APPENDIX A
Results of Soakaway Test

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: St Mary's College, twickenham, Project No: C10832
Client:

Sheet No: 1/1

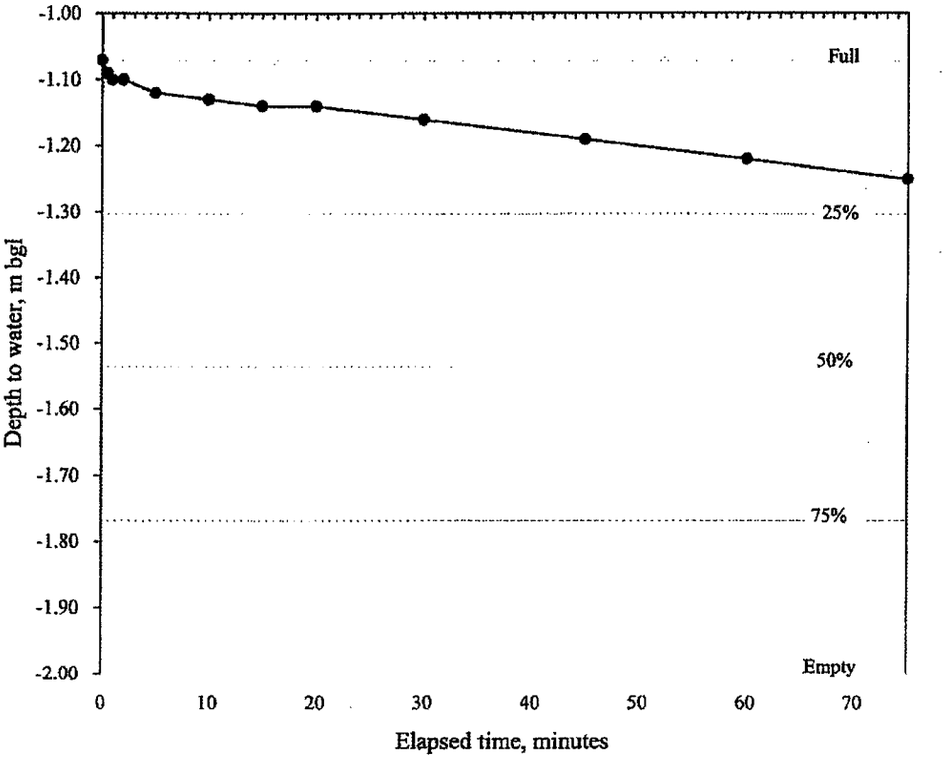
Trial Pit: TP 2 First Fill
Depth: 2.00
Length: 2.80
Width: 0.60

Description of Stratum under test: Sandy Gravel

Depth to water prior to test: Unknown
(below ground level)

Elapsed Time min	Depth to Water m
0.00	1.070
0.50	1.090
1.00	1.100
2.00	1.100
5.00	1.120
10.00	1.130
15.00	1.140
20.00	1.140
30.00	1.160
45.00	1.190
60.00	1.220
75.00	1.250

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

f = (V75-V25)/A50(T75-T25)
V75-V25 = 0.78
A50 = 4.84
T75-T25 = 219

Soil Infiltration Rate f = **1.23E-05** m/s

Ground Engineering, Peterborough

APPENDIX B
Results of Gas and Groundwater Monitoring

Gas Monitoring Record

GROUND ENGINEERING

Site: St. Mary's College, Twickenham

Report Ref: C10832

Date	Location No.	Methane (% v/v)	LEL %	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Flow Rate (l/hr)	Pressure		Depth to Groundwater (mbgl)	Comments
							Downhole (Pa)	Ambient (mb)		Weather: cold and damp
17/01/2007	BH2	<0.1		1.3	12.7	<0.1		1005	2.76	
		<0.1		1.3	12.6					
		<0.1		1.3	12.5					

APPENDIX C
Results of Geotechnical Testing

LABORATORY TEST RESULTS

CONTRACT ST.MARY'S COLLEGE, TWICKENHAM

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	
BH1	B2	0.20	28	19	9													SOIL CLASSIFICATION = CL 15% retained on 425μm sieve
	B4	1.20													99		7.4	
	B8	5.00													82		8.1	
	U2	8.00 - 8.45				32	1.91	1.45	Q	110	140	55	0					
	U3	9.00 - 9.45				29	1.98	1.54	Q	173	160	86	0					
	U4	10.00 - 10.45				29	1.97	1.53	Q	186	180	93	0					
	U5	11.50 - 11.95				28	2.02	1.58	Q	175	210	87	0					
BH2	B3	1.10	25	15	10													SOIL CLASSIFICATION = CL 13% retained on 425μm sieve
	B4	1.90													58		8.3	
	U1	7.00 - 7.45				25	2.06	1.65	Q	197	120	99	0					
	D2	7.45													432		7.7	

