Hamson
Barron
Smith

Former Wombwell High
Barnsley

Ground Investigation Report

On behalf of Barnsley Metropolitan Borough Council

Report 23-24-18-1-6003/GIR1
May 2018

Report Issue Record

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Report Title:	Ground Investigation Report
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Position	Senior geo-Environmental Engineer	Technical Director
Contact Details	[redacted]	[redacted]

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Executive Summary

SITE INFORMATION	
Client	Barnsley Metropolitan Borough Council.
Site	Former Wombwell High.
Location	Roebuck Street , Barnsley, S73 0JT. NGR 440176, 402370.
Approximate area	9.8Ha.
Topography	Elevations range from approximately 50m OD in the north east to 70m OD in the south west, with series of terrace / benching.
Current land use	Southern half - derelict land, former high school that has been demolished. Northern half – community playing fields.
Proposed development	Low rise residential.

SITE SETTING	
Geology	Oaks Rock a sandstone flag of the Pennine Middle Coal Measures. No superficial Deposits shown.
Hydrogeology	Secondary A Aquifer. The site does not lies within a source protection zone.
Hydrology	Disused canal 225m north east.
History	The site was undeveloped agricultural land until the 1920s, when the school high school first. The school was extended over time with the current layout reached by 1977. The school closed in 2011 and subsequently the buildings were demolished.

INVESTIGATION	
Previous site investigations	Phase 1 Desk Study Report by Hamson Barron Smith (ref 23-24-18-1-6003/DSR1 dated July 2017).
This site Investigation	Twenty seven windowless sampler boreholes to 4.30m bgl with 7 x 50mm standpipes & gas valves. Nineteen machine excavated trial pits to 3.65m bgl. Infiltration testing in four of the trial pits.
Monitoring	Two gas and groundwater level monitoring visits completed at this stage.
Ground conditions	Variable topsoil and Made Ground to between 0.50m and 3.50m over medium dense clayey very sandy gravel / gravelly sand of the weathered bedrock. The bedrock itself was encountered at depths 0.60m to 3.45m bgl. No groundwater encountered during investigation. Rest levels recorded between 2.00m and 3.90 bgl during monitoring in March 2018.

GEOTECHNICAL	
Foundations	Strip footings may be suitable, depending on the depth of Made Ground. Bearing capacity of 140kPa at 0.60m in medium dense sands.
Shrinkable soils	Granular soils are non-shrinkable. Localised cohesive deposits are medium volume change potential.
Buried concrete	DS1 & AC2z. FND2z
Floor slabs	Ground floor slab suitable for granular natural strata. Where Made Ground > 600mm and/or cohesive soils are present suspended floors are recommended.
Gas protection	No gas protection measures required. No radon protection measures required.
Slope stability	Gradients are considered generally stable but careful assessment of changes of elevation or construction near existing slopes would still be needed.
Pavement	Design CBR 5% for granular soils and 3% for cohesive soils.
Soakaways	Underlying geology may to be suitable for soakaway drainage, subject to full scale testing to confirm and calculate infiltration rates at proposed locations. Infiltration rates recorded of 3 x 10^{-4} to >1 x 10^{-6} m/s.
Natural cavities	None expected.
Mining	None expected.

CONTAMINATION	
Human health	Localised surface PAH present.
Controlled waters	No significant risks identified.
Water supply pipes	The investigation has indicated no significant Contaminants of Concern. It is expected that standard pipework will be suitable.
Remediation	Further assessment / remediation required in the vincity of TP05, WS06 and WS13 where elevated PAH concentrations were recorded.

1 Introduction

Hamson Barron Smith Ltd (HBS) was commissioned by Barnsley Metropolitan Borough Council to specify and tender a ground investigation at Former Wombwell High, Barnsley and based on the results of the investigation to produce an interpretive Ground Investigation Report.

The site comprises a former high school, now demolished, and recreational field. The location of the site is shown on Figure 1.

It is understood that the site is being considered for mixed development including residential, a new secondary school and public open space. An outline masterplan has been provided and is included in Appendix A.

This report describes the work undertaken and presents the data obtained together with an evaluation of their significance in relation to the proposed works.

1.1 Project Requirements and Scope of Works

The objectives of the investigation were to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors.
- Develop a ground model for the site.
- Quantitatively assess the potential nature and extent of contamination from those uses and the environmental risks and liabilities which may be posed to the identified receptors (human health and the environment).
- Assess any potential geotechnical risks.
- Provide geotechnical recommendations to assist in construction design.
- Undertake BRE testing to confirm the infiltration rate of the soils.

To address these objectives HBS proposed the following scope of works:

- An intrusive ground investigation consisting of dynamic sampler boreholes, trial pits, groundwater and gas monitoring and laboratory chemical and geotechnical testing.
- Reporting on findings of the ground investigation and presentation of results.
- Geotechnical recommendations in relation to the proposed development.
- Geo-environmental assessment and interpretation of the ground, ground gas and groundwater conditions.

A tender package included conditions of contract, specification and Bill of Quantities were prepared by HBS and the works were tendered though the YorTender portal to three ground investigation companies. Rogers Geotechnical Ltd were the successful tenderer.

1.2 Previous Investigations

A Preliminary Land Contamination and Geotechnical Risk Assessment for the site has been undertaken by Hamson Barron Smith Ltd in July 2017 (report reference 23-24-18-1-6003/DSR1).

During the production of this report the information in that report has been reviewed and a summary of its findings is described in Section 4.

2 Site Location

Address: Former Wombwell High, Roebuck Street, Barnsley.

Post Code: S73 0JT.

National Grid Reference: 440176, 402370.

The site is located on the southern edge of Wombwell, approximately 6.5km south east of Barnsley town centre as shown on Figure 1.

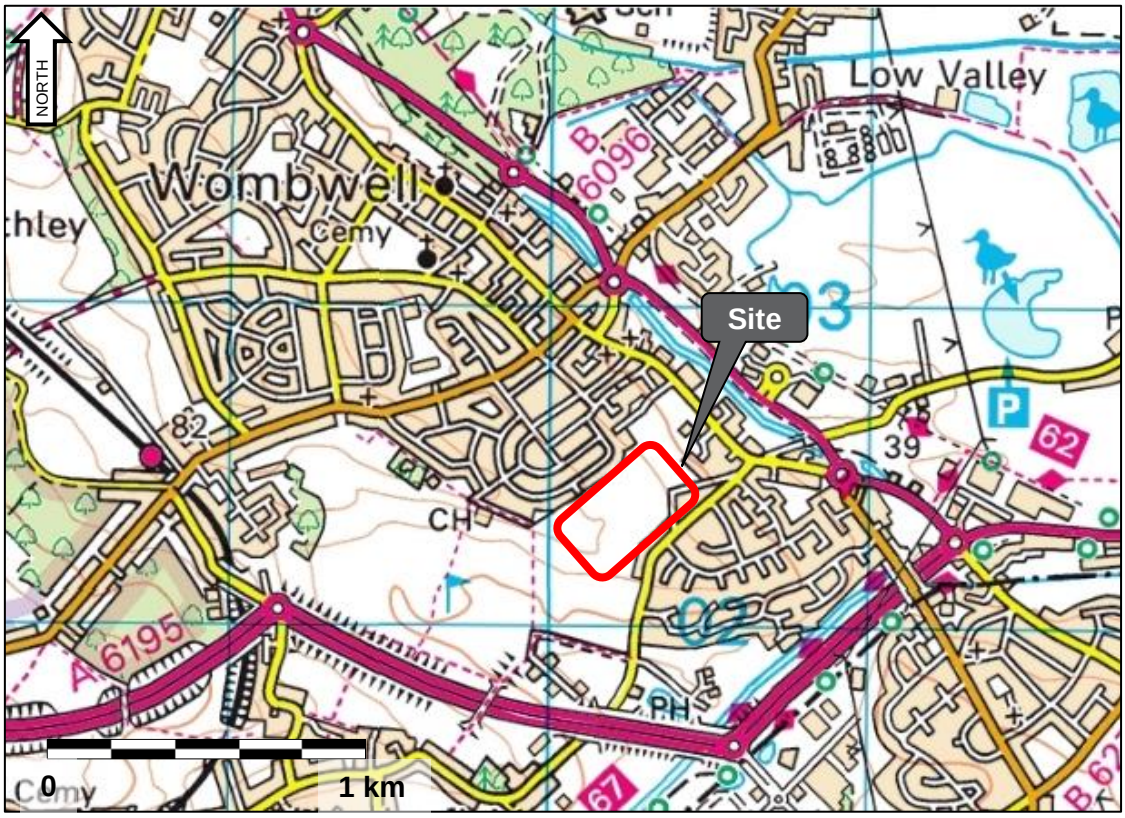


Figure 1 Site Location Plan

3 Site Description

The site consists of a 9.8ha parcel of land located approximately 750m south of the centre of Wombwell, Barnsley. The site includes the former Wombwell High and two community playing fields. The site rises from 50m in the north east to between 70m and 75m OD in the south west. The elevation changes are accommodated in a four terraces / development platforms.

Access to the former high school site is gained via a drive leading from Roebuck Street to the west. Access to the playing field is gained of Gypsy Lane to the north east.

The northern half of the site comprises an area of managed grassland. This area of the site comprises recreational fields, which are open to the public

The area that formerly contained Wombwell High School covers the southern half of the site and is bounded by a palisade fence. The buildings have been demolished; however, an electricity substation is still present to the west. The majority of this area of the site now comprises overgrown grassland.

The proposed master plan has been provided for the site showing potential end uses, an extract is given Figure 3 overleaf.

- New secondary school to the west (spans northern edge of third and fourth tier).
- Land to be retained by Barnsley council to the east (northern half of lowest tier.
- Public open space to the east (southern half of lowest tier)
- Residential housing over the remainder of the site.

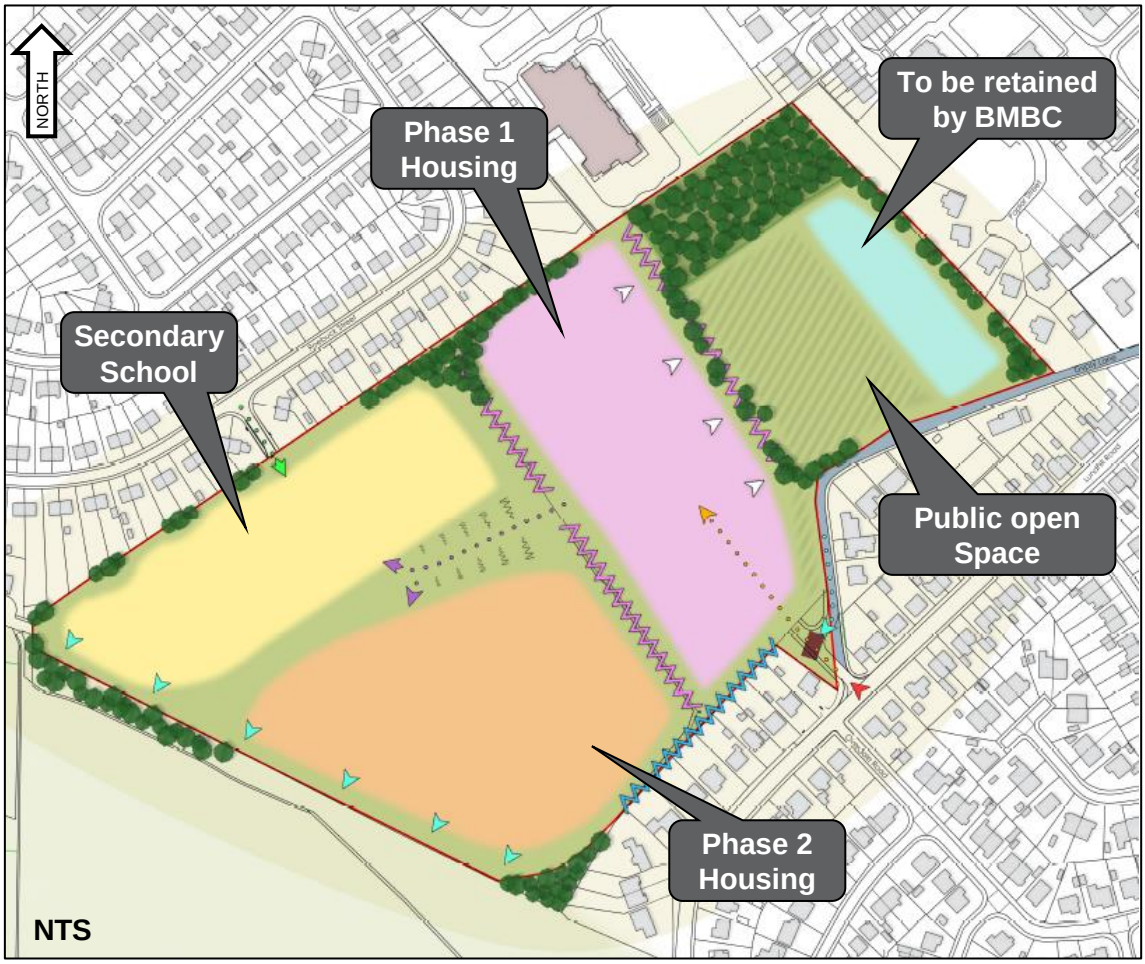


Figure 2 Site Plan

3.1 Surrounding Land-Use

The site is bound to the north west, north east and south east by residential premises. Grassed open land lies to the south west.

Figure 3 shows the site setting.

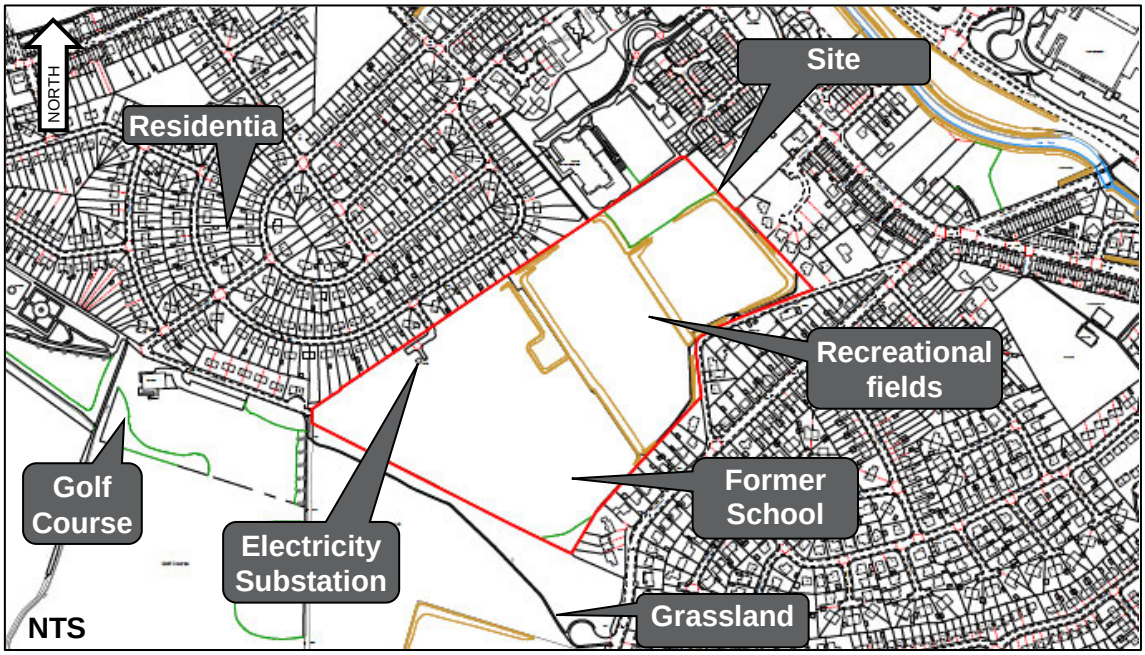
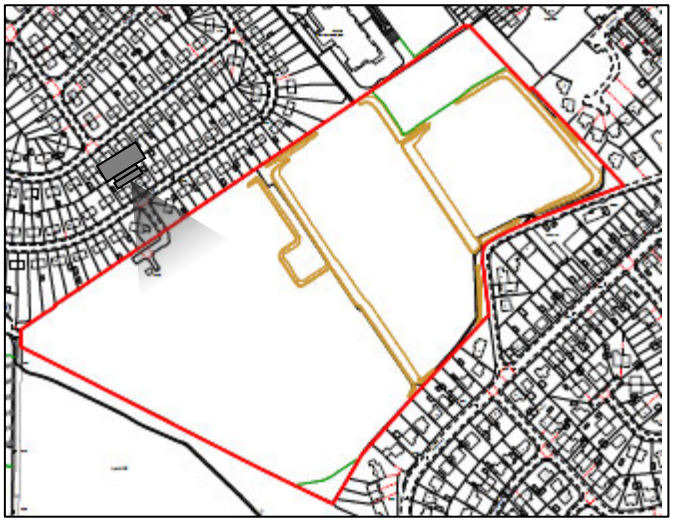


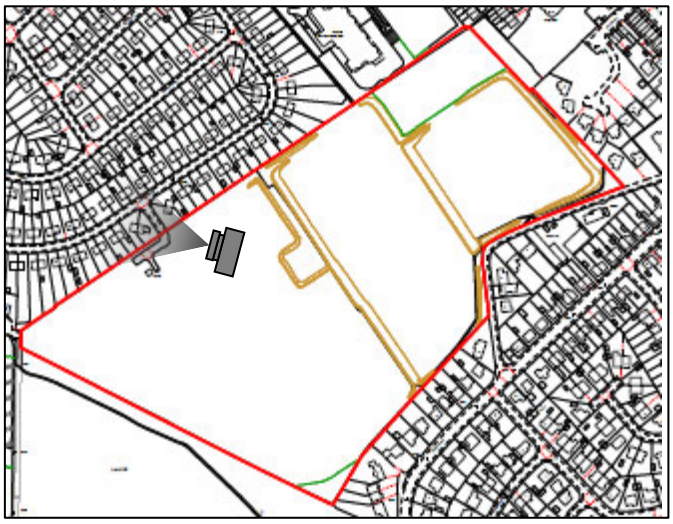
Figure 3 Site Plan

3.2 Photographs

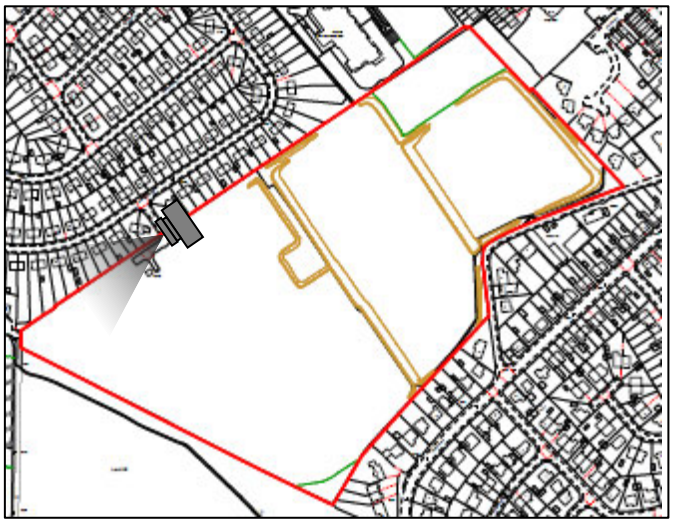
Photograph 1 The main access road into the site from Roebuck Street, looking south east.



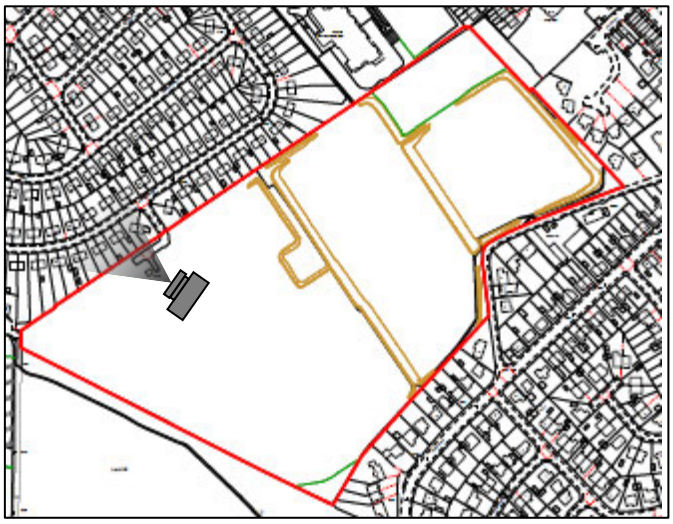
Photograph 2 The main into the site from Roebuck Street, looking north west.



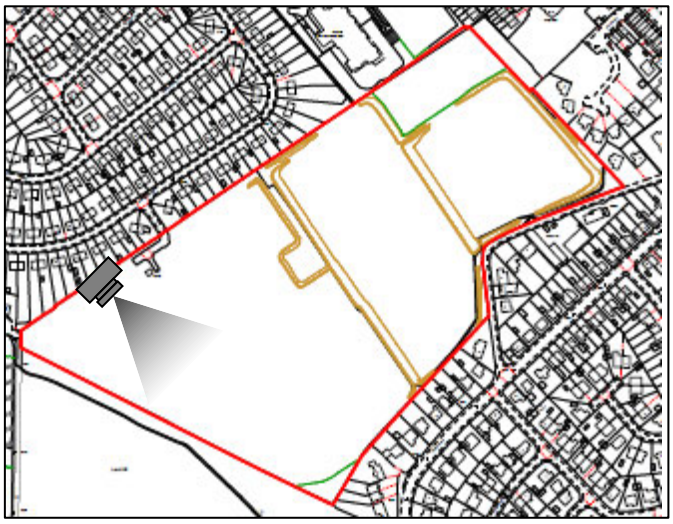
Photograph 3 The remainder of the school access road, looking south west.



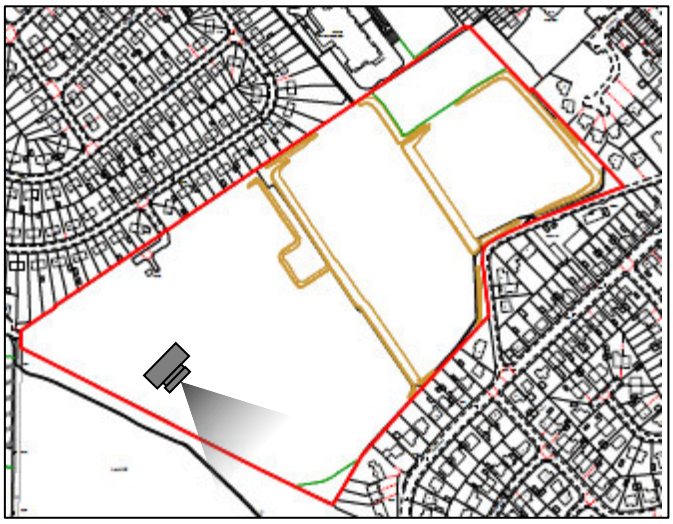
Photograph 4 The electricity substation, looking north west.



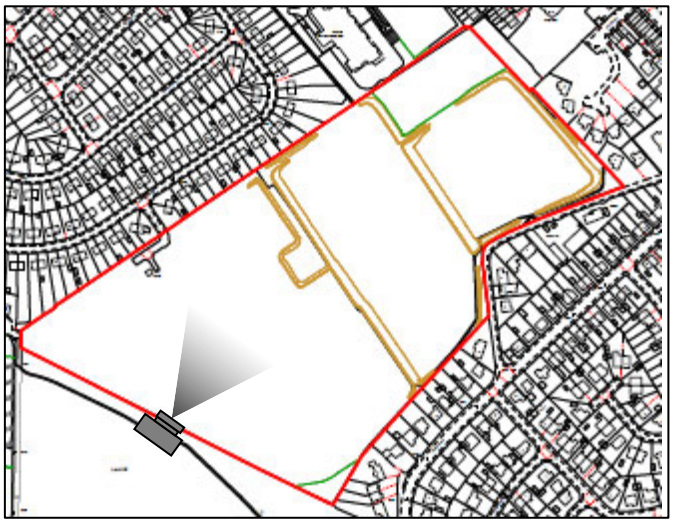
Photograph 5 The southern edge of the site, looking south east.



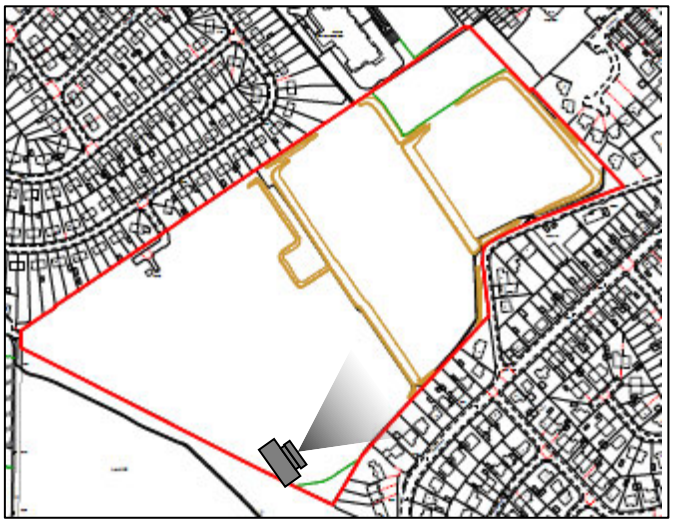
Photograph 6 Looking south east across the southern portion of the site.



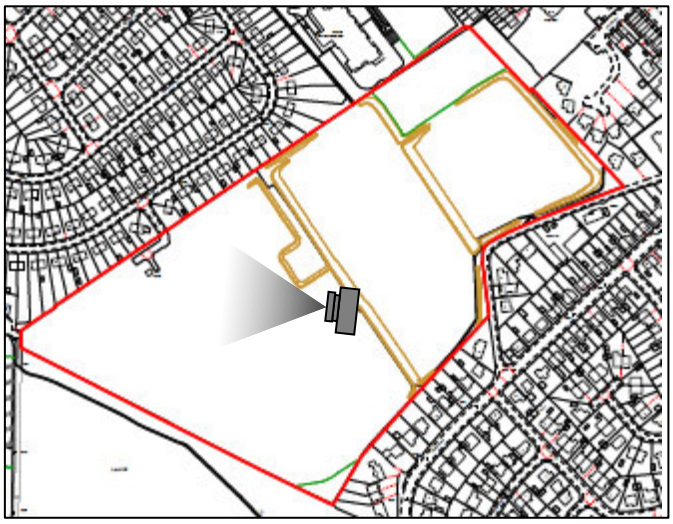
Photograph 7 Former tarmacked playground, looking north east.



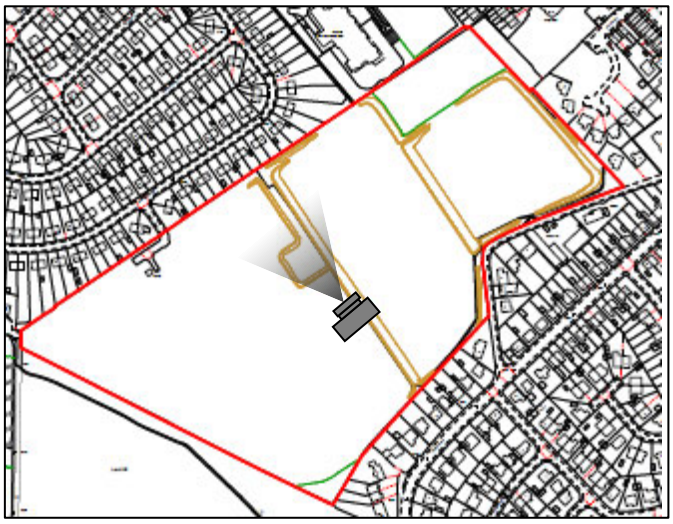
Photograph 8 Overgrown former playing field, looking north east.



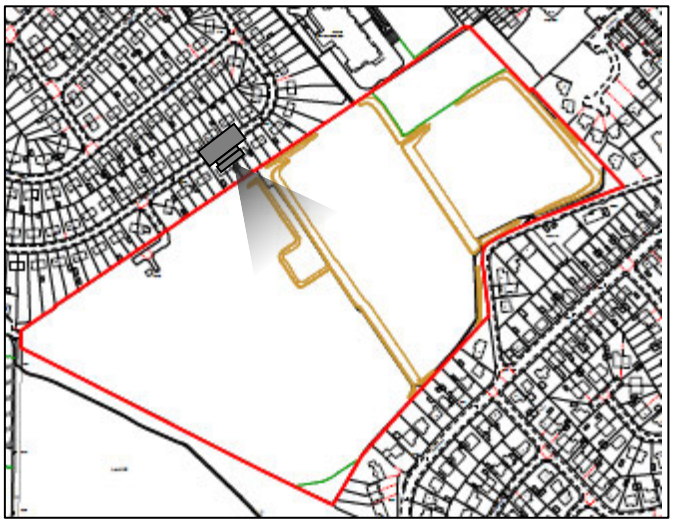
Photograph 9 The main area of the former Wombwell school site, looking west.



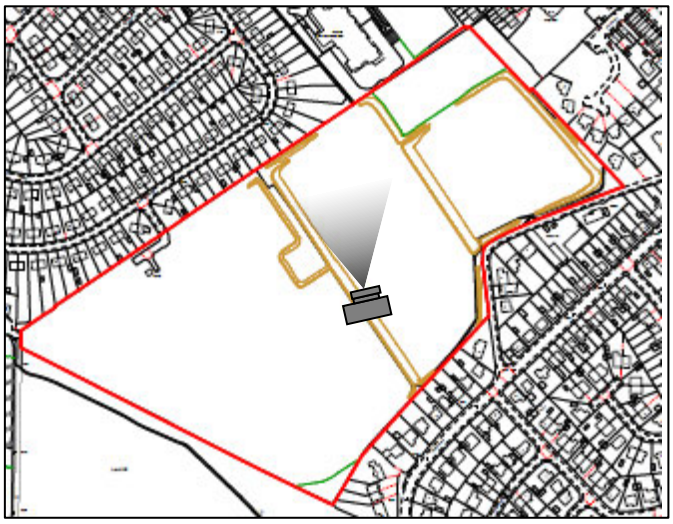
Photograph 10 Terracing at the northern edge of the former school site, looking north west.



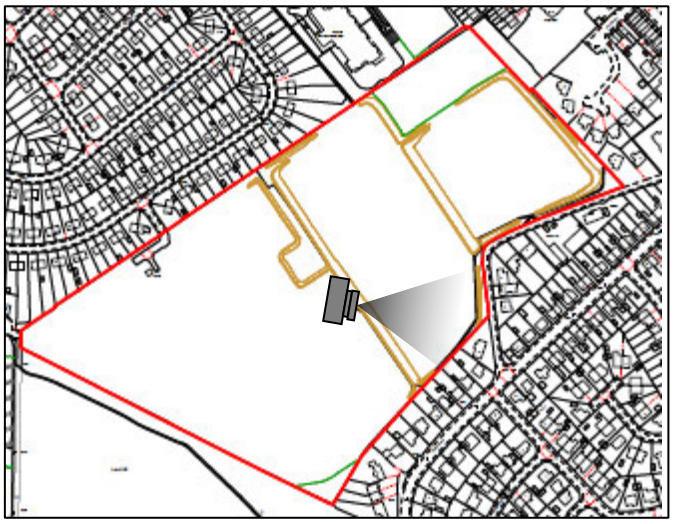
Photograph 11 The northern edge of the former Wombwell High School site looking north east.



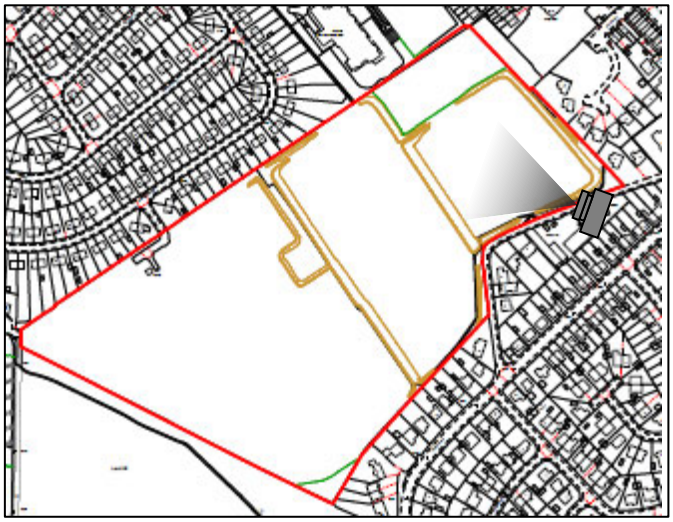
Photograph 12 The middle playing field, looking north.



Photograph 13 The middle playing field, looking east.



Photograph 14 The lower playing field from Gypsy Lane, looking north west.



4 Summary of Previous Work

A Preliminary Land Contamination and Geotechnical Risk Assessment for the site has been undertaken by HBS in July 2017 (report reference 23-24-18-1-6003/DSR1).

A summary of the salient findings of that report is presented below.

- Information published by the British Geological Survey indicated the site to be underlain by the Oaks Rock a sandstone flag of the Pennine Middle Coal Measures. No superficial deposits are anticipated on the site. The 1:50,000 scale mapping shows Made Ground is present on the site as a series of artificial deposits and / or voids. It was considered that this may be representative of cut and fill earthworks undertaken as part of the former development of the site.
- The Environment Agency classifies the Oaks Rock at the site to be Secondary A Aquifer. The site does not lie within a Source Protection Zone and there are no groundwater extractions within 2km of the site. It was considered that groundwater would be of medium sensitivity to any potential sources of on-site contamination.
- The nearest surface water is an unnamed disused canal which lies circa 225m north east at its closest point. It was concluded that based on the distance from the site that nature of the feature, i.e. an engineered watercourse, that surface water was of low sensitivity to any potential sources of on-site contamination.
- The nearest recorded current landfill is located circa 575m to the north east and is listed as Land / Premises at Everill Gate Lane; the waste type recorded as Household, Commercial and Industrial. A historical landfill is also recorded circa 310m south of the site. This site is listed and Lundhill Road; the landfill was active from 1977 to 1988 and is recorded to have taken Inert, Industrial, Commercial, Household, Liquid and Sludge. On the basis of the distance from the site, the landfill sites were not considered likely to present a risk to the site from gas or leachate migration.

- The Groundsure radon report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between 1% and 3% and therefore no radon protective measures are required in the construction of new buildings.
- The site was undeveloped agricultural land until the 1920s, when the school high school first. The school was extended over time with the current layout reached by 1977. The school was closed in 2011 and subsequently the buildings were demolished.
- The report indicated that there are no record of any shallow working in the locality of the site and the likelihood of unchartered workings being present to affect the site was considered low to negligible. Consequently, no mining specific ground investigation was deemed necessary for future developments.
- The anticipated ground conditions were considered likely to be suitable for conventional strip foundations for the proposed development, subject to the potential presence of Made Ground. No significant geotechnical risks were identified.
- The site appeared to have comprised undeveloped land prior to the construction of the former high school. Sources of land contamination were considered to be limited, comprising Made Ground / demolition materials associated with the former school and the substation present on the western boundary from the 1980s , this was considered a localised potential source of hydrocarbons and PCBs. The site was considered to be low risk with regards to contamination.
- No current or historical landfills are known to exist within 250m of the site. The site is underlain by Coal Measures strata, which have the potential to generate ground gases. While the risk of significant ground gas was considered low, risks could not be discounted. Subject to the findings of an intrusive investigation it was currently envisaged that no gas protection measures would be required.

5 Ground Investigation

The intrusive investigation was designed, specified and administered by HBS. The works were undertaken by Rogers Geotechnical Ltd (Rogers) who were appointed by Barnsley Metropolitan Borough Council. A copy of Rogers's Factual report is presented in Appendix B.

The intrusive works comprised the following:

- Twenty seven windowless sampler boreholes.
- Dynamic probe holes undertaken adjacent to each borehole.
- Ground & gas monitoring wells installed in seven boreholes.
- Nineteen machine excavated trial pits.
- BRE soakaway tests in four pits.

The positions of the exploratory holes were intended to provide a reasonable coverage of the site for an assessment of general site ground conditions.

The site investigation works were specified to be undertaken in accordance with BS 5930:1999 + Annex 2:2010 - Code of Practice for Site Investigations. The soils and rocks encountered were to be described in accordance with BS5930:1999 + Annex 2:2010 and BS EN ISO 14688-1:2002 and BS EN ISO 14689-1:2003.

The approximate positions of the exploratory holes are shown on the Exploratory Hole Location Plan Drawing 23-24-18-1-6003 D01 in Appendix **Error! Reference source not found.** and the exploratory hole records are included in Rogers's Factual report which is presented in Appendix B.

5.1 Windowless Sampler Boreholes

Twenty seven boreholes were formed to depths of between 0.60m and 4.08m on 12th to 16th March 2018 using windowless sampling techniques in order to obtain samples for laboratory testing and to provide geotechnical information for foundation design.

Representative disturbed small (1kg) and environmental (identified on the borehole logs as D and ES) samples of the soils encountered were obtained at regular intervals.

Standard Penetration Tests (SPTs) were carried out at metre intervals using either a split spoon sampler or a solid 60° cone. The results of these tests are given as a Standard Penetration "N" value or as a blow count for a given penetration on the borehole logs.

A detailed description of all strata and groundwater encountered, samples, in situ tests and other pertinent information observed are included on the borehole logs included in Rogers's Factual report which is presented in Appendix B.

5.2 Dynamic Probing

Twenty seven Dynamic Probe Holes (DP1 to DP27) were undertaken adjacent to the corresponding windowless sampler boreholes using super-heavy dynamic probe equipment. The dynamic probe apparatus conforms to BS 1377 (1990) Part 9 and effectively drives a 90º (sacrificial) cone into the ground using a 63.5kg automatic trip hammer falling over 750mm. The number of blows required to achieve increments of 100mm penetration is recorded and plotted graphically on the records, which are included in Rogers's Factual report which is presented in Appendix B.

5.3 Trial Pits

Nineteen trial pits (TP1 to TP19) were excavated to depths varying between 0.60m and 3.65mm below ground level (bgl) on 12h and 13th March 2018 using a wheeled backhoe excavator.

The profiles of strata or other features were recorded as excavation proceeded and measurements taken from ground level. Samples were taken, where appropriate, for laboratory analysis. In situ hand shear vane tests were also carried out. Descriptions of the strata encountered, groundwater observations and excavation stability notes, together with any other pertinent information observed, are included on the trial pit records, which are included in Rogers's Factual report which is presented in Appendix B.

5.4 Infiltration Testing

In order to determine the permeability of the ground to assess the suitability of soakaways for drainage at the site, infiltration testing was undertaken in four machine excavated trial pits (TP3, TP5, TP14 and TP16) on 12th and 13th March 2018.

The results of the infiltration testing, including logs for the test pits are included in Rogers's Factual report which is presented in Appendix B.

5.5 Installations

Gas / Groundwater monitoring wells were installed into seven of the twenty seven boreholes on completion, as detailed in Table 1. The wells were designed to allow monitoring of ground gases and shallow groundwater within the superficial deposits. The response zone comprised slotted pipe with a 10mm inert gravel surround. The strata above the response zone were sealed with bentonite. All remaining exploratory holes were backfilled with arisings and the ground surface reinstated.

Table 1 Summary of Monitoring Installations

Hole	Base (m bgl)	Dia. (mm)	Response Zone (m bgl)	Headworks
WS01	3.0	50	1.0 to 3.0	Gas valve, flush locked cover
WS07	1.45	50	0.5 to 1.4	Gas valve, flush locked cover
WS11	1.0	50	0.5 to 1.0	Gas valve, flush locked cover
WS14	2.7	50	1.0 to 2.5	Gas valve, flush locked cover
WS19	2.0	50	1.0 to 2.0	Gas valve, flush locked cover
WS20	4.0	50	1.0 to 4.0	Gas valve, flush locked cover
WS27	3.0	50	1.0 to 3.0	Gas valve, flush locked cover

6 Laboratory Testing

6.1 General

All laboratory testing was scheduled by HBS and is summarised as follows:

6.2 Geotechnical Testing

Samples of soil retained from the exploratory holes were scheduled for geotechnical laboratory testing. The geotechnical analysis was carried out in accordance with BS1377: 1990 'Soils for Civil Engineering Purposes'. The following tests were carried out on selected samples:

- Twelve particle size distribution (PSD) tests
- Thirteen natural moisture contents and Atterberg Limits
- Eight soluble sulphate content and pH value

The results are included in Rogers's Factual report which is presented in Appendix B.

6.3 Chemical Testing

Thirty samples of soils (eight topsoil, eleven granular Made Ground, eight cohesive Made Ground and three weathered bedrock) were retained from the exploratory holes and were scheduled for chemical laboratory testing. The soil samples were analysed for a combination of the following:

Arsenic	Selenium
Boron (water soluble)	Zinc
Cadmium	pH
Chromium (total and VI)	Total Organic Carbon
Copper	Phenols
Lead	PAH (USEPA 16)
Mercury	TPH (CWG)
Nickel	Asbestos screen

In addition, two soil samples from adjacent to the substation were analysed for PCBs.

Six soil sample was also submitted for waste acceptance criteria (WAC) testing to assist with determining the acceptability for landfill classes of the soil.

The chemical analysis was undertaken by MCERTS and UKAS accredited laboratory Chemtest Ltd. Certificates of analysis are included in Rogers's Factual report which is presented in Appendix B.

7 Ground Conditions

7.1 General

The results of this investigation were consistent with the anticipated geology. A summary of the strata encountered is presented in, and discussed in sections 7.2 to 0. For full details of the strata encountered reference should be made to the exploratory hole logs in Appendix B.

Table 2 Ground Conditions

	Depth to Base (m bgl)										
	Topsoil	MG: clay	MG: sand / gravel	MG: clay	MG: sand	Gravel	Clay	Sand	SST	SiST	Comment
WS01	0.10	-	3.00*	-	-	-	-	-	-		Refusal^
WS02	0.10	-	-	-	-	1.00*	-	-	-		
WS03	0.20	-	0.50	-	-	-	-	1.75*	-		
WS04	0.15	-	-	-	-	0.90*	-	-	-		
WS05	0.05	0.32	0.56	-	-	1.00*	-	-	-		
WS06	-	0.30	0.60*	-	-	-	-	-	-		Refusal^
WS07	-	0.35	1.45*	-	-	-	-	-	-		
WS08	-	0.35	2.45*	-	-	-	-	-	-		
WS09	-	0.55	0.70*	-	-	-	-	-	-		
WS10	0.25	-	1.25	-	-	-	-	-	2.00*		
WS11	0.24	-	-	-	-	1.15*	-	-	-		
WS12	0.05	-	0.55	1.00	2.00*	-	-	-	-		
WS13	0.01	1.6	3.45*	-	-	-	-	-	-		
WS14	0.22	0.70	1.35	2.40	-	-	2.70*	-	-		
WS15	0.25	-	-	-	-	-	-	-	0.40*		
WS16	0.25	-	-	-	-	1.15*	-	-	-		
WS17	0.30	-	1.75	-	-	-	-	-	2.00*		
WS18	0.30	1.60	-	-	-	-	1.75	-	2.00*		
WS19	0.35	-	1.30	-	-	-	-	2.00*	-		
WS20	0.25	-	1.80	2.90	-	-	-	4.30*	-		
WS21	0.40	2.80	3.80	4.08	-	-	-	-	-		Refused^
WS22	0.30	-	-	-	-	-	0.50	1.70	2.00*		
WS23	0.25	-	-	-	-	-	0.55	-	1.45*		
WS24	0.35	-	1.00	-	-	-	-	1.90*	-		
WS25	0.30	0.80	-	-	--	-	-	-	1.00*		
WS26	0.25	-	-	-	-	-	0.60	1.00*	-		
WS27	0.25	-	1.30	1.50	-	2.80	-	-	3.00*		

	Depth to Base (m bgl)										
	Topsoil	MG: clay	MG: sand / gravel	MG: clay	MG: sand	Gravel	Clay	Sand	SST	SiST	Comment
TP01	0.25	0.70	2.30	-	-	-	-	-	2.70*	-	Refused^
TP02	0.20	-	1.10	-	-	-	-	-	1.42*	-	Refused^
TP03	0.30	-	-	-	-	1.50	-	-	-	1.60*	Refused^
TP04	0.40	-	0.65	-	-	2.05*	-	-	-	-	Refused^
TP05	0.05	-	1.20	-	-	2.25*	-	-	-	-	Refused^
TP06	0.30	-	-	-	-	1.35	-	-	-	-	Refused^
TP07	0.30	-	1.35	-	-	-	1.90*			-	Refused^
TP08	0.46	-	2.00	-	-	2.30*	-	-	-	-	Refused^
TP09	0.30	1.80	2.50*	-	-	-	-	-	-	-	Refused^
TP10	0.40	-	-	-	-	-	-	-	0.60*	-	Refused^
TP11	0.40	-	-	-	-	-	-	-	0.60*	-	Refused^
TP12	-	-	-	-	-	-	-	-	1.15*	-	Refused^
TP13	0.30	-	2.00*	-	-	-	-	-	-	-	Refused^
TP14	0.25	-	1.90	-	-	-	-	-	2.15*	-	Refused^
TP15	0.20		1.50	2.30	3.50	3.65*	-	-	-	-	Refused^
TP16	0.20	-	-	-	-	0.85	-	-	1.20*	-	Refused^
TP17	0.25	-	-	-	-	-	0.60	-	0.65*	-	Refused^
TP18	0.20	-	1.50	1.70	2.00	2.30*	-	-	-	-	Refused^
TP19	0.30	-	1.80	2.40	3.00	-	3.45	-	-	-	Refused^

MD - medium dense
SST – Sandstone
SiST - Siltstone
* base of hole
^ Refused on rock

7.2 Topsoil

Topsoil was encountered in the majority of the exploratory holes to between 0.10m and 0.46m below ground level (bgl). The material consisted of dark brown sandy clay. In one location the topsoil was

Topsoil was absent in the area of the former high school building.

7.3 Made Ground

Made Ground materials were encountered in all locations to depths ranging from 0.50m to 3.50m bgl. The materials generally comprised medium dense, locally loose, clayey silty gravelly sand or clayey sandy gravel with interbedded soft sandy gravelly clays.

The site has been developed into a series of four engineered platforms, typically Made Ground is present in wedges with thickness of <1m at the base of the slope increasing to between 1.00m and 3.50m at the top of the slopes.

7.4 Pennine Middle Coal Measures Formation

The topsoil and Made Ground was underlain by the solid geology of the Pennine Middle Coal Measures Formation.

This material was typically weathered to granular deposits of medium dense clayey very sandy gravel or medium dense clayey gravelly sand, with intact bedrock being encountered at depths of 0.60m to 3.45m bgl.

Locally (WS14, WS18, WS22, WS23, WS26, TP07 and TP17) a cohesive firm sandy gravelly clay was recorded beneath the Made Ground to between 0.60m and 2.70m bgl.

7.5 Groundwater

No groundwater was encountered during the intrusive works. Monitoring of groundwater levels within the standpipes installed was undertaken in March 2018. The results are presented in Table 3.

Table 3 Groundwater Monitoring Results

Hole	WS01	WS07	WS11	WS14	WS19	WS20	WS27
Depth to water	Dry	Dry	Dry	2.60m bgl	2.04m bgl	3.88m bgl	2.94m bgl

7.6 Field Observations of Contamination

With the exception of anthropogenic deposits in the Made Ground, no visual or olfactory evidence of contamination was encountered.

7.7 Shrinkable Soils

Cohesive soils (clay and silt) may undergo volume change when subject to changes in moisture content. This can cause ground movement of soils where seasonal changes or tree root action affect the moisture content. Where foundations are constructed in such soils these movements can lead to damage of the superstructure. These

movements are greatest where trees are removed or tree root systems are severed as this allows the soils to regain their equilibrium moisture content resulting in expansion.

The NHBC (National House Building Council) has derived minimum foundation depths and other precautions relating to ground movements in shrinkable soils. These standards are set out in NHBC Chapter 4.2 “Building Near Trees” (2017) and are commonly adopted for both residential and non-residential structures.

The Modified Plasticity Index is related to volume change potential and NHBC recommended minimum foundation depths as indicated in Table 4.

Table 4 Volume Change Potential

Modified Plasticity Index	Volume Change Potential	Minimum Foundation Depth
40% or greater	High	1.00m
20% to <40%	Medium	0.90m
10% to <20%	Low	0.75m

Shrinkable soils are generally considered as clays having a modified plasticity index (I'p) of 10% or greater. The Modified Plasticity Index is defined as the Plasticity Index (Ip) of the soil multiplied by the percentage of particles less than 425µm. Soils containing less than 35% fine particles (< 63µm) are non-shrinkable.

The plasticity indices of thirteen soil samples (one of the natural clay strata and twelve form the cohesive Made Ground) ranged from 10 % to 26%, with the percentage of the soil <425µm ranging from 88% to 100%. Two of the samples were non plastic. The calculated modified plasticity indices ranged from 9% to 25%.

On this basis, the clay soils would therefore be considered to be of **medium volume change potential** with respect to NHBC Chapter 4.2 “Building Near Trees” (NHBC, 2017). Consequently, a minimum foundation depth of 0.90m is recommended where foundations are outside the influence zone of trees.

The results of six particle size distribution tests on samples of the granular strata recorded < 63µm fractions ranging from 4% to 26%. On this basis the granular soils tested are not considered to be shrinkable and no precautions are needed in this regard.

