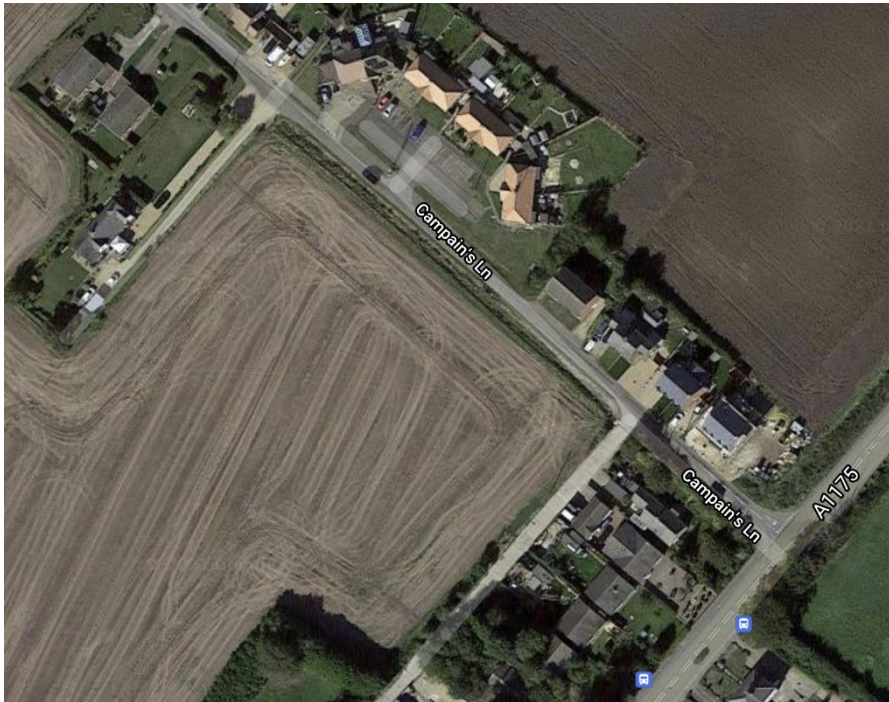


GROUND INVESTIGATION REPORT**UPON****LAND SOUTH WEST OF****CAMPAINS LANE****DEEPING ST NICHOLAS****PROJECT No: SW 21-241****DOCUMENT REF: SW 21-241-GI-01**

Mr Robert Spenceley
D&R Property Services Ltd.
Celey House
4A, The Wentworths
Long Sutton,
Lincs,
PE12 9RT



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1. INTRODUCTION

Acting upon the instruction of Mr Robert Spenceley, on behalf of D&R Properties, we attended site on 30th November 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.

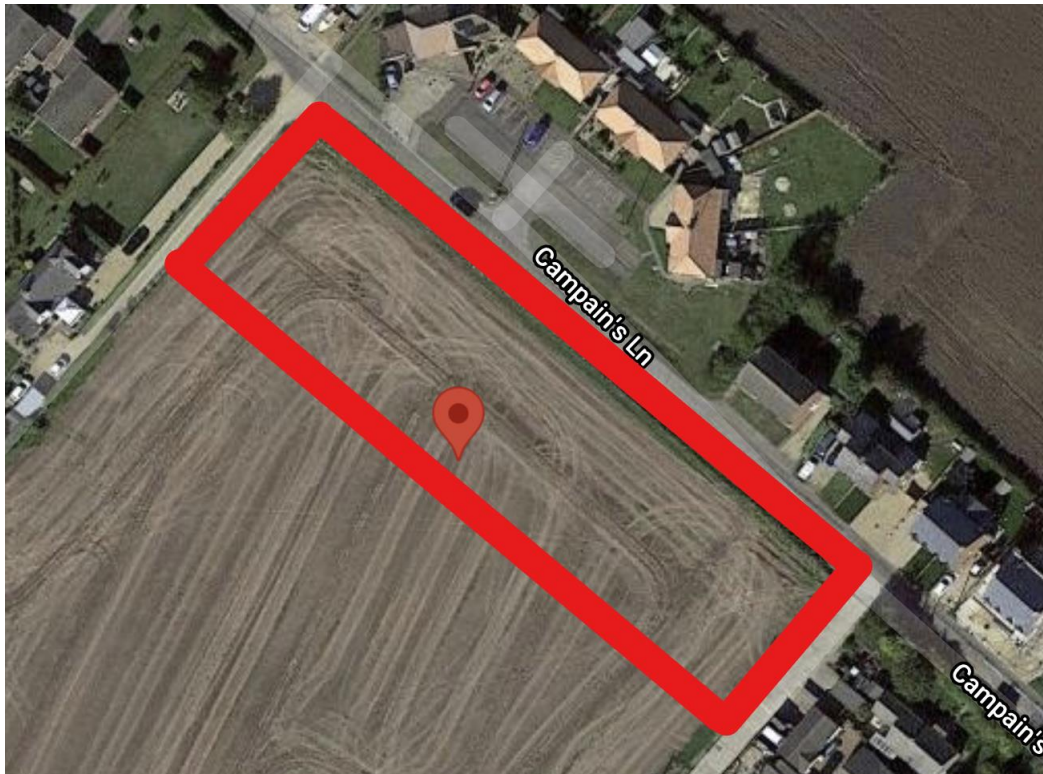
The opinions and comments expressed within this report are based upon ground conditions encountered in the trial pits excavated at the time of our visit.

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.

2. LOCATION & DESCRIPTION OF SITE

2.1. Site Location

The site is situated to the South West of Campain's Lane, Deeping St Nicholas. Appropriate national grid reference TF 217164.



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 farming fields.

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

2.3. Site Description

The site currently stands as arable farm land for the use of growing produce.

The North of the site is bound by Campains Lane.

The Eastern Boundary of the site is shared with a neighbouring property.

The West of the site is formed by a concreted track road which serves as an access road the rear driveways of the neighbouring properties, which the proposed site will also gain its access.

The Southern boundary is formed by ditch that has been cut into the field to separate the proposed site from the existing field.

