waste at the landfill. All surplus arisings should be appropriately classified prior to its movement off site.

All materials must be transported in compliance with the Duty of Care Regulations by authorising movements with Carrier's individually numbered Duty of Care conveyance notes, complete with the appropriate EWC Codes. All relevant dockets will need to be kept to provide evidence of the removal.

APPENDICES

Appendix A – Site Plan

Appendix B – Stratigraphic Logs

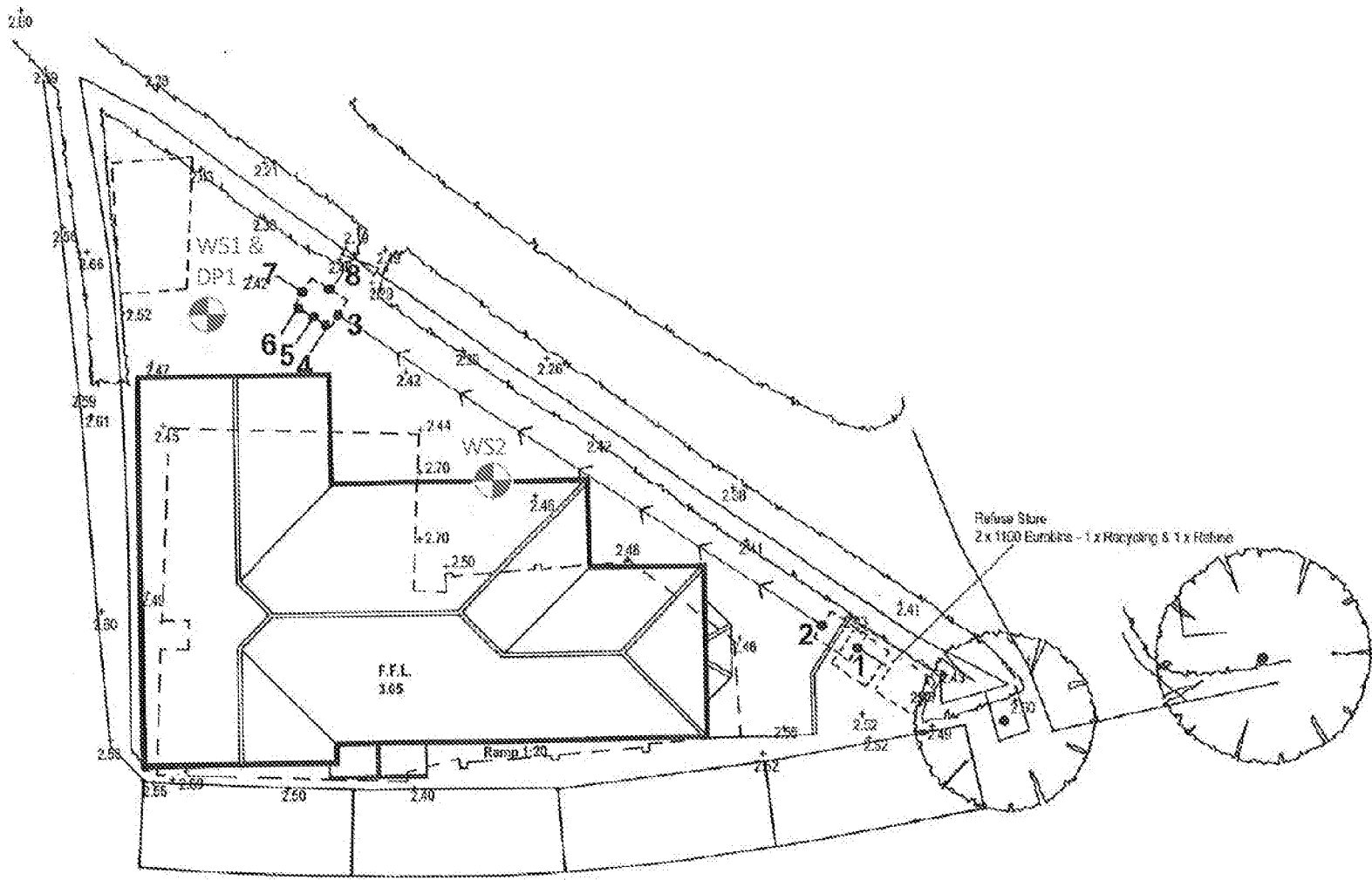
Appendix C – Photographs

Appendix D – Laboratory Certificates



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- NOTES
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 2. All dimensions must be checked on site prior to commencement of work.
 3. Where applicable this drawing is to be read in conjunction with other consultants drawings.
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Project:
ROSELANDS, ARUNDEL

Drawing:
EXPLORATORY HOLES LOCATION
PLAN

scale:
N.T.S.

