



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: CURTINS
Client Address: Rose Wharf, Ground Floor,
78-80 East Street, Leeds,
LS9 8EE
Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 01/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

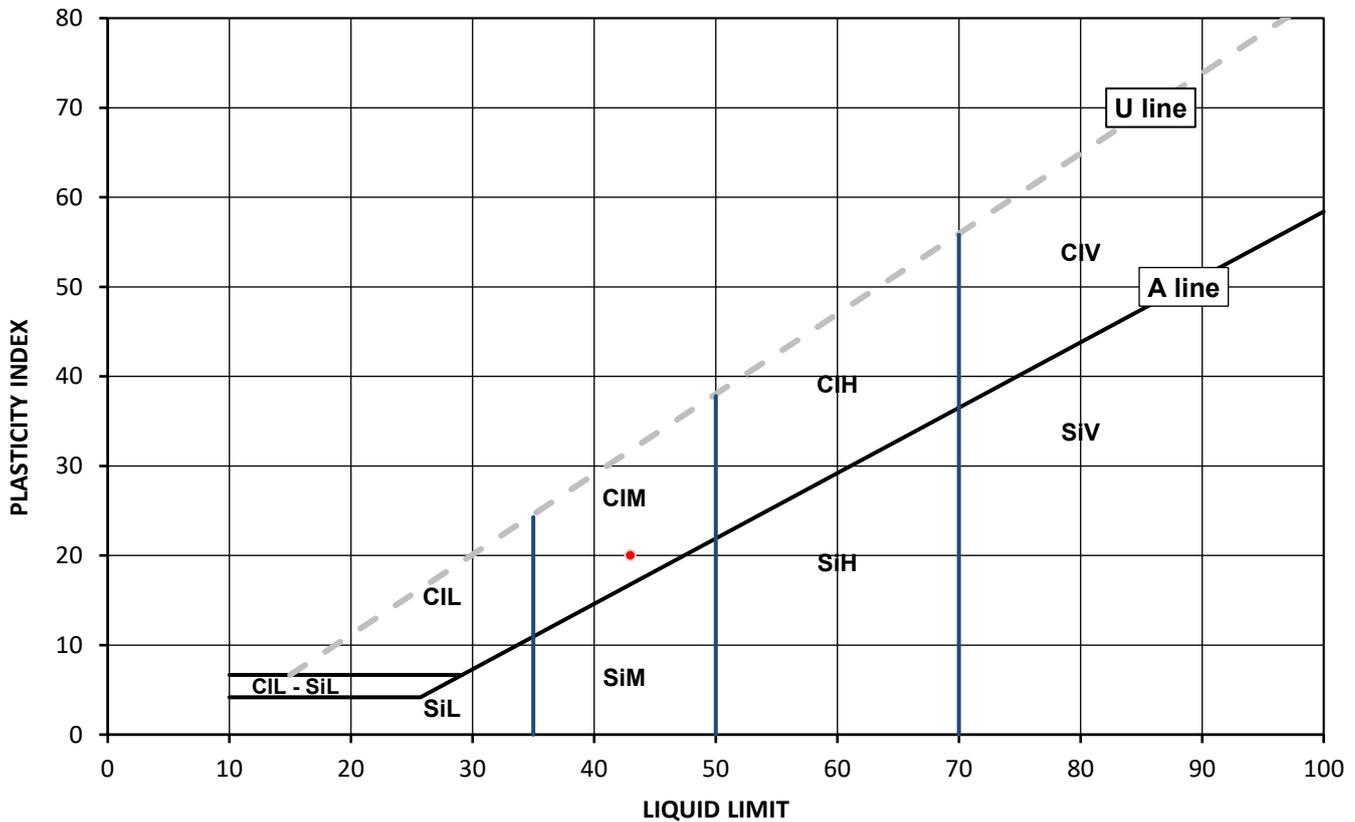
Test Results:

Laboratory Reference: 1622089
Hole No.: TT201
Sample Reference: Not Given
Soil Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 1.00
Depth Base [m]: 1.50
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
25	43	23	20	94



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed: **Redacted**
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Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd



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Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 03/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

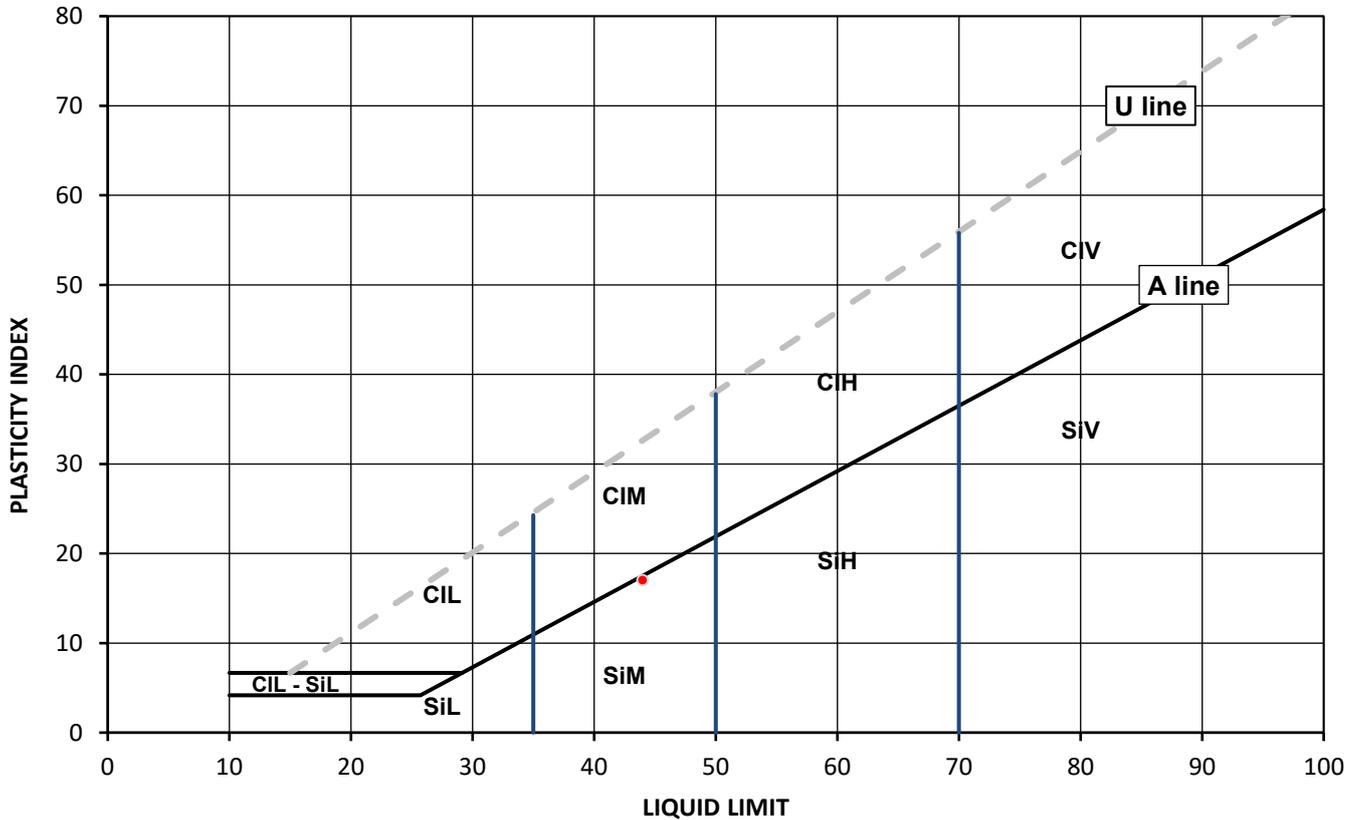
Test Results:

Laboratory Reference: 1622090
Hole No.: BH201
Sample Reference: Not Given
Soil Description: Dark brown slightly gravelly sandy CLAY

Depth Top [m]: 13.00
Depth Base [m]: 13.50
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
17	44	27	17	88



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Ci	Clay	Plasticity	Liquid Limit
Si	Silt	L	Low
		M	Medium
		H	High
		V	Very high
		O	Organic
			below 35
			35 to 50
			50 to 70
			exceeding 70
			append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 03/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

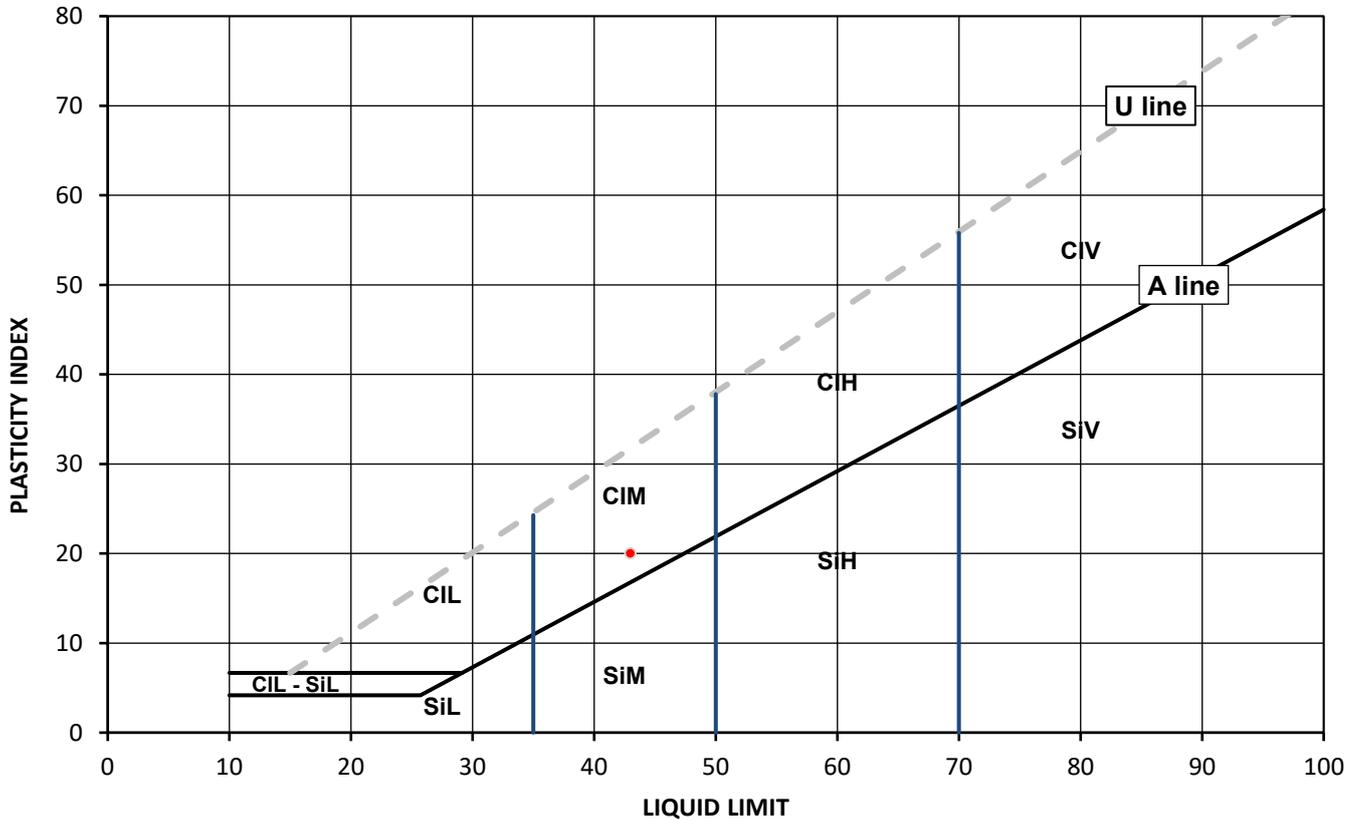
Test Results:

