Soura	EST GEO	TECHNICAL				Tel: 01 Fax: 01 email: r	Nest Geo 884 2524 884 2539 nail@swo	14 74 eotech.co.uk	Borehole No WS2 Sheet 1 of 1
	ect Na			1		oject N		Co-ords: -	Hole Type
	anage ation:	Sea Fron	ıt		59	951			WS Scale
LUC	ation.	Doiset						Level: -	1:25
Clie	nt:	Design	Base					Dates: 19/03/2014	Logged By NW
Well	Water Strikes	Sample Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description	
	Curkes	Deput (m)	туре	Results		(III7(OD)		TOPSOIL - Grass over soft brown sandy clayey SILT rootlets.	with roots and
					0.25			Stiff light brown very sandy silty CLAY. IVN @ 0.5m = 64 kPa	
		1.00			1.10		X X X	Strong light grey / white sub-rounded COBBLE of lim IVN @ 1.0m = 58 kPa Firm becoming stiff tan / light brown mottled red and sitly CLAY. Becomes friable 2.7 - 4.0m. Lithorelict str and roots visible.	light grev
		2.00							
		3.00			3.00			Firm becoming very stiff grey mottled brown silty CL/lithorelict structure.	AY. Blocky

Results Туре Borehole backfilled with arisings.
 Groundwater not encountered.
 WS refused at 4.0m 4.00

4.00



End of Borehole at 4.00 m

	2					Tel: 01: Fax: 01	884 2524 1884 253		Borehole N	10
SOUTHY		TECHNICAL		ř.		www.sv	wgeotech	n.co.uk	Sheet 1 of	1
Proj	ect N	ame			Pr	roject N	lo.	0	Hole Type	Э
Swa	anage	Sea Fron	nt		59	951		Co-ords: -	WS	
Loca	ation:	Dorset		**				Level: -	Scale 1:25	
Clie	nt:	Design	Base					Dates: 19/03/2014	Logged By	y
Well	Water	Sample	es & li	n Situ Testing	Depth	Level	Legend	Chrokium Description	1444	Т
000000	Strikes	Depth (m)	Туре	Results	(m)	(m AOD)	Legenu	Stratum Description		L
								TOPSOIL - Grass over soft brown sandy clayey SILT with rootlets.	roots and	-
					0.20			MADE GROUND - Stiff dark brown sandy silty CLAY with locally much fine to medium sub-angular gravel of polymistone. Pockets and partings of sand.	some ct	
					1.00			0.6 - 0.7m - Dense medium sub-angular gravel. MADE GROUND - Very loose to loose dark brown / black	silty SAND.	-1
		1.00-1.50	D					Some fine to medium sub-angular gravel of polymict ston- Occasional fragments of white pottery.	e.	
		2.00	D	5	1.60			MADE GROUND - Very loose becoming loose light yellow slightly silty SAND. Possible beach sand infill. WS refused 3.0m depth beneath loose sand.	v brown d at	-2
		2.00-3.00	В			24				
		2.00-3.00	Ь							
12 X 1982					3.00		XXXXX	End of Borehole at 3.00 m		-3
										-
										-4
				8.						
					1	ıl				1

Туре

- Borehole backfilled with arisings.
 Perched groundwater seepage encountered at 1.5m, borehole dry at end of shift and following morning.
 Dynamic Probe DP03 carried out adjacent to borehole.
 Borehole situated in depression on grass field.

Results



SOUTH WEST GEOTECHNICAL	South West Geo Tel: 01884 2524 Fax: 01884 253 email: mail@sw www.swgeotech	144 974 geotech.co.uk	Borehole No WS4 Sheet 1 of 1
Project Name Swanage Sea Front	Project No. 5951	Co-ords: -	Hole Type WS
Location: Dorset		Level: -	Scale 1:25
Client: Design Base		Dates: 19/03/2014	Logged By NW

1.00-2.00 B 1.00-2.00 B 2.00-3.00 B 3.00 End of Borehole at 3.00 m	Cile		Design						Dates: 19/03/2014	NW
0.10 0.10	Well	Water Strikes	Sample Depth (m)	es & I	n Situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum Description	
0.20-1.00 B IVN @ 0.5m = 46 kPe IVN @ 0.5m = 42 kPa IVN @ 0.5m = 46 kPe IVN @ 0									TOPSOIL - Grass over soft brown sandy clayey SILT wit rootlets.	
1.00-2.00 B 1.00-2.00 B 2.00-3.00 B 3.00 End of Borehole at 3.00 m			0.20-1.00	В				X X X X X X X X X X X X X X X X X X X		
2,00-3,00 B 3,00 End of Borehole at 3,00 m			1.00-2.00	В	#]	5.			IVN @ 1.0m = 42 kPa	-1
End of Borehole at 3,00 m			2.00-3.00	В		300				
									End of Borehole at 3.00 m	
Type Regulte					9					-4
Type Results				Туре	Results					-

- Borehole backfilled with arisings.
 Groundwater not encountered.
 Dynamic Probe DP04 carried out adjacent to borehole.



SOUTH WE	GEO	TECHNICAL		જુ		Tel: 01 Fax: 0	West Ged 884 2524 1884 253 mail@sw	44	WS5 Sheet 1 of	
Proje	***				Pr	roject N			Hole Type	
		Sea Fron	ıt			951	100.0	Co-ords: -	WS	25
Loca	tion:	Dorset						Level: -	Scale 1:25	
Clien	ıt:	Design				4		Dates: 20/03/2014	Logged By NW	У
Well	Water Strikes	Sample Depth (m)	Type	n Situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum Description		
		1 3 1			0.10			TOPSOIL - Grass over soft brown sandy clayey SILT with rootlets.	roots and	
							X X X	Firm brown silty sandy CLAY.	/	-
		0.20-1.00	В		0.80		X X X X X X X X X X X X X X X X X X X	IVN @ 0.5m = 42 kPa		-
					0.80		X X X X X X X X X X X X X X X X X X X	Firm becoming stiff tan / light brown light grey silty CLAY. Lithorelict structure and roots visible. IVN @ 1.0m = 38 kPa		-1 -1
		1.00-2.00	В	a .				IVN @ 1.5m = 54 kPa		
							X X X X X X X X X X X X X X X X X X X	IVN @ 2.0m = 72 kPa		-2
2000 007					2.50			End of Borehole at 2.50 m		1
										-3 -
										-4
- 1			Tuno	Dogulto			1 1			F

- Borehole backfilled with arisings.
 Groundwater not encountered.
 WS refused at 2.5m.
 Dynamic probe DP05 carried out adjacent to borehole.



