



Solutions To Your Contaminated Land Issues

Date: 11th December 2024

Beaumont Business Park, Woodlands Road, Mere

Preliminary Findings Of Intrusive Investigation

Mark,

As discussed, this brief report covers our preliminary findings at the site in Mere.

7 Boreholes were advanced in total with 2 existing monitoring wells encountered. Strata was logged and samples taken from the boreholes advanced with water samples taken from the existing wells. The existing wells were levelled in with a laser level and all location recorded using a Trimble GA2 sub-meter GPS. Figure 1 shows the locations of the boreholes and existing monitoring wells.

Strata

The general sequence was MADE GROUND underlain by CLAY.

MADE GROUND was present in all locations except WS01 and WS03. This strata does not necessarily imply potential contamination but rather it indicates the presence of anthropogenic materials or reworked natural materials e.g. WS06 comprised limestone cobbles and reworked clay. Where present, made ground extended to a depth of between 0.4-0.8m below ground level (bgl), the deepest occurring in WS05.

CLAY comprised a soft to stiff grey material occasionally with inclusions of coarser material such as gravel or sand.

Groundwater observations

Groundwater was encountered within the made ground generally occurring as seepage from the base. In WS07, whilst made ground extended to 0.6m bgl, seepage occurred at 0.3m. Water was absent in WS06 where the made ground appeared to be reworked natural materials such as clay and cobbles. Water absent in boreholes where made ground was not present and we would conclude that the groundwater represents a perched layer generally within the more granular or permeable materials. This overlay clay which represent a low permeability aquiclude and hence we would consider the water to be perched. This is evidenced by the lack of water strike in other locations.

General Contaminant Observations

Visual evidence of contamination was confined largely to the presence of anthropogenic materials in made ground. In WS05, suspected asbestos fragments were encountered at the base of the made ground at 0.7-0.8m. In WS02 made ground included macadam and ash and a slightly sweet odour was noted indicating possible volatile organic carbons (VOC) being present. A photoionisation detector (PID) was used to screen the soil samples from this location for VOC compounds and indicated that these were slightly elevated returning a value of 17.1 parts per million (ppm). The samples from this location were therefore scheduled for laboratory Analysis of VOC and also petroleum hydrocarbons (TPH).

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Laboratory Testing

Soils were sent to i2 Analytical an MCERTS/UKAS accredited laboratory. Soils were analysed for:

- Heavy metals
- Polycyclic aromatic hydrocarbons (PAH)
- TPH - Selected samples
- VOC - Selected Samples
- Polychlorinated biphenyl (PCB) - Selected Samples
- Total Organic Carbon (TOC)

TOC Analysis was carried out because the organic determinands (PAH, TPH, VOC) have generic assessment criteria (GAC) based on organic matter content. TOC was converted to soil organic matter (SOM) by multiplying by 1.72 to derive this figure.

Heavy metals were all -present above limits of detection LOD except mercury and selenium which were below this figure in all samples. Cadmium was not present above LOD in WS1 at 1.0-1.1m WS2 at 0.8-0.9m or WS3 at 0.7-0.8m. No metals were present above the human health generic assessment criteria for residential land with plant uptake (GAC). Results are summarised below in table 1.

Determinand	LOD	Min	Max	Mean	GAC
Arsenic	1	5.1	13	9.1	37
Barium	1	46	390	138.5	1300
Beryllium	0.06	0.44	1.8	1.2	1.7
Boron (water soluble)	0.2	1.1	5.6	2.4	290
Cadmium	0.2	<LOD	1.7	0.4	11
Chromium	1	14	53	37.6	910
Copper	1	6.4	28	18.6	2400
Lead	1	12	48	26.8	210
Mercury	0.3	<LOD	<LOD	<LOD	40
Nickel	1	10	43	24.9	130
Selenium	1	<LOD	<LOD	<LOD	250
Vanadium	1	18	69	44.3	410
Zinc	1	49	140	89.2	3700

Table 1. Summary of analysis of heavy metals (units mg/kg).

PAH compounds were either present below LOD or were present at low levels. In the majority of samples where they were present, they were only marginally elevated above LOD. No determinands were present above GAC (table 2).

