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STRUCTURAL AND CIVIL ENGINEERING

GROUND INVESTIGATION REPORT

UPON

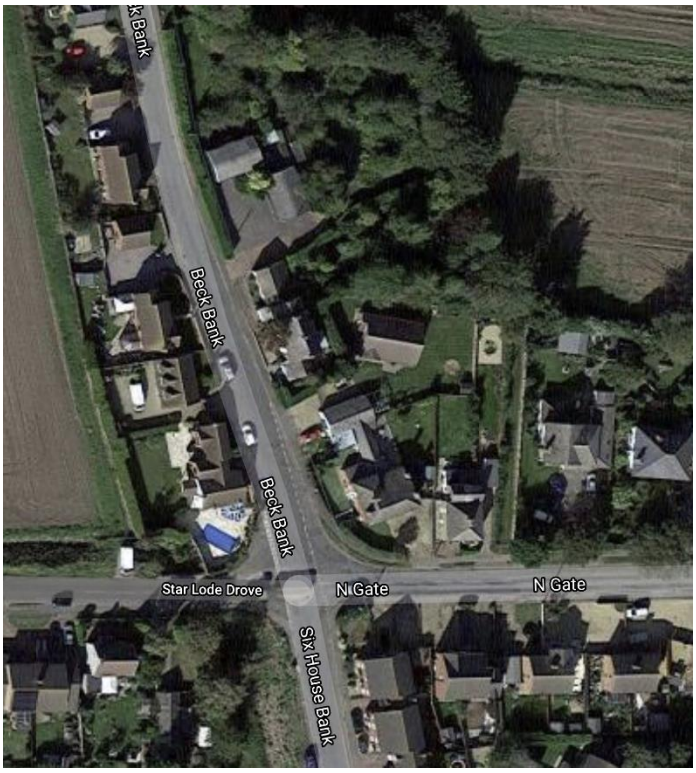
LAND EAST OF

BECK BANK

NORTHGATE, WEST PINCHBECK

PROJECT No: SW 21-163

DOCUMENT REF: SW 21-163-GI-01



Mr Adrian Brotherton
Highgrove Homes (Spalding Ltd.)
Ashgrove Lodge,
Austendyke Road,
Weston Hills,
PE12 6BX

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1. INTRODUCTION

Acting upon the instruction of Mr Adrian Brotherton, we attended site on 15th June 2021, the purpose being to observe the underlying ground conditions and determine the basic characteristics of the soil strata.

Mechanically excavated trial pits took place, and our comments are based upon a visual inspection of the disturbed samples obtained and the in-situ strata within the trial pits.

We would suggest the groundwater conditions may vary seasonally and that the water levels as recorded at the time of explorations should not necessarily be taken as being constant as they may be subject to fluctuations.

The opinions and comments expressed within this report are based upon ground conditions encountered in the trial pits excavated at the time of our visit.

This report has been prepared for the named client above and should not be relied upon by any other parties, with the exception of the client's professional advisors, for any use without the express written permission of Shields Wilson Limited.

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2. LOCATION & DESCRIPTION OF SITE

2.1. Site Location

The site is situated to the east of Beck Bank, Northgate, West Pinchbeck. Appropriate national grid reference TF 195 263.



A Location plan is contained with Appendix A.

2.2. Site History Description

Desktop study of publicly available historical maps has been undertaken and found the site has not been previously developed and has stood as residential garden.

An extract of OS Lincolnshire map, 1972, is contained within Appendix B.

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2.3. Site Description

The site currently stands as residential garden and garages.

The North of the site is bound by a neighbouring property.

The Eastern Boundary of the site is shared with an agricultural field.

The West of the site is boarded by Beck Bank on which the proposed site will gain its access.

The Southern boundary is formed by a fence line between the proposed site and a neighbouring property.

At the time of our visit the weather was dry and clear, however there had been some precipitation in the days leading up to the visit.

2.4. Geological Description

Desktop study of the area has been undertaken using the British Geological Society Maps.

The maps indicate the site to be underlain by superficial tidal flat deposits of Sand and Silt over the Ampthill Clay (Mudstone) formation.

This information is based upon publicly available records. An extract is contained with Appendix C.

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3. SITE WORK

Two Number trial pits and two number soakaway test pits were excavated with the use of mechanical excavator. The siting of these explorations is shown on the Location plan shown within Appendix D.

Soakaway testing was undertaken in accordance with the guidelines contained within BRE digest 365.

A visual inspection of the disturbed samples was undertaken. A description of the strata and test results are shown on sheets SW21-163/TP01 thru TP02. The Trial pit logs are contained within Appendix D along with infiltration test results.

The historical investigation indicates that no previous development has been present. The outbuildings adjacent the dwelling have been utilised for storage purposes and not for any workshop or industrial business purposes.
As such no specific investigations for contamination were undertaken.
The soil demonstrated no identifying odours or markers for known man-made contamination, as such it was deemed unnecessary to submit any samples for laboratory contamination testing.

However, 2 No. Samples were taken to be sent for Laboratory testing in order to determine the Atterberg limits and moisture content of the clays.

A photographic record of site explorations is contained within Appendix E.

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4. GROUND CONDITIONS

The sequence of the strata encountered during the investigation generally conforms to the geology identified by the desk top studies.

The strata encountered in both explorations were very similar and demonstrated a consistent geological profile across the site.

Once the dry 0.4m of topsoil material was penetrated the strata became an orangey brown mid dense sandy silt.

Underlaying the sandy silt at a depth of around one meter, is a firm brown, grey clay with some silty inclusions, this material extended down to a depth of around two meters in TP01 and 1.6m in TP02.

Once the excavation penetrated through the firm brown, grey clay, a water strike was encountered, and the clay became very soft, bluey grey in colour. The clay becoming softer with depth.

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5. CONCLUSIONS & RECCOMENDATIONS

The proposed development is understood to comprise of 3/4 detached dwellings, constructed using traditional load bearing masonry walls.