SOUTH WEST GEOTECHNICAL	South West Geo Tel: 01884 2524 Fax: 01884 253 email: mail@sw www.swgeotech	.44 974 geotech.co.uk	Borehole No WS6 Sheet 1 of 1
Project Name Swanage Sea Front	Project No. 5951	Co-ords: -	Hole Type WS
Location: Dorset		Level: -	Scale 1:25
Client: Design Base		Dates: 20/03/2014	Logged By NW

Client:	Design	Base					Dates: 20/03/2014	NW
Vell Wat	er Sample es Depth (m)	es & Ir Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description	я
							TOPSOIL - Grass over soft brown sandy clayey SILT with rootlets.	roots and
				0.20			Firm light brown slightly sandy silty CLAY.	
							IVN @ 0.5m = 60 kPa	
				1.00			Firm becoming stiff tan / light brown mottled light grev silt	,
						x = 2	Firm becoming stiff tan / light brown mottled light grey silty CLAY. Becomes friable 3.0 - 3.5m. Lithorelict structure arroots visible.	d
						X X X	IVN @ 1.0m = 50 kPa	
						X _ X		
						¥	IVN @ 1.5m = 38 kPa	
						<u> </u>		
						X X		2
	1.50-2.50	В				<u> </u>	IVN @ 2.0m = 48 kPa	
						ZZ_Z		
						X X X		
						X X	IVN @ 2.5m = 86 kPa	
						XXXX	and a second	
						X X		
	2.50-3.50	В				X 2 X	IVN @ 3.0m = 78 kPa	
							1VN @ 5.5III = 75 KF 2	
				3.50				
				5.50			End of Borehole at 3.50 m	
								-
		Туре	Results					

- Borehole backfilled with arisings.
 Groundwater not encountered.
 WS refused at 3.5m.
 Dynamic Probe DP06 carried out adjacent to borehole.



SOUTH W	LS GEO	TECHNICAL				Tel: 01 Fax: 0 email:	884 252 1884 253	974 geotech.co.uk	Borehole No WS7 Sheet 1 of 1
Proje	ect Na	ame			Pr	oject N			Hole Type
Swa	nage	Sea Fron	nt		59	951		Co-ords: -	WS
Loca	ation:	Dorset						Level: -	Scale 1:25
Clier	nt:	Design	Base					Dates: 20/03/2014	Logged By NW
Well	Water Strikes			Situ Testing	Depth (m)	Level	Legend	Stratum Description	
y vei	Strikes		Ws	Results	(m) 0.45 0.70	(m AOD)	Legend	Stratum Description TOPSOIL - Grass over soft brown sandy clayey SILT wrootlets. Firm brown slightly sandy silty CLAY. Firm becoming stiff tan / light brownsilty CLAY. Become 2.0 - 3.0m. Lithorelict structure and roots visible. Loose light grey fine to medium sub-angular GRAVEL of grey clay and sand. Firm becoming stiff tan / light brownsilty CLAY. Become 2.0 - 3.0m. Lithorelict structure and roots visible. End of Borehole at 3.00 m	es friable -1
			Туре	Results					

- Borehole backfilled with arisings.
 Groundwater not encountered.
 WS refused at 3.0m.
 Dynamic Probe DP07 carried out adjacent to borehole.



GOUTH WEST GEOTECHNICAL	South West Ge Tel: 01884 2524 Fax: 01884 253 email: mail@sw www.swgeotech	144 974 geotech.co.uk	Borehole No WS8 Sheet 1 of 1
Project Name Swanage Sea Front	Project No. 5951	Co-ords: -	Hole Type WS
Location: Dorset	d	Level: -	Scale 1:25
Client: Design Base		Dates: 20/03/2014	Logged By NW

Cile		Design	Duoo					Dates. 20/03/2014	NW	
Well	Water Strikes	Sample Depth (m)	es & Ir	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description		T
		(,	.,,,,,					TOPSOIL - Grass over soft brown sandy clayey SILT with rootlets.	roots and	Ţ
					0.25		XX-	Firm light brown / tan silty CLAY.		1
								IVN @ 0.5m = 47 kPa		
							7 2			Ī
			200				<u> </u>			
		1.00	D				X	IVN @ 1.0m = 42 kPa		
							X			
								IVN @ 1.5m = 42 kPa		
						5.1	<u> </u>	1VIV & 1.5III = 42 N 2		
							x			
					2.00			Stiff light grey mottled purple and brown silty CLAY. Block lithorelict structure. Desiccated 2- 4m, increasing with dep IVN @ 2.0m = 52 kPa	y th.	
								IVN @ 2.0m = 52 kPa		
		3.00	D							
					4.00			End of Borehole at 4.00 m		1.7
						*1				
							Ε.			
			Туре	Results						

- Borehole backfilled with arisings.
 Groundwater not encountered.
 WS refused at 4.0m
 Dynamic Probe DP08 carried out adjacent to borehole.



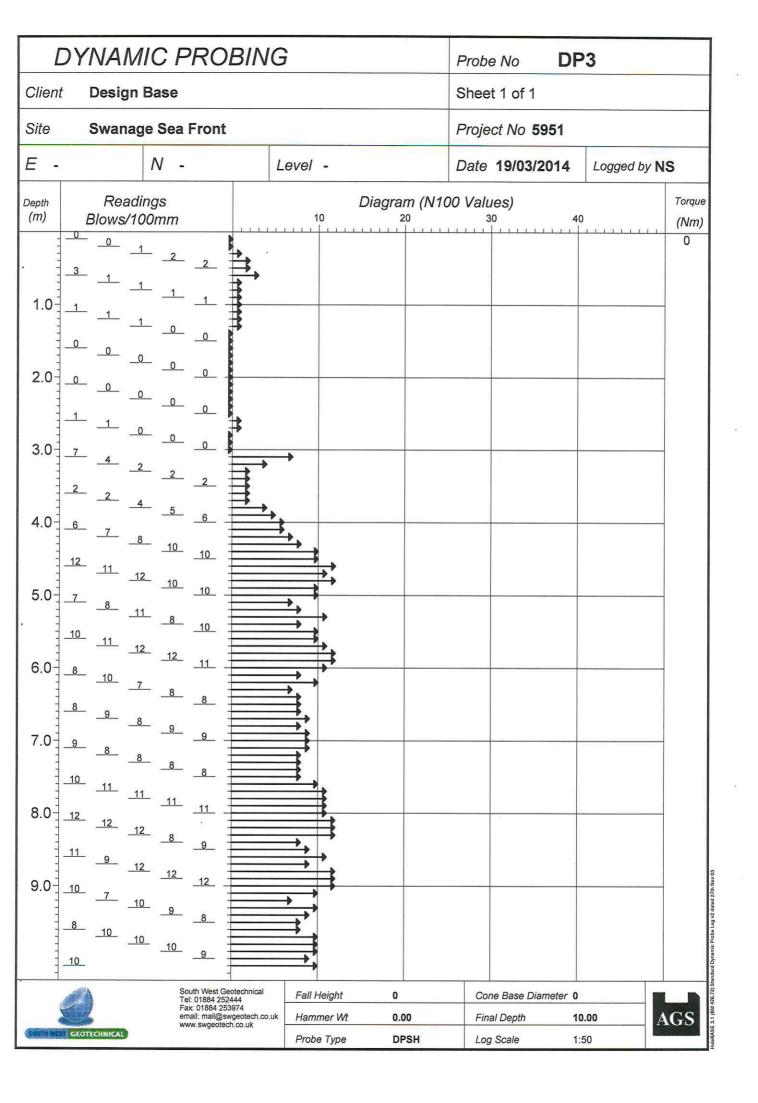
SOUTH WEST GEOTECHNICAL	South West Gec Tel: 01884 2524 Fax: 01884 2539 email: mail@sw www.swgeotech	44 974 geotech.co.uk	Borehole No WS9 Sheet 1 of 1
Project Name Swanage Sea Front	Project No. 5951	Co-ords: -	Hole Type WS
Location: Dorset		Level: -	Scale 1:25
Client: Design Base		Dates: 20/03/2014	Logged By NW
Water Samples & In Situ Tes	ting Depth Level		

