

**Appendix F**  
**Laboratory test results**



**SOIL AND ROCK SAMPLE ANALYSIS  
LABORATORY TEST REPORT**

<b>To:</b>	<b>Bord Gais</b>
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<b>Date:</b>	<b>25/02/15</b>
<b>Ref:</b>	<b>14-645</b>

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**Greater Dublin Drainage Scheme Ground Investigation**

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the *Contents page(s)*.

The samples were delivered to our laboratory in Ballymoney, Co. Antrim on 18/01/2015 and tested in accordance with the electronic schedule received on 20/01/2015. Further testing instructions were received on 16/02/2015. All testing was performed 26/01/2015 to 25/02/2015.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of one month from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Approved Signatory

Stephen Watson  
Laboratory Manager



**Project Name**            **Greater Dublin Drainage Scheme Ground Investigation**

**Report Reference.**    **14-645**

The table below details the tests carried out, the specifications used and the number of tests included in this report:

<b>Material tested</b>	<b>Type of test/Properties measured/Range of measurement</b>	<b>Standard specifications</b>	<b>Number of test results included in the report</b>	<b>Comments</b>
SOIL	Moisture content - oven drying method	BS 1377-2:1990	64	Currently working towards UKAS accreditation
SOIL	Liquid limit - cone penetrometer	BS 1377-2:1990	44	Currently working towards UKAS accreditation
SOIL	Liquid limit - cone penetrometer - one point	BS 1377-2:1990	44	Currently working towards UKAS accreditation
SOIL	Plastic limit	BS 1377-2:1990	44	Currently working towards UKAS accreditation
SOIL	Plasticity index and liquidity index	BS 1377-2:1990	44	Currently working towards UKAS accreditation
SOIL	Particle size distribution - wet sieving	BS 1377-2:1990	42	Currently working towards UKAS accreditation
SOIL	Particle size distribution - dry sieving	BS 1377-2:1990	0	Currently working towards UKAS accreditation
SOIL	Particle size distribution -sedimentation hydrometer method	BS 1377-2:1990	40	Currently working towards UKAS accreditation
SOIL	Density - linear	BS 1377-2:1990	0	Currently working towards UKAS accreditation
SOIL	Particle density – gas jar	BS 1377-2:1990	0	Currently working towards UKAS accreditation
SOIL	Dry density/moisture content relationship (2.5 kg rammer)	BS 1377-4:1990	0	Currently working towards UKAS accreditation
	Dry density/moisture content relationship (4.5 kg rammer)	BS 1377-4:1990	0	Currently working towards UKAS accreditation
SOIL	MCV	BS 1377-4:1990	0	Currently working towards UKAS accreditation



SOIL	MCV relationship	BS 1377-4:1990	0	Currently working towards UKAS accreditation
SOIL	California Bearing Ratio (CBR)	BS 1377-4:1990	0	Currently working towards UKAS accreditation
SOIL	One-dimensional consolidation properties	BS 1377- 5:1990	0	Currently working towards UKAS accreditation
SOIL	Laboratory vane	BS 1377- 7:1990	0	Currently working towards UKAS accreditation
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377- 7:1990	0	Currently working towards UKAS accreditation
SOIL	Undrained shear strength – triaxial compression with multistage loading and without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377- 7:1990	0	Currently working towards UKAS accreditation
ROCK	Point load index	ISRM Commission on Testing Methods. Suggested Method for Determining Point Load Strength 1985	10	Currently working towards UKAS accreditation
ROCK	UCS	ISRM Suggested Methods - Rock Characterization Testing and Monitoring, Ed. E T Brown - 1981	6	Currently working towards UKAS accreditation



## Summary of Classification Test Results

Project No. 14-645	Project Name Greater Dublin Drainage Scheme Ground Investigation
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Hole No.	Sample				Soil Description	Density		w	Passing 425µm	LL	PL	PI	Particle density	Remarks
	Ref	Top	Base	Type		bulk	dry							
BH117	B03	3.50	4.00	B	Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles.			14.0	62	28 -1pt	NP			
BH117	B04	4.50	5.00	B	Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles.			13.0						
BH117	D05	5.00		D	Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles.			15.0						
BH117	B02	1.80	3.00	B	Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles.			11.0	44	27 -1pt	15	12		
BH117	B01	0.35	1.20	B	Stiff brown sandy gravelly CLAY with rare cobbles.			12.0	57	29 -1pt	17	12		
BH118	8	8.00	8.45	B	Stiff dark grey slightly sandy slightly gravelly CLAY.			20.0	50	31 -1pt	18	13		
BH120	14	9.50		D	Firm to stiff black sandy gravelly CLAY.			22.0						
BH120	11	5.00		D	Stiff black sandy gravelly CLAY.			18.0						
BH120	4	5.50	6.50	B	Firm to stiff black sandy gravelly CLAY.			19.0	68	31 -1pt	16	15		
BH120	12	6.50		D	Firm to stiff black sandy gravelly CLAY.			12.0						
BH120	13	8.00		D	Firm to stiff black sandy gravelly CLAY.			17.0	50	28 -1pt	16	12		
BH120	2	1.70	2.00	B	Stiff brown sandy gravelly CLAY.			13.0	60	30 -1pt	17	13		
BH120	3	3.10	4.00	B	Stiff black sandy gravelly CLAY.			16.0	52	29 -1pt	15	14		
BH121	4	3.50	4.00	B	Stiff black sandy gravelly CLAY.			8.9	53	28 -1pt	16	12		
BH121	6	2.00		D	MADE GROUND - Firm very sandy gravelly CLAY with occasional boulders.			13.0	45	25 -1pt	16	9		
BH122	B07	9.50	10.00	B	Black very stiff gravelly CLAY with occasional cobbles and boulders.			27.0	56	31 -1pt	17	14		
BH122	B04	4.50	5.00	B	Black very stiff gravelly CLAY with occasional cobbles and boulders.			13.0						
BH122	B05	6.00	6.50	B	Black very stiff gravelly CLAY with occasional cobbles and boulders.			13.0	39	28 -1pt	15	13		
BH122	B06	7.00	7.50	B	Black very stiff gravelly CLAY with occasional cobbles and boulders.			16.0						
BH122	B03	2.50	3.00	B	Black very stiff gravelly CLAY with occasional cobbles and boulders.			12.0	54	29 -1pt	15	14		

All tests performed in accordance with BS1377:1990 unless specified otherwise

<b>Key</b> Density test Linear measurement unless : wd - water displacement wi - immersion in water	Liquid Limit 4pt cone unless : cas - Casagrande method 1pt - single point test	Particle density sp - small pyknometer gj - gas jar	Date Printed 04/09/2015 00:00	Approved By Stephen.Watson	Table 1 sheet 1
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## Summary of Classification Test Results

Project No. 14-645	Project Name Greater Dublin Drainage Scheme Ground Investigation
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Hole No.	Sample				Soil Description	Density		w	Passing 425µm	LL	PL	PI	Particle density	Remarks
	Ref	Top	Base	Type		bulk	dry							
BH122	B01	0.20	1.20	B	Brown firm to stiff gravelly CLAY with occasional cobbles and boulders.			12.0	48	29 -1pt	16	13		
BH123	D04	4.00		D	Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles and rare boulders.			9.1						
BH123	B02	1.30	2.00	B	Stiff dark brown sandy gravelly CLAY with occasional cobbles and boulders.			13.0	49	28 -1pt	15	13		
BH123	B03	2.50	3.00	B	Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles and boulders.			11.0	48	31 -1pt	18	13		
BH123	B01	0.25	1.00	B	Firm to stiff dark brown sandy gravelly CLAY with occasional cobbles and boulders.			13.0	52	31 -1pt	17	14		
BH124	2	1.50	2.00	B	Firm brown gravelly CLAY			14.0	46	30 -1pt	17	13		
BH124	3	2.10	3.00	B	Very stiff black sandy gravelly CLAY.			16.0	51	30 -1pt	16	14		
BH124	1	0.00	1.20	B	Firm brown gravelly CLAY			16.0	64	35 -1pt	17	18		
BH125	3	3.50		B	Very stiff black sandy gravelly CLAY.			16.0	45	29 -1pt	15	14		
BH127	7	4.00		D	Very stiff black sandy gravelly CLAY.			12.0	57	29 -1pt	15	14		
BH127	2	1.80	2.00	B	Very stiff black sandy gravelly CLAY.			14.0						
BH127	3	2.50	3.00	B	Very stiff black sandy gravelly CLAY.			12.0	49	29 -1pt	16	13		
BH127	1	0.30	1.20	B	Stiff brown grey sandy gravelly CLAY			34.0	67	44 -1pt	32	12		
BH128	D03	3.50		D	Very stiff black gravelly CLAY with occasional cobbles and boulders.			9.7	35	29 -1pt	16	13		
BH128	B04	2.50	3.00	B	Very stiff black gravelly CLAY with occasional cobbles and boulders.			8.2	41	29 -1pt	16	13		
BH128	B02	0.30	1.10	B	Firm to stiff light brown gravelly CLAY with occasional cobbles and boulders.			30.0	78	45 -1pt	28	17		
BH128	B03	1.10	2.00	B	Very stiff black gravelly CLAY with occasional cobbles and boulders.			15.0	42	25 -1pt	14	11		
BH130	6	5.00	5.45	B	Very stiff dark grey slightly sandy slightly gravelly CLAY.			20.0	62	32 -1pt	18	14		
BH130	2	1.20	1.65	B	Firm brown mottled grey slightly gravelly CLAY.			16.0	53	32 -1pt	17	15		
BH135	6	5.00	5.45	B	Stiff dark grey sandy gravelly CLAY.			16.0	71	29 -1pt	16	13		

All tests performed in accordance with BS1377:1990 unless specified otherwise

<b>Key</b> Density test Linear measurement unless : wd - water displacement wi - immersion in water	Liquid Limit 4pt cone unless : cas - Casagrande method 1pt - single point test	Particle density sp - small pyknometer gj - gas jar	Date Printed 04/09/2015 00:00	Approved By Stephen.Watson	Table 2 sheet 2
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## Summary of Classification Test Results

Project No. 14-645	Project Name Greater Dublin Drainage Scheme Ground Investigation
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Hole No.	Sample				Soil Description	Density		w	Passing 425µm	LL	PL	PI	Particle density	Remarks
	Ref	Top	Base	Type		bulk Mg/m3	dry %							
BH135	2	1.20	1.65	B	Brown mottled grey sandy gravelly CLAY			20.0	60	35 -1pt	20	15		
BH137	2	1.20	1.65	B	Firm to soft brown sandy gravelly CLAY.			19.0	63	35 -1pt	17	18		
BH138	B03	2.50	3.00	B	Medium dense grey slightly sandy subangular to rounded fine to medium GRAVEL.			6.0						
BH138	B02	0.90	1.50	B	Medium dense grey slightly sandy subangular to rounded fine to medium GRAVEL.			5.4	10	27 -1pt	19	8		
BH139	8	8.00	8.45	B	Firm to stiff dark grey slightly sandy gravelly CLAY with occasional cobbles.			14.0	54	28 -1pt	15	13		
BH139	7	6.00	6.45	B	Stiff black slightly sandy slightly gravelly CLAY with occasional cobbles.			13.0	58	28 -1pt	15	13		
BH139	3	2.00	2.45	B	Firm to stiff brown slightly sandy slightly gravelly CLAY			16.0	67	30 -1pt	17	13		
TP100	B02	1.50		B	Firm brown gravelly CLAY.			8.3	33	29 -1pt	18	11		
TP100	B01	0.50		B	MADE GROUND - Firm brown grey gravelly CLAY with fragments of plastic timber and gravel.			14.0	55	29 -1pt	18	11		
TP101	B01	0.50		B	MADE GROUND - Soft to firm light brown gravelly CLAY with fragments of plastic and glass.			20.0	59	41 -1pt	27	14		
TP102	2	1.50		B	Firm grey gravelly CLAY with fragments of weathered roots.			13.0	37	30 -1pt	22	8		
TP102	B01	0.50		B	Firm brown gravelly CLAY.			14.0	35	37 -1pt	25	12		
TP103	B01	0.50		B	Firm brown gravelly CLAY			15.0	33	34 -1pt	24	10		
TP103	B02	0.90		B	Firm brown gravelly CLAY with fragments of weathered roots.			8.5	25	33 -1pt	24	9		
TP104	B01	0.50		B	Firm brown gravelly CLAY with occasional cobbles.			32.0	92	51 -1pt	29	22		
TP104	B02	1.00		B	Firm grey brown gravelly CLAY with occasional cobbles.			15.0	58	46 -1pt	28	18		
TP105	B02	0.80		B	Firm brown gravelly CLAY.			18.0	55	41 -1pt	25	16		
TP106	B01	0.30		B	MADE GROUND - Firm brown gravelly CLAY with fragments of brick, glass and timbers.			24.0	55	42 -1pt	25	17		
TP108	2	2.00		B	Firm to stiff dark grey gravelly CLAY with occasional cobbles			9.5	40	29 -1pt	17	12		
TP109	7	3.00		B	Soft grey gravelly CLAY.			22.0	59	39 -1pt	21	18		

All tests performed in accordance with BS1377:1990 unless specified otherwise

<b>Key</b> Density test Linear measurement unless : wd - water displacement wi - immersion in water Liquid Limit 4pt cone unless : cas - Casagrande method 1pt - single point test Particle density sp - small pyknometer gj - gas jar	<b>Date Printed</b> 04/09/2015 00:00	<b>Approved By</b> Stephen.Watson	<b>Table</b> 3 sheet 3
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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH117**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B01**

Soil Description **Stiff brown sandy gravelly CLAY with rare cobbles.**

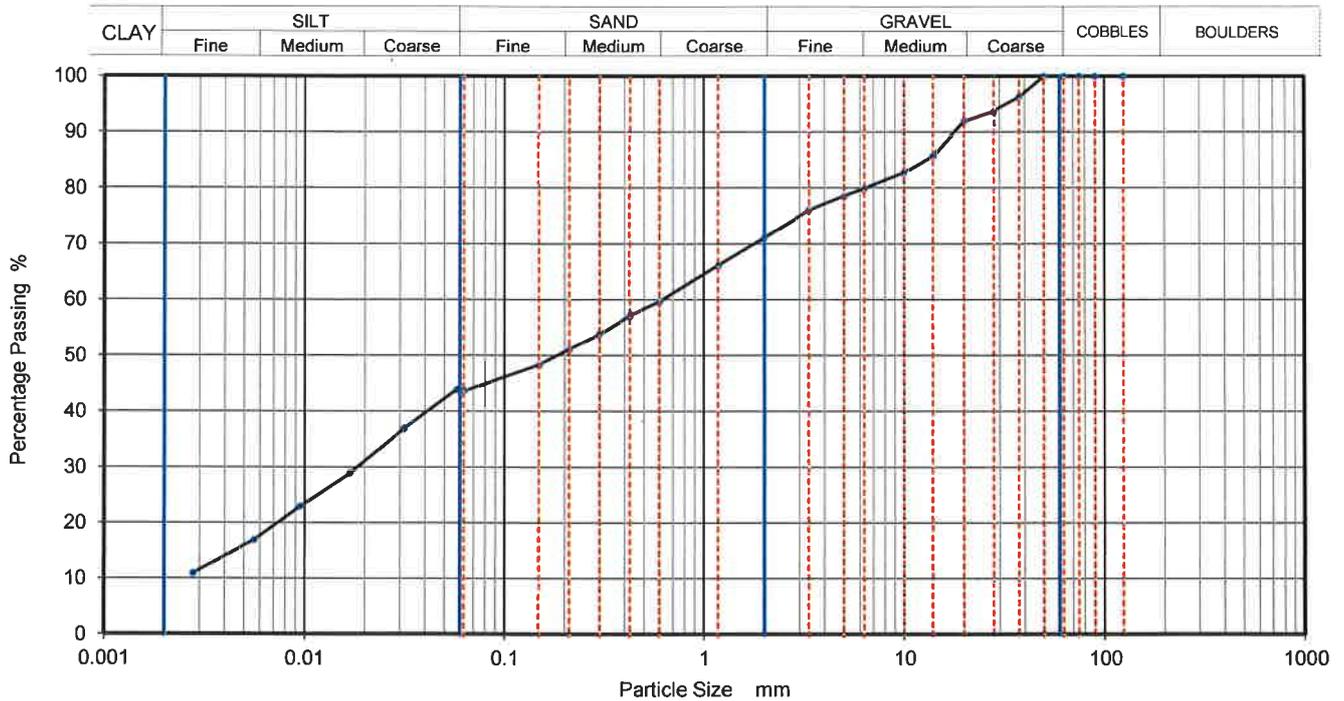
Depth, m **0.35**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH117B01**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0580	44
90	100	0.0315	37
75	100	0.0169	29
63	100	0.0095	23
50	100	0.0056	17
37.5	96	0.0028	11
28	94		
20	92		
14	86		
10	83		
6.3	80		
5	79		
3.35	76		
2	71		
1.18	66		
0.6	60		
0.425	57	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.3	54		
0.212	51		
0.15	48		
0.063	44		

Dry Mass of sample, g **3361**

Sample Proportions	% dry mass
Very coarse	0
Gravel	29
Sand	28
Fines <0.063mm	44

Grading Analysis	
D100	mm
D60	mm 0.619
D30	mm 0.0181
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Approved

Stephen.Watson

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Fig **7**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH117**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B03**

Soil Description **Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles.**

Depth, m **3.50**

Specimen Reference

12

Specimen Depth

m

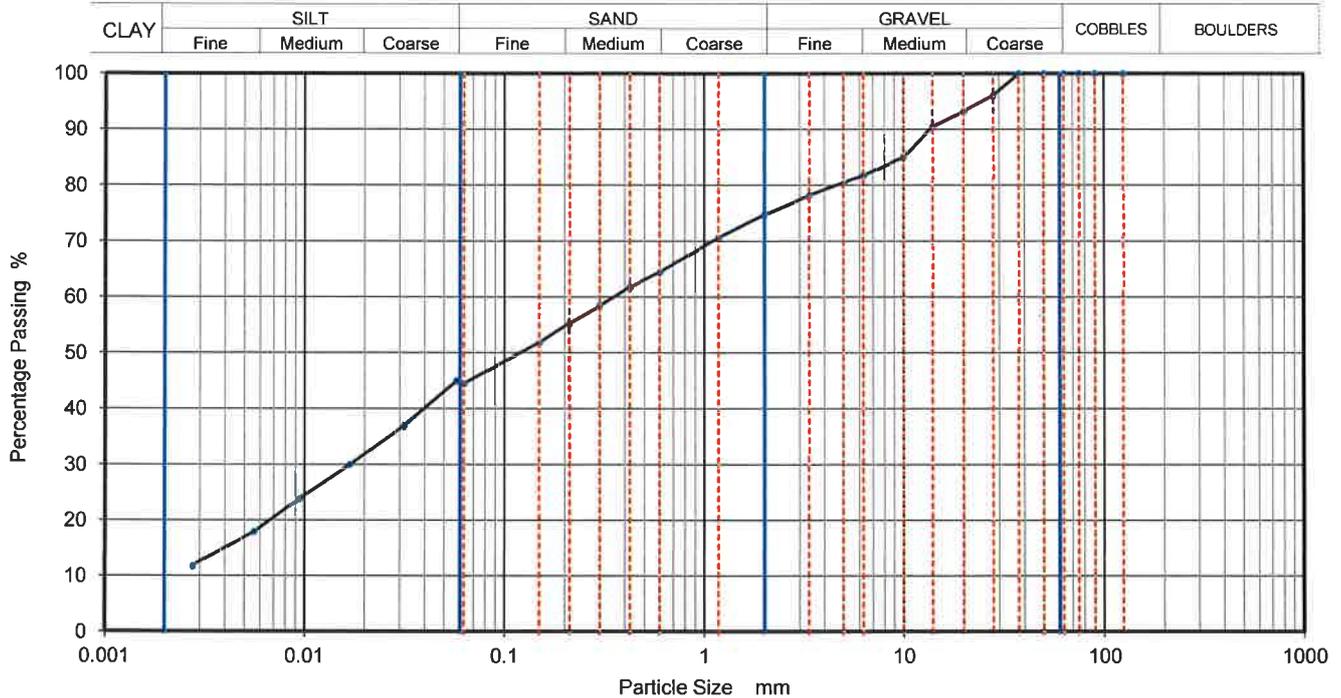
Sample Type

B

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID

**14645BH117B03**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	45
90	100	0.0315	37
75	100	0.0168	30
63	100	0.0095	24
50	100	0.0056	18
37.5	100	0.0028	12
28	96		
20	93		
14	91		
10	85		
6.3	82		
5	81		
3.35	78		
2	75		
1.18	71		
0.6	65	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	62		
0.3	59		
0.212	55		
0.15	52		
0.063	45		

Dry Mass of sample, g **3458**

Sample Proportions	% dry mass
Very coarse	0
Gravel	25
Sand	30
Fines <0.063mm	45

Grading Analysis		
D100	mm	
D60	mm	0.35
D30	mm	0.0166
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Approved

