



ENVIRONMENTAL



Ground Investigation Factual Report

*Land at Orchard Way, Fontwell,
West Sussex, BN18 0SH*

Client Name: Quay Contractors Ltd

Project Number: P3459.1.0

Date: 19 November 2020

ENABLING DEVELOPMENT

Client:	Quay Contractors Ltd
Site:	Land at Orchard Way, Fontwell, West Sussex, BN18 0SH
Report ref.:	P3459.1.0
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Date:	19 November 2020
Version:	<i>DRAFT</i>

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1 Introduction and Site Details

The client, Quay Contractors Ltd, commissioned agb Environmental to undertake the drilling of a borehole with selected soils submitted for geotechnical laboratory testing, groundwater level monitoring and soakaway tests at a parcel of Land at Orchard Way, Fontwell, West Sussex, BN18 0SH.

1.1 Development Proposals

Available plans are presented in **Appendix 1**. It is understood that the site is to be redeveloped consisting of the construction of two new detached dwellings with associated hardstanding car parking area.

1.2 Purpose of Investigation

The objectives of the investigation were to:

- Complete a limited investigation of the ground conditions,
- Undertake laboratory analysis of selected soil samples,
- Ascertain groundwater levels from long term monitoring,
- Complete soakaway tests via trial pits generally in accordance with BRE 365,
- Provide a factual report.

1.3 Site Details

A location plan is presented in **Appendix 1**. The site is in a predominantly residential area approximately 10.5km east of the centre of Chichester. The rectangular site covers an area of approximately 0.1ha, centred at National Grid Reference 495443, 107173, and at an elevation of 33mOD; the ground is reasonably flat with local undulations. At the time of the sitework the site was bounded by, and accessed from, Orchard Way to the south. To the north is the A27 dual carriage way, with the east shrubland and west by a residential dwelling to which the study site is part of the large associated garden.

1.4 Anticipated Ground Conditions and Permeability

From online British Geological Survey (BGS) maps the site is shown to be underlain by superficial deposits of Head (gravel, sand, silt and clay), which overlies sedimentary bedrock of the Lambeth Group.

2 Fieldwork and Analysis

The works undertaken as part of the site investigation and subsequent analysis of selected samples is summarised below. The locations of investigative positions were selected, based on the objectives of the investigation, including the client's requirements, and available access. Buried services plans were provided by the client. Prior to boring, a cable avoidance tool and signal generator was used to confirm each location was clear of detectable services. The exploratory hole location plan and fieldwork records are presented in **Appendix 2**. The exploratory holes completed as part of the investigation are detailed below.

2.1 Cable Percussive Borehole

A single cable percussive borehole was formed on 2nd December 2019. The borehole, referenced BH1, was advanced using 150mm cable percussive tooling to a depth of 14.00mbgl. The borehole was cased to full depth and small or bulk disturbed samples were taken at regular intervals. Standard Penetration Tests (SPTs) were undertaken at intervals to provide an indication of the strength or density of the soil, the results are presented as 'N' values on the borehole logs.

2.2 Standpipe Installations and Monitoring

Single standpipe installation was placed in the borehole and comprised of 50mm diameter PTFE piping, slotted below 1.00mbgl and installed to a depth of 12.00m. Once introduced into the ground the slotted section was surrounded by suitable gravel pack, above which a sealing material (bentonite) was used. A rubber bung with a gas tap was placed at the top of the pipework and a flush cover concreted at surface to protect the installation from damage. The groundwater level within the installed borehole was measured on three different occasions using a dip-meter.

2.3 Soakaway Tests

Two pits, referenced SA1 (central flank of the site) and SA2 (rear of the site), were completed on 17th February 2020. It was originally envisaged that SA2 location would be undertaken in the extreme southwest corner immediately adjacent to the hedge fronting onto Orchard Way. However, a distinct gaseous odour was noted where upon inspection on the roadside signage indicated there was an underground gas pipework present in the locale.

These two pits were excavated to depth of 1.00mbgl. Disturbed soil samples were taken at regular intervals throughout the depth of the pits. The soakaway tests were completed in the pits generally in accordance with BRE Digest DG 365 2016: *Soakaway design*. The soakaway tests included the pits being partially filled with water, with the subsequent drop in water level measured at regular intervals. The test was repeated twice more. Water used for the tests was provided within a bowser by the client. Following completion of the tests the trial pits were backfilled.

2.4 Laboratory Analysis

The scheduled geotechnical laboratory testing is summarised in **Table 2.1**. The results are presented in **Appendix 3**.

Table 2.1 Summary of Scheduled Geotechnical Testing

Test	No. of Soil Samples Tested
Plasticity index	2

Test	No. of Soil Samples Tested
Water content	2
Total sulphate and water-soluble sulphate	3

DRAFT

3 Geotechnical Information

The ground conditions and results of testing are provided below.

3.1 Ground Conditions

A summary of the encountered ground conditions is provided in **Table 3.1** and a summary of the geotechnical in-situ and laboratory test results is provided in **Table 3.2**.

Table 3.1 Summary of In-situ and Laboratory Test Results

Stratum	Surface Depth (mbgl)	Base Depth (mbgl)	Driller Description
Topsoil	0.00	0.20	Turf and topsoil.
Head	0.20	3.00	Brown flinty CLAY.
Lambeth Group	3.00	6.50	Green tan and orange SAND and CLAY.
	6.50	8.50	Stiff black and grey CLAY.
	8.50	9.50	Stiff red and grey sandy silty CLAY.
	9.50	10.10	Grey CLAY and SAND.
	10.10	12.30	Black grey red and brown CLAY.
White Chalk Subgroup	12.30	>14.00	CHALK and flints.
Groundwater	<i>During fieldwork:</i> groundwater was struck at 3.50mbgl that rose to 3.50mbgl and a second groundwater strike was at 9.50mbgl that rose to 8.70mbgl. <i>During monitoring:</i> groundwater was at depths between 2.81mbgl to 3.11mbgl.		

Table 3.2 Summary of In-situ and Laboratory Test Results

Stratum	SPT 'N' Value	Shear Strength (kPa)	Plasticity Index (%)	
		<i>SPT N x 6*</i>	<i>PI</i>	<i>Mod PI</i>
Head	18 to 20	108 to 120	9	3
Lambeth Group	14 to 46	84 to 276	7	7
Chalk	50	-	-	-

*: based on correlation between N value and undrained shear strength (Stroud 1974).

3.2 Results of Soakaway Test

The results of the soakaway testing is summarised in **Table 3.3**. Where the water level did not fall to full test depth, an infiltration rate has been extrapolated based on the constant rate during the test. Further specialist advice will be required for soakaway design.

Table 3.3 Summary of Soakaway Test Result

Summary of Soakaway Test Results			
Location	Ground Conditions	Test Number	Infiltration Rate (m/s)
SA1	Head	Test 1	3.51×10^{-5}
		Test 2	4.38×10^{-5}
		Test 3	3.29×10^{-5}
SA2	Head	Test 1	4.74×10^{-5}
		Test 2	3.46×10^{-5}
		Test 3	4.45×10^{-5}

3.3 Chemical Attack on Buried Concrete

The results of testing for aggressive ground conditions have been summarised in **Table 4.4**, the design sulphate class (DS) and aggressive chemical environment for concrete (ACEC) has also been provided.

Table 4.4 Summary of Aggressive Ground Analysis

Stratum	Determinand		
	Total sulphate (%)	SO4 (mg/l)	pH
Head	0.03	21	7.3
Lambeth Group	<0.02 to 0.08	18 to 375	7.1 to 8.0

4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by agb Environmental Ltd.

Should any changes to the development be proposed, including changes to the proposed landscaping, then the risks will need to be reassessed. This may require additional site investigation work and may result in the need for alteration of the remedial works.

Advice provided within this report is based on current guidelines available at the time of writing. This report is subject to amendment in light of additional information becoming available or statutory consultee review, including the Environment Agency and Local Authority and the NHBC.

It is possible the conditions observed during the site investigation may change. This may result in changes to sources, pathways or receptors that were unforeseen and unexpected. Statements relating to ground gas or groundwater conditions are based on observations made at the time of the site investigation (unless otherwise stated). Ground gas or groundwater conditions may vary as a result of seasonal fluctuations or other effects.

