

Our ref: AT/GML18201/GR1

Date: 4th September 2018

BY EMAIL

Cowbit Homes Ltd
22 The Point
Rockingham Road
Market Harborough
LE16 7QU

Dear Sir / Madam,

GML18201: Addendum Geotechnical Test Results at the Land Off Moulton Chapel Road, Cowbit, Spalding.

Initial geotechnical analysis was undertaken following completion of the Phase I and II Geo-Environmental Investigation for the Land off Moulton Chapel Road, Cowbit, Spalding (ref. GML18201/1/1 dated September 2018) which **must** be read in conjunction with this report. Supplementary testing was then scheduled to provide a more comprehensive overview of site conditions, the results of which are included within this *addendum* letter report.

The geotechnical laboratory testing was carried out in accordance with BS EN 14688 'Geotechnical Investigation and Testing – Identification and Classification of Soil'. Full details of the test results are included at the end of this report.

Initial Geotechnical Analysis

For the initial testing, 1 No. representative soil sample (1 No. sample of dark grey slightly sandy silt) was tested for Particle Size Distribution with the results broadly corresponding with the engineer's logs. Samples were also analysed for Moisture Contents, with 4 No. samples tested for Plasticity Index the results are presented Table 1.0 below:

Table 1.0: Plasticity Index Results

Determinand	No. of Samples	Range	Remark
Moisture Content	15	1.30% - 32.00%	-
Very Coarse (>63.00mm)	1	0.00%	-
Gravel (2.00 – 63.00mm)	1	0.50%	-
Sand (0.063 – 2.000mm)	1	31.40%	-
Fines <0.063mm	1	68.10%	-
% passing 425µm test sieve	4	99.00% - 100.00%	-

GEO-MATTERS Ltd. Consulting Engineers
104 Bondgate, Castle Donington Derby DE74 2NR.
Tel: **01332 817 644** - 0800 0149 249

www.geo-matters.com

Company Registration : 5238140 VAT Registration : 117 4917 09



Plasticity Index (unmodified)	3	Non-Plastic – 22.00%	Medium Plasticity
Modified Plasticity Index	3	Non-Plastic – 22.00%	Medium Plasticity

From the results outlined in Table 1.0, on-site cohesive soils have been calculated to have modified plasticity indices ranging between 16.00% and 22.00% indicating cohesive soils to have an overall **MEDIUM** volume change potential as a maximum classification, which should be used when calculating foundation depths across the site in accordance with the relevant standards (e.g. NHBC Standards, Chapter 4.2).

Supplementary Geotechnical Analysis

To provide a more comprehensive overview of site conditions and in accordance with Local Authority guidance on highways design, 3 No. laboratory-soaked California Bearing Ratio Tests (CBRs) were completed.

The results, which are attached, are summarised below:

- CBR01 taken from 0.50m begl (below existing ground level) in the northern part of the site recorded CBR values of between 0.40% (top of sample) and 5.50% (sample base);
- CBR03 taken from 0.60m begl in the central part of the site recorded CBR values of between 0.90% (top of sample) and 4.50% (sample base); and
- CBR04 taken from 0.70m begl in the eastern part of the site recorded CBR results of between 0.70% (top of sample) and 3.30% (sample base).

Subject to final layouts etc., *in situ* CBR tests may be considered to confirm specific conditions in the areas of proposed road construction. This may be particularly relevant in areas of very low *in situ* strength or over the path of drainage ditches etc. All road construction proposals should be agreed with the Local Authority prior to finalising designs.

Conclusions

The results of the supplementary testing do not significantly change the conclusions / recommendations of the Phase I and II Geo-Environmental Investigation report dated September 2018. Therefore, the results and the recommendations of the Phase I and II Geo-Environmental Investigation report are still considered appropriate at this stage.

Copies of this *addendum* report should be forwarded to the appropriate regulatory authorities by the Client should they be required as part of any planning applications etc. in the future.

Should you have any queries or require any further information then please do not hesitate to contact us.

Yours faithfully
For Geo-Matters Ltd

Alex Thornber
Geo-Environmental Engineer
Encs. Exploratory Hole Location Plan
Laboratory Test Certificates



- DO NOT SCALE
- NOTES:
-  Approx. Site Boundary
 -  Approx. Location of Boreholes
 -  Approx. Location of Trenches and Trial Pits



www.geo-matters.com
info@geo-matters.com

CLIENT:

Cowbit Homes Ltd

PROJECT:

Land off Moulton Chapel Road,
Cowbit, Spalding

TITLE:

Exploratory Hole Layout Plan

SCALE@SIZE :

NTS

ISSUE:

FINAL

DESIGN/DRAWN:

AT

DATE:

September 2018

PROJECT No:

GML18201

DRAWING No:

005

© Geo-Matters Ltd



4041

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Geo-Matters Limited
Client Address: 104 Bondgate
Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