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.

3. SITE WORK

Six 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 A.

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 SW21-241/TP01 thru TP06. 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 existing infilled dyke to north of the site, illustrated on our location plan within Appendix A, has been backfilled with an inappropriate material which appears to have potatoes mixed throughout the depth of the backfill.

The soil demonstrated no identifying odours or markers for known man-made contamination. Given this and the historical map confirmation of no previous development and long-term agricultural use 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 single sample was also submitted to the Laboratory for CBR testing in order to determine the required road build up during the design stage of the project. Laboratory test results are contained within Appendix F.

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

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 all explorations were very similar and demonstrated a consistent geological profile across the site.

Once the dry layer of topsoil material ranging from 0.35m – 0.6m below existing ground level was penetrated the strata became an orangey brown mid dense sandy silt.

Underlying 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.

Once the excavation penetrated through the firm brown, grey clay, a water strike was encountered, and the clay became soft, bluey grey in colour. The clay becoming softer with depth and water entering the excavations at around a depth of 2m.

Atterberg limit test results indicate the underlying clays are of a medium volume change potential.

CBR test result showed a CBR value of 2.3%.

5. CONCLUSIONS & RECCOMENDATIONS

The proposed development is understood to comprise of 9 detached dwellings, comprising of 3 semi-detached dwellings and 3 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 250mm beneath the suspended floor due to the Laboratory results returning results of medium-volume change potential. Laboratory results are contained within Appendix F.

With the dense sandy silt extending down to a depth of 1.1m and the firm clay to a further depth of 2m, a traditional strip foundation will be suitable for this project. A layer of reinforcement mesh should be utilised in the strip foundations to bridge any potential difference in formation strengths that may be encountered and to limit potential differential settlements.

Following ground investigation being undertaken it is proposed that a safe ground bearing pressure of 65kN/m², should be utilised for a shallow strip footing of a width up to 0.75m. Widths in excess of this should consider suitable reductions in bearing capacities.

The inappropriate backfill in the infilled dyke to the north of the site will need to be fully removed and backfilled appropriately.

However due to the softening bearing strata at depth, we would recommend this back fill area is avoided for traditional shallow strip footings. Should foundations be required in this area a piled solution may be necessary and should be appropriately considered by the foundation design engineer.

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 softer underlying clays at depth. A value of 8.8×10^{-6} would be suitable for design purposes.

A recommended CBR value of 2% should be used for the purposes of road and surface designs.