Stephen.Watson

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Fig **34**

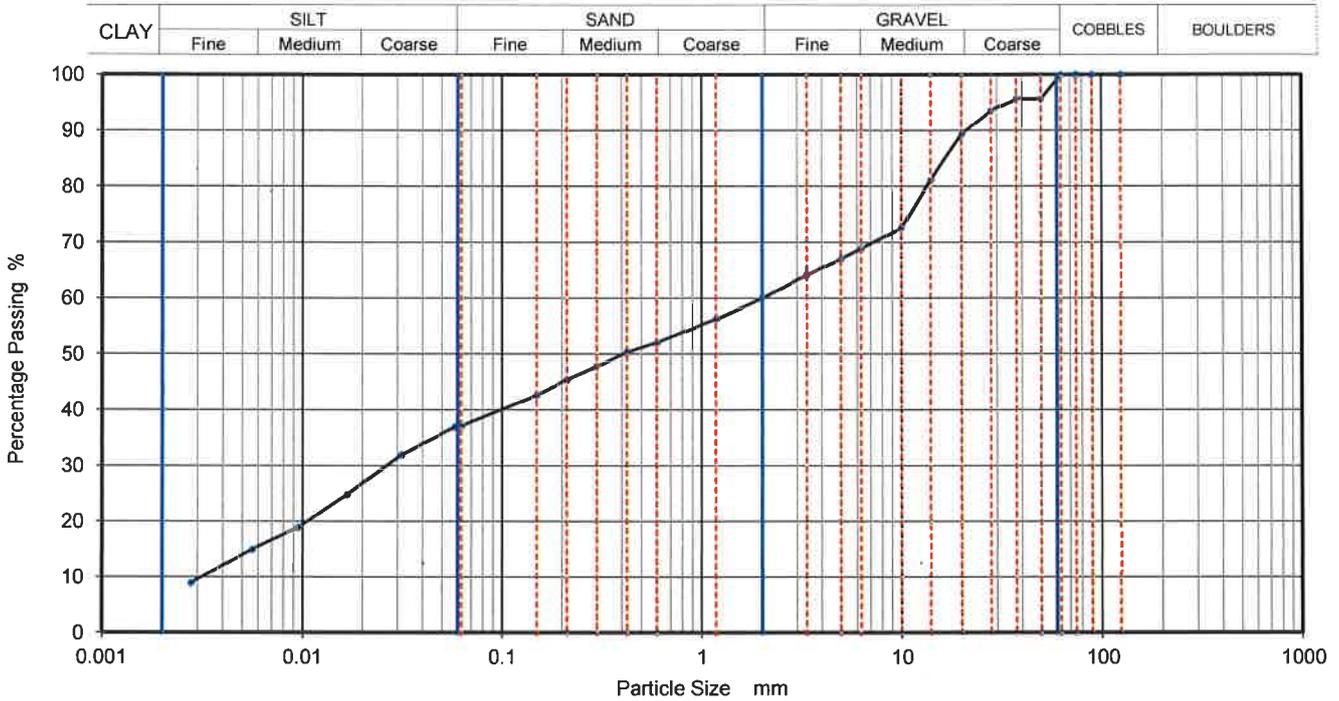
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## PARTICLE SIZE DISTRIBUTION

Job Ref	14-645
Borehole/Pit No.	BH118
Sample No.	8
Depth, m	8.00
KeyLAB ID	14645BH118B8

Site Name	Greater Dublin Drainage Scheme Ground Investigation	
Soil Description	Stiff dark grey slightly sandy slightly gravelly CLAY.	
Specimen Reference	6	m
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0580	37
90	100	0.0315	32
75	100	0.0169	25
63	100	0.0095	19
50	96	0.0056	15
37.5	96	0.0028	9
28	94		
20	89		
14	81		
10	73		
6.3	69		
5	67		
3.35	64		
2	60		
1.18	56		
0.6	52		
0.425	50	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.3	48		
0.212	46		
0.15	43		
0.063	37		

Dry Mass of sample, g 5307

Sample Proportions	% dry mass
Very coarse	0
Gravel	40
Sand	23
Fines <0.063mm	37

Grading Analysis	
D100	mm
D60	mm 1.99
D30	mm 0.0273
D10	mm 0.00315
Uniformity Coefficient	630
Curvature Coefficient	0.12

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



# PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH120**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **2**

Soil Description **Stiff brown sandy gravelly CLAY.**

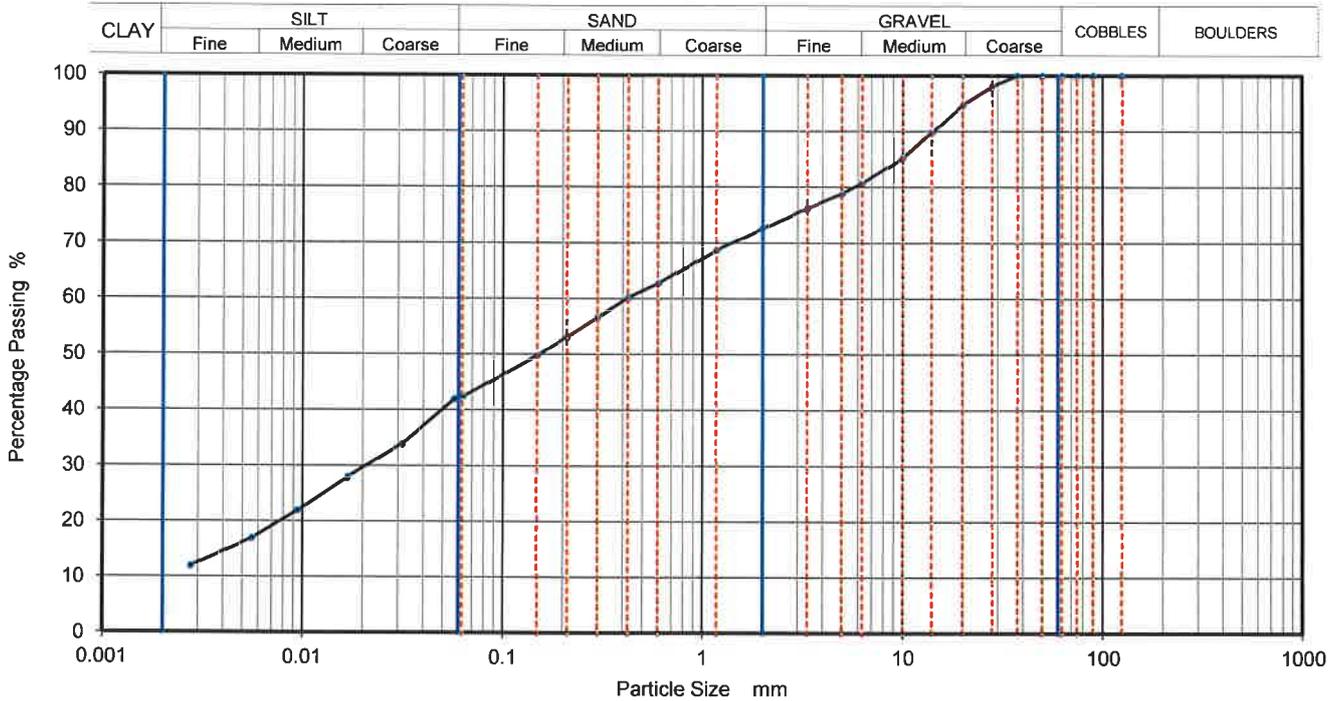
Depth, m **1.70**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH120B2**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0571	42
90	100	0.0315	34
75	100	0.0168	28
63	100	0.0095	22
50	100	0.0056	17
37.5	100	0.0028	12
28	98		
20	95		
14	90		
10	85		
6.3	81		
5	79		
3.35	76		
2	73		
1.18	69		
0.6	63		
0.425	60	Particle density (assumed)	
0.3	57	1.50	Mg/m <sup>3</sup>
0.212	53		
0.15	50		
0.063	42		

Dry Mass of sample, g **2869**

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	30
Fines <0.063mm	42

Grading Analysis	
D100	mm
D60	mm 0.416
D30	mm 0.021
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Approved  
**Stephen.Watson**

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**Fig 24**  
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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH120**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **4**

Soil Description **Firm to stiff black sandy gravelly CLAY.**

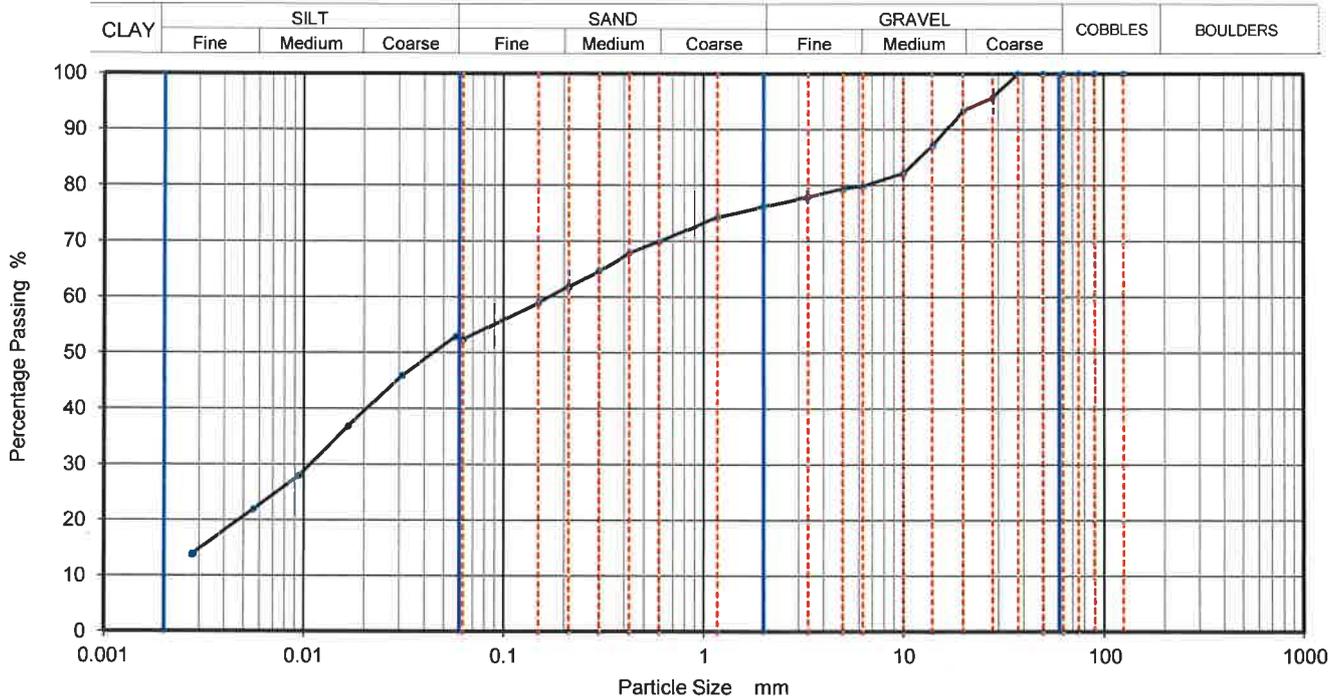
Depth, m **5.50**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH120B4**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	53
90	100	0.0311	46
75	100	0.0167	37
63	100	0.0095	28
50	100	0.0056	22
37.5	100	0.0028	14
28	96		
20	93		
14	87		
10	82		
6.3	80		
5	79		
3.35	78		
2	76		
1.18	74		
0.6	70	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	68		
0.3	65		
0.212	62		
0.15	59		
0.063	53		

Dry Mass of sample, g **2868**

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	24
Fines <0.063mm	52

Grading Analysis	
D100	mm
D60	mm 0.168
D30	mm 0.0109
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Approved  
  
Stephen.Watson

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Fig **39**  
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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH121**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **4**

Soil Description **Stiff black sandy gravelly CLAY.**

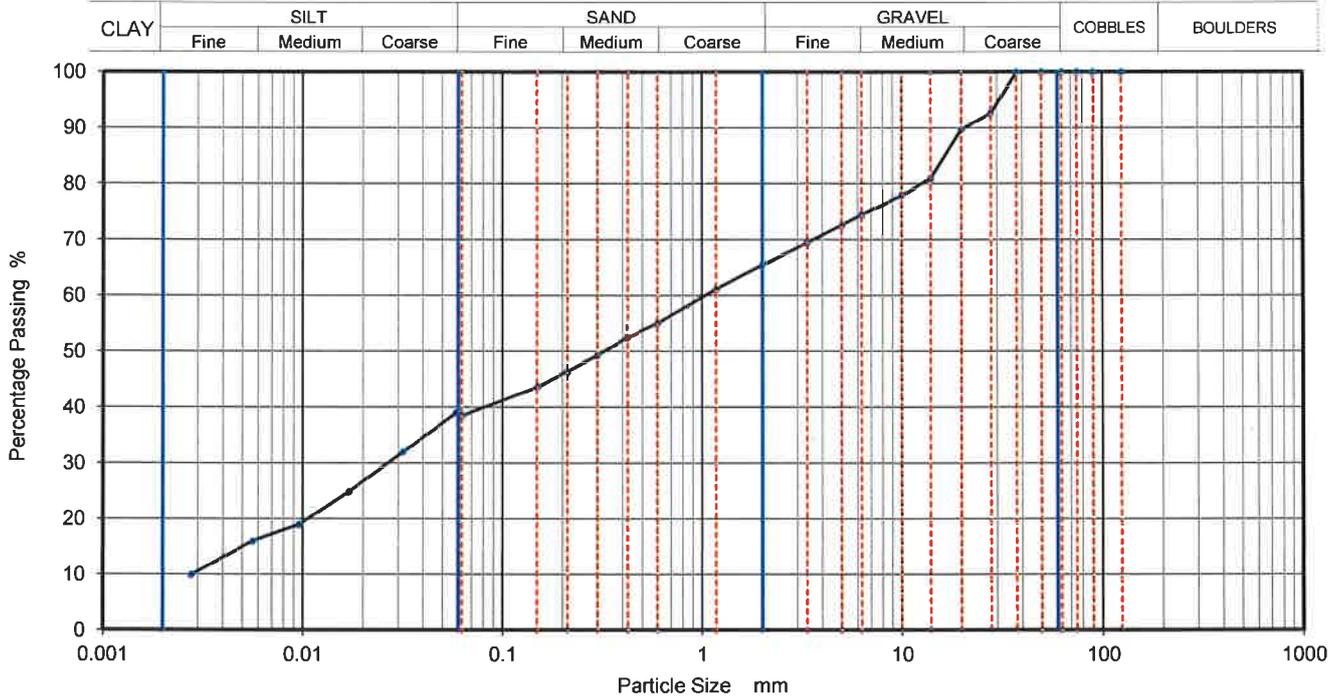
Depth, m **3.50**

Specimen Reference **11** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH121B4**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0584	39
90	100	0.0317	32
75	100	0.0170	25
63	100	0.0096	19
50	100	0.0056	16
37.5	100	0.0028	10
28	93		
20	90		
14	81		
10	78		
6.3	75		
5	73		
3.35	70		
2	66		
1.18	61		
0.6	55	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	53		
0.3	49		
0.212	47		
0.15	44		
0.063	39		

Dry Mass of sample, g

**3718**

Sample Proportions	% dry mass
Very coarse	0
Gravel	35
Sand	27
Fines <0.063mm	39

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	360
Curvature Coefficient	0.22

Remarks

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Fig **33**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH122**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **801**

Soil Description **Brown firm to stiff gravelly CLAY with occasional cobbles and boulders.**

Depth, m **0.20**

Specimen Reference

12

Specimen Depth

m

Sample Type

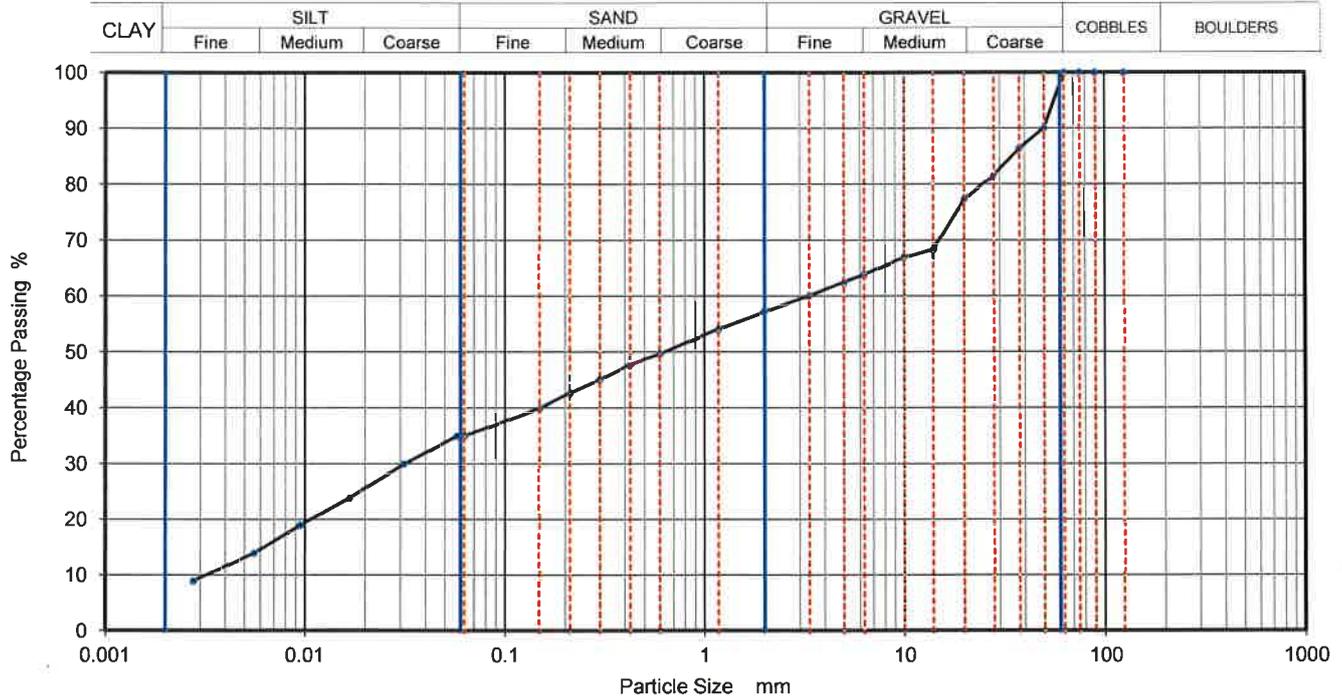
B

Test Method

BS1377:Part 2:1990, clauses 9.2 and 9.5

KeyLAB ID

14945BH122B01



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	35
90	100	0.0313	30
75	100	0.0168	24
63	100	0.0095	19
50	90	0.0056	14
37.5	86	0.0028	9
28	82		
20	77		
14	69		
10	67		
6.3	64		
5	63		
3.35	60		
2	57		
1.18	54		
0.6	50		
0.425	48	Particle density (assumed)	
0.3	45	1.50	Mg/m <sup>3</sup>
0.212	43		
0.15	40		
0.063	35		

Dry Mass of sample, g

6324

Sample Proportions	% dry mass
Very coarse	0
Gravel	43
Sand	22
Fines <0.063mm	35

Grading Analysis	
D100	mm
D60	mm 3.26
D30	mm 0.0319
D10	mm 0.00306
Uniformity Coefficient	1100
Curvature Coefficient	0.1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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Fig **2**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH122**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B03**

Soil Description **Black very stiff gravelly CLAY with occasional cobbles and boulders.**