date	drawn	checked
drawing number		revision

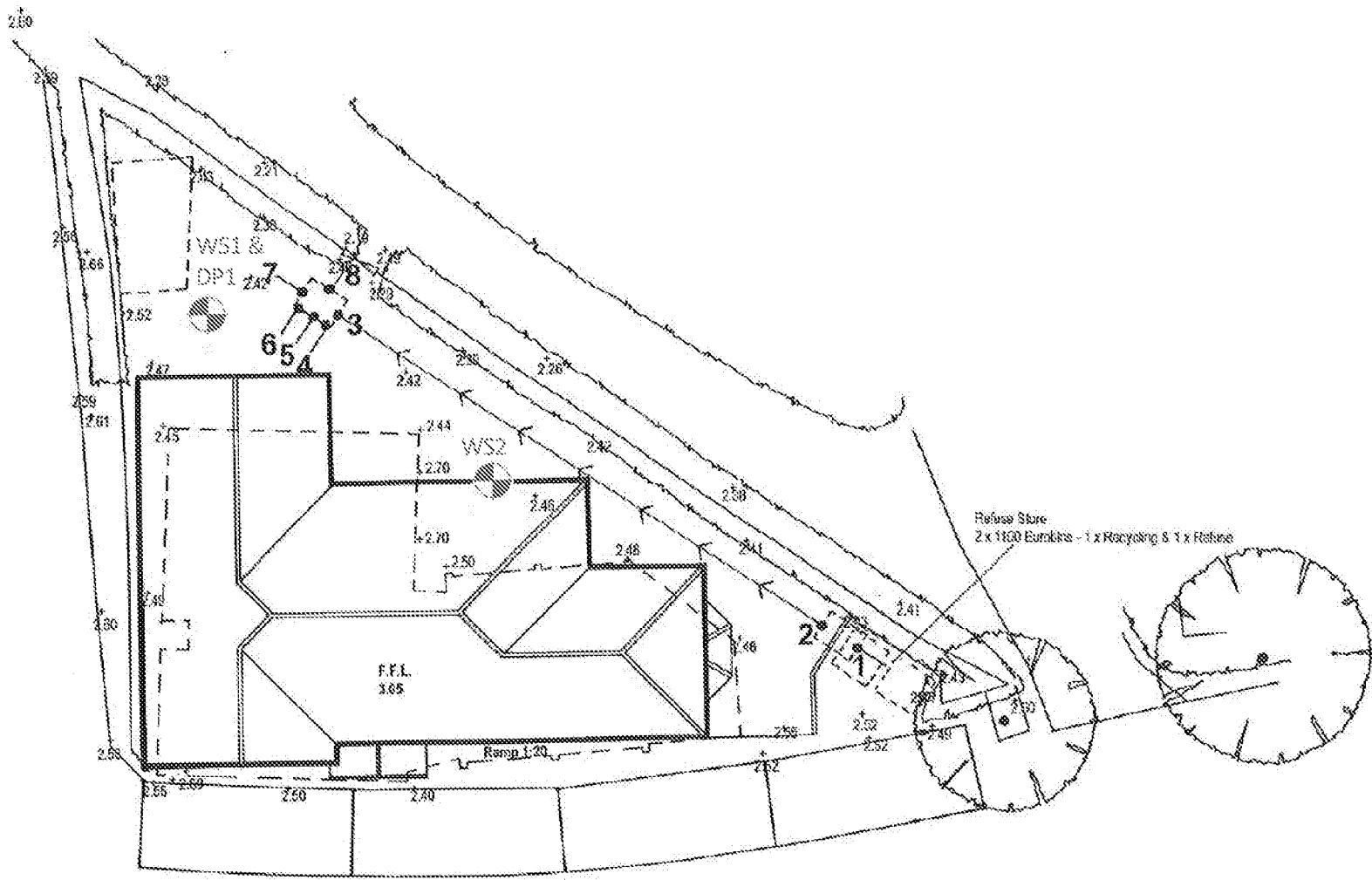
APPENDIX A

Site Plan



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ROSELANDS, ARUNDEL

Drawing:
EXPLORATORY HOLES LOCATION
Scale:
NOT TO SCALE
PLAN

date	drawn	checked
drawing number	revision	

APPENDIX B

Stratigraphic Logs



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 constructiveevaluation site investigation • building pathology					Borehole Log			Borehole No. WS1 Sheet 1 of 1		
Project Name: Roselands					Project No. 17.9607		Co-ords:		Hole Type WLS	
Location: Arundel, West Sussex					Level:		Scale 1:40		Logged By SG	
Client: Birchside Management Ltd					Dates: 10/08/2017					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.20	ES		0.10		(MADE GROUND) Light grey concrete. With 50-60% aggregate of fine to coarse sub-angular to sub-rounded flint. No steel recorded.	1		
		0.70	ES		0.60		(MADE GROUND) Black silty ashy gravelly fine to coarse Sand. Gravel is fine to coarse angular to sub-rounded flint, chalk, charcoal and concrete.			
		0.80	D				(MADE GROUND) Very soft dark brown becoming brown sandy gravelly silty Clay. Sand is fine to coarse. Gravel is fine to coarse angular to sub-rounded flint, brick and occasional clinker/ charcoal.			
		1.00 - 1.45	D		1.00		(MADE GROUND) Dark brown and bluish grey frequently brown mottled gravelly silty Clay. Gravel is fine to coarse angular to sub-rounded flint and brick. Organic odour.			
		1.00	SPT	N=6 (0,1/1,1,2,2)						2
		1.60	D		1.50		Soft to firm bluish grey mottled brown organic silty CLAY. Moderate becoming strong with depth organic odour. Occasional fine rootlets in upper 1.0m. Rare fine to coarse sub-angular to sub-rounded gravels of chalk. (ALLUVIUM)			
		2.00	D							
		2.00 - 2.45	D							
		2.00	SPT	N=2 (0,1/0,1,0,1)						3
		2.50	D				...below 2.50mbgl becoming very soft			
		3.00	D							
		3.00 - 3.45	D							
		3.00	SPT	N=0 (0,0/0,0,0,0)						4
		3.50	D							
		4.00	D							
4.00 - 4.45	D									
4.00	SPT	N=0 (0,0/0,0,0,0)						5		
4.50	D									
5.00	D									
5.00 - 5.45	D									
5.00	SPT	N=0 (0,0/0,0,0,0)						6		
5.50	D									
6.00	D									
6.00 - 6.45	D									
6.00	SPT	N=0 (0,0/0,0,0,0)						7		
6.50	D									
7.00	D									
7.00 - 7.45	D									
7.00	SPT	N=0 (0,0/0,0,0,0)						8		
7.45						End of Borehole at 7.450m				

Remarks
 Hand excavated service clearance pit to 1.00mbgl. Groundwater seepage encountered at 1.00mbgl. Water standing at 3.50mbgl on completion of hole.



 constructiveevaluation site investigation • building pathology				Borehole Log				Borehole No. WS2	
Project Name: Roselands				Project No. 17.9607		Co-ords:		Sheet 1 of 1 Hole Type WLS	
Location: Arundel, West Sussex						Level:		Scale 1:40	
Client: Birchside Management Ltd						Dates: 10/08/2017		Logged By SG	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20			0.10		(MADE GROUND) Light grey concrete. With 50-60% aggregate of fine to coarse sub-angular to sub-rounded flint. No steel recorded.		
		0.40					(MADE GROUND) Black silty ashy gravelly fine to coarse Sand. Gravel is fine to coarse angular to sub-rounded flint, chalk, charcoal and concrete.		
		0.80			0.70		(MADE GROUND) Soft brown gravelly silty Clay. Gravel is fine to coarse angular to sub-rounded flint and brick. Occasional cobbles of brick.	1	
		1.00							
		1.00 - 1.45							
		1.00	SPT	N=5 (1,1/1,1,2,1)					
		1.50			1.40		Soft to firm bluish grey mottled brown organic silty CLAY. Moderate becoming strong with depth organic odour. Occasional fine rootlets in upper 1.0m. Rare fine to coarse sub-angular to sub-rounded gravels of chalk. (ALLUVIUM)		
		2.00					... 1.50-2.00mbgl Medium sized bed of very soft black plastic amorphous clayey PEAT. Strong organic odour.	2	
		2.00 - 2.45							
		2.00	SPT	N=2 (0,1/1,0,1,0)					
		2.50							
		3.00							3
		3.00 - 3.45							
		3.00	SPT	N=0 (0,0/0,0,0,0)					
		3.50							
		4.00							4
	4.00 - 4.45								
	4.00	SPT	N=0 (0,0/0,0,0,0)						
	4.50								
	5.00							5	
	5.00 - 5.45								
	5.00	SPT	N=0 (0,0/0,0,0,0)						
	5.50								
	6.00							6	
	6.00 - 6.45								
	6.00	SPT	N=0 (0,0/0,0,0,0)						
	6.50								
	7.00							7	
	7.00 - 7.45								
	7.00	SPT	N=0 (0,0/0,0,0,0)						
				7.45			End of Borehole at 7.450m	8	

Remarks Hand excavated service clearance pit to 1.00mbgl. Groundwater seepage encountered at 1.00mbgl. Water standing at 1.50mbgl on completion of hole.		
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Probe Log

Borehole No.

DP1

Sheet 5 of 7

Project Name: Roselands

Project No.
17.9607

Co-ords: -

Hole Type
DP

Location: Arundel, West Sussex

Level:

Scale
1:25

Client: Birchside Management Ltd

Dates: 18/08/2017 -

Logged By
SG

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
21	12				
	11				
	12				
	11				
	11				
	12				
	12				
	12				
	12				
	12				
	12				
	12				
22	13				
	15				
	15				
	15				
	15				
	15				
	16				
	16				
	16				
	15				
	18				
	18				
23	18				
	18				
	19				
	21				
	22				
	22				
	23				
	21				
	23				
	23				
	23				
	23				
24	23				
	25				
	28				
	26				
	28				
	29				
	30				
	30				
	31				
	31				
	31				
	31				
25	31				

Remarks

Fall Height 500

Cone Base Diameter

Hammer Wt 50

Final Depth

Probe Type DPH

Log Scale 1:25



Probe Log

Borehole No.

DP1

Sheet 6 of 7

Project Name: Roselands

Project No.
17.9607

Co-ords: -

Hole Type
DP

Location: Arundel, West Sussex

Level:

Scale
1:25

Client: Birchside Management Ltd

Dates: 18/08/2017 -

Logged By
SG

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
26			31		
			31		
			31		
			32		
			33		
			33		
			33		
			34		
			34		
			34		
27			38		
			36		
			36		
			36		
			37		
			37		
			37		
			37		
			37		
			38		
28			38		
			37		
			38		
			39		
			39		
			39		
			39		
			40		
			40		
			41		
29			41		
			40		
			41		
			41		
			41		
			42		
			41		
			42		
			42		
			42		
30			42		
			42		
			42		
			42		
			44		
			44		
			44		
			44		
			46		
			46		