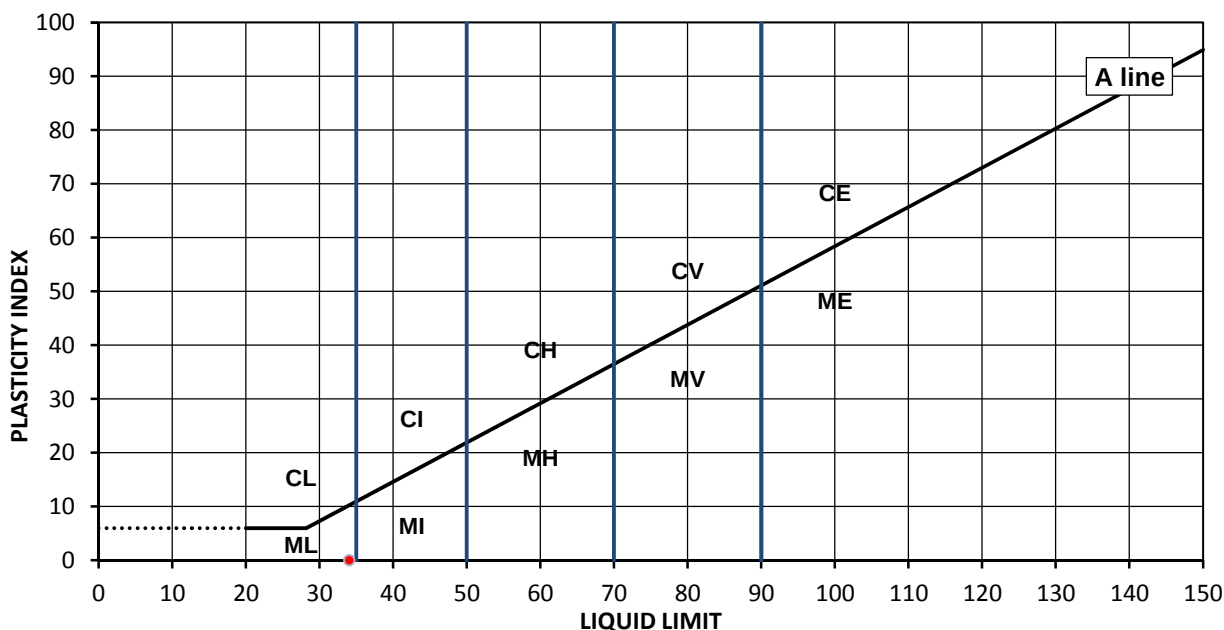
Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 25/07/2018
Date Received: 26/07/2018
Date Tested: 03/08/2018
Sampled By: AT

Test Results

Laboratory Reference: 1011931
Hole No.: WS01
Sample Reference: Not Given
Soil Description: Brown very sandy CLAY
Sample Preparation: Tested in natural condition

Depth Top [m]: 1.00
Depth Base [m]: Not Given
Sample Type: B

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
23	34	NP	NP	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L Low	below 35
		I Medium	35 to 50
		H High	50 to 70
		V Very high	70 to 90
		E Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Remarks: NP – non plastic

Approved:

Maria Chandler
Site Manager
Northampton
Date Reported:

30/08/2018

Signed:

Darren Berrill
Geotechnical General
Manager

for and on behalf of i2 Analytical Ltd

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The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."



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Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

i2 Analytical Ltd
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DE74 2NR
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Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

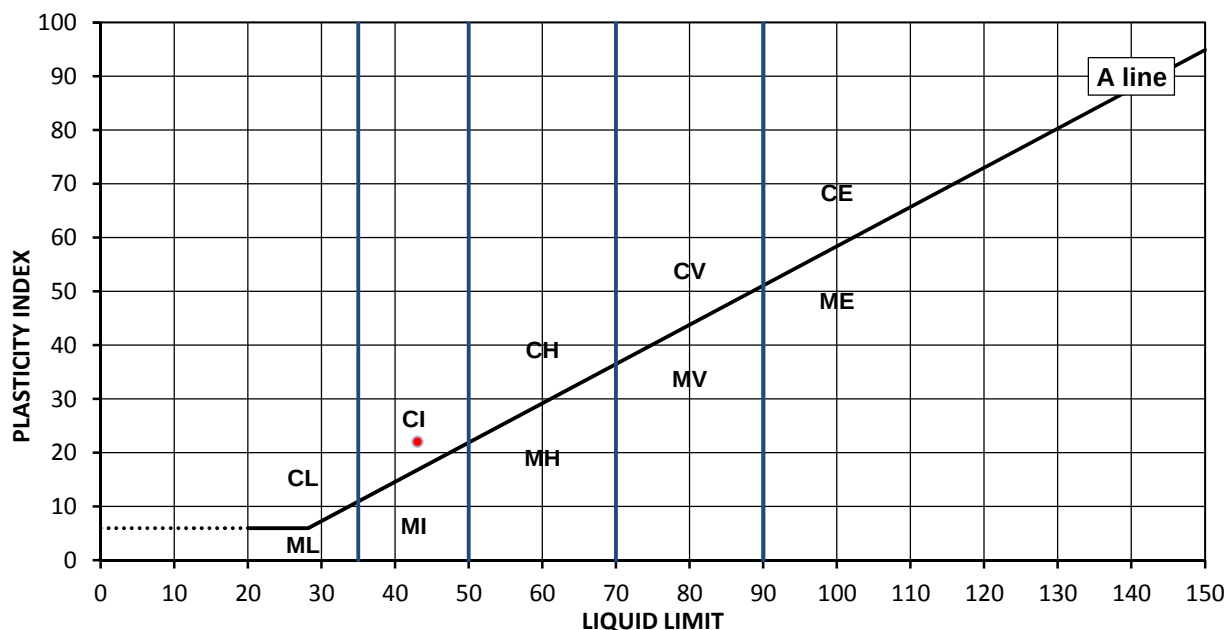
Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 25/07/2018
Date Received: 26/07/2018
Date Tested: 03/08/2018
Sampled By: AT