Determinand	LOD	Min	Max	Mean	GAC
Acenaphthylene	0.05	0.09	0.09	0.1	170
Anthracene	0.05	0.09	0.42	0.3	2400
Benzo(a)anthracene	0.05	0.11	1.3	0.4	7.2
Benzo(a)pyrene	0.05	0.12	1.6	0.5	2.2
Benzo(b)fluoranthene	0.05	0.18	2.1	0.7	2.6
Benzo(ghi)perylene	0.05	0.07	0.99	0.3	320
Benzo(k)fluoranthene	0.05	0.06	0.7	0.2	77
Chrysene	0.05	0.13	1.4	0.5	15
Dibenz(a,h)anthracene	0.05	0.18	0.18	0.2	0.24
Fluoranthene	0.05	0.06	3.2	0.5	280
Fluorene	0.05	0.05	0.1	0.1	170
Indeno(1,2,3-cd)pyrene	0.05	0.07	0.91	0.3	27
Naphthalene	0.05	0.1	0.41	0.2	2.3
Phenanthrene	0.05	0.05	1.6	0.3	95
Pyrene	0.05	0.06	2.6	0.4	620

Table 2. Summary of analysis of PAH (units mg/kg).

Analysis of soils for TPH was only carried out in WS2, WS3 and WS6. In WS3 and WS6 only shallow samples were submitted for analysis of this group of compounds. As no evidence of potential contamination from this group of compounds was evident in any sample except for WS02 with the slight odour and positive PID result, this was carried out merely to confirm the assumption from the observations. As can be seen table 3, only the longest chain length hydrocarbon species were present above LOD and these were orders of magnitude below GAC.

Determinand	LOD	WS2	WS2	WS3	WS6	GAC
		0.10-0.20	0.80-0.90	0.20-0.30	0.40-0.50	
Aliphatic >EC5 - EC6	0.01	<LOD	<LOD	<LOD	<LOD	42
Aliphatic >EC6 - EC8	0.01	<LOD	<LOD	<LOD	<LOD	100
Aliphatic >EC8 - EC10	0.01	<LOD	0.41	<LOD	<LOD	27
Aliphatic >EC10 - EC12	1	<LOD	<LOD	<LOD	<LOD	130
Aliphatic >EC12 - EC16	2	<LOD	<LOD	<LOD	<LOD	1100
Aliphatic >EC16 - EC21	8	<LOD	<LOD	<LOD	<LOD	65000
Aliphatic >EC21 - EC35	8	10	<LOD	<LOD	<LOD	65000
Aliphatic >EC5 - EC35	10	10	<LOD	<LOD	<LOD	
Aromatic >EC5 - EC7	0.01	<LOD	<LOD	<LOD	<LOD	70
Aromatic >EC7 - EC8	0.01	<LOD	<LOD	<LOD	<LOD	130
Aromatic >EC8 - EC10	0.02	<LOD	<LOD	<LOD	<LOD	34
Aromatic >EC10 - EC12	1	<LOD	<LOD	<LOD	<LOD	74
Aromatic >EC12 - EC16	2	<LOD	<LOD	<LOD	<LOD	140
Aromatic >EC16 - EC21	10	<LOD	<LOD	<LOD	<LOD	260
Aromatic >EC21 - EC35	10	27	<LOD	<LOD	<LOD	1100
Aromatic >EC5 - EC35	10	27	<LOD	<LOD	<LOD	

Table 3. Summary of analysis of TPH (units mg/kg).

VOC and PCB analysis indicated that all determinands for these classes of contaminants were below LOD where analysis took place.

Groundwater

Samples were taken from the existing boreholes BH01 and BH02. Sampling was carried out using low flow sampling techniques. Groundwater and well depth is shown below:

Location	Depth to Water (m)	Total Depth (m)	Observations
BH1	0.27	4.0	Water rose to final depth on removing bung. Silt at base.
BH2	0.65	4.950	HS (rotten eggs) odour.

Table 4. Well observation

Samples were analysed for:

- Heavy metals
- PAH
- TPH
- VOC
- PCB

All PAH, TPH, VOC, PCB compounds were below LOD.

Of the heavy metals, beryllium, mercury and selenium were below LOD in both samples. Cadmium and vanadium were below LOD in the sample from BH2. Copper was above the freshwater Environmental Quality Standard (EQS) in both samples, whilst zinc exceeded the freshwater EQS in BH01. It should be borne in mind that these EQS for these compounds refer to the bioavailable concentration and to calculate the amount that is actually bioavailable we would need to gather a number of other parameter on which this depends.

It should be borne in mind that the samples were taken from the northern part of the site and that there is some distance to the drain to the south. We would need to look at wider data to assess the distribution of any exceedances. We would also point out that this most likely represents a concentration perched water which may not be in hydraulic continuity with the drain to the south. This is evidenced by the records from WS06 when drilling which is the nearest to the drain and south of BH1 and BH2 – no water was encountered in this location. This is also true of WS01 to the south of BH01. Furthermore, it is likely that made ground will need to be removed in the areas around BH01 and BH02 to facilitate development would. This would be likely to remove whatever source is present for the copper and zinc and also would be likely to prevent the presence of perched water especially given the proposed surface water management.

