



Site Investigation Report

Location
24 Nicholas Way,
Northwood,
HA6 2TS

Client: Davies Subsidence
Client Reference: 71814425
Optera Reference: 3788
Compiled by: A Watkins
Report Date: January 2019



Introduction

Acting on instructions received from Davies Subsidence, the property was visited 07/01/2019 to assess the cause of the reported damage. The information obtained from this investigation will be used to establish the ground make up and cause of the damage to the property.

Property Description

The property is a large two storey detached house of traditional brick construction surmounted by a gabled tiled roof. Constructed circa 1980.



British Geological Survey Data

The BGS has listed the bedrock as London Clay Formation – comprising Clay, Silt and Sand. Sedimentary Bedrock formed between 48Ma - 56Ma during the Palaeogene Period. Local environment previously dominated by deep seas. The BGS has indicated there are no overlying superficial deposits.



Contains British Geological Survey materials ©NERC 2017

Site Investigation Details

The investigation consisted of a hand excavated trial pit to reveal the construction of the foundations and two boreholes to establish the underlying ground conditions.

TP/BH1 is located at the junction between the rear bay window and the main building. The foundations comprise concrete and are situated at a depth of 0.83mbgl which then proceeds to extend down to a depth of 1.03mbgl with a total thickness of 200mm. The foundation steps out from the brick face by 380mm with an approximate 50mm overhang.

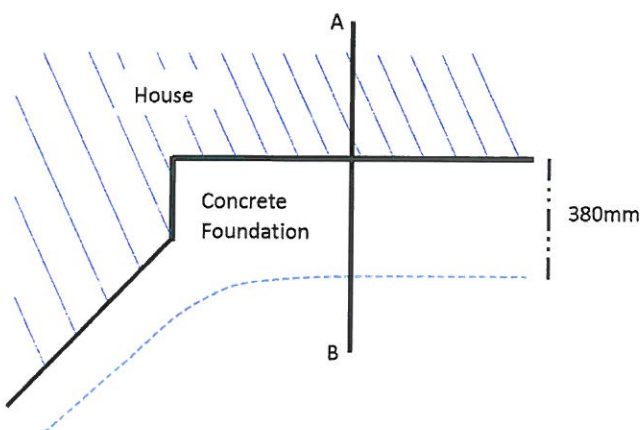


Figure 1.1 – Plan view of TP/BH1 foundations.

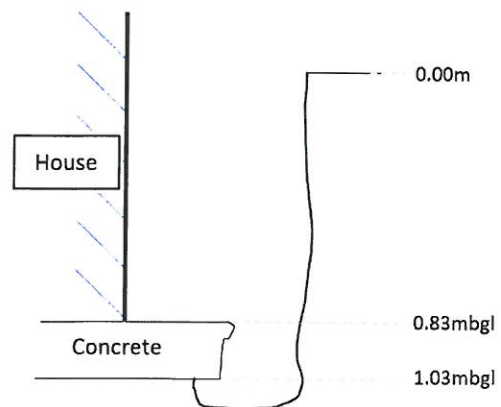


Figure 1.2 – Cross Section AB



TP/BH1

0.00m- 0.15m – TOPSOIL: Very soft dark brown slightly gravelly slightly sandy silt with rootlets.

0.15m- 0.30m – MADE GROUND: Soft brown slightly gravelly sandy clay.

0.30m- 0.45m – MADE GROUND: Very loose slightly sandy slightly clayey gravel.

0.45m- 0.60m – MADE GROUND: Soft brown slightly sandy slightly gravelly clay with rootlets.

0.65m- 1.10m – Soft light brown slightly sandy CLAY with rootlets.

1.10m- 2.45m – Stiff orangish brown mottled grey slightly sandy CLAY.

2.45m- 3.00m – Very stiff grey mottled brown slightly sandy CLAY.

-Roots visible to 2.00mbgl.

TP/BH1 was terminated at 3.00m due to ground conditions becoming too hard.

BH2 is located along the left-hand side of the house to determine the underlying geology.

BH2

0.00m-0.30m – TOPSOIL: Very soft dark brown slightly sandy slightly gravelly clay with rootlets.

0.30m- 0.45m – Soft light brown slightly sandy slightly gravelly CLAY.

0.45m- 1.90m – Stiff Orangish brown mottled grey slightly sandy slightly gravelly CLAY with rootlets.

