



Phase 2a Preliminary Ground Investigation Report

Land South of Trowbridge

Report: GCE00644/R2v6

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1.0 INTRODUCTION

1.1 Instruction

Geo Consulting Engineering Ltd (GCEL) was instructed by Waddeton Park Ltd to undertake a Phase 2a Preliminary Ground Investigation on the south of Trowbridge, adjacent the A361 (Frome Road).

1.2 Background

The site, currently utilised for agriculture, is being considered for residential development comprising approximately 180 dwellings with associated access, open space and landscaping.

A Phase 1 Desk Study was issued by GCEL in December 2016 (GCE00644/R1). The report covered a larger area than the Phase 2a investigation area, comprising the immediate fields surrounding Southwick Court Farm and split into Zones A to D. The Phase 2a Ground Investigation has targeted the proposed development area in the north only (part of former zones A and D).

1.3 Objectives

A preliminary intrusive investigation is required to provide information on ground and groundwater conditions. Additionally, design information is required to assist with the civil and structural design of the development.

1.4 Methodology

A phased investigation approach has been adopted; the first stage of which is the Phase 1 desk study and walkover survey (completed by GCEL in report GCE00664/R1) for development of site characterisation, conceptual model, and sampling and analysis plan. Subsequently, a Phase 2 preliminary ground investigation has been undertaken comprising trial pits, large-scale infiltration testing, dynamic sampling, groundwater and ground gas monitoring, geotechnical and chemical laboratory testing, largely as per the sampling and analysis plan outlined in the Phase 1 report, but tailored towards the revised site area.

1.5 Limitations

Subsoils are inherently variable and by their very nature are hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent from the data available for review. Similarly, this assessment has been based in part on third party data. This data has been taken at face value and has not been subjected to any external validation.

Groundwater levels are subject to seasonal variation and therefore may change from the levels recorded during this investigation.

Assessment of asbestos in the ground is outside the scope of our report and expertise. The potential for asbestos or other hazardous or deleterious substances in structures and substructures should be assessed by a competent person.

Unless specifically noted to the contrary, it should be assumed that this report has not been submitted to any regulatory authorities for approval.

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Eurocode 7 EN 1997-1:2004 identifies the requirements of a ground investigation report, which shall form part of the Geotechnical Design Report. This document is not a Geotechnical Design Report.

2.0 SITE DATA

2.1 Site Location

The site is located immediately east of the A361 and comprises a band of land south of Trowbridge and north of Southwick Court Farm, BA14 0HD.

The National Grid Reference for the approximate centre of site is ST 84572 55978.

A site location plan is presented in Figure 1.

2.2 Site Description

The site is cut by the Lambrok Stream flowing from south to north, splitting the site into the east side, approximately 12.5ha in size, and the west side, approximately 6.3ha in size.

The land is currently in agricultural use and is traversed by several Public Right of Ways (PROW) and footpaths.

East Side

The east side is being considered for residential development. This area comprises one field and part of the field immediately south, a metal wire fence running north-east south-west containing some small trees separates the two fields. The area is irregular in shape, measuring approximately 585m from east to west and 200m north to south, across the centre lines of the site. Access to the east side was gained through a gate in the south west corner of the field east of Southwick Court Farm. A narrow footbridge is present south east of the property to cross the Lambrok Stream.

West Side

The west side of the site is irregular in shape, measuring approximately 375m from east to west and 180m north to south, across the centre lines of the site. It comprises two grass covered fields, separated by metal wire fencing running north north west to south south east. Access to this side is located along the western site boundary via the private road to the Southwick Court Farm property, a cattle grid is located at the entrance.

The site boundary conditions are as follows:

- North - Mature hedge with residential properties beyond on the east side and fields followed by residential properties on the west side.
- East – Grass covered fields, Axe and Cleaver Lane and Bramble Farm.
- South – Southwick Court Farm and grass covered fields.
- West – A361 road followed by Southwick Court Farm.

The site topography is generally level at roughly 42m AOD. The topography slopes gently down to the north from the access road in the west to the approximate centre of this field where the topography levels out. The west side also slopes very gently down to the west (1.5%).

An area of saturated ground was noted, in the north east of the east side of the stream, this is located approximately above the public water main running north west to south east cross this area. One water trough was present on site, along the fence separating the two fields on the west side of the stream.

Services

A public water main roughly follows the northern boundary of the site, generally between 20 and 25m south of the hedgerow. Another public water main cuts across the far east side of the site trending NNW-SSE.

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A medium pressure gas main runs roughly central, west north west to east south east across the site.

Overhead cables are located along the boundary of the south-east corner of the site.

Publicly available utility service plans are attached as Appendix J.

2.3 Geology

Strata	Type	Source of data
Bedrock geology	Jurassic Oxford Clay Formation	British Geological Survey (BGS)
	Jurassic Kellaways Formation	
Superficial drift deposits	None mapped. Head and Alluvial deposits encountered during investigation.	British Geological Survey (BGS)

The geological mapping indicates the western half of site is predominantly underlain by the Jurassic Kellaways Formation, known to consist of sandy mudstones, and the eastern half of the site is mapped as the Oxford Clay Formation, generally mudstones and also of Jurassic age.

No Superficial deposits are mapped across or local to the site but were encountered during the investigation; generally alluvial adjacent the Lambrook Stream and Head deposits across the rest of the site.

2.4 Hydrogeology

The bedrock is classified as an aquitard, and superficial deposits are classed as unproductive strata according to the Envirocheck Database completed as part of the Phase 1 Desk Study.

2.5 Hydrology

The nearest surface water feature is the Lambrok Stream flowing from south to north through the site.

2.6 Site History

The site history derived from the available Ordnance Survey mapping as part of the Envirocheck Report indicates the site has been in agricultural use since at least 1887.

Anecdotal evidence provided to GCEL advised that the moated medieval manor house (now, Southwick Court Farmhouse) was present from 13th to the 14th Century, and rebuilt circa 18th - 17th Century. The southernmost field of the property was mapped as an orchard from 1887 to 1961.

The gatehouse and bridge over the moat at Southwick Court Farmhouse are listed under the Planning (Listed buildings and Conservation Areas) Act 1990 as amended due to special architectural or historic interest. The structures have been Grade 2 listed since 11th September 1968.

A (historic) water meadow is believed to have been present in the north west of the site, adjacent the Lambrok Stream.

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Off site, Brick Works are mapped 26m north west of site from 1887. An associated quarry is mapped here from 1890, expansion is mapped in 1924 and 1938, and in 1974 a Haulage depot and Refuse Tip replace the Brick Works. The Tip is labelled disused from 1979. 1999 mapping shows the Tip to be covered and filled. 2006 mapping shows this area has been residentially developed (Spring Meadows), as part of the surrounding residential area of Upper Studley.

The Environment Agency do not have record of first and last waste received, however the types of waste buried are confirmed to be both “inert” and “household”.

An enquiry with the Environment Agency under the Request for information under the Freedom of Information Act 2000 (FOIA) / Environmental Information Regulations 2004 (EIR) detailed the following:

“Site used by the old R.D.C for disposal of household waste prior to 1974. The site was then used by a haulage company during which time rubble was tipped too for a hard standing.”

2.7 Radon

The Phase 1 Desk Study (GCE00644/R1) indicates that no radon protection measures are required in the construction of new dwellings or extensions.

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3.0 GROUND INVESTIGATION

The following table summarises the ground investigation methods:

Method	Detail	Remarks
Trial Pitting	16 trial pits were excavated giving a general coverage across the whole site with particular focus on the east side (residential development area).	See Appendix A Investigation Methods, Appendix B Trial Pit Records and Appendix C Trial Pit Photographs. See Figure 2 and Figure 3 for exploratory hole location plans.
Large Scale Infiltration Testing	Four of the 16 trial pits were used for large scale infiltration testing.	See Appendix A Investigation Methods and Appendix E Large Scale Infiltration Results
Dynamic Sampling	Twelve dynamic sample boreholes were undertaken across the whole site. (Two additional boreholes were completed at WS05 and WS06 due to borehole collapse and shallow refusal.	See Appendix A Investigation Methods and Appendix D Borehole Records. See Figure 2 and Figure 3 for exploratory hole location plans.
Monitoring Wells	Ten combined ground gas and groundwater monitoring wells were installed in the dynamic sampling boreholes using 50mm diameter standpipes and completed with a flush cover. This enabled groundwater and ground gas monitoring to assess groundwater rest levels and to investigate the north west landfill as a potential source of ground gas.	See Appendix F Ground Gas and Groundwater Monitoring Results.
Chemical analysis	- 20No. soil samples were analysed for a generic suite comprising metals/ metalloids, pH soil, Soluble Sulphate, Poly Aromatic Hydrocarbons (PAH), Banded Petroleum Hydrocarbons (TPH), and Fraction of Organic Carbon and Asbestos ID. - 2No. samples were analysed for a combined pesticide suite comprising organophosphorus and organochlorine.	See Appendix G Chemical Laboratory Results.
Geotechnical testing	- 60No. Moisture Content - 5No. Plasticity Index tests - 6No. BRE SD1 suite	See Appendix H Geotechnical Laboratory Results
Dynamic Cone Penetrometer (DCP)	8No. DCP tests were undertaken along the road alignment across the site.	See Appendix I for DCP Test Results
Vacuum Excavation	Inspection Pits were excavated at six locations using a track mounted vacuum rig to locate the medium pressure gas main.	Results in Appendix K on drawing GCE00644-Fig A.

4.0 INVESTIGATION FINDINGS

4.1 Ground Conditions

The following table summarises the depths and thicknesses of the strata identified in the sixteen trial pits and ten dynamic sampling boreholes:

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Strata		Depth of strata at each exploratory hole (m)					
		TP01	TP02	TP03	TP04	TP05	TP06
Topsoil / Subsoil		GL – 0.25	GL – 0.30	GL – 0.36	GL – 0.25	GL – 0.30	GL – 0.35
Superficial deposits	Stiff to very stiff, grey brown, gravelly, sandy silty CLAY				0.25 – 0.50		
	Stiff to very stiff mottled yellow brown and light grey (slightly sandy) silty CLAY	0.25 – 1.60	0.30 – 0.92		0.50 – 1.00	0.30 – 0.60	0.35 – 0.45
	Firm to stiff mottled blue grey/purple and yellow brown (slightly gravelly, slightly sandy) silty CLAY			0.36 – 1.50		0.60 – 1.30	0.45 – 1.30
	Stiff, yellow brown and blue grey slightly gravelly, sandy silty CLAY				1.00 – 1.50		
	Grey mottled yellow silty SAND	1.60 – 2.00					
	Grey brown, sandy, silty GRAVEL	2.00 – 2.90					
	Soft, blue-grey, slightly sandy slightly gravelly clayey SILT		0.92 – 1.40				
Completely weathered Kellaways Formation	Firm to stiff light blue grey/purple grey mottled yellow brown, silty CLAY			1.50 – 1.60		1.30 – 1.50	
	Stiff, blue/purple grey/dark grey, slightly sandy, silty CLAY (loc. shelly debris and relic structure and lithorelics, gypsum crystal and sandy lenses and occ. decaying root)				1.50 – 2.00	1.50 – 3.50	1.30 – 1.60
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE (with occ. shelly debris)						1.60 – 3.20
	Very stiff, dark blue grey CLAY	2.90 – 3.10					

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Strata		Depth of strata at each exploratory hole (m)					
		TP07	TP08	TP09	TP10	TP11	TP12
Topsoil / Subsoil		GL – 0.25	GL – 0.28	GL – 0.30	GL – 0.25	GL – 0.25	GL – 0.25
Superficial deposits	Stiff to very stiff mottled yellow brown with grey slightly sandy, (slightly gravelly) silty CLAY	0.25 – 0.50	0.28 – 0.56	0.30 – 0.55	0.25 – 0.80	0.25 – 0.60	0.25 – 0.50
	Firm to stiff mottled blue grey/purple and yellow brown (slightly gravelly, slightly sandy) silty CLAY					0.60 – 1.20	0.50 – 1.50
	Stiff, blue/purple grey mottled yellow brown, silty CLAY	0.50 – 1.60	0.56 – 1.50		0.80 – 1.40		
	Soft to firm blue-grey, locally sandy silty CLAY			0.55 – 1.50			
Completely weathered Kellaways Formation	Firm to stiff light blue grey/purple grey mottled yellow brown, (slightly sandy) silty CLAY (<i>loc. marine algae</i>)	1.60 – 2.80		1.50 – 2.10		1.20 – 1.80	
	Stiff, blue/purple grey/dark grey, slightly sandy, silty CLAY (<i>loc. shelly debris and relic structure and lithorelics, gypsum crystals, loc. marine algae and sandy lenses</i>)	2.80 – 3.80	1.50 – 2.80	2.10 – 3.50	1.40 – 2.80	1.80 – 2.00	1.50 – 3.30
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE (<i>with occ. shelly debris</i>)		2.80 – 3.75	3.50 – 3.85	2.80 – 3.00	2.00 – 2.80	

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Strata		Depth of strata at each exploratory hole (m)			
		TP13	TP14	TP15	TP16
Topsoil / Subsoil		GL – 0.40	GL - 0.30	GL – 0.40	GL – 0.60
Superficial Deposits	Stiff, yellow brown with grey brown, gravelly, sandy silty CLAY		0.30 – 0.70	0.40 – 0.70	
	Stiff yellow brown gravelly, sandy, silty CLAY with cobbles	0.40 – 0.65			0.60 – 1.10 / 1.40
	Firm, locally soft mottled blue grey/purple and yellow brown (slightly gravelly, slightly sandy) silty CLAY	0.65 – 1.50	0.70 – 1.30		
	Stiff to very stiff, light blue grey mottled yellow brown, slightly gravelly, slightly sandy, silty CLAY			0.70 – 1.50	
Completely weathered Kellaways Formation	Firm purple grey mottled yellow brown, (slightly sandy) silty CLAY (loc. marine algae)	1.50 – 2.10			
	Stiff to very stiff, light blue/purple grey mottled yellow brown, sandy silty CLAY		1.30 – 1.70		1.10 / 1.40 – 2.80
	Stiff, blue/purple grey/dark grey, slightly sandy, silty CLAY (loc. shelly debris and relic structure and lithorelics, gypsum crystals, loc. marine algae and sandy lenses)	2.10 – 2.90	1.70 – 3.80	1.50 – 2.20	2.80 – 3.70
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE (with occ. shelly debris)	2.90 – 3.50		2.90 – 3.00	

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Strata		Depth of strata at each exploratory hole (m)					
		WS01	WS02	WS03	WS04	WS05	WS05A
Topsoil / Subsoil		GL – 0.28	GL – 0.25	GL – 0.26	GL – 0.28	GL – 0.26	GL – 0.24
Superficial deposits	Firm, brown slightly sandy, slightly gravelly silty CLAY	0.28 – 0.56					
	Stiff to very stiff brown mottled light brown slightly sandy (slightly gravelly) silty CLAY	0.56 – 1.05	0.25 – 1.05	0.26 – 1.17	0.28 – 1.15	0.26 – 0.78	0.24 – 0.80
	Soft, orange brown and brown, slightly sandy, (slightly gravelly) silty CLAY		1.05 – 4.27		1.15 – 2.00		0.80 – 1.05
	Very soft, orange brown and grey, sandy silty CLAY				2.00 – 2.63		
	Firm brown and grey, slightly sandy silty CLAY		4.27 – 4.57			0.78 – 1.17	
	Stiff, grey and orange brown (slightly gravelly), sandy silty CLAY	1.05 – 2.70				1.17 – 1.81	
	Grey brown, sandy, silty GRAVEL				2.63 – 3.51		1.05 – 1.30
Completely weathered Kellaways Formation	Stiff to very stiff, brown becoming dark grey, slightly sandy, silty CLAY (loc. shelly debris and relic structure and lithorelics, gypsum crystal and sandy lenses)	2.70 – 5.45	4.57 – 5.45	1.17 – 5.40	3.51 – 5.00	1.81 – 4.45	
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE (with occ. shelly debris)			5.40 – 5.45			

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Strata		Depth of strata at each exploratory hole (m)					
		WS06	WS06A	WS07	WS08	WS09	WS10
Topsoil / Subsoil		GL – 0.22	GL – 0.20	GL – 0.21	GL – 0.18	GL – 0.28	GL – 0.24
Superficial deposits	Stiff to very stiff brown mottled light brown (with grey) slightly sandy (slightly gravelly) silty CLAY	0.22 – 1.28	0.20 – 0.42	0.21 – 0.72	0.18 – 0.49	0.28 – 1.00	0.24 – 1.10
	Soft, orange brown and brown with grey, slightly sandy, (slightly gravelly) silty CLAY			0.72 – 1.33		1.00 – 1.34	
	Firm brown and grey, silty CLAY				0.49 – 1.34		
	Stiff, orange brown and grey (locally sandy) silty CLAY	1.28 – 1.95	0.42 – 1.00	1.33 – 1.90			
	Stiff, locally firm, orange brown and grey (locally sandy) silty CLAY		1.00 – 1.83				
	Grey brown, sandy, silty GRAVEL			1.90 – 2.50			
Completely weathered Kellaways Formation	Stiff to very stiff, brown becoming dark grey, slightly sandy, silty CLAY (loc. shelly debris and relic structure and lithorelics, gypsum crystals and sandy lenses)	1.95 – 5.45	1.83 – 2.10	2.50 – 3.00	1.34 – 4.70	1.34 – 5.45	1.10 – 3.40
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE (with occ. shelly debris)						3.40 – 3.45
	COBBLE of sandstone		2.10 – 2.35				

Topsoil (to include Subsoil)

Topsoil and subsoil were encountered in all exploratory holes to depths ranging from 0.18m to 0.60m, typically comprising dark brown sandy silty clay with rootlets.

Superficial deposits

Varying strata were encountered overlying the weathered bedrock, predominantly Head deposits and Alluvium to a maximum depth of 4.57m bgl and 2.50m bgl respectively.

Alluvial deposits were generally situated on the west side of the site, near to the Lambrook Stream, however gravels of sub-rounded limestone and chert/flint were seen to extend across to WS07 to a depth of 2.50m bgl.

Head deposits were typically light brown mottled grey silty CLAYs, locally sandy and gravelly, with occasional rootlets. They lacked structure and were generally less competent.

Completely weathered Kellaways Clay Formation / Oxford Clay Formation

Underlying the Head was a weathered profile of Jurassic clays of the Kellaways and Oxford Clay formations. The sequence was relatively consistent across the site comprising grey silty CLAYs, weathered to become mottled yellow brown in places, grading into generally darker, purple grey/dark blue grey or dark grey silty CLAYs with relic structure and lithorelics.

Shelly debris was encountered in varying abundance, and shells were often less fragmented at depth, seen between layers in mudstone/siltstone. A white powdery silt dusting was noted in places, generally encountered as localised veins, interpreted to be calcite. Gypsum crystals were seen in varying sizes and abundance, ranging from localised medium sand sized crystals to up to 6cm long, prismatic crystals. These were encountered in eight trial pits in the east field. Fossil organic matter was locally abundant within the silty CLAYs across the site, seen as paleo-roots and marine algae, described

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as red, fine and dendritic. Marine algae was recorded in four trial pits in the east field, and always partnered with gypsum crystals in the soils.

Silty clays became closely fractured MUDSTONE/SILTSTONE and CARBONACEOUS SHALE with depth. SANDSTONE was encountered in WS06A only, as a cobble at 2.10m, this is interpreted to be a part of the weathered bedrock due to the shelly debris in the strata above.

4.2 Groundwater

Groundwater was encountered in seven trial pits; TP01, TP02, TP04 - TP07 and TP11. Water ingress was seen in TP11 and TP06 only between 2.60m and 3.20m below ground level respectively. Strata were wet from as shallow as 0.92m bgl (TP02).

Groundwater was encountered in five of the dynamic sample boreholes when initially drilled between 1.05m bgl and 3.00m bgl, as well as in fissures between 3.26 and 3.78m bgl in WS02. Standpipes were installed in each borehole for long term groundwater monitoring. The following table shows the water depths below ground level (bgl) recorded:

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Rest groundwater monitoring results

Hole ID	Water strike during drilling (27/07/2017 + 28/07/2017)	Base depth of well (m bgl)	Groundwater Level (m bgl)					
			08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
WS01	NE	4.97	0.90	0.77	0.75	0.67	0.70	0.59
WS02	3.26**	4.85	3.68	3.74	3.81	3.89	3.99	3.85
WS03	3.00	5.03	4.82	4.50	4.06	2.20	3.45	3.27
WS04	2.00	2.93	2.25	2.32	2.39	2.40	2.51	2.31
WS05	NE	3.69	Dry	3.32	2.60	1.72	1.45	1.10
WS06	NE	4.92	1.10	1.11	1.12	1.09	1.15	1.08
WS07	1.90	2.86	0.90	0.82	0.87	0.84	0.93	0.70
WS08	NE	4.60	-	1.10	1.02	0.94	0.92	0.76
WS09	NE	4.95	4.32	3.25	2.15	1.06	1.11	1.93
WS10	NE	3.02	2.56	2.10	1.67	1.56	1.57	1.60

* NE = Not encountered

** Groundwater encountered in fissures between 3.26m bgl and 3.68 m bgl.

4.3 Ground Gas

Six ground gas monitoring visits have been completed in order to measure the concentration of: methane, carbon dioxide, oxygen, carbon monoxide, hydrogen sulphide and flow rate.

The results of the methane, carbon dioxide, oxygen and gas flows are given in the following tables:

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Parameter	WS01					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.10 / 0.00	0.00 / 0.00	0.10 / 0.10	0.10 / 0.10	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	2.50 / 2.50	0.90 / 0.40	0.50 / 0.50	2.20 / 2.20	3.40 / 3.20	3.60 / 3.60
Oxygen (%)	18.60 / 18.40	19.90 / 19.90	20.40 / 20.70	20.00 / 19.90	19.80 / 19.00	18.20 / 18.00
Gas Flow (l/h)	12.20 / 9.10 (60s)	0.00 / 0.00	-0.10 / -0.10	4.60 / 3.30 (60s)	-0.90 / -0.70 (60s)	9.40 / 5.80 (60s)
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

Parameter	WS02					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.10 / 0.10	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	2.50 / 2.50	2.60 / 2.60	2.60 / 2.60	2.80 / 2.80	3.00 / 3.00	3.20 / 3.20
Oxygen (%)	19.40 / 19.40	19.50 / 19.40	18.60 / 18.60	18.60 / 18.60	19.00 / 18.90	18.30 / 18.20
Gas Flow (l/h)	0.00 / 0.00	-0.10 / -0.10	0.00 / 0.00	-0.10 / -0.10	-0.10 / 0.00	0.00 / 0.00
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

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Parameter	WS03					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.10 / 0.10	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	2.10 / 2.10	2.10 / 2.10	1.90 / 1.90	1.60 / 1.60	1.10 / 1.10	1.10 / 1.10
Oxygen (%)	18.90 / 18.90	18.70 / 18.70	19.10 / 19.10	19.50 / 19.50	20.60 / 20.60	20.30 / 20.30
Gas Flow (l/h)	0.00 / 0.00	-0.10 / -0.10	0.00 / 0.00	0.10 / 0.10	0.00 / 0.00	0.10 / 0.10
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

Parameter	WS04					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.20 / 0.20	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	1.10 / 0.60	0.80 / 0.40	0.80 / 0.20	1.80 / 1.70	1.40 / 1.10	1.00 / 0.30
Oxygen (%)	20.80 / 20.80	20.90 / 20.90	20.20 / 20.70	19.90 / 19.90	20.80 / 20.80	21.60 / 21.60
Gas Flow (l/h)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.10 / 0.10	0.10 / 0.10	0.20 / 0.20
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

Parameter	WS05					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.10 / 0.00	0.10 / 0.00
Carbon Dioxide (%)	3.00 / 3.00	1.80 / 1.80	2.30 / 2.30	1.60 / 1.60	1.20 / 1.20	1.00 / 1.00
Oxygen (%)	18.80 / 18.80	20.30 / 20.30	19.70 / 9.80	20.60 / 20.60	21.10 / 21.10	21.80 / 21.80
Gas Flow (l/h)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.20 / 0.20	0.10 / 0.10	-0.10 / -0.10
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

Parameter	WS06					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.20 / 0.20	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	2.50 / 2.50	2.00 / 2.00	1.70 / 1.70	2.00 / 2.00	2.10 / 2.10	2.20 / 2.20
Oxygen (%)	18.80 / 18.80	20.00 / 20.00	19.20 / 19.20	19.90 / 19.80	19.70 / 19.60	20.20 / 20.20
Gas Flow (l/h)	3.20 / 2.00 (60s)	0.00 / 0.00	-0.30 / -0.20	2.60 / 1.60 (60s)	-0.90 / -0.40 (60s)	3.40 / 2.40
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

Parameter	WS07					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.10 / 0.10	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	1.30 / 1.30	1.70 / 1.70	1.60 / 1.60	1.70 / 1.70	1.60 / 1.60	2.10 / 2.10
Oxygen (%)	20.30 / 20.20	19.90 / 19.80	19.70 / 19.50	19.70 / 19.60	20.50 / 20.10	20.50 / 20.40
Gas Flow (l/h)	5.60 / 4.1 (60s)	3.90 / 3.00 (60s)	-4.60 / -3.20	2.00 / 2.00	-6.20 / -4.20 (60s)	10.20 / 7.60 (60s)
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

Parameter	WS08					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)		0.00 / 0.00	0.00 / 0.00	0.10 / 0.10	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	-	2.70 / 2.70	2.60 / 2.60	4.10 / 4.10	3.60 / 3.50	4.70 / 4.70
Oxygen (%)	-	19.00 / 19.00	18.70 / 18.60	18.30 / 18.20	17.60 / 17.60	18.70 / 18.70
Gas Flow (l/h)	-	4.40 / 3.40 (60s)	4.80 / 3.00	9.70 / 4.70 (60s)	5.40 / 1.60 (60s)	11.20 / 6.00 (60s)
Atmospheric Pressure (mb) [Start / End of day]	-	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

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Parameter	WS09					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.20 / 0.20	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	6.30 / 6.20	6.60 / 6.60	5.50 / 5.40	4.50 / 4.50	4.50 / 4.40	3.40 / 3.40
Oxygen (%)	15.10 / 15.10	15.40 / 15.40	16.50 / 16.40	17.90 / 17.80	18.60 / 18.60	20.00 / 20.00
Gas Flow (l/h)	0.00 / 0.00	0.00 / 0.00	-0.10 / 0.00	5.70 / 4.40 (60s)	-2.70 / 1.50 (60s)	5.00 / 3.50 (60s)
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

Parameter	WS10					
	[Peak / Steady State]					
	08/08/2017	18/08/2017	04/09/2017	27/09/2017	17/10/2017	10/11/2017
Methane (%)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.10 / 0.10	0.10 / 0.10	0.10 / 0.10
Carbon Dioxide (%)	3.40 / 3.40	2.60 / 2.60	1.90 / 1.90	1.60 / 1.60	1.60 / 1.60	1.90 / 1.90
Oxygen (%)	18.80 / 18.80	20.20 / 20.20	19.50 / 19.50	19.20 / 19.20	20.60 / 20.60	20.10 / 20.00
Gas Flow (l/h)	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.20 / 0.1	0.40 / 0.40	0.30 / 0.30
Atmospheric Pressure (mb) [Start / End of day]	1008 / 1009	1006 / 1009	1008 / 1010	1008 / 1010	1016/1017	1018/1019

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Gas monitoring shows a relatively consistent trend across nine of the ten monitoring wells with little or no methane and carbon dioxide typically at 2% to 3%. The exception to this occurs in WS09 where, again, no significant methane was recorded but carbon dioxide was higher than the “norm” for the site at 4.5% to 6.6%. The NHBC traffic light system for assessing ground gas uses a trigger level of 5% Carbon Dioxide as the step between their “Green” and “Amber 1” categorisations. Taking the gas flow readings and measured levels a Gas Screening Value (GSV) can be calculated to better characterise the risk.