Laboratory Reference: 1622091
Hole No.: BH201
Sample Reference: Not Given
Soil Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: 2.50
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
13	43	23	20	91



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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78-80 East Street, Leeds,
LS9 8EE
Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 07/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

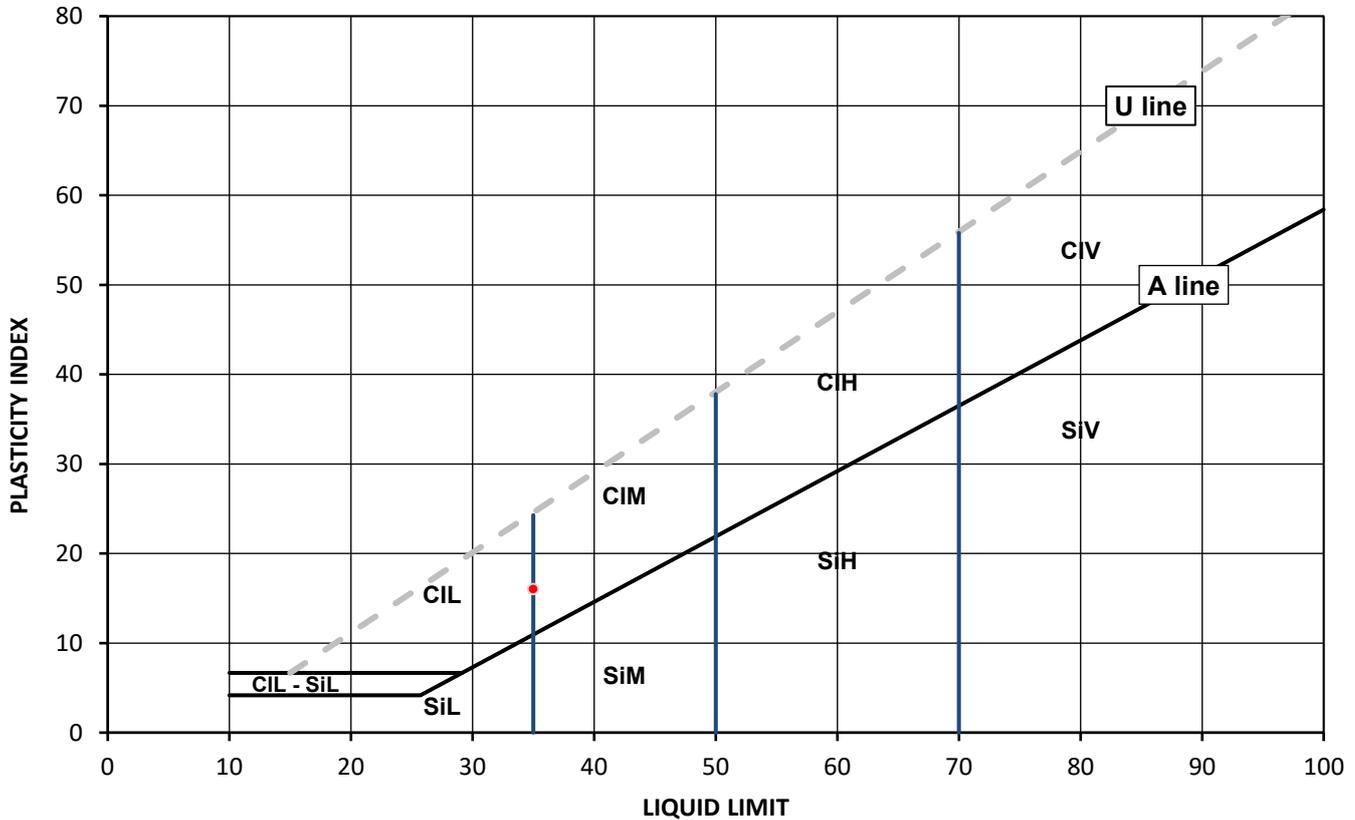
Test Results:

Laboratory Reference: 1622092
Hole No.: BH203
Sample Reference: Not Given
Soil Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 1.50
Depth Base [m]: 2.00
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
17	35	19	16	85



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Ci	Clay	Plasticity	Liquid Limit
Si	Silt	L	Low
		M	Medium
		H	High
		V	Very high
		O	Organic
			below 35
			35 to 50
			50 to 70
			exceeding 70
			append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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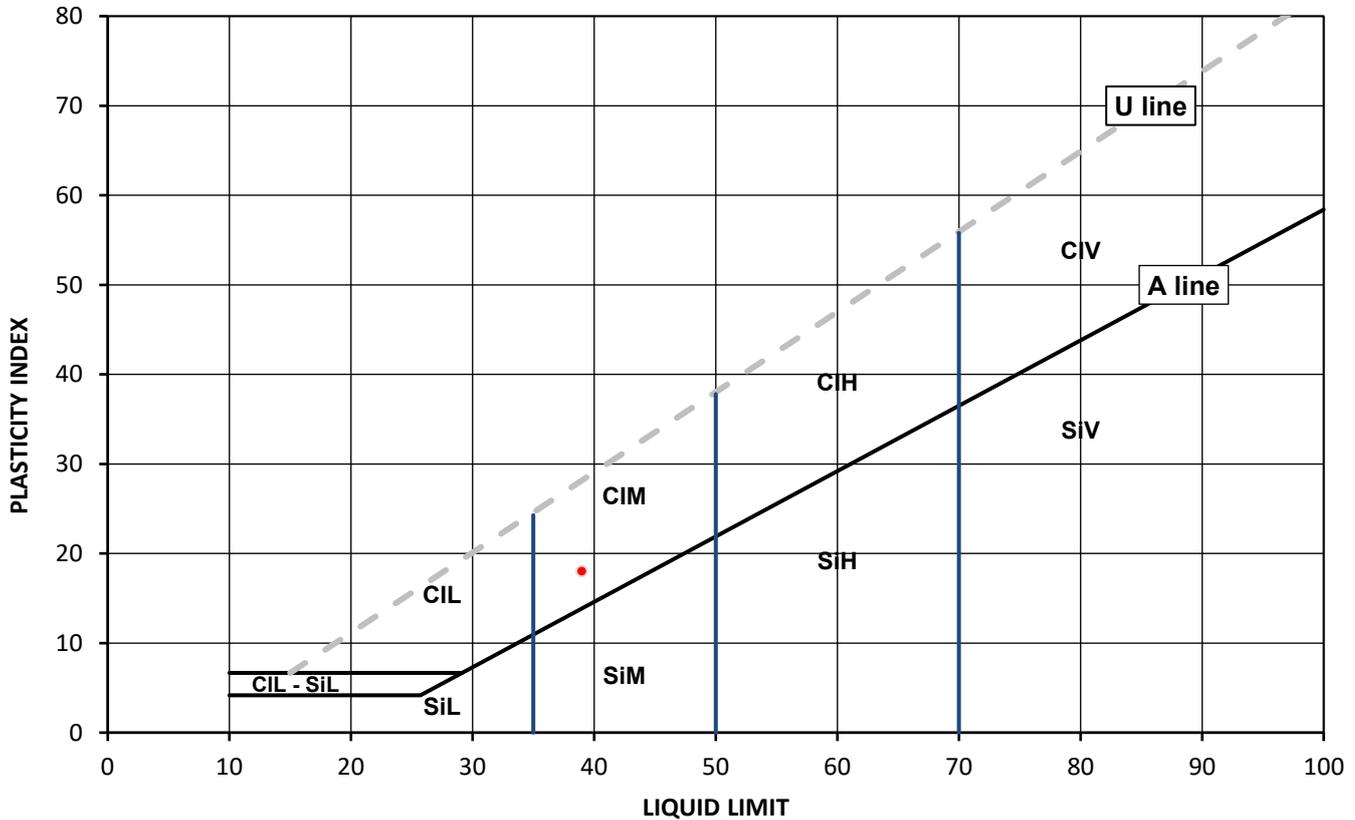
Test Results:

Laboratory Reference: 1622093
Hole No.: TT205
Sample Reference: Not Given
Soil Description: Dark brown slightly gravelly sandy CLAY

Depth Top [m]: 1.00
Depth Base [m]: 1.50
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
15	39	21	18	84