7.8 Soil Strength

The corrected N60 values of the Standard Penetration Tests (SPTs) were recorded as follows (see Figure 4).

- Cohesive Made Ground – 4 to 18
- Granular Made Ground – 9 to 62 (refusal)
- Natural sand / gravel / weathered sandstone – 15 to 68 (refusal)

The SPT hammer energy ratio for the drilling rig is 74%. Based on a plasticity index of 30%, the correlation proposed by Stroud 1975 gives a factor f1 of 5 between the SPT N values and undrained shear strength. This equates to values of 20kPa to 90kPa. The shear strength values are shown on Figure 5. Based on the correlation of Peck, Hansen and Thornburn (1974), the corrected N values equate to soil friction values of 29 to 38 degrees, increasing with depth. The friction angle values are shown on Figure 6.

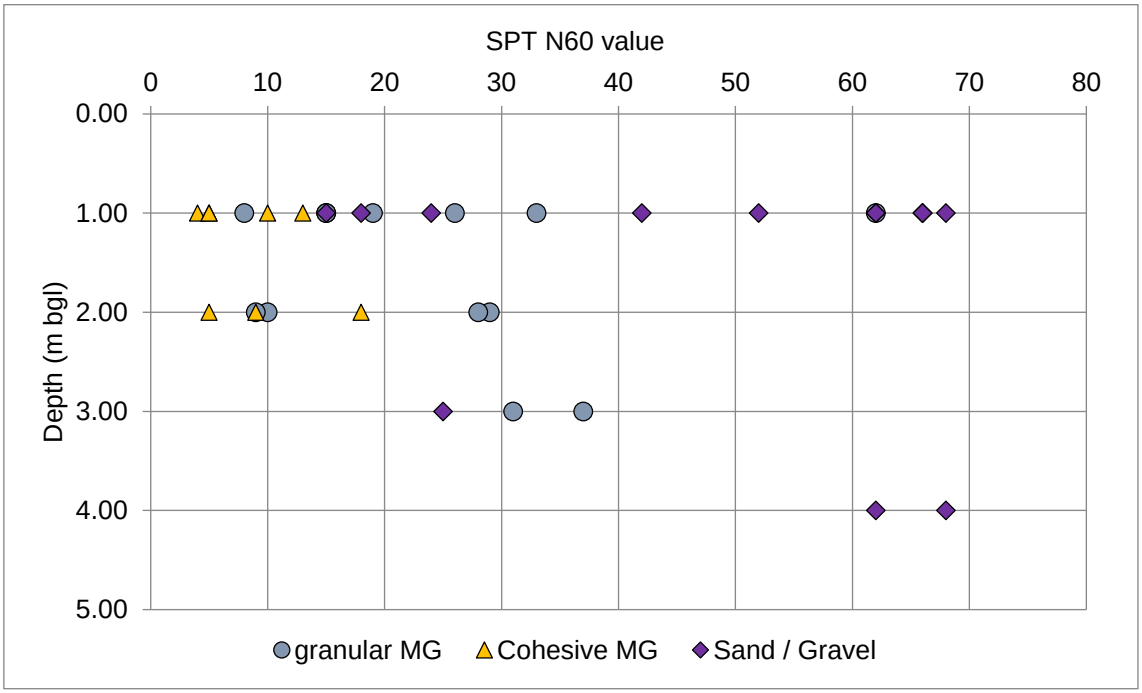


Figure 4 Corrected SPT N values

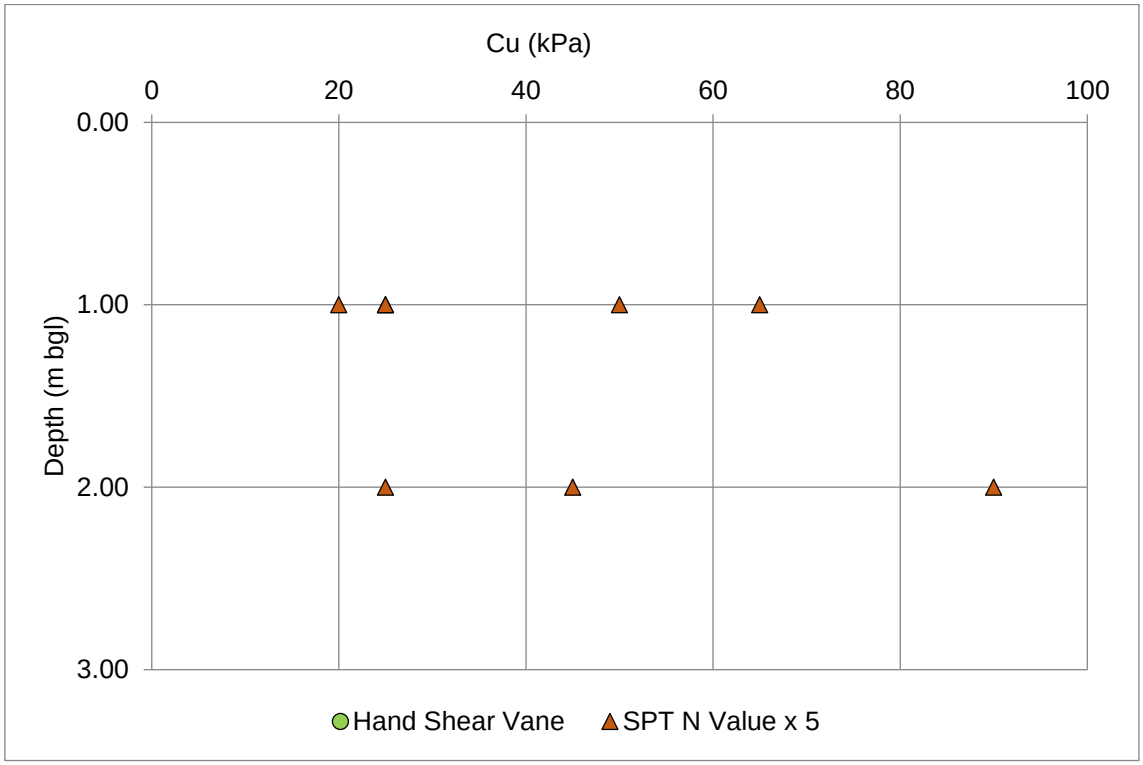


Figure 5 Shear strength

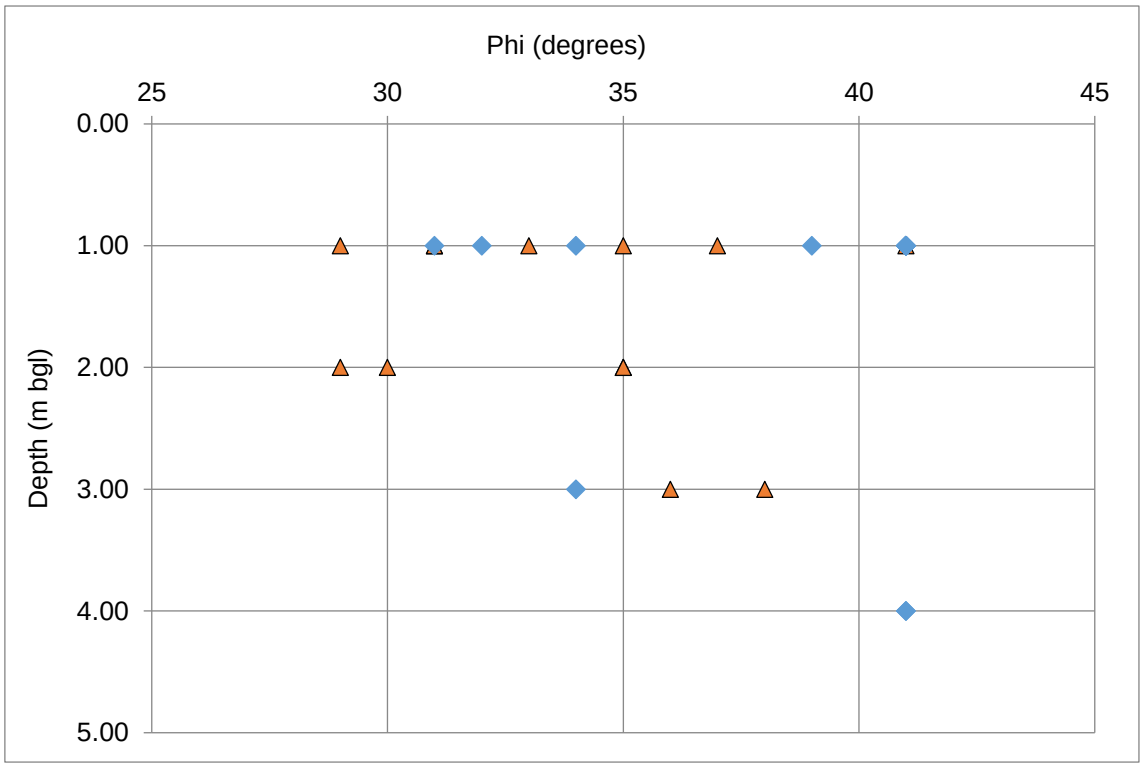


Figure 6 Soil friction angle (phi) derived from corrected SPT N values

8 Geotechnical Assessment

8.1 Proposed Development

It is understood that the site is being considered for redevelopment with low rise residential properties together with access roads, infrastructure and open spaces. The site is at an early feasibility stage and no master plan / preliminary layout for the development has been received.

8.2 Summary of Ground Conditions

The investigation identified between 0.50m and 3.50m of topsoil and Made Ground generally overlying medium dense clayey very sandy gravel / gravelly sand of the weathered bedrock. In WS14, WS18, WS22, WS23, WS26, TP07 and TP17 the Made Ground overlies cohesive Clays.

The bedrock itself was encountered at depths 0.60m to 3.45m bgl.

No groundwater was encountered during the intrusive works. During subsequent monitoring of the standpipes, groundwater was recorded in four of the seven wells at depths of approximately 2.00m to 3.90m bgl.

8.3 Foundation Design Principles

The two primary factors controlling the performance of foundations are bearing capacity and settlement. Usually the settlement tolerances of the structure are considerably less than the settlement that would be expected as the ultimate bearing capacity of the soils is approached. Therefore it is usually tolerable settlement that dictates the bearing pressure for foundation design. In general, the ultimate bearing capacity is usually divided by a safety factor of 3 for an allowable bearing capacity in order to maintain total settlement within tolerable limits for most structures, which is generally accepted to be 25mm. However, it should be noted that total settlements are usually less than this value as the average actual imposed load will be less than the design load.

8.4 Foundation Design

It is understood that the site is being considered for residential development, assumed to consist of two or three storey residential properties. The site has previously been developed with a series of four engineered platforms, rising from the north east to south west. Typically at the base of the slopes no or limited, <1m thick, Made Ground was recorded. At the top of the slope depths of Made Ground varied between 1.00m and 3.50m.

The composition, strength and depth of the Made Ground is variable with localised layers of soft sandy clay in the medium dense clayey sandy gravels or gravelly sands.

Traditional foundations should be constructed in the natural sand or gravel of the weathered Pennine Middle Coal Measures Formation at a minimum depth of 0.60m bgl, although it is acknowledged that a greater depth may be required to allow for construction detail or to reach this stratum.

Assessment of the SPTs carried out within the boreholes indicates a conservative N value of 12 to 19 (see Figure 4) for the granular soils of the weathered bedrock. Based on the correlation of Peck, Hansen and Thornburn (1974), this equates to a soil friction of 31 to 34 degrees. At a founding depth of 0.6m bgl this provides a safe bearing capacity of 140kPa for strip footings.

The bedrock is non shrinkable and therefore there is no requirement to deepen foundations within the influence zone of existing, proposed or felled trees where this is present, which is anticipated to be at or close to foundation depths.

Total settlements for foundations designed to the above pressure are likely to be in the order of 15 to 25mm, most of which would occur during construction. There would be a reduction in settlements with foundation depth, as the soil strength increases. Imposing a lower bearing pressure than the safe bearing capacity would also reduce settlement.

All foundations should be inspected by a suitably qualified and competent person to ensure that foundations are placed in competent material capable of supporting the intended loads and below any clay soils.

8.4.1 Piled Foundations

Where the thickness of Made Ground is too great for practical or economical construction of strip foundations, piled foundations can offer a suitable alternative solution.

Potential issues that may need to be addressed are:

- The sandstone bedrock may present difficulties with pile penetration. Driven steel tubes or bored rock sockets may be needed.
- It is likely that piling contractors will require further investigation by deep boreholes to obtain pile design parameters.
- Piling can result in connection of groundwater bodies and we would recommend early agreement with the Environment Agency to ensure that they are satisfied that works will not have a detrimental impact on water bearing aquifers present at the site.

The advice of a specialist piling contractor should be sought on the suitability and load carrying capacity of their proprietary techniques for use at this site.

Where foundations are within the influence of trees, a suitable compressible material or void former may be required for ring beams and sufficient longitudinal reinforcement incorporated into piles to resist tensile forces resulting from heave. The clay Made Ground soils are of medium volume change potential.

In order to ensure the safe operation of tracked plant (e.g. piling rigs, cranes etc), it will be necessary to design a suitable working platform. This can only be done in the context of the precise rig to be used and the route it will take to gain access. The data will require specific study for this design case. In some cases further specific shallow investigation may be necessary.

8.4.2 Excavation and Replacement of Made Ground

If the proposed final levels are such that a significant degree of re-profiling is required to create a more level development platform then the degree of cut and fill required may be such that it would be economic to remove all Made Ground and re-compact to

an engineered specification. This would then result in a more uniform material in terms of constituents and strength, allowing easier construction of shallow foundations in the underlying natural strata where thickness allows, or the use of reinforced box beam type foundations for suitable structures where the thickness of fill is too great. Liaison and agreement with the NHBC or other warranty provider would be advised at an early stage should this solution be considered.

The economy and practicality of this solution would need to be discussed at an early stage with groundworks contractors and the NHBC / Building Control. An earthworks strategy, specification and subsequent validation would also be required, this can be provided by Hamson Barron Smith Ltd.

8.5 Floor Slabs

Where the underlying soils underlying soils comprise in excess of 600mm of Made Ground a suspended floor slab would be required. Where natural granular soils are present at formation level then a ground bearing floor slab may be used, subject to the requirements of the NHBC or other warranty provider. The formation would need to be proof rolled and a platform of well compacted high quality stone placed over the formation.

No ground gas or radon protection measures are considered necessary.

Confirmation of any protection measures should be agreed with the local authority building control and or the NHBC.

8.6 Buried Structures

Notwithstanding the ground conditions revealed by the intrusive investigations, it is important to note that both foundation and ground floor slab construction could be significantly influenced by pre-existing subsurface construction, associated with the historical development of the site. This could include, for example, foundations and underground services, infilled pits and channels, which will need to be treated / managed as part of the development works.

8.7 Concrete Protection

Buried concrete classification is based on guidelines provided in BRE Special Digest 1 (BRE, 2005).

Chemical Analysis was undertaken on eight soil samples for pH and a total potential sulphate suite (water soluble sulphate, total sulphate and total sulphur).

An assessment for total potential sulphate indicates that the soils are not considered to be pyritic and the design class should be based on soluble sulphates.

The pH values were 5.2 to 7.2 with water soluble sulphate concentrations of <10mg/l to 55mg/l. Therefore, it is recommended that a Design Class of DS1 and AC2z should be assumed for buried concrete in accordance with BRE Special Digest 1 assuming natural ground and mobile groundwater conditions.

For low rise residential on mass concrete foundations, this corresponds to a concrete type of FND2z. It is recommended that the concrete supplier confirm the necessary concrete type based on its intended use and the chemical test results included in Rogers's Factual report which is presented in Appendix B.

8.8 Pavement Design

Equilibrium CBR values for various materials are given in Interim Advice Note 73/06 "Design Guidance for Road Pavement Foundations (Draft HD25)" produced by the Highways Agency and these are summarised in Table 5 assuming a high water table and thin pavement construction.

Table 5 Typical CBR Values

Soil Type	PI (%)	Equilibrium CBR (%)
Heavy clay	50-70	2
Silty clay	30	3
Sandy clay	10-20	3-4
Silt	-	1
sands and gravels		> 5%

The near surface soils are predominantly sand and gravel. Based on Table 5 it is recommended that a design CBR of 5% is adopted for these soils. Where clay soils are present a CBR value of 3% is recommended, although it is likely that the required

pavement thickness would result in the formation level being within the underlying gravel in any case.

Road construction thicknesses for a range of CBR values are given in Interim Advice Note 73/06 Revision 1 (2009) - Design Guidance for Road Pavement Foundations. The thickness of construction for different options are summarised in Table 6.

Table 6 Road Foundation Construction

CBR	2.5%	3%	4%	5%
Capping only (600 Series)	550mm	510mm	450mm	390mm
Sub-base only (800 Series)	450mm	420mm	360mm	320mm

CBR	2.5%	3%	4%	5%
Sub-base (800 Series)	350mm	320mm	275mm	240mm
Capping (600 Series)	250mm	240mm	225mm	210mm
Total	600mm	560mm	500mm	450mm

The construction thickness can be reduced by the use of a basal geo-grid, although detailed design would be required, specific to the loads and geo-grid used.

All Topsoil should be removed and the formation level should be proof rolled to identify any loose or soft spots, which should be removed and replaced with compacted granular fill. The conditions prevailing at the time of construction will affect the CBR of the sub-grade soil and its strength. Research has shown the importance of the equilibrium moisture content of the sub-grade. The relationship between soil suction and the moisture content shows that a soil that becomes wet during construction will retain water and will therefore be weaker under the pavement in the equilibrium condition than a foundation that has remained dry, particularly for soils of low to medium plasticity. Consequently the formation level will also need to be protected during inclement weather from deterioration; all slopes should be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

8.9 Excavations

Conventional mechanical backhoe excavators should prove suitable for excavation within the weathered bedrock.

The soils may be subject to spalling and collapse within excavations and concrete should be poured as soon as possible and temporary support may be required. Entry into shallow excavations by personnel should be minimised, and excavation stability should be assessed by suitably qualified and experienced staff and shoring used when required. Entry into deeper excavations should not be permitted unless full support is provided.

No groundwater was encountered during the investigation. During a subsequent monitoring visit a water table was recorded between 2m and 4m bgl in four of the seven monitoring wells. The water levels may well represent perched water rather than the water table itself.

8.10 Soakaway Drainage

Infiltration testing was undertaken in accordance with BRE 365 (2016) in four locations (TP3, TP5, TP14 and TP16). The stratum tested was the weathered Pennine Middle Coal Measures Formation. Infiltration Rates were recorded are summarised in Table 7.

Table 7 Infiltration Rates

Trial Pit No	Depth of pit (m)	Stratum	Test Number	Infiltration Rate
TP3	1.60	Weathered siltstone – gravelly clay	1	6.0×10^{-6} m/s
TP5	2.25	Weathered bedrock – very sandy gravel	1	6.1×10^{-6} m/s
TP14	2.16	Weathered sandstone – gravel and cobbles	1	3.0×10^{-4} m/s
TP14			2	1.4×10^{-4} m/s
TP14			3	9.6×10^{-5} m/s
TP16	1.20	Weathered sandstone – gravel and cobbles	1	1.75×10^{-5} m/s
TP16			2	2.65×10^{-5} m/s

Soakaways should be positioned a minimum of 5m from any proposed structure to avoid the risk of inducing ground collapse near buildings.

The results of the infiltration testing are included in Rogers's Factual report which is presented in Appendix B.

No proposed soakaway locations were provided therefore the tests undertaken may not represent the ground conditions at the locations of soakaways.

9 Contamination Risk Assessment

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. Local authorities are the principal regulator for inspection of land under Part 2A. In England, Part 2A is described fully in DEFRA Circular 01/2006, which also contains the statutory guidance (DEFRA, 2006). Part 2A defines contaminated land as:

'…any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

a. *significant harm is being caused or there is a significant possibility of such harm being caused; or*

b. *Pollution of controlled waters is being, or is likely to be, caused.'*

In applying the definition of Contaminated Land, Part 2A states that 'the Local Authority must:

- Identify a 'Pollution Linkage'. That is, a linkage between a contaminant and a receptor, by means of a pathway(s).
- Determine if the contaminant is causing significant harm to that receptor, or there is a significant possibility of such harm being caused by that contaminant to that receptor.

If any one element of the pollutant linkage is not present then the land should not be identified as 'contaminated land'.

Part 2A is designed to 'enable the identification and remediation of land on which contamination is causing unacceptable risks to human health or the wider environment. It does not necessarily include all land where contamination is present, even though such contamination may be relevant in the context of other regimes'. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

The control of development and land use in the future is the responsibility of the planning system. A fundamental principle of sustainable development is that the condition of land, its use and its development should be protected from potential hazards. The National Planning Policy Framework (NPPF) states that '*to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location*.'

Planning policies and decisions should also ensure that the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation.

NPPF also states that after any required remediation, the land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

9.1 Introduction to Human Health Risk Assessment

A generic quantitative risk assessment (GQRA) has been undertaken using the geochemical results for the soil samples retained from the site. The approach to human health risk assessment adopted in this report is consistent with the Environment Agency's Model Procedures (CLR11) and other relevant guidance (including SR3, BS10175:2001 and NPPF).

The laboratory soil data has been compared to relevant and applicable critical concentrations as outlined in the guidance. These criteria can be either Generic Assessment Criteria (GAC) or Site Specific Assessment Criteria (SSAC). For the purpose of this generic quantitative risk assessment, GAC will be used. The GACs been derived from

- LQM/CIEH 'Suitable 4 Use Levels' (S4ULs) where available, or
- DEFRA C4SL Health Criteria Values (March 2014),

We understand that the proposed development is likely to be residential housing therefore a '***residential with plant uptake'*** end use has been assumed for the assessment.

The % total organic carbon (TOC) for the soils samples ranges from <0.2% to 6.5%, average 2.12%. From this the Soil Organic Matter (SOM) can be calculated. The Environment Agency Briefing Note 7 (EA, 2005) states that %SOM = %TOC/0.58. Therefore for the site the SOM ranges from <0.34% to 11.2%, average 3.65%. Where the assessment criteria are reliant on Soil Organic Matter (SOM); assessment criteria derived for 2.5% SOM have been used.

The results of the laboratory geochemical soil analysis have been statistically analysed to ensure a true representative assessment of the site is made and allow a comparison with the appropriate GAC. Statistical analysis has been undertaken in accordance with the report: "Guidance on Comparing Soil Contamination Data with a Critical Concentration", published by the Chartered Institute of Environmental Health through CL:AIRE (Contaminated Land: Applications In Real Environments) in May 2008.

In order to undertake the statistical assessments, the ESI Contaminated Land Statistics Calculator software has been utilised. This software has been developed in accordance with the CL:AIRE guidance. The statistical tests are structured according to the reason for the assessment (i.e., whether the assessment is addressing concerns relating to either the planning or Part IIA regimes).

The statistical tests are presented in terms of a Null and an Alternative Hypothesis. The tests are structured to show, at the defined level of confidence, which of the two hypotheses is most likely to be true. By convention, the Null Hypothesis is the starting proposition against which the key question (i.e. can we confidently say that the level of contamination at the site is high relative to an appropriate measure of risk?) can be tested. Hence, for the planning assessment:

- The Null Hypothesis (H_0) is that the level of contamination in the study area is same as or greater than the critical concentration; and
- The Alternative Hypothesis is that the level of contamination is lower than the critical concentration.

If the Null Hypothesis cannot confidently be rejected, then further assessment or remediation may be required. However, if the Null Hypothesis can confidently be rejected in favour of the Alternative Hypothesis, it can be concluded that there is good evidence that no further action is required.

9.2 Soil Assessment

To ascertain a preliminary assessment of the contaminative nature of the near surface materials across the site, thirty soil samples were retained during the site investigation works and submitted for laboratory analysis.

The chemical analysis was undertaken at Chemtest Ltd laboratories. The results are included in Rogers's Factual report which is presented in Appendix B.

9.2.1 Asbestos

All of the samples were screen for the presence of asbestos containing material (ACM). No ACM was detected.

9.2.2 Metals

The results of the chemical analysis for heavy metal concentrations within the soil samples are summarised in Table 8.

Table 8 Summary of Heavy Metals

Determinant	GAC	Concentration Range		H_0 Rejected?	Evidence Level
		Min	Max		
Arsenic	37	3.80	17.00	Yes	100%
Boron (w/s)	290	<0.40	2.00	Yes	100%
Cadmium	11	<0.10	0.62	Yes	100%
Chromium (total)	910	8.10	87.00	Yes	100%
Chromium (VI)	6	<0.50	<0.50	Yes	100%
Copper	2400	5.20	440.00	Yes	100%
Lead	200*	2.80	770.00	Yes	97%
Mercury	11	<0.10	0.53	Yes	100%
Nickel	130	13.00	49.00	Yes	100%
Selenium	250	<0.20	<0.20	Yes	100%
Zinc	3700	18.00	130.00	Yes	100%

Results in mg/kg unless stated otherwise
GACs are LQM GAC unless stated otherwise
*DEFRA C4SL

All available soil data has been incorporated within the Statistical Calculator. The key inputs to and outputs from the Calculator tool are included in Appendix C.

Based on the full datasets the Statistical Calculator indicates that we can be 97% to 100% confident in rejecting the Null Hypothesis for the planning scenario. This result indicates that the observed metals concentrations are unlikely to pose any significant risks to human health in a Planning context.

9.2.3 Polyaromatic Hydrocarbons

The results of the chemical analysis for Polyaromatic Hydrocarbons (PAH US-EPA16) are summarised in Table 9.

Table 9 Summary of Polyaromatic Hydrocarbons

Determinant	GAC (resi)	Concentration Range		Topsoil		Granular MG		Cohesive MG	
		Min	Max	H_0 Rej?	EL	H_0 Rej?	EL	H_0 Rej?	EL
Acenaphthene	510	< 0.10	28.00	Yes	100%	Yes	100%	Yes	100%
Acenaphthylene	420	< 0.10	1.90	Yes	100%	Yes	100%	Yes	100%
Anthracene	5400	< 0.10	13.00	Yes	100%	Yes	100%	Yes	100%
Benz(a)anthracene	11	< 0.10	32.00	Yes	100%	Yes	99%	Yes	100%
Benzo(a)pyrene	2.7	< 0.10	31.00	Yes	100%	Yes	100%*	No	90%
Benzo(b)fluoranthene	3.3	< 0.10	41.00	Yes	100%	Yes	100%*	No	75%
Benzo(ghi)perylene	340	< 0.10	19.00	Yes	100%	Yes	100%	Yes	100%
Benzo(k)fluoranthene	93	< 0.10	17.00	Yes	100%	Yes	100%	Yes	100%
Chrysene	22	< 0.10	36.00	Yes	100%	Yes	97%	Yes	100%
Dibenz(a,h)anthracene	0.28	< 0.10	5.20	Yes	100%	Yes	89%*	No	0%
Fluoranthene	560	< 0.10	71.00	Yes	100%	Yes	100%	Yes	100%
Fluorene	400	< 0.10	30.00	Yes	100%	Yes	100%	Yes	100%
Indeno(1,2,3-cd)pyrene	36	< 0.10	22.00	Yes	100%	Yes	100%	Yes	100%
Naphthalene	5.6	< 0.10	1.40	Yes	100%	Yes	100%	Yes	100%
Phenanthrene	220	< 0.10	69.00	Yes	100%	Yes	100%	Yes	100%
Pyrene	1200	< 0.10	75.00	Yes	100%	Yes	100%	Yes	100%

Results in mg/kg unless stated otherwise
GACs are LQM S4UL for SOM of 2.5% unless stated otherwise
*Outlier removed
EL – Evidence Level
Rej - Rejected

All available soil data has been incorporated within the Statistical Calculator. The key inputs to and outputs from the Calculator tool are included in Appendix C.

Topsoil

Based on the full datasets the Statistical Calculator indicates that we can be 100% confident in rejecting the Null Hypothesis for the planning scenario. This result indicates that the observed concentrations in the topsoil are unlikely to pose any significant risks to human health in a Planning context

Granular Made Ground

An outlier of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene was recorded in the granular Made Ground in TP5 from 0.05m to 1.20m bgl.

The Made Ground in TP05 included a proportion of clinker gravel. We envisage that this is the source of the PAH compounds.

With the outlier removed from the dataset the Statistical Calculator indicates that we can be 97% to 100% confident in rejecting the Null Hypothesis for the planning scenario. This result indicates that the observed concentrations in the PAH, with the exception of the outlier in TP05, are unlikely to pose any significant risks to human health in a Planning context.

Cohesive Made Ground

No outliers were identified by the Statistical Calculator for the cohesive Made Ground. However two samples of the cohesive Made Ground have elevated concentrations of Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene, as listed below

PAH Determinant	Concentration (mg/kg)	
	WS06	WS13
Benzo(a)pyrene	4.3	4.3
Benzo(b)fluoranthene	6.0	6.7
Dibenz(a,h)anthracene	0.81	0.89

It was noted that WS06 lies immediately south of location TP05 where an outlier of PAH was recorded in the granular Made Ground. The Made Ground in TP05 included a proportion of clinker gravel. Similarly, the cohesive Made Ground in WS06 also contained clinker gravel.

The sample from WS13 did not contain clinker gravel however, in this location coal was recorded. We envisage that this is the source of the PAH compounds.

The concentrations recorded in these two samples was more than two times greater than the maximum concentrations recorded elsewhere. In addition both samples contained a portion of clinker and / or coal. Therefore, a review of the data with these samples excluded was undertaken.

With WS6 and WS13 removed, the Statistical Calculator indicates that we can be 98% to 100% confident in rejecting the Null Hypothesis for the planning scenario. This result indicates that the observed concentrations in the PAH, with the exception of WS06 and WS13, are unlikely to pose any significant risks to human health in a Planning context.

Natural soils

Three samples of the weathered bedrock were tested; one comprising soft gravelly clay and two comprising clayey sandy gravel. None of the samples recorded concentrations of PAH above the laboratory limit of detection. This indicates that the observed concentrations of PAH in the natural soils are unlikely to pose any significant risks to human health in a Planning context

9.2.4 Petroleum Hydrocarbons and BTEX

All soil samples were analysed for total petroleum hydrocarbons (TPH CGW) in an aromatic/aliphatic split and BTEX (benzene, toluene, ethylbenze and xylene), the results of which are summarised in Table 10.

Table 10 Summary of Petroleum Hydrocarbons

Determinant	GAC	Concentration Range		H_0 Rejected?	Evidence Level
		Min	Max		
EC>5-6 Aliphatic	78	< 1.0	< 1.0	Yes	100%
EC>6-8 Aliphatic	230	< 1.0	< 1.0	Yes	100%
EC>8-10 Aliphatic	65	< 1.0	< 1.0	Yes	100%
EC>10-12 Aliphatic	330	< 1.0	14	Yes	100%
EC>12-16 Aliphatic	2,400	< 1.0	33	Yes	100%
EC>16-35 Aliphatic	92,000	<2.0	66	Yes	100%

Determinant	GAC	Concentration Range		H_0 Rejected?	Evidence Level
		Min	Max		
EC>35-44 Aliphatic	92,000	< 1.0	<1.0	Yes	100%
EC>5-7 Aromatic	140	< 1.0	< 1.0	Yes	100%
EC>7-8 Aromatic	290	< 1.0	< 1.0	Yes	100%
EC>8-10 Aromatic	83	< 1.0	< 1.0	Yes	100%
EC>10-12 Aromatic	180	< 1.0	< 1.0	Yes	100%
EC>12-16 Aromatic	330	<1.0	17	Yes	100%
EC>16-21 Aromatic	540	<1.0	230	Yes	100%
EC>21-35 Aromatic	1,500	<1.0	1200	Yes	100%
EC>35-44 Aromatic	1,500	<1.0	75	Yes	100%
Benzene	0.17	<0.001	<0.001	Yes	100%
Toluene	290	<0.001	<0.001	Yes	100%
Ethylbenzene	110	<0.001	<0.001	Yes	100%
m&p-Xylene	130	<0.001	<0.001	Yes	100%
o-Xylene	140	<0.001	<0.001	Yes	100%

Results in mg/kg unless stated otherwise
GACs are LQM S4UL for SOM of 2.5% unless stated otherwise
*DEFRA C4SL

All available soil data has been incorporated within the Statistical Calculator. The key inputs to and outputs from the Calculator tool are included in Appendix C.

Based on the full datasets the Statistical Calculator indicates that we can be 100% confident in rejecting the Null Hypothesis for the planning scenario. This result indicates that the observed TPH and BTEX concentrations are unlikely to pose any significant risks to human health in a Planning context.

9.3 Human Health Summary

An outlier of Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene was recorded in the Made Ground in TP5 from 0.05m to 1.20m bgl. The granular Made Ground in TP05 included a proportion of clinker gravel. We envisage that this is the source of the PAH compounds.

Elevated Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene was recorded in two samples of the cohesive Made Ground, WS06 at 0.00m to 0.30m and WS13 at 0.10 to 0.25m bgl. The concentrations recorded in these two samples was more than two times greater than the maximum concentrations recorded elsewhere.

Similar, to the soils sample in the granular Made ground from the adjacent exploratory hole, TP05, the cohesive Made Ground in WS06 contained clinker gravel. The sample from WS13 did not contain clinker gravel however, in this location coal was recorded. We envisage that this is the source of the PAH compounds.

TP05 and WS06 currently lies within the area identified for a proposed new secondary school. The presence of hardstanding and buildings over a proportion of the site will break the pathway between the source and the end user and therefore remove the potential risk in these areas. Therefore, with respect to human health no action will be required beneath areas of hardstanding. In areas of soft landscaping and playing field further assessment and / or localised remediation will be required.

TP13 lies between the area identified for a proposed new secondary school and the area identified for Phase 2 residential. The area is indicated for a potential main access road. The presence of hardstanding (tarmacked road) will break the pathway between the source and the end user and therefore remove the potential risk in these areas. Therefore, with respect to human health no action will be required beneath areas of hardstanding. In areas of soft landscaping further assessment and / or localised remediation will be required. Once the masterplan / plot boundaries have been confirmed the area around WS13 should be reassessed.

9.4 Controlled Waters

The previous report undertaken considered the risks to controlled waters (groundwater and surface water) to be low.

The results of the soils analysis have support this assessment with no significant sources of land contamination identified.

Consequently based on the information available the ground conditions present at the site are unlikely to pose a significant risk to controlled waters.

9.5 Water Pipelines

The current guidance on selection of materials for water supply pipes to be laid in contaminated land is contained in UKWIR Report 10/WM/03/02 (re-issued 2010) which sets out in Table 3.1 of that document threshold values for a selection of organic

contaminants that may have a detrimental effect on pipes and fittings. However, the document is for guidance and is not mandatory and has not been adopted universally by all water suppliers.

In addition, various consultative technical bodies have expressed concern on the nature of the document and the methodologies proposed, which would result in significant cost and time implications for all site assessments.

The site is brownfield and there is a presumption in the guidance that barrier pipe will be required. The investigation and assessment has indicated no significantly elevated concentrations of contaminants with the potential to attack plastics and as such standard pipework may be suitable for the site. However, this investigation was not designed specifically for water pipe runs and because of conflicting and ambiguous guidance, confirmation should be sought from the water supply company at the earliest opportunity.

9.6 Ground Gas Assessment

9.6.1 Radon

The Groundsure GeoInsight radon report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is less than 1%. No radon protective measures are required in the construction of new buildings or extensions.

9.6.2 Landfill Gas

No current or historical landfills are known to exist within 250m of the site. The site is underlain by Coal Measures strata, which have the potential to generate ground gases. While the risk of significant ground gas is considered low, risks cannot be discounted. To validate this assumption gas monitoring was undertaken on two occasions.

The results of the two rounds of gas monitoring are presented in Table 11.

Table 11 Gas Monitoring Results - Maximum recorded values

Visit No	1	2
Pressure (mb)	1983/985	995/998

Max values recorded		WS01	WS07	WS11	WS14	WS19	WS20	WS27
Flow rate	(l/hr)	0.1	0.1	0.1	<0.1	0.1	0.1	0.1
Methane	(%)	0.1	0.1	0.1	<0.1	0.1	0.1	<0.1
Carbon dioxide	(%)	2.8	0.9	0.6	0.4	2.0	1.6	3.8
Oxygen	(%)	20.1	19.6	20.8	21.4	20.7	21.1	18.6

The results from the confirmatory round of monitoring suggest that the site is not being significantly affected by ground gas.

10 Site Conceptual Model

Following the generic quantitative risk assessment, a summary of the receptors, sources and potential pollutant linkages identified for the site is presented in the following sections. This Site Conceptual Model is summarised in Table 12.

10.1 Receptors

It is understood that the site is being considered for redevelopment with residential dwellings. Residents are assumed therefore to occupy the site full time and may be expected to be exposed directly to soils within the site. Construction workers would be directly exposed to soils, however this would only be short term.

- Residents of the proposed development.
- Construction workers.
- Construction materials (including services).
- Groundwater – Secondary A classification.
- Surface water – Disused canal 225m north east.
- Flora and fauna.

10.2 Sources

10.2.1 Contaminants

An outlier of Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene was recorded in the Made Ground in TP5 from 0.05m to 1.20m bgl. The granular Made Ground in TP05 included a proportion of clinker gravel. We envisage that this is the source of the PAH compounds.

Elevated Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene was recorded in two samples of the cohesive Made Ground, WS06 at 0.00m to 0.30m and WS13 at 0.10 to 0.25m bgl. The concentrations recorded in these two samples was more than two times greater than the maximum concentrations recorded elsewhere. Similar, to the soils sample in the granular Made ground from the adjacent exploratory hole, TP05, the cohesive Made Ground in WS06 contained clinker gravel. The sample

from WS13 did not contain clinker gravel however, in this location coal was recorded. We envisage that this is the source of the PAH compounds.

TP05 and WS06 currently lies within the area identified for a proposed new secondary school. The presence of hardstanding and buildings over a proportion of the site will break the pathway between the source and the end user and therefore remove the potential risk in these areas. Therefore, with respect to human health no action will be required beneath areas of hardstanding. In areas of soft landscaping and playing field further assessment and / or localised remediation will be required.

TP13 lies between the area identified for a proposed new secondary school and the area identified for Phase 2 residential. The area is indicated for a potential main access road. The presence of hardstanding (tarmacked road) will break the pathway between the source and the end user and therefore remove the potential risk in these areas. Therefore, with respect to human health no action will be required beneath areas of hardstanding. In areas of soft landscaping further assessment and / or localised remediation will be required. Once the masterplan / plot boundaries have been confirmed the area around WS13 should be reassessed.

10.2.2 Landfill gas

No risks from ground gas have been identified.

10.2.3 Radon

No radon protective measures are necessary in the construction of new developments or extensions.

10.3 Pathways

Generic possible pathways between potential sources and receptors are discussed as follows:

10.3.1 Receptor – Residents

- Dermal contact with contaminated soil.
- Ingestion of contaminated soil.
- Indoor and outdoor inhalation of dust or vapours.

- Ingestion of produce or soil particles on produce grown on site.

10.3.2 Receptor – Construction Workers

- Dermal contact with contaminated soil or water.
- Ingestion of contaminated soil or water.
- Outdoor inhalation of dust or vapours.

10.3.3 Receptor – Buildings and services

- Sulphate attack on concretes.
- Hydrocarbon attack on plastics which can result in tainting of potable water carried in supply pipes.

10.3.4 Receptor – Groundwater

- Infiltration and leaching of contaminants in soil into groundwater.
- Migration of contaminated water via drainage system.
- Migration of polluted groundwater to drinking water abstraction.

10.3.5 Receptor – Surface Water

- Run off of contaminants into surface water.
- Migration of contaminated water via drainage system.

10.3.6 Receptor – Flora and Fauna

- Uptake via root system.
- Displacement of oxygen from root systems.
- Harm to ecosystems from contaminated surface water.

Following the generic quantitative risk assessment, a summary of the potential pollutant linkages identified for the site is presented in the Site Conceptual Model in Table 12.

Table 12 Site Conceptual Model

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
Elevated PAH (BaP, BbF and DahA) in vicinity of TP05, WS06 and WS13. No potential sources of soil contamination identified over the reminder of the site.	Human Health – future users of the site e.g. residents and visitors.	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Likely – localised BaP, BbF and DahA concentrations of in the Made Ground in the vincity of TP05, WS06 and WS13.	Probability: Likely Consequence: Medium Magnitude: **Medium Risk**
		Indirect Contact - Vapour inhalation.	Unlikely – no volatile sources of identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
		Hydrocarbon tainting of potable water supply pipes.	Possible – only localised sources identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
	Human Health – Construction workers	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Likely – localised BaP, BbF and DahA concentrations of in the Made Ground in TP05, WS06 and WS13. Risk can be mitigated with appropriate working practices and use of appropriate PPE. Risk would increase if not adopted.	Probability: Likely Consequence: Medium Magnitude: **Low Risk**
		Indirect Contact - Vapour inhalation.	Unlikely – no volatile sources identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
	Controlled Waters – groundwater (Secondary A Aquifer)	Leaching and percolation.	Unlikely – localised source only identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
	Controlled Waters – No significant surface water lies within 250m of the site.	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination.	Unlikely – localised source only identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
	Buried structures – Aggressive ground conditions	Direct contact and/or leaching (sulphate, pH).	Unlikely – underlying geology not expected to be aggressive.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
	Ecology - existing trees and landscaping on site.	Plant uptake.	Unlikely – localised source only identified and no protected ecosystems on or in the vicinity of the site.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Ground gases.	Human Health – future users of the site e.g. residents and visitors.	Permeation through ground and intrusion into buildings and structures.	Unlikely – no sources identified.	Probability: Unlikely Consequence: High Magnitude: **Low Risk**
	Flora	Displacement of oxygen from root systems	Unlikely – no sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Radon.	Human Health – future users of the site e.g. residents and visitors.	Permeation through ground floor.	Unlikely – no protection measures required.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**

11 Remedial Requirements

An outlier of Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene was recorded in the Made Ground in TP5 from 0.05m to 1.20m bgl. The granular Made Ground in TP05 included a proportion of clinker gravel. We envisage that this is the source of the PAH compounds.

Elevated Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene was recorded in two samples of the cohesive Made Ground, WS06 at 0.00m to 0.30m and WS13 at 0.10 to 0.25m bgl. The concentrations recorded in these two samples was more than two times greater than the maximum concentrations recorded elsewhere. Similar, to the soils sample in the granular Made ground from the adjacent exploratory hole, TP05, the cohesive Made Ground in WS06 contained clinker gravel. The sample from WS13 did not contain clinker gravel however, in this location coal was recorded. We envisage that this is the source of the PAH compounds.

TP05 and WS06 currently lies within the area identified for a proposed new secondary school. The presence of hardstanding and buildings over a proportion of the site will break the pathway between the source and the end user and therefore remove the potential risk in these areas. Therefore, with respect to human health no action will be required beneath areas of hardstanding. In areas of soft landscaping and playing field further assessment and / or localised remediation will be required.

TP13 lies between the area identified for a proposed new secondary school and the area identified for Phase 2 residential. The area is indicated for a potential main access road. The presence of hardstanding (tarmacked road) will break the pathway between the source and the end user and therefore remove the potential risk in these areas. Therefore, with respect to human health no action will be required beneath areas of hardstanding. In areas of soft landscaping further assessment and / or localised remediation will be required. Once the masterplan / plot boundaries have been confirmed the area around WS13 should be reassessed.

No remediation required over the remainder of the site.

11.1 Material Reuse

Based on the GQRA carried out the majority of the soil sampled does not pose a potential risk to human receptors and would be suitable for re-use. Soils in the vicinity of TP05 containing a portion of clinker may pose a risk to human receptors and would not be suitable for reuse within remediation or further assessment.

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is now widely accepted as an alternative regime to the EPR.

Under the EPR, material that is contaminated but otherwise suitable for re-use is also classified as waste and its re-use should be in accordance with the Environmental Permitting Regulations 2007 (EPR).

Under the CL:AIRE Voluntary Code of Practice (CoP) materials excavated on-site are not deemed contaminated if suitable for re-use at specified locations or generally within the site. Material that may have been classified as hazardous waste under the EPR may be re-used. The CoP regime requires that a 'Qualified Person' as defined under the CoP reviews the development of the Materials Management Plan, including review of Risk Assessments and Remediation Strategy/Design Statement together with documentation relating to Planning and Regulatory issues, and signs a Declaration which is forwarded to the Environment Agency and which confirms compliance with the CoP.

Based upon the data obtained from the ground investigation there would not be a requirement to take material off-site as long as a suitable Materials Management Plan (MMP) was in place.

12 Recommendations for Further Work

The following further works are recommended:

- Discussions with service providers regarding the materials suitable for pipework etc.
- Discussions with regulatory bodies regarding the conclusions of this report.
- Detailed design of foundations.
- Projection of remedial strategy.
- Remediation of the site in the vicinity of TP05, WS06 and WS13.
- Verification of the remedial works.

13 Limitations and Uncertainties

13.1 General

This report has been prepared by Hamson Barron Smith with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client.

The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true representative data with respect to site conditions. The information reported herein is based on the interpretation of data collected during the site investigation, pertaining specifically to the soil samples retained from the identified locations. Should additional information become available that may influence the opinions expressed in this report, Hamson Barron Smith reserves the right to review such information and, if warranted, to alter the opinions accordingly.

The evaluation and conclusions do not preclude the existence of other site conditions and contamination, which could not reasonably have been revealed by the site investigation works undertaken at the time of writing. This report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions or potential contaminants.

It must be noted that the locations of the exploratory holes are, by requirement, usually free from buried services and structures, and therefore are more likely to encounter natural strata at a shallower depth than areas underlain by services and structures.

This report has been prepared solely for the use of the client, and may not be relied upon by other parties without written consent from Hamson Barron Smith.

Hamson Barron Smith disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

14 General Notes

This report will be prepared for the exclusive use of the client named in the document and copyright will subsist with Hamson Barron Smith Limited. Prior written permission must be obtained to reproduce all or part of the report. It will be prepared on the understanding that you will disclose its contents to parties directly involved in the current investigation, preparation and development of the site. Further copies may be obtained with the client's written permission from Hamson Barron Smith Limited with whom a master copy of the document will be retained.

The report and /or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Hamson Barron Smith Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.

The report will be based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. There may be special conditions, appertaining to the site, however, which may not be revealed by the investigation, and which may not be taken into account in the report.

Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.

The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated in the light of these data by the supervising geotechnical engineers.

Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

Unless specifically stated, the investigation will not take into account of possible effects of mineral extraction.

The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.

Appendix A

Proposed Master Plan

NORTH

- Gross site area 24.05 acres approx
- Proposed site access from Lundhill Road
- Main access street into development site
- Possible re-alignment of Gypsy Lane to link with new access street into site
- Potential footpath link into new school site from Roebuck Street
- Main access into new school site and phase 2 residential. Approx 80m road @ 1:20 to accommodate level change with 1:3 embankments adjacent
- Existing trees and hedgerows to be retained (subject to additional survey work) - suitable buffer from development to be provided
- Phase 1 residential area approximately 5.0 acres - approx. 65 dwellings
- Phase 2 residential area approximately 6.5 acres - approx. 91 dwellings
- Land retained by Barnsley Metropolitan Council - approximately 1.60 acres gross
- Public open space approx. 2.85 acres
- Site for proposed new secondary school - approximately 5.0 acres
- Existing dwellings by site
- Wombwell Park Street Primary School
- Amenity of existing dwellings along southern boundary to be respected with suitable off-set distances from proposed development
- Existing changes in level to be incorporated within detail design
- Opportunity to provide outward looking development along western boundary to maximise positive views out of site
- Opportunity to provide outward looking development over public open space
- Gypsy Lane - opportunity to improve access and egress, possibly one way
- Junction of Lundhill Road to Park Street subject to highway improvement to work to be agreed with Local Authority
- Existing bungalow off Gypsy Lane to be demolished to accomodate site access

Scale
0m 50m

Wombwell High School Masterplan dwg. no. 16-235-01 1-1250@a1 September 2016

Premier Construction (Northern)

Appendix B

Rogers Factual Report

Riley, Catherine

From: Rob Palmer <Rob.palmer@rogersgeotech.co.uk>
Sent: 01 May 2018 09:23
To: Riley, Catherine
Subject: Wombwell

Report Number18-07897-1					
Position	**Depth (m)**	**Description**	**→**	**Sampled Depth (m)**	**Comments**
WS17	0 to 0.45	Topsoil		0 to 0.3	
WS18	0 to 0.6	Topsoil		0 to 0.3	Topsoil contained clinker
WS20	0 to 0.6	Made ground (RW Natural)		0.35 to 0.6	
WS22	0 to 0.6	Topsoil		0 to 0.3	Topsoil contained clinker
WS23	0 to 0.4	Clay		0.25 to 0.4	Weathered fraction
WS24	0 to 0.6	Made ground (RW Natural)		0.35 to 0.6	
WS25	0 to 0.5	Topsoil		0 to 0.3	
WS27	0 to 0.6	Made ground (RW Natural)		0.25 to 0.6	
Report Number 18-07894-1					
WS1	0.1 to 0.5	Made ground (RW Natural)		0.1 to 0.5	
WS2	0.1 to 0.6	Gravel		-	Weathered fraction
WS3	0 to 0.6	Made ground (RW Natural)		0.2 to 0.5	
WS5	0 to 0.5	Made ground (Clay)		0 to 0.3	
WS7	0 to 0.35	Made ground (Clay)		0 to 0.35	
WS8	0 to 0.6	Made ground (Clay)		0.2 to 0.6	
WS9	0 to 0.6	Made ground (Clay)		0.3 to 0.6	
WS10	0 to 0.6	Made ground (RW Natural)		0.25 to 0.6	
WS11	0 to 0.4	Topsoil		0 to 0.3	
WS12	0 to 0.6	Made ground (Gravel)		0 to 0.4	
WS13	0 to 0.6	Made ground (Clay)		0.1 to 0.25	
WS6	0 to 0.6	Topsoil		0 to 0.3	Topsoil contained clinker
WS14	0 to 0.5	Made ground (Clay)		0.2 to 0.5	
WS15	0.1 to 0.6	Topsoil		0 to 0.25	Topsoil contained coal
WS16	0 to 0.6	Gravel		0.25 to 0.6	Possibly re-worked
WS19	0 to 0.5	Made ground (RW Natural)		0.35 to 0.5	
WS21	0 to 0.6	Made ground (Clay)		0.4 to 0.6	
Report Number 18-07457-1					
TP2	0 to 0.6	Made ground (Gravel)		0.2 to 0.6	
TP4	0 to 0.6	Made ground (Gravel)		0.4 to 0.6	

TP5	0 to 0.6	Made ground (Gravel)		0.05 to 0.6	
TP19	0 to 0.6	Topsoil		0 to 0.3	

Hi Catherine,

I've tabulated the data and added the appropriate descriptions to show which strata have been targeted. I'll send this off to our chem lab now and get the reports updated ASAP.