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

10832

GROUND ENGINEERING PETERBOROUGH

LABORATORY TEST RESULTS

CONTRACT ST.MARY'S COLLEGE, TWICKENHAM

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	
BH2	U2	8.50 - 8.95				25	2.05	1.64	Q	265	150	133	0					
	U3	10.00 - 10.45				26	2.01	1.60	Q	222	180	111	0					
	U4	11.50 - 11.95				28	2.04	1.59	Q	316	210	158	0					
	U5	13.00 - 13.45				28	2.00	1.56	Q	238	230	119	0					
	U6	14.50 - 14.95				28	2.00	1.56	Q	216	260	108	0					

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

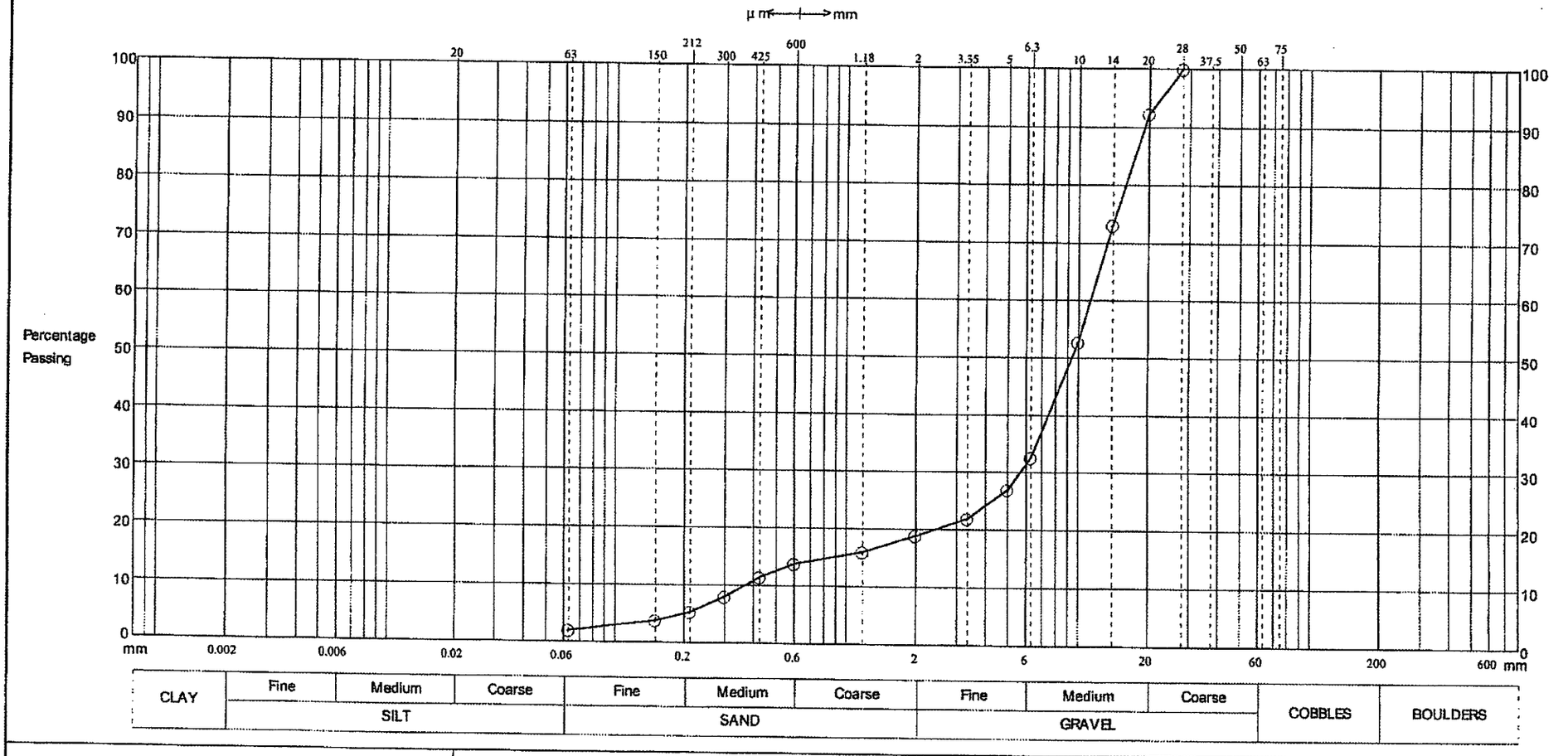
Aqueous Extract 2:1 Water:Soil

10832

GROUND ENGINEERING PETERBOROUGH

PARTICLE SIZE DISTRIBUTION

Sieve Size	Size µm									Size mm														
	2	6	20	63	150	212	300	425	600	1.18	2	3.35	5	6.3	10	14	20	28	37.5	50	63	75	90	120
Percentage by Mass Passing Sieve	-	-	-	2	4	5	8	11	14	16	19	22	27	32	53	73	92	100	-	-	-	-	-	-