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Ci	Clay	Plasticity	Liquid Limit
Si	Silt	L	Low
		M	Medium
		H	High
		V	Very high
		O	Organic
			below 35
			35 to 50
			50 to 70
			exceeding 70
			append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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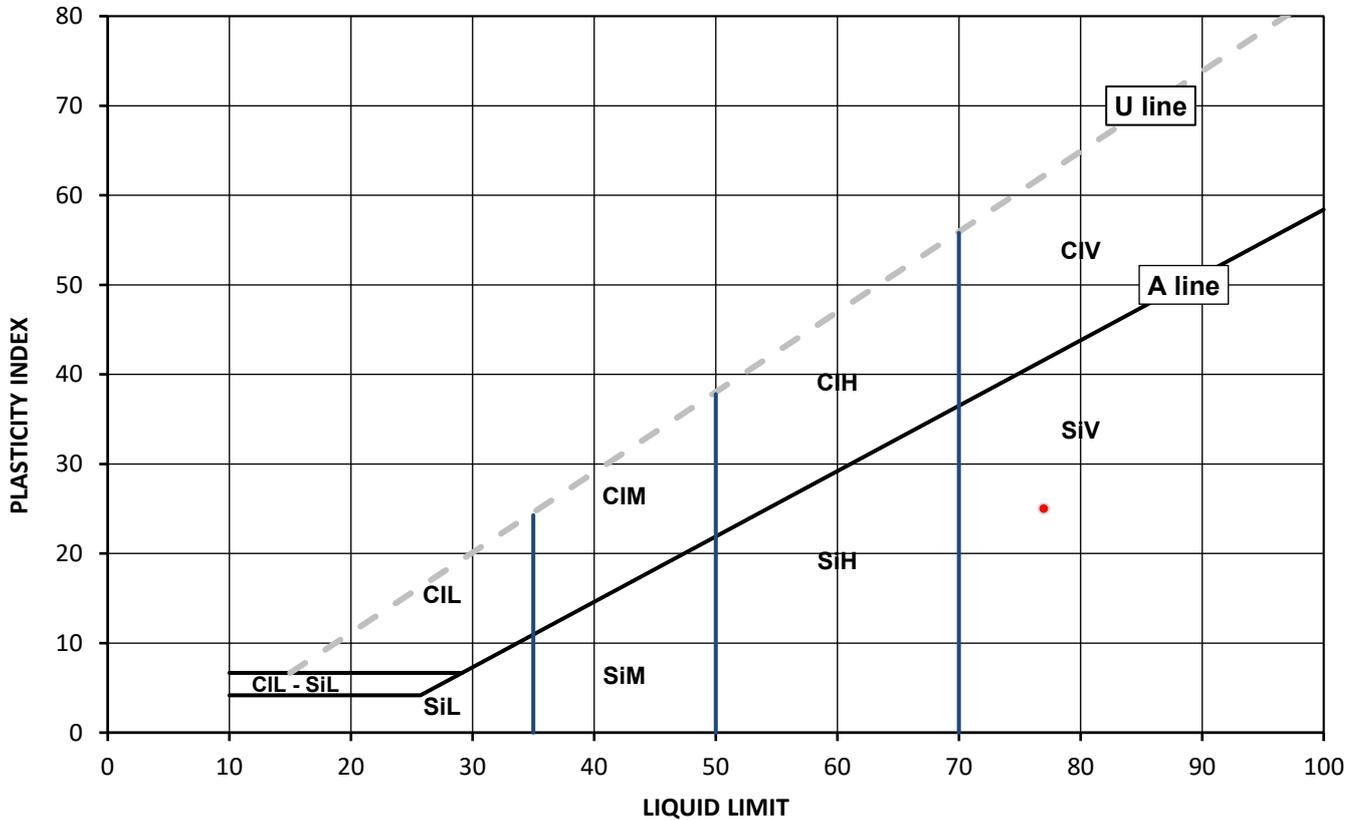
Test Results:

Laboratory Reference: 1622094
Hole No.: TT204A
Sample Reference: Not Given
Soil Description: Dark brown gravelly CLAY

Depth Top [m]: 2.00
Depth Base [m]: 2.50
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
45	77	52	25	48



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Ci	Clay	Plasticity	Liquid Limit
Si	Silt	L	Low
		M	Medium
		H	High
		V	Very high
		O	Organic
			below 35
			35 to 50
			50 to 70
			exceeding 70
			append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

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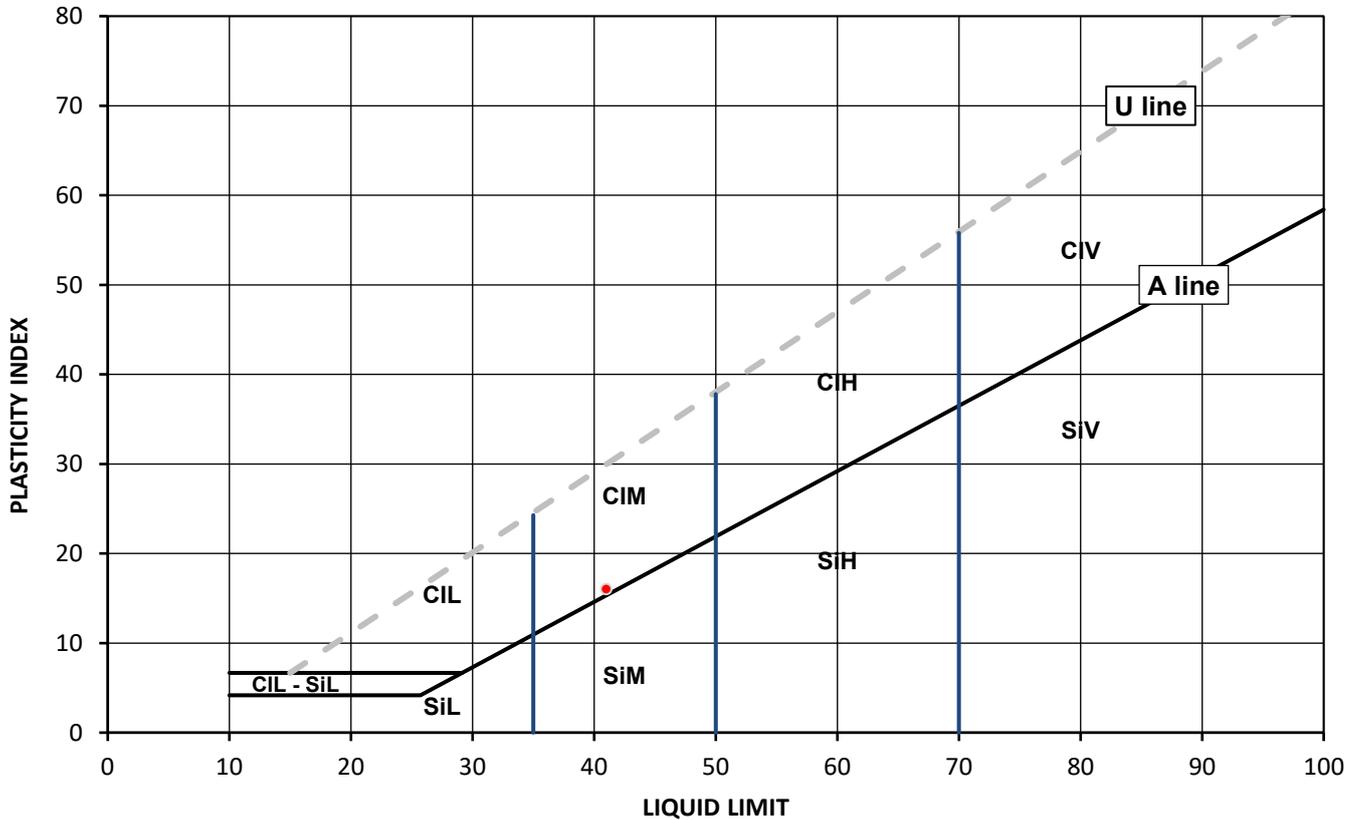
Test Results:

Laboratory Reference: 1622095
Hole No.: BH201
Sample Reference: Not Given
Soil Description: Dark brown slightly gravelly sandy CLAY

Depth Top [m]: 5.00
Depth Base [m]: 5.50
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
21	41	25	16	91



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Ci	Clay	Plasticity	Liquid Limit
Si	Silt	L	Low
		M	Medium
		H	High
		V	Very high
		O	Organic
			below 35
			35 to 50
			50 to 70
			exceeding 70
			append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 01/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

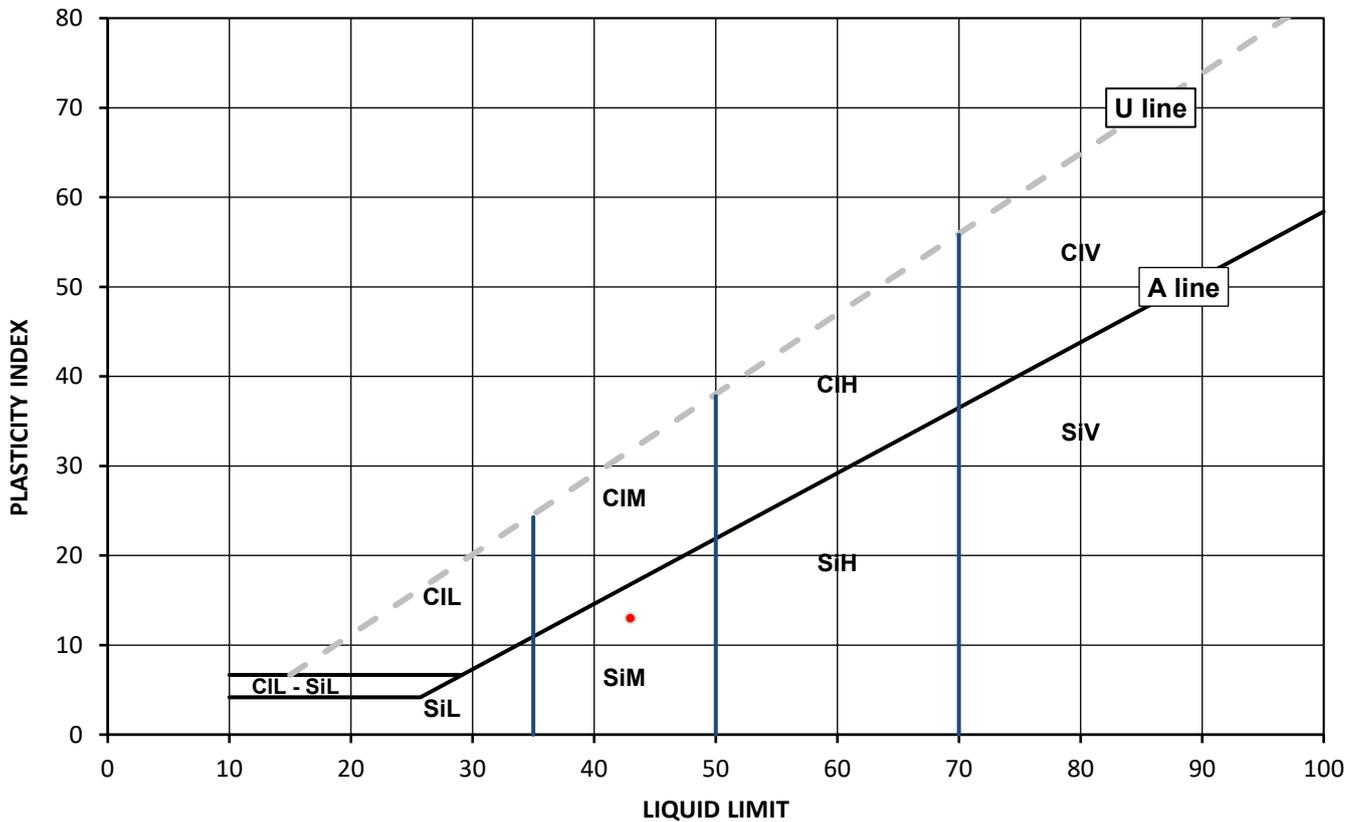
Test Results:

Laboratory Reference: 1622096
Hole No.: TT203
Sample Reference: Not Given
Soil Description: Dark brown slightly gravelly sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: 2.50
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
17	43	30	13	66



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Ci	Clay	Plasticity	Liquid Limit
Si	Silt	L	Low
		M	Medium
		H	High
		V	Very high
		O	Organic
			below 35
			35 to 50
			50 to 70
			exceeding 70
			append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
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Tested in Accordance with:

Client: CURTINS
Client Address: Rose Wharf, Ground Floor,
78-80 East Street, Leeds,
LS9 8EE
Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN
17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test),
Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 01/09 - 07/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W] %	Water Content [W] %	Atterberg				Density			Total Porosity# %
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3	
1622091	BH201	Not Given	2.00	2.50	B	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	13		91	43	23	20				
1622095	BH201	Not Given	5.00	5.50	D	Dark brown slightly gravelly sandy CLAY	Atterberg 4 Point	21		91	41	25	16				
1622090	BH201	Not Given	13.00	13.50	B	Dark brown slightly gravelly sandy CLAY	Atterberg 4 Point	17		88	44	27	17				
1622092	BH203	Not Given	1.50	2.00	B	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	17		85	35	19	16				
1622088	TT201	Not Given	0.00	0.40	B	Dark brown slightly clayey sandy GRAVEL with cobbles		8.2									
1622099	TT201	Not Given	0.40	0.80	B	Light brown sandy clayey GRAVEL with cobbles		13									
1622089	TT201	Not Given	1.00	1.50	B	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	25		94	43	23	20				
1622096	TT203	Not Given	2.00	2.50	D	Dark brown slightly gravelly sandy CLAY	Atterberg 4 Point	17		66	43	30	13				
1622094	TT204A	Not Given	2.00	2.50	B	Dark brown gravelly CLAY	Atterberg 4 Point	45		48	77	52	25				
1622097	TT204C	Not Given	2.20	2.70	B	Dark brown slightly clayey sandy GRAVEL with shales		10									

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Redacted

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Unit 8 Harrowden Road
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Northampton NN4 7EB



Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: 76893

Job Number: 20-30435

Date Sampled: 01/09/2020

Date Received: 14/09/2020

Date Tested: 23/09/2020

Sampled By: Client - AD

Client: CURTINS
Client Address: Rose Wharf, Ground Floor,
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LS9 8EE

Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W] %	Water Content [W] %	Atterberg				Density			Total Porosity# %	
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3		
1622093	TT205	Not Given	1.00	1.50	D	Dark brown slightly gravelly sandy CLAY	Atterberg 4 Point	15		84	39	21	18					

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
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Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

Client: CURTINS
Client Address: Rose Wharf, Ground Floor,
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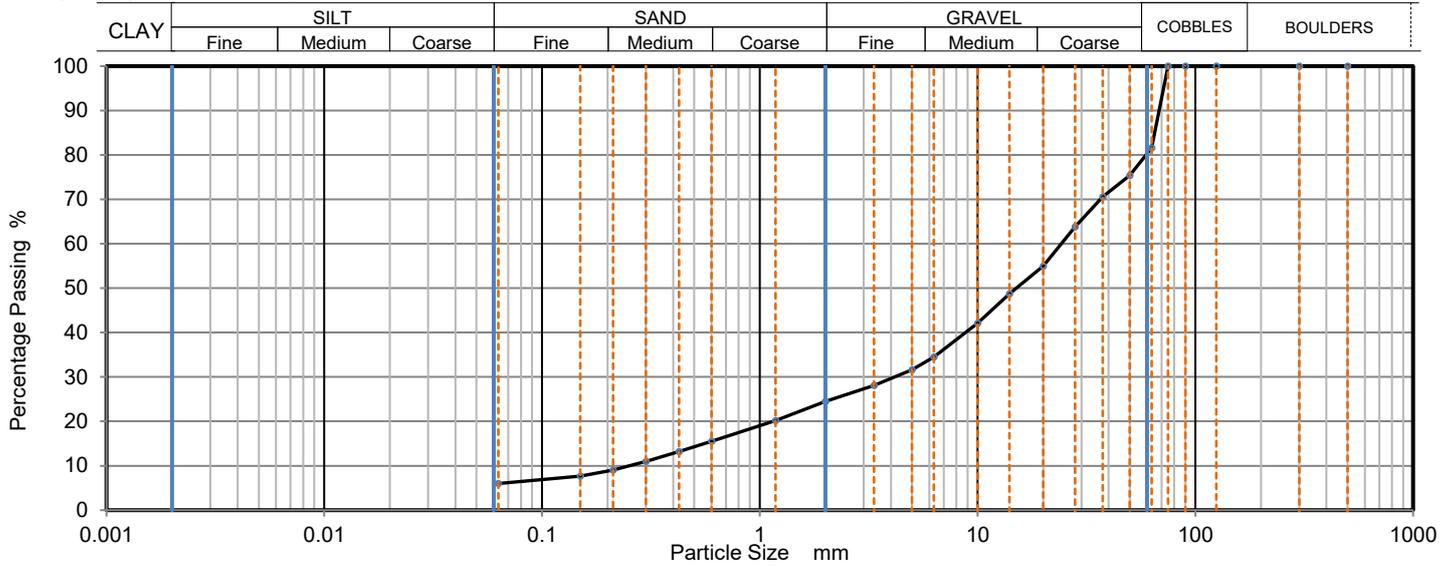
Client Reference: 76893
Job Number: 20-30435
Date Sampled: 01/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1622088
Hole No.: TT201
Sample Reference: Not Given
Sample Description: Dark brown slightly clayey sandy GRAVEL with cobbles
Sample Preparation: Sample was whole tested, oven dried at 106.1 °C and broken down by hand.

Depth Top [m]: 0.00
Depth Base [m]: 0.40
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	82		
50	75		
37.5	71		
28	64		
20	55		
14	49		
10	42		
6.3	35		
5	32		
3.35	28		
2	25		
1.18	20		
0.6	16		
0.425	13		
0.3	11		
0.212	9		
0.15	8		
0.063	6		

Sample Proportions	% dry mass
Very coarse	18.40
Gravel	57.00
Sand	18.30
Fines <0.063mm	6.20

Grading Analysis	
D100	mm 75
D60	mm 24.2
D30	mm 4.16
D10	mm 0.252
Uniformity Coefficient	96
Curvature Coefficient	2.8

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

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

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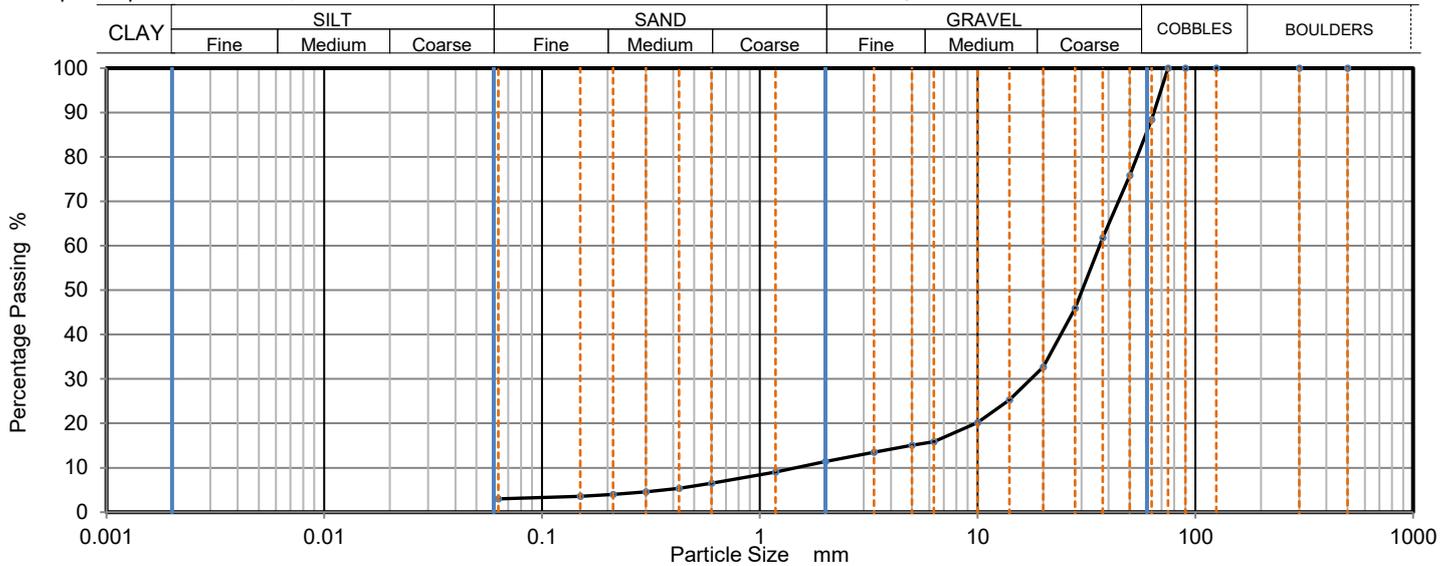
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Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1622097
Hole No.: TT204C
Sample Reference: Not Given
Sample Description: Dark brown slightly clayey sandy GRAVEL with shales
Sample Preparation: Sample was whole tested, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 2.20
Depth Base [m]: 2.70
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	88		
50	76		
37.5	62		
28	46		
20	33		
14	25		
10	20		
6.3	16		
5	15		
3.35	14		
2	11		
1.18	9		
0.6	7		
0.425	5		
0.3	5		
0.212	4		
0.15	4		
0.063	3		