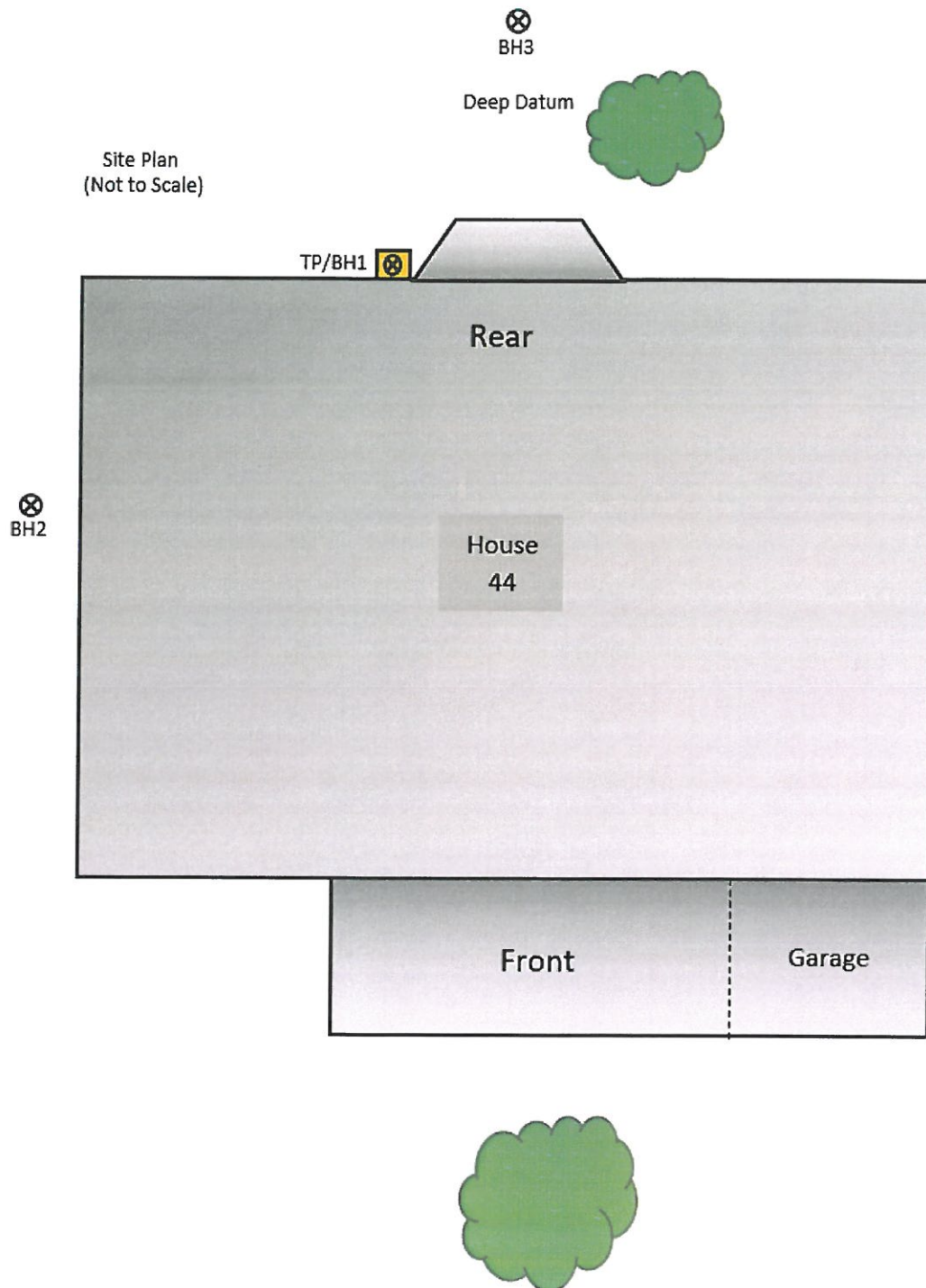
1.90m- 3.10m – Very stiff grey with orangish brown in places slightly sandy CLAY with rootlets.

BH2 was terminated at a depth of 3.10m due to ground conditions becoming too hard.

-Roots were visible to 2.60mbgl.

BH3 is Located approximately 5m West North West of TP/BH1 and was drilled using a windowless sample rig. The position is to be used for deep datum monitoring.

Appendices





Completed By:

Andrew Watkins

Job Role:

Trade

Date:

7th January 2019

Reference Number:

Issue Number:

SIT - Borehole Log

71814425 - Mr and Mrs Robinson: 3788 TP/BH1

1. Claim Details

Q1.1. Project Number: 3788

Q1.2. Project: 24 Nicholas Way, Northwood, London, HA6 2TS - Mr and Mrs Robinson

Q1.3. Date of Investigation:

07/01/2019

Q1.4. BH Number:

BH/TP1

2. Technical Information

Q2.1. New Question

Depth	Sample Type	Test	Description
0.00m-0.15m	Root sample at 0.10m.		[TOPSOIL] Very soft dark brown and black slightly gravelly slightly gravelly silt with many rootlets and roots (up to 3 mm in size). Gravel is subangular fine to coarse flint and brick.
0.15m-0.30m	Root sample at 0.25m.		[MADEGROUND] Soft brown slightly gravelly sandy clay with many rootlets and roots (up to 3mm in size). Gravel is subangular to subrounded fine to coarse flint and brick.
0.30m-0.45m			[MADEGROUND] Very loose grey and brown slightly sandy slightly clayey gravel of flint, quartzite and quartz.
0.45m-0.65m	Disturbed at 0.50m Root Sample at 0.50m	Hand vane at 0.50m = 31Kpa	[MADEGROUND] Soft brown with light brown in places, slightly sandy slightly gravelly clay with occasional rootlets. Gravel is subangular to subrounded fine to coarse flint and brick.
0.65m-1.10m	Root sample at 1.00m Disturbed sample at 1.00m	Hand Vane at 1.00m = 107Kpa	Soft light brown and brown slightly sandy CLAY with occasional rootlets. -below 1.00m, becoming stiff

Optera Limited
The Barn, Oxburgh, Fosse Way,
Sireton on Dunsmore
Rugby, Warwickshire, CV23 9JF
United Kingdom

T: 02476 553776

E: info@optera.co.uk
W: www.optera.co.uk

Registered Office: C/O HBO Accountants
Seven Stars House
COVENTRY, West Midlands, CV3 4LB
Registration No. 07468088
VAT Registration No. 173061919



Completed By:

Andrew Watkins

Job Role:

Trade

Date:

7th January 2019

Reference Number:

Issue Number:

1.10m-2.45m	Disturbed at 1.50m, 2.00m, Root sample at 1.50m, 1.80m, 2.00m	Hand vane at 1.50m = 133Kpa, at 2.00m = 138Kpa.	Stiff orangish brown mottled grey slightly sandy CLAY with rare subangular fine to coarse mudstone lithorelics. -Below 1.80m, clay becomes fishered. Fissures are subhorizontal, rarely vertical, extremely closely to very closely spaced, rough planar and dull.
2.45m-3.00m	Disturbed at 2.50m, 3.00m	Hand Vane at 2.50m = 183Kpa, at 3.00m = 177Kpa.	Very stiff grey occasionally mottled orangish brown, slightly sandy CLAY with occasional pockets (up to 10mm in size) of coarse yellow sandy and rare partially decayed plant matter.