The ground floor should take the form of a suspended precast concrete beam and block system, design by the specialist supplier.

There should be a minimum clear void of 300mm beneath the suspended floor due to the Laboratory results returning results of high-volume change potential. Laboratory results are contained within Appendix F.

Therefore, due to the soft underlying wet clays and high-volume change potential with tree interaction, this site would require a pile and ground beam foundation solution. Careful consideration should be taken with regards to the heave protection required due to the clays and large number of trees on the existing site. Engineer designed foundations in accordance with the NHBC chapter 4.2 guidance should be utilised.

Prior to construction detailed foundation designs should be undertaken by a competent structural engineer.

Furthermore, the results from the infiltration test show that the ground is suitable for an infiltration surface water drainage system, however, the detailed design should bear in mind the likely variable groundwater level and the soft wet underlaying clays at depth. A value of 1.03x10-6 would be suitable for design purposes.

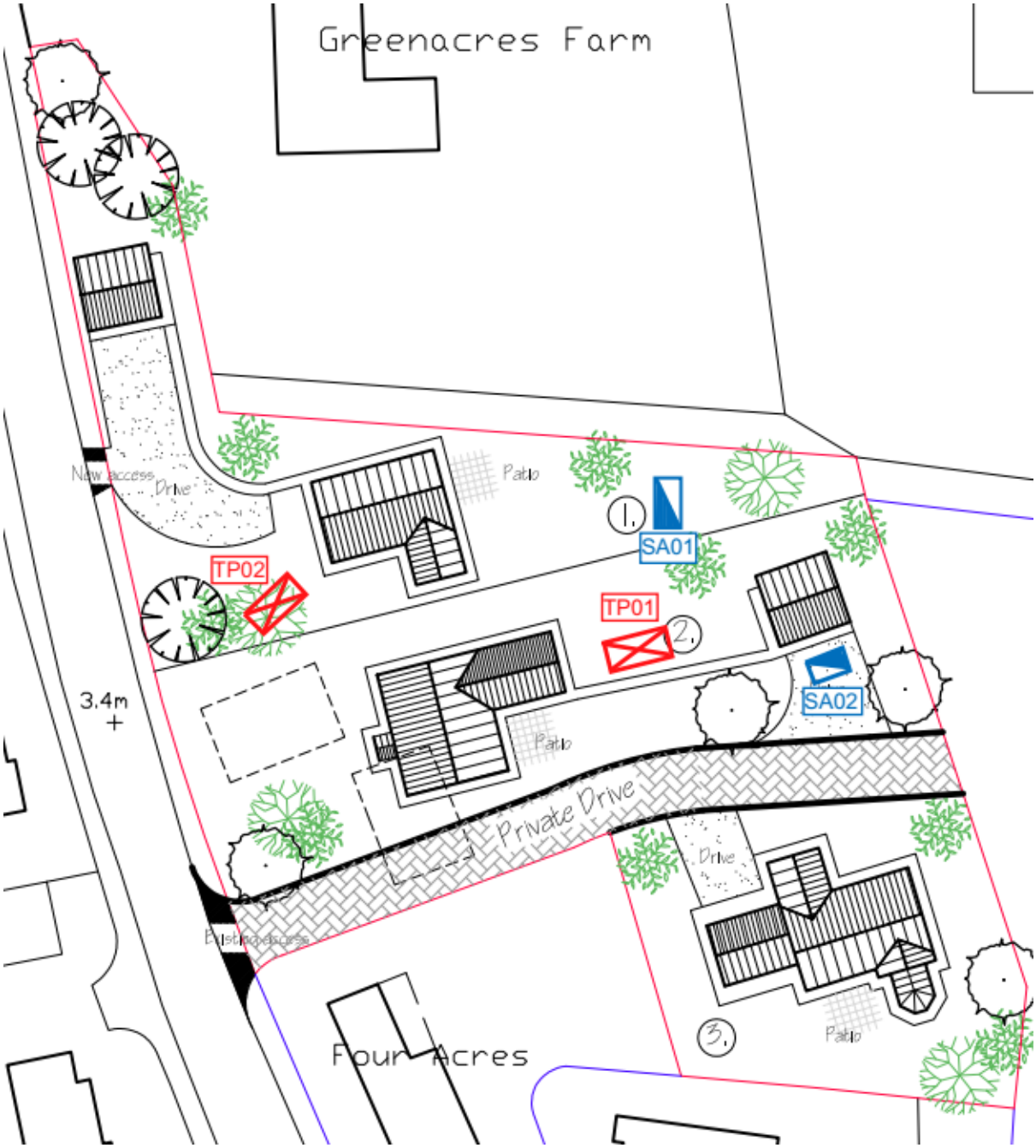
For and on behalf of **SHIELDS WILSON LIMITED**