Sample Proportions	% dry mass
Very coarse	11.60
Gravel	77.00
Sand	8.20
Fines <0.063mm	3.20

Grading Analysis	
D100	mm 75
D60	mm 36.3
D30	mm 17.6
D10	mm 1.46
Uniformity Coefficient	25
Curvature Coefficient	5.8

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

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed:

Szczepan Białowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Redacted



TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

Client: CURTINS
Client Address: Rose Wharf, Ground Floor,
78-80 East Street, Leeds,
LS9 8EE
Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

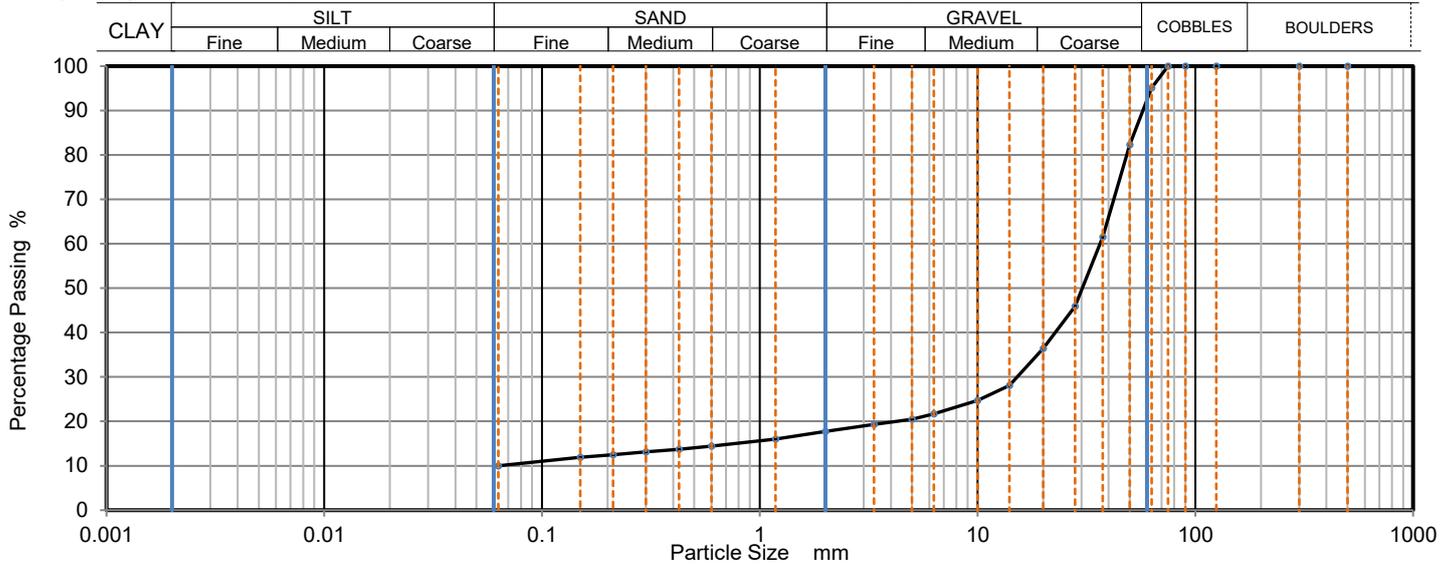
Client Reference: 76893
Job Number: 20-30435
Date Sampled: 01/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1622099
Hole No.: TT201
Sample Reference: Not Given
Sample Description: Light brown sandy clayey GRAVEL with cobbles
Sample Preparation: Sample was whole tested, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 0.40
Depth Base [m]: 0.80
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	95		
50	82		
37.5	62		
28	46		
20	36		
14	28		
10	25		
6.3	22		
5	21		
3.35	19		
2	18		
1.18	16		
0.6	14		
0.425	14		
0.3	13		
0.212	13		
0.15	12		
0.063	11		

Sample Proportions	% dry mass
Very coarse	4.90
Gravel	77.40
Sand	7.20
Fines <0.063mm	10.50

Grading Analysis	
D100	mm 75
D60	mm 36.4
D30	mm 15.2
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

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

Remarks: The material submitted - fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Redacte

Page 1 of 1

Date Reported: 28/09/2020

GF 100.18



TEST CERTIFICATE
Dry Density / Moisture Content
Relationship Heavy Compaction

Tested in Accordance with:
 BS 1377-4: 1990

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Client: CURTINS
 Client Address: Rose Wharf, Ground Floor,
 78-80 East Street, Leeds,
 LS9 8EE
 Contact: Aaron Drew
 Site Address: Lidl - Bankwood Way, Birstall

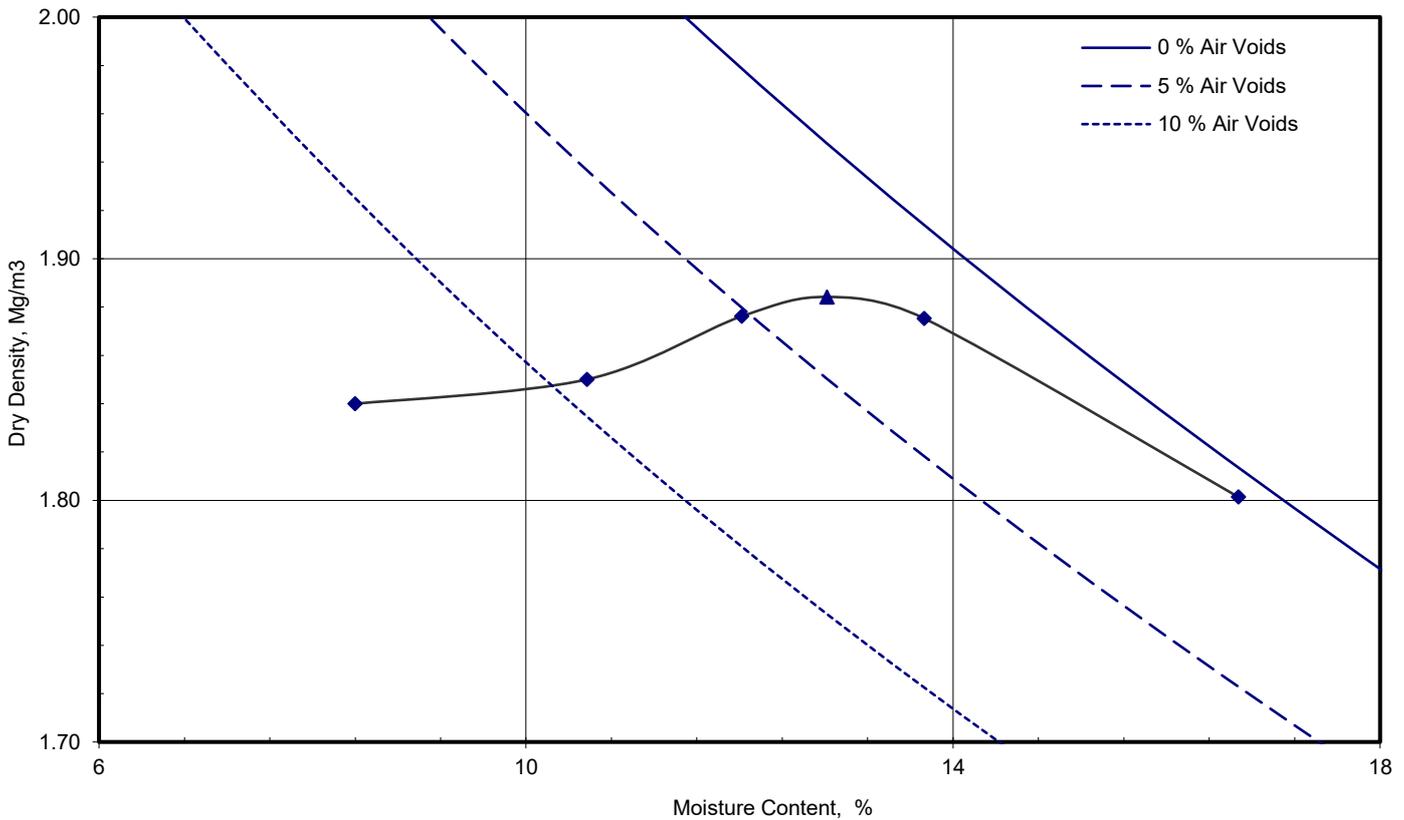
Client Reference: 76893
 Job Number: 20-30435
 Date Sampled: 01/09/2020
 Date Received: 14/09/2020
 Date Tested: 24/09/2020
 Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1622089
 Hole No.: TT201
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 1.00
 Depth Base [m]: 1.50
 Sample Type: B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	2
Particle Density - Assumed	Mg/m ³	2.60
As received Moisture Content	%	23
Maximum Dry Density	Mg/m ³	1.88
Optimum Moisture Content	%	13

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.5 using 4.5kg [heavy] Rammer

Remarks:

Signed:

Szczepan Bielatowicz
 PL Deputy of Head of Geotechnical Section
 for and on behalf of i2 Analytical Ltd

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Redacted



TEST CERTIFICATE
Dry Density / Moisture Content
Relationship Heavy Compaction

Tested in Accordance with:
 BS 1377-4: 1990

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Client: CURTINS
 Client Address: Rose Wharf, Ground Floor,
 78-80 East Street, Leeds,
 LS9 8EE
 Contact: Aaron Drew
 Site Address: Lidl - Bankwood Way, Birstall