Q2.2. Water Strike:

None encountered.

Q2.3. Water Level:

DRY

Q2.4. Comments:

Roots visible to 2.00mbgl.

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Completed By:

Andrew Watkins

Job Role:

Trade

Date:

7th January 2019

Reference Number:

Issue Number:

SIT - Borehole Log

71814425 - Mr and Mrs Robinson: 3788 TP2

1. Claim Details

Q1.1. Project Number: 3788

Q1.2. Project: 24 Nicholas Way, Northwood, London, HA6 2TS - 71814425 - Mr and Mrs Robinson

Q1.3. Date of Investigation:

07/01/2019

Q1.4. BH Number:

TP2

2. Technical Information

Q2.1. New Question

Depth	Sample Type	Test	Description
0.00m-0.30m			[TOPSOIL] Very soft dark brown slightly gravelly sandy clay with occasional rootlets. Gravel is subrounded flint.
0.30m-0.45m			Soft light brown slightly sandy slightly gravelly CLAY. Gravel is subrounded flint.
0.45m-1.90m	Disturbed at 0.50m, 1.00m, 1.50m	Hand Vane at 0.50m = 112Kpa, at 1.00m = 112Kpa, at 1.50m = 144Kpa	Stiff orangish brown mottled grey, slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subrounded fine to coarse flint.
1.90m-3.10m	Disturbed at 2.00m, 2.50m, 3.00m	Hand Vane at 2.00m = 177Kpa, 2.50m = 183Kpa, 3.00m = 183Kpa	Very stiff grey with orangish brown in places, slightly sandy CLAY with rare rootlets. -Below 2.30m, occasional gypsum crystals (up to 4mm in size). -Below 2.60m, rare gypsum crystals (up to 10mm in length). -Below 2.80m, clay becomes fissured. Fissured are sub horizontal with rare vertical, very closely spaced, rough, planar and dull.

Q2.2. Water Strike:

None encountered.

Q2.3. Water Level:

DRY

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VAT Registration No. 173061919



Completed By:

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Job Role:

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Date:

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Reference Number:

Issue Number:

Q2.4. Comments:

Rootlets visible to 2.60mbgl.

Hole terminated at 3.10m, unable to continue due to hard ground conditions.

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Registration No. 07468088
VAT Registration No. 173061919



Richardson's Botanical Identifications

Root identification
Vegetation surveys
Tree Building investigations
Plant taxonomy

Optera Structural Solutions
The Barn
OXBURGH, Fosse Way
Stretton on Dunsmoor
Rugby CV23 9JF

Dr Ian B K Richardson
BSc, MSc, PhD, MRSB, FLS
James Richardson
BSc (Hons. Biology)

Enterprise House
49-51 Whiteknights Road
Reading
RG6 7BB

Tel: (0118) 988 9552 (Direct line)
E-mail: richardsons@botanical.net
Web: www.botanical.net

Your ref: Root ID
Our ref: 77/0405

24/01/2019

Dear Sirs

3788

The samples you sent in relation to the above on 10/01/2019 (received by us on 14/01/2019) have been examined. Their structures were referable as follows:

TP/BH1, 0.10m	
2 no.	Examined root: HEDERA (Ivy) - or the related FATSIA (a robust shrub with fig-like leaves).
6 no.	Unfortunately all with insufficient cells for identification.
TP/BH1, 0.50m	
5 no.	Examined root: HEDERA (Ivy) - or the related FATSIA (a robust shrub with fig-like leaves).
TP/BH1, 1.00m	
1 no.	Examined root: QUERCUS (Oak).
2 no.	Examined root: HEDERA (Ivy) - or the related FATSIA (a robust shrub with fig-like leaves).
2 no.	Both samples revealed too few cells for microscopic identification.
TP/BH1, 1.30m	
3 no.	Examined root: similar in many ways to QUERCUS (Oak).
1 no.	Microscopic examination showed insufficient cells for recognition.
TP/BH1, 1.80m	
2 no.	Examined root: also most referable to QUERCUS (Oak).
1 no.	Microscopic examination showed insufficient cells for recognition.
TP/BH1, 2.00m	
5 no.	Examined root: again, most like QUERCUS (Oak).

Click here for more information: [QUERCUS](#)

I trust this is of help. Please call us if you have any queries; our Invoice is enclosed.

Yours faithfully

Dr Ian B K Richardson

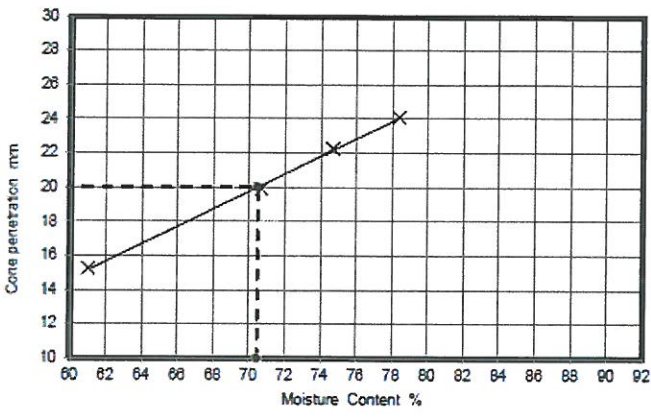
Identified with no information on vegetation, on or off site.