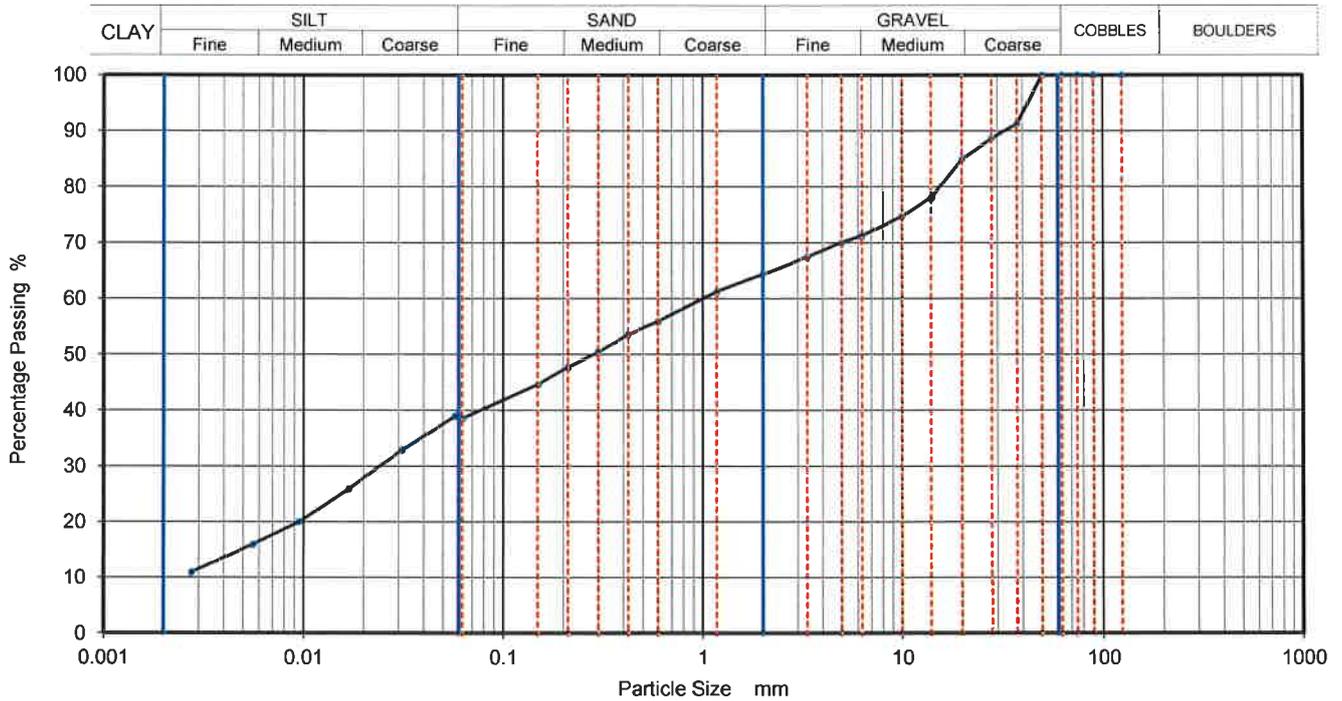
Depth, m **2.50**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14945BH122B03**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	39
90	100	0.0313	33
75	100	0.0168	26
63	100	0.0095	20
50	100	0.0056	16
37.5	91	0.0028	11
28	89		
20	85		
14	78		
10	75		
6.3	71		
5	70		
3.35	68		
2	64		
1.18	61		
0.6	56		
0.425	54	Particle density (assumed)	
0.3	51	1.50	Mg/m <sup>3</sup>
0.212	48		
0.15	45		
0.063	39		

Dry Mass of sample, g

**3892**

Sample Proportions	% dry mass
Very coarse	0
Gravel	36
Sand	26
Fines <0.063mm	39

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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Fig **30**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH123**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B01**

Soil Description **Firm to stiff dark brown sandy gravelly CLAY with occasional cobbles and boulders.**

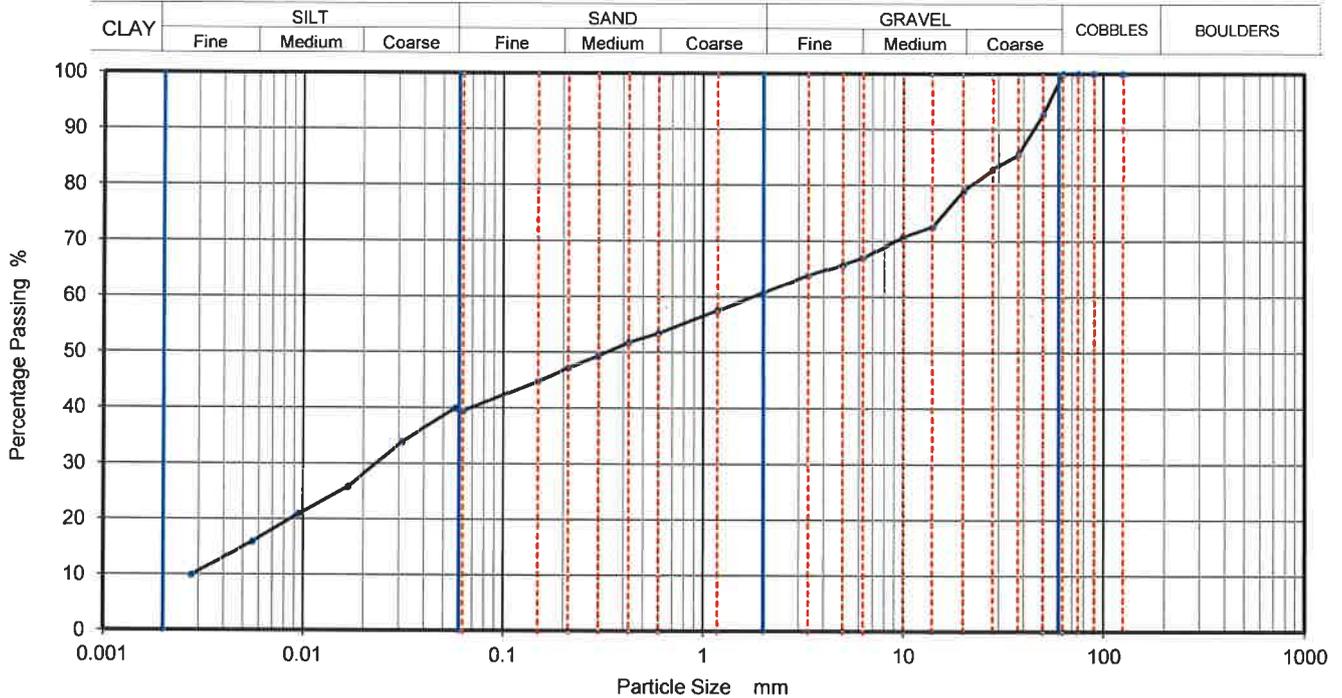
Depth, m **0.25**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH123B01**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	40
90	100	0.0313	34
75	100	0.0169	26
63	100	0.0095	21
50	93	0.0056	16
37.5	86	0.0028	10
28	83		
20	79		
14	73		
10	71		
6.3	67		
5	66		
3.35	64		
2	61		
1.18	58		
0.6	54	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	52		
0.3	49		
0.212	47		
0.15	45		
0.063	40		

Dry Mass of sample, g **5218**

Sample Proportions	% dry mass
Very coarse	0
Gravel	39
Sand	21
Fines <0.063mm	39

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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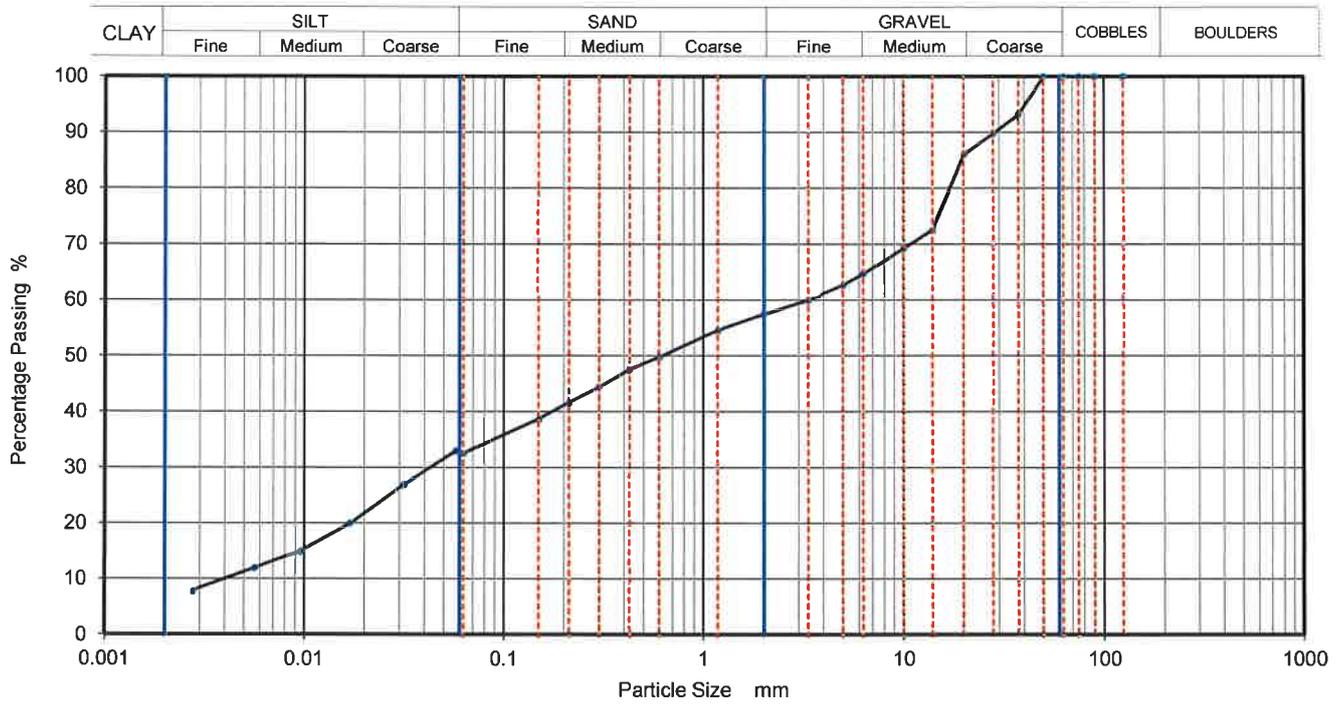
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Fig **3**  
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## PARTICLE SIZE DISTRIBUTION

Job Ref	14-645
Borehole/Pit No.	BH123
Site Name	Greater Dublin Drainage Scheme Ground Investigation
Sample No.	B03
Soil Description	Very stiff dark grey to black sandy gravelly CLAY with occasional cobbles and boulders.
Depth, m	2.50
Specimen Reference	12
Specimen Depth	m
Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5
KeyLAB ID	14645BH123B03



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	33
90	100	0.0315	27
75	100	0.0170	20
63	100	0.0096	15
50	100	0.0057	12
37.5	93	0.0028	8
28	90		
20	86		
14	73		
10	69		
6.3	65		
5	63		
3.35	60		
2	58		
1.18	55		
0.6	50		
0.425	48	Particle density (assumed)	
0.3	45	1.50	Mg/m <sup>3</sup>
0.212	42		
0.15	39		
0.063	33		

Dry Mass of sample, g 5031

Sample Proportions	% dry mass
Very coarse	0
Gravel	43
Sand	25
Fines <0.063mm	33

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	780
Curvature Coefficient	0.13

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH124**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **1**

Soil Description **Firm brown gravelly CLAY**

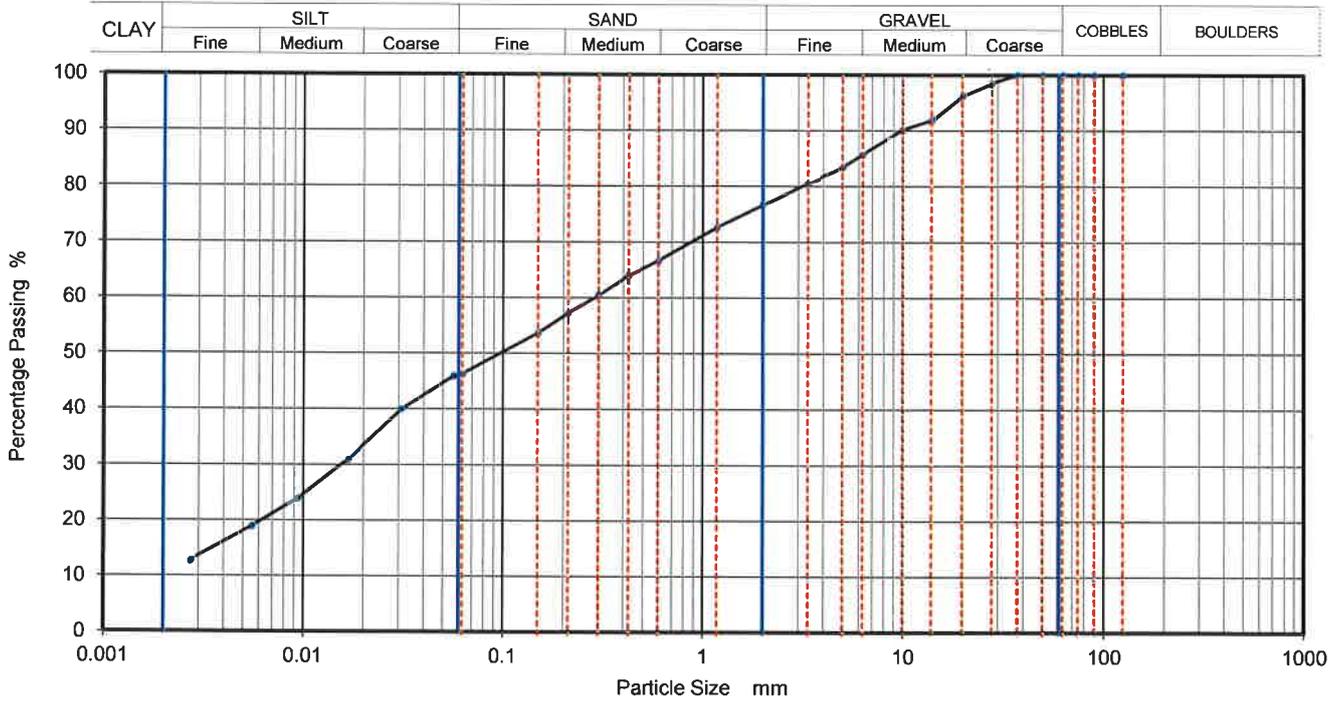
Depth, m **0.00**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH124B1**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0567	46
90	100	0.0309	40
75	100	0.0167	31
63	100	0.0094	24
50	100	0.0056	19
37.5	100	0.0028	13
28	99		
20	96		
14	92		
10	90		
6.3	86		
5	84		
3.35	81		
2	77		
1.18	73		
0.6	67	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	64		
0.3	61		
0.212	57		
0.15	54		
0.063	46		

Dry Mass of sample, g 2706

Sample Proportions	% dry mass
Very coarse	0
Gravel	23
Sand	30
Fines <0.063mm	46

Grading Analysis	
D100	mm
D60	mm 0.283
D30	mm 0.0154
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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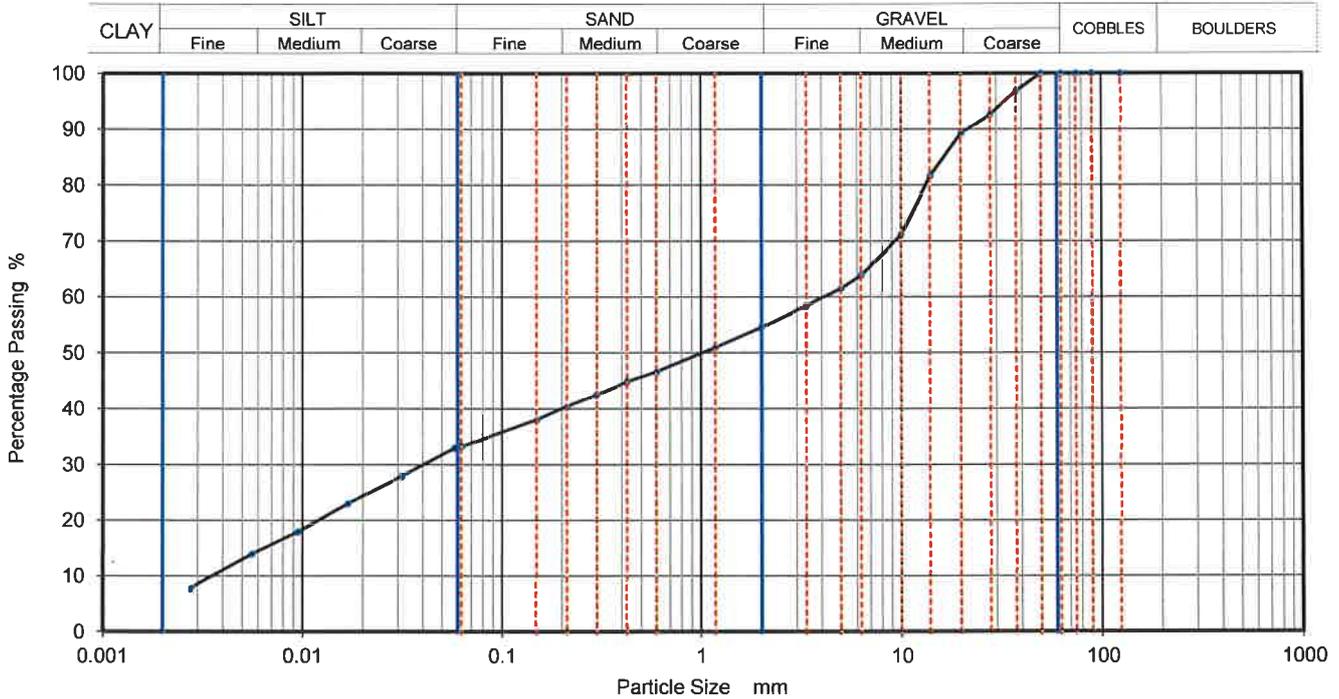
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Fig **1**  
  
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## PARTICLE SIZE DISTRIBUTION

Job Ref	14-645
Borehole/Pit No.	BH125
Site Name	Greater Dublin Drainage Scheme Ground Investigation
Sample No.	3
Soil Description	Very stiff black sandy gravelly CLAY.
Depth, m	3.50
Specimen Reference	6
Specimen Depth	m
Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5
KeyLAB ID	14645BH125B3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0580	33
90	100	0.0315	28
75	100	0.0168	23
63	100	0.0095	18
50	100	0.0056	14
37.5	97	0.0028	8
28	93		
20	89		
14	82		
10	71		
6.3	64		
5	62		
3.35	59		
2	55		
1.18	51		
0.6	47		
0.425	45	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.3	43		
0.212	41		
0.15	38		
0.063	33		

Dry Mass of sample, g 4469

Sample Proportions	% dry mass
Very coarse	0
Gravel	45
Sand	21
Fines <0.063mm	33

Grading Analysis	
D100	mm
D60	mm 4.06
D30	mm 0.0389
D10	mm 0.00348
Uniformity Coefficient	1200
Curvature Coefficient	0.11

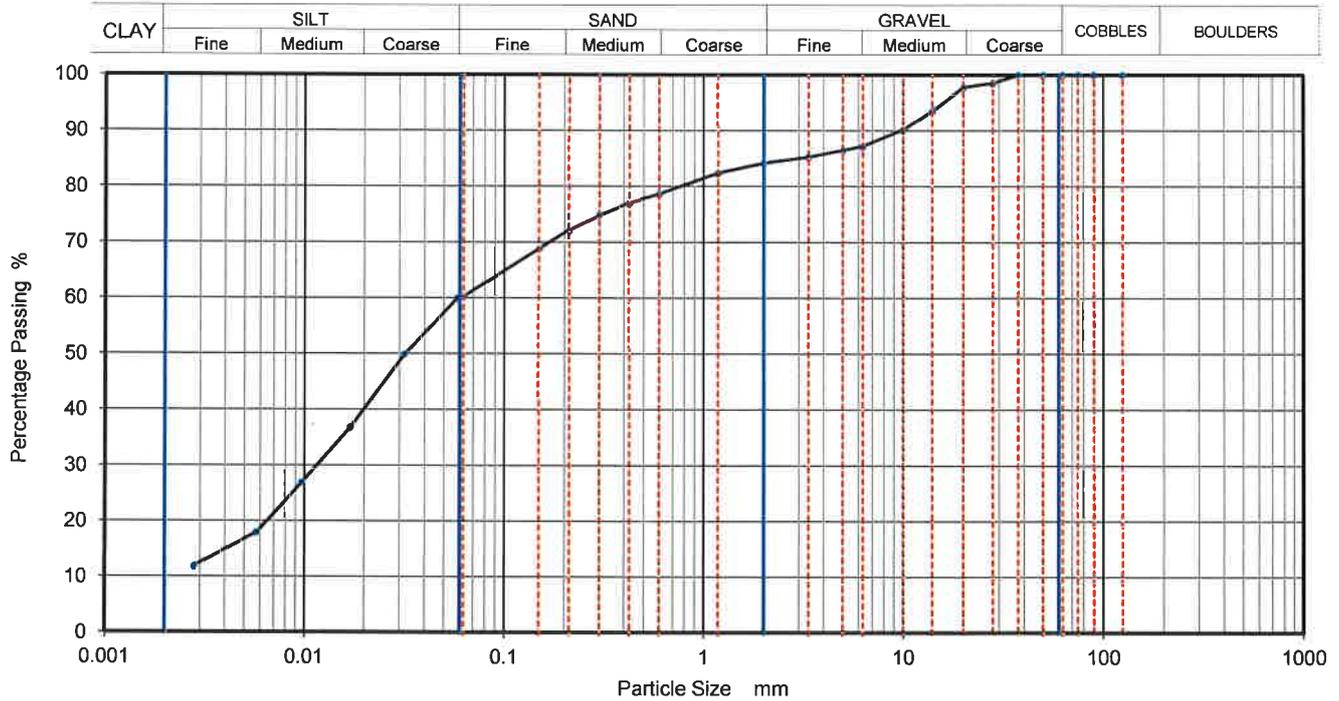
Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref	<b>14-645</b>
Borehole/Pit No.	BH127
Sample No.	1
Depth, m	0.30
Sample Type	B
KeyLAB ID	14645BH127B1

Site Name	Greater Dublin Drainage Scheme Ground Investigation		
Soil Description	Stiff brown grey sandy gravelly CLAY		
Specimen Reference	12	Specimen Depth	m
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0584	60
90	100	0.0319	50
75	100	0.0172	37
63	100	0.0097	27
50	100	0.0058	18
37.5	100	0.0028	12
28	99		
20	98		
14	94		
10	90		
6.3	87		
5	87		
3.35	85		
2	84		
1.18	82		
0.6	79	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	77		
0.3	75		
0.212	72		
0.15	69		
0.063	60		