Kind regards,

Rob Palmer MSc FGS ACIEH
Geotechnical and Environmental Engineer
Rogers Geotechnical Services Ltd

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Environmental
Geotechnical
Specialists

REPORT

job number J4199/18/E/F	site address Wombwell High Redevelopment
date 24/04/18	Roebuck Street
written by R.A. Palmer	Wombwell
checked by E.S. Lewis	S70 0JX
issued by R.A. Palmer	

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GEOTECHNICAL ENVIRONMENTAL

Environmental Geotechnical Specialists

Contents

Appendices

Environmental Geotechnical Specialists

Factual Report on a Ground Investigation

Location:	Wombwell High Redevelopment Roebuck Street, Wombwell, S73 0JX
For:	Barnsley MBC
Consultants:	Hamson Barron Smith
Report No.	J4199/18/E/F
Report date:	April 2018

For and on behalf of **Rogers Geotechnical Services Ltd**

[redacted]
Rob Palmer MSc FGS ACIEH
Geotechnical & Environmental Engineer

[redacted]
Emma Lewis LLB ACIEH
Managing Director

1. Introduction

It is understood that the site of the former Wombwell High School, Roebuck street, is proposed to be redeveloped, the outcome of which has not yet been finalised. Consequently, a site investigation has been undertaken in accordance with the instruction from the client. This work was required in order to determine the nature of the underlying soils and to assess their engineering properties. This report describes the work undertaken and presents the data obtained.

2. Limitations

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue. No liability can be accepted for the incorrect interpretation of any of the factual data supplied, particularly between investigatory locations.

3. Fieldworks

The fieldworks were undertaken during the period 12th to the 16th March 2018 and included the following:

- Twenty-seven windowless sample boreholes.
- Standard penetration tests.
- Twenty-seven dynamic probes.
- Seven gas and water monitoring standpipes.
- Nineteen machine excavated trialpits.
- Four soakaway tests.

The investigatory locations are shown on the site plan which is presented in Appendix 1 to this report.

3.1 Windowless Sample Boreholes

These boreholes were sunk using a drive-in windowless sampler. The cores were undertaken in 1m lengths and reduced in diameter from 90mm for the first 1m through 80mm, 70mm and 60mm for subsequent 1m increments. The recovered cores were sealed and returned to the laboratory for logging and subsequent testing. The soils were described in general accordance with BS5930: 2015 and full descriptions are given on the window sample records which are presented in Appendix 2. Also included on these records are the core diameters and percentages of core recovered.

3.2 Standard Penetration Tests

Standard penetration tests (SPT) were undertaken at regular depth increments within the windowless sample boreholes. The SPT was conducted in accordance with the procedures given in BS1377 : 1990 : Part 9 : 3.3, and the results are summarised on the borehole record. During this work an automatic trip hammer of 63.5kg falling through 750mm was employed to drive either a cone or split barrel sampler assembly into the ground and the recovered barrel samples were retained in air tight plastic containers. It may be appreciated that the approximate cohesion of clay soils may be obtained by multiplying the equivalent SPT value by approximately 4.5 (after Stroud, 1975).

3.3 Dynamic Probes

Dynamic penetration tests were undertaken adjacent to the windowless sample boreholes in accordance with the procedure given in BS1377: 1990: Part 9, using the super heavy penetrometer (DPSH). This probe consists of a 63.5kg mass falling through 750mm onto an anvil, which drives a 50mm diameter cone into the ground. The number of blows required to drive the cone through successive 100mm increments are recorded as the N_{100} values. The results of the dynamic penetration tests are tabulated and presented as bar charts of N_{100} values versus depth in Appendix 3.

3.4 Gas/Groundwater Monitoring Standpipes

Standpipes were installed to the full depth of seven of the windowless sample boreholes and the details of the installations are shown on the appropriate borehole records. In all cases, the monitoring standpipe consisted of a perforated pipe from the base of the borehole to between 0.4m and 1.0m below surface, with a non-perforated pipe to ground level. The response zone was filled with pea gravel, with a bentonite seal above and the installation was capped with a stop box cover in a concrete surround.

3.5 Trialpits and Soakaway Tests

Nineteen trialpits were excavated using a JCB 3CX. Four of these trialpits were utilised for soakaway testing. The tests were undertaken at the base of the pit at depths rational to the construction of soakaways. The soils exposed in the trialpits were logged on site in general accordance with BS5930: 2015, and full descriptions are given on the trialpit records which are presented in Appendix 4. The soakaway test results are presented in Appendix 5.

Once excavations were completed, the trialpits were carefully re-instated with the arisings. Whilst every care was taken during the infilling process, including compacting of the infill at regular intervals with the back acting arm of the excavator, it should be appreciated that some mounding of the surface may have resulted. Moreover, the infilled soils may be subjected to settlement over time, such that a depression in the surface may also occur. Therefore, the locations of any pits undertaken in this investigation should be conveyed to the current site user, as the mounds or depressions associated with the pits may present a risk to current site operations. Furthermore, it must be realised that the infilled pits represent an area of disturbance within the site soils, thus the soils at the pit locations may vary characteristically compared to the undisturbed ground. As such, foundations placed in this disturbed material may not perform as anticipated.

3.6 GPS Survey

A Leica GS18 T was employed during the fieldworks to record positions relevant to the investigation. During the investigation, the GPS system typically indicated 2D co-ordinate (X-axis & Y-axis) accuracies of +/-3mm, with 3D co-ordinate (X-axis, Y-axis & Z-axis) accuracy of +/-9mm. Whilst the system utilised Assisted-GPS (A-GPS) to improve initialisation time, it should be appreciated that clear view of the sky is required in order to obtain accuracy better than +/-3mm. Therefore, in areas where tall obstructions are present, such as near tree canopies, it is not always possible to obtain accurate survey data. The position data obtain during the works has been used to produce the site plan and are recorded on borehole records.

4. Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

Strata Type	Strata Name[1]	Previous Name[2]	Description[2]
Made Ground/Fill	Made Ground/Worked Ground	-	Variable composition. Man-made superficial deposit.
Superficial Geology	None recorded	-	-
Solid Geology	Oaks Rock	-	Named sandstone member of the Pennine Middle Coal Measures Formation

The published geological data indicates large deposits of made ground and worked ground on site. This most likely represents cut and fill operation that was undertaken to produce the stepped landscape that the school grounds were situated upon.

5. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 2: Generalised Strata Profile (Boreholes)

Depth m below ground level to underside of layer	Strata Type	Positions Layer	Groundwater Strikes m below ground level
0.05 – 0.4	Topsoil	WS1-WS5, WS10-WS27	-
0.32 – 1.3	Made ground (Cohesive)	WS5-WS8,WS12-WS14, WS25	-
0.7 – 1.0	Made ground (Granular)	WS9, WS12	-
0.5 – +4.0	Made ground (Reworked)	WS1, WS3-WS8, WS10, WS12-WS14, WS16-WS21, WS24, WS27	-
0.5 – +2.7	Silty sandy gravelly CLAY	WS14, WS18, WS22, WS23, WS26	-
+1.0 – +4.3	Silty very gravelly SAND	WS3, WS19, WS20, WS22, WS24, WS26	-
+0.9 – +1.15	Clayey silty sandy GRAVEL	WS2, WS4, WS5, WS11, WS27	-
+0.4 – +3.0	SANDSTONE	WS10, WS15, WS17, WS18, WS22, WS23, WS25, WS27	-

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated.

[1] Sources: British Geological Survey (NERC) Map Sheets 87; Barnsley; Solid and Drift Edition, and Geology of Britain Viewer [*online resource from www.bgs.ac.uk*]
[2] Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [*online resource from www.bgs.ac.uk*]

6. Insitu Testing

6.1 Standard Penetration Tests

The standard penetration tests carried out are summarised in the following table:

Table 3: Summary of Standard Penetration Tests

Strata	SPT 'N' (Blows/300mm)		Comments
	Granular soils	Cohesive soils	
Made Ground	–	10 – 15	SPT's indicate a soft to firm in-situ condition.
Made Ground (Re-worked natural)	4 – 73	4 – 14	SPT's indicate variable in-situ conditions.
Silty very gravelly SAND	14 – 55	-	SPT's indicate granular material is in at least a medium dense in-situ condition.
Clayey silty sandy GRAVEL	29 – 53	-	SPT's indicate granular material is in at least a medium dense in-situ condition.

6.2 Dynamic Penetration Tests

Dynamic penetration tests were undertaken adjacent to the windowless sample borehole positions. The probe records are summarised below:

Table 3: Summary of Dynamic Penetration Tests

Position	Blows/100mm			Refusal type (Effective/ Abrupt)[3]	Comments
	0 - 2	3 - 10	10+		
	Depth to which blow count range was observed (m)				
1	-	0.8 3.1	1.4	Abrupt	Service pit to 0.4m
2	-	-	1.5	Effective	Service pit to 0.3m
3	1.0	0.8 1.4	1.7	Abrupt	Service pit to 0.4m
4	-	0.6	0.9	Effective	Service pit to 0.4m
5	-	0.9	1.7	Abrupt	Service pit to 0.5m
6	0.6	-	0.8	Abrupt	Service pit to 0.5m
7	-	1.1	1.5	Abrupt	Service pit to 0.5m
8	1.3	0.8 2.5	2.8	Abrupt	Service pit to 0.5m
9	-	-	0.7	Abrupt	Service pit to 0.6m
10	-	1.8	2.0	Abrupt	Service pit to 0.6m

[3] Abrupt refusal: obstruction or bedrock encountered. Effective refusal: +25 blows/100mm.

11	-	0.6	1.2	Abrupt	Service pit to 0.5m
12	1.9	1.0 2.5	2.7	Abrupt	Service pit to 0.5m
13	1.9	3.5	3.7	Abrupt	Service pit to 0.6m
14	0.8	2.6	2.9	Abrupt	Service pit to 0.5m
15	-	-	0.6	Abrupt	Service pit to 0.4m
16	-	1.1	1.3	Abrupt	Service pit to 0.5m
17	1.5	1.8	2.0	Abrupt	Service pit to 0.5m
18	1.3	1.9	2.2	Abrupt	Service pit to 0.5m
19	1.1	1.8	2.1	Abrupt	Service pit to 0.6m
20	2.9	1.5 4.2	4.4	Abrupt	Service pit to 0.6m
21	2.8	4.1	4.3	Abrupt	Service pit to 0.6m
22	0.6	1.2	2.1	Abrupt	Service pit to 0.5m
23	-	1.4	1.6	Abrupt	Service pit to 0.5m
24	1.4	1.7	2.1	Abrupt	Service pit to 0.5m
25	0.8	0.9	1.2	Abrupt	Service pit to 0.5m
26	0.7	1.0	1.6	Abrupt	Service pit to 0.5m
27	1.7	2.9	3.1	Abrupt	Service pit to 0.5m

6.3 Standpipe Monitoring

The standpipes were monitored on the 15th March and the 27th March 2018. The results of the gas monitoring undertaken to date are tabulated below.

Table 4: Standpipe Monitoring

Borehole No.	Date	CH_4 (%)	CO_2 (%)	O_2 (%)	Flow (l/hr)	Barometric Pressure (mb)	Water Level (m bgl)	Standpipe Depth (m)
WS01	15.03.18	0.1	0.6	21.7	0.1	983	-	2.05
	27.03.18	0.1	2.8	20.1	0.1	995	-	
WS07	15.03.18	0.0	0.2	21.7	0.0	984	-	1.35
	27.03.18	0.1	0.9	19.6	0.1	996	-	
WS11	15.03.18	0.1	0.5	21.5	0.1	984	-	1.25
	27.03.18	0.0	0.6	20.8	0.0	996	-	
WS14	15.03.18	0.0	0.4	21.8	0.0	984	2.60	2.60
	27.03.18	0.0	0.2	21.4	0.0	997	-	
WS19	15.03.18	0.1	1.7	20.9	0.1	984	2.05	2.05
	27.03.18	0.1	2.0	20.7	0.1	997	2.04	
WS20	15.03.18	0.1	1.6	21.1	0.1	985	3.88	3.90
	27.03.18	0.0	1.1	21.4	0.1	998	-	
WS27	15.03.18	0.0	1.5	21.3	0.1	985	-	2.95
	27.03.18	0.0	3.8	18.6	0.1	998	2.94	

This work was undertaken using a GA5000 ground gas analyser, serial No G503524 which was last calibrated on the 23rd January 2018.

6.4 Soakaway Tests

On reaching the elected soakaway test depth, the pit was trimmed and squared as much as practicable. Water was then introduced into the pit at a controlled rate to prevent collapse of the sides and the level monitored at time intervals relative to a reference bar at ground level. The results obtained from the soakaway tests are appended to this letter and are summarised below:

Table 3: Soakaway Test Results

Location	Soakage Area Dimensions (average) (m)	Test Depth (m)	Soil Description (base of pit)	Infiltration Rate (m/sec)	Drainage Characteristics
TP3	0.6 x 1.6	1.6	Gravelly CLAY	*$6x10^{-6}$	Marginal
TP5	0.6 x 1.6	2.25	Sandy GRAVEL	$6.1x10^{-6}$	Marginal
TP14	0.6 x 1.5	2.16	Gravel and Cobbles	$9.6x10^{-5}$	Good
TP16	0.6 x 1.65	1.2	Gravel and Cobbles	*$1.7x10^{-5}$	Good

*Rates calculated from linear extrapolation

7. Laboratory Testing - Geotechnical

The following programme of laboratory testing has been undertaken on samples obtained during this investigation:

- Moisture content determinations — BS 1377: 1990: Pt2: 3.2
- Index properties (1 point) — BS 1377: 1990: Pt2: 4.4, 5.3 & 5.4
- Particle size distribution (Wet sieve) — BS 1377: 1990: Pt2: 9.2
- Sedimentation by pipette — BS 1377: 1990: Pt2: 9.4

The test results are presented in Appendix 3 and are summarised below:

Table 3: Summary of geotechnical test results

Test type	Number of tests	Range of results		Comments
Moisture content determinations	10	16% to 22%		
Index Properties (1 Point)	10	LL PL PI	26% to 49% 16% to 24% 10% to 26%	Clay of low intermediate plasticity.

Particle size distribution (Wet sieve)	8	Cobbles Gravel Sand Silt/Clay	05% to 37% 51% to 74% 10% to 21% 04% to 09%
Particle size distribution (Wet sieve and sedimentation)	4	Cobbles Gravel Sand Silt Clay	0% to 25% 34% to 73% 12% to 40% 06% to 13% 04% to 13%

8. Laboratory Testing - Environmental

Chemical testing was conducted on samples from across the site employing the following regimes.

Suite D

- pH, S, total/soluble SO_4^{2-}.
- *Mg, Cl⁻, NO_3^-* (if triggered by pH and SO_4^{2-} results).

Suite E

Soils

- Metals – Cd, Cr, Cr^{VI}, Cu, Hg, Ni, Pb and Zn.
- Semi and Non-Metals - As, B (soluble), Se and Phenols.
- Polycyclic aromatic hydrocarbons (PAHs – EPA 16).
- Petroleum hydrocarbons (TPHs CWG & BTEX).
- Volatile Organic Compounds (VOCs).
- Asbestos identification.
- PCBs.

Suite H

Waste Acceptance Criteria (WAC) – 2 Stage Combined as per BS 12457-3

This testing was undertaken by Chemtest Ltd and the results of all of the chemical testing are presented in Appendix 7 of this report.

9. References

- British Standards Institution (1990) BS1377: *British standard methods of test for soils for civil engineering purposes,* B.S.I., London.
- British Standards Institution (2015) BS5930: *Code of practice for site investigations*, B.S.I., London.
- British Geological Survey (NERC) (2018), BGS, Keyworth.
  - Geology of Britain Viewer: (*http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html)*
  - Lexicon of Named Rock Units: (*http://www.bgs.ac.uk/lexicon/)*

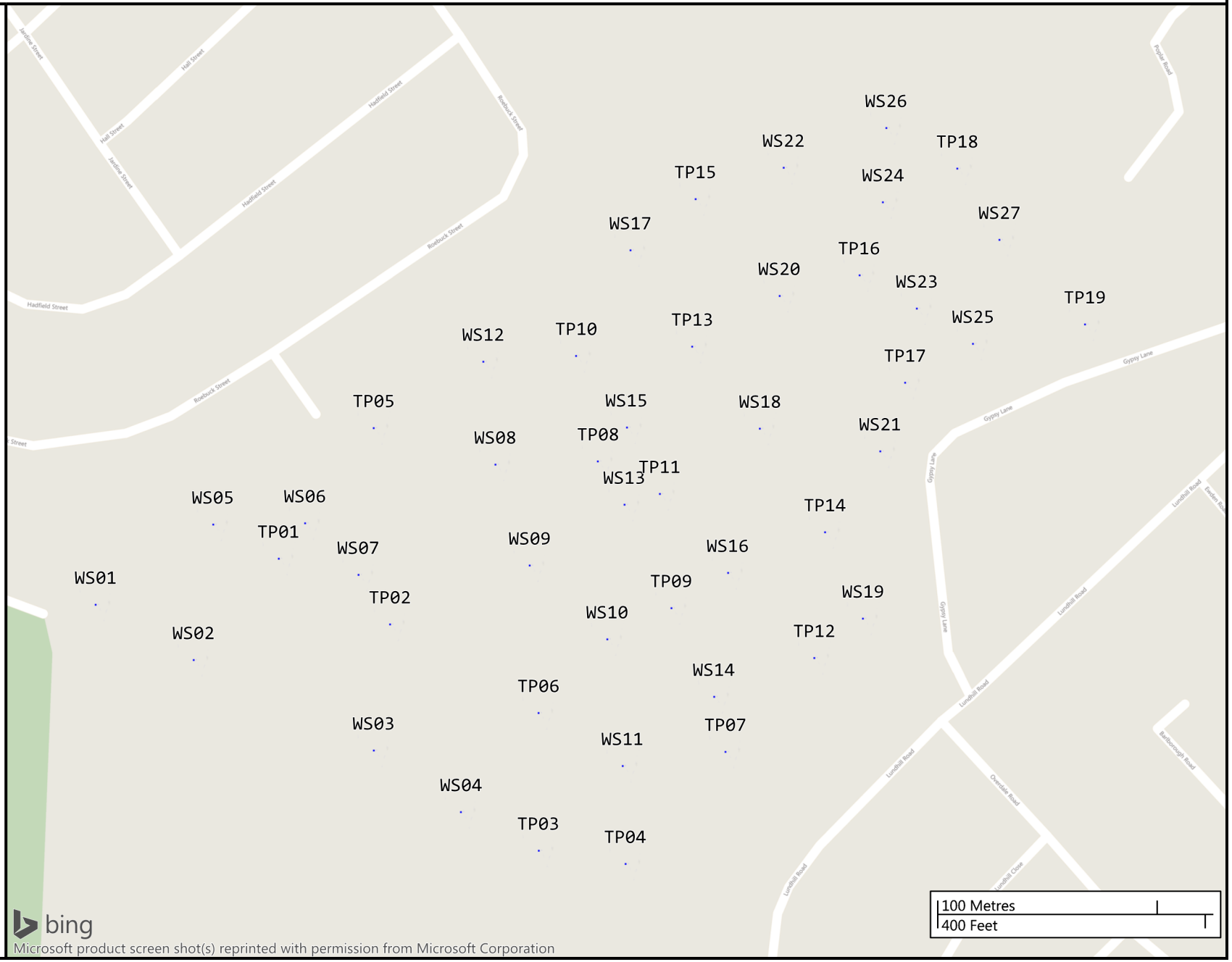
Appendix 1

Site Plan

Project Id:	J4199/18/E/F	Title:	Site Plan
Project Title:	Wombwell High Redevelopment	Scale:	1:2500
Location:	Roebuck Street, Wombwell	Engineer:	RAP
Client:	Hamson Barron Smith	Contractor:	

Legend Key

- Locations By Type - Empty
- Locations By Type - TP
- Locations By Type - DCP
- Locations By Type - WLS



Project Id:	J4199/18/E/F	Title:	Site Plan
Project Title:	Wombwell High Redevelopment	Scale:	1:2500
Location:	Roebuck Street, Wombwell	Engineer:	RAP
Client:	Hamson Barron Smith	Contractor:	

Legend Key

- Locations By Type - Empty
- Locations By Type - TP
- Locations By Type - DCP
- Locations By Type - WLS

Rogers Geotechnical Services Ltd

Investigated Position Co-ordinates

Location ID	Easting	Northing	Ground Level
TP01	440070.598	402348.4	71.321
TP02	440122.007	402318.8	68.935
TP03	440190.946	402215.8	68.26
TP04	440230.83	402210.1	67.61
TP05	440113.85	402408.6	68.571
TP06	440190.515	402278.8	67.555
TP07	440276.357	402261.7	66.064
TP08	440216.875	402394.2	64.663
TP09	440250.962	402327.3	65.641
TP10	440206.422	402442.4	61.872
TP11	440245.173	402379.5	62.03
TP12	440316.786	402305	61.586
TP13	440259.594	402447.1	60.935
TP14	440321.168	402362.7	60.863
TP15	440260.425	402514.6	60.055
TP16	440335.836	402480.4	53.728
TP17	440357.321	402431.4	54.469
TP18	440380.467	402529.6	51.912
TP19	440439.598	402458.8	52.648
WS01	439986.994	402326.6	73.944
WS02	440032.082	402301.7	72.2
WS03	440115.051	402261	71.053
WS04	440155.407	402233.1	68.777
WS05	440040.476	402363.8	71.58
WS06	440082.659	402364.8	68.616
WS07	440107.329	402341.3	68.743
WS08	440169.733	402392.3	66.667
WS09	440185.927	402346.3	67.168
WS10	440221.729	402312.8	66.397
WS11	440229.207	402254.9	67.016
WS12	440163.817	402439.4	66.461
WS13	440229.062	402374.5	65.889
WS14	440270.88	402286.9	65.799
WS15	440229.779	402409.8	61.876
WS16	440276.787	402343.7	61.899
WS17	440230.873	402491	60.791
WS18	440291.055	402409.8	60.859
WS19	440339.06	402323.3	61.133
WS20	440299.33	402470.6	59.862
WS21	440346.2	402399.9	60.183
WS22	440300.814	402529.3	54.567
WS23	440362.514	402465.4	53.642
WS24	440346.601	402513.9	52.826
WS26	440347.685	402547.9	51.051
WS27	440400.159	402497.2	52.335

Appendix 2

Windowless Sample Borehole Records

Borehole Log

Borehole No. **WS01**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 439986.99E - 402326.64N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 73.94m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 12/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				90	90		0.10	73.84		TOPSOIL (Soft dark brown sandy CLAY). MADE GROUND (Medium dense brown and orangish brown silty very gravelly fine and medium SAND with occasional clay lenses. Gravel is sub-angular fine to coarse sandstone). *0.7m: 120mm soft sandy CLAY.*
		1.00	SPT			N=21 (5,6/6,7,4,4)				
				80	100					
		2.00	SPT			N=8 (3,2/2,2,2,2)				
				70	100					
							3.00	70.94		End of Borehole at 3.00m

Remarks

Starter pit to 0.5m. Refusal anticipated to be on rock.

Borehole Log

Borehole No. **WS02**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440032.08E - 402301.71N
Location:	Roebuck Street, Wombwell		Level: 72.20m aOD
Client:	Hamson Barron Smith		Dates: 12/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				70	90		0.10	72.10		TOPSOIL (Soft dark brown sandy CLAY). Medium dense clayey silty very sandy sub-angular fine to coarse sandstone GRAVEL with medium cobble content of sandstone. (Weathered rock).
		1.00	SPT			53 (12,15/53 for 75mm)	1.00	71.20		End of Borehole at 1.00m

Remarks

Starter pit to 0.3m.

Borehole Log

Borehole No. **WS03**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440115.05E - 402260.99N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 71.05m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 12/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.20	70.85		TOPSOIL (Soft dark brown CLAY with gravel of sandstone brick and rare clinker).
				90	100		0.50	70.55		MADE GROUND (Orangish brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone (Re-worked natural)).
		1.00	SPT			N=53 (12,24/18,6,10,19)				Medium dense brown silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse sandstone.
				80	66					
							1.75	69.30		End of Borehole at 1.75m

Remarks

Starter pit to 0.5m. Refusal due to rock.

Borehole Log

Borehole No. **WS04**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440155.41E - 402233.14N
Location:	Roebuck Street, Wombwell		Level: 68.78m aOD
Client:	Hamson Barron Smith		Dates: 12/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				60	50		0.15	68.63		TOPSOIL (Soft dark brown sandy CLAY).
							0.90	67.88		Medium dense clayey silty very sandy sub-angular fine to coarse sandstone GRAVEL with medium cobble content of sandstone. (Weathered rock).
										End of Borehole at 0.90m

Remarks

Starter pit to 0.3m.

Borehole Log

Borehole No. **WS05**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440040.48E - 402363.80N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 71.58m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				70	100		0.05	71.53		TOPSOIL (Soft dark brown CLAY).
							0.32	71.26		MADE GROUND (Soft dark brown silty sandy gravelly CLAY. Gravel is sub-angular fine to coarse sandstone clinker and brick).
							0.56	71.02		MADE GROUND (Orangish brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone (Re-worked natural)).
		1.00	SPT			N=42 (7,9/9,10,11,12)	1.00	70.58		Medium dense clayey silty very sandy sub-angular fine to coarse sandstone GRAVEL with medium cobble content of sandstone. (Weathered rock).
										End of Borehole at 1.00m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS06**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440082.66E - 402364.75N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 68.62m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				80	100		0.30	68.32		MADE GROUND (Soft dark brown silty sandy gravelly CLAY. Gravel is sub-rounded and sub-angular fine to coarse sandstone clinker and various lithologies (quartz)).
							0.45	68.17		MADE GROUND (Red fine and medium SAND with treated wood fragments).
							0.60	68.02		MADE GROUND (Orangish brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone (Re-worked natural)).
										End of Borehole at 0.60m

1 2 3 4 5 6 7 8 9 10

Remarks

Starter pit to 0.5m. Refusal anticipated to be on rock.

Borehole Log

Borehole No. **WS07**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440107.33E - 402341.34N
Location:	Roebuck Street, Wombwell		Level: 68.74m aOD
Client:	Hamson Barron Smith		Dates: 13/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				90	100		0.35	68.39		MADE GROUND (Soft dark greyish brown silty slightly sandy gravelly CLAY. Gravel is rounded to angular fine to coarse of sandstone various lithologies brick coal and clinker).
							0.55	68.19		MADE GROUND (Medium dense red fine and medium SAND with occasional gravel of various lithologies (quartz)).
		1.00	SPT			N=73 (6,8/12,11,16,34)				
							1.45	67.29		MADE GROUND (Medium dense orangish brown clayey silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse of sandstone (Re-worked natural)).
										End of Borehole at 1.45m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS08**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440169.73E - 402392.34N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 66.67m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				90	100		0.80	65.87		MADE GROUND (Soft dark grey and orangish brown silty very gravelly CLAY with low cobble content. Gravel is sub-angular fine to coarse siltstone sandstone coal and various lithologies (quartz). Cobbles are of sandstone).
		1.00	SPT			N=15 (3,3/3,5,4,3)	1.00	65.67		MADE GROUND (Soft reddish brown silty sandy slightly gravelly CLAY. Gravel is sub-angular fine of coal).
				80	100		1.40	65.27		MADE GROUND (Medium dense orangish brown clayey silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse of sandstone (Re-worked natural)).
		2.00	SPT			N=23 (6,5/6,5,5,7)				
							2.45	64.22		MADE GROUND (Medium dense orangish brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone (Re-worked natural)).
										End of Borehole at 2.45m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS09**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440185.93E - 402346.29N
Location:	Roebuck Street, Wombwell		Level: 67.17m aOD
Client:	Hamson Barron Smith		Dates: 13/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.55	66.62		MADE GROUND (Soft dark grey and orangish brown silty very gravelly CLAY. Gravel is sub-angular fine to coarse siltstone sandstone coal and ironstone).
							0.68	66.49		MADE GROUND (Red fine and medium SAND with occasional gravel of various lithologies (quartz)).
		1.00	SPT			0 (49 for 75mm/0 for 0mm)	0.70	66.47		MADE GROUND (Brick).
										End of Borehole at 0.70m

Remarks

Starter pit to 0.6m.

Borehole Log

Borehole No. **WS10**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440221.73E - 402312.81N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 66.40m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				70	100		0.25	66.15		TOPSOIL (Soft dark brown silty sandy CLAY).
		1.00	SPT			N=19 (3,3/5,4,5,5)				MADE GROUND (Medium dense dark brown and orangish brown clayey silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse of sandstone (Re-worked natural)). *0.7m: 100mm lens of brown silty CLAY.*
				60	70		1.25	65.15		SANDSTONE recovered as sandy tabular gravel.
							2.00	64.40		End of Borehole at 2.00m

Remarks

Starter pit to 0.6m.

Borehole Log

Borehole No. **WS11**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440229.21E - 402254.86N
Location:	Roebuck Street, Wombwell		Level: 67.02m aOD
Client:	Hamson Barron Smith		Dates: 13/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.24	66.78		TOPSOIL (Soft dark brown silty CLAY with occasional sandstone gravel).
		1.00	SPT	90	100	0 (15,29/0 for 0mm)	1.15	65.87		Medium dense silty very sandy sub-angular fine to coarse sandstone GRAVEL with medium sandstone cobble content.
										End of Borehole at 1.15m

Remarks

Starter pit to 0.5m. SPT refused due to rock.

Borehole Log

Borehole No. **WS12**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440163.82E - 402439.39N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 66.46m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.05	66.41		TOPSOIL (Soft dark brown CLAY).
				90	80		0.40	66.06		MADE GROUND (Brownish grey and black clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone clinker concrete and various lithologies).
		1.00	SPT			N=10 (1,2/2,2,3,3)	0.55	65.91		MADE GROUND (Black sandy sub-angular fine to coarse GRAVEL of clinker and sandstone).
				80	100		1.00	65.46		MADE GROUND (Soft brown silty slightly gravelly CLAY. Gravel is sub-angular fine to coarse sandstone and rare coal).
		2.00	SPT			N=22 (6,5/5,5,6,6)	2.00	64.46		MADE GROUND (Loose becoming medium dense orangish brown very clayey silty very gravelly fine and medium SAND with occasional soft clay horizons. Gravel is sub-angular fine to coarse of sandstone. (Re-worked natural)).
										1.4m: 150mm Soft very sandy CLAY.
										End of Borehole at 2.00m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS13**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440229.06E - 402374.49N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 65.89m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.10	65.79		TOPSOIL (Soft dark brown CLAY).
							0.25	65.64		MADE GROUND (Soft dark grey silty CLAY with rare fragments of coal).
				90	100					MADE GROUND (Very soft brownish grey silty slightly gravelly CLAY).
		1.00	SPT			N=3 (1,0/0,1,1,1)				
							1.30	64.59		MADE GROUND (Loose becoming medium dense orangish brown very clayey silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse of sandstone. (Re-worked natural)).
				80	80					
		2.00	SPT			N=7 (2,1/2,1,2,2)				
				70	85					
		3.00	SPT			N=30 (3,2/3,4,8,15)				
							3.45	62.44		End of Borehole at 3.45m

Remarks

Starter pit to 0.6m.

Borehole Log

Borehole No. **WS14**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440270.88E - 402286.89N
Location:	Roebuck Street, Wombwell		Level: 65.80m aOD
Client:	Hamson Barron Smith		Dates: 13/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.22	65.58		TOPSOIL (Soft dark brown silty CLAY with occasional sandstone gravel).
				90	100		0.70	65.10		MADE GROUND (Soft brown and grey mottled orangish brown silty slightly sandy slightly gravelly CLAY. Gravel is sub-angular fine to coarse sandstone).
		1.00	SPT			N=6 (2,2/1,1,2,2)				MADE GROUND (Loose orangish brown silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse of sandstone. (Re-worked natural)).
				80	100		1.35	64.45		MADE GROUND (Soft brown and grey mottled orangish brown silty sandy slightly gravelly CLAY. Gravel is sub-angular fine to coarse sandstone).
		2.00	SPT			N=14 (3,3/3,3,4,4)				
				70	80		2.40	63.40		Firm grey mottled brown silty sandy gravelly CLAY. Gravel is tabular and sub-angular fine to coarse of sandstone.
							2.70	63.10		End of Borehole at 2.70m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS15**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440229.78E - 402409.83N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 61.88m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				70	100		0.25	61.63		TOPSOIL (Soft dark brown silty CLAY with occasional sandstone gravel and rare coal).
							0.40	61.48		SANDSTONE recovered as brown very sandy tabular fine to coarse gravel of sandstone.
										End of Borehole at 0.40m

Remarks

Starter pit to 0.4m.

Borehole Log

Borehole No. **WS16**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440276.79E - 402343.67N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 61.90m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results				
				70	100		0.25	61.65		TOPSOIL (Soft dark brown silty CLAY with occasional sandstone gravel and rare coal).
		1.00	SPT			0 (15,29/0 for 0mm)	1.15	60.75		Medium dense orangish brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone (Possibly re-worked).
										End of Borehole at 1.15m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS17**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440230.87E - 402490.97N
Location:	Roebuck Street, Wombwell		Level: 60.79m aOD
Client:	Hamson Barron Smith		Dates: 14/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.30	60.49		TOPSOIL (Soft dark brown silty CLAY).
				70	50					MADE GROUND (Loose brown clayey silty gravelly fine and medium SAND. Gravel is sub-angular fine and medium of sandstone (Re-worked natural)).
		1.00	SPT			N=12 (3,3/3,3,3,3)				
				60	70		1.75	59.04		SANDSTONE recovered as thinly laminated tabular gravel.
							2.00	58.79		End of Borehole at 2.00m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS18**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440291.06E - 402409.82N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 60.86m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				80	90		0.30	60.56		TOPSOIL (Soft dark brown silty sandy CLAY with rare gravel of clinker).
		1.00	SPT			N=8 (1,1/1,2,2,3)				MADE GROUND (Soft orangish brown silty very sandy slightly gravelly CLAY. Sand is fine and medium. Gravel is sub-angular fine to coarse of sandstone (Re-worked natural)).
				70	90		1.60	59.26		
							1.75	59.11		Soft to firm brown silty gravelly CLAY. Gravel is sub-rounded and sub-angular fine and medium of sandstone.
							2.00	58.86		SANDSTONE recovered as sandy tabular and sub-angular medium and coarse gravel.
										End of Borehole at 2.00m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS19**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440339.06E - 402323.28N
Location:	Roebuck Street, Wombwell		Level: 61.13m aOD
Client:	Hamson Barron Smith		Dates: 14/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.35	60.78		TOPSOIL (Soft dark brown silty CLAY with occasional sandstone gravel).
		1.00	SPT	80	100	N=12 (3,2/3,3,3,3,3)				MADE GROUND (Loose dense orangish brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone with occasional clay horizons (Re-worked natural)).
				70	100		1.30	59.83		Medium dense brown silty very gravelly fine and medium SAND. Gravel is tabular sub-angular fine to coarse of sandstone (Weathered rock).
							2.00	59.13		End of Borehole at 2.00m

Remarks

Starter pit to 0.6m.

Borehole Log

Borehole No. **WS20**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440299.33E - 402470.65N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 59.86m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				90	90		0.25	59.61		TOPSOIL (Soft dark brown silty sandy CLAY with occasional sandstone gravel and rare coal).
		1.00	SPT			N=12 (3,3/3,4,3,2)				MADE GROUND (Medium dense orangish brown and brown silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse of sandstone (Re-worked natural)).
				80	100		1.80	58.06		
		2.00	SPT			N=4 (1,1/1,1,1,1)				MADE GROUND (Soft dark brown silty slightly gravelly CLAY. Gravel is sub-angular fine to medium of sandstone and rare coal (Re-worked natural)).
				70	100		2.90	56.96		
		3.00	SPT			N=20 (6,4/4,5,5,6)				Medium dense brown and orangish brown gravelly fine to coarse SAND. Gravel is sub-angular fine and medium of sandstone.
				60	75					
		4.00	SPT			55 (6,10/55 for 150mm)				
							4.30	55.56		End of Borehole at 4.30m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS21**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440346.20E - 402399.91N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 60.18m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				90	90		0.40	59.78		TOPSOIL (Soft dark brown silty slightly sandy CLAY).
		1.00	SPT			N=4 (1,1/0,1,2,1)				MADE GROUND (Soft brown and orangish brown silty sandy gravelly CLAY. Gravel is sub-angular fine to coarse of sandstone).
				80	100					
		2.00	SPT			N=7 (1,2/1,2,2,2)				
				70	90		2.80	57.38		
		3.00	SPT			N=25 (5,5/6,7,5,7)				MADE GROUND (Medium dense brown silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse of sandstone (Re-worked natural)).
				60	100					
							3.80	56.38		
		4.00	SPT			0 (30 for 75mm/0 for 0mm)	4.08	56.10		MADE GROUND (Soft to firm brown silty gravelly CLAY. Gravel is sub-angular fine and medium of sandstone).
										End of Borehole at 4.08m

Remarks

Starter pit to 0.6m. SPT refused due to rock.

Borehole Log

Borehole No. **WS22**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440300.81E - 402529.35N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 54.57m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				80	100		0.30	54.27		TOPSOIL (Soft dark brown silty sandy CLAY with rare gravel of clinker).
							0.50	54.07		Soft reddish brown silty very sandy CLAY with occasional rootlets.
		1.00	SPT			N=34 (6,5/7,9,9,9)				Loose brown and light brown silty very gravelly fine and medium SAND. Gravel is sub-angular fine and medium of sandstone.
				70	80		1.70	52.87		SANDSTONE recovered as tabular and sub-angular medium and coarse gravel.
							2.00	52.57		End of Borehole at 2.00m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS23**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440362.51E - 402465.41N
Location:	Roebuck Street, Wombwell		Level: 53.64m aOD
Client:	Hamson Barron Smith		Dates: 16/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.25	53.39		TOPSOIL (Soft dark brown silty CLAY).
				60	100		0.55	53.09		Soft greyish brown silty slightly gravelly CLAY. Gravel is sub-angular fine and medium of sandstone.
		1.00	SPT			N=55 (3,4/5,10,14,26)				SANDSTONE recovered as clayey silty sandy sub-angular fine to coarse gravel and cobbles.
							1.45	52.19		End of Borehole at 1.45m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS24**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440346.60E - 402513.94N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 52.83m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 16/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				80	100		0.35	52.48		TOPSOIL (Soft dark brown silty slightly sandy CLAY).
		1.00	SPT			N=14 (3,3/2,4,3,5)	1.00	51.83		MADE GROUND (Loose orangish brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone (Re-worked natural).
				70	100					Loose becoming medium dense light brown gravelly fine and medium SAND. Gravel is sub-angular fine and medium of sandstone. *1.6m: Becoming medium dense.*
							1.90	50.93		End of Borehole at 1.90m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS25**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440388.44E - 402449.49N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 53.60m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 16/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
				90	100		0.30	53.30		TOPSOIL (Soft dark brown silty CLAY).
							0.80	52.80		MADE GROUND (Soft dark brown silty sandy slightly gravelly CLAY. Gravel is sub-angular fine and medium of sandstone and coal).
							1.00	52.60		SANDSTONE recovered as thinly laminated tabular gravel.
										End of Borehole at 1.00m

Remarks

Starter pit to 0.5m. No SPTs due to refusal.

Borehole Log

Borehole No. **WS26**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440347.68E - 402547.94N	Hole Type WLS
Location: Roebuck Street, Wombwell		Level: 51.05m aOD	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By RAP

Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results				
				70	100		0.25	50.80		TOPSOIL (Soft dark brown silty CLAY with occasional gravel of clinker and brick).
							0.60	50.45		Soft reddish brown silty very sandy CLAY with occasional rootlets.
		1.00	SPT			N=53 (10,11/12,12,12,17)	1.00	50.05		Loose brown gravelly fine and medium SAND. Gravel is sub-angular fine and medium of sandstone.
										End of Borehole at 1.00m

Remarks

Starter pit to 0.5m.

Borehole Log

Borehole No. **WS27**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440400.16E - 402497.19N
Location:	Roebuck Street, Wombwell		Level: 52.34m aOD
Client:	Hamson Barron Smith		Dates: 15/03/2018

Hole Type: WLS

Scale: 1:50

Logged By: RAP

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Dia. (mm)	TCR (%)	Results	Depth (m)	Level (m)	Legend	Stratum Description
							0.25	52.08		TOPSOIL (Soft dark brown silty CLAY).
				90	100					MADE GROUND (Loos dark brown and brown very clayey silty gravelly fine and medium SAND with occasional clay horizons. Gravel is sub-angular fine and medium of sandstone (Re-worked natural)).
		1.00	SPT			N=4 (2,2/1,1,1,1)				
							1.30	51.04		MADE GROUND (Soft silty slightly gravelly CLAY).
				80	80		1.50	50.84		Medium dense light brown silty very sandy sub-angular sandstone GRAVEL.
		2.00	SPT			N=29 (7,6/7,7,7,8)				
				70	100					
							2.80	49.54		SANDSTONE recovered as thinly laminated clayey tabular gravel.
							3.00	49.34		End of Borehole at 3.00m

Remarks

Starter pit to 0.5m.