The table below shows the gas screening values for carbon dioxide in WS09 for the monitoring visits which have recorded elevated typical maximum concentration values (%). The final three monitoring visits have not recorded carbon dioxide exceeding 5%.

Date	08/08/2017	18/08/2017	04/09/2017
Gas screening value (l/hr)	0.63	0.66	0.06

These results confirm the GSVs allocated for a worst-case ground gas regime to sit within the Green NHBC traffic light classification noting that the total gas concentrations fall into Amber 1. A further six monitoring visits are recommended during the wet winter period in order to better characterise the trend of carbon dioxide concentrations in WS09 as well as WS08 which has encountered a maximum carbon dioxide concentration of 4.7%. If measurements continue to exceed 5%, consideration should be given to the installation of a further four wells around WS09 in an attempt to delineate the extent of the anomalous area. The further monitoring and any associated works should be addressed as a condition to any planning permission, being a matter that will influence design detail rather than any fundamental viability.

Borehole flow rate across the site is interpreted to be heavily affected by the shallow groundwater encountered in the wells. The groundwater fluctuation creates a “piston effect” within the standpipe, due to the metre of plain piping below the surface, which

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traps air until released by the gas tap. Consequently, the initial flow reading and subsequent decline recorded during gas monitoring visits are not deemed to be representative of the actual borehole flow rate. Accordingly, a more representative peak flow value of 0.20l/hr is used to calculate site-wide GSVs, as this marks the highest non-groundwater affected flow rate recorded to date.

Carbon Dioxide and methane GSVs do not exceed the Green NHBC traffic light classification when using the representative site-flow rate of 0.20l/hr.

Carbon monoxide was recorded in minor concentrations and therefore not deemed to be of concern.

Volatile vapour levels within the boreholes were measured during one of the monitoring visits using a Photo Ionisation Detector (PID). A peak and steady reading were recorded for each borehole, steady readings were recorded after 1 minute of stabilization.

The following table summarises the peak and steady results recorded across six monitoring visits.

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Location	08/08/2017		18/08/2017		04/09/2017		27/09/2017		17/10/2017		10/11/2017	
	Peak (ppm)	Steady (ppm)	Peak (ppm)	Steady (ppm)	Peak (ppm)	Steady (ppm)	Peak (ppm)	Steady (ppm)	Peak (ppm)	Steady (ppm)	Peak (ppm)	Steady (ppm)
WS01	1.50	1.40	0.00	0.00	0.00	0.00	0.40	0.10	0.00	0.00	0.00	0.00
WS02	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WS03	0.60	0.30	0.50	0.40	0.00	0.00	0.10	0.10	0.10	0.10	0.00	0.00
WS04	0.10	0.10	0.20	0.20	0.00	0.00	0.30	0.30	0.00	0.00	0.00	0.00
WS05	0.40	0.30	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WS06	0.40	0.30	1.60	1.60	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WS07	0.00	0.00	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00
WS08	-	-	0.00	0.00	1.80	0.50	0.00	0.00	0.00	0.00	0.00	0.00
WS09	0.70	0.70	0.80	0.60	0.80	0.70	0.00	0.00	0.00	0.00	0.00	0.00
WS10	0.0	0.0	0.00	0.00	0.60	0.60	0.30	0.30	0.20	0.20	0.00	0.00

None of the measured levels are considered to be of significance.

4.4 Chemical Laboratory Analysis

The following provides a summary of the chemical laboratory analysis findings:

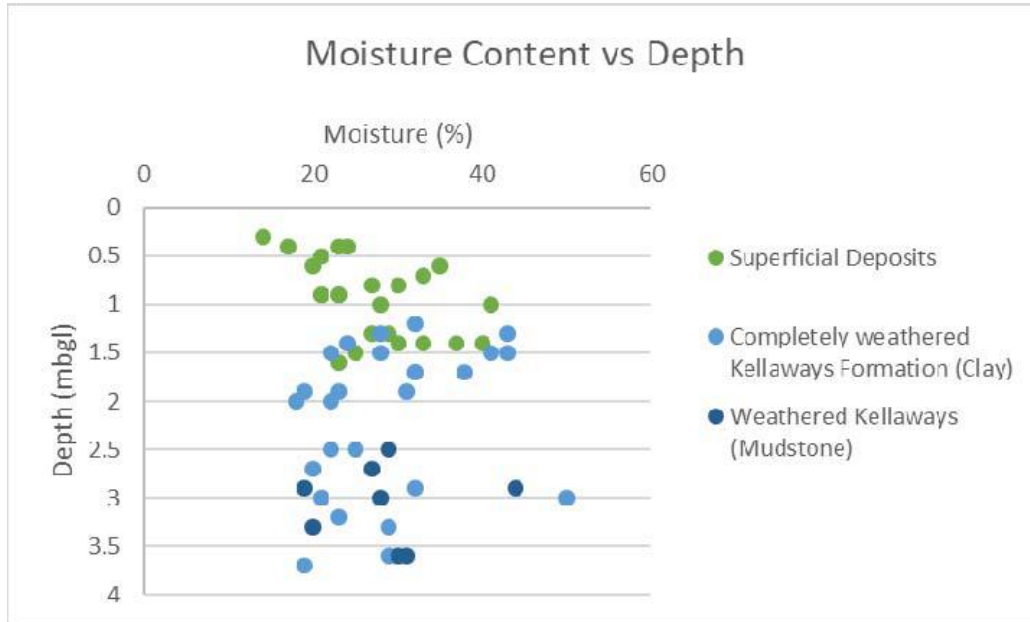
Preliminary soil testing:

- One sample (TP09 at 0.10m) exceeds both the NBC and residential S4UL for Mercury at 16mg/kg. Total Petroleum Hydrocarbons (TPHs) were below the laboratory Limit of Detection (LoD) in twenty samples.
- Minor detections of Polycyclic Aromatic Hydrocarbons (PAHs) were recorded in one sample (TP05 at 0.20m bgl). Total PAH for this sample was <2.0 mg/kg, and concentrations are below the S4UL.
- The pH from fifteen samples ranged from 4.0 to 7.5 indicating slightly acidic conditions. The two samples with the lowest pH (4.0 and 4.7) were both collected from 1.90m in the Kellaways Formation, but there is no clear correlation between depth and pH.
- All determinands within the pesticide suite were below the LoD.
- No asbestos in soils was detected in twenty samples tested.

4.5 Geotechnical Laboratory Analysis

The moisture content ranged from 0% to 50% with a mean value of 27%. The following chart presents moisture content values versus depth:

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- The graphs show a trend of decreasing moisture content with depth in the completely weathered Kellaways Formation.
- An increase in moisture content with depth is generally noted in the Superficial Deposits.
- There is no clear trend between moisture content and depth in the weathered Kellaways Formation.

Five samples were tested for Plasticity Index (PI). Results from these analyses are presented in the following table. The table also provides natural moisture content (Wn%), Liquid Limit (LL), Plastic Limit (PL), modified Plasticity Index (PI mod), equivalent moisture content (We%), Liquidity Index (LI) and Consistency Index (CI):

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TP	Depth	Wn%	LL%	PL%	PI	%pass 0.425	PI mod	We%	LI	CI
TP01	0.9	23	58	26	32	100	32	23	-0.09	1.09
TP02	1.3	29	53	24	29	100	29	29	0.17	0.83
TP03	1.5	41	66	34	32	100	32	41	0.22	0.78
TP05	2.5	25	61	27	34	100	34	25	-0.06	1.06
TP12	3	50	86	47	39	100	39	50	0.08	0.92

The modified Plasticity Index (PI_{mod}) indicates the fine-grained soils are clays of high to very high plasticity with a medium volume change potential as defined by NHBC.

The Consistency Index (CI) indicates a stiff to very stiff consistency fine grained soil.

The low to medium Liquid Index (LI) suggests the soils tested are within a semi plastic to plastic state.

Four samples were tested for pH, total sulphate, soluble sulphate and total sulphur (BRE SD1 Suite):

	TP05	TP05	TP08	TP09	TP09	TP13
Depth (m bgl)	0.40	3.40	2.90	0.80	1.70	1.90
pH	7.11	7.08	7.66	7.91	7.88	7.53
Total Sulphur (%S)	0.08	0.13	0.09	6.21	2.92	0.45
Total Potential Sulphate (%SO₄)	0.24	0.39	0.27	18.63	8.76	1.35
Oxidisable sulphides (OS as %SO₄)	0.01	-0.14	-0.02	0.3	0.02	0.03

By calculating an approximate concentration of oxidisable sulphides, pyrite is not likely to be present in the ground at this site.

4.6 Large Scale Infiltration Testing

Large scale infiltration tests were carried out in TP01-TP04. The tests were undertaken in general accordance with BRE 365. The BRE approach uses the time taken for the water levels to fall from 75% effective depth to 25% effective depth; effective depth being the depth between invert level or water level at the start of the test and the base of the soakaway or test pit.

Each infiltration test pit was left to run for almost 24 hours.

The tables below summarise the results recorded:

Trial Pit	Depth (m bgl)	No. of tests	Time	Start Depth of water (m bgl)	Final Depth of water (m bgl)
TP02	1.40	1	29hr 52min	0.26	1.11
TP03	1.6	1	28hr 32min	0.21	0.47
TP04	2.0	1	27hr 31min	0.7	0.72

Trial Pit	Depth (m bgl)	Number of Tests	Infiltration Rate (m/s)		
			Test 1	Test 2	Test 3
TP01	2.1	3	1.37×10^{-5}	8.01×10^{-6}	6.48×10^{-6}

Groundwater was encountered between 1.60 and 2.10m in TP01.

Based on the results from the four large scale infiltration tests, soakaway drainage is unlikely to be viable on a widespread basis at this site although localised areas could be found where infiltration drainage could be considered.

4.7 DCP CBR Testing

In-situ Dynamic Cone Penetrometer (DCP) CBR tests were undertaken at eight locations along the proposed road alignment. The results calculate a minimum CBR value of 2.60%. The lowest results were recorded in DCP 6 and DCP 7.

The table below summarises the results calculated below the topsoil at each location.

	CBR values (%)	
	Min	Max
DCP1	5.46	15.43
DCP2	4.37	8.15
DCP3	7.05	7.41
DCP4	5.03	48.18
DCP5	4.92	30.81
DCP6	2.60	5.88
DCP7	2.76	4.41
DCP8	4.69	5.40

Full DCP CBR test results are attached as Appendix I.

4.8 Vacuum Excavation

A medium pressure gas main traverses the site. Confirmation of the location and depth was requested by the utility owner, Wales & West, to back-up the earlier ground radar survey which identified an alignment but could not confirm the depth to the pipe. Following an unsuccessful attempt to hand dig onto the pipe on 27th June 2020, a track-mounted vacuum excavation rig was mobilised to site on 13th July 2020 and over two days exposed the gas main at seven locations, as shown on Figure GCE00644-Fig A in Appendix J.

5.0 POTENTIALLY CONTAMINATED LAND ASSESSMENT

5.1 Source Characterisation

The assessment of potentially contaminated land is based on source-pathway-receptor pollutant linkages. The following source characterisation, based on the chemical analysis, provides a basis for assessing the significance of potential pollutant linkages. The Normal Background Concentrations (NBC) based on the principal domain and the LQM/CIEH suitable for use levels (S4UL) values have been used to provide comparative screening values for residential development with home-grown produce. This provides a stringent first tier screening assessment. Results that exceed these levels require assessment in relation to the site-specific conditions prior to determining whether a potential pollutant linkage exists.

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Soils - metals

Twenty soil samples were analysed for a generic suite of metals/metalloids:

Determinand	Number of samples >LOD	Minimum mg/kg	Maximum mg/kg	Max>NBC	Max>S4UL
Arsenic	20	3.8	21	No	No
Cadmium	16	0.1	0.89	No	No
Chromium	20	21	43	NA	No
Copper	20	7	23	No	No
Mercury	2	0.12	16	Yes	Yes
Nickel	20	10	130	Yes	No
Lead	20	11	56	No	NA
Selenium	1	0.3	0.3	NA	No
Zinc	19	4.7	440	NA	No

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The above table shows all metal/metalloid concentrations fall below the residential S4UL, with the exception of Mercury. One sample (TP09 at 0.10m) exceeds both the NBC and residential S4UL, further statistical analysis gives the following results:

Determinand	US95 Value	Sample Mean	Suitable 4 Use Level (S4UL)	Statistical outliers?
	(mg/kg)			
Mercury	4.33	0.851	1.2	Yes

Further statistical analysis calculates a US95 value of 4.33mg/kg which still exceeds the S4UL, the sample mean of the 20 results is 0.85mg/kg which is below the S4UL.

The analysis identifies the elevated Mercury result as a statistical outlier; when removing the outlier from the dataset, the following results are calculated.

Determinand	US95 Value	Sample Mean	Suitable 4 Use Level (S4UL)	Statistical outliers?
	(mg/kg)			
Mercury	0.07	0.05	1.2	Yes

The elevated Mercury concentration of 16mg/kg is not deemed to be representative of the dataset as a whole, as demonstrated by the significant difference in the two US95 values calculated above. As such, further sampling of the topsoil in the eastern field, targeting the area around TP09, is recommended in order to confirm the result as anomalous. A sample tested from 0.3m below the anomalous sample did not exhibit any elevated Mercury. The further sampling and analysis and any associated works should be addressed as a condition to any planning permission, being a matter that will influence design detail rather than any fundamental viability.

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Nickel exceeds the NBC in one sample collected from TP10 at 1.40m bgl. This result is below the S4UL for residential properties with home grown produce, and therefore of no further concern.

Soils - Total Petroleum Hydrocarbons (TPHs)

All twenty samples tested are below the LoD for TPH concentrations and are therefore of no further concern.

Soils - Polycyclic Aromatic Hydrocarbons (PAHs)

Twenty soil samples were analysed for total PAHs:

Determinand	Number of samples >LOD	Minimum (mg/kg)	Maximum (mg/kg)	Max>NBC	Max>SU4L
Total Organic Carbon	20	0.36	4.7	NA	NA
Naphthalene	0	0	0	NA	No
Acenaphthylene	0	0	0	NA	No
Acenaphthene	0	0	0	NA	No
Fluorene	0	0	0	NA	No
Phenanthrene	0	0	0	NA	No
Anthracene	0	0	0	NA	No
Fluoranthene	1	0.61	0.61	NA	No
Pyrene	1	0.62	0.62	NA	No
Benzo[a]anthracene	1	0.69	0.69	NA	No
Chrysene	0	0	0	NA	No
Benzo[b]fluoranthene	0	0	0	NA	No
Benzo[k]fluoranthene	0	0	0	NA	No
Benzo[a]pyrene	0	0	0	No	No
Indeno(1,2,3-c,d)Pyrene	0	0	0	NA	No
Dibenz(a,h)Anthracene	0	0	0	NA	No
Benzo[g,h,i]perylene	0	0	0	NA	No
Total Of 16 PAH's	0	0	0	NA	NA

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PAHs were detected in one sample only; TP05 at 0.20m bgl with a Soil Organic Matter (SOM) of 7.9% and a Total PAH <2.0mg/kg. All PAH detections are below the residential S4UL and therefore are considered to be of no further concern.

5.2 Pathways

The proposed residential end use will provide the following exposure pathways that are considered in the CLEA model for residential development with home-grown vegetable consumption and used to calculate the S4UL values.

- Soil/ dust ingestion
- Home-grown vegetable consumption
- Soil attached to vegetables
- Dust inhalation indoors and outdoors
- Dermal contact indoors and outdoors
- Vapour inhalation indoors and outdoors

Additional pathways not included in the CLEA model include:

- Permeation through portable water supply pipes.
- Ingress of ground gas into confined spaces and dwellings.

5.3 Receptors

The following receptors require consideration:

- Construction workers/future residents
- Property
- Controlled Waters and associated eco-systems

5.4 Pollution Linkages

The site has been in agricultural use since the first available mapping of 1887. The southernmost field of the Southwick Court Farm Property was mapped as an orchard from 1887 to 1961. The site, which has a cover of Topsoil, is underlain by weathered sequence of the Kellaways Formation and Oxford Clay Formation predominantly comprising silty clay, becoming mudstone/siltstone/shale with depth.

Mercury was identified at levels that would be considered significant in one sample only, the source of which is unknown but is believed to be anthropogenic and recent. This sample was recovered from the topsoil in TP09 (at 0.10m bgl). Further statistical analysis has identified the result as an outlier, however, supplementary localised sampling of the topsoil in the eastern field, targeting the area around TP09, is recommended in order to better characterise the result as anomalous.

No other significant pollutant linkages have been identified.

The site is located within an area where no Radon protection measures are required.

5.5 Waste Assessment

Topsoil by definition is not inert and as such should be re-used and is not suitable for disposal at an inert landfill site.

If any anomalous Made Ground is encountered during the construction phase this should be assessed separately.

6.0 GEOTECHNICAL ASSESSMENT & RECOMMENDATIONS

6.1 Introduction

The British Geological Survey mapping indicates that the site is underlain by deposits of Kellaways Formation and Oxford Clay Formation.

The recent ground investigation identified a cover of Topsoil which is underlain by Head comprising predominantly firm to stiff silty clays, locally soft at depth, with localised areas where clayey sandy gravels are found overlying the bedrock. These more granular strata may represent alluvial deposits infilling channels from former courses of the Lambrook Stream; other such channels may traverse the site area. The Head overlies a weathered sequence of the Kellaways Clay Formation comprising silty clays typically becoming more competent with depth. Locally the strata contain; calcite veins; fossil organic matter (paleo-roots and marine algae); crystals (believed to be gypsum); and shells and fragments. The weathering sequence is reflected by an increase in mudstone lithorelics and relic structure with depth, becoming mudstone/siltstone/shale in the base of eight trial pits and one dynamic sampling borehole.

6.2 Excavation and Groundwater

The trial pits sides were generally stable during excavation however minor wall collapse occurred in places. Instability occurred in gravelly strata only, and in TP01 from 1.60m bgl.

Two dynamic sampling boreholes, WS05A and WS07, were abandoned due to collapse of gravels at 1.30m bgl and 3.00m bgl respectively. WS04 was drilled to 5.00m bgl but gravels collapsed to 3.00mbgl after drilling.

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Wet strata were encountered as shallow as 0.92m from ground level in seven of the sixteen trial pits. Groundwater ingress occurred at 2.60m bgl and 3.20m bgl in TP11 and TP06 respectively.

Groundwater was encountered from below 1.05m bgl to 3.0m bgl in four of the twelve dynamic sampling boreholes at the time of drilling and WS02 encountered groundwater in fissures between 3.26 to 3.78m bgl (with a base depth of 5.45m bgl).

Groundwater monitoring (see section 4.2) identified groundwater depths at approximately 0.59m to 4.82m below ground level (bgl). Groundwater levels appear to be typically around 1m below ground level in the eastern part of the site with greater apparent variability in the western area, typically 1m to 4m.

The groundwater monitoring results of four of the ten wells showed a gradual rising of groundwater levels (WS01, WS03, WS09 and WS10). This may be related to a long lag time due to the strata's low permeability, which is reflected in the infiltration test results in TP02 – TP04.

Due to the above findings, provision for pumping and excavation support or benched excavations should be made.

6.3 Foundations

The application of an increased load through foundations of a structure results in deformation of the ground and settlement. Foundation design should ensure that foundation movements are within limits that can be tolerated by the structure without impairing its function. Foundation movements occur from the application and removal of load and ground movement independent of load. The following conditions may result in movements resulting from the application or removal of load:

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- Shear deformation and failure (EC7 Ultimate Limit State condition)
- Settlement (EC7 Serviceability Limit State condition)

Shear deformation and failure may be guarded against using the traditional methods by determining the ultimate bearing capacity and application of a factor of safety of between 2 and 3 to limit deformation.

Settlement may result from immediate elastic settlement and primary consolidation settlement and in some cases secondary settlement of fine grained low permeability strata, subject to the stress history. Differential settlement may result from non-uniform soil conditions, made ground or fill, peaty and organic soils and non-level sites. The magnitude of tolerable settlement defines the allowable bearing pressure and is therefore the value provided within the report.

Eurocode 7: Geotechnical design Part 1: General Rules (BS EN 1997-1:2004) provides the following:

- Principle rules (P) are general statement and definitions for which there is no alternative; requirements and analytical models for which no alternative is permitted unless specifically stated.
- Application rules are examples of generally recognised rules, which follow the principles and satisfy their requirements.
- EC7 design requirements: P for each geotechnical design situation it shall be verified that no relevant limit state, as defined by EN 1990:2002, is exceeded.
- EC7 design situations: P Both short-term and long-term design situation shall be considered.
- EC7 Durability: P at the geotechnical design stage, the significance of environmental conditions shall be assessed in relation to durability and to enable provisions to be made for the protection or adequate resistance of materials.

- Geotechnical design by calculation: (1) P design by calculation shall be in accordance with the fundamental requirements of EN 1990:2002 and with the particular rules of the standard. (2) It should be considered that knowledge of the ground conditions depends on the extent and quality of the geotechnical investigations. Such knowledge and the control of workmanship are usually more significant to fulfilling the fundamental requirements than is precision in the calculation method.
- EC7 Actions: (1) P The definition of actions shall be taken from EN 1990:2002. The values of actions shall be taken from EN1991, where relevant. (2) P The values of geotechnical actions to be used shall be selected, since they are known before a calculation is performed; they may change during that calculation. (3) Any interaction between the structure and the ground shall be taken into account when determining the actions to be adopted in the design.
- EC7 Ground properties: (1) P Properties of soil and rock masses, as quantified for design calculation by geotechnical parameters, shall be obtained from test results, either directly or through correlation, theory or empiricism, and from other relevant data. (2) P Values obtained from test results and other data shall be interpreted appropriately for the limit state considered. (3) Account shall be taken of the possible differences between the ground properties and the geotechnical parameters obtained from the test results and those governing the behaviour of the geotechnical structure. (6) Calibration factors shall be applied where necessary to convert laboratory or field test results according to EN 1997-2 into values that represent the behaviour of the soil and rock in the ground, for the actual limit state, or to take account of correlations used to obtain derived values from test results.
- EC7 Geometrical data: P The level and slope of the ground surface, water levels, levels of interfaces between strata, excavation levels and the dimensions of the geotechnical structure shall be treated as geometrical data.