Test Results

Laboratory Reference: 1011932
Hole No.: WS03
Sample Reference: Not Given
Soil Description: Brown sandy CLAY
Sample Preparation: Tested in natural condition

Depth Top [m]: 1.20
Depth Base [m]: Not Given
Sample Type: B

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
23	43	21	22	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L Low	below 35
		I Medium	35 to 50
		H High	50 to 70
		V Very high	70 to 90
		E Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Remarks:

Approved:

Maria Chandler
Site Manager
Northampton
Date Reported:

30/08/2018

Signed:

Darren Berrill
Geotechnical General
Manager

for and on behalf of i2 Analytical Ltd

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Determination of Liquid and Plastic Limits

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Geo-Matters Limited
Client Address: 104 Bondgate
Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

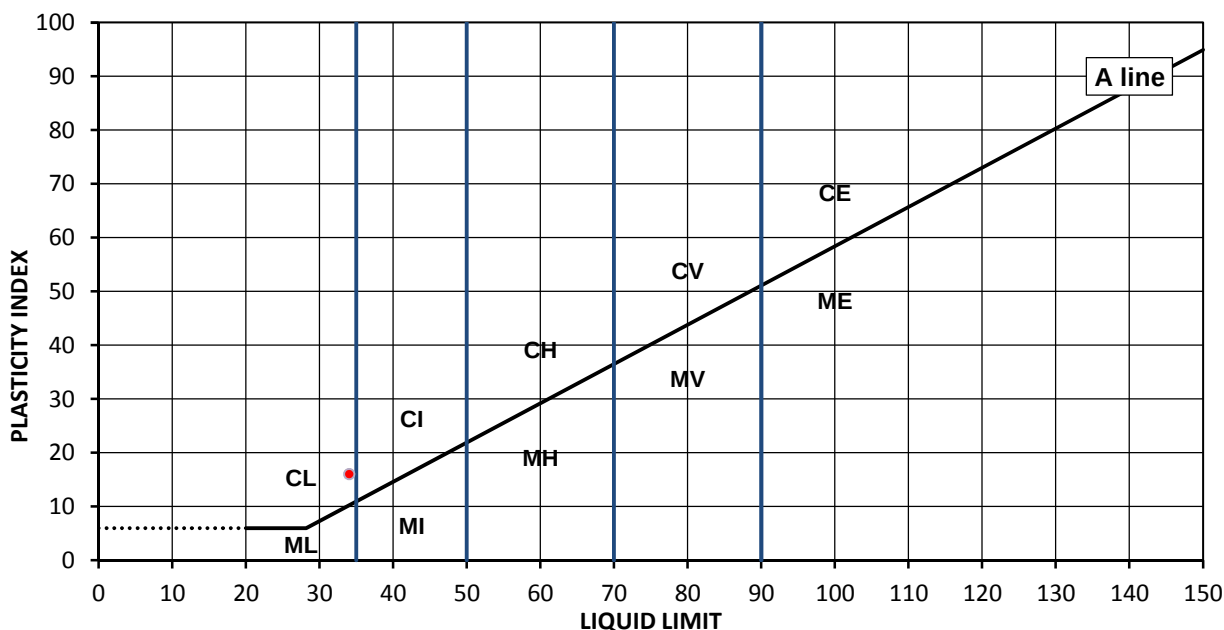
Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 25/07/2018
Date Received: 26/07/2018
Date Tested: 03/08/2018
Sampled By: AT

Test Results

Laboratory Reference: 1011933
Hole No.: WS05
Sample Reference: Not Given
Soil Description: Brown very sandy CLAY
Sample Preparation: Tested in natural condition

Depth Top [m]: 1.20
Depth Base [m]: Not Given
Sample Type: B

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
23	34	18	16	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L Low	below 35
		I Medium	35 to 50
		H High	50 to 70
		V Very high	70 to 90
		E Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Remarks:

Approved:

Maria Chandler
Site Manager
Northampton
Date Reported:

30/08/2018

Signed:

Darren Berrill
Geotechnical General
Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Geo-Matters Limited
Client Address: 104 Bondgate
Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 25/07/2018
Date Received: 26/07/2018
Date Tested: 03/08/2018
Sampled By: AT

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	M/C	Atterberg				Density		Total Porosity
		Reference	Top depth [m]	Base depth [m]	Type			% Passing 425um	LL	PL	PI	bulk	PD	
							%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3
1011931	WS01	Not Given	1.00	Not Given	B	Brown very sandy CLAY	23	100	34	NP	NP			
1011932	WS03	Not Given	1.20	Not Given	B	Brown sandy CLAY	23	100	43	21	22			
1011933	WS05	Not Given	1.20	Not Given	B	Brown very sandy CLAY	23	100	34	18	16			

Comments: NP - non plastic

Approved:

Maria Chandler
Site Manager Northampton

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 30/08/2018

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

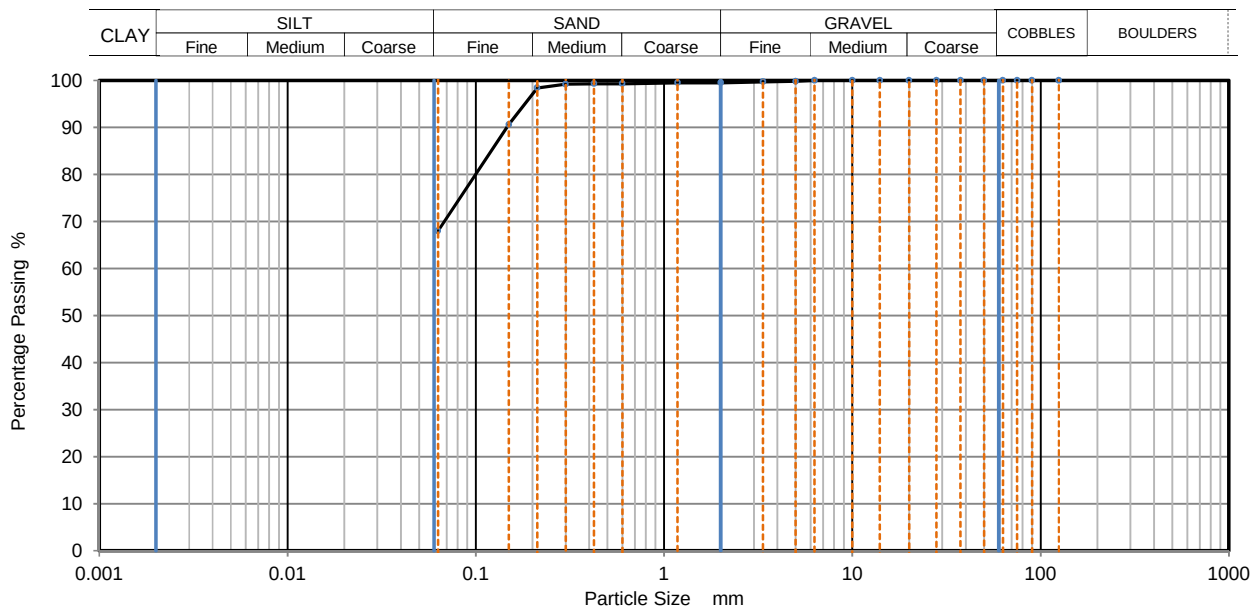
Client: Geo-Matters Limited
Client Address: 104 Bondgate
Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 24/07/2018
Date Received: 26/07/2018
Date Tested: 03/08/2018
Sampled By: AT

TEST RESULTS

Laboratory Reference: 1011934
Sample description: Mottled brown very sandy CLAY
Location: WS08
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 2.80
Depth Base [m]: Not Given





TEST CERTIFICATE

Determination of California Bearing Ratio

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Geo-Matters Limited
Client Address: 104 Bondgate
Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 24/07/2018
Date Received: 26/07/2018
Date Tested: 29/08/2018
Sampled By: AT

Test Results:

Laboratory Reference: 1011928
Hole No.: CBR01
Sample Reference: Not Given

Depth Top [m]: 0.50
Depth Base [m]: Not Given
Sample Type: B

Specimen Preparation:

Condition: Remoulded
Details: Recompacted with specified standard effort using 2.5kg rammer

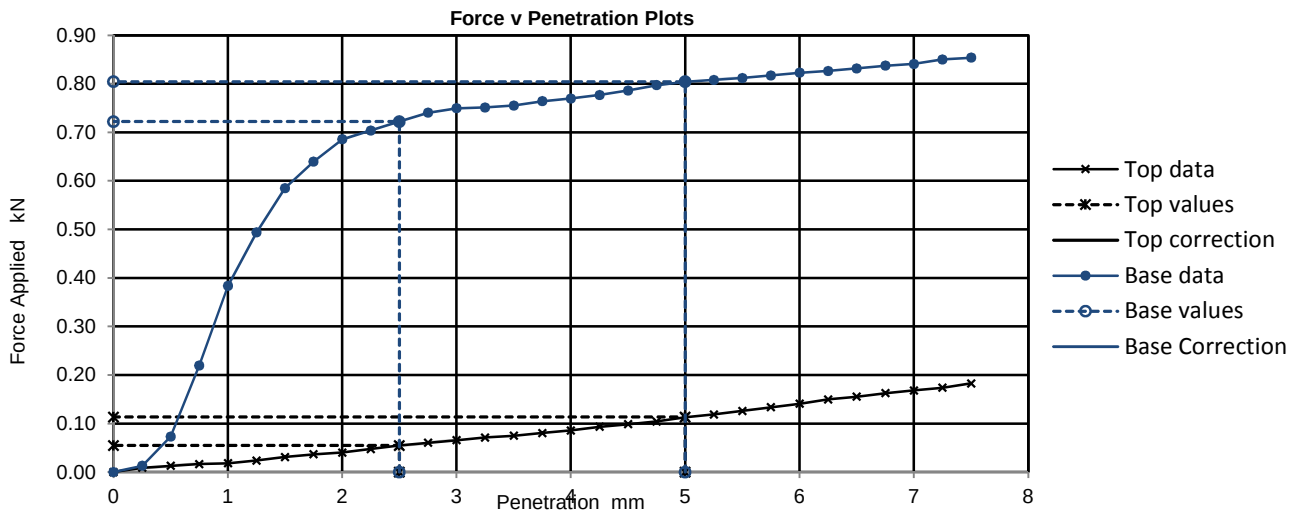
Sample Description: Brown clayey SILT

Material retained on 20mm sieve removed 0 %

Initial Specimen details
Bulk density 1.83 Mg/m3
Dry density 1.61 Mg/m3
Moisture content 14 %