However, we would recommend that further monitoring is carried out to further investigate metal concentrations in perched water.

Dr. Richard Wesson

Wesson Environmental

Figures

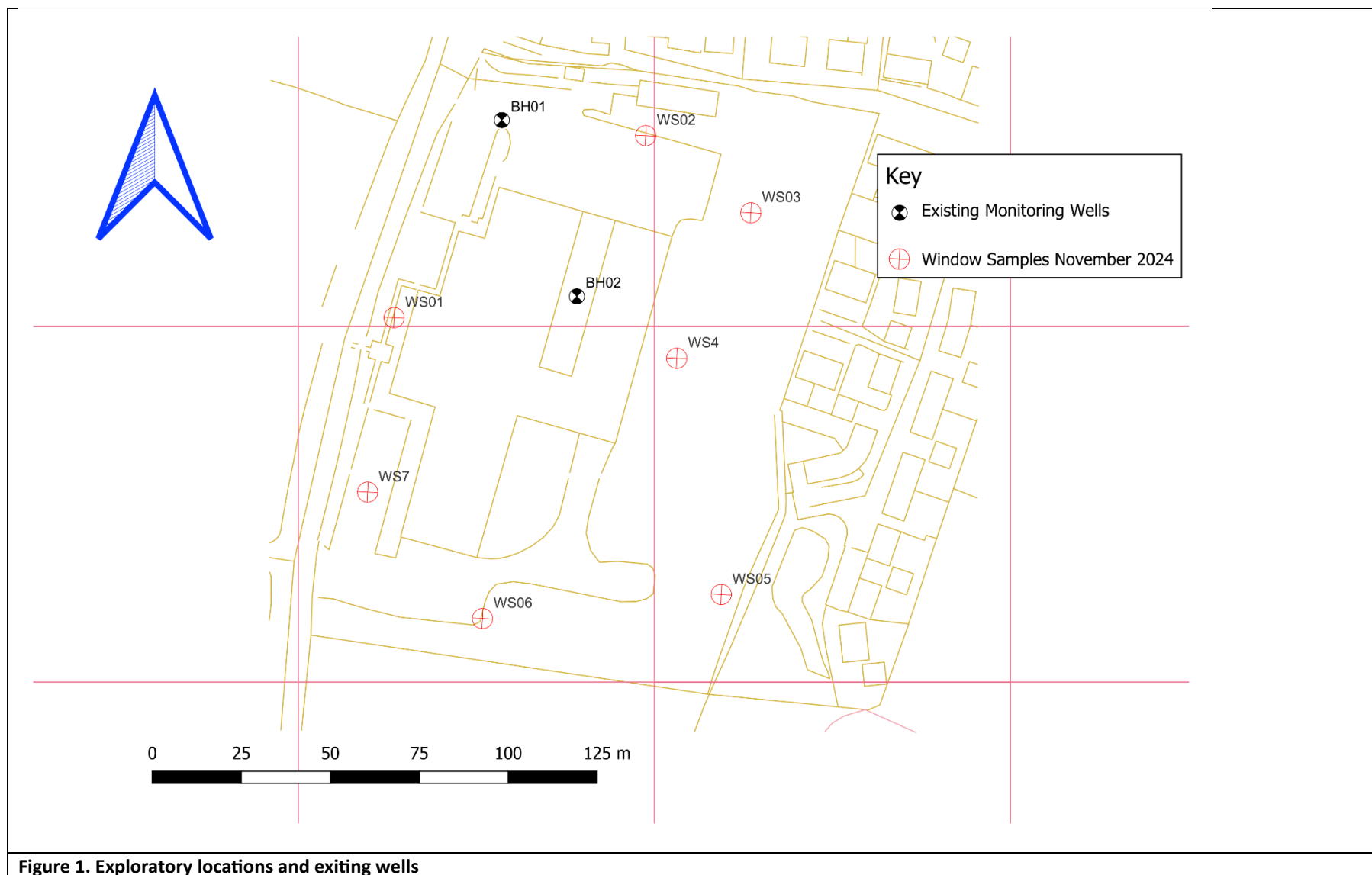


Figure 1. Exploratory locations and exiting wells

Borehole Logs

PROJECT NO.: 001REHOP2

DRILLING DATE:

TOTAL DEPTH: 5

PROJECT NAME: Mere

DRILLING CO : Jackson Drilling

COORDINATES: 51.08254, -2.26367 ↗

CLIENT: Redcliffe Homes

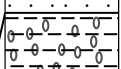
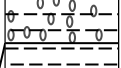
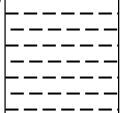
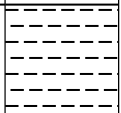
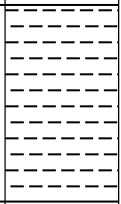
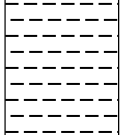
DRILL METHOD:

ADDRESS: Woodlands Road, Mere,
Wiltshire, BA12 6BT

LOGGED BY:

GROUND ELEV:

NOTES:

Depth (m)	Material Description	Graphic	Sample Type	Depth (m)	Hydrocarbon	Piezometer / Well
Ground Surface at (m)						
0	<u>Brown slightly sandy occasionally gravelly clay with rootlets.</u> TOPSOIL 0.1 m		D	0		#1 Standpipe
1	<u>Soft brown gravelly CLAY. Gravels fine subrounded chalk and medium tabular flint.</u> Gravelly CLAY 0.8 m		D	1		
2	<u>Soft grey CLAY with occasional orange sand partings.</u> CLAY 1.8 m			2		
3	<u>Firm grey CLAY.</u> CLAY 2.6 m			3		
4	<u>Stiff grey CLAY.</u> CLAY 4 m			4		
5	<u>Stiff grey CLAY with occasional fine sand partings.</u> CLAY 5 m			5		
6	End of Test Hole at 5 (m)			6		
7				7		
8				8		
9				9		
10				10		

PROJECT NO.: 001REHOP2	DRILLING DATE:	TOTAL DEPTH: 3
PROJECT NAME: Mere	DRILLING CO : Jackson Drilling	COORDINATES: 51.08300, -2.26266 ↗
CLIENT: Redcliffe Homes	DRILL METHOD:	
ADDRESS: Woodlands Road, Mere, Wiltshire, BA12 6BT	LOGGED BY:	GROUND ELEV:

NOTES:

Depth (m)	Material Description	Graphic	Sample Type	Depth (m)	Hydrocarbon	Piezometer / Well
Ground Surface at (m)						
0	CONCRETE	0.1 m	D	0	0	#1 Sandpiper
	<u>Sub base of sand and gravel. Water present.</u>					
	MADE GROUND	0.6 m	D		17.1	
1	<u>Clay, sand, gravel with some macadam and ash. Slight sweet odour.</u>	0.9 m		1		
	<u>Soft dark grey CLAY</u>					
2	CLAY	2.5 m		2		
	<u>Firm dark grey CLAY.</u>					
3	CLAY	3 m		3		
End of Test Hole at 3 (m)						
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

PROJECT NO.: 001REHOP2

DRILLING DATE:

TOTAL DEPTH: 3

PROJECT NAME: Mere

DRILLING CO :

COORDINATES: 51.08280, -2.26224 ↗

CLIENT: Redcliffe Homes

DRILL METHOD:

ADDRESS: Woodlands Road, Mere,
Wiltshire, BA12 6BT

LOGGED BY:

GROUND ELEV:

NOTES:

Depth (m)	Material Description	Graphic	Sample Type	Depth (m)	Hydrocarbon	Piezometer / Well
Ground Surface at (m)						
0	Brown slightly sandy occasionally gravelly clay with rootlets. TOPSOIL 0.2 m		D	0		#1 Standpipe
1	Soft brown occasionally cobbly CLAY. Cobbles sub angular flint. Cobbly CLAY 1 m			1		
2	Soft grey CLAY with occasional orange sand partings. CLAY 1.9 m			2		
3	Soft grey CLAY. CLAY 2.1 m			3		
3	Firm grey CLAY. CLAY 3 m			4		
4	End of Test Hole at 3 (m)		D	5		
5				6		
6				7		
7				8		
8				9		
9				10		

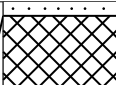
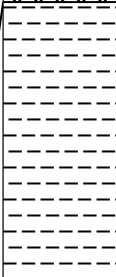
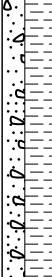
GEO-ENVIRONMENTAL LOG: WS04

PROJECT NO.: 001REHOP2
PROJECT NAME: Mere
CLIENT: Redcliffe Homes
ADDRESS: Woodlands Road, Mere,
Wiltshire, BA12 6BT

DRILLING DATE:
 DRILLING CO :
 DRILL METHOD:
 LOGGED BY:

TOTAL DEPTH: 3
COORDINATES: 51.08244, -2.26254 [↗](#)
GROUND ELEV:

NOTES:

Depth (m)	Material Description	Graphic	Sample Type	Depth (m)	Hydrocarbon	Piezometer / Well
Ground Surface at (m)						
0	<u>Brown slightly sandy occasionally gravelly clay with rootlets.</u> TOPSOIL 0.1 m		D	0		
1	<u>Reworked brown clay with occasional gravel and rare masonry with plastic at base. Seepage from base.</u> MADE GROUND 0.6 m		D	1		
2	<u>Soft brown CLAY.</u> CLAY 2.6 m			2		
3	<u>Firm grey CLAY.</u> CLAY 3 m			3		
End of Test Hole at 3 (m)						
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

PROJECT NO.: 001REHOP2

DRILLING DATE:

TOTAL DEPTH: 3

PROJECT NAME: Mere

DRILLING CO.:

COORDINATES: 51.08184, -2.26235

CLIENT: Redcliffe Homes

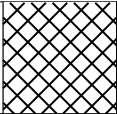
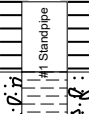
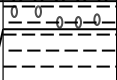
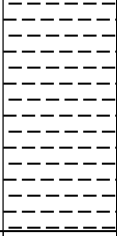
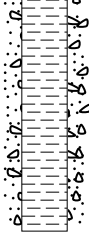
DRILL METHOD:

ADDRESS: Woodlands Road, Mere,
Wiltshire, BA12 6BT

LOGGED BY:

GROUND ELEV:

NOTES:

Depth (m)	Material Description	Graphic	Sample Type	Depth (m)	Hydrocarbon	Piezometer / Well
Ground Surface at (m)						
0	<u>Reworked clay with layer of occasional ash and suspected asbestos fragments at 0.7-0.8m. Seepage at 0.8m.</u> MADE GROUND		D	0		
1	<u>Soft brown CLAY with occasional coarse tabular flint gravel.</u> Gravelly CLAY		D	1		
2	<u>Soft brown CLAY.</u> CLAY			2		
3	End of Test Hole at 3 (m)			3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

PROJECT NO.: 001REHOP2

DRILLING DATE:

TOTAL DEPTH: 3

PROJECT NAME: Mere

DRILLING CO.:

COORDINATES: 51.08178, -2.26331

CLIENT: Redcliffe Homes

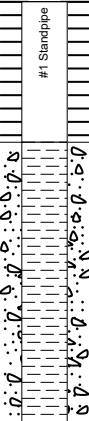
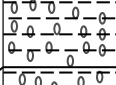
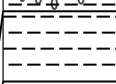
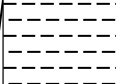
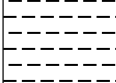
DRILL METHOD:

ADDRESS: Woodlands Road, Mere,
Wiltshire, BA12 6BT

LOGGED BY:

GROUND ELEV:

NOTES:

Depth (m)	Material Description	Graphic	Sample Type	Depth (m)	Hydrocarbon	Piezometer / Well
Ground Surface at (m)						
0	<u>Limestone cobbles with reworked clay.</u>		D	0		
	MADE GROUND 0.4 m					
	<u>Firm brown CLAY.</u>		D			
	Gravelly CLAY 0.9 m					
1	<u>Soft grey gravelly CLAY. Gravel fine sub round chalk and subangular flint</u>			1		
	Gravelly CLAY 1.1 m					
2	<u>Soft grey CLAY</u>			2		
	CLAY 1.6 m					
	<u>Firm grey CLAY.</u>					
	CLAY 3 m					
3	End of Test Hole at 3 (m)			3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

PROJECT NO.: 001REHOP2

DRILLING DATE:

TOTAL DEPTH: 3

PROJECT NAME: Mere

DRILLING CO :

COORDINATES: 51.08210, -2.26377 ↗

CLIENT: Redcliffe Homes

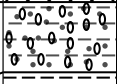
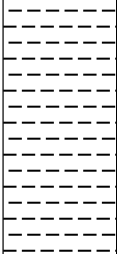
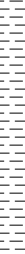
DRILL METHOD:

ADDRESS: Woodlands Road, Mere,
Wiltshire, BA12 6BT

LOGGED BY:

GROUND ELEV:

NOTES:

Depth (m)	Material Description	Graphic	Sample Type	Depth (m)	Hydrocarbon	Piezometer / Well
Ground Surface at (m)						
0	Sub base of sand and gravel. Seepage at 0.3m. MADE GROUND		D	0		
	0.6 m					
1	Grey sandy clayey GRAVEL. Gravel fine sun Clayey sandy GRAVEL		D	1		
	1.1 m					
2	Firm grey CLAY. CLAY			2		
	3 m					
3	End of Test Hole at 3 (m)			3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		