



Ground and Environmental Services Limited

**Unit 2 Montpelier Business Park
Dencora Way
Ashford
Kent
TN23 4FG
01233 646237**

**4 Golf Links Avenue,
Gravesend,
Kent
DA11 7PA**

On behalf of Gallop Homes

Report on Ground Investigation



Document Reference: 13362

November 2024

air quality assessment contaminated land ecology environmental audits noise assessment
environmental impact assessments flood risk assessments geotechnical engineering ground investigation
hydrogeology noxious weeds remediation design risk assessments waste management

Site: 4 Golf Links Avenue, Gravesend, Kent DA11 7PA

Document Reference No: 13362

Quality Management

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1 INTRODUCTION

Ground and Environmental Services Ltd (GES) was commissioned by Gallop Homes to undertake an intrusive ground Investigation on a proposed development site at 4 Golf Links Avenue, Gravesend, Kent DA11 7PA.

It was understood that the proposed development is to comprise the demolition of an existing garage and the construction of a new two storey detached house on land to the north of No.4 golf links avenue.

The objectives of the Ground Investigation was to ascertain geotechnical recommendations to aid foundation, ground floor slab, soakaway, pavement and temporary works design for the proposed development.

This report specifically excludes comment or advice with regards to contaminated land or pollution related issues.

2 SITE LOCATION AND LAYOUT

The site is located off Golf Links Avenue and is centred on approximate ordnance survey grid reference centre: TQ 64559 71282.

At the time of investigation, the site comprised an area of soft landscaping with an area of demolished hardstanding (formally a garage) located in the central western part of the site. A single large mature tree was located in the centre of the site.

The topography of the site was generally flat although the ground cover was uneven. Towards the east of the site was a roughly square area of the site which was approximately 1m lower than the surrounding area.

The site is surrounded on all fronts by residential properties with Golf Links Avenue to the immediate West and Orchard Avenue to the immediate North.

3 GEOLOGY

Reference to the British Geological Survey online geological mapping of the area indicates that the site is underlain by soils of the White Chalk Supergroup. No superficial deposits were shown on the site.

The geological memoir for the area described these strata as follows:

White Chalk Supergroup

Comprising of Chalk with flints. With discrete marl seams, nodular chalk, sponge rich and flint seams throughout.



4 INTRUSIVE INVESTIGATION

4.1 FIELDWORK

The site works were carried out on the 23rd October 2024 and comprised:

- Window Sampling;
- Falling Head Testing
- Dynamic Cone Penetrometer Testing

The positions of the above works on the site are indicated on Figure 1, Exploratory Hole Location Plan.

Window Sample Holes

Four window sample holes (WS1 to WS4) were excavated using a Premier Compact 110 window sampling rig to depths of 5.0m.

The soils and materials encountered in the holes were logged and representative samples recovered for laboratory analysis. Standard Penetration tests were also carried out at regular intervals using the split spoon attachment.

Upon completion all window sample holes were backfilled with arisings and made safe.

Window sample hole logs are presented in Appendix 1.

Falling Head Soakage Testing

Falling head soakage testing was undertaken in the temporary standpipes installed in window sample holes WS1 and WS2. The test involved recording the drop in water level with respect to time.

The field test data is summarised below in Section 7.5 below and the results presented in Appendix 2.

Dynamic Cone Penetrometer Testing

Four Dynamic Cone Penetrometer Tests (DCP1 to DCP4) were carried out in the proposed hardstanding areas.

The Dynamic cone penetrometer (DCP) uses an 8 kg hammer dropping through a height of 575 mm and a 60° cone having a maximum diameter of 20 mm. Penetration depth is recorded after every blow.

The DCP is a Penetrometer device used to provide a measure of in situ CBR. Blow count readings were converted to an equivalent CBR, which is displayed in the results tables



presented in Appendix 3. The TRRL equation was used to calculate the equivalent CBR value from the DCP results.

4.2 GROUNDWATER

Groundwater was not encountered during drilling.

It should be noted that the absence of groundwater is not necessarily indicative of the absence of a groundwater table in view of the short period the window sample holes remained open. Groundwater levels may vary due to seasonal fluctuations in rainfall, but in the shorter term, can be affected by antecedent weather conditions or other causes.

5 LABORATORY TESTING

The following range of laboratory tests were scheduled and the results are presented in Appendix 4.

- i. Determination of Particle Size Distribution (3 no.).
- ii. Determination of Saturation Moisture Content and dry density of chalk (2 no.).
- iii. Determination of pH (4 No.).
- iv. Determination of water-soluble sulphate (4 No.).

6 GROUND CONDITIONS AND ENGINEERING PROPERTIES

This ground investigation proved the anticipated geology, as introduced in Section 3, with the ground profile generally comprising a surface layer of Made Ground over soils typical of Head Deposits with chalk of the White Chalk Supergroup found at depth.

Made Ground

Made Ground was encountered in all test locations to depths ranging between 0.35mbegl and 0.45mbegl and comprised of slightly silty gravelly clay. The gravel comprised fine to coarse sub angular flint and concrete. At the location of WS1 a surface layer of aggregate, brick, flint concrete, asphalt and sand was found to a depth of 0.2mbegl.

Head Deposits

Beneath the Made Ground at all locations were soils typical of Head Deposits. The Head Deposits were found to depths ranging between 1.0m and 1.5mbegl. The Head Deposits comprised a variable sequence of slightly clayey to clayey sandy gravels, sandy gravelly silt sandy very gravelly clay. The gravel component comprised of sub rounded to sub angular fine to coarse flint and chalk.

Standard penetration tests carried out in WS1 and WS3 at 1m recorded N values of 6 and 23 respectively (firm/medium dense). The SPT test results are presented in Figure 2.

4 Golf Links Avenue, Gravesend, Kent DA11 7PA

Report on Ground Investigation



Figure 3 provides a plot of corrected N_{60} values against depth. The N_{60} value taking into account an energy ratio (Er) of 85% for the test equipment used.

Particle size distribution testing carried out on samples taken from WS1 (0.7m) and WS3 (1.2m) recorded a silty sandy gravel with fine fractions of 15.2% in WS1 and 34.1% in WS3.

Particle size distribution testing carried out on a sample taken from WS2 at 0.7m recorded a slightly clayey sandy gravelly silt with a fine fraction of 59%. Hydrometer testing recorded a silt content of 40.7% and a clay content of 18.3%.

White Chalk Supergroup

Beneath the Head Deposits were chalk materials typical of the White Chalk Supergroup. The chalk was found to the base of all WS locations (max depth of 5m proven) and comprised highly weathered chalk. The chalk stratum was recovered as silty clayey chalk gravel.

The partially weathered chalk material found in the window sample holes was classified as Grade Dc material with reference to CIRIA Report C574 'Engineering in Chalk'. It should be noted that the Dc grading is considered conservative for the materials found in the window sample holes which were significantly disturbed through the sampling process.

Standard penetration tests recorded N values in the range 7 to 21 (very weak).

Laboratory density testing on samples of chalk recovered found chalk of low density with a dry density of 1.48Mg/m^3 in both samples and saturation moisture contents in the range 30.4% to 30.5% recorded.