Remarks

Method: Wet Sieve

Sample Number: B5

Depth: 1.80

BH/TP Number: BH1

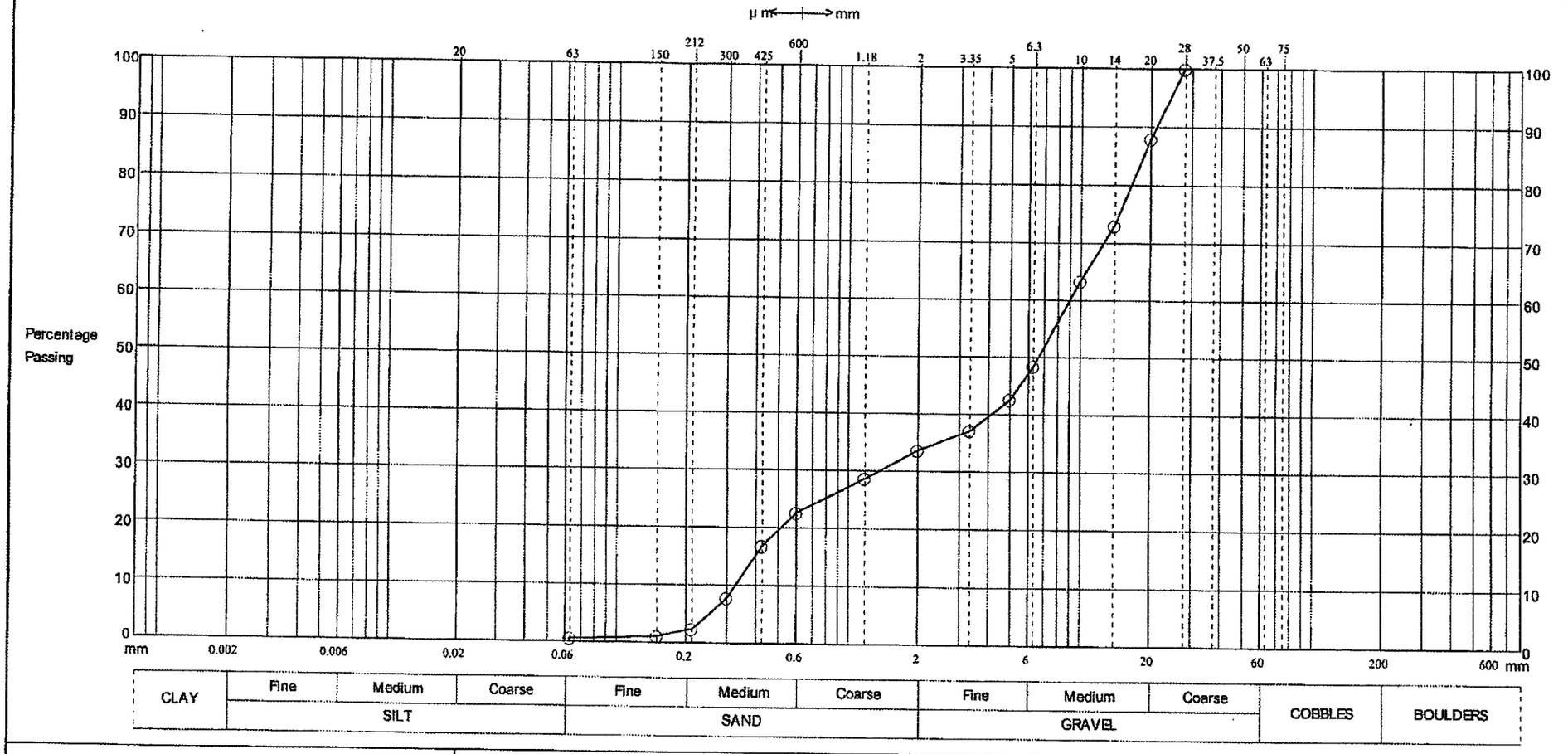
10832

Site: ST.MARY'S COLLEGE, TWICKENHAM

GROUND ENGINEERING

PARTICLE SIZE DISTRIBUTION

Sieve Size	Size µm									Size mm														
	2	6	20	63	150	212	300	425	600	1.18	2	3.35	5	6.3	10	14	20	28	37.5	50	63	75	90	120
Percentage by Mass Passing Sieve	-	-	-	1	1	2	8	17	23	29	34	37	43	48	63	73	88	100	-	-	-	-	-	-