A.P.Wilson CEng MIStructE **19th September 2021**

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APPENDIX A

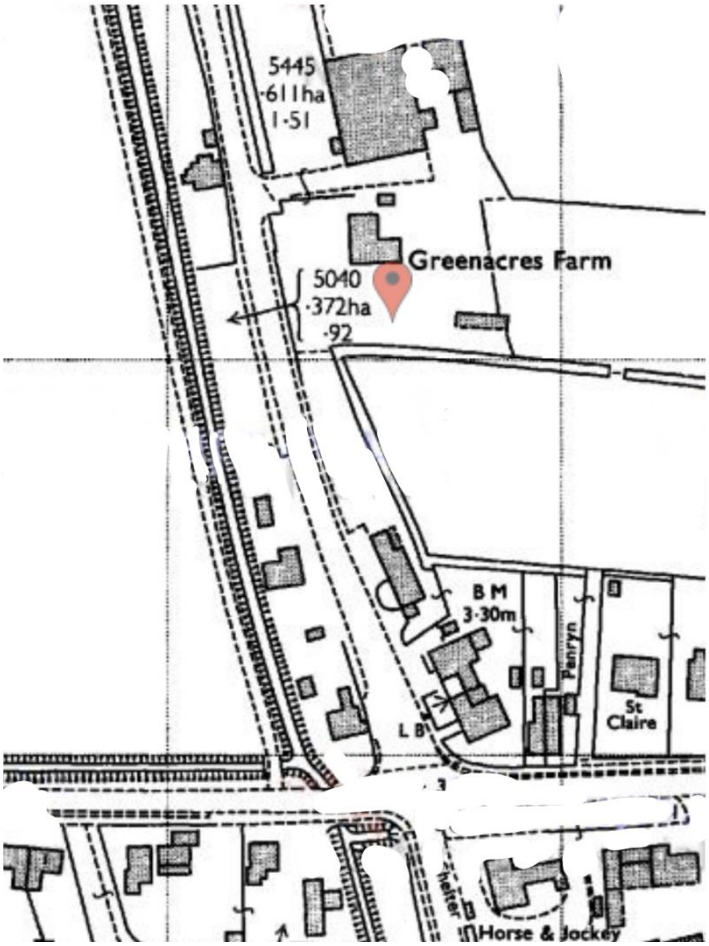
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APPENDIX B

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Extract OS County Series, 1972

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APPENDIX C

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Extract British Geological Society Maps

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APPENDIX D

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Project No.	SW21-163
Log Ref	TP01
Exploration Method	Excavator
Site Coordinates	TF 195263
Location	Proposed Development, Land East of Beck Bank, Northgate, West Pinchbeck
Carried Out For	Highgrove Homes
Date Undertaken	15/06/21
Logged By	APW

Description	Reduced Level	Legend	Depth (Thick)	Samples: Depth	Samples: Sample Reference	Samples: Sample Type	Samples: Sample No.	Test Required	Mackintosh Probe
Top Soil.			0.400m						
Greyey Orangey Brown Mid Dense Silty Sand.			(0.600m) 1.000m						
Firm Browney Grey Clay With Brown Silty Inclusions.			(1.000m) 2.000m	(0.400m) 1.400m					
Soft Wet Grey Clay. With Water Appearing At Base.			(0.400m) 2.400m						

Remarks
Borehole Terminated @ 2.40m Below Ground Level.

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Project No.	SW21-163
Log Ref	TP02
Exploration Method	Excavator
Site Coordinates	TF 195263
Location	Proposed Development, Land East of Beck Bank, Northgate, West Pinchbeck
Carried Out For	Highgrove Homes
Date Undertaken	15/06/21
Logged By	APW

Description	Reduced Level	Legend	Depth (Thick)	Samples: Depth	Samples: Sample Reference	Samples: Sample Type	Samples: Sample No.	Test Required	Mackintosh Probe
Top Soil.			0.450m						
Orangey Brown Mid Dense Silty Sand.			(0.450m) 0.900m						
Firm Brown Clay With Brown Silty Inclusions.			(0.700m) 1.600m						
Soft Wet Bluey Grey Clay. With Water Appearing At Base.				(0.150m) 1.750m					
Blue Grey Clay Becoming Very Soft Towards Bottom of Excavation.			(1.200m) 2.800m						

Remarks

Borehole Terminated @ 2.80m Below Ground Level.

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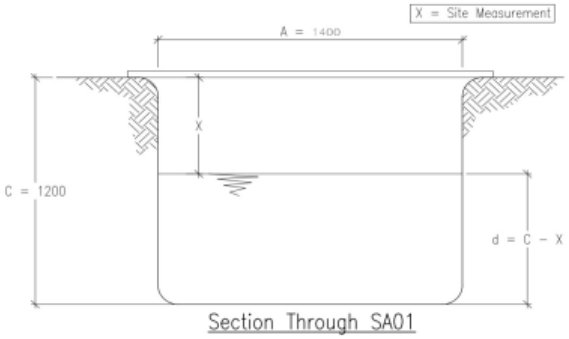
Proposed Residential Development
Land off Beck Bank, Northgate, West Pinchbeck

Project No. 21-163

Site Visit Date 15/06/2021

Soak-Away Test SA 01

TEST 1	
SA01	
TIME (Mins)	DEPTH mm (d)
0	750
5	715
10	690
25	645
55	600
70	575
95	530
125	505
155	480
185	450



Section Through SA01

Trial Pit Dimensions		
A =	1.4	m
B =	0.6	m
C =	1.20	m

Plan Area of Trial Pit		
SA01 =	0.84	m^2
Total Volume =	0.252	m^3
75% Volume =	0.189	m^3
25%Volume =	0.063	m^3