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

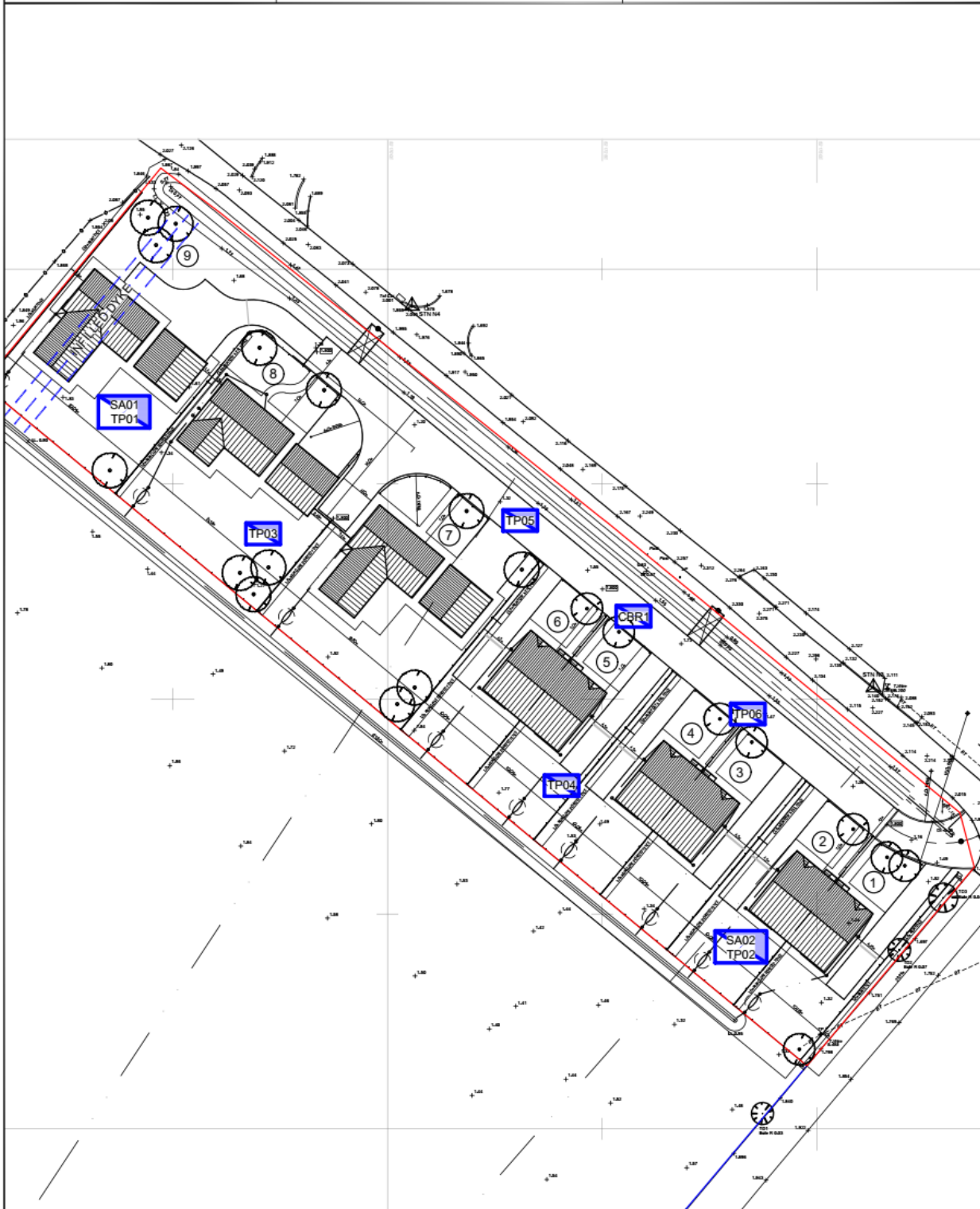
J. Lawrence

(Checked) A.P.Wilson CEng MIStructE

20th December 2021

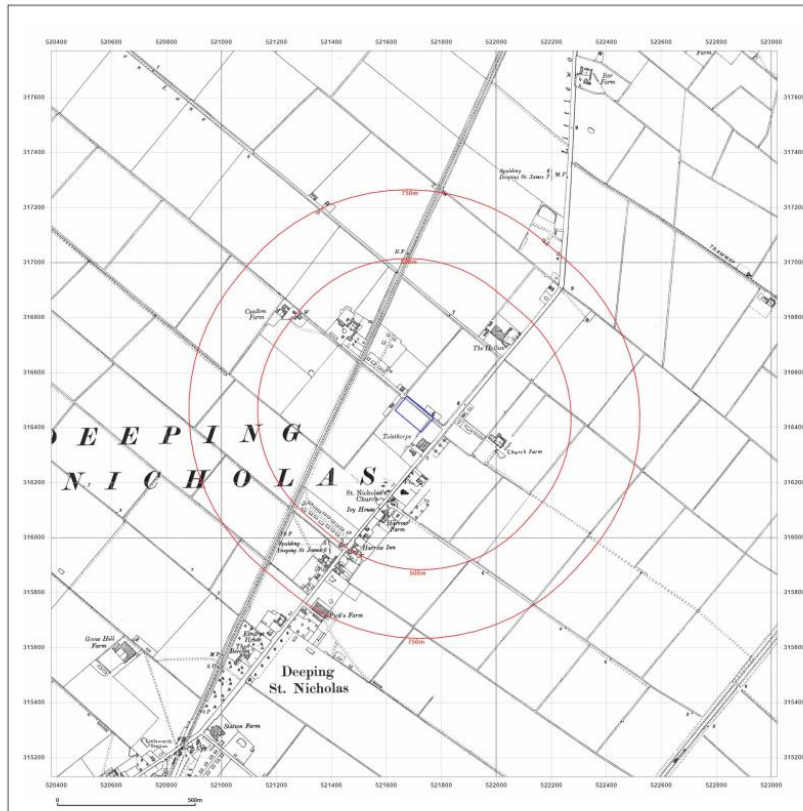
APPENDIX A

GROUND INVESTIGATION	Project: LAND SOUTH OF CAMPAINS LANE	Date: DEC. '21	Designer: JL
Project No: SW 21-241	Subject:	Sheet No: SK01	Rev: -

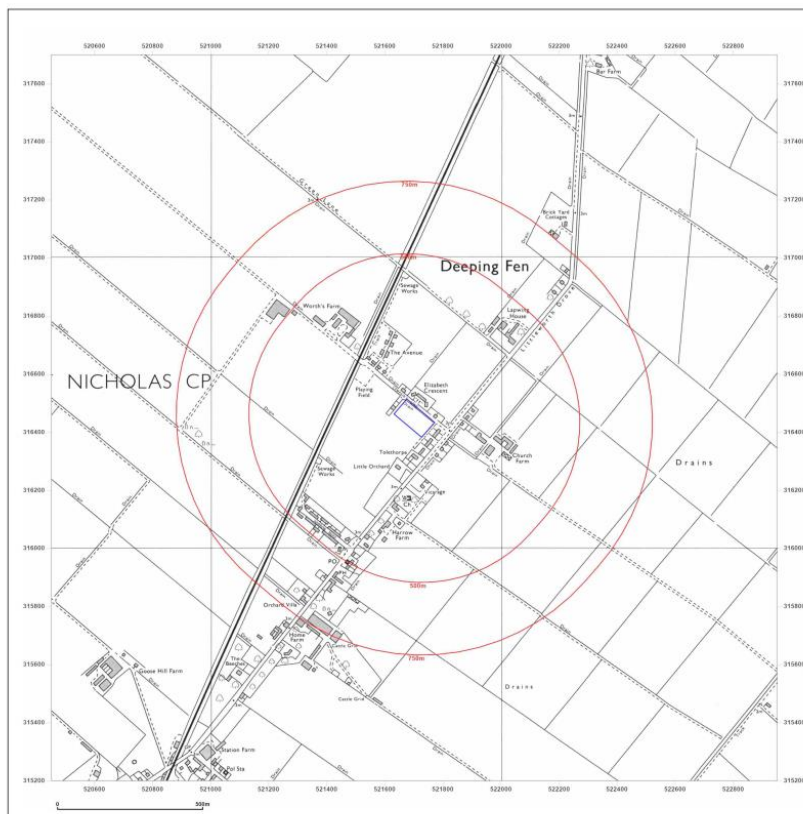
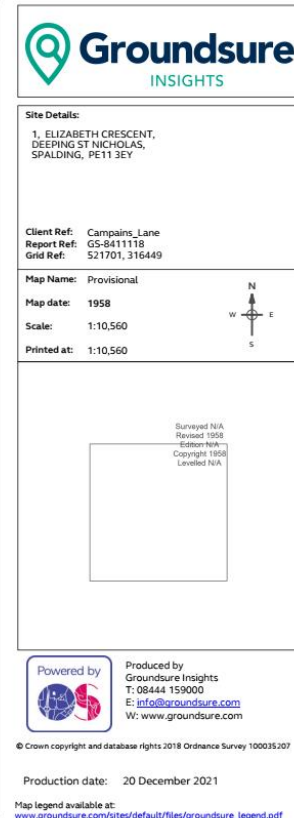