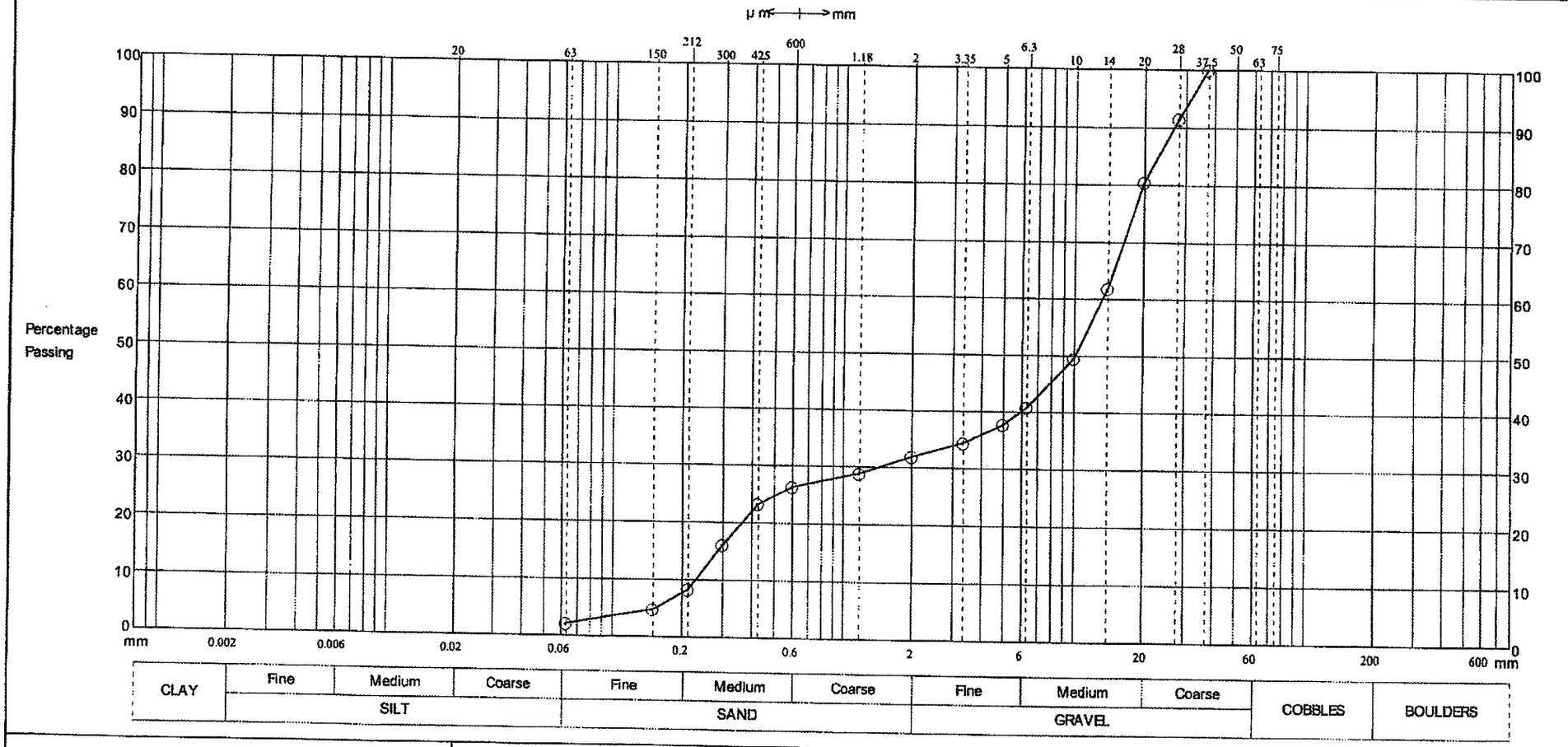


	Remarks	Method: Wet Sieve	Sample Number: B8	Depth: 5.00	BH/TP Number: BH1
		Site: ST. MARY'S COLLEGE, TWICKENHAM			10832

GROUND ENGINEERING

PARTICLE SIZE DISTRIBUTION

Sieve Size	Size µm									Size mm														
	2	6	20	63	150	212	300	425	600	1.18	2	3.35	5	6.3	10	14	20	28	37.5	50	63	75	90	120
Percentage by Mass Passing Sieve	-	-	-	2	5	8	16	23	26	29	32	34	38	41	49	62	80	91	100	-	-	-	-	-