Dry Mass of sample, g 2277

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	24
Fines <0.063mm	60

Grading Analysis	
D100	mm
D60	mm 0.0571
D30	mm 0.0116
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

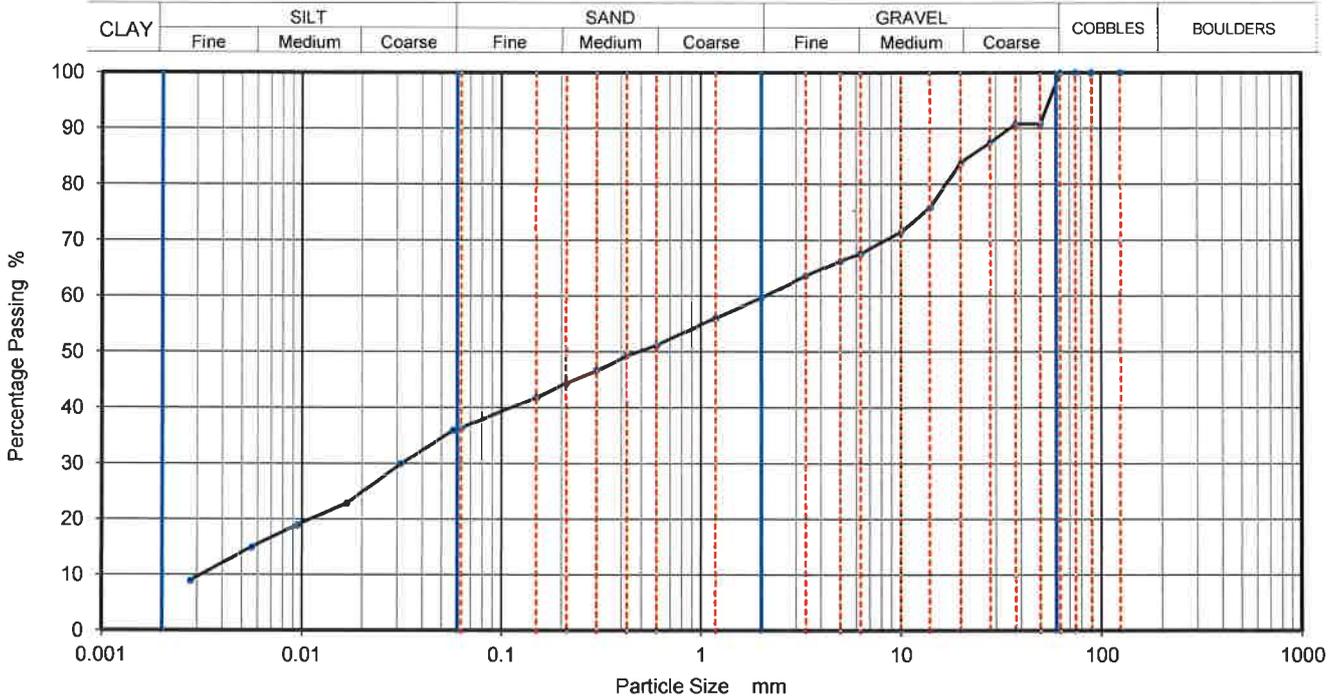
Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref	14-645
Borehole/Pit No.	BH127
Sample No.	3
Depth, m	2.50
Sample Type	B
KeyLAB ID	14645BH127B3

Site Name	Greater Dublin Drainage Scheme Ground Investigation		
Soil Description	Very stiff black sandy gravelly CLAY.		
Specimen Reference	12	Specimen Depth	m
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0571	36
90	100	0.0313	30
75	100	0.0169	23
63	100	0.0095	19
50	91	0.0056	15
37.5	91	0.0028	9
28	88		
20	84		
14	76		
10	72		
6.3	68		
5	66		
3.35	64		
2	60		
1.18	56		
0.6	51		
0.425	49	Particle density (assumed)	
0.3	47	1.50	Mg/m <sup>3</sup>
0.212	45		
0.15	42		
0.063	36		

Dry Mass of sample, g 6617

Sample Proportions	% dry mass
Very coarse	0
Gravel	40
Sand	23
Fines <0.063mm	36

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	690
Curvature Coefficient	0.15

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH128**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B02**

Soil Description **Firm to stiff light brown gravelly CLAY with occasional cobbles and boulders.**

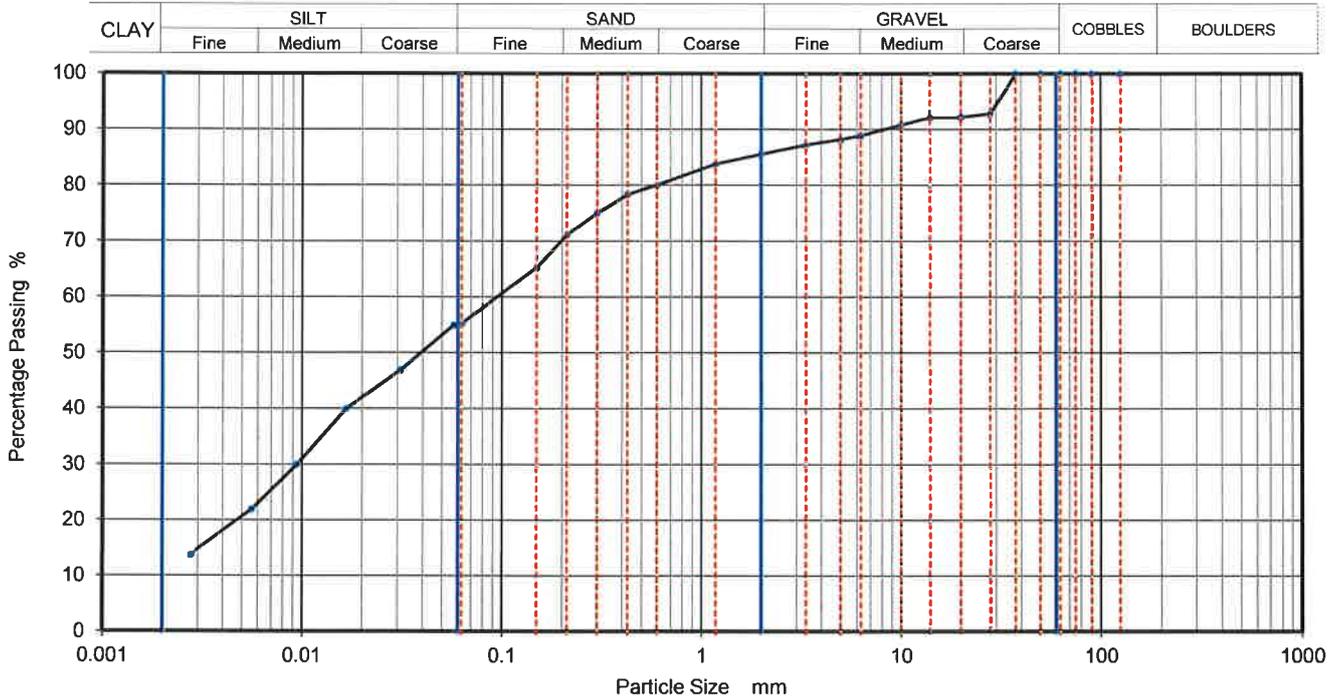
Depth, m **0.30**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH128B02**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0571	55
90	100	0.0311	47
75	100	0.0166	40
63	100	0.0094	30
50	100	0.0056	22
37.5	100	0.0028	14
28	93		
20	92		
14	92		
10	91		
6.3	89		
5	88		
3.35	87		
2	86		
1.18	84		
0.6	80	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	78		
0.3	75		
0.212	71		
0.15	65		
0.063	55		

Dry Mass of sample, g **2304**

Sample Proportions	% dry mass
Very coarse	0
Gravel	14
Sand	30
Fines <0.063mm	55

Grading Analysis	
D100	mm
D60	mm 0.0943
D30	mm 0.00943
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH128**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B03**

Soil Description **Very stiff black gravelly CLAY with occasional cobbles and boulders.**

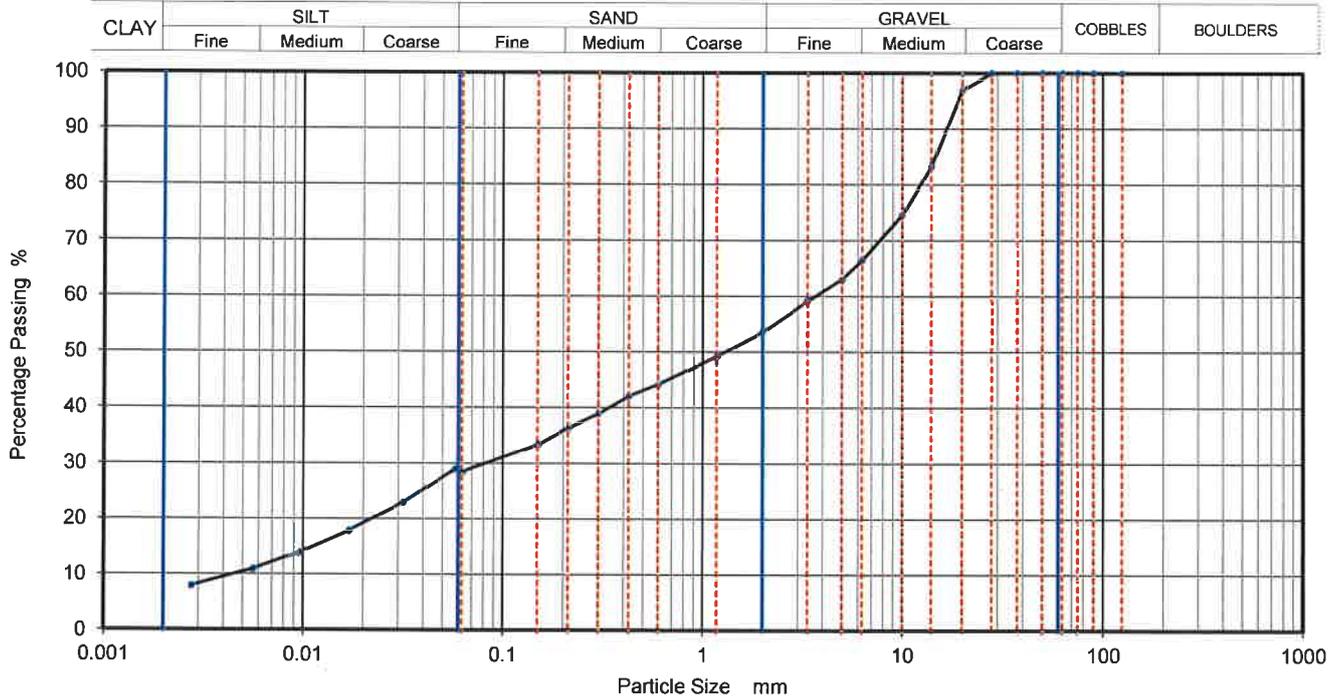
Depth, m **1.10**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH128B03**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0580	29
90	100	0.0317	23
75	100	0.0170	18
63	100	0.0096	14
50	100	0.0056	11
37.5	100	0.0028	8
28	100		
20	97		
14	83		
10	75		
6.3	67		
5	63		
3.35	59		
2	54		
1.18	49		
0.6	44		
0.425	42		
0.3	39		
0.212	36		
0.15	33		
0.063	29		
		Particle density (assumed)	
		1.50 Mg/m <sup>3</sup>	

Dry Mass of sample, g **3950**

Sample Proportions	% dry mass
Very coarse	0
Gravel	46
Sand	25
Fines <0.063mm	28

Grading Analysis	
D100	mm
D60	mm 3.65
D30	mm 0.082
D10	mm 0.00438
Uniformity Coefficient	830
Curvature Coefficient	0.42

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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Fig **16**  
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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH130**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **2**

Soil Description **Firm brown mottled grey slightly gravelly CLAY.**

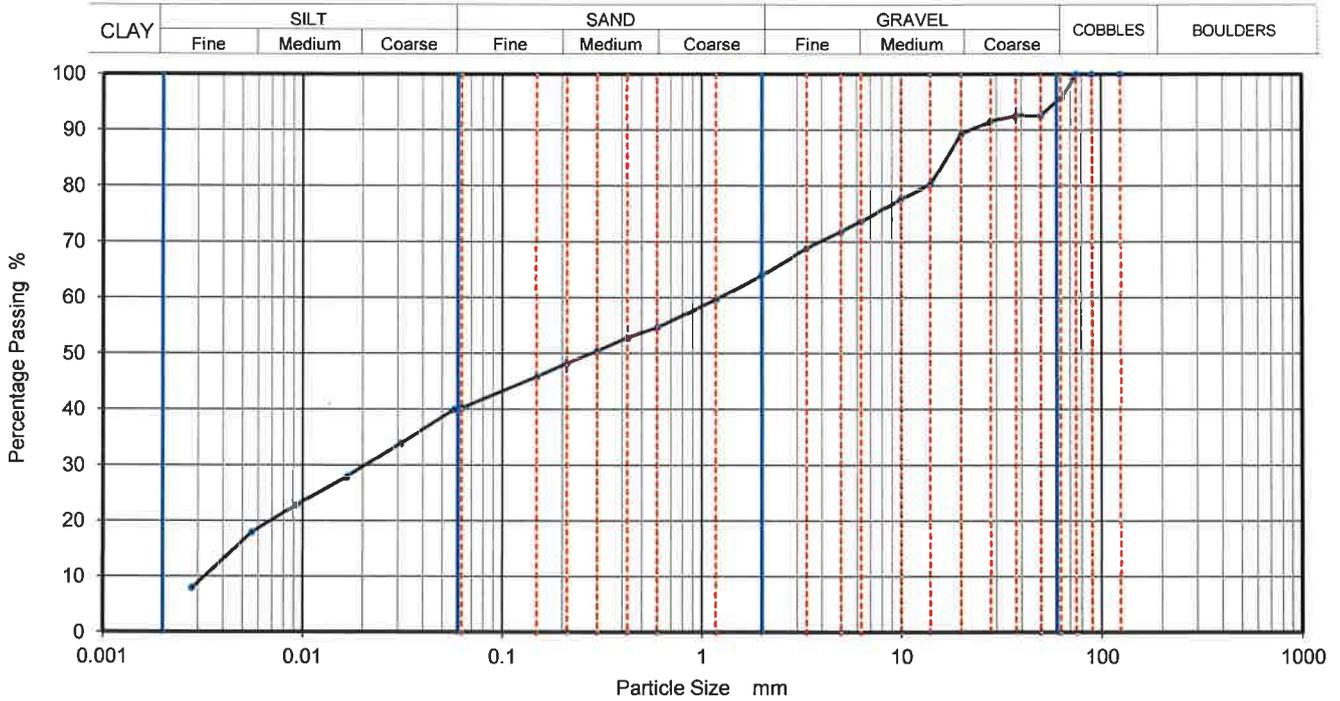
Depth, m **1.20**

Specimen Reference **6** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH130B2**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	40
90	100	0.0313	34
75	100	0.0167	28
63	96	0.0094	23
50	93	0.0056	18
37.5	93	0.0028	8
28	92		
20	89		
14	80		
10	78		
6.3	74		
5	72		
3.35	69		
2	64		
1.18	60		
0.6	55		
0.425	53	Particle density (assumed)	
0.3	51	1.50	Mg/m3
0.212	48		
0.15	46		
0.063	40		

Dry Mass of sample, g 5961

Sample Proportions	% dry mass
Very coarse	4
Gravel	32
Sand	24
Fines <0.063mm	40

Grading Analysis	
D100	mm
D60	mm 1.22
D30	mm 0.0197
D10	mm 0.00317
Uniformity Coefficient	390
Curvature Coefficient	0.1

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH130**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **6**

Soil Description **Very stiff dark grey slightly sandy slightly gravelly CLAY.**

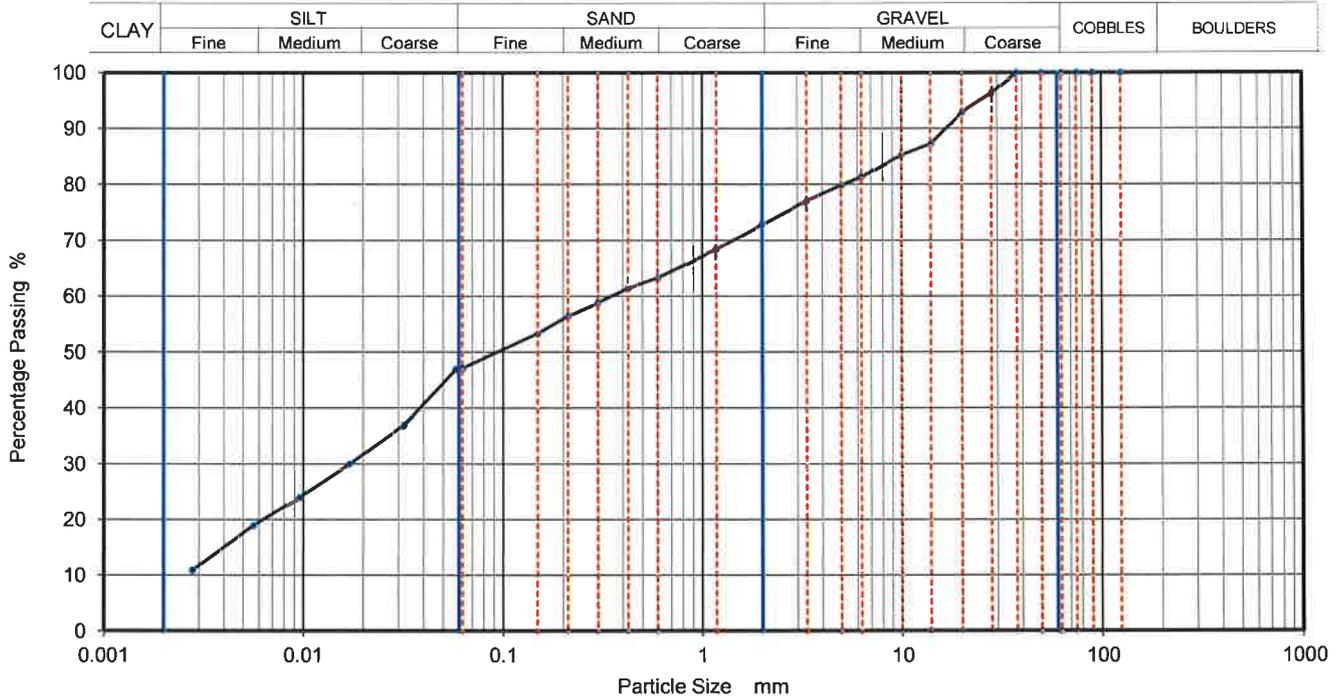
Depth, m **5.00**

Specimen Reference **6** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH130B6**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0580	47
90	100	0.0320	37
75	100	0.0170	30
63	100	0.0095	24
50	100	0.0056	19
37.5	100	0.0028	11
28	96		
20	93		
14	87		
10	85		
6.3	81		
5	80		
3.35	77		
2	73		
1.18	68		
0.6	63		
0.425	62	Particle density (assumed)	
0.3	59	1.50 Mg/m <sup>3</sup>	
0.212	57		
0.15	53		
0.063	47		

Dry Mass of sample, g 2508

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	26
Fines <0.063mm	47

Grading Analysis		
D100	mm	
D60	mm	0.347
D30	mm	0.017
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH135**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **2**