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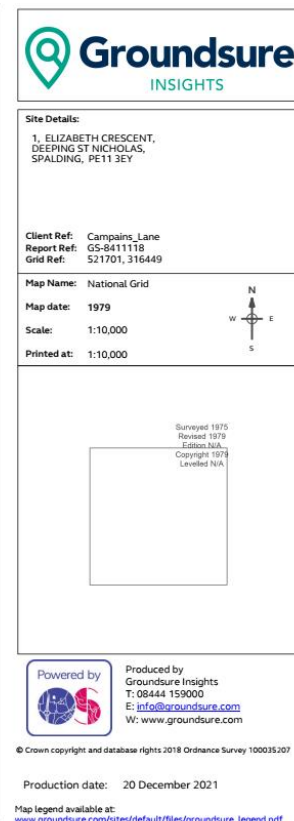
APPENDIX B



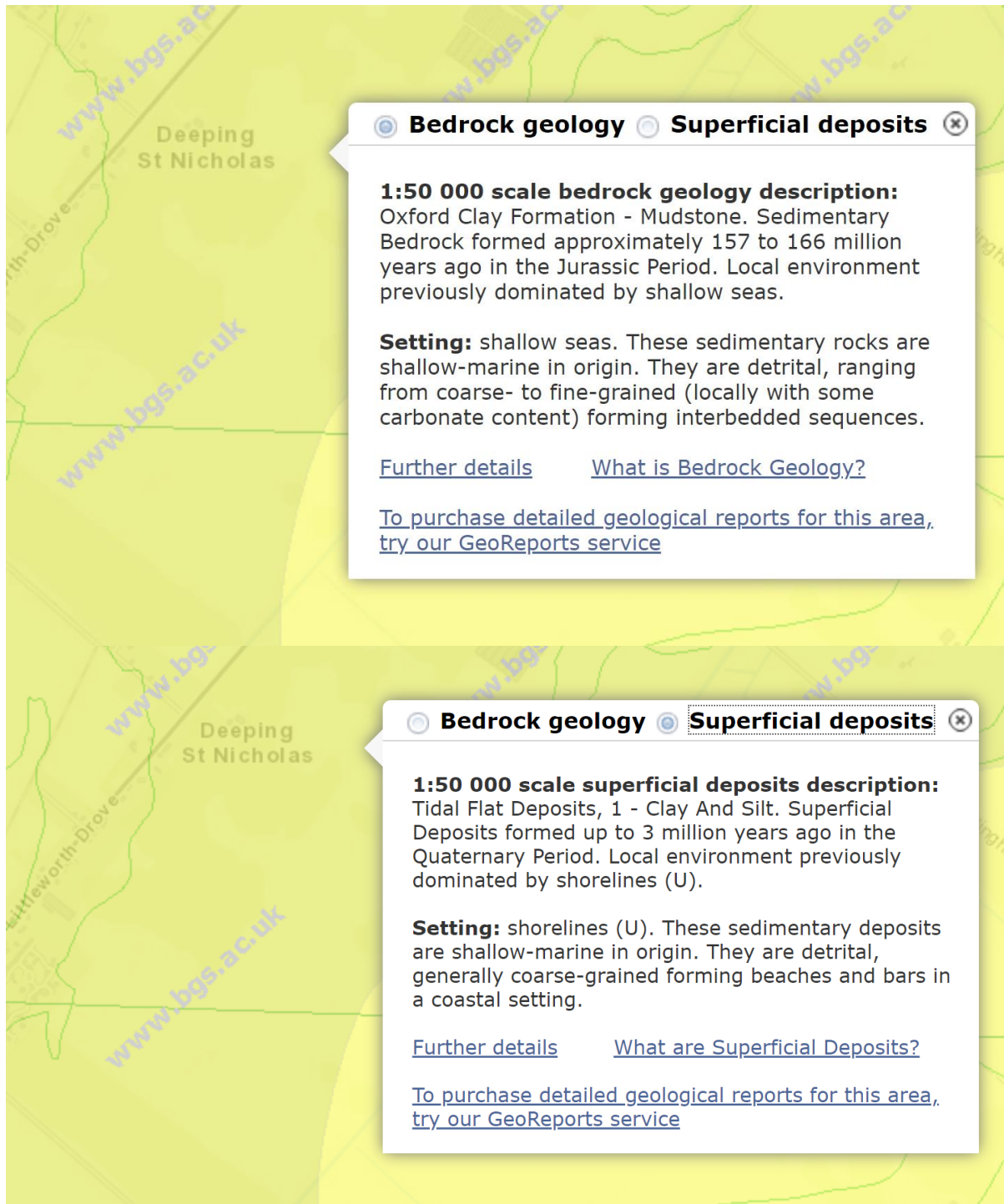
Extract OS County Series, 1958



Extract OS County Series, 1979

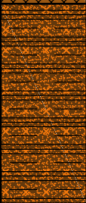


APPENDIX C



Extract British Geological Society Maps

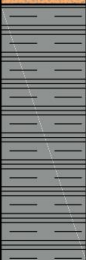
APPENDIX D

SHIELDS WILSON e: info@shieldswilson.co.uk t: 01775 729252 STRUCTURAL AND CIVIL ENGINEERING				Project No. SW21-241		Log Ref TP01		
				Exploration Method Excavator		Site Coordinates TF 217164		
Location Proposed Development, Land South of Campains Lane, Deeping St. Nicholas				Carried Out For D&R Homes		Date Undertaken 30/11/21		
						Logged By JL		
Description	Reduced Level	Legend	Depth (Thick)	Samples			Test Required	Mackintosh Probe
				Depth	Sample Reference	Sample Type No.		
Clayey Top Soil.			0.600m					
Firm Clayey Silt With Orange Sand Inclusions.			(0.500m) 1.100m					
Remarks Trial Pit Terminated @ 1.1m Below Ground Level, Soakaway Started.								