Appendix 3

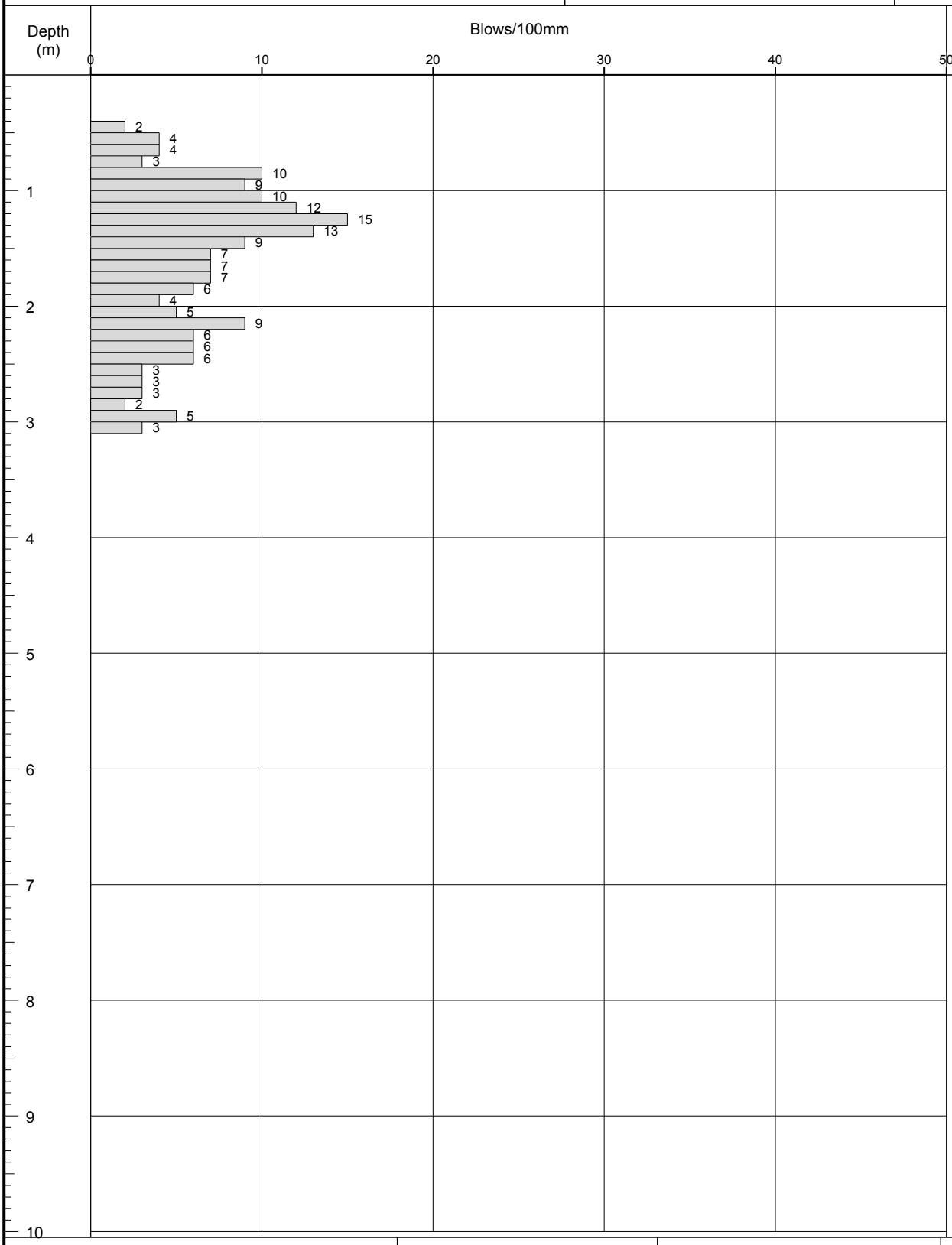
Dynamic Probe Results

Probe Log

Probe No. **DP01**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 12/03/2018	Logged By AB

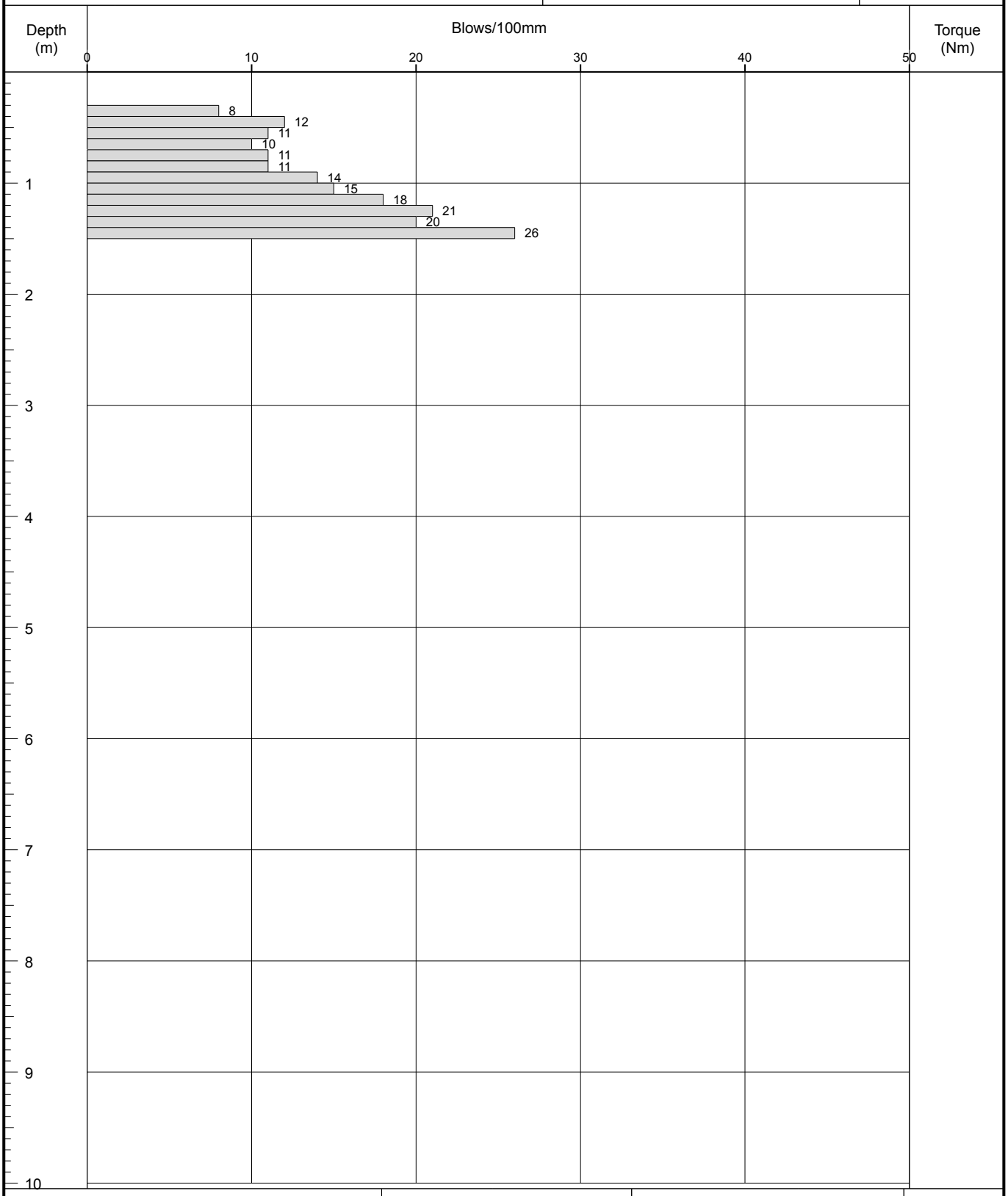


Remarks:
Service inspection pit to 0.40m. Abrupt refusal at 3.10m.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	3.1m
Probe Type	DPSH-B		

Probe Log

			Probe No. **DP02** Sheet 1 of 1
Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 12/03/2018	Logged By AB



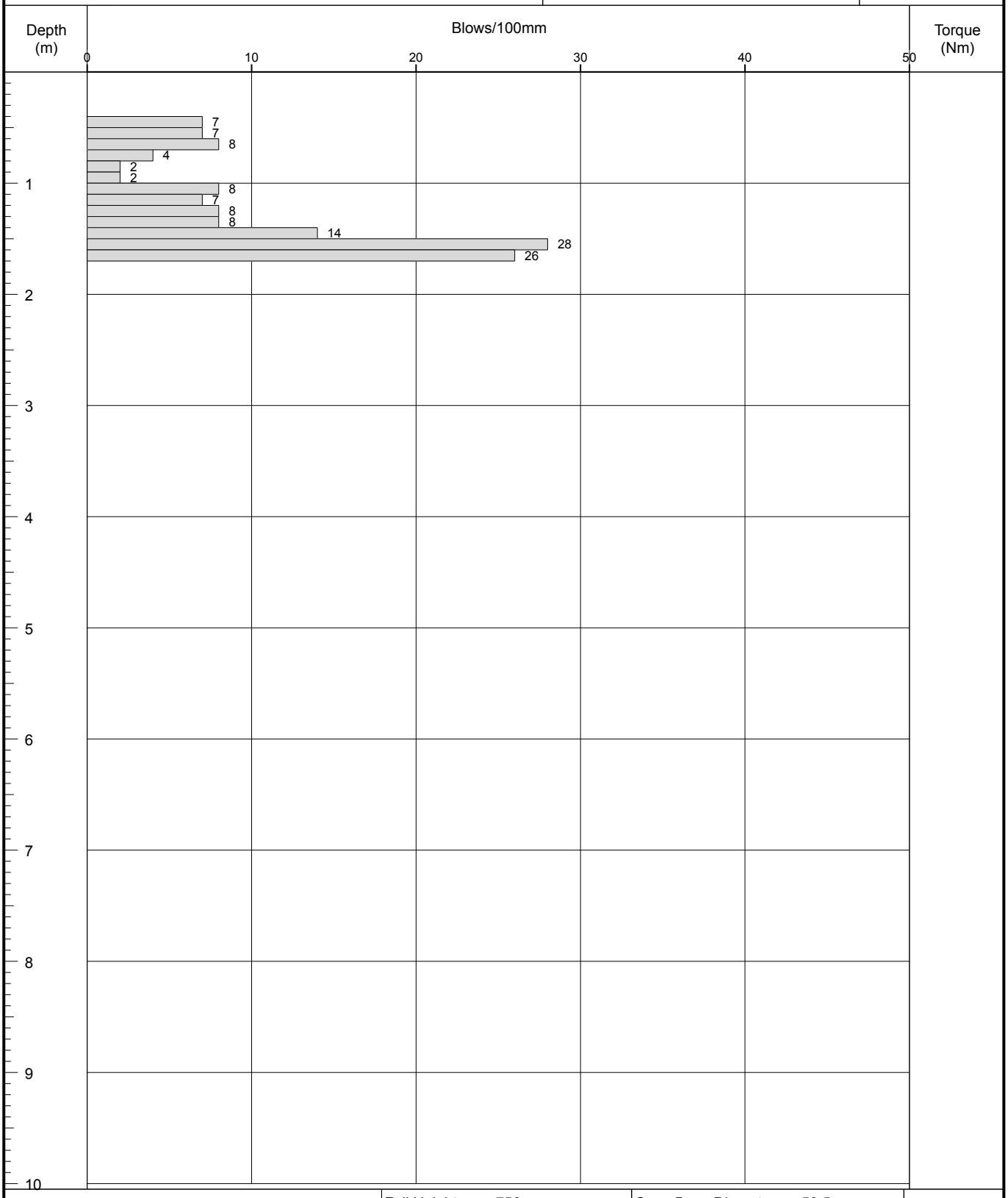
Remarks:
Service inspection pit to 0.30m. Effective refusal at 1.50m with 67/300mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.5m
Probe Type	DPSH-B		

Probe Log

Probe No.
DP03
Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 12/03/2018	Logged By AB



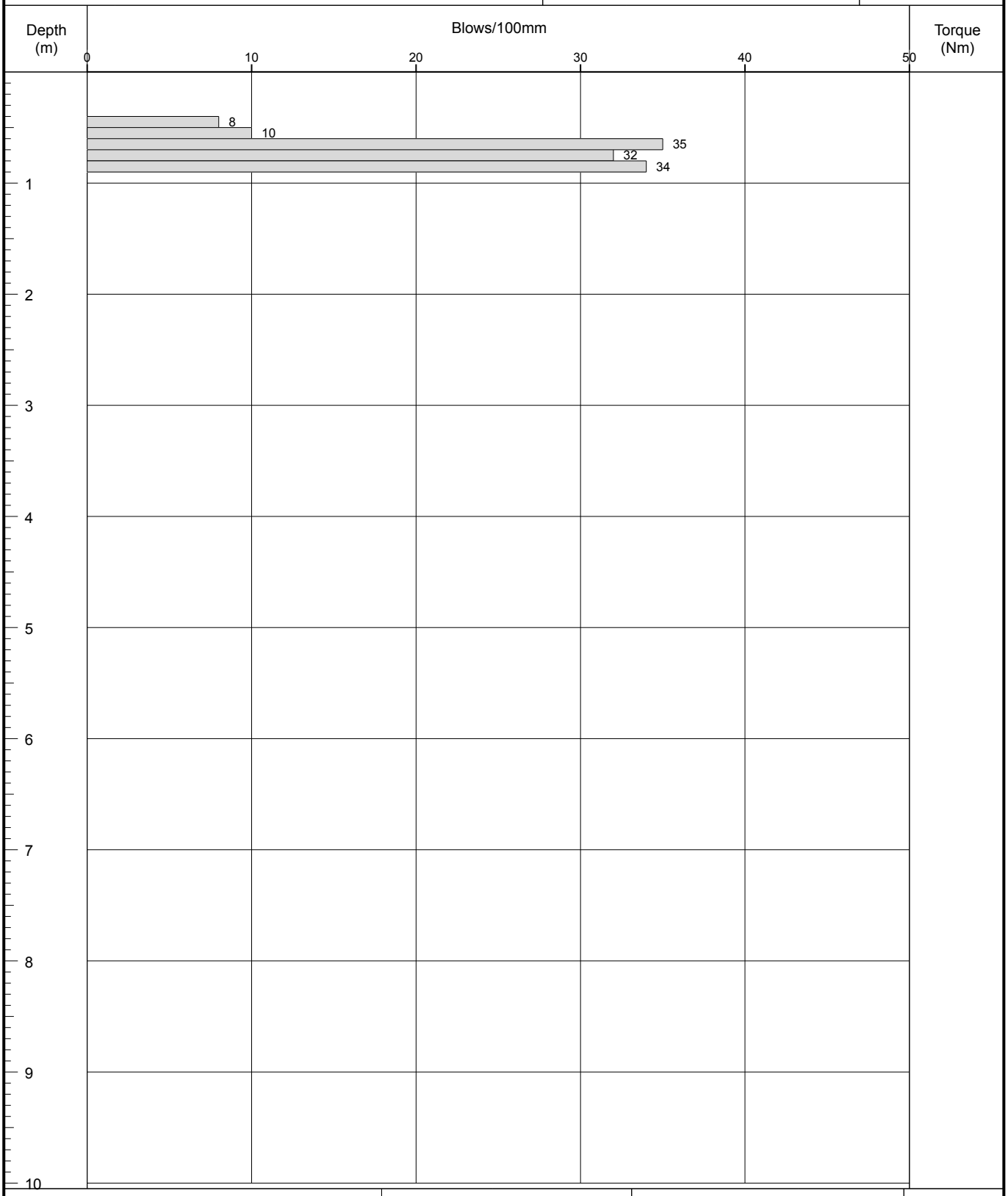
Remarks:
Service inspection pit to 0.40m . Abrupt refusal at 1.70m with 26/100mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.7m
Probe Type	DPSH-B		

Probe Log

Probe No.
DP04
Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 12/03/2018	Logged By AB



Remarks:
Service inspection pit to 0.40m. Effective refusal at 0.90m with 101/300mm.

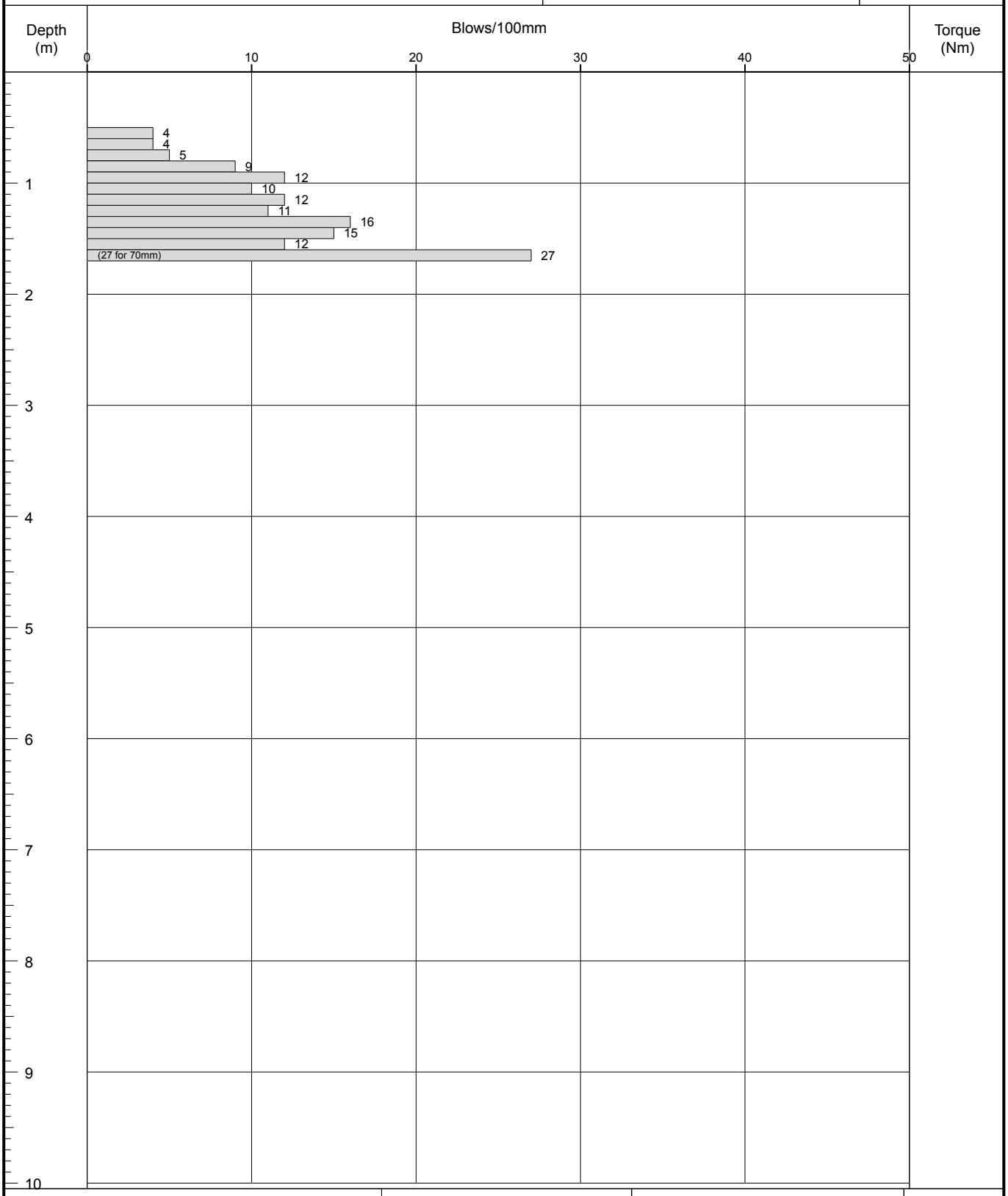
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	0.9m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP05**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



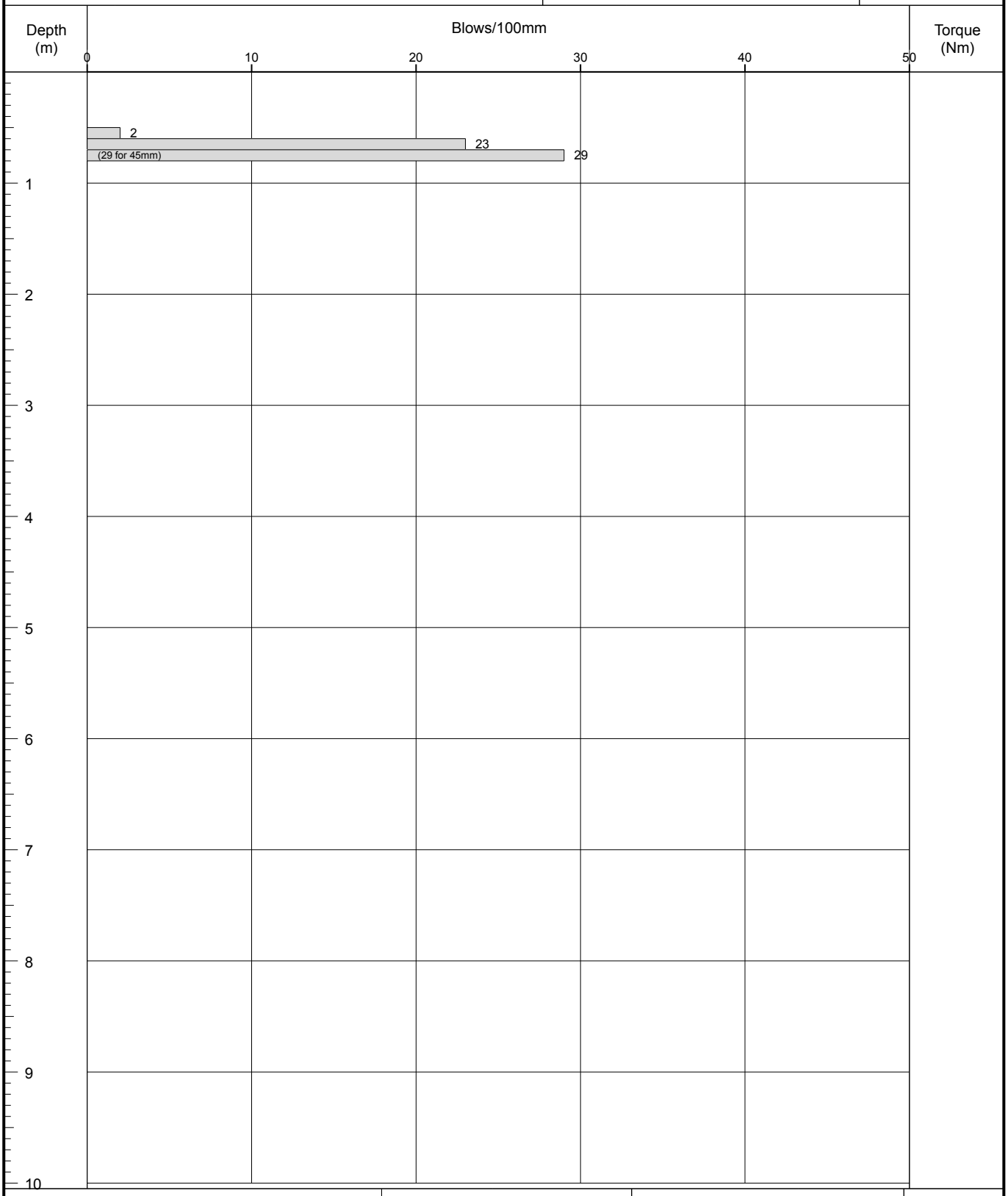
Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.67m with 27/70mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.67m
Probe Type	DPSH-B		

Probe Log

Probe No.
DP06
Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 0.745m with 29/45mm.

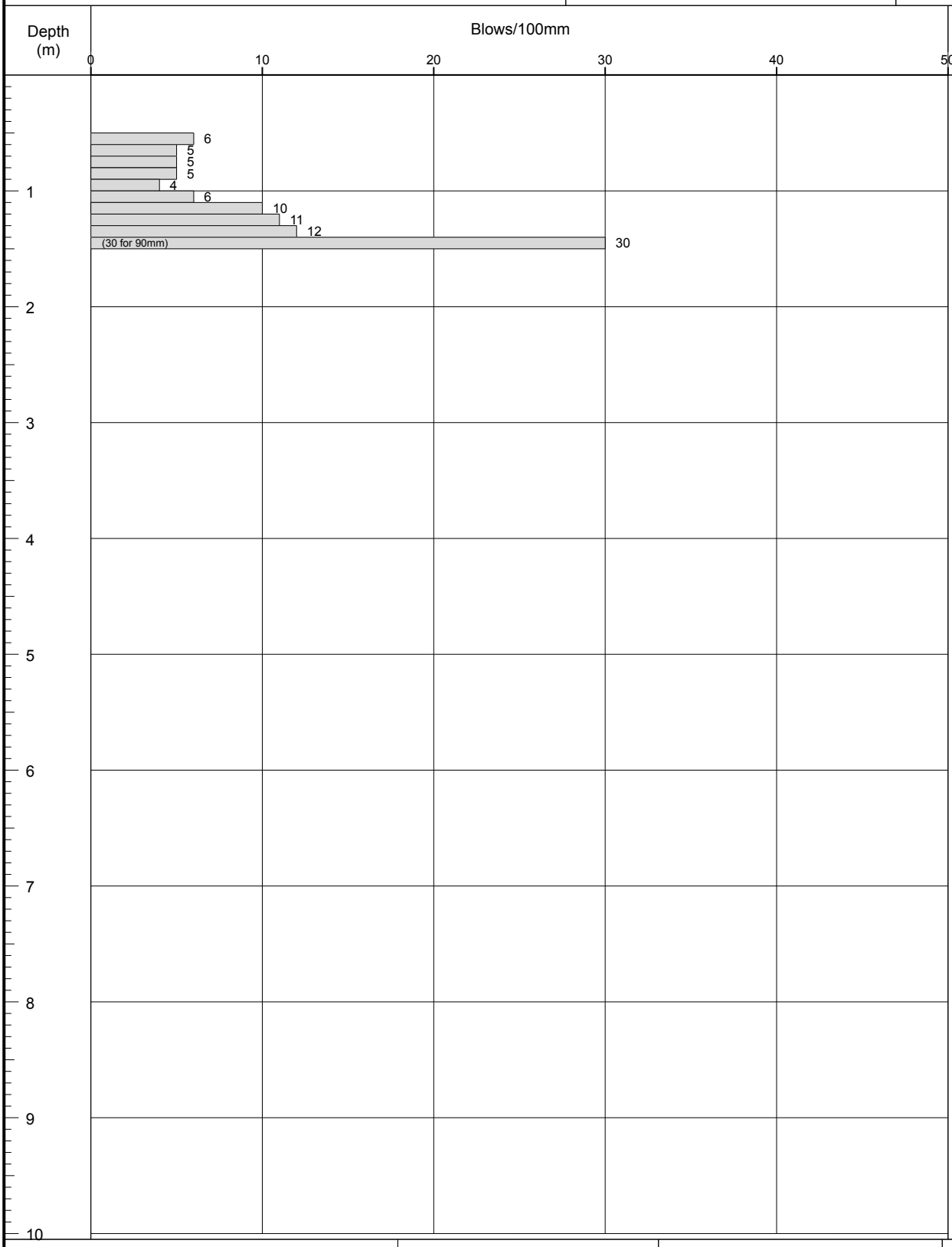
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	0.745m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP07**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.49m with 30/90mm.

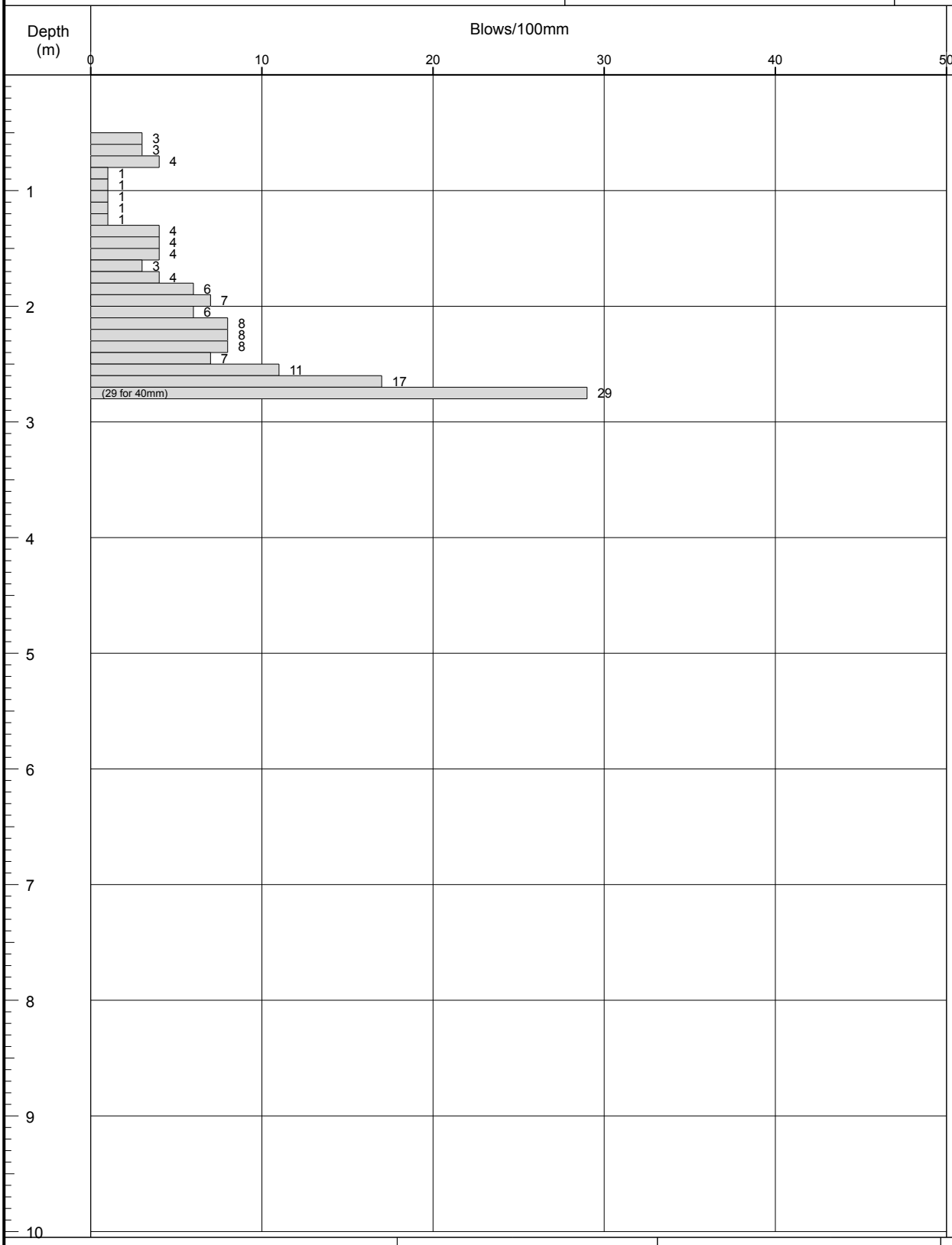
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.49m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP08**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



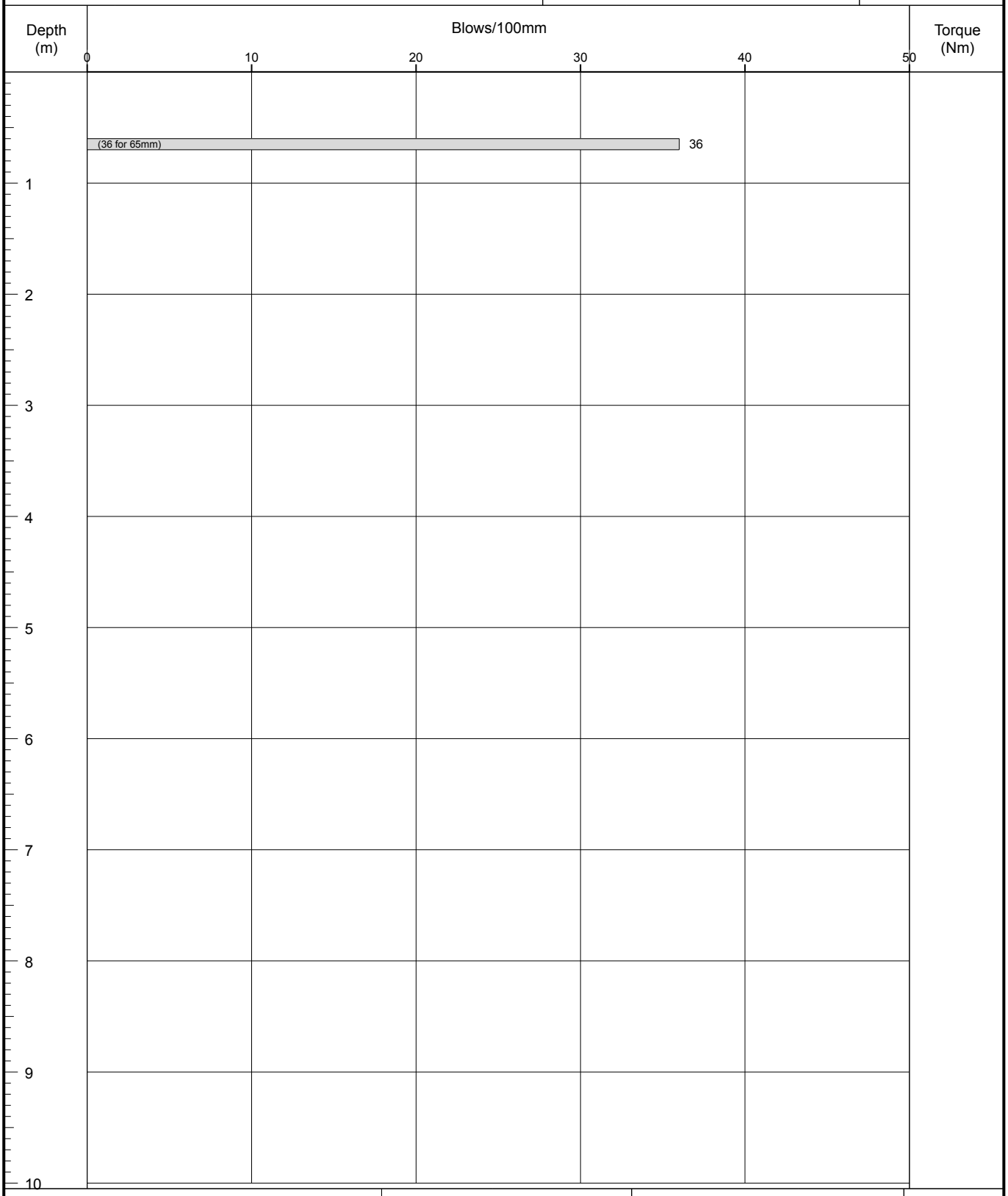
Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 2.74m with 29/40mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.74m
Probe Type	DPSH-B		

Probe Log

Probe No.
DP09
Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.60m. Abrupt refusal at 0.665m with 36/65mm.

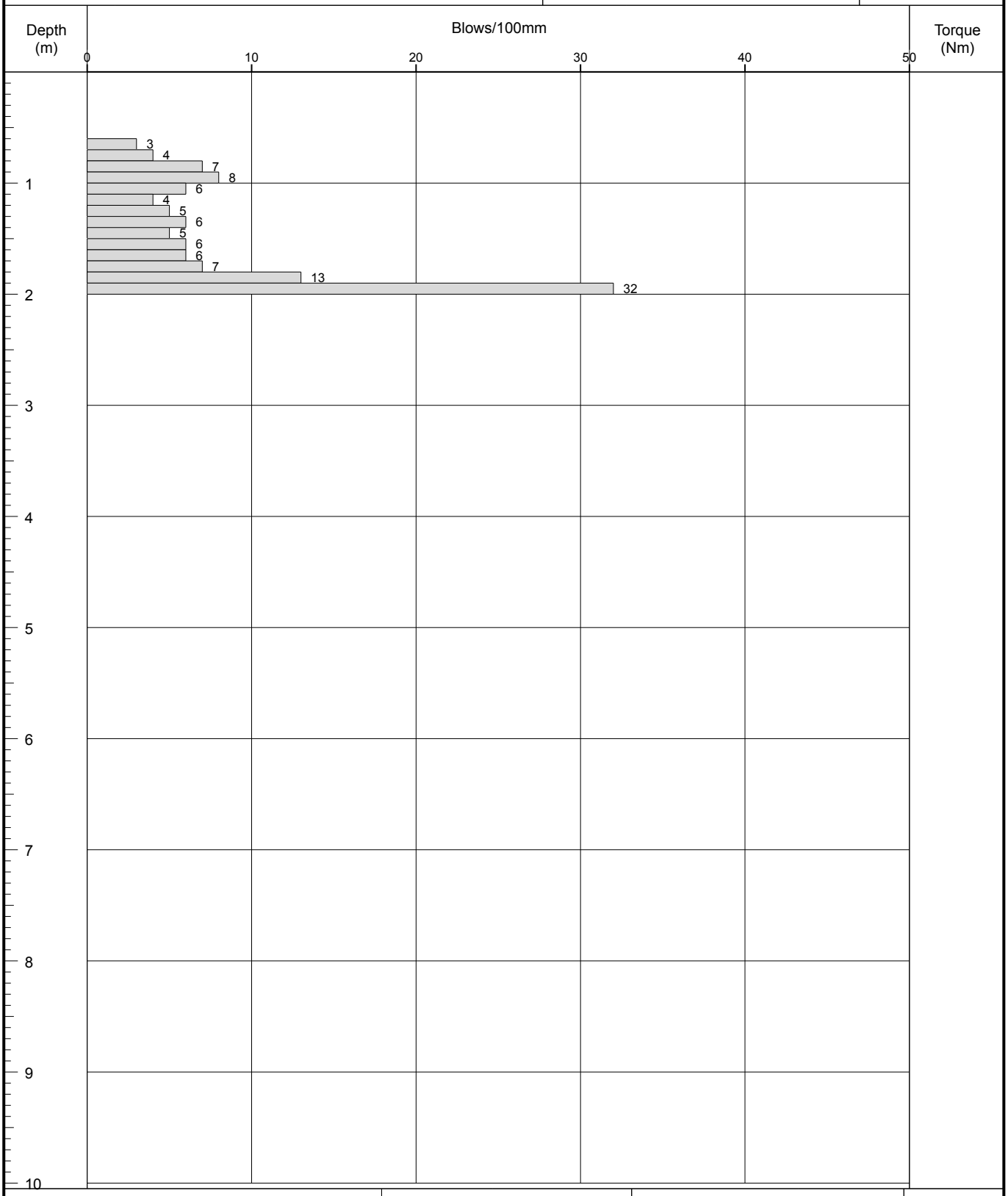
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	0.665m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP10**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.60m. Abrupt refusal at 2.00m with 32/100mm.

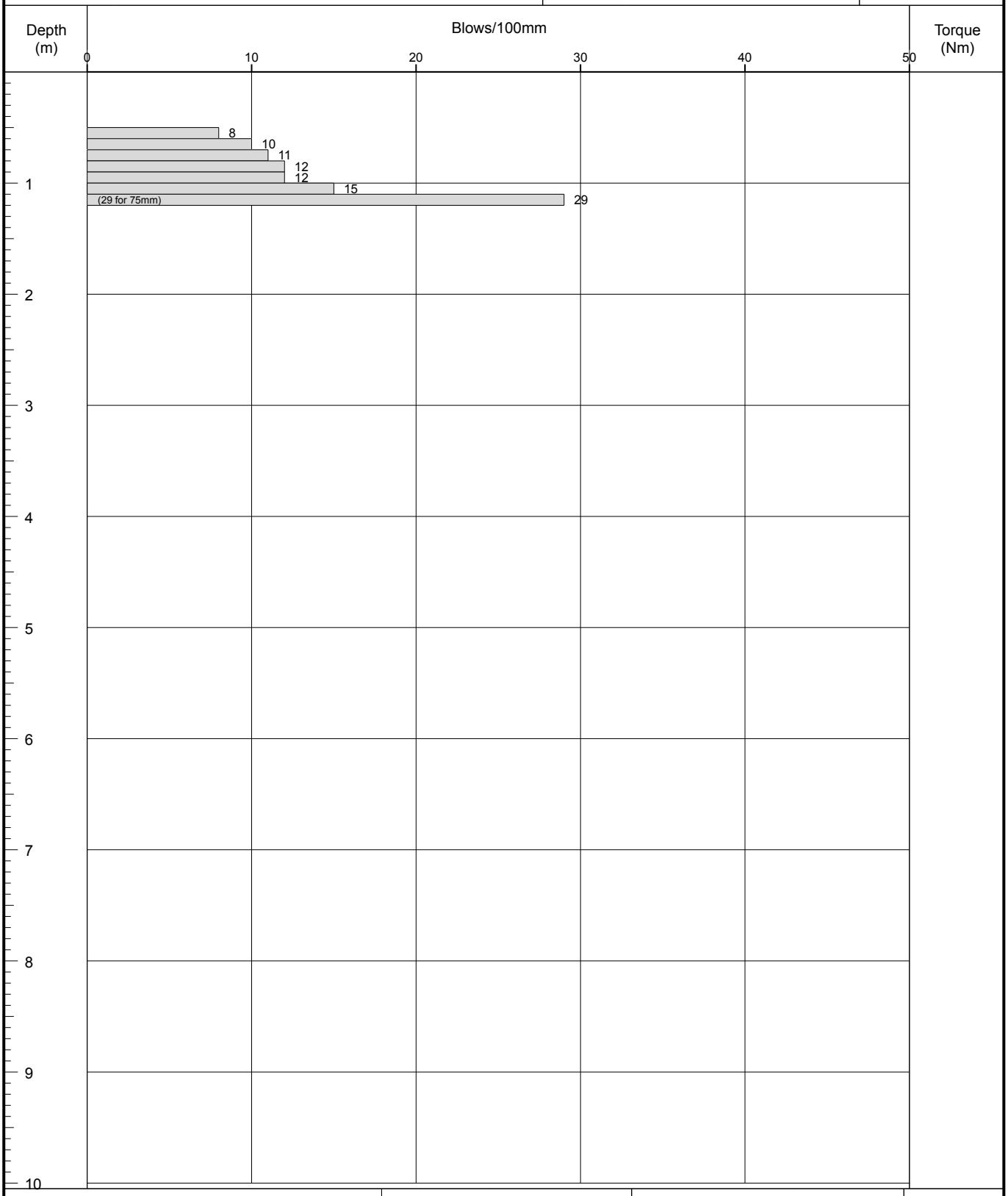
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP11**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.175m with 29/75mm.

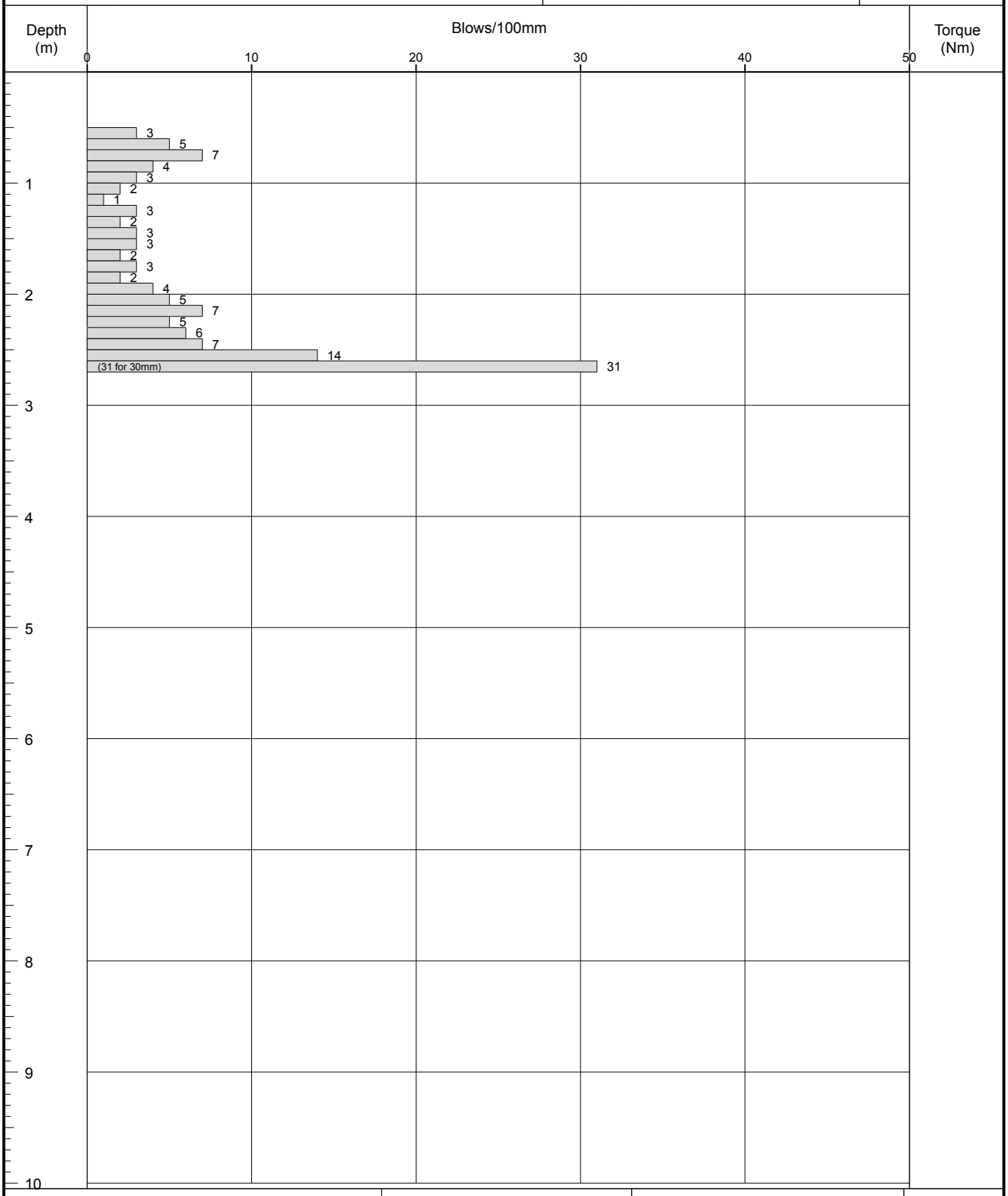
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.175m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP12**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 2.63m with 31/30mm.

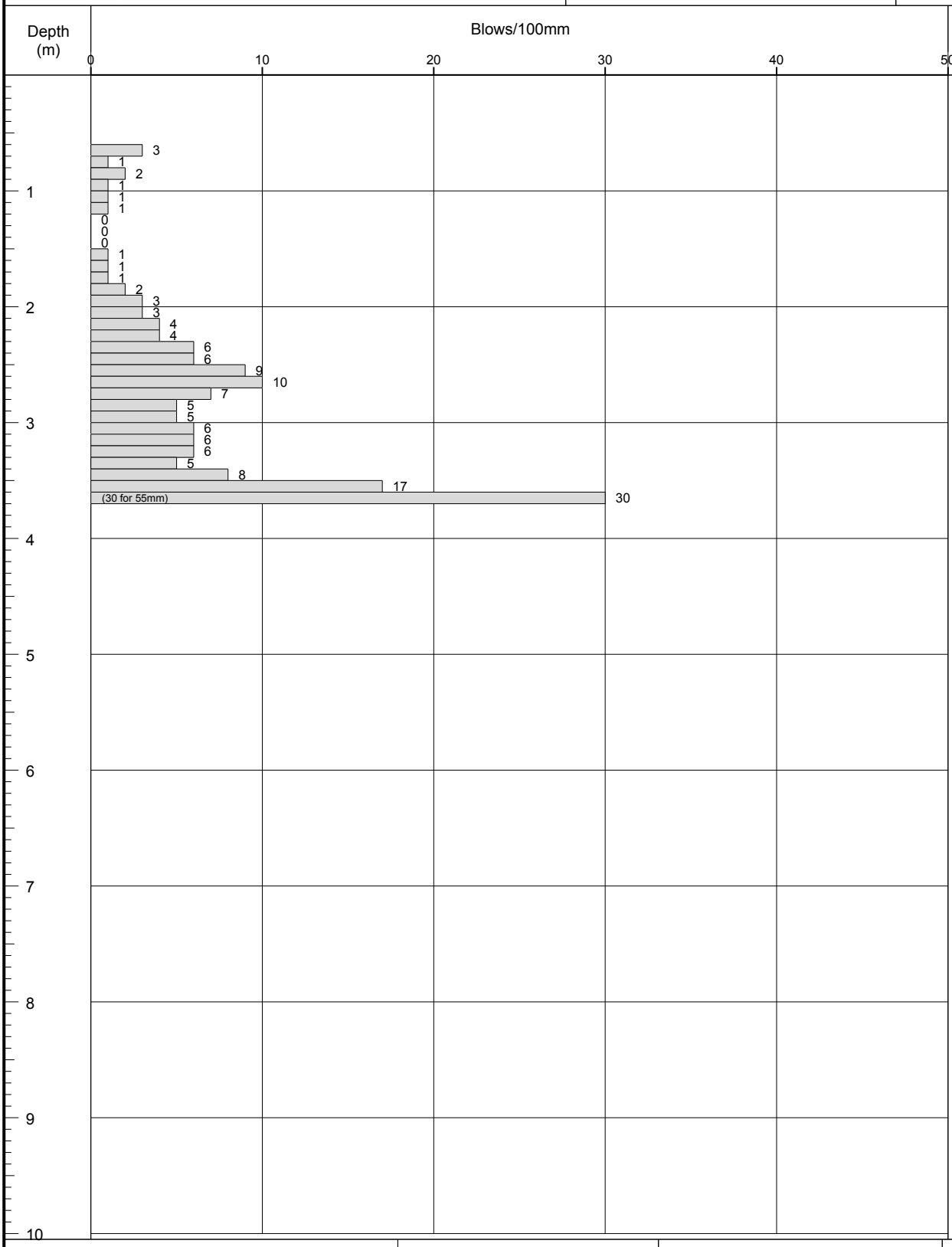
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.63m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP13**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.60m. Abrupt refusal at 3.655m with 30/55mm.

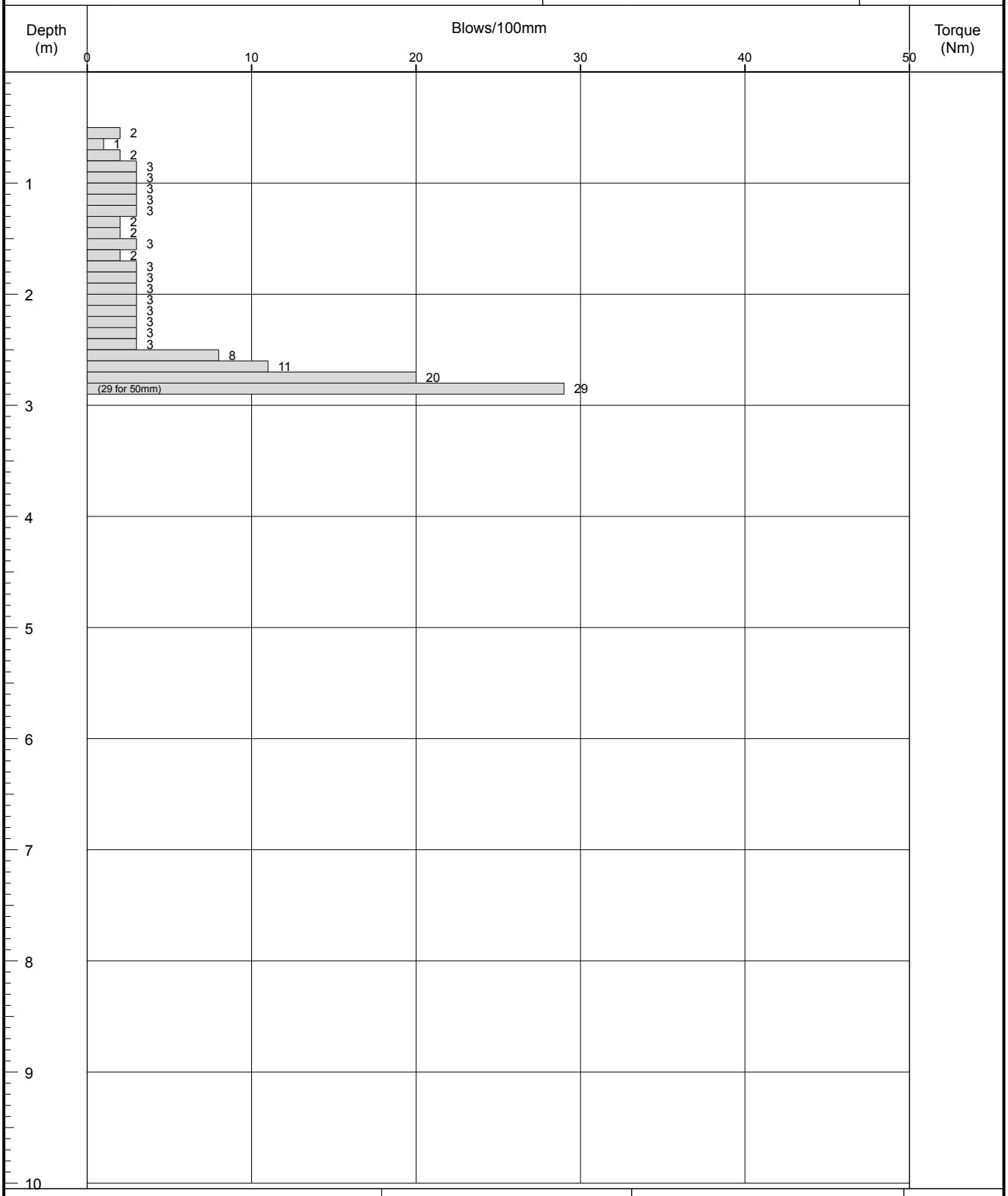
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	3.655m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP14**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 13/03/2018	Logged By KW



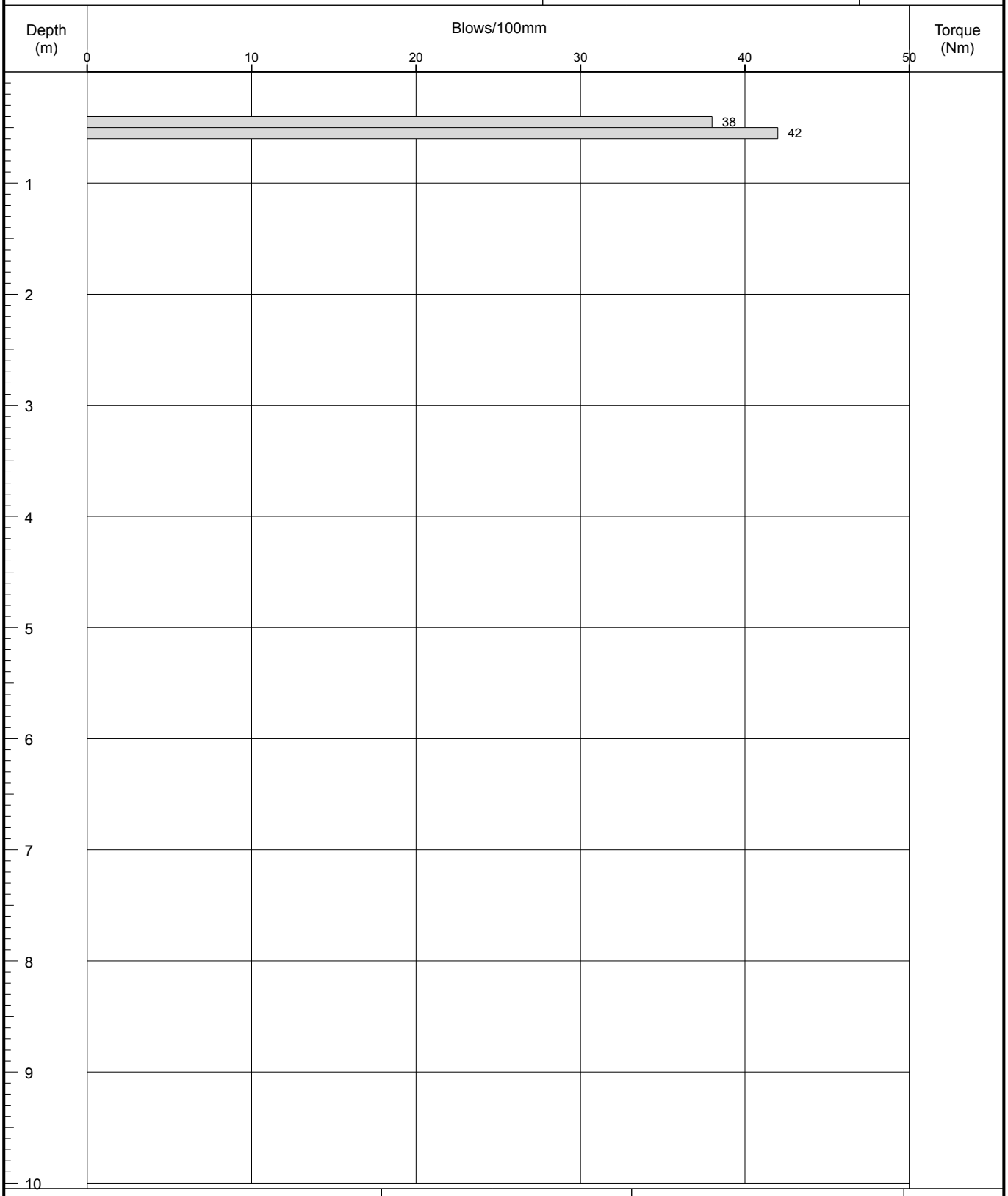
Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 2.85m with 29/50mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.85m
Probe Type	DPSH-B		

Probe Log

Probe No.
DP15
Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By KW

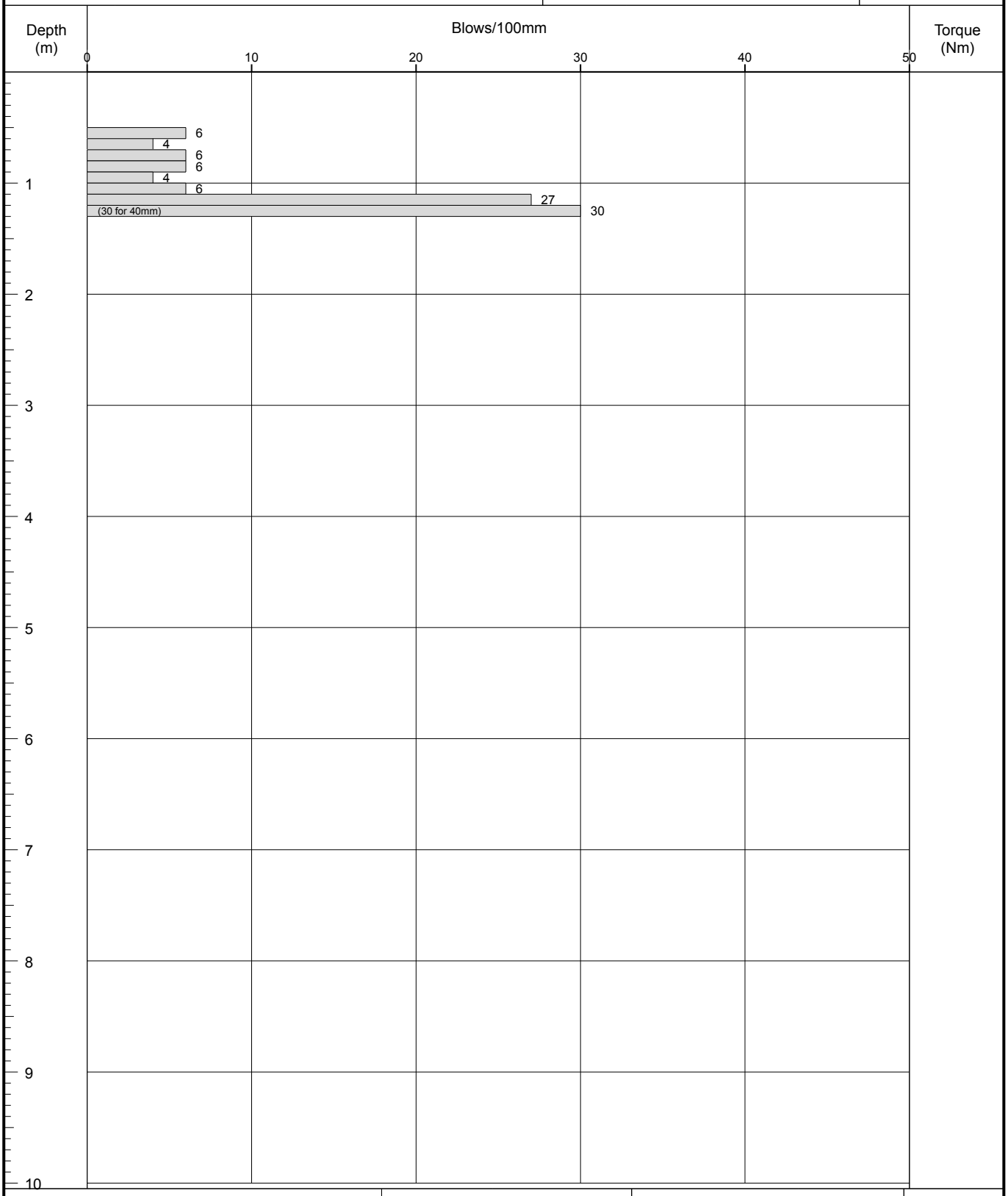


Remarks:
Service inspection pit to 0.40m. Abrupt refusal at 0.60m with 42/100mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	0.6m
Probe Type	DPSH-B		

Probe Log

			Probe No. **DP16** Sheet 1 of 1
Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.24m with 30/40mm.