Soil Description **Brown mottled grey sandy gravelly CLAY**

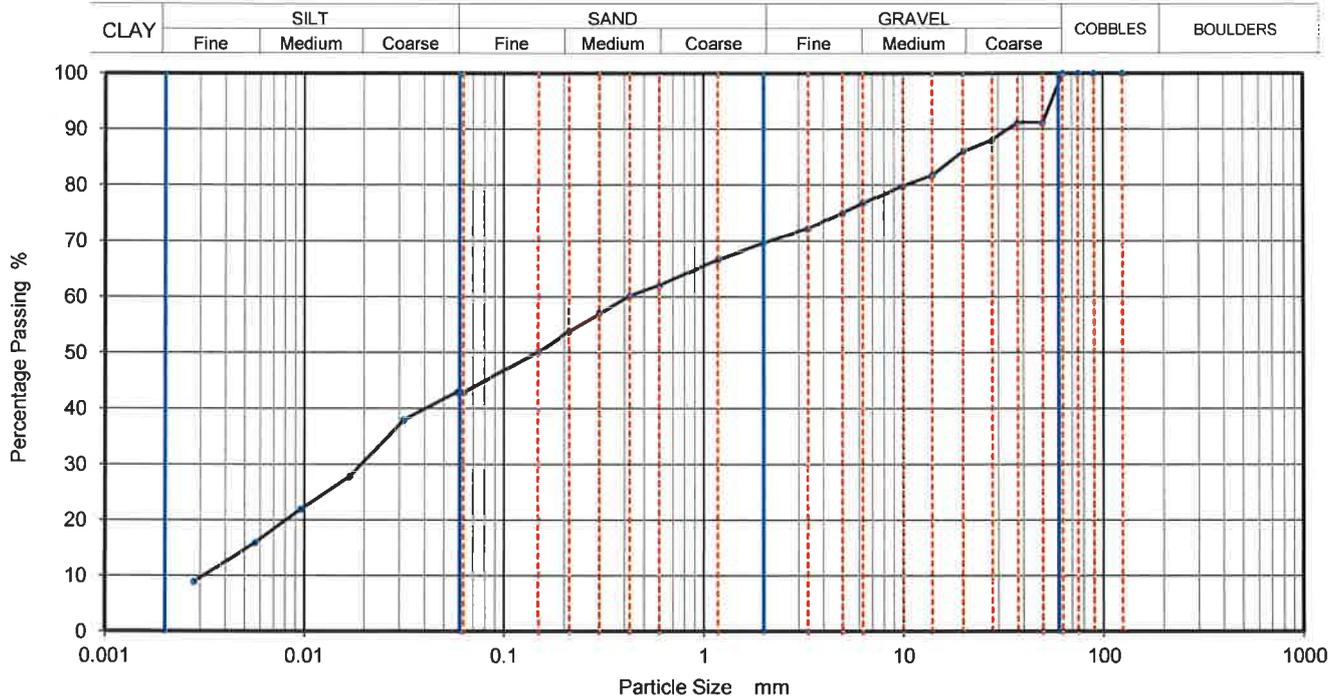
Depth, m **1.20**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH135B2**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0584	43
90	100	0.0315	38
75	100	0.0170	28
63	100	0.0096	22
50	91	0.0057	16
37.5	91	0.0028	9
28	88		
20	86		
14	82		
10	80		
6.3	77		
5	75		
3.35	72		
2	70		
1.18	67		
0.6	62		
0.425	60	Particle density (assumed)	
0.3	57	1.50	Mg/m <sup>3</sup>
0.212	54		
0.15	50		
0.063	43		

Dry Mass of sample, g **3168**

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	27
Fines <0.063mm	43

Grading Analysis	
D100	mm
D60	mm 0.415
D30	mm 0.0191
D10	mm 0.00298
Uniformity Coefficient	140
Curvature Coefficient	0.3

Remarks  
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Fig **17**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH135**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **6**

Soil Description **Stiff dark grey sandy gravelly CLAY.**

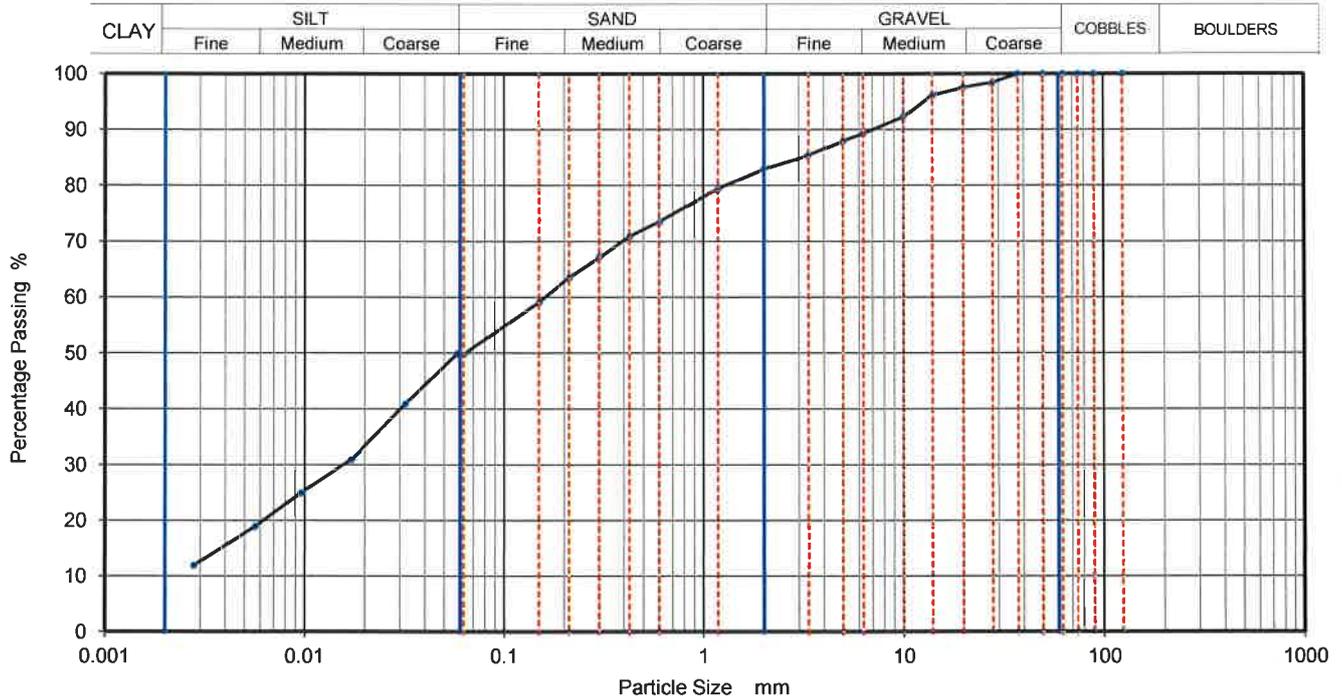
Depth, m **5.00**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH135B6**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0584	50
90	100	0.0320	41
75	100	0.0171	31
63	100	0.0096	25
50	100	0.0057	19
37.5	100	0.0028	12
28	98		
20	98		
14	96		
10	92		
6.3	89		
5	88		
3.35	86		
2	83		
1.18	80		
0.6	74		
0.425	71	Particle density (assumed)	
0.3	67	1.50 Mg/m <sup>3</sup>	
0.212	64		
0.15	59		
0.063	50		

Dry Mass of sample, g **3067**

Sample Proportions	% dry mass
Very coarse	0
Gravel	17
Sand	33
Fines <0.063mm	50

Grading Analysis	
D100	mm
D60	mm 0.159
D30	mm 0.0153
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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Fig **38**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH138**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B02**

Soil Description **Medium dense grey slightly sandy subangular to rounded fine to medium GRAVEL.**

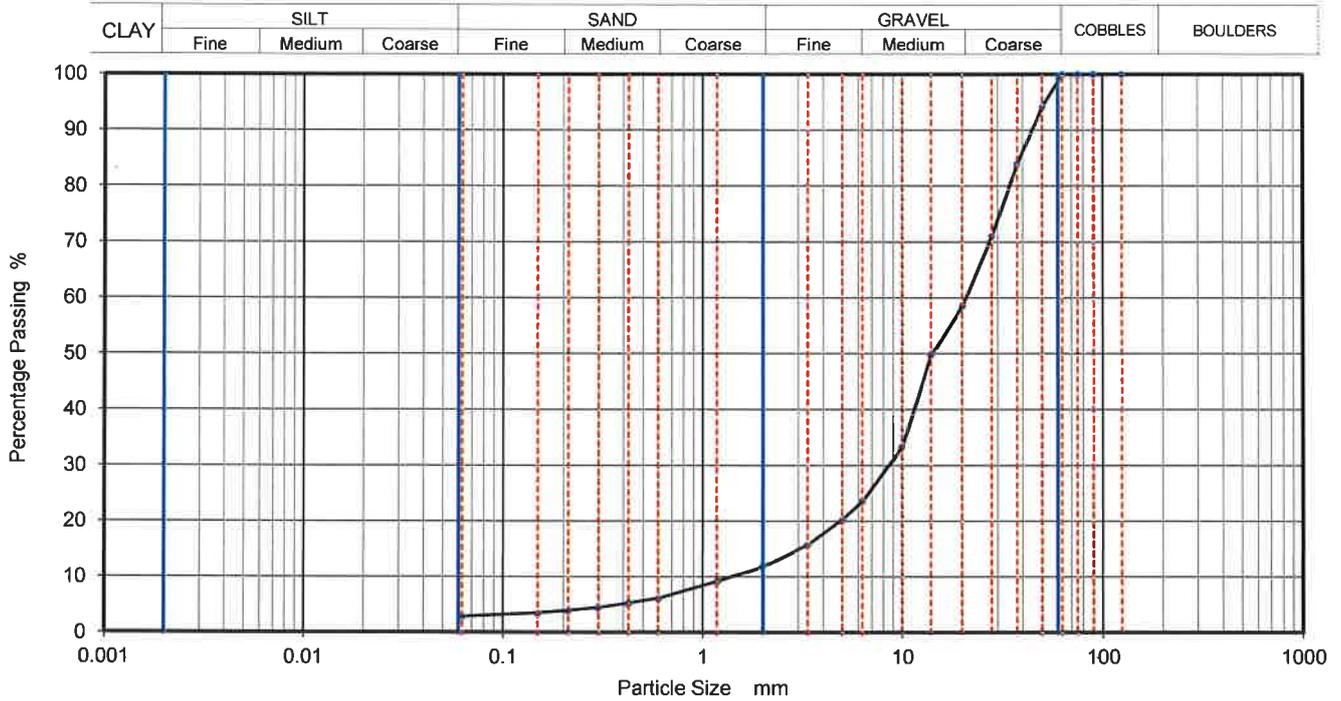
Depth, m **0.90**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clause 9.2**

KeyLAB ID **14645BH138B02**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	94		
37.5	84		
28	71		
20	59		
14	50		
10	33		
6.3	24		
5	20		
3.35	16		
2	12		
1.18	9		
0.6	6		
0.425	5		
0.3	5		
0.212	4		
0.15	4		
0.063	3		

Dry Mass of sample, g **10851**

Sample Proportions	% dry mass
Very coarse	0
Gravel	88
Sand	9
Fines <0.063mm	3

Grading Analysis	
D100	mm
D60	mm 20.8
D30	mm 8.51
D10	mm 1.39
Uniformity Coefficient	15
Curvature Coefficient	2.5

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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Fig **14**  
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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH138**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B03**

Soil Description **Medium dense grey slightly sandy subangular to rounded fine to medium GRAVEL.**

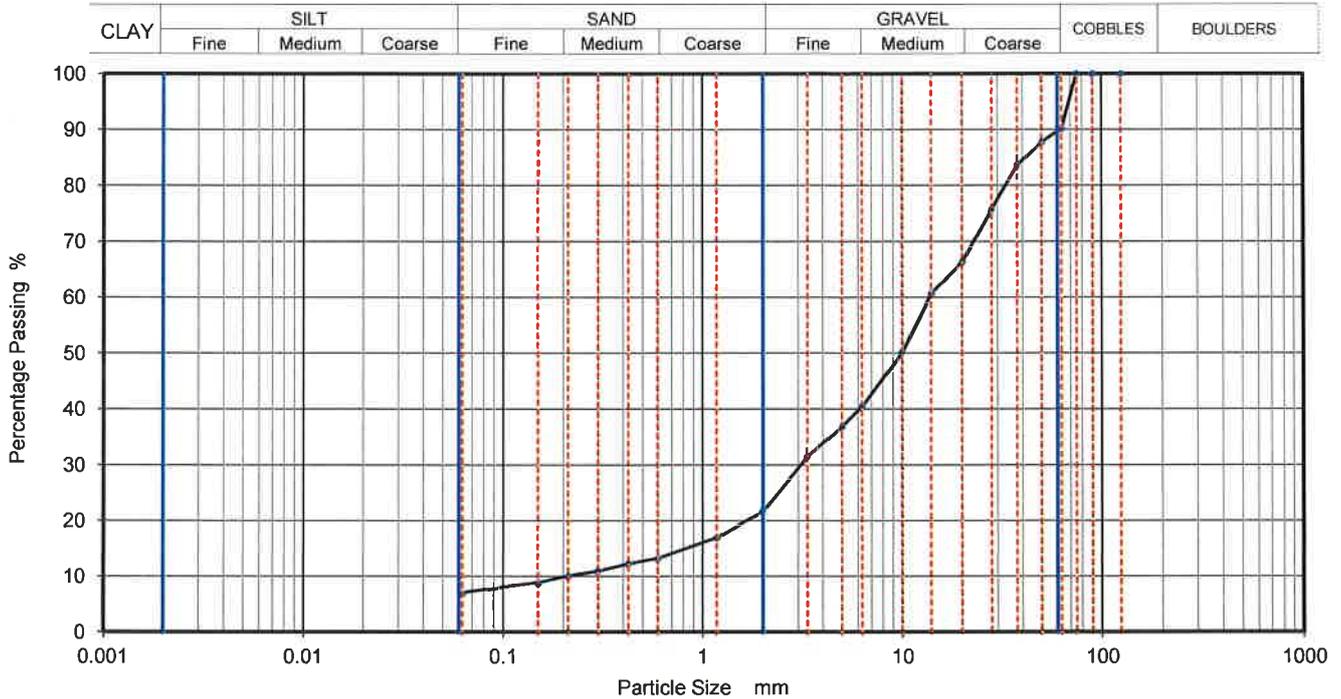
Depth, m **2.50**

Specimen Reference **8** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clause 9.2**

KeyLAB ID **14645BH138B03**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	90		
50	88		
37.5	84		
28	76		
20	66		
14	61		
10	50		
6.3	41		
5	37		
3.35	32		
2	22		
1.18	17		
0.6	13		
0.425	12		
0.3	11		
0.212	10		
0.15	9		
0.063	7		

Dry Mass of sample, g **11596**

Sample Proportions	% dry mass
Very coarse	10
Gravel	68
Sand	15
Fines <0.063mm	7

Grading Analysis	
D100	mm
D60	mm 13.6
D30	mm 3.08
D10	mm 0.207
Uniformity Coefficient	66
Curvature Coefficient	3.4

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH139**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **3**

Soil Description **Firm to stiff brown slightly sandy slightly gravelly CLAY**

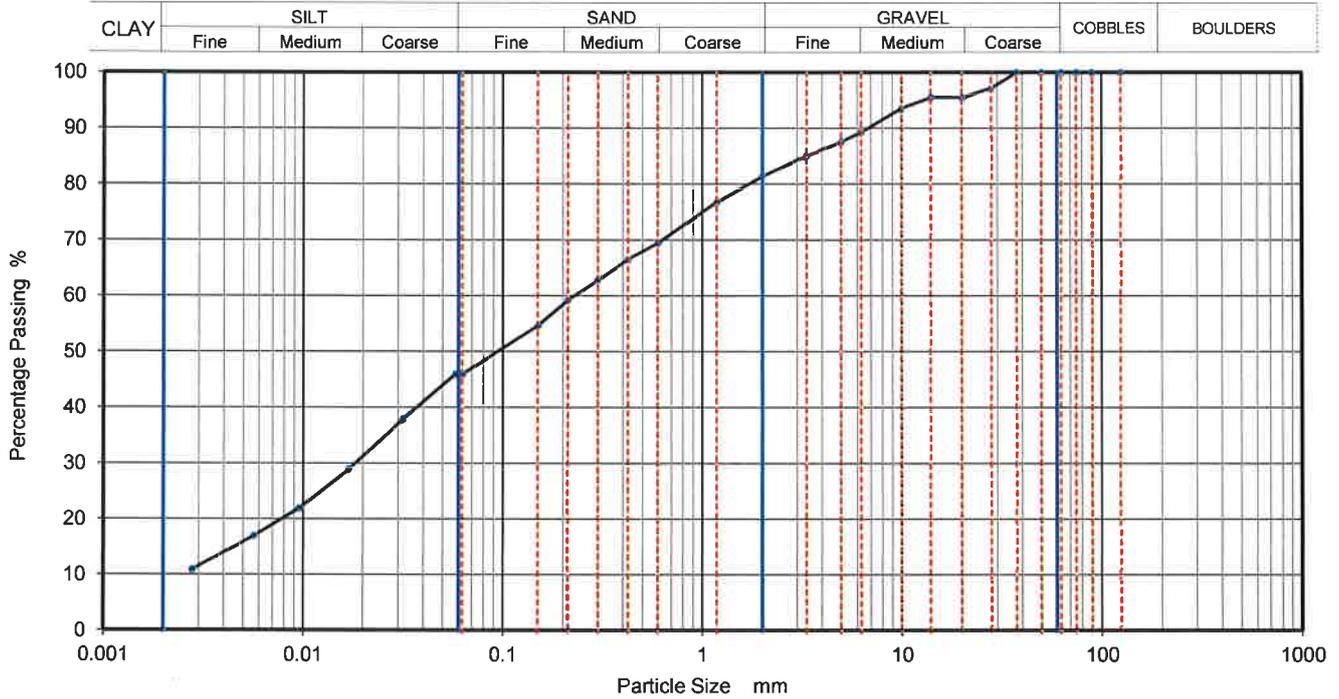
Depth, m **2.00**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH139B3**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0580	46
90	100	0.0317	38
75	100	0.0170	29
63	100	0.0096	22
50	100	0.0057	17
37.5	100	0.0028	11
28	97		
20	96		
14	96		
10	94		
6.3	89		
5	88		
3.35	85		
2	81		
1.18	77		
0.6	70		
0.425	67	Particle density (assumed)	
0.3	63	1.50	Mg/m <sup>3</sup>
0.212	59		
0.15	55		
0.063	46		

Dry Mass of sample, g **2880**

Sample Proportions	% dry mass
Very coarse	0
Gravel	19
Sand	35
Fines <0.063mm	46

Grading Analysis	
D100	mm
D60	mm 0.226
D30	mm 0.018
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **BH139**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **8**

Soil Description **Firm to stiff dark grey slightly sandy gravelly CLAY with occasional cobbles.**

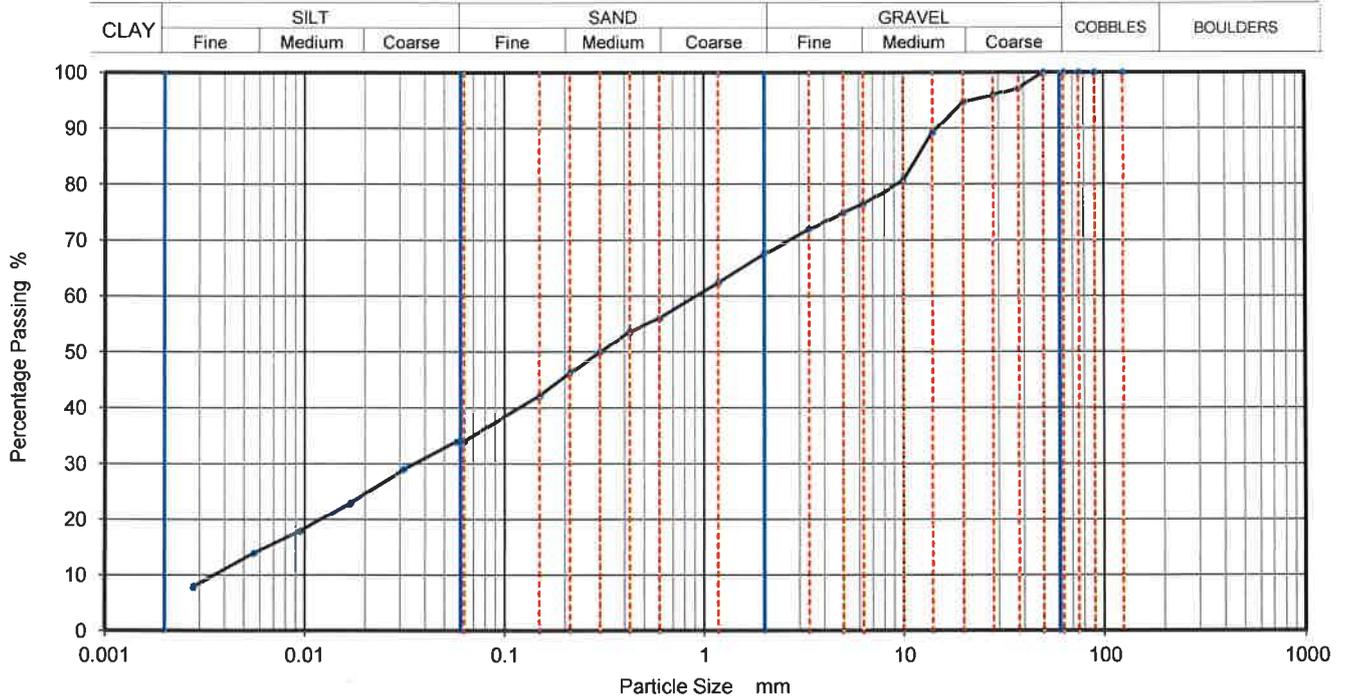
Depth, m **8.00**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645BH139B8**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	34
90	100	0.0313	29
75	100	0.0168	23
63	100	0.0095	18
50	100	0.0056	14
37.5	97	0.0028	8
28	96		
20	95		
14	89		
10	81		
6.3	77		
5	75		
3.35	72		
2	68		
1.18	62		
0.6	56	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	54		
0.3	50		
0.212	46		
0.15	42		
0.063	34		

Dry Mass of sample, g **4216**

Sample Proportions	% dry mass
Very coarse	0
Gravel	32
Sand	34
Fines <0.063mm	34

Grading Analysis	
D100	mm
D60	mm 0.911
D30	mm 0.035
D10	mm 0.0035
Uniformity Coefficient	260
Curvature Coefficient	0.38

Remarks  
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Fig **42**  
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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. TP100

Site Name Greater Dublin Drainage Scheme Ground Investigation

Sample No. B01

Soil Description MADE GROUND - Firm brown grey gravelly CLAY with fragments of plastic timber and gravel.