Report commissioned by

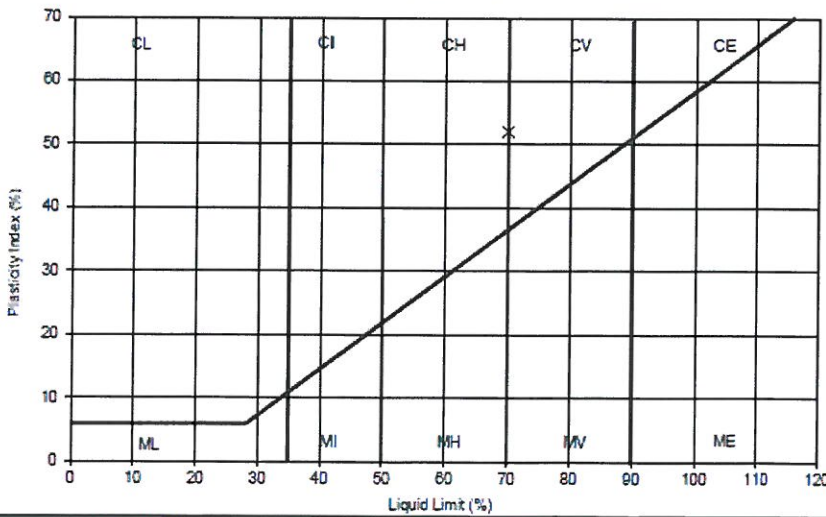


[illegible]

 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX		Job No.	25776	
Site Name		24 Nicholas Way, Northwood	Borehole/Pit No.	TP/BH1
Project No.		3788	Client	Optera Ltd
Soil Description		Orangish brown slightly mottled grey and dark grey slightly gravelly silty CLAY with traces of fine rootlets (gravel is fm and sub-angular to rounded)		
		Depth Top	1.00 m	
		Depth Base	- m	
		Sample Type	D	
		Samples received	11/01/2019	
		Schedules received	11/01/2019	
		Project Started	12/01/2019	
		Date Tested	20/02/2019	



PLASTICITY INDEX

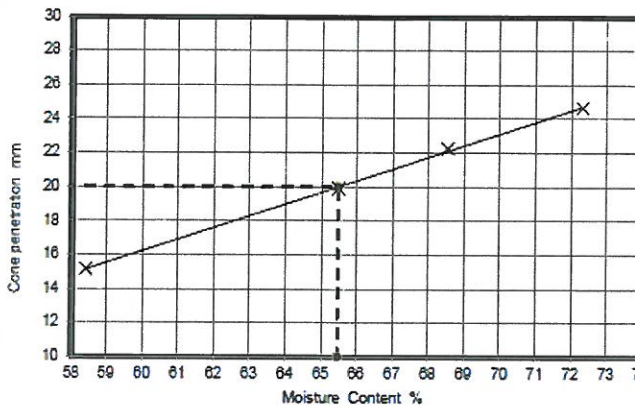


NATURAL MOISTURE CONTENT	32	%
% PASSING 425µm SIEVE	96	%
LIQUID LIMIT	70	%
PLASTIC LIMIT	18	%
PLASTICITY INDEX	52	%

Remarks

 2519	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	Checked and Approved Initials: K.P Date: 21/02/2019
	Test Report by: K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD15 9RU Tel: 01923 711 265 Email: James@k4soils.com	
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	
	MEF-5 RL	

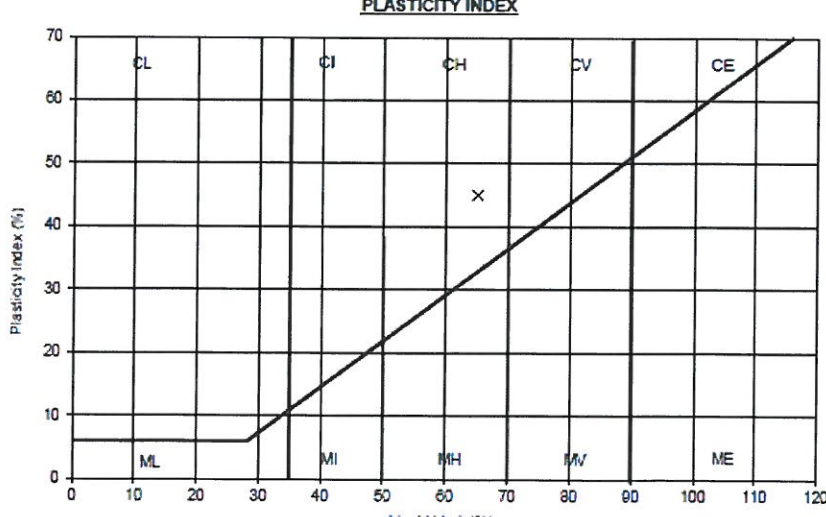
 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX		Job No.	
Site Name		25776	
Project No.		Borehole/Pit No.	
3788		TP/BH1	
Client		Sample No.	
Optera Ltd		-	
Soil Description		Depth Top	
		2.00 m	
		Depth Base	
		-	
		Sample Type	
		D	
		Samples received	
		11/01/2019	
		Schedules received	
		11/01/2019	
		Project Started	
		12/01/2019	
		Date Tested	
		20/02/2019	