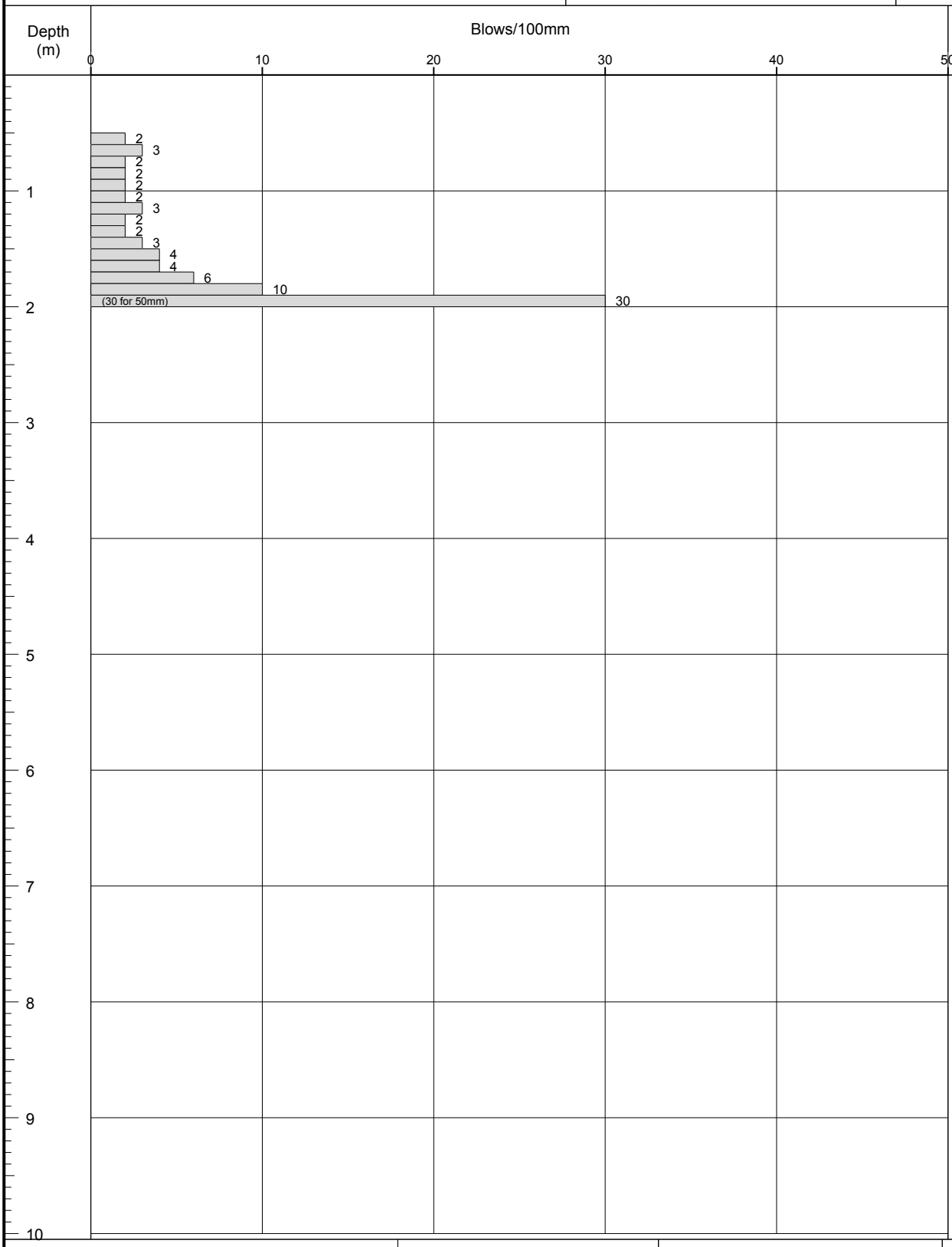
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.24m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP17**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By KW



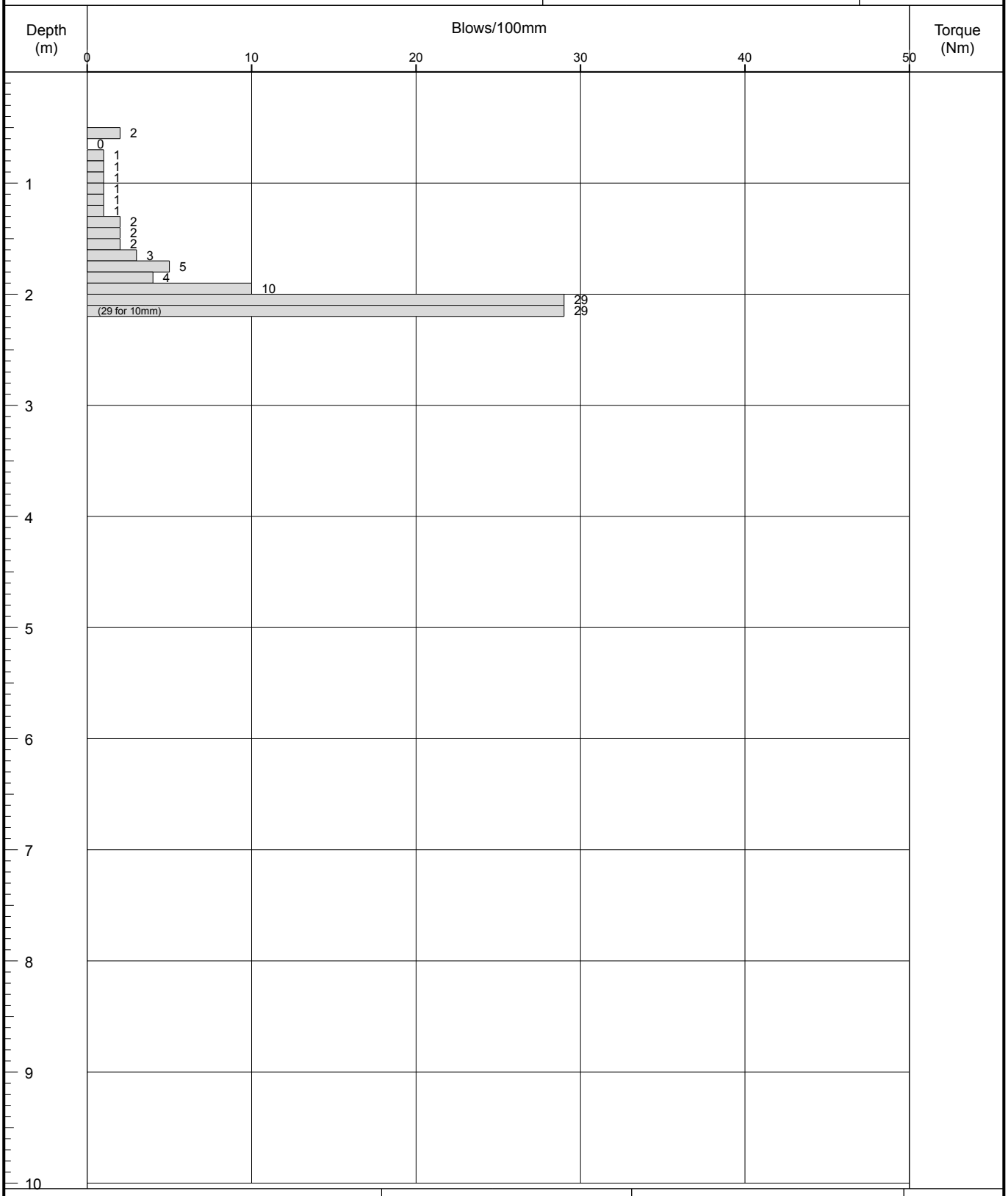
Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.95m with 30/50mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.95m
Probe Type	DPSH-B		

Probe Log

Probe No.
DP18
Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 2.11m with 29/10mm.

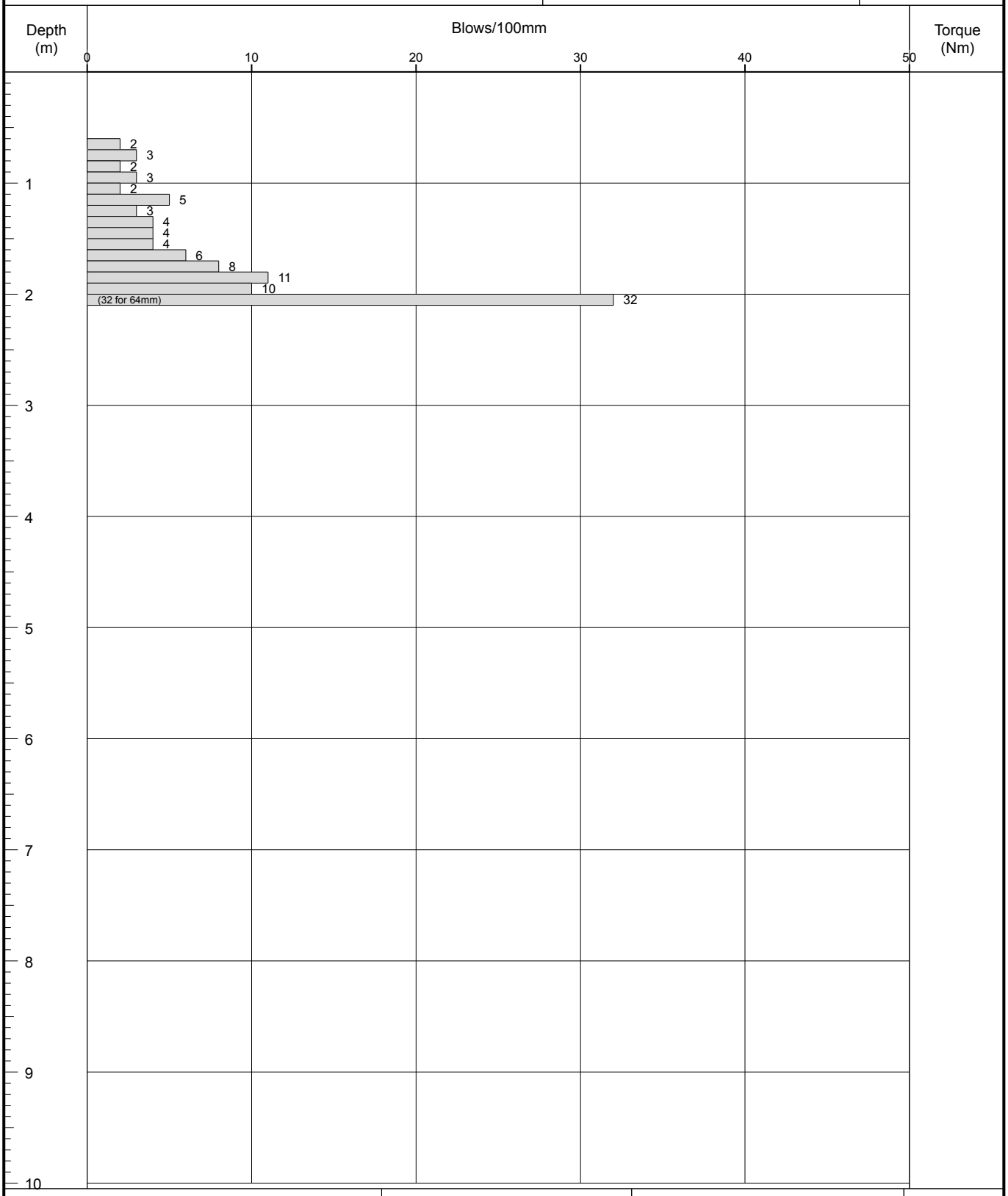
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.11m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP19**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.60m. Abrupt refusal at 2.064m with 32/64mm.

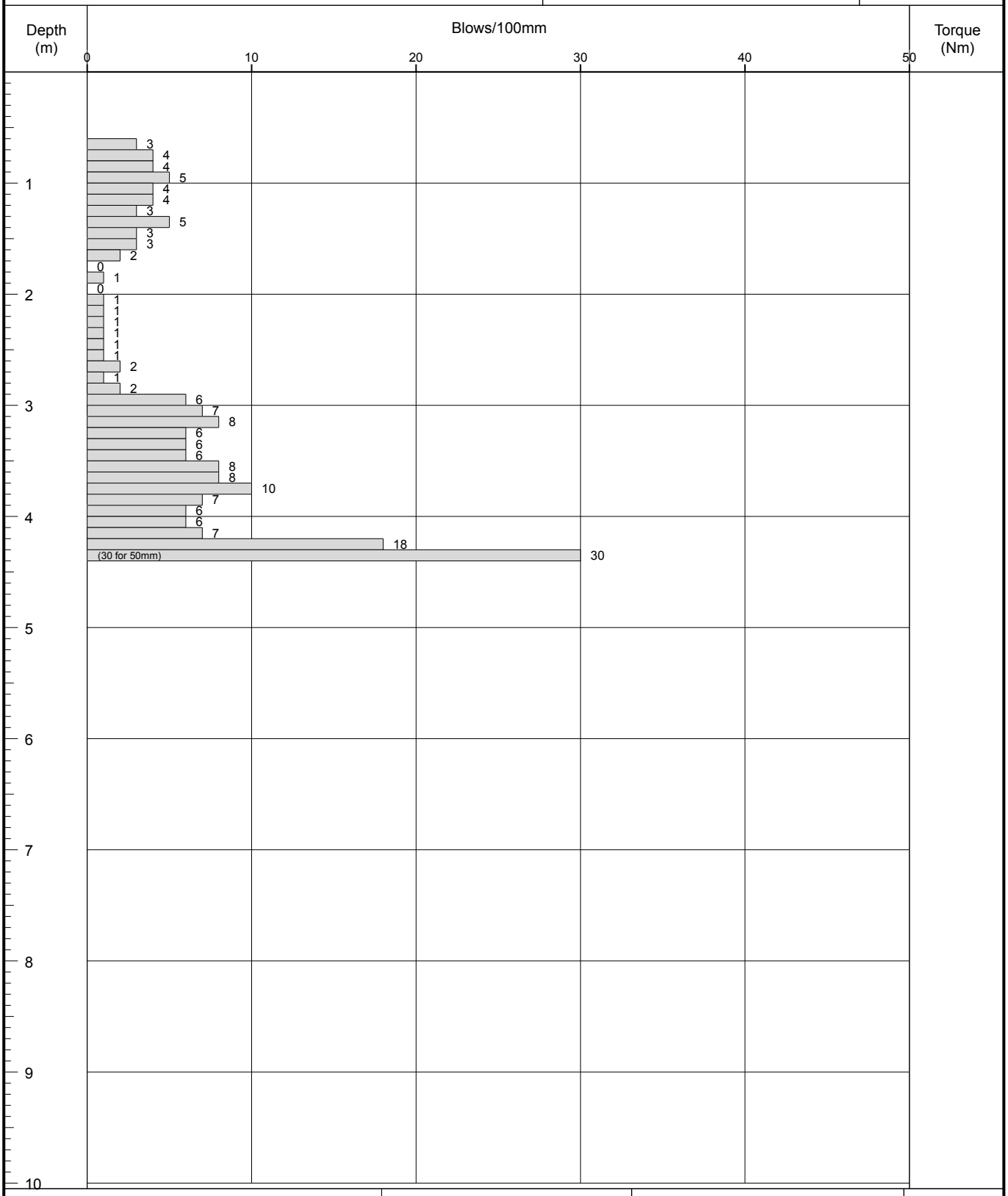
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.064m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP20**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.60m. Abrupt refusal at 4.35m with 30/50mm.

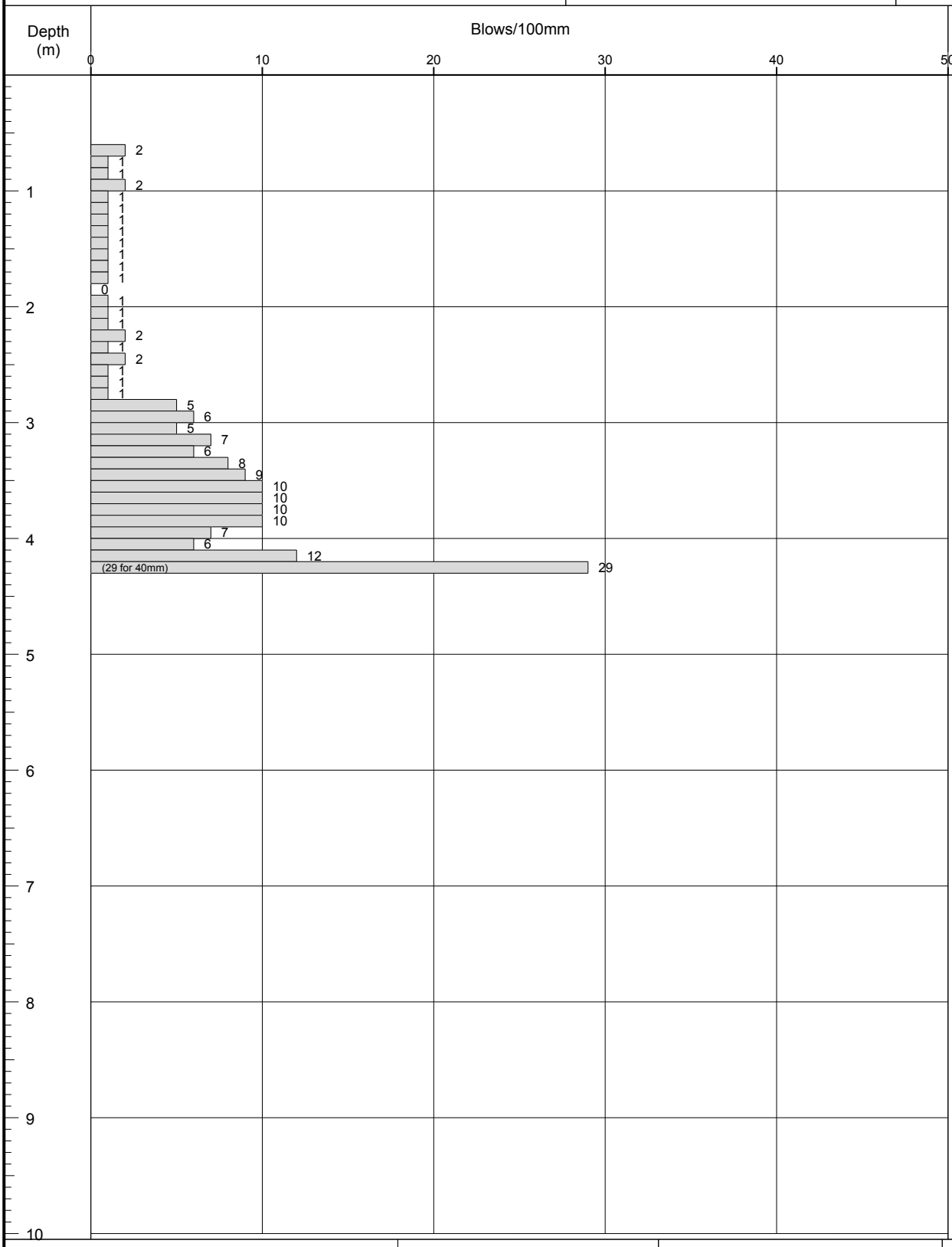
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	4.35m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP21**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 14/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.60m. Abrupt refusal at 4.24m 29/40mm.

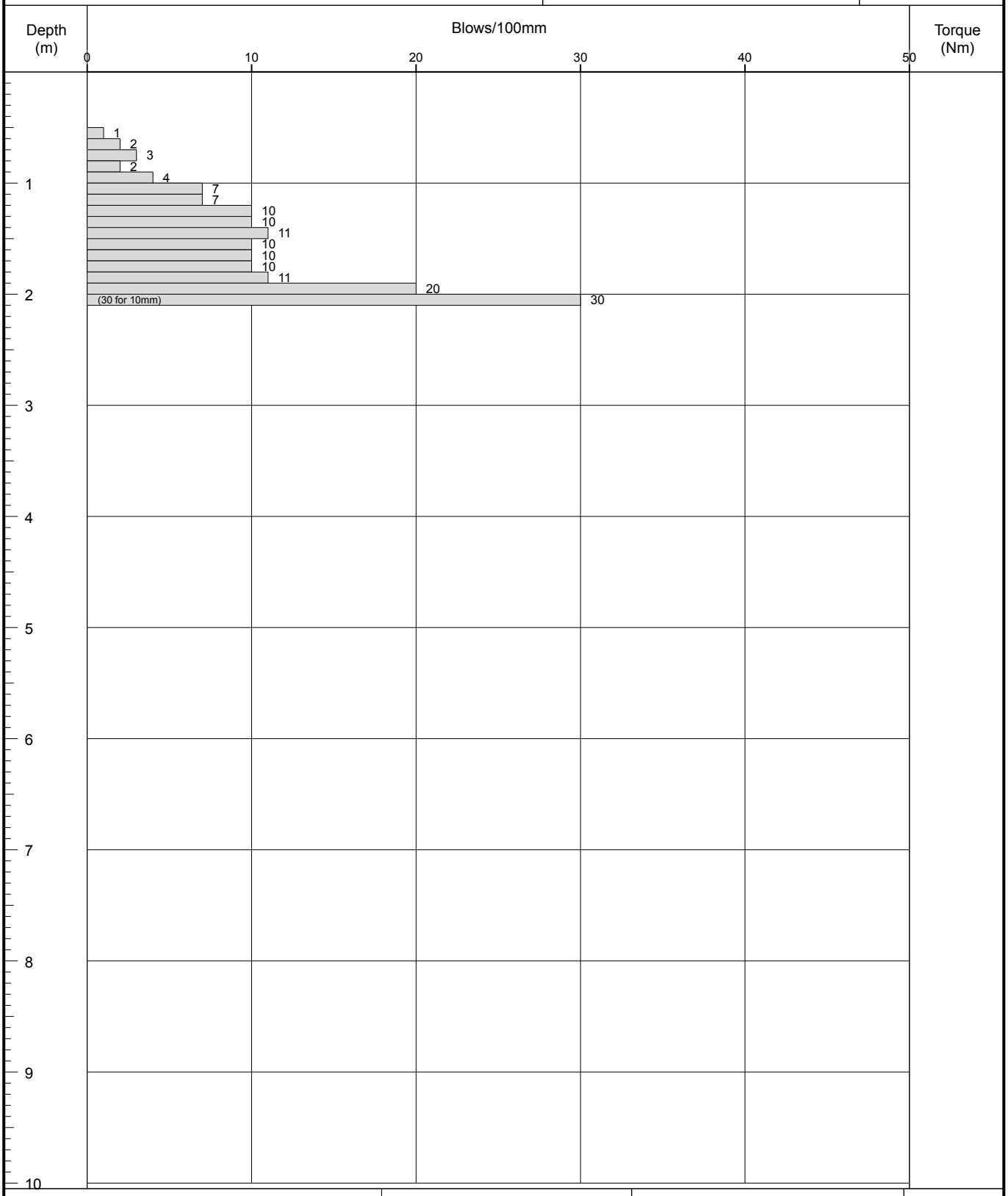
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	4.24m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP22**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 2.01m with 30/10mm.

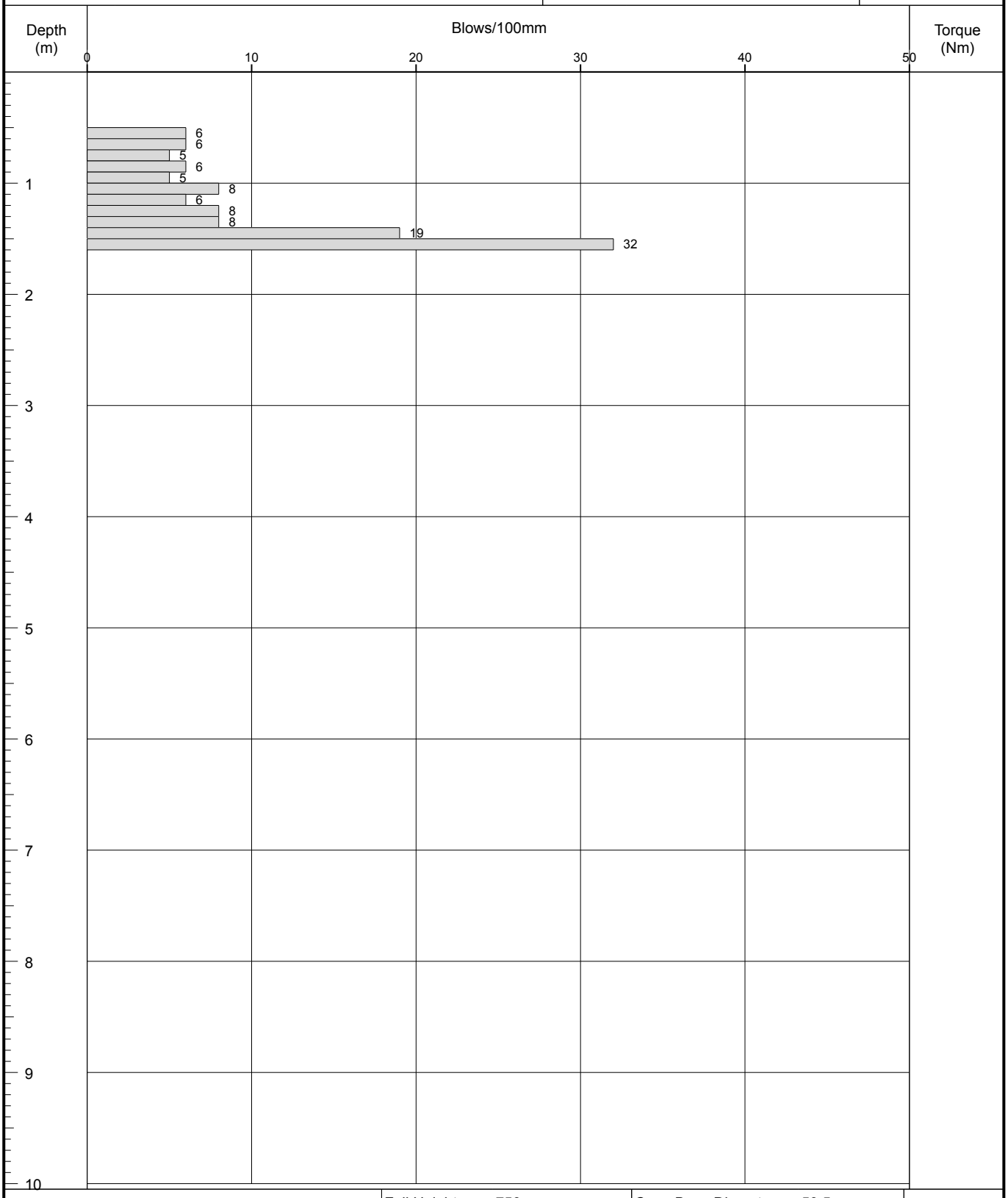
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.01m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP23**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 16/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.60m with 32/100mm.

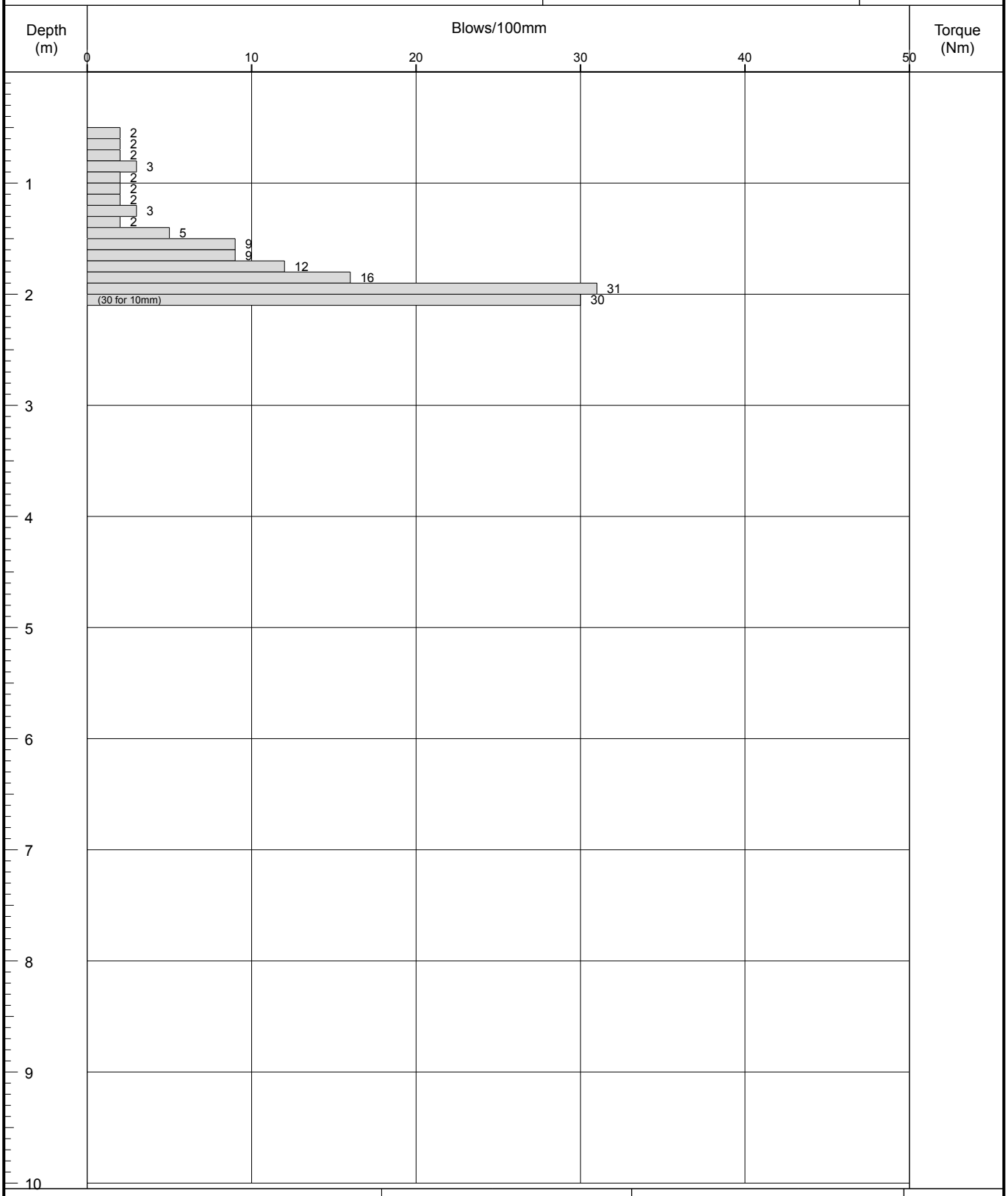
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.6m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP24**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 16/03/2018	Logged By KW

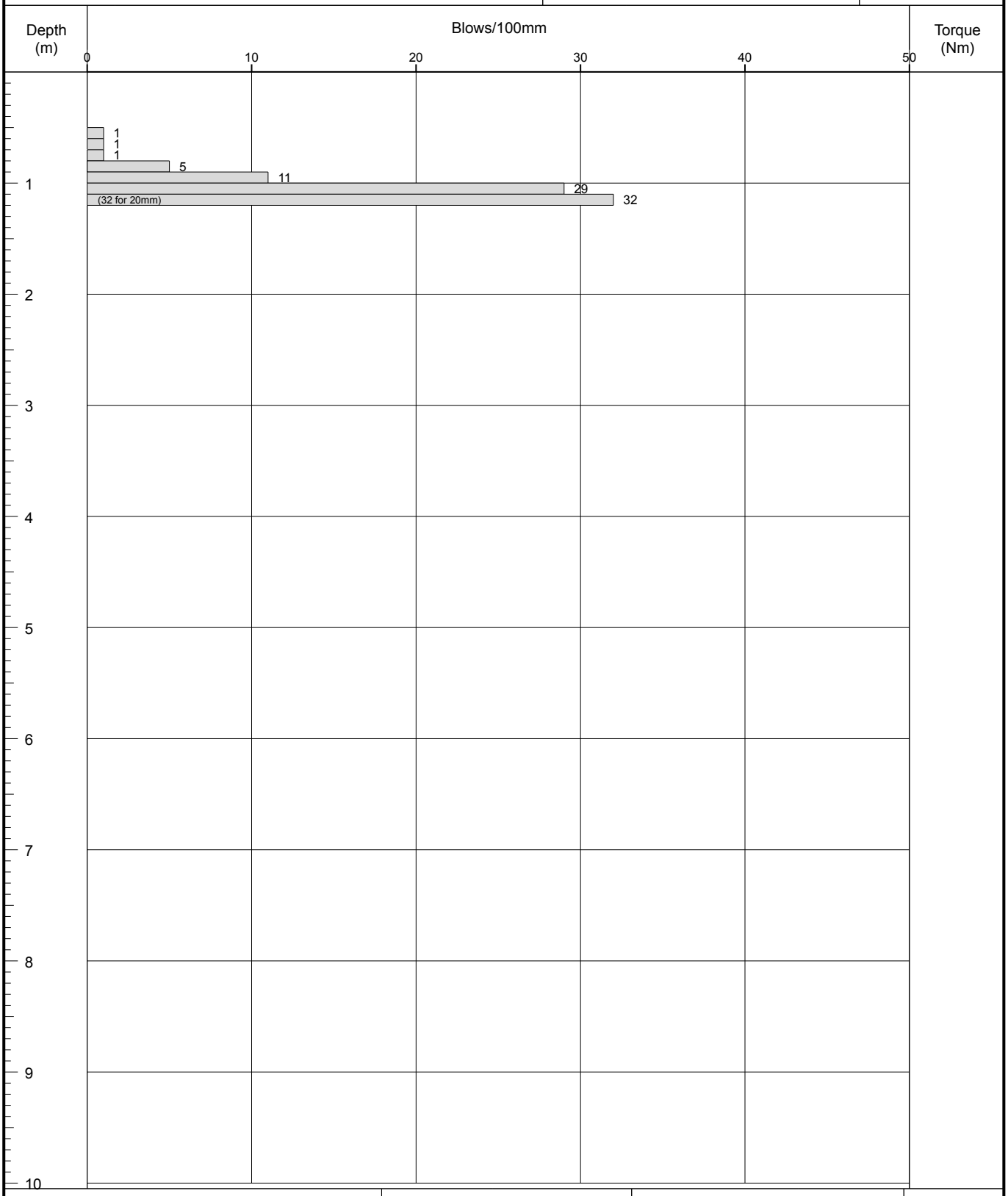


Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 2.01m with 30/10mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	2.01m
Probe Type	DPSH-B		

Probe Log

			Probe No. **DP25** Sheet 1 of 1
Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 16/03/2018	Logged By KW



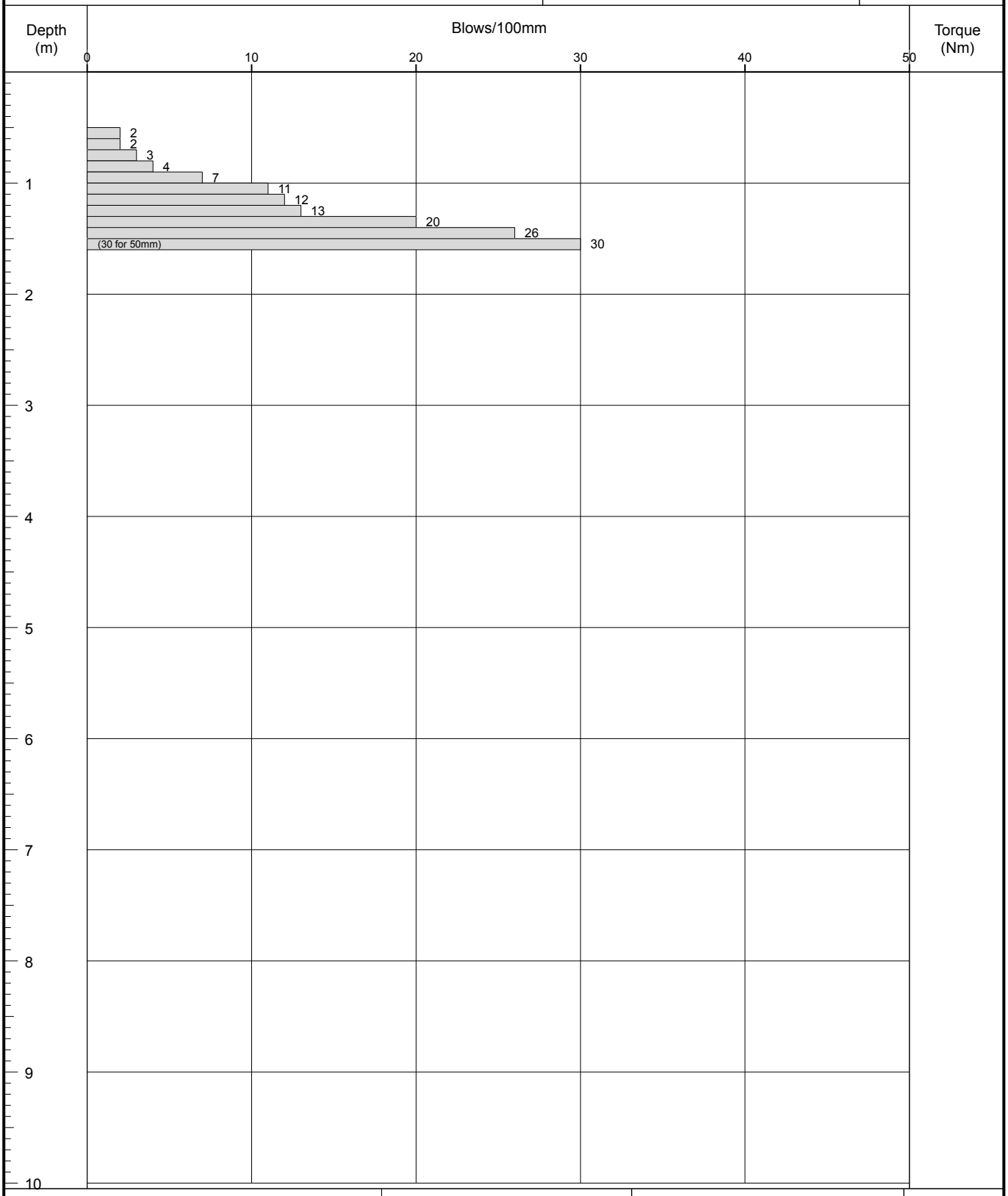
Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.12m with 32/20mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.12m
Probe Type	DPSH-B		

Probe Log

Probe No.
DP26
Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 1.55m with 30/50mm.

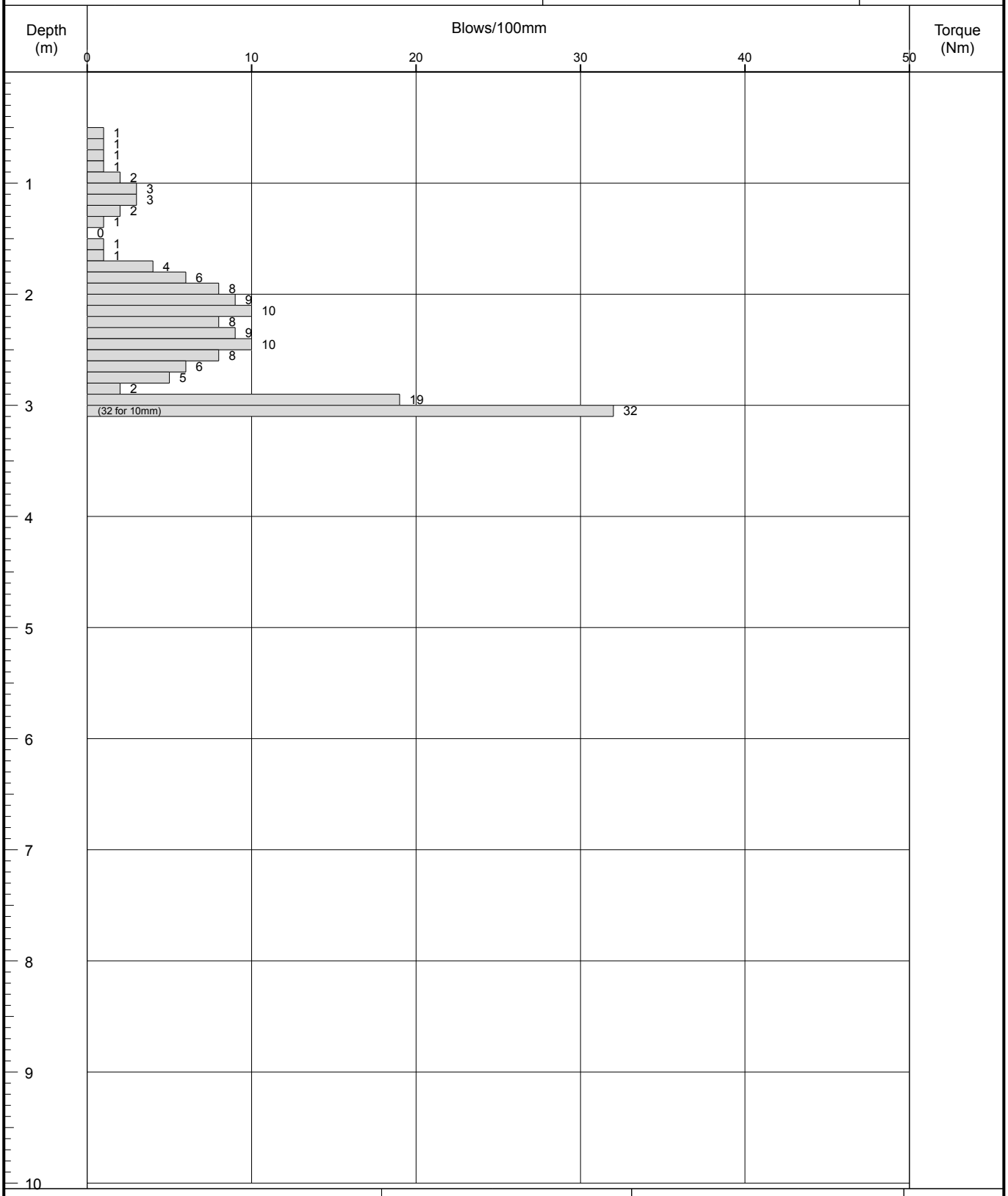
Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	1.55m
Probe Type	DPSH-B		

Probe Log

Probe No. **DP27**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords:	Hole Type DCP
Location: Roebuck Street, Wombwell		Level:	Scale 1:50
Client: Hamson Barron Smith		Dates: 15/03/2018	Logged By KW



Remarks:
Service inspection pit to 0.50m. Abrupt refusal at 3.01m with 32/10mm.

Fall Height	750mm	Cone Base Diameter	50.5mm
Hammer Wt	63.5kg	Final Depth	3.01m
Probe Type	DPSH-B		

Appendix 4

Trialpit Records

Trial Pit Log

Trialpit No **TP01**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440070.60 - 402348.43 Level: 71.32	Date 12/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.55 × 0.6, Depth 2.70	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.25	71.07		TOPSOIL (Soft dark brown sandy CLAY).
				0.70	70.62		MADE GROUND (Soft and firm grey silty gravelly CLAY. Gravel is sub-rounded to angular fine to coarse brick sandstone and various lithologies).
				2.30	69.02		MADE GROUND (Brown clayey tabular angular fine to coarse GRAVEL of sandstone. High cobble content of sandstone).
				2.70	68.62		SANDSTONE recovered as tabular and sub-angular coarse gravel and cobbles.
							End of pit at 2.70 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP02**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440122.01 - 402318.78 Level: 68.94	Date 12/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 2.2 × 0.6, Depth 1.42	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.60	D		0.20	68.74		TOPSOIL (Soft dark brown sandy CLAY).
				0.60	68.33		MADE GROUND (Black clayey silty sandy sub-rounded to angular fine to coarse GRAVEL of sandstone and clinker).
				1.10	67.83		MADE GROUND (Red silty sandy sub-angular GRAVEL of brick and sandstone).
				1.42	67.52		SANDSTONE recovered as tabular and sub-angular coarse gravel and cobbles.
							End of pit at 1.42 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP03**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440190.95 - 402215.76 Level: 68.26
Location:	Roebuck Street, Wombwell	Dimensions (m): Depth 1.60	1.7 × 0.6
Client:	Hamson Barron Smith		Date 12/03/2018 Scale 1:50 Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	67.96		TOPSOIL (Soft dark brown sandy CLAY).
							Brown silty very sandy tabular sub-angular fine to coarse GRAVEL of sandstone. High cobble content of sandstone. (Possible fill).
				1.50	66.76		
				1.60	66.66		SILTSTONE recovered as gravelly clay and clayey gravel.
							End of pit at 1.60 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP04**

Sheet 1 of 1

Project Name:	Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440230.83 - 402210.05 Level: 67.61
Location:	Roebuck Street, Wombwell	Dimensions (m): Depth 2.05	1.55 × 0.6
Client:	Hamson Barron Smith		Scale 1:50 Logged RAP Date 12/03/2018

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.60	B		0.40	67.21		TOPSOIL (Soft dark brown sandy CLAY).
				0.65	66.96		MADE GROUND (Brown clayey sub-angular fine to coarse GRAVEL of sandstone).
							Brown silty very sandy tabular sub-angular fine to coarse GRAVEL of sandstone. High cobble content of sandstone. (Possible fill).
				2.05	65.56		End of pit at 2.05 m

Remarks: Refusal: Rock. Old pipe at 0.65m.