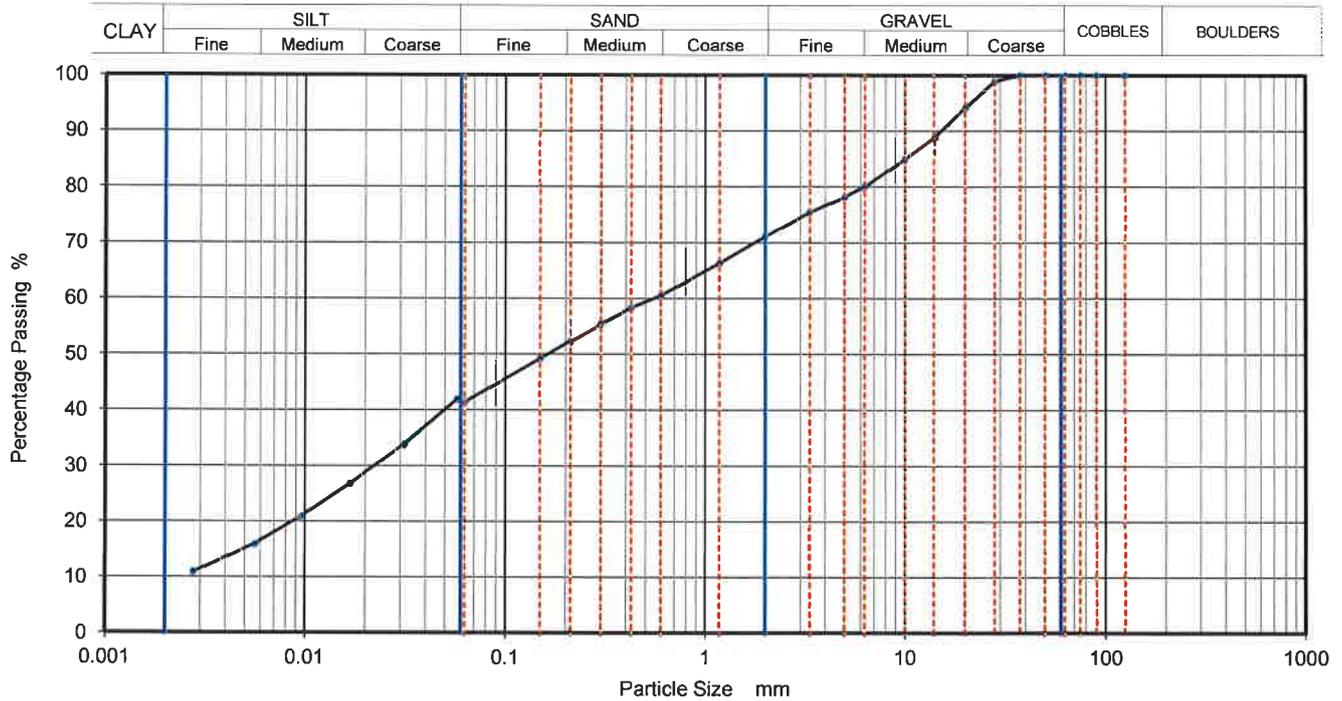
Depth, m 0.50

Specimen Reference 12 Specimen Depth m

Sample Type B

Test Method BS1377:Part 2:1990, clauses 9.2 and 9.5

KeyLAB ID 14645TP100B01



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	42
90	100	0.0315	34
75	100	0.0169	27
63	100	0.0095	21
50	100	0.0056	16
37.5	100	0.0028	11
28	99		
20	94		
14	89		
10	85		
6.3	80		
5	78		
3.35	76		
2	71		
1.18	66		
0.6	61	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	58		
0.3	56		
0.212	53		
0.15	49		
0.063	42		

Dry Mass of sample, g 3510

Sample Proportions	% dry mass
Very coarse	0
Gravel	29
Sand	30
Fines <0.063mm	42

Grading Analysis	
D100	mm
D60	mm 0.546
D30	mm 0.0221
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP100**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B02**

Soil Description **Firm brown gravelly CLAY**

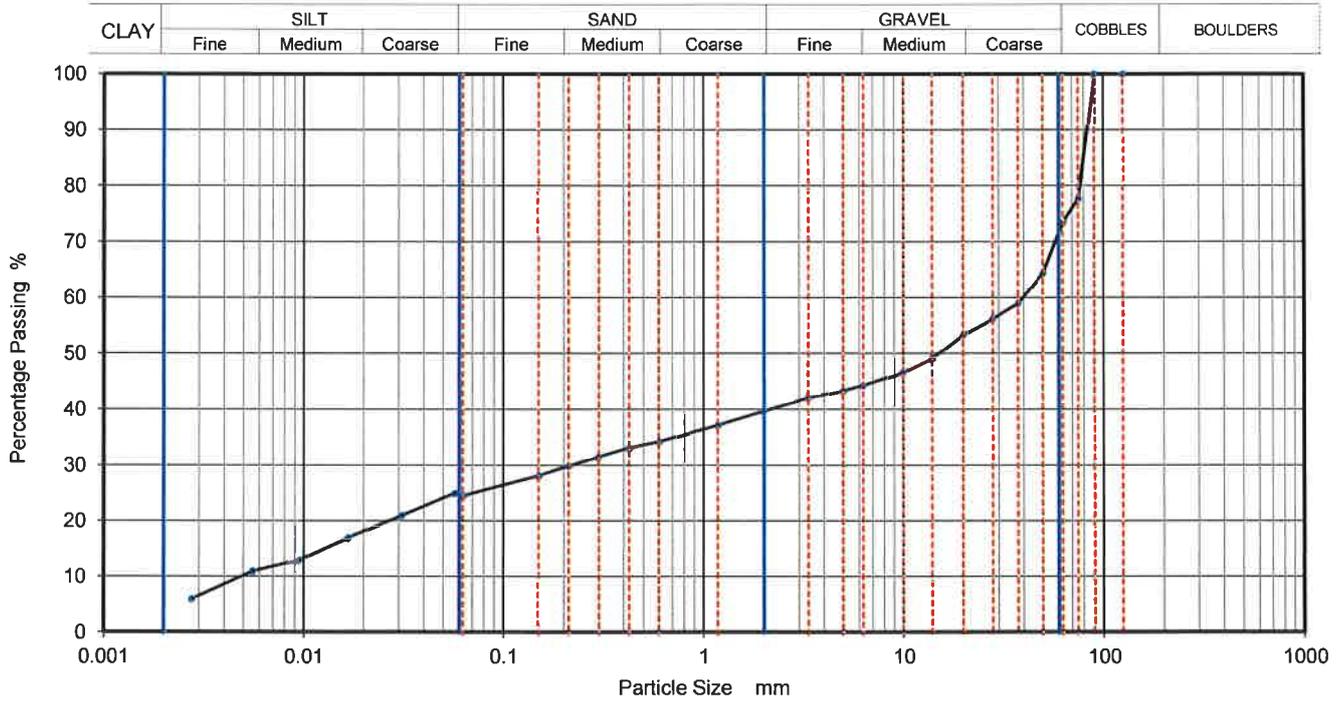
Depth, m **1.50**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP100B02**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0571	25
90	100	0.0311	21
75	78	0.0167	17
63	74	0.0095	13
50	64	0.0056	11
37.5	59	0.0028	6
28	56		
20	53		
14	49		
10	47		
6.3	44		
5	43		
3.35	42		
2	40		
1.18	37		
0.6	34		
0.425	33	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.3	32		
0.212	30		
0.15	28		
0.063	25		

Dry Mass of sample, g

**8346**

Sample Proportions	% dry mass
Very coarse	27
Gravel	34
Sand	15
Fines <0.063mm	25

Grading Analysis	
D100	mm
D60	mm 39.5
D30	mm 0.218
D10	mm 0.00513
Uniformity Coefficient	7700
Curvature Coefficient	0.23

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

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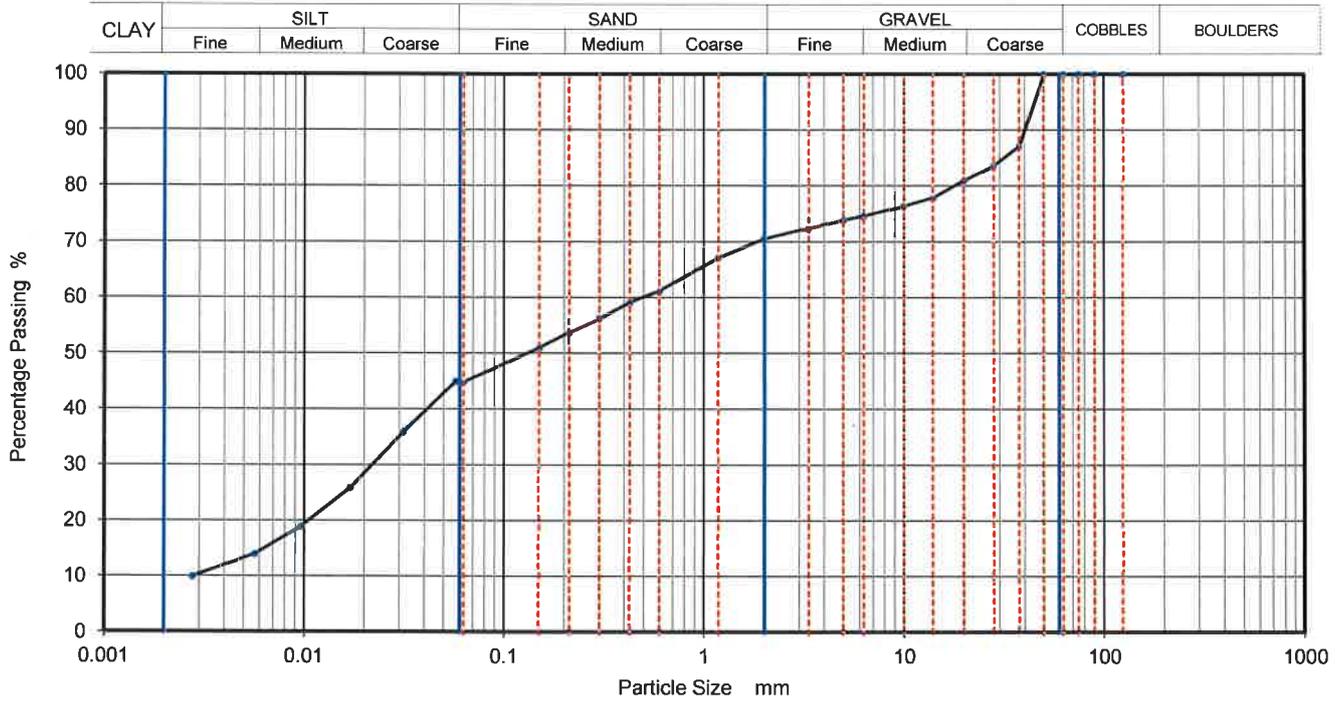
**Fig 23**

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## PARTICLE SIZE DISTRIBUTION

Job Ref	14-645
Borehole/Pit No.	TP101
Site Name	Greater Dublin Drainage Scheme Ground Investigation
Sample No.	B01
Soil Description	MADE GROUND - Soft to firm light brown gravelly CLAY with fragments of plastic and glass.
Depth, m	0.50
Specimen Reference	3
Specimen Depth	m
Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5
KeyLAB ID	14645TP101B01



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0571	45
90	100	0.0315	36
75	100	0.0171	26
63	100	0.0097	19
50	100	0.0057	14
37.5	87	0.0028	10
28	84		
20	81		
14	78		
10	76		
6.3	75		
5	74		
3.35	73		
2	71		
1.18	67		
0.6	61		
0.425	59	Particle density (assumed)	
0.3	56	1.50	Mg/m <sup>3</sup>
0.212	54		
0.15	51		
0.063	45		

Dry Mass of sample, g 3864

Sample Proportions	% dry mass
Very coarse	0
Gravel	29
Sand	26
Fines <0.063mm	45

Grading Analysis	
D100	mm
D60	mm 0.491
D30	mm 0.0222
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. TP102

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B01**

Soil Description **Firm brown gravelly CLAY.**

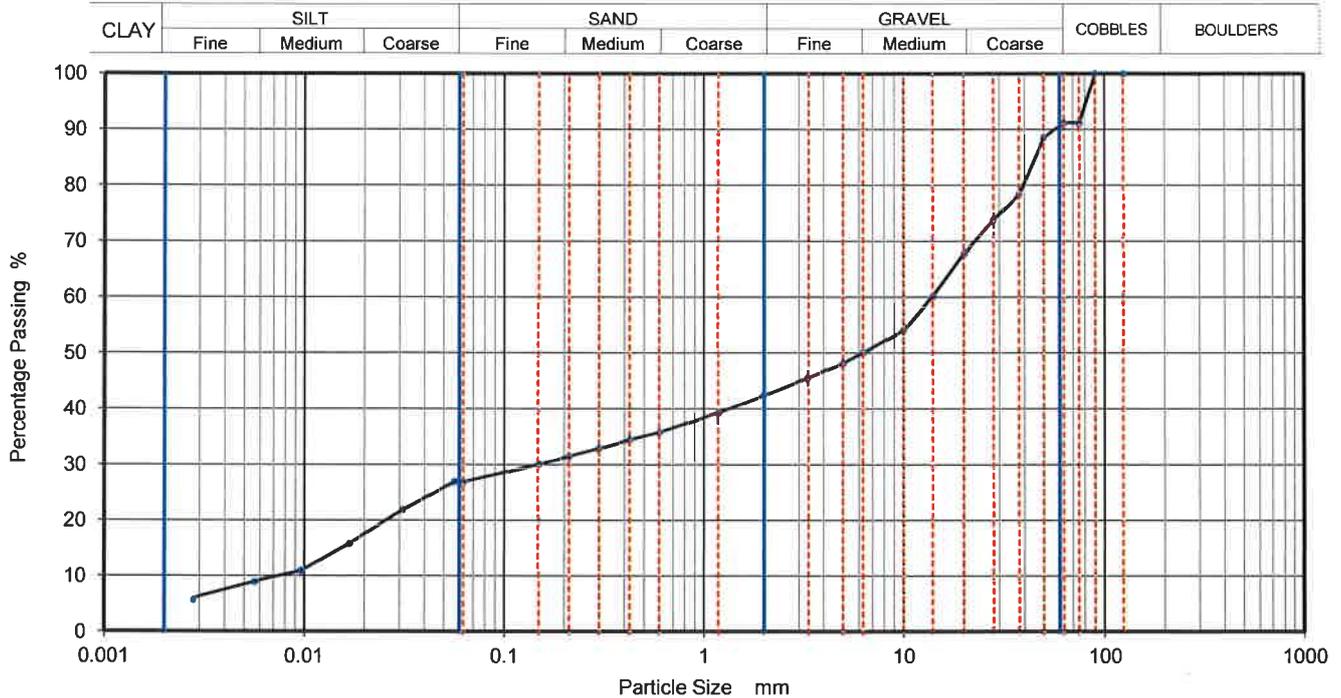
Depth, m **0.50**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP102B01**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0567	27
90	100	0.0313	22
75	91	0.0170	16
63	91	0.0097	11
50	89	0.0057	9
37.5	78	0.0028	6
28	74		
20	68		
14	60		
10	54		
6.3	50		
5	48		
3.35	46		
2	43		
1.18	39		
0.6	36		
0.425	35	Particle density (assumed)	
0.3	33	1.50	Mg/m <sup>3</sup>
0.212	32		
0.15	30		
0.063	27		

Dry Mass of sample, g **6955**

Sample Proportions	% dry mass
Very coarse	9
Gravel	49
Sand	16
Fines <0.063mm	27

Grading Analysis	
D100	mm
D60	mm 13.9
D30	mm 0.146
D10	mm 0.00725
Uniformity Coefficient	1900
Curvature Coefficient	0.21

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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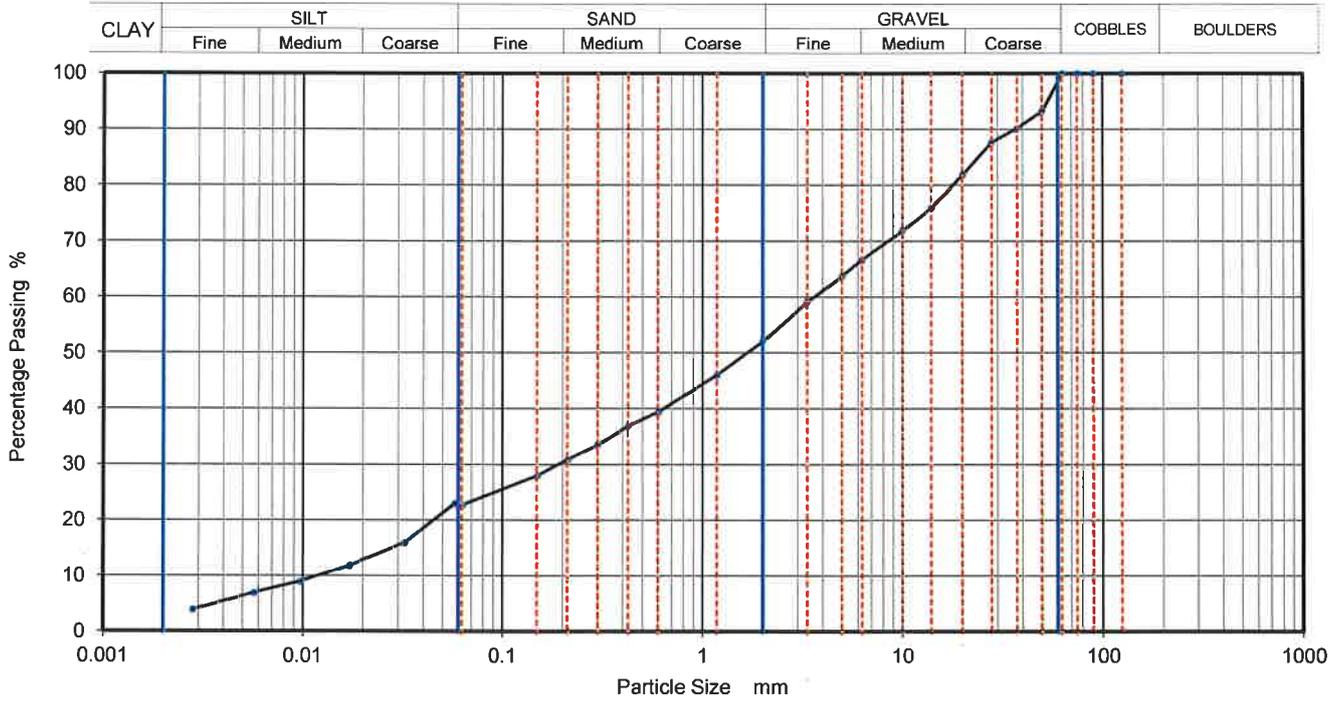
Fig **10**

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## PARTICLE SIZE DISTRIBUTION

Job Ref	14-645
Borehole/Pit No.	TP102
Site Name	Greater Dublin Drainage Scheme Ground Investigation
Sample No.	2
Soil Description	Firm grey gravelly CLAY with fragments of weathered roots.
Depth, m	1.50
Specimen Reference	12
Specimen Depth	m
Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5
KeyLAB ID	14645TP102B02



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.075	23
90	100	0.0324	16
75	100	0.0173	12
63	100	0.0098	9
50	93	0.0057	7
37.5	90	0.0028	4
28	88		
20	82		
14	76		
10	72		
6.3	67		
5	64		
3.35	59		
2	52		
1.18	46		
0.6	39		
0.425	37	Particle density (assumed)	
0.3	34	1.50	Mg/m <sup>3</sup>
0.212	31		
0.15	28		
0.063	23		