- EC7 Characteristic Values of actions: (1) P Characteristic and representative values of actions shall be derived in accordance with EN 1990:2002 and the various parts of EN 1991.
- EC7 Characteristic values of geotechnical parameters: (1) P The selection of characteristic values for geotechnical parameters shall be based on results and derived values from laboratory and field tests, complemented by well-established experience. (2) P The characteristic value of geotechnical parameter shall be selected as a cautious estimate of the value affecting the occurrence of the limit state. (12) When using standard tables of characteristic values related to soil investigation parameters, the characteristic value shall be selected as a very cautious estimate.

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The following conditions influencing foundation design are independent of load:

Condition	Yes/No	Requirements
Seasonal volume change	Yes	Medium volume change potential within the cohesive superficial strata requiring a minimum foundation depth of 0.9m.
Building near trees	Yes	Follow NHBC Chapter 4.2 Building Near Trees.
Frost Heave	Possible	Minimum construction depth 0.45m
Application of artificial heat or cold to supporting ground	No	
Changes in groundwater level.	Yes	Seasonal fluctuations are likely. Make provision for groundwater pumping where necessary.
Loss of ground due to erosion (internal erosion) or solution by percolating water or pumping.	Possible	
Changes in state of stress due to adjacent structures, dredging, scour or erosion by streams or floods (loss of support) or due to erection of adjacent structures.	Yes	Foundations to be placed below adjacent service pipes, taking account of adjacent foundation stress zones. The Lambrook stream flows through the site and deposits in the surrounding area suggest it has been subjected to flooding, this will scour over time; structures should be placed well away from this zone.
Continuing settlement of natural deposits.	Yes	Do not place foundations on compressible superficial deposits if encountered. Soft strata encountered in 6 exploratory holes between 0.55 and 4.27m bgl.
Soil creep or landslides, ground sloping >1v:10h	No	
Vibration including seismic disturbances	Unlikely	
Alteration of the properties of the ground due to natural or artificial processes	No	

Foundation Options

Strip or trench fill foundations can be adopted within the firm silty clay Head or the Kellaways Clay Formation. Due to the medium volume change potential results of the four samples tested (see section 4.4) a minimum foundation depth of 0.9m must be adopted in accordance with Chapter 4.4 of the NHBC guidance.

An allowable bearing pressure of 75kPa can be adopted for foundations placed on the firm silty clays. If foundations are placed onto stiff silty clays an allowable bearing pressure of 100kPa can be adopted.

Granular deposits were not widely encountered on site and may be indicative of former channels of the Lambrook Stream. Based on Standard Penetration Testing in the two boreholes to encounter such material, an allowable bearing pressure of 100kPa can be adopted for sands and gravels.

Soft strata were encountered in eight exploratory holes as follows:

Location	Depth	Consistency	Description
TP02	0.92 – 1.40+	Soft	Blue grey mottled orange and yellow, slightly sandy, slightly fine gravelly, clayey SILT.
TP09	0.55 – 1.50	Soft to firm	Light blue grey mottled yellow brown, locally sandy silty CLAY.
TP14	0.70 – 1.30	Firm, locally soft	Yellow brown, mottled brown and grey, slightly gravelly, sandy, silty CLAY
WS02	1.05 – 4.27	Soft	Orange brown, mottled light brown, slightly fine sandy (slightly gravelly), silty CLAY
WS04	1.15 – 2.00	Soft	Brown and orange brown, slightly fine sandy, silty CLAY
WS04	2.00 – 2.63	Very soft	Orange brown mottled light grey, fine sandy, silty CLAY
WS05A	0.80 – 1.05	Soft	Orange brown sandy slightly gravelly silty CLAY.
WS07	0.72 – 1.33	Soft	Light brown, grey and orange brown, slightly sandy, silty CLAY
WS09	1.00 – 1.34	Soft to firm	Light brown and grey, slightly sandy, silty CLAY

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Of the exploratory holes listed above, TP09, TP14, WS07 and WS09 are the only holes within the proposed residential development area. Accordingly, in these areas, and in any others which encounter strata of similar consistency, foundations should be extended to depths where more competent strata are reached.

The foundation for each building should be placed on a consistent bearing stratum.

Soft spots are possible and where encountered these should be assessed separately. If the soft spot is relatively small, it could be excavated and replaced with either engineering fill or lean mix concrete.

The depth of foundations near to existing or proposed trees will need to be increased in accordance with the recommendations of NHBC Chapter 4.2.

Foundations should be placed deeper than adjacent pipes and trenches.

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Strata		Depth of strata at each exploratory hole (m)					
		TP01	TP02	TP03	TP04	TP05	TP06
Topsoil / Subsoil		GL – 0.25	GL – 0.30	GL – 0.36	GL – 0.25	GL – 0.30	GL – 0.35
Superficial deposits	Stiff to very stiff, grey brown, gravelly, sandy silty CLAY				0.25 – 0.50		
	Stiff to very stiff mottled yellow brown and light grey (slightly sandy) silty CLAY	0.25 – 1.60	0.30 – 0.92		0.50 – 1.00	0.30 – 0.60	0.35 – 0.45
	Firm to stiff mottled blue grey/purple and yellow brown (slightly gravelly, slightly sandy) silty CLAY			0.36 – 1.50		0.60 – 1.30	0.45 – 1.30
	Stiff, yellow brown and blue grey slightly gravelly, sandy silty CLAY				1.00 – 1.50		
	Grey mottled yellow silty SAND	1.60 – 2.00					
	Grey brown, sandy, silty GRAVEL	2.00 – 2.90					
	Soft, blue-grey, slightly sandy slightly gravelly clayey SILT		0.92 – 1.40				
Completely weathered Kellaways Formation	Firm to stiff light blue grey/purple grey mottled yellow brown, silty CLAY			1.50 – 1.60		1.30 – 1.50	
	Stiff, blue/purple grey/dark grey, slightly sandy, silty CLAY				1.50 – 2.00	1.50 – 3.50	1.30 – 1.60
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE						1.60 – 3.20
	Very stiff, dark blue grey CLAY	2.90 – 3.10					
Minimum founding depth (m)		0.9	*	0.9	0.9	0.9	0.9
Allowable bearing pressure (kPa)		100		75	100	75	75

* Further investigation required.

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Strata		Depth of strata at each exploratory hole (m)					
		TP07	TP08	TP09	TP10	TP11	TP12
Topsoil / Subsoil		GL – 0.25	GL – 0.28	GL – 0.30	GL – 0.25	GL – 0.25	GL – 0.25
Superficial deposits	Stiff to very stiff mottled yellow brown with grey slightly sandy, silty CLAY	0.25 – 0.50	0.28 – 0.56	0.30 – 0.55	0.25 – 0.80	0.25 – 0.60	0.25 – 0.50
	Firm to stiff mottled blue grey/purple and yellow brown (slightly gravelly, slightly sandy) silty CLAY					0.60 – 1.20	0.50 – 1.50
	Stiff, blue/purple grey mottled yellow brown, silty CLAY	0.50 – 1.60	0.56 – 1.50		0.80 – 1.40		
	Soft to firm blue-grey, locally sandy silty CLAY			0.55 – 1.50			
Completely weathered	Firm to stiff light blue grey/purple grey mottled yellow brown, (slightly sandy) silty CLAY	1.60 – 2.80		1.50 – 2.10		1.20 – 1.80	
Kellaways Formation	Stiff, blue/purple grey/dark grey, slightly sandy, silty CLAY	2.80 – 3.80	1.50 – 2.80	2.10 – 3.50	1.40 – 2.80	1.80 – 2.00	1.50 – 3.30
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE		2.80 – 3.75	3.50 – 3.85	2.80 – 3.00	2.00 – 2.80	

Minimum founding depth (m)	0.9	0.9	1.5	0.9	0.9	0.9
Allowable bearing pressure (kPa)	100	100	75	100	75	75

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Strata		Depth of strata at each exploratory hole (m)			
		TP13	TP14	TP15	TP16
Topsoil / Subsoil		GL – 0.40	GL - 0.30	GL – 0.40	GL – 0.60
Superficial Deposits	Stiff, yellow brown with grey brown, gravelly, sandy silty CLAY		0.30 – 0.70	0.40 – 0.70	
	Stiff yellow brown gravelly, sandy, silty CLAY with cobbles	0.40 – 0.65			0.60 – 1.10 / 1.40
	Firm, locally soft mottled blue grey/purple and yellow brown (slightly gravelly, slightly sandy) silty CLAY	0.65 – 1.50	0.70 – 1.30		
	Stiff to very stiff, light blue grey mottled yellow brown, slightly gravelly, slightly sandy, silty CLAY			0.70 – 1.50	
Completely weathered Kellaways Formation	Firm purple grey mottled yellow brown, (slightly sandy) silty CLAY	1.50 – 2.10			
	Stiff to very stiff, light blue/purple grey mottled yellow brown, sandy silty CLAY		1.30 – 1.70		1.10 / 1.40 – 2.80
	Stiff, blue/purple grey/dark grey, slightly sandy, silty CLAY	2.10 – 2.90	1.70 – 3.80	1.50 – 2.20	2.80 – 3.70
	Extremely weak dark purple grey MUDSTONE/SILSTONE/SHALE	2.90 – 3.50		2.90 – 3.00	

Minimum founding depth (m)	0.9	0.9	0.9	0.9
Allowable bearing pressure (kPa)	75	75	100	100

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Strata		Depth of strata at each exploratory hole (m)					
		WS01	WS02	WS03	WS04	WS05	WS05A
Topsoil / Subsoil		GL – 0.28	GL – 0.25	GL – 0.26	GL – 0.28	GL – 0.26	GL – 0.24
Superficial deposits	Firm, brown slightly sandy, slightly gravelly silty CLAY	0.28 – 0.56					
	Stiff to very stiff brown mottled light brown slightly sandy silty CLAY	0.56 – 1.05	0.25 – 1.05	0.26 – 1.17	0.28 – 1.15	0.26 – 0.78	0.24 – 0.80
	Soft, orange brown and brown, slightly sandy, silty CLAY		1.05 – 4.27		1.15 – 2.00		0.80 – 1.05
	Very soft, orange brown and grey, sandy silty CLAY				2.00 – 2.63		
	Firm brown and grey, slightly sandy silty CLAY		4.27 – 4.57			0.78 – 1.17	
	Stiff, grey and orange brown (slightly gravelly), sandy silty CLAY	1.05 – 2.70				1.17 – 1.81	
	Grey brown, sandy, silty GRAVEL				2.63 – 3.51		1.05 – 1.30
Completely weathered	Stiff to very stiff, brown becoming dark grey, slightly sandy, silty CLAY	2.70 – 5.45	4.57 – 5.45	1.17 – 5.40	3.51 – 5.00	1.81 – 4.45	
Kellaways Formation	Extremely weak dark purple grey MUDSTONE/SILSTONE/SHALE			5.40 – 5.45			
Minimum founding depth (m)		0.9	*	0.9	2.6	1.1	
Allowable bearing pressure (kPa)		100		100	100	100	

* Piling likely to be required.

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Strata		Depth of strata at each exploratory hole (m)					
		WS06	WS06A	WS07	WS08	WS09	WS10
Topsoil / Subsoil		GL – 0.22	GL – 0.20	GL – 0.21	GL – 0.18	GL – 0.28	GL – 0.24
Superficial deposits	Stiff to very stiff brown mottled light brown slightly sandysilty CLAY	0.22 – 1.28	0.20 – 0.42	0.21 – 0.72	0.18 – 0.49	0.28 – 1.00	0.24 – 1.10
	Soft, orange brown and brown with grey, slightly sandy, silty CLAY			0.72 – 1.33		1.00 – 1.34	
	Firm brown and grey, silty CLAY				0.49 – 1.34		
	Stiff, orange brown and grey silty CLAY	1.28 – 1.95	0.42 – 1.00	1.33 – 1.90			
	Stiff, locally firm, orange brown and grey silty CLAY		1.00 – 1.83				
Completely weathered Kellaways Formation	Grey brown, sandy, silty GRAVEL			1.90 – 2.50			
	Stiff to very stiff, brown becoming dark grey, slightly sandy, silty CLAY	1.95 – 5.45	1.83 – 2.10	2.50 – 3.00	1.34 – 4.70	1.34 – 5.45	1.10 – 3.40
	Extremely weak dark purple grey MUDSTONE/SILTSTONE/SHALE						3.40 – 3.45
	COBBLE of sandstone		2.10 – 2.35				

Minimum founding depth (m)	0.9	0.9	1.3	0.9	1.3	0.9
Allowable bearing pressure (kPa)	100	100	100	75	100	100

6.4 Floor Slabs

The previous Phase 1 report (ref: GCE00644/R1) indicates that no radon protection measures are required.

Suspended floor slabs will be required to take account of the potential for volume change where fine-grained soils are present within the building footprint. The following table provides the NHBC recommended void dimensions for potential ground movement based on volume change potential of the fine-grained soils:

Volume change potential	Against side of foundation/ ground beam	Underground beam and suspended in-situ concrete ground floor	Pre-cast concrete and suspended timber floors	Drainage construction minimum allowance for potential movement
	mm	mm	mm	mm
High	35	150	300	150
Medium	25	100	250	100
Low	0	50	200	50

6.5 Buried Concrete

Six samples were analysed for pH, total sulphate, soluble sulphate and total sulphur (BRE SD1 Suite) (see section 4.5). The calculated Total Potential Sulphate (%SO₄) calculated from these results were from 0.24 %SO₄ to 18.63 %SO₄.

Due to the high sulphate levels in the soils, buried concrete should be designed in accordance with design sulphate class DS-4 ACEC class AC-4s of BRE Special Digest 1 (2005), assuming mobile groundwater is present.

6.6 Road Pavement Design

Near surface sub-grade should be treated as frost susceptible therefore requiring a minimum 450mm layer of non-frost susceptible construction.

DCP testing has calculated a minimum CBR of 2.60% below the topsoil and a maximum CBR of 30.81%. Lowest results were recorded in DCP 6, which encountered soft ground to 777mm below ground level.

A preliminary design CBR of 2% is suggested, which should be subject to confirmation by further in-situ testing once the horizontal and vertical alignments of the roads are finalised.

7.0 CONCLUSIONS

The Phase 1 Desk Study completed by Geo Consulting Engineering Ltd (ref: GCE00644/R1) indicates that the site has been in agricultural use since the first available mapping of 1887. The north west of site was historically a water meadow.

An historic brickworks was mapped from 1887 north west of site. This area is subsequently mapped as a refuse tip and haulage depot from 1974 to 1999. Residential development covers the area from 2006.

The British Geological Survey's mapping indicates the site is underlain by the Kellaways Formation and Oxford Clay Formation.

The ground investigation comprised sixteen trial pits; four large scale infiltration tests; twelve dynamic sampling boreholes, ground gas and groundwater monitoring, and chemical and geotechnical laboratory testing.

The ground investigation found the site has a cover of top- and sub- soil over Head deposits of soft to firm (locally sandy) silty clays, occasional alluvial sands and predominantly limestone alluvial gravels. Superficial deposits are underlain by a weathered sequence of the Kellaways Formation, comprising silty clays typically becoming more competent with depth. Shell fragments, clear crystals (believed to be gypsum), organic matter (marine algae and paleo-roots) and sandy lenses were identified within the strata across the site.

Groundwater monitoring identified groundwater levels ranged from 0.59m to 4.82m below ground level (bgl). Water ingress was noted during the excavation of two trial pits from 2.60m bgl but wet strata, interpreted to be groundwater were observed from 0.92m bgl.

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Large scale infiltration testing of four trial pits indicate that soakaway drainage is unlikely to be viable at this site due to the high rest groundwater levels and predominantly low permeability strata.

Mercury concentrations exceeded the residential S4UL values in one sample of topsoil only. Further statistical analysis identifies this concentration as an outlier. Further topsoil sampling around TP09 is recommended in order to delineate this result. The further sampling and any associated works should be addressed as a condition to any planning permission.

All other metal/metalloid concentrations fall below the residential S4UL values.

Total Petroleum Hydrocarbons (TPHs) were not detected in any of the twenty samples.

Polycyclic Aromatic Hydrocarbons (PAHs) were detected in one sample only. All PAH detections are below the residential S4UL.

Ground gas monitoring on four occasions to date has not identified any Gas Screening Values that would exceed the NHBC “Green” assessment criteria. Elevated typical maximum carbon dioxide concentrations have been recorded on three occasions in WS09, the three most recent monitoring visits have not recorded carbon dioxide exceeding 5%. A further six monitoring visits are recommended in order to better characterise carbon dioxide concentrations in WS09 as well as continue to assess WS08. The further monitoring should be addressed as a condition to any planning permission.

Strip or trench fill foundations can be adopted within firm to stiff clays. Due to the medium volume change potential, the foundation depth must be a minimum of 0.9m.

Suspended floor slabs are required.

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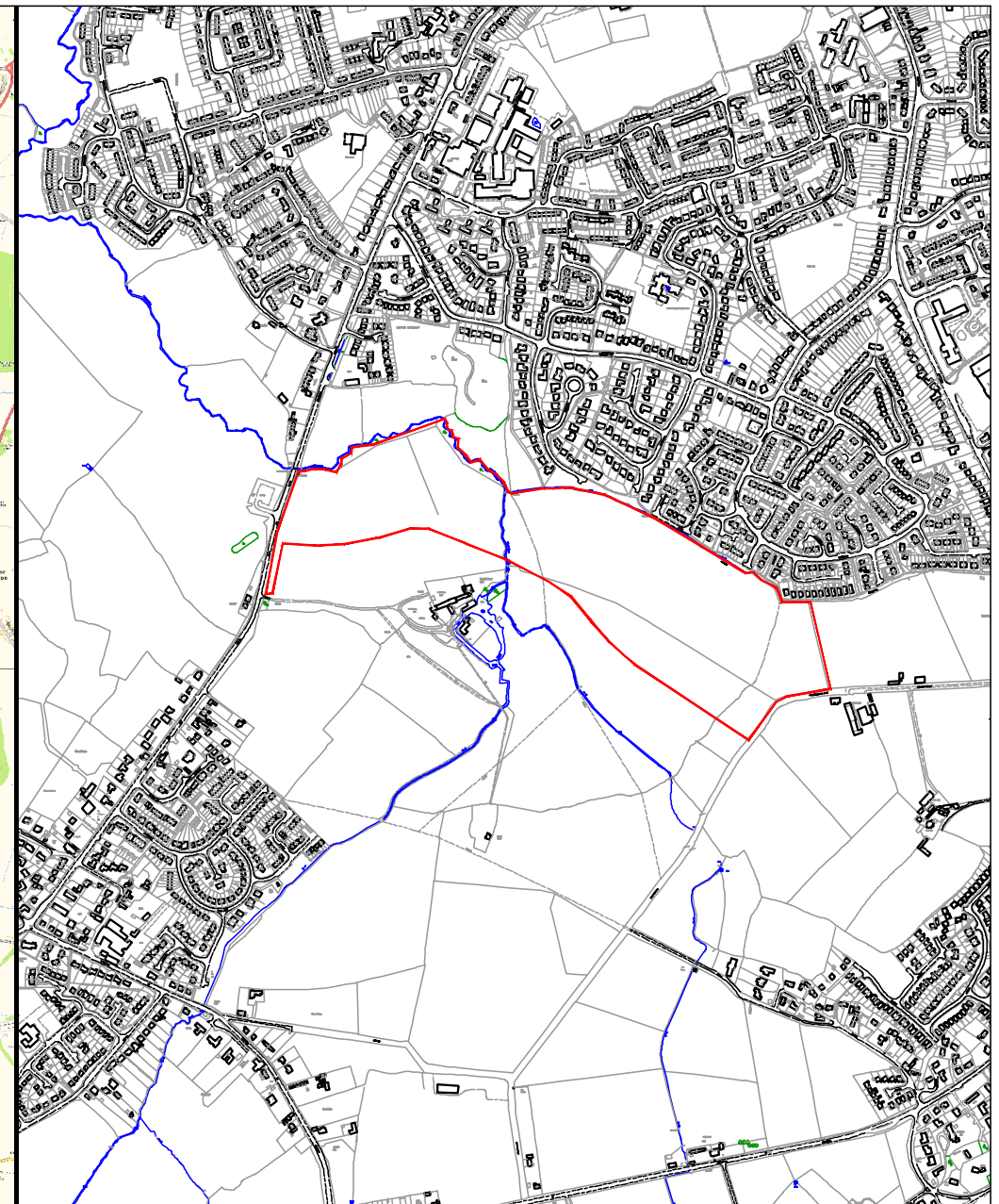
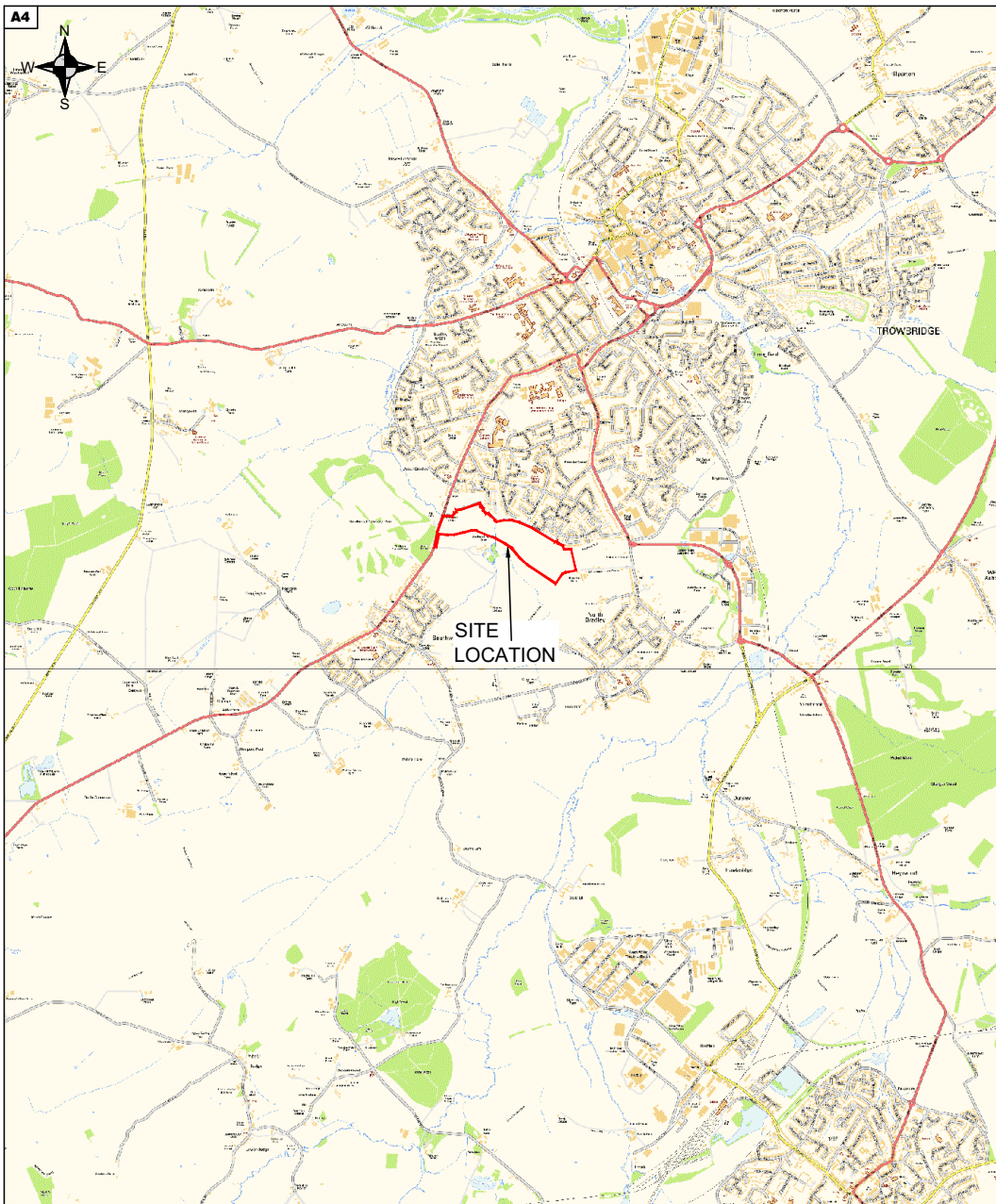
Due to high sulphate levels in the soils, buried concrete should be designed in accordance with design sulphate class DS-4 ACEC class AC-4s of BRE Special Digest 1 (2005), assuming mobile groundwater is present.

A preliminary design CBR of 2% is suggested; in-situ testing is recommended during road construction.