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SHIELDS WILSON e: info@shieldswilson.co.uk t: 01775 729252 STRUCTURAL AND CIVIL ENGINEERING				Project No. SW21-241		Log Ref TP02		
				Exploration Method Excavator				
				Site Coordinates TF 217164				
Location Proposed Development, Land South of Campains Lane, Deeping St. Nicholas				Carried Out For D&R Homes		Date Undertaken 30/11/21		
						Logged By JL		
<u>Description</u>	<u>Reduced Level</u>	<u>Legend</u>	<u>Depth (Thick)</u>	<u>Samples</u>			<u>Test Required</u>	<u>Mackintosh Probe</u>
				<u>Depth</u>	<u>Sample Reference</u>	<u>Sample Type</u> <u>No.</u>		
Top Soil.			0.350m					
Orangey Grey Fine, Mid Dense Sandy Silt.			(0.750m) 1.100m					
<u>Remarks</u> Trial Pit Terminated @ 1.1m Below Ground Level, Soakaway Started.								

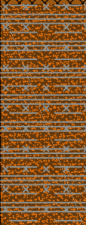
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SHIELDS WILSON e: info@shieldswilson.co.uk t: 01775 729252 STRUCTURAL AND CIVIL ENGINEERING				Project No. SW21-241		Log Ref TP03		
				Exploration Method Excavator		Site Coordinates TF 217164		
Location Proposed Development, Land South of Campains Lane, Deeping St. Nicholas				Carried Out For D&R Homes		Date Undertaken 30/11/21		
						Logged By JL		
Description	Reduced Level	Legend	Depth (Thick)	Samples			Test Required	Mackintosh Probe
				Depth	Sample Reference	Sample Type No.		
Top Soil.			0.400m					
Orangey Grey Fine, Mid Dense Sandy Silt.			(0.700m) 1.100m					
Firm Moist Grey Clay.			(0.900m) 2.000m					
Remarks Trial Pit Terminated @ 2.0m Below Ground Level, Water at 1.900m Below Ground Level After 1 Hour.								

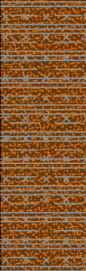
Copyright Shields Wilson Limited.

SHIELDS WILSON e: info@shieldswilson.co.uk t: 01775 729252 STRUCTURAL AND CIVIL ENGINEERING		Project No. SW21-241		Log Ref TP04			
		Exploration Method Excavator					
		Site Coordinates TF 217164					
Location Proposed Development, Land South of Campains Lane, Deeping St. Nicholas		Carried Out For D&R Homes		Date Undertaken 30/11/21			
				Logged By JL			
<u>Description</u>	Reduced Level	Legend	Depth (Thick)	<u>Samples</u>		Test Required	Mackintosh Probe
				Depth	Sample Reference		
Top Soil.			0.400m				
Orangey Brown, Silty Fine Clay.			(0.500m) 0.900m				
Mid-Firm Grey Clay.			(0.900m) 2.200m	1.100m	Sample 1	Atterberg & Moisture	
<u>Remarks</u> Trial Pit Terminated @ 2.200m Below Ground Level, Water at 2.150m Below Ground Level After $\frac{3}{4}$ Hour.							

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SHIELDS WILSON e: info@shieldswilson.co.uk t: 01775 729252 STRUCTURAL AND CIVIL ENGINEERING				Project No. SW21-241		Log Ref TP05		
				Exploration Method Excavator		Site Coordinates TF 217164		
Location Proposed Development, Land South of Campains Lane, Deeping St. Nicholas				Carried Out For D&R Homes		Date Undertaken 30/11/21		
						Logged By JL		
Description	Reduced Level	Legend	Depth (Thick)	Samples			Test Required	Mackintosh Probe
				Depth	Sample Reference	Sample Type No.		
Clayey Top Soil.			0.400m					
Firm Clayey Silt With Orange Sand Inclusions.			(0.600m) 1.000m					
Bluey Grey Clay Becoming Wetter With Depth.			(1.100m) 2.100m					
Remarks Trial Pit Terminated @ 2.1m Below Ground Level, Water at 2.050m Below Ground Level After ½ Hour.								

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SHIELDS WILSON e: info@shieldswilson.co.uk t: 01775 729252 STRUCTURAL AND CIVIL ENGINEERING				Project No. SW21-241		Log Ref TP06		
				Exploration Method Excavator		Site Coordinates TF 217164		
Location Proposed Development, Land South of Campains Lane, Deeping St. Nicholas				Carried Out For D&R Homes		Date Undertaken 30/11/21		
						Logged By JL		
<u>Description</u>	<u>Reduced Level</u>	<u>Legend</u>	<u>Depth (Thick)</u>	<u>Samples</u>			<u>Test Required</u>	<u>Mackintosh Probe</u>
				<u>Depth</u>	<u>Sample Reference</u>	<u>Sample Type</u> <u>No.</u>		
Clayey Top Soil.			0.350m					
Firm Clayey Silt With Orange Sand Inclusions.			(0.750m) 1.100m					
Firm Grey Clay .			(1.000m) 2.100m	2.100m	Sample 2		Atterberg & Moisture	
<u>Remarks</u> Trial Pit Terminated @ 2.100m Below Ground Level, Water at 2.050m Below Ground Level.								

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Soak-Away Test SA 01

TEST 1	
SA01	
TIME (Mins)	DEPTH mm (d)
0	535
15	510
30	470
45	455
60	440
90	400
120	380
150	370
180	350
210	330
240	310
270	300
300	290
330	280

Trial Pit Dimensions

A =	1.3 m
B =	0.8 m
C =	1.10 m

Plan Area of Trial Pit

SA01 =	1.04 m ²
Total Volume =	0.265 m ³
75% Volume =	0.199 m ³
25% Volume =	0.066 m ³