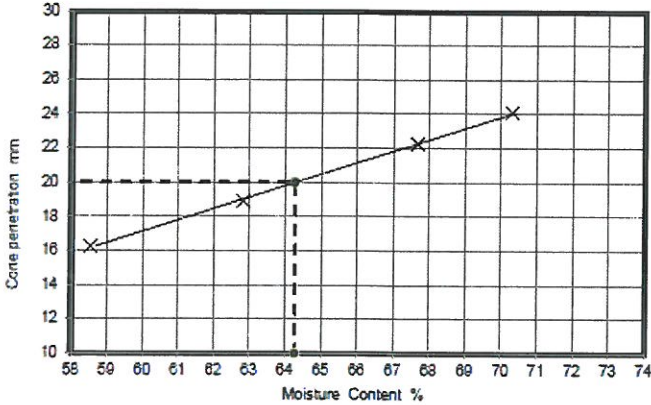
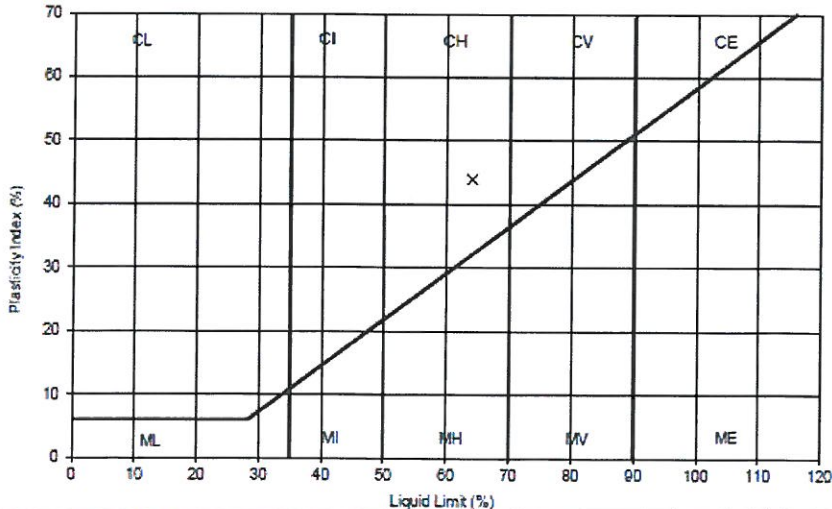
NATURAL MOISTURE CONTENT	33	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	65	%
PLASTIC LIMIT	20	%
PLASTICITY INDEX	45	%

Remarks

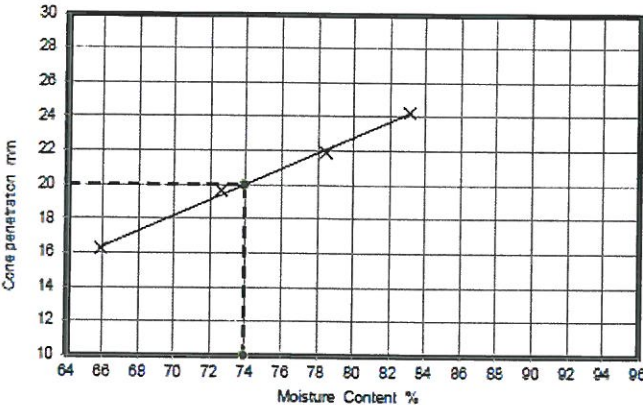
PLASTICITY INDEX



TEST METHOD		Checked and Approved	
BS1377: Part 2: Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method		Initials: K.P. Date: 21/02/2019	
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 WD15 9RU			
Tel: 01923 711 285 Email: James@k4soils.com			
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab Mgr)			

 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX				Job No.	25776															
Site Name				24 Nicholas Way, Northwood	Borehole/Pit No.	TP/BH1														
Project No.		3758	Client	Optera Ltd	Sample No.	-														
Soil Description				Depth Top	3.00 m															
				Depth Base	- m															
				Sample Type	D															
				Samples received	11/01/2019															
				Schedules received	11/01/2019															
				Project Started	12/01/2019															
				Date Tested	20/02/2019															
 <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>NATURAL MOISTURE CONTENT</td> <td>33</td> <td>%</td> </tr> <tr> <td>% PASSING 425µm SIEVE</td> <td>100</td> <td>%</td> </tr> <tr> <td>LIQUID LIMIT</td> <td>64</td> <td>%</td> </tr> <tr> <td>PLASTIC LIMIT</td> <td>20</td> <td>%</td> </tr> <tr> <td>PLASTICITY INDEX</td> <td>44</td> <td>%</td> </tr> </table>						NATURAL MOISTURE CONTENT	33	%	% PASSING 425µm SIEVE	100	%	LIQUID LIMIT	64	%	PLASTIC LIMIT	20	%	PLASTICITY INDEX	44	%
NATURAL MOISTURE CONTENT	33	%																		
% PASSING 425µm SIEVE	100	%																		
LIQUID LIMIT	64	%																		
PLASTIC LIMIT	20	%																		
PLASTICITY INDEX	44	%																		
PLASTICITY INDEX  Remarks																				
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 0RU Tel: 01923 711 265 Email: James@k4soils.com Checked and Approved Initials: K.P Date: 21/02/2019																				
2519 Approved Signatories: K.Phaure (Tech Mgr) J.Phaure (Lab Mgr)				MEF-5 RC																

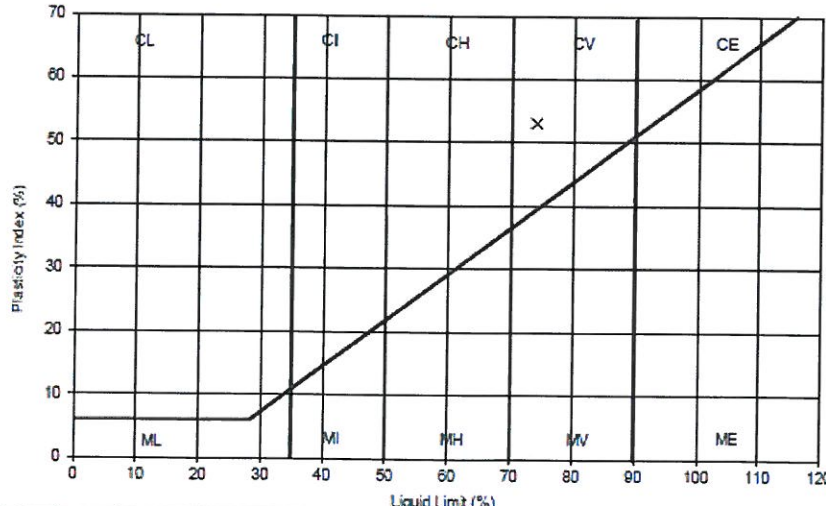
 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX				Job No.	25776	
Site Name				24 Nicholas Way, Northwood	Borehole/Pit No.	TP/BH2
Project No.		3788	Client	Optera Ltd	Sample No.	-
Soil Description				Depth Top	1.00 m	
				Depth Base	- m	
				Sample Type	D	
				Samples received	11/01/2019	
				Schedules received	11/01/2019	
				Project Started	12/01/2019	
				Date Tested	20/02/2019	