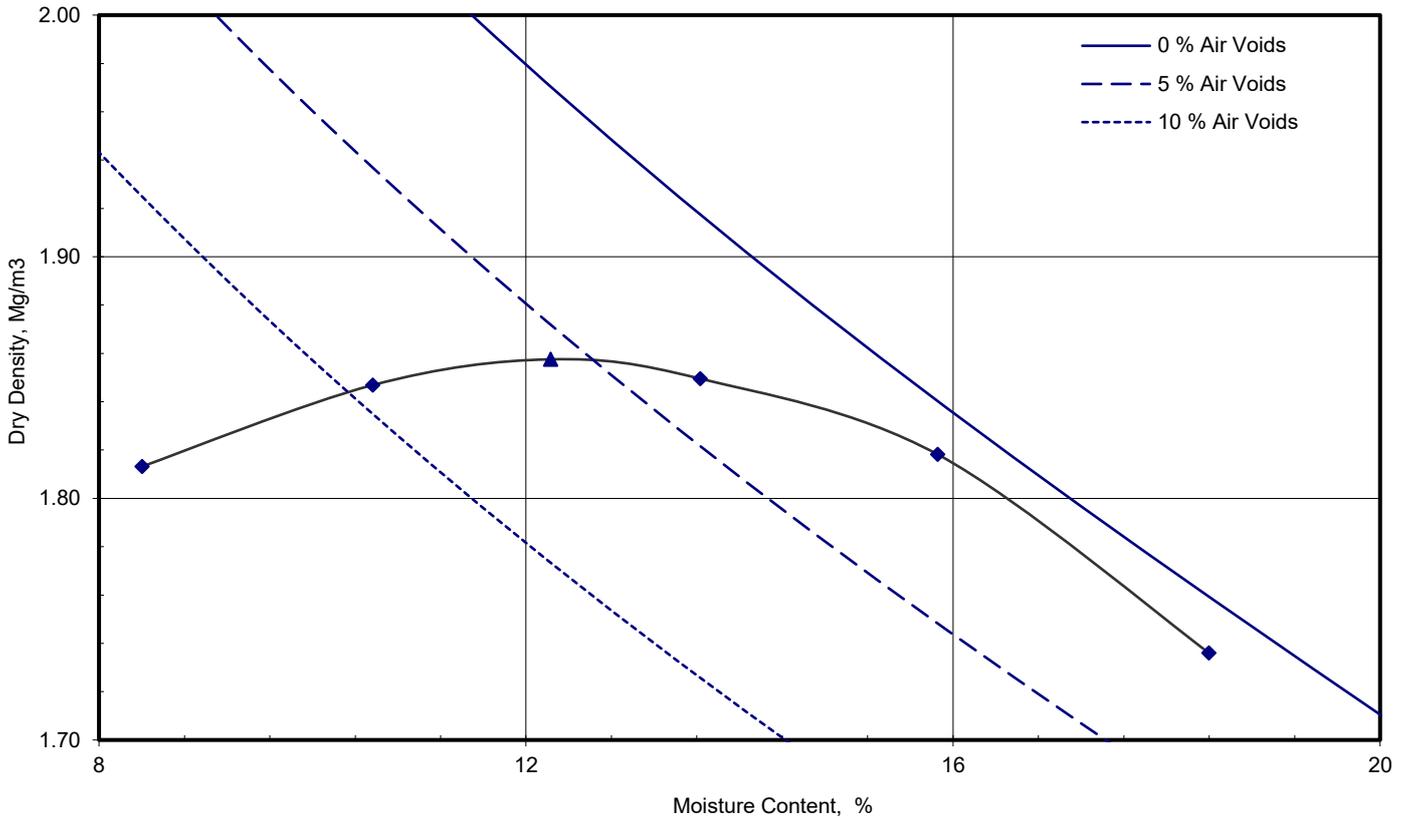
Client Reference: 76893
 Job Number: 20-30435
 Date Sampled: 03/09/2020
 Date Received: 14/09/2020
 Date Tested: 24/09/2020
 Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1622091
 Hole No.: BH201
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 2.00
 Depth Base [m]: 2.50
 Sample Type: B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	4
Particle Density - Assumed	Mg/m ³	2.60
As received Moisture Content	%	22
Maximum Dry Density	Mg/m ³	1.86
Optimum Moisture Content	%	12

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.5 using 4.5kg [heavy] Rammer

Remarks:

Signed:

Szczepan Bielatowicz
 PL Deputy of Head of Geotechnical Section
 for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE
Dry Density / Moisture Content
Relationship Heavy Compaction

Tested in Accordance with:
 BS 1377-4: 1990

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Client: CURTINS
 Client Address: Rose Wharf, Ground Floor,
 78-80 East Street, Leeds,
 LS9 8EE
 Contact: Aaron Drew
 Site Address: Lidl - Bankwood Way, Birstall

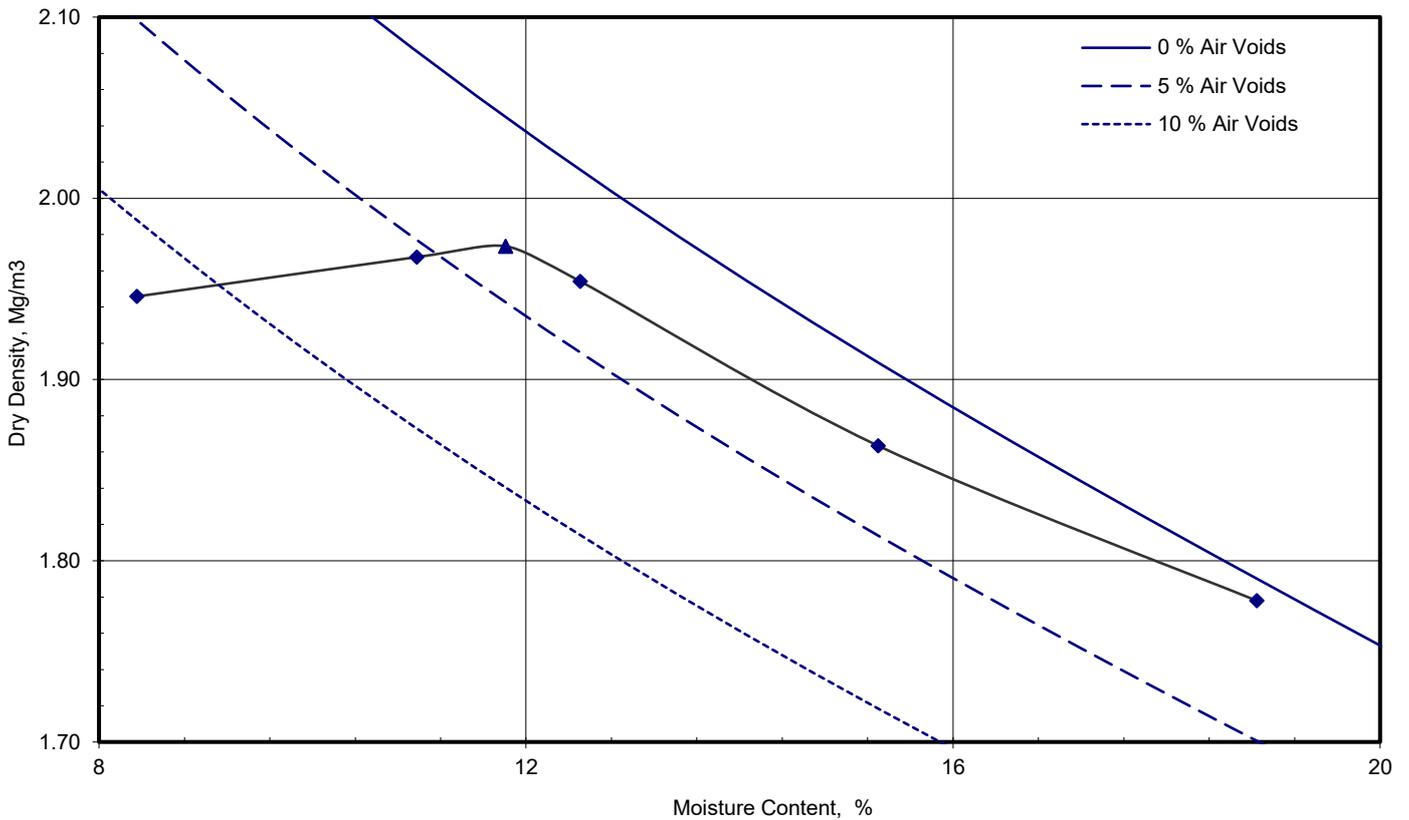
Client Reference: 76893
 Job Number: 20-30435
 Date Sampled: 07/09/2020
 Date Received: 14/09/2020
 Date Tested: 24/09/2020
 Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1622092
 Hole No.: BH203
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 1.50
 Depth Base [m]: 2.00
 Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Single sample tested	
Material Retained on 37.5 mm Sieve	%	7
Material Retained on 20.0 mm Sieve	%	7
Particle Density - Assumed	Mg/m ³	2.70
As received Moisture Content	%	19
Maximum Dry Density	Mg/m ³	1.97
Optimum Moisture Content	%	12

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.5 using 4.5kg [heavy] Rammer

Remarks: Insufficient amount of material - compacted in 1 litre mould

Signed:

Szczepan Bielatowicz
 PL Deputy of Head of Geotechnical Section
 for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Summary of Point Load Strength Index Tests Results