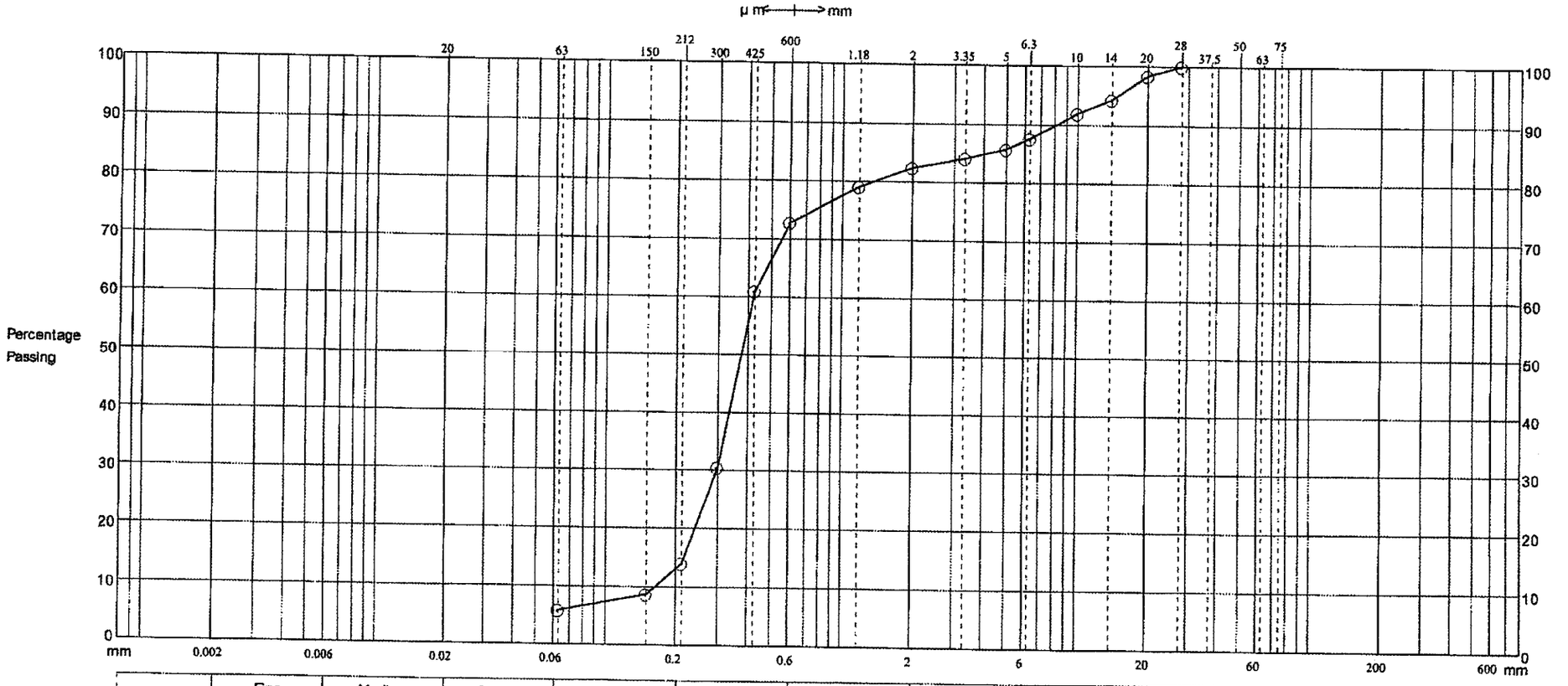


	Remarks	Method	Sample Number	Depth	BH/TP Number	
		Wet Sieve	B4	1.90	BH2	10832
		Site: ST. MARY'S COLLEGE, TWICKENHAM				

GROUND ENGINEERING

PARTICLE SIZE DISTRIBUTION

Sieve Size	Size µm									Size mm														
	2	6	20	63	150	212	300	425	600	1.18	2	3.35	5	6.3	10	14	20	28	37.5	50	63	75	90	120
Percentage by Mass Passing Sieve	-	-	-	6	9	14	30	61	73	79	82	84	86	87	92	94	98	100	-	-	-	-	-	-