NATURAL MOISTURE CONTENT	33	%
% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	74	%
PLASTIC LIMIT	21	%
PLASTICITY INDEX	53	%

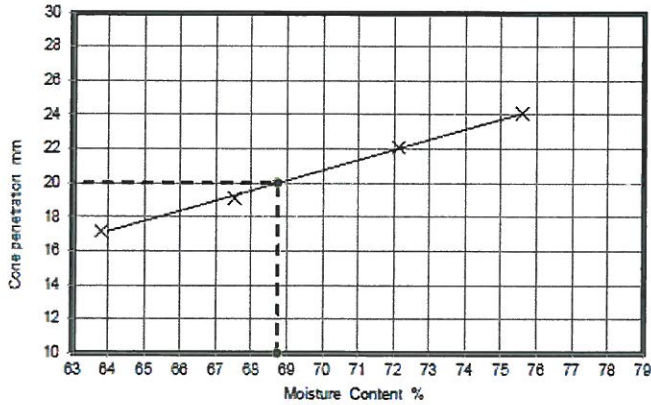
Remarks

PLASTICITY INDEX

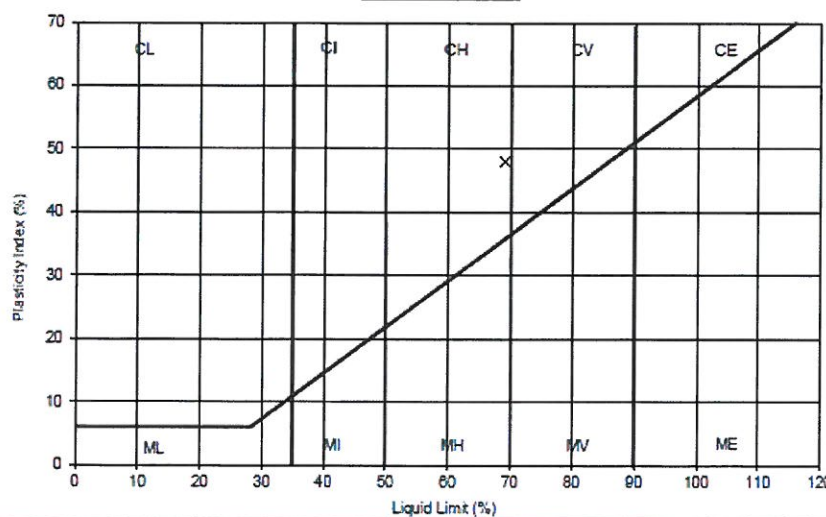


 2519	TEST METHOD BS1377: Part 2: Clause 4.4: 1990 Determination of the liquid limit by the cone penetrometer method BS1377: Part 2: Clause 5.0: 1990: Determination of the plastic limit and plasticity index BS1377: Part 2: Clause 3.2: 1990: Determination of the moisture content by the oven drying		Checked and Approved Initials: K.P. Date: 21/02/2019
	Test Report by: K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD15 9RU Tel: 01923 711 288 Email: James@k4soils.com		
	Approved Signatories: K.Phaure (Tech Mgr) J.Phaure (Lab. Mgr)		
	MEP-S RL		

 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX		Job No.	25776
Site Name		24 Nicholas Way, Northwood	
Project No.		3768	Client: Optera Ltd
Soil Description		Borehole/Pit No.	TP/BH2
		Sample No.	-
		Depth Top	2.00 m
		Depth Base	- m
		Sample Type	D
		Samples received	11/01/2019
		Schedules received	11/01/2019
		Project Started	12/01/2019
		Date Tested	20/02/2019



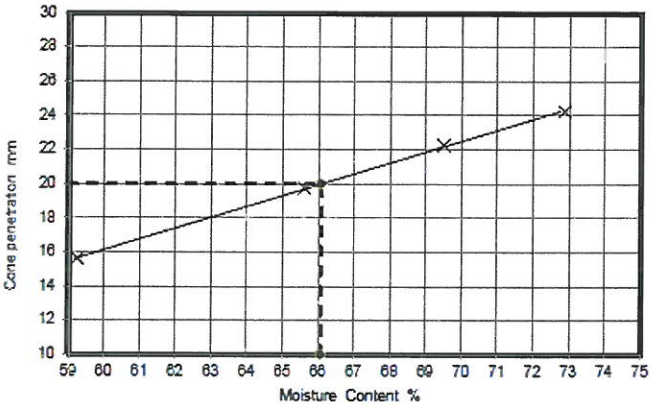
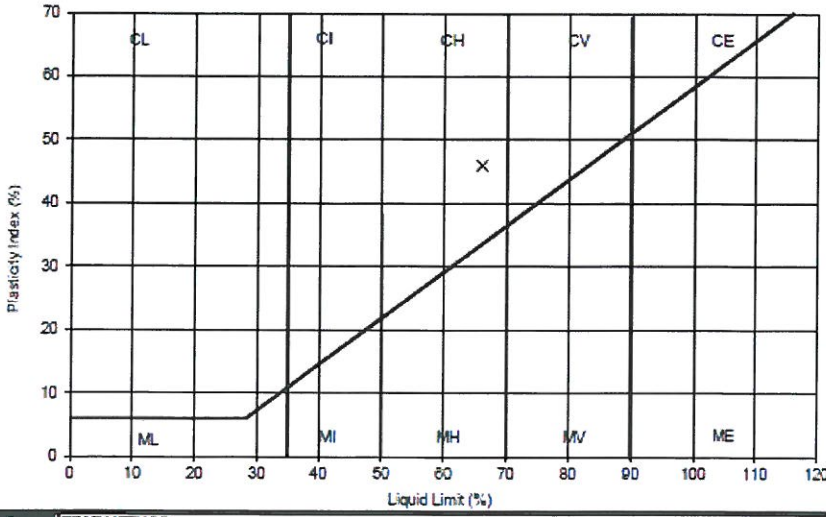
PLASTICITY INDEX