Ground contamination can exist as small discrete areas of contamination and there can be no certainty that any or all such areas have been sampled or identified. This is particularly significant for an investigation by exploratory holes (as used in this site investigation) as a relatively small sample of soil is extracted, which may not be entirely representative of the surrounding ground conditions.

The geotechnical advice given in this report seeks to provide foundation design guidelines for the proposed building(s). The recommendations/advice given is based on the available information obtained during the investigation. Should any unusual ground conditions be encountered that differ from those proved in the exploratory holes further advice should be sought from agb Environmental Ltd.

This report is written in the context of an agreed scope of work between agb Environmental Ltd and the Client and should only be used in this specific context. Re-interpretation of the Site Investigation and/or this report in whole or part may become necessary if additional information becomes available or practices or legislation changes. agb Environmental Ltd does not provide legal advice; the advice of the Client's legal advisors may also be required. agb Environmental Ltd Terms and Conditions apply.

Appendix 1 Plans

proposal plan:
based upon OS map + detail survey (overlaid)



0 10 12 14 16 18 20 m

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WITH ALL OTHER PROJECT, CONSULTANT +
SPECIALIST CONTRACTORS DOCUMENTATION
Do not scale.
Figured dimensions only are to be taken from this drawing.
All dimensions are to be checked on site before any work is
put in hand.

notes:

key:

- :recycle + refuse bins
- :pedestrian sandstone paving
- :1.8m screen fence
- :garden gates
- :new post and rail fencing
- :secure cycle parking
- :existing hedge retained and adapted to enlarged highway access
- :private driveway and parking bay: permeable tarmac
- :new five bar gate and pedestrian gate

revisions:
FIRST ISSUE: 21.03.2018
a. 04.05.2018
c. 15.06.2018 + planning application-01
d. 16.07.2018 + planning application -02
e. 31.10.2018+ planning application-04
g. 08.02.2019+ tree protection/build zone shown
h. 21.02.2019+ unit location updated, carparking updated

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mail@ nbarchitecture.com

project + location
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Quay Contracts + Jim and Cathy McMonagle

drawing code
nb:17101+09h
planning application-02+

proposed scheme

Appendix 2 Fieldworks Records of Site Investigation Plan

existing plan:
based upon OS map + detail survey (overlaid)



0 10 12 14 16 18 20 m

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All dimensions are to be checked on site before any work is put in hand.

notes:

key:

revisions:
FIRST ISSUE:
15.06.2018: planning application-01



agb Environmental

BOREHOLE LOG

Project Orchard Farm Way, Fontwell				BOREHOLE No BH1
Job No P3459	Date 02-12-19	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 2

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
					 	0.20	Turf and topsoil		
0.50 0.50-1.00	D1 B2	N18			     	(2.80)	Brown flinty CLAY (HEAD)		                            
1.00-1.50 1.00	B4 SPT3								
1.50	D5								
2.00-2.50 2.00	B7 SPT6			N20					
2.50	D8								
3.00-3.50 3.00	B10 SPT9	N25							
3.50	D11								
4.00	SPT12		N14						
4.50	D13								
5.00	SPT14			N21					
5.50	D15								
6.50 6.50	D16 SPT17	N17							
7.50	D18								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
All dimensions in metres Scale 1:50			Client TBC			Method/ Plant Used			Logged By		

AGS3 UK BH P3459 - LOGS 01.GPJ AGS1.GDT 3/12/19

**BOREHOLE LOG**

Project Orchard Farm Way, Fontwell				BOREHOLE No BH1
Job No P3459	Date 02-12-19	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 2 of 2

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
8.00	SPT19	N28	Water 2			8.50	Stiff black and grey CLAY (LAMBETH GROUP) <i>(continued)</i>		
8.50	D20					(1.00)	Stiff red and grey sandy silty CLAY (LAMBETH GROUP)		
9.50	D21					9.50			
9.50	SPT22	N44				(0.60)	Grey CLAY and SAND (LAMBETH GROUP)		
10.50	D23					10.10	Black grey red and brown CLAY (LAMBETH GROUP)		
11.00	SPT24	N46				(2.20)			
11.50	D25					12.30			
12.50	D26					(1.70)	CHALK and flints (WHITE CHALK SUBGROUP)		
12.50	SPT27	N50/ 210mm				14.00			
13.50	D28								
14.00	SPT29	N50/ 190mm							

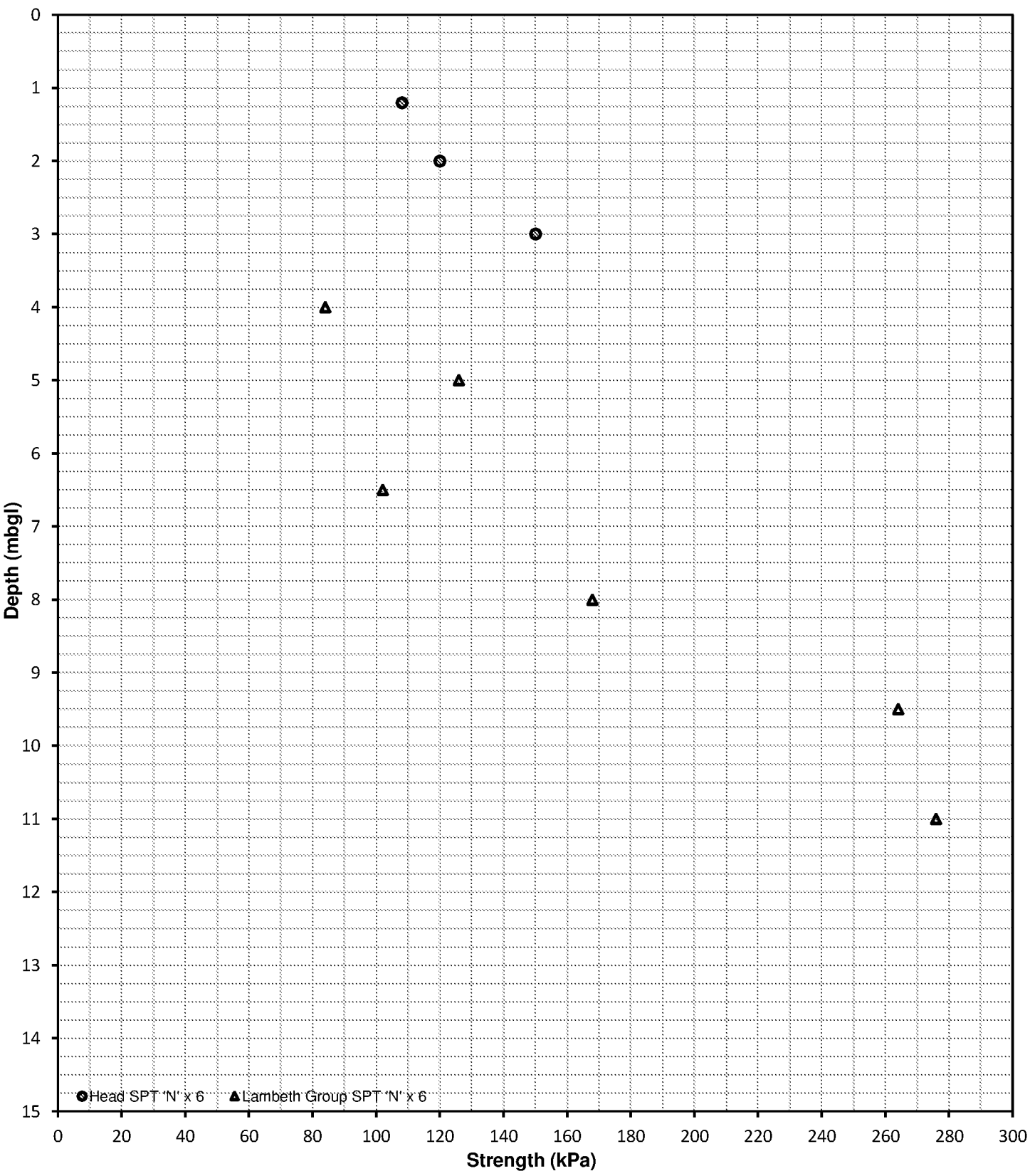
Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
All dimensions in metres Scale 1:50			Client TBC			Method/ Plant Used			Logged By		