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FIGURES

- | | |
|----------|---|
| Figure 1 | Site Location Plan |
| Figure 2 | Exploratory Hole Location Plan (existing site layout) |
| Figure 3 | Exploratory Hole Location Plan (proposed site layout) |



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Job Title:

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Trowbridge
Wiltshire**

Client:

Waddeton Park Ltd

Dwg Title:

Site Location Plan

Drawing Status

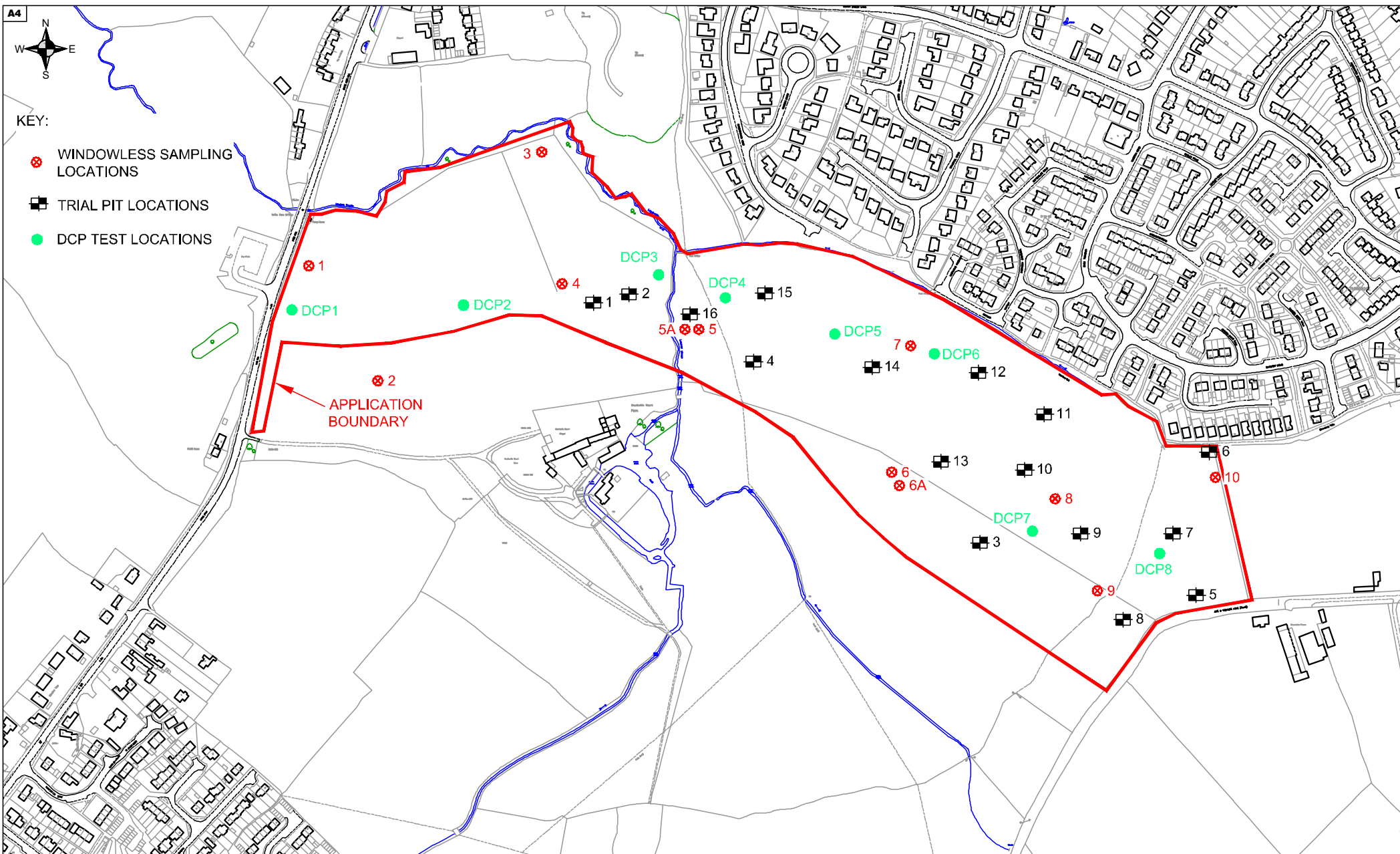
For Information

Scale 1:50000/1:12500 @ A4 Drawn RH

Date Sep 2017 Checked DLJ

Drawing no:
GCE00644/Fig1

Rev



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**Land South of Trowbridge
Trowbridge
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Client:

Waddeton Park Ltd

Dwg Title:

**Exploratory Hole
Layout Plan
(Existing Layout)**

Drawing Status

For Information

Scale 1:5000 @ A4 Drawn RH

Date Sep 2017 Checked DLJ

Drawing no:
GCE00644/Fig2

Rev

APPENDICES

Appendix A	Investigation Methods
Appendix B	Trial Pit Records
Appendix C	Trial Pit Photographs
Appendix D	Dynamic Sampling Borehole Records
Appendix E	Large Scale Infiltration Records
Appendix F	Ground Gas and Groundwater Monitoring Results
Appendix G	Chemical Laboratory Test Results
Appendix H	Geotechnical Laboratory Test Results
Appendix I	DCP CBR Test Results
Appendix J	Utility Service Plans
Appendix K	Gas Main Location Plan

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Appendix A – Investigation Methods

Investigation Methods

The following brief of Ground Investigation techniques summarises their methodology.

Soils and bedrock have been described in accordance with BS5930 2015. Prior to undertaking exploratory holes on site service plans are checked and locations are CAT scanned.

Ground conditions should be monitored during the construction of the works by groundworkers and the recommendations of the report re-evaluated as necessary.

Trial Pits

Trial pits provide an effective method of assessing ground conditions at shallow depth on site and advantages include a rapid check of ground conditions. Trial pits are normally excavated with a wheeled back acting excavator to up to 4m depth, to provide information on ground conditions. Where information is required for existing foundation details or services hand excavated trial pits are normally excavated to up to 1.20m depth. The strata within each trial pit are logged on site by an experienced Engineering Geologist and soil samples are collected for subsequent laboratory testing. The trial pits are entered at shallow depth where safe to do so to allow logging, in-situ testing and sampling. On completion the trial pits are backfilled with arisings.

The excavator will be operated by a trained driver with appropriate experience of the particular machine and suitable certification. A brief explanation of the works and site specific hazards will be provided at the beginning of the working day and reviewed as the work progresses. A bucket width of 0.6m will normally be selected, other widths may be used depending on particular conditions, and a trial pit length of 2m to 3m will be excavated in order to reach the maximum depth of the excavator boom. The arisings will be placed a safe distance from the pit sides in order to prevent overloading of the ground and collapse of the pit sides. Excavation in the upper layers will be undertaken

carefully in thin layers in order to reveal any warning tape indicating buried services. If the trial pit becomes unstable excavation will be stopped.

Large Scale Infiltration Testing

Infiltration testing is undertaken in general accordance with the BRE365 methodology.

Infiltration testing will involve the safe delivery of water into the trial pit via a pipe from a tractor towed bowser. Measurements of water depth will be recorded against time, together with pit dimensions, to allow calculation of an infiltration factor in accordance with BRE365.

Dynamic Drive (Window) Sampling

Dynamic Drive Sampling is used where access is restricted and/or where gas and groundwater installations are required or where hard surfacing is present. Depths of between 3-6m are normally achieved in suitable ground.

The Sampling rig is track mounted, with dimensions of 2.7m long, 0.75m wide and 2.4m high when in operation and 1.3m high when being tracked to position. A four stroke diesel engine is used to operate a chain lifted weight of 63.5kg, which is dropped a distance of 0.76m onto a hardened steel anvil, which in turn drives the steel sampling tubes vertically into the ground. The sample tubes are typically 1m long and 100mm to 75mm in diameter and contain a plastic liner. The sample tubes are retrieved using integral hydraulic rams. Additional driving rods are attached and tubes of gradually reducing diameter used to reach the required depth. Standard Penetration Testing and U100 sampling may be undertaken. Samples are collected from the soil samples recovered. The resulting hole may be completed as a monitoring well or backfilled with arisings. The rig will be operated by trained and experienced crew. Concrete coring is normally undertaken prior to window sampling where concrete surfacing is present, this is normally undertaken with the Archway rig with a coring attachment.

In areas where there is very limited access Dynamic Sampling is undertaken using a hand held jack hammer and separate power pack to drive the sample tubes into the ground. The diameter of the sample tubes are reduced as drilling proceeds. The sample tubes are jacked out of the ground using hydraulic jacks and the power pack. The soils are logged and samples are collected from the tubes.

Supervision of the works will be undertaken by competent Engineering Geologist/ Geotechnical Engineer.

Dynamic Probing

This technique measures the number of blows of a standard weight falling over a standard height. The weight is dropped onto an anvil delivering a set energy onto a hardened steel probe, which is driven into the ground. The number of blows per set 100mm increment is recorded. Dynamic Probing is normally undertaken with a track mounted Archway rig. Where access is limited a portable mechanically driven dynamic probe is used. Depths of up to 10m are typically achieved in suitable ground conditions. The normal weight used is 63.5kg (DPSH). Where access is very limited hand held dynamic probing can be undertaken, which uses a 10kg weight (DPL) with a separate power pack. The rods are jacked out of the ground using a hand held jack. No samples are collected with this method.

Dynamic Cone Penetrometer (DCP)

The hand driven DCP probing device has been calibrated by TRL to provide a profile of CBR values, normally to 0.85m depth.

Cable Percussion Boreholes

The technique can determine ground conditions to depths of in excess of 30m in suitable ground conditions. The method is used in ground conditions other than rock. Soil samples are recovered for logging purposes. Samples are normally collected at 1.00m

intervals or at a change of strata. Standard Penetration Testing and U100/UT100 sampling may be undertaken. Insitu testing is normally undertaken at 1m intervals to 5m depth and thereafter at 1.50m intervals. Steel casing is normally used to prevent hole collapse.

The following description is taken from British Standard BS5930 2015.

Cable percussion boring is an adaptation of standard well-boring methods, and normally uses a mobile rig specially designed for ground investigation work. For most investigations, the rig has a winch of 1 tonne to 2 tonne capacity, which is driven by a diesel engine and a derrick of about 6 m in height. With many types of rig, the legs of the derrick fold down to form a simple trailer that can be towed by a light vehicle. The drill tools, which are worked on a wire rope using the clutch of the winch for the percussive action, consist of the clay cutter for dry cohesive soils, the shell or bailer for granular soils and the chisel for breaking up rock and other hard layers.

The sizes of borehole casings and tools are usually 150 mm and 200 mm. For special projects 250 mm and 300 mm are available. This gives a maximum borehole depth of about 60m in suitable strata. The clay cutter should be used in cohesive soil in a damp or dry borehole. Where the borehole contains water, it might be necessary to use a combination of the clay cutter and the shell in cohesive soil. The shell should be used in granular soils and there should be sufficient water in the bottom of the borehole to cover the shell (about 2.5 m); it is, therefore, necessary to add water to a borehole in order to bore through dry granular strata that require the use of the shell. When the boring advances below the water table in granular strata, water should be added to the borehole to sufficient maintain water in the hole at a level above that of the surrounding groundwater. This reduces, but might not eliminate, the tendency for loosening the ground below the base of the hole by 'blowing'. The shell should be withdrawn slowly and, if necessary, an undersized shell should be used.

Cable percussion boring may be used for soil and weaker rocks. The clay cutter and shell bring up disturbed material which is usually sufficiently representative to permit identification of the strata.

Rotary Drilling

The technique can determine ground conditions to depths of in excess of 30m in suitable ground conditions. The method is used for drilling in soil and rock. The drilling is undertaken using a rotary drilling rig. The boreholes are initially drilled by dynamic sampling methods from ground level and stopped when effective refusal for this technique is reached as defined by a Standard Penetration Test (SPT) N value >50.

Soils samples are recovered for logging purposes. Samples are normally collected at 1.00m intervals or at a change of strata. Standard Penetration Testing and U100/UT100 sampling may be undertaken. Insitu testing is normally undertaken at 1m intervals to 5m depth and thereafter at 1.50m intervals. The boreholes are then ODEX cased and continued by rotary coring. The coring is normally undertaken using a 1.50m long T6-116 core barrel, giving a core diameter of 92mm. A combined air and water flush is used to assist coring and maximise the core recovery. The rotary coring technique includes a plastic core liner within the metal barrel; the liner is removed after sampling and placed into a wooden core box. The rock cores are logged, sampled and photographed by an Engineering Geologist. Examination of the cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed.

The following description is taken from British Standard BS5930 2015.

Rotary drilling methods, in which the drill bit is rotated on the bottom of the borehole, are used to drill rocks and soils for investigation purposes. The drilling fluid, which is passed from the surface through hollow drill rods to the face of the bit, cools and lubricates the bit, transports drill cuttings to the ground surface and, when using particular types of drilling fluids, stabilizes the borehole. Common drilling fluids include clean water, air or a mixture of both. Mud, polymers or foam are also frequently used to maintain or assist

borehole stability, aid the transport of drill cuttings to the surface and maximize core recovery, particularly in soils and weaker rock formations.

There are two basic types of rotary drilling: open hole (or full hole) drilling, where the drill bit cuts all the material within the diameter of the borehole; and core drilling, where an annular bit, fixed to the bottom of the outer rotating tube of a core barrel, cuts a core, which is recovered within the innermost tube of the core barrel assembly and brought to the surface for examination and testing. Rotary drilling for ground investigation is usually core drilling.

When open hole drilling or coring, temporary casing is normally used to support unstable ground or to seal off fissures or voids, which cause excessive loss of drilling fluid. Drilling fluid additives or cement grouting can sometimes be satisfactory alternatives.

The rotary drilling rig should be well maintained and should be capable both of controlling rotational speed and providing axial load and torque to suit the nature and hardness of the material penetrated, the diameter of the core barrel and drill string, drilling fluid and flushing system, weight of drill string and installation of temporary casing(s). When recirculating, the drill fluid should be cleaned as an integral part of the process so that it is suitable for continuing reuse.

Open Hole Drilling

The technique is normally used for installing groundwater and gas monitoring wells or for determining the presence or otherwise of voids in bedrock to depths of in excess of 30m in suitable ground conditions. The drilling is undertaken using a rotary drilling rig. The boreholes are normally drilled by open hole methods with air flush. The boreholes are logged from risings and rates of penetration by an Engineering Geologist.

The following description is taken from British Standard BS5930 2015.

Open hole drilling is sometimes used in soils and weaker rocks as a rapid and economical means of making holes in the ground for the purpose of advancing the hole to a sampling depth, progressing a hole to a specified depth or material type, for carrying out in-situ tests, for installing instruments, etc. The technique can also be used to probe for voids such as mine workings, solution cavities, etc. Systems are available whereby casings are driven simultaneously with the open hole bit. While drilling, only drill cuttings are returned in the drill fluid.

The rate of progress of drilling and observations of the flushing medium and the cuttings should be recorded. These records may be made by the lead driller or a separate logger. The cuttings constitute very low quality samples and it is usually difficult to detect a change in strata, unless there is a good contrast in properties such as colour, mineral content or hardness. Where such contrast prevails, open hole drilling can be used as a probing technique.

NOTE The use of suitable instrumentation, termed “drilling parameter recording” (DPR) or “measurements while drilling” (MWD), in order to record the progress of the drilling rig can considerably enhance the results obtained (see BS EN ISO 22476-15).

Static Cone Penetration Test (SCPT)

Static cone penetration testing uses a hydraulic drive system to push a cone into the ground at a constant velocity from ground level on hollow extension rods each 1m long, which have a readout cable running through the hollow centre. Internal load sensing devices measure the axial thrust on the cone and the frictional force on the sleeve; an inclinometer checks vertical alignment and drift. The electrical signals are transmitted by the umbilical cable to the recorders at ground level as the tip is pushed into the ground at a constant rate of penetration of 20 mm/second.

The cone is 35.7mm in diameter, so that its projected area is 10cm², and the friction sleeve area is 150cm². The cone and sleeve resistances are automatically recorded in MPa.

A piezometric sensor and filter can be incorporated in the penetrometer to record equilibrium pore water pressures at intervals and excess pore water pressures during penetration.

GCE00644/ R2



Appendix B – Trial Pit Records



Trial Pit Log

TrialPit No
TP01
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384510.00 - 156008.00
Level:

Date
18/07/2017

Location: Trowbridge

Dimensions (m):

1.80

Depth
3.10

0.50

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25			Grass over, brown, sandy, silty CLAY with abundant roots and rootlets. (Topsoil/Subsoil)	
	0.30	ES					Stiff to very stiff, light yellow brown, sandy, silty CLAY with occasional rootlets.	
	0.40	D						
	0.40	PP	112.5	0.45			Stiff, yellow mottled light grey, slightly sandy, silty CLAY with occasional rootlets.	
	0.45	HVP	112					
	0.70	HVP	90					
	0.70	PP	100					
	0.90	D						
	0.90	PP	100					1
	1.30	HVP	72					
	1.50	D						
	1.60	D		1.60			Grey, mottled yellow, very silty/clayey fine SAND with black staining. Locally tending to very sandy SILT/CLAY.	
	2.00	D		2.00			Grey brown, sandy silty GRAVEL. Gravel is predominantly fine, sub-rounded limestone, siltstone, sandstone, chert and quartz.	2
				2.90			Very stiff, dark blue grey, silty CLAY.	3
				3.10			End of Pit at 3.10m	

Remarks: Strata are wet from 1.60mbgl.

Stability: Minor spalling from 1.60mbgl.





Trial Pit Log

Trial Pit No
TP02
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384534.00 - 156010.00
Level:

Date
18/07/2017

Location: Trowbridge

Dimensions (m): 2.05

Depth
1.40

0.50

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES					Grass over, brown, sandy, silty CLAY with abundant roots and rootlets. (Topsoil/Subsoil)	
	0.30	D		0.30			Stiff to very stiff, yellow brown, fine sandy, silty CLAY with occasional rootlets.	
	0.40	PP	200					
	0.55	PP	162.5	0.50 0.60			Very stiff, yellow brown, mottled light grey, slightly sandy, silty CLAY with occasional rootlets. Stiff to very stiff, yellow mottled light grey, slightly sandy, silty CLAY with occasional rootlets.	
	0.80	HVP	82					
	0.90	D		0.92				
	0.90	PP	125				Soft, blue grey mottled orange and yellow, slightly sandy (est.10%), slightly fine gravelly, clayey SILT. Gravel comprises fine, sub-angular limestone. Increase in sand and gravel content from 1.20m	1
	1.30	D		1.40			End of Pit at 1.40m	2 3 4 5

Remarks: Strata are wet from 0.92mbgl.

Stability: No side spalling below 0.3mbgl.





Trial Pit Log

Trial Pit No
TP03
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384835.00 - 155796.00
Level:

Date
18/07/2017

Location: Trowbridge

Dimensions (m): 2.10

Depth
1.60

0.50

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.25			Grass over, dark brown, slightly sandy, silty CLAY with abundant roots and rootlets and orange staining. (Topsoil/Subsoil)	
	0.40	ES		0.36			Very stiff, dark grey, silty CLAY with mottled orange staining and rootlets.	
	0.40	PP	200				Firm to stiff, blue grey, mottled yellow, closely fissured, silty CLAY with rootlets.	
	0.65	HVP	80					
	0.80	D						
	1.00	PP	75	1.10				1
	1.20	HVP	68				Firm, blue grey, mottled yellow and orange, closely fissured, silty CLAY with rootlets.	
	1.50	D		1.50				
	1.55	PP	75	1.60			Firm to stiff, purple brown, mottled yellow, closely fissured, silty CLAY.	
							End of Pit at 1.60m	
								2
								3
								4
								5

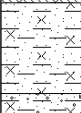
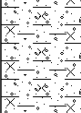
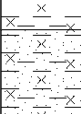
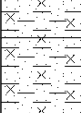
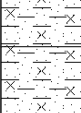
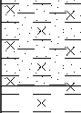
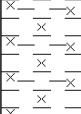
Remarks: Damp from 0.36mbgl. Excavated as clumps.

Stability: Minor spalling from Ground level to 0.36mbgl. No spalling below.



				Trial Pit Log			TrialPit No TP04 Sheet 1 of 1		
Project Name: Southwick Court Farm				Project No. GCE00644		Co-ords: 384648.00 - 155940.00 Level:		Date 18/07/2017	
Location: Trowbridge						Dimensions (m): 0.60		Scale 1:25	
Client: Waddeton Park Ltd						Depth 2.00		Logged RH	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.25			Grass over, dark brown, slightly sandy, silty CLAY with abundant roots and rootlets and orange staining. (Topsoil/Subsoil)		
	0.35	PP	137.5				Stiff to very stiff, grey brown, mottled orange, fissured, slightly gravelly (est.10%), slightly sandy, silty CLAY with rootlets. Gravel comprises predominantly medium, sub-angular chert and occasional sandstone and occasional fine gravel of charcoal.		
	0.40	D					Stiff to very stiff, yellow brown, mottled blue grey and white, slightly sandy, fissured silty CLAY with occasional roots.		
	0.40	PP	137.5	0.50					
	0.90	D					Stiff, yellow brown, mottled blue grey and white, slightly gravelly, sandy fissured silty CLAY. Gravel comprises fine to medium, sub-rounded limestone.		
	0.90	PP	125	1.00					
	1.00	HVP	106				Stiff, blue grey mottled yellow brown, sandy silty CLAY with occasional decaying root and shell fragment.		
	1.50	D		1.50					
	1.90	D		1.80			Stiff, blue grey, occasionally mottled dark grey, slightly sandy, silty CLAY with est. 20% shells and shell fragments and thickly laminated relic structure. Excavated as blocky crumble.		
				2.00			End of Pit at 2.00m		
Remarks: Strata are wet from approximately 1.40mbgl.									
Stability: Very slight spalling.									



				Trial Pit Log			TrialPit No TP05 Sheet 1 of 1	
Project Name: Southwick Court Farm				Project No. GCE00644		Co-ords: 385092.00 - 155709.00 Level:		Date 18/07/2017
Location: Trowbridge						Dimensions (m):		Scale 1:25
Client: Waddeton Park Ltd						Depth 3.50		Logged RH
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.30			Grass over, dark brown, slightly gravelly, slightly sandy, silty CLAY with abundant roots and rootlets and mottled orange brown staining. (Topsoil/Subsoil)	1 2 3 4 5
	0.40	D						
	0.40	PP	200	0.60		Stiff to very stiff, yellow brown mottled light blue grey, very closely fissured, slightly sandy, silty CLAY. Gravel comprises occasional medium, sub-angular chert.		
	0.40	PP	225					
	0.60	PP	125					
	0.90	D		1.30		Firm to stiff, light blue grey, mottled, closely fissured, slightly gravelly, slightly sandy, silty CLAY. Gravel comprises occasional medium, sub-angular chert.		
	1.30	HVP	80					
	1.40	HVP	64					
	1.70	D		1.50		Firm to stiff, light blue grey mottled yellow brown, closely fissured silty CLAY with localised silt dusting (possible calcite).		
				1.90		Stiff, dark purple grey, mottled orange and yellow, slightly sandy, silty CLAY with thinly laminated relic structure. Sand is fine to coarse in localised lenses of orange and yellow mottling.		
			2.30		Stiff, dark purple grey, mottled orange and yellow, slightly sandy, silty CLAY with abundant coarse sand sized gypsum crystals and thinly laminated relic structure. Sand is fine to coarse in localised lenses of orange and yellow mottling.			
2.50	D		2.80		Stiff, dark purple grey, silty CLAY with thinly laminated relic structure, mottled pale yellow silt and occasional (<10%) dark brown, fine sand lenses.			
			3.30		Stiff, dark grey, silty CLAY with up to 10% extremely weak mudstone lithorelics, estimated 30 - 40% coarse sand sized gypsum crystals, estimated 20% shells and fragments, thinly laminated relic structure and localised lenses of dark brown fine sand.			
3.40	D		3.50		Very stiff, dark grey, silty CLAY tending to extremely weak mudstone with thinly to thickly laminated relic structure and occasional very weak, black, fine to medium mudstone gravel. Excavated as blocky cobble and coarse gravel of clay.			
End of Pit at 3.50m								
Remarks: Strata are wet from approximately 2.80mbgl.								
Stability: No spalling below 0.3mbgl.								