Remarks

Method: Wet Sieve

Sample Number: B7

Depth: 5.00

BH/TP Number: BH2

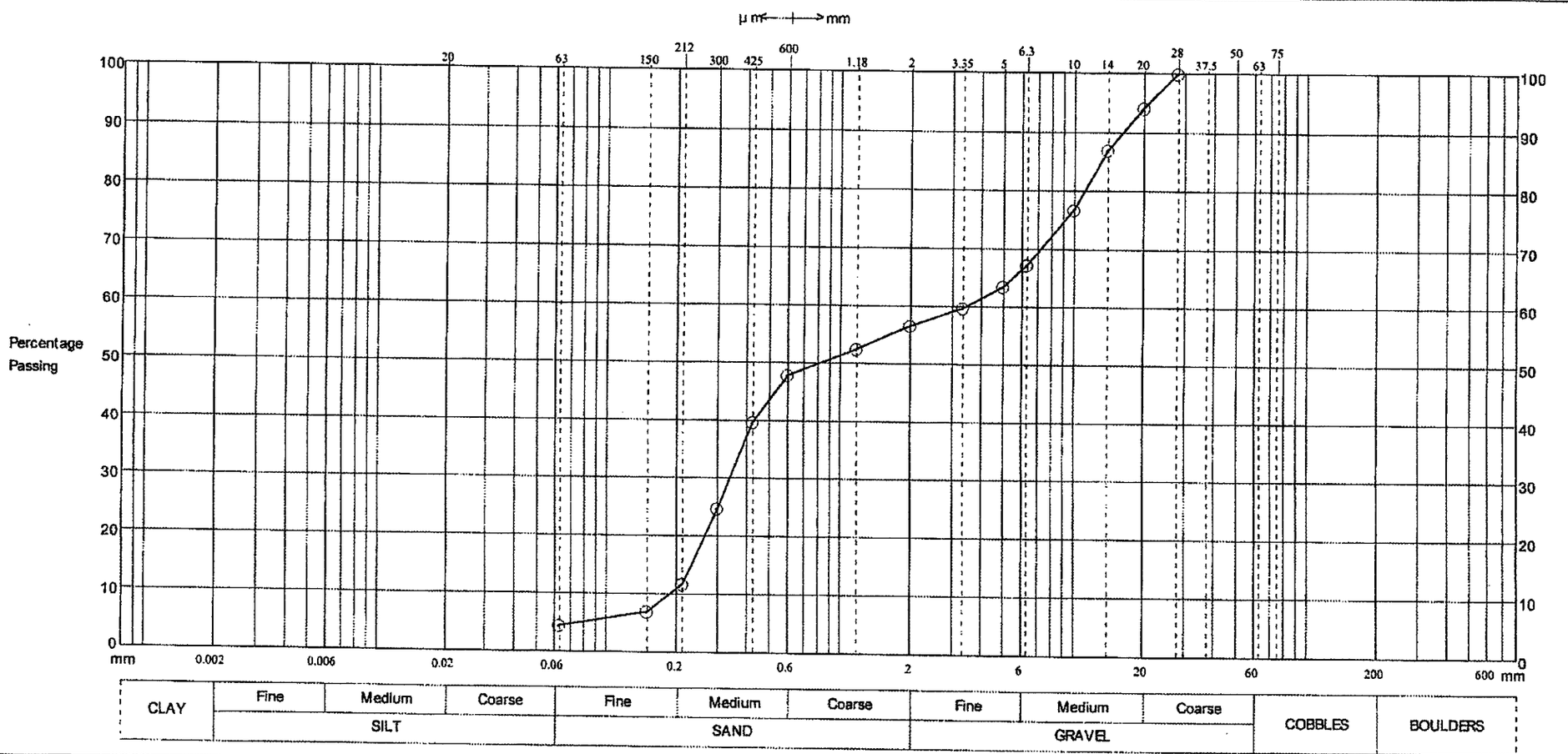
10832

Site: ST. MARY'S COLLEGE, TWICKENHAM

GROUND ENGINEERING

PARTICLE SIZE DISTRIBUTION

Sieve Size	Size µm									Size mm														
	2	6	20	63	150	212	300	425	600	1.18	2	3.35	5	6.3	10	14	20	28	37.5	50	63	75	90	120
Percentage by Mass Passing Sieve	-	-	-	4	7	12	25	40	48	52	57	60	63	67	77	87	94	100	-	-	-	-	-	-



	Remarks	Method: Wet Sieve	Sample Number: B2	Depth: 1.40	BH/TP Number: TP2
		Site: ST.MARY'S COLLEGE, TWICKENHAM			10832

GROUND ENGINEERING

APPENDIX D
Results of Chemical Analytical Testing

Chemtest

Willie Snaith Road Newmarket CB8 7SQ
Tel: 01638 606070 Fax: 01638 606071
Email: admin @ chemtest.co.uk

Ground Engineering
Newark Road
Peterborough

PE1 5UA
FAO Caroline Spark

16 January 2007

Dear Caroline Spark

Test Report Number 32505
Your Project Reference St Mary's College, Waldegrave Road

Please find enclosed the results of analysis for the samples received 09 January 2007.

All soil samples will be retained for a period of one month and all water samples will be retained for 14 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact Daniel Woods in Customer Services.