Remarks

Fall Height 500

Cone Base Diameter

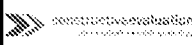
Hammer Wt 50

Final Depth

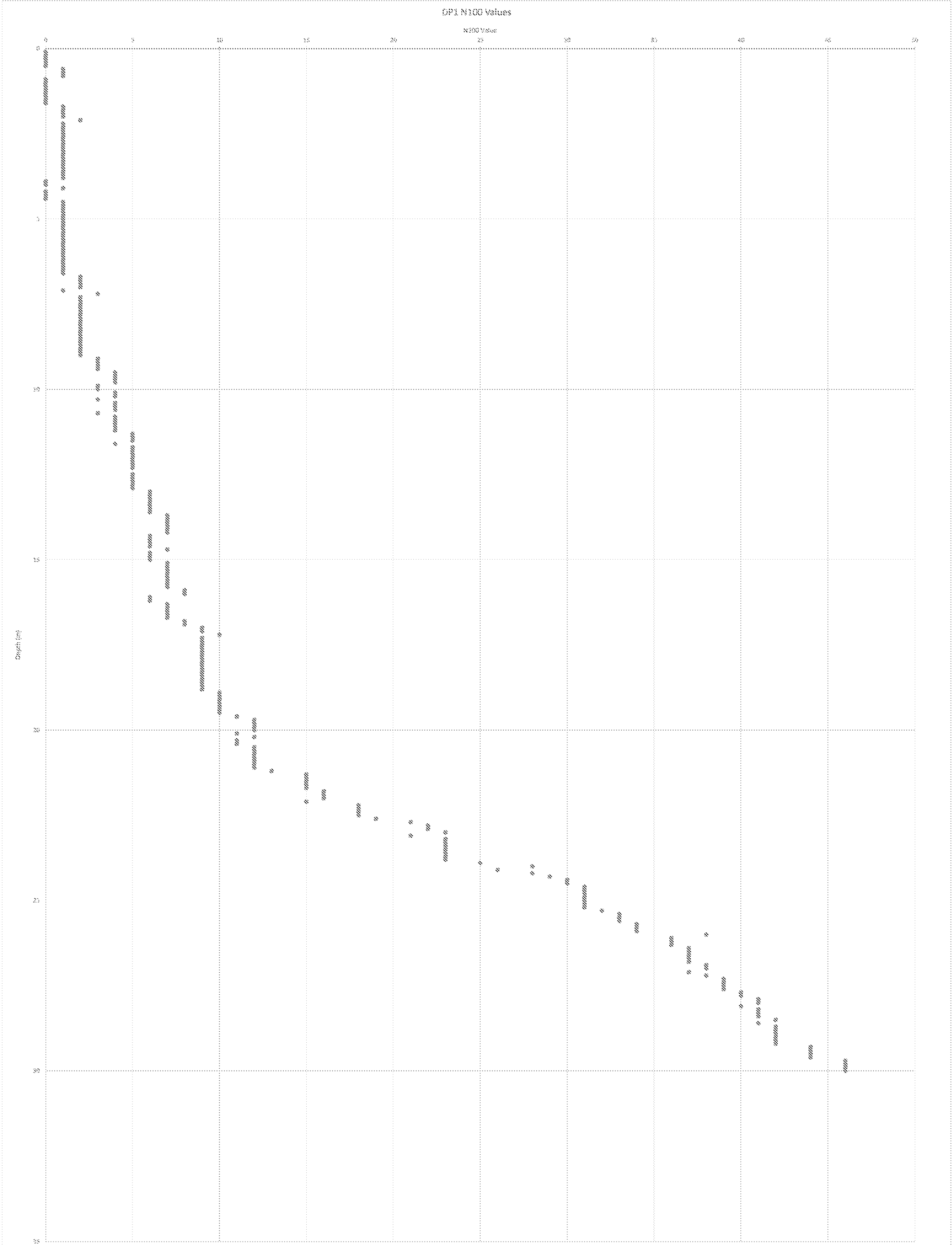
Probe Type DPH

Log Scale 1:25



		Probe Log		Borehole No. DP1	
Project Name: Roselands		Project No. 17.9607		Co-ords: -	
Location: Arundel, West Sussex		Level:		Scale 1:25	
Client: Birchside Management Ltd		Dates: 18/08/2017 -		Logged By SG	
Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	46
31					
32					
33					
34					
35					
Remarks		Fall Height 500		Cone Base Diameter	
		Hammer Wt 50		Final Depth	
		Probe Type DPH		Log Scale 1:25	





APPENDIX C

Photographs



constructiveevaluation
site investigation • building pathology

Investigation Photographs

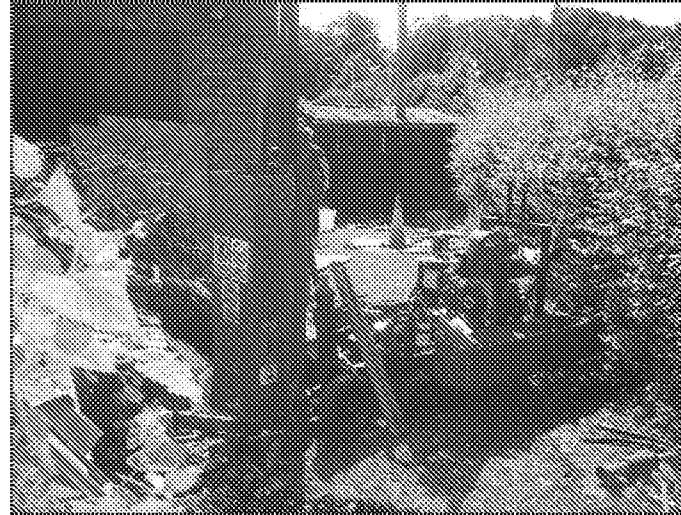
Project Ref: 17.9607

Site Name: Roselands, Arundel

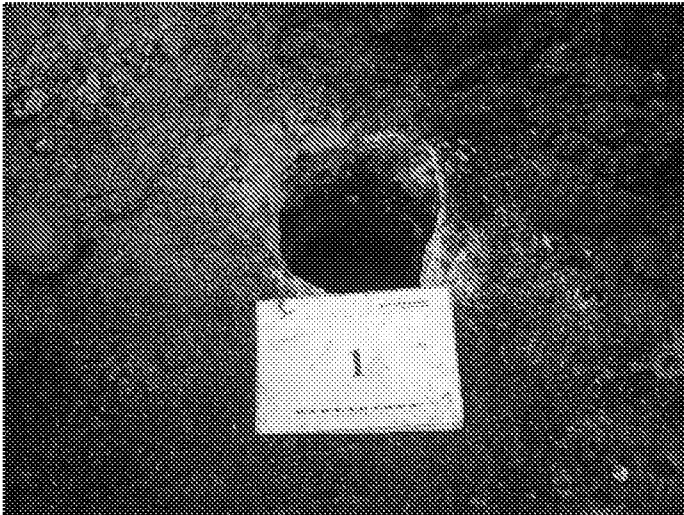
1.



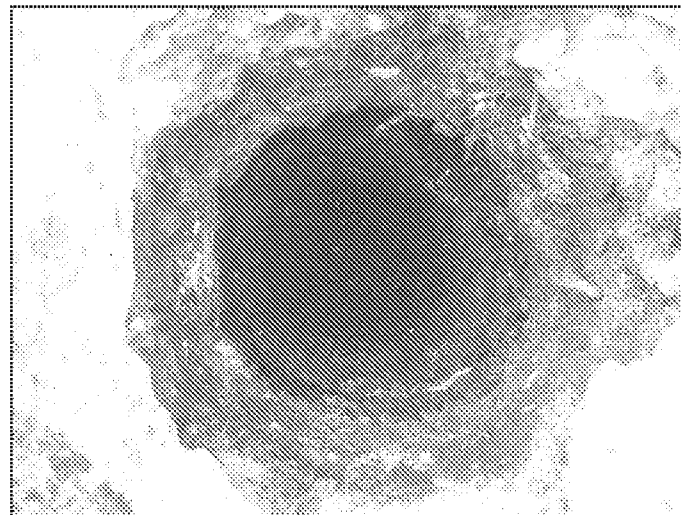
2.



3.



4.



- 1) Existing site
- 2) Existing site
- 3) WS1 location
- 4) WS1 GL-1.00mbgl



constructiveevaluation
site investigation • building pathology

Investigation Photographs

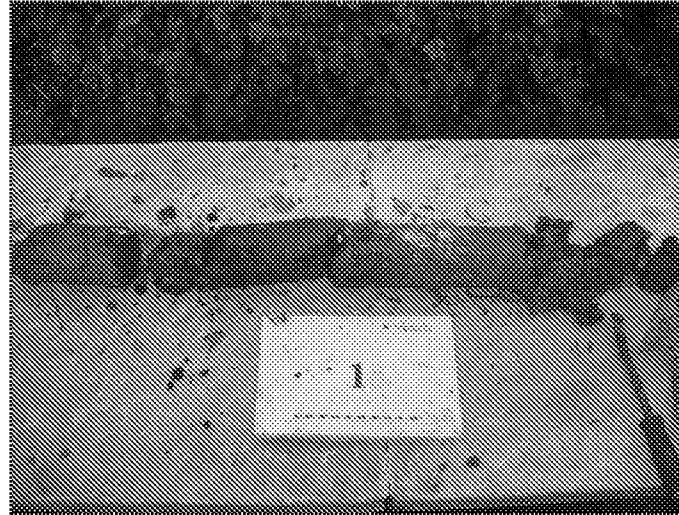
Project Ref: 17.9607

Site Name: Roselands, Arundel

5.