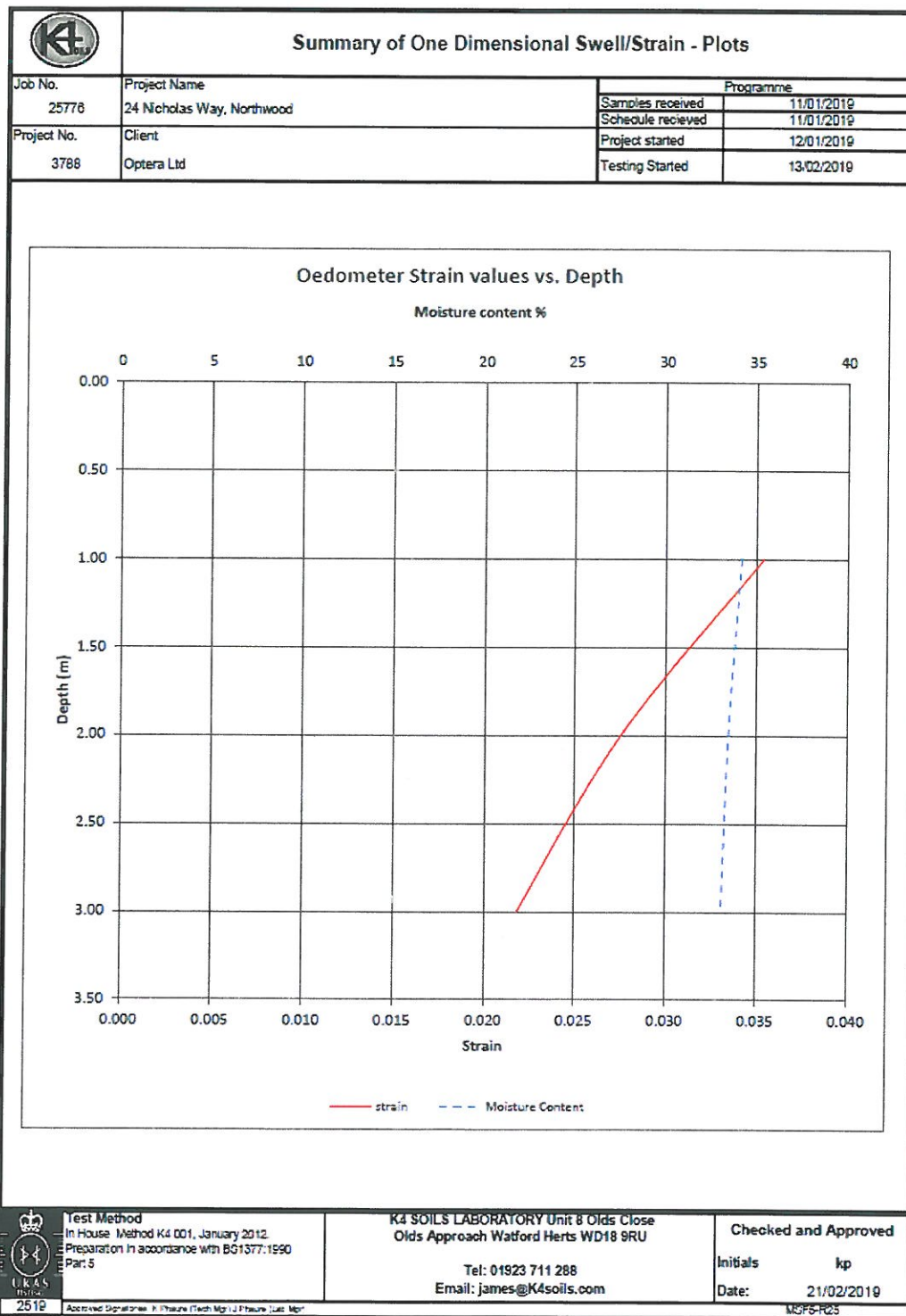
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% PASSING 425µm SIEVE	100	%
LIQUID LIMIT	69	%
PLASTIC LIMIT	21	%
PLASTICITY INDEX	48	%