Yours sincerely

Darrell Hall - Laboratory Manager
Authorised Signatory

UKAS TESTING
2183

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *I/s means 'insufficient sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

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Ground Engineering
Newark Road
Peterborough

PE1 5UA

FAO Caroline Spark

LABORATORY TEST REPORT

Results of analysis of 6 samples received 09 January 2007

St Mary's College, Waldegrave Road

Chemtest

Report Date
16 January 2007

Login Batch No					32505			
Chemtest LIMS ID					AB66834	AB66835	AB66836	AB66837
Sample ID					TP1	TP2	TP3	TP4
Sample No					D3	D2	D3	D2
Depth					0.4	0.1	0.3	0.13
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*				
2300	Cyanide (total)		mg kg^{-1}	M	<0.5	<0.5	<0.5	<0.5
2310	Cyanide (free)		mg kg^{-1}	M	<0.5	<0.5	<0.5	<0.5
2320	Sulfide	18496258	mg kg^{-1}	N	< 0.5	< 0.5	< 0.5	< 0.5
2630	Organic matter		%	N	0.68	43	2.4	1.1
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	U	0.4	0.4	0.5	<0.4
2210	Sulfate (2:1 water soluble)	14808798	g l^{-1}	M	0.04	0.04	0.07	0.05
2450	Arsenic	7440382	mg kg^{-1}	M	6.9	16	11	5.3
	Cadmium	7440439	mg kg^{-1}	M	<0.1	<0.1	<0.1	<0.1
	Chromium	7440473	mg kg^{-1}	U	17	14	19	10
	Copper	7440508	mg kg^{-1}	M	11	39	60	11
	Mercury	7439976	mg kg^{-1}	M	<0.1	<0.1	0.29	<0.1
	Nickel	7440020	mg kg^{-1}	M	14	26	15	36
	Lead	7439921	mg kg^{-1}	M	14	39	110	39
	Selenium	7782492	mg kg^{-1}	U	<0.1	0.97	0.22	<0.1
	Zinc	7440666	mg kg^{-1}	M	39	31	43	66
2700	Naphthalene	91203	mg kg^{-1}	M	<0.1	<0.1	<0.1	<0.1
	Acenaphthylene	208968	mg kg^{-1}	M	<0.1	<0.1	<0.1	<0.1
	Acenaphthene	83329	mg kg^{-1}	M	<0.1	<0.1	<0.1	<0.1
	Fluorene	86737	mg kg^{-1}	M	<0.1	<0.1	<0.1	<0.1
	Phenanthrene	85018	mg kg^{-1}	M	<0.1	<0.1	<0.1	<0.1
	Anthracene	120127	mg kg^{-1}	M	<0.1	<0.1	<0.1	<0.1
	Fluoranthene	206440	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.4
	Pyrene	129000	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.3
	Benzo[a]anthracene	56553	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.2
	Chrysene	218019	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.3
	Benzo[b]fluoranthene	205992	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.4
	Benzo[k]fluoranthene	207089	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.2
	Benzo[a]pyrene	50328	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.2
	Dibenzo[a,h]anthracene	53703	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.4
	Indeno[1,2,3-cd]pyrene	193395	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.2

All tests undertaken between 10-Jan-2007 and 16-Jan-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Ground Engineering
Newark Road
Peterborough

PE1 5UA

FAO Caroline Spark

LABORATORY TEST REPORT

Results of analysis of 6 samples received 09 January 2007

St Mary's College, Waldegrave Road

Chemtest

Report Date 16 January 2007

					32505			
					AB66834	AB66835	AB66836	AB66837
					TP1	TP2	TP3	TP4
					D3	D2	D3	D2
					0.4	0.1	0.3	0.13
					SOIL	*SOIL*	*SOIL*	*SOIL*
2700	Benzo[g,h,i]perylene	191242	mg kg^{-1}	M	<0.1	<0.1	<0.1	0.5
	Total (of 16) PAHs		mg kg^{-1}	M	<2	<2	<2	3.1
2920	Phenols (total)		mg kg^{-1}	M	<0.3	<0.3	<0.3	<0.3
2010	pH		-	M	6.2	7.5	6.2	7.8

All tests undertaken between 10-Jan-2007 and 16-Jan-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Ground Engineering
Newark Road
Peterborough