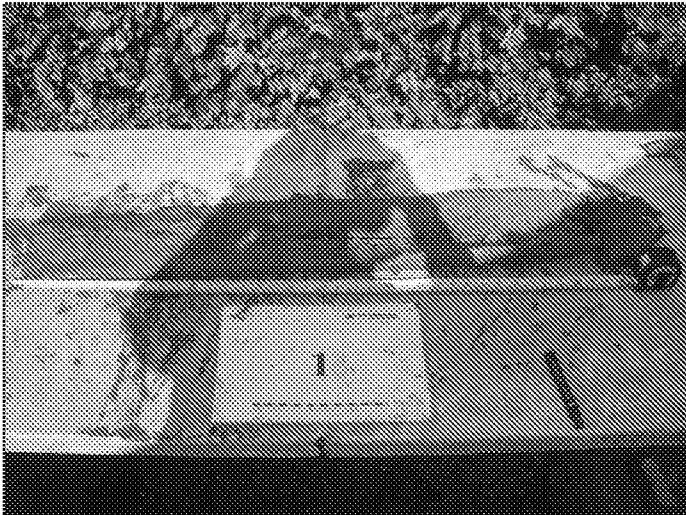


6.



- 5) WS1 spoil
- 6) WS1 1.00-2.00mbgl
- 7) WS1 2.00-3.00mbgl
- 8) WS1 3.00-4.00mbgl

7.



8.



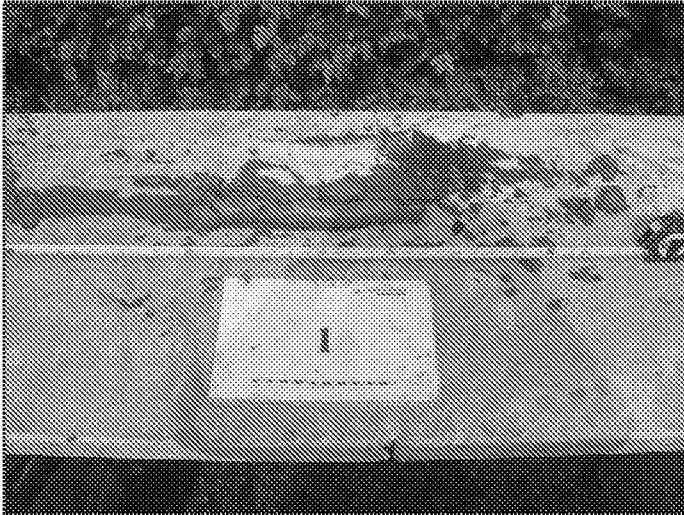
constructiveevaluation
site investigation • building pathology

Investigation Photographs

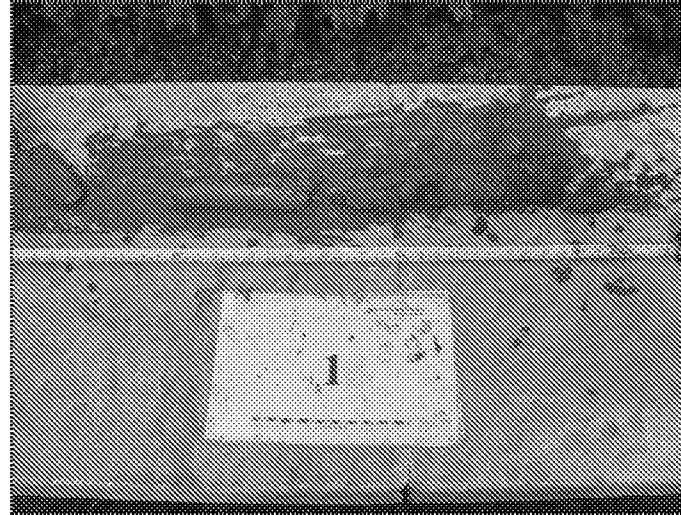
Project Ref: 17.9607

Site Name: Roselands, Arundel

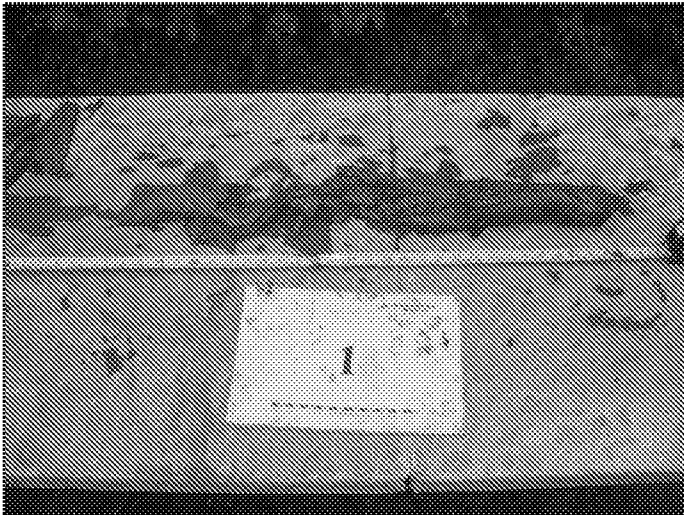
9.



10.



11.



12.



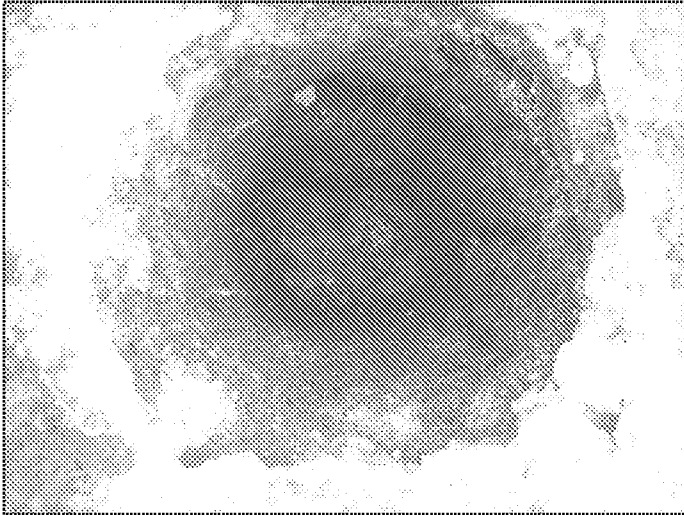
- 9) WS1 4.00-5.00mbgl
- 10) WS1 5.00-6.00mbgl
- 11) WS1 6.00-7.00mbgl
- 12) WS2 location

Investigation Photographs

Project Ref: 17.9607

Site Name: Roselands, Arundel

13.

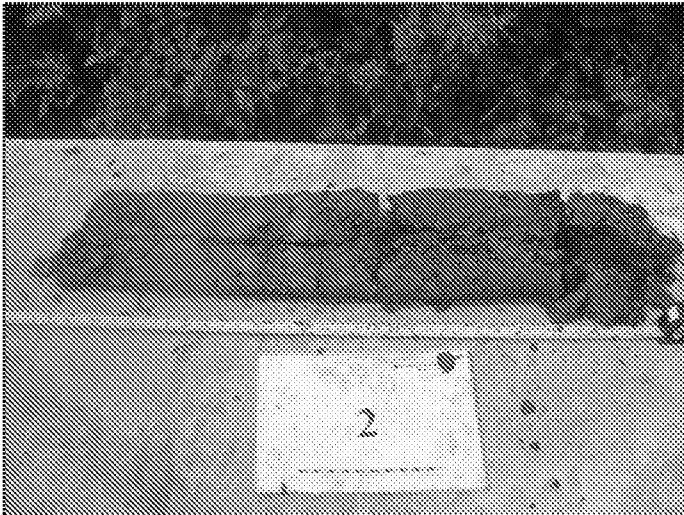


14.

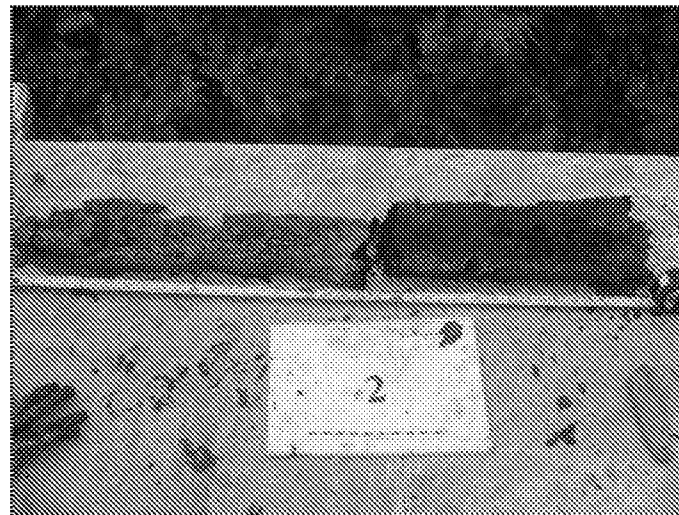


- 13) WS2 GL-1.00mbgl
- 14) WS2 spoil
- 15) WS2 1.00-2.00mbgl
- 16) WS2 2.00-3.00mbgl

15.