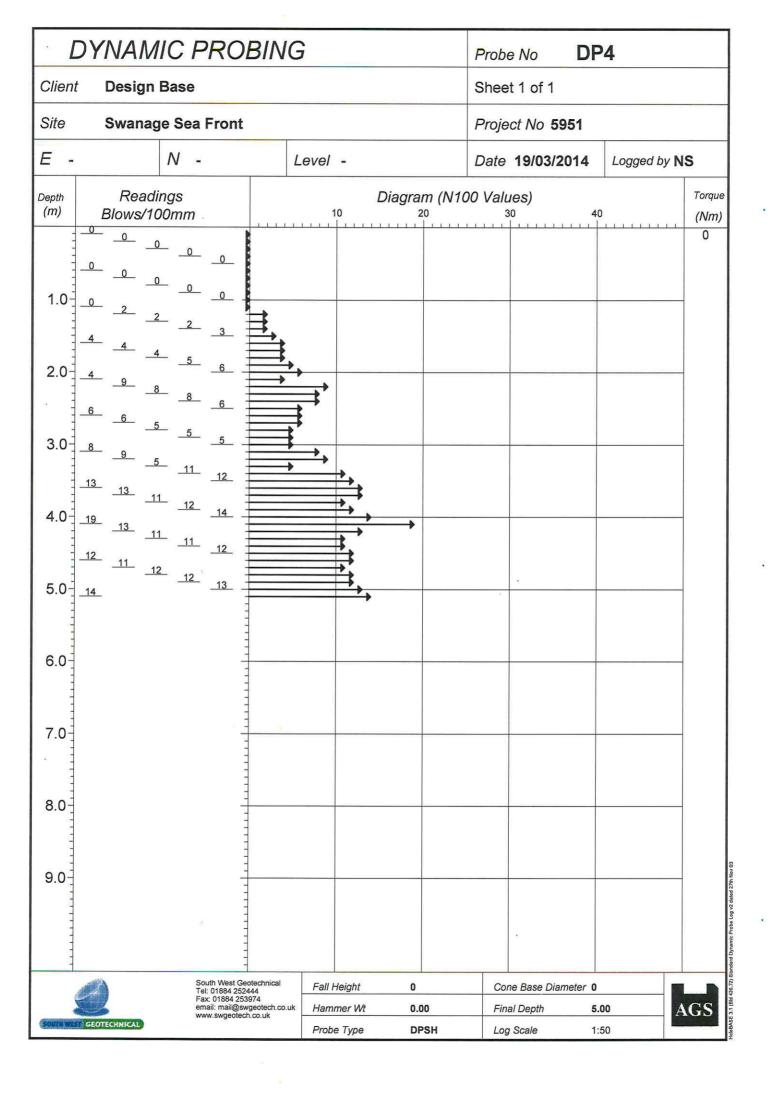
Client:	Design						Dates: 20/03/2014	NW	
Well Wa	ter Sample (m)	es & Ir	Situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum Description	L	
	Dopar (m)	.,,,,,	Noodilo				TOPSOIL - Grass over soft brown sandy clayey SILT wire rootlets.	th roots and	-
				0.20			Firm becoming stiff orange brown CLAY.		-
							IVN @ 0.5m = 58 kPa		-
							.,,, @ 0.5111 35 // 2		
									ŀ
	1.00	D					IVN @ 1.0m = 80 kPa		-1
							8		
							IVN @ 1.5m = 56 kPa		-
			*6				1011 (g) 1.5111 = 55 Ni a		-
	2.00	D		2.00		X X	Stiff light grey mottled purple and brown silty CLAY. Bloc lithorelict structure. IVN @ 2.0m = 72 kPa	iky	-2
						XXX	IVN @ 2.0m = 72 kPa		ŀ
						X X X	IVN @ 2.5m = 78 kPa		
						<u> </u>			Ì.
-52108A				3.00			End of Borehole at 3.00 m		+3
									-
						v			-
							7		Ī
			em						-
									·
Domorko	1 Porchs	Type	Results						

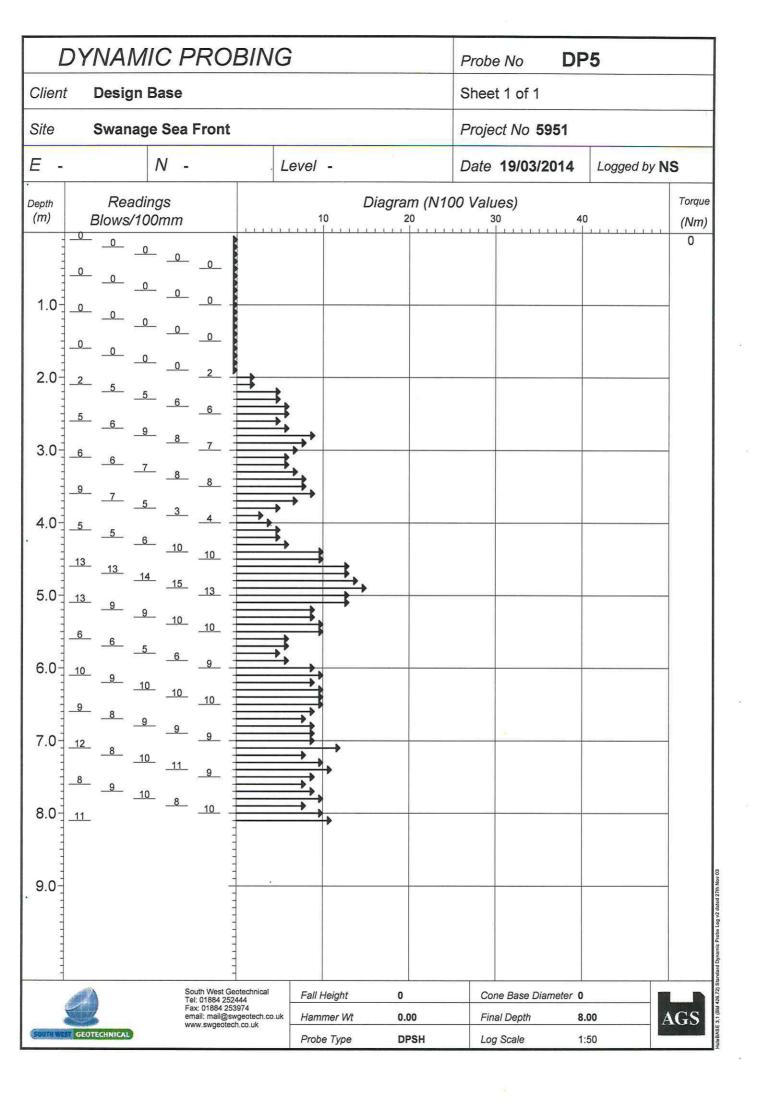
- Borehole backfilled with arisings.
 Groundwater not encountered.
 WS refused at 3.0m
 Dynamic Probe DP09 carried out adjacent to borehole.