Tested in Accordance with: ISRM: 2007, pages 125-132

Client: CURTINS
Client Address: Rose Wharf, Ground Floor,
78-80 East Street, Leeds,
LS9 8EE
Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 09/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
1622100	RH211	Not Given	13.35	13.50	D	Mottled brown MUDSTONE	WC = 6.5%	1	A	U	YES	-	85.9	47.0	30.0	0.3	57.3	0.09	0.09
1622101	RH211	Not Given	13.75	13.85	D	Brown SHALE	WC = 6.7%	1	A	U	YES	-	86.5	50.0	44.0	0.3	69.6	0.06	0.07
1622102	RH211	Not Given	14.60	14.70	D	Mottled brown MUDSTONE	WC = 8.8%	1	I	U	YES	43.9	55.1	52.0	48.0	0.1	58.0	0.03	0.03
1622103	RH211	Not Given	16.20	16.40	D	Brownish grey SILTSTONE	WC = 5.7%	1	A	U	YES	-	83.3	38.0	31.0	1.4	57.3	0.42	0.45
1622104	RH211	Not Given	17.80	18.00	D	Brownish grey SILTSTONE	WC = 4.4%	1	A	U	YES	-	86.9	51.0	43.0	1.8	69.0	0.37	0.43
1622105	RH211	Not Given	18.80	18.90	D	Brownish grey SILTSTONE	WC = 4.0%	1	A	U	YES	-	86.2	35.0	32.0	1.3	59.3	0.36	0.39
1622106	RH211	Not Given	21.30	21.50	D	Brownish grey SILTSTONE	WC = 3.6%	1	A	U	YES	-	85.9	28.0	25.0	1.1	52.3	0.40	0.41
1622107	RH211	Not Given	22.10	22.30	D	Greyish brown SILTSTONE	WC = 4.2%	1	A	U	YES	-	85.6	49.0	40.0	0.7	66.0	0.16	0.18
1622108	RH212	Not Given	7.30	7.50	D	Mottled brown MUDSTONE	WC = 14.2%	1	A	U	YES	-	88.3	54.0	42.0	0.2	68.7	0.04	0.05
1622109	RH212	Not Given	8.80	9.00	D	Mottled brown MUDSTONE	WC = 13.1%	1	I	U	YES	47.4	75.1	39.0	27.0	0.1	50.8	0.04	0.04

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 8), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P,
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

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Signed:
Redacted

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd



SUMMARY REPORT

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Summary of Point Load Strength Index Tests Results

Tested in Accordance with: ISRM: 2007, pages 125-132

Client: CURTINS
Client Address: Rose Wharf, Ground Floor,
78-80 East Street, Leeds,
LS9 8EE
Contact: Aaron Drew
Site Address: Lidl - Bankwood Way, Birstall

Client Reference: 76893
Job Number: 20-30435
Date Sampled: 01/09 - 09/09/2020
Date Received: 14/09/2020
Date Tested: 23/09/2020
Sampled By: Client - AD

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
1622110	RH212	Not Given	9.90	10.00	D	Mottled brown SILTSTONE	WC = 9.4%	1	I	U	YES	38.6	62.9	31.0	25.0	0.2	44.7	0.09	0.09
1622111	RH212	Not Given	10.25	10.35	D	Brownish grey SILTSTONE	WC = 10.3%	1	I	U	YES	45.1	85.7	35.0	24.0	0.1	51.2	0.03	0.03
1622098	TT204B	Not Given	1.00	1.50	D	Brown SILTSTONE	WC = 21.7%	1	I	U	YES	39.2	61.3	33.0	18.0	0.6	37.5	0.42	0.37

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed:

Redacted

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Appendix F Ground Gas and Groundwater Monitoring Results



GAS MONITORING LOG SHEET

Project: Bankwood Way, Birstall **Date:** _____ Date
Job Number: ##### **Visit:** 1
Client: Lidl GB Limited **Weather:** _____ Weather
Barometric State: 998 mb **Ground Conditions:** _____

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
BH201	998	0.1	0.1	29.6	22.0	6.7	5.5	5.4	0	0	11.48	14.05	Readings taken at 90 seconds. Solinst Interface probe encountered fault during monitoring. Readings taken at 90 seconds. Solinst Interface probe encountered fault during monitoring. Bung loose on opening well Readings taken at 90 seconds. Solinst Interface probe encountered fault during monitoring. Readings taken at 90 seconds. Solinst Interface probe encountered fault during monitoring.
BH202	998	0.1	0.1	52.4	52.4	20.8	20.8	0.6	0	0	-	-	
BH203	998	0.1	0.1	38.5	38.5	14.3	14.3	0.6	0	0	-	-	
RH211	997	0.1	0.1	74.2	74.2	14.2	14.2	0.2	0	0	-	-	

Notes _____

Logged by ML

*1% gas volume = 10,000 ppm
 Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
 All other gases recorded at 'steady state' unless otherwise stated*

Curtins
 Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
 Tel: 0161 236 2394
 Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project: Bankwood Way, Birstall **Date:** 08/10/2020
Job Number: ##### **Visit:** 2
Client: Lidl GB Limited **Weather:** Cool 13 degrees, wet, overcast
Barometric State: 983 mb **Ground Conditions:**

Borehole Reference	Barometric Pressure mb	Flow		Methane		Carbon Dioxide		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		l/hr		%		%							
		Max	SS	Max	SS	Max	SS						
BH201	983	0.1	0.1	20.2	11.6	6.6	4.0	13.40	1	14	12.7	14.05	Time elapsed: 5 mins
BH202	985	-0.4	-0.2	57.1	57.1	5.3	5.3	3.10	2	15	4.44	9.54	Time elapsed: 5 mins. Groundwater effervescing/bubbling. Differential pressure: 26mbar. Peak flow rate recorded at -0.4 l/hr
BH203	984	0.1	0.1	67.9	67.7	17.5	17.5	0.10	2	10	3.37	6.79	Time elapsed: 5 mins
RH211	983	4.2	4.0	77.3	77.3	16.7	16.5	0.00	1	14	7.15	11.75	Time elapsed: 5 mins
0													
0													
0													
0													
0													
0													
0													
0													
0													
0													

Notes _____ **Logged by AD** _____

*1% gas volume = 10,000 ppm
 Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
 All other gases recorded at 'steady state' unless otherwise stated*

Curtins

Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
 Tel: 0161 236 2394
 Fax: 0161 228 7902



GAS MONITORING LOG SHEET

Project: Bankwood Way, Birstall **Date:** 16/10/2020
Job Number: ##### **Visit:** 3
Client: Lidl GB Limited **Weather:** Cloudy, overcast, 10 degrees c
Barometric State: 1008 mb **Ground Conditions:**

Borehole Reference	Barometric Pressure mb	Flow		Methane		Carbon Dioxide		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		l/hr		%		%							
		Max	SS	Max	SS	Max	SS						
BH201	1008	0.1	0.1	23.1	14.4	9.2	5.9	10.2	3	23	12.15	14.13	Sulphurous odour noted. Differential pressure of 38 mbar.
BH202	1007	0.1	0.1	78.8	78.0	21.4	21.4	0.1	3	20	5.65	9.55	
BH203	1007	0.1	0.1	24.2	24.2	9.5	9.5	7.1	2	22	3.19	6.73	
RH211	1008	5.2	5.2	78.6	78.6	17.3	17.3	0.1	2	22	6.94	11.74	

Notes

Logged by ES

1% gas volume = 10,000 ppm
 Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
 All other gases recorded at 'steady state' unless otherwise stated

Appendix G GAC Screening Thresholds

- Curtins GACs.

Adopted Soil Generic Assessment Criteria
Sandy loam with 6% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 <u>220</u>	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 <u>21</u>	6 <u>21</u>	1.8 <u>170</u>	33 <u>49</u>	7.7 <u>21</u>	<u>220 250</u>
Lead	<u>200</u>	<u>310</u>	<u>80</u>	<u>2,300</u>	<u>630</u>	<u>1,300</u>
Mercury (elemental)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (inorganic)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 <u>79</u>	170 <u>170</u>
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
EC _{>5} - EC ₆	160	160	3900	12000	600000	180000
EC _{>6} - EC ₈	530	530	13000	40000	620000	320000
EC _{>8} - EC ₁₀	150	150	1700	11000	13000	21000
EC ₁₀ -EC ₁₂	760	770	7300	47000	13000	24000
EC ₁₂ -EC ₁₆	4300	4400	13000	90000	13000	26000
EC _{>16} - EC ₃₅	110000	110000	270000	1800000	250000	490000
EC _{>35} - EC ₄₄	110000	110000	270000	1800000	250000	490000
Aromatic risk banded hydrocarbons - TPHCWG method						
EC _{>5} - EC ₇	300	1400	57	86000	56000	92000
EC _{>7} - EC ₈	660	3900	120	180000	56000	100000
EC _{>8} - EC ₁₀	190	270	51	17000	5000	9300
EC ₁₀ - EC ₁₂	380	1200	74	34000	5000	10000
EC ₁₂ - EC ₁₆	660	2500	130	38000	5000	10000
EC _{>16} - EC ₂₁	930	1900	260	28000	3800	7800
EC _{>21} - EC ₃₅	1700	1900	1600	28000	3800	7900
EC _{>35} - EC ₄₄	1700	1900	1600	28000	3800	7900
Aliph + Arom EC >44-70	1900	1900	3000	28000	3800	7900
Aromatic						
Benzene	0.33 0.87	1.0 3.3	0.07 0.18	95 98	73 <u>140</u>	110 <u>230</u>
Ethyl benzene	350	840	90	2800⁽⁸⁾ [66000]	2800⁽⁸⁾ [250000]	2800⁽⁸⁾ [27000]
Toluene	610	2700	120	4400⁽⁸⁾ [190000]	4400⁽⁸⁾ [56000]	4400⁽⁸⁾ [100000]
Xylene ⁽⁹⁾	230	290	160	2600⁽⁸⁾ [32000]	2600⁽⁸⁾ [43000]	2600⁽⁸⁾ [31000]
Phenol	420	520	280	3200⁽¹⁴⁾ (38000)	3200⁽¹⁴⁾ (10000)	3200⁽¹⁴⁾ (9300)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	13	13	24	1100	4900	3000
Acenaphthylene	920	6000	160	100000	15000	30000
Acenaphthene	1100	6000	200	100000	15000	30000
Fluorene	860	4500	160	71000	9900	20000
Phenanthrene	440	1500	90	23000	3100	6300
Anthracene	11000	37000	2200	540000	74000	150000
Fluoranthene	890	1600	290	23000	3100	6400
Pyrene	2000	3800	620	54000	7400	15000
Benz(a)anthracene	13	15	13	180	29	62
Chrysene	27	32	19	350	57	120
Benzo(b)fluoranthene	3.7	4.0	3.9	45	7.2	16.0
Benzo(k)fluoranthene	100	110	130	1200	190	440
Benzo(a)pyrene	3.0 5.0	3.2 5.3	3.5 5.7	36 77	5.7 10	13 21
Indeno(123cd)pyrene	41	46	39	510	82	180
Dibenzo(ah)anthracene	0.3	0.32	0.43	3.6	0.58	1.4
Benzo(ghi)perylene	350	360	640	4000	640	1600
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.0014	0.0015	0.0018	0.12	3.5	5.4
Trichloroethene (TCE)	0.075	0.08	0.21	5.7	120	120
1,1,1,2 Tetrachlorethane	6.4	8.2	4.4	560	1400	2100
Tetrachlorethane (PCE)	0.90	0.92	3.6	95	1400	1500
1,1,1 Trichlorethane	39	40	240	3000	140000	100000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs
- Soil organic matter (SOM) is assumed to be 6% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM



Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 21	6 21	1.8 170	33 49	7.7 21	220 250
Lead	200	310	80	2,300	630	1,300
Mercury (elemental)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (inorganic)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
<i>Aliphatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₆	78	78	1700	5900	590000	130000
EC ₅₋₆ - EC ₈	230	230	5600	17000	610000	220000
EC ₅₋₈ - EC ₁₀	65	65	770	4800	13000	18000
EC ₁₀ - EC ₁₂	330	330	4400	23000	13000	23000
EC ₁₂ - EC ₁₆	2400	2400	13000	82000	13000	25000
EC ₁₆ - EC ₃₅	92000	92000	270000	1700000	250000	480000
EC ₃₅ - EC ₄₄	92000	92000	270000	1700000	250000	480000
<i>Aromatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₇	140	690	27	46000	56000	84000
EC ₇ - EC ₈	290	1800	51	110000	56000	95000
EC ₈ - EC ₁₀	83	110	21	8100	5000	8500
EC ₁₀ - EC ₁₂	180	590	31	28000	5000	9700
EC ₁₂ - EC ₁₆	330	2300	57	37000	5100	10000
EC ₁₆ - EC ₂₁	540	1900	110	28000	3800	7700
EC ₂₁ - EC ₃₅	1500	1900	820	28000	3800	7800
EC ₃₅ - EC ₄₄	1500	1900	820	28000	3800	7800
Aliph + Arom EC >44-70	1800	1900	2100	28000	3800	7800
<i>Aromatic</i>						
Benzene	0.16	0.49	0.035	50	72	100
Ethyl benzene	150	380	39	1200⁽⁸⁾ [35000]	1200⁽⁸⁾ [24000]	1200⁽⁸⁾ [22000]
Toluene	270	1300	51	1900⁽⁸⁾ [110000]	1900⁽⁸⁾ [56000]	1900⁽⁸⁾ [95000]
Xylene ⁽⁹⁾	98	120	70	1200⁽⁸⁾ [14000]	1200⁽⁸⁾ [42000]	1200⁽⁸⁾ [23000]
Phenol	290	420	140	1500⁽¹⁴⁾ (35000)	1500⁽¹⁴⁾ (10000)	1500⁽¹⁴⁾ (8300)
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>						
Naphthalene	5.6	5.6	10	460	4900	1900
Acenaphthylene	420	4600	69	97000	15000	30000
Acenaphthene	510	4700	85	97000	15000	30000
Fluorene	400	3800	67	68000	9900	20000
Phenanthrene	220	1500	38	22000	3100	6200
Anthracene	5400	35000	950	540000	74000	150000
Fluoranthene	560	1600	130	23000	3100	6300
Pyrene	1200	3800	270	54000	7400	15000
Benz(a)anthracene	11	14	6.5	170	29	56
Chrysene	22	31	9.4	350	57	110
Benzo(b)fluoranthene	3.3	4.0	2.1	44	7.2	15
Benzo(k)fluoranthene	93	110	75	1200	190	410
Benzo(a)pyrene	2.7	3.2	2	35	5.7	12
Indeno(123cd)pyrene	36	46	21	510	82	170
Dibenzo(ah)anthracene	0.28	0.32	0.27	3.6	0.57	1.3
Benzo(ghi)perylene	340	360	470	4000	640	1500
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00087	0.001	0.001	0.077	3.5	5
Trichloroethene (TCE)	0.034	0.036	0.091	2.6	120	91
1,1,1,2 Tetrachlorethane	2.8	3.5	1.9	250	1400	1800
Tetrachlorethane (PCE)	0.39	0.4	1.5	42	1400	1100
1,1,1 Trichlorethane	18	18	110	1300	140000	76000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs
- Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 1% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	<u>6 21</u>	<u>6 21</u>	<u>1.8 170</u>	<u>33 49</u>	<u>7.7 21</u>	<u>220 250</u>
Lead	<u>200</u>	<u>310</u>	<u>80</u>	<u>2,300</u>	<u>630</u>	<u>1,300</u>
Mercury (elemental)	1	1	26	26	16	26 ⁽⁸⁾ [30]
Mercury (inorganic)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
EC ₅ - EC ₆	42	42	730	3200	570000	95000
EC ₆ - EC ₈	100	100	2300	7800	600000	150000
EC ₈ - EC ₁₀	27	27	320	2000	13000	14000
EC ₁₀ - EC ₁₂	130	130	2200	9700	13000	21000
EC ₁₂ - EC ₁₆	1100	1100	11000	59000	13000	25000
EC ₁₆ - EC ₃₅	65000	65000	260000	1600000	250000	450000
EC ₃₅ - EC ₄₄	65000	65000	260000	1600000	250000	450000
Aromatic risk banded hydrocarbons - TPHCWG method						
EC ₅ - EC ₇	70	370	13	26000	56000	76000
EC ₇ - EC ₈	130	860	22	56000	56000	87000
EC ₈ - EC ₁₀	34	47	8.6	3500	5000	7200
EC ₁₀ - EC ₁₂	74	250	13	16000	5000	9200
EC ₁₂ - EC ₁₆	140	1800	23	36000	5100	10000
EC ₁₆ - EC ₂₁	260	1900	46	28000	3800	7600
EC ₂₁ - EC ₃₅	1100	1900	370	28000	3800	7800
EC ₃₅ - EC ₄₄	1100	1900	370	28000	3800	7800
Aliph + Arom EC >44-70	1600	1900	1200	28000	3800	7800
Aromatic						
Benzene	0.08	0.3	0.017	28	72	90
Ethyl benzene	65	170	16	520⁽⁸⁾ [17000]	520⁽⁸⁾ [24000]	520⁽⁸⁾ [17000]
Toluene	120	610	22	860⁽⁸⁾ [59000]	860⁽⁸⁾ [56000]	860⁽⁸⁾ [87000]
Xylene ⁽⁹⁾	41	53	28	480⁽⁸⁾ [69000]	480⁽⁸⁾ [41000]	480⁽⁸⁾ [17000]
Phenol	180	310	66	760⁽¹⁴⁾ (31000)	760⁽¹⁴⁾ (10000)	760⁽¹⁴⁾ (7600)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	2.3	2.3	4.1	190	4900	1200
Acenaphthylene	170	2900	28	83000	15000	29000
Acenaphthene	210	3000	34	84000	15000	29000
Fluorene	170	2800	27	63000	9900	20000
Phenanthrene	95	1300	15	22000	3100	6200
Anthracene	2400	31000	380	520000	74000	150000
Fluoranthene	280	1500	52	23000	3100	6300
Pyrene	620	3700	110	54000	7400	15000
Benz(a)anthracene	7.2	11	2.9	170	29	49
Chrysene	15	30	4.1	350	57	93
Benzo(b)fluoranthene	2.6	3.9	0.99	44	7.1	13
Benzo(k)fluoranthene	77	110	37	1200	190	370
Benzo(a)pyrene	2.2	3.2	0.97	35	5.7	11
Indeno(123cd)pyrene	27	45	9.5	500	82	150
Dibenzo(ah)anthracene	0.24	0.31	0.14	3.5	0.57	1.1
Benzo(ghi)perylene	320	360	290	3900	640	1400
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00064	0.00077	0.00055	0.059	3.5	4.8
Trichloroethene (TCE)	0.016	0.017	0.041	1.2	120	70
1,1,1,2 Tetrachlorethane	1.2	1.5	0.79	110	1400	1500
Tetrachlorethane (PCE)	0.18	0.18	0.65	19	1400	810
1,1,1 Trichlorethane	8.8	9	48	660	140000	57000

Notes

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- Soil organic matter (SOM) is assumed to be 1% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Appendix H Risk Assessment Methodology

The site-specific risk assessment, presented in this report, follows the principle of establishing whether there is a viable linkage between a contaminant source to a potential receptor, via an exposure pathway.

The risk assessment corresponds with the total site area and incorporates both descriptive (qualitative) and, where available, numerical (quantitative) lines of evidence.

Risk assessment is the process of collating known information on a hazard or set of hazards to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of contaminant source on a site does not necessarily mean there is a risk.

The risk assessment considers the likelihood of an event taking place (accounting for the presence of the source and receptor and the viability of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment, the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in EA LCRM, Version 3.

		Consequence			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to an ecosystem or organisation forming part of such ecosystem.	<p>High concentrations of cyanide on the surface of an informal recreation area.</p> <p>Major spillage of contaminants from site into controlled water.</p> <p>Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).</p>
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in an ecosystem or organism forming part of such ecosystem.	<p>Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria.</p> <p>Leaching of contaminants from a site to a Principal or Secondary A aquifer.</p> <p>Death of a species within a designated nature reserve.</p> <p>Lesser toxic and asphyxiate effects</p>
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	<p>Pollution of non-classified groundwater (inc. Secondary B aquifers).</p> <p>Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).</p>
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	<p>The presence of contaminants at such concentrations that protective equipment is required during site works.</p> <p>The loss of plants in a landscaping scheme.</p> <p>Discoloration of concrete.</p>

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	<i>Harm is likely to arise</i> to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	<i>It is possible</i> that without appropriate further action <i>harm could arise</i> to a designated receptor. It is relatively <i>unlikely</i> that any such harm would be <i>severe</i> , and if any harm were to occur it is <i>more likely</i> that such harm would be <i>relatively mild</i> .
Low Risk	<i>It is possible</i> that <i>harm could arise</i> to a designated receptor from an identified hazard. It is <i>likely</i> that, at worst, if any harm was realised any effects would be <i>mild</i> .
Very Low Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation.

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