7 ENGINEERING DESIGN

7.1 FOUNDATION DESIGN CONSIDERATIONS

It was understood that the proposed redevelopment of the site would comprise the demolition of an existing garage and the construction of a new two storey detached house.

At the time of reporting, structural loads were unknown however for preliminary design purposes a line load of 60kN/m run has been adopted.

In deliberation of suitable foundation options consideration was given to the geotechnical hazards and risks as presented below:

Geotechnical Hazard	Qualitative Risk & Consequences	Possible Risk Reduction Measures
Existing underground structures such as service runs and old footings.	Very high Implication for foundation depth and economic feasibility of shallow foundations.	New foundations to be constructed in undisturbed ground or alternatively disturbed ground to be removed and replaced with suitable engineering fill.
Shrinkage/swelling of foundation soils due to action of tree roots.	Low Foundation movement and cracking of brickwork.	None required
Variations in stiffness of ground below foundation depth that could give rise to unacceptable total and differential settlement.	Low to Medium Buildings particularly sensitive to differential settlement. Would result in cracking of superstructure if conventional brickwork or brick cladding.	Calculate likely magnitude of settlement and determine if within acceptable tolerances. Make foundations act as reinforced beams. Include movement joints if and where necessary.

Based upon the findings of the ground investigation, for preliminary design purposes consideration has been given to founding the proposed new structure on conventional shallow foundations founding in the Chalk stratum.

Shallow Foundations in Chalk

The guidance provided for foundation design in Chalk is principally related to determining the density of Chalk and then sub-divisions based upon Chalk Grade indicate limiting values of applied stress that can be used. The general guidance for allowable bearing pressure on Chalk for shallow footings that will limit total settlement to 25 mm is as follows:

Medium/High Density (Grades A, B, C, Dc)	300 kN/m ²
Low Density (Grades A, B, C)	240 kN/m ²
Low Density (Grade Dc)	225 kN/m ²



Site-specific plate loading tests are typically required for proposed foundations on Grade Dm Chalk.

Low Density Chalk of Grade Dc was found at depths generally ranging between 1.0m and 1.5m over the footprint of the building. Foundations should extend 0.3m into the chalk stratum

For preliminary design purposes an allowable bearing pressure of 225kN/m² can be adopted. For a line load of 60kN/m run it is recommended that a minimum practicable foundation width of 0.45m be adopted.

Settlements of the foundations under a ground loading equivalent to 225kN/m² would be less than 10mm.

As foundations are to be taken down into the chalk no heave protection measures are considered necessary.

Based on the evidence gained from this ground investigation it is considered that the risk of solution features affecting the development is low. However, should evidence of solution features be found during the foundation construction works redesign and reinforcement of foundations would most likely be required.

7.2 GROUND FLOORS

NHBC guidance advises that suspended ground floors should be adopted when the plasticity index (PI) of the founding soils is greater than 10%. In addition, where the depth of fill would be greater than 600 mm within a self contained area, the floor construction over the whole of that area is required to be self supporting and independent of the fill.

7.3 TEMPORARY WORKS

Excavations in excess of 1.2m depth will be required in connection with the proposed development on this site. If there is a requirement for personnel to enter into excavations, then the need for trench side support should be considered for any depth of excavation and, therefore, appropriate equipment should be available on site prior to excavation proceeding. A site specific risk assessment should be carried out where man entry into excavations is required.

The base of foundation excavations should be inspected and any soft loose, organic or otherwise deleterious material at foundation level removed and replaced with lean mix concrete. The soils encountered will be liable to softening/loosening when exposed to surface water infiltration. In order to avoid deterioration of the prepared formation the base of foundations should be blinded with concrete as soon as practical after excavation and particularly if there is delay before placing foundation concrete.



7.4 SOAKAWAYS

The results of the falling head test carried out in WS1 and WS2 are presented in Appendix 2. The testwork proved a good infiltration potential with infiltration rates of 5.51×10^{-4} m/s and 6.2×10^{-4} m/s calculated in WS1 and WS2 respectively.

Based on these results the use of shallow chamber type soakaways would be a viable option for the disposal of surface water. It is recommended that full scale soakage tests are carried out to obtain final design parameters. This would be best done at enabling stage when excavating plant is available onsite.

7.5 ROADS/HARDSTANDING

The results of in situ DCP tests indicated CBR values in the range 7 to <100% although below a typical formation level of 0.45m CBR values were generally in the range 20 to 41%.

For preliminary design purposes it is recommended that a CBR value of 20% should be adopted. The soils encountered during this ground investigation are considered frost susceptible therefore road construction should have a minimum thickness of 450 mm.

7.6 CHEMICAL ATTACK ON BURIED CONCRETE

The results of the chemical testing indicated a concentration of water-soluble sulphate in the near surface soils in the range <10mg/l to 44mg/l as SO_4 . pH values were slightly acidic to slightly alkaline with 8.2 to 8.4 pH units.

In accordance with BRE Special Digest 1 (SD1:2005) entitled 'Concrete in Aggressive Ground' a design sulphate class for the site of DS-1 is recommended. Using SD1 an ACEC (Aggressive Chemical Environment for Concrete) class of AC-1 is recommended.



8 CONCLUSIONS AND RECOMMENDATIONS

Based on the intrusive works the following conclusions and recommendations have been drawn up in respect of the site at 4 Golf Links Avenue, Gravesend, Kent DA11 7PA.

- The ground profile encountered at the site comprised a surface layer of Made ground over a layer of Head Deposits with chalk materials typical of the White Chalk Supergroup found at depth.
- At the time of reporting, applied structural loads from the proposed redevelopment of the site were unknown. However, for preliminary foundation design purposes a line load of 60kN/m run was adopted.
- The White Chalk Supergroup was identified as a suitable founding stratum.
- Based on field observations, in situ testing and laboratory test results, a maximum allowable bearing of 225kN/m² was recommended for foundations placed within the Grade Dc chalk which was found at depths ranging from 1.0m and 1.5m over the footprint of the proposed development. For a typical line load of 60kN/m a minimum practicable foundation width of 0.45m was recommended.
- Total settlements would be less than 10mm.
- Based on the results of the falling head tests the use of shallow soakaways would be a viable option for disposal of surface water. Full scale BRE DG365 testing is recommended at enabling stage to obtain final design parameters.
- For preliminary design purposes it is recommended that a CBR value of 20% should be adopted.
- A design sulphate class for the site of DS-1 and an ACEC class of AC-1 is recommended for foundation concrete.



KEY:

- WS - WINDOW SAMPLE
- BH - BOREHOLE
- (I) - INSTALLATION
- TP - TRIAL PIT
- HDTP - HAND DUG TRIAL PIT
- SP - SOAKAGE PIT
- ▲ DCP - DYNAMIC CONE PENETRATION
- DP - DYNAMIC PROBE
- HA - HAND AUGER
- PT - PERCOLATION TEST
- GM - GAS MONITORING STANDPIPE
- S - SAMPLE LOCATION

CLIENT:
Gallop Homes

SITE ADDRESS:
4 Golf Links Avenue
Gravesend
DA11 7PA

DRAWING NO.:
Figure 1

DRAWING TITLE:
Exploratory Hole Location Plan

PROJECT NO.: 13362	DATE: 11/24
DRAWN: PJ	REVISION: 00

GROUND AND ENVIRONMENTAL
SERVICES (GES) LIMITED
UNIT 2
MONTPELIER BUSINESS PARK
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Figure 2: 4 Golf Links Avenue, Gravesend
SPT N-Depth Profile

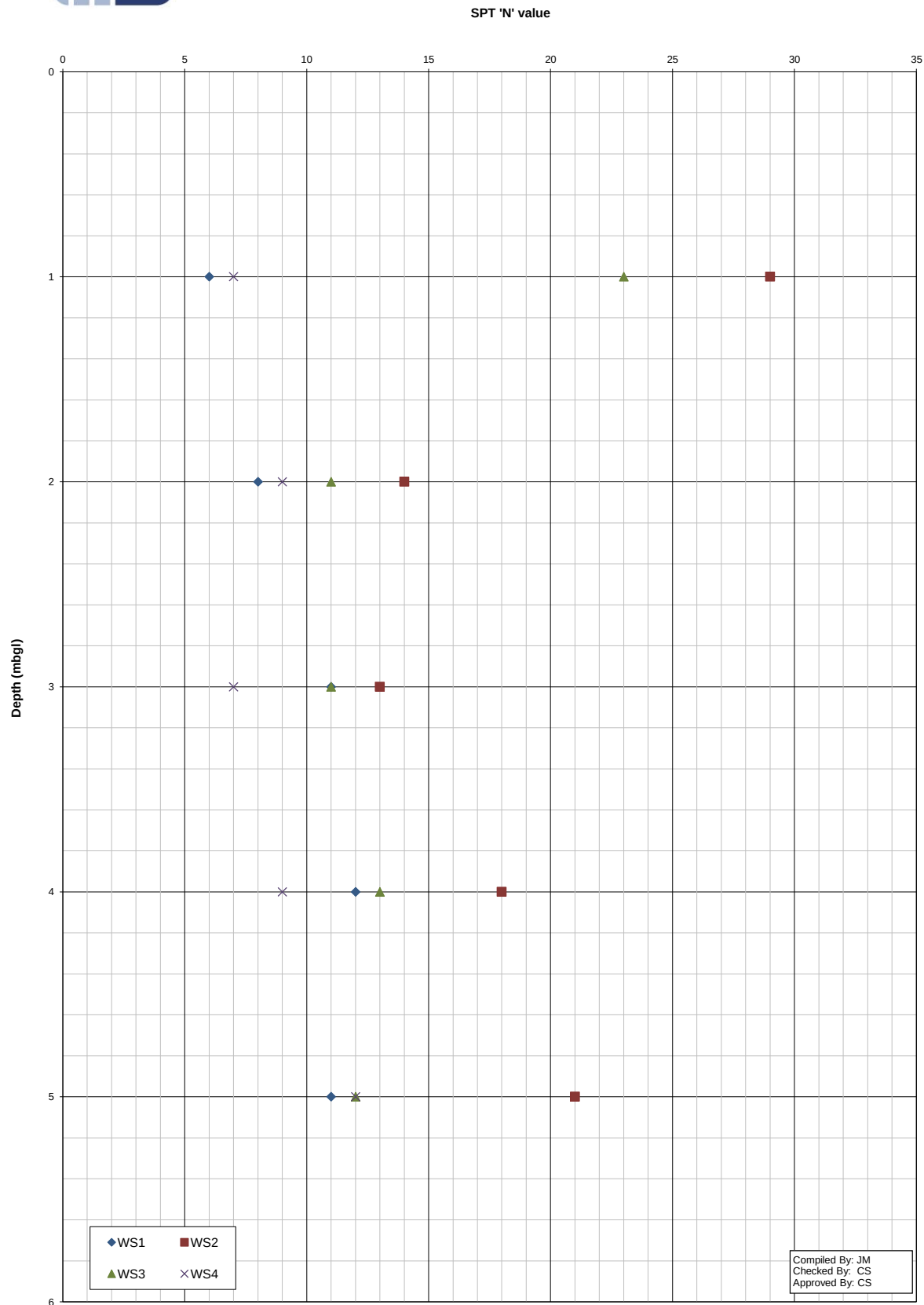
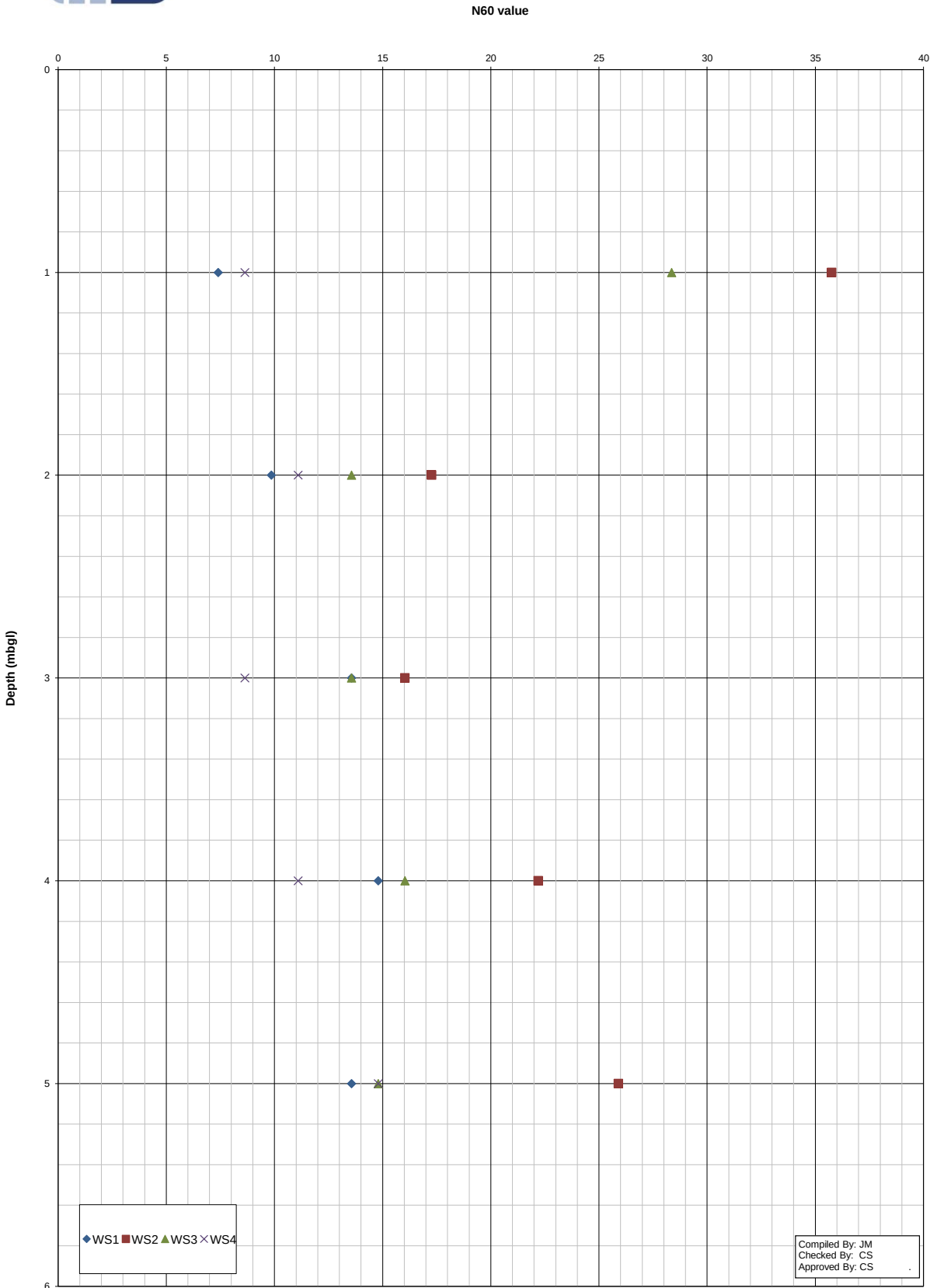




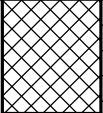
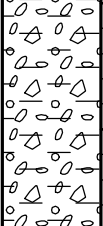
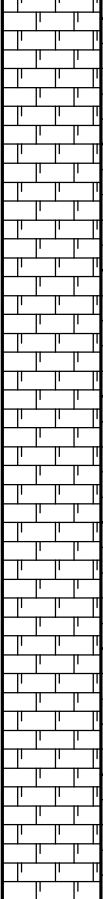
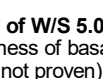
Figure 3: 4 Golf Links Avenue, Gravesend
N60-Depth Profile

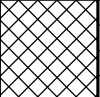
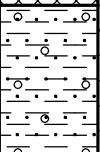
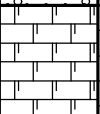
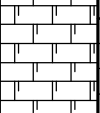
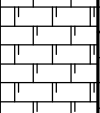
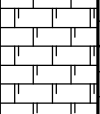
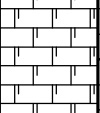
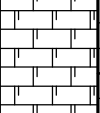
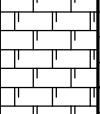
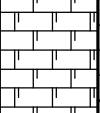
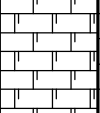
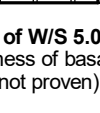
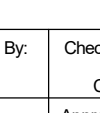
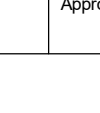




APPENDIX 1
WINDOW SAMPLE LOGS

 Ground and Environmental Services Limited Unit 2 Montpelier Business Park Dencora Way, Ashford Kent TN23 4FG Window Sampler Log No. WS1 Sheet: 1 of 1					Project Name: 4 Golf Links Avenue Project Location: Gravesend Client: Gallop Homes					Job No: 13362	
Equipment & Methods. Premier 110 Support Used:None Backfill: Arisings					Co-ordinates: E: N:		Ground Level (m):		Date Started:23/10/2024 Date Completed:23/10/2024		
Samples and In situ Testing				Field Records		DESCRIPTION		Reduced Level (m)	Legend	Depth (Thick) (m)	
Depth (m)	No.	Type	Result								
0.30		D				MADEGROUND: Dry dark brown and black aggregate, brick, flint, concrete, asphalt and sand. MADEGROUND: Dry dark grey with dark brown slightly silty gravelly clay, gravel comprised of fine to coarse sub angular flint with concrete. Dry medium dense light orangish brown slightly clayey silty sandy GRAVEL, gravel comprised of fine to coarse sub angular flint.		-0.20		(0.20)	
								-0.35		0.20 (0.15) 0.35	
0.70		D									
			SN=6	1,1/1,1,2,2							
1.20		D								(1.15)	
											
1.80		D				Dry very weak white with light brown highly weathered grade Dc CHALK.		-1.50		1.50	
			SN=8	1,2/2,2,2,2							
2.50		D									
			SN=11	1,2/2,3,3,3							
3.50		D								(3.50)	
											
4.50		D									
			SN=12	2,2/3,3,3,3							
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
											
Remarks:								Logged By: JM	Checked By: CSS		
								Scale: 1:30	Approved By:		
								FIG No.			
Notes: For explanation of symbols and abbreviations, see Key Sheet.											

 Ground and Environmental Services Limited Unit 2 Montpelier Business Park Dencora Way, Ashford Kent TN23 4FG Window Sampler Log No. WS3 Sheet: 1 of 1					Project Name: 4 Golf Links Avenue Project Location: Gravesend Client: Gallop Homes					Job No: 13362	
Co-ordinates: E: N:					Ground Level (m):		Date Started:23/10/2024 Date Completed:23/10/2024				
Samples and In situ Testing				Field Records		DESCRIPTION		Reduced Level (m)	Legend	Depth (Thick) (m)	
Depth (m)	No.	Type	Result								
0.30		D			MADEGROUND: Dry dark grey with dark brown slightly silty gravelly clay, gravel comprised of fine to coarse sub angular flint with concrete and brick.		-0.45		(0.45)		
0.70		D	SN=23	2,3/5,6,7,5	Dry medium dense light orangish brown and brownish white silty sandy GRAVEL, gravel comprised of fine to coarse sub angular flint and fine to coarse sub rounded chalk.				(0.95)		
1.20		D									
1.80		D	SN=11	2,2/3,2,3,3	Dry very weak white with light brown highly weathered grade Dc CHALK.				1.40		
2.50		D									
3.50		D	SN=11	1,2/2,3,2,4					(3.60)		
4.50		D	SN=13	2,2/3,3,4,3							
		D	SN=12	2,1/3,3,3,3							
							-5.00		5.00		
Remarks:								End of W/S 5.00 m (Thickness of basal layer not proven)			
								Logged By: JM	Checked By: CSS		
								Scale: 1:30	Approved By:		
								FIG No.			
Notes: For explanation of symbols and abbreviations, see Key Sheet.											

 Ground and Environmental Services Limited Unit 2 Montpelier Business Park Dencora Way, Ashford Kent TN23 4FG Tel: 01233 646237 Window Sampler Log No. WS4					Sheet: 1 of 1									
Equipment & Methods. Premier 110 Support Used:None Backfill: Arisings					Project Name: 4 Golf Links Avenue Project Location: Gravesend Client: Gallop Homes					Job No: 13362				
Co-ordinates: E: N:					Ground Level (m):					Date Started:23/10/2024 Date Completed:23/10/2024				
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)						
Depth (m)	No.	Type	Result											
0.30		D			MADEGROUND: Dry dark grey with dark brown slightly silty gravelly clay, gravel comprised of fine to coarse sub angular flint with concrete and brick.	-0.40		(0.40)						
0.70		D			Dry firm light orangish brown and brownish white sandy very gravelly CLAY, gravel comprised of fine to coarse sub angular flint and fine to coarse sub rounded chalk.	-1.00		(0.60)						
1.20		D	SN=7	1,2/1,2,2,2	Dry very weak white with light brown highly weathered grade Dc CHALK.	-1.00		1.00						
1.80		D												
2.50		D												
3.50		D	SN=7	1,1/2,2,1,2				(4.00)						
4.50		D												
			SN=9	2,1/3,2,2,2										
														
														
														
														
														
														
														
			SN=12	2,2/3,3,3,3		-5.00		5.00						
Remarks:						End of W/S 5.00 m (Thickness of basal layer not proven)								
						Logged By:	Checked By:							
						JM	CSS							
						Scale:	Approved By:							
						1:30								
						FIG No.								
Notes: For explanation of symbols and abbreviations, see Key Sheet.														



APPENDIX 2
FALLING HEAD TEST RESULTS

4 Golf Links Avenue, Gravesend

WS1

Top section	1	m
Bottom section	5	m
Water Level	dry m	

Centre section	3	m
Diameter of test section	0.1	m

Diameter of Hole	0.1	m
Length of test section	4	m

Time (Seconds)	Depth	Head
0	0	5
30	1.5	3.5
90	1.7	3.3
120	1.85	3.15
240	1.9	3.1
300	2.1	2.9
600	2.25	2.75
1200	2.55	2.45
1800	2.86	2.14
3600	3.15	1.85
5400	3.4	1.6
7200	3.8	1.2
9000	4.2	0.8
10800	4.8	0.2

WS1 - Test 1

Time (secs)	Head (m)
0	5.0
30	3.5
90	3.3
120	3.15
240	3.1
300	2.9
600	2.75
1200	2.45
1800	2.14
3600	1.85
5400	1.6
7200	1.2
9000	0.8
10800	0.2

Good soakage - 12.5L of water added to fill standpipe

After BS5930:1999 $k(\text{approx}) = 5.51 \times 10^{-4} \text{ m/s}$ estimate

4 Golf Links Avenue, Greavesend

WS2

Top section

1

m

Bottom
section

5

m

Water Level

dry

m

Centre section
Diameter of test
section

3

m

0.1

m

Diameter of
Hole

0.1

m

Length of test
section

4

m

Time (Seconds)	Depth	Head
0	0	5
30	1.3	3.7
60	1.72	3.28
90	1.9	3.1
120	2.3	2.7
240	2.55	2.45
300	2.7	2.3
600	2.8	2.2
1200	2.9	2.1
1800	3	2
3600	3.3	1.7
5400	3.6	1.4
7200	4	1
9000	4.5	0.5
10800	4.9	0.1

WS2 - Test 1

The graph plots Head (m) on the Y-axis (0 to 6) against Time (secs) on the X-axis (0 to 12000). The data points for Test 1 are as follows:

Time (secs)	Head (m)
0	5.0
30	3.7
60	3.28
90	3.1
120	2.7
240	2.45
300	2.3
600	2.2
1200	2.1
1800	2.0
3600	1.7
5400	1.4
7200	1.0
9000	0.5
10800	0.1

Good soakage - 12.5L of water added to fill standpipe

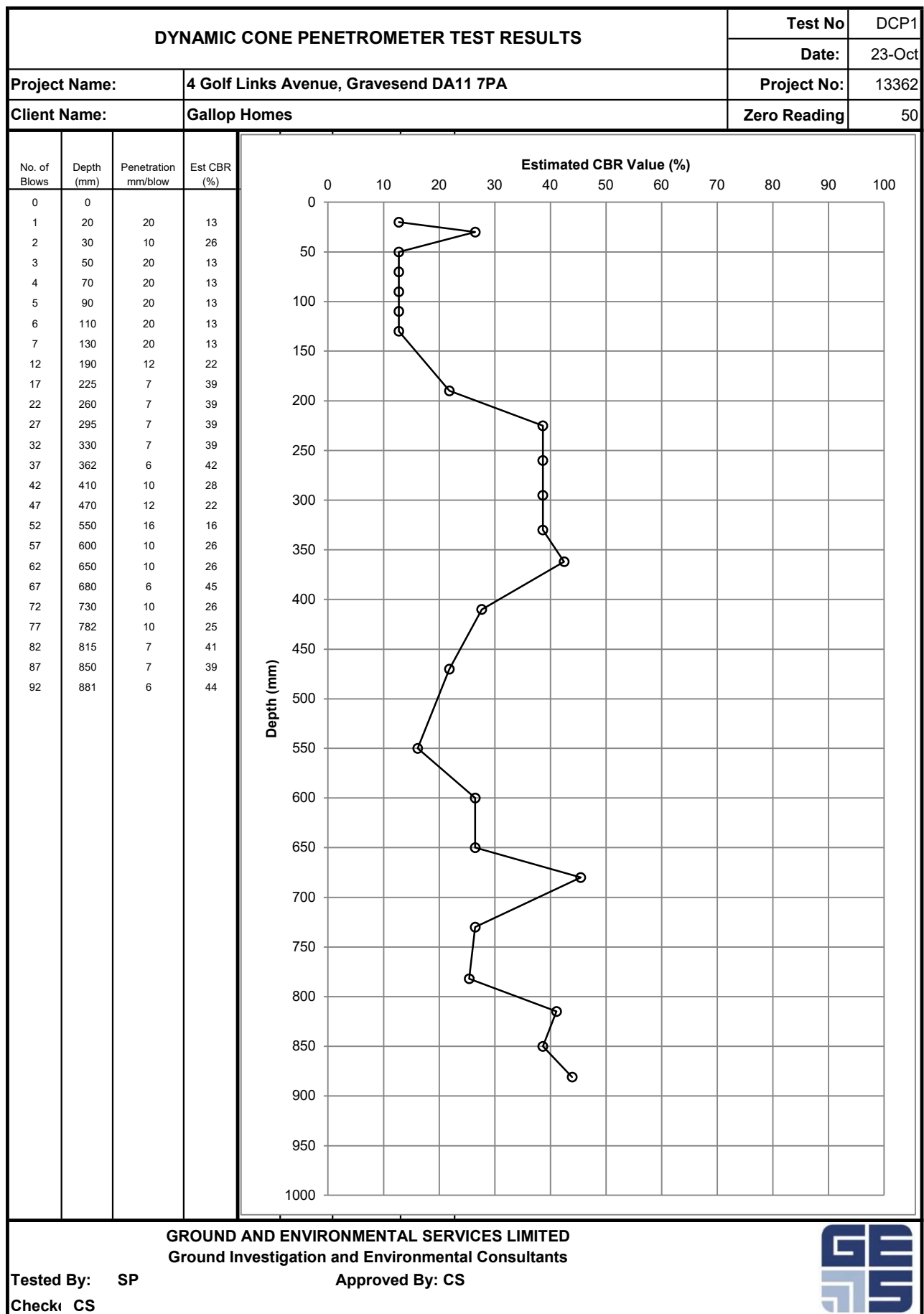
After BS5930:1999

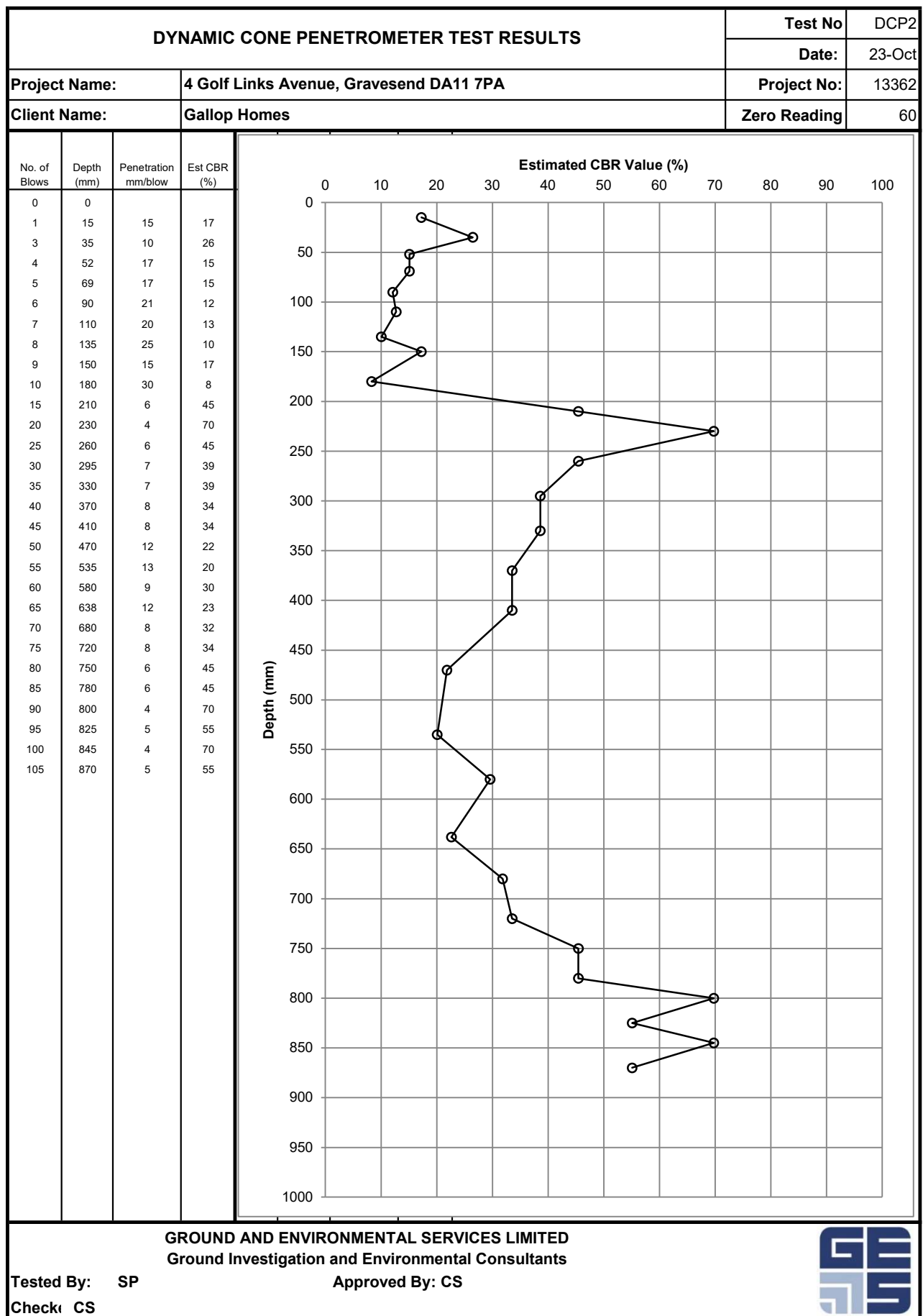
$k(\text{approx}) = 6.2 \times 10^{-4} \text{ m/s}$

estimated



APPENDIX 3
DYNAMIC CONE PENETROMETER TESTING



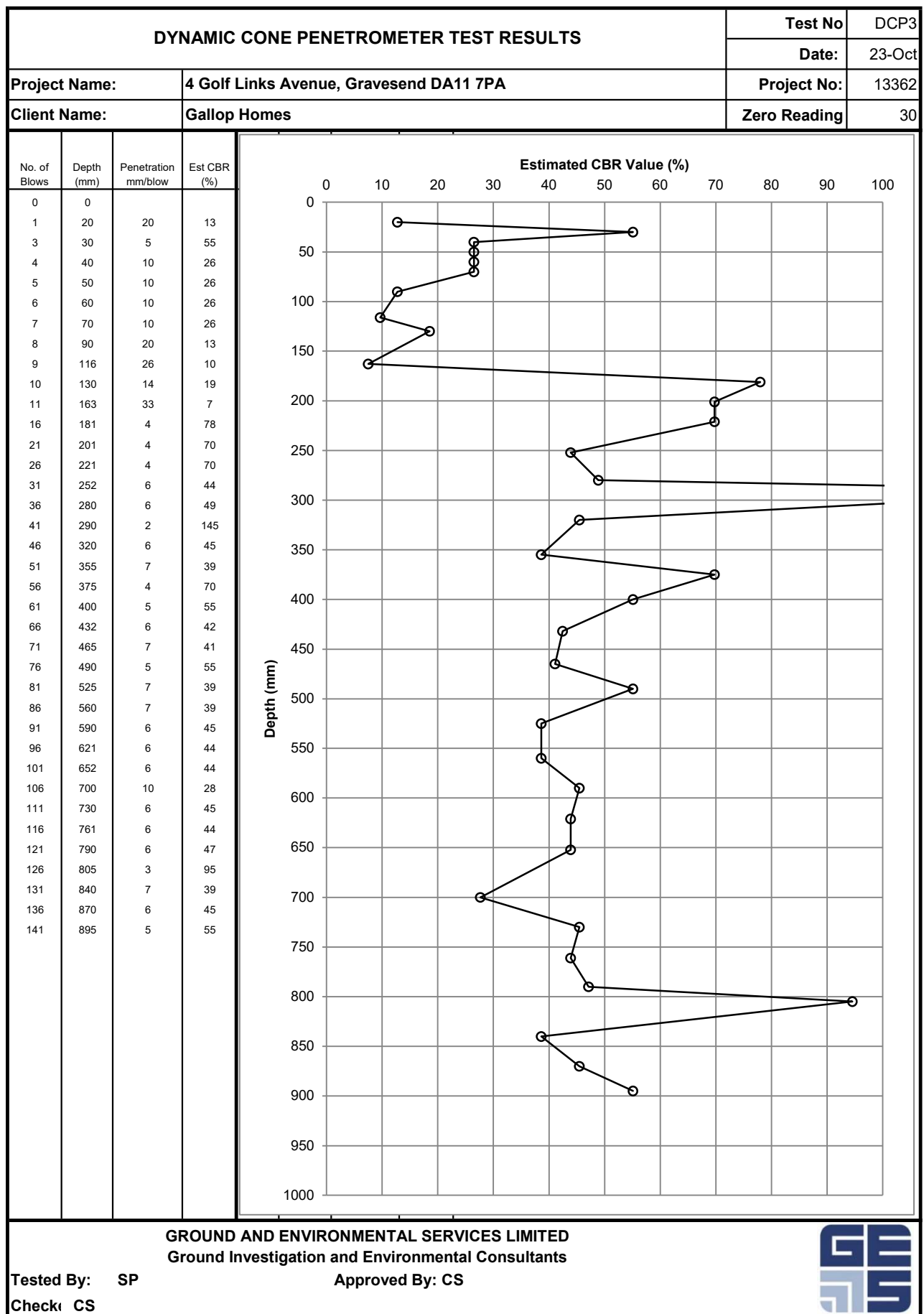


GROUND AND ENVIRONMENTAL SERVICES LIMITED
Ground Investigation and Environmental Consultants

Tested By: SP
Checked: CS

Approved By: CS



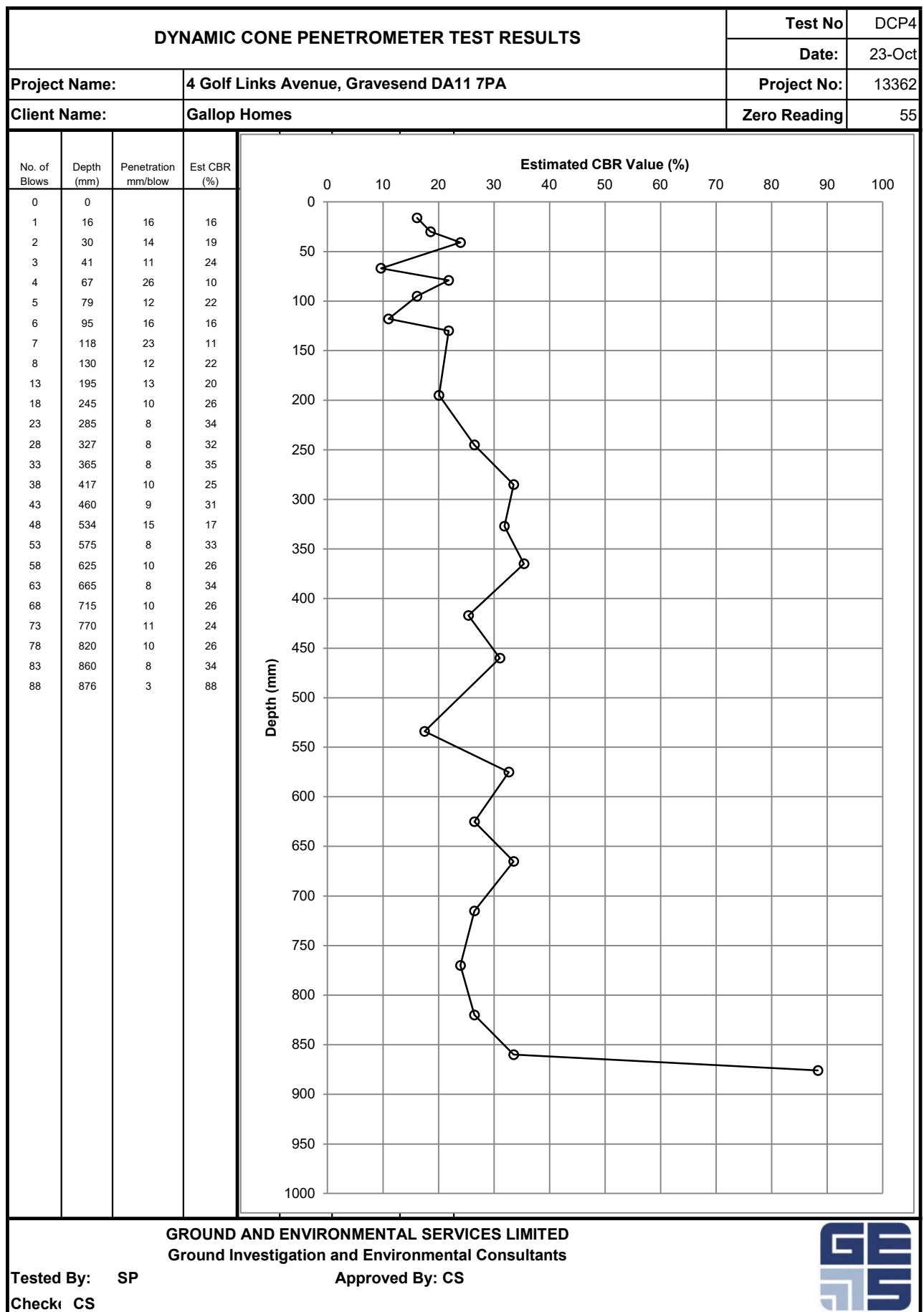


GROUND AND ENVIRONMENTAL SERVICES LIMITED
Ground Investigation and Environmental Consultants

Tested By: SP
Checked: CS

Approved By: CS

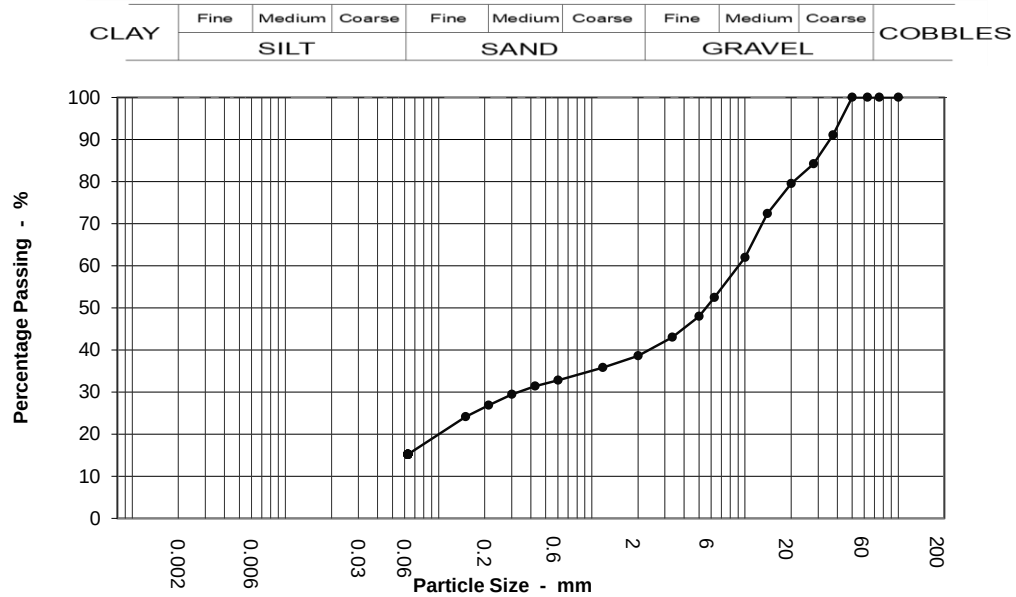






APPENDIX 4
LABORATORY TEST RESULTS

	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	13362
		Borehole / Pit No	WS 1
Project	4 Golf Links Avenue	Sample No	
Soil Description	Orangeish brown silty sandy fine to coarse GRAVEL	Depth	0.70 m
		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	91		
28	84		
20	80		
14	72		
10	62		
6.3	52		
5	48		
3.35	43		
2	39		
1.18	36		
0.6	33		
0.425	31		
0.3	29		
0.212	27		
0.15	24		
0.063	15		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