AGS3 UK BH P3459 - LOGS 01.GPJ AGS1.GDT 3/12/19

Site Name: Land at Orchard Way
Location: Fontwell, West Sussex
Ref: P3459



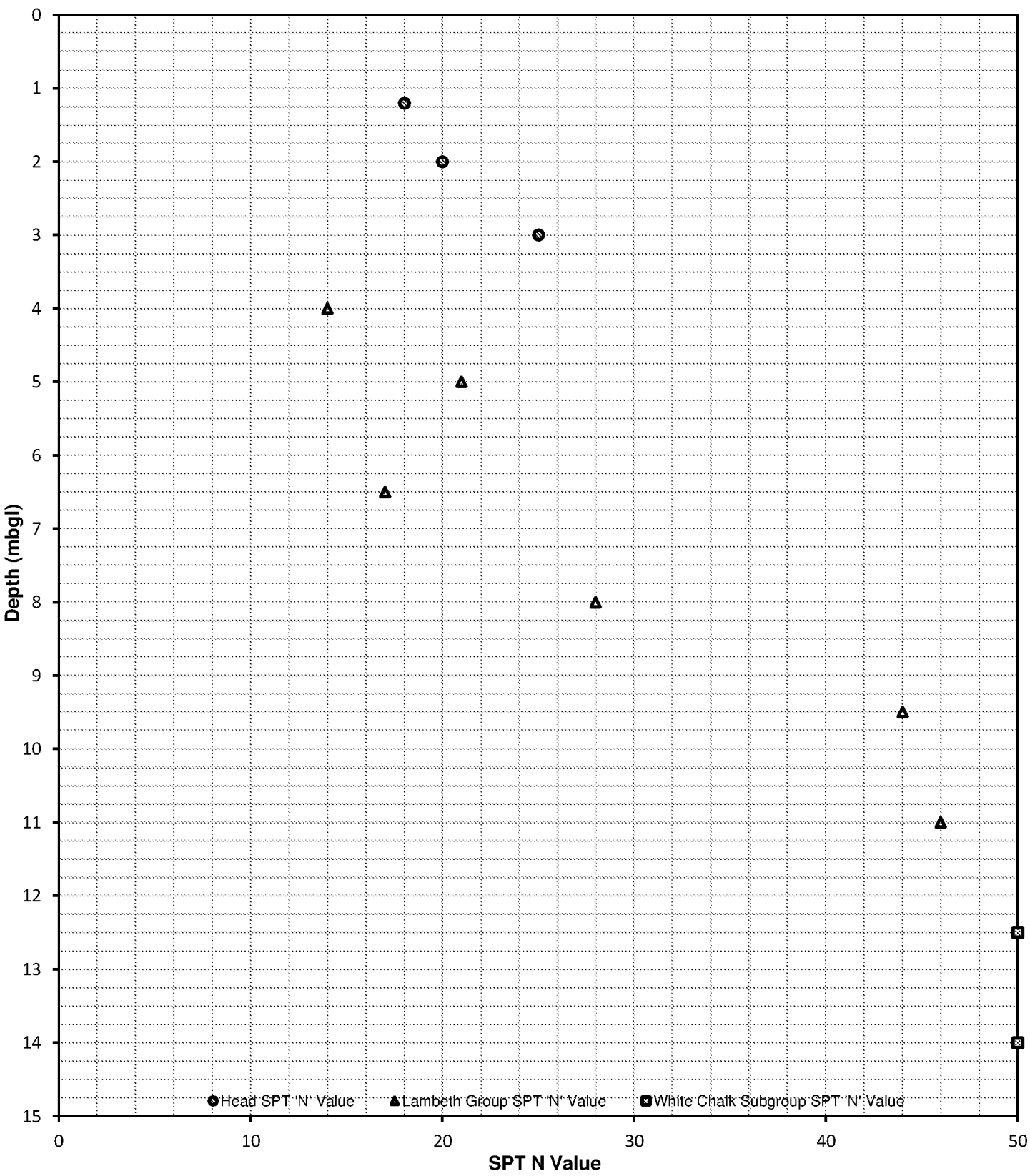
Shear Strength vs Depth Plot



Site Name: Land at Orchard Way
Location: Fontwell, West Sussex
Ref: P3459



SPT Results vs Depth Plot



Site: Orchard Way, Fontwell

Project ref: P3459

Test Reference: SA01

Test no.: 1

Pit dimensions (m)

Length	1.10
Width	1.00
Depth	1.00

Other test details

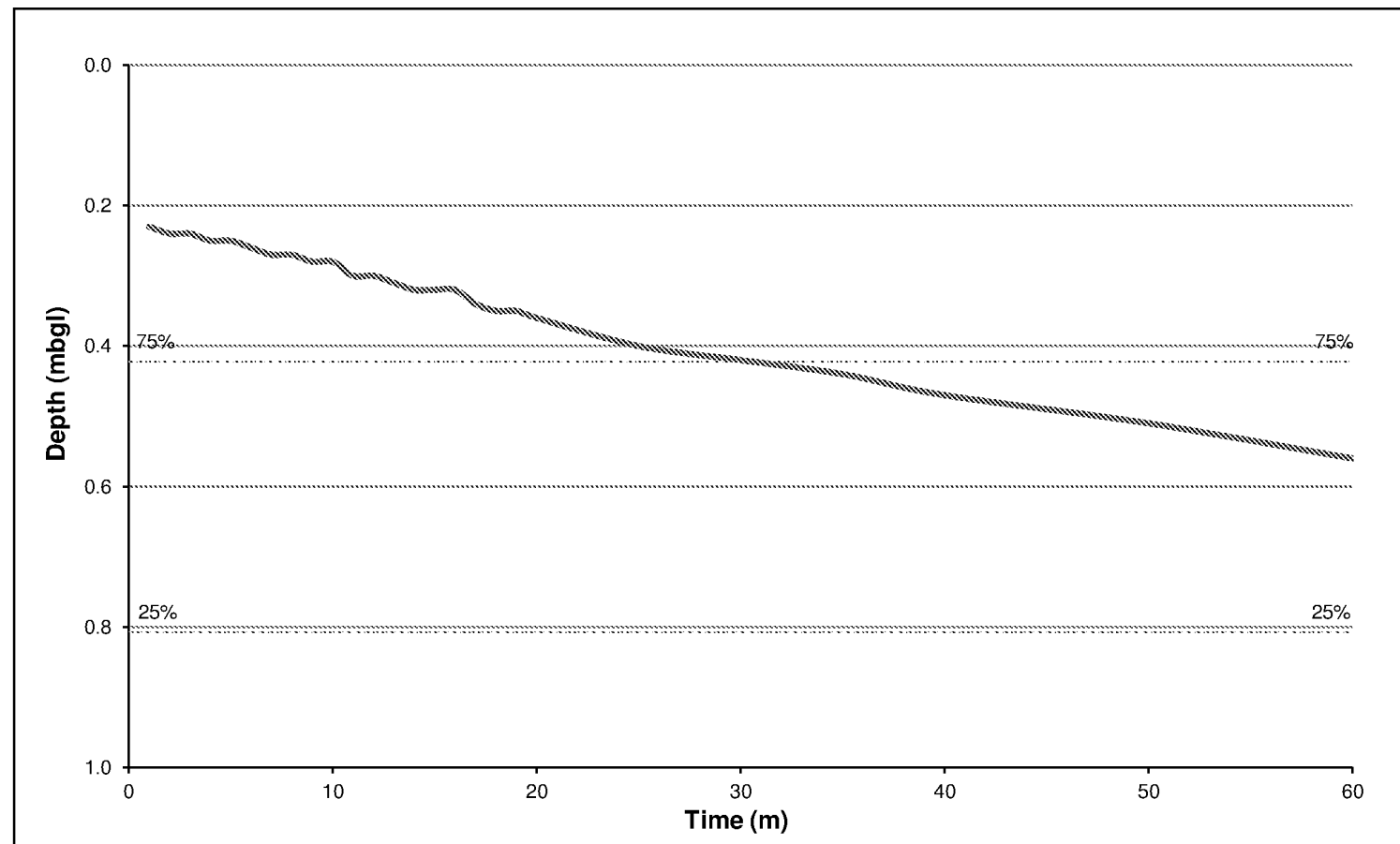
Fill depth (mbgl)	0.23	Vp75-25	0.42 m ³
75% water depth	0.42	Ap50	2.72 m ²
25% water depth	0.81	Tp75-25	74 mins