Soaking details

Period of soaking 21 days
Time to surface 1.00 days
Amount of swell recorded 8.43 mm
Dry density after soaking 1.51 Mg/m3
Surcharge applied 8 kg
4.9 kPa



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	0.4	0.6	0.6	
No	5.5	4.0	5.5	

Moisture Content %
20
21

Remarks:

Test/ Specimen specific remarks:

Approved:

Signed:

Maria Chandler
Site Manager
Northampton

Darren Berrill
Geotechnical General
Manager

Date Reported: 30/08/2018

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of California Bearing Ratio

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Geo-Matters Limited
Client Address: 104 Bondgate
Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 24/07/2018
Date Received: 26/07/2018
Date Tested: 29/08/2018
Sampled By: AT

Test Results:

Laboratory Reference: 1011929
Hole No.: CBR03
Sample Reference: Not Given

Depth Top [m]: 0.60
Depth Base [m]: Not Given
Sample Type: B

Specimen Preparation:

Condition: Remoulded
Details: Recompacted with specified standard effort using 2.5kg rammer

Sample Description: Light brown clayey SILT

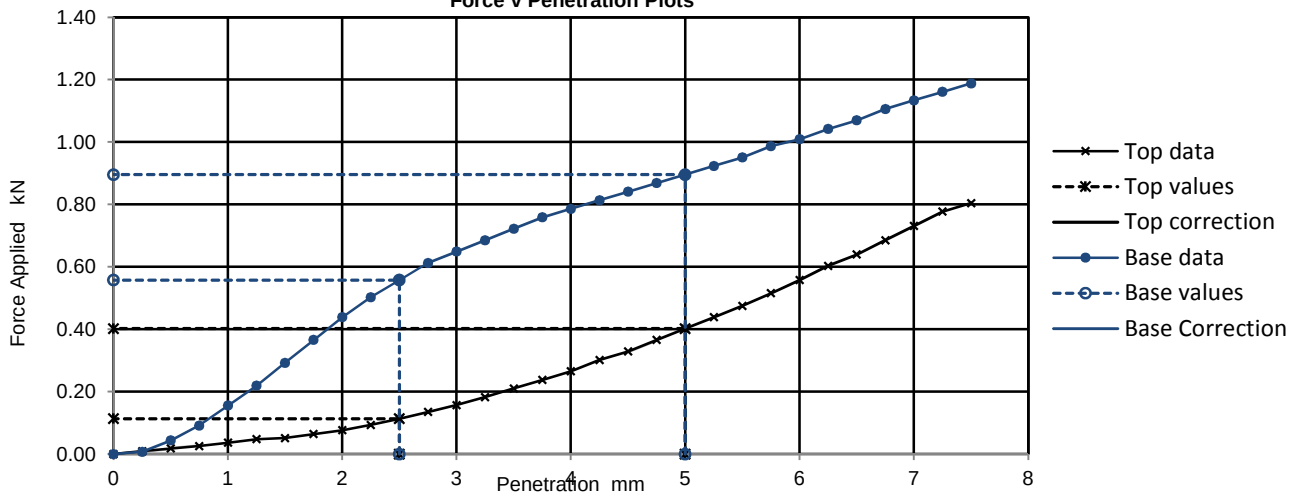
Material retained on 20mm sieve removed 0 %

Initial Specimen details
Bulk density 1.84 Mg/m3
Dry density 1.61 Mg/m3
Moisture content 14 %

Soaking details

Period of soaking 21 days
Time to surface 1.00 days
Amount of swell recorded 3.17 mm
Dry density after soaking 1.57 Mg/m3
Surcharge applied 8 kg
4.9 kPa

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	0.9	2.0	2.0	
No	4.2	4.5	4.5	

Moisture Content %
24
24

Remarks:

Test/ Specimen specific remarks:

Approved:

Signed:

Maria Chandler
Site Manager
Northampton

Darren Berrill
Geotechnical General
Manager

Date Reported: 30/08/2018

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of California Bearing Ratio

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Geo-Matters Limited
Client Address: 104 Bondgate
Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 24/07/2018
Date Received: 26/07/2018
Date Tested: 29/08/2018
Sampled By: AT

Test Results:

Laboratory Reference: 1011930
Hole No.: CBR04
Sample Reference: Not Given

Depth Top [m]: 0.70
Depth Base [m]: Not Given
Sample Type: B

Specimen Preparation:

Condition: Remoulded
Details: Recompacted with specified standard effort using 2.5kg rammer