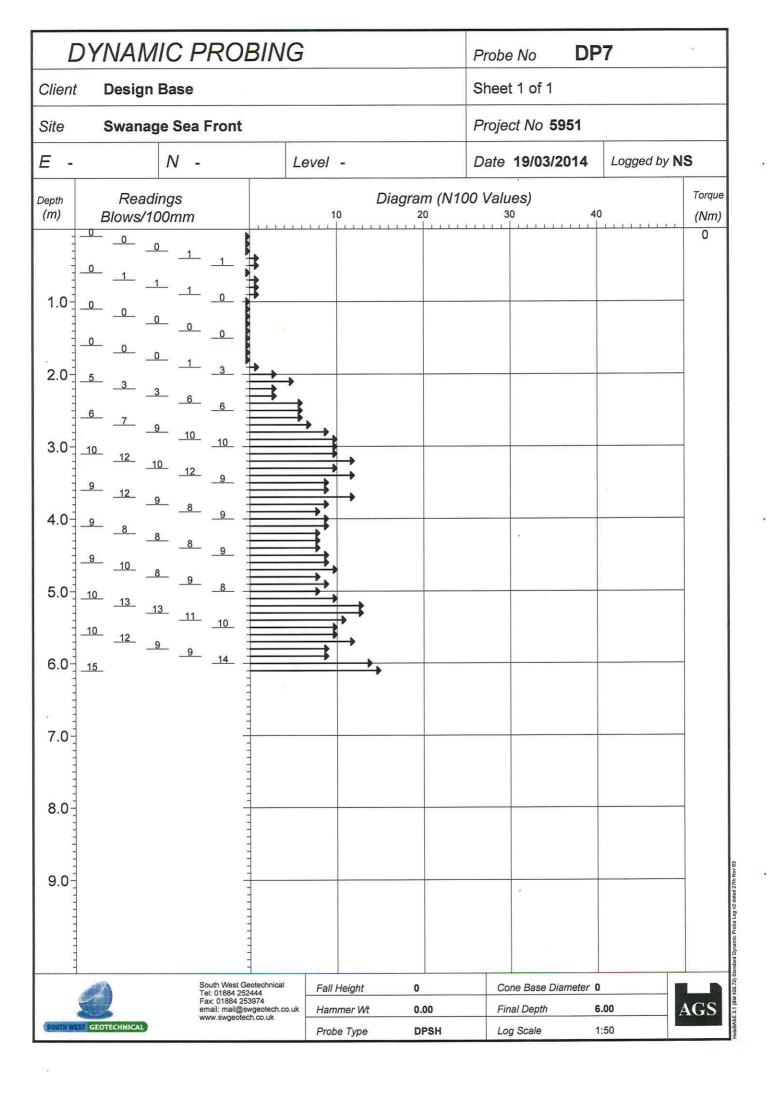


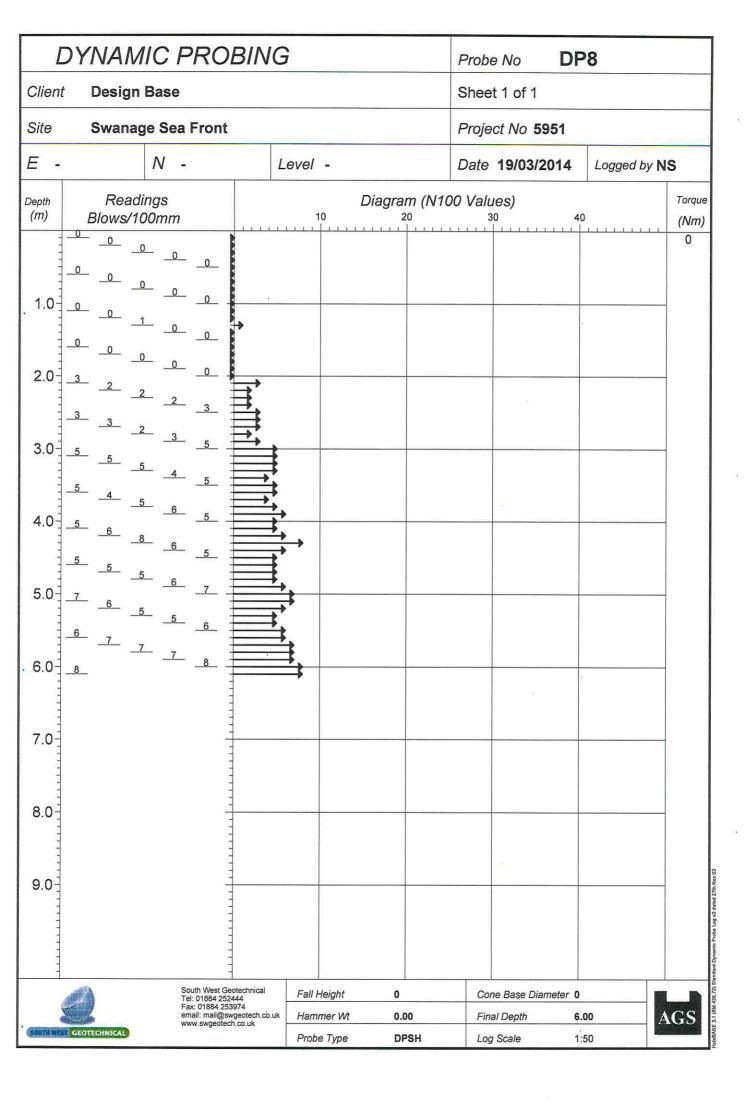
	YNAMIC PR	OBING	;		Probe No DF	21	
Client	Design Base				Sheet 1 of 1		
Site	Swanage Sea Fro	ont			Project No 5951		
E -	N -	L	.evel -		Date 19/03/2014	Logged by	NS
Depth (m)	Readings Blows/100mm		10	Diagram (N10	00 Values)	0	Torque (Nm)
3.0	3 3 4 4 4 4 4 5 5 5 6 6 6 6 7 7 6 6 6 6 6 6 6 6 6 7 8 10		Fall Heinht				0 7 7 10 8 6 8
South	Fax: 018 email: m	/est Geotechnical 84 252444 84 253974 nail@swgeotech.co.uk geotech.co.uk	Fall Height Hammer Wt	0.00		0.00	AGS
Water Street,			Probe Type	DPSH	Log Scale 1	:50	H 00H