Soil infiltration rate:

f = 3.51E-05 m/s (extrapolated)

Soakaway test results

Time (min)	Depth to water (m bgl)
1	0.23
2	0.24
3	0.24
4	0.25
5	0.25
6	0.26
7	0.27
8	0.27
9	0.28
10	0.28
11	0.30
12	0.30
13	0.31
14	0.32
15	0.32
16	0.32
17	0.34
18	0.35
19	0.35
20	0.36
25	0.40
30	0.42
35	0.44
40	0.47
50	0.51
60	0.56



Site: Orchard Way, Fontwell

Project ref: P3459

Test Reference: SA01

Test no.: 2

Pit dimensions (m)

Length 1.10
Width 1.00
Depth 1.00

Other test details

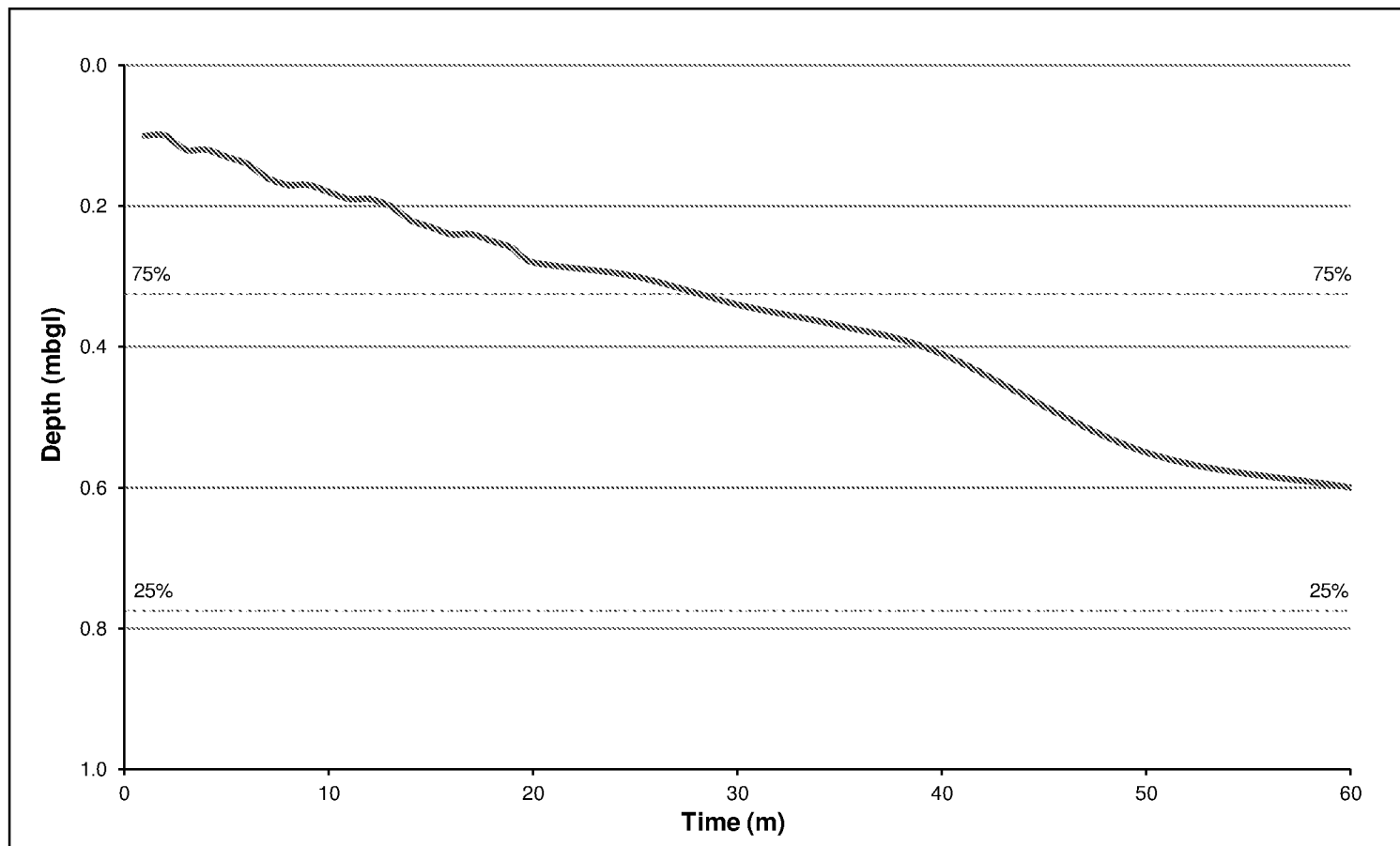
Fill depth (mbgl) 0.10 Vp75-25 0.50 m³
75% water depth 0.33 Ap50 2.99 m²
25% water depth 0.78 Tp75-25 63 mins

Soil infiltration rate:

f = 4.38E-05 m/s (extrapolated)

Soakaway test results

Time (min)	Depth to water (m bgl)
1	0.10
2	0.10
3	0.12
4	0.12
5	0.13
6	0.14
7	0.16
8	0.17
9	0.17
10	0.18
11	0.19
12	0.19
13	0.20
14	0.22
15	0.23
16	0.24
17	0.24
18	0.25
19	0.26
20	0.28
25	0.30
30	0.34
35	0.37
40	0.41
50	0.55
60	0.60



Site: Orchard Way, Fontwell

Project ref: P3459

Test Reference: SA01

Test no.: 3

Pit dimensions (m)

Length 1.10
Width 1.00
Depth 1.00

Other test details

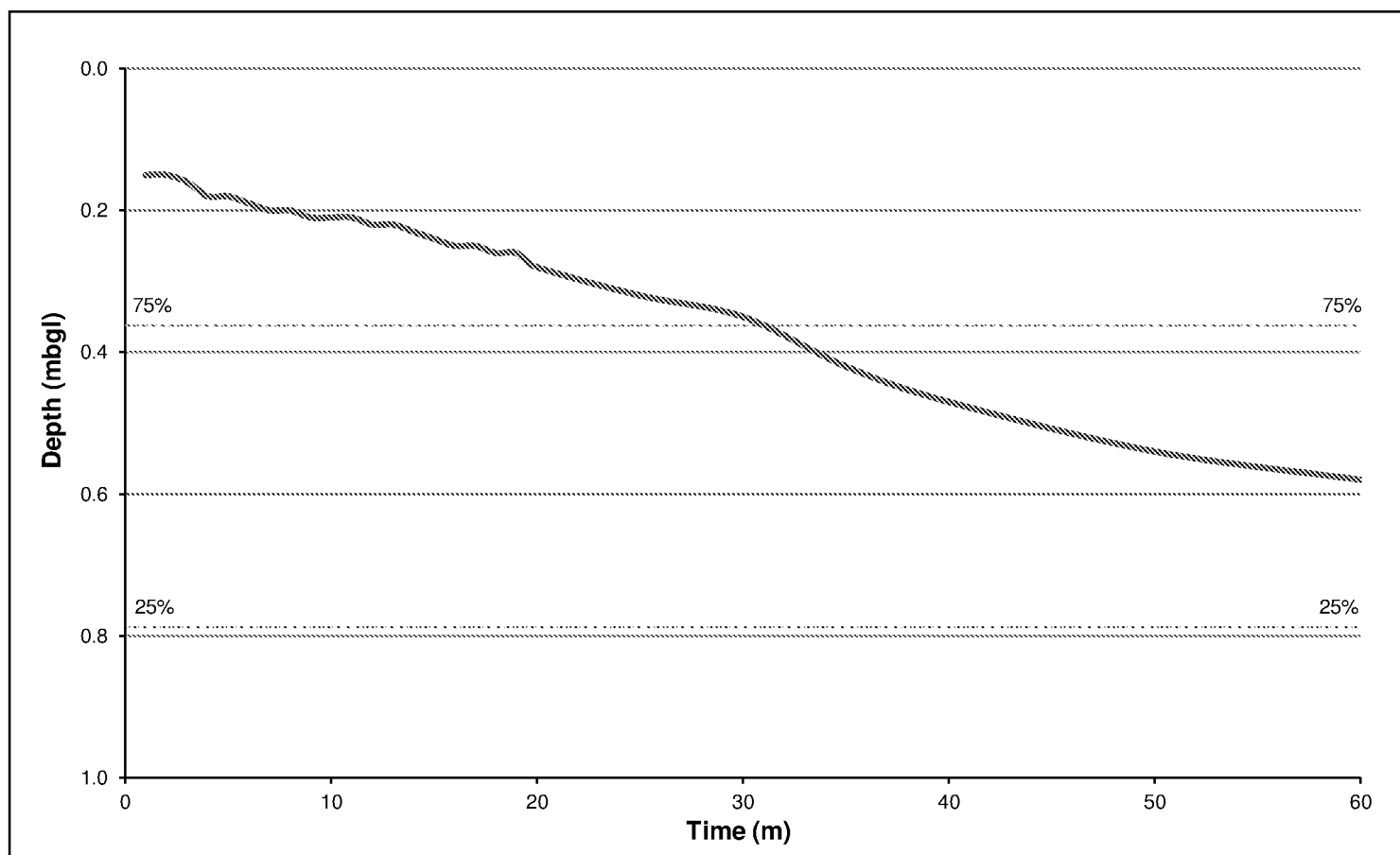
Fill depth (mbgl) 0.15
75% water depth 0.36
25% water depth 0.79
Vp75-25 0.47 m³
Ap50 2.89 m²
Tp75-25 82 mins