**Time Taken From 75%
Volume to 25% Volume**

160	Mins
-----	------

**Effective Depth From 75%
Volume to 25% Volume**

0.1275 m

**50% Effective Internal Surface
Area Including Base Area**

1.5755 m ²

Soil Infiltration Rate, f

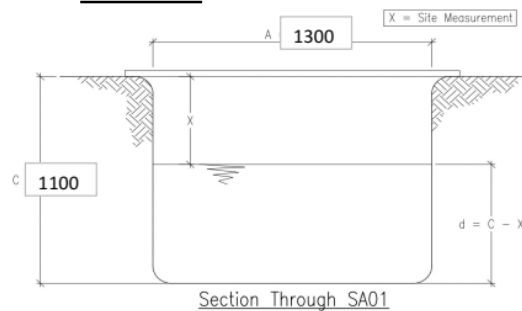
8.76706E-06 m/s
0.031561409 m/h

Project Title

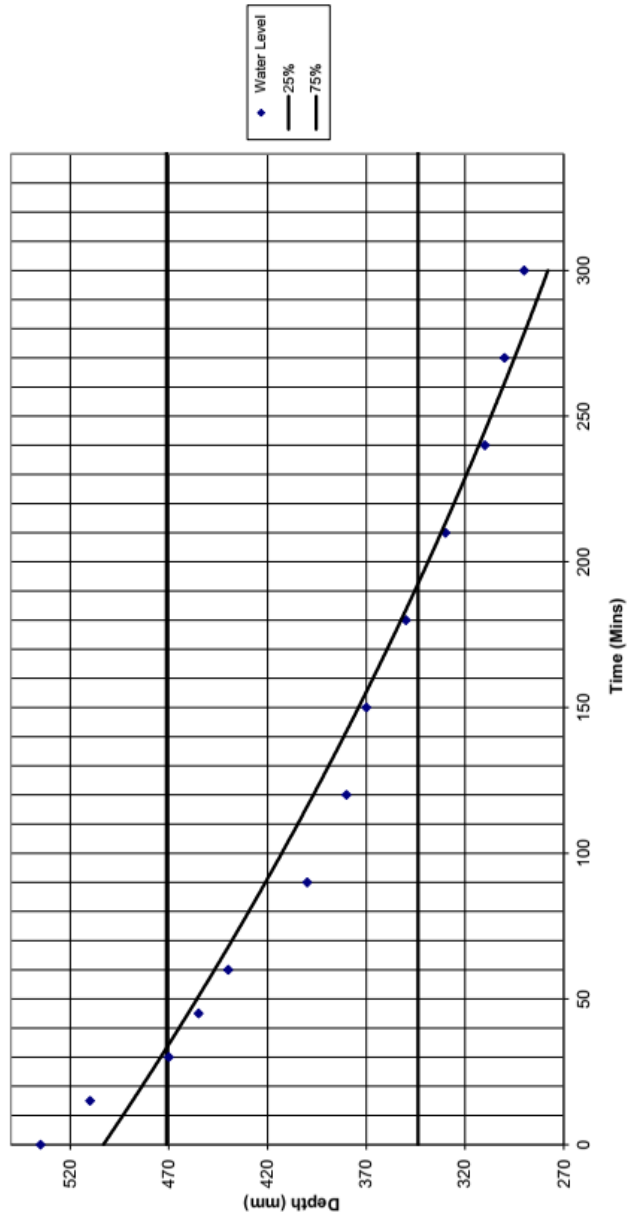
Proposed Residential Development
Land South of Campains Lane, Deeping St Nicholas

Project No. 21-241

Site Visit Date 30/11/2021



Proposed Residential Development,
Land South of Campains Lane, Deeping St Nicholas.
Project No. 21-241 30/11/2021
Plot showing water level against time for SA01 - TEST 1



Soak-Away Test SA 02

TEST 1	
SA01	
TIME (Mins)	DEPTH mm (d)
0	545
15	490
30	450
45	420
60	390
75	330
105	300
135	260
165	220
195	180

Trial Pit Dimensions

A =	1.5 m
B =	0.8 m
C =	1.10 m

Plan Area of Trial Pit

SA01 =	1.2 m ²
Total Volume =	0.438 m ³
75% Volume =	0.329 m ³
25% Volume =	0.110 m ³

Time Taken From 75% Volume to 25% Volume

94	Mins
----	------

Effective Depth From 75% Volume to 25% Volume

0.1825 m

50% Effective Internal Surface Area Including Base Area

2.0395 m ²

Soil Infiltration Rate, f

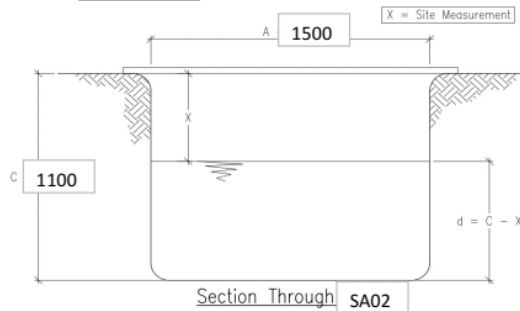
1.90389E-05 m/s
0.068539953 m/h

Project Title

Proposed Residential Development
Land South of Campains Lane, Deeping St Nicholas