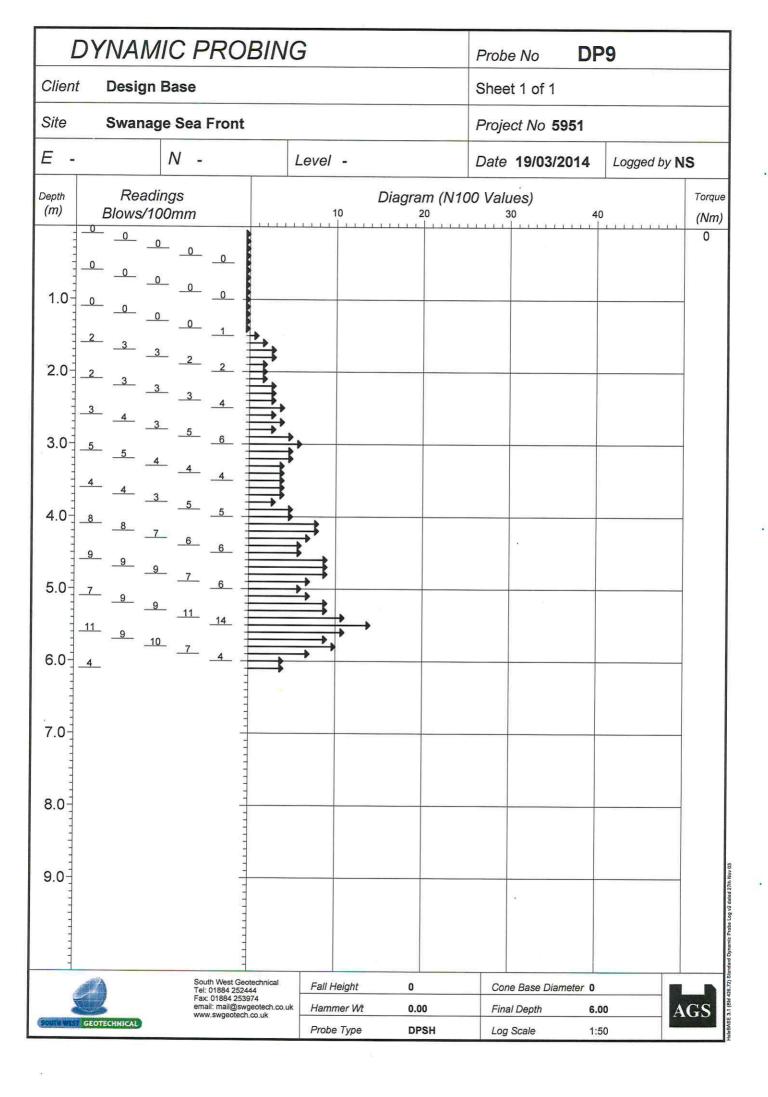


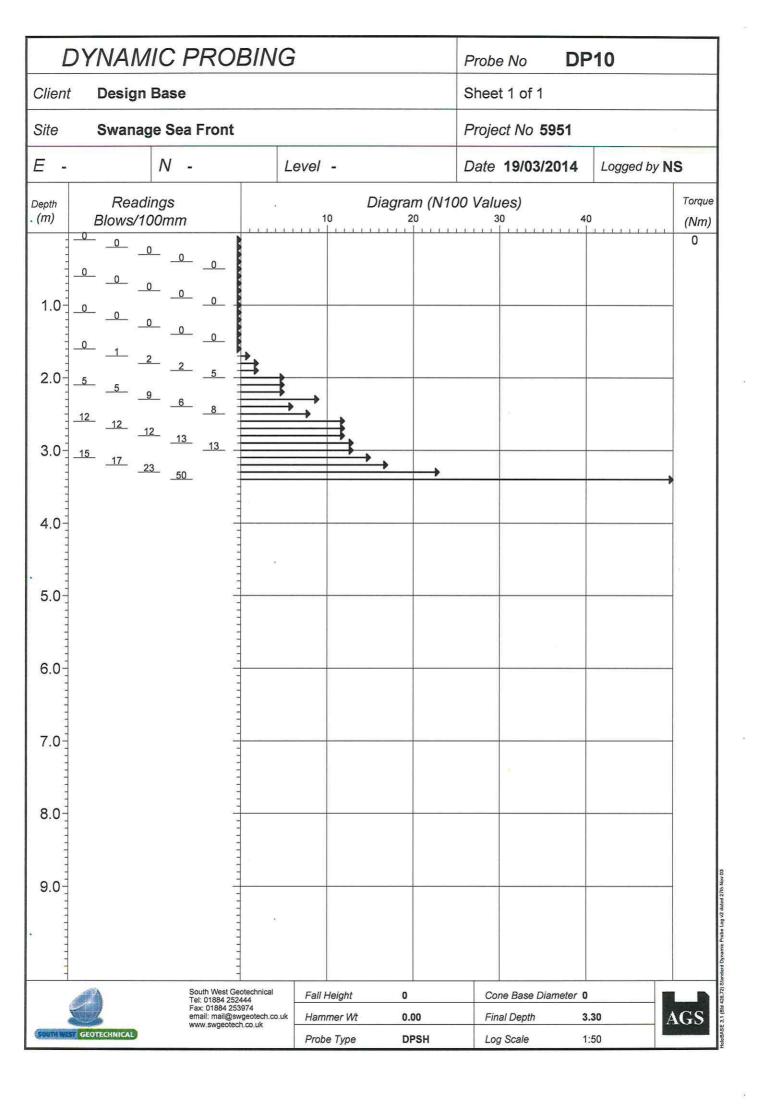














Appendix E

Geotechnical Test Data





Job: Swanage Seafront Client: Design Base

Job No: 5951 Client Job No: N/A

Sample Reference	Natural MC (%)	Liquid Limit (%)	Natural MC Liquid Limit Plastic Limit (%) (%)	Plasticity Index (%)	% Passing .425mm	Modified Plasticity Index (%)	Preparation Method	Description/ Remarks
WS1 1.00m (D)	25.3	54	22	32	100.0	32	Natural	Grey/green silty CLAY
WS2 1.00m (D)	24.1	47	29	18	100.0	18	Natural	Grey/brown very silty CLAY
WS4 0.20-1.00m (B)	26.0	50	19	31	100.0	31	Natural	Grey silty CLAY
WS5 0.20-1.00m (D)	23.5	53	17	36	100.0	36	Natural	Brown silty CLAY
WS7 1.00-2.00m (D)	16.2	43	16	27	100.0	27	Natural	Grey/brown silty CLAY
WS8 1.00m (D)	25.1	50	27	23	100.0	23	Natural	Brown silty CLAY
WS9 2.00 (D)	19.8	51	23	28	100.0	28	Natural	Brown silty CLAY

Tests carried out in accordance with Clauses 3.2, 4.3, 5.3 and 5.4 of BS1377: Part 2: 1990

Modified Plasticity Index is defined in NHBC Chapter 4.2 as the PI multiplied by the percentage of particles passing the .425mm sieve.

Non-Modified Plasticity Indices plotted on the attached chart.