Remarks

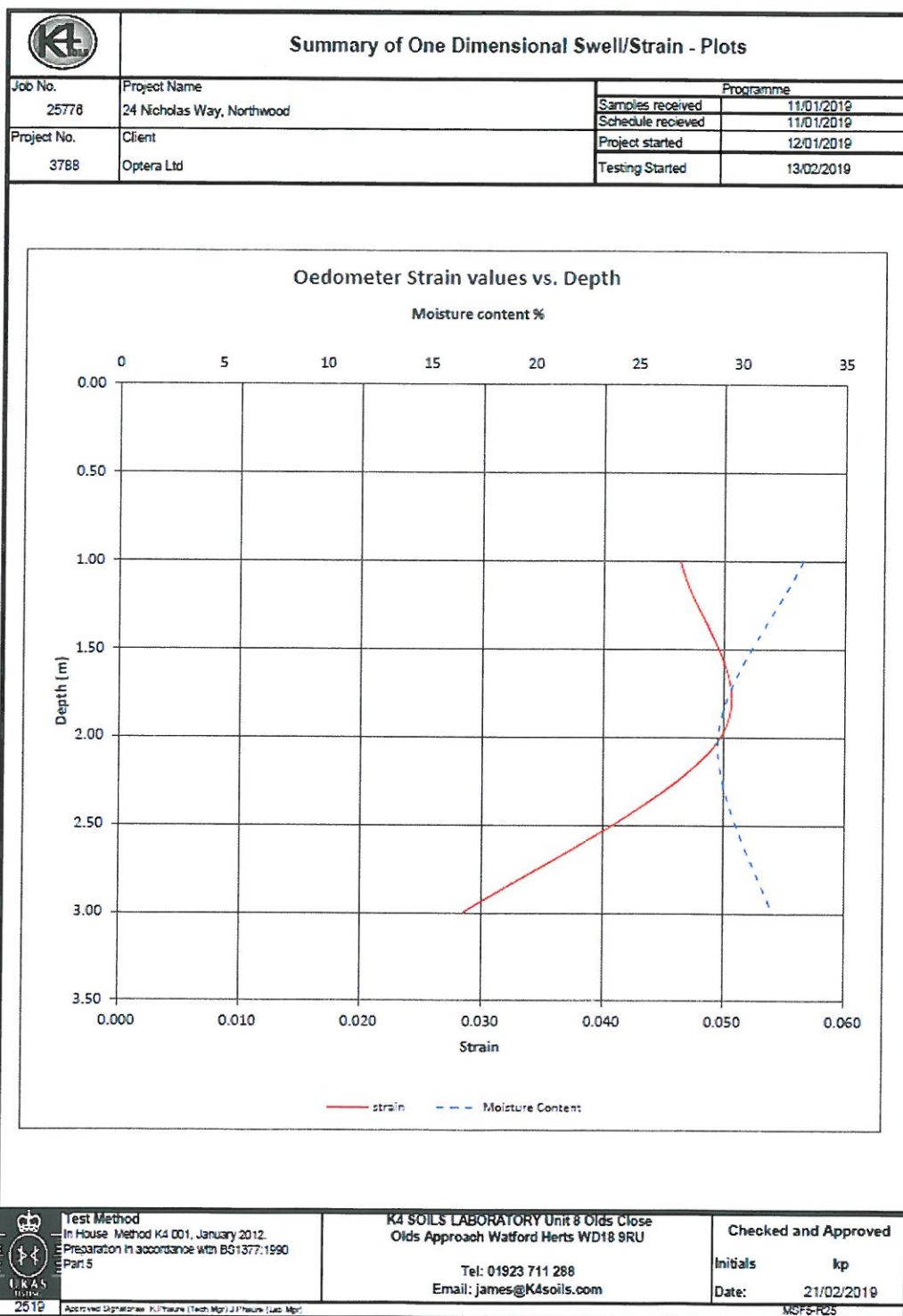
	TEST METHOD	BS1377: Part 2: Clause 4.4: 1990 Determination of the liquid limit by the cone penetrometer method	Checked and Approved Initials: K.P. Date: 21/02/2019
		BS1377: Part 2: Clause 5.0: 1990: Determination of the plastic limit and plasticity index	
		BS1377: Part 2: Clause 3.2: 1990: Determination 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 711 285 Email: James@k4soils.com		
2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MEP-6 R2

 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX				Job No.	25776															
Site Name				24 Nicholas Way, Northwood	Borehole/Pit No.	TP/BH2														
Project No.		3768	Client	Optera Ltd	Sample No.	-														
Soil Description				Depth Top	3.00 m															
				Depth Base	- m															
				Sample Type	D															
				Samples received	11/01/2019															
				Schedules received	11/01/2019															
				Project Started	12/01/2019															
				Date Tested	20/02/2019															
Greyish brown slightly mottled orangish brown and yellowish brown silty CLAY with traces of fine rootlets																				
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% PASSING 425µm SIEVE	100	%																		
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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)					MEP-S R2															

K4		Summary of One-Dimensional Swell/Strain Tests							
Job No. 25776	Project Name 24 Nicholas Way, Northwood						Programme		
Project No. 3788						Client Optera Ltd		Samples received 11/01/2019	
						Testing Started 13/02/2019		Schedule received 11/01/2019	
								Project started 12/01/2019	
Notes: Heave potential (Dd) expressed in mm and corrected by 0.1 mm to take account of disturbance during sample preparation Dd is calculated based on the difference in depth between samples. A shrinkage factor of 0.5 has been assumed									
Hole No.	Sample	Soil Description	Strain %	Corrected Dd mm	Moisture Content %	Bulk Density Mg/m ³	Dry Density Mg/m ³	Remarks	
Ref	Depth	Type							
TP/BH1	-	1.00	D	0.035	17.60	34	1.89	1.41	
TP/BH1	-	2.00	D	0.028	13.66	33	1.89	1.42	
TP/BH1	-	3.00	D	0.022	10.82	33	1.92	1.44	
Predicted total free surface heave over depth of exploratory position						42.08	mm		
 Test Method In House Method K4 001, January 2012. Preparation in accordance with BS1377:1990 Part 5		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: kp Date: 21/02/2019			
2519		Approved Signature: K. P. Paine (Tech Mgr) J. Paine (Lab Mgr)				MSF-SR25			



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Our Core Services

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Site Investigation



Sub Structure Intervention



Environmental Intervention



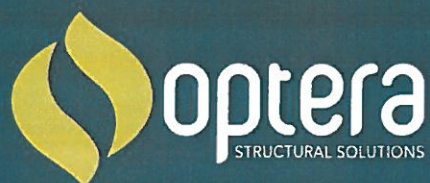
Drainage Works



Superstructure Intervention



Geotechnical Intervention



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