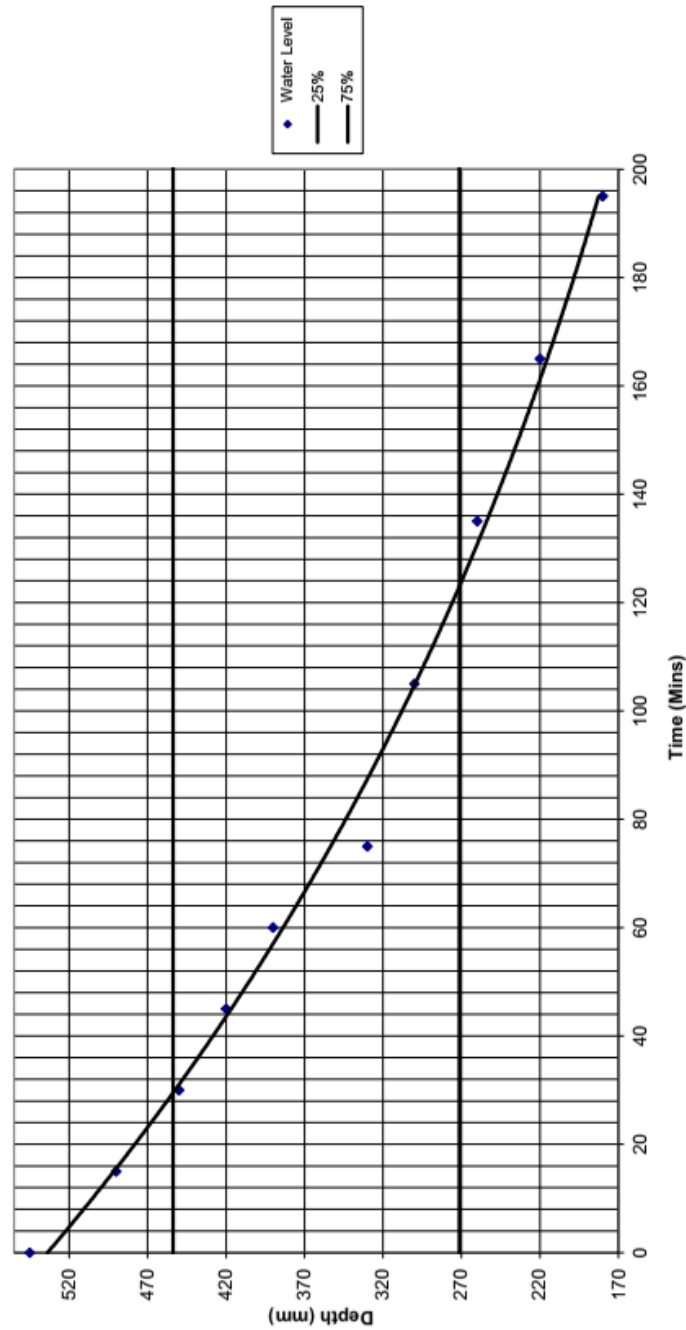
Project No. 21-241

Site Visit Date 30/11/2021



Proposed Residential Development,
Land South of Campains Lane, Deeping St Nicholas.
Project No. 21-241 30/11/2021
Plot showing water level against time for SA02 - TEST 1

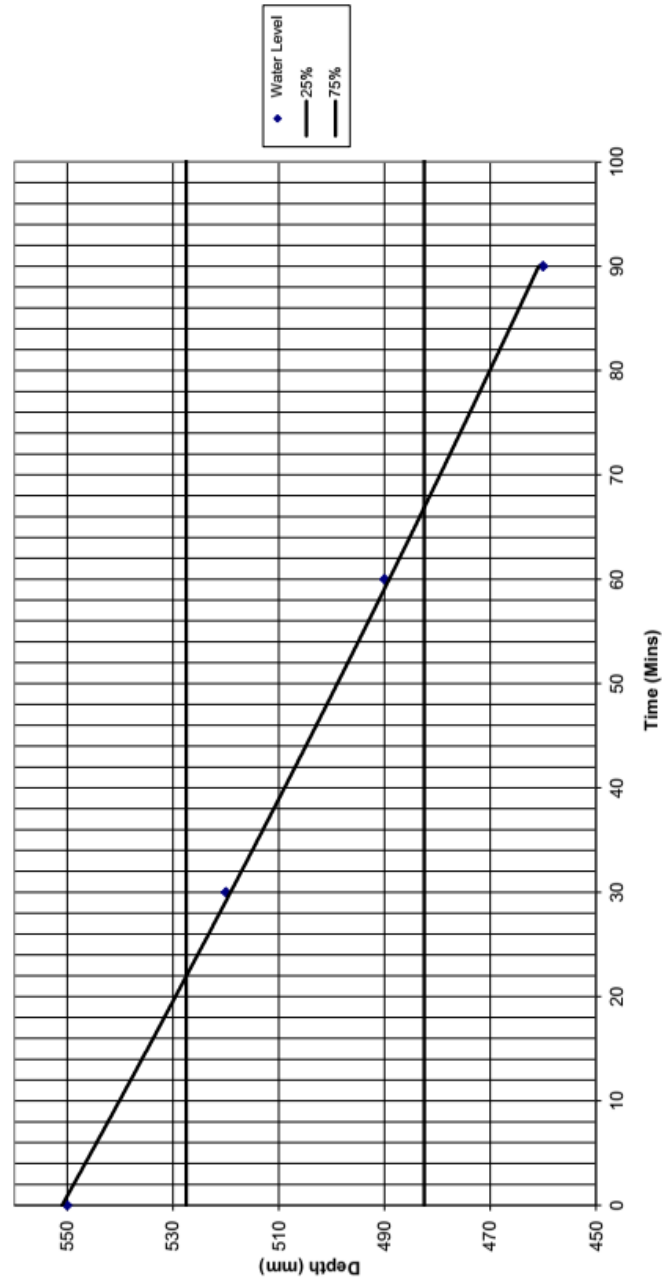
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Soil Infiltration Rate, f
1.42146E-05 m/s
0.051172708 m/h

Proposed Residential Development,
Land South of Campains Lane, Deeping St Nicholas.
Project No. 21-241 30/11/2021
Plot showing water level against time for SA02 - TEST 2

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APPENDIX E







APPENDIX F



8180

GROUND ENGINEERING

TEST CERTIFICATE

Determination of Liquid & Plastic Limits

Newark Road Peterborough

t: 01733 566566

e: admin@groundengineering.co.uk

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

Client: Shields Wilson Ltd
Client Address: Bank House
Broad Street
Spalding, Lincs
PE11 1TB