Soil infiltration rate:

f = 3.29E-05 m/s (extrapolated)

Soakaway test results

Time (min)	Depth to water (m bgl)
1	0.15
2	0.15
3	0.16
4	0.18
5	0.18
6	0.19
7	0.20
8	0.20
9	0.21
10	0.21
11	0.21
12	0.22
13	0.22
14	0.23
15	0.24
16	0.25
17	0.25
18	0.26
19	0.26
20	0.28
25	0.32
30	0.35
35	0.42
40	0.47
50	0.54
60	0.58



Site: Orchard Way, Fontwell

Project ref: P3459

Test Reference: SA02

Test no.: 1

Pit dimensions (m)

Length 1.00
Width 1.05
Depth 1.00

Other test details

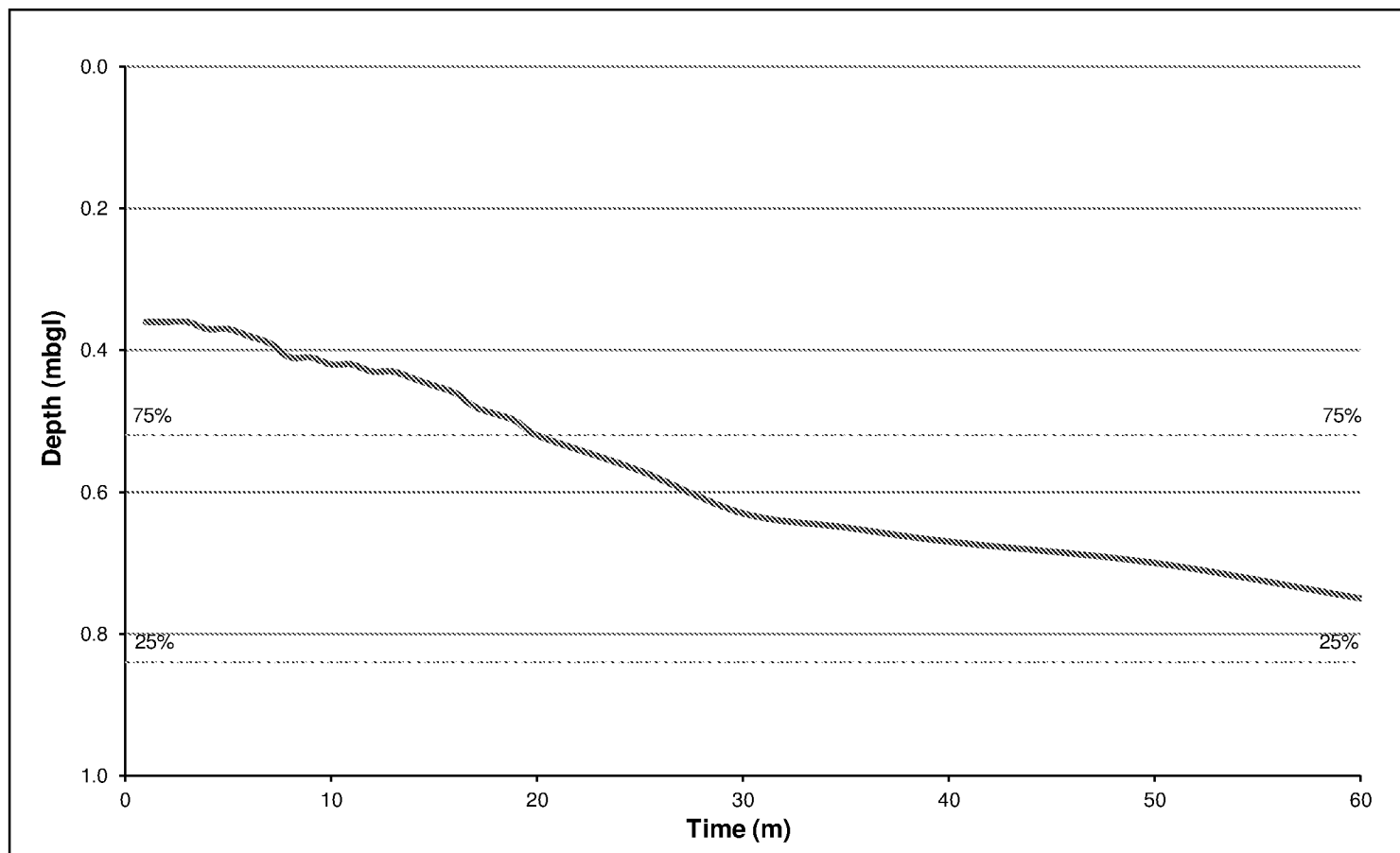
Fill depth (mbgl) 0.36
75% water depth 0.52
25% water depth 0.84
Vp75-25 0.34 m³
Ap50 2.36 m²
Tp75-25 50 mins

Soil infiltration rate:

f = 4.74E-05 m/s (extrapolated)

Soakaway test results

Time (min)	Depth to water (m bgl)
1	0.36
2	0.36
3	0.36
4	0.37
5	0.37
6	0.38
7	0.39
8	0.41
9	0.41
10	0.42
11	0.42
12	0.43
13	0.43
14	0.44
15	0.45
16	0.46
17	0.48
18	0.49
19	0.50
20	0.52
25	0.57
30	0.63
35	0.65
40	0.67
50	0.70
60	0.75



Site: Orchard Way, Fontwell

Project ref: P3459

Test Reference: SA02

Test no.: 2

Pit dimensions (m)