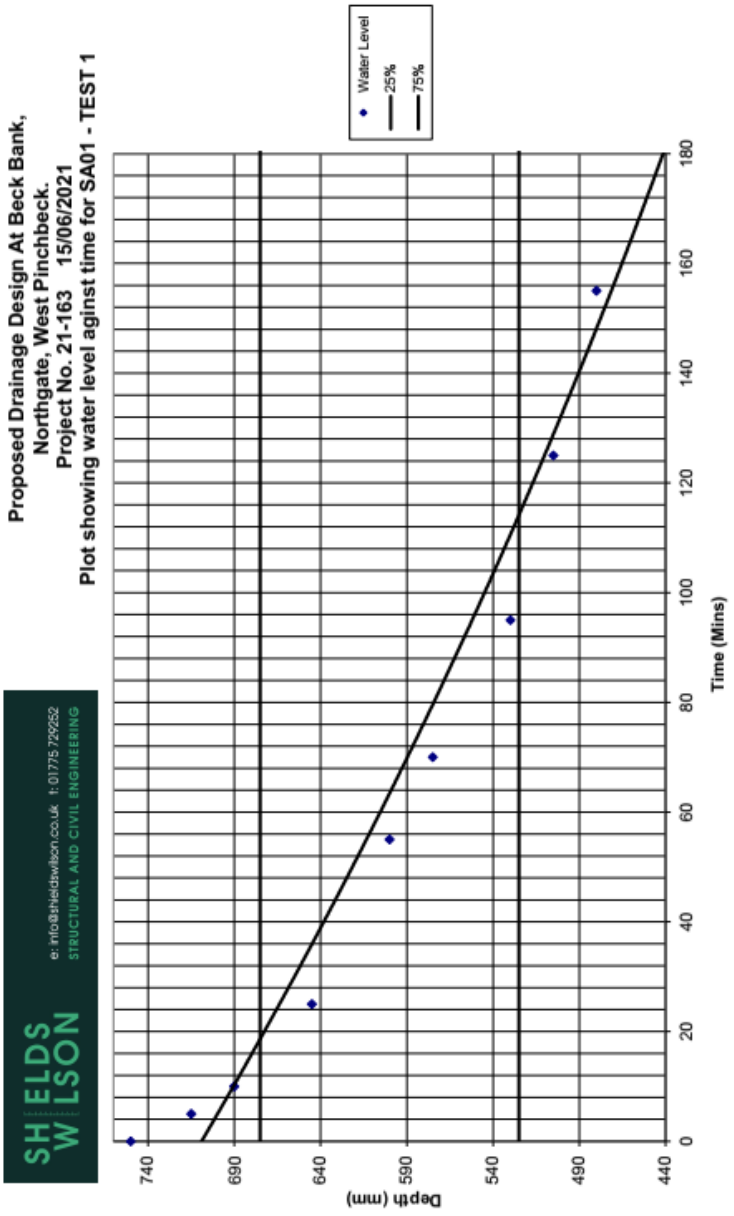
Time Taken From 75% Volume to 25% Volume	
96	Mins

Effective Depth From 75% Volume to 25% Volume
0.15 m

50% Effective Internal Surface Area Including Base Area
1.44 m^2

Soil Infiltration Rate, f
1.5191E-05 m/s
0.0546875 m/h

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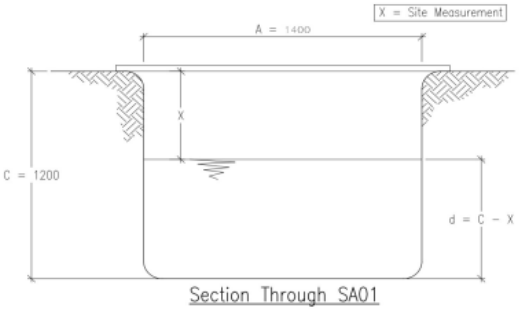
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Land off Beck Bank, Northgate, West Pinchbeck

Project No. 21-163

Site Visit Date 15/06/2021

Soak-Away Test SA 01

TEST 2	
SA01	
TIME (Mins)	DEPTH mm (d)
0	710
5	695
15	670
30	625
60	585
75	570
90	540
120	515
150	490
180	460



Section Through SA01

Trial Pit Dimensions		
A =	1.4	m
B =	0.6	m
C =	1.20	m

Plan Area of Trial Pit		
SA01 =	0.84	m^2
Total Volume =	0.210	m^3
75% Volume =	0.158	m^3
25%Volume =	0.053	m^3

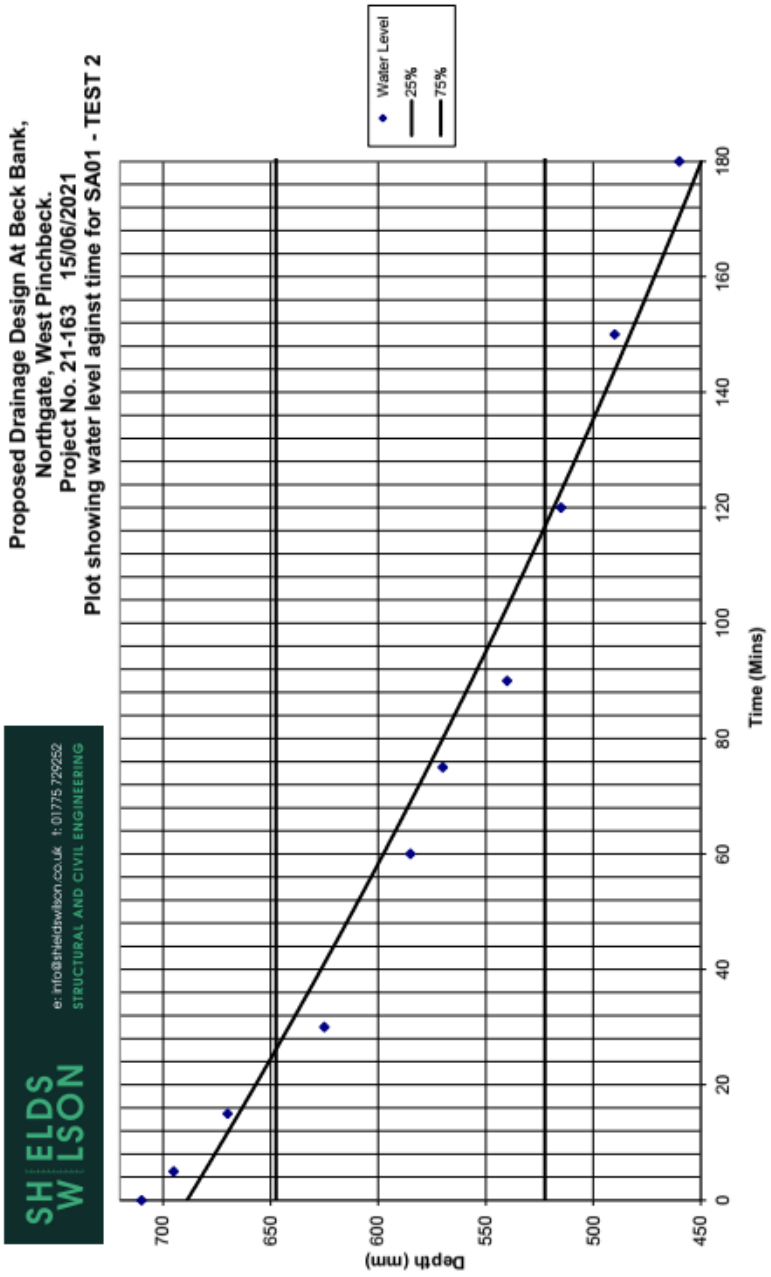
Time Taken From 75% Volume to 25% Volume	
90	Mins