Dry Mass of sample, g 5729

Sample Proportions	% dry mass
Very coarse	0
Gravel	48
Sand	29
Fines <0.063mm	23

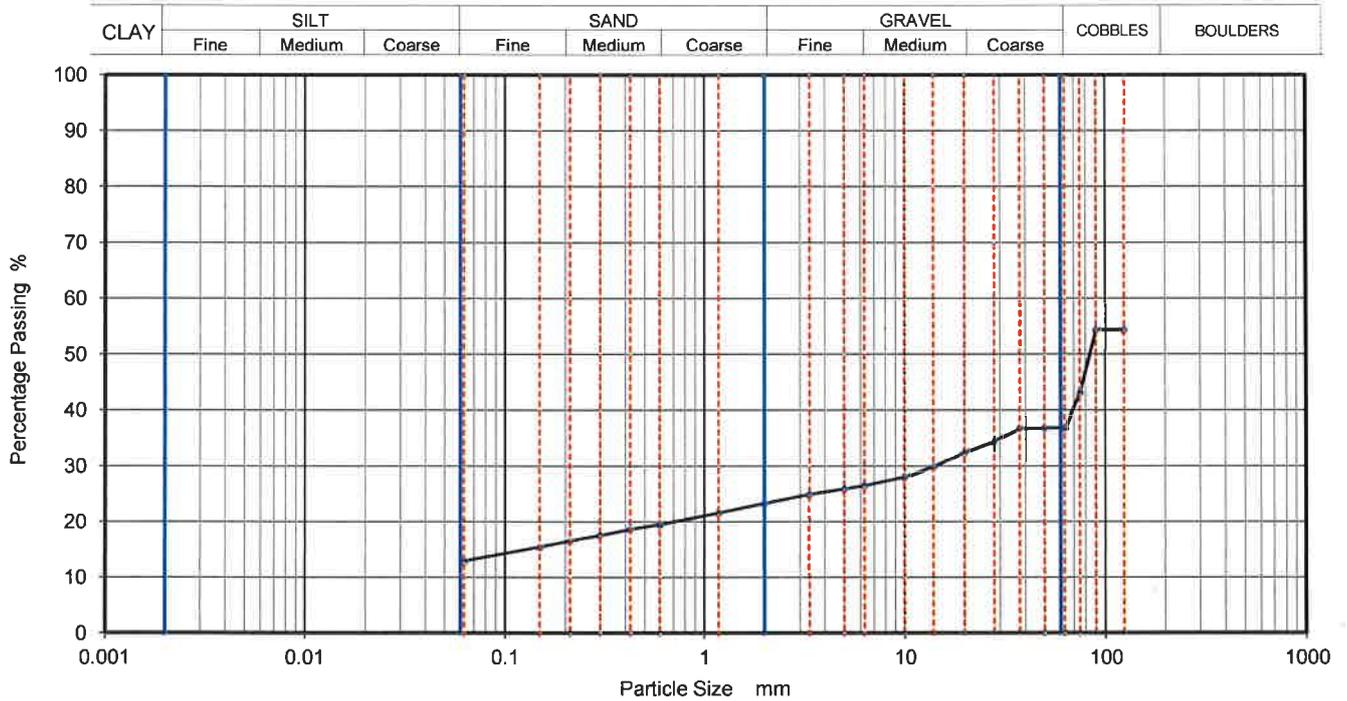
Grading Analysis	
D100	mm
D60	mm 3.58
D30	mm 0.191
D10	mm 0.0123
Uniformity Coefficient	290
Curvature Coefficient	0.83

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref	<b>14-645</b>
Borehole/Pit No.	TP103
Site Name	Greater Dublin Drainage Scheme Ground Investigation
Sample No.	B02
Soil Description	Firm brown gravelly CLAY with fragments of weathered roots.
Depth, m	0.90
Specimen Reference	12
Specimen Depth	m
Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2
KeyLAB ID	14645TP103B02



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	54		
90	54		
75	43		
63	37		
50	37		
37.5	37		
28	35		
20	33		
14	30		
10	28		
6.3	27		
5	26		
3.35	25		
2	23		
1.18	22		
0.6	20		
0.425	19		
0.3	18		
0.212	17		
0.15	16		
0.063	13		

Dry Mass of sample, g 10867

Sample Proportions	% dry mass
Very coarse	63
Gravel	14
Sand	10
Fines <0.063mm	13

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP104**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B01**

Soil Description **Firm brown gravelly CLAY with occasional cobbles.**

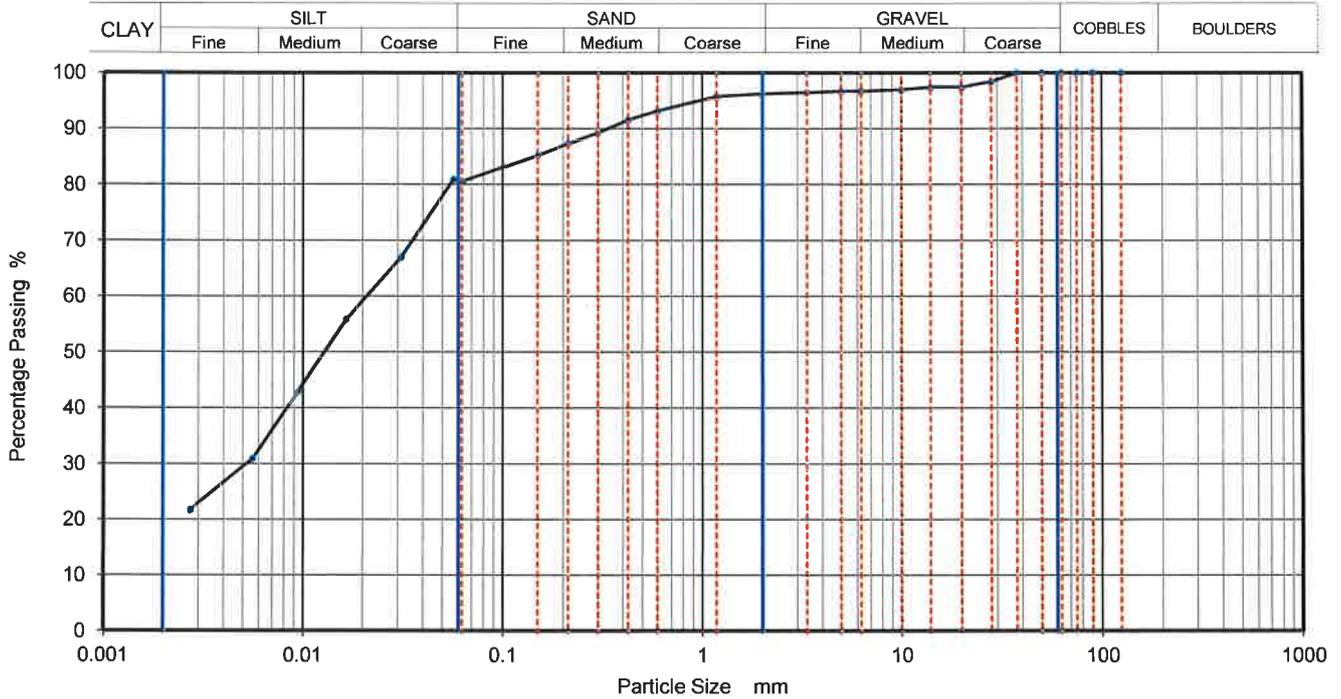
Depth, m **0.50**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP104B01**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0567	81
90	100	0.0311	67
75	100	0.0166	56
63	100	0.0094	43
50	100	0.0056	31
37.5	100	0.0028	22
28	98		
20	97		
14	97		
10	97		
6.3	97		
5	97		
3.35	97		
2	96		
1.18	96		
0.6	93	Particle density (assumed)	
0.425	92	1.50	Mg/m <sup>3</sup>
0.3	89		
0.212	87		
0.15	85		
0.063	81		

Dry Mass of sample, g

1935

Sample Proportions	% dry mass
Very coarse	0
Gravel	4
Sand	16
Fines <0.063mm	81

Grading Analysis	
D100	mm
D60	mm 0.0208
D30	mm 0.00504
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Fig **11**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP104**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B02**

Soil Description **Firm grey brown gravelly CLAY with occasional cobbles.**

Depth, m **1.00**

Specimen Reference

12

Specimen Depth

m

Sample Type

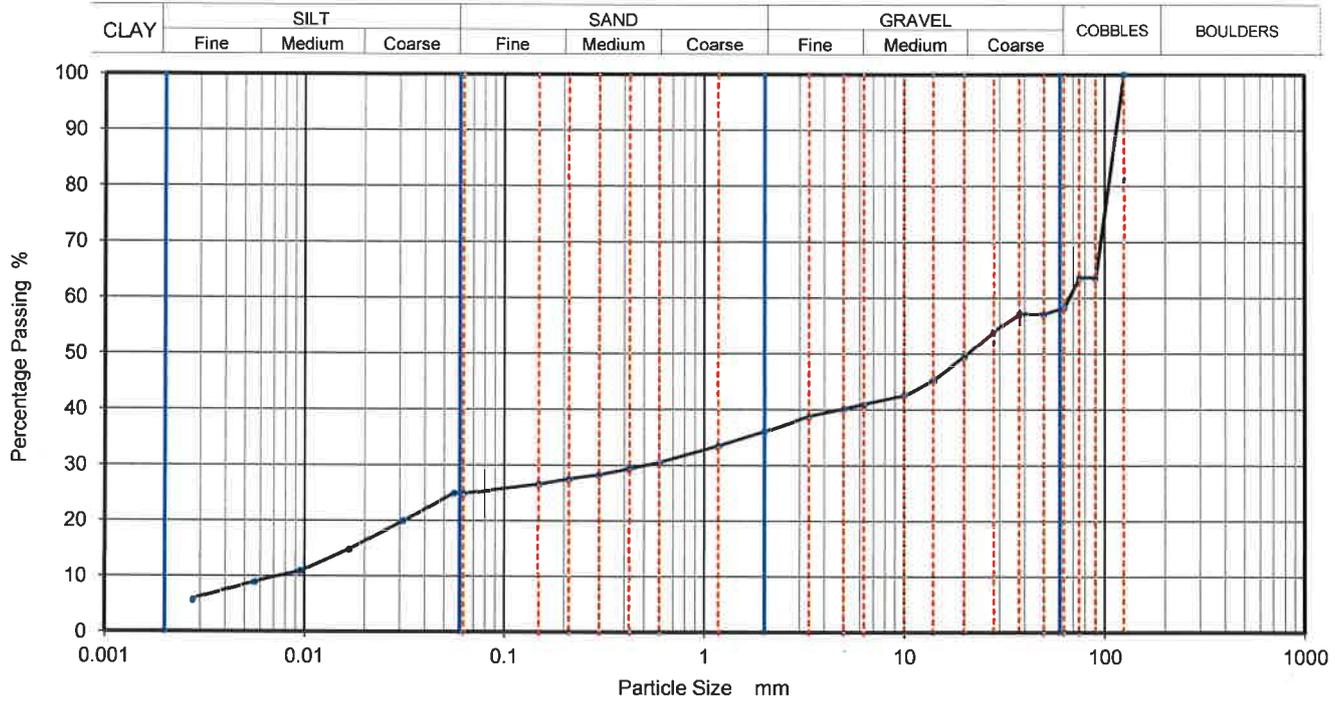
B

Test Method

BS1377:Part 2:1990, clauses 9.2 and 9.5

KeyLAB ID

14645TP104B02



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0563	25
90	64	0.0313	20
75	64	0.0169	15
63	58	0.0095	11
50	57	0.0056	9
37.5	57	0.0028	6
28	54		
20	50		
14	45		
10	43		
6.3	41		
5	40		
3.35	39		
2	36		
1.18	34		
0.6	31		
0.425	29	Particle density (assumed)	
0.3	28	1.50	Mg/m <sup>3</sup>
0.212	28		
0.15	27		
0.063	25		

Dry Mass of sample, g

7597

Sample Proportions	% dry mass
Very coarse	42
Gravel	22
Sand	11
Fines <0.063mm	25

Grading Analysis	
D100	mm 125
D60	mm 66.6
D30	mm 0.511
D10	mm 0.0072
Uniformity Coefficient	9200
Curvature Coefficient	0.54

Remarks

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Fig **15**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP105**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **B02**

Soil Description **Firm brown gravelly CLAY.**

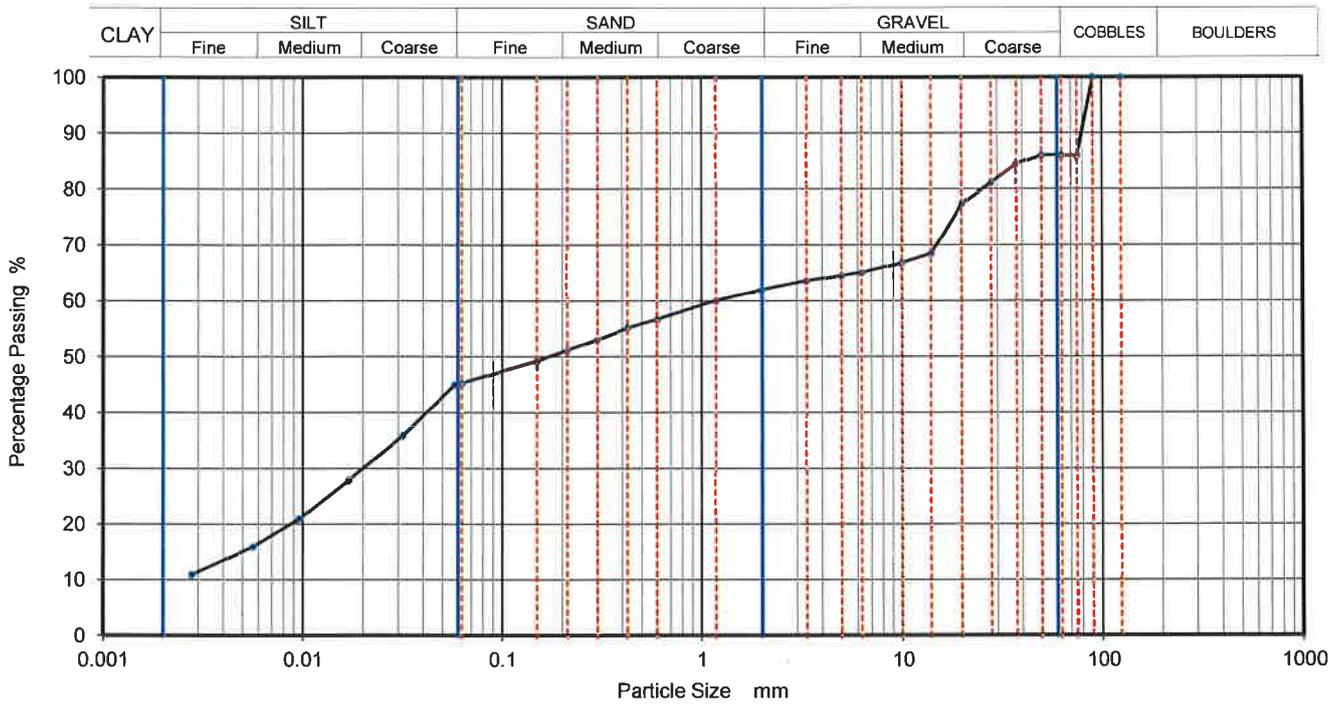
Depth, m **0.80**

Specimen Reference **12** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP105B02**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	45
90	100	0.0317	36
75	86	0.0170	28
63	86	0.0096	21
50	86	0.0057	16
37.5	85	0.0028	11
28	81		
20	77		
14	69		
10	67		
6.3	65		
5	65		
3.35	64		
2	62		
1.18	60		
0.6	57		
0.425	55	Particle density (assumed)	
0.3	53	1.50	Mg/m <sup>3</sup>
0.212	51		
0.15	49		
0.063	45		

Dry Mass of sample, g

**5438**

Sample Proportions	% dry mass
Very coarse	14
Gravel	24
Sand	17
Fines <0.063mm	45

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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**Fig 12**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. TP106

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. B01

Soil Description **MADE GROUND - Firm brown gravelly CLAY with fragments of brick,glass and timbers.**

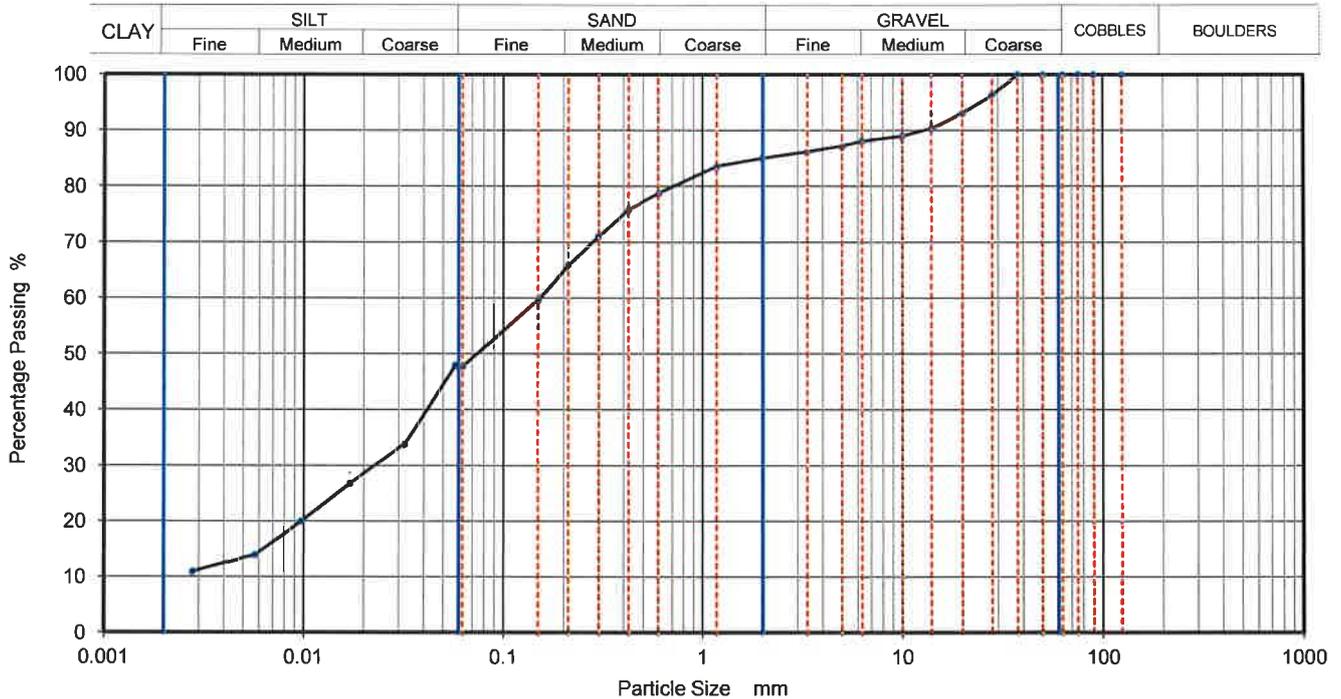
Depth, m 0.30

Specimen Reference 12 Specimen Depth m

Sample Type B

Test Method BS1377:Part 2:1990, clauses 9.2 and 9.5

KeyLAB ID 14645TP106B01



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	48
90	100	0.0324	34
75	100	0.0172	27
63	100	0.0097	20
50	100	0.0057	14
37.5	100	0.0028	11
28	96		
20	93		
14	90		
10	89		
6.3	88		
5	87		
3.35	86		
2	85		
1.18	84		
0.6	79	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	76		
0.3	71		
0.212	66		
0.15	60		
0.063	48		

Dry Mass of sample, g **2507**

Sample Proportions	% dry mass
Very coarse	0
Gravel	15
Sand	37
Fines <0.063mm	48

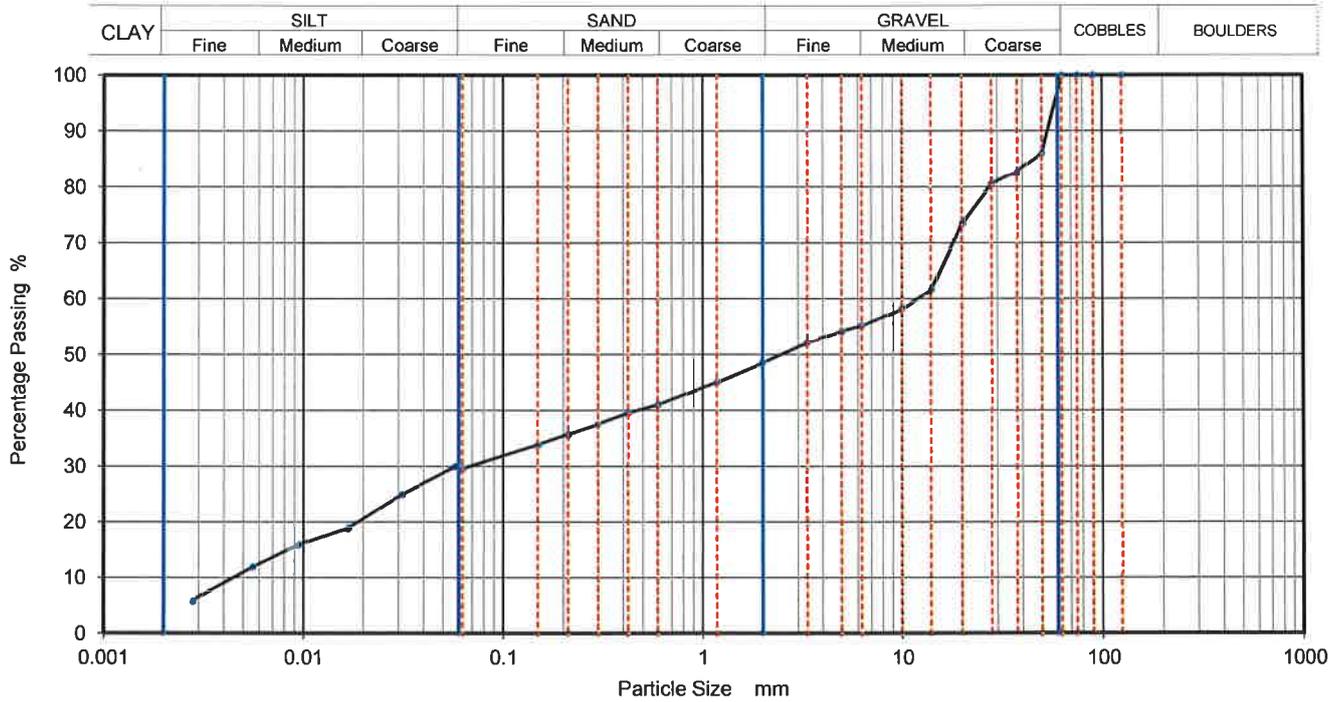
Grading Analysis	
D100	mm
D60	mm 0.153
D30	mm 0.0231
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref	14-645
Borehole/Pit No.	TP108
Site Name	Greater Dublin Drainage Scheme Ground Investigation
Sample No.	2
Soil Description	Firm to stiff dark grey gravelly CLAY with occasional cobbles
Depth, m	2.00
Specimen Reference	3
Specimen Depth	m
Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5
KeyLAB ID	14645TP108B2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	30
90	100	0.0313	25
75	100	0.0169	19
63	100	0.0095	16
50	86	0.0056	12
37.5	83	0.0028	6
28	81		
20	74		
14	62		
10	58		
6.3	55		
5	54		
3.35	52		
2	49		
1.18	45		
0.6	41		
0.425	40	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.3	38		
0.212	36		
0.15	34		
0.063	30		