PE1 5UA

FAO Caroline Spark

LABORATORY TEST REPORT

Chemtest

Results of analysis of 6 samples
received 09 January 2007

Report Date
16 January 2007

St Mary's College, Waldegrave Road

Login Batch No					32505	
Chemtest LIMS ID					AB66838	AB66839
Sample ID					BH1	BH2
Sample No					W1	W1
Depth					5.0	5.5
Matrix					*WATER*	*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓	*		
1010	pH	PH	-	U	7.4	7.3
1300	Cyanide (total)		mg l^{-1}	N	<0.05	<0.05
1310	Cyanide (free)		mg l^{-1}	N	<0.05	<0.05
1330	Sulfide	18496258	mg l^{-1}	N	<0.05	<0.05
1120	Sulfate	14808798	mg l^{-1}	U	72	88
1450	Arsenic	7440382	µg l^{-1}	U	4.2	3.8
	Boron	7440428	µg l^{-1}	U	250	270
	Cadmium	7440439	µg l^{-1}	U	<0.5	<0.5
	Chromium	7440473	µg l^{-1}	U	42	41
	Copper	7440508	µg l^{-1}	U	<1	<1
	Lead	7439921	µg l^{-1}	U	<1	<1
	Mercury	7439976	µg l^{-1}	U	<0.5	<0.5
	Nickel	7440020	µg l^{-1}	U	7.5	<1
	Selenium	7782492	µg l^{-1}	U	2.8	1.4
	Zinc	7440666	µg l^{-1}	U	7.7	6.7
1700	Naphthalene	91203	µg l^{-1}	N	<0.1	<0.1
	Acenaphthylene	208968	µg l^{-1}	N	<0.1	<0.1
	Acenaphthene	83329	µg l^{-1}	N	<0.1	<0.1
	Fluorene	86737	µg l^{-1}	N	<0.1	<0.1
	Phenanthrene	85018	µg l^{-1}	N	<0.1	<0.1
	Anthracene	120127	µg l^{-1}	N	<0.1	<0.1
	Fluoranthene	206440	µg l^{-1}	N	<0.1	<0.1
	Pyrene	129000	µg l^{-1}	N	<0.1	<0.1
	Benzo[a]anthracene	56553	µg l^{-1}	N	<0.1	<0.1
	Chrysene	218019	µg l^{-1}	N	<0.1	<0.1
	Benzo[b]fluoranthene	205992	µg l^{-1}	N	<0.1	<0.1
	Benzo[k]fluoranthene	207089	µg l^{-1}	N	<0.1	<0.1
	Benzo[a]pyrene	50328	µg l^{-1}	N	<0.1	<0.1
	Dibenzo[a,h]anthracene	53703	µg l^{-1}	N	<0.1	<0.1
	Indeno[1,2,3-cd]pyrene	193395	µg l^{-1}	N	<0.1	<0.1

All tests undertaken between 10-Jan-2007 and 16-Jan-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Ground Engineering
Newark Road
Peterborough

PE1 5UA

FAO Caroline Spark

LABORATORY TEST REPORT

Results of analysis of 6 samples received 09 January 2007

St Mary's College, Waldegrave Road

Chemtest

Report Date
16 January 2007

					32505	
					AB66838	AB66839
					BH1	BH2
					W1	W1
					5.0	5.5
					WATER	*WATER*
1700	Benzo[g,h,i]perylene	191242	µg l^{-1}	N	<0.1	<0.1
	Total (OF 16) PAHs		µg l^{-1}	N	<2	<2
1920	Phenols (total)		mg l^{-1}	N	<0.03	<0.03

All tests undertaken between 10-Jan-2007 and 16-Jan-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

APPENDIX E
TABLE C2 BRE Special Digest 1 (2005)

TABLE C2 – AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS[a]

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations

Sulfate and magnesium						Groundwater		ACEC
Design Sulfate Class for location	2:1 water/soil extract[b]		Groundwater		Total potential sulfate[c]	Static water	Mobile water	Class for location
1	2 (SO_4 mg/l)	3 (Mg mg/l)	4 (SO_4 mg/l)	5 (Mg mg/l)	6 (SO_4 %)	7 (pH)[d]	8 (pH)[d]	9
DS-1	< 500		< 400		< 0.24	≥ 2.5		AC-1s
							> 6.5[d]	AC-1
							5.5–6.5	AC-2z
							4.5–5.5	AC-3z
							2.5–4.5	AC-4z
DS-2	500–1500		400–1400		0.24–0.6	> 5.5		AC-1s
							> 6.5	AC-2
						2.5–5.5		AC-2s
							5.5–6.5	AC-3z
							4.5–5.5	AC-4z
							2.5–5.5	AC-5z
DS-3	1600–3000		1500–3000		0.7–1.2	> 5.5		AC-2s
							> 6.5	AC-3
						2.5–5.5		AC-3s
							5.5–6.5	AC-4
							2.5–5.5	AC-5
DS-4	3100–6000	≤ 1200	3100–6000	≤ 1000	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4
						2.5–5.5		AC-4s
							2.5–6.5	AC-5
DS-4m	3100–6000	> 1200[e]	3100–6000	> 1000[e]	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4m
						2.5–5.5		AC-4ms
							2.5–6.5	AC-5m
DS-5	> 6000	≤ 1200	> 6000	≤ 1000	> 2.4	> 5.5		AC-4s
						2.5–5.5	≥ 2.5	AC-5
DS-5m	> 6000	> 1200[e]	> 6000	> 1000[e]	> 2.4	> 5.5		AC-4ms
						2.5–5.5	≥ 2.5	AC-5m

Notes

a Brownfield locations are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered from previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4), which may result from the oxidation of sulfides such as pyrite, following ground disturbance (Appendix A1 and Box C8).

d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).

e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that include the suffix 'z' have primarily to resist acid conditions and may be made with any of the cements in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.