Effective Depth From 75% Volume to 25% Volume
0.125 m

50% Effective Internal Surface Area Including Base Area
1.34 m^2

Soil Infiltration Rate, f
1.45108E-05 m/s
0.052238806 m/h

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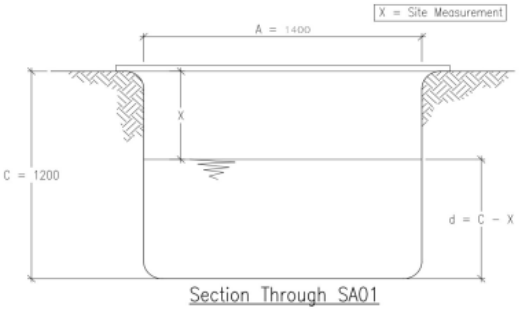
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Land off Beck Bank, Northgate, West Pinchbeck

Project No. 21-163

Site Visit Date 15/06/2021

Soak-Away Test SA 01

TEST 3	
SA01	
TIME (Mins)	DEPTH mm (d)
0	720
5	710
15	690
30	650
60	600
75	580
90	555
120	535
150	515
180	485



Section Through SA01

Trial Pit Dimensions		
A =	1.4	m
B =	0.6	m
C =	1.20	m

Plan Area of Trial Pit		
SA01 =	0.84	m^2
Total Volume =	0.197	m^3
75% Volume =	0.148	m^3
25%Volume =	0.049	m^3

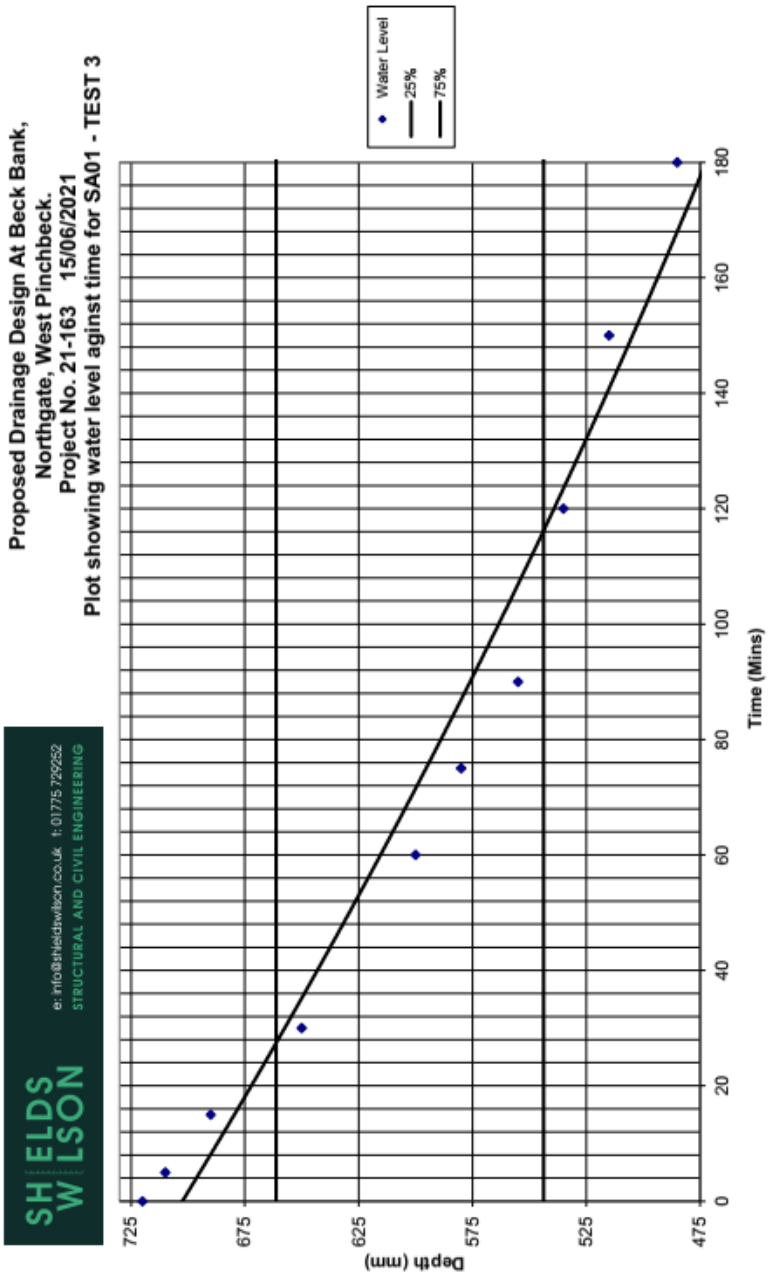
Time Taken From 75% Volume to 25% Volume	
89	Mins

Effective Depth From 75% Volume to 25% Volume
0.1175 m

50% Effective Internal Surface Area Including Base Area
1.31 m^2

Soil Infiltration Rate, f
1.41093E-05 m/s
0.050793379 m/h

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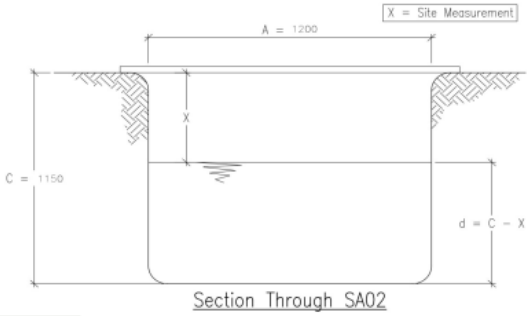
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Land off Beck Bank, Northgate, West Pinchbeck