Prepared By: RS

Date: 25/04/2014

Processed By: EB

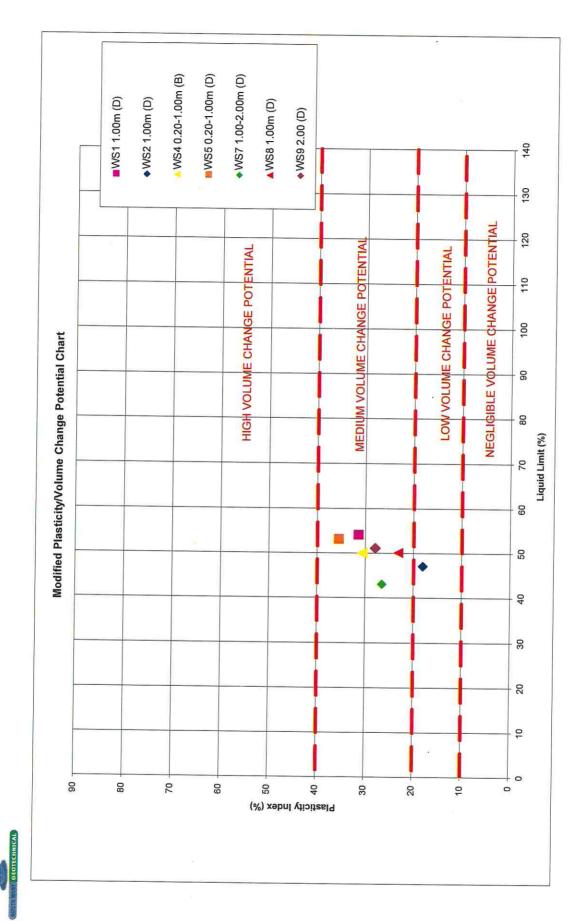
Date: 01/05/2014

Checked By: EB

Tested By AS/LC

Date: 28/04/2014

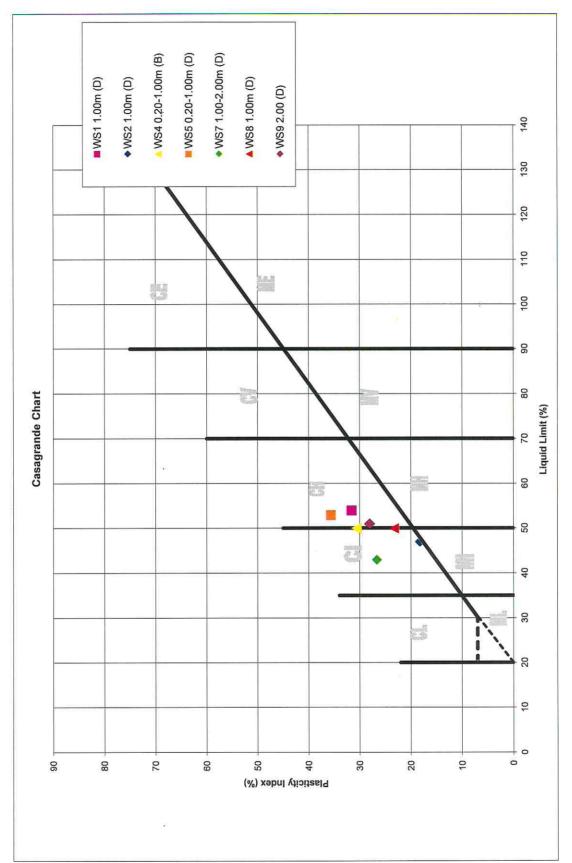
Date: 01/05/2014



Summary of Index Property Test Results



Summary of Index Property Test Results





Appendix F

Environmental Test Data



Evelyn Burnside South West Geotechnical Ltd Unit 3 Brooklands Howden Road Tiverton Devon EX16 5HW



QTS Environmental Ltd

Unit 1

Rose Lane Industrial Estate

Rose Lane

Lenham Heath

Kent

ME17 2JN

t: 01622 850410

russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 14-20791

Site Reference:

Swanage Seafront

Project / Job Ref:

5951

Order No:

None Supplied

Sample Receipt Date:

07/04/2014

Sample Scheduled Date: 07/04/2014

Report Issue Number:

Reporting Date:

09/04/2014

Authorised by:

Russell Jarvis

Director

On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old Director

On behalf of QTS Environmental Ltd

co co





QTS Environmental Report No: 14-20791					
	Date Sampled	None Supplied	None Supplied	None Supplied	
South West Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	
Site Reference: Swanage Seafront	TP / BH No	WS7	WS8	WS9	
Project / Job Ref: 5951	Additional Refs		D	, N	
Order No: None Supplied	Depth (m)	1.00 - 2.00	1.00	1.00	
Reporting Date: 09/04/2014	QTSE Sample No	99734	99735	99736	-
	Tier outline ito	55737	99733	99/30	

Determinand	Unit	RL	Accreditation				
рН	pH Units	N/a	MCERTS	7.9	8.2	7.8	
Total Cyanide	mg/kg	< 2	NONE	< 2	0.2	7.0	
W/S Sulphate as SO ₄ (2:1)	q/I	< 0.01	NONE	0.04	0.01	0.01	
Organic Matter	%	< 0.1	NONE	0.3	0.01	0.01	
Arsenic (As)	mg/kg	< 2	MCERTS	15			
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5			
Chromium (Cr)	mg/kg	< 2	MCERTS	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	< 4			
Lead (Pb)	mg/kg	< 3	MCERTS	< 3			
Mercury (Hg)	mg/kg	< 1	NONE	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3			
Selenium (Se)	mg/kg	< 3	NONE	< 3			
Zinc (Zn)	mg/kg	< 3	MCERTS	4			
results are expressed on a dry weight basis w arried out on the dried sample is corrected for cted analysis ^(S)	here samples are dri		an 30°C				





Tel: 01622 850410

QTS Environmental Report No: 14-20791	Date Sampled	None Supplied		
South West Geotechnical Ltd	Time Sampled	None Supplied		
Site Reference: Swanage Seafront	TP / BH No	WS7		
Project / Job Ref: 5951	Additional Refs	WS		
Order No: None Supplied	Depth (m)	1.00 - 2.00		
Reporting Date: 09/04/2014	QTSE Sample No	99734		

Determinand	Unit	RL	Accreditation			
Naphthalene	mg/kg <	< 0.1	MCERTS	< 0.1		
Acenaphthylene	mg/kg <	< 0.1	MCERTS	< 0.1		
Acenaphthene	mg/kg <	< 0.1	MCERTS	< 0.1		
Fluorene	mg/kg <	< 0.1	MCERTS	< 0.1		
Phenanthrene	mg/kg <	< 0.1	MCERTS	< 0.1		
Anthracene	mg/kg <	< 0.1	MCERTS	< 0.1		
Fluoranthene	mg/kg <	< 0.1	MCERTS	< 0.1		
Pyrene	mg/kg <	< 0.1	MCERTS	< 0.1		
Benzo(a)anthracene	mg/kg <	< 0.1	MCERTS	< 0.1		
Chrysene	mg/kg <	< 0.1	MCERTS	< 0.1		
Benzo(b)fluoranthene	mg/kg <	< 0.1	MCERTS	< 0.1		
Benzo(k)fluoranthene	mg/kg <	< 0.1	MCERTS	< 0.1		
Benzo(a)pyrene	mg/kg <	< 0.1	MCERTS	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg <	< 0.1	MCERTS	< 0.1		
Dibenz(a,h)anthracene	mg/kg <	< 0.1	MCERTS	< 0.1		
Benzo(ghi)perylene	mg/kg <	< 0.1	MCERTS	< 0.1		
Total EPA-16 PAHs	mg/kg <	< 1.6	MCERTS	< 1.6		