Stability:

Trial Pit Log

Trialpit No **TP05**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440113.85 - 402408.57 Level: 68.57	Date 12/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): Depth 2.25	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.60	B		0.05	68.52		TOPSOIL (Soft dark brown CLAY). MADE GROUND (Dark brown clayey silty very sandy sub-rounded and sub-angular fine to coarse GRAVEL of brick clinker sandstone mortar and concrete. High cobble content of brick and sandstone).
	1.10	B		1.20	67.37		Brown clayey very sandy sub-angular and angular tabular fine to coarse GRAVEL of sandstone. Medium cobble content. Occasional clay horizons.
	2.10	B		2.25	66.32		End of pit at 2.25 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP06**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440190.52 - 402278.80 Level: 67.56	Date 12/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.55 × 0.6, Depth 1.35	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	67.26		TOPSOIL (Soft dark brown sandy CLAY).
	1.00	B					Brown clayey sandy tabular sub-angular fine to coarse GRAVEL of sandstone. Low to medium cobble content of sandstone.
				1.35	66.20		End of pit at 1.35 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP07**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440276.36 - 402261.74 Level: 66.06	Date 12/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.6 × 0.6, Depth 1.90	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	65.76		TOPSOIL (Soft dark brown sandy CLAY).
							MADE GROUND (Dark brown clayey gravelly fine and medium SAND. Gravel is sub-angular fine to coarse sandstone).
				1.35	64.71		Firm becoming stiff grey mottled brown silty sandy slightly gravelly CLAY. Gravel is sub-rounded to angular fine to coarse sandstone.
							1.5m: Stiff.
				1.90	64.16		End of pit at 1.90 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP08**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440216.88 - 402394.21 Level: 64.66	Date 12/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.7 x 0.6, Depth 2.30	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.46	64.20		TOPSOIL (Soft dark brown sandy CLAY).
	0.60	B					MADE GROUND (Brown clayey silty very sandy sub-angular fine to coarse GRAVEL of sandstone. Low to medium cobble content of sandstone. Becoming less clayey with depth and gravel more tabular).
	0.90	D					
				2.00	62.66		Brown clayey silty sandy tabular and sub-angular fine to coarse GRAVEL of sandstone. Medium to high cobble content of sandstone. (Possible fill).
				2.30	62.36		End of pit at 2.30 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP09** Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440250.96 - 402327.32 Level: 65.64	Date 12/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.7 × 0.6, Depth 2.50	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.60	B		0.30	65.34		TOPSOIL (Soft dark brown sandy CLAY).
	1.00	D		1.80	63.84		MADE GROUND (Soft brown silty sandy slightly gravelly CLAY. Sand is fine. Gravel is sub-angular fine to coarse sandstone and rare gravel. Low cobble content of sandstone).
				2.50	63.14		MADE GROUND (Brown very clayey silty sandy sub-angular fine to coarse GRAVEL of sandstone. Low to medium cobble content of sandstone). End of pit at 2.50 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP10**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440206.42 - 402442.39 Level: 61.87	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.5 × 1.1, Depth 0.60	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40	61.47		TOPSOIL (Soft dark brown silty sandy slightly gravelly CLAY. Gravel is sub-angular fine to coarse sandstone brick and rare clinker and coal).
				0.60	61.27		SANDSTONE recovered as tabular cobbles.
							End of pit at 0.60 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP11**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440245.17 - 402379.55 Level: 62.03	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.5 x 1.1, Depth 0.60	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.40	B		0.40	61.63		TOPSOIL (Soft dark brown silty sandy slightly gravelly CLAY. Gravel is sub-angular fine to coarse sandstone brick and rare clinker and coal).
				0.60	61.43		SANDSTONE recovered as tabular cobbles.
							End of pit at 0.60 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP12**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440316.79 - 402305.05 Level: 61.59	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.5 × 1 Depth 1.30	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05	61.54		MADE GROUND (Asphalt). Brown very sandy tabular and sub-angular fine to coarse GRAVEL of sandstone. Medium cobble content of sandstone.
	1.30	B		1.30	60.29		End of pit at 1.30 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP13**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440259.59 - 402447.10 Level: 60.94	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.85 × 1.15, Depth 2.00	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	60.64		Soft dark brown silty sandy CLAY).
							MADE GROUND (Brown silty very sandy tabular and sub-angular fine to coarse GRAVEL of sandstone. High cobble content of sandstone).
				2.00	58.94		End of pit at 2.00 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP14**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440321.17 - 402362.67 Level: 60.86	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.5 × 0.6, Depth 2.15	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.25	60.61		TOPSOIL (Soft brown CLAY).
							MADE GROUND (Brown silty very sandy tabular and sub-angular fine to coarse GRAVEL of sandstone. High cobble content of sandstone).
				1.90	58.96		SANDSTONE recovered as very thinly bedded tabular cobbles and coarse gravel.
				2.15	58.71		End of pit at 2.15 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP15** Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440260.43 - 402514.65 Level: 60.06	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.55 × 1.1, Depth 3.65	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	59.86		TOPSOIL (Soft dark brown silty sandy CLAY).
	1.00	B					MADE GROUND (Brown clayey very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse sandstone. Low cobble content of sandstone).
	1.50	D		1.50	58.56		MADE GROUND (Soft dark brown silty slightly gravelly CLAY. Gravel is sub-rounded to angular fine to coarse sandstone and rare clinker).
	2.10	B					
				2.30	57.76		MADE GROUND (Brown clayey very sandy sub-angular fine to coarse GRAVEL of sandstone. Medium cobble content of sandstone).
	3.50	B		3.50	56.56		
				3.65	56.40		Grey mottled brown clayey sandy tabular and sub-angular fine to coarse GRAVEL. High cobble content of sandstone. End of pit at 3.65 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP16**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440335.84 - 402480.41 Level: 53.73	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.65 x 1 Depth 1.20	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.40	B		0.20	53.53		TOPSOIL (Soft dark brown sandy CLAY).
							Brown clayey silty sandy sub-angular fine to coarse GRAVEL of sandstone.
▼				0.85	52.88		SANDSTONE recovered as very thinly bedded tabular cobbles and coarse gravel.
				1.20	52.53		End of pit at 1.20 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP17**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440357.32 - 402431.42 Level: 54.47	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.1 × 0.6, Depth 0.65	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.40	D		0.25	54.22		TOPSOIL (Soft dark brown sandy CLAY).
				0.60	53.87		Firm to stiff grey mottled orange silty slightly sandy gravelly CLAY. Gravel is tabular sub-angular fine to coarse sandstone. Low to medium cobble content.
				0.65	53.82		SANDSTONE recovered as tabular and sub-angular gravel and cobbles.
							End of pit at 0.65 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP18**

Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440380.47 - 402529.64 Level: 51.91	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.8 × 0.9, Depth 2.30	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.60	B		0.20	51.71		TOPSOIL (Soft dark brown sandy CLAY).
	1.00	B					MADE GROUND (Brown clayey silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse sandstone. Low to medium cobble content of sandstone).
	1.60	D		1.50	50.41		
				1.70	50.21		MADE GROUND (Soft brown silty slightly sandy slightly gravelly CLAY. Gravel is sub-angular fine to coarse sandstone. Low to medium cobble content of sandstone).
	2.00	B		2.00	49.91		
				2.30	49.61		MADE GROUND (Brown clayey silty very gravelly fine and medium SAND. Gravel is sub-angular fine to coarse sandstone. Low to medium cobble content of sandstone).
							Grey mottled brown clayey very sandy tabular and sub-angular fine to coarse GRAVEL. High cobble content of sandstone.
							End of pit at 2.30 m

Remarks: Refusal: Rock.

Stability:

Trial Pit Log

Trialpit No **TP19** Sheet 1 of 1

Project Name: Wombwell High Redevelopment	Project No. J4199/18/E/F	Co-ords: 440439.60 - 402458.82 Level: 52.65	Date 13/03/2018
Location: Roebuck Street, Wombwell		Dimensions (m): 1.7 × 0.6, Depth 3.45	Scale 1:50
Client: Hamson Barron Smith			Logged RAP

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.60	B		0.30	52.35		TOPSOIL (Soft dark brown CLAY with occasional sandstone gravel).
	0.60 - 0.70	B					MADE GROUND (Brown very clayey very sandy sub-angular and angular fine to coarse GRAVEL of sandstone. Medium cobble content of sandstone. Rare brick and concrete gravel and cobbles).
	1.60	B					
	1.80	D		1.80	50.85		MADE GROUND (Soft brown and dark brown silty sandy gravelly CLAY. Gravel is sub-angular fine to coarse sandstone. Saturated).
				2.40	50.25		MADE GROUND (Brown very clayey very sandy sub-angular and angular fine to coarse GRAVEL of sandstone. Medium cobble content of sandstone).
	3.00	B		3.00	49.65		Soft to firm and firm brown mottled orange slightly sandy gravelly CLAY with occasional clayey gravelly sand horizons. Gravel is sub-angular fine to coarse sandstone. Medium cobble content of sandstone.
				3.45	49.20		End of pit at 3.45 m

Remarks: Refusal: Rock.

Stability:

Appendix 5

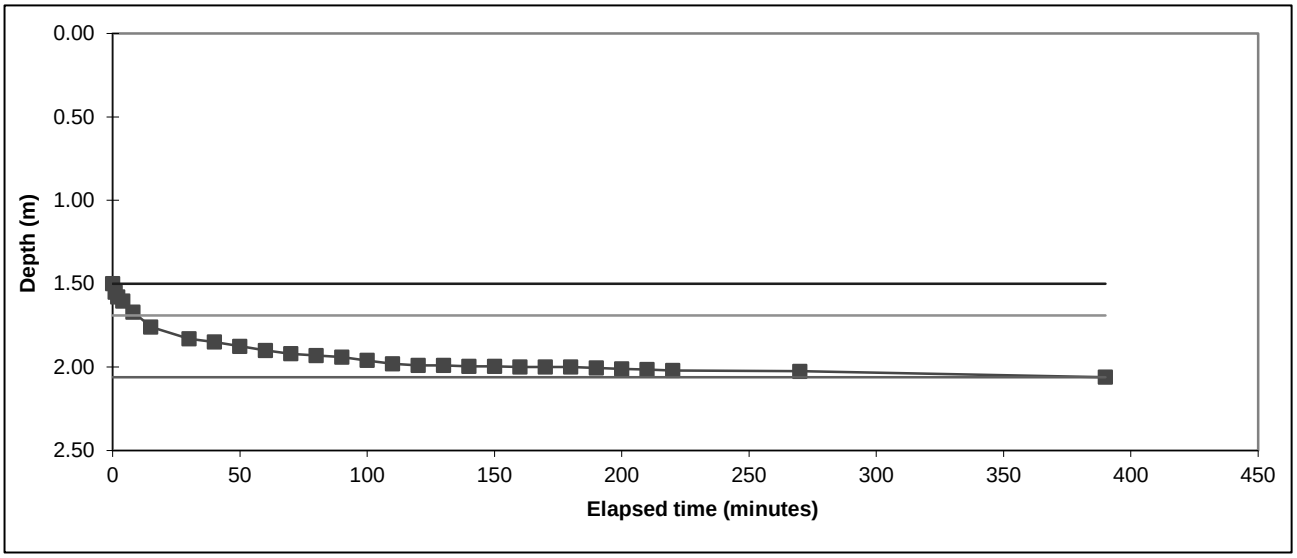
Soakaway Records

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP5	Test No:	1	Date:	12/03/2018
Length (m):	1.600		Datum Height:	0.00	m agl
Width (m):	0.60		Granular infill:	None	
Depth (m):	2.25		Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.500	110	1.980
1	1.550	120	1.990
2	1.580	130	1.990
4	1.605	140	1.995
8	1.670	150	1.995
15	1.760	160	2.000
30	1.830	170	2.000
40	1.850	180	2.000
50	1.875	190	2.005
60	1.900	200	2.010
70	1.920	210	2.015
80	1.930	220	2.020
90	1.940	270	2.025
100	1.960	*390*	*2.061*



Start water depth for analysis (mbgl):	1.50		
75% effective depth (mbgl):	1.69	Elapsed time (mins):	9.6
50% effective depth (mbgl):	1.88		
25% effective depth (mbgl):	2.06	Elapsed time (mins):	386.7
Base of soakage zone (mbgl):	2.25		

Volume outflow between 75% and 25% effective depth (m^3):	0.355
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	2.59
Time for outflow between 75% and 25% effective depth (mins):	377.1

Soil infiltration rate (m/s):	**6.1E-6**

Remarks Results processed following BRE 365 (2007).
*Results obtained from liner extrapolation.

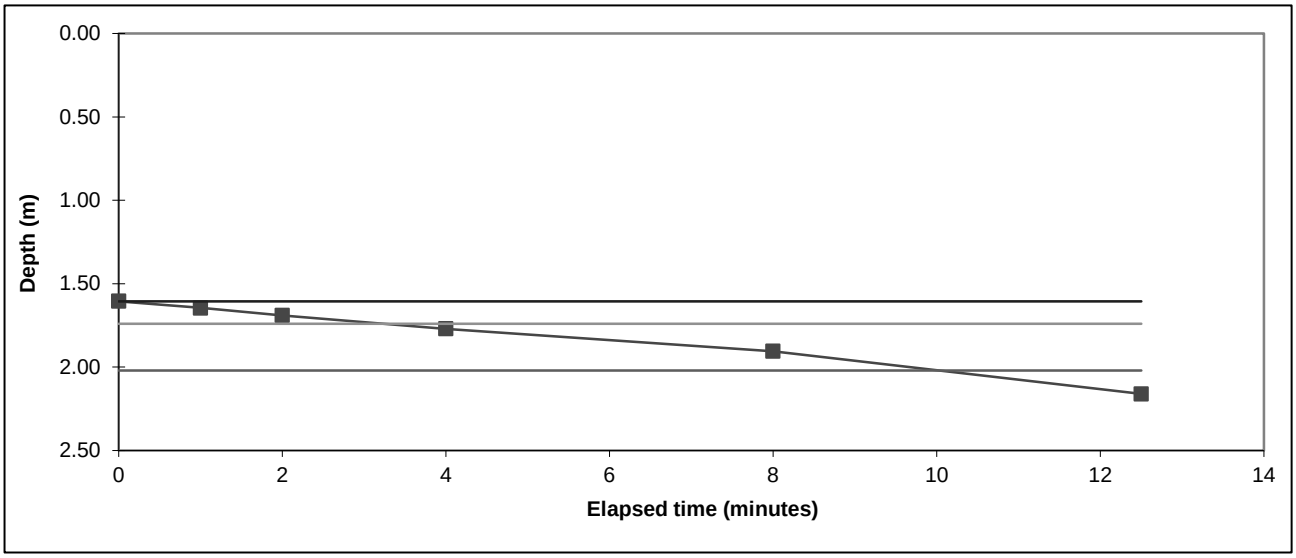
Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP14	Test No:	1	Date:	13/03/2018
Length (m):	1.500		Datum Height:	0.00	m agl
Width (m):	0.60		Granular infill:	None	
Depth (m):	2.16		Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.605		
1	1.645		
2	1.690		
4	1.770		
8	1.905		
12.5	2.160		



Start water depth for analysis (mbgl):	1.61		
75% effective depth (mbgl):	1.74	Elapsed time (mins):	3.3
50% effective depth (mbgl):	1.88		
25% effective depth (mbgl):	2.02	Elapsed time (mins):	10.0
Base of soakage zone (mbgl):	2.16		

Volume outflow between 75% and 25% effective depth (m^3):	0.252
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	2.08
Time for outflow between 75% and 25% effective depth (mins):	6.7

Soil infiltration rate (m/s):	**3.0E-4**

Remarks Results processed following BRE 365 (2007).

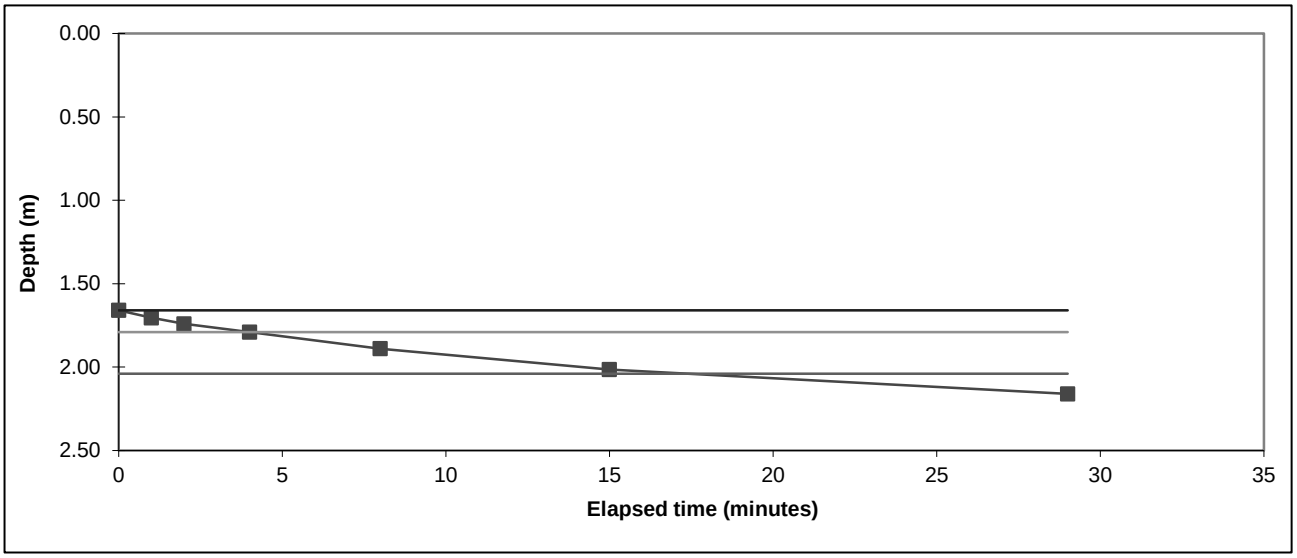
Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP14	Test No:	2	Date:	13/03/2018
Length (m):	1.500		Datum Height:	0.00	m agl
Width (m):	0.60		Granular infill:	None	
Depth (m):	2.16		Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.660		
1	1.704		
2	1.740		
4	1.790		
8	1.890		
15	2.015		
29	2.160		



Start water depth for analysis (mbgl):	1.66		
75% effective depth (mbgl):	1.79	Elapsed time (mins):	4.0
50% effective depth (mbgl):	1.91		
25% effective depth (mbgl):	2.04	Elapsed time (mins):	17.4
Base of soakage zone (mbgl):	2.16		

Volume outflow between 75% and 25% effective depth (m^3):	0.225
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	1.95
Time for outflow between 75% and 25% effective depth (mins):	13.4

Soil infiltration rate (m/s):	**1.4E-4**

Remarks Results processed following BRE 365 (2007).

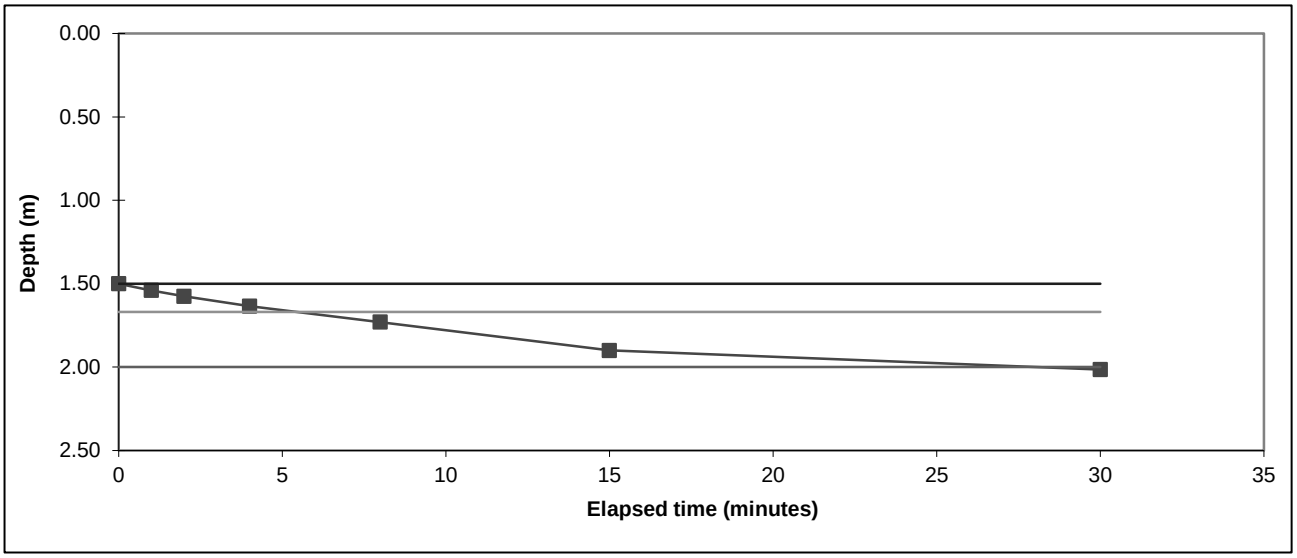
Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP14	Test No:	3	Date:	13/03/2018
Length (m):	1.500		Datum Height:	0.00	m agl
Width (m):	0.60		Granular infill:	None	
Depth (m):	2.16		Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.500		
1	1.540		
2	1.575		
4	1.635		
8	1.730		
15	1.900		
30	2.015		



Start water depth for analysis (mbgl):	1.50		
75% effective depth (mbgl):	1.67	Elapsed time (mins):	5.5
50% effective depth (mbgl):	1.83		
25% effective depth (mbgl):	2.00	Elapsed time (mins):	28.0
Base of soakage zone (mbgl):	2.16		

Volume outflow between 75% and 25% effective depth (m^3):	0.297
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	2.29
Time for outflow between 75% and 25% effective depth (mins):	22.5

Soil infiltration rate (m/s):	**9.6E-5**

Remarks Results processed following BRE 365 (2007).

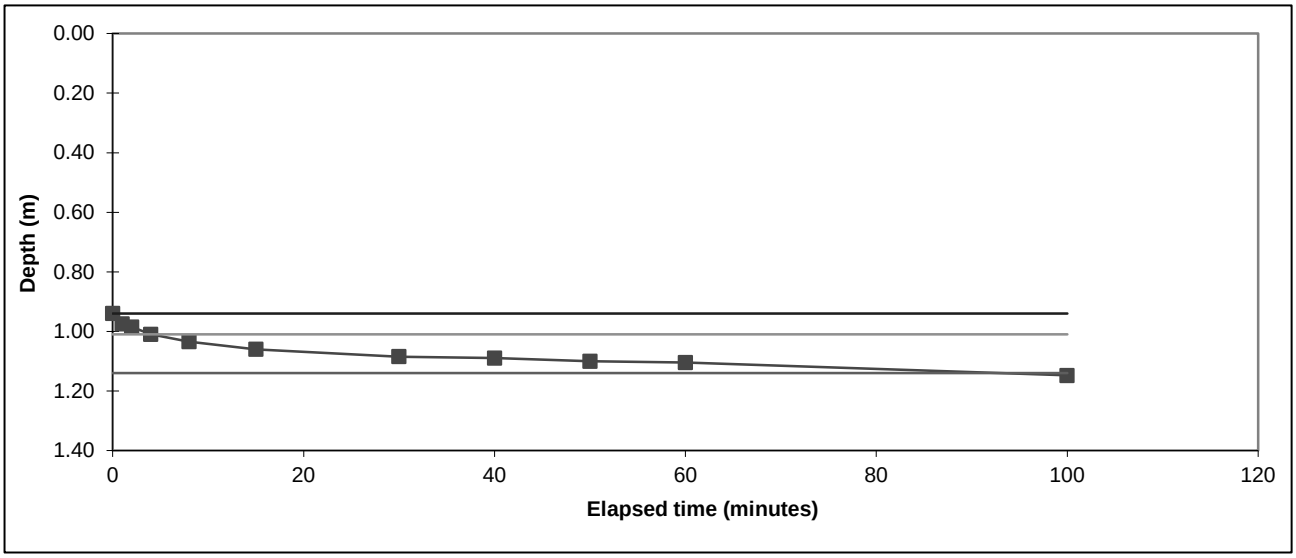
Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP16	Test No:	1	Date:	13/03/2018
Length (m):	1.650		Datum Height:	0.00	m agl
Width (m):	1.00		Granular infill:	None	
Depth (m):	1.20		Porosity of infill:	1	(assumed)

	Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
	0	0.940		
	1	0.975		
	2	0.985		
	4	1.010		
	8	1.035		
	15	1.060		
	30	1.085		
	40	1.090		
	50	1.100		
	60	1.105		
*	*100*	*1.148*		



Start water depth for analysis (mbgl):	0.94		
75% effective depth (mbgl):	1.01	Elapsed time (mins):	4.0
50% effective depth (mbgl):	1.07		
25% effective depth (mbgl):	1.14	Elapsed time (mins):	92.6
Base of soakage zone (mbgl):	1.20		

Volume outflow between 75% and 25% effective depth (m^3):	0.215
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	2.34
Time for outflow between 75% and 25% effective depth (mins):	88.6

Soil infiltration rate (m/s):	**1.7E-5**

Remarks Results processed following BRE 365 (2007).
*Result obtained by linear extrapolation.

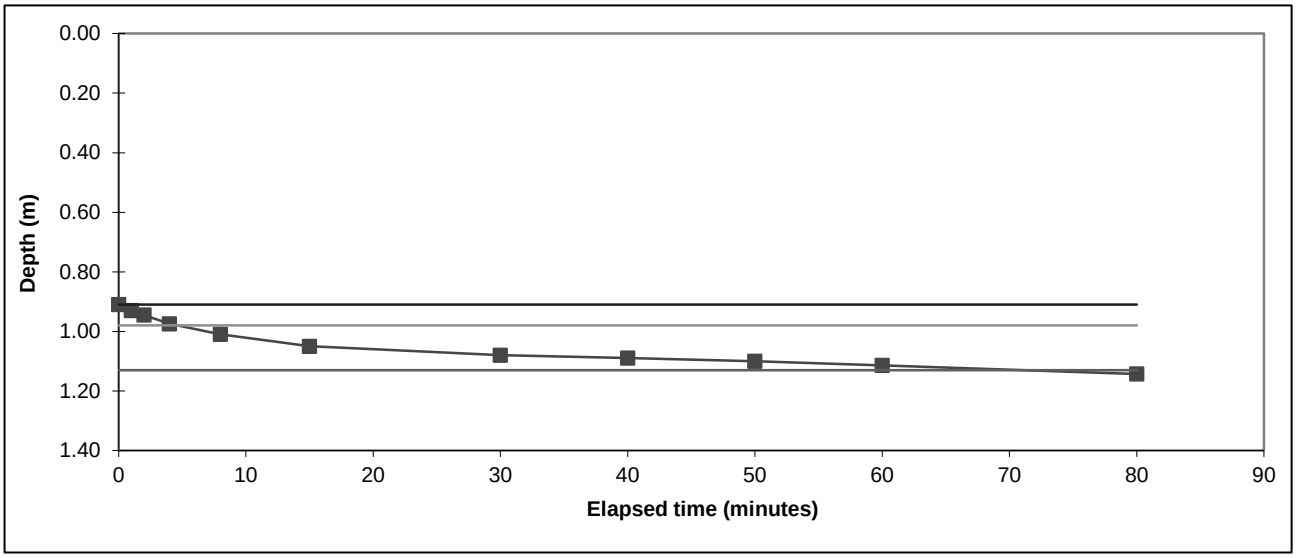
Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP16	Test No:	2	Date:	13/03/2018
Length (m):	1.650		Datum Height:	0.00	m agl
Width (m):	1.00		Granular infill:	None	
Depth (m):	1.20		Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.910		
1	0.930		
2	0.945		
4	0.975		
8	1.010		
15	1.050		
30	1.080		
40	1.090		
50	1.100		
60	1.114		
80	1.143		



Start water depth for analysis (mbgl):	0.91		
75% effective depth (mbgl):	0.98	Elapsed time (mins):	4.6
50% effective depth (mbgl):	1.06		
25% effective depth (mbgl):	1.13	Elapsed time (mins):	71.0
Base of soakage zone (mbgl):	1.20		

Volume outflow between 75% and 25% effective depth (m^3):	0.248
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	2.39
Time for outflow between 75% and 25% effective depth (mins):	66.4

Soil infiltration rate (m/s):	**2.6E-5**

Remarks Results processed following BRE 365 (2007).

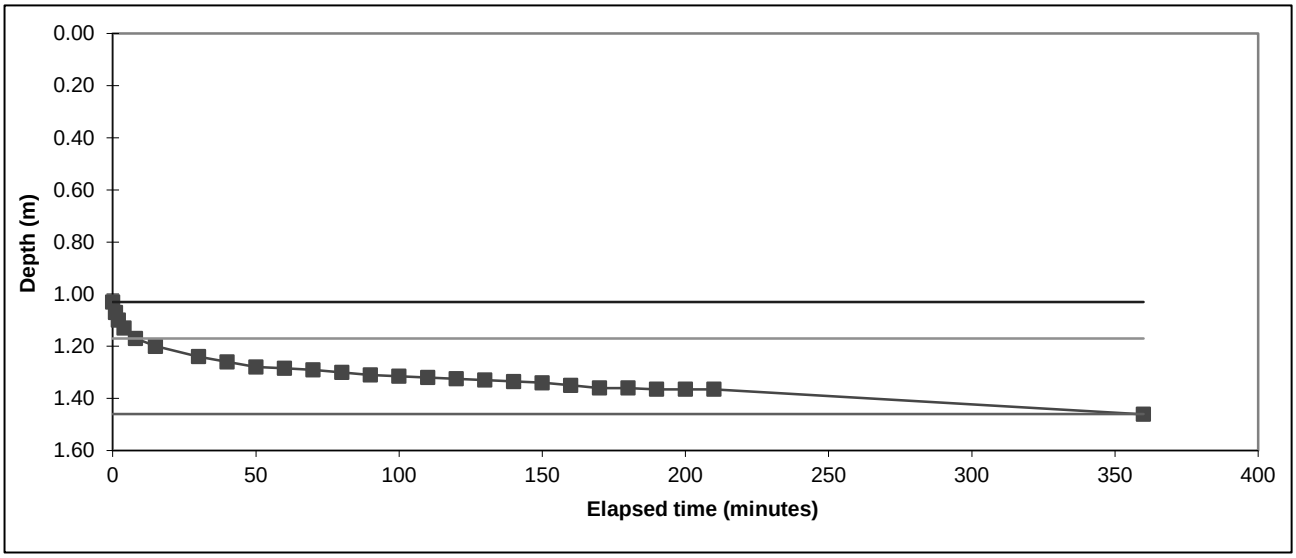
Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP3	Test No:	1	Date:	12/03/2018
Length (m):	1.600		Datum Height:	0.00	m agl
Width (m):	0.60		Granular infill:	None	
Depth (m):	1.60		Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)	
0	1.030	110	1.320	
1	1.070	120	1.325	
2	1.100	130	1.330	
4	1.130	140	1.335	
8	1.170	150	1.340	
15	1.200	160	1.350	
30	1.240	170	1.360	
40	1.260	180	1.360	
50	1.280	190	1.365	
60	1.285	200	1.365	
70	1.290	210	1.365	
80	1.300	*360*	*1.461*	*
90	1.310			
100	1.315			



Start water depth for analysis (mbgl):	1.03		
75% effective depth (mbgl):	1.17	Elapsed time (mins):	8.0
50% effective depth (mbgl):	1.32		
25% effective depth (mbgl):	1.46	Elapsed time (mins):	358.4
Base of soakage zone (mbgl):	1.60		

Volume outflow between 75% and 25% effective depth (m^3):	0.278
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	2.19
Time for outflow between 75% and 25% effective depth (mins):	350.4

Soil infiltration rate (m/s):	**6.0E-6**

Remarks Results processed following BRE 365 (2007).
*Results obtained from liner extrapolation.

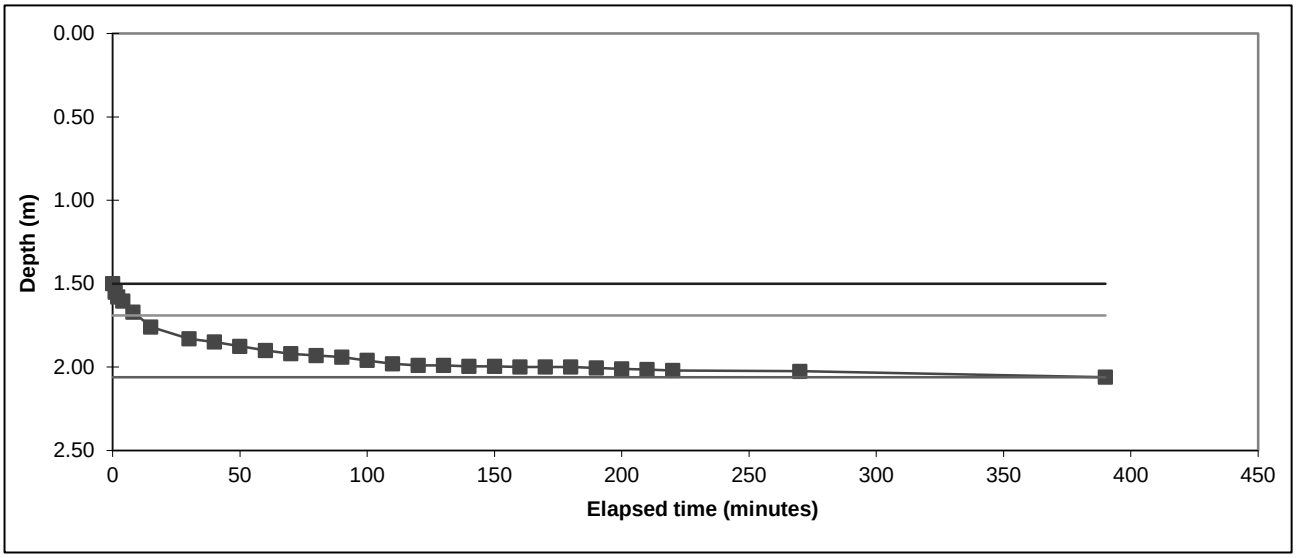
Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Rogers Geotechnical Services Ltd

Soakaway Test

Trial Pit No:	TP5	Test No:	1	Date:	12/03/2018
Length (m):	1.600		Datum Height:	0.00	m agl
Width (m):	0.60		Granular infill:	None	
Depth (m):	2.25		Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.500	110	1.980
1	1.550	120	1.990
2	1.580	130	1.990
4	1.605	140	1.995
8	1.670	150	1.995
15	1.760	160	2.000
30	1.830	170	2.000
40	1.850	180	2.000
50	1.875	190	2.005
60	1.900	200	2.010
70	1.920	210	2.015
80	1.930	220	2.020
90	1.940	270	2.025
100	1.960	*390*	*2.061*



Start water depth for analysis (mbgl):	1.50		
75% effective depth (mbgl):	1.69	Elapsed time (mins):	9.6
50% effective depth (mbgl):	1.88		
25% effective depth (mbgl):	2.06	Elapsed time (mins):	386.7
Base of soakage zone (mbgl):	2.25		

Volume outflow between 75% and 25% effective depth (m^3):	0.355
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	2.59
Time for outflow between 75% and 25% effective depth (mins):	377.1

Soil infiltration rate (m/s):	**6.1E-6**

Remarks Results processed following BRE 365 (2007).
*Results obtained from liner extrapolation.

Client:	Barnsley MBC	**Job No:**
Site:	Wombwell Redevlopment	J4199/18/E/F

Appendix 6

Laboratory Testing - Geotechnical

LABORATORY REPORT

4043

Contract Number: PSL18/1303

Report Date: 16 April 2018

Client's Reference: J4199/18/E

Client Name: Rogers Geotechnical Ltd
Offices 1 & 2
Barncliffe Business Park
Near Bank, Shelley
Huddersfield
HD8 8LU

For the attention of: Rob Palmer

Contract Title: Wombwell Redevelopment

Date Received: 21/3/2018
Date Commenced: 21/3/2018
Date Completed: 16/4/2018

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

[redacted]

R Gunson (Director)
A Watkins (Director)
R Berriman (Quality Manager)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP5		B	2.00		Brown sandy silty GRAVEL with some cobbles.
TP6		B	1.00		Brown sandy silty GRAVEL with many cobbles.
TP8		B	0.60		Brown very gravelly very clayey SAND.
TP8		B	2.00		Brown sandy slightly clayey silty GRAVEL.
TP12		B	1.30		Brown sandy silty GRAVEL with occasional cobbles.
TP15		B	1.00		Brown very sandy silty GRAVEL with some cobbles.
TP15		B	3.50		Brown sandy silty GRAVEL with some cobbles.
TP16		B	0.40		Brown sandy silty GRAVEL with some cobbles.
TP18		B	1.00		Brown very sandy slightly clayey silty GRAVEL with occasional cobbles.
TP18		B	2.00		Brown sandy silty GRAVEL with many cobbles.
TP19		B	1.60		Brown very sandy clayey silty GRAVEL with many cobbles.
TP19		B	3.00		Brown sandy silty GRAVEL with many cobbles.
TP8		D	0.90		Brown slightly gravelly very sandy CLAY.
TP9		D	1.00		Brown slightly gravelly very sandy CLAY.
TP15		D	1.50		Brown slightly gravelly very sandy CLAY.
TP15		D	2.10		Brown slightly gravelly very sandy very silty CLAY.
TP17		D	0.40		Brown slightly gravelly sandy CLAY.
TP18		D	1.60		Brown slightly gravelly sandy CLAY.
TP19		D	1.80		Brown slightly gravelly sandy CLAY.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Wombwell Redevelopment	Contract No: PSL18/1303 Client Ref: J4199/18/E

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS1		D	0.70		Brown very sandy very silty CLAY.
WS13		D	1.30		Brown slightly gravelly slightly clayey very silty SAND.
WS14		D	1.70		Brown slightly gravelly slightly clayey very silty SAND.
WS21		D	2.40		Brown slightly gravelly very sandy CLAY.
WS20		D	1.90		Brown slightly gravelly sandy CLAY.
WS25		D	0.55		Brown slightly gravelly clayey very silty SAND.

UKAS TESTING
4043

PSL
Professional Soils Laboratory

Wombwell Redevelopment

Contract No:
PSL18/1303
Client Ref:
J4199/18/E

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP8		D	0.90		15			30	18	12	90	Low plasticity CL.
TP9		D	1.00		17			26	16	10	88	Low plasticity CL.
TP15		D	1.50		22			49	24	25	91	Intermediate plasticity CI.
TP15		D	2.10		20			29	18	11	96	Low plasticity CL.
TP17		D	0.40		22			49	23	26	98	Intermediate plasticity CI.
TP18		D	1.60		18			29	16	13	88	Low plasticity CL.
TP19		D	1.80		19			30	17	13	89	Low plasticity CL.
WS1		D	0.70		17			28	18	10	100	Low plasticity CL.
WS13		D	1.30		16				NP			
WS14		D	1.70		17				NP			
WS21		D	2.40		17			26	16	10	93	Low plasticity CL.
WS20		D	1.90		22			49	23	26	90	Intermediate plasticity CI.
WS25		D	0.55		16				NP			

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Wombwell Redevelopment

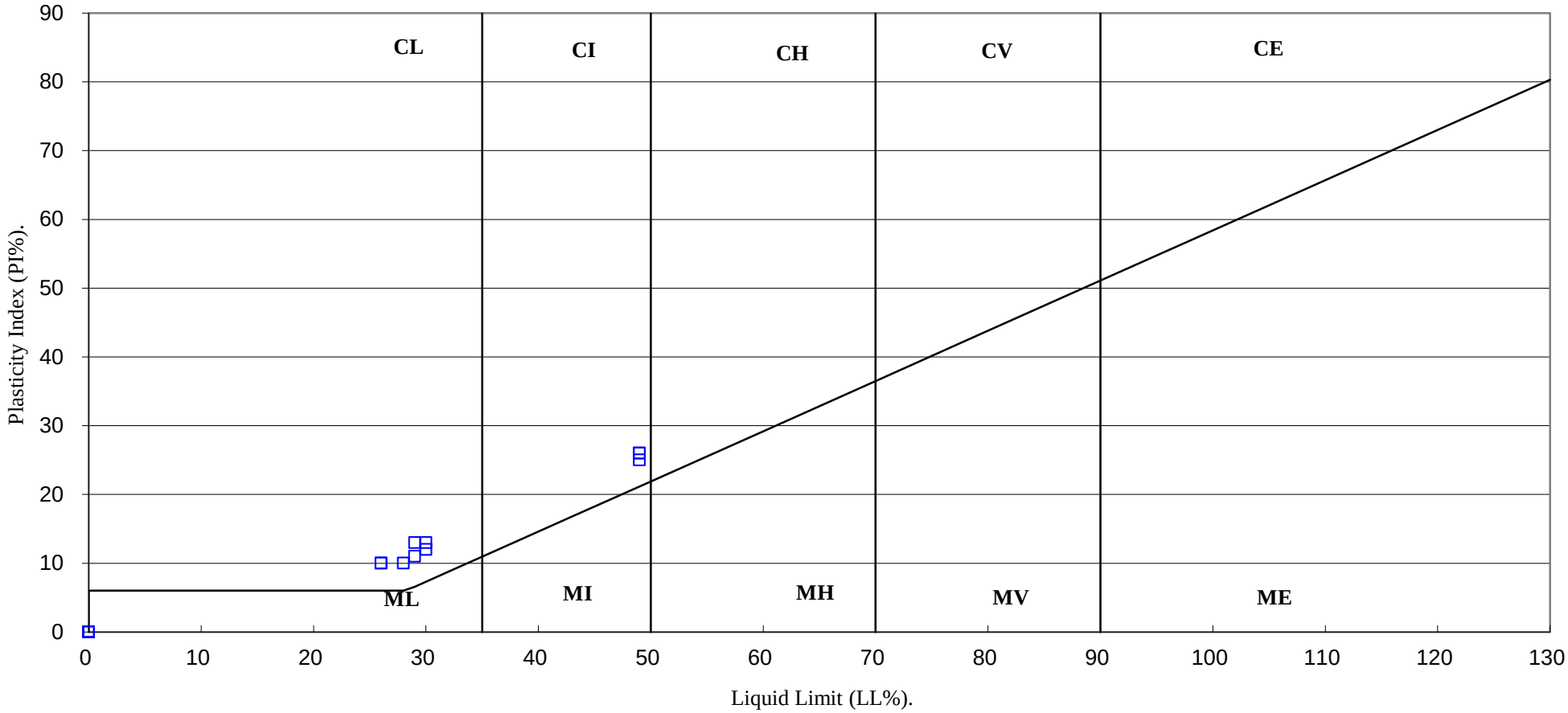
Contract No:

PSL18/1303

Client Ref:

J4199/18/E

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

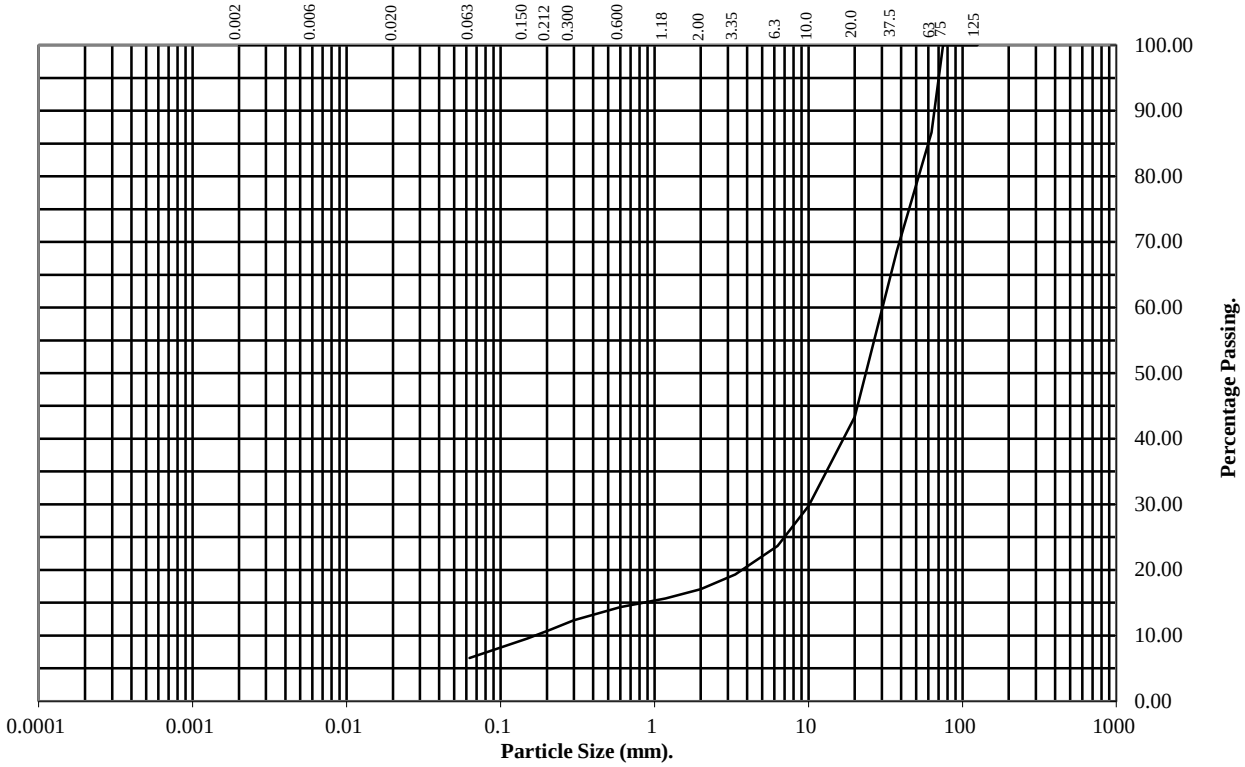
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP5** **Top Depth (m):** **2.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	87
37.5	69
20	43
10	30
6.3	24
3.35	19
2	17
1.18	16
0.6	14
0.3	12
0.212	11
0.15	10
0.063	7

Soil Fraction	Total Percentage
Cobbles	13
Gravel	70
Sand	10
Silt/Clay	7

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

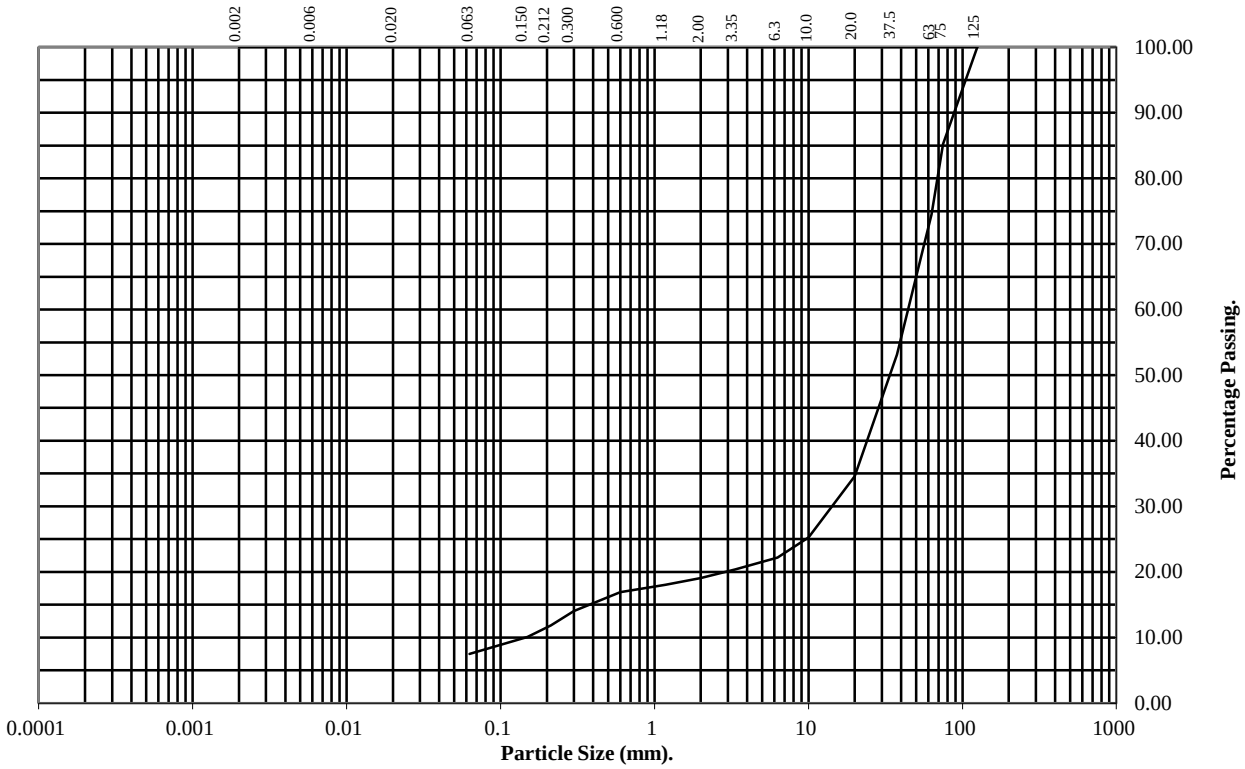
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP6** **Top Depth (m):** **1.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	85
63	75
37.5	53
20	35
10	25
6.3	22
3.35	20
2	19
1.18	18
0.6	17
0.3	14
0.212	12
0.15	10
0.063	8