Project No. 21-163

Site Visit Date 15/06/2021

Soak-Away Test SA 02

TEST 1	
SA02	
TIME (Mins)	DEPTH mm (d)
0	750
5	720
15	670
30	610
45	545
60	475
90	410
120	350
150	310
180	270



Section Through SA02

Trial Pit Dimensions		
A =	1.2	m
B =	0.6	m
C =	1.15	m

Plan Area of Trial Pit		
SA01 =	0.72	m^2
Total Volume =	0.346	m^3
75% Volume =	0.259	m^3
25%Volume =	0.086	m^3

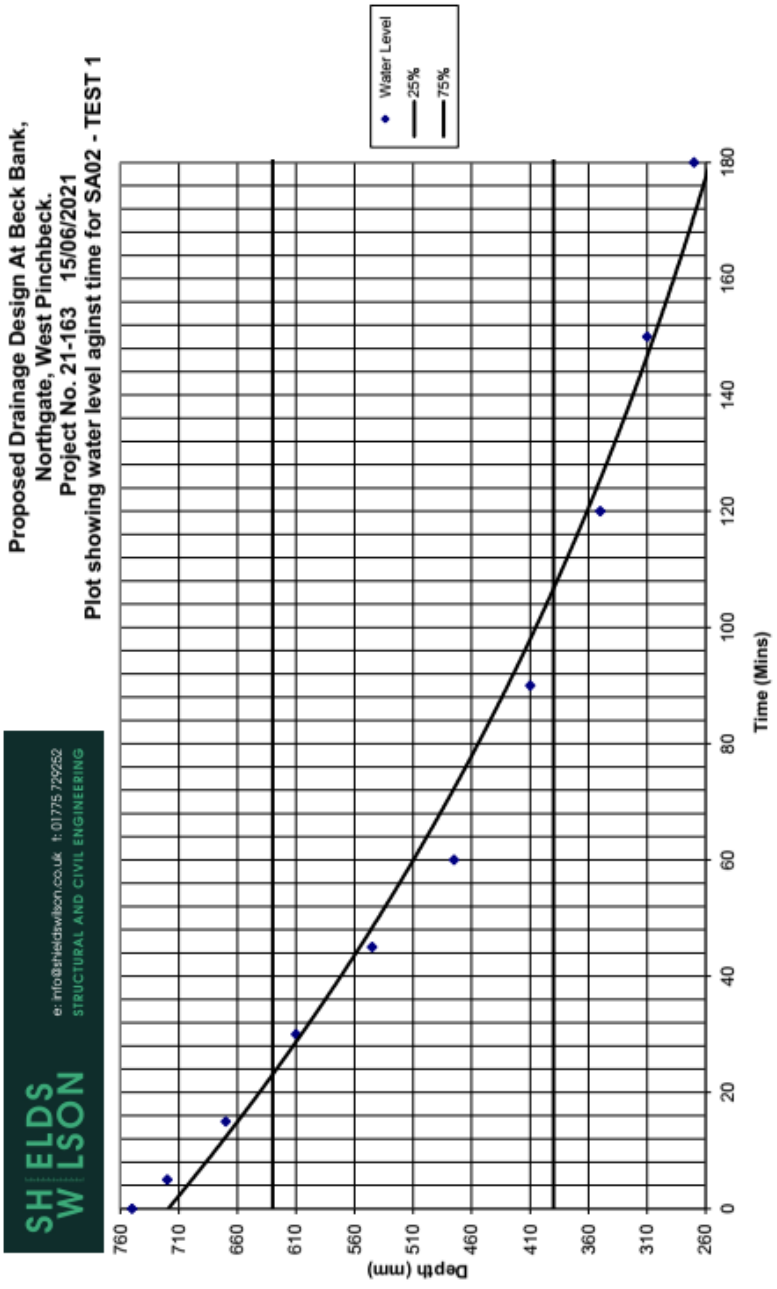
Time Taken From 75% Volume to 25% Volume	
84	Mins

Effective Depth From 75% Volume to 25% Volume
0.24 m

50% Effective Internal Surface Area Including Base Area
1.584 m^2

Soil Infiltration Rate, f
2.1645E-05 m/s
0.077922078 m/h

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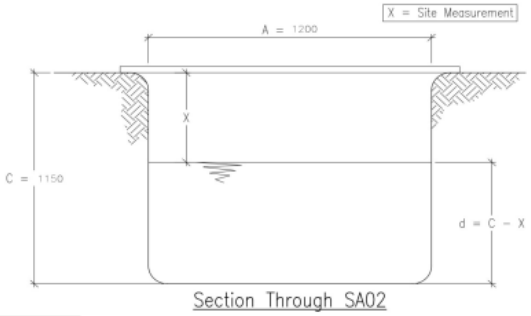
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Land off Beck Bank, Northgate, West Pinchbeck

Project No. 21-163

Site Visit Date 15/06/2021

Soak-Away Test SA 02

TEST 2	
SA02	
TIME (Mins)	DEPTH mm (d)
0	735
5	710
15	665
30	610
45	600
60	500
90	445
120	390
150	325
180	280



Section Through SA02

Trial Pit Dimensions		
A =	1.2	m
B =	0.6	m
C =	1.15	m

Plan Area of Trial Pit		
SA01 =	0.72	m^2
Total Volume =	0.328	m^3
75% Volume =	0.246	m^3
25%Volume =	0.082	m^3