Tel: 01622 850410

QTS Environmental Report No: 14-20791	Date Sampled	None Supplied		
South West Geotechnical Ltd	Time Sampled	None Supplied	-	
Site Reference: Swanage Seafront	TP / BH No	WS7		
Project / Job Ref: 5951	Additional Refs	WS		
Order No: None Supplied	Depth (m)	1.00 - 2.00		
Reporting Date: 09/04/2014	QTSE Sample No	99734		

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01		1	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aliphatic >C8 - C10	mg/kg	< 1	NONE	< 1			
Aliphatic >C10 - C12	mg/kg	< 1	NONE	< 1			
Aliphatic >C12 - C16	mg/kg	< 1	NONE	< 1			
Aliphatic >C16 - C21	mg/kg	< 1	NONE	< 1		+	
Aliphatic >C21 - C34	mg/kg	< 6	NONE	< 6			
Aliphatic (C5 - C34)	mg/kg	< 12	NONE	< 12			
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01			
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aromatic >C8 - C10	mg/kg	< 1	NONE	< 1			
Aromatic >C10 - C12	mg/kg	< 1	NONE	< 1			
Aromatic >C12 - C16	mg/kg	< 1	NONE	< 1		_	_
Aromatic >C16 - C21	mg/kg	< 1	NONE	< 1			
Aromatic >C21 - C35	mg/kg	< 6	NONE	< 6			_
Aromatic (C5 - C35)	mg/kg	< 12	NONE	< 12			
Total >C5 - C35	mg/kg	< 24	NONE	< 24			-





Soil Analysis Certificate - BTEX / MTBE				
QTS Environmental Report No: 14-20791	Date Sampled	None Supplied		
South West Geotechnical Ltd	Time Sampled	None Supplied		
Site Reference: Swanage Seafront	TP / BH No	WS7		
Project / Job Ref: 5951	Additional Refs	WS		
Order No: None Supplied	Depth (m)	1.00 - 2.00		
Reporting Date: 09/04/2014	QTSE Sample No	99734		

Determinand	Unit	RL	Accreditation		
Benzene	ug/kg	< 2	MCERTS	< 2	
Toluene	ug/kg	< 5	MCERTS	< 5	
Ethylbenzene	ug/kg	< 10	MCERTS	< 10	
p & m-xylene	ug/kg	< 10	MCERTS	< 10	
o-xylene	ug/kg	< 10	MCERTS	< 10	





Soil Analysis Certificate - Sample Descriptions
QTS Environmental Report No: 14-20791
South West Geotechnical Ltd
Site Reference: Swanage Seafront Project / Job Ref: 5951
Order No: None Supplied
Reporting Date: 09/04/2014

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 99734	WS7	WS	1.00 - 2.00	The same of the sa	Light brown clayey gravel
^ 99735	WS8	D	1.00		Light brown clav
^ 99736	WS9	D	1.00		Light brown clay

Moisture content is part of procedure E003 & is not an accredited test Insufficient Sample ^{1/s} Unsuitable Sample ^{0/s}

[^] no sampling date provided; unable to confirm if samples are within acceptable holding times





Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 14-20791
South West Geotechnical Ltd
Site Reference: Swanage Seafront
Project / Job Ref: 5951
Order No: None Supplied
Reporting Date: 09/04/2014

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of	E016
3011			1,5 diphenylcarbazide followed by colorimetry	
Soil	AR		Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR		Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR		Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D		Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	ALTERNATION AND ALTERNATION OF A PARTY OF A	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D		Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR		Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR		Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR		Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D		Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR		Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	svoc	Determination of comi valatile excepts compounds by extraction in acctone and beyong followed by	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	TPH LQM	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR		Determination of hydrocarbons C6-C10 by headspace GC-MS	E001

D Dried AR As Received



Evelyn Burnside South West Geotechnical Ltd Unit 3 Brooklands Howden Road Tiverton Devon EX16 5HW



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Lenham Heath
Kent
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russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 14-20790

Site Reference:

Swanage Seafront

Project / Job Ref:

5951

Order No:

None Supplied

Sample Receipt Date:

07/04/2014

Sample Scheduled Date:

07/04/2014

Report Issue Number:

1

Reporting Date:

09/04/2014

Authorised by:

Russell Jarvis Director

On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old Director

On behalf of QTS Environmental Ltd





Soil Analysis Certificate						
QTS Environmental Report No: 14-20790	Date Sampled	None Supplied				
South West Geotechnical Ltd	Time Sampled	None Supplied				
Site Reference: Swanage Seafront	TP / BH No	WS1	WS2	WS2	WS3	WS4
Project / Job Ref: 5951	Additional Refs	D	D	D	D	В
Order No: None Supplied	Depth (m)	1.00	1.00	2,00	1.00	0.20 - 1.00
Reporting Date: 09/04/2014	QTSE Sample No	99725	99726	99727	99728	99729

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	8.2	8.4	8.3	8.2	8.0
Total Cyanide	mg/kg	< 2	NONE		< 2		< 2	< 2
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	NONE	0.03	0.01	< 0.01	0.01	0.02
Organic Matter	%	< 0.1	NONE		0.3		3.7	0.7
Arsenic (As)	mg/kg	< 2	MCERTS		4		8	17
Cadmium (Cd)	mg/kg	< 0.5	MCERTS		< 0.5		< 0.5	0.5
Chromium (Cr)	mg/kg	< 2	MCERTS		22		< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS		12		< 4	< 4
Lead (Pb)	mg/kg	< 3	MCERTS		16		< 3	< 3
Mercury (Hg)	mg/kg	< 1	NONE		< 1		< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS		27		< 3	< 3
Selenium (Se)	mg/kg	< 3	NONE		< 3		< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS		34		23	4

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C Analysis carried out on the dried sample is corrected for the stone content Subcontracted analysis ⁽⁵⁾





QTS Environmental Report No: 14-20790	Date Sampled	None Supplied	None Supplied	None Supplied	Name Constitut	
South West Geotechnical Ltd	Time Sampled	None Supplied	None Supplied		None Supplied	
Site Reference: Swanage Seafront	TP / BH No	WS4		None Supplied WS5	None Supplied WS6	
Project / Job Ref: 5951	Additional Refs		W33	WSS	VVSO	
Order No: None Supplied	Depth (m)	1.00 - 2.00	0.20 - 1.00	1.00 - 2.00	1.50 - 2.50	
Reporting Date: 09/04/2014	QTSE Sample No		99731	99732	99733	