Certificate Number: PL7691-1/1/704

Client Reference: L10094
Job Number: PL7691-1

Date Sampled: Unknown
Date Received: 30.11.2021
Date Tested: 08.12.2021

Contact: Adam Wilson

Site Name: Campains Lane
Site Address: Deeping St Nicholas

Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

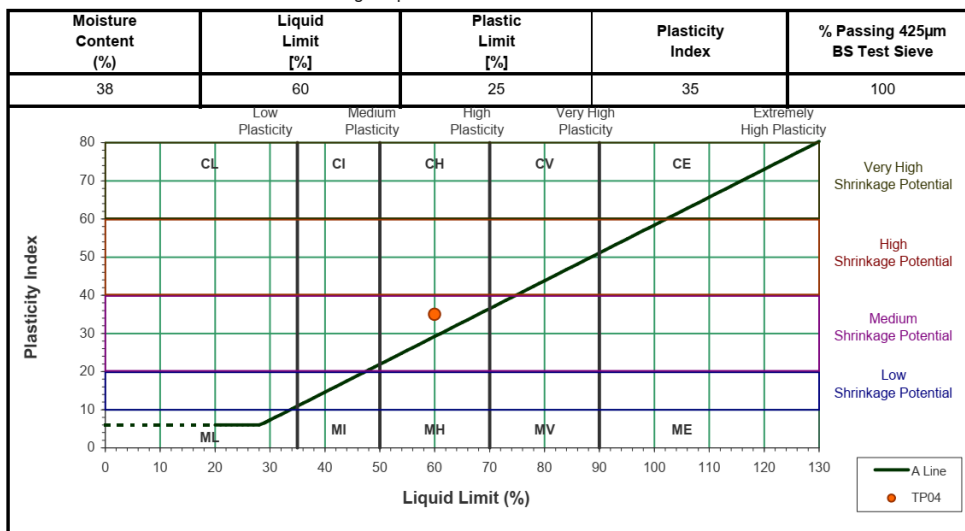
Test Results: Laboratory Reference: PL7691-1/1
Sample Reference: S01

Sample Description: Soft dark-brown brown-grey brown, slightly silty slightly sandy CLAY.

Location: TP04

Depth: 1.00m

Sample Preparation: As Received
Estimated % Passing 425µm BS Test Sieve



Comments:

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 10.12.2021 Page 1 of 1
Form Number: GELab/C/704 Version 46

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Registered in England & Wales
Registration Number: 6929574
Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA



8180

GROUND ENGINEERING

TEST CERTIFICATE**Determination of Moisture Content**

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

Client: Shields Wilson Ltd
Client Address: Bank House
Broad Street
Spalding, Lincs
PE11 1TB

Contact: Adam Wilson

Site Name: Campains Lane
Site Address: Deeping St Nicholas

Certificate Number: PL7691-1/1/705

Client Reference: L10094

Job Number: PL7691-1

Date Sampled: Unknown

Date Received: 30.11.2021

Date Tested: 03.12.2021

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

TEST RESULTS

Laboratory Reference	Sample Reference	Location	Depth Top	Depth Base	Description	Moisture Content [%]
PL7691-1/1	S01	TP04	1.00m	N/A	Soft dark-brown brown-grey brown, slightly silty slightly sandy CLAY.	38
PL7691-1/2	S02	TP06	2.10m	N/A	Very Soft brown-grey grey orange-brown slightly silty slightly sandy CLAY with some organic pockets.	65

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager

Signed: 

Date Reported: 10.12.2021

Form Number: GELab/C/705 Version 19

Page 1 of 1

for and on behalf of Ground Engineering Ltd

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Registration Number: 6929574
Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA



8180

TEST CERTIFICATE**GROUND ENGINEERING**

Newark Road Peterborough

t: 01733 566566

e: admin@groundengineering.co.uk

Determination of California Bearing Ratio

Tested in accordance with BS 1377-4: 1990: Clause 7.4

Client: Shields Wilson Ltd
Client Address: Bank House
Broad Street
Spalding, Lincs
PE11 1TB

Contact: Adam Wilson

Site Name: Campains Lane
Site Address: Deeping St Nicholas

Certificate Number: PL7691-1/3/736-1

Client Reference: L10094

Job Number: PL7691-1

Date Sampled: Unknown

Date Received: 30.11.2021

Date Tested: 09.12.2021

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

Test Results: Laboratory Reference: PL7691-1/3

Sample Reference: S03

Sample Description: Stiff friable brown orange-brown grey dark-brown silty sandy CLAY with rare fine roots.**Sample Location:** CBR1**Depth:** 0.60m**Sample Soaked:** No**Sample Preparation:** Recompacted at 'as received moisture content' using a 2.5kg rammer

Retained on 20mm test sieve: 0 (%)

Applied Seating Load (top): 10 N

Moisture Content (Top): 26 (%)

Applied Seating Load (base): 10 N

Moisture Content (Base): 27 (%)

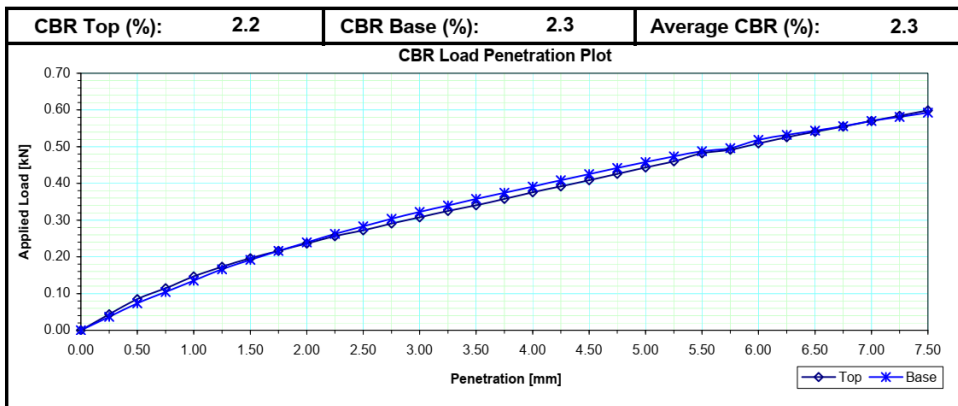
Applied Surcharge: 12.0kg

Moisture Content (Mean): 26 (%)

Initial Bulk Density: 1.94 (Mg/m³)

Initial Dry Density: 1.54 (Mg/m³)

Initial Moisture Content: 25 (%)



Comments:

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 10.12.2021 Page 1 of 1

Form Number: GELab/C/736-1 Version 32

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Registration Number: 6929574
Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA