



**Baden Street
Barnsley**

Ground Investigation Report

On behalf of Barnsley Metropolitan Borough
Council

Report 23-24-18-1-6004/GIR1
September 2017

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Executive Summary

SITE INFORMATION	
Client	Barnsley Metropolitan Borough Council.
Site	Baden Street.
Location	Worsborough, Barnsley, S70 5PA. NGR 435777, 403730.
Approximate area	0.12Ha / 1180m ² .
Topography	Elevations range from approximately 63m OD in the north to 57.9m OD in the south.
Current land use	Residential housing, disused.
Proposed development	Demolish existing houses and replace with new low rise residential

SITE SETTING	
Geology	Pennine Middle Coal Measures. No superficial deposits shown.
Hydrogeology	Secondary A Aquifer. The site does not lie within a source protection zone.
Hydrology	River Dove lies circa 190m south.
History	The site was undeveloped agricultural land until the 1920s, when the current (now disused) residential dwellings were constructed.

INVESTIGATION	
Previous site investigations	Phase 1 Desk Study Report by Hamson Barron Smith (ref 12-17-16-1-6007/DSR1 dated 11 March 2016).
This site Investigation	Six windowless sampler boreholes to 5.45m bgl with 3 x 50mm standpipes & gas valves. One machine excavated trial pit with infiltration testing to 2.30m bgl. Two rotary open boreholes to 30.00m bgl.
Monitoring	One gas and groundwater level monitoring visit completed at this stage.
Ground conditions	The investigation identified firm becoming stiff clay with mudstone bedrock at depth. Coal was present at 3.60m bgl and 5.00m bgl in the lower western part of the site, and 16.00m bgl in the upper eastern part. No voids or other evidence of workings were observed. No groundwater was encountered during the investigation. Monitoring of groundwater levels within the standpipes installed was undertaken on the 13 and 26 July 2017; all of the wells were dry.

GEOTECHNICAL	
Foundations	Strip footings suitable. Bearing capacity of 100kPa at 0.75m. There is reportedly a basement to No. 2 at the western end of the terrace. If this is present then this would entail a below ground void. If Made Ground is too great for practical or economical construction of strip foundations then piled foundations can offer a suitable alternative solution.
Shrinkable soils	Soils are low volume change potential.
Buried concrete	DS1 & AC1.
Floor slabs	Suspended floors 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.
Soakaways	Underlying geology not suitable for soakaway drainage.
Natural cavities	None expected.
Mining	Coal was present at 3.60m bgl and 5.00m bgl in the lower western part of the site, and 16.00m bgl in the upper eastern part. No voids or other evidence of workings were observed. However due to the presence of the current buildings only two rotary holes were drilled. It is anticipated that further holes will be required to confirm the mining risk at the site.

CONTAMINATION	
Human health	Localised surface heavy metals, PAH and TPH present.
Water supply pipes	Localised elevated concentrations of hydrocarbons have been encountered, which may have the potential to attack plastics. Confirmation should be sought from the water supply company at the earliest opportunity as to their specific requirements.
Remediation	Site strip and import of clean material required, or placement of 600mm thick cover layer. This will need to be validated on completion.

1 Introduction

In August 2017 Hamson Barron Smith Ltd (HBS) was commissioned by Barnsley Metropolitan Borough Council to plan, design, procure and interpret an intrusive investigation at Baden Street, Barnsley.

The site comprises a row of derelict former residential properties. The location of the site is shown on Figure 1. A site topographic survey is included in Appendix B.

It is understood that the site is being considered for redevelopment. Redevelopment is to comprise the demolition of the former properties and construction of new low rise residential premises. A provisional development layout has been provided by NPS Barnsley (reference drawing number NPS-DR-A-(00)-012 P3 dated 28 June 2017) and is presented in Appendix B.

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:

- 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, including mining.
- Provide geotechnical recommendations to assist in construction design.

To address these objectives Hamson Barron Smith proposed the following scope of works:

- An intrusive ground investigation consisting of dynamic sampler boreholes, trial pits, rotary open hole boreholes, 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.

1.2 Previous Investigations

A Preliminary Land Contamination and Geotechnical Risk Assessment for the site has been undertaken by Hamson Barron Smith Ltd (formerly Robson Liddle Limited) in March 2017 (report reference 12-17-16-1-6007/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: Baden Street, Worsborough, Barnsley

Post Code: S70 5PA

National Grid Reference: 435777, 403730

The site is located on Baden Street on the southern edge of Worsborough, approximately 3km south of Barnsley town centre as shown on Figure 1.



Figure 1 Site Location Plan

3 Site Description

The site occupies an area of 0.12Ha / 1180m² and falls from an elevation of 63.00m in the north to 57.90m in the south along the front elevations of the buildings.

The site consists of a row of eleven terraced two-storey houses, numbered 2 to 24.

The houses front directly onto the pavement of Baden Street with gardens to the rear (west) of the site. The properties are all boarded up. Damaged roofs were noted to the three southern properties (Nos 2 – 6). The rear gardens of the properties were typically overgrown and inaccessible. Anecdotal information from NPS Barnsley indicates that the southernmost property No 2 may have a basement.

3.1 Surrounding Land-Use

The site is bound to the north and west by residential premises. A doctor's surgery lies to the east. An open grassed area is present to the south with the B6100 beyond and a workshop, used as a paint shop, to the south.

Figure 2 shows the site setting.



Figure 2 Site layout

3.2 Photographs



Photograph 1 Baden Street showing existing properties which are to be demolished, looking south.





Photograph 2 Gardens to the rear of the properties are overgrown, looking north.



4 Summary of Previous Work

A Preliminary Land Contamination and Geotechnical Risk Assessment for the site has been undertaken by Hamson Barron Smith Ltd (formerly Robson Liddle Ltd) in March 2016 (report reference 12-17-16-1-6007/DSR1).

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

- Information published by the British Geological Survey indicated that the site is expected to be underlain by Pennine Middle Coal Measures. The Pennine Middle Coal Measures is described by the BGS as “*interbedded mudstone, siltstone, sandstone and commonly coal seams*”.
- No superficial deposits are expected to overlie the Pennine Middle Coal Measures. The anticipated ground conditions are considered likely to be suitable for conventional strip foundations for the proposed development.
- It is likely that some Made Ground would be present, resulting from the current development of the site. Deep Made Ground resulting from infilling or significant raising of levels is considered unlikely. However anecdotal information indicates that No 2 Baden Street has a cellar; Made Ground to around 3m bgl is therefore anticipated to be present in the immediate vicinity of this property.
- The SYMAS Report, included in the report, indicates that the Kent's Thin Coal seam (thickness circa 0.6m) is conjectured to outcrop to the south west of the site and therefore may be present at shallow depth beneath the site. The seam is likely to lie at a depth of 6m below the site due to the rise in elevation from the outcrop and the north easterly dip of the strata.
- The report indicates that SYMAS hold no records of any shallow mine workings beneath the site. However the possibility of unchartered workings beneath the site cannot be ruled out therefore the risk to the site is assessed as Low. The SYMAS report concludes that while there are no records of shallow mining beneath the site it would be advisable to undertake limited ground investigation to confirm the depth and condition of the Kent's Thin Coal seam.

- The Groundsure GeoInsight 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%. Therefore, no radon protective measures are required in the construction of new buildings.
- The site was undeveloped agricultural land until the 1920s, when the current (disused) residential dwellings were constructed.
- The Environment Agency classifies the Pennine Middle Coal Measures at the site to be Secondary A Aquifer. The site does not lie within a Source Protection Zone. There are no groundwater abstraction boreholes within 1km of the site.
- The nearest surface water is a primary river, River Dove, which lies circa 190m south east of the site.
- The nearest landfill is located 248m to the east and is listed as Stallite Batteries, West Street; no detail on the waste type is recorded. On the basis of the underlying geology and the distance from the site, the landfill is unlikely to present a risk to the site from gas or leachate migration.
- Coal mining and other historical industrial uses including timber yard have been identified in the surrounding area, which could have resulted in historic contamination. However all identified locations lie down gradient or cross gradient from the site. They are therefore unlikely to represent significant sources of contamination for the development site.

5 Ground Investigation

The intrusive investigation was designed, specified and administered by HBS. The works were undertaken by Sub Surface North East (SSNE) who were appointed by Barnsley Metropolitan Borough Council. A copy of SSNE's Factual report is presented in Appendix D.

The intrusive works comprised the following:

- Six windowless sampler boreholes.
- Dynamic probe holes undertaken adjacent to each borehole.
- Two Rotary Open Hole Boreholes.
- Ground & gas monitoring wells installed in three boreholes.
- Four hand dug foundation exposure pits.
- One BRE soakaway tests.

The purpose of the exploratory holes was to provide information on the near surface ground conditions across the site and to allow monitoring wells to be installed for future gas monitoring.

The purpose of the two rotary boreholes was to provide a preliminary assessment of the mining risk at the site. The boreholes were drilled at the northern and southern edge of the site only due to access restrictions as a result of the presence of the current houses. It is anticipated that further holes will be required to confirm the mining risk at the site.

The positions of the exploratory holes were intended to provide a reasonable coverage of the site for an assessment of general site ground conditions. However, only limited access was available to the rear of the current derelict properties due to existing fences and overgrown vegetation.

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 23-24-18-1-6004 D01 in Appendix C and the exploratory hole records are included SSNE's Factual report which is presented in Appendix D.

5.1 Windowless Sampler Boreholes

Six boreholes (M1 to M6) were formed to depths of between 1.00m and 5.45m on 10 July 2017 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 in SSNE's Factual report which is presented in Appendix D.

5.2 Dynamic Probing

Five Dynamic Probe Holes (DP1 to DP4 and DP6) 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 90° (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 SSNE's Factual report which is presented in Appendix D.

5.3 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 one machine excavated trial pit (SA1) on 18 July 2017.

The pit was partially filled with water with the rate of inflow sufficiently rapid so that the pit was filled in a short time. The rate of dissipation was then monitored to obtain a plot of water level over time. Due to poor infiltration it was not possible to complete one full cycle of testing.

Variations in soil conditions, areas of filled land, preferential underground seepage routes, variations in the level of groundwater and any geological factors likely to affect the long-term percolation and stability of the area surrounding the soakaway were assessed.

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

5.4 Rotary Boreholes

Two rotary boreholes were progressed to a depth of 30.00m bgl using open holing techniques and water flush medium in order to assess the presence of intact or worked coal seams. The completed boreholes were grouted on completion.

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

5.5 Installations

Gas / Groundwater monitoring wells were installed into three of the six 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
M1	5.45	50	1.00 to 5.00	Gas valve, flush locked cover
M3	5.45	50	1.00 to 5.00	Gas valve, flush locked cover
M6	5.45	50	1.00 to 5.00	Gas valve, flush locked cover

5.6 Foundation Exposure Pits

Four hand excavated pits were undertaken to expose and examine the foundations of the existing building. HD1 to HD3 were excavated along the eastern elevation of the existing row of derelict houses and HD4 at the southern end. The profiles of strata or other features were recorded as excavation proceeded and measurements of the foundations exposed taken from ground level. Sketch sections of the foundations and strata encountered are included in SSNE's Factual report which is presented Appendix D.

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:

- Two particle size distribution (PSD) tests and two Sedimentation tests
- Five natural moisture contents and Atterberg Limits
- Three 2.5kg dry density tests
- Three remould CBR tests
- Three BRE SD1 sulphate suites

The results are included in SSNE's Factual report which is presented Appendix D.

6.3 Chemical Testing

Seven samples of soils 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	

Three soil samples were 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 SSNE's Factual report which is presented Appendix D.

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 Table 2 and discussed in sections 7.2 to 7.6. For full details of the strata encountered reference should be made to the exploratory hole logs in Appendix D.

Table 2 Ground Conditions

Stratum	Depth to Base (m bgl)					
	M1	M2	M3	M4	M5	M6
Hardstanding	0.38	0.08	0.12	0.05	-	0.25
Made Ground	0.80	0.90	0.80	0.60	0.65	-
Soft to firm slightly sandy slightly gravelly clay	1.60	1.60	3.90	3.00	-	-
Firm to stiff slightly sandy slightly gravelly clay	3.60	3.80	-	4.60	1.00	4.50
Extremely weak highly weathered mudstone	4.10	5.45*	5.45*	5.45*	5.45	5.00
Coal	-	-	-	-	-	5.42*
Extremely weak thinly laminated moderately weathered mudstone	5.45*	-	-	-	-	-
Groundwater	Dry	Dry	Dry	Dry	Dry	Dry

* base of hole

7.2 Hardstanding

Hardstanding was recorded in five of the exploratory holes.

In M1 the hardstanding was recorded as a layer of sandstone paving slabs on mortar over a secondary layer of concrete paving slabs to a depth of 0.38m bgl.

In M2 to M4 and M6 hardstanding comprises a layer of tarmac between 0.05m and 0.16m thick. In M6 the tarmac was underlain by a layer of sandstone setts to a depth of 0.25m bgl.

7.3 Topsoil

A layer of Made Ground, which was interpreted as reworked Topsoil, was encountered in one of the exploratory hole (M5) to a depth of 0.10m below ground level (bgl). The material consisted of an ashy slightly sandy very gravelly clay. The gravel constituents comprised fine to medium brick, sandstone and slate.

7.4 Made Ground

Made Ground materials were encountered in the majority of locations to depths ranging from 0.60m to 0.90m bgl. The materials generally comprised dark brown slightly ashy slightly clayey sandy gravel. The gravel constituents comprised fine to coarse brick, stone, clinker, tarmac, sandstone and siltstone. Occasional brick and stone cobbles were present

In M2 and M3 an upper layer of gravel subbase was recorded to between 0.15m and 0.20m bgl.

In M3 the granular Made Ground was underlain at 0.75m bgl by soft light brown and brown ashy slightly sandy slightly gravelly clayey silt to 0.80m bgl.

In M5 a layer of soft dark brown slightly sandy gravelly clay was recorded from 0.10m to 0.20m bgl.

In M6 a layer of possible Made Ground was identified to 0.40m bgl. The materials comprised firm dark brown, brown and light brown sandy slightly gravelly clay.

7.5 Pennine Middle Coal Measures

The Made Ground was underlain by the solid geology of the Pennine Middle Coal Measures. This material was weathered a soft to firm slightly sandy slightly gravelly clay with occasional to many lenses of silt clay to between 1.60 and 3.90m bgl over firm becoming stiff slightly sandy gravelly clay with occasional black organic lenses and low sandstone / siltstone cobble content to between 1.0m and 4.60m bgl.

In M5 and M6, the soft to firm layer was not recorded. In M3 the firm to stiff layer was no recorded.

In all of the exploratory hole the weathered clay was underlain by extremely weak friable light grey highly weathered mudstone, completely weathered to clay in places with mudstone lithorelicts. In M1 this was underlain at 4.10 by moderately weathered mudstone. In M5 this stratum was underlain at 5.00m by dark grey vitreous coal.

The rotary boreholes recorded clay to between 2.70m and 3.40m bgl.

In R1 this is underlain by weak to moderately strong siltstone to 15.60m, moderately strong mudstone to 16.00m, coal to 17.60m and moderately strong becoming strong mudstone to the base of the hole at 30.0m bgl.

In R2 the clay is underlain by weak siltstone to 3.10m, moderately strong mudstone to 3.60m, coal to 5.50m, mudstone to 18.95m, coal to 19.10m and mudstone to the base of the hole at 30.00m bgl. No voids were recorded in the rotary boreholes.

7.6 Groundwater

No groundwater was encountered in the windowless sampler boreholes or trial pit during the intrusive works. A groundwater inflow was recorded at 14.50m in R1 and 3.10m bgl in R2. Monitoring of groundwater levels within the standpipes installed was undertaken on the 13 and 26 July 2017; all of the wells were dry.

7.7 Field Observations of Contamination

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

7.8 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” (2011) 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 3.

Table 3 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 (I_p) 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 five soil samples of the weathered clay strata ranged from 15% to 21%, with the percentage of the soil <425µm ranging from 85% to 100%. The calculated modified plasticity indices ranged from 14% to 21%.

On this basis, the clay soils would therefore be considered to be of **low volume change potential** with respect to NHBC Chapter 4.2 “Building Near Trees” (NHBC, 2011). Consequently, a minimum foundation depth of 0.75m is recommended where foundations are outside the influence zone of trees.

7.9 Soil Strength

The Standard Penetration Tests (SPTs) ranged from 9 to 26 in the clay and from 12 to 56 in the weathered bedrock (see Figure 3). 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 45kPa to 120kPa. The results of hand shear vane tests ranged from 42kPa to 130kPa. The shear strength values are shown on Figure 4.

7.10 Existing Foundation Details

To determine the construction of the foundations to the buildings four hand dug foundations pits (HD1 to HD4) were excavated. .

HD1 was excavated to the rear of No 24. The base of the foundation was recorded at 0.70m below existing ground level, and extended to 0.14m from the elevation.

HD2 was excavated to the front of No 20. The base of the foundation was recorded at 0.71m below existing ground level, and extended to 0.11m from the elevation.

HD3 was excavated to the front of No. 8. The base of the foundation was recorded at 0.73m below existing ground level, and extended to 0.09m from the elevation.

HD4 was excavated to the side of No 2. The base of the foundation was recorded at 0.346m below existing ground level, and extended to 0.101m from the elevation. No evidence of a basement was recorded at this location.

Sketch sections of the foundations and strata encountered is presented on trial pit logs, which are included in SSNE's Factual report in Appendix D.

8 Geotechnical Assessment

8.1 Proposed Development

It is understood that the site is being considered for redevelopment with low rise residential properties. A preliminary proposed development layout plan was provided by Barnsley Metropolitan Borough Council. A copy of this plan is included in Appendix B.

8.2 Summary of Ground Conditions

The investigation identified firm becoming stiff clay with mudstone bedrock at depth. Coal was present at 3.60m bgl and 5.00m bgl in the lower western part of the site, and 16.00m bgl in the upper eastern part. No voids or other evidence of workings were observed. However due to the presence of the current buildings only two rotary holes were drilled. It is anticipated that further ho will be required to confirm the mining risk at the site.

There is reportedly a basement to No. 2 at the western end of the terrace. If this is present then this would result in a void and or could entail up to around 3m of Made Ground. The presence or otherwise of basements to all houses should be confirmed. A foundation pit was undertaken to the rear of the southern elevation of No.2; however, no evidence of a basement was recorded in the foundation pit.

No groundwater was encountered within 5m of ground level during the investigation or subsequent monitoring.

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

Based on the ground conditions encountered, conventional spread foundations would be suitable for lightly loaded structures. These should be taken down through any Topsoil, Made Ground or soft deposits and constructed within the firm or stiff clay.

To avoid seasonal ground movements associated with the shrinkable clay soils a minimum foundation depth of 0.75m should be adopted, although it is acknowledged that depths would need to be greater locally where deeper Made Ground or soft soils are present, or where foundations need to be deepened in the vicinity of trees.

Assessment of the shear strength of the clay (Figure 4) indicates a characteristic undrained shear strength of 50kPa in the upper parts of the Pennine Middle Coal Measures. This value would provide a bearing capacity of 100kPa for strip foundations.

Where the design bearing capacity is imposed then 15mm to 25mm of settlement may occur.

The clay soils are shrinkable (low volume change potential) and therefore foundations will need to be deepened and heave precautions adopted within the influence zone of existing, proposed or felled trees, in accordance with NHBC Chapter 4.2.

A tree survey to determine species and height will be required to calculate foundation depths in shrinkable soils.

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 desiccated clay soils.

8.4.1 Piled Foundations

Where the thickness of Made Ground is too great for practical or economical construction of strip foundations (for example where basements are present), piled foundations can offer a suitable alternative solution.

Potential issues that may need to be addressed are:

- Piles would either need to toe at least 4m above the coal seams, or penetrate to below the coal.
- 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. Noted that no groundwater is present within five metres of the ground surface and that consequently risks of connection of groundwater bodies is low.

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.

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.

8.5 Floor Slabs

The underlying soils are shrinkable or comprise in excess of 600mm of Made Ground. The sloping site also precludes a ground bearing slab. Therefore, a suspended floor slab would be required.

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 current 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. Anecdotal information indicated that No 2 may have a basement. No evidence of this was encountered in the HD4 located to the southern elevation of this property.

If a basement is still present beneath No.2 the void will need to be backfilled, with the fill material compacted to an engineered specification. This would result in a 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 raft foundations for suitable structures where the thickness of fill is too great.

8.7 Concrete Protection

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

Chemical Analysis was undertaken on two 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 8.0 to 8.3 with water soluble sulphate concentrations of <10mg/l. Therefore it is recommended that a Design Class of DS1 and AC1 should be assumed for buried concrete in accordance with BRE Special Digest 1 assuming natural ground and mobile groundwater conditions.

8.8 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 no groundwater was noted to the base of the monitoring wells at 5.00m bgl.

8.9 Soakaway Drainage

Infiltration testing was undertaken in accordance with BRE 365 (2016) in one locations (TP1). The stratum tested was the weathered Pennine Middle Coal Measures.

The pit did not drain sufficiently to allow the calculation of an infiltration rate.

However, the very low dissipation of water would suggest infiltrations rates are likely to be less than $1 \times 10^{-6} \text{m/s}$ and therefore efficient soakaway drainage is unlikely to be feasible.

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

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),

The proposed development is 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 0.32% to 9.0%, average 6.80%. 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 0.55% to 15.52%, average 11.7%. Where the assessment criteria are reliant on Soil Organic Matter (SOM); assessment criteria derived for 6% 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, seven 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 SSNE's Factual report which is presented in Appendix D.

9.2.1 Heavy Metals

The results of the chemical analysis for heavy metal concentrations within the soil samples are summarised in Table 4.

Table 4 Summary of Heavy Metals

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
Arsenic	37	8.5	29	Yes	100%
Boron (w/s)	290	<0.4	0.84	Yes	100%
Cadmium	11	<0.10	1.4	Yes	100%
Chromium (total)	910	11	180	Yes	100%
Chromium (VI)	6	<0.5	<0.5	Yes	100%
Copper	2400	19	120	Yes	100%
Lead	200*	15	290	No	90%
Mercury	11	<0.1	0.23	Yes	100%
Nickel	130	18	61	Yes	100%
Selenium	250	<0.2	<0.2	Yes	100%
Zinc	3700	68	350	Yes	100%

Results in mg/kg unless stated otherwise

GACs are LQM GAC unless stated otherwise

*DEFRA C4SL

9.2.2 Polyaromatic Hydrocarbons

The results of the chemical analysis for Polyaromatic Hydrocarbons (PAH US-EPA16) are summarised in Table 5.

Table 5 Summary of Polyaromatic Hydrocarbons

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
Acenaphthene	1100	<0.1	2.2	Yes	100%
Acenaphthylene	920	<0.1	20	Yes	100%
Anthracene	11000	<0.1	30	Yes	100%
Benz(a)anthracene	13	<0.1	120	No	8%
Benzo(a)pyrene	3	<0.1	110	No	4%
Benzo(b)fluoranthene	3.7	<0.1	140	No	4%
Benzo(ghi)perylene	350	<0.1	59	Yes	100%
Benzo(k)fluoranthene	100	<0.1	56	Yes	100%
Chrysene	27	<0.1	130	No	21%
Dibenz(a,h)anthracene	0.3	<0.1	20	No	3%
Fluoranthene	890	0.12	170	Yes	100%
Fluorene	860	<0.1	6.0	Yes	100%
Indeno(1,2,3-cd)pyrene	41	<0.1	71	No	91%
Naphthalene	13	<0.10	2.1	Yes	100%
Phenanthrene	440	<0.1	55	Yes	100%
Pyrene	2000	0.34	170	Yes	100%

Results in mg/kg unless stated otherwise

GACs are LQM S4UL for SOM of 6% unless stated otherwise

*DEFRA C4SL

9.2.3 Petroleum Hydrocarbons and BTEX

All soil samples were analysed for total petroleum hydrocarbons (TPH CGW) in an aromatic/aliphatic split and BTEX (benzene, toluene, ethylbenzene and xylene), the results of which are summarised in Table 6.

Table 6 Summary of Petroleum Hydrocarbons

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
EC>5-6 Aliphatic	160	<1.0	<1.0	Yes	100%
EC>6-8 Aliphatic	530	<1.0	<1.0	Yes	100%
EC>8-10 Aliphatic	150	<1.0	2.5	Yes	100%
EC>10-12 Aliphatic	760	<1.0	<1.0	Yes	100%
EC>12-16 Aliphatic	4,300	<1.0	130	Yes	100%
EC>16-35 Aliphatic	110,000	<1.0	710	Yes	100%
EC>35-44 Aliphatic	110,000	<1.0	130	Yes	100%
EC>5-7 Aromatic	300	<1.0	<1.0	Yes	100%

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
EC>7-8 Aromatic	660	<1.0	<1.0	Yes	100%
EC>8-10 Aromatic	190	<1.0	15	Yes	100%
EC>10-12 Aromatic	380	<1.0	35	Yes	100%
EC>12-16 Aromatic	660	<1.0	460	Yes	99%
EC>16-21 Aromatic	930	<1.0	2400	No	59%
EC>21-35 Aromatic	1,700	<1.0	9200	No	0%
EC>35-44 Aromatic	1,700	<1.0	970	Yes	99%
Benzene	0.37	<0.001	<0.001	Yes	100%
Toluene	660	<0.001	<0.001	Yes	100%
Ethylbenzene	260	<0.001	<0.001	Yes	100%
m&p-Xylene	310	<0.001	<0.001	Yes	100%
o-Xylene	330	<0.001	<0.001	Yes	100%

Results in mg/kg unless stated otherwise

GACs are LQM S4UL for SOM of 6.0% unless stated otherwise

*DEFRA C4SL

9.3 Human Health Summary

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 E.

9.3.1 Metals

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

The lead results, which ranged from 15mg/kg to 290mg/kg. One sample (14%) recorded a concentration in excess of the LQM S4UL for residential with gardens. The sample was from M5 at 0.1m bgl. The Made Ground in this location comprises an ashy gravelly sand. It is considered that the ash content is likely to be the source of the elevated lead.

9.3.2 PAH

The Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-cd)pyrene concentrations across the site are elevated with respect to the GAC for a residential end use and may pose a risk to human health. All of the elevated samples were in Made Ground.

A summary of the elevated concentrations, with respect to a residential end use, are given in Table 7 below.

Table 7 Elevated PAHs

Determinant	Concentration (mg/kg)	Location	Depth m bgl
Benz(a)anthracene	76	HD2	0.30
	120	HD3	0.15
Benzo(a)pyrene	65	HD2	0.30
	110	HD3	0.15
	11	HD3	0.55
	3.8	M5	0.10
	79	HD4	0.20
Benzo(b)fluoranthene	81	HD2	0.30
	140	HD3	0.15
	15	HD3	0.55
	5	M5	0.10
	98	HD4	0.20
Chrysene	71	HD2	0.30
	130	HD3	0.15
Dibenzo(a,h)anthracene	13	HD2	0.30
	20	HD3	0.15
	3.7	HD3	0.55
	0.78	M5	0.10
	0.71	M5	0.30
	13	HD4	0.20
Indeno(1,2,3-cd)pyrene	43	HD2	0.30
	71	HD3	0.15
	46	HD4	0.20

The Made Ground in this location comprises an ashy gravelly sand. It is considered that the ash content is likely to be the source of the elevated PAHs.

9.3.3 TPH

The TPH concentrations for the EC>16-21 Aromatic and EC>21-35 Aromatic splits across the site are elevated with respect to the GAC for a residential end use and may pose a risk to human health. All of the elevated samples were in Made Ground.

A summary of the elevated concentrations, with respect to a residential end use, are given in Table 8 below.

Table 8 Elevated TPHs

Determinant	Concentration (mg/kg)	Location	Depth m bgl
EC>16-21 Aromatic	2400	HD3	0.15
EC>21-35 Aromatic	3200	HD2	0.30
	9200	HD3	0.15
	2500	HD4	0.20

9.3.4 Summary

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 gardens further assessment and / or remediation will be required.

9.4 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 investigation and assessment has indicated localised elevated concentrations of PAH and TPH contaminants within the Made Ground which may have the potential to attack plastics and as such standard pipework may not be suitable for the site. In light of the conflicting and ambiguous guidance, confirmation should be sought from the water supply company at the earliest opportunity as to their specific requirements.

9.5 Ground Gas Assessment

9.5.1 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 between 1 and 3%. Therefore, no radon protective measures are required in the construction of new buildings or extensions.

9.5.2 Landfill Gas

The nearest landfill is located 248m to the east and is listed as Stallite Batteries, West Street; no detail on the waste type is recorded. On the basis of the underlying geology and the distance from the site, the landfill is unlikely to present a risk to the site from gas or leachate migration.

No organic soils, evidence of buried biodegradable materials or other potential sources of ground gas were identified on the site.

Consequently the risks to end users from explosive or asphyxiating gases is considered low. However, as the site lies within an area where coal resources are present, two rounds of gas monitoring was undertaken to validate this assumption. One round of gas monitoring was undertaken during the site works and a second round post site sites.

The results of the initial two rounds of gas monitoring are presented in Table 9.

Table 9 Gas Monitoring Results - Maximum recorded values

Visit No	1	2
Date	13.07.17	26.07.17
Pressure (mb)	998	983

Max values recorded	M1	M3	M6
Flow rate (l/hr)	< 0.1	< 0.1	< 0.1
Methane (%)	< 0.1	< 0.1	< 0.1
GSV (l/hr)	<0.001	<0.001	<0.001
Carbon dioxide (%)	1.4	1.1	3.6
GSV (l/hr)	<0.0014	<0.0011	<0.0036
Oxygen (%)	19.1	20.0	18.1

The two rounds of gas monitoring confirmed that negligible ground gas is present beneath the site and therefore no gas protection are anticipated to be required. However this assumption should be agreed with the regulatory authority.

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 10.

10.1 Receptors

It is understood that the site will be redeveloped 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 – River Dove 190m south east.
- Flora and fauna.

10.2 Sources

10.2.1 Contaminants

Elevated lead, Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-cd)pyrene and TPH EC>16-21 Aromatic and EC>21-35 Aromatic splits were encountered in the Made Ground.

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 10.

Table 10 Site Conceptual Model

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
Made Ground containing lead, PAH compounds and TPH.	Human Health – future users of the site e.g. residents and visitors.	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Likely – elevated lead, PAH and TPH identified in the Made Ground. Hardstanding will break the pathway. Cover required in areas of soft landscaping.	Probability: Likely Consequence: Medium Magnitude: Medium Risk
		Indirect Contact - Vapour inhalation.	Unlikely – no volatile sources identified.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk
		Hydrocarbon tainting of potable water supply pipes.	Possible – elevated concentrations of TPH and PAH contaminants within the Made Ground which may have the potential to attack plastics.	Probability: Likely Consequence: Medium Magnitude: Medium Risk
	Human Health – Construction workers	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible – increased risk of direct contact with soils during the construction period. Risk to be manage through working practices, PPE and risk assessment.	Probability: Likely Consequence: Medium Magnitude: Medium 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 – sources identified however underlying clay strata are of low permeability.	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 – River Dove 190m south east.	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination	Unlikely – sources identified but 190m to nearest watercourse.	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 – sources identified on site but 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

A preferred remedial strategy for the site will have to be developed in consultation with the design team and the regulatory authorities. Liaison should be continued during implementation and subsequent verification.

With the information available from the current investigation, the following approach is suggested. Note that additional site investigation works to allow more detailed zoning of the site and/or higher tiers of risk assessment may result in a reduced remedial requirement.

- Controlled decommissioning, decontamination and demolition of site buildings and ancillary structures such as existing drainage system.
- Installation of a cover system for areas of residential gardens, landscaping areas and public open space, designed according to the BRE guidance (Hollingsworth 2004).
- Protection of water supply pipes this may include clean services trench's and or barrier pipe.

The methodology for the remediation should be detailed in a Remediation Method Statement which will need to be submitted to the NHBC and the regulatory authorities for approval.

In addition, the writing and approval of a Materials Management Plan will be required to allow re-use of suitable material at the site (see Section 11.1).

Following completion of the above works verification reports, undertaken by a suitably qualified independent engineer will be required.

11.1 Material Reuse

Based on the GQRA carried out the Made Ground soils sample pose a potential risk to human receptors and would be not be suitable for re-use. Underlying weathered bedrock would be suitable for reuse.

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:

- Further investigation / confirmation of depth of Made Ground and depth to coal seams post demolition.
- Pre-demolition asbestos survey.
- 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.
- Production of remedial design
- Remediation of the site.
- 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.

13.2 Site Specific

No investigation beneath buildings has been undertaken. There may be deeper areas of Made Ground and buried structures associated with these buildings. It would be

prudent to confirm ground conditions to validate design assumptions, once demolition works are completed.

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.

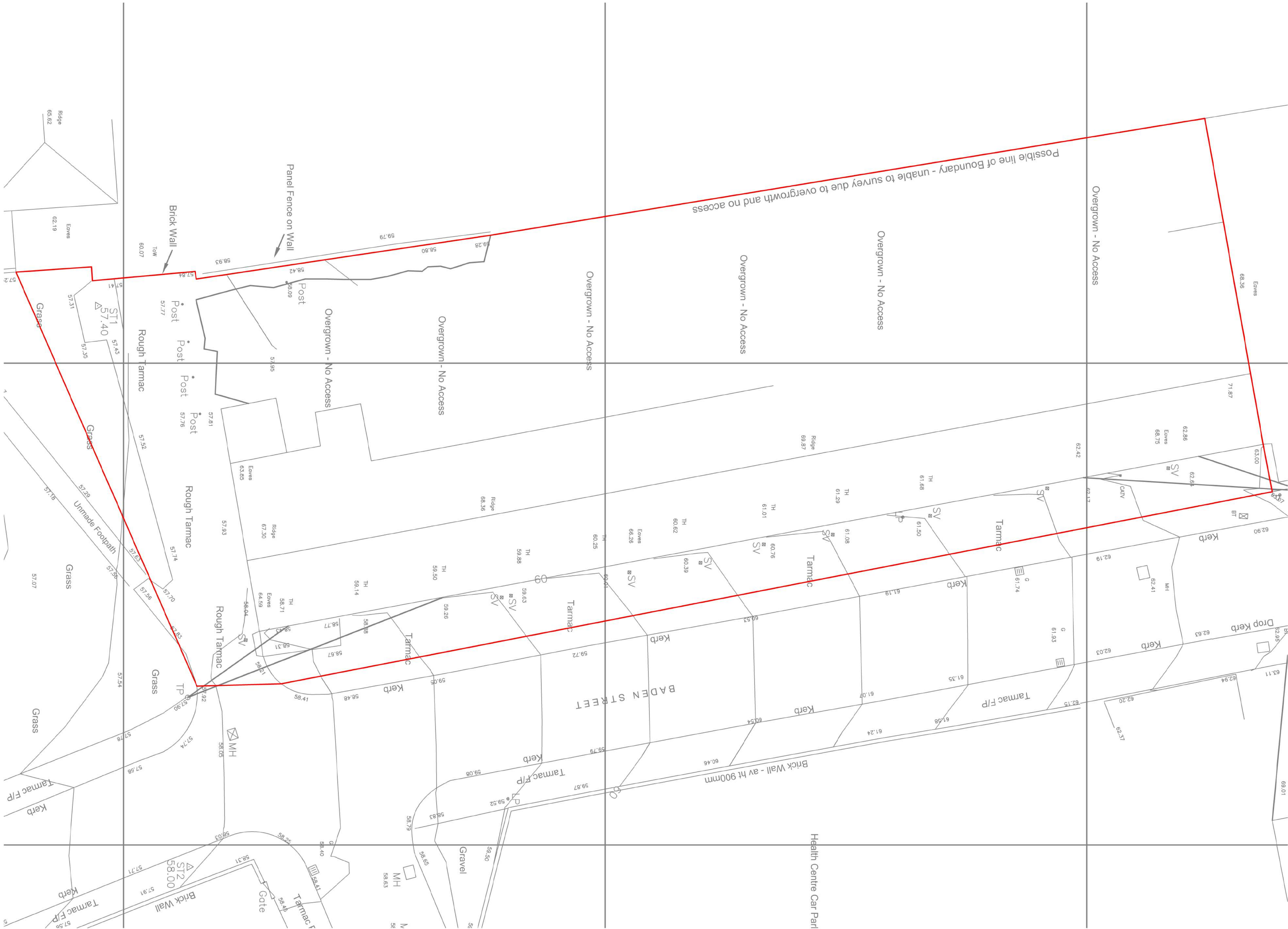
Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will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

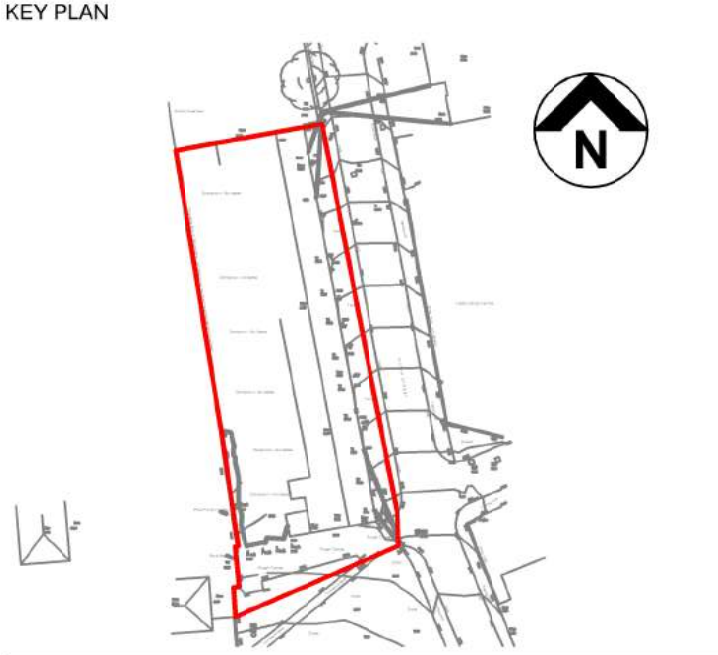
Site Topographic Survey



RESPONSIBILITY IS NOT ACCEPTED FOR OTHERS SCALING DIRECTLY FROM THIS DRAWING. DO NOT SCALE FROM THIS DRAWING. USE WRITTEN DIMENSIONS ONLY.

0m 1 2 3 6m
1:100

ORIGINAL SHEET SIZE **A1**



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Notes:

REDLINE BOUNDARY AMENDED TO INCLUDE SECTION OF EXISTING ADOPTED HIGHWAY					
P2	LJK	26.01.16			
ISSUED FOR PLANNING APPROVAL					
P1	LJK	15.01.16			
COMMENT:					
REV	DRAWN	DATE	CHECKED	DATE	APPROVED
nps group					
NPS Barnsley Ltd Gateway Plaza, Sackville St, Barnsley, South Yorkshire, S70 2RD, Tel: 01228 774005; Email: barnsley@nps.co.uk; web: www.nps.co.uk					

CLIENT
Berneslai Homes

PROJECT
Baden Street Housing Development

TITLE
TOPOGRAPHICAL

SCALES	DISCIPLINE	PROJECT NUMBER
1:100	ARCHITECT	16-1-1084
DRAWING NUMBER	REV CODE	REV CODE
NPS-DR-A-(00)-011	P2	
STATUS CODE	PURPOSE OF ISSUE	DRAWN BY
S2	PLANNING APPROVAL	LJK

01 Topographical
Scale 1:100 @ A1

Appendix B

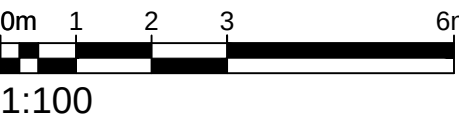
Proposed Development Plan

01



01 Proposed Site GA
Scale 1:100

RESPONSIBILITY IS NOT ACCEPTED FOR OTHERS SCALING DIRECTLY FROM THIS DRAWING. DO NOT SCALE FROM THIS DRAWING. USE WRITTEN DIMENSIONS ONLY.



ORIGINAL SHEET SIZE **A1**

KEY PLAN



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Notes:

Site area -1225 m² / 0.12ha
Existing Terrace units - 11 dwellings
Proposed new units - 8 dwellings
Proposed site density - 65 p/ ha

Proposed Units;
2bed / 3person - plots 2-8
3bed / 5person - plots 1

Unit size;
2bed / 3person - xx 2m (Gross Int)
3bed / 5person - xx 2m (Gross Int)

Parking provision;
2bed / 3person - 1No
3bed / 5person - 2No

Specification;
Dwellings to meet requirements of Secure-by-Design.

Proposed Materials;

- 1.0_Roof
 - Covering / Wienerberger/ Britlock recycled slate tiles / Graphite
 - Facia & Soffits / UPvc - colour grey (RAL TBC)
- 2.0_Walls & Cladding
 - Facing Brick - lbstock / Ivanhoe mellow red / light grey mortar
 - Through Colour render (off white) to ground floor.
- 3.0_Doors & windows
 - Main Entrance Door / Composite (Colour TBC)
 - Windows / UPvc - colour grey (RAL TBC)
 - French Doors / UPvc - colour grey (RAL TBC)
- 4.0_Miscellaneous
 - RW goods / UPvc (black)
 - Retaining walls / Brick - lbstock / Ivanhoe mellow red / light grey mortar / Gabion baskets recycled brick
 - Access gate to rear / galvanised mild steel
 - External Works as Drawing 17-1-1186-NPS-DR-00-800.

Issued for Tender

P3	SBL	28.06.17			LS	25.07.17
----	-----	----------	--	--	----	----------

Employers Requirements.

P2	SBL	26.06.17			LS	25.07.17
----	-----	----------	--	--	----	----------

ISSUED FOR PLANNING APPROVAL

P1	LJK	FEB 17			LS	25.07.17
----	-----	--------	--	--	----	----------

COMMENT

REV	DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
-----	-------	------	---------	------	----------	------

npsgroup

NPS Barnsley Ltd
Gateway Plaza, Sackville St, Barnsley, South Yorkshire, S70 2RD,
Tel: 01226 774605. Email: barnsley@nps.co.uk. web:www.nps.co.uk

CLIENT

Berneslai Homes

PROJECT

Baden Street Housing Development

TITLE

Existing and Proposed Site GA

SCALES	DISCIPLINE	PROJECT NUMBER
1:100	ARCHITECT	17-1-1186

DRAWING NUMBER	REV CODE
NPS- DR- A-(00)-012	P3
STATUS CODE	DRAWN BY
D2	LJK

Appendix C

Exploratory Hole Plan



Project: Baden Street
Redevelopment

Client: Barnsley Metropolitan
Borough Council

Title: Exploratory Hole Location
Plan

Drawing: 23-24-18-1-6004 D01

Date: 04 Jul 2017

Notes:

Hole Locations Approximate.

Key

-  Windowless Sampler
Borehole & Dynamic Probe
-  Machine Excavated Trial
Pit For BRE testing
-  Hand Excavated
Foundation Exposure Pit
-  Rotary Borehole

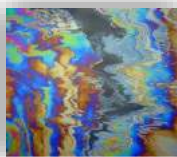
**Hamson
Barron
Smith**

Appendix D

Sub Surface North East Factual Report



INVESTIGATE



REMEDiate



REGENERATE

TECHNICAL REPORT

**GROUND INVESTIGATION
AT BADEN STREET
WORSBOROUGH
BARNsLEY
SOUTH YORKSHIRE
FOR
BARNsLEY METROPOLITAN COUNCIL**

**REPORT NO. NE3625
AUGUST 2017**



SUB SURFACE NORTH EAST LIMITED

AHED House
Dewsbury Road
Ossett
West Yorkshire
WF5 9ND

Tel: 01924 278181 Fax: 01924 283455
Email: dsimpson@subsurface.co.uk



CONTENTS

1. INTRODUCTION	1.1 Site Location and Description
	1.2 Proposed Development and Purpose of the Ground Investigation
2. INVESTIGATION	2.1 Investigation Details
3. SAMPLING, TESTING AND MONITORING	3.1 Sampling
	3.2 Field Testing
	3.3 Installations and Monitoring
	3.4 Laboratory Testing
4. GENERAL	
APPENDICES	Insitu Test results
	Laboratory Test results
	Contamination Analysis results
	Mini Borehole Record sheets
	Rotary Borehole Record sheets
	Hand Dug Trial Pit Record sheets
	Figures

**GROUND INVESTIGATION AT BADEN STREET, WORSBOROUGH, BARNSELY
SOUTH YORKSHIRE**

CLIENT: BARNSELY METROPOLITAN BOROUGH COUNCIL

ENGINEER: HAMSON BARRON SMITH

1. INTRODUCTION

This report has been prepared in accordance with Purchase Order No 4000291686 dated 26th June 2017, from the Client.

The brief was set out in our estimate, ref. E5626 and dated 9th June 2017, with amendments as the investigation proceeded and includes:

- 6 No. mini boreholes
- 2 No. rotary boreholes
- 4 No. hand excavated trial pits
- 1 No. machine excavated trial pit and soakaway test
- Geotechnical laboratory testing
- Contamination analysis
- Installation of standpipes followed by groundwater and ground gas monitoring
- Provision of a factual report on the above.

1.1 Site Location and Description

The site is located off Baden Street in Worsborough, Barnsley, S70 5PA as indicated on Figure 1, the approximate National Grid Reference of the centre of the site is 435776, 403746.

As shown on Figure 2, the site comprises a row of existing terraced houses with rear overgrown gardens awaiting demolition fronting onto a large macadam footpath. The western side of the site is formed by the rear boundary of gardens to properties that front onto Ravenscourt, Baden Street to the east, the garden to number 26 Baden Street in the north and a new development in the south.

The site slopes gently from the north down to the south. Tipped and discarded material is evident within the rear gardens.

1.2 Proposed Development and Purpose of the Ground Investigation

We understand that it is proposed to construct new housing on site. The purpose of the ground investigation was to determine the ground conditions at the positions of the exploratory holes. No interpretation was required or has been given in this report, as this is to be carried out by others.

2. INVESTIGATION

2.1 Investigation Details

Four hand dug trial pits were taken out at the positions determined by the Client's Engineer and set out by Sub Surface North East Limited, as shown on Figure 2. The hand dug trial pits were excavated to depths of between 0.55 and 0.90 metres. Samples were taken for logging, in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003, and testing. The resulting Hand Dug Trial Pit Records are appended.

One trial pit was taken out by a mechanical excavator at the position determined by the Client's Engineer and set out by Sub Surface North East Limited, as shown on Figure 2. The trial pit was excavated to a depth of 2.30 metres and the materials were logged in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003. The resulting trial pit was then used to conduct a soakaway test, the results of which are appended.

Six mini boreholes were put down to depths of 1.00 to 5.45 metres using a Mini Sampling Rig fitted with windowless sample tubes of 83mm diameter at the positions determined by the Client's Engineer and set out by Sub Surface North East Limited, as shown on Figure 2. The samples were subsequently logged in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003 and the resulting Mini Borehole Records are appended.

Two rotary boreholes were put down to depths of 30.00 metres using a Beretta T44 drill rig at the positions determined and set out by the Client's Engineer, as shown on Figure 2. Boreholes were advanced by rotary open holing techniques, with mist/water flushing medium using 100mm diameter rock roller bits and 120mm diameter temporary casing. The foreman driller logged chippings flushed to the surface during drilling and the resulting Rotary Borehole Records are appended.

On completion the trial pits were backfilled with arisings by the excavator and it is therefore likely that loose or soft pockets will still remain.

3. SAMPLING, TESTING AND MONITORING

3.1 Sampling

Continuous core, small disturbed and bulk disturbed samples were obtained for the strata encountered and were subjected to careful examination and hand shear vane tests, where appropriate.

The samples will be retained for a period of one month after the issue of this report, for reference purposes, and then disposed of unless otherwise instructed.

3.2 Field Testing

On completion of the trial pit, a soakaway test was undertaken. Water was added to the pit from a bowser and the water level was subsequently monitored over a period of 4 hours. Water levels were found to have fallen insufficiently to determine the Soil Infiltration Rates and details of the soakaway tests are appended.

Twenty-five Standard Penetration Tests (SPTs) were performed in the mini boreholes, the results of which are recorded on the appended Standard Penetration Test Results Sheet with 'N' values and indicative states of compaction and shear strength, where appropriate, given on the appended Mini Borehole Records

3.3 Installations and Monitoring

On completion of M1, M3 and M6 hdpe standpipes were installed to a depth of 5.00 metres. The standpipes are slotted, with an internal diameter of 50mm and removable quick release gas valves to enable both ground gas and groundwater monitoring and sampling to be undertaken by the Client's Engineer. Details of the installations are given on the appended Mini Hole Borehole Records.

Monitoring of the standpipes for ground gas and groundwater has been undertaken on two occasions to date during and after the fieldwork period using portable equipment. A Gas Data GFM 435 was used for monitoring methane, carbon dioxide, oxygen, gas flows and atmospheric pressure. The results of the monitoring is given on the appended Ground Gas and Groundwater Monitoring Results sheet.

3.4 Laboratory Testing

The following laboratory tests were carried out in accordance with BS.1377: 1990, where applicable, and the results are appended.

- Moisture content, plastic limit and liquid limit tests.
- Particle size distribution by wet sieve / sedimentation analysis.
- Compaction tests using a 2.5kg rammer.
- Pyritic Ground testing (including soluble sulphate and pH value tests)
- Soluble sulphate content and pH value tests.

The results of the above analyses are appended.

Contamination analyses have been performed on 7 soil samples for a suite of contaminants specified by the Client's Engineer.

Waste Acceptance Criteria (WAC) analysis has also been undertaken on three of the soil samples.

4. GENERAL

We trust that this report fulfils your present requirements but if you have any queries or we can be of further assistance please contact Mr David Simpson at our Ossett office.

SUB SURFACE CONSULTANTS LIMITED
FACTUAL REPORT No. NE3625
AUGUST 2017

INSITU TEST RESULTS



SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Standard Penetration Test Results

Site : BADEN STREET, WORSBOROUGH, BARNSELEY, SOUTH YORKSHIRE

Client : BARNSELEY METROPOLITAN BOROUGH COUNCIL

Engineer: HAMSON BARRON SMITH

Job Number
NE3625

Sheet
1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
M1	1.00	1.15	1.45	SPT	2	2	2	3	3	3	N=11	
M1	2.00	2.15	2.45	SPT	2	2	2	2	3	3	N=10	
M1	3.00	3.15	3.45	SPT	5	3	2	3	3	4	N=12	
M1	4.00	4.15	4.45	SPT	2	4	4	5	6	8	N=23	
M1	5.00	5.15	5.45	SPT	5	5	4	6	7	8	N=25	
M2	1.00	1.15	1.45	SPT	0	0	2	2	2	2	N=8	
M2	2.00	2.15	2.45	SPT	3	3	4	3	4	4	N=15	
M2	3.00	3.15	3.45	SPT	2	3	4	3	3	3	N=13	
M2	4.00	4.15	4.45	SPT	3	3	4	5	5	5	N=19	
M2	5.00	5.15	5.45	SPT	3	4	5	6	6	6	N=23	
M3	1.00	1.15	1.45	SPT	2	2	2	2	2	3	N=9	
M3	2.00	2.15	2.45	SPT	2	2	3	3	5	5	N=16	
M3	3.00	3.15	3.45	SPT	4	2	2	2	4	2	N=10	
M3	4.00	4.15	4.45	SPT	2	2	2	3	3	4	N=12	
M3	5.00	5.15	5.45	SPT	3	4	4	5	5	5	N=19	
M4	1.00	1.15	1.45	SPT	2	2	2	3	3	3	N=11	
M4	2.00	2.15	2.45	SPT	4	4	4	4	4	4	N=16	
M4	3.00	3.15	3.45	SPT	2	3	6	5	4	3	N=18	
M4	4.00	4.15	4.45	SPT	2	2	2	2	3	4	N=11	
M4	5.00	5.15	5.45	SPT	3	3	3	3	3	3	N=12	
M6	1.00	1.15	1.45	SPT	2	1	1	3	2	3	N=9	
M6	2.00	2.15	2.45	SPT	3	3	3	4	4	4	N=15	
M6	3.00	3.15	3.45	SPT	2	2	2	2	2	3	N=9	
M6	4.00	4.15	4.45	SPT	3	3	4	4	5	6	N=19	
M6	5.00	5.15	5.42	SPT	6	9	12	16	18	10	56/265mm	



SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Insitu Test Results

Site: BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer: HAMSON BARRON SMITH

Job Number

NE3625

Sheet:

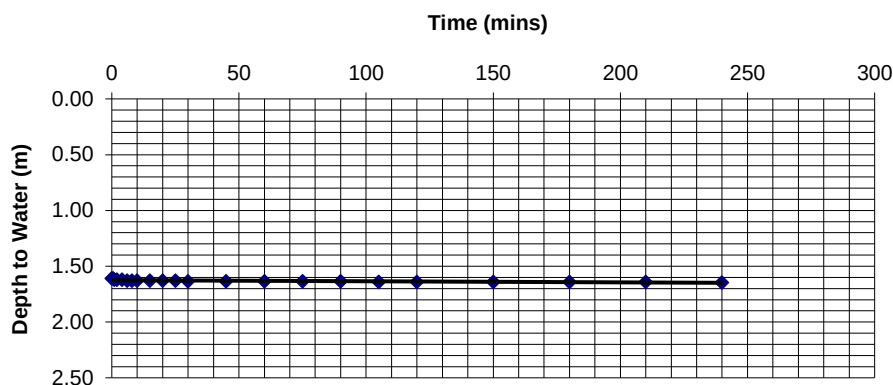
1 / 1

Soakaway Test

Trial Pit No: 1 (57.95 mOD)

TEST NO: 1

DATE: 18/07/2017



Length of pit: L = 1.90 m

Width of pit: W = 0.60 m

Depth of pit: D = 2.30 m

Base area of pit: A = 1.14 m²

100% effective depth D100 = 1.61 m

75% effective depth D75 = 1.78 m

50% effective depth D50 = 1.96 m

25% effective depth D25 = 2.13 m

time to D75 T75 = - sec

time to D25 T25 = - sec

time from D75 to D25 t_{p75-25} = - sec
(T25 - T75)

volume between D75 & D25 V_{p75-25} = 0.39 m³
(A x (D25 - D75))

surface area to D50 inc. base a_{p50} = 2.87 m²
((2x(D-D50)x(W+L)) + A)

SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

$$f = - \text{ m/sec}$$

Time (min)	Depth (m)
0	1.61
0.5	1.61
1	1.62
2	1.62
4	1.62
6	1.63
8	1.63
10	1.63
15	1.63
20	1.63
25	1.63
30	1.64
45	1.64
60	1.64
75	1.64
90	1.64
105	1.64
120	1.64
150	1.64
180	1.64
210	1.64
240	1.65

Test Strata: 0.00-0.30m MADE GROUND: Topsoil containing occasional brick and clay pipe fragments.
(see Trial Pit) 0.30-0.60m MADE GROUND: soft brown silty clay and slight topsoil.
0.60-1.65m Soft brown and grey mottled silty CLAY.
1.65-2.30m Very stiff to hard grey and brown silty CLAY with mudstone lithorelicts.
becoming highly weathered mudstone by 1.80m.

Old drian pipe exposed in side of trial pit at 0.85m.

Remarks: Soil infiltration rate not able to be calculated as strata is of very low permeability.

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907					Site BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE					Probe Number DP1					
Method DYNAMIC PROBING		Cone Dimensions Diameter 50mm, Angle 90°		Ground Level (mOD)		Client BARNSLEY METROPOLITAN BOROUGH COUNCIL					Job Number NE3625				
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH					Sheet 1/2				
Depth (m)	Blows for Depth Increment	Field Records		Level (mOD)	Depth (m)	Blows for Depth Increment 02468101214161820									
0.00-0.10	2				0.00										
0.10-0.20	2														
0.20-0.30	3														
0.30-0.40	3														
0.40-0.50	1														
0.50-0.60	0				0.50										
0.60-0.70	1														
0.70-0.80	1														
0.80-0.90	1														
0.90-1.00	1														
1.00-1.10	3				1.00										
1.10-1.20	2														
1.20-1.30	2														
1.30-1.40	2														
1.40-1.50	2														
1.50-1.60	2				1.50										
1.60-1.70	3														
1.70-1.80	2														
1.80-1.90	2														
1.90-2.00	2														
2.00-2.10	2				2.00										
2.10-2.20	3														
2.20-2.30	3														
2.30-2.40	4														
2.40-2.50	3														
2.50-2.60	3				2.50										
2.60-2.70	4														
2.70-2.80	4														
2.80-2.90	4														
2.90-3.00	4														
3.00-3.10	4				3.00										
3.10-3.20	3														
3.20-3.30	3														
3.30-3.40	2														
3.40-3.50	3														
3.50-3.60	3				3.50										
3.60-3.70	3														
3.70-3.80	4														
3.80-3.90	4														
3.90-4.00	4														
4.00-4.10	4				4.00										
4.10-4.20	3														
4.20-4.30	3														
4.30-4.40	2														
4.40-4.50	3														
4.50-4.60	3				4.50										
4.60-4.70	3														
4.70-4.80	3														
4.80-4.90	3														
4.90-5.00	3				5.00										
Remarks Weight = 63.5kg Drop = 750mm										Scale (approx) 1:25		Logged By DS/SJ			
										Figure No. NE3625.DP1					

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907					Site BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE					Probe Number DP1					
Method DYNAMIC PROBING		Cone Dimensions Diameter 50mm, Angle 90°		Ground Level (mOD)		Client BARNSLEY METROPOLITAN BOROUGH COUNCIL					Job Number NE3625				
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH					Sheet 2/2				
Depth (m)	Blows for Depth Increment	Field Records		Level (mOD)	Depth (m)	Blows for Depth Increment 0 2 4 6 8 10 12 14 16 18 20									
5.00-5.10	4				5.00	</									

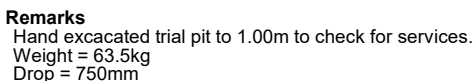


BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH
YORKSHIRE

DP2

**Job
Number**
NE3625

Sheet
1/2



Scale (approx)	Logged By
1:25	DS/SJ
Figure No.	
NE3625.DP2	

S SS SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907					Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE					Probe Number DP2					
Method DYNAMIC PROBING		Cone Dimensions Diameter 50mm, Angle 90°		Ground Level (mOD)		Client BARNSELY METROPOLITAN BOROUGH COUNCIL					Job Number NE3625				
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH					Sheet 2/2				
Depth (m)	Blows for Depth Increment	Field Records		Level (mOD)	Depth (m)	Blows for Depth Increment 0 1 2 3 4 5 6 7 8 9 10									
5.00-5.10	6				5.00										
5.10-5.20	6														
5.20-5.30	7														
5.30-5.40	5														
5.40-5.50	6														
5.50-5.60	4				5.50										
5.60-5.70	7														
5.70-5.80	7														
5.80-5.90	6														
5.90-6.00	5														
6.00-6.10	6				6.00										
6.10-6.20	6														
6.20-6.30	5														
6.30-6.40	6														
6.40-6.50	7														
6.50-6.60	8				6.50										
6.60-6.70	10														
6.70-6.80	8														
6.80-6.90	8														
6.90-7.00	8				7.00										
		</													



BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH
YORKSHIRE

DP3

**Job
Number**
NE3625

Sheet
1/1

Remarks
Hand excavated trial pit to 1.00m to check for services.
Obstruction at 3.50m
Weight = 63.5kg
Drop = 750mm

Scale (approx)	Logged By
1:25	DS/SJ
Figure No.	
NE3625.DP3	

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907					Site BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE					Probe Number DP4					
Method DYNAMIC PROBING		Cone Dimensions Diameter 50mm, Angle 90°		Ground Level (mOD)		Client BARNSLEY METROPOLITAN BOROUGH COUNCIL					Job Number NE3625				
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH					Sheet 1/2				
Depth (m)	Blows for Depth Increment	Field Records		Level (mOD)	Depth (m)	Blows for Depth Increment 036912151821242730									
					0.00										
1.00-1.10	1				1.00										
1.10-1.20	2														
1.20-1.30	2														
1.30-1.40	2														
1.40-1.50	2														
1.50-1.60	3				1.50										
1.60-1.70	4														
1.70-1.80	2														
1.80-1.90	3														
1.90-2.00	3														
2.00-2.10	3				2.00										
2.10-2.20	6														
2.20-2.30	6														
2.30-2.40	5														
2.40-2.50	5														
2.50-2.60	5				2.50										
2.60-2.70	5														
2.70-2.80	5														
2.80-2.90	4														
2.90-3.00	5														
3.00-3.10	5				3.00										
3.10-3.20	8														
3.20-3.30	5														
3.30-3.40	3														
3.40-3.50	5														
3.50-3.60	4				3.50										
3.60-3.70	3														
3.70-3.80	2														
3.80-3.90	3														
3.90-4.00	3														
4.00-4.10	4				4.00										
4.10-4.20	4														
4.20-4.30	4														
4.30-4.40	3														
4.40-4.50	3														
4.50-4.60	4				4.50										
4.60-4.70	5														
4.70-4.80	4														
4.80-4.90	5														
4.90-5.00	5				5.00										
Remarks Hand excavated trial pit to 4.10m to check for services Weight = 63.5kg Drop = 750mm										Scale (approx) 1:25		Logged By DS/SJ			
										Figure No. NE3625.DP4					



SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site

BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE

Probe Number

DP4

Method DYNAMIC PROBING	Cone Dimensions Diameter 50mm, Angle 90°	Ground Level (mOD)	Client BARNSLEY METROPOLITAN BOROUGH COUNCIL	Job Number NE3625
	Location AS PLAN	Dates 10/07/2017	Engineer HAMSON BARRON SMITH	Sheet 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
5.00-5.10	5			5.00	
5.10-5.20	6				
5.20-5.30	5				
5.30-5.40	5				
5.40-5.50	5			5.50	
5.50-5.60	4				
5.60-5.70	5				
5.70-5.80	5				
5.80-5.90	5				
5.90-6.00	6			6.00	
6.00-6.10	6				
6.10-6.20	7				
6.20-6.30	8				
6.30-6.40	10				
6.40-6.50	12			6.50	
6.50-6.60	13				
6.60-6.70	20				
6.70-6.80	25				
				7.00	
				7.50	
				8.00	
				8.50	
				9.00	
				9.50	
				10.00	

Remarks

Scale (approx)	Logged By
1:25	DS/SJ
Figure No.	
NE3625.DP4	

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907					Site BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE					Probe Number DP6					
Method DYNAMIC PROBING		Cone Dimensions Diameter 50mm, Angle 90°		Ground Level (mOD)		Client BARNSLEY METROPOLITAN BOROUGH COUNCIL					Job Number NE3625				
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH					Sheet 1/2				
Depth (m)	Blows for Depth Increment	Field Records		Level (mOD)	Depth (m)	Blows for Depth Increment 036912151821242730									
					0.00										
					0.50										
1.00-1.10	1				1.00										
1.10-1.20	2														
1.20-1.30	2														
1.30-1.40	2														
1.40-1.50	3				1.50										
1.50-1.60	3														
1.60-1.70	3														
1.70-1.80	4														
1.80-1.90	5														
1.90-2.00	5				2.00										
2.00-2.10	7														
2.10-2.20	6														
2.20-2.30	5														
2.30-2.40	4														
2.40-2.50	4				2.50										
2.50-2.60	4														
2.60-2.70	4														
2.70-2.80	3														
2.80-2.90	3														
2.90-3.00	2				3.00										
3.00-3.10	3														
3.10-3.20	2														
3.20-3.30	3														
3.30-3.40	2														
3.40-3.50	2				3.50										
3.50-3.60	2														
3.60-3.70	2														
3.70-3.80	3														
3.80-3.90	3														
3.90-4.00	3				4.00										
4.00-4.10	2														
4.10-4.20	4														
4.20-4.30	3														
4.30-4.40	3														
4.40-4.50	3				4.50										
4.50-4.60	3														
4.60-4.70	3														
4.70-4.80	7														
4.80-4.90	7														
4.90-5.00	11				5.00										
Remarks Hand excavated trial pit to 1.00m to check for services. Fall = 63.5kg Drop = 750mm										Scale (approx) 1:25		Logged By DS/SJ			
										Figure No. NE3625.DP6					



BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH
YORKSHIRE

DP6

**Job
Number**
NE3625

Engineer
HAMSON BARRON SMITH

Sheet
2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment											
					0	3	6	9	12	15	18	21	24	27	30	
5.00-5.10	13			5.00												
5.10-5.20	24															
5.20-5.30	28															
						5.50										
						6.00										
						6.50										
						7.00										
						7.50										
						8.00										
						8.50										
				9.00												
				9.50												
				10.00												

Scale (approx)	Logged By
1:25	DS/SJ

Figure No.

NE3625 DP6

Site: BADEN STREET, WORSBOROUGH, BARNSELY
Client: BARNSELY METROPLITAN BOROUGH COUNCIL
Engineer: HAMSON BARRON SMITH

Job Number
NE3625

Sheet:
1 / 1

Ground Gas and Groundwater Monitoring Results Sheet

[illegible]

Remarks: Elevated levels of methane and carbon dioxide and depleted levels of oxygen are shown in ***bold/italics***.

LABORATORY TEST RESULTS



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 36114

Client's Reference: **NE3625**

Report Date: **10-08-2017**

Client **Sub Surface**
3 Peel Street
Preston
PR2 2QS

Contract Title: **Baden Street, Worsborough, Barnsley**
For the attention of: **Simon Gabbatt**

Date Received: **28-07-2017**
Date Commenced: **28-07-2017**
Date Completed: **10-08-2017**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	5
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	5
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	2
PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected) 1377 : 1990 Part 2 : 9.4 - * UKAS	2
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould) 1377 : 1990 Part 4 : 3.3 - * UKAS	3
CBR: Remoulded Specimen and tested at top only 1377 : 1990 Part 4 : 7 - * UKAS	3
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Quality Assistant)
Vaughan Edwards (Managing Director) - Wayne Honey (Administrative/Quality Assistant)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377 : Part 2 : 1990 Method 5)

DESCRIPTIONS

Contract Number	36114	
Site Name	Baden Street, Worsborough, Barnsley	

[illegible]

Operators	Checked	09-08-17	Emma Sharp	
RO/MH	Approved	10-08-17	Paul Evans	

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)

Contract Number

36114

Site Name

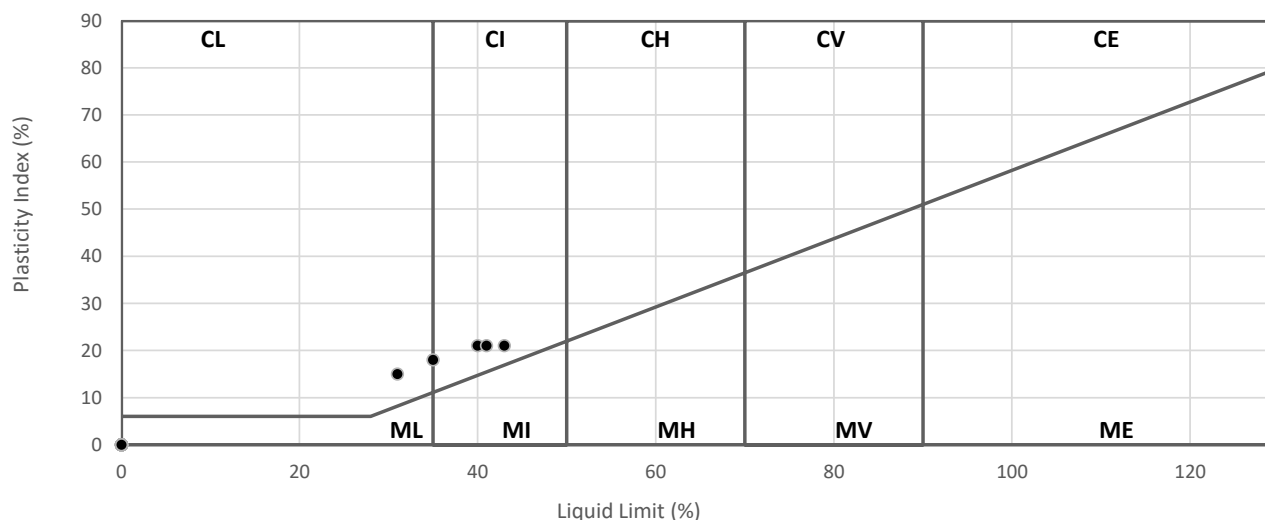
Baden Street, Worsborough, Barnsley

[illegible]

Symbols: NP : Non Plastic

: Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION BS 5930:1999+A2:2010



Operators	Checked	09-08-17	Emma Sharp	
DB	Approved	10-08-17	Paul Evans	



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Contract Number **36114**

Borehole/Pit No. **M1**

Site Name **Baden Street, Worsborough, Barnsley**

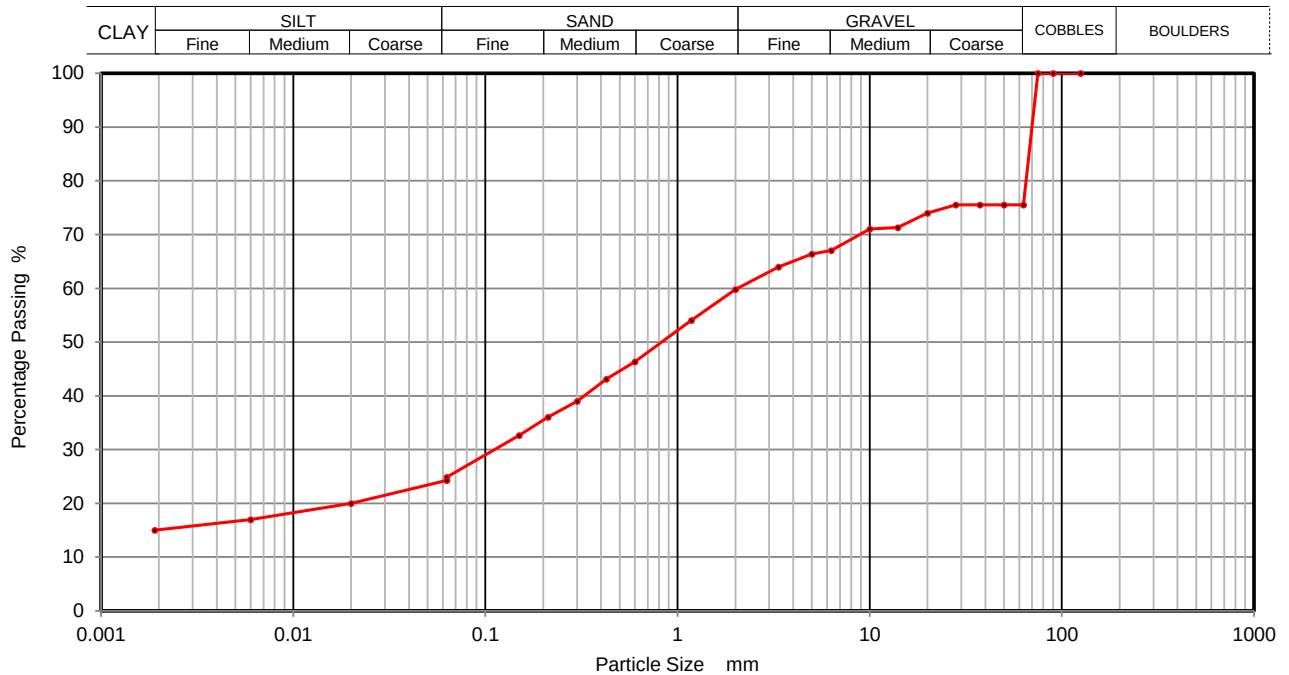
Sample No. **266**

Soil Description **Brown silty clayey fine to coarse gravelly fine to coarse SAND with many cobbles.**

Depth Top **0.70**

Depth Base

Sample Type **C**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	20
90	100	0.0060	17
75	100	0.0019	15
63	76		
50	76		
37.5	76		
28	76		
20	74		
14	71		
10	71		
6.3	67		
5	66		
3.35	64		
2	60		
1.18	54		
0.6	46		
0.425	43		
0.3	39		
0.212	36		
0.15	33		
0.063	25		

Sample Proportions	% dry mass
Cobbles	24
Gravel	16
Sand	35
Silt	10
Clay	15

Grading Analysis	
Uniformity Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	09-08-17	Emma Sharp	
RO/MH	Approved	10-08-17	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Contract Number **36114**

Borehole/Pit No. **M5**

Site Name **Baden Street, Worsborough, Barnsley**

Sample No. **329**

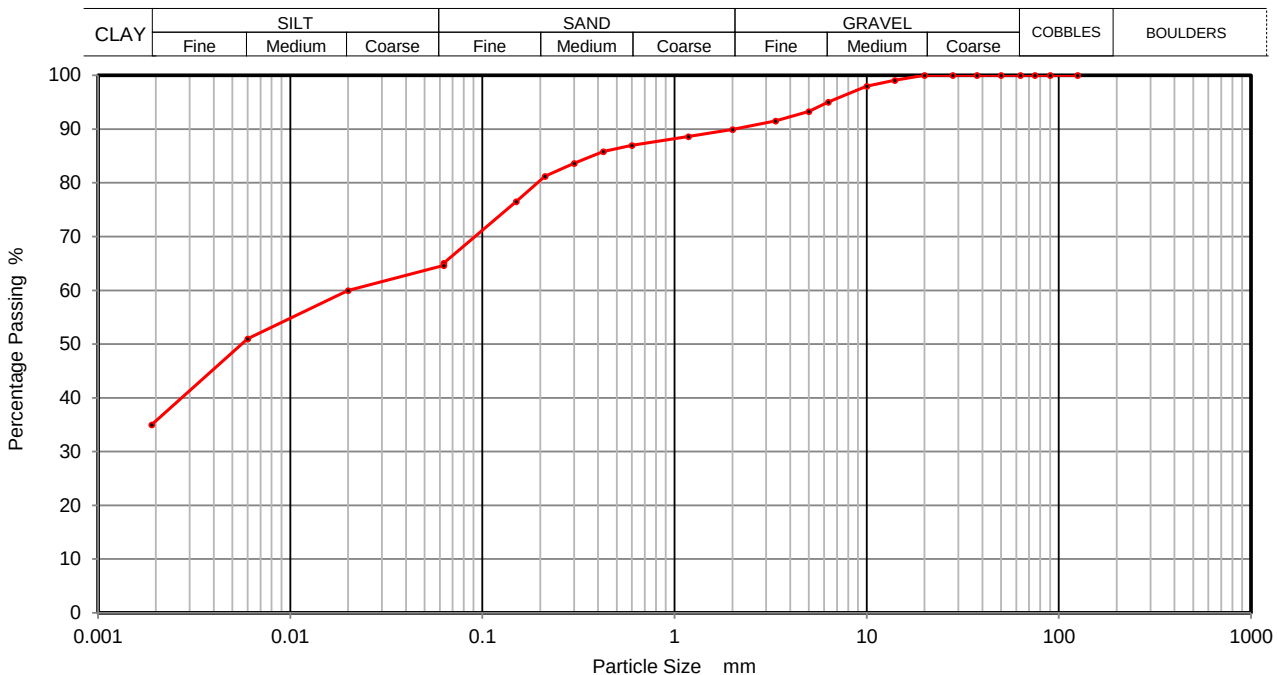
Soil Description

Brown fine to medium gravelly fine to coarse sandy silty CLAY.

Depth Top **0.70**

Depth Base

Sample Type **C**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	60
90	100	0.0060	51
75	100	0.0019	35
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	95		
5	93		
3.35	92		
2	90		
1.18	89		
0.6	87		
0.425	86		
0.3	84		
0.212	81		
0.15	76		
0.063	65		

Sample Proportions	% dry mass
Cobbles	0
Gravel	10
Sand	25
Silt	30
Clay	35

Grading Analysis	
Uniformity Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	09-08-17	Emma Sharp	
RO/MH	Approved	10-08-17	Paul Evans	



Dry Density / Moisture Content Relationship BS 1377:Part 4:1990

Contract Number 36114

Borehole / Pit No M2

Site Name Baden Street, Worsborough, Barnsley

Sample No 278

Soil Description Brown fine sandy silty CLAY.

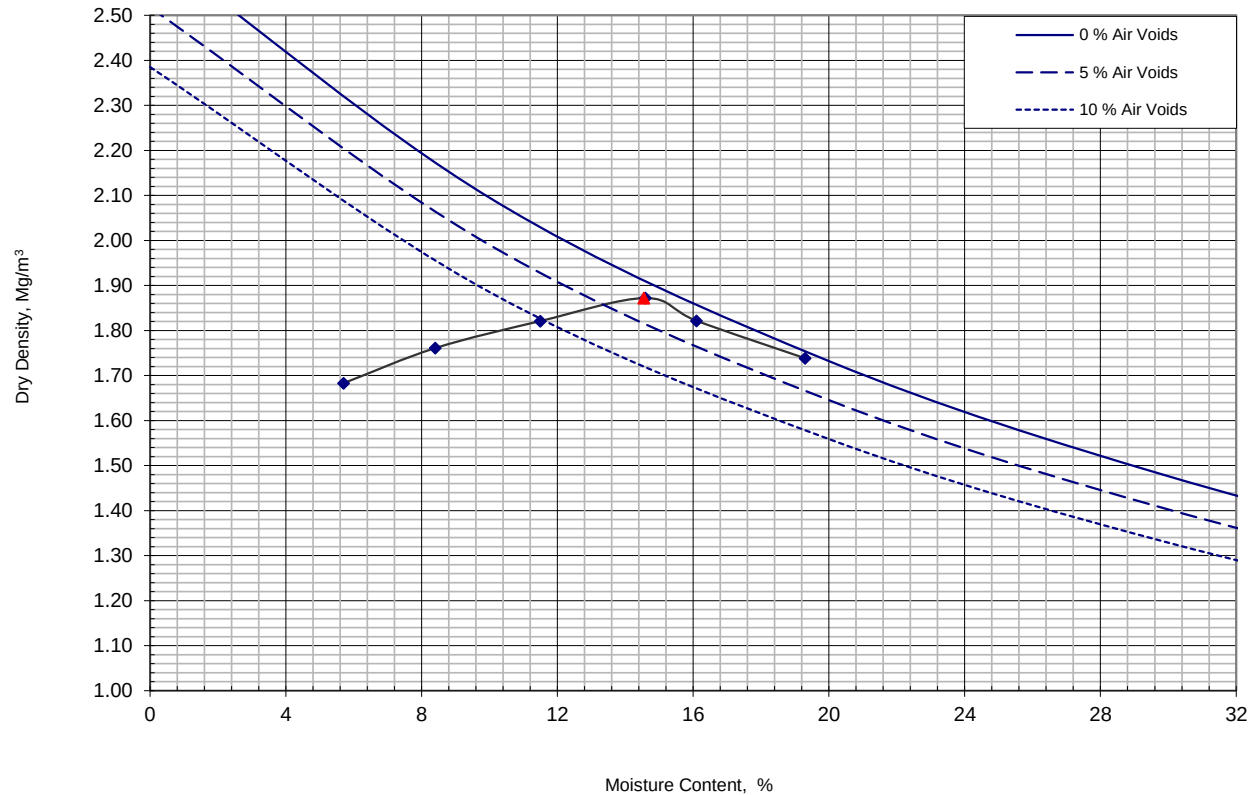
Depth Top 0.70

Compaction Method 2.5 Kg Rammer

Depth Base

Compaction Clause BS1377:Part 4:1990, Clause 3.4

Sample Type B



Compaction Point	1	2	3	4	5	6						
Moisture Content	5.7	8.4	12	15	16	19						
Bulk Density	1.78	1.91	2.03	2.15	2.11	2.07						
Dry Density	1.68	1.76	1.82	1.87	1.82	1.74						

Initial Moisture Content	19	%
Maximum Dry Density	1.87	Mg/m3
Optimum Moisture Content	15	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	4.7	%
Material Retained 20mm	9.3	%

Operators Checked 09-08-17 Emma Sharp

CA Approved 10-08-17 Ben Sharp

Emma Sharp

Ben Sharp

Site Name

Baden Street, Worsborough, Barnsley

Sample No

306

Soil Description

Brown fine sandy silty CLAY.

Depth Top

0.80

Compaction Method

2.5 Kg Rammer

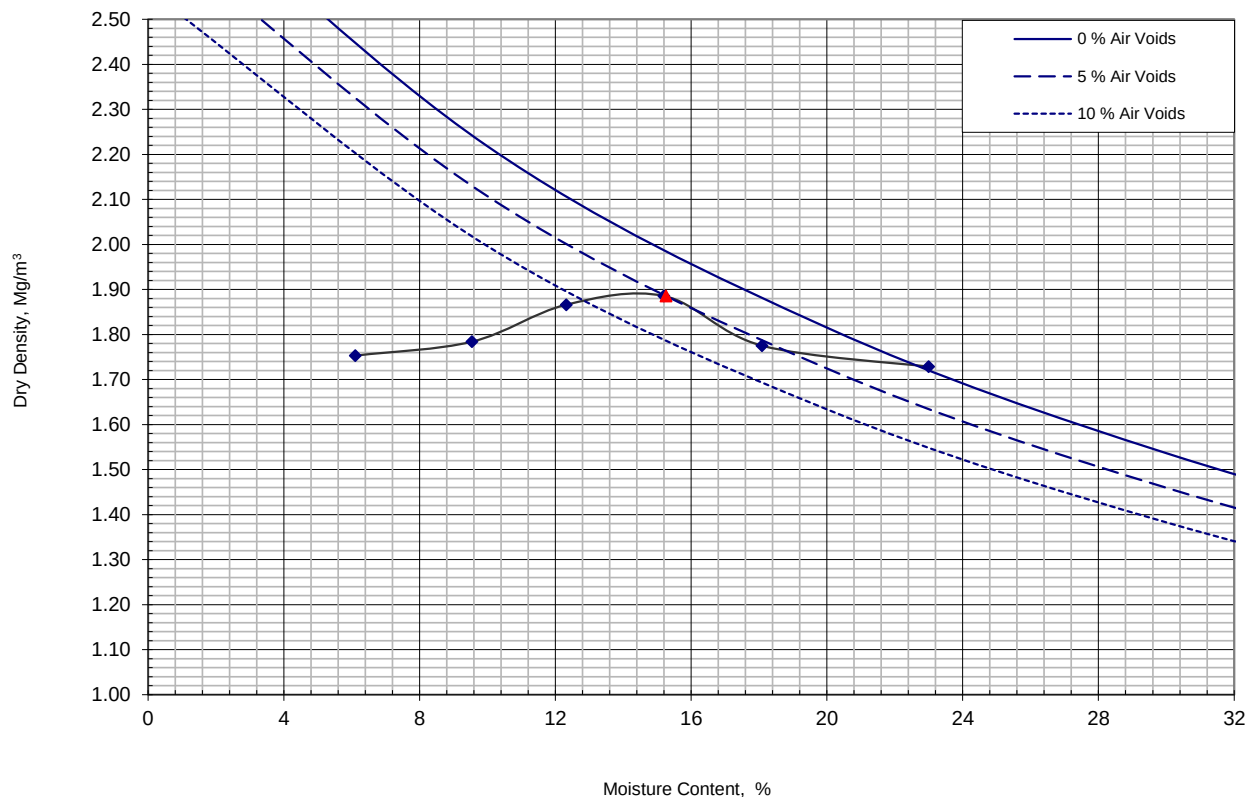
Depth Base

Compaction Clause

BS1377:Part 4:1990, Clause 3.4

Sample Type

B



Compaction Point	1	2	3	4	5	6						
Moisture Content	6.1	9.5	12	15	18	23						
Bulk Density	1.86	1.95	2.10	2.17	2.10	2.13						
Dry Density	1.75	1.78	1.87	1.89	1.78	1.73						

Initial Moisture Content	23	%
Maximum Dry Density	1.89	Mg/m3
Optimum Moisture Content	15	%
Particle Density	2.85 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators

Checked

09-08-17

Emma Sharp

Emma Sharp

CA

Approved

10-08-17

Ben Sharp

Ben Sharp

Dry Density / Moisture Content Relationship BS 1377:Part 4:1990

Contract Number 36114

Borehole / Pit No M6

Site Name Baden Street, Worsborough, Barnsley

Sample No 319

Soil Description Brown fine sandy silty CLAY.

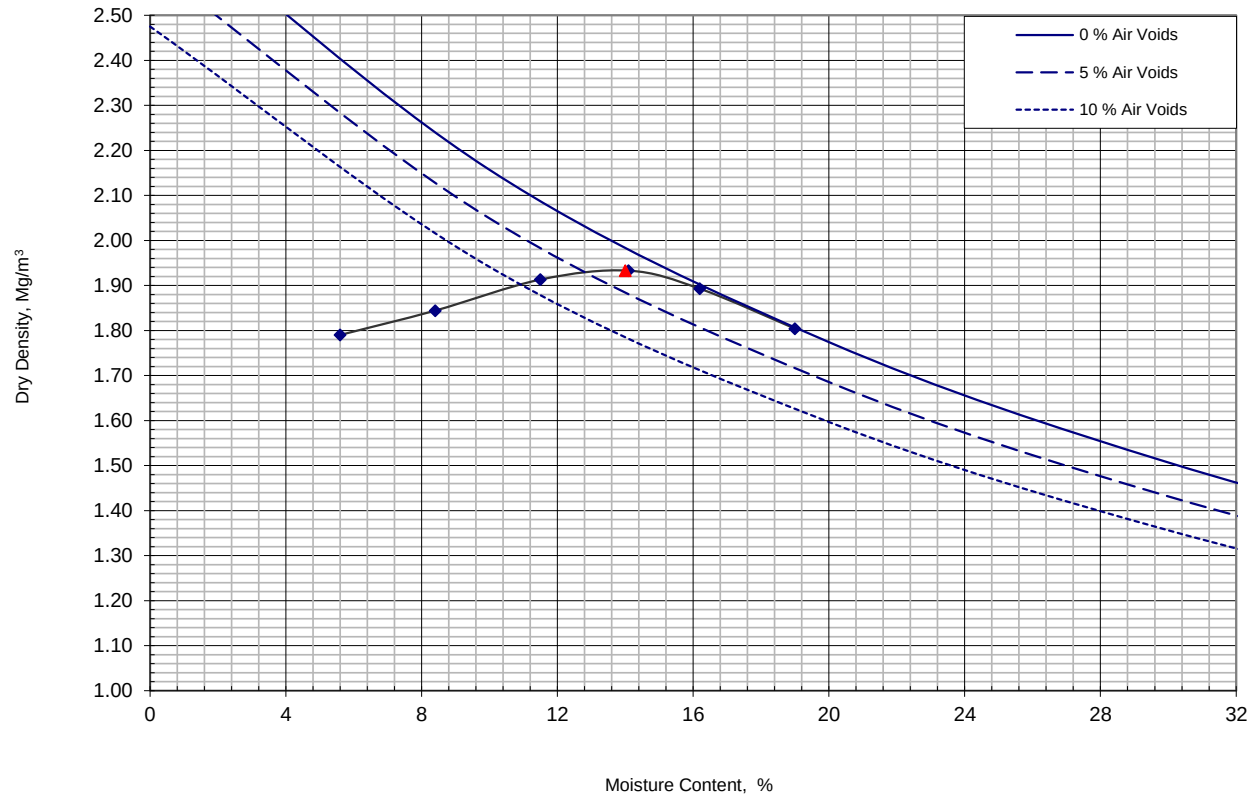
Depth Top 0.70

Compaction Method 2.5 Kg Rammer

Depth Base

Compaction Clause BS1377:Part 4:1990, Clause 3.4

Sample Type B



Compaction Point	1	2	3	4	5	6						
Moisture Content	5.6	8.4	12	14	16	19						
Bulk Density	1.89	2.00	2.13	2.21	2.20	2.15						
Dry Density	1.79	1.84	1.91	1.93	1.89	1.80						

Initial Moisture Content	19	%
Maximum Dry Density	1.93	Mg/m3
Optimum Moisture Content	14	%
Particle Density	2.75 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators

Checked

09-08-17

Emma Sharp

Emma Sharp

CA

Approved

10-08-17

Ben Sharp

Ben Sharp

CSZ
CEO Eric A. Teisinger, Sereno Limited

For the attention of:

The following samples listed have been scheduled for testing but are unsuitable for the specified test.

Heol Aur, Dafen, Llanelli, SA24 8QN

CONTAMINATION ANALYSIS RESULTS



Amended Report

Report No.: 17-19498-2

Initial Date of Issue: 02-Aug-2017 **Date of Re-Issue:** 24-Aug-2017

Client: Sub Surface

Client Address: 3 Peel Street
Preston
Lancashire
PR2 2QS

Contact(s): Simon Gabbatt

Project: NE3625 Baden Street, Worsborough,
Barnsley

Quotation No.: **Date Received:** 27-Jul-2017

Order No.: **Date Instructed:** 27-Jul-2017

No. of Samples: 10

Turnaround (Wkdays): 21 **Results Due:** 24-Aug-2017

Date Approved: 24-Aug-2017

Approved By:

Details: Glynn Harvey, Laboratory Manager
Martin Dyer, Laboratory Manager

Results - Soil

Project: NE3625 Baden Street, Worsborough, Barnsley

Client: Sub Surface	Chemtest Job No.:				17-19498	17-19498	17-19498	17-19498	17-19498	17-19498	17-19498	17-19498	17-19498
Quotation No.:	Chemtest Sample ID.:				489162	489163	489164	489165	489166	489167	489168	489169	489170
Order No.:	Client Sample Ref.:				TP1	M3	M6	M1	TP2	TP3	TP3	M5	M5
	Client Sample ID.:				282	294	321	266	263	260	261	329	329
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.70	0.90	1.40	0.45	0.30	0.15	0.55	0.10	0.30
	Date Sampled:				10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017
	Asbestos Lab:							COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD									
Moisture	N	2030	%	0.020	16	18	14	14	15	12	21	13	14
pH	U	2010		N/A				7.9	8.3	8.5	8.1	7.9	8.3
pH (2.5:1)	N	2010		N/A	8.1	8.3	8.0						
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40				< 0.40	0.48	< 0.40	0.57	< 0.40	0.55
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010						
Total Sulphur	U	2175	%	0.010	0.026	0.024	0.012						
Sulphate (Acid Soluble)	U	2430	%	0.010	< 0.010	0.012	< 0.010						
Arsenic	U	2450	mg/kg	1.0				8.5	29	15	22	24	20
Cadmium	U	2450	mg/kg	0.10				< 0.10	0.41	0.70	0.41	1.4	0.60
Chromium	U	2450	mg/kg	1.0				15	100	180	13	15	11
Copper	U	2450	mg/kg	0.50				19	82	48	31	44	31
Mercury	U	2450	mg/kg	0.10				< 0.10	0.20	0.23	0.14	0.12	< 0.10
Nickel	U	2450	mg/kg	0.50				28	61	38	21	28	22
Lead	U	2450	mg/kg	0.50				15	79	100	63	290	71
Selenium	U	2450	mg/kg	0.20				< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50				68	230	190	150	350	240
Chromium (Hexavalent)	N	2490	mg/kg	0.50				< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
LOI	U	2610	%	0.10				2.6			6.4		
Total Organic Carbon	U	2625	%	0.20				0.32	14	7.7	4.8	9.0	5.8
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] 2.5	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0				[B] < 1.0	[B] 1.1	[B] 10	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0				[B] < 1.0	[B] 7.0	[B] 130	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0				[B] < 1.0	[B] 28	[B] 360	[B] 1.4	[B] 4.0	[B] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0				[B] < 1.0	[B] 85	[B] 350	[B] 40	[B] 34	[B] 22
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				[B] < 1.0	[B] 41	[B] 130	[B] 8.2	[B] < 1.0	[B] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0				[B] < 5.0	[B] 160	[B] 980	[B] 50	[B] 38	[B] 22
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] 15	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0				[B] < 1.0	[B] 6.6	[B] 35	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0				[B] < 1.0	[B] 61	[B] 460	[B] 1.8	[B] < 1.0	[B] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0				[B] < 1.0	[B] 730	[B] 2400	[B] 43	[B] 14	[B] 4.2
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0				[B] < 1.0	[B] 3200	[B] 9200	[B] 310	[B] 110	[B] 52
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0				[B] < 1.0	[B] 330	[B] 970	[B] < 1.0	[B] < 1.0	[B] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0				[B] < 5.0	[B] 4300	[B] 13000	[B] 350	[B] 120	[B] 56
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0				[B] < 10	[B] 4400	[B] 14000	[B] 400	[B] 160	[B] 78