Soil Fraction	Total Percentage
Cobbles	25
Gravel	56
Sand	11
Silt/Clay	8

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

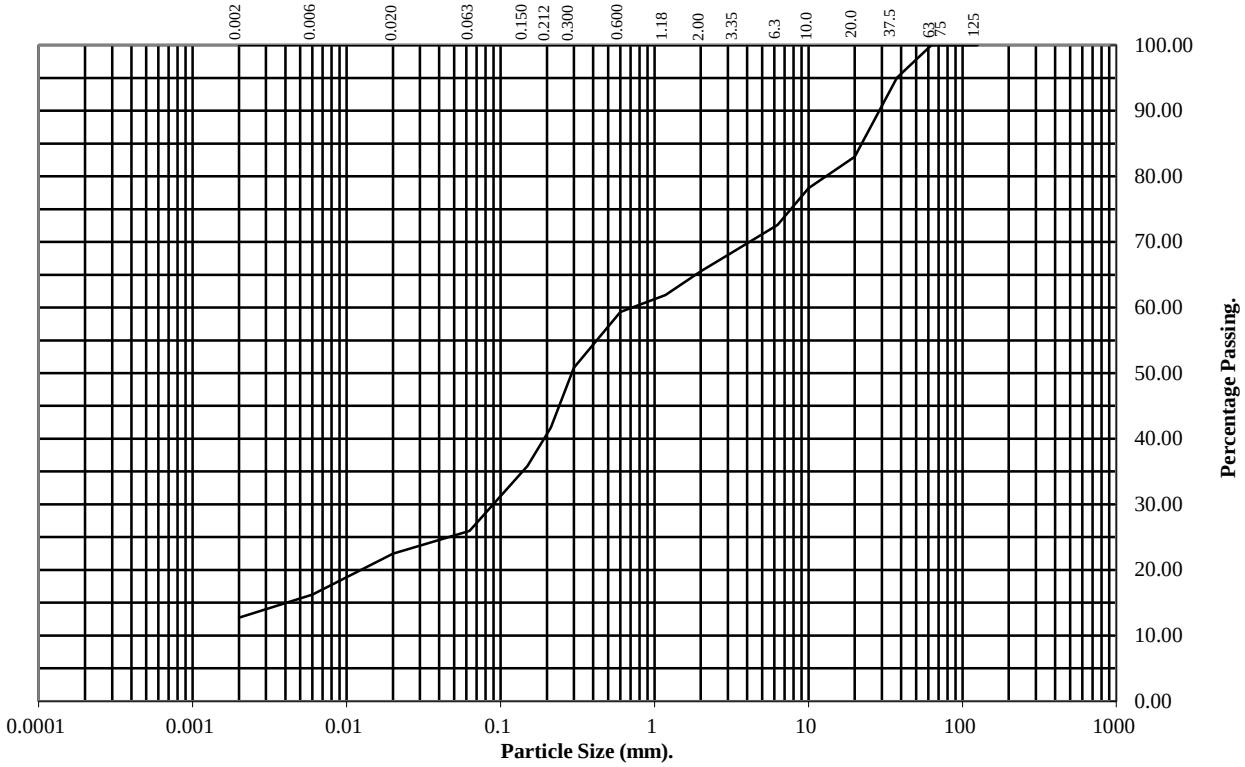
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP8** **Top Depth (m):** **0.60**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	95
20	83
10	78
6.3	73
3.35	69
2	66
1.18	62
0.6	59
0.3	51
0.212	42
0.15	36
0.063	26

Particle Diameter	Percentage Passing
0.02	22
0.006	16
0.002	13

Soil Fraction	Total Percentage
Cobbles	0
Gravel	34
Sand	40
Silt	13
Clay	13

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Wombwell Redevelopment

Contract No:
PSL18/1303
Client Ref:
J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

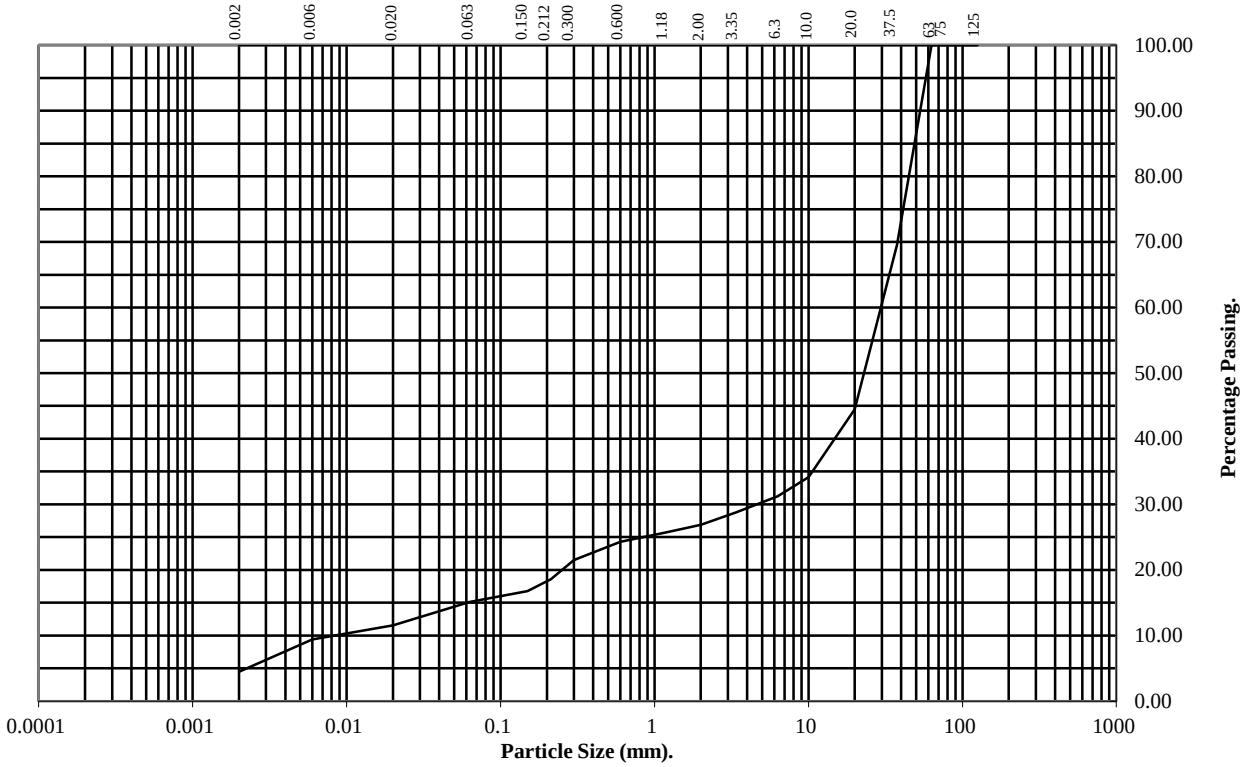
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP8** **Top Depth (m):** **2.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	70
20	45
10	34
6.3	31
3.35	29
2	27
1.18	26
0.6	24
0.3	21
0.212	19
0.15	17
0.063	15

Particle Diameter	Percentage Passing
0.02	12
0.006	9
0.002	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	73
Sand	12
Silt	11
Clay	4

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

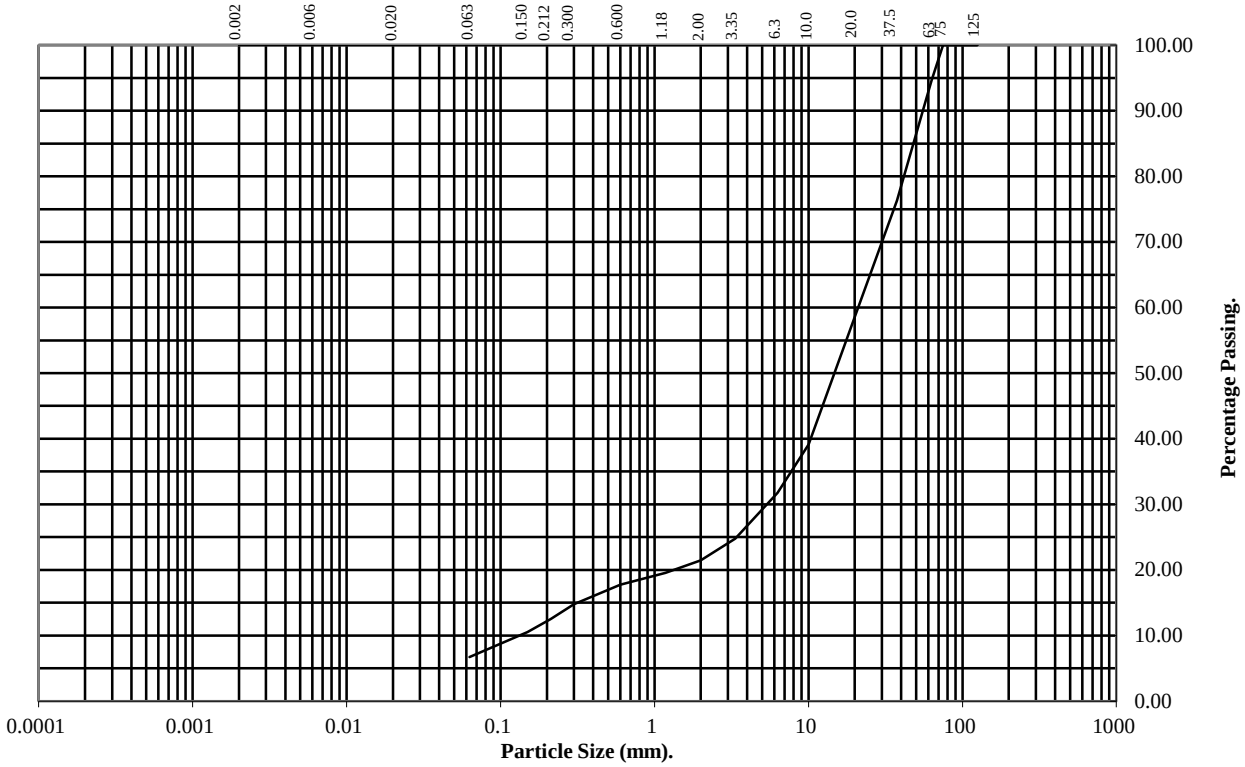
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP12** **Top Depth (m):** **1.30**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	95
37.5	76
20	59
10	39
6.3	32
3.35	25
2	21
1.18	20
0.6	18
0.3	15
0.212	13
0.15	11
0.063	7

Soil Fraction	Total Percentage
Cobbles	5
Gravel	74
Sand	14
Silt/Clay	7

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

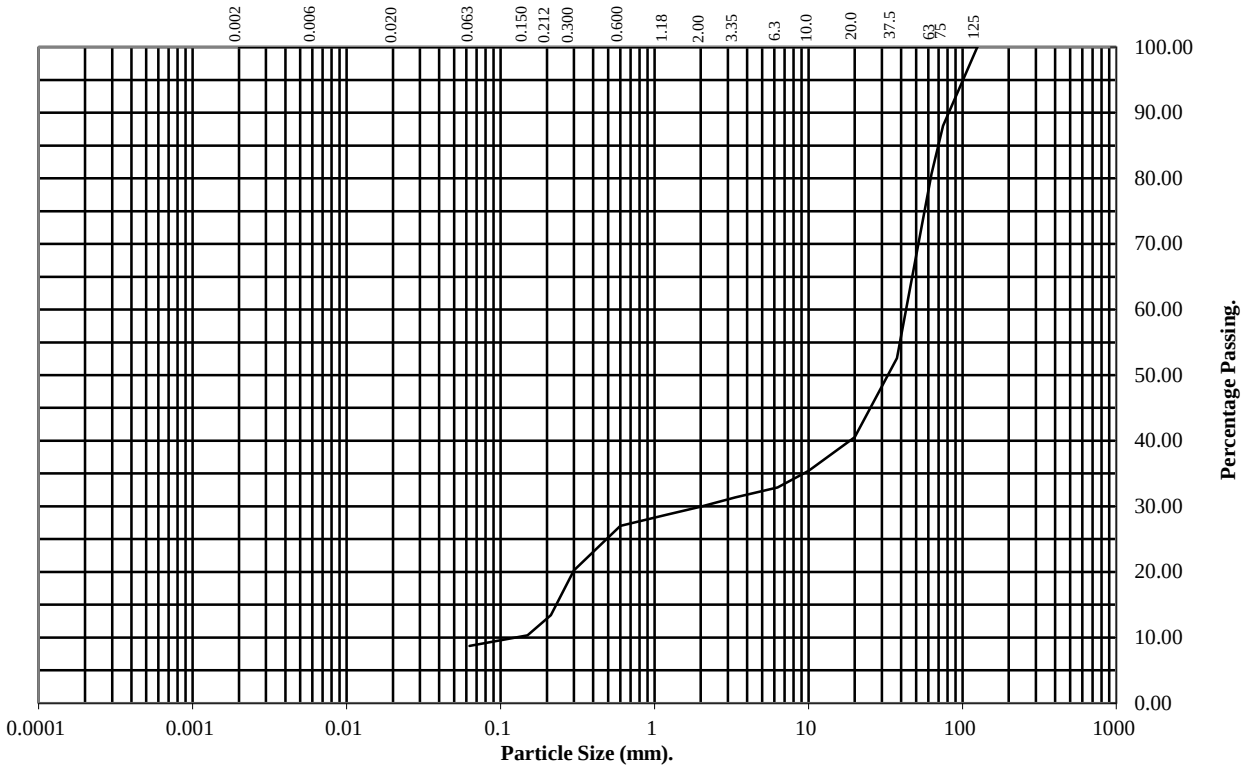
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP15** **Top Depth (m):** **1.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	88
63	81
37.5	53
20	41
10	35
6.3	33
3.35	31
2	30
1.18	29
0.6	27
0.3	20
0.212	13
0.15	10
0.063	9

Soil Fraction	Total Percentage
Cobbles	19
Gravel	51
Sand	21
Silt/Clay	9

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

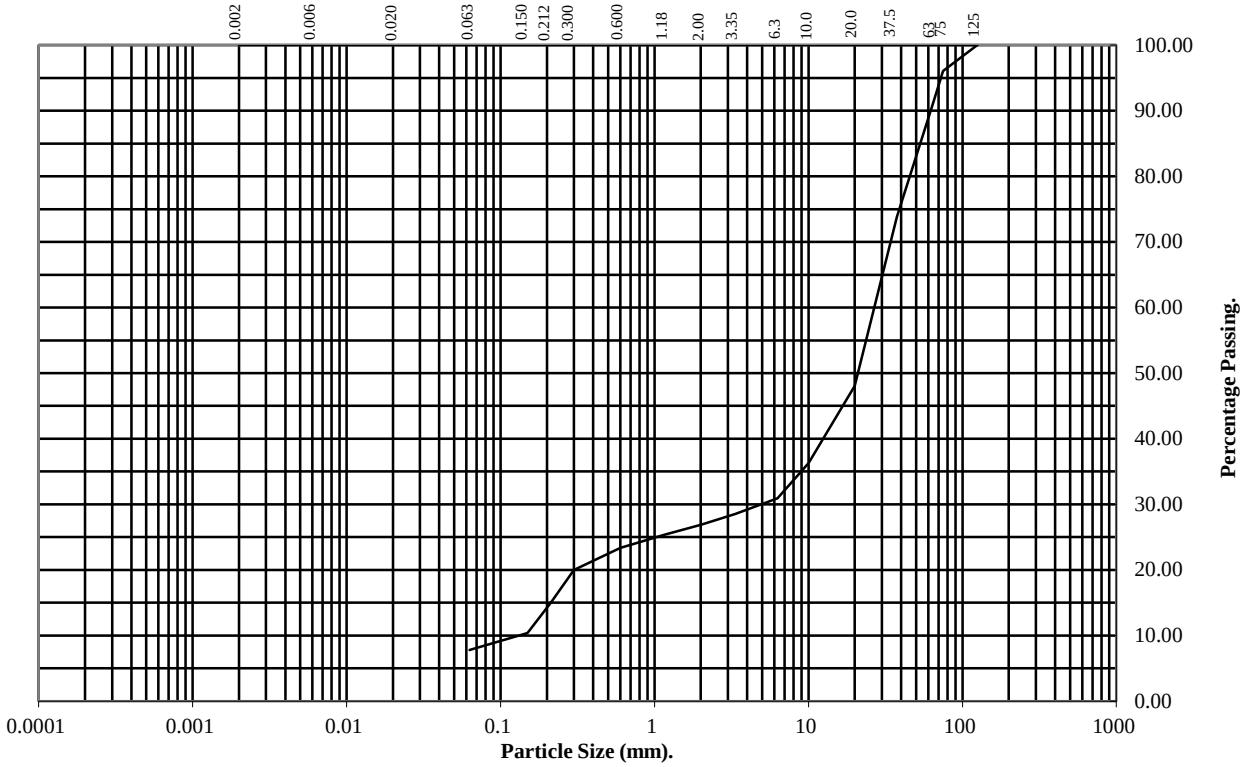
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP15** **Top Depth (m):** **3.50**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	96
63	90
37.5	74
20	48
10	36
6.3	31
3.35	29
2	27
1.18	25
0.6	23
0.3	20
0.212	15
0.15	10
0.063	8

Soil Fraction	Total Percentage
Cobbles	10
Gravel	63
Sand	19
Silt/Clay	8

Remarks:

See Summary of Soil Descriptions

4043

Professional Soils Laboratory

Wombwell Redevelopment

Contract No:
PSL18/1303
Client Ref:
J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

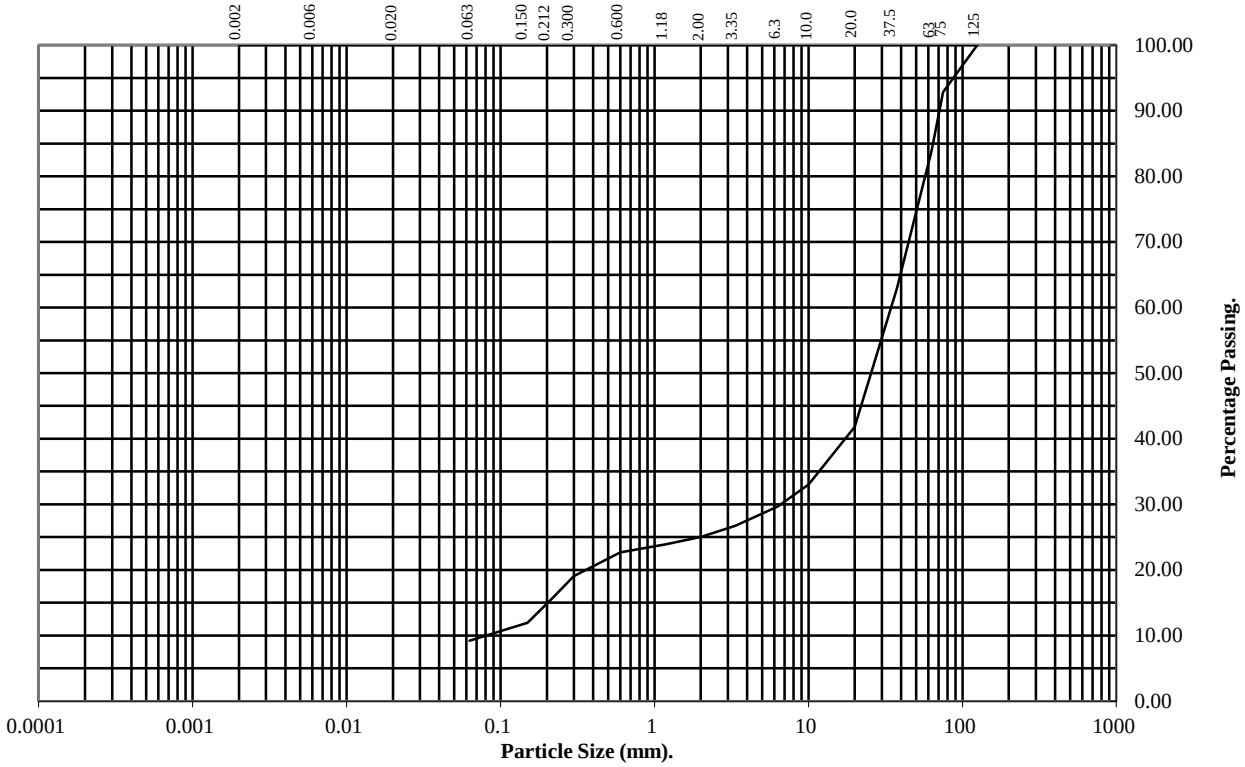
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP16** **Top Depth (m):** **0.40**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	93
63	84
37.5	63
20	42
10	33
6.3	30
3.35	27
2	25
1.18	24
0.6	23
0.3	19
0.212	15
0.15	12
0.063	9

Soil Fraction	Total Percentage
Cobbles	16
Gravel	59
Sand	16
Silt/Clay	9

Remarks:

See Summary of Soil Descriptions

4043

Professional Soils Laboratory

Wombwell Redevelopment

Contract No: **PSL18/1303**

Client Ref: **J4199/18/E**

PARTICLE SIZE DISTRIBUTION TEST

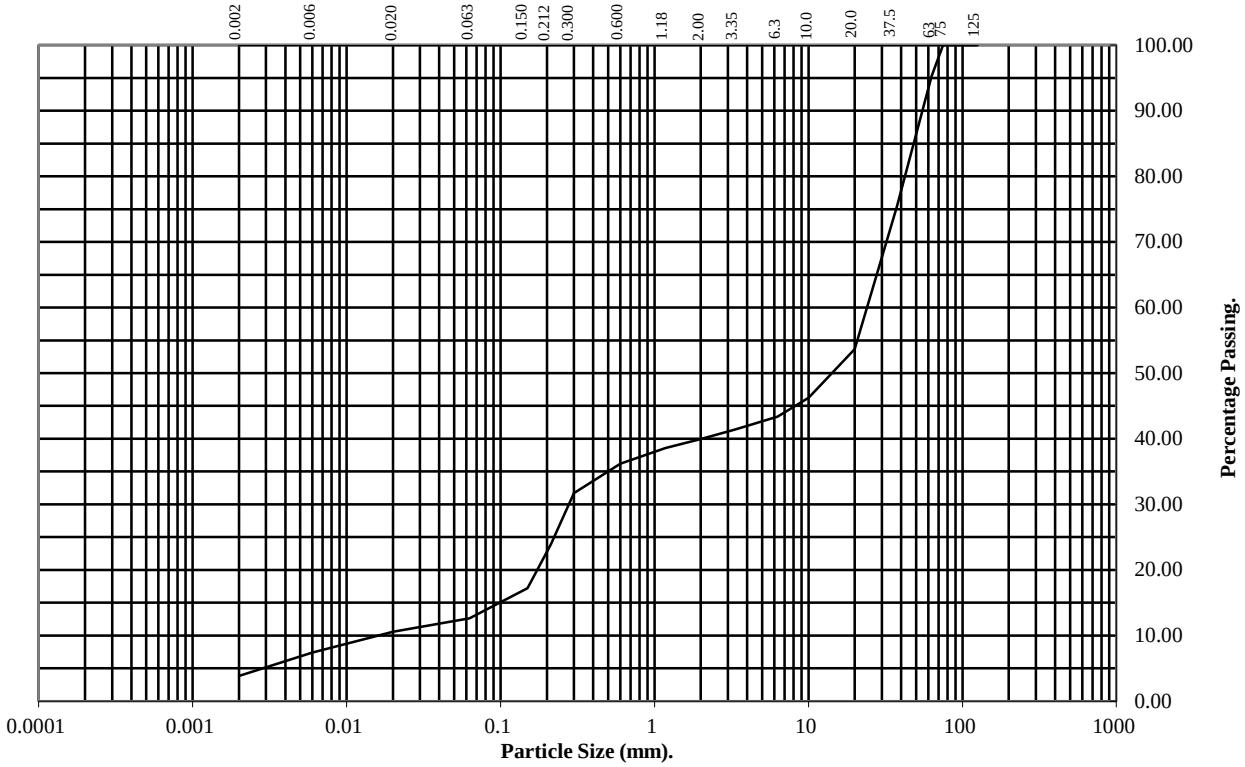
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP18** **Top Depth (m):** **1.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	95
37.5	75
20	54
10	46
6.3	43
3.35	41
2	40
1.18	39
0.6	36
0.3	32
0.212	24
0.15	17
0.063	13

Particle Diameter	Percentage Passing
0.02	11
0.006	7
0.002	4

Soil Fraction	Total Percentage
Cobbles	5
Gravel	55
Sand	27
Silt	9
Clay	4

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

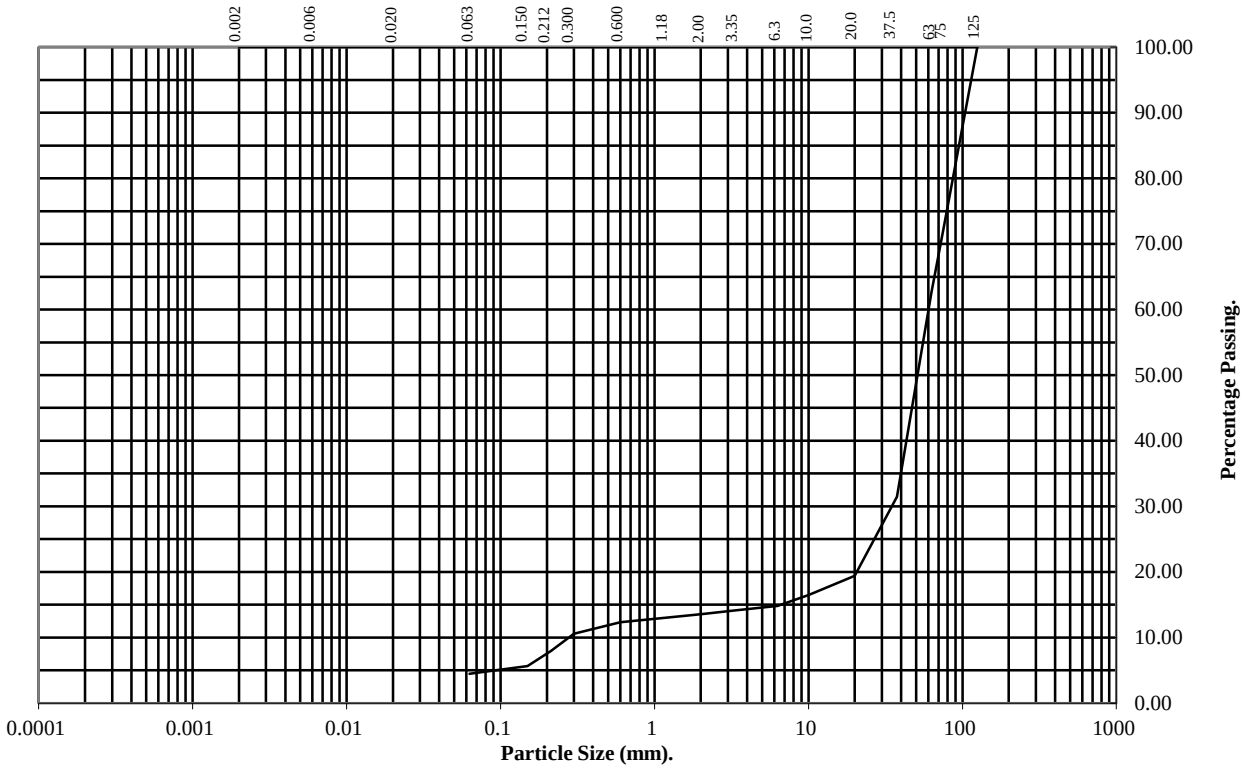
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP18** **Top Depth (m):** **2.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	72
63	63
37.5	31
20	19
10	16
6.3	15
3.35	14
2	14
1.18	13
0.6	12
0.3	11
0.212	8
0.15	6
0.063	4

Soil Fraction	Total Percentage
Cobbles	37
Gravel	49
Sand	10
Silt/Clay	4

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

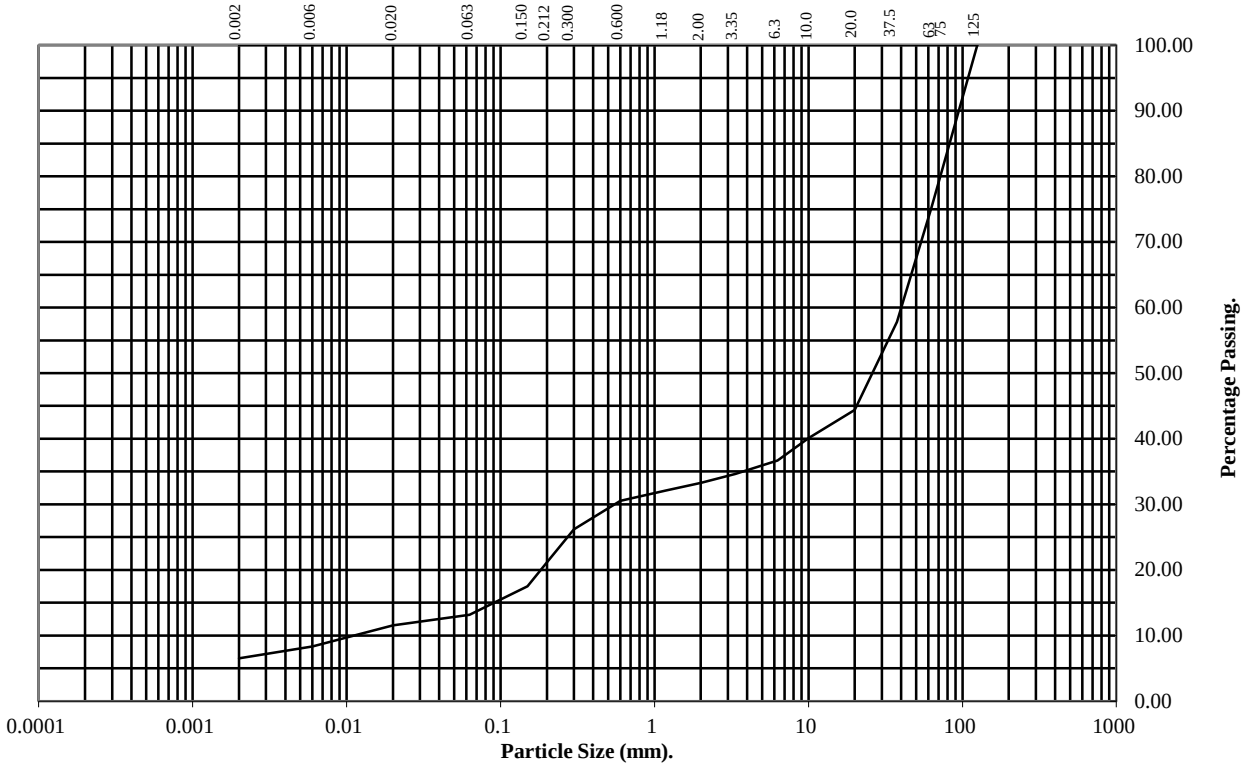
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP19** **Top Depth (m):** **1.60**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	81
63	75
37.5	58
20	44
10	40
6.3	37
3.35	35
2	33
1.18	32
0.6	31
0.3	26
0.212	22
0.15	17
0.063	13

Particle Diameter	Percentage Passing
0.02	12
0.006	8
0.002	7

Soil Fraction	Total Percentage
Cobbles	25
Gravel	42
Sand	20
Silt	6
Clay	7

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Wombwell Redevelopment

Contract No:
PSL18/1303
Client Ref:
J4199/18/E

PARTICLE SIZE DISTRIBUTION TEST

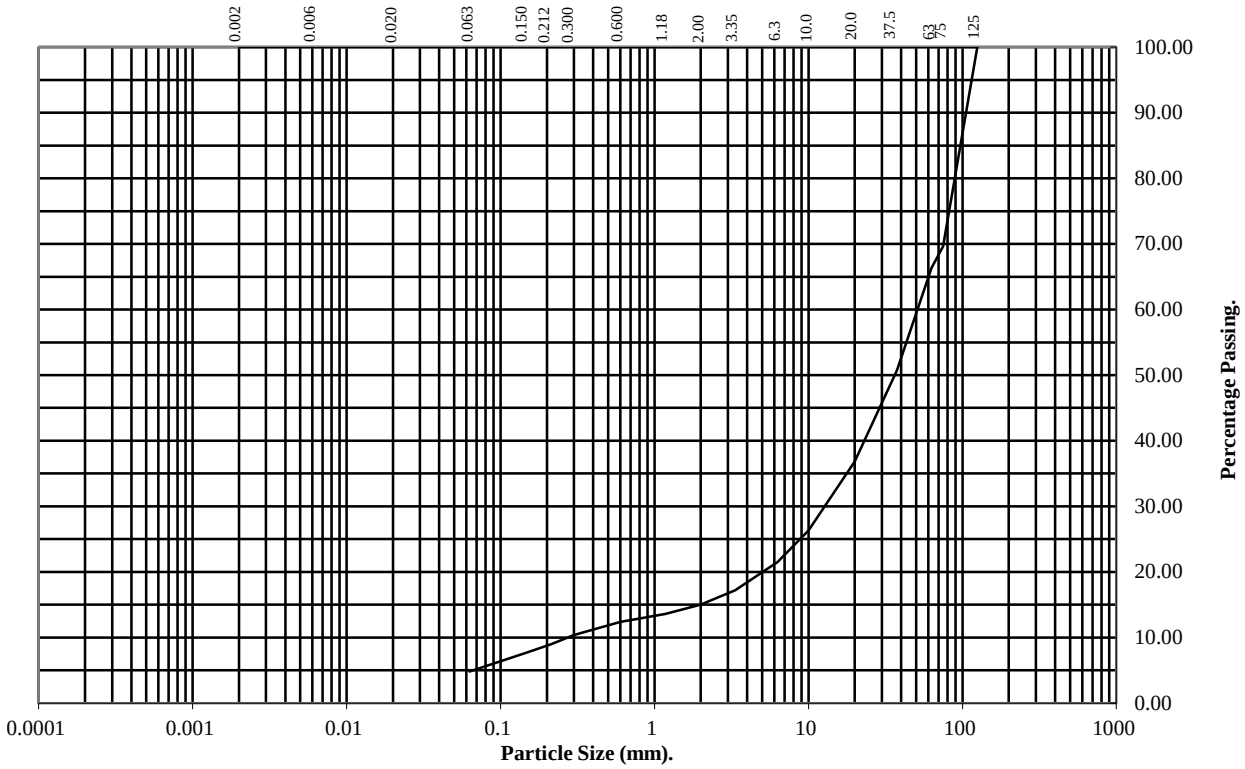
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP19** **Top Depth (m):** **3.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	70
63	66
37.5	51
20	37
10	26
6.3	22
3.35	17
2	15
1.18	14
0.6	12
0.3	10
0.212	9
0.15	8
0.063	5

Soil Fraction	Total Percentage
Cobbles	34
Gravel	51
Sand	10
Silt/Clay	5

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Wombwell Redevelopment**	**Contract No:** PSL18/1303 **Client Ref:** J4199/18/E

Appendix 7

Laboratory Testing - Environmental

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	18-07457-1
Initial Date of Issue:	26-Mar-2018
Client	Rogers Geotechnical Services Ltd
Client Address:	Unit 4, Barncliffe Business Park Near Bank Shelley Huddersfield West Yorkshire HD8 8LU
Contact(s):	Rob Palmer
Project	J4199/18/E/F Wombwell Redevelopment

Quotation No.:		**Date Received:**	16-Mar-2018
Order No.:	0318-21	**Date Instructed:**	16-Mar-2018
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	22-Mar-2018
Date Approved:	22-Mar-2018		

[redacted]

Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07457	18-07457	18-07457	18-07457
Quotation No.:		**Chemtest Sample ID.:**			593362	593363	593364	593366
Order No.: 0318-21		Client Sample Ref.:			TP2	TP4	TP5	TP19
		Client Sample ID.:			D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.00	0.00
		Bottom Depth (m):			0.60	0.60	0.60	0.60
		Date Sampled:			12-Mar-2018	12-Mar-2018	12-Mar-2018	13-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Cadmium	M	2450	mg/kg	0.10	0.23	< 0.10	0.43	< 0.10
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	M	2450	mg/kg	0.50	72	11	25	15
Mercury	M	2450	mg/kg	0.10	0.53	< 0.10	0.18	< 0.10
Nickel	M	2450	mg/kg	0.50	46	23	19	24
Lead	M	2450	mg/kg	0.50	56	16	61	20
Zinc	M	2450	mg/kg	0.50	110	49	110	43
Arsenic	M	2450	mg/kg	1.0	14	7.2	16	6.8
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	M	2700	mg/kg	0.10	0.75	< 0.10	0.59	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	0.23	< 0.10	0.76	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	0.29	< 0.10	1.6	< 0.10
Fluorene	M	2700	mg/kg	0.10	0.39	< 0.10	1.4	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	1.7	< 0.10	28	0.28
Anthracene	M	2700	mg/kg	0.10	0.36	< 0.10	7.9	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	2.1	< 0.10	71	0.73
Pyrene	M	2700	mg/kg	0.10	2.2	< 0.10	75	0.84
Benzo[a]anthracene	M	2700	mg/kg	0.10	0.98	< 0.10	32	0.14
Chrysene	M	2700	mg/kg	0.10	1.8	< 0.10	36	0.25
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	1.2	< 0.10	41	0.50
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.96	< 0.10	17	0.24
Benzo[a]pyrene	M	2700	mg/kg	0.10	0.88	< 0.10	31	0.34
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	22	0.36
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.33	< 0.10	5.2	0.14
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	0.56	< 0.10	19	0.48
Total Of 16 PAH's	M	2700	mg/kg	2.0	15	< 2.0	390	4.3
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	11	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	30	8.1
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	41	8.1

Chemtest
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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07457	18-07457	18-07457	18-07457
Quotation No.:		**Chemtest Sample ID.:**			593362	593363	593364	593366
Order No.: 0318-21		Client Sample Ref.:			TP2	TP4	TP5	TP19
		Client Sample ID.:			D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.00	0.00
		Bottom Depth (m):			0.60	0.60	0.60	0.60
		Date Sampled:			12-Mar-2018	12-Mar-2018	12-Mar-2018	13-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	17	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	2.5	< 1.0	230	4.7
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	17	< 1.0	1200	15
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	75	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	20	< 5.0	1500	20
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	20	< 10	1500	28
pH	M	2010		N/A	8.7	6.0	8.8	6.6
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	12	12	13	13
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones, Roots	Stones	Stones, Roots
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.57	< 0.40	0.40	< 0.40
Chromium	M	2450	mg/kg	1.0	36	13	33	13
Total Organic Carbon	M	2625	%	0.20	5.1	0.80	2.3	1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010			< 0.010	
PCB 52	M	2815	mg/kg	0.010			< 0.010	
PCB 90+101	M	2815	mg/kg	0.010			< 0.010	
PCB 118	M	2815	mg/kg	0.010			< 0.010	
PCB 153	M	2815	mg/kg	0.010			< 0.010	
PCB 138	M	2815	mg/kg	0.010			< 0.010	
PCB 180	M	2815	mg/kg	0.010			< 0.010	
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10			< 0.10	

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

UKAS TESTING
2183

Final Report

Report No.:	18-07458-1
Initial Date of Issue:	27-Mar-2018
Client	Rogers Geotechnical Services Ltd
Client Address:	Unit 4, Barncliffe Business Park Near Bank Shelley Huddersfield West Yorkshire HD8 8LU
Contact(s):	Rob Palmer
Project	J4166/18/E/F Wombwell Redevelopment

Quotation No.:		**Date Received:**	16-Mar-2018
Order No.:	0318-21	**Date Instructed:**	16-Mar-2018
No. of Samples:	6		
Turnaround (Wkdays):	7	**Results Due:**	26-Mar-2018
Date Approved:	27-Mar-2018		

Approved By:

[redacted]

Details: Robert Monk, Technical Manager

Results - 2 Stage WAC

Project: J4166/18/E/F Wombwell Redevelopment

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-07458								
Chemtest Sample ID:	593367								
Sample Ref:	TP2								
Sample ID:	D								
Top Depth(m):	0.00								
Bottom Depth(m):	0.60								
Sampling Date:	12-Mar-2018								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			5.1	3	5	6
Loss On Ignition	2610	U	%			5.3	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			8.2	100	--	--
pH	2010	U				8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			< 0.0020	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0013	0.0014	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.029	0.0066	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0034	0.0016	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0096	0.0039	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	0.0020	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	0.0030	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0052	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	2.9	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	1.5	0.80	3.0	9.1	10	150	500
Sulphate	1220	U	78	14	150	240	1000	20000	50000
Total Dissolved Solids	1020	N	210	69	420	920	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	6.9	3.6	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	14

Leachate Test Information	
Leachant volume 1st extract/l	0.322
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.281

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: J4166/18/E/F Wombwell Redevelopment

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-07458								
Chemtest Sample ID:	593368								
Sample Ref:	TP4								
Sample ID:	D								
Top Depth(m):	0.00								
Bottom Depth(m):	0.60								
Sampling Date:	12-Mar-2018								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			0.58	3	5	6
Loss On Ignition	2610	U	%			2.8	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				5.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0080	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	0.0014	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0034	0.0040	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0010	0.0012	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0015	0.0015	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	0.0014	0.0017	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	0.0014	< 0.010	0.012	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0033	0.0037	< 0.50	< 0.50	4	50	200
Chloride	1220	U	2.3	1.8	< 10	19	800	15000	25000
Fluoride	1220	U	0.34	0.38	< 1.0	3.7	10	150	500
Sulphate	1220	U	3.7	< 1.0	< 10	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	21	15	42	160	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	40	9.5	79	150	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	12

Leachate Test Information	
Leachant volume 1st extract/l	0.326
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.305

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: J4166/18/E/F Wombwell Redevelopment

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-07458								
Chemtest Sample ID:	593369								
Sample Ref:	TP9								
Sample ID:	D								
Top Depth(m):	0.00								
Bottom Depth(m):	0.60								
Sampling Date:	12-Mar-2018								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			3.3	3	5	6
Loss On Ignition	2610	U	%			6.4	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.018	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0026	0.0028	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	0.0013	< 0.010	0.011	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0031	0.0028	< 0.50	< 0.50	4	50	200
Chloride	1220	U	3.9	1.9	< 10	22	800	15000	25000
Fluoride	1220	U	0.15	0.16	< 1.0	1.6	10	150	500
Sulphate	1220	U	4.7	1.6	< 10	21	1000	20000	50000
Total Dissolved Solids	1020	N	17	9.6	33	110	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	16	5.3	< 50	70	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	17

Leachate Test Information	
Leachant volume 1st extract/l	0.315
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.273

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: J4166/18/E/F Wombwell Redevelopment

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-07458								
Chemtest Sample ID:	593370								
Sample Ref:	TP15								
Sample ID:	D								
Top Depth(m):	1.00								
Bottom Depth(m):									
Sampling Date:	13-Mar-2018								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			< 0.20	3	5	6
Loss On Ignition	2610	U	%			1.5	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				7.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0060	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0083	0.0031	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0011	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0014	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	0.0020	0.0013	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	0.0014	0.0011	< 0.010	0.012	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0039	0.0022	< 0.50	< 0.50	4	50	200
Chloride	1220	U	2.8	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.16	0.14	< 1.0	1.4	10	150	500
Sulphate	1220	U	11	1.7	22	34	1000	20000	50000
Total Dissolved Solids	1020	N	24	11	48	130	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	77	8.8	150	210	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	9.3

Leachate Test Information	
Leachant volume 1st extract/l	0.332
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.322

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: J4166/18/E/F Wombwell Redevelopment

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-07458								
Chemtest Sample ID:	593371								
Sample Ref:	TP11								
Sample ID:	D								
Top Depth(m):	0.00								
Bottom Depth(m):	0.40								
Sampling Date:	13-Mar-2018								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			4.8	3	5	6
Loss On Ignition	2610	U	%			6.7	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				5.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			< 0.0020	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0028	0.0035	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0070	0.0091	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	0.0015	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0033	0.0037	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	0.0024	0.0028	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	0.0070	0.0080	0.014	0.078	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0097	0.012	< 0.50	< 0.50	4	50	200
Chloride	1220	U	3.0	1.6	< 10	18	800	15000	25000
Fluoride	1220	U	0.21	0.26	< 1.0	2.5	10	150	500
Sulphate	1220	U	4.0	4.2	< 10	42	1000	20000	50000
Total Dissolved Solids	1020	N	15	15	30	150	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	39	15	77	180	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	16

Leachate Test Information	
Leachant volume 1st extract/l	0.317
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.254

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: J4166/18/E/F Wombwell Redevelopment

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	18-07458								
Chemtest Sample ID:	593372								
Sample Ref:	TP19								
Sample ID:	D								
Top Depth(m):	0.00								
Bottom Depth(m):	0.60								
Sampling Date:	13-Mar-2018								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%			1.5	3	5	6
Loss On Ignition	2610	U	%			4.3	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	U				5.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			< 0.0020	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0014	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0058	0.0034	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0016	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0032	0.0022	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	0.0022	0.0014	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	0.0038	0.0020	< 0.010	0.023	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0058	0.0029	< 0.50	< 0.50	4	50	200
Chloride	1220	U	1.6	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.23	0.26	< 1.0	2.5	10	150	500
Sulphate	1220	U	4.1	1.0	< 10	15	1000	20000	50000
Total Dissolved Solids	1020	N	16	13	32	130	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	120	22	240	380	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	16

Leachate Test Information	
Leachant volume 1st extract/l	0.316
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.281

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	18-07894-1
Initial Date of Issue:	27-Mar-2018
Client	Rogers Geotechnical Services Ltd
Client Address:	Unit 4, Barncliffe Business Park Near Bank Shelley Huddersfield West Yorkshire HD8 8LU
Contact(s):	Rob Palmer
Project	J4199/18/E/F Wombwell Redevelopment

Quotation No.:		**Date Received:**	21-Mar-2018
Order No.:	0318-21	**Date Instructed:**	21-Mar-2018
No. of Samples:	23		
Turnaround (Wkdays):	5	**Results Due:**	27-Mar-2018
Date Approved:	27-Mar-2018		

Approved By:

[redacted]

Details: Robert Monk, Technical Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:		**Chemtest Sample ID.:**			595710	595711	595712	595713	595714	595715	595716	595717
Order No.: 0318-21		Client Sample Ref.:			WS1	WS2	WS3	WS5	WS7	WS8	WS9	WS10
		Client Sample ID.:			D	D	D	D	D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
		Bottom Depth (m):			0.50	0.60	0.60	0.50	0.60	0.60	0.60	0.60
		Date Sampled:			16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Cadmium	M	2450	mg/kg	0.10	< 0.10	< 0.10	0.22	< 0.10	0.34	0.62	0.10	0.13
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	M	2450	mg/kg	0.50	8.9	5.2	17	20	19	71	57	16
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	0.29	0.18	0.15	0.26	0.11	< 0.10
Nickel	M	2450	mg/kg	0.50	16	13	22	26	16	49	36	28
Lead	M	2450	mg/kg	0.50	11	2.8	38	21	36	97	63	21
Zinc	M	2450	mg/kg	0.50	31	18	96	48	68	130	82	57
Arsenic	M	2450	mg/kg	1.0	5.2	4.8	13	13	10	16	12	7.8
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.47	0.49	1.4	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.35	0.36	0.69	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.55	0.28	0.22	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.67	0.37	0.40	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	6.3	1.9	1.5	0.69	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.7	0.62	0.26	0.12	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	1.8	< 0.10	1.8	5.9	2.7	2.4	0.52	< 0.10
Pyrene	M	2700	mg/kg	0.10	1.8	< 0.10	1.7	5.3	2.7	2.3	0.62	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	2.3	1.6	1.7	0.38	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	2.3	1.7	1.2	0.27	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	4.7	1.8	1.5	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.4	0.87	0.50	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.8	1.4	0.95	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.2	0.97	0.71	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.27	0.20	0.20	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.1	1.1	0.56	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	3.6	< 2.0	3.5	36	19	17	2.6	< 2.0
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	14	< 1.0	< 1.0	< 1.0	< 1.0	12	9.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	33	< 1.0	< 1.0	< 1.0	< 1.0	17	13	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	66	< 1.0	< 1.0	< 1.0	25	48	25	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	110	< 5.0	< 5.0	< 5.0	25	76	47	< 5.0