16.

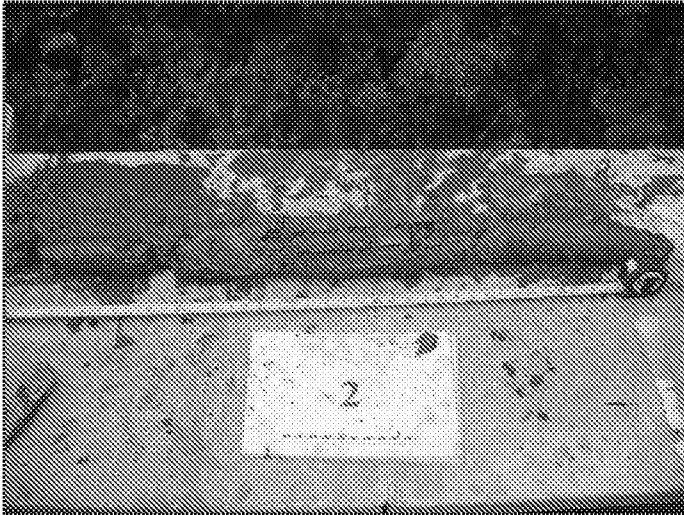


Investigation Photographs

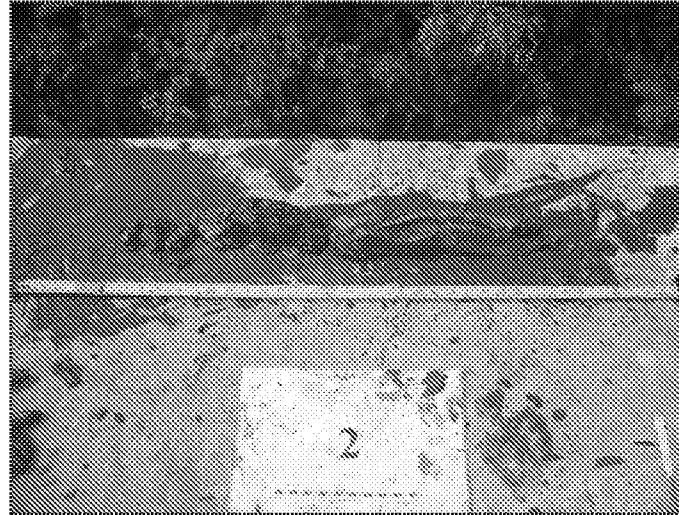
Project Ref: 17.9607

Site Name: Roselands, Arundel

17.



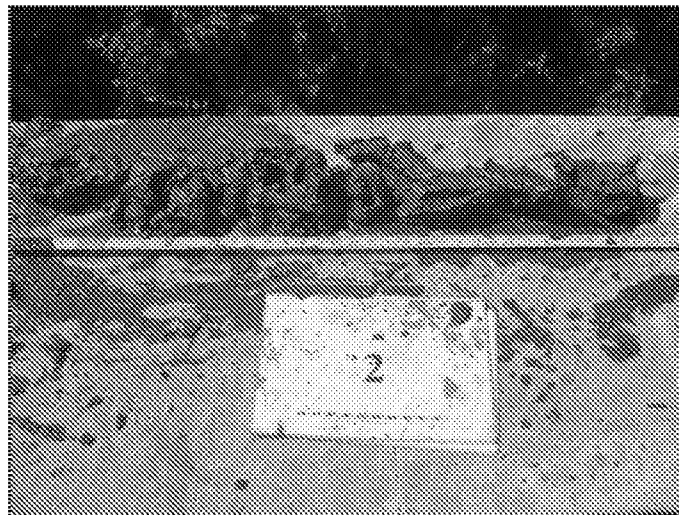
18.



19.



20.



- 17) WS2 3.00-4.00mbgl
- 18) WS2 4.00-5.00mbgl
- 19) WS2 5.00-6.00mbgl
- 20) WS2 6.00-7.00mbgl



constructiveevaluation
site investigation • building pathology

Investigation Photographs

Project Ref: 17.9607

Site Name: Roselands, Arundel

21.



22.



21) WS1 reinstatement

22) WS2 reinstatement



constructiveevaluation
site investigation • building pathology

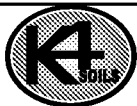
APPENDIX D

Laboratory Certificates



constructiveevaluation
site investigation • building pathology

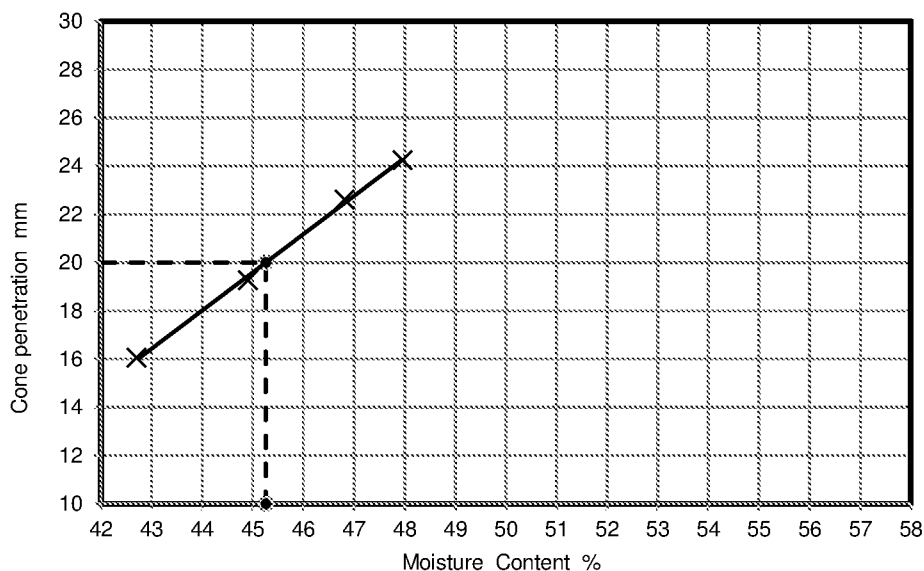
[illegible]



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.	23264
Borehole/Pit No.	WS1
Sample No.	-
Depth Top	0.80 m
Depth Base	- m
Sample Type	D
Samples received	21/08/2017
Schedules received	21/08/2017
Project Started	22/08/2017
Date Tested	04/09/2017

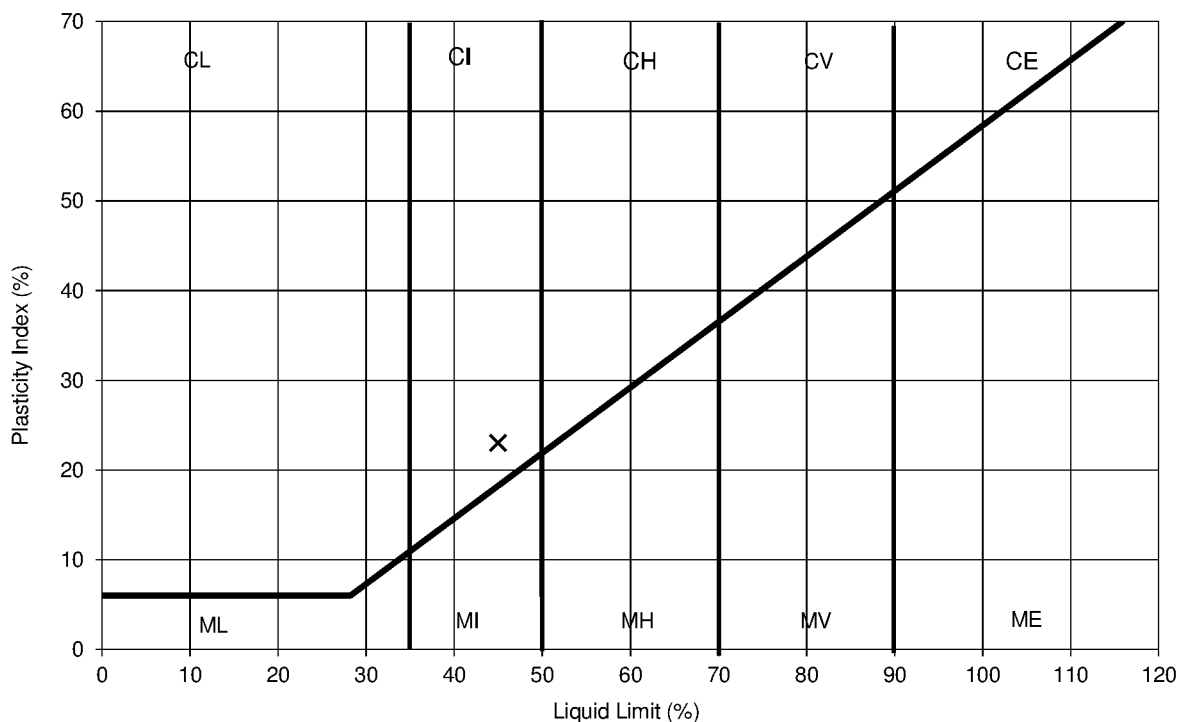
Site Name	Roselands		
Project No.	17.9607	Client	Constructive Evaluation
Soil Description	Dark grey slightly mottled black slightly gravelly sandy silty CLAY with occasional fm brick and chalk fragments (gravel is fmc and sub-angular to angular)		