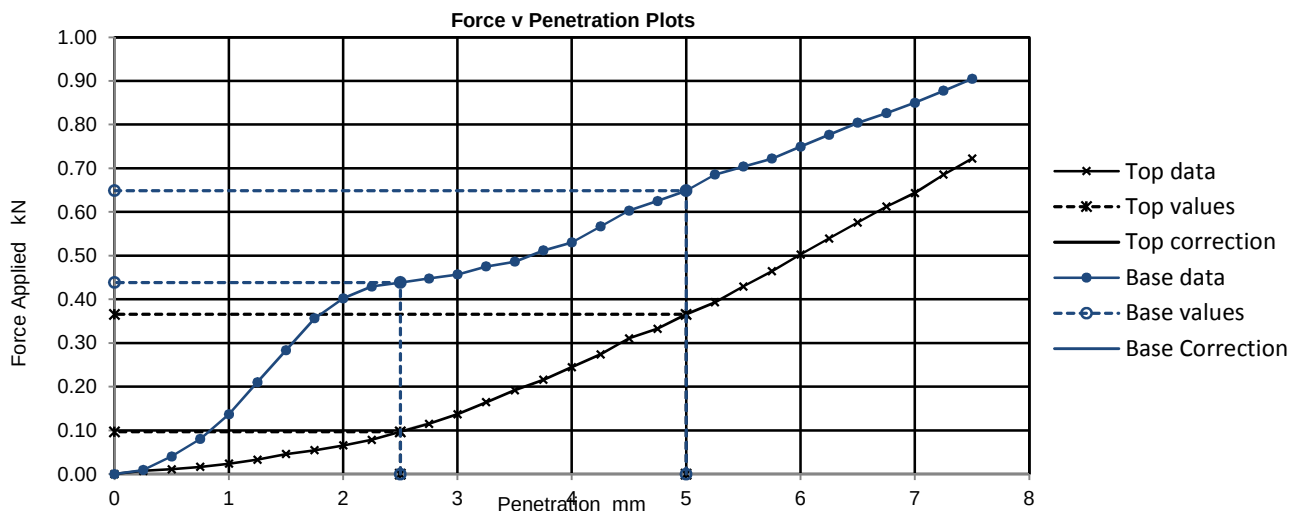
Sample Description: Light brown slightly clayey SILT

Material retained on 20mm sieve removed 0 %

Initial Specimen details
Bulk density 1.81 Mg/m3
Dry density 1.61 Mg/m3
Moisture content 13 %

Soaking details

Period of soaking 21 days
Time to surface 1.00 days
Amount of swell recorded 4.36 mm
Dry density after soaking 1.55 Mg/m3
Surcharge applied 8 kg
4.9 kPa



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	0.7	1.8	1.8	
No	3.3	3.2	3.3	

Moisture Content %
25
21

Remarks:

Test/ Specimen specific remarks:

Approved:

Signed:

Maria Chandler
Site Manager
Northampton

Darren Berrill
Geotechnical General
Manager

Date Reported: 30/08/2018

for and on behalf of i2 Analytical Ltd

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Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

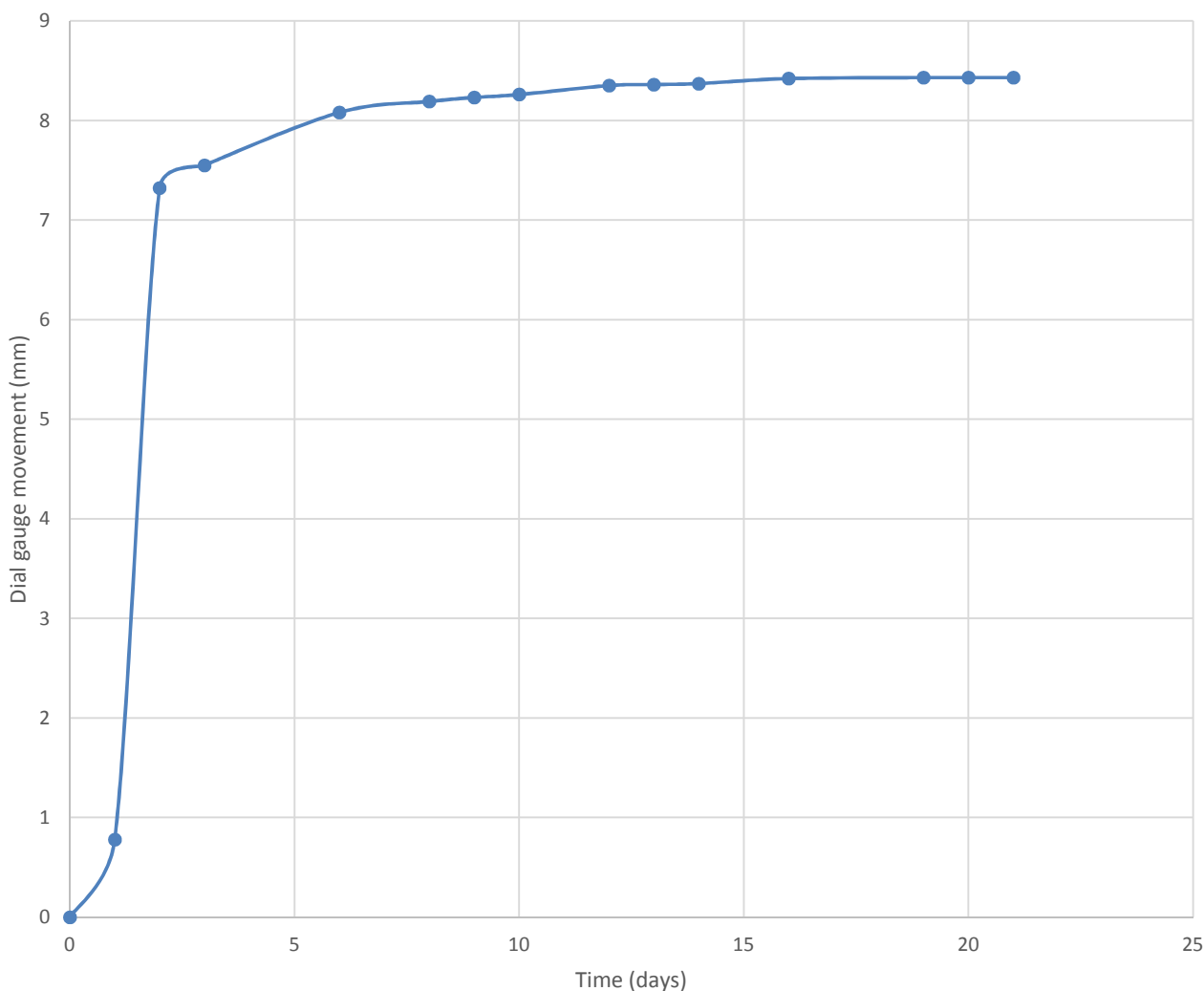
Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 24/07/2018
Date Received: 26/07/2018
Date Tested: 08/08/2018
Sampled By: AT