Results - Soil

Project: NE3625 Baden Street, Worsborough, Barnsley

Client: Sub Surface	Chemtest Job No.:				17-19498	17-19498	17-19498	17-19498	17-19498	17-19498	17-19498	17-19498	17-19498
Quotation No.:	Chemtest Sample ID.:				489162	489163	489164	489165	489166	489167	489168	489169	489170
Order No.:	Client Sample Ref.:				TP1	M3	M6	M1	TP2	TP3	TP3	M5	M5
	Client Sample ID.:				282	294	321	266	263	260	261	329	329
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.70	0.90	1.40	0.45	0.30	0.15	0.55	0.10	0.30
	Date Sampled:				10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017	10-Jul-2017
	Asbestos Lab:							COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD									
Naphthalene	U	2700	mg/kg	0.10				< 0.10	2.1	1.5	1.4	1.3	0.98
Acenaphthylene	U	2700	mg/kg	0.10				< 0.10	3.9	20	1.8	0.75	0.50
Acenaphthene	U	2700	mg/kg	0.10				< 0.10	1.2	2.2	0.32	0.41	0.31
Fluorene	U	2700	mg/kg	0.10				< 0.10	2.9	5.9	1.1	0.68	0.67
Phenanthrene	U	2700	mg/kg	0.10				< 0.10	48	55	6.0	3.7	2.7
Anthracene	U	2700	mg/kg	0.10				< 0.10	14	30	2.8	1.0	0.98
Fluoranthene	U	2700	mg/kg	0.10				0.12	130	170	19	6.6	4.6
Pyrene	U	2700	mg/kg	0.10				0.34	130	170	17	6.4	4.4
Benzo[a]anthracene	U	2700	mg/kg	0.10				< 0.10	76	120	11	4.0	3.0
Chrysene	U	2700	mg/kg	0.10				< 0.10	71	130	13	4.1	2.8
Benzo[b]fluoranthene	U	2700	mg/kg	0.10				< 0.10	81	140	15	5.0	3.2
Benzo[k]fluoranthene	U	2700	mg/kg	0.10				< 0.10	32	56	5.7	1.9	1.2
Benzo[a]pyrene	U	2700	mg/kg	0.10				< 0.10	65	110	11	3.8	2.5
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10				< 0.10	43	71	7.1	2.9	1.9
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10				< 0.10	13	20	3.7	0.78	0.71
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10				< 0.10	40	59	11	2.9	2.7
Total Of 16 PAH's	U	2700	mg/kg	2.0				< 2.0	750	1200	130	46	33
Benzene	U	2760	µg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Toluene	U	2760	µg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
o-Xylene	U	2760	µg/kg	1.0				[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Total Phenols	U	2920	mg/kg	0.30				< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Project: NE3625 Baden Street, Worsborough, Barnsley

Results - Soil

Client: Sub Surface	Chemtest Job No.:				17-19498
Quotation No.:	Chemtest Sample ID.:				489171
Order No.:	Client Sample Ref.:				TP4
	Client Sample ID.:				258
	Sample Type:				SOIL
	Top Depth (m):				0.20
	Date Sampled:				10-Jul-2017
	Asbestos Lab:				COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Moisture	N	2030	%	0.020	14
pH	U	2010		N/A	9.9
pH (2.5:1)	N	2010		N/A	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.84
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	
Total Sulphur	U	2175	%	0.010	
Sulphate (Acid Soluble)	U	2430	%	0.010	
Arsenic	U	2450	mg/kg	1.0	16
Cadmium	U	2450	mg/kg	0.10	0.26
Chromium	U	2450	mg/kg	1.0	11
Copper	U	2450	mg/kg	0.50	120
Mercury	U	2450	mg/kg	0.10	0.11
Nickel	U	2450	mg/kg	0.50	18
Lead	U	2450	mg/kg	0.50	52
Selenium	U	2450	mg/kg	0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	130
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
LOI	U	2610	%	0.10	6.2
Total Organic Carbon	U	2625	%	0.20	6.0
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[B] 15
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[B] 76
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[B] 140
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] 32
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[B] 260
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[B] 2.8
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[B] 72
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[B] 520
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[B] 2500
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] 260
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[B] 3400
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[B] 3600

Project: NE3625 Baden Street, Worsborough, Barnsley

Results - Soil

Client: Sub Surface	Chemtest Job No.:		17-19498		
Quotation No.:	Chemtest Sample ID.:		489171		
Order No.:	Client Sample Ref.:		TP4		
	Client Sample ID.:		258		
	Sample Type:		SOIL		
	Top Depth (m):		0.20		
	Date Sampled:		10-Jul-2017		
	Asbestos Lab:		COVENTRY		
Determinand	Accred.	SOP	Units	LOD	
Naphthalene	U	2700	mg/kg	0.10	1.2
Acenaphthylene	U	2700	mg/kg	0.10	17
Acenaphthene	U	2700	mg/kg	0.10	1.3
Fluorene	U	2700	mg/kg	0.10	6.0
Phenanthrene	U	2700	mg/kg	0.10	38
Anthracene	U	2700	mg/kg	0.10	23
Fluoranthene	U	2700	mg/kg	0.10	94
Pyrene	U	2700	mg/kg	0.10	100
Benzo[a]anthracene	U	2700	mg/kg	0.10	82
Chrysene	U	2700	mg/kg	0.10	89
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	98
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	40
Benzo[a]pyrene	U	2700	mg/kg	0.10	79
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	46
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	13
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	37
Total Of 16 PAH's	U	2700	mg/kg	2.0	770
Benzene	U	2760	µg/kg	1.0	[B] < 1.0
Toluene	U	2760	µg/kg	1.0	[B] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[B] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[B] < 1.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30

Report Information

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- M MCERTS and UKAS accredited
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- 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

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



2183

Final Report

Report No.: 17-19502-1

Initial Date of Issue: 04-Aug-2017

Client Sub Surface

Client Address: 3 Peel Street
Preston
Lancashire
PR2 2QS

Contact(s): Simon Gabbatt

Project NE3625 Baden Street, Worsborough,
Barnsley

Quotation No.: **Date Received:** 27-Jul-2017

Order No.: **Date Instructed:** 27-Jul-2017

No. of Samples: 3

Turnaround (Wkdays): 7 **Results Due:** 04-Aug-2017

Date Approved: 04-Aug-2017

Approved By:



Details: Robert Monk, Technical Development
Chemist

Results - 2 Stage WAC

Project: NE3625 Baden Street, Worsborough, Barnsley

Chemtest Job No: 17-19502 Chemtest Sample ID: 489177 Sample Ref: M1 Sample ID: 266 Top Depth(m): 0.45 Bottom Depth(m): Sampling Date: 10-Jul-2017							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	U	%				0.67	3	5
Loss On Ignition	2610	U	%				3.4	--	10
Total BTEX	2760	U	mg/kg				[B] < 0.010	6	--
Total PCBs (7 Congeners)	2815	U	mg/kg				< 0.10	1	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg				[B] < 10	500	--
Total (Of 17) PAH's	2700	N	mg/kg				17	100	--
pH	2010	U					8.1	--	>6
Acid Neutralisation Capacity	2015	N	mol/kg				0.0050	--	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 12457-3 at L/S 10 l/kg		
Arsenic	1450	U	0.0049	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.047	0.0080	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	0.00011	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0021	0.0015	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0045	0.0021	< 0.050	< 0.050	2	50	100
Mercury	1450	U	0.00083	< 0.00050	0.0016	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.065	0.0046	0.13	0.11	0.5	10	30
Nickel	1450	U	0.0017	0.0014	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	0.0020	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0083	0.0021	0.016	0.027	0.1	0.5	7
Zinc	1450	U	0.12	0.019	< 0.50	< 0.50	4	50	200
Chloride	1220	U	230	11	450	330	800	15000	25000
Fluoride	1220	U	3.2	0.82	6.3	11	10	150	500
Sulphate	1220	U	370	26	730	610	1000	20000	50000
Total Dissolved Solids	1020	N	64	35	130	380	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	12	10	< 50	100	500	800	1000

Soild 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	0.178

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: NE3625 Baden Street, Worsborough, Barnsley

Chemtest Job No: 17-19502 Chemtest Sample ID: 489178 Sample Ref: TP3 Sample ID: 261 Top Depth(m): 0.55 Bottom Depth(m): Sampling Date: 10-Jul-2017							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	U	%				5.9	3	5
Loss On Ignition	2610	U	%				7.1	--	10
Total BTEX	2760	U	mg/kg				[B] < 0.010	6	--
Total PCBs (7 Congeners)	2815	U	mg/kg				< 0.10	1	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg				[B] 45	500	--
Total (Of 17) PAH's	2700	N	mg/kg				50	100	--
pH	2010	U					8.0	--	>6
Acid Neutralisation Capacity	2015	N	mol/kg				0.0050	--	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 12457-3 at L/S 10 l/kg		
Arsenic	1450	U	0.013	0.015	< 0.050	0.15	0.5	2	25
Barium	1450	U	0.012	0.0069	< 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	0.0021	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0048	0.0055	< 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	0.0048	0.0019	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	0.0013	< 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	0.0021	0.0011	< 0.010	0.013	0.06	0.7	5
Selenium	1450	U	< 0.0010	0.0017	< 0.010	0.014	0.1	0.5	7
Zinc	1450	U	0.011	0.0077	< 0.50	< 0.50	4	50	200
Chloride	1220	U	2.0	2.4	< 10	23	800	15000	25000
Fluoride	1220	U	0.74	0.63	1.4	6.4	10	150	500
Sulphate	1220	U	15	9.9	29	110	1000	20000	50000
Total Dissolved Solids	1020	N	120	60	230	690	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	13	15	< 50	150	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	21

Leachate Test Information	
Leachant volume 1st extract/l	0.303
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: NE3625 Baden Street, Worsborough, Barnsley

Chemtest Job No: 17-19502 Chemtest Sample ID: 489179 Sample Ref: TP4 Sample ID: 258 Top Depth(m): 0.20 Bottom Depth(m): Sampling Date: 10-Jul-2017							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	U	%				4.6	3	5
Loss On Ignition	2610	U	%				7.9	--	10
Total BTEX	2760	U	mg/kg				[B] < 0.010	6	--
Total PCBs (7 Congeners)	2815	U	mg/kg				< 0.10	1	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg				[B] 45	500	--
Total (Of 17) PAH's	2700	N	mg/kg				630	100	--
pH	2010	U					8.4	--	>6
Acid Neutralisation Capacity	2015	N	mol/kg				0.010	--	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 12457-3 at L/S 10 l/kg		
Arsenic	1450	U	0.0055	0.0088	< 0.050	0.082	0.5	2	25
Barium	1450	U	0.046	0.012	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	0.00012	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0024	0.0038	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0040	0.0041	< 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	0.065	0.0083	0.13	0.18	0.5	10	30
Nickel	1450	U	0.0020	0.0012	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	0.0020	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0063	0.0070	0.012	0.069	0.1	0.5	7
Zinc	1450	U	0.13	0.046	< 0.50	0.60	4	50	200
Chloride	1220	U	230	69	450	960	800	15000	25000
Fluoride	1220	U	3.2	1.4	6.3	17	10	150	500
Sulphate	1220	U	370	56	730	1100	1000	20000	50000
Total Dissolved Solids	1020	N	620	160	1200	2400	4000	60000	100000
Phenol Index	1920	U	0.030	0.050	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	24	17	< 50	180	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	15

Leachate Test Information	
Leachant volume 1st extract/l	0.319
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.294

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.

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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

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

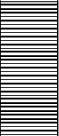
MINI BOREHOLE RECORD SHEETS

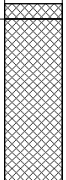
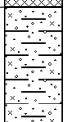
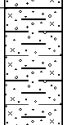
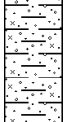
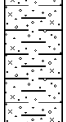
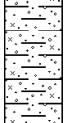
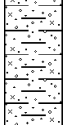
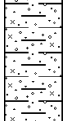
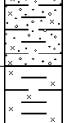
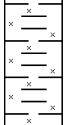
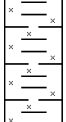
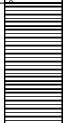
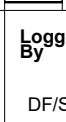
S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BADEN STREET, WORSBOROUGH, BARNSELEY, SOUTH YORKSHIRE			Borehole Number M1		
Boring Method MINI PERCUSSIVE		Casing Diameter			Ground Level (mOD) 61.91		Client BARNSELEY METROPOLITAN BOROUGH COUNCIL			Job Number NE3625	
										Sheet 1/2	
		Location AS PLAN			Dates 10/07/2017		Engineer HAMSON BARRON SMITH				
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
0.38-1.00	C			0.38m to 1.00m - 80% recovery	61.53	0.38 (0.38)	MADE GROUND: paving flags and mortar over concrete paving flags and mortar (driller's description).				
1.00-1.45 1.00-1.45 1.00-2.00	SPT N=11 D C			2,2/2,3,3,3 1.00m to 2.00m - 100% recovery	61.11	0.80 (0.42)	MADE GROUND: dark grey and orange ashy slightly sandy fine gravel sized fragments of brick, sandstone and siltstone with low cobble sized fragments of brick.				
2.00-2.45 2.00-2.45 2.00-3.00	SPT N=10 D C			HV@1.50m, c=42kPa HV@1.75m, c=54kPa 2,2/2,2,3,3 2.00m to 3.00m - 100% recovery	60.31	1.60 (0.80)	Soft to firm medium strength yellowish grey and orange mottled slightly gravelly slightly sandy silty CLAY with many lenses of silt. Gravel is angular to subangular fine to coarse sandstone and siltstone.				
3.00-3.45 3.00-3.45 3.00-4.00	SPT N=12 D C			5,3/2,3,3,4 3.00m to 4.00m - 100% recovery	58.31	3.60 (0.50)	Firm medium strength light brown with orange and grey mottled slightly gravelly slightly sandy silty CLAY with occasional black organic spotting/lenses and low sandstone and siltstone cobble content.				
4.00-4.45 4.00-4.45 4.00-5.00	SPT N=23 D C			2,4/4,5,6,8 4.00m to 5.00m - 100% recovery	57.81	4.10 (1.35)	Extremely weak friable light grey highly weathered MUDSTONE, completely weathered to clay in places with mudstone lithorelicts.				
5.00-5.45	SPT N=25			5,5/4,6,7,8			Extremely weak thinly laminated grey moderately weathered MUDSTONE. Partially weathered to clay in places and discoloured to orange.				
Remarks Hand dug inspection pit from GL to 0.38m to check for services. C = Plastic lined core sample HV = Hand Shear Vane test Core diameter : 83mm to 1.00m, 73mm to 2.00m, 73mm to 3.00m, 66mm to 4.00m and 66mm to 5.00m On completion backfilled with arisings and installed a 50mm dia slotted standpipe with a gas valve and a gravel surround to 5.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.								Scale (approx) 1:25	Logged By DF/SJ	Figure No. NE3625.M1	