Trial Pit Log

Trial Pit No
TP06
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 385106.00 - 155849.00
Level:

Date
18/07/2017

Location: Trowbridge

Dimensions
(m):

Depth
3.20

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES					Grass over, dark brown, slightly sandy, silty CLAY with abundant roots and rootlets and orange staining. (Topsoil)	
	0.30	PP	250	0.25			Very stiff, brown mottled dark grey and yellow brown, slightly sandy, silty CLAY with abundant rootlets and occasional pottery fragment. (Subsoil)	
	0.40	PP	200	0.35			Very stiff, yellow brown mottled light grey, closely fissured, silty CLAY with occasional rootlets and occasional fine coal.	
	0.60	PP	100	0.45			Firm to stiff, yellow brown mottled light grey, closely fissured, silty CLAY with occasional rootlets.	
	0.70	D						
	0.70	HVP	74					
	1.00	D		1.00			Firm to stiff, light blue grey mottled yellow brown, closely to very closely fissured silty CLAY with occasional rootlet.	1
	1.00	HVP	72					
	1.30	D		1.30			Stiff, dark purple grey, weathered brown and mottled pale yellow, silty CLAY with estimated 40% extremely weak, fine to coarse mudstone lithorelics and thinly to thickly laminated relic structure. Excavated as blocky gravel of clay.	
	1.50	D		1.50				
	1.70	D		1.60			Stiff, dark purple grey mottled rusty orange and pale yellow slightly sandy, silty CLAY.	
							Extremely weak, dark purple grey MUDSTONE excavated as blocky coarse gravel/cobbles in (est. 20%) slightly sandy clay matrix.	2
				2.40				
	2.50	D					Extremely weak to very weak, dark purple grey MUDSTONE.	
				2.90				
	3.00	D					Extremely weak, dark grey, thinly laminated MUDSTONE/ SHALE with up to 40% shell fragments between layers.	3
				3.20			End of Pit at 3.20m	
								4
								5

Remarks: Wet from 2.50mbgl, groundwater entered the trial pit from 3.20m.

Stability: Very slight spalling.





Trial Pit Log

Trial Pit No
TP07
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 385083.00 - 155770.00
Level:

Date
18/07/2017

Location: Trowbridge

Dimensions
(m):

Depth
3.80

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES	225	0.15			Grass over, slightly gravelly, sandy silty CLAY with abundant roots and rootlets. Gravel comprises <10% sub-rounded sandstone and sub-angular chert. (Topsoil)	
	0.35	PP		0.25			Stiff, dark brown mottled yellow and orange, slightly gravelly, sandy, silty CLAY with occasional rootlets. Gravel comprises <10% medium limestone and sandstone. (Subsoil)	
	0.60	D		0.50			Very stiff, yellow brown, sandy, silty CLAY with occasional rootlets.	
			120				Stiff to very stiff, light blue grey mottled yellow brown, closely fissured silty CLAY with occasional rootlets. Lense of black decayed tree roots encountered at 1.40m.	1
	1.15	HVP						
	1.40	D						
				1.60				
	1.70	D		1.80			Stiff, locally firm, light blue grey mottled yellow brown and white, closely fissured silty CLAY with localised (up to 30%) fine, white medium sand.	
	1.90	D		2.00			Stiff, mottled light blue grey and yellow brown, sandy silty CLAY with occasional black staining. Sand is medium to coarse.	2
							Stiff, light blue grey, tending grey brown, closely fissured, slightly sandy silty CLAY with estimated 10% coarse sand sized gypsum crystals and relic structure of thin to thick laminations. Locally abundant seaweed-like palaeo-rootlets around 2.50m.	
	2.50	D						
				2.80			Stiff, grey, locally mottled brown, closely fissured, silty CLAY with up to 40% coarse sand and fine gravel sized gypsum crystals and relic thin and thick laminations.	3
	2.90	D		3.10			Stiff to very stiff, dark grey silty CLAY, with estimated 10% extremely weak mudstone lithorelics. Localised pale yellow silt veins in initial 0.30m.	
	3.30	D						
				3.80			End of Pit at 3.80m	4
								5

Remarks: Strata are wet around 2.80mbgl.

Stability: Very slight spalling.





Trial Pit Log

TrialPit No
TP08
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 385031.00 - 155677.00
Level:

Date
19/07/2017

Location: Trowbridge

Dimensions
(m):

Depth
3.75

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.05	ES		0.15			Grass over, brown, sandy, silty CLAY with abundant roots and rootlets. (Topsoil)	
	0.20	PP	250	0.28			Very stiff, brown, slightly gravelly, sandy silty CLAY with occasional rootlets and mottled orange staining. Gravel comprises fine, sub-rounded sandstone and limestone. (Subsoil)	
	0.35	PP	225				Stiff to very stiff, yellow brown, mottled light blue grey, closely fissured, slightly fine sandy silty CLAY with occasional rootlets and occasional fine coal.	
	0.40	D					Stiff, light blue grey mottled yellow brown, closely fissured silty CLAY with occasional rootlet.	
	0.55	PP	162.5	0.56				
	0.85	HVP	106					
	1.00	D						
	1.00	PP	130					
	1.20	HVP	116	1.30				
	1.40	D		1.50			Stiff, purple grey mottled pale yellow and rusty brown, closely to very closely fissured, silty CLAY with very occasional rootlets and occasional lenses of black organics.	
							Stiff, purple grey mottled pale yellow and rusty brown, closely to very closely fissured, silty CLAY with relic thin to thick laminations and locally medium sandy and very occasional rootlets.	
				2.00			Stiff, purple grey mottled yellow and rusty brown, silty CLAY tending to extremely weak MUDSTONE. Excavated as silty clay with up to 60% extremely weak, up to cobble sized mudstone lithorelics.	
	2.70	D		2.80			Extremely weak, blue grey, closely fractured MUDSTONE/SILTSTONE with localised yellow silt and <5% prismic gypsum crystals generally 3cm to 6cm long. Excavated as blocky gravelly cobbles in 20% silty clay matrix. Cobbles are smooth sided where broken along bedding fractures.	
	2.90	D						
	3.60	D		3.75				
							End of Pit at 3.75m	

Remarks: No groundwater encountered.

Stability: No spalling below 0.30mbgl.





Trial Pit Log

Trial Pit No
TP11
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384943.00 - 155895.00
Level:

Date
19/07/2017

Location: Trowbridge

Dimensions
(m):

Depth
2.80

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.25			Grass over, brown, slightly gravelly, sandy, silty CLAY with abundant roots and rootlets. Gravel comprises fine, sub-angular siltstone and sandstone and fine hard coal. (Topsoil)	
	0.45	PP	250				Stiff to very stiff, grey brown mottled yellow brown, very slightly fine sandy, silty CLAY with rootlets.	
	0.60	D		0.60			Firm to stiff, grey mottled yellow brown, fissured silty CLAY with occasional rootlet and occasional palaeo-root.	
	0.60	PP	100					
	0.60	PP	150					
	0.90	HVP	60					1
	1.20	HVP	62	1.20			Firm to stiff, purple grey mottled yellow brown, closely to very closely fissured silty CLAY with seaweed-like palaeo-rootlets.	
	1.20	HVP	78					
	1.30	D		1.40			Firm to stiff, purple grey, locally rusty orange and pale yellow, very closely fissured silty CLAY with occasional seaweed-like palaeo-rootlets.	
	1.30	HVP	56					
	1.50	HVP	70					
	1.90	D		1.80			Stiff to very stiff, purple grey, locally rusty orange and pale yellow, very closely fissured silty CLAY with occasional seaweed-like palaeo-rootlets.	2
	1.90	HVP	112	2.00			Extremely weak, dark purple grey, locally rusty orange and pale yellow, thinly laminated MUDSTONE/ SILTSTONE.	
				2.40			Extremely to very weak, dark blue grey, thinly laminated MUDSTONE/SHALE. Excavated as blocky, smooth-side cobbles, fractured along bedding planes.	
	2.70	D		2.80			End of Pit at 2.80m	3
								4
								5

Remarks: Groundwater encountered at 2.60mbgl.

Stability: No spalling below 0.40mbgl.





Trial Pit Log

Trial Pit No
TP12
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384876.00 - 155936.00
Level:

Date
19/07/2017

Location: Trowbridge

Dimensions
(m):

Depth
3.30

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30 0.35	ES PP	150	0.25 0.50			Grass over, brown mottled orange, slightly sandy tending sandy, silty CLAY with abundant roots and rootlets. Gravel comprises fine siltstone and sandstone and occasional medium sub-angular chert. (Topsoil/Subsoil) Stiff to very stiff, grey brown, mottled yellow brown, fissured silty CLAY with occasional rootlets and fine gravel sized coal.
	0.85	HVP	56				Firm, light grey mottled yellow brown, closely fissured silty CLAY with occasional rootlets and black staining.
	1.20 1.30 1.40	HVP D B	60	1.30 1.50			Firm, light grey mottled yellow brown, closely fissured, medium to coarse sandy, silty CLAY with occasional rootlets and black staining.
							Stiff, dark purple grey locally rusty orange and pale yellow closely to very closely fissured silty CLAY with localised sandy lenses, localised areas of seaweed-like palaeo-rootlets and localised lenses of fine gravel sized angular gypsum crystals.
				2.10			Very stiff, dark purple grey locally rusty orange and pale yellow, closely to very closely fissured, slightly sandy silty CLAY with relic laminations and abundant shell fragments. Boulder and occasional cobble of medium strong dark grey calcareous mudstone with calcite veins.
	2.70	B		2.70			Stiff to very stiff, dark blue grey, silty CLAY with relic thin laminations tending to extremely weak mudstone/ siltstone from 3.20m.
	3.00	D		3.30			End of Pit at 3.30m

Remarks: No groundwater encountered.

Stability: No spalling below 0.40mbgl.





Trial Pit Log

Trial Pit No
TP13
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384819.00 - 155855.00
Level:

Date
19/07/2017

Location: Trowbridge

Dimensions
(m):

Scale
1:25

Client: Waddeton Park Ltd

Depth
3.50

Logged
RH

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.15			Grass over, brown, slightly sandy tending sandy, silty CLAY with abundant roots and rootlets. Gravel comprises fine siltstone and sandstone and occasional medium sub-angular chert. (Topsoil)	
	0.40	ES		0.40			Very stiff, brown, slightly gravelly, sandy silty CLAY with rootlets. Gravel comprises fine siltstone and sandstone and occasional medium sub-angular chert. (Subsoil)	
	0.60	PP	100	0.65			Stiff, grey brown mottled yellow brown, silty CLAY with occasional rootlets.	
	0.90	PP	50				Firm, light purple grey mottled yellow brown, silty CLAY with occasional decaying rootlets.	1
	1.10	HVP	60					
	1.20	HVP	56					
	1.40	D		1.50				
	1.90	D					Firm, purple grey mottled rusty orange and pale yellow, closely to very closely fissured, slightly sandy, silty CLAY with localised fine gravel sized angular gypsum crystals and relic thin laminations. Abundant gypsum crystals up to 4cm long around 1.60m.	2
	1.90	ES		2.10				
							Stiff, dark blue grey, closely fissured silty CLAY with estimated 10% extremely weak mudstone lithorelics, thinly laminated relic structure, 5% prismic crystals up to 6cm long and locally sandy pockets.	
				2.90			Extremely weak, dark blue grey, slightly fine sandy MUDSTONE/SILTSTONE with abundant shells and fragments.	3
	3.30	D		3.20			Extremely weak, dark blue grey MUDSTONE/SILTSTONE with some shells and occasional gypsum crystal, tending to very stiff silty CLAY.	
				3.50			End of Pit at 3.50m	4
								5

Remarks: No groundwater encountered.

Stability: No spalling below 0.40mbgl.





Trial Pit Log

TrialPit No
TP14
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384783.00 - 155941.00
Level:

Date
19/07/2017

Location: Trowbridge

Dimensions
(m):

Depth
3.80

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10			0.10			Grass over, brown, slightly gravelly, sandy silty CLAY with abundant roots and rootlets. Gravel comprises fine, sub-angular siltstone and sandstone. (Topsoil)	
	0.30			0.30			Stiff, slightly gravelly, sandy silty CLAY with rootlets. Gravel comprises fine, sub-angular siltstone and sandstone. (Subsoil)	
	0.50	D					Stiff, yellow brown mottled brown and grey, slightly gravelly, sandy silty CLAY. Gravel comprises predominantly medium sub-angular to angular chert/flint.	
	0.80	ES		0.70			Firm locally soft, yellow brown mottled brown and grey, slightly gravelly, sandy silty CLAY. Gravel comprises predominantly medium sub-angular to angular chert/flint.	1
	1.00	HVP	40				Stiff to very stiff, closely to very closely fissured slightly fine sandy, silty CLAY.	
	1.20	HVP	70	1.30			Stiff, light blue grey mottled yellow brown, medium to coarse sandy, silty CLAY.	
	1.40	D					Stiff, purple grey mottled yellow and rusty orange, closely fissured silty CLAY with abundant fine angular gypsum crystals and occasional decaying root and occasional lense of weathered roots.	2
	1.40	HVP	70	1.60			Stiff to very stiff, blue grey, closely fissured, slightly fine sandy, silty CLAY with very occasional rounded cobble of limestone and occasional shell fragments. Tending to extremely weak, slightly sandy SILTSTONE/MUDSTONE from 3.60mbgl.	
				1.70			Stiff to very stiff, blue grey, closely fissured, slightly fine sandy, silty CLAY with very occasional rounded cobble of limestone and occasional shell fragments. Tending to extremely weak, slightly sandy SILTSTONE/MUDSTONE from 3.60mbgl.	
				2.50			Stiff to very stiff, blue grey, closely fissured, slightly fine sandy, silty CLAY with very occasional rounded cobble of limestone and occasional shell fragments. Tending to extremely weak, slightly sandy SILTSTONE/MUDSTONE from 3.60mbgl.	3
	3.00	D					Stiff to very stiff, blue grey, closely fissured, slightly fine sandy, silty CLAY with very occasional rounded cobble of limestone and occasional shell fragments. Tending to extremely weak, slightly sandy SILTSTONE/MUDSTONE from 3.60mbgl.	
	3.70	D		3.80			Stiff to very stiff, blue grey, closely fissured, slightly fine sandy, silty CLAY with very occasional rounded cobble of limestone and occasional shell fragments. Tending to extremely weak, slightly sandy SILTSTONE/MUDSTONE from 3.60mbgl.	4
							End of Pit at 3.80m	5

Remarks: No groundwater encountered.

Stability: Sides stable.





Trial Pit Log

Trial Pit No
TP15
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384671.00 - 156011.00
Level:

Date
19/07/2017

Location: Trowbridge

Dimensions
(m):

Depth
3.00

Scale
1:25

Logged
RH

Client: Waddeton Park Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Grass over, stiff, dark brown, slightly gravelly, sandy, silty CLAY with abundant roots and rootlets and low cobble content. Gravel comprises fine to medium, sub-angular limestone, sandstone and siltstone and coarse sub-angular chert. Cobbles are sub-angular sandstone. (Topsoil)	
				0.40			Stiff, dark brown, slightly gravelly, slightly sandy, silty CLAY with occasional rootlets. Gravel comprises fine to medium, sub-angular limestone, sandstone and siltstone and coarse sub-angular chert. (Subsoil)	
				0.70			Stiff, grey brown, mottled yellow brown, slightly sandy, slightly gravelly, silty CLAY. Gravel comprises predominantly medium sandstone and chert.	
	1.20	D					Stiff to very stiff, light blue grey mottled yellow brown, slightly gravelly, slightly sandy, silty CLAY with occasional rootlets.	1
	1.20	HVP	94					
				1.50			Stiff, blue grey mottled yellow brown, sandy silty CLAY with thinly laminated relic structure. Sand is medium grained and white.	
				1.70			Stiff, purple grey, silty CLAY with thinly laminated relic structure and abundant seaweed-like rootlets and shell fragments. Tending to extremely weak MUDSTONE from 2.0mbgl.	2
	2.00	D						
				2.20			Extremely weak, purple grey, slightly fine sandy, MUDSTONE/SILTSTONE with occasional very weak cobbles and coarse gravel.	
	2.70	D						
	2.90	D		2.90			Extremely weak, blue grey MUDSTONE/SILTSTONE tending to very stiff, silty CLAY.	3
				3.00			End of Pit at 3.00m	
								4
								5

Remarks: No groundwater encountered.

Stability: Sides stable.





Trial Pit Log

Trial Pit No
TP16
Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords: 384595.00 - 155997.00
Level:

Date
19/07/2017

Location: Trowbridge

Dimensions
(m):



Scale
1:25

Client: Waddeton Park Ltd

Depth
3.70

Logged
RH

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.40 0.40	ES PP	150	0.30 0.60		 	Grass over, stiff, dark brown, slightly gravelly (est. <10%), slightly sandy, silty CLAY. Gravel comprises fine to medium sub-rounded sandstone, siltstone and sub-angular chert with roots and rootlets. (Topsoil) Stiff, brown, silty CLAY with occasional rootlet. (Subsoil)	
				1.10			Stiff, yellow brown, gravelly, sandy, silty CLAY with low cobble content. Gravel comprises predominantly fine to coarse, sub-angular to sub-rounded chert. Cobbles are sub-rounded chert. Locally tending to gravelly SAND. This stratum extends to 1.40m in west of trial pit.	1
	1.90	D					Very stiff, purple grey mottled yellow brown, closely fissured silty CLAY with occasional root.	
	2.20	HVP	106				Very stiff, purple grey mottled yellow brown and pale yellow, closely fissured silty CLAY with abundant gypsum crystals from coarse sand sized to up to 6cm long. Tending to extremely weak mudstone from 3.0m.	2
				2.80			Very stiff, blue grey silty CLAY tending to extremely weak MUDSTONE.	
	3.20	D		3.30			End of Pit at 3.70m	3
	3.60	D		3.70				4
								5

Remarks: No groundwater encountered.

Stability: Minor spalling in gravelly layer.



GCE00644/ R2



Appendix C – Trial Pit Photographs

TP01



GCE00644 Land South of Trowbridge—Trial Pit photographs

TP02



TP03



GCE00644 Land South of Trowbridge—Trial Pit photographs

TP04



TP05



GCE00644 Land South of Trowbridge—Trial Pit photographs

TP06



TP07



TP08



GCE00644 Land South of Trowbridge—Trial Pit photographs

TP09



TP10



TP11



TP12



TP13



TP14



TP15



TP16



GCE00644/ R2



Appendix D – Dynamic Sampling Borehole Records



Borehole Log

Borehole No.

WS01

Sheet 1 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.12			Grass over brown, fine sandy, silty clay with rootlets.	
					0.28			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
		0.45	PP	62.50	0.56			Firm, brown with dark brown and orange brown speckles, slightly sandy, slightly gravelly, silty CLAY Gravel is of sandy limestone.	
		0.65	PP	75.00				Stiff, brown mottled light brown, dark brown and orange brown, slightly sandy, silty CLAY.	
		0.90	D						
		0.90	PP	75.00					
		1.00	SS	N=5 (1,1/1,2,1,1)	1.05			Stiff, grey and orange brwn, slightly fine sandy, slightly gravelly, silty CLAY. Gravel is of sub-rounded limestone. (Low SPT N value may be attributed to groundwater)	1
		1.20	PP	100.00					
		1.40	D						
		1.60	PP	100.00					
		2.00	PP	75.00					
		2.00	SS	N=14 (1,2/3,3,3,5)					2
		2.40	D		2.30			Stiff, grey brown mottled orange brown, slightly fine sandy, silty CLAY.	
		2.40	PP	75.00					
		2.60	PP	100.00					
		2.75	PP	100.00	2.70			Stiff, dark grey, slightly fine sandy, silty CLAY.	
					2.82			Hard, dark grey, silty CLAY with occasional shells.	
		3.00	SS	N=14 (1,2/3,3,4,4)	3.00			Stiff to very stiff, dark grey, silty CLAY with numerous shelly fragments. Locally tends to fine sandy gravel of mudstone.	3
		3.40	PP	100.00					
		3.60	D						
		3.80	PP	125.00					
		4.00	SS	N=30 (3,4/7,7,8,8)					4
		4.20	PP	212.50					
		4.50	D						
		4.60	PP	125.00					
		5.00	PP	137.50					
		5.00	SS	N=15 (4,3/3,3,4,5)					5

Continued on Next Sheet

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS01

Sheet 2 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.45			End of Borehole at 5.450m	
									6
									7
									8
									9
									10

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS02

Sheet 1 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.10			Grass over brown, fine sandy, silty clay with rootlets.	
					0.25			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
								Stiff, brown, slightly fine sandy, silty CLAY.	
		0.50	PP	162.50					1
		0.70	D		0.60			Stiff, orange brown mottled light brown, slightly fine sandy, silty CLAY.	
		0.70	PP	125.00					
		0.90	PP	125.00					
		1.00	SS	N=3 (1,0/1,0,1,1)	1.05				
		1.20	PP	25.00				Very soft to soft, orange brown mottled light brown, slightly fine sandy, slightly fine gravelly, silty CLAY. Gravel is of sandy limestone.	
		1.50	D						2
		1.70	PP	25.00					
		2.00	SS	N=0 (0,0/0,0,0,0)					
		2.20	PP	12.50					
		2.50	D						
		2.70	PP	12.50					
		3.00	SS	N=6 (1,0/1,1,2,2)					3
		3.10	PP	12.50					
		3.30	PP	25.00	3.26			Soft, brown and orange brown, slightly fine sandy, fissured silty CLAY. Fissures concentrate wet, very soft, dark grey silty clay.	
		3.50	D						
		3.50	PP	25.00					
		3.70	PP	25.00	3.78			Soft to firm, light brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is of sub-rounded limestone.	
		3.90	PP	37.50					4
		4.00	SS	N=11 (2,2/2,3,3,3)					
		4.35	PP	62.50	4.27			Firm, brown grey, slightly fine sandy, silty CLAY.	
		4.40	D		4.57				
		4.80	D					Stiff, dark grey, silty CLAY with occasional gypsum crystals up to 3mm.	
		5.00	SS	N=13 (1,2/2,3,3,5)					

Continued on Next Sheet

Remarks

Groundwater encountered in fissures between 3.26 - 3.78mbgl.





Borehole Log

Borehole No.

WS02

Sheet 2 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.45			End of Borehole at 5.450m	6 7 8 9 10

Remarks

Groundwater encountered in fissures between 3.26 - 3.78mbgl.





Borehole Log

Borehole No.

WS03

Sheet 1 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05	ES		0.12			Grass over brown, slightly sandy, silty clay with roots and rootlets.	1
					0.26			Firm to stiff, brown, slightly sandy, silty CLAY with occasional rootlets.	
		0.40	PP	185.00				Very stiff, brown, slightly sandy, slightly fine gravelly, silty CLAY. Gravel is of iron-stained sandstone.	
		0.50	D						
		0.60	PP	212.50	0.65			Very stiff, light brown, slightly gravelly, silty CLAY. Gravel is of rounded chert and sandstone.	1
		0.80	PP	200.00					
		0.90	D						
		1.00	SS	N=16 (2,2/3,4,4,5)					
		1.10	PP	212.50	1.17			Very stiff, light brown mottled grey, silty CLAY with sand-sized gypsum crystals.	2
		1.30	PP	150.00					
					1.55			Very stiff, grey brown mottled light brown, orange brown and grey, silty CLAY with gypsum crystals up to 10-15mm.	
		1.70	PP	225.00					
		1.90	D						
		2.00	SS	N=23 (3,4/5,5,6,7)					3
		2.10	PP	200.00					
		2.60	PP	175.00					
					2.97			Very stiff, dark grey, fine sandy, silty CLAY with occasional shelly debris.	4
		3.00	D						
		3.00	SS	N=14 (2,3/3,3,4,4)					
		3.10	PP	137.50					
		3.60	PP	112.50					5
		4.00	D						
		4.00	SS	N=22 (3,4/5,5,5,7)					
		4.10	PP	212.50					
		4.60	PP	112.50					
		5.00	D						
		5.00	SS	33 (4,6/33 for 115mm)					

Continued on Next Sheet

Remarks

Groundwater encountered below 3.0mbgl.





Borehole Log

Borehole No.

WS03

Sheet 2 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

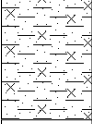
Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		5.10	PP	162.50				Extremely weak, dark grey, thinly laminated, fine sandy MUDSTONE. End of Borehole at 5.450m	
					5.40 5.45				
									6
									7
									8
									9
									10

Remarks

Groundwater encountered below 3.0mbgl.





Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.13			Grass over brown, fine sandy, silty clay with rootlets.	1
					0.28			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
		0.40	PP	187.50				Stiff, brown and orange brown with dark brown speckles, slightly fine sandy, silty CLAY.	
		0.80	D						1
		0.80	PP	175.00					
		1.00	PP	150.00					
		1.00	SS	N=6 (1,1/1,2,1,2)					
		1.10	PP	100.00	1.15				1
		1.20	PP	25.00					
		1.50	D						
		1.50	PP	25.00					2
		1.90	PP	25.00					
		2.00	SS	N=0 (0,0/0,0,0,0)	2.00			Very soft, orange brown mottled light grey, fine sandy, silty CLAY.	
									3
		2.20	PP	12.50					
		2.40	D						
		2.50	PP	12.50					3
					2.63				
		3.00	D						
		3.00	SS	N=10 (2,2/2,2,3,3)				Light brown, slightly silty, slightly clayey, sandy GRAVEL of fine to medium sandy limestone.	
									4
					3.51				
		3.70	PP	100.00				Very stiff, dark grey, silty CLAY with occasional shell debris.	
		4.00	D						4
		4.00	PP	125.00					
		4.00	SS	N=15 (3,3/3,4,4,4)					
					5.00				5
								End of Borehole at 5.000m	

Remarks

Groundwater encountered below 2.0mbgl. Gravels collapsed to 3mbgl after drilling.





Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.16			Grass over brown, fine sandy, silty clay with rootlets.	
					0.26			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
		0.50	D					Stiff, brown mottled light brown and orange brown, slightly gravelly, silty CLAY. Gravel is of sub-angular chert.	1
					0.78			Firm, orange brown and grey, slightly sandy, silty CLAY.	
		0.90	PP	50.00					
		1.00	SS	N=9 (1,2/2,2,3,2)					
		1.10	PP	55.00	1.17			Stiff, orange brown and grey, slightly sandy, silty CLAY.	2
		1.40	D						
		1.40	PP	160.00					
		1.70	PP	175.00					3
					1.81			Stiff to very stiff, grey and grey brown, silty CLAY with gypsum crystals up to 8mm.	
		1.90	PP	100.00					
		2.00	SS	N=13 (1,2/2,3,4,4)					
									4
		2.30	D						
		2.30	PP	125.00					
		2.70	PP	112.50					5
					3.30			Very stiff, dark grey, silty CLAY.	
		3.00	SS	N=17 (3,3/4,4,4,5)					
		3.10	PP	112.50					
		3.40	PP	105.00					
		3.70	D						
		3.70	PP	100.00					
		4.00	SS	N=19 (3,4/4,5,5,5)					
					4.45				
								End of Borehole at 4.450m	

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS06

Sheet 1 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 26/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.10			Grass over brown, fine sandy, silty clay with rootlets.	
					0.22			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
								Stiff, brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is of sub-angular flint.	
					0.60			Stiff, orange brown and light brown, silty CLAY.	
		0.70	PP	125.00					
		0.80	D						
		1.00	PP	100.00					1
		1.00	SS	N=8 (1,2/1,2,3,2)					
		1.20	PP	100.00					
					1.28			Stiff, orange brown and grey, sandy, silty CLAY with localised horizons of silty sand.	
		1.40	PP	87.50					
		1.60	D						
		1.80	PP	87.50					
					1.95			Stiff, brown, sandy, slightly gravelly, silty CLAY with shells. Gravel is of sandstone with occasional iron staining.	
		2.00	SS	N=35 (2,3/3,12,10,10)					2
		2.10	PP	100.00					
		2.20	D						
					2.33			Stiff, brown, sandy, slightly gravelly, silty CLAY with low cobble content and shells. Gravel and cobbles are of sandstone with occasional iron staining.	
					2.50			Stiff, dark grey, fine sandy, silty CLAY with shells and shelly fragments.	
		2.60	PP	112.50					
		2.90	PP	150.00					
		3.00	SS	N=13 (2,2/2,3,4,4)					
					3.14			Stiff, dark grey, slightly fine sandy, slightly gravelly, silty CLAY. Gravel is of ironstone nodules.	3
		3.30	PP	125.00					
		3.60	D						
		3.60	PP	100.00					
		3.90	PP	125.00					
		4.00	SS	N=20 (2,2/4,4,6,6)	4.00			Stiff, dark grey, silty CLAY with very occasional shells.	
									4
		4.30	PP	137.50					
		4.50	D						
		4.60	PP	125.00					
		4.90	PP	137.50					
		5.00	SS	N=20 (2,3/4,4,5,7)					
								Continued on Next Sheet	5

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS06

Sheet 2 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 26/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.45			End of Borehole at 5.450m	
									6
									7
									8
									9
									10

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS06A

Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 26/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			Grass over brown, fine sandy, silty clay with rootlets.	
					0.20			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
					0.42			Stiff, brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is of sub-angular flint.	
		0.60	PP	150.00				Stiff, light brown and orange brown occasionally grey, silty CLAY.	
		0.80	PP	125.00					
		1.00	SS	N=7 (1,1/1,2,2,2)	1.00			Stiff, locally firm, brown orange brown and grey, slightly sandy to sandy, silty CLAY.	1
		1.20	PP	62.50					
		1.50	PP	75.00					
		1.70	PP	112.50					
					1.83			Stiff, brown and grey, slightly fine sandy, silty CLAY with shells and shelly fragments.	2
		2.00	SS	0 (60 for 135mm/0 for 0mm)	2.10			Cobble of sandstone.	
					2.35			End of Borehole at 2.350m	
									3
									4
									5

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 25/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15			Grass over brown, fine sandy, silty clay with rootlets.	
					0.21			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
								Stiff, brown, slightly sandy, silty CLAY.	
		0.50	D						
		0.50	PP	100.00					
		0.70	PP	75.00	0.72				
		0.90	PP	25.00				Soft, light brown, grey and orange brown, slightly sandy, silty CLAY.	
		1.00	SS	N=7 (1,0/1,2,2,2)					1
		1.20	D						
		1.20	PP	25.00					
					1.33			Stiff, brown, orange brown and grey, slightly sandy, silty CLAY.	
		1.50	PP	75.00					
		1.70	D						
		1.70	PP	87.50					
					1.90			Grey, slightly silty, slightly clayey, sandy GRAVEL of flint and limestone. Locally tends to sandy, gravelly, silty clay.	2
		2.00	SS	N=14 (22,9/5,3,3,3)					
		2.20	D						
					2.50			Stiff, dark grey, fine sandy, silty CLAY.	
		2.70	PP	112.50					
		2.80	D						
		2.90	PP	112.50					
					3.00			End of Borehole at 3.000m	3
									4
									5

Remarks

Groundwater encountered at 1.9mbgl. Borehole abandoned due to collapse of gravels.





Borehole Log

Borehole No.

WS08

Sheet 1 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 26/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.09 0.18			Grass over brown, fine sandy, silty clay with rootlets.	1 -
								Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
					0.49			Stiff, brown mottled orange brown, silty CLAY.	
		0.60	PP	62.50				Firm, light brown and grey, silty CLAY.	
		0.75	D					Clay land drain at 0.60mbgl.	
		0.90	PP	62.50					
		1.00	SS	N=7 (1,0/1,2,2,2)					
		1.10	PP	62.50					
		1.30	PP	62.50	1.34				
		1.40	PP	75.00				Stiff, brown, dark brown and orange brown, silty CLAY with gypsum crystals up to 5mm. Light brown bands tends to have dense clusters of fine gypsum crystals.	
		1.50	D						
		1.70	PP	112.50					
		2.00	PP	175.00					
		2.00	SS	N=13 (1,2/2,3,4,4)					
		2.30	PP	125.00					
		2.50	D						
		2.60	PP	212.50					
		2.90	PP	187.50					
		3.00	SS	N=17 (3,3/3,4,5,5)	3.09				
		3.30	PP	150.00				Very stiff, dark grey, silty CLAY with numerous gypsum crystals <1mm and occasional gypsum up to 3mm. Occasional shells and shelly fragments.	
		3.60	D						
		3.60	PP	225.00					
		3.90	PP	175.00					
		4.00	SS	N=26 (3,4/5,5,8,8)					
		4.30	PP	212.50					
		4.50	D						
		4.60	PP	150.00					
				5.00	SS		N=30 (4,4/5,7,9,9)		
Continued on Next Sheet									

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS09

Sheet 1 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 26/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.10			Grass over brown, fine sandy, silty clay with rootlets.	
					0.28			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
					0.44			Stiff, brown, silty CLAY.	
								Stiff, brown speckled orange brown, silty CLAY.	
		0.60	PP	212.50					1
		0.70	D						
		0.90	PP	125.00					
		1.00	SS	N=3 (1,0/1,0,1,1)	1.00			Soft to firm, light brown and grey, slightly sandy, silty CLAY.	
		1.10	PP	37.50					
		1.20	D						
		1.25	PP	37.50	1.34			Stiff, brown occasionally light brown, silty CLAY with occasional gravel-sized mudstone lithorelics and sub-horizontal relic structure.	2
		1.50	PP	100.00					
		1.80	PP	125.00					
		1.90	D						
		2.00	SS	N=15 (1,2/3,3,4,5)	2.00			Stiff, brown occasionally light brown, silty CLAY with occasional gravel-sized mudstone lithorelics, sub-horizontal relic structure and gypsum crystals up to 20mm.	
		2.20	PP	137.50					
		2.25	D						
		2.40	PP	125.00					
		2.60	PP	100.00	2.55			Stiff, dark grey, silty CLAY with gypsum crystals up to 40mm.	3
		2.80	D						
		2.90	PP	137.50					
		3.00	SS	N=22 (2,3/4,5,6,7)					
		3.20	PP	112.50					
		3.50	D						
		3.60	PP	137.50					4
					3.80			Very stiff, dark grey, silty CLAY with shells.	
		3.90	PP	112.50					
		4.00	SS	N=17 (2,3/3,4,5,5)					
		4.40	PP	125.00					
		4.50	D						
		4.70	PP	162.50					5
		4.90	PP	225.00					
		5.00	SS	N=25 (2,3/5,6,7,7)					
Continued on Next Sheet									

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS09

Sheet 2 of 2

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 26/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.45			End of Borehole at 5.450m	
									6
									7
									8
									9
									10

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS10

Sheet 1 of 1

Project Name: Southwick Court Farm

Project No.
GCE00644

Co-ords:

Hole Type
WS

Location: Trowbridge

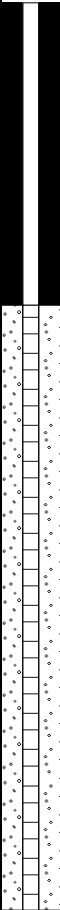
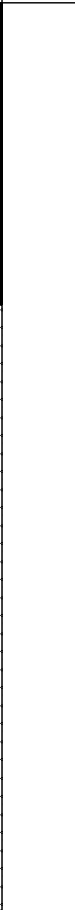
Level:

Scale
1:25

Client: Waddeton Park Ltd

Dates: 26/07/2017

Logged By
MH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.10			Grass over brown, fine sandy, silty clay with rootlets.	1
					0.24			Firm, brown, fine sandy, silty CLAY with occasional rootlets.	
								Stiff, brown and orange brown, slightly fine sandy, silty CLAY.	
		0.70	PP	200.00	0.58			Stiff, brown and grey, slightly gravelly, silty CLAY. Gravel is of sub-angular limestone.	1
		0.90	D						
		1.00	PP	200.00					
		1.00	SS	N=10 (1,2/2,2,3,3)	1.10			Stiff, brown, silty CLAY with laminations of silty, fine sand and fine gypsum crystals <1mm.	2
		1.30	PP	100.00					
		1.50	D						
		1.50	PP	87.50	1.66				2
		1.70	PP	125.00	1.80			Stiff, brown, silty CLAY with laminations of silty, fine sand and fine gypsum crystals <1mm. Sub-horizontal relic structure.	
		1.90	PP	112.50				Very stiff, dark brown, silty CLAY with sub-horizontal relic structure, numerous gypsum crystals <1mm and occasional gypsum crystals up to 2mm.	
		2.00	SS	N=22 (2,3/5,5,6,6)					3
		2.30	PP	187.50					
		2.40	D						
		2.60	PP	150.00					4
		3.00	PP	212.50					
		3.00	SS	N=54 (3,5/10,13,15,16)					
					3.40				5
					3.45				
								Extremely weak, thinly laminated, dark brown MUDSTONE with occasional shelly fragments. End of Borehole at 3.450m	

Remarks

No groundwater encountered.



GCE00644/ R2



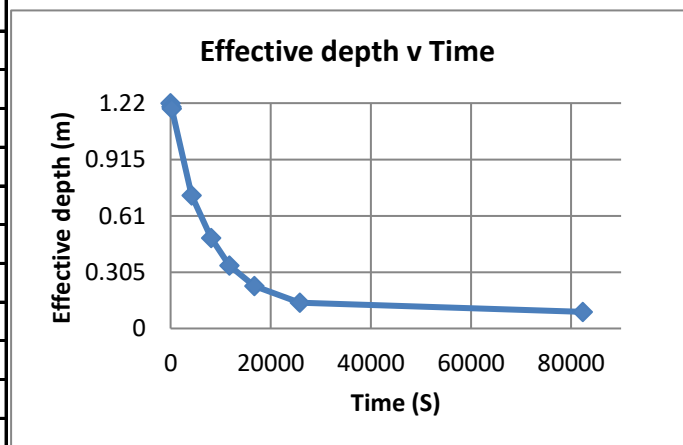
Appendix E – Large Scale Infiltration Test Results

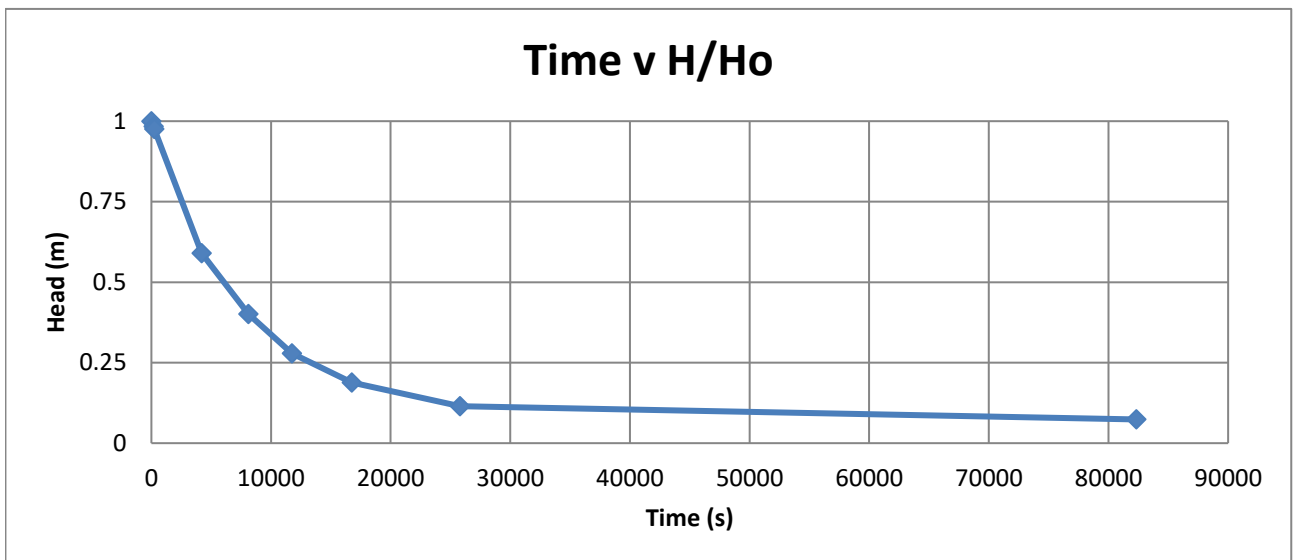
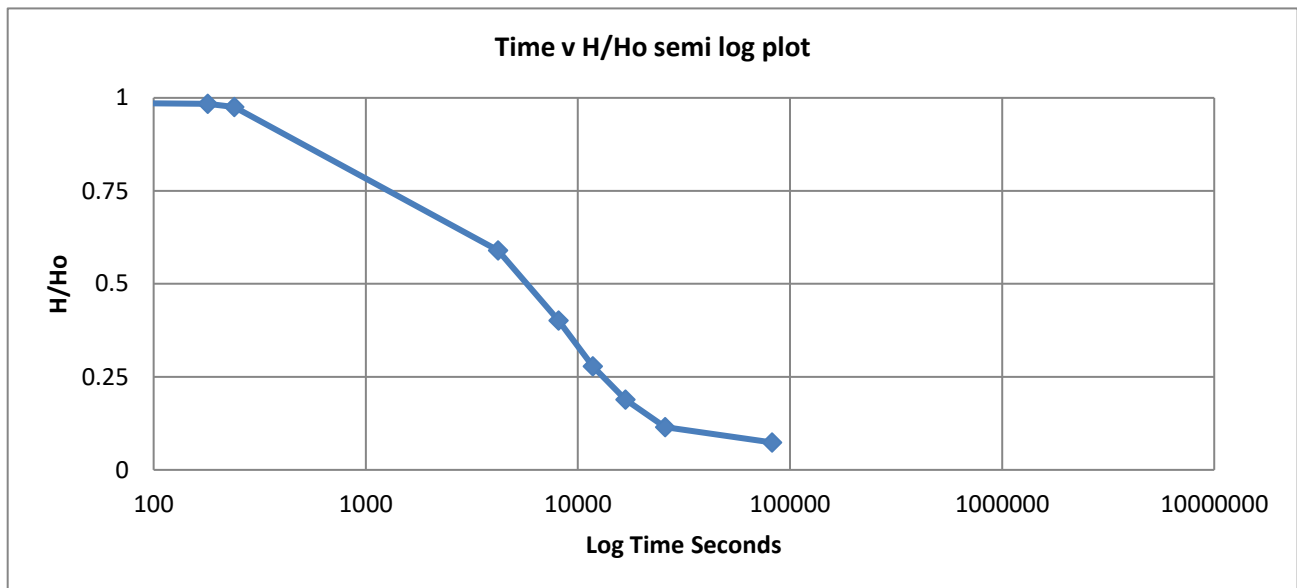
Trial Pit.	TP01
Test No.	1

Length	1.8	m
Width	0.5	m
Depth	2.1	m
Start water depth	0.88	m
Effective Depth	1.22	m

[illegible]

	Depth	Time
Effective Depth %	m	Seconds
75	0.915	2600
25	0.305	13400
	Vp75-25	tp75-25
Sum	0.549	10800
Base	0.9	m2
Side long	1.098	m
Side short	0.305	m
ap50	3.706	m2
Soil Infiltration Rate	1.37E-05	m/s





Soakaway Test:

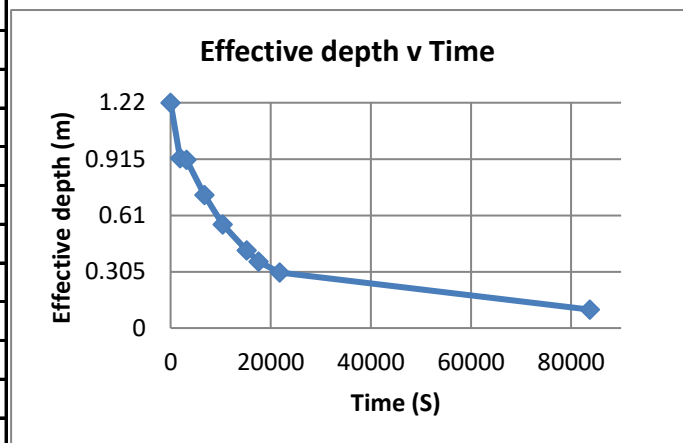
Trial Pit.	TP01
Test No.	2

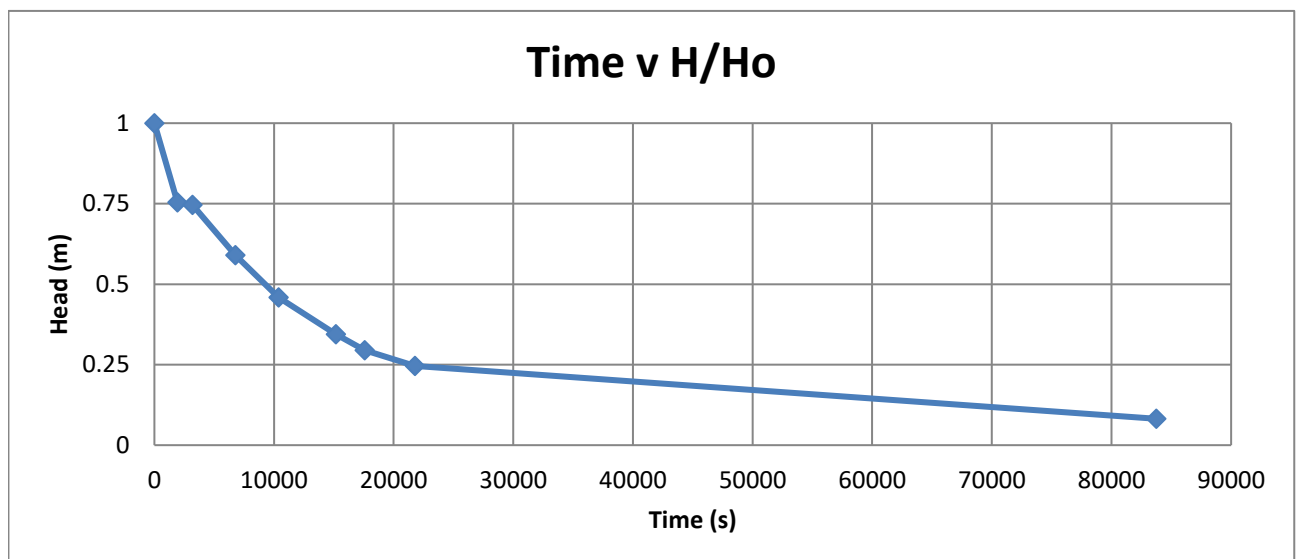
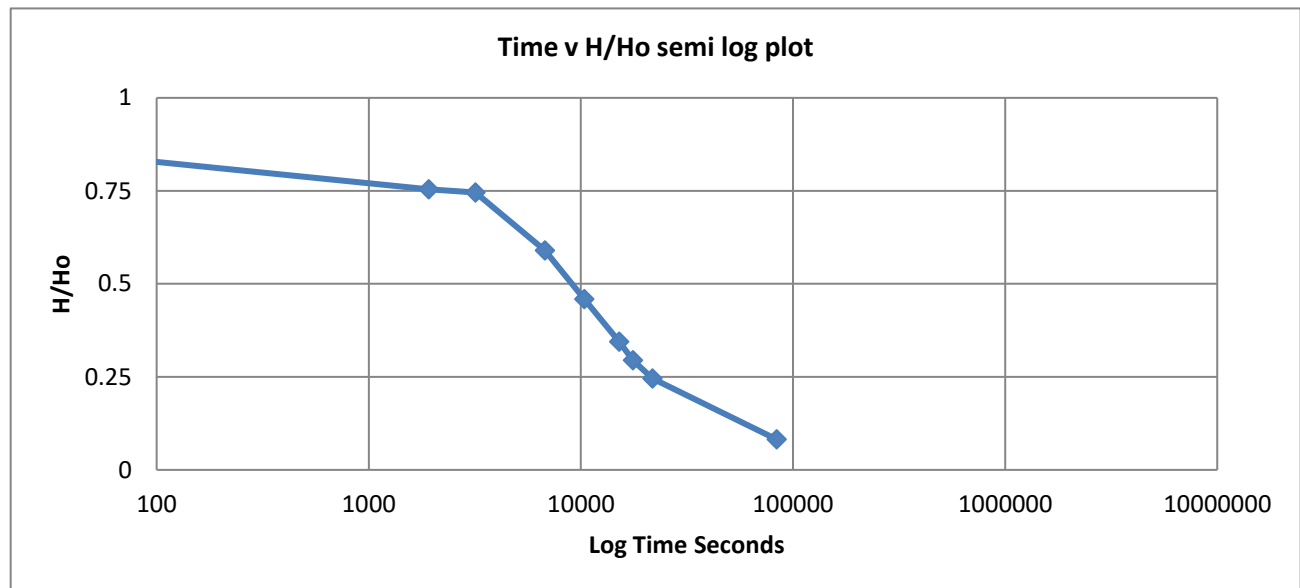
Dimensions:

Length	1.8	m
Width	0.5	m
Depth	2.1	m
Start water depth	0.88	m
Effective Depth	1.22	m

			Depth	Effect	Head		
Time	Time	Seconds	m	Depth		Seconds	H/Ho
19 July 2017	42935.401	0	0.88	1.22	1.22	0.1	1
19 July 2017	42935.423	1920	1.18	0.92	0.92	1920	0.754098
19 July 2017	42935.438	3180	1.19	0.91	0.91	3180	0.745902
19 July 2017	42935.479	6780	1.38	0.72	0.72	6780	0.590164
19 July 2017	42935.521	10380	1.54	0.56	0.56	10380	0.459016
19 July 2017	42935.576	15180	1.68	0.42	0.42	15180	0.344262
19 July 2017	42935.604	17580	1.74	0.36	0.36	17580	0.295082
19 July 2017	42935.653	21780	1.8	0.3	0.3	21780	0.245902
20 July 2017	42936.370	83760	2	0.1	0.1	83760	0.081967

	Depth	Time
Effective Depth %	m	Seconds
75	0.915	3000
25	0.305	21500
	Vp75-25	tp75-25
Sum	0.549	18500
Base	0.9	m2
Side long	1.098	m
Side short	0.305	m
ap50	3.706	m2
Soil Infiltration Rate	8.01E-06	m/s





Soakaway Test:

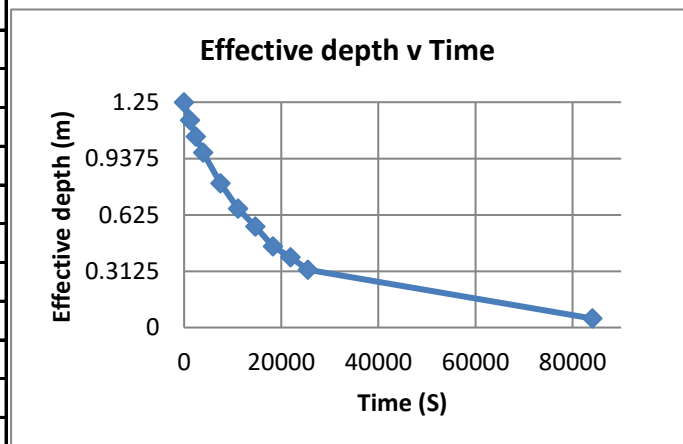
Trial Pit.	TP01
Test No.	3

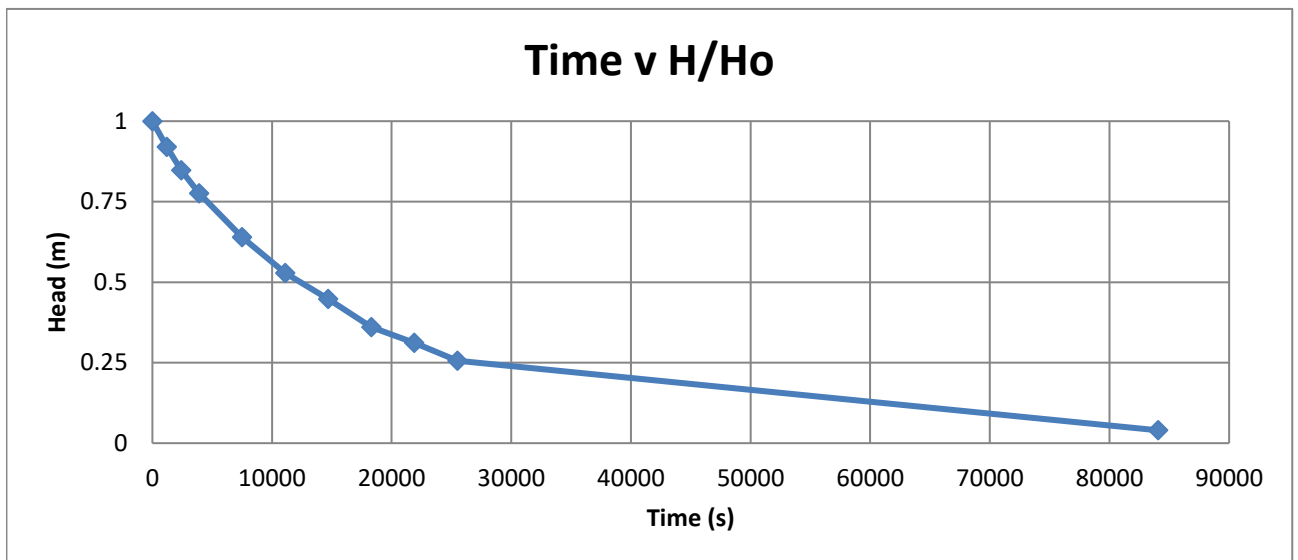
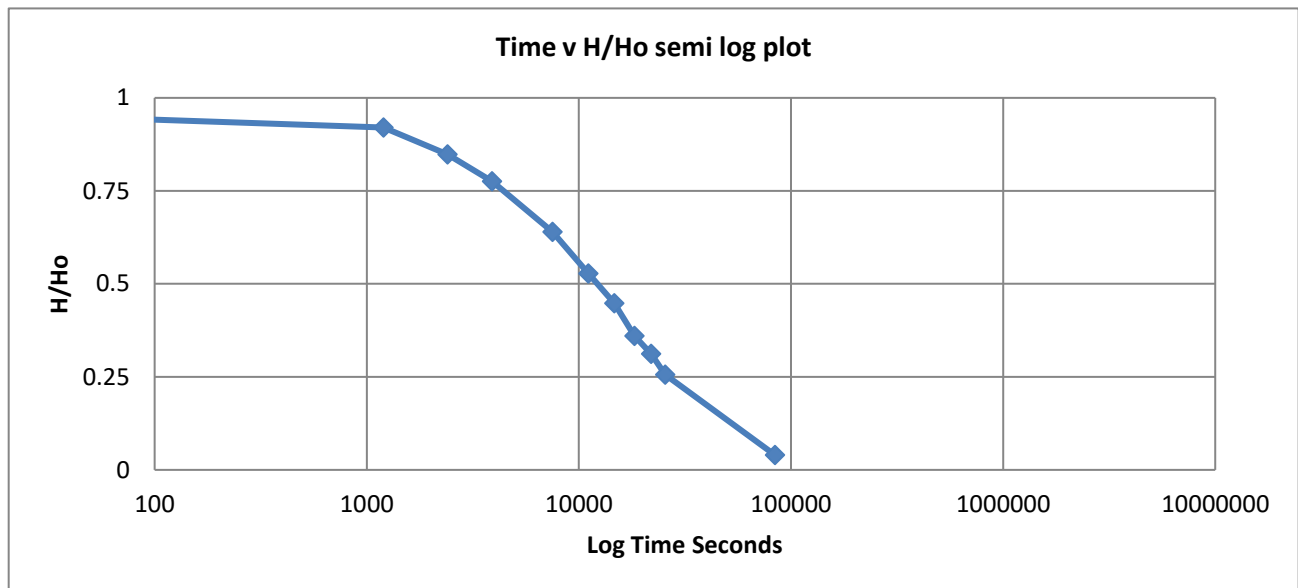
Dimensions:

Length	1.8	m
Width	0.5	m
Depth	2.1	m
Start water depth	0.85	m
Effective Depth	1.25	m

			Depth	Effect	Head		
Time	Time	Seconds	m	Depth		Seconds	H/Ho
20 July 2017	42936.372	0	0.85	1.25	1.25	0.1	1
20 July 2017	42936.385	1200	0.95	1.15	1.15	1200	0.92
20 July 2017	42936.399	2400	1.04	1.06	1.06	2400	0.848
20 July 2017	42936.417	3900	1.13	0.97	0.97	3900	0.776
20 July 2017	42936.458	7500	1.3	0.8	0.8	7500	0.64
20 July 2017	42936.500	11100	1.44	0.66	0.66	11100	0.528
20 July 2017	42936.542	14700	1.54	0.56	0.56	14700	0.448
20 July 2017	42936.583	18300	1.65	0.45	0.45	18300	0.36
20 July 2017	42936.625	21900	1.71	0.39	0.39	21900	0.312
20 July 2017	42936.667	25500	1.78	0.32	0.32	25500	0.256
21 July 2017	42937.344	84060	2.05	0.05	0.05	84060	0.04

	Depth	Time
Effective Depth %	m	Seconds
75	0.9375	4600
25	0.3125	27600
	Vp75-25	tp75-25
Sum	0.5625	23000
Base	0.9	m ²
Side long	1.125	m
Side short	0.3125	m
ap50	3.775	m ²
Soil Infiltration Rate	6.48E-06	m/s





Soakaway Test:

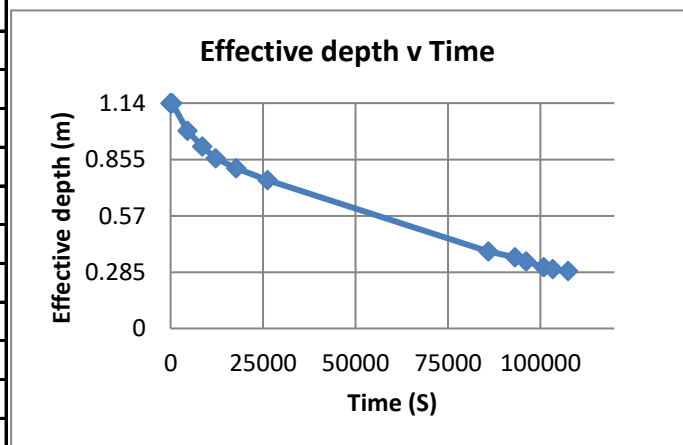
Trial Pit.	TP02
Test No.	1

Dimensions:

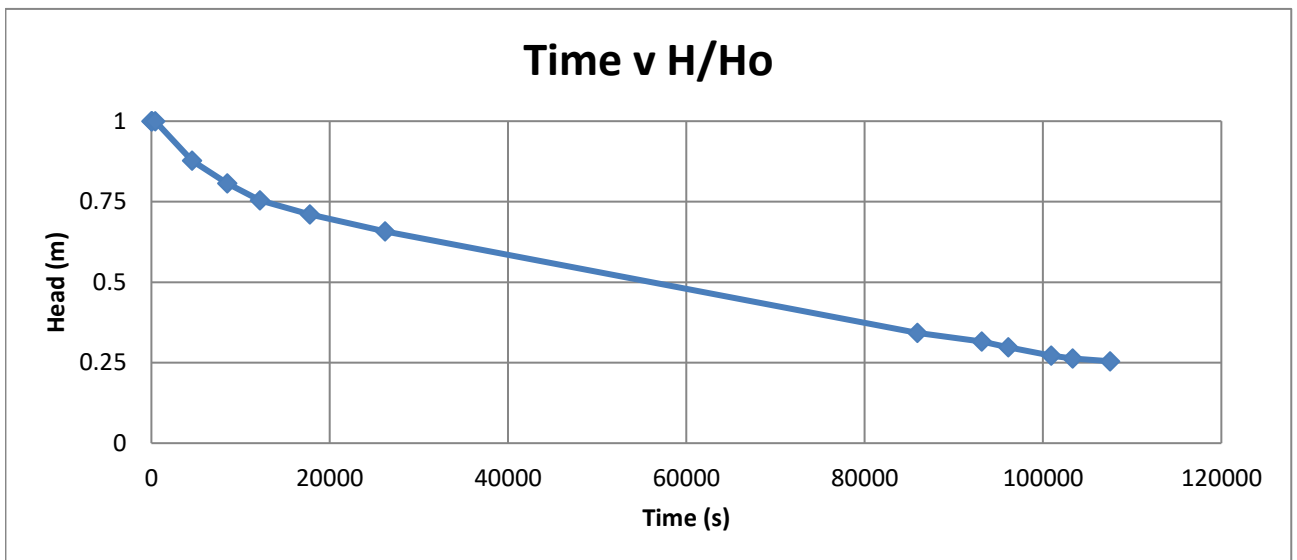
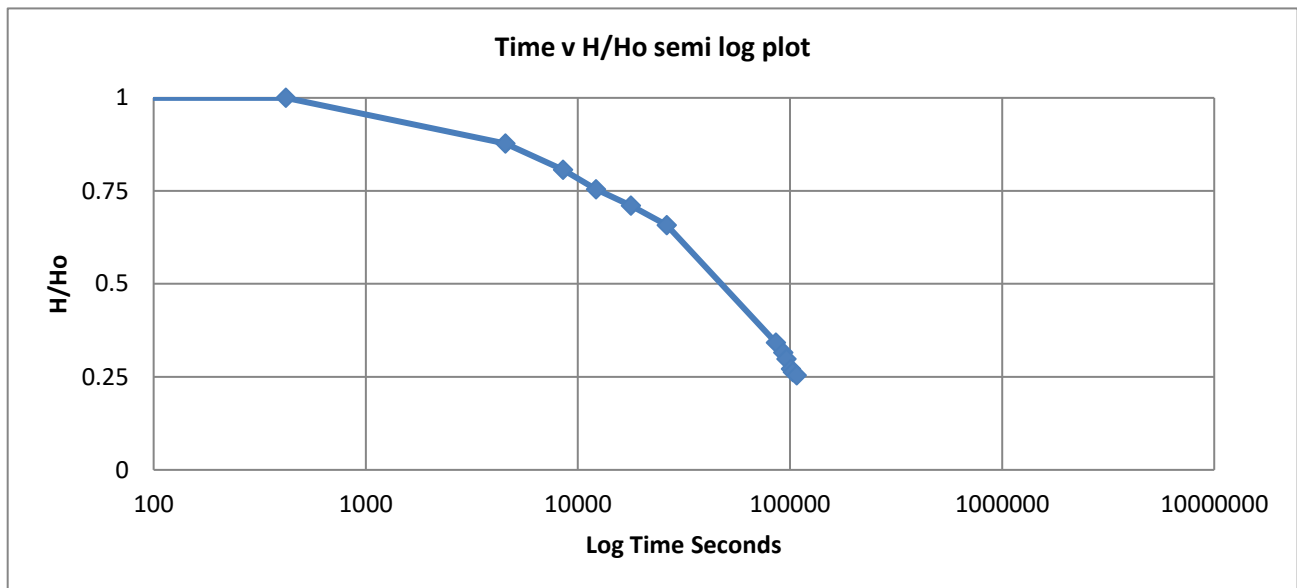
Length	2.05	m
Width	0.5	m
Depth	1.4	m
Start water depth	0.26	m
Effective Depth	1.14	m

			Depth	Effect	Head		
Time	Time	Seconds	m	Depth		Seconds	H/Ho
18 July 2017	42934.408	0	0.26	1.14	1.14	0.1	1
18 July 2017	42934.409	60	0.26	1.14	1.14	60	1
18 July 2017	42934.413	420	0.26	1.14	1.14	420	1
18 July 2017	42934.461	4560	0.4	1	1	4560	0.877193
18 July 2017	42934.507	8520	0.48	0.92	0.92	8520	0.807018
18 July 2017	42934.549	12180	0.54	0.86	0.86	12180	0.754386
18 July 2017	42934.614	17760	0.59	0.81	0.81	17760	0.710526
18 July 2017	42934.712	26220	0.65	0.75	0.75	26220	0.657895
19 July 2017	42935.403	85920	1.01	0.39	0.39	85920	0.342105
19 July 2017	42935.486	93120	1.04	0.36	0.36	93120	0.315789
19 July 2017	42935.521	96120	1.06	0.34	0.34	96120	0.298246
19 July 2017	42935.576	100920	1.09	0.31	0.31	100920	0.27193
19 July 2017	42935.604	103320	1.1	0.3	0.3	103320	0.263158
19 July 2017	42935.653	107520	1.11	0.29	0.29	107520	0.254386

	Depth	Time
Effective Depth %	m	Seconds
75	0.855	
25	0.285	
	Vp75-25	tp75-25
Sum	0.58425	0
Base	1.025	m2
Side long	1.1685	m
Side short	0.285	m
ap50	3.932	m2
Soil Infiltration Rate	N/A	m/s



Soakaway test pit failed to reach 25% effective depth in 29 hours



Soakaway Test:

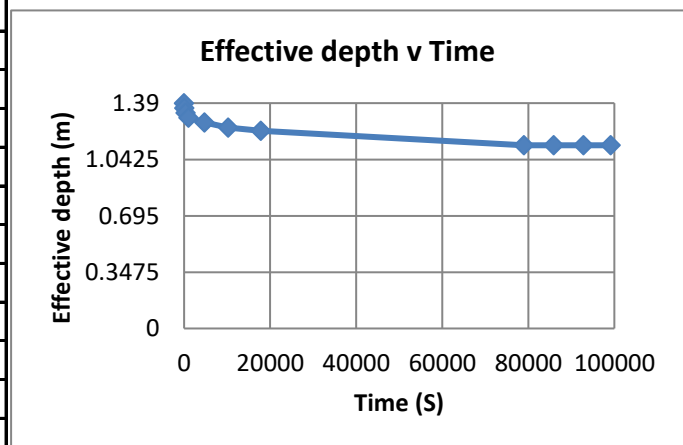
Trial Pit.	TP03
Test No.	1

Dimensions:

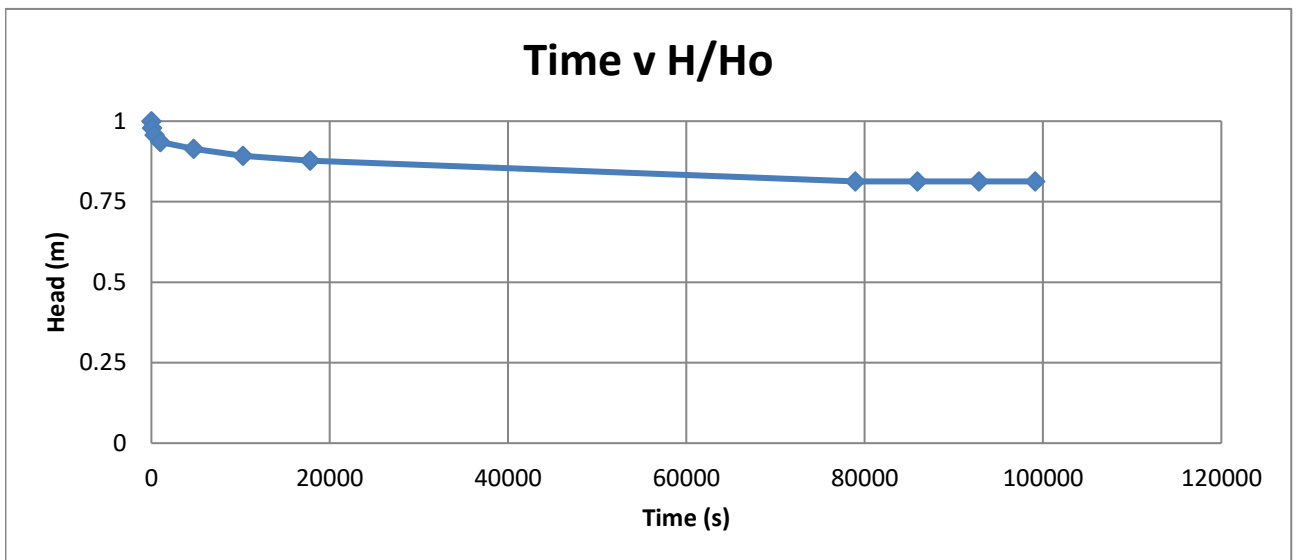
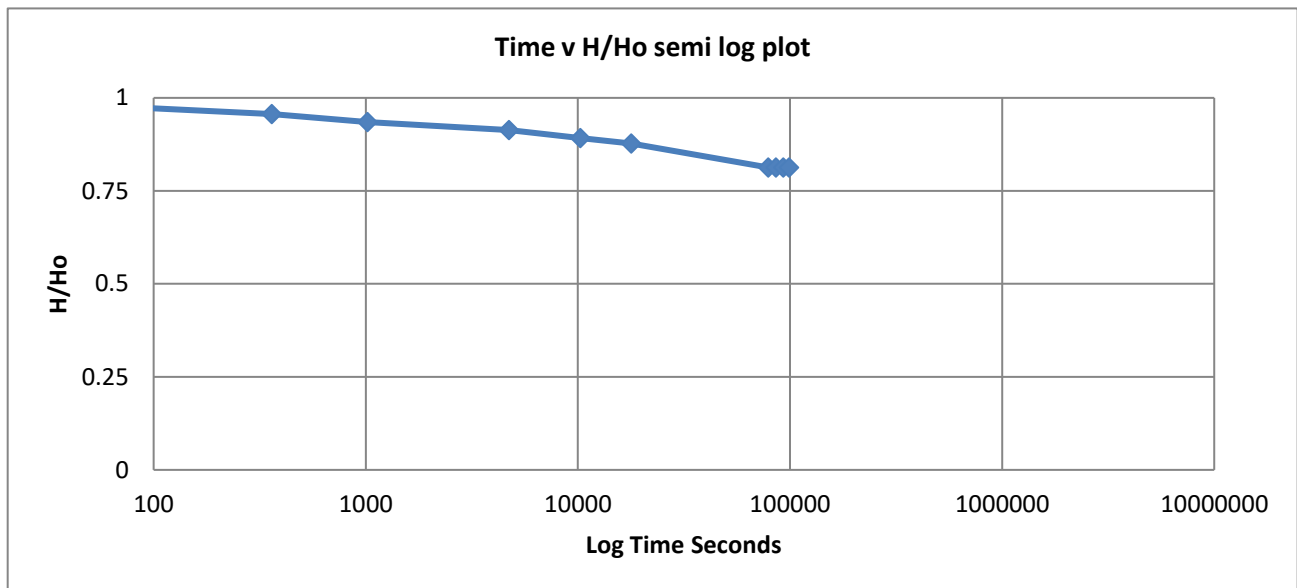
Length	2.1	m
Width	0.5	m
Depth	1.6	m
Start water depth	0.21	m
Effective Depth	1.39	m

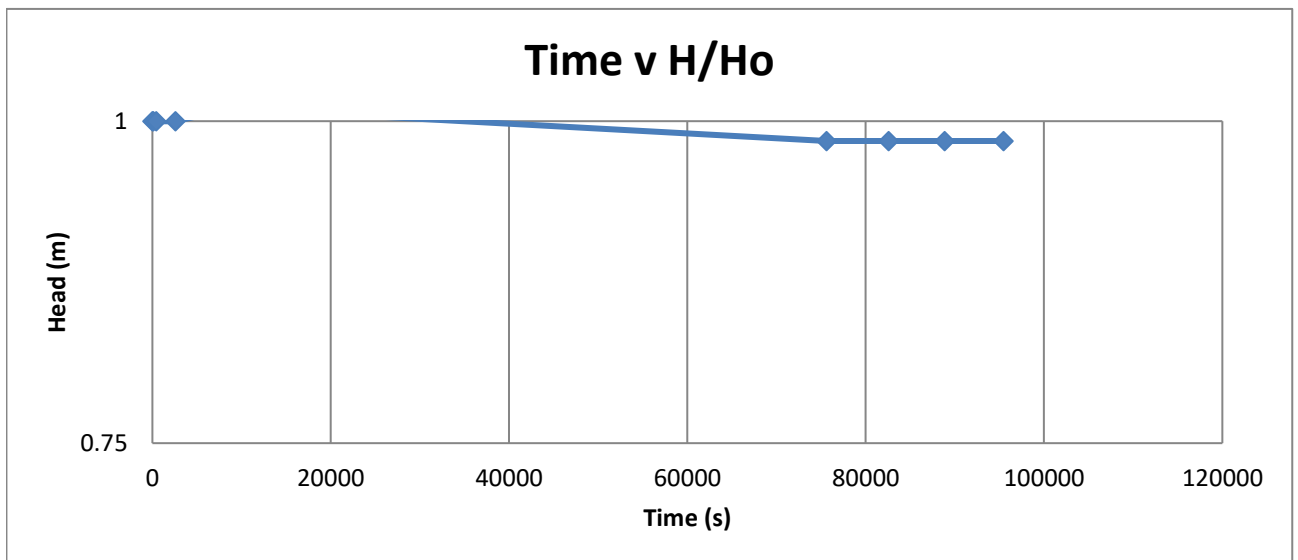
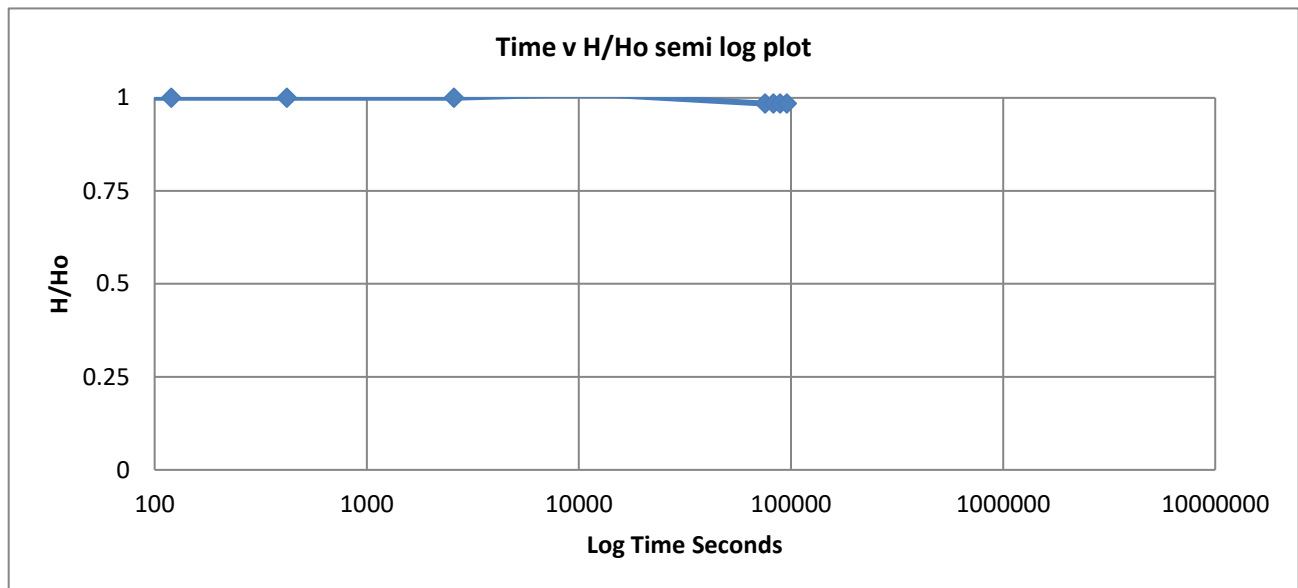
			Depth	Effect	Head		
Time	Time	Seconds	m	Depth		Seconds	H/Ho
18 July 2017	42934.499	0	0.21	1.39	1.39	0.1	1
18 July 2017	42934.499	60	0.24	1.36	1.36	60	0.978417
18 July 2017	42934.503	360	0.27	1.33	1.33	360	0.956835
18 July 2017	42934.510	1020	0.3	1.3	1.3	1020	0.935252
18 July 2017	42934.553	4740	0.33	1.27	1.27	4740	0.913669
18 July 2017	42934.617	10260	0.36	1.24	1.24	10260	0.892086
18 July 2017	42934.705	17820	0.38	1.22	1.22	17820	0.877698
19 July 2017	42935.413	78960	0.47	1.13	1.13	78960	0.81295
19 July 2017	42935.493	85920	0.47	1.13	1.13	85920	0.81295
19 July 2017	42935.573	92820	0.47	1.13	1.13	92820	0.81295
19 July 2017	42935.646	99120	0.47	1.13	1.13	99120	0.81295