Length	1.00
Width	1.05
Depth	1.00

Other test details

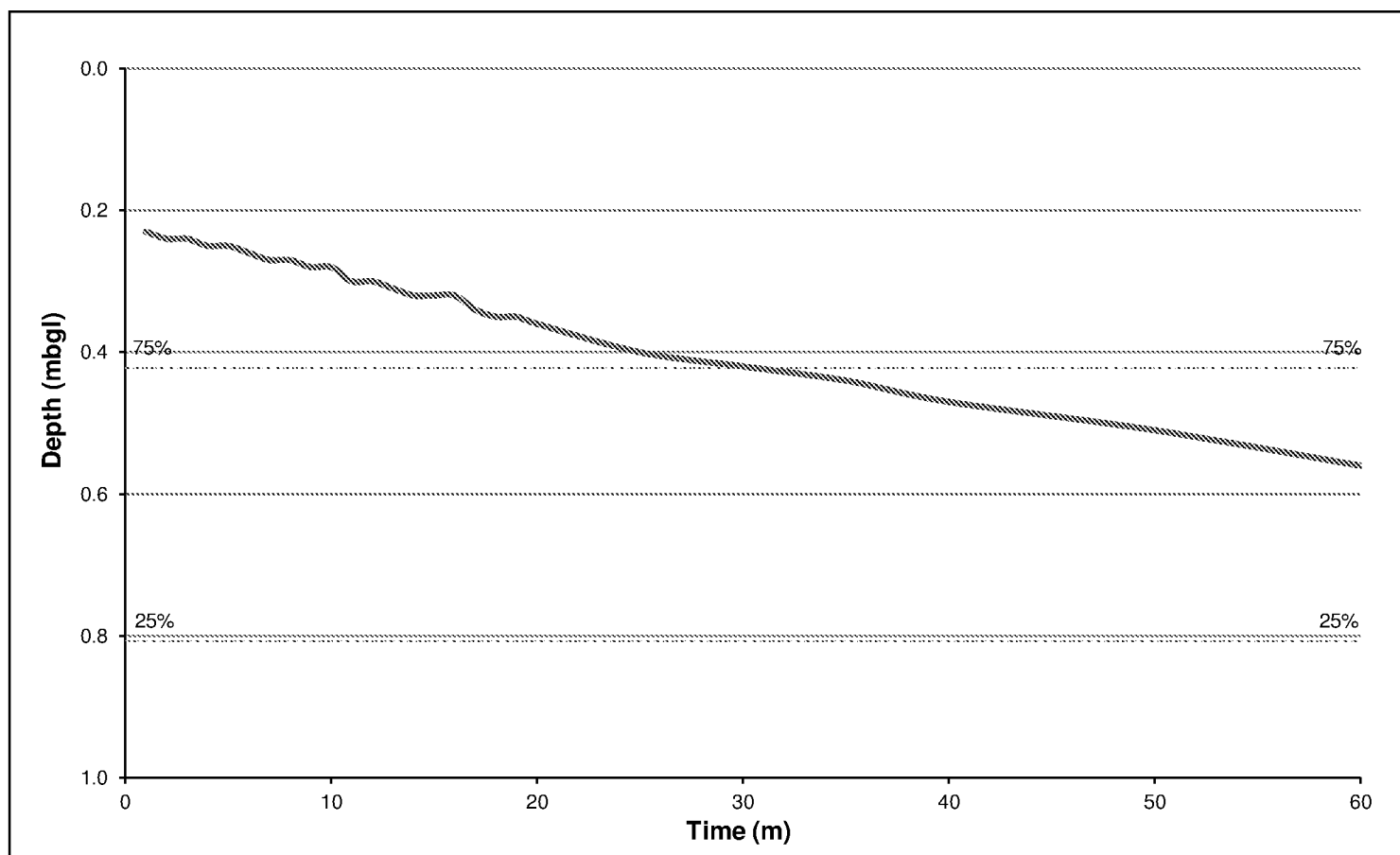
Fill depth (mbgl)	0.23	Vp75-25	0.40 m ³
75% water depth	0.42	Ap50	2.63 m ²
25% water depth	0.81	Tp75-25	74 mins

Soil infiltration rate:

f = 3.46E-05 m/s (extrapolated)

Soakaway test results

Time (min)	Depth to water (m bgl)
1	0.23
2	0.24
3	0.24
4	0.25
5	0.25
6	0.26
7	0.27
8	0.27
9	0.28
10	0.28
11	0.30
12	0.30
13	0.31
14	0.32
15	0.32
16	0.32
17	0.34
18	0.35
19	0.35
20	0.36
25	0.40
30	0.42
35	0.44
40	0.47
50	0.51
60	0.56



Site: Orchard Way, Fontwell

Project ref: P3459

Test Reference: SA02

Test no.: 3

Pit dimensions (m)

Length	1.00
Width	1.05
Depth	1.00

Other test details

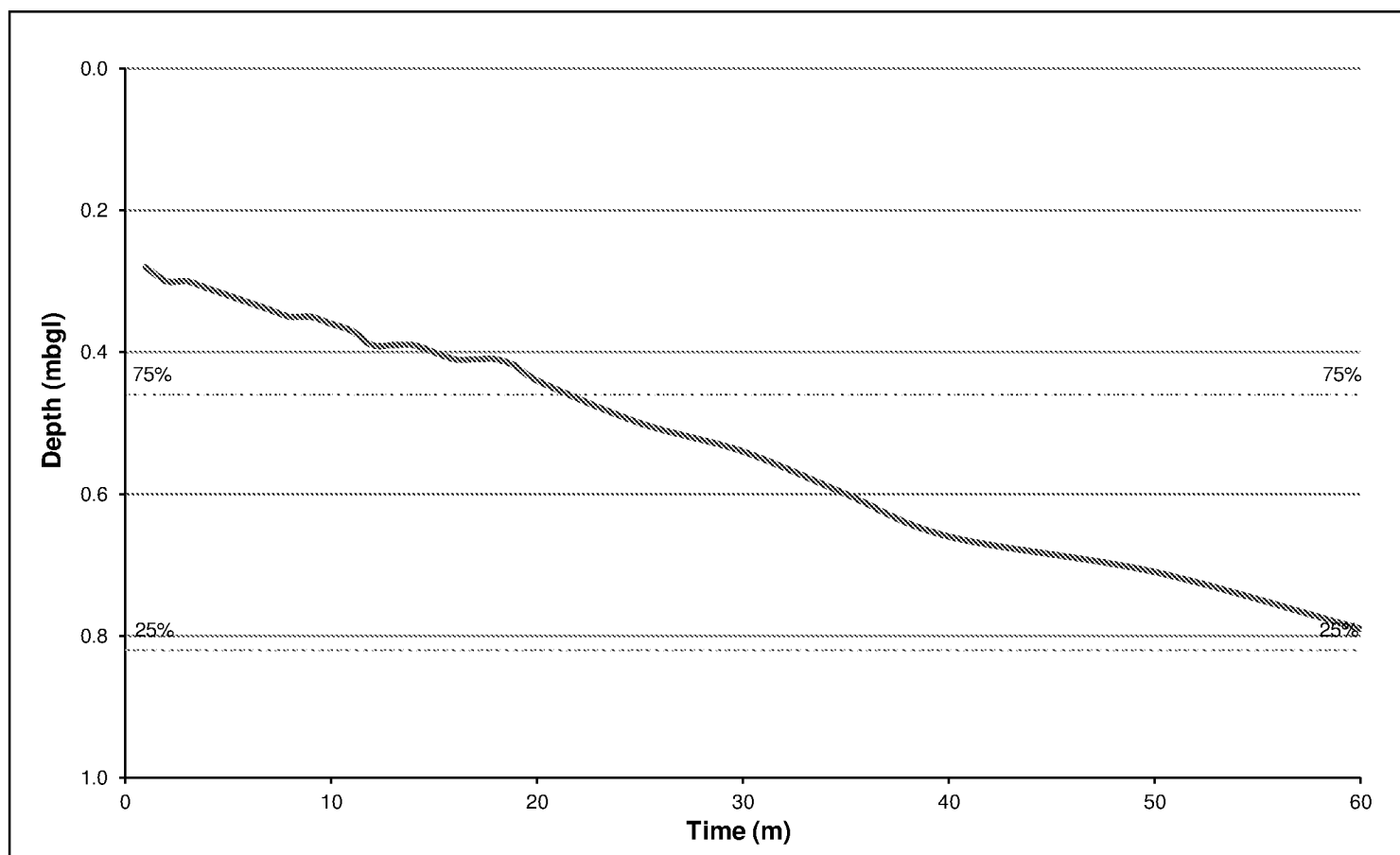
Fill depth (mbgl)	0.28	Vp75-25	0.38 m ³
75% water depth	0.46	Ap50	2.53 m ²
25% water depth	0.82	Tp75-25	56 mins

Soil infiltration rate:

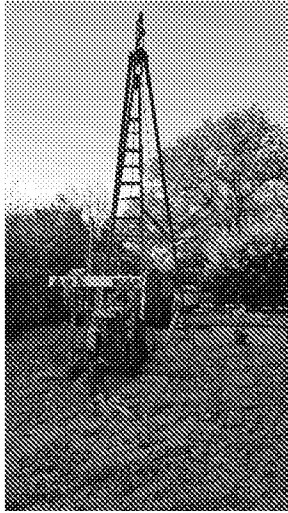
f = 4.45E-05 m/s (extrapolated)

Soakaway test results

Time (min)	Depth to water (m bgl)
1	0.28
2	0.30
3	0.30
4	0.31
5	0.32
6	0.33
7	0.34
8	0.35
9	0.35
10	0.36
11	0.37
12	0.39
13	0.39
14	0.39
15	0.40
16	0.41
17	0.41
18	0.41
19	0.42
20	0.44
25	0.50
30	0.54
35	0.60
40	0.66
50	0.71
60	0.79



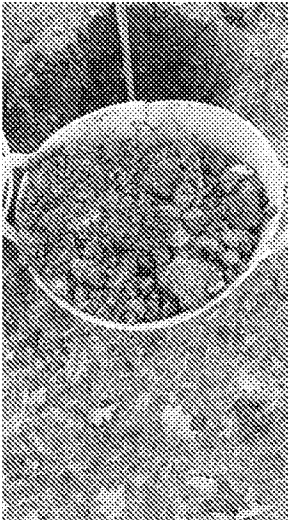
1.