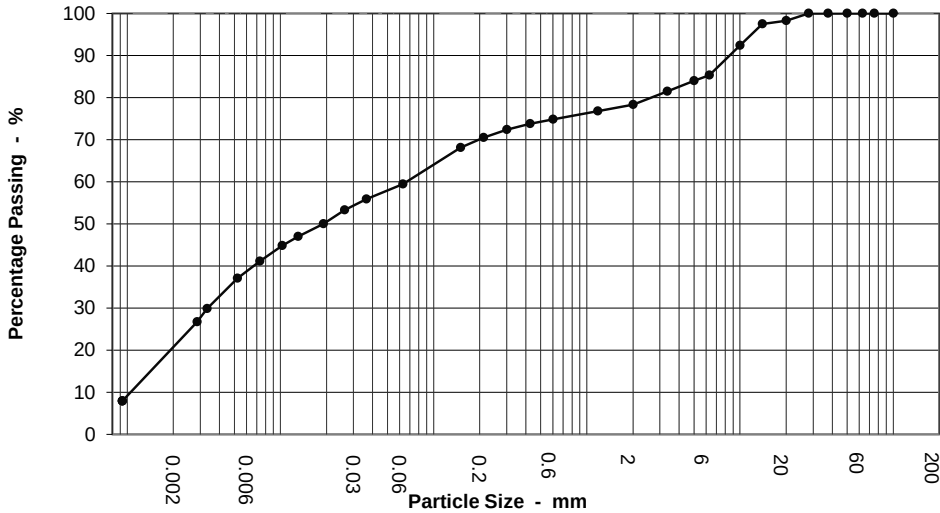
Sample Proportions	
Cobbles	0.0
Gravel	61.4
Sand	23.4
Silt & Clay	15.2

Grading Analysis	
D100	50.0
D60	9.241
D10	
Uniformity Coefficient	N/A

Operator	Checked	Approved	Remarks	
STP	KM	CSS		

	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9		Job Ref	13362
			Borehole / Pit No	WS 2
Project	4 Golf Links Avenue		Sample No	
Soil Description	Off white and brown sandy gravelly SILT with some clay content		Depth	0.70 m
			Sample type	B

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			



Percentage Passing - %

Particle Size - mm

Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100	0.036	56
63	100	0.026	53
50	100	0.019	50
37.5	100	0.013	47
28	100	0.010	45
20	98	0.007	41
14	98	0.005	37
10	92	0.003	30
6.3	85	0.003	27
5	84	0.001	8
3.35	81		
2	78		
1.18	77		
0.6	75		
0.425	74		
0.3	72		
0.212	70		
0.15	68		
0.063	59		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

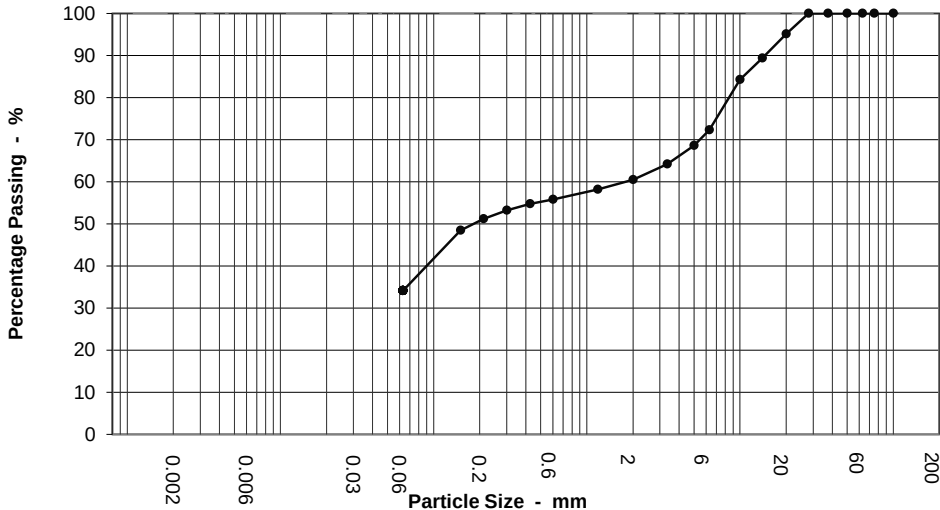
Sample Proportions	
Cobbles	0.0
Gravel	21.7
Sand	19.3
Silt	40.7
Clay	18.3

Grading Analysis	
D100	28.0
D60	0.068
D10	0.001
Uniformity Coefficient	60

Operator	Checked	Approved	Remarks	
STP	KM	CSS		

	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9		Job Ref	13362
			Borehole / Pit No	WS 3
Project	4 Golf Links Avenue		Sample No	
Soil Description	Off white and brown silty sandy fine to coarse GRAVEL with some clay content		Depth	1.20 m
			Sample type	B

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	95		
14	89		
10	84		
6.3	72		
5	69		
3.35	64		
2	61		
1.18	58		
0.6	56		
0.425	55		
0.3	53		
0.212	51		
0.15	48		
0.063	34		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	39.5
Sand	26.4
Silt & Clay	34.1

Grading Analysis	
D100	28.0
D60	1.817
D10	
Uniformity Coefficient	N/A

Operator	Checked	Approved	Remarks	
STP	KM	CSS		



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Site: 4 Golf Links Avenue

Project No: 13362

Client: Gallop Homes

Date 14/11/2024

Date Received: 24/10/2024

Date Tested: 13/11/2024

Test Results

Location ID	Depth (m)	Saturation Moisture Content SMC (%)	Bulk Density (mg/m ³)	Dry Density (mg/m ³)	Sample type
WS 2	1.2	30.5	1.91	1.48	D
WS 3	1.8	30.4	1.91	1.48	D

Visual Descriptions

Location ID	Depth	Description
WS 2	1.2	Off white gravel of CHALK
WS 3	1.8	Off white gravel of CHALK

Tested by: STP

Checked by: CSS

Approved by: CSS



Craig Spanton
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Normec DETS Limited
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 24-12876

Site Reference: 4 Golf Links Avenue

Project / Job Ref: 13362

Order No: GES/5784.13362

Sample Receipt Date: 28/10/2024

Sample Scheduled Date: 28/10/2024

Report Issue Number: 1

Reporting Date: 01/11/2024

Authorised by:

Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 24-12876	~Date Sampled	25/10/24	25/10/24	25/10/24	25/10/24	
Ground & Environmental Services Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
~Site Reference: 4 Golf Links Avenue	~TP / BH No	WS 1	WS 2	WS 3	WS 4	
~Project / Job Ref: 13362	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
~Order No: GES/5784.13362	~Depth (m)	0.70	0.70	1.20	0.70	
Reporting Date: 01/11/2024	DETS Sample No	746841	746842	746843	746844	

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)
pH	pH Units	N/a	MCERTS	8.2	8.4	8.3
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	44	17	< 10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.04	0.02	< 0.01

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

~Sample details provided by customer and can affect the validity of results

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation



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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 24-12876	
Ground & Environmental Services Ltd	
~Site Reference: 4 Golf Links Avenue	
~Project / Job Ref: 13362	
~Order No: GES/5784.13362	
Reporting Date: 01/11/2024	

DETS Sample No	~TP / BH No	~Additional Refs	~Depth (m)	Moisture Content (%)	Sample Matrix Description
746841	WS 1	None Supplied	0.70	11.1	Light brown sandy clay
746842	WS 2	None Supplied	0.70	13	Beige chalk
746843	WS 3	None Supplied	1.20	7.3	Light brown clay with stones
746844	WS 4	None Supplied	0.70	14.1	Beige chalk

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

Insufficient Sample ^{1/s}

Unsuitable Sample ^{u/s}

~Sample details provided by customer and can affect the validity of results



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 24-12876

Ground & Environmental Services Ltd

~Site Reference: 4 Golf Links Avenue

~Project / Job Ref: 13362

~Order No: GES/5784.13362

Reporting Date: 01/11/2024

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	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	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	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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	Phenols - Total (monohydric)	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	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	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 semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	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 (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received