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:		**Chemtest Sample ID.:**			595710	595711	595712	595713	595714	595715	595716	595717
Order No.: 0318-21		Client Sample Ref.:			WS1	WS2	WS3	WS5	WS7	WS8	WS9	WS10
		Client Sample ID.:			D	D	D	D	D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
		Bottom Depth (m):			0.50	0.60	0.60	0.50	0.60	0.60	0.60	0.60
		Date Sampled:			16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	4.3	< 1.0	11	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	57	< 1.0	4.4	14	72	110	29	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	57	< 5.0	5.2	19	72	120	29	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	170	< 10	< 10	19	97	190	76	< 10
pH	M	2010		N/A	8.1	7.8	9.5	8.5	9.6	7.8	8.8	5.6
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	9.3	9.1	13	12	12	15	12	13
Soil Colour	N	2040		N/A	Brown,	Brown,	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones,	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	San	Sand	Sand	Sand	Sand	Sand
pH (2.5:1)	N	2010		N/A								
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	0.57	0.49	0.99	0.53	< 0.40
Total Sulphur	M	2175	%	0.010								
Chloride (Water Soluble)	M	2220	g/l	0.010								
Nitrate (Water Soluble)	N	2220	g/l	0.010								
Sulphate (Acid Soluble)	M	2430	%	0.010								
Chromium	M	2450	mg/kg	1.0	10	8.1	14	18	17	28	19	16
Total Organic Carbon	M	2625	%	0.20	0.68	< 0.20	1.0	2.2	1.8	6.5	3.7	0.64
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010								
PCB 52	M	2815	mg/kg	0.010								
PCB 90+101	M	2815	mg/kg	0.010								
PCB 118	M	2815	mg/kg	0.010								

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd					**Chemtest Job No.:**	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:					**Chemtest Sample ID.:**	595710	595711	595712	595713	595714	595715	595716	595717
Order No.: 0318-21					Client Sample Ref.:	WS1	WS2	WS3	WS5	WS7	WS8	WS9	WS10
					Client Sample ID.:	D	D	D	D	D	D	D	D
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
					Bottom Depth (m):	0.50	0.60	0.60	0.50	0.60	0.60	0.60	0.60
					Date Sampled:	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 153	M	2815	mg/kg	0.010									
PCB 138	M	2815	mg/kg	0.010									
PCB 180	M	2815	mg/kg	0.010									
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10									

Chemtest
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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		Chemtest Job No.:			18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:		Chemtest Sample ID.:			595718	595719	595720	595721	595722	595723	595724	595725
Order No.: 0318-21		Client Sample Ref.:			WS11	WS12	WS13	WS6	WS14	WS15	WS16	WS19
		Client Sample ID.:			D	D	D	D	D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
		Bottom Depth (m):			0.40	0.60	0.60	0.60	0.50	0.60	0.60	0.50
		Date Sampled:			16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Cadmium	M	2450	mg/kg	0.10	0.20	0.30	0.10	0.24	0.32	0.18	< 0.10	0.15
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	M	2450	mg/kg	0.50	24	36	440	62	22	18	7.8	14
Mercury	M	2450	mg/kg	0.10	0.28	0.14	0.17	0.22	0.10	0.24	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	16	25	25	35	25	18	18	17
Lead	M	2450	mg/kg	0.50	59	770	80	57	38	32	15	38
Zinc	M	2450	mg/kg	0.50	54	83	87	94	61	35	35	62
Arsenic	M	2450	mg/kg	1.0	17	14	14	14	13	12	3.8	8.4
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	M	2700	mg/kg	0.10	0.28	1.1	1.1	0.66	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	0.30	1.9	0.55	0.86	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	28	0.92	0.49	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	0.14	30	1.0	0.90	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	0.72	69	7.9	6.5	0.41	0.28	< 0.10	0.19
Anthracene	M	2700	mg/kg	0.10	0.11	13	2.2	2.0	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	1.3	36	12	12	0.53	0.40	< 0.10	0.20
Pyrene	M	2700	mg/kg	0.10	1.6	31	12	11	0.49	0.41	< 0.10	0.16
Benzo[a]anthracene	M	2700	mg/kg	0.10	1.3	7.5	5.6	5.7	0.18	0.20	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	0.71	7.9	6.2	6.3	0.24	0.16	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	1.1	7.1	6.7	6.0	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.37	2.7	2.6	2.3	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	0.57	5.0	5.2	4.3	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	0.57	3.0	3.4	2.7	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	0.79	0.89	0.81	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	0.55	2.7	3.0	2.6	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	9.6	250	71	65	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	12	5.3	< 1.0	< 1.0	2.3	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	20	13	< 1.0	< 1.0	7.6	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	42	10	< 1.0	< 1.0	42	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	74	28	< 5.0	< 5.0	52	< 5.0	< 5.0

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		Chemtest Job No.:			18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:		Chemtest Sample ID.:			595718	595719	595720	595721	595722	595723	595724	595725
Order No.: 0318-21		Client Sample Ref.:			WS11	WS12	WS13	WS6	WS14	WS15	WS16	WS19
		Client Sample ID.:			D	D	D	D	D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
		Bottom Depth (m):			0.40	0.60	0.60	0.60	0.50	0.60	0.60	0.50
		Date Sampled:			16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	2.4	< 1.0	43	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	2.9	39	590	81	< 1.0	3.6	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	36	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	5.3	39	670	81	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	110	700	81	< 10	55	< 10	< 10
pH	M	2010		N/A	4.6	8.2	8.2	8.4	5.8	6.0	5.7	5.3
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	18	15	15	13	14	16	8.9	13
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown,	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand
pH (2.5:1)	N	2010		N/A								
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.40	0.81	0.70	2.0	< 0.40	0.40	< 0.40	0.49
Total Sulphur	M	2175	%	0.010								
Chloride (Water Soluble)	M	2220	g/l	0.010								
Nitrate (Water Soluble)	N	2220	g/l	0.010								
Sulphate (Acid Soluble)	M	2430	%	0.010								
Chromium	M	2450	mg/kg	1.0	16	23	26	87	19	11	10	12
Total Organic Carbon	M	2625	%	0.20	3.3	4.4	3.1	2.0	1.7	4.8	0.33	1.2
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.2	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.0	< 1.0	< 1.0
PCB 28	M	2815	mg/kg	0.010				< 0.010				
PCB 52	M	2815	mg/kg	0.010				< 0.010				
PCB 90+101	M	2815	mg/kg	0.010				< 0.010				
PCB 118	M	2815	mg/kg	0.010				< 0.010				

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd					**Chemtest Job No.:**	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:					**Chemtest Sample ID.:**	595718	595719	595720	595721	595722	595723	595724	595725
Order No.: 0318-21					Client Sample Ref.:	WS11	WS12	WS13	WS6	WS14	WS15	WS16	WS19
					Client Sample ID.:	D	D	D	D	D	D	D	D
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
					Bottom Depth (m):	0.40	0.60	0.60	0.60	0.50	0.60	0.60	0.50
					Date Sampled:	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
PCB 153	M	2815	mg/kg	0.010					< 0.010				
PCB 138	M	2815	mg/kg	0.010					< 0.010				
PCB 180	M	2815	mg/kg	0.010					< 0.010				
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10					< 0.10				

Chemtest
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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd					**Chemtest Job No.:**	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:					**Chemtest Sample ID.:**	595726	595727	595728	595729	595730	595731	595732
Order No.: 0318-21					Client Sample Ref.:	WS21	WS1	WS7	WS11	WS12	WS10	WS16
					Client Sample ID.:	D	D	D	D	D	D	D
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.70	0.70	0.50	0.85	0.80	0.80
					Bottom Depth (m):	0.60						
					Date Sampled:	19-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	19-Mar-2018
					Asbestos Lab:	COVENTRY						
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Cadmium	M	2450	mg/kg	0.10	0.20							
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50							
Copper	M	2450	mg/kg	0.50	19							
Mercury	M	2450	mg/kg	0.10	0.11							
Nickel	M	2450	mg/kg	0.50	20							
Lead	M	2450	mg/kg	0.50	35							
Zinc	M	2450	mg/kg	0.50	58							
Arsenic	M	2450	mg/kg	1.0	12							
Selenium	M	2450	mg/kg	0.20	< 0.20							
Total Phenols	M	2920	mg/kg	0.30	< 0.30							
Naphthalene	M	2700	mg/kg	0.10	< 0.10							
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10							
Acenaphthene	M	2700	mg/kg	0.10	< 0.10							
Fluorene	M	2700	mg/kg	0.10	< 0.10							
Phenanthrene	M	2700	mg/kg	0.10	0.30							
Anthracene	M	2700	mg/kg	0.10	< 0.10							
Fluoranthene	M	2700	mg/kg	0.10	0.22							
Pyrene	M	2700	mg/kg	0.10	0.20							
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10							
Chrysene	M	2700	mg/kg	0.10	< 0.10							
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10							
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10							
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10							
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10							
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10							
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10							
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0							
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0							
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0							
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0							
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0							
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0							
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0							
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0							
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0							
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0							

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:		**Chemtest Sample ID.:**			595726	595727	595728	595729	595730	595731	595732
Order No.: 0318-21		Client Sample Ref.:			WS21	WS1	WS7	WS11	WS12	WS10	WS16
		Client Sample ID.:			D	D	D	D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	1.70	0.70	0.50	0.85	0.80	0.80
		Bottom Depth (m):			0.60						
		Date Sampled:			19-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	19-Mar-2018
		Asbestos Lab:			COVENTRY						
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0						
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0						
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0						
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0						
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0						
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	1.8						
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	11						
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0						
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	13						
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	13						
pH	M	2010		N/A	5.5						
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		< 0.010	0.034	< 0.010	0.055	< 0.010	< 0.010
ACM Type	U	2192		N/A	-						
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected						
Moisture	N	2030	%	0.020	15	15	13	8.3	13	9.4	8.2
Soil Colour	N	2040		N/A	Brown	Orange	Orange	Brown	Brown	Brown	Orange
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Clay	Sand	Sand
pH (2.5:1)	N	2010		N/A		5.2	6.2	6.1	6.4	6.0	6.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.56						
Total Sulphur	M	2175	%	0.010		0.062	0.017	< 0.010	0.020	< 0.010	< 0.010
Chloride (Water Soluble)	M	2220	g/l	0.010		< 0.010					
Nitrate (Water Soluble)	N	2220	g/l	0.010		< 0.010					
Sulphate (Acid Soluble)	M	2430	%	0.010		< 0.010	< 0.010	< 0.010	0.021	< 0.010	< 0.010
Chromium	M	2450	mg/kg	1.0	14						
Total Organic Carbon	M	2625	%	0.20	2.6						
Benzene	M	2760	µg/kg	1.0	< 1.0						
Toluene	M	2760	µg/kg	1.0	< 1.0						
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0						
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0						
o-Xylene	M	2760	µg/kg	1.0	< 1.0						
PCB 28	M	2815	mg/kg	0.010							
PCB 52	M	2815	mg/kg	0.010							
PCB 90+101	M	2815	mg/kg	0.010							
PCB 118	M	2815	mg/kg	0.010							

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd					**Chemtest Job No.:**	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894	18-07894
Quotation No.:					**Chemtest Sample ID.:**	595726	595727	595728	595729	595730	595731	595732
Order No.: 0318-21					Client Sample Ref.:	WS21	WS1	WS7	WS11	WS12	WS10	WS16
					Client Sample ID.:	D	D	D	D	D	D	D
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	1.70	0.70	0.50	0.85	0.80	0.80
					Bottom Depth (m):	0.60						
					Date Sampled:	19-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	16-Mar-2018	19-Mar-2018
					Asbestos Lab:	COVENTRY						
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
PCB 153	M	2815	mg/kg	0.010								
PCB 138	M	2815	mg/kg	0.010								
PCB 180	M	2815	mg/kg	0.010								
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10								

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	18-07897-1
Initial Date of Issue:	27-Mar-2018
Client	Rogers Geotechnical Services Ltd
Client Address:	Unit 4, Barncliffe Business Park Near Bank Shelley Huddersfield West Yorkshire HD8 8LU
Contact(s):	Rob Palmer
Project	J4199/18/E/F Wombwell Redevelopment

Quotation No.:		**Date Received:**	21-Mar-2018
Order No.:	0318-21	**Date Instructed:**	21-Mar-2018
No. of Samples:	11		
Turnaround (Wkdays):	5	**Results Due:**	27-Mar-2018
Date Approved:	27-Mar-2018		

Approved By:

[redacted]

Details: Robert Monk, Technical Manager

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07897	18-07897	18-07897	18-07897	18-07897	18-07897	18-07897	18-07897
Quotation No.:		**Chemtest Sample ID.:**			595745	595746	595747	595748	595749	595750	595751	595752
Order No.: 0318-21		Client Sample Ref.:			WS17	WS18	WS20	WS22	WS23	WS24	WS25	WS26
		Client Sample ID.:			D	D	D	D	D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Bottom Depth (m):			0.45	0.60	0.60	0.60	0.40	0.60	0.50	0.50
		Date Sampled:			19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Cadmium	U	2450	mg/kg	0.10	0.16	< 0.10	0.22	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	U	2450	mg/kg	0.50	14	15	18	13	15	14	10	21
Mercury	U	2450	mg/kg	0.10	< 0.10	0.15	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12
Nickel	U	2450	mg/kg	0.50	16	17	21	17	31	19	15	15
Lead	U	2450	mg/kg	0.50	26	29	35	24	16	17	21	39
Zinc	U	2450	mg/kg	0.50	46	47	50	47	87	60	43	49
Arsenic	U	2450	mg/kg	1.0	9.2	9.7	12	5.7	5.7	5.6	5.2	16
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.43
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.67
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.41
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07897	18-07897	18-07897	18-07897	18-07897	18-07897	18-07897	18-07897
Quotation No.:		**Chemtest Sample ID.:**			595745	595746	595747	595748	595749	595750	595751	595752
Order No.: 0318-21		Client Sample Ref.:			WS17	WS18	WS20	WS22	WS23	WS24	WS25	WS26
		Client Sample ID.:			D	D	D	D	D	D	D	D
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Bottom Depth (m):			0.45	0.60	0.60	0.60	0.40	0.60	0.50	0.50
		Date Sampled:			19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018	19-Mar-2018
		Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
pH	U	2010		N/A	5.9	5.1	6.1	4.9	6.1	5.6	5.7	5.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	12	11	14	12	12	11	17	15
pH (2.5:1)	N	2010		N/A								
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	0.40	< 0.40	< 0.40	0.46	0.43
Total Sulphur	U	2175	%	0.010								
Sulphate (Acid Soluble)	U	2430	%	0.010								
Chromium	U	2450	mg/kg	1.0	11	12	13	12	15	11	10	13
Total Organic Carbon	U	2625	%	0.20	1.1	2.4	2.1	0.81	0.38	0.46	1.2	2.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	1.9	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	3.7	< 1.0	< 1.0	2.6	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	2.5	< 1.0	< 1.0	1.9	< 1.0	< 1.0	< 1.0	< 1.0

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Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07897	18-07897	18-07897
Quotation No.:		**Chemtest Sample ID.:**			595753	595754	595755
Order No.: 0318-21		Client Sample Ref.:			WS27	WS20	WS27
		Client Sample ID.:			D	D	D
		Sample Type:			SOIL	SOIL	SOIL
		Top Depth (m):			0.00	2.40	0.70
		Bottom Depth (m):			0.60		
		Date Sampled:			19-Mar-2018	19-Mar-2018	19-Mar-2018
		Asbestos Lab:			COVENTRY		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Cadmium	U	2450	mg/kg	0.10	< 0.10		
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		
Copper	U	2450	mg/kg	0.50	9.6		
Mercury	U	2450	mg/kg	0.10	< 0.10		
Nickel	U	2450	mg/kg	0.50	18		
Lead	U	2450	mg/kg	0.50	14		
Zinc	U	2450	mg/kg	0.50	39		
Arsenic	U	2450	mg/kg	1.0	4.3		
Selenium	U	2450	mg/kg	0.20	< 0.20		
Total Phenols	U	2920	mg/kg	0.30	< 0.30		
Naphthalene	U	2700	mg/kg	0.10	< 0.10		
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10		
Acenaphthene	U	2700	mg/kg	0.10	< 0.10		
Fluorene	U	2700	mg/kg	0.10	< 0.10		
Phenanthrene	U	2700	mg/kg	0.10	< 0.10		
Anthracene	U	2700	mg/kg	0.10	< 0.10		
Fluoranthene	U	2700	mg/kg	0.10	< 0.10		
Pyrene	U	2700	mg/kg	0.10	< 0.10		
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10		
Chrysene	U	2700	mg/kg	0.10	< 0.10		
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10		
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10		
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10		
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10		
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10		
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10		
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0		
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0		
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0		
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0		
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0		
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0		
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0		
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0		
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0		
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0		

Chemtest
The right chemistry to deliver results

Results - Soil

Project: J4199/18/E/F Wombwell Redevelopment

Client: Rogers Geotechnical Services Ltd		**Chemtest Job No.:**			18-07897	18-07897	18-07897
Quotation No.:		**Chemtest Sample ID.:**			595753	595754	595755
Order No.: 0318-21		Client Sample Ref.:			WS27	WS20	WS27
		Client Sample ID.:			D	D	D
		Sample Type:			SOIL	SOIL	SOIL
		Top Depth (m):			0.00	2.40	0.70
		Bottom Depth (m):			0.60		
		Date Sampled:			19-Mar-2018	19-Mar-2018	19-Mar-2018
		Asbestos Lab:			COVENTRY		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0		
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0		
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10		
pH	U	2010		N/A	6.1		
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		< 0.010	< 0.010
ACM Type	U	2192		N/A	-		
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected		
Moisture	N	2030	%	0.020	12	16	12
pH (2.5:1)	N	2010		N/A		7.2	6.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40		
Total Sulphur	U	2175	%	0.010		0.076	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010		0.036	< 0.010
Chromium	U	2450	mg/kg	1.0	11		
Total Organic Carbon	U	2625	%	0.20	1.9		
Benzene	U	2760	µg/kg	1.0	< 1.0		
Toluene	U	2760	µg/kg	1.0	< 1.0		
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0		
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0		
o-Xylene	U	2760	µg/kg	1.0	< 1.0		

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Appendix C

Statistical Analysis

Client/client ref	Barnsley MBC
Project ref	Wombwell
Site ref	23-24-18-1-6003
Data description	Preliminary Investigation
Contaminant(s)	Metals and Phenols
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	26 April 2018
User details	C Riley

Statistics Calculator (Version 2)

Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

Go to summary | Project details | Select all filters | Deselect all filters | Paste Values

Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Arsenic	Boron (Hot Water Soluble)	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Selenium	Zinc	Phenols									
							Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
		0.2-0.6	MG:G			TP2	14	0.57	0.23	36	< 0.50	72	56	0.53	46	< 0.20	110	< 0.30										
		0.4-0.6	MG:G			TP4	7.2	< 0.40	< 0.10	13	< 0.50	11	16	< 0.10	23	< 0.20	49	< 0.30										
		0.05-0.6	MG:G			TP5	16	0.4	0.43	33	< 0.50	25	61	0.18	19	< 0.20	110	< 0.30										
		0.0-0.3	Topsoil			TP19	6.8	< 0.40	< 0.10	13	< 0.50	15	20	< 0.10	24	< 0.20	43	< 0.30										
		0.1-0.5	MG:RwN			WS1	5.2	< 0.40	< 0.10	10	< 0.50	8.9	11	< 0.10	16	< 0.20	31	< 0.30										
		0.1-0.6	G			WS2	4.8	< 0.40	< 0.10	8.1	< 0.50	5.2	2.8	< 0.10	13	< 0.20	18	< 0.30										
		0.2-0.5	MG:RwN			WS3	13	< 0.40	0.22	14	< 0.50	17	38	0.29	22	< 0.20	96	< 0.30										
		0.0-0.5	MG:C			WS5	13	0.57	< 0.10	18	< 0.50	20	21	0.18	26	< 0.20	48	< 0.30										
		0.0-0.35	MG:C			WS7	10	0.49	0.34	17	< 0.50	19	36	0.15	16	< 0.20	68	< 0.30										
		0.2-0.6	MG:C			WS8	16	0.99	0.62	28	< 0.50	71	97	0.26	49	< 0.20	130	< 0.30										
		0.3-0.6	MG:C			WS9	12	0.53	0.1	19	< 0.50	57	63	0.11	36	< 0.20	82	< 0.30										
		0.25-0.60	MG:RwN			WS10	7.8	< 0.40	0.13	16	< 0.50	16	21	< 0.10	28	< 0.20	57	< 0.30										
		0.0-0.3	Top			WS11	17	0.4	0.2	16	< 0.50	24	59	0.28	16	< 0.20	54	< 0.30										
		0-0.4	MG:G			WS12	14	0.81	0.3	23	< 0.50	36	770	0.14	25	< 0.20	83	< 0.30										
		0.1-0.25	MG:C			WS13	14	0.7	0.1	26	< 0.50	440	80	0.17	25	< 0.20	87	< 0.30										
		0-0.3	top			WS6	14	2	0.24	87	< 0.50	62	57	0.22	35	< 0.20	94	< 0.30										
		0.2-0.5	MG: C			WS14	13	< 0.40	0.32	19	< 0.50	22	38	0.1	25	< 0.20	61	< 0.30										
		0-0.25	top			WS15	12	0.4	0.18	11	< 0.50	18	32	0.24	18	< 0.20	35	< 0.30										
		0.25-0.6	G			WS16	3.8	< 0.40	< 0.10	10	< 0.50	7.8	15	< 0.10	18	< 0.20	35	< 0.30										
		0.35-0.5	MG: RwN			WS19	8.4	0.49	0.15	12	< 0.50	14	38	< 0.10	17	< 0.20	62	< 0.30										
		0.4-0.6	MG:C			WS21	12	0.56	0.2	14	< 0.50	19	35	0.11	20	< 0.20	58	< 0.30										
		0-0.3	Top			WS17	9.2	< 0.40	0.16	11	< 0.50	14	26	< 0.10	16	< 0.20	46	< 0.30										
		0-0.3	Top			WS18	9.7	< 0.40	< 0.10	12	< 0.50	15	29	0.15	17	< 0.20	47	< 0.30										
		0.35-0.6	MG:RwN			WS20	12	< 0.40	0.22	13	< 0.50	18	35	0.1	21	< 0.20	50	< 0.30										
		0.0-0.3	Top			WS22	5.7	0.4	< 0.10	12	< 0.50	13	24	< 0.10	17	< 0.20	47	< 0.30										
		0.25-0.4	Cl			WS23	5.7	< 0.40	< 0.10	15	< 0.50	15	16	< 0.10	31	< 0.20	87	< 0.30										
		0.35-0.60	MG:RwN			WS24	5.6	< 0.40	< 0.10	11	< 0.50	14	17	< 0.10	19	< 0.20	60	< 0.30										
		0.0-0.3	top			WS25	5.2	0.46	< 0.10	10	< 0.50	10	21	< 0.10	15	< 0.20	43	< 0.30										
		0.0-0.25	Top			WS26	16	0.43	< 0.10	13	< 0.50	21	39	0.12	15	< 0.20	49	< 0.30										
		0.25-0.6	MH:RwN			WS27	4.3	< 0.40	< 0.10	11	< 0.50	9.6	14	< 0.10	18	< 0.20	39	< 0.30										

Client/client ref: Barnsley MBC
Project ref: Wombwell
Site ref: 23-24-18-1-6003
Data description: Preliminary Investigation
Contaminant(s): Metals and Phenols
Test scenario: Planning
Date: 26 April 2018
User details: C Riley

	Arsenic	Boron (Hot Water Soluble)	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Selenium	Zinc	Phenols								
Critical concentration, C_c	**37**	**290**	**11**	**910**	**6**	**2400**	**200**	**11**	**130**	**250**	**3700**	**550**								
Notes	LQM GAC	LQM GAC	LQM GAC	LQM GAC	LQM GAC	LQM GAC	Defra C4SL	LQM GAC	LQM GAC	LQM GAC	LQM GAC	LQM GAC 2.5%SOM								
Full dataset size	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0
Outliers present?	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	No								
Number of outliers temporarily excluded	0																			
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Sample mean, $\bar{x}$	10.246667	0.4333333	0.1596667	18.37	0.25	36.983333	59.593333	0.1326667	22.866667	0.1	62.633333	0.15	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s	4.1053987	0.3626467	0.1376774	14.669818	0	78.242382	135.88965	0.1080209	8.8696823	4.235E-17	26.669734	0								
Number of non-detects	0	**14**	**13**	0	**30**	0	0	**13**	0	**30**	0	**30**	0	0	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection lim	Half detection lim	Half detection lim	Half detection lim	Half detection lim	Half detection lim	Half detection lim	Half detection lim	Half detection lim	Half detection lim	Half detection lim
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Single value	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Normal	Single value								
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers												
t statistic, t_0 (or k_0)	-35.69301076	-4373.462833	-431.261522	-332.9052027	N/A	-165.418983	-5.659290533	-551.030951	-66.15720974	-3.23239E+19	-747.0144891	N/A								
Upper confidence limit (on true mean concentration, μ)	13.513835	0.7219357	0.2692334	30.04457	0.25	99.250376	167.73736	0.2186321	29.925359	0.1	70.906731	0.15								
Evidence level	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**97%**	**100%**	**100%**	**100%**	**100%**	**100%**								
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level								
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**								
Select dataset	◉	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Client/client ref	Barnsley MBC
Project ref	Wombwell
Site ref	23-24-18-1-6003
Data description	Preliminary Investigation
Contaminant(s)	PAH
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	26 April 2018
User details	C Riley

Statistics Calculator (Version 2)

Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

Go to summary | Project details | Select all filters | Deselect all filters | Paste Values

Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
							Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
		0.0-0.3	Topsoil			TP19	< 0.10	< 0.10	< 0.10	0.14	0.34	0.5	0.48	0.24	0.25	0.14	0.73	< 0.10	0.36	< 0.10	0.28	0.84				
		0.0-0.3	Top			WS11	< 0.10	0.3	0.11	1.3	0.57	1.1	0.55	0.37	0.71	< 0.10	1.3	0.14	0.57	0.28	0.72	1.6				
		0-0.25	top			WS15	< 0.10	< 0.10	< 0.10	0.2	< 0.10	< 0.10	< 0.10	< 0.10	0.16	< 0.10	0.4	< 0.10	< 0.10	< 0.10	0.28	0.41				
		0-0.3	Top			WS17	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0-0.3	Top			WS18	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.0-0.3	Top			WS22	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.0-0.3	top			WS25	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.0-0.25	Top			WS26	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.67	< 0.10	< 0.10	< 0.10	0.43	0.41				

Client/client ref: Barnsley MBC
Project ref: Wombwell
Site ref: 23-24-18-1-6003
Data description: Preliminary Investigation
Contaminant(s): PAH
Test scenario: Planning
Date: 26 April 2018
User details: C Riley

	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
Critical concentration, C_c	**510**	**420**	**5400**	**11**	**2.7**	**3.3**	**340**	**93**	**22**	**0.28**	**560**	**400**	**36**	**5.6**	**220**	**1200**				
Notes	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM				
Full dataset size	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0	0	0	0
Outliers present?	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes				
Number of outliers temporarily excluded										0										
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**0**	**0**	**0**	**0**
Sample mean, $\overline{x}$	0.05	0.08125	0.0575	0.23625	0.15125	0.2375	0.16625	0.11375	0.17125	0.06125	0.4125	0.06125	0.15375	0.07875	0.23875	0.4325	No Data	No Data	No Data	No Data
Standard deviation, s	7.418E-18	0.0883883	0.0212132	0.4335217	0.1972987	0.3824265	0.2160646	0.1230491	0.229934	0.0318198	0.4598991	0.0318198	0.2001383	0.0813173	0.2432187	0.5497207				
Number of non-detects	**8**	**7**	**7**	**5**	**6**	**6**	**6**	**6**	**5**	**7**	**4**	**7**	**6**	**7**	**4**	**4**	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal				
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers												
t statistic, t_0 (or k_0)	-1.9444E+20	-13437.4	-719992.3333	-70.22596999	-36.53826827	-22.65025801	-4448.645541	-2135.099502	-268.5163111	-19.44444444	-3441.521435	-35550.11111	-506.5921067	-192.0434783	-2555.636427	-6172.023727				
Upper confidence limit (on true mean concentration, μ)	0.05	0.2174656	0.0901917	0.9043518	0.4553078	0.8268588	0.499228	0.3033813	0.5256021	0.1102876	1.121252	0.1102876	0.4621839	0.2040683	0.6135753	1.2796765				
Evidence level	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**				
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level				
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**				
Select dataset	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Client/client ref	Barnsley MBC
Project ref	Wombwell
Site ref	23-24-18-1-6003
Data description	Preliminary Investigation
Contaminant(s)	PAH
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	2 May 2018
User details	C Riley

Statistics Calculator (Version 2)

Input data

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Go to summary | Project details | Select all filters | Deselect all filters | Paste Values

Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
							Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
		0.0-0.5	MG:C			WS5	0.55	0.35	1.7	2.3	1.8	4.7	1.1	1.4	2.3	0.27	5.9	0.67	1.2	0.47	6.3	5.3				
		0.0-0.35	MG:C			WS7	0.28	0.36	0.62	1.6	1.4	1.8	1.1	0.87	1.7	0.2	2.7	0.37	0.97	0.49	1.9	2.7				
		0.2-0.6	MG:C			WS8	0.22	0.69	0.26	1.7	0.95	1.5	0.56	0.5	1.2	0.2	2.4	0.4	0.71	1.4	1.5	2.3				
		0.3-0.6	MG:C			WS9	< 0.10	< 0.10	0.12	0.38	< 0.10	< 0.10	< 0.10	< 0.10	0.27	< 0.10	0.52	< 0.10	< 0.10	< 0.10	0.69	0.62				
		0.1-0.25	MG:C			WS13	0.92	0.55	2.2	5.6	5.2	6.7	3	2.6	6.2	0.89	12	1	3.4	1.1	7.9	12				
		0-0.3	MG: C			WS6	0.49	0.86	2	5.7	4.3	6	2.6	2.3	6.3	0.81	12	0.9	2.7	0.66	6.5	11				
		0.2-0.5	MG: C			WS14	< 0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10	0.53	< 0.10	< 0.10	< 0.10	0.41	0.49				
		0.4-0.6	MG:C			WS21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.22	< 0.10	< 0.10	< 0.10	0.3	0.2				

Client/client ref: Barnsley MBC
Project ref: Wombwell
Site ref: 23-24-18-1-6003
Data description: Preliminary Investigation
Contaminant(s): PAH
Test scenario: Planning
Date: 2 May 2018
User details: C Riley

	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
Critical concentration, C_c	**510**	**420**	**5400**	**11**	**2.7**	**3.3**	**340**	**93**	**22**	**0.28**	**560**	**400**	**36**	**5.6**	**220**	**1200**				
Notes	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM				
Full dataset size	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0	0	0	0
Outliers present?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No				
Number of outliers temporarily excluded										0										
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**0**	**0**	**0**	**0**
Sample mean, $\bar{x}$	0.32625	0.37	0.875	2.18875	1.725	2.60625	1.06375	0.9775	2.2825	0.315	4.53375	0.43625	1.14125	0.53375	3.1875	4.32625	No Data	No Data	No Data	No Data
Standard deviation, s	0.3097897	0.3122728	0.9316958	2.2817377	1.9940984	2.7809861	1.1618082	1.0268085	2.569173	0.3411744	4.9572542	0.3855956	1.2718315	0.506386	3.1546553	4.7298896				
Number of non-detects	**3**	**3**	**2**	**1**	**3**	**3**	**3**	**3**	**1**	**3**	0	**3**	**3**	**3**	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Normal	Normal	Non-normal	Normal	Normal	Normal	Normal	Normal	Non-normal	Non-normal	Non-normal	Normal	Normal	Normal	Non-normal	Non-normal				
Statistical approach	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers												
t statistic, t_0 (or k_0)	-4653.399305	-3800.820856	-16390.57609	-10.92236801	-1.382938975	-0.705584716	-825.1418016	-253.4834225	-21.70718415	0.290159335	-316.9286325	-2930.886902	-77.52240313	-28.29762037	-194.3915577	-715.001062				
Upper confidence limit (on true mean concentration, μ)	0.5337579	0.5791711	2.3108397	3.717137	3.0607163	4.469051	1.8419694	1.665292	6.2418615	0.8407851	12.173392	0.6945353	1.9931669	0.8729449	8.0491503	11.615499				
Evidence level	**100%**	**100%**	**100%**	**100%**	**90%**	**75%**	**100%**	**100%**	**100%**	**0%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**				
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level				
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**$\mu \approx \geq$ Cc**	**$\mu \approx \geq$ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**$\mu \geq$ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**				
Select dataset	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Client/client ref	Barnsley MBC
Project ref	Wombwell
Site ref	23-24-18-1-6003
Data description	Preliminary Investigation
Contaminant(s)	PAH
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	2 May 2018
User details	C Riley

Statistics Calculator (Version 2)

Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

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Go to summary | Project details | Select all filters | Deselect all filters | Paste Values

Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
							Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
		0.0-0.5	MG:C			WS5	0.55	0.35	1.7	2.3	1.8	4.7	1.1	1.4	2.3	0.27	5.9	0.67	1.2	0.47	6.3	5.3				
		0.0-0.35	MG:C			WS7	0.28	0.36	0.62	1.6	1.4	1.8	1.1	0.87	1.7	0.2	2.7	0.37	0.97	0.49	1.9	2.7				
		0.2-0.6	MG:C			WS8	0.22	0.69	0.26	1.7	0.95	1.5	0.56	0.5	1.2	0.2	2.4	0.4	0.71	1.4	1.5	2.3				
		0.3-0.6	MG:C			WS9	< 0.10	< 0.10	0.12	0.38	< 0.10	< 0.10	< 0.10	< 0.10	0.27	< 0.10	0.52	< 0.10	< 0.10	< 0.10	0.69	0.62				
		0.1-0.25	MG:C			WS13																				
		0-0.3	MG: C			WS6																				
		0.2-0.5	MG: C			WS14	< 0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10	0.53	< 0.10	< 0.10	< 0.10	0.41	0.49				
		0.4-0.6	MG:C			WS21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.22	< 0.10	< 0.10	< 0.10	0.3	0.2				

Client/client ref: Barnsley MBC
Project ref: Wombwell
Site ref: 23-24-18-1-6003
Data description: Preliminary Investigation
Contaminant(s): PAH
Test scenario: Planning
Date: 2 May 2018
User details: C Riley

	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
Critical concentration, C_c	**510**	**420**	**5400**	**11**	**2.7**	**3.3**	**340**	**93**	**22**	**0.28**	**560**	**400**	**36**	**5.6**	**220**	**1200**				
Notes	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM				
Full dataset size	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0	0	0
Outliers present?	No	No	Yes	No	No	Yes	No	No	No	No	No	No	No	Yes	Yes	No				
Number of outliers temporarily excluded										0										
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**0**	**0**	**0**	**0**
Sample mean, $\bar{x}$	0.2	0.2583333	0.4666667	1.035	0.7166667	1.3583333	0.485	0.4866667	0.96	0.1366667	2.045	0.265	0.505	0.4183333	1.85	1.935	No Data	No Data	No Data	No Data
Standard deviation, s	0.1983935	0.258953	0.6410512	0.9478344	0.7782459	1.8175304	0.5157034	0.5573748	0.9190647	0.0983192	2.1618302	0.2576626	0.5219866	0.5250682	2.2693259	1.9426348				
Number of non-detects	**3**	**3**	**2**	**1**	**3**	**3**	**3**	**3**	**1**	**3**	0	**3**	**3**	**3**	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Normal	Normal	Non-normal	Normal	Normal	Normal	Non-normal	Normal	Normal	Normal	Normal	Normal	Normal	Non-normal	Non-normal	Normal				
Statistical approach	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				Evidence level required:		95%	Use Normal distribution to test for outliers												
t statistic, t_0 (or k_0)	-6294.306855	-3970.422536	-20631.89509	-25.75256391	-6.24244177	-2.616788499	-1612.629478	-406.5674685	-56.0757712	-3.570955634	-632.1981357	-3800.112613	-166.564889	-24.17293249	-235.4691274	-1510.653426				
Upper confidence limit (on true mean concentration, μ)	0.3632065	0.4713585	1.6074257	1.8147265	1.3568829	2.8535066	1.4027009	0.9451855	1.7160595	0.217548	3.8234081	0.4769636	0.9344071	1.3526991	5.888295	3.5330892				
Evidence level	**100%**	**100%**	**100%**	**100%**	**100%**	**98%**	**100%**	**100%**	**100%**	**99%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**				
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level				
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**				
Select dataset	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	○

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Client/client ref	Barnsley MBC
Project ref	Wombwell
Site ref	23-24-18-1-6003
Data description	Preliminary Investigation
Contaminant(s)	PAH
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	26 April 2018
User details	C Riley

Statistics Calculator (Version 2)

Input data

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Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
							Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
		0.2-0.6	MG:G			TP2	0.29	0.23	0.36	0.98	0.88	1.2	0.56	0.96	1.8	0.33	2.1	0.39	< 0.10	0.75	1.7	2.2				
		0.4-0.6	MG:G			TP4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.05-0.6	MG:G			TP5	1.6	0.76	7.9	32	31	41	19	17	36	5.2	71	1.4	22	0.59	28	75				
		0-0.4	MG:G			WS12	28	1.9	13	7.5	5	7.1	2.7	2.7	7.9	0.79	36	30	3	1.1	69	31				
		0.1-0.5	MG:RwN			WS1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.8	< 0.10	< 0.10	< 0.10	< 0.10	1.8				
		0.2-0.5	MG:RwN			WS3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.8	< 0.10	< 0.10	< 0.10	< 0.10	1.7				
		0.25-0.60	MG:RwN			WS10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.35-0.5	MG: RwN			WS19	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.2	< 0.10	< 0.10	< 0.10	0.19	0.16				
		0.35-0.6	MG:RwN			WS20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.35-0.60	MG:RwN			WS24	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.25-0.6	MH:RwN			WS27	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				

Client/client ref: Barnsley MBC
Project ref: Wombwell
Site ref: 23-24-18-1-6003
Data description: Preliminary Investigation
Contaminant(s): PAH
Test scenario: Planning
Date: 26 April 2018
User details: C Riley

	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
Critical concentration, C_c	**510**	**420**	**5400**	**11**	**2.7**	**3.3**	**340**	**93**	**22**	**0.28**	**560**	**400**	**36**	**5.6**	**220**	**1200**				
Notes	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM				
Full dataset size	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	0	0	0	0
Outliers present?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
Number of outliers temporarily excluded	0																			
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**0**	**0**	**0**	**0**
Sample mean, $\bar{x}$	2.7536364	0.2990909	1.9690909	3.7163636	3.3890909	4.5181818	2.06	1.9145455	4.1909091	0.6109091	10.286364	2.9263636	2.3136364	0.2581818	9.0218182	10.191818	No Data	No Data	No Data	No Data
Standard deviation, s	8.3860387	0.5724064	4.3463673	9.640049	9.2760395	12.281353	5.6740109	5.0686416	10.809575	1.5390806	22.768488	8.9885063	6.5889336	0.3751485	21.569929	23.354664				
Number of non-detects	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**5**	**8**	**9**	**8**	**7**	**5**	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal				
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers												
t statistic, t_0 (or k_0)	-200.6126993	-2431.82192	-4119.127932	-2.505909341	0.246382736	0.328974499	-197.5357813	-59.60103372	-5.464236388	0.713088902	-80.07531614	-146.5142508	-16.95646613	-47.22612168	-32.44032322	-168.9661342				
Upper confidence limit (on true mean concentration, μ)	13.77505	1.0513803	7.6813367	16.38587	15.580195	20.659042	9.5171113	8.5760455	18.397474	2.6336573	40.210019	14.739575	10.973192	0.7512235	37.370259	40.88586				
Evidence level	**100%**	**100%**	**100%**	**86%**	**0%**	**0%**	**100%**	**100%**	**97%**	**0%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**				
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level				
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**$\mu \approx$ Cc**	**$\mu \geq$ Cc**	**$\mu \geq$ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**$\mu \geq$ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**				
Select dataset	◉	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Client/client ref	Barnsley MBC
Project ref	Wombwell
Site ref	23-24-18-1-6003
Data description	Preliminary Investigation
Contaminant(s)	PAH
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	26 April 2018
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Input data

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Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Acenaphthene filter	Acenaphthylene filter	Anthracene filter	Benzo[a]anthracene filter	Benzo[a]pyrene filter	Benzo[b]fluoranthene filter	Benzo[g,h,i]perylene filter	Benzo[k]fluoranthene filter	Chrysene filter	Dibenz(a,h)Anthracene filter	Fluoranthene filter	Fluorene filter	Indeno(1,2,3-c,d)Pyrene filter	Naphthalene filter	Phenanthrene filter	Pyrene filter				
		0.2-0.6	MG:G	inc clinker		TP2	0.29	0.23	0.36	0.98	0.88	1.2	0.56	0.96	1.8	0.33	2.1	0.39	< 0.10	0.75	1.7	2.2				
		0.4-0.6	MG:G	gravel		TP4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.05-0.6	MG:G	inc clinker		TP5	1.6	0.76	7.9				19	17	36		71	1.4	22	0.59	28	75				
		0-0.4	MG:G	inc clinker		WS12	28	1.9	13	7.5			2.7	2.7	7.9		36	30	3	1.1	69	31				
		0.1-0.5	MG:RwN	Sand		WS1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.8	< 0.10	< 0.10	< 0.10	< 0.10	1.8				
		0.2-0.5	MG:RwN	Gravel		WS3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.8	< 0.10	< 0.10	< 0.10	< 0.10	1.7				
		0.25-0.60	MG:RwN	Sand		WS10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.35-0.5	MG: RwN	Gravel		WS19	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.2	< 0.10	< 0.10	< 0.10	0.19	0.16				
		0.35-0.6	MG:RwN	Sand		WS20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.35-0.60	MG:RwN	Gravel		WS24	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				
		0.25-0.6	MH:RwN	Sand		WS27	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10				

Client/client ref: Barnsley MBC
Project ref: Wombwell
Site ref: 23-24-18-1-6003
Data description: Preliminary Investigation
Contaminant(s): PAH
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	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz(a,h)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)Pyrene	Naphthalene	Phenanthrene	Pyrene				
Critical concentration, C_c	**510**	**420**	**5400**	**11**	**2.7**	**3.3**	**340**	**93**	**22**	**0.28**	**560**	**400**	**36**	**5.6**	**220**	**1200**				
Notes	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM				
Full dataset size	11	11	11	10	9	9	11	11	11	9	11	11	11	11	11	11	0	0	0	0
Outliers present?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
Number of outliers temporarily excluded										0										
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	**11**	**11**	**11**	**10**	**9**	**9**	**11**	**11**	**11**	**9**	**11**	**11**	**11**	**11**	**11**	**11**	**0**	**0**	**0**	**0**
Sample mean, $\bar{x}$	2.7536364	0.2990909	1.9690909	0.888	0.1422222	0.1777778	2.06	1.9145455	4.1909091	0.0811111	10.286364	2.9263636	2.3136364	0.2581818	9.0218182	10.191818	No Data	No Data	No Data	No Data
Standard deviation, s	8.3860387	0.5724064	4.3463673	2.3415323	0.2766667	0.3833333	5.6740109	5.0686416	10.809575	0.0933333	22.768488	8.9885063	6.5889336	0.3751485	21.569929	23.354664				
Number of non-detects	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**5**	**8**	**9**	**8**	**7**	**5**	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal				
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers												
t statistic, t_0 (or k_0)	-200.6126993	-2431.82192	-4119.127932	-13.65642158	-27.73493976	-24.43478261	-197.5357813	-59.60103372	-5.464236388	-6.392857143	-80.07531614	-146.5142508	-16.95646613	-47.22612168	-32.44032322	-168.9661342				
Upper confidence limit (on true mean concentration, μ)	13.77505	1.0513803	7.6813367	4.1155795	0.5442096	0.7347482	9.5171113	8.5760455	18.397474	0.2167213	40.210019	14.739575	10.973192	0.7512235	37.370259	40.88586				
Evidence level	**100%**	**100%**	**100%**	**99%**	**100%**	**100%**	**100%**	**100%**	**97%**	**98%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**				
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level				
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**				
Select dataset	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Client/client ref	Barnsley MBC
Project ref	Wombwell
Site ref	23-24-18-1-6003
Data description	Preliminary Investigation
Contaminant(s)	TPH and BTEX
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	26 April 2018
User details	C Riley

Statistics Calculator (Version 2)

Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

Go to summary | Project details | Select all filters | Deselect all filters | Paste Values

Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Aliphatic TPH >C5-C6	Aliphatic TPH >C6-C8	Aliphatic TPH >C8-C10	Aliphatic TPH >C10-C12	Aliphatic TPH >C12-C16	Aliphatic TPH >C16-C35	Aliphatic TPH >C35-C44	Aromatic TPH >C5-C7	Aromatic TPH >C7-C8	Aromatic TPH >C8-C10	Aromatic TPH >C10-C12	Aromatic TPH >C12-C16	Aromatic TPH >C16-C21	Aromatic TPH >C21-C35	Aromatic TPH >C35-C44	Benzene	Toluene	Ethylbenzene	m & p-Xylene	o-Xylene
							Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
		0-0.6				TP2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.5	17	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				TP4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				TP5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	41	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	17	230	1200	75	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				TP19	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.7	15	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.5				WS1	< 1.0	< 1.0	< 1.0	14	33	66	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	57	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0.1-0.6				WS2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.4	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.5				WS5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.3	14	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	72	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS8	< 1.0	< 1.0	< 1.0	12	17	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	11	110	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS9	< 1.0	< 1.0	< 1.0	9	13	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	29	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.4				WS11	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.4	2.9	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS12	< 1.0	< 1.0	< 1.0	12	20	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	39	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS13	< 1.0	< 1.0	< 1.0	5.3	13	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	43	590	36	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	81	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.5				WS14	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS15	< 1.0	< 1.0	< 1.0	2.3	7.6	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.6	< 1.0	<0.001	<0.001	<0.001	0.0032	0.002
		0-0.6				WS16	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.5				WS19	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0-0.6				WS21	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.8	11	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0.0-0.45				WS17	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	0.037	0.0025
		0.0-0.6				WS18	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0.0-0.6				WS20	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0.0-0.6				WS22	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	0.0019	<0.001	<0.001	<0.001
		0.0-0.4				WS23	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	< 1.0	<0.001	<0.001	<0.001
		0.0-0.6				WS24	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0.0-0.5				WS25	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0.0-0.5				WS26	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001
		0.0-0.6				WS27	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<0.001	<0.001	<0.001	<0.001	<0.001

Client/client ref: Barnsley MBC
Project ref: Wombwell
Site ref: 23-24-18-1-6003
Data description: Preliminary Investigation
Contaminant(s): TPH and BTEX
Test scenario: Planning
Date: 26 April 2018
User details: C Riley

	Aliphatic TPH >C5-C6	Aliphatic TPH >C6-C8	Aliphatic TPH >C8-C10	Aliphatic TPH >C10-C12	Aliphatic TPH >C12-C16	Aliphatic TPH >C16-C35	Aliphatic TPH >C35-C44	Aromatic TPH >C5-C7	Aromatic TPH >C7-C8	Aromatic TPH >C8-C10	Aromatic TPH >C10-C12	Aromatic TPH >C12-C16	Aromatic TPH >C16-C21	Aromatic TPH >C21-C35	Aromatic TPH >C35-C44	Benzene	Toluene	Ethylbenzene	m & p-Xylene	o-Xylene
Critical concentration, C_c	**78**	**230**	**65**	**330**	**2400**	**92000**	**92000**	**140**	**290**	**83**	**180**	**330**	**540**	**1500**	**1500**	**0.17**	**290**	**110**	**130**	**140**
Notes	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM	LQM GAC 2.5%SOM				
Full dataset size	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Outliers present?	No	No	No	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Number of outliers temporarily excluded	0																			
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Sample mean, $\bar{x}$	0.5	0.5	0.5	2.22	3.8533333	4.7666667	0.5	0.5	0.5	0.5	0.5	1.05	10.356667	75.113333	4.1666667	0.0005	0.0171967	0.0005	0.0018067	0.0006167
Standard deviation, s	0	0	0	3.9676624	7.7333016	13.725595	0	0	0	0	0	3.0124741	42.228244	238.47006	14.863942	3.308E-19	0.0911873	3.308E-19	0.0066652	0.0004488
Number of non-detects	**30**	**30**	**30**	**24**	**24**	**27**	**30**	**30**	**30**	**30**	**30**	**29**	**22**	**15**	**28**	**30**	**29**	**30**	**28**	**28**
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Single value	Single value	Single value	Non-normal	Non-normal	Non-normal	Single value	Single value	Single value	Single value	Single value	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev
Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers												
t statistic, t_0 (or k_0)	N/A	N/A	N/A	-452.489356	-1697.106416	-36710.87849	N/A	N/A	N/A	N/A	N/A	-598.0909091	-68.69752852	-32.72706747	-551.2007788	-2.80632E+18	-17417.99967	-1.8212E+21	-106828.0481	-1708509.363
Upper confidence limit (on true mean concentration, μ)	0.5	0.5	0.5	5.3775547	10.007668	15.689803	0.5	0.5	0.5	0.5	0.5	3.4473944	43.96285	264.89315	15.995725	0.0005	0.0897656	0.0005	0.007111	0.0009738
Evidence level	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**
Select dataset	◉	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**