Test Results

Laboratory Reference: 1011928
Hole No.: CBR01
Sample Reference: Not Given

Depth Top [m]: 0.50
Depth Base [m]: Not Given
Sample Type: B

CBR Soaked Graph



Remarks:

Test/ Specimen specific remarks:

Approved:

Maria Chandler
Site Manager
Northampton

Signed:

Darren Berrill
Geotechnical General
Manager

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Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

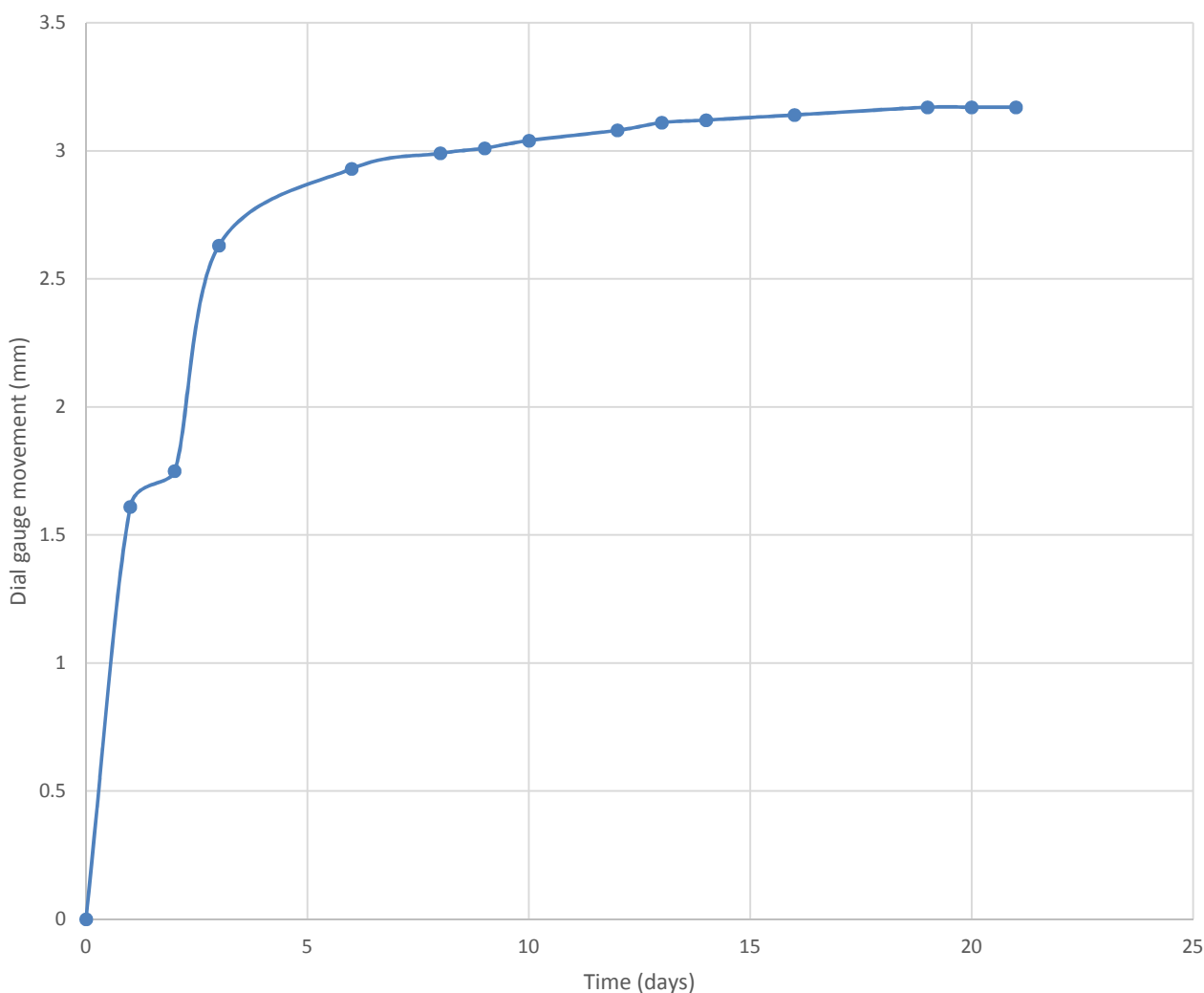
Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 24/07/2018
Date Received: 26/07/2018
Date Tested: 08/08/2018
Sampled By: AT