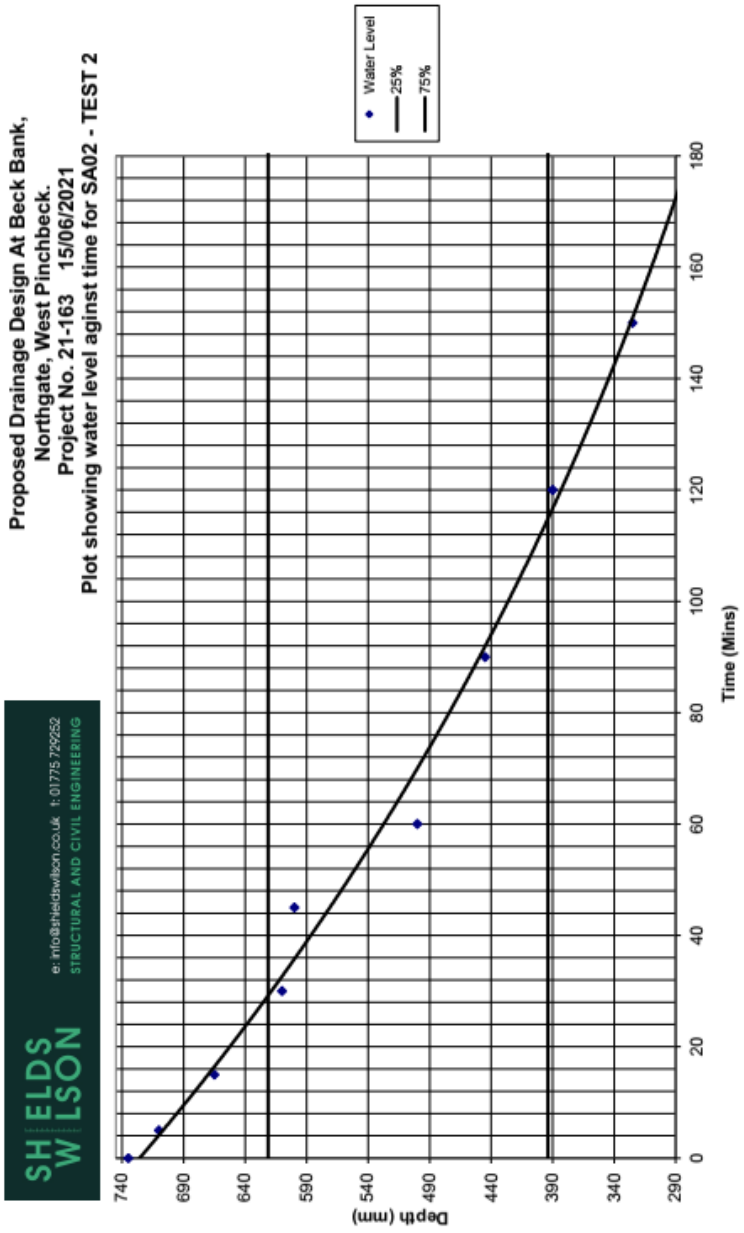
Time Taken From 75% Volume to 25% Volume	
86	Mins

Effective Depth From 75% Volume to 25% Volume
0.2275 m

50% Effective Internal Surface Area Including Base Area
1.539 m^2

Soil Infiltration Rate, f
2.06265E-05 m/s
0.074255406 m/h

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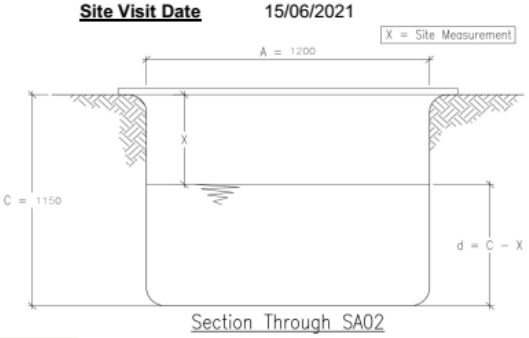
Proposed Residential Development
Land off Beck Bank, Northgate, West Pinchbeck

Project No. 21-163

Site Visit Date 15/06/2021

Soak-Away Test SA 02

TEST 3	
SA02	
TIME (Mins)	DEPTH mm (d)
0	360
5	340
15	335
30	320
45	300
60	290
90	265
120	240
150	220
180	200



Section Through SA02

Trial Pit Dimensions		
A =	1.2	m
B =	0.6	m
C =	1.15	m

Plan Area of Trial Pit		
SA01 =	0.72	m^2
Total Volume =	0.115	m^3
75% Volume =	0.086	m^3
25%Volume =	0.029	m^3