	Depth	Time
Effective Depth %	m	Seconds
75	1.0425	
25	0.3475	
	Vp75-25	tp75-25
Sum	0.72975	0
Base	1.05	m2
Side long	1.4595	m
Side short	0.3475	m
ap50	4.664	m2
Soil Infiltration Rate	N/A	m/s



Soakaway test pit failed to reach 25% effective depth in 27.5 hours





GCE00644/ R2



Appendix F – Ground Gas and Groundwater Monitoring Results

GAS MONITORING RECORD

Geo Consulting Engineering Ltd

Project:	Southwick Court Farm	Engineer:	RH
Job Number:	GCE00644	Date:	08/08/2017
Equipment:	Geotechnical Instruments	Calibration Certificate no:	G502010_2/18332
	Model GA2000 (Serial No G502010)	Calibration Date:	26/04/2017
	PhoCheck TIGER (Serial No T-111659)	Calibration Certificate no:	236201 (Jan 2017)

Borehole No.	WS1	Parameter	Peak	Steady
Water Level (m/bgl):	0.90	CH ₄ %	0.10	0.00
Time:	10:12:00	CO ₂ %	2.50	2.50
		O ₂ %	18.60	18.40
		CO (ppm)	3.00	3.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	1.5	1.40	Gas Flow (l/hr)	12.20
				9.10 (1min)

Borehole No.	WS2	Parameter	Peak	Steady
Water Level (m/bgl):	3.68	CH ₄ %	0.00	0.00
Time:	10:43:00	CO ₂ %	2.50	2.50
		O ₂ %	19.40	19.40
		CO (ppm)	1.00	0.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0.2	0.20	Gas Flow (l/hr)	0.20

Borehole No.	WS3	Parameter	Peak	Steady
Water Level (m/bgl):	4.82	CH ₄ %	0.00	0.00
Time:	10:52:00	CO ₂ %	2.10	2.10
		O ₂ %	18.90	18.90
		CO (ppm)	1.00	0.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0.6	0.30	Gas Flow (l/hr)	0.00

Borehole No.	WS4	Parameter	Peak	Steady
Water Level (m/bgl):	2.25	CH ₄ %	0.00	0.00
Time:	11:07:00	CO ₂ %	1.10	0.60
		O ₂ %	20.80	20.80
		CO (ppm)	1.00	1.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0.1	0.10	Gas Flow (l/hr)	0.00

Borehole No.	WS5	Parameter	Peak	Steady
Water Level (m/bgl):	Dry	CH ₄ %	0.00	0.00
Time:	12:17:00	CO ₂ %	3.00	3.00
		O ₂ %	18.80	18.80
		CO (ppm)	1.00	1.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0.4	0.30	Gas Flow (l/hr)	0.00

Borehole No.	WS6	Parameter	Peak	Steady
Water Level (m/bgl):	1.10	CH ₄ %	0.00	0.00
Time:	11:24:00	CO ₂ %	2.50	2.50
		O ₂ %	18.80	18.80
		CO (ppm)	3.00	2.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0.4	0.30	Gas Flow (l/hr)	3.20
				2.00 (1min)

Borehole No.	WS7	Parameter	Peak	Steady
Water Level (m/bgl):	0.90	CH ₄ %	0.00	0.00
Time:	12:06:00	CO ₂ %	1.30	1.30
		O ₂ %	20.30	20.20
		CO (ppm)	2.00	2.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0.00	0.00	Gas Flow (l/hr)	5.60
				4.10 (1min)

Borehole No.	WS9	Parameter	Peak	Steady
Water Level (m/bgl):	4.32	CH ₄ %	0.00	0.00
Time:	11:40:00	CO ₂ %	6.30	6.20
		O ₂ %	15.10	15.10
		CO (ppm)	1.00	1.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0.7	0.70	Gas Flow (l/hr)	0.10
				0.10

Borehole No.	WS10	Parameter	Peak	Steady
Water Level (m/bgl):	2.56	CH ₄ %	0.00	0.00
Time:	11:55:00	CO ₂ %	3.40	3.40
		O ₂ %	18.80	18.80
		CO (ppm)	1.00	1.00
		H ₂ S (ppm)	0.00	0.00
PID	Peak	Steady		
	0	0.00	Gas Flow (l/hr)	0.00
				0.00

Note: WS5 was wet at the base of the well (<3cm of water).

Atmospheric pressure: 1008 / 1009

Ambient Concentrations: CH₄ (%): CO (ppm):
CO₂ (%): H₂S (ppm):
O₂ (%):

Tidal Conditions High Tide: n/a
Low Tide: n/a

Monitoring techniques and proforma based on guidance from CIRIA document C665
"stable" reading achieved after 60sec of stable values unless otherwise stated

GAS MONITORING RECORD

Geo Consulting Engineering Ltd

Project:	Southwick Court Farm	Engineer:	RH
Job Number:	GCE00644	Date:	18/08/2017
Equipment:	Geotechnical Instruments Model GA2000 (Serial No G502010) PhoCheck TIGER (Serial No T-111659)	Calibration Certificate no:	G502010_2/18332
		Calibration Date:	26/04/2017
		Calibration Certificate no:	236201 (Jan 2017)

Borehole No.	WS1	Parameter	Peak	Steady
Water Level (m/bgl):	0.77	CH ₄ %	0.00	0.00
Time:	10:33:00	CO ₂ %	0.90	0.40
		O ₂ %	19.90	19.90
		CO (ppm)	2.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.00	0.00
	0.00			

Borehole No.	WS2	Parameter	Peak	Steady
Water Level (m/bgl):	3.74	CH ₄ %	0.00	0.00
Time:	10:19:00	CO ₂ %	2.60	2.60
		O ₂ %	19.50	19.40
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	-0.10	-0.10
	0.00			

Borehole No.	WS3	Parameter	Peak	Steady
Water Level (m/bgl):	4.50	CH ₄ %	0.00	0.00
Time:	10:47:00	CO ₂ %	2.10	2.10
		O ₂ %	18.70	18.70
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.5	Steady	Gas Flow (l/hr)	-0.10	-0.10
	0.40			

Borehole No.	WS4	Parameter	Peak	Steady
Water Level (m/bgl):	2.32	CH ₄ %	0.00	0.00
Time:	10:59:00	CO ₂ %	0.80	0.40
		O ₂ %	20.90	20.90
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.2	Steady	Gas Flow (l/hr)	0.00	0.00
	0.20			

Borehole No.	WS5	Parameter	Peak	Steady
Water Level (m/bgl):	3.32	CH ₄ %	0.00	0.00
Time:	12:40:00	CO ₂ %	1.80	1.80
		O ₂ %	20.30	20.30
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.00	0.00
	0.00			

Borehole No.	WS6	Parameter	Peak	Steady
Water Level (m/bgl):	1.11	CH ₄ %	0.00	0.00
Time:	11:33:00	CO ₂ %	2.00	2.00
		O ₂ %	20.00	20.00
		CO (ppm)	3.00	3.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
1.6	Steady	Gas Flow (l/hr)	0.00	0.00
	1.60			

Borehole No.	WS7	Parameter	Peak	Steady
Water Level (m/bgl):	0.82	CH ₄ %	0.00	0.00
Time:	12:29:00	CO ₂ %	1.70	1.70
		O ₂ %	19.90	19.80
		CO (ppm)	2.00	2.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.00	Steady	Gas Flow (l/hr)	3.90	3.00 (1min)
	0.00			

Borehole No.	WS8	Parameter	Peak	Steady
Water Level (m/bgl):	1.10	CH ₄ %	0.00	0.00
Time:	12:18:00	CO ₂ %	2.70	2.70
		O ₂ %	19.00	19.00
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	4.40	3.40 (1min)
	0.00			

Borehole No.	WS9	Parameter	Peak	Steady
Water Level (m/bgl):	3.25	CH ₄ %	0.00	0.00
Time:	11:45:00	CO ₂ %	6.60	6.60
		O ₂ %	15.40	15.40
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.8	Steady	Gas Flow (l/hr)	0.00	0.00
	0.60			

Borehole No.	WS10	Parameter	Peak	Steady
Water Level (m/bgl):	2.10	CH ₄ %	0.00	0.00
Time:	11:56:00	CO ₂ %	2.60	2.60
		O ₂ %	20.20	20.20
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.00	0.00
	0.00			

Note:

Atmospheric pressure: 1006/1009

Ambient Concentrations:

CH₄ (%): 0.0% CO (ppm): 0.0%

CO₂ (%): 0.1% H₂S (ppm): 0.0%

O₂ (%): 21.4%

Tidal Conditions

High Tide: n/a

Low Tide: n/a

Monitoring techniques and proforma based on guidance from CIRIA document C665

"stable" reading achieved after 60sec of stable values unless otherwise stated

GAS MONITORING RECORD

Geo Consulting Engineering Ltd

Project:	Southwick Court Farm	Engineer:	RH
Job Number:	GCE00644	Date:	04/09/2017
Equipment:	Geotechnical Instruments Model GA2000 (Serial No G502010) PhoCheck TIGER (Serial No T-111659)	Calibration Certificate no:	G502010_2/18332
		Calibration Date:	26/04/2017
		Calibration Certificate no:	236201 (Jan 2017)

Borehole No.	WS1	Parameter	Peak	Steady
Water Level (m/bgl):	0.75	CH ₄ %	0.10	0.10
Time:	07:12:00	CO ₂ %	0.50	0.50
		O ₂ %	20.70	20.70
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	-0.10	-0.10
	0.00			

Borehole No.	WS2	Parameter	Peak	Steady
Water Level (m/bgl):	3.81	CH ₄ %	0.00	0.00
Time:	12:50:00	CO ₂ %	2.60	2.60
		O ₂ %	18.60	18.60
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.00	0.00
	0.00			

Borehole No.	WS3	Parameter	Peak	Steady
Water Level (m/bgl):	4.06	CH ₄ %	0.00	0.00
Time:	13:41:00	CO ₂ %	1.90	1.90
		O ₂ %	19.10	19.10
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.00	0.00
	0.00			

Borehole No.	WS4	Parameter	Peak	Steady
Water Level (m/bgl):	2.39	CH ₄ %	0.00	0.00
Time:	13:22:00	CO ₂ %	0.80	0.20
		O ₂ %	20.20	20.70
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.00	0.00
	0.00			

Borehole No.	WS5	Parameter	Peak	Steady
Water Level (m/bgl):	2.60	CH ₄ %	0.00	0.00
Time:	15:00:00	CO ₂ %	2.30	2.30
		O ₂ %	19.70	19.80
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.4	Steady	Gas Flow (l/hr)	0.00	0.00
	0.20			

Borehole No.	WS6	Parameter	Peak	Steady
Water Level (m/bgl):	1.12	CH ₄ %	0.00	0.00
Time:	13:55:00	CO ₂ %	1.70	1.70
		O ₂ %	19.20	19.20
		CO (ppm)	4.00	4.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.5	Steady	Gas Flow (l/hr)	-0.30	-0.20
	0.00			

Borehole No.	WS7	Parameter	Peak	Steady
Water Level (m/bgl):	0.87	CH ₄ %	0.00	0.00
Time:	14:50:00	CO ₂ %	1.60	1.60
		O ₂ %	19.70	19.50
		CO (ppm)	2.00	2.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.20	Steady	Gas Flow (l/hr)	-4.60	-3.20 (1min)
	0.20			

Borehole No.	WS8	Parameter	Peak	Steady
Water Level (m/bgl):	1.02	CH ₄ %	0.00	0.00
Time:	14:34:00	CO ₂ %	2.60	2.60
		O ₂ %	18.70	18.60
		CO (ppm)	4.00	4.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
1.8	Steady	Gas Flow (l/hr)	4.80	3.00 (1min)
	0.50			

Borehole No.	WS9	Parameter	Peak	Steady
Water Level (m/bgl):	2.15	CH ₄ %	0.00	0.00
Time:	14:05:00	CO ₂ %	5.50	5.40
		O ₂ %	16.50	16.40
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.8	Steady	Gas Flow (l/hr)	-0.10	0.00
	0.70			

Borehole No.	WS10	Parameter	Peak	Steady
Water Level (m/bgl):	1.67	CH ₄ %	0.00	0.00
Time:	14:19:00	CO ₂ %	1.90	1.90
		O ₂ %	19.50	19.50
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0.6	Steady	Gas Flow (l/hr)	0.00	0.00
	0.60			

Note:
Atmospheric pressure: 1008/1010

Ambient Concentrations: CH₄ (%): 0.1% CO (ppm): 0/1%
CO₂ (%): 0.1% H₂S (ppm): 0.0%
O₂ (%): 21.3%

Tidal Conditions High Tide: n/a
Low Tide: n/a

Monitoring techniques and proforma based on guidance from CIRIA document C665
"stable" reading achieved after 60sec of stable values unless otherwise stated

GAS MONITORING RECORD

Geo Consulting Engineering Ltd

Project:	Southwick Court Farm	Engineer:	RH
Job Number:	GCE00644	Date:	27/09/2017
Equipment:	Geotechnical Instruments Model GA2000 (Serial No G502010) PhoCheck TIGER (Serial No T-111659)	Calibration Certificate no:	G502010_2/18332
		Calibration Date:	26/04/2017
		Calibration Certificate no:	236201 (Jan 2017)

Borehole No.	WS1	Parameter	Peak	Steady
Water Level (m/bgl):	0.67	CH ₄ %	0.10	0.10
Time:	12:58:00	CO ₂ %	2.20	2.20
		O ₂ %	20.00	19.90
		CO (ppm)	3.00	3.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0.4	Gas Flow (l/hr)	4.60	3.30 (1min)

Borehole No.	WS2	Parameter	Peak	Steady
Water Level (m/bgl):	3.89	CH ₄ %	0.10	0.10
Time:	13:16:00	CO ₂ %	2.80	2.80
		O ₂ %	18.60	18.60
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	-0.10	-0.10

Borehole No.	WS3	Parameter	Peak	Steady
Water Level (m/bgl):	2.20	CH ₄ %	0.10	0.10
Time:	10:46:00	CO ₂ %	1.60	1.60
		O ₂ %	19.50	19.50
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0.1	Gas Flow (l/hr)	0.10	0.10

Borehole No.	WS4	Parameter	Peak	Steady
Water Level (m/bgl):	2.40	CH ₄ %	0.20	0.20
Time:	10:37:00	CO ₂ %	1.80	1.70
		O ₂ %	19.90	19.90
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0.3	Gas Flow (l/hr)	0.10	0.10

Borehole No.	WS5	Parameter	Peak	Steady
Water Level (m/bgl):	1.72	CH ₄ %	0.00	0.00
Time:	12:21:00	CO ₂ %	1.60	1.60
		O ₂ %	20.60	20.60
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	0.20	0.20

Borehole No.	WS6	Parameter	Peak	Steady
Water Level (m/bgl):	1.09	CH ₄ %	0.20	0.20
Time:	11:06:00	CO ₂ %	2.00	2.00
		O ₂ %	19.90	19.80
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	2.60	1.60 (1min)

Borehole No.	WS7	Parameter	Peak	Steady
Water Level (m/bgl):	0.84	CH ₄ %	0.10	0.10
Time:	12:06:00	CO ₂ %	1.70	1.70
		O ₂ %	19.70	19.60
		CO (ppm)	2.00	2.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	1.10	0.20

Borehole No.	WS8	Parameter	Peak	Steady
Water Level (m/bgl):	0.94	CH ₄ %	0.10	0.10
Time:	11:52:00	CO ₂ %	4.10	4.10
		O ₂ %	18.30	18.20
		CO (ppm)	5.00	5.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	9.70	4.70 (1min)

Borehole No.	WS9	Parameter	Peak	Steady
Water Level (m/bgl):	1.06	CH ₄ %	0.20	0.20
Time:	11:22:00	CO ₂ %	4.50	4.50
		O ₂ %	17.90	17.80
		CO (ppm)	2.00	2.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	5.70	4.40 (1min)

Borehole No.	WS10	Parameter	Peak	Steady
Water Level (m/bgl):	1.56	CH ₄ %	0.10	0.10
Time:	11:34:00	CO ₂ %	1.60	1.60
		O ₂ %	19.20	19.20
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0.3	Gas Flow (l/hr)	0.20	0.10

Note:

Atmospheric pressure: 1008/1010

Ambient Concentrations:

CH₄ (%): 0.1% CO (ppm): 0/1%
CO₂ (%): 0.1% H₂S (ppm): 0.0%
O₂ (%): 21.3%

Tidal Conditions

High Tide: n/a
Low Tide: n/a

Monitoring techniques and proforma based on guidance from CIRIA document C665
"stable" reading achieved after 60sec of stable values unless otherwise stated

GAS MONITORING RECORD

Geo Consulting Engineering Ltd

Project:	Southwick Court Farm	Engineer:	RH
Job Number:	GCE00644	Date:	17/10/2017
Equipment:	Geotechnical Instruments Model GA2000 (Serial No G502010) PhoCheck TIGER (Serial No T-111659)	Calibration Certificate no:	G502010_2/18332
		Calibration Date:	26/04/2017
		Calibration Certificate no:	236201 (Jan 2017)

Borehole No.	WS1	Parameter	Peak	Steady
Water Level (m/bgl):	0.70	CH ₄ %	0.10	0.10
Time:	11:19:00	CO ₂ %	3.40	3.20
		O ₂ %	19.80	19.00
		CO (ppm)	2.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	-0.90	-0.70 (1min)

Borehole No.	WS2	Parameter	Peak	Steady
Water Level (m/bgl):	3.99	CH ₄ %	0.10	0.10
Time:	11:37:00	CO ₂ %	3.00	3.00
		O ₂ %	19.00	18.90
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	-0.10	0.00

Borehole No.	WS3	Parameter	Peak	Steady
Water Level (m/bgl):	3.45	CH ₄ %	0.10	0.10
Time:	11:48:00	CO ₂ %	1.10	1.10
		O ₂ %	20.60	20.60
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0.1	Gas Flow (l/hr)	0.00	0.00

Borehole No.	WS4	Parameter	Peak	Steady
Water Level (m/bgl):	2.51	CH ₄ %	0.10	0.10
Time:	12:03:00	CO ₂ %	1.40	1.10
		O ₂ %	20.80	20.80
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	0.10	0.10

Borehole No.	WS5	Parameter	Peak	Steady
Water Level (m/bgl):	1.45	CH ₄ %	0.10	0.00
Time:	13:40:00	CO ₂ %	1.20	1.20
		O ₂ %	21.10	21.10
		CO (ppm)	1.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	0.10	0.10

Borehole No.	WS6	Parameter	Peak	Steady
Water Level (m/bgl):	1.15	CH ₄ %	0.10	0.10
Time:	12:19:00	CO ₂ %	2.10	2.10
		O ₂ %	19.70	19.60
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	-0.90	-0.40 (1min)

Borehole No.	WS7	Parameter	Peak	Steady
Water Level (m/bgl):	0.93	CH ₄ %	0.10	0.10
Time:	13:26:00	CO ₂ %	1.60	1.60
		O ₂ %	20.50	20.10
		CO (ppm)	1.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	-6.20	-4.20 (1min)

Borehole No.	WS8	Parameter	Peak	Steady
Water Level (m/bgl):	0.92	CH ₄ %	0.10	0.10
Time:	13:10:00	CO ₂ %	3.60	3.50
		O ₂ %	17.60	17.60
		CO (ppm)	4.00	4.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	5.40	1.60 (1min)

Borehole No.	WS9	Parameter	Peak	Steady
Water Level (m/bgl):	1.11	CH ₄ %	0.10	0.10
Time:	12:35:00	CO ₂ %	4.50	4.40
		O ₂ %	18.60	18.60
		CO (ppm)	2.00	1.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0	Gas Flow (l/hr)	-2.70	-1.50 (1min)

Borehole No.	WS10	Parameter	Peak	Steady
Water Level (m/bgl):	1.57	CH ₄ %	0.10	0.10
Time:	12:51:00	CO ₂ %	1.60	1.60
		O ₂ %	20.60	20.60
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
	0.2	Gas Flow (l/hr)	0.40	0.40

Note:

Atmospheric pressure: 1016/1017

Ambient Concentrations:

CH₄ (%): 0.1% CO (ppm): 0.0%

CO₂ (%): 0.1% H₂S (ppm): 0.0%

O₂ (%): 21.6%

Tidal Conditions

High Tide: n/a

Low Tide: n/a

Monitoring techniques and proforma based on guidance from CIRIA document C665
 "stable" reading achieved after 60sec of stable values unless otherwise stated

GAS MONITORING RECORD

Geo Consulting Engineering Ltd

Project:	Southwick Court Farm	Engineer:	RH
Job Number:	GCE00644	Date:	10/11/2017
Equipment:	Geotechnical Instruments Model GA2000 (Serial No G502010) PhoCheck TIGER (Serial No T-111659)	Calibration Certificate no:	G502010_2/18332
		Calibration Date:	26/04/2017
		Calibration Certificate no:	236201 (Jan 2017)

Borehole No.	WS1	Parameter	Peak	Steady
Water Level (m/bgl):	0.59	CH ₄ %	0.10	0.10
Time:	11:14:00	CO ₂ %	3.60	3.60
		O ₂ %	18.20	18.00
		CO (ppm)	2.00	2.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	9.40	5.80 (1min)

Borehole No.	WS2	Parameter	Peak	Steady
Water Level (m/bgl):	3.85	CH ₄ %	0.10	0.10
Time:	11:04:00	CO ₂ %	3.20	3.20
		O ₂ %	18.30	18.20
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.00	0.00

Borehole No.	WS3	Parameter	Peak	Steady
Water Level (m/bgl):	3.27	CH ₄ %	0.10	0.10
Time:	11:26:00	CO ₂ %	1.10	1.10
		O ₂ %	20.30	20.30
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.10	0.10

Borehole No.	WS4	Parameter	Peak	Steady
Water Level (m/bgl):	2.31	CH ₄ %	0.10	0.10
Time:	11:35:00	CO ₂ %	1.00	0.30
		O ₂ %	21.60	21.60
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.20	0.20

Borehole No.	WS5	Parameter	Peak	Steady
Water Level (m/bgl):	1.10	CH ₄ %	0.10	0.00
Time:	12:53:00	CO ₂ %	1.00	1.00
		O ₂ %	21.80	21.80
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	-0.10	-0.10

Borehole No.	WS6	Parameter	Peak	Steady
Water Level (m/bgl):	1.08	CH ₄ %	0.10	0.10
Time:	11:56:00	CO ₂ %	2.20	2.20
		O ₂ %	20.20	20.20
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	3.40	2.40

Borehole No.	WS7	Parameter	Peak	Steady
Water Level (m/bgl):	0.70	CH ₄ %	0.10	0.10
Time:	12:41:00	CO ₂ %	2.10	2.10
		O ₂ %	20.50	20.40
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	10.20	7.60 (1min)

Borehole No.	WS8	Parameter	Peak	Steady
Water Level (m/bgl):	0.76	CH ₄ %	0.10	0.10
Time:	12:29:00	CO ₂ %	4.70	4.70
		O ₂ %	18.70	18.70
		CO (ppm)	4.00	3.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	11.20	6.00 (1min)

Borehole No.	WS9	Parameter	Peak	Steady
Water Level (m/bgl):	1.93	CH ₄ %	0.10	0.10
Time:	12:08:00	CO ₂ %	3.40	3.40
		O ₂ %	20.00	20.00
		CO (ppm)	2.00	2.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	5.00	3.50 (1min)

Borehole No.	WS10	Parameter	Peak	Steady
Water Level (m/bgl):	1.60	CH ₄ %	0.10	0.10
Time:	12:18:00	CO ₂ %	1.90	1.90
		O ₂ %	20.10	20.00
		CO (ppm)	0.00	0.00
PID	Peak	H ₂ S (ppm)	0.00	0.00
0	Steady	Gas Flow (l/hr)	0.30	0.30

Note:

Atmospheric pressure: 1018/1019

Ambient Concentrations:

CH₄ (%): 0.1% CO (ppm): 0.0%

CO₂ (%): 0.1% H₂S (ppm): 0.0%

O₂ (%): 21.6%

Tidal Conditions

High Tide: n/a

Low Tide: n/a

Monitoring techniques and proforma based on guidance from CIRIA document C665
 "stable" reading achieved after 60sec of stable values unless otherwise stated