Determinand	Unit	RL	Accreditation				
рН	pH Units	N/a	MCERTS	8.8	8.1	7.7	7.7
Total Cyanide	mg/kg	< 2	NONE		< 2		< 2
W/S Sulphate as SO ₄ (2:1)	g/I	< 0.01	NONE	0.05	0.01	0.02	0.16
Organic Matter	%	< 0.1	NONE		2.3	0.02	0.10
Arsenic (As)	mg/kg	< 2	MCERTS		11		0.1
Cadmium (Cd)	mg/kg	< 0.5	MCERTS		< 0.5		< 0.5
Chromium (Cr)	mg/kg	< 2	MCERTS		< 2		(0.3
Copper (Cu)	mg/kg	< 4	MCERTS		< 4		< 4
Lead (Pb)	mg/kg	< 3	MCERTS		< 3		(2)
Mercury (Hg)	mg/kg	< 1	NONE		< 1		< 1
Nickel (Ni)	mg/kg	< 3	MCERTS		< 3		< 3
Selenium (Se)	mg/kg	< 3	NONE		< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS		- 5		< 3

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C Analysis carried out on the dried sample is corrected for the stone content Subcontracted analysis ⁽⁵⁾





NE ENVIRONMENT AGENCY'S DUIDDING CERTHEATING SCHIPE

Tel: 01622 850410

Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 14-20790	Date Sampled	None Supplied				
South West Geotechnical Ltd	Time Sampled	None Supplied				
Site Reference: Swanage Seafront	TP / BH No	WS2	WS3	WS4	WS5	WS6
Project / Job Ref: 5951	Additional Refs	D	D	В	В	В
Order No: None Supplied	Depth (m)	1.00	1.00	0.20 - 1.00	0.20 - 1.00	1.50 - 2.50
Reporting Date: 09/04/2014	QTSE Sample No	99726	99728	99729	99731	99733

Determinand	Unit	RL	Accreditation				311111111111111111111111111111111111111	
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene			MCERTS	< 0.1	0.15	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	0.22	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	0.19	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	5.78	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	1.16	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	24.50	< 0.1	0.15	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	20.40	< 0.1	0.13	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	9.77	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	10.60	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	13.70	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	5.06	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	9.17	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	6.35	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.65	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	5.54	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	113	< 1.6	< 1.6	< 1.6



Tel: 01622 850410

Soil Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 14-20790	Date Sampled	None Supplied				
South West Geotechnical Ltd	Time Sampled	None Supplied				
Site Reference: Swanage Seafront	TP / BH No	WS2	WS3	WS4	WS5	WS6
Project / Job Ref: 5951	Additional Refs	D	D	В	B	P
Order No: None Supplied	Depth (m)	1.00	1.00	0.20 - 1.00	0.20 - 1.00	1.50 - 2.50
Reporting Date: 09/04/2014	QTSE Sample No	99726	99728	99729	99731	99733

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aliphatic >C10 - C12	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aliphatic >C12 - C16	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aliphatic >C16 - C21	mg/kg	< 1	NONE	< 1	16	< 1	< 1	< 1
Aliphatic >C21 - C34	mg/kg	< 6	NONE	< 6	99	< 6	< 6	< 6
Aliphatic (C5 - C34)	mg/kg	< 12	NONE	< 12	115	< 12	< 12	< 12
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aromatic >C10 - C12	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aromatic >C12 - C16	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aromatic >C16 - C21	mg/kg	< 1	NONE	< 1	22	< 1	< 1	< 1
Aromatic >C21 - C35	mg/kg	< 6	NONE	< 6	168	< 6	< 6	< 6
Aromatic (C5 - C35)	mg/kg	< 12	NONE	< 12	190	< 12	< 12	< 12
Total >C5 - C35	mg/kg	< 24	NONE	< 24	304	< 24	< 24	< 24





Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 14-20790	Date Sampled	None Supplied				
South West Geotechnical Ltd	Time Sampled	None Supplied				
Site Reference: Swanage Seafront	TP / BH No	WS2	WS3	WS4	WS5	WS6
Project / Job Ref: 5951	Additional Refs	D	D	В	В	В
Order No: None Supplied	Depth (m)	1.00	1.00	0.20 - 1.00	0.20 - 1.00	1.50 - 2.50
Reporting Date: 09/04/2014	QTSE Sample No	99726	99728	99729	99731	99733

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
p & m-xylene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
o-xylene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10





Soil Analysis Certificate - Sample Descriptions

QTS Environmental Report No: 14-20790

South West Geotechnical Ltd

Site Reference: Swanage Seafront

Project / Job Ref: 5951

Order No: None Supplied

Reporting Date: 09/04/2014

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 99725	WS1	D	1.00	16.8	Light brown clay
^ 99726	WS2	D	1.00		Light brown clay
^ 99727	WS2	D	2,00		Light brown clayey gravel
^ 99728	WS3	D	1.00		Brown sand
^ 99729	WS4	В	0.20 - 1.00		Light grey clay
^ 99730	WS4	В	1.00 - 2.00		Light grey clay
^ 99731	WS5	В	0.20 - 1.00		Brown clayey gravel with vegetation
^ 99732	WS5	В	1.00 - 2.00		Light brown clay
^ 99733	WS6	В	1.50 - 2.50		Light brown clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5} Unsuitable Sample ^{0/5}

[^] no sampling date provided; unable to confirm if samples are within acceptable holding times





Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 14-20790

South West Geotechnical Ltd

Site Reference: Swanage Seafront

Project / Job Ref: 5951

Order No: None Supplied

Reporting Date: 09/04/2014

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1.5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanida - Compley	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Complex	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR		Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D		Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR		Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	NORTH WITH THE THE PROPERTY OF	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D		Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR		Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR		Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble		E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR		Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR		Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR		Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D		Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR		Determination of phenols by distillation followed by colorimetry	E021
Soil	D		Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D		Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR		Determination of sulphide by distillation followed by colorimetry	E018 E024
Soil Soil	D AR	Sulphur - Total SVOC	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E024
Soil	AR	Thiocyanate (as SCN)	IGL-IVIS Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	TPH LQM	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR		Determination of hydrocarbons C6-C10 by headspace GC-MS	E001

D Dried AR As Received



Appendix G

Photographic Plates





View of southern end of site, looking west from Shore Road. Walrond Road to the right of photograph.



View of middle part of site, looking west from Shore Road. Walrond Road just to the left of photograph. Note holiday chalets to the right of photograph.



View of holiday chalets, looking west from Shore Road.



View of northern end of site, looking west from Shore Road. Note holiday chalets to the left of photograph.



View looking south from southern end of site, looking from Walrond Road.



View looking south from southern end of site. Shore Road visible to left of photograph.



View of middle part of site, looking north east towards Shore Road.





View of pathway in middle part of site showing signs of slippage.



Tension cracks within crest of slope above southern end of site, adjacent to WS9.





Slumping wall and cracked paving slabs.



Slumped electrical box. Formally attached to stone wall to the left.





Cracking within retaining wall to the south of the middle part of site, on the corner of Shore Road and Walrond Road.



Tension cracks at top of slope on De Moulham Road.

April 2014 Report No 5951





WS1



WS2





WS3



WS4



WS5





WS6



WS7





WS8



WS9