NATURAL MOISTURE CONTENT	31	%
% PASSING 425µm SIEVE	70	%
LIQUID LIMIT	45	%
PLASTIC LIMIT	22	%
PLASTICITY INDEX	23	%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
 BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
 BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying
 Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
 Tel: 01923 711 288 Email: James@k4soils.com

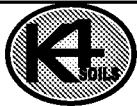
Checked and Approved

Initials: J.P
 Date: 05/09/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

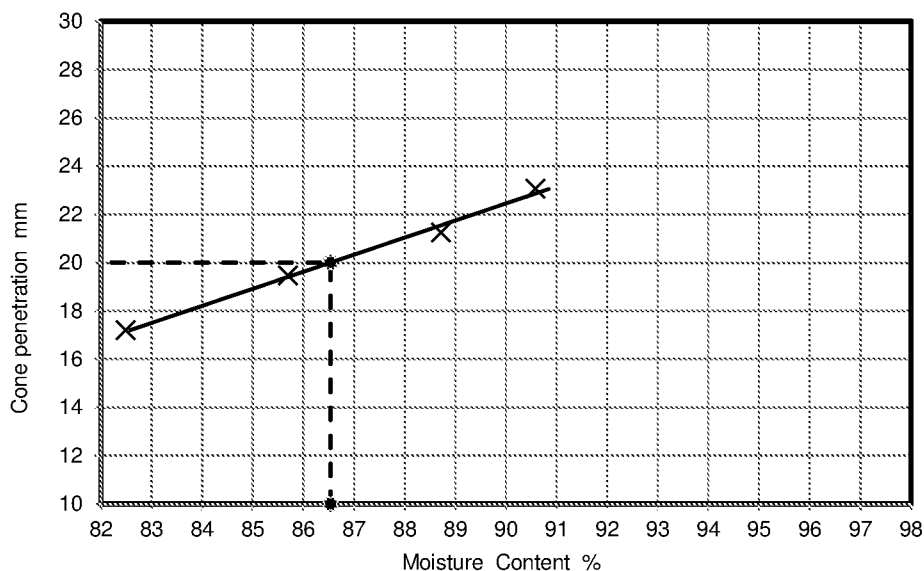
MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.	23264
Borehole/Pit No.	WS1
Sample No.	-
Depth Top	2.00 m
Depth Base	- m
Sample Type	D
Samples received	21/08/2017
Schedules received	21/08/2017
Project Started	22/08/2017
Date Tested	04/09/2017

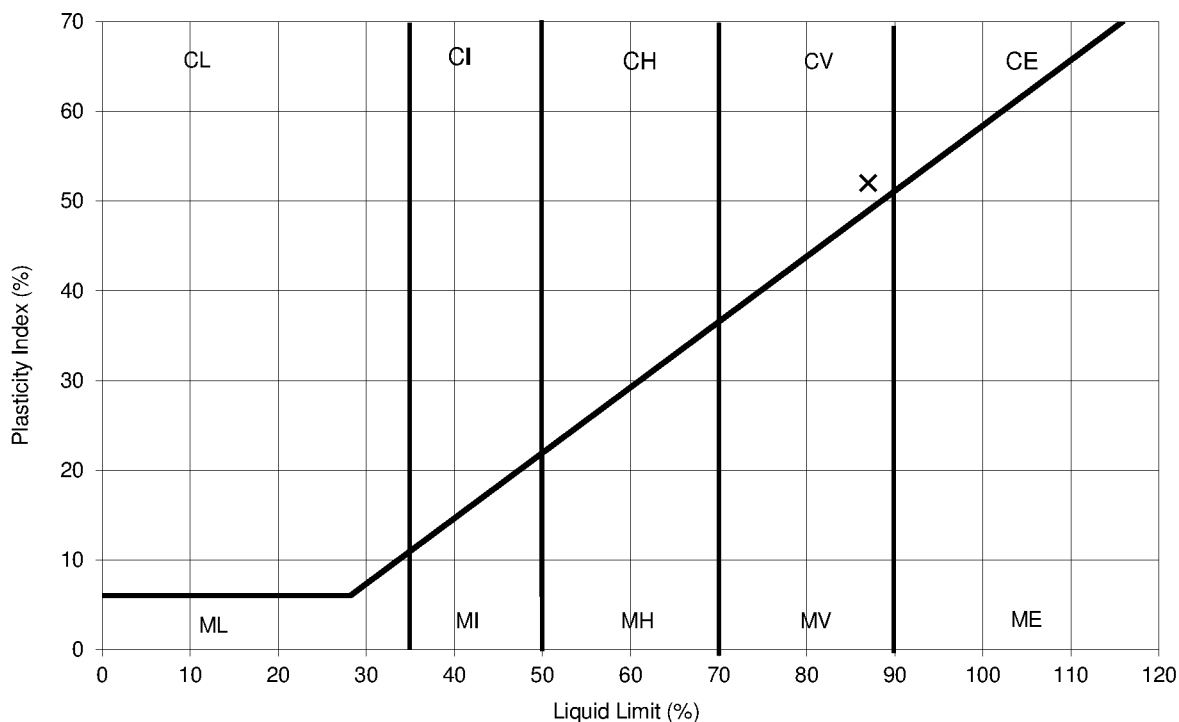
Site Name	Roselands		
Project No.	17.9607	Client	Constructive Evaluation
Soil Description	Greyish brown slightly mottled bluish grey silty CLAY with traces of fine chalk fragments		



NATURAL MOISTURE CONTENT	64	%
% PASSING 425µm SIEVE	99	%
LIQUID LIMIT	87	%
PLASTIC LIMIT	35	%
PLASTICITY INDEX	52	%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying
Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

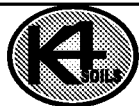
Checked and Approved

Initials: J.P
Date: 05/09/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

23264

Borehole/Pit No.

WS2

Site Name

Roselands

Sample No.

-

Project No.

17.9607

Client

Constructive Evaluation

Depth Top

1.00

m

Depth Base

-

m

Sample Type

D

Samples received

21/08/2017

Schedules received

21/08/2017

Project Started

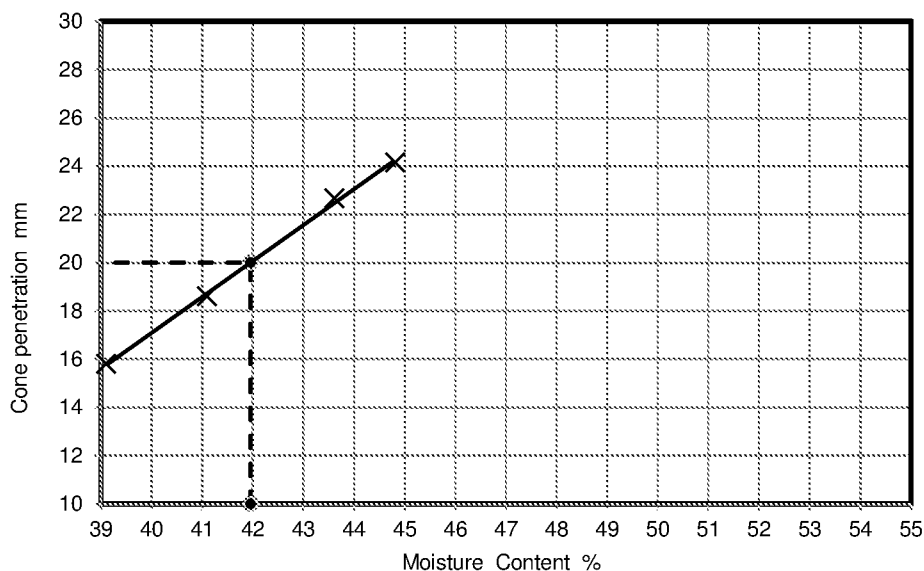
22/08/2017

Date Tested

04/09/2017

Soil Description

Dark grey mottled brown slightly gravelly slightly sandy silty CLAY with occasional fine chalk fragments (gravel is fmc and sub-angular to rounded)