2.



3.



4.



1. Shell & Auger Set Up
2. Site Location - Pre Borehole
3. Trial Pit Soils
4. Shell & Auger Setting Up

Appendix 3 Laboratory Results



Holly Barratt
AGB Environmental Ltd
341 Exning Road
Newmarket
CB8 0AT

DETS Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2NN



DETS Report No: 19-17009

Site Reference: Orchard Farm Way, Fontwell, BN18 0SH

Project / Job Ref: P3459

Order No: P07084

Sample Receipt Date: 05/12/2019

Sample Scheduled Date: 05/12/2019

Report Issue Number: 1

Reporting Date: 12/11/2019

Authorised by:



Technical Manager

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DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN



Soil Analysis Certificate						
DETS Report No: 19-17009	Date Sampled	02/12/19	02/12/19	02/12/19		
AGB Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Orchard Farm Way, Fontwell, BN18 0SH	TP / BH No	BH1	BH1	BH1		
Project / Job Ref: P3459	Additional Refs	SPT3	D13	D18		
Order No: P07084	Depth (m)	1.00	4.50	7.50		
Reporting Date: 11/12/2019	DETS Sample No	451129	451130	451131		

Determinand	Unit	RL	Accreditation				
pH	pH Units	N/a	MCERTS	7.3	7.1	8.0	
Total Sulphate as SO ₄	mg/kg	< 200	NONE	290	< 200	826	
Total Sulphate as SO ₄	%	< 0.02	NONE	0.03	< 0.02	0.08	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	21	18	375	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	0.02	0.38	

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



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 19-17009	
AGB Environmental Ltd	
Site Reference: Orchard Farm Way, Fontwell, BN18 0SH	
Project / Job Ref: P3459	
Order No: P07084	
Reporting Date: 11/12/2019	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
451129	BH1	SPT3	1.00	14.6	Light brown sandy clay with stones
451130	BH1	D13	4.50	18.3	Light brown sandy clay
451131	BH1	D18	7.50	21.1	Black loamy clay

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

Insufficient Sample ^{1/5}

Unsuitable Sample ^{U/5}



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN



Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 19-17009

AGB Environmental Ltd

Site Reference: Orchard Farm Way, Fontwell, BN18 0SH

Project / Job Ref: P3459

Order No: P07084

Reporting Date: 11/12/2019

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 diphénylcarbazine 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 @ 450°C	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

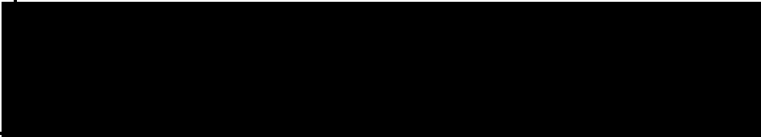
D Dried
AR As Received



TEST REPORT
ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 13/12/2019



0998

Contract	Orchard Farm Way, Fontwell, BN18 0SH		
Serial No.	36235		
Client: AGB Environmental Ltd 341 Exning Road Newmarket Suffolk CB8 0AT		Soil Property Testing Ltd 15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG 	
Samples Submitted By: AGB Environmental Ltd Samples Labelled: Orchard Farm Way, Fontwell, BN18 0SH		Approved Signatories: ☐ J.C. Garner B.Eng (Hons) FGS Technical Director & Quality Manager ☐ S.P. Townend FGS Chairman ☐ W. Johnstone Materials Lab Manager ☒ D. Sabnis Operations Manager 	
Date Received: 05/12/2019		Samples Tested Between: 05/12/2019 and 13/12/2019	
Remarks: For the attention of Kevin Brown Your Reference No: P3459 Your Order No: 7083			
Notes: 1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary. 2 (a) UKAS - United Kingdom Accreditation Service. (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. 3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory. 4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.			



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 13/12/2019



0998

Contract		Orchard Farm Way, Fontwell, BN18 0SH																			
Serial No.		36235										Target Date		18/12/2019							
Scheduled By		AGB Environmental Ltd																			
SCHEDULE OF LABORATORY TESTS																					
Schedule Remarks																					
Bore Hole No.	Type	Sample Ref.	Top Depth	Water Content (BSN) Liquid/Plastic Limits Wet Sieve Preparation																Sample Remarks	
BH1	D	5	1.50	1	1	1															
BH1	D	11	3.50	1	1	1															
Totals				2	2	2													End of Schedule		



