

 Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware SG12 7QE						Site Royal Heights, Queen's Road, Reading, RG1 4BN		Number BH2	
Excavation Method Open-drive sampler		Dimensions 118mm to 1.00m		Ground Level (mOD)		Client Reading Heights Limited		Job Number J18003	
		Location		Dates 15/01/2018		Engineer Fluid Structures		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.80	D1				0.07	MADE GROUND (macadam)			
1.00-1.45	SPT(C) N60=7		0,1/1,1,2,1		(0.33)	MADE GROUND (granular sub-base)			
1.30	D2				0.40	MADE GROUND (grey silty sandy clay with fragments of chalk)			
1.50	D3				(0.20)	MADE GROUND (light brown sand with occasional fragments of brick and chalk. Decaying wood at 0.70 m, overlying red plastic tile)			
					(0.30)	MADE GROUND (grey clayey silt with fragments of chalk, flint gravel and cobbles, brick and concrete. Half red brick at 1.00 m)			
2.00-2.45	SPT(C) N60=3		0,0/0,0,1,1		1.00	MADE GROUND (brown silty sandy clay with fragments of fine chalk, red brick and abundant ash)			
2.00	D4				(0.44)	MADE GROUND (light brown clayey silty sand with rare fragments of chalk, burnt coal and brick)			
					1.44	MADE GROUND (brown mottled grey silty sandy clay with occasional flint gravel, rare fragments of chalk, rare ash and red brick)			
2.60	D5				(0.36)	Soft brown gravelly clayey fine sandy SILT with chalk fragments. Gravel is fine to coarse subangular flint gravel			
3.00-3.45	SPT N60=8		3,2/2,1,2,1		(0.80)	CHALK recovered as structureless chalk, composed of off-white with rare light brown staining gravelly slightly sandy SILT with brown clay infill. Gravel is very weak, low density, off-white, with rare medium to coarse subangular flint gravel (Grade Dm)			
3.00	D6				(2.25)				
3.50	D7								
4.00-4.45	SPT(C) N60=3		Water strike(1) at 4.00m. 0,0/0,1,1,0						
4.50	D8								
5.00-5.45	SPT(C) N60=7		1,1/1,1,1,2		5.00	Complete at 8.15m			
5.90-6.35	SPT(C) N60=7		1,1/2,1,1,1						
6.35-6.80	SPT(C) N60=14		2,2/2,2,3,3						
6.80-7.25	SPT(C) N60=14		2,3/3,2,3,2						
7.25-7.70	SPT(C) N60=17		3,2/3,3,3,3						
7.70-8.15	SPT(C) N60=19		4,3/4,4,3,3						
Remarks 700 mm of soil recovered from 3.00 m to 4.00 m 300 mm of soil recovered from 4.00 m to 5.00 m Standpipe installed to a depth of 5.00 m - response zone from 2.00 m to 5.00 m Groundwater standing at a depth of 2.29 m at end of day (15/01/2018) Groundwater measured at a depth of 2.16 m on 30/01/2018 and 2.18 m on 05/02/2018 Borehole extended by continuous probing							Scale (approx) 1:50	Logged By HD	Figure No. J18003.BH2

 GEA Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware SG12 7QE						Site Royal Heights, Queen's Road, Reading, RG1 4BN		Number BH3	
Excavation Method Open-drive sampler		Dimensions 118mm to 1.00m		Ground Level (mOD)		Client Reading Heights Limited		Job Number J18003	
		Location		Dates 15/01/2018		Engineer Fluid Structures		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.80	D1	0,1/2,2,4,7			0.11	MADE GROUND (macadam)			
1.00-1.45	SPT(C) N60=21				(0.59)	MADE GROUND (granular sub-base)			
1.20	D2				0.70	MADE GROUND (dark brown silty sandy clay with fragments of chalk and pottery. Red brick at 1.00 m)			
1.50	D3				(0.30)	MADE GROUND (brown silty sandy clay with occasional flint gravel, chalk fragments, and rare ash)			
					(0.35)	MADE GROUND (brown silty sandy clay with occasional flint gravel, chalk fragments, and rare ash)			
2.00-2.45	SPT N60=6	2,2/1,1,1,1			1.35	Soft light brown clayey SILT with abundant chalk gravel and occasional coarse subangular flint gravel			
2.00	D4				1.75	CHALK recovered as structureless chalk, composed of off-white with rare light brown staining gravelly slightly sandy SILT with brown clay infill. Gravel is very weak, low density, off-white, with rare medium to coarse subangular flint gravel (Grade Dm)			
2.50	D5							V ₁	
3.00-3.45	SPT N60=7	0,0/1,0,1,3			(3.25)				
3.00	D6								
3.50	D7								
4.00	D8	Water strike(1) at 4.00m. 2,1/1,0,1,0							
4.00-4.45	SPT N60=3								
5.00-5.45	SPT(C) N60=8	1,1/2,1,1,2			5.00	Complete at 8.15m			
5.00	D9								
5.45-5.90	SPT(C) N60=14				3,3/2,3,2,3				
5.90-6.35	SPT(C) N60=18				3,3/3,3,3,4				
6.35-6.80	SPT(C) N60=32				5,4/4,5,7,7				
6.80-7.25	SPT(C) N60=29				6,6/6,6,5,4				
7.25-7.70	SPT(C) N60=33				6,6/5,6,6,7				
7.70-8.15	SPT(C) N60=40				8,7/8,8,7,6				
Remarks 630 mm of soil recovered between 2 m and 3 m 500 mm of soil recovered between 3 m and 4 m Standpipe installed to a depth of 5 m - response zone from 1.00 m to 5.00 m Groundwater standing at 2.22 m at end of day (15/01/2018) Groundwater measured at a depth of 2.12 m on 30/01/2018 and 2.14 m on 05/02/2018 Borehole extended by continuous probing							Scale (approx) 1:50	Logged By HD	
							Figure No. J18003.BH3		

 Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware SG12 7QE						Site Royal Heights, Queen's Road, Reading, RG1 4BN		Number BH4	
Excavation Method Open-drive sampler		Dimensions 118mm to 1.00m		Ground Level (mOD)		Client Reading Heights Limited		Job Number J18003	
		Location		Dates 15/01/2018		Engineer Fluid Structures		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.70	D1				(0.13)	MADE GROUND (macadam)			
1.00-1.45	SPT(C) N60=7		1,1/1,1,1,2		0.13 (0.30) 0.43	MADE GROUND (granular sub-base)			
1.20	D2				(0.57)	MADE GROUND (brown mottled dark brown silty sandy clay with partings of orange-brown sand, chalk fragments, burnt coal, brick and concrete)			
1.60	D3				1.00 (0.40)	MADE GROUND (brown silty sandy clay with rare chalk fragments, shells, rare flint gravel, brick and ash)			
2.00-2.45	SPT(C) N60=28		4,6/6,5,5,4		1.40	Light brown fine SAND with rare fine to coarse subangular flint gravel and fragments of chalk			
2.40	D4				(0.90)				
3.00-3.45	SPT N60=28		2,2/2,5,6,7		2.30	Soft brown clayey SILT with occasional white chalk, rare coarse subangular flint gravel			
3.00	D5				(1.40)				
3.50	D6				3.70	CHALK recovered as structureless chalk, composed of off-white with rare light brown staining gravelly slightly sandy SILT with brown clay infill. Gravel is very weak, low density, off-white, with rare medium to coarse subangular flint gravel (Grade Dm)			
4.00	D7		Water strike(1) at 4.00m.		(1.30)				
4.00-4.45	SPT N60=12		4,4/3,2,2,2						
4.50	D8				5.00	Complete at 8.15m			
5.00-5.45	SPT(C) N60=10		3,1/2,2,1,2						
5.00	D9								
5.45-5.90	SPT(C) N60=12		2,2/3,2,2,2						
5.90-6.35	SPT(C) N60=15		2,2/2,2,3,4						
6.35-6.80	SPT(C) N60=22		5,5/3,4,5,4						
6.80-7.25	SPT(C) N60=24		3,4/4,3,5,5						
7.25-7.70	SPT(C) N60=50		8,8/8,9,10,9						
7.70-8.15	SPT(C) N60=54		9,8/10,10,9,10						
Remarks Water standing at 2.07 m at end of day (15/01/2018) Borehole extended by continuous probing							Scale (approx) 1:50	Logged By HD	
							Figure No. J18003.BH4		

 GEA Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware SG12 7QE						Site Royal Heights, Queen's Road, Reading, RG1 4BN		Number BH5	
Excavation Method Open-drive sampler		Dimensions 118mm to 1.00m		Ground Level (mOD)		Client Reading Heights Limited		Job Number J18003	
		Location		Dates 15/01/2018		Engineer Fluid Structures		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.60	D1				0.10 (0.30) 0.40 0.50 (0.20) 0.70	MADE GROUND (macadam)			
1.00-1.45	SPT(C) N60=6		2,1/1,1,1,1		(0.40)	MADE GROUND (granular sub-base)			
1.50	D2				(0.40)	MADE GROUND (grey silty sandy clay with rare flint gravel, brick and ash)			
					(0.40)	MADE GROUND (dark reddish brown sand)			
1.00-1.45	SPT(C) N60=6		2,1/1,1,1,1		1.10	MADE GROUND (crushed brick with ash. Red brick at 1.00 m)			
1.50	D2				(1.30)	MADE GROUND (brown becoming orange-brown silty sandy clay with flint gravel, shell fragments, chalk, black specks and brick. Clump of wire at 1.95 m)			
2.00-2.45	SPT(C) N60=22		0,0/3,4,4,5		2.40	Soft orange-brown fine sandy SILT with fine to coarse subangular fragments of chalk, and rare medium to coarse well rounded to subangular flint gravel			
2.20	D3								
2.50	D4								
3.00-3.45	SPT(C) N60=14		0,2/2,3,2,3		(2.00)				
3.00	D5								
3.50	D6								
4.00-4.45	SPT N60=6		0,0/0,2,1,1		4.40	CHALK recovered as structureless chalk, composed of off-white with rare light brown staining gravelly slightly sandy SILT with brown clay infill. Gravel is very weak, low density, off-white, with rare medium to coarse subangular flint gravel (Grade Dm)			
4.00	D7				(0.60)				
4.50	D8		Water strike(1) at 4.50m.		5.00	Complete at 8.15m			
5.00-5.45	SPT(C) N60=1		0,0/0,0,0,1						
5.00	D9								
5.45-5.90	SPT(C) N60=4		1,2/1,1,1,0						
5.90-6.35	SPT(C) N60=6		1,0/1,1,1,1						
6.35-6.80	SPT(C) N60=12		3,3/3,2,2,2						
6.80-7.25	SPT(C) N60=10		2,2/2,2,1,2						
7.25-7.70	SPT(C) N60=17		2,2/3,3,3,3						
7.70-8.15	SPT(C) N60=19		3,4/3,4,3,4						
Remarks 700 mm of soil recovered from 3.00 m to 4.00 m 900 mm of soil recovered from 4.00 m to 5.00 m Groundwater standing at 2.38 m on completion (15/01/2018) Borehole extended by continuous probing							Scale (approx) 1:50	Logged By HD	
							Figure No. J18003.BH5		

 GEA Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware SG12 7QE							Standard Penetration Test Results					
Site : Royal Heights, Queen's Road, Reading, RG1 4BN Client : Reading Heights Limited Engineer : Fluid Structures												Job Number J18003
												Sheet 1 / 2
Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	1.20	1.35	1.65	CPT	1	3	7	7	8	8	N60=32	
BH1	2.00	2.15	2.45	CPT	1	2	2	3	2	3	N60=11	
BH1	3.00	3.15	3.45	CPT	1	1	2	2	2	2	N60=9	
BH1	4.00	4.15	4.45	SPT	1	0	1	1	1	0	N60=3	
BH1	5.00	5.15	5.45	SPT	1	1	0	1	1	2	N60=4	
BH1	6.00	6.15	6.45	SPT	1	1	1	4	3	2	N60=11	
BH1	7.50	7.65	7.95	SPT	2	2	3	4	3	4	N60=15	
BH1	9.00	9.15	9.45	SPT	1	2	3	3	5	6	N60=18	
BH1	10.50	10.65	10.95	SPT	3	3	3	4	4	5	N60=17	
BH1	12.00	12.15	12.45	SPT	3	2	4	3	5	5	N60=18	
BH1	13.50	13.65	13.95	SPT	3	3	5	5	6	5	N60=22	
BH1	15.00	15.15	15.45	SPT	3	4	4	6	7	7	N60=26	
BH1	16.50	16.65	16.95	SPT	8	8	8	8	8	10	N60=36	
BH1	18.00	18.15	18.45	SPT	8	8	9	11	12	11	N60=46	
BH1	19.50	19.65	19.95	SPT	8	7	9	9	15	15	N60=51	
BH1	21.00	21.15	21.45	SPT	7	7	8	10	12	14	N60=47	
BH1	22.50	22.65	22.95	SPT	5	7	4	8	9	18	N60=42	
BH1	24.00	24.15	24.45	SPT	9	8	10	12	15	18	N60=59	
BH1	25.50	25.53	25.53	SPT	35						35*/25mm	
BH1	27.00	27.15	27.45	SPT	8	11	13	15	24	27	N60=84	
BH1	28.50	28.65	28.95	SPT	10	10	14	18	22	25	N60=84	
BH1	29.50	29.65	29.95	SPT	11	16	15	22	26	33	N60=102	
BH2	1.00	1.15	1.45	CPT	0	1	1	1	2	1	N60=7	
BH2	2.00	2.15	2.45	CPT	0	0	0	0	1	1	N60=3	
BH2	3.00	3.15	3.45	SPT	3	2	2	1	2	1	N60=8	
BH2	4.00	4.15	4.45	CPT	0	0	0	1	1	0	N60=3	
BH2	5.00	5.15	5.45	CPT	1	1	1	1	1	2	N60=7	
BH2	5.90	6.05	6.35	CPT	1	1	2	1	1	1	N60=7	
BH2	6.35	6.50	6.80	CPT	2	2	2	2	3	3	N60=14	
BH2	6.80	6.95	7.25	CPT	2	3	3	2	3	2	N60=14	
BH2	7.25	7.40	7.70	CPT	3	2	3	3	3	3	N60=17	
BH2	7.70	7.85	8.15	CPT	4	3	4	4	3	3	N60=19	
BH3	1.00	1.15	1.45	CPT	0	1	2	2	4	7	N60=21	
BH3	2.00	2.15	2.45	SPT	2	2	1	1	1	1	N60=6	
BH3	3.00	3.15	3.45	SPT	0	0	1	0	1	3	N60=7	
BH3	4.00	4.15	4.45	SPT	2	1	1	0	1	0	N60=3	
BH3	5.00	5.15	5.45	CPT	1	1	2	1	1	2	N60=8	
BH3	5.45	5.60	5.90	CPT	3	3	2	3	2	3	N60=14	
BH3	5.90	6.05	6.35	CPT	3	3	3	3	3	4	N60=18	
BH3	6.35	6.50	6.80	CPT	5	4	4	5	7	7	N60=32	
BH3	6.80	6.95	7.25	CPT	6	6	6	6	5	4	N60=29	
BH3	7.25	7.40	7.70	CPT	6	6	5	6	6	7	N60=33	
BH3	7.70	7.85	8.15	CPT	8	7	8	8	7	6	N60=40	



GEA

Geotechnical & Environmental Associates
Widbury Barn | Widbury Hill | Ware | SG12 7QE

Standard Penetration Test Results

Site : Royal Heights, Queen's Road, Reading, RG1 4BN

Client : Reading Heights Limited

Engineer : Fluid Structures

Job Number
J18003

Sheet
2 / 2

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH4	1.00	1.15	1.45	CPT	1	1	1	1	1	2	N60=7	
BH4	2.00	2.15	2.45	CPT	4	6	6	5	5	4	N60=28	
BH4	3.00	3.15	3.45	SPT	2	2	2	5	6	7	N60=28	
BH4	4.00	4.15	4.45	SPT	4	4	3	2	2	2	N60=12	
BH4	5.00	5.15	5.45	CPT	3	1	2	2	1	2	N60=10	
BH4	5.45	5.60	5.90	CPT	2	2	3	2	2	2	N60=12	
BH4	5.90	6.05	6.35	CPT	2	2	2	2	3	4	N60=15	
BH4	6.35	6.50	6.80	CPT	5	5	3	4	5	4	N60=22	
BH4	6.80	6.95	7.25	CPT	3	4	4	3	5	5	N60=24	
BH4	7.25	7.40	7.70	CPT	8	8	8	9	10	9	N60=50	
BH4	7.70	7.85	8.15	CPT	9	8	10	10	9	10	N60=54	
BH5	1.00	1.15	1.45	CPT	2	1	1	1	1	1	N60=6	
BH5	2.00	2.15	2.45	CPT	0	0	3	4	4	5	N60=22	
BH5	3.00	3.15	3.45	CPT	0	2	2	3	2	3	N60=14	
BH5	4.00	4.15	4.45	SPT	0	0	0	2	1	1	N60=6	
BH5	5.00	5.15	5.45	CPT	0	0	0	0	0	1	N60=1	
BH5	5.45	5.60	5.90	CPT	1	2	1	1	1	0	N60=4	
BH5	5.90	6.05	6.35	CPT	1	0	1	1	1	1	N60=6	
BH5	6.35	6.50	6.80	CPT	3	3	3	2	2	2	N60=12	
BH5	6.80	6.95	7.25	CPT	2	2	2	2	1	2	N60=10	
BH5	7.25	7.40	7.70	CPT	2	2	3	3	3	3	N60=17	
BH5	7.70	7.85	8.15	CPT	3	4	3	4	3	4	N60=19	



GEA

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Site

Royal Heights, Queen's Road, Reading,
RG1 4BN

Trial Pit
Number
1

Excavation Method
Mechanical using a tracked mini-
excavator

Dimensions
700 x 1200 x 1500

Ground Level (m OD)

Client
Reading Heights Limited

Job
Number
J18003

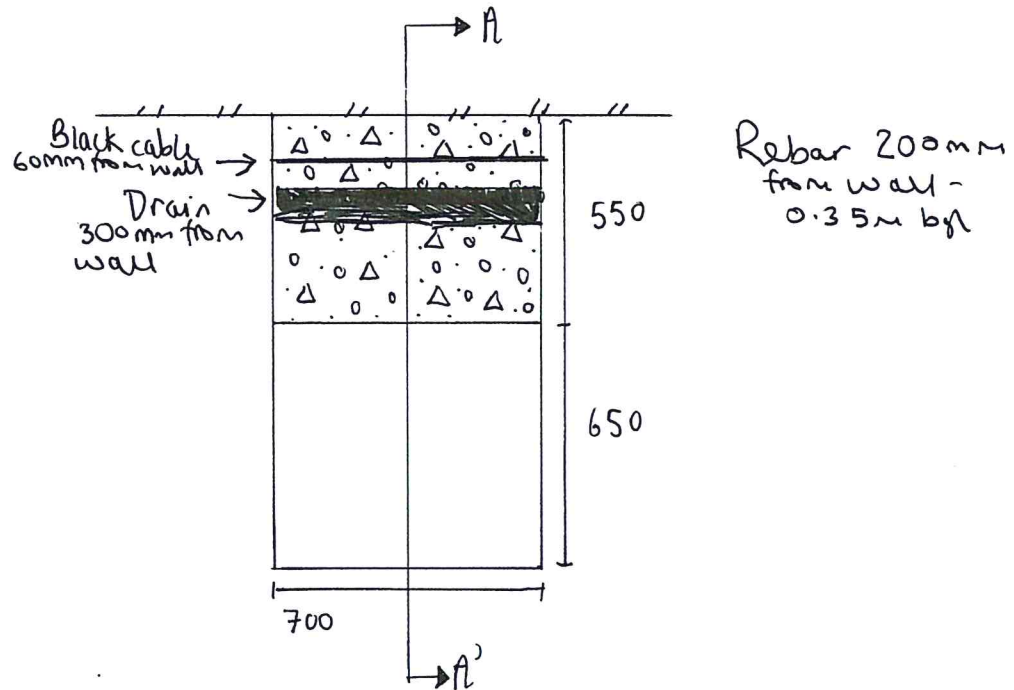
Location

Dates
15/01/2018

Engineer
Fluid Structures

Sheet

PLAN



Remarks:

All dimensions in millimetres

Sides of trial pit remained relatively stable during excavation

Groundwater: Not encountered

Scale:

1:20

Logged by:

HD



GEA

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Site

Royal Heights, Queen's Road, Reading,
RG1 4BN

Trial Pit
Number
1

Excavation Method

Mechanical using a tracked mini-
excavator

Dimensions

700 x 1200 x 1500

Ground Level (m OD)

Dates

15/01/2018

Client

Reading Heights Limited

Engineer

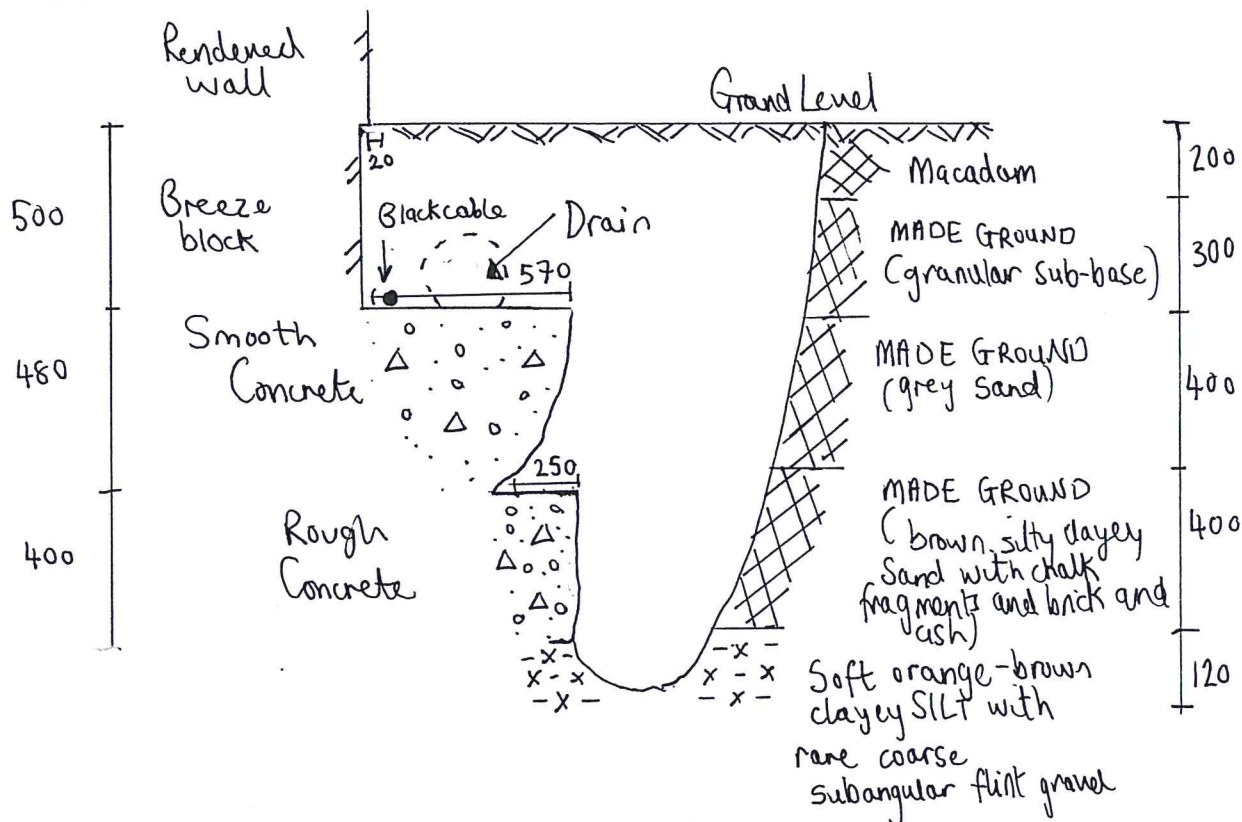
Fluid Structures

Job
Number

J18003

Sheet

SECTION A - A'



Remarks:

All dimensions in millimetres

Sides of trial pit remained relatively stable during excavation

Groundwater: Not encountered

Scale:

1:20

Logged by:

HD

Site Royal Heights, Queen's Road, Reading, RG1 4BN

Client Reading Heights Limited

Engineer Fluid Structures

Job Number
J18003

Sheet

Location of Trial Pit 1



View of foundations and services encountered in Trial Pit No 1





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Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Site
Royal Heights, Queen's Road, Reading,
RG1 4BN

**Trial Pit
Number**
2

Excavation Method
Mechanical using a tracked mini-
excavator

Dimensions
1570 x 900 x 1500

Ground Level (m OD)

Client
Reading Heights Limited

**Job
Number**
J18003

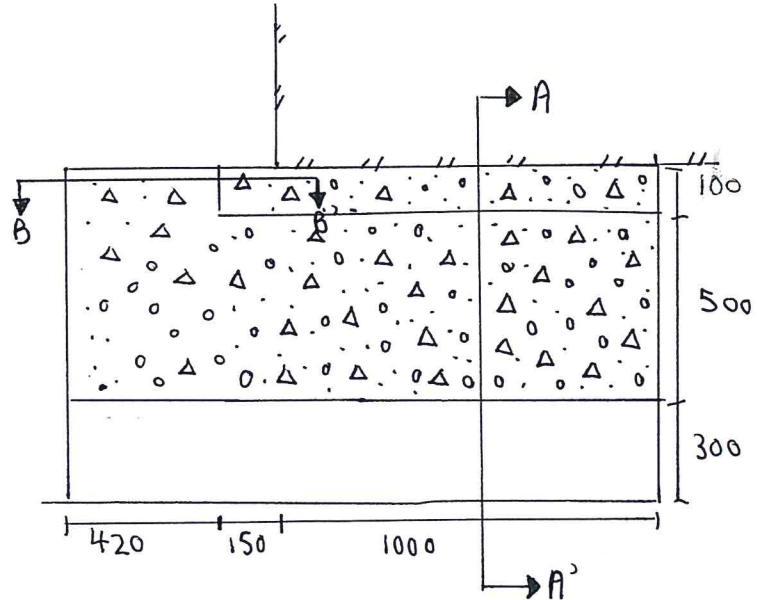
Location

Dates
15/01/2018

Engineer
Fluid Structures

Sheet

PLAN



Remarks:

All dimensions in millimetres

Sides of trial pit remained relatively stable during excavation

Groundwater: Not encountered

Scale:

1:20

Logged by:

HD



GEA

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Site

Royal Heights, Queen's Road, Reading,
RG1 4BN

Trial Pit
Number
2

Excavation Method

Mechanical using a tracked mini-
excavator

Dimensions

1570 x 900 x 1500

Ground Level (m OD)

Dates

15/01/2018

Client

Reading Heights Limited

Engineer

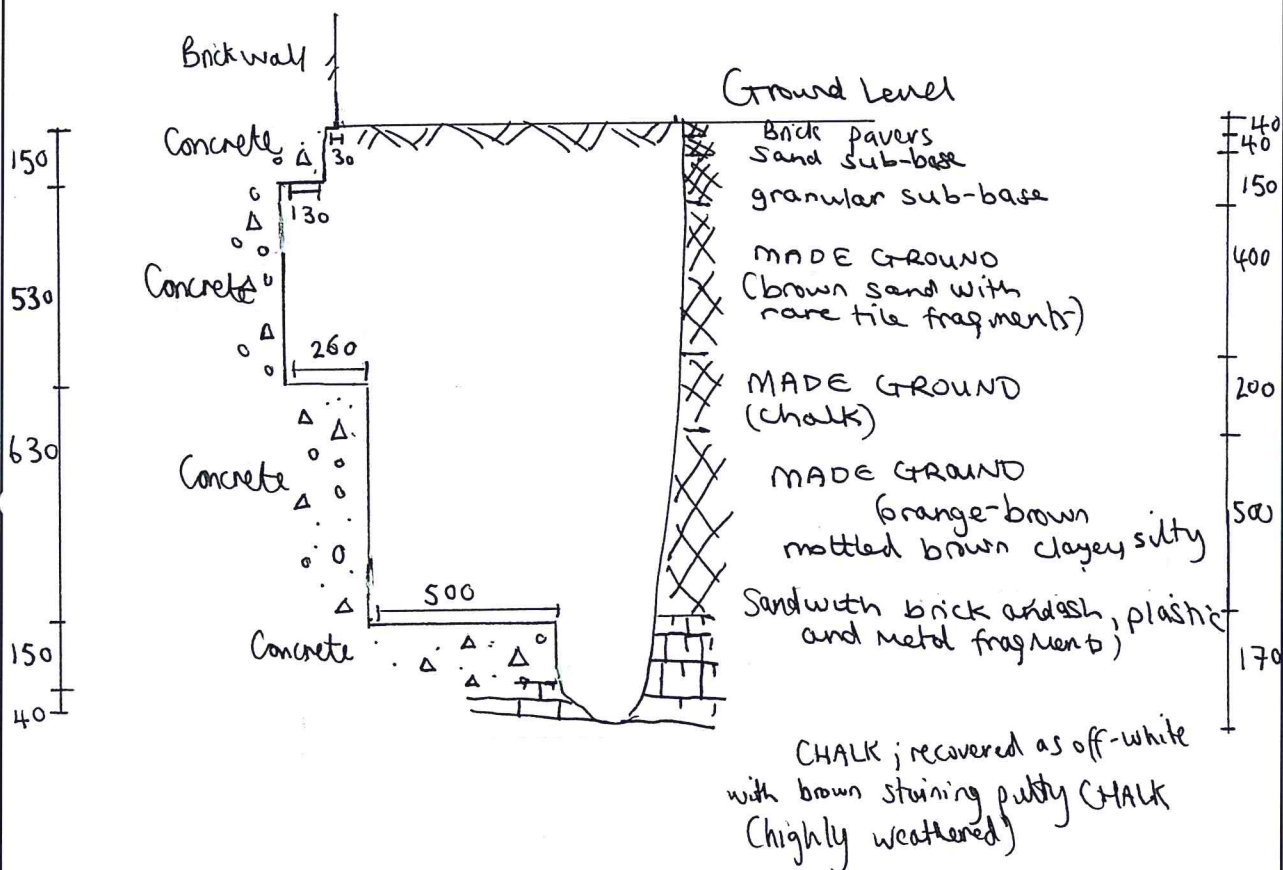
Fluid Structures

Job

Number
J18003

Sheet

SECTION A - A'



Remarks:

All dimensions in millimetres

Sides of trial pit remained relatively stable during excavation

Groundwater: Not encountered

Scale:

1:20

Logged by:

HD



GEA

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Site
Royal Heights, Queen's Road, Reading,
RG1 4BN

Trial Pit
Number
2

Excavation Method
Mechanical using a tracked mini-
excavator

Dimensions
1570 x 900 x 1500

Ground Level (m OD)

Client
Reading Heights Limited

Job
Number
J18003

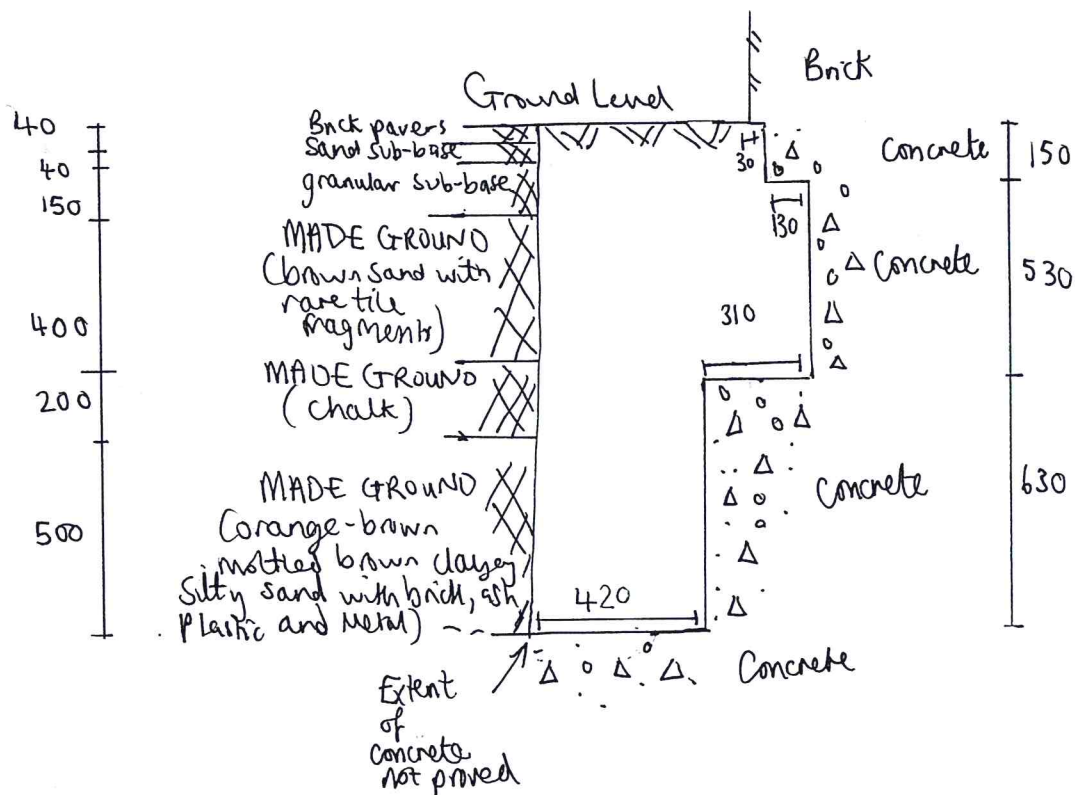
Location

Dates
15/01/2018

Engineer
Fluid Structures

Sheet

SECTION B - B'



Remarks:

All dimensions in millimetres

Sides of trial pit remained relatively stable during excavation

Groundwater: Not encountered

Scale:

1:20

Logged by:

HD

Site Royal Heights, Queen's Road, Reading, RG1 4BN

Client Reading Heights Limited

Engineer Fluid Structures

Job Number
J18003

Sheet

Location of Trial Pit 2



View of foundations and services encountered in Trial Pit No 2





 UKAS TESTING 2519	Test Methods: BS1377: Part 2: 1990: Natural Moisture Content : clause 3.2 Atterberg Limits: clause 4.3 and 5.0	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com	Checked and Approved Initials J.P Date: 13/02/201
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R1(b)

					Saturation Moisture Content - Summary of Results Tested in accordance with BS1377 : Part 2 : 1990, clause 3.3 unless annotated otherwise.					
Job No.		Project Name							Programme	
23950		Royal Heights, Queen's Road, Reading, RG1 4BN							Samples received	17/01/2018
									Schedule received	25/01/2018
Project No.		Client							Project started	
J18003		GEA							Testing Started	
Hole No.	Sample				Description	SMC %	NMC %	Bulk Density Mg/m3	Dry Density Mg/m3	Remarks - Sample size complies with BS1377:1990: Part 2 (Yes/No)
	Ref	Top m	Base m	Type						
BH1	6	4.00	-	B	Off white putty CHALK with occasional fmc intact chalk fragments	27	27	1.98	1.56	No
BH1	17	17.50	-	B	Off white putty CHALK with occasional fm intact chalk fragments and fmc flint gravel	28	26	1.95	1.55	No
BH1	25	26.50	-	B	Off white putty CHALK with occasional fmc intact chalk fragments and fmc flint gravel	27	26	1.96	1.56	No
 Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com Checked and Approved Initials J.P Date: 13/02/2018										
2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)									MSF-5-R18



PARTICLE SIZE DISTRIBUTION

Job Ref 23950

Borehole/Pit No. BH1

Site Name Royal Heights, Queen's Road, Reading, RG1 4BN

Sample No. 3

Project No. J18003 Client GEA

Depth Top 1.20 m

Soil Description

Brown very clayey very sandy GRAVEL with occasional putty chalk pockets and fm intact chalk fragments (gravel is fmc and angular to rounded)

Depth Base - m

Sample Type B

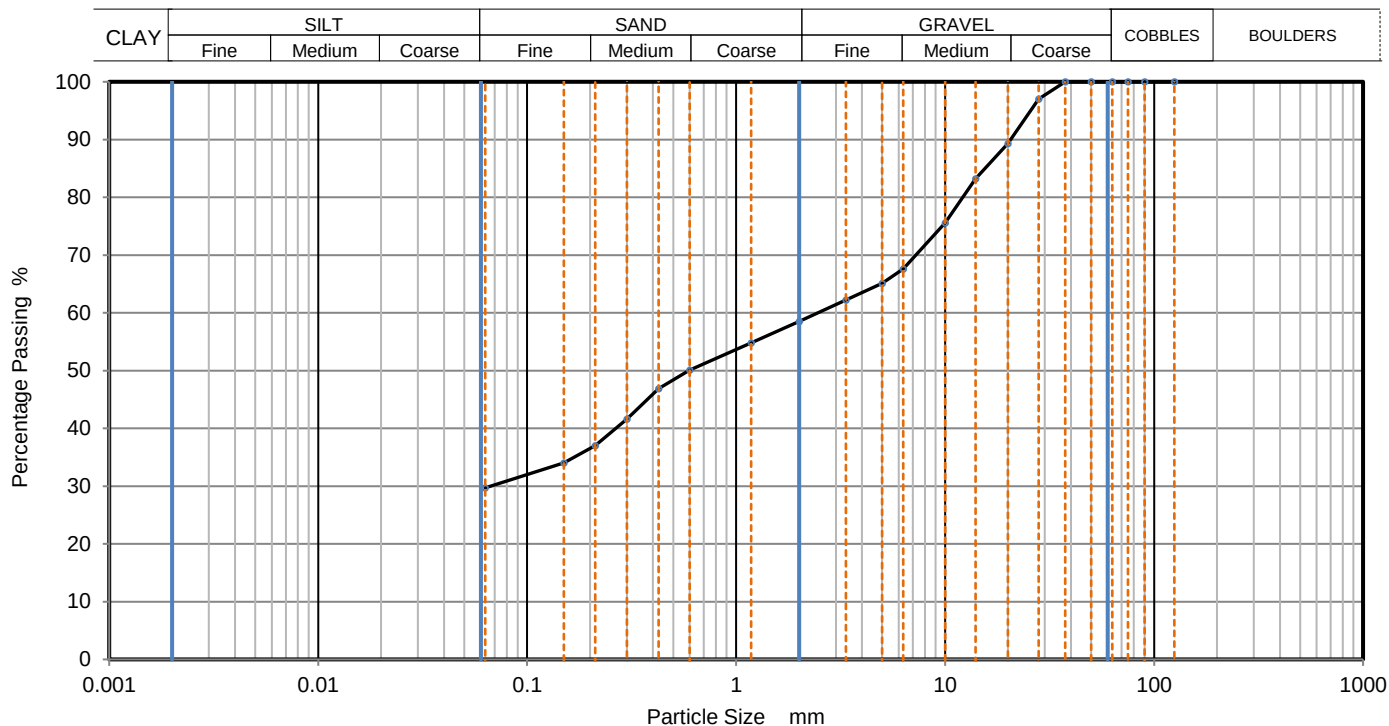
Samples received 17/01/2018

Schedules received 25/01/2018

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 26/01/2018

Date tested 08/02/2018



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	89		
14	83		
10	76		
6.3	68		
5	65		
3.35	62		
2	59		
1.18	55		
0.6	50		
0.425	47		
0.3	42		
0.212	37		
0.15	34		
0.063	30		

Dry Mass of sample, g

2727

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	41.5
Sand	28.8
Fines <0.063mm	29.7

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below



2519

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: J.P

Date: 13/02/2018

MSF-5-R3

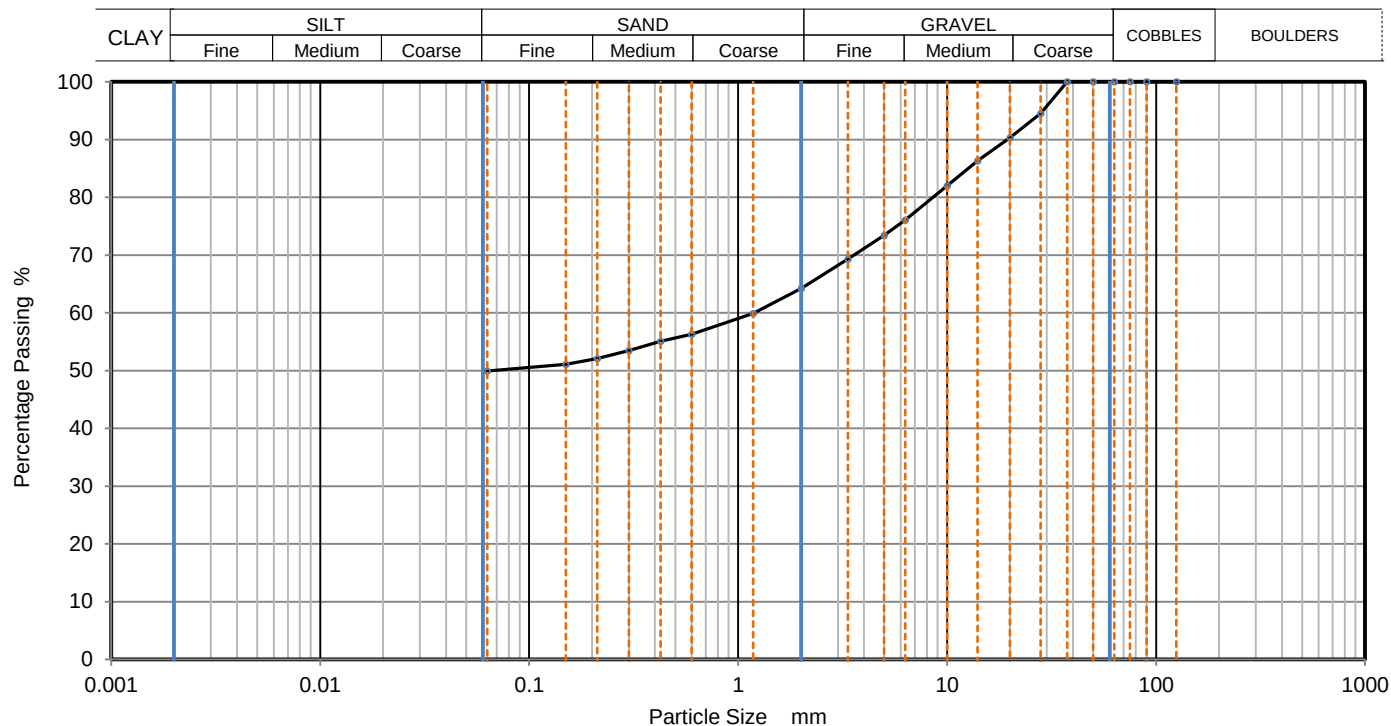
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



PARTICLE SIZE DISTRIBUTION

Job Ref	23950
Borehole/Pit No.	BH1
Sample No.	5
Depth Top	3.00 m
Depth Base	- m
Sample Type	B
Samples received	17/01/2018
Schedules received	25/01/2018
Project started	26/01/2018
Date tested	08/02/2018

Site Name	Royal Heights, Queen's Road, Reading, RG1 4BN		
Project No.	J18003	Client	GEA
Soil Description	Off white putty CHALK with occasional fmc intact chalk fragments and fm sub-angular flint gravel		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	90		
14	86		
10	82		
6.3	76		
5	73		
3.35	69		
2	64		
1.18	60		
0.6	56		
0.425	55		
0.3	54		
0.212	52		
0.15	51		
0.063	50		

Dry Mass of sample, g 1290

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	35.8
Sand	14.3
Fines <0.063mm	49.9

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below



K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved

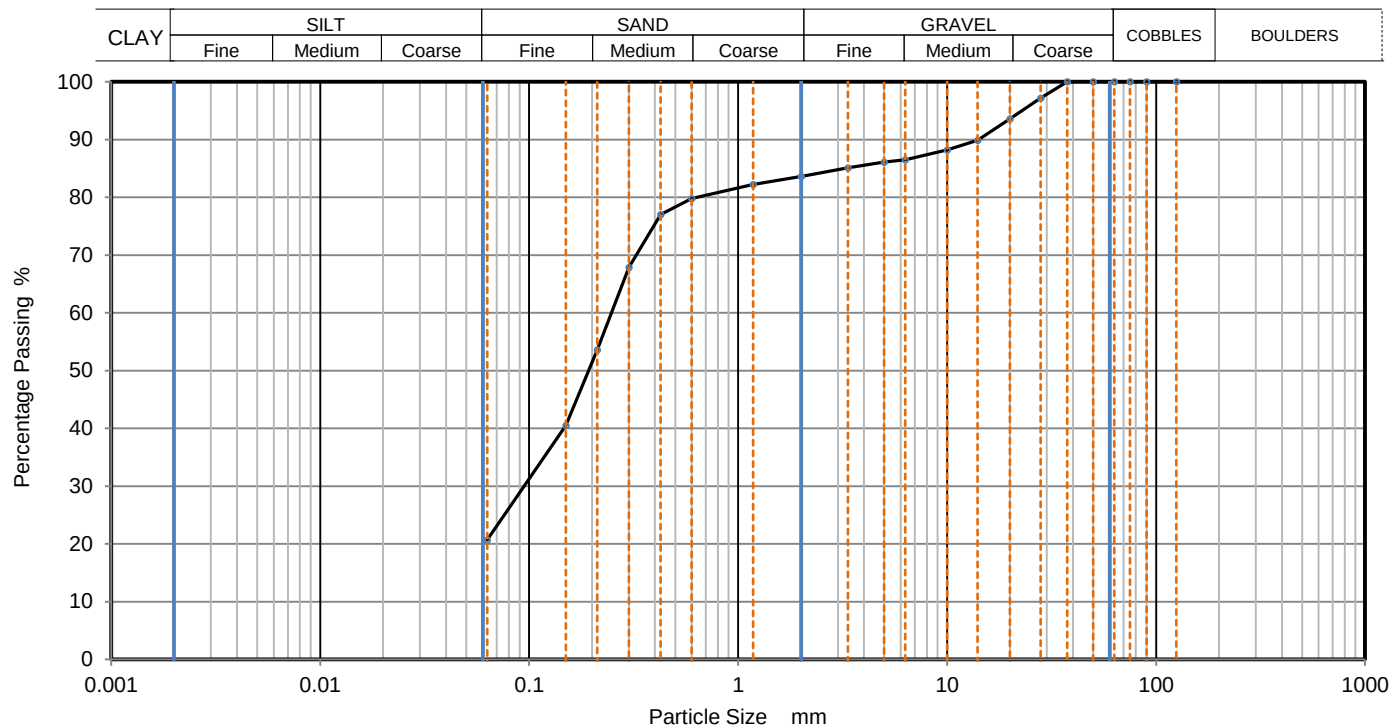
Initials: J.P
Date: 13/02/2018



PARTICLE SIZE DISTRIBUTION

Job Ref	23950
Borehole/Pit No.	BH4
Sample No.	3
Depth Top	1.60 m
Depth Base	- m
Sample Type	D
Samples received	17/01/2018
Schedules received	25/01/2018
Project started	26/01/2018
Date tested	08/02/2018

Site Name	Royal Heights, Queen's Road, Reading, RG1 4BN		
Project No.	J18003	Client	GEA
Soil Description	Brown gravelly very clayey SAND (gravel is fmc and sub-angular to rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	94		
14	90		
10	88		
6.3	87		
5	86		
3.35	85		
2	84		
1.18	82		
0.6	80		
0.425	77		
0.3	68		
0.212	54		
0.15	41		
0.063	21		

Dry Mass of sample, g

927

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	16.4
Sand	63.0
Fines <0.063mm	20.7

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

Remarks

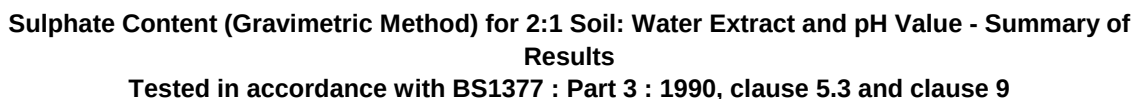
Preparation and testing in accordance with BS1377 unless noted below



K4 Soils Laboratory
 Unit 8, Olds Close, Watford, Herts, WD18 9RU
 Email: james@k4soils.com
 Tel: 01923 711288

Checked and Approved

Initials: **J.P**
 Date: 13/02/2018

[illegible]

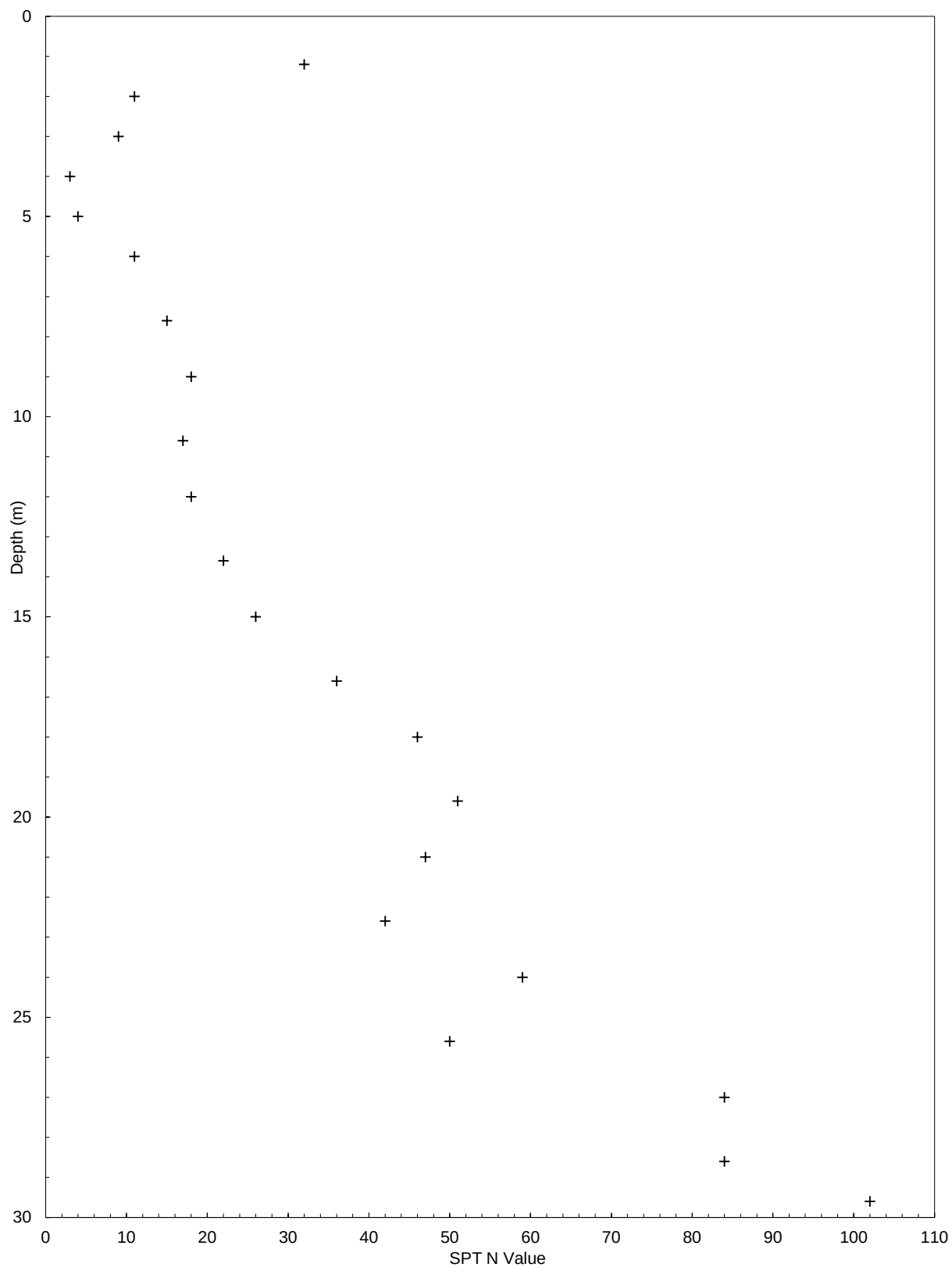
Checked and Approved	
Initials	J.P
Date:	13/02/2018

Site Royal Heights, Queen's Road, Reading, RG1 4BN

Job Number
J18003

Client Reading Heights Limited

Sheet
1 / 1

Engineer Fluid Structures


+ - SPT 'N' values

**Hannah Dashfield**

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Hertfordshire
SG127QE

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i2 Analytical Ltd.
7 Woodshots Meadow,
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Watford,
Herts,
WD18 8YS

t: 01923 225404
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Analytical Report Number : 18-73130

Project / Site name:	Royal Heights, Reading	Samples received on:	17/01/2018
Your job number:	J18003	Samples instructed on:	17/01/2018
Your order number:	J18003	Analysis completed by:	24/01/2018
Report Issue Number:	1	Report issued on:	24/01/2018
Samples Analysed:	5 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 18-73130

Project / Site name: Royal Heights, Reading

Your Order No: J18003

Lab Sample Number				890365	890366	890367	890368	890369
Sample Reference				BH2	BH3	BH4	BH5	TP2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	0.80	0.70	0.60	0.50
Date Sampled				15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	36
Moisture Content	%	N/A	NONE	9.5	16	13	10	15
Total mass of sample received	kg	0.001	NONE	1.2	1.3	1.4	1.0	1.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	10.3	8.3	8.2	9.1	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	5200	850	740	1500	920
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.6	0.035	0.053	0.21	0.044
Sulphide	mg/kg	1	MCERTS	< 1.0	1.1	< 1.0	1.3	1.3
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	32	40	8.3	9.9	12
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.3	2.0	1.4	0.7	0.5

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.21	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.49	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.12	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	5.6	0.76	0.22	< 0.05	0.35
Anthracene	mg/kg	0.05	MCERTS	1.6	0.16	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	11	2.0	0.64	< 0.05	0.77
Pyrene	mg/kg	0.05	MCERTS	8.9	1.7	0.56	< 0.05	0.66
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.6	1.2	0.46	< 0.05	0.52
Chrysene	mg/kg	0.05	MCERTS	3.8	0.77	0.42	< 0.05	0.38
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.3	1.1	0.57	< 0.05	0.53
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.1	0.57	0.30	< 0.05	0.44
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.3	1.1	0.53	< 0.05	0.55
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.4	0.57	0.30	< 0.05	0.36
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.38	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.6	0.61	0.30	< 0.05	0.51

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	55.5	10.6	4.30	< 0.80	5.07
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.7	26	21	9.9	13
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.6	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	10	22	21	83	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6.8	92	52	250	18
Lead (aqua regia extractable)	mg/kg	1	MCERTS	45	260	190	290	62
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1.0	1.1	0.4	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.5	26	21	14	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	39	240	170	230	75

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	260	62	< 10	160	< 10
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	7.4	< 4.0	< 4.0	6.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	76	18	5.0	40	3.5
TPH (C21 - C35)	mg/kg	1	MCERTS	160	35	4.5	110	5.3



Analytical Report Number: 18-73130

Project / Site name: Royal Heights, Reading

Your Order No: J18003

Lab Sample Number				890365	890366	890367	890368	890369
Sample Reference				BH2	BH3	BH4	BH5	TP2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	0.80	0.70	0.60	0.50
Date Sampled				15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					



Analytical Report Number : 18-73130

Project / Site name: Royal Heights, Reading

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
890365	BH2	None Supplied	0.80	Red rubble with brick. **
890366	BH3	None Supplied	0.80	Brown clay and sand with gravel.
890367	BH4	None Supplied	0.70	Brown clay and sand with gravel.
890368	BH5	None Supplied	0.60	Brown clay and sand with gravel and brick.
890369	TP2	None Supplied	0.50	Brown clay and sand with gravel and stones.

**Non MCERTS matrix.

Analytical Report Number : 18-73130

Project / Site name: Royal Heights, Reading

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding.	L076-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L076-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Site	Royal Heights, Queen's Road, Reading, RG1 4BN	Job Number J18003
Client	Reading Heights Limited	Sheet 1 / 1
Engineer	Fluid Structures	

Proposed End Use Residential with plant uptake

Soil pH 8

Soil Organic Matter content % 2.5

Contaminant	Screening Value mg/kg	Data Source	Contaminant	Screening Value mg/kg	Data Source
Metals			Anions		
Arsenic	37	C4SL	Soluble Sulphate	500 mg/l	Structures
Cadmium	26	C4SL	Sulphide	50	Structures
Chromium (III)	3000	LQM/CIEH	Chloride	400	Structures
Chromium (VI)	21	C4SL	Others		
Copper	2,330	LQM/CIEH	Organic Carbon (%)	6	Methanogenic potential
Lead	200	C4SL	Total Cyanide	140	WRAS
Elemental Mercury	1	SGV	Total Mono Phenols	290	SGV
Inorganic Mercury	170	SGV	PAH		
Nickel	97	LQM/CIEH	Naphthalene	5.30	C4SL exp & LQM/CIEH
Selenium	350	SGV	Acenaphthylene	400	LQM/CIEH
Zinc	3,750	LQM/CIEH	Acenaphthene	480	LQM/CIEH
Hydrocarbons			Fluorene	380	LQM/CIEH
Benzene	0.34	C4SL	Phenanthrene	200	LQM/CIEH
Toluene	320	SGV	Anthracene	4,900	LQM/CIEH
Ethyl Benzene	180	SGV	Fluoranthene	460	LQM/CIEH
Xylene	120	SGV	Pyrene	1,000	LQM/CIEH
Aliphatic C5-C6	55	LQM/CIEH	Benzo(a) Anthracene	6.7	C4SL exp & LQM/CIEH
Aliphatic C6-C8	160	LQM/CIEH	Chrysene	11	C4SL exp & LQM/CIEH
Aliphatic C8-C10	46	LQM/CIEH	Benzo(b) Fluoranthene	9.5	C4SL exp & LQM/CIEH
Aliphatic C10-C12	230	LQM/CIEH	Benzo(k) Fluoranthene	14.1	C4SL exp & LQM/CIEH
Aliphatic C12-C16	1700	LQM/CIEH	Benzo(a) pyrene	4.40	C4SL
Aliphatic C16-C35	64,000	LQM/CIEH	Indeno(1 2 3 cd) Pyrene	5.6	C4SL exp & LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH	Dibenzo(a h) Anthracene	1.27	C4SL exp & LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH	Benzo (g h i) Perylene	69	C4SL exp & LQM/CIEH
Aromatic C8-C10	65	LQM/CIEH	Screening value for PAH	62.9	B(a)P / 0.15
Aromatic C10-C12	160	LQM/CIEH	Chlorinated Solvents		
Aromatic C12-C16	310	LQM/CIEH	1,1,1 trichloroethane (TCA)	27.2	LQM/CIEH
Aromatic C16-C21	480	LQM/CIEH	tetrachloroethane (PCA)	1.25	LQM/CIEH
Aromatic C21-C35	1100	LQM/CIEH	tetrachloroethene (PCE)	2.32	LQM/CIEH
PRO (C ₅ –C ₁₀)	646	Calc	trichloroethene (TCE)	0.308	LQM/CIEH
DRO (C ₁₂ –C ₂₈)	66,490	Calc	1,2-dichloroethane (DCA)	0.008	LQM/CIEH
Lube Oil (C ₂₈ –C ₄₄)	65,100	Calc	vinyl chloride (Chloroethene)	0.000184	LQM/CIEH
TPH	1000	Trigger for speciated testing	tetrachloromethane (Carbon tetra	0.039	LQM/CIEH
			trichloromethane (Chloroform)	1.99	LQM/CIEH

Notes

Concentrations measured below the above values may be considered to represent 'uncontaminated conditions' which pose 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment.

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009

LQM/CIEH - Generic Assessment Criteria for Human Health Risk Assessment 2nd edition (2009) derived using CLEA 1.04 model 2009

C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk

C4SL exp & LQM/CIEH calculated using C4SL revisions to exposure assessment but LQM/CIEH health criteria values

Calc - sum of nearest available carbon range specified including BTEX for PRO fraction

B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene (one of the most common and most carcinogenic of the PAHs) rarely exceeds 15% of the total

PAH concentration, hence this Total PAH threshold is regarded as being conservative

Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

152113190_1_1

Customer Reference:

J18003

National Grid Reference:

472190, 173290

Slice:

A

Site Area (Ha):

0.01

Search Buffer (m):

1000

Site Details:

57

Queens Road

READING

RG1 4BN

Client Details:

Mr S Branch

GEA Ltd

Widbury Barn

Widbury Hill

Ware

Herts

SG12 7QE