Dry Mass of sample, g 6641

Sample Proportions	% dry mass
Very coarse	0
Gravel	51
Sand	19
Fines <0.063mm	30

Grading Analysis	
D100	mm
D60	mm 11.9
D30	mm 0.0689
D10	mm 0.00437
Uniformity Coefficient	2700
Curvature Coefficient	0.091

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP109**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **7**

Soil Description **Soft grey gravelly CLAY.**

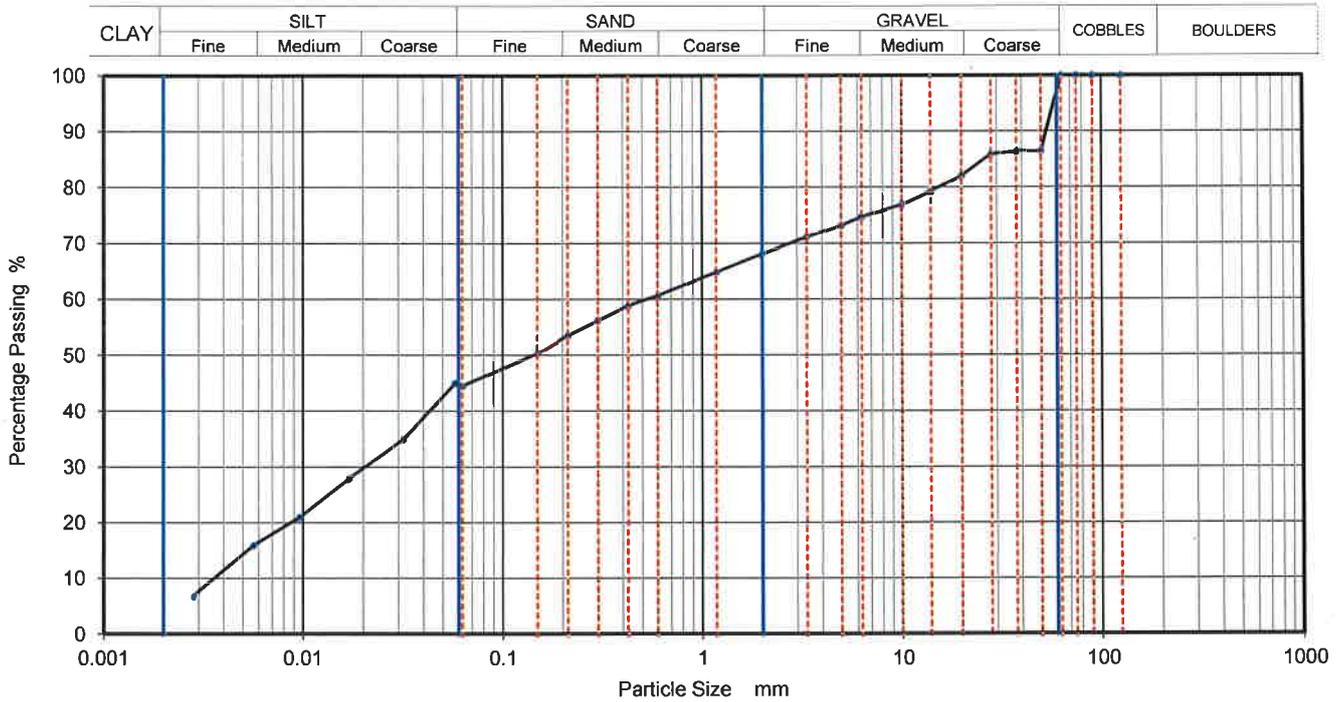
Depth, m **3.00**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP109B7**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0575	45
90	100	0.0317	35
75	100	0.0170	28
63	100	0.0096	21
50	87	0.0057	16
37.5	87	0.0028	7
28	86		
20	82		
14	79		
10	77		
6.3	75		
5	73		
3.35	71		
2	68		
1.18	65		
0.6	61	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	59		
0.3	56		
0.212	54		
0.15	50		
0.063	45		

Dry Mass of sample, g

**3680**

Sample Proportions	% dry mass
Very coarse	0
Gravel	32
Sand	24
Fines <0.063mm	45

Grading Analysis	
D100	mm
D60	mm 0.525
D30	mm 0.0207
D10	mm 0.00367
Uniformity Coefficient	140
Curvature Coefficient	0.22

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

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**Fig 31**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP110**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **5**

Soil Description **Firm brown gravelly CLAY with occasional cobbles and boulders.**

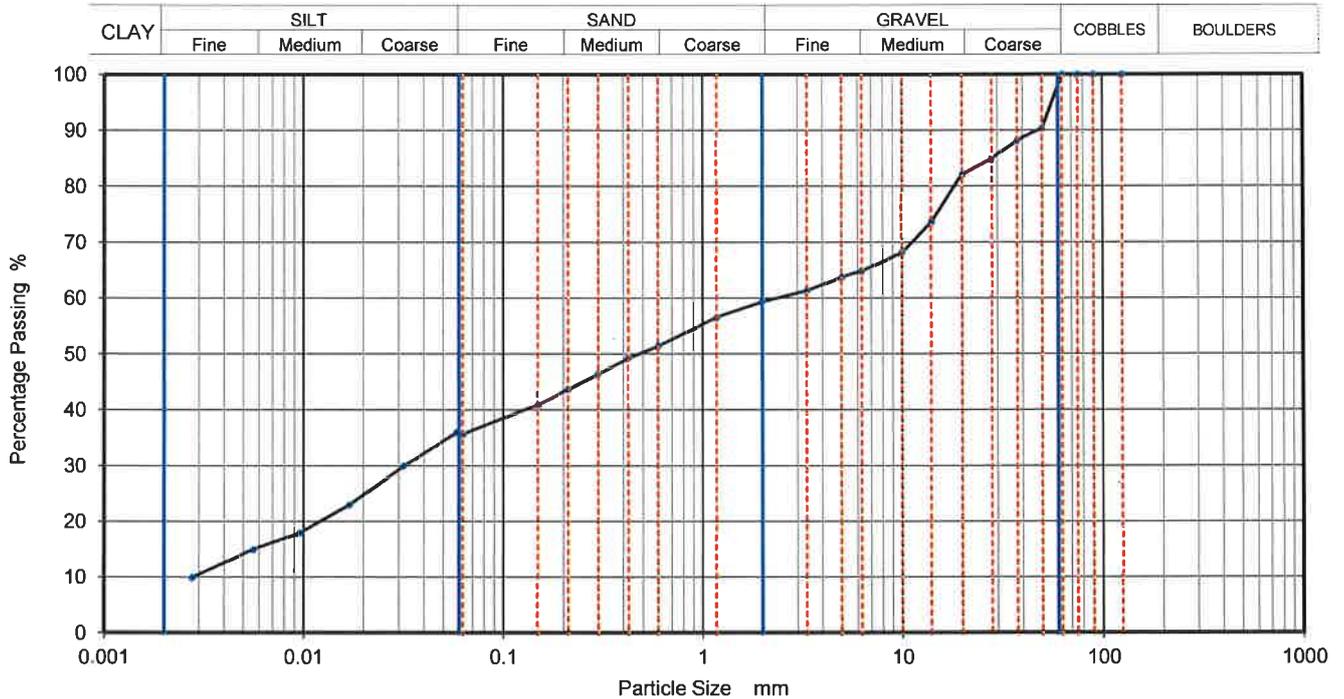
Depth, m **1.50**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP110B5**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0584	36
90	100	0.0317	30
75	100	0.0170	23
63	100	0.0096	18
50	90	0.0056	15
37.5	88	0.0028	10
28	85		
20	82		
14	74		
10	68		
6.3	65		
5	64		
3.35	61		
2	59		
1.18	57		
0.6	52		
0.425	49	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.3	47		
0.212	44		
0.15	41		
0.063	36		

Dry Mass of sample, g

**4010**

Sample Proportions	% dry mass
Very coarse	0
Gravel	41
Sand	24
Fines <0.063mm	36

Grading Analysis	
D100	mm
D60	mm 2.32
D30	mm 0.0314
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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Fig **22**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP112**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **2**

Soil Description **Firm to stiff dark grey gravelly CLAY with cobbles and boulders.**

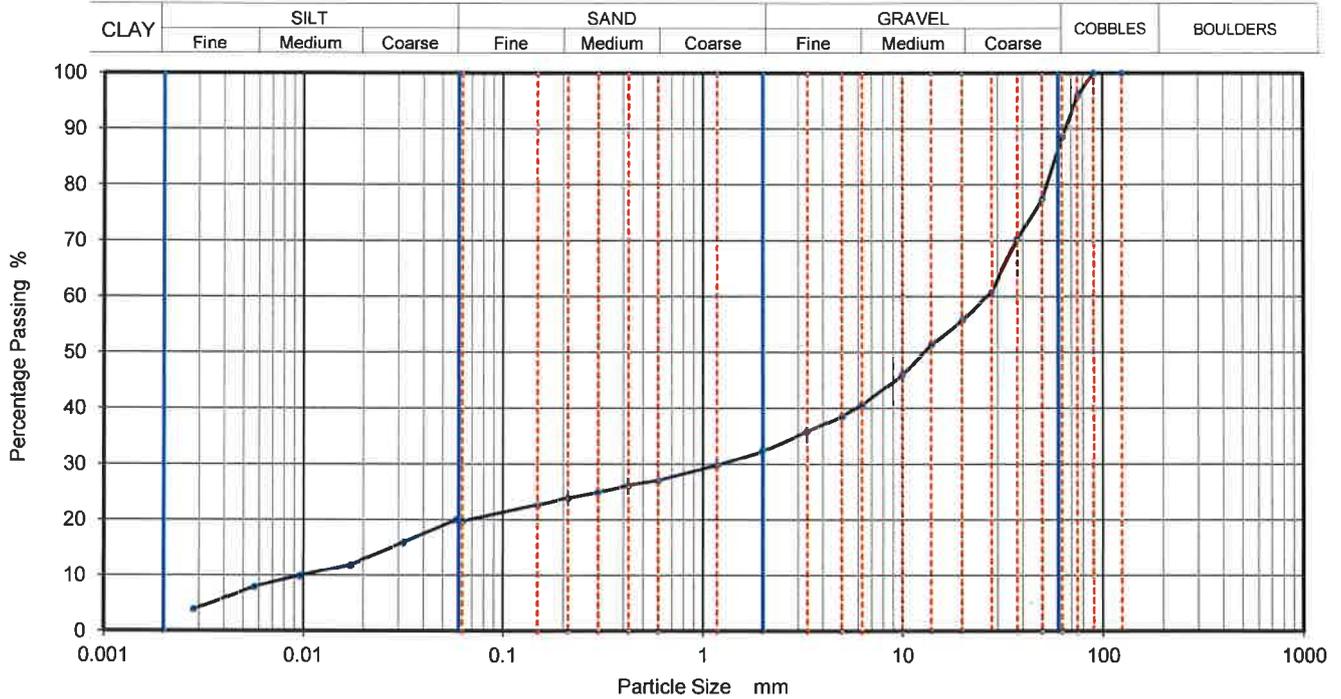
Depth, m **1.50**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP112B2**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0584	20
90	100	0.0320	16
75	96	0.0172	12
63	89	0.0097	10
50	78	0.0057	8
37.5	70	0.0028	4
28	61		
20	56		
14	52		
10	46		
6.3	41		
5	39		
3.35	36		
2	32		
1.18	30		
0.6	27	Particle density (assumed) 1.50 Mg/m <sup>3</sup>	
0.425	26		
0.3	25		
0.212	24		
0.15	23		
0.063	20		

Dry Mass of sample, g 8832

Sample Proportions	% dry mass
Very coarse	11
Gravel	56
Sand	13
Fines <0.063mm	20

Grading Analysis	
D100	mm
D60	mm 26.4
D30	mm 1.23
D10	mm 0.0099
Uniformity Coefficient	2700
Curvature Coefficient	5.8

Remarks  
Preparation and testing in accordance with BS1377 unless noted below



## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. **TP113**

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **4**

Soil Description **Firm to stiff dark grey gravelly CLAY with cobbles and boulders.**

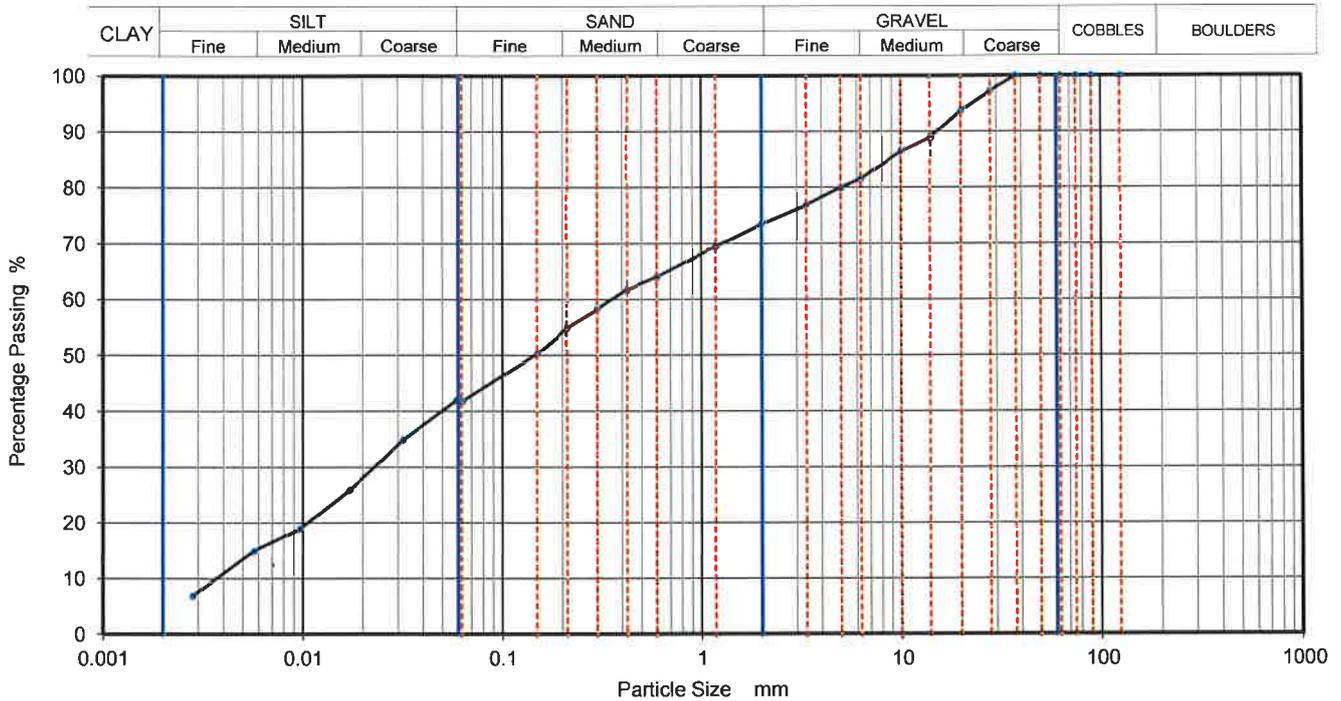
Depth, m **4.00**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP113B4**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0588	42
90	100	0.0320	35
75	100	0.0172	26
63	100	0.0097	19
50	100	0.0057	15
37.5	100	0.0028	7
28	97		
20	94		
14	89		
10	87		
6.3	82		
5	80		
3.35	77		
2	74		
1.18	70		
0.6	64		
0.425	62	Particle density (assumed)	
0.3	58	1.50	Mg/m <sup>3</sup>
0.212	55		
0.15	50		
0.063	42		

Dry Mass of sample, g

**3729**

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	32
Fines <0.063mm	42

Grading Analysis	
D100	mm
D60	mm 0.351
D30	mm 0.023
D10	mm 0.00375
Uniformity Coefficient	94
Curvature Coefficient	0.4

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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**Fig 35**

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## PARTICLE SIZE DISTRIBUTION

Job Ref **14-645**

Borehole/Pit No. TP114

Site Name **Greater Dublin Drainage Scheme Ground Investigation**

Sample No. **4**

Soil Description **Firm to stiff dark grey gravelly CLAY with occasional cobbles**

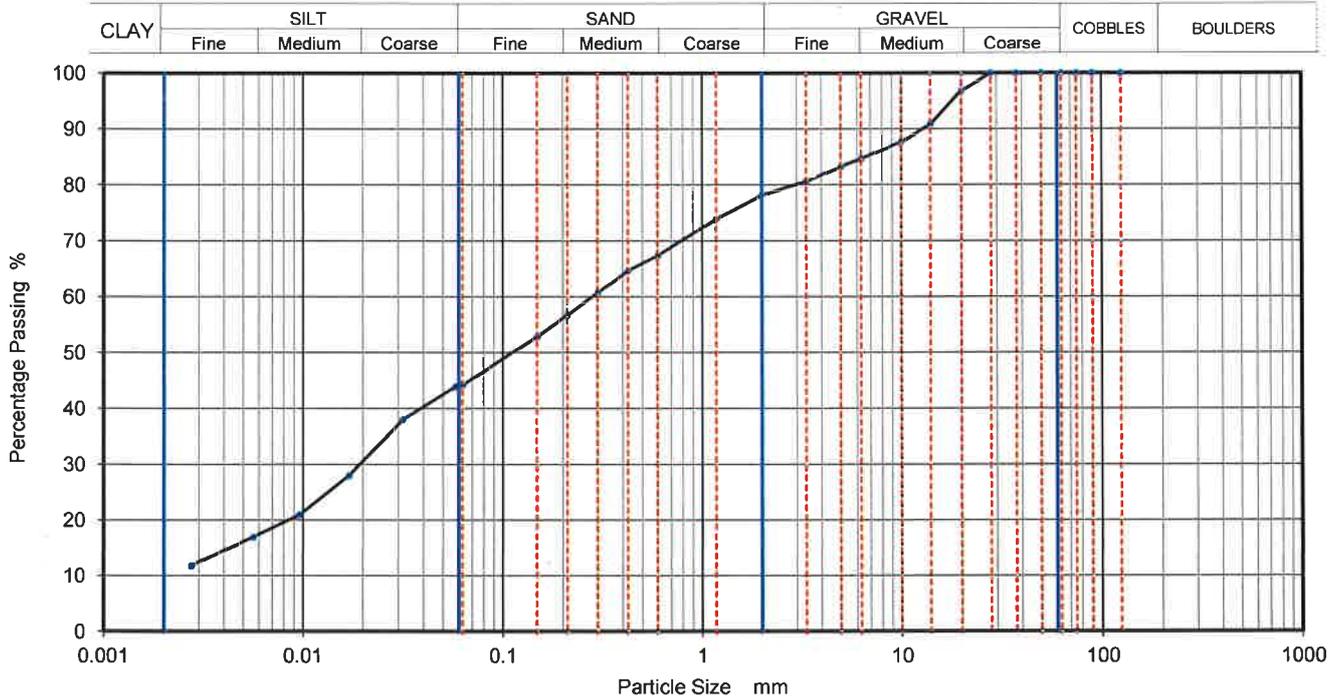
Depth, m **4.00**

Specimen Reference **3** Specimen Depth **m**

Sample Type **B**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **14645TP114B4**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0580	44
90	100	0.0315	38
75	100	0.0170	28
63	100	0.0096	21
50	100	0.0056	17
37.5	100	0.0028	12
28	100		
20	97		
14	91		
10	88		
6.3	85		
5	83		
3.35	81		
2	78		
1.18	74		
0.6	67		
0.425	65	Particle density (assumed)	
0.3	61	1.50 Mg/m <sup>3</sup>	
0.212	57		
0.15	53		
0.063	44		

Dry Mass of sample, g **4150**

Sample Proportions	% dry mass
Very coarse	0
Gravel	22
Sand	34
Fines <0.063mm	44

Grading Analysis	
D100	mm
D60	mm 0.28
D30	mm 0.0189
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

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Fig **36**

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