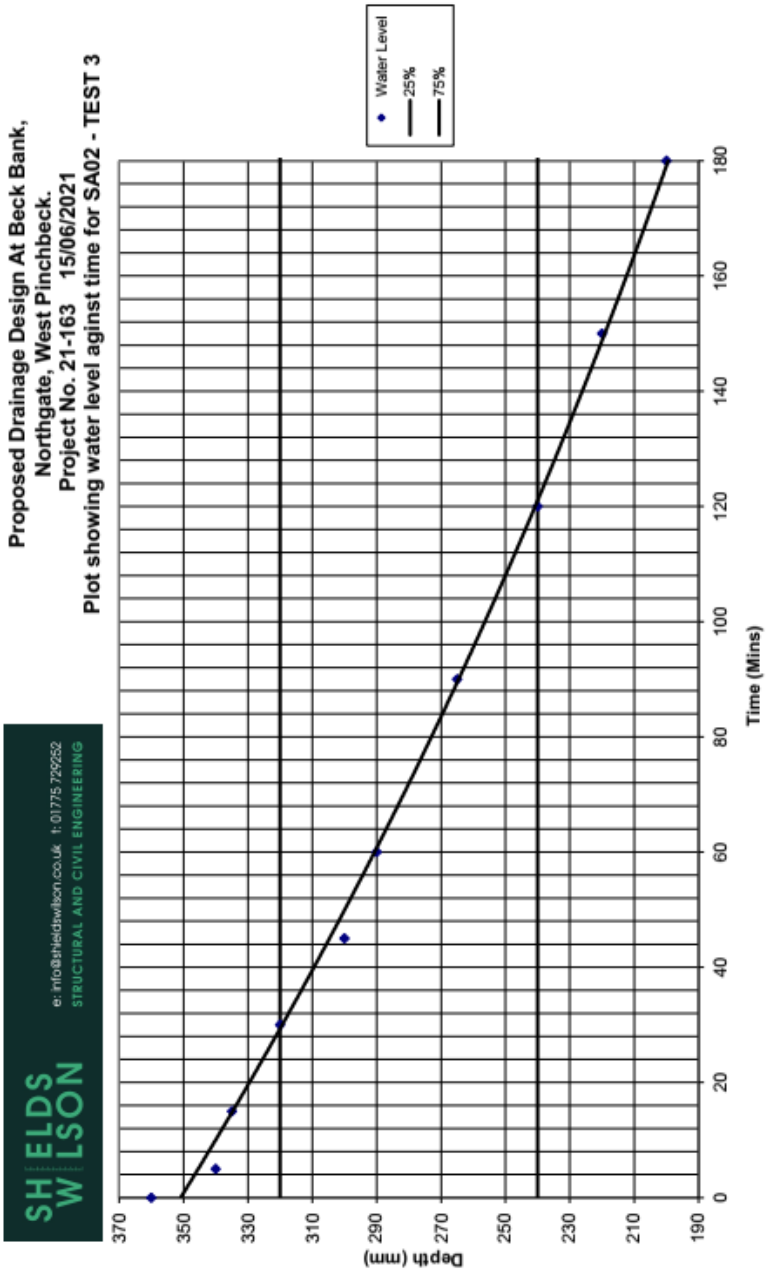
Time Taken From 75% Volume to 25% Volume	
92	Mins

Effective Depth From 75% Volume to 25% Volume
0.08 m

50% Effective Internal Surface Area Including Base Area
1.008 m^2

Soil Infiltration Rate, f
1.0352E-05 m/s
0.037267081 m/h

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APPENDIX E

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APPENDIX F

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Newark Road Peterborough
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e: admin@groundengineering.co.uk

TEST CERTIFICATE

Determination of Liquid & Plastic Limits

Tested in accordance with BS 1377-2:1990: Clause 4.4 & 5: One Point Method

Client:	Shields Wilson Ltd	Certificate Number:	PL7520-1/1/704
Client Address:	Bank House Broad Street Spalding, Lincs PE11 1TB	Client Reference:	L10014
		Job Number:	PL7520-1
		Date Sampled:	Unknown
Contact:	Adam Wilson	Date Received:	22.06.2021
		Date Tested:	05.07.2021
Site Name:	Beck Bank	Certificate of Sampling:	N/A
Site Address:	West Pinchbeck	Sampling Certificate No.:	N/A
		Sampled By:	Client

Test Results:

Laboratory Reference: PL7520-1/1
Sample Reference: S01

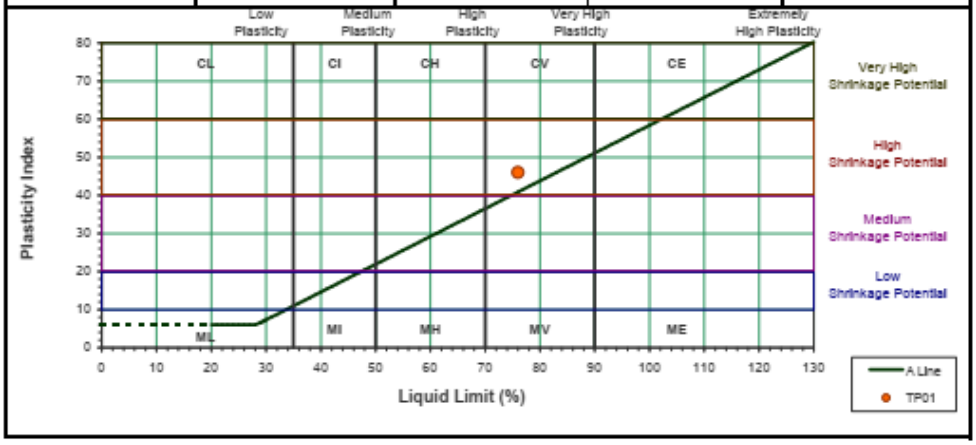
Sample Description: Firm to stiff brown grey silty CLAY with rare roots less than 1mm in diameter.

Location: TP01 **Depth:** 1.40m

Sample Preparation: As Received

Estimated % Passing 425µm BS Test Sieve

Moisture Content (%)	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index	% Passing 425µm BS Test Sieve
41	76	30	46	100



Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 07.07.2021 Page 1 of 1
Form Number: GELab/C/704 Version 46

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Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA

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GROUND ENGiNEERiNG

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e: admin@groundengineering.co.uk

TEST CERTIFICATE

Determination of Moisture Content

Tested in Accordance with BS 1377-2: 1990: Clause 3.2

Client:	Shields Wilson Ltd	Certificate Number:	PL7520-1/1/705
Client Address:	Bank House Broad Street Spalding, Lincs PE11 1TB	Client Reference:	L10014
		Job Number:	PL7520-1
		Date Sampled:	Unknown
		Date Received:	22.06.2021
Contact:	Adam Wilson	Date Tested:	05.07.2021
		Certificate of Sampling:	N/A
Site Name:	Beck Bank	Sampling Certificate No.:	N/A
Site Address:	West Pinchbeck	Sampled By:	Client

TEST RESULTS

Laboratory Reference	Sample Reference	Location	Depth Top	Depth Base	Description	Moisture Content [%]
PL7520-1/1	S01	TP01	1.40m	N/A	Firm to stiff brown grey silty CLAY with rare roots less than 1mm in diameter.	41
PL7520-1/2	S02	TP02	1.75m	N/A	Soft dark-brown brown silty slightly organic CLAY.	58

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 07.07.2021 Page 1 of 1
Form Number: GELab/C/705 Version 19

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