NATURAL MOISTURE CONTENT

30

%

% PASSING 425µm SIEVE

95

%

LIQUID LIMIT

42

%

PLASTIC LIMIT

20

%

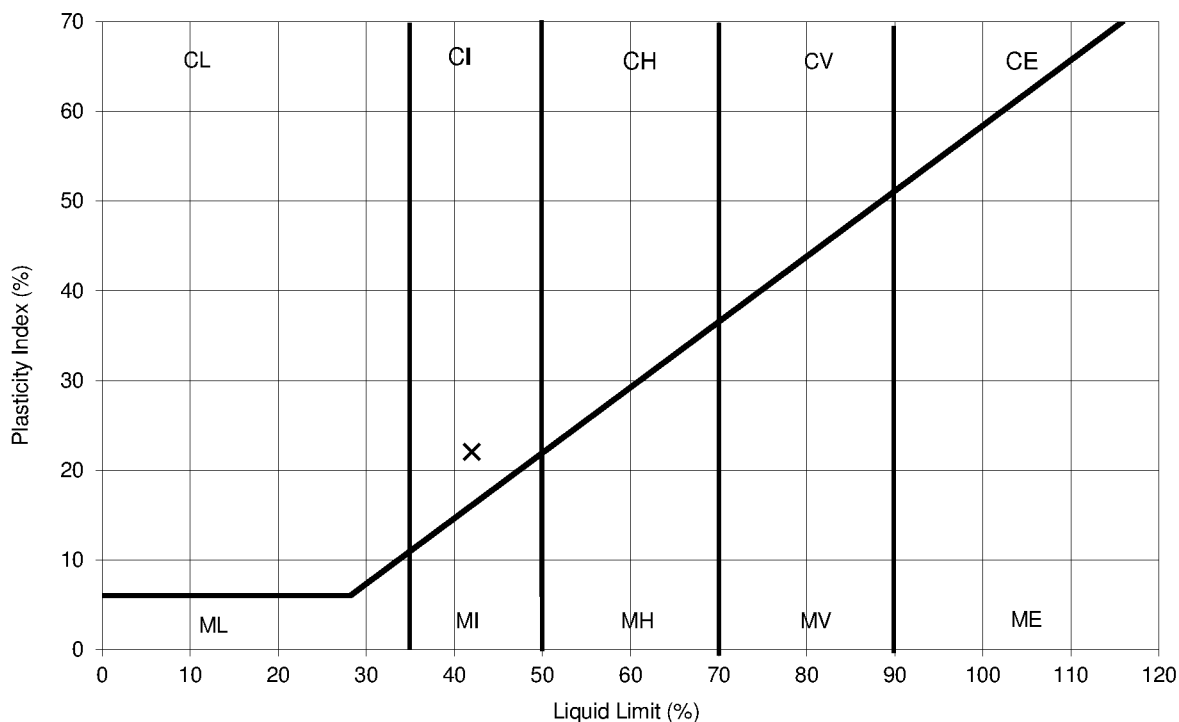
PLASTICITY INDEX

22

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

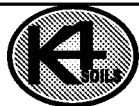
Initials: J.P

Date: 05/09/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

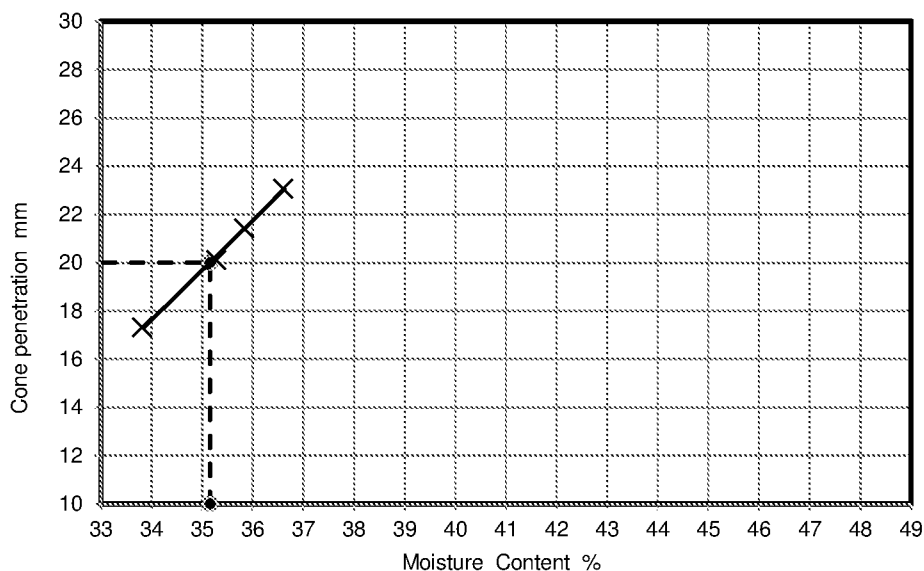
MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.	23264
Borehole/Pit No.	WS2
Sample No.	-
Depth Top	1.50 m
Depth Base	- m
Sample Type	D
Samples received	21/08/2017
Schedules received	21/08/2017
Project Started	22/08/2017
Date Tested	04/09/2017

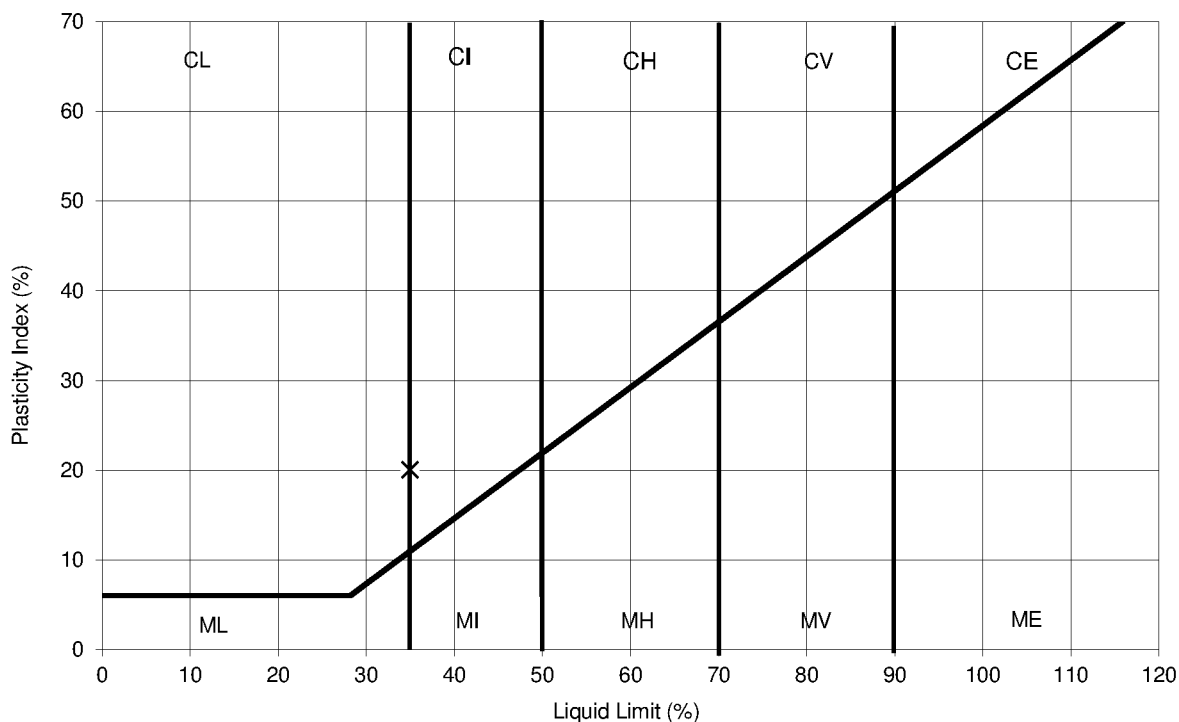
Site Name	Roselands		
Project No.	17.9607	Client	Constructive Evaluation
Soil Description	Brown mottled greenish brown and bluish grey slightly gravelly sandy silty CLAY with rare roots (gravel is fm and sub-angular to rounded)		