Test Results

Laboratory Reference: 1011929
Hole No.: CBR03
Sample Reference: Not Given

Depth Top [m]: 0.60
Depth Base [m]: Not Given
Sample Type: B

CBR Soaked Graph



Remarks:

Test/ Specimen specific remarks:

Approved:

Maria Chandler
Site Manager
Northampton

Signed:

Darren Berrill
Geotechnical General
Manager

Date Reported: 30/08/2018

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Castle Donington
DE74 2NR
Contact: Alex Thornber
Site Name: Site off Maulton Chapel, Cowbit
Site Address: Not Given

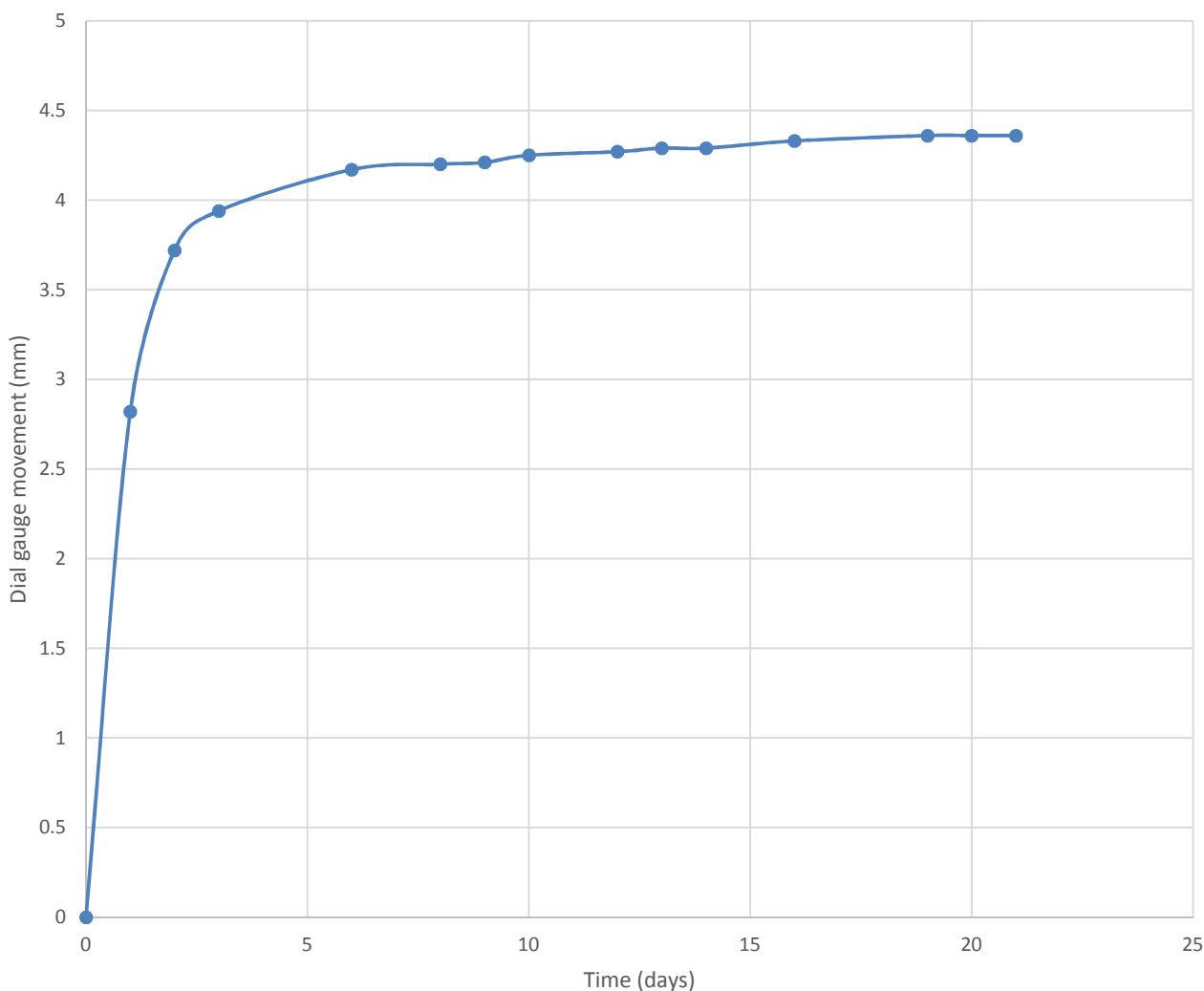
Client Reference: GML18201
Job Number: 18-94459
Date Sampled: 24/07/2018
Date Received: 26/07/2018
Date Tested: 08/08/2018
Sampled By: AT

Test Results

Laboratory Reference: 1011930
Hole No.: CBR04
Sample Reference: Not Given

Depth Top [m]: 0.70
Depth Base [m]: Not Given
Sample Type: B

CBR Soaked Graph



Remarks:

Test/ Specimen specific remarks:

Approved:

Signed:

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Site Manager
Northampton

Darren Berrill
Geotechnical General
Manager

Date Reported: 30/08/2018

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