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 13/12/2019

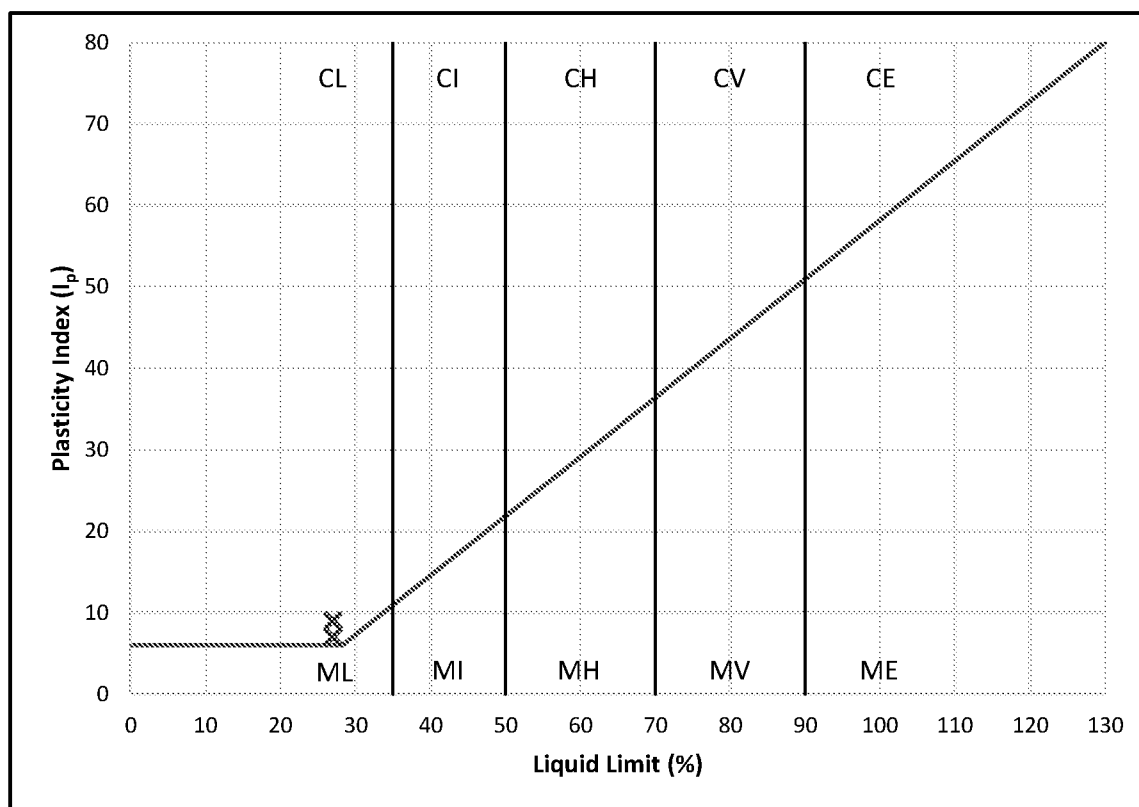


0998

Contract	Orchard Farm Way, Fontwell, BN18 0SH
Serial No.	36235

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High

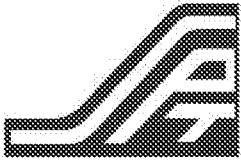


Plasticity Chart BS5930: 2015: Figure 8

High
Medium
Low

NHBC Volume Change Potential

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 13/12/2019



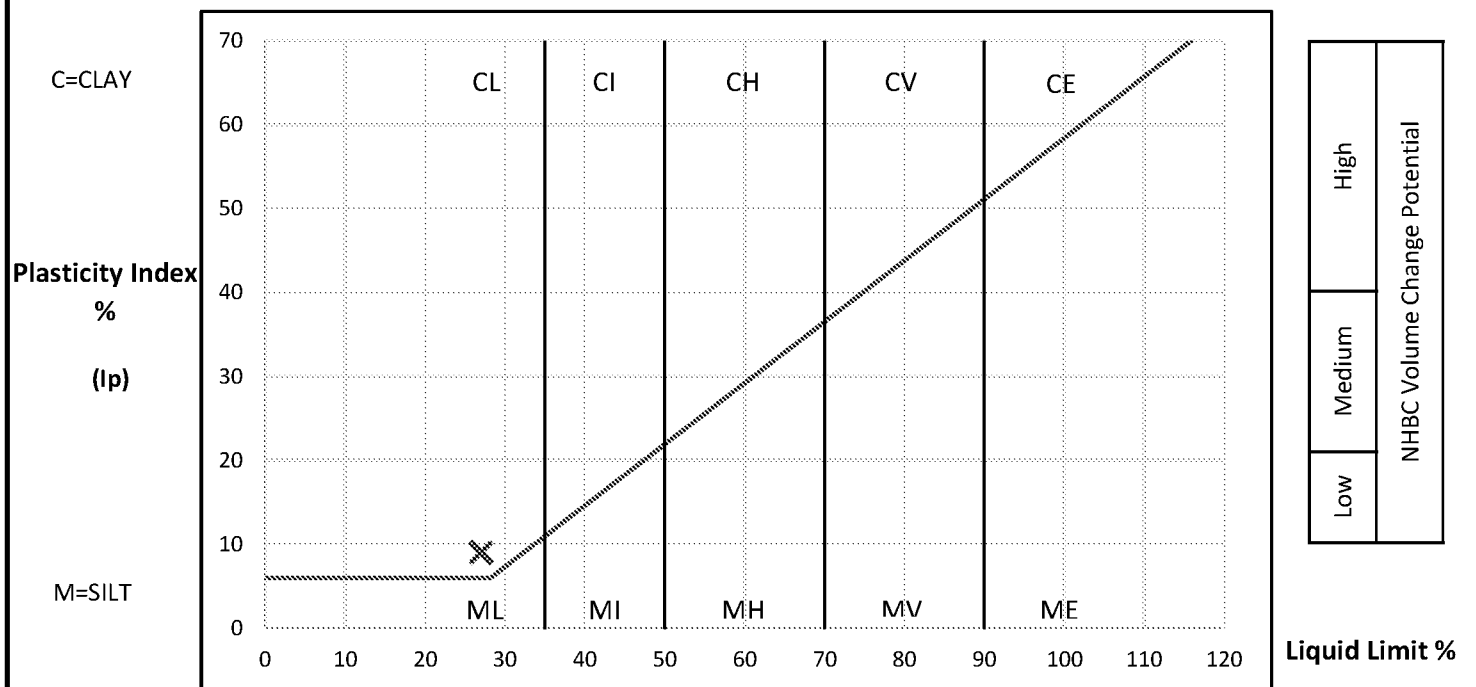
0998

Contract	Orchard Farm Way, Fontwell, BN18 0SH
Serial No.	36235

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
BH1	1.50	D	5	13.9	Firm orangish brown gravelly slightly sandy silty CLAY with occasional brown mottling. Gravel is grey, white and brown fine to medium angular to subrounded chert. Sand is fine.	

PREPARATION				Liquid Limit	27 %	
Method of preparation		Wet sieved over 0.425mm sieve		Plastic Limit	18 %	
Sample retained 0.425mm sieve		(Measured)	64 %	Plasticity Index	9 %	
Corrected water content for material passing 0.425mm			Not reported	Liquidity Index	-0.46	
Sample retained 2mm sieve		(Measured)		48 %	NHBC Modified (I'p)	3 %
Curing time		24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



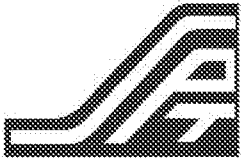
Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments: Corrected water content not reported due to material type.
Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1
Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index
Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)



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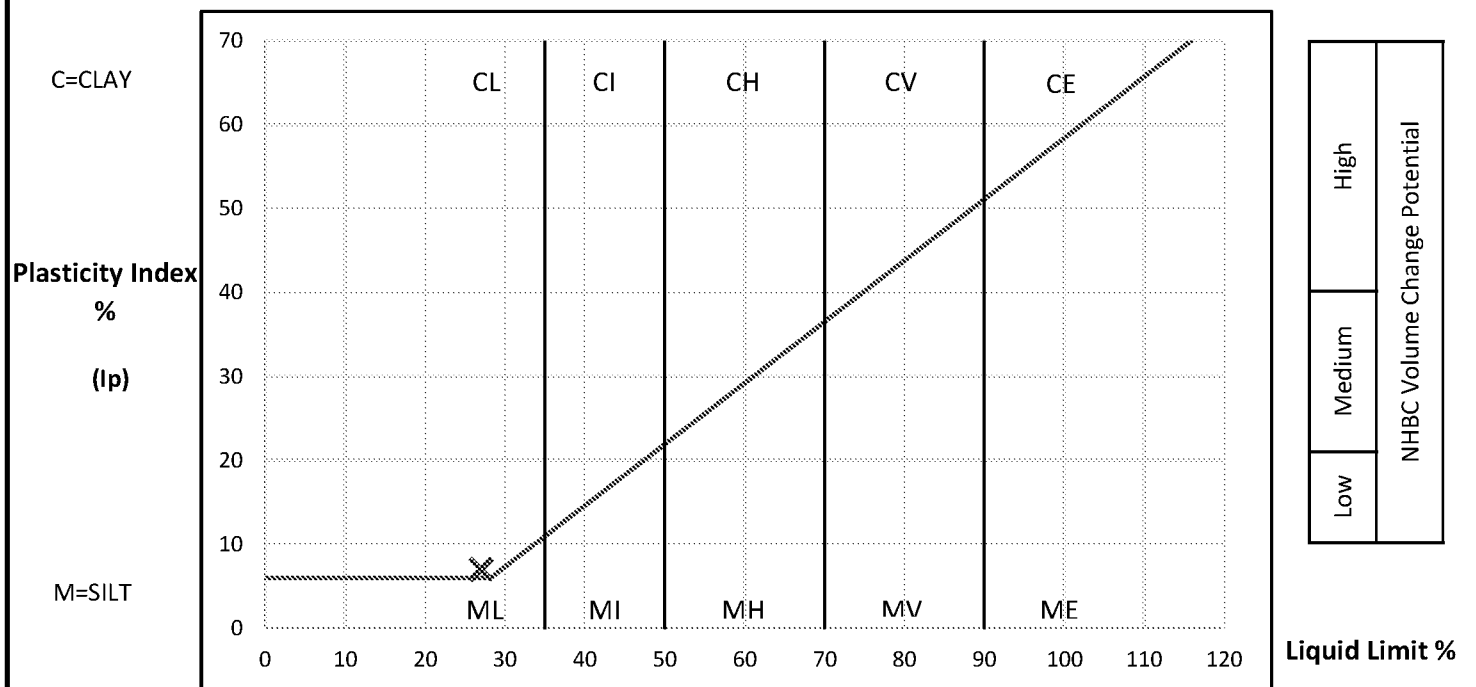
0998

Contract	Orchard Farm Way, Fontwell, BN18 0SH
Serial No.	36235

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
BH1	3.50	D	11	22.1	Olive yellow slightly gravelly sandy silty CLAY with rare light grey mottling, and light orange staining, Gravel is white and grey fine to medium angular to subrounded chert.	

PREPARATION				Liquid Limit 27 %	
Method of preparation				Wet sieved over 0.425mm sieve	
Sample retained 0.425mm sieve (Measured)				7 %	
Corrected water content for material passing 0.425mm				Not reported	
Sample retained 2mm sieve (Measured)				4 %	
Curing time				24 hrs	
Clay Content				Not analysed	
Derived Activity				Not analysed	



Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments: Corrected water content not reported due to material type.
Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1
Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index
Note: Modified Plasticity Index $I'_p = I_p \times (\% \text{ less than } 425\text{microns}/100)$