NATURAL MOISTURE CONTENT	24	%
% PASSING 425µm SIEVE	87	%
LIQUID LIMIT	35	%
PLASTIC LIMIT	15	%
PLASTICITY INDEX	20	%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
 BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
 BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying
 Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
 Tel: 01923 711 288 Email: James@k4soils.com

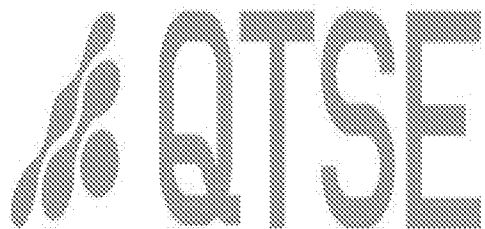
Checked and Approved

Initials: J.P
 Date: 05/09/2017

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



Rob Marsh
Constructive Evaluation Ltd
Unit 15 & 16
Ford Lane Business
Ford Lane
Ford
Arundel
BN18 0UZ

QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN

QTS Environmental Report No: 17-63193

Site Reference: Roselands

Project / Job Ref: 17.9607

Order No: 17.9607/RM

Sample Receipt Date: 18/08/2017

Sample Scheduled Date: 18/08/2017

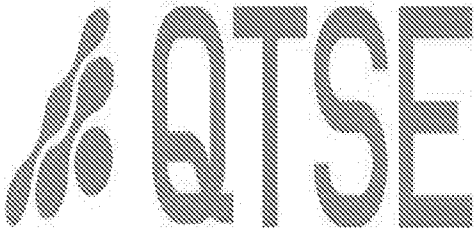
Report Issue Number: 1

Reporting Date: 24/08/2017

Kevin Old
Associate Director of Laboratory

Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
QTS Environmental Report No: 17-63193	Date Sampled	10/08/17	10/08/17	10/08/17	10/08/17	10/08/17
Constructive Evaluation Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Roselands	TP / BH No	WS1	WS1	WS1	WS1	WS2
Project / Job Ref: 17.9607	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 17.9607/RM	Depth (m)	0.20	0.70	1.60	3.50	0.80
Reporting Date: 24/08/2017	QTSE Sample No	286214	286215	286216	286217	286218

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected				Not Detected
pH	pH Units	N/a	MCERTS	9.7	8.1	8.0	8.0	8.0
Total Cyanide	mg/kg	< 2	NONE	< 2				< 2
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	44	22	51	1350	68
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.04	0.02	0.05	1.35	0.07
Organic Matter	%	< 0.1	MCERTS	3.8				3.7
Arsenic (As)	mg/kg	< 2	MCERTS	10				16
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2				0.3
Chromium (Cr)	mg/kg	< 2	MCERTS	16				17
Copper (Cu)	mg/kg	< 4	MCERTS	71				27
Lead (Pb)	mg/kg	< 3	MCERTS	143				142
Mercury (Hg)	mg/kg	< 1	NONE	< 1				< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	13				17
Selenium (Se)	mg/kg	< 3	NONE	< 3				< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	97				90
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				< 2

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

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

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

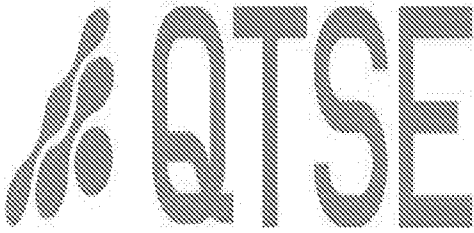
The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis (S)



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
QTS Environmental Report No: 17-63193	Date Sampled	10/08/17				
Constructive Evaluation Ltd	Time Sampled	None Supplied				
Site Reference: Roselands	TP / BH No	WS2				
Project / Job Ref: 17.9607	Additional Refs	None Supplied				
Order No: 17.9607/RM	Depth (m)	2.00				
Reporting Date: 24/08/2017	QTSE Sample No	286219				

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
pH	pH Units	N/a	MCERTS	7.2				
Total Cyanide	mg/kg	< 2	NONE					
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	85				
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.08				
Organic Matter	%	< 0.1	MCERTS					
Arsenic (As)	mg/kg	< 2	MCERTS					
Cadmium (Cd)	mg/kg	< 0.2	MCERTS					
Chromium (Cr)	mg/kg	< 2	MCERTS					
Copper (Cu)	mg/kg	< 4	MCERTS					
Lead (Pb)	mg/kg	< 3	MCERTS					
Mercury (Hg)	mg/kg	< 1	NONE					
Nickel (Ni)	mg/kg	< 3	MCERTS					
Selenium (Se)	mg/kg	< 3	NONE					
Zinc (Zn)	mg/kg	< 3	MCERTS					
Total Phenols (monohydric)	mg/kg	< 2	NONE					

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

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

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

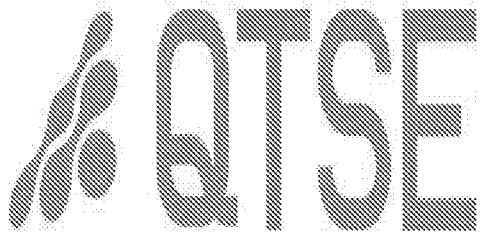
The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis (S)



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 17-63193	Date Sampled	10/08/17	10/08/17			
Constructive Evaluation Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Roselands	TP / BH No	WS1	WS2			
Project / Job Ref: 17.9607	Additional Refs	None Supplied	None Supplied			
Order No: 17.9607/RM	Depth (m)	0.20	0.80			
Reporting Date: 24/08/2017	QTSE Sample No	286214	286218			

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	0.30	0.12			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	2.13	0.97			
Anthracene	mg/kg	< 0.1	MCERTS	0.38	0.13			
Fluoranthene	mg/kg	< 0.1	MCERTS	5.21	2.49			
Pyrene	mg/kg	< 0.1	MCERTS	4.45	2.15			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	2.06	0.87			
Chrysene	mg/kg	< 0.1	MCERTS	2.49	1.21			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	2.79	1.46			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	1.40	0.70			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	2.24	0.85			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	1.17	0.51			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	0.13	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	1.08	0.50			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	25.8	12			

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



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Soil Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 17-63193	Date Sampled	10/08/17	10/08/17			
Constructive Evaluation Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Roselands	TP / BH No	WS1	WS2			
Project / Job Ref: 17.9607	Additional Refs	None Supplied	None Supplied			
Order No: 17.9607/RM	Depth (m)	0.20	0.80			
Reporting Date: 24/08/2017	QTSE Sample No	286214	286218			

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	30			
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	30			
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	4	< 2			
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	23	7			
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	74	24			
Aromatic (C5 - C35)	mg/kg	< 21	NONE	102	31			
Total >C5 - C35	mg/kg	< 42	NONE	102	61			

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 17-63193	Date Sampled	10/08/17	10/08/17			
Constructive Evaluation Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Roselands	TP / BH No	WS1	WS2			
Project / Job Ref: 17.9607	Additional Refs	None Supplied	None Supplied			
Order No: 17.9607/RM	Depth (m)	0.20	0.80			
Reporting Date: 24/08/2017	QTSE Sample No	286214	286218			

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2			
Toluene	ug/kg	< 5	MCERTS	< 5	< 5			
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2			
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2			
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2			
MTBE	ug/kg	< 5	MCERTS	< 5	< 5			

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 17-63193	
Constructive Evaluation Ltd	
Site Reference: Roselands	
Project / Job Ref: 17.9607	
Order No: 17.9607/RM	
Reporting Date: 24/08/2017	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
286214	WS1	None Supplied	0.20	7.7	Black sandy clay with stones
286215	WS1	None Supplied	0.70	18.2	Black sandy clay with stones
286216	WS1	None Supplied	1.60	25.7	Brown clay
286217	WS1	None Supplied	3.50	42	Brown clay
286218	WS2	None Supplied	0.80	18.4	Black clay with stones and brick
286219	WS2	None Supplied	2.00	15	Brown clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{U/5}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 17-63193

Constructive Evaluation Ltd

Site Reference: Roselands

Project / Job Ref: 17.9607

Order No: 17.9607/RM

Reporting Date: 24/08/2017

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received