 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE		Borehole Number M2
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 61.80		Client BARNSELY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625	
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH		Sheet 1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	B				61.72	(0.08)	MADE GROUND: bituminous macadam surfacing (driller's description).		
0.40	D				61.65	(0.15)	MADE GROUND: light brown gravel (driller's description).		
0.70	B				61.35	(0.30)	MADE GROUND: soft dark brown and light brown slightly ashy slightly clayey sandy fine to coarse gravel sized fragments of stone, brick and bituminous macadam..		
1.00-1.45	SPT N=8			0,0/2,2,2,2	60.90	(0.45)	MADE GROUND: soft dark brown ashy slightly clayey sandy fine to coarse gravel sized fragments of slag, clinker, bituminous macadam and stone with low brick cobble sized fragment content.		
1.00	D			1.00m to 2.00m -		0.90	Soft low to medium strength light brown and grey mottled slightly gravelly slightly sandy silty CLAY with occasional pockets of silt. Gravel is angular to subangular fine to coarse sandstone and mudstone.		
1.00-1.45	D			95% recovery		(0.70)			
1.00-2.00	C				60.20	1.60	Firm becoming stiff medium strength light brown with brown, grey and orange mottled gravelly slightly sandy silty CLAY with occasional black organic spotting. Gravel is subangular fine to coarse siltstone and sandstone with low sandstone cobble content.		
2.00-2.45	SPT N=15			HV@1.50m, c=53kPa		(2.20)			
2.00-2.45	D			HV@1.80m, c=58kPa					
2.00-3.00	C			3,3/4,3,4,4					
3.00-3.45	SPT N=13			2,3/4,3,3,3					
3.00-3.45	D			3.00m to 4.00m, -					
3.00-4.00	C			100% recovery					
4.00-4.45	SPT N=19			3,3/4,5,5,5	58.00	3.80	Extremely weak laminated grey highly weathered MUDSTONE, completely weathered to clay in places.		
4.00-4.45	D			4.00m to 5.00m -		(1.65)			
4.00-5.00	C			100% recovery					
5.00-5.45	SPT N=23			3,4/5,6,6,6					
Remarks Hand dug inspection pit from GL to 1.00m to check for services. C = Plastic lined core sample Core diameter : 83mm to 2.00m, 73mm to 3.00m, 66mm to 4.00m and 66mm to 5.00m On completion backfilled with gravel, spoil and with bituminous macadam at the surface.								Scale (approx) 1:25	Logged By DF/SJ
								Figure No. NE3625.M2	

 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE		Borehole Number M2	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 61.80		Client BARNSELY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625		
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH		Sheet 2/2		
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
5.00-5.45	D			10/07/2017: DRY	56.35	5.45	Extremely weak laminated grey highly weathered MUDSTONE, completely weathered to clay in places. Complete at 5.45m			
Remarks							Scale (approx) 1:25	Logged By DF/SJ	Figure No. NE3625.M2	

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site		BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE		Borehole Number M3	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 60.59		Client BARNSELY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625			
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH		Sheet 1/2			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
0.40	B				60.47 60.39	(0.12)	MADE GROUND: bituminous macadam surfacing (driller's description).				
						0.12	MADE GROUND: light brown stone (driller's description).				
						(0.08) 0.20	MADE GROUND: dark brown slightly ashy slightly clayey sandy fine to coarse stone, brick and clinker. Gravel sized fragments with low cobble sized fragments of stone.				
0.75	D				59.84 59.79	0.75 0.80	MADE GROUND: soft light brown and brown ashy slightly gravelly slightly sandy clayey silt. Gravel sized fragments are fine to coarse brick, stone and clinker.				
0.90	D					(0.45)	Soft low strength light brown with occasional orange and grey mottled gravelly slightly sandy silty CLAY. Gravel is subangular fine to coarse sandstone and siltstone.				
1.00-1.45	SPT N=9			2,2/2,2,2,3	59.34	1.25	Soft to firm medium strength brown and light brown with occasional grey and orange mottled slightly gravelly slightly sandy silty CLAY with occasional lenses of silt. Gravel is subangular fine to coarse sandstone and siltstone.				
1.00-1.45	D			1.00m to 2.00m -							
1.00-2.00	C			100% recovery							
2.00-2.45	SPT N=16			2,2/3,3,5,5		(2.65)	 at 2.80m : low strength				
2.00-2.45	D			2.00m to 3.00m -							
2.00-3.00	C			100% recovery							
3.00-3.45	SPT N=10			HV@2.80m, c=36kPa			Extremely weak laminated light brown and orangish brown and grey mottled highly weathered MUDSTONE completely weathered to clay in places and discoloured to dark grey and orange.				
3.00-3.45	D			4,2/2,2,4,2							
3.00-4.00	D			3.00m to 4.00m -							
4.00-4.45	SPT N=12			HV@3.80m, c=66kPa	56.69	3.90					
4.00-4.45	D			2,2/2,3,3,4							
4.00-5.00	C			4.00m to 5.00m -							
5.00-5.45	SPT N=19			3,4/4,5,5,5		(1.55)					
Remarks Hand dug inspection pit from GL to 1.00m to check for services. C = Plastic lined core sample HV = Hand Shear Vane test Core diameter : 83mm to 2.00m, 73mm to 4.00m and 63mm to 5.00m On completion backfilled with arisings and installed a 50mm dia slotted standpipe with a gas valve and a gravel surround to 5.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.								Scale (approx) 1:25	Logged By DF/SJ		
Figure No. NE3625.M3											

 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE			Borehole Number M3	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 60.59		Client BARNSELY METROPOLITAN BOROUGH COUNCIL			Job Number NE3625		
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH			Sheet 2/2		
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
5.00-5.45	D			10/07/2017: DRY	55.14	5.45	Extremely weak laminated light brown and orangish brown and grey mottled highly weathered MUDSTONE completely weathered to clay in places and discoloured to dark grey and orange. Complete at 5.45m				
Remarks								Scale (approx) 1:25	Logged By DF/SJ		
								Figure No. NE3625.M3			

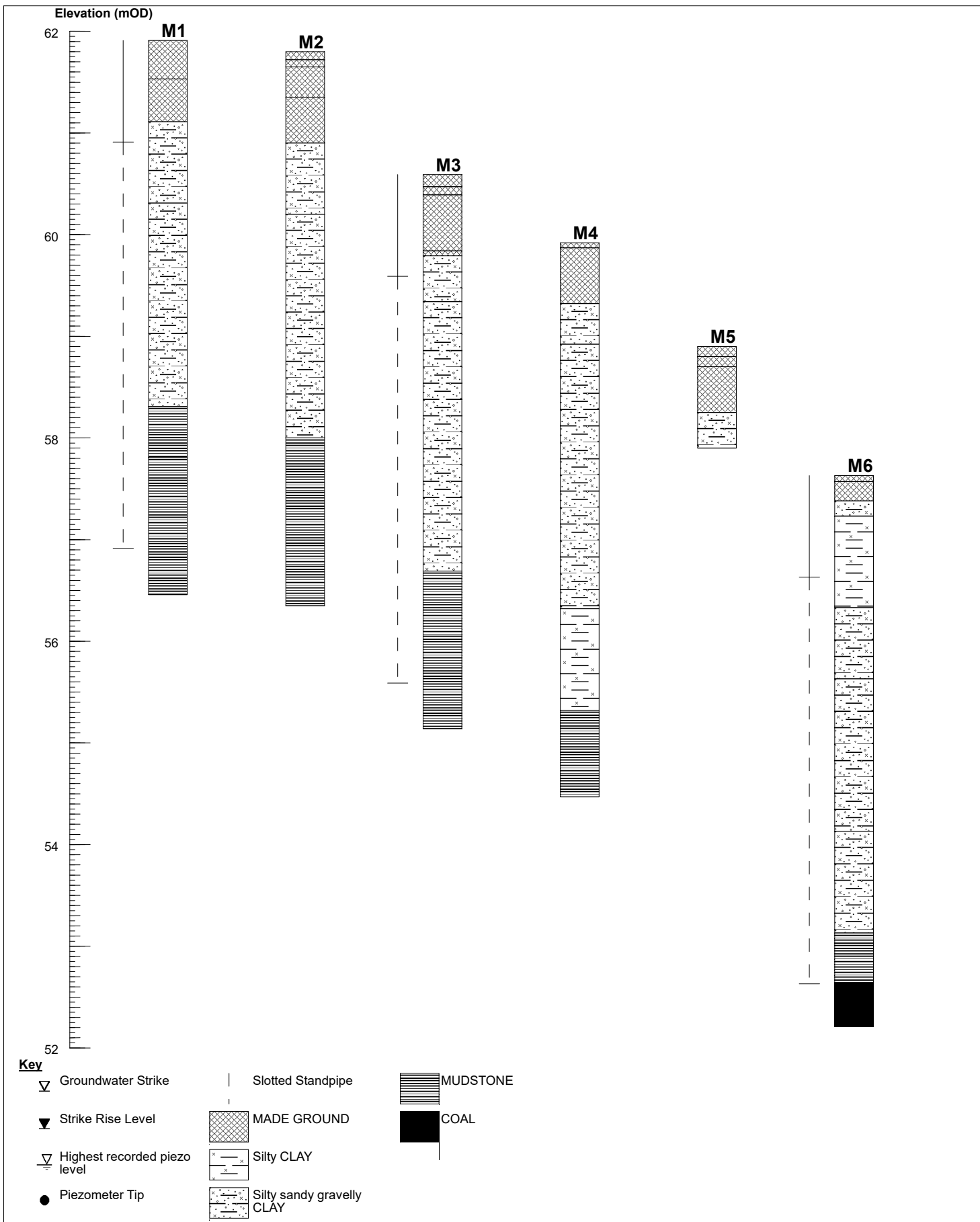
S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BADEN STREET, WORSBOROUGH, BARNSELEY, SOUTH YORKSHIRE		Borehole Number M4	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 59.92		Client BARNSELEY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625	
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH		Sheet 1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				59.87	0.05	MADE GROUND: bituminous macadam surfacing (driller's description).		
						(0.55)	MADE GROUND: very dark grey ashy sandy fine to coarse gravel sized fragments of stone bituminous macadam with low cobble sized fragments of concrete and stone. Gravel is fine to coarse stone, brick and clinker.		
0.50	B				59.32	0.60	Firm light brown and occasional dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to medium clinker, coal and stone (possibly made ground).		
						(0.40)			
0.80	B								
1.00-1.45	SPT N=11			2,2/2,3,3,3	58.92	1.00	Soft becoming firm to stiff medium strength light brown with orange and grey mottled slightly gravelly slightly sandy silty CLAY with low sandstone cobble content and occasional lenses of silt. Gravel is angular to subrounded fine to coarse sandstone, siltstone and mudstone.		
1.00-1.45	D			1.00m to 2.00m -					
1.00-2.00	C			100% recovery					
				HV@1.60m, c=52kPa					
2.00-2.45	SPT N=16			4,4/4,4,4,4					
2.00-2.45	D			2.00m to 3.00m -					
2.00-3.00	C			100% recovery		(2.60)			
									
3.00-3.45	SPT N=18			2,3/6,5,4,3			 at 3.00m : firm to stiff		
3.00-3.45	D			3.00m to 4.00m -					
3.00-4.00	C			100% recovery					
					56.32	3.60	Firm to stiff medium strength occasionally laminated light greyish brown with occasional orange mottled silty CLAY, completely weathered mudstone with occasional lithorelicts.		
4.00-4.45	SPT N=11			2,2/2,2,3,4					
4.00-4.45	D			4.00m to 5.00m -		(1.00)			
4.00-5.00	C			100% recovery					
					55.32	4.60	Extremely weak laminated grey highly weathered MUDSTONE, completely weathered to clay in places and discoloured to orange.		
5.00-5.45	SPT N=12			3,3/3,3,3,3					
Remarks Hand dug inspection pit from GI to 1.00m to check for services. C = Plastic lined core sample HV = Hand Shear Vane test Core diameter : 83mm to 2.00m, 73mm to 4.00m and 66mm to 5.00m On completion backfilled with gravel, spoil and bituminous macadam.								Scale (approx) 1:25	Logged By DF/SJ
								Figure No. NE3625.M4	

 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE		Borehole Number M4	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 59.92		Client BARNSELY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625		
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH		Sheet 2/2		
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
5.00-5.45	D			10/07/2017: DRY	54.47	(0.85) 5.45	Extremely weak laminated grey highly weathered MUDSTONE, completely weathered to clay in places and discoloured to orange. Complete at 5.45m			
Remarks							Scale (approx) 1:25	Logged By DF/SJ	Figure No. NE3625.M4	

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE		Borehole Number M5	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 58.90		Client BARNSLEY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625	
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH		Sheet 1/1	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	C			0.00m to 1.00m - 100% recovery	58.80	(0.10)	MADE GROUND: dark grey ashy very gravelly slightly silty fine sand with some rootlets. Gravel sized fragments are fine to medium brick, sandstone and slate (topsoil).		
					58.70	(0.10)			
						(0.10)	MADE GROUND: soft dark brown gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse brick, concrete and shale.		
						(0.20)			
						(0.45)	MADE GROUND: dark grey ashy slightly silty slightly sandy fine to coarse gravel sized fragments of brick, concrete and shale.		
					58.25	0.65			
						(0.35)	Firm high strength brownish grey slightly gravelly slightly sandy silty CLAY with low sandstone cobble content. Gravel is angular to subangular fine to medium sandstone. at 1.00m : obstruction		
				10/07/2017:DRY	57.90	1.00	Complete at 1.00m		
Remarks Hole stopped at 1.00m due to suspect cable. C = Plastic lined core sample HV = Hand Shear Vane test Core diameter : 83mm to 1.00m On completion backfilled with spoil.								Scale (approx) 1:25	Logged By DF/SJ
								Figure No. NE3625.M5	

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE			Borehole Number M6	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 57.63		Client BARNSELY METROPOLITAN BOROUGH COUNCIL			Job Number NE3625	
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH			Sheet 1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	B				57.57	0.06 (0.19)	MADE GROUND: bituminous macadam surfacing (driller's description).			
0.35	D				57.38	0.25 (0.15)	MADE GROUND: sandstone setts, grey and brown sand, angular gravel (driller's description).			
0.70	B				57.23	0.40	Firm dark brown, brown and light brown slightly gravelly sandy silty CLAY. Gravel is subangular to subrounded fine to medium siltstone and coal (possible made ground).			
1.00-1.45	SPT N=9			2,1/1,3,2,3			Firm to stiff low strength light brown and orange brown silty CLAY.			
1.00-1.45	D			1.00m to 2.00m -						
1.00-2.00	C			100% recovery						
					56.33	1.30	Firm medium strength brown gravelly slightly sandy silty CLAY. Gravel is angular to subangular fine to coarse sandstone and mudstone.			
				HV@1.60m, c=62kPa		(0.70)				
2.00-2.45	SPT N=15			3,3/3,4,4,4	55.63	2.00	Firm to stiff medium becoming low strength light brown and brown with occasional orange and grey mottled slightly gravelly slightly sandy silty CLAY. Gravel is angular to subangular fine to medium sandstone, siltstone and mudstone.			
2.00-2.45	D			2.00m to 3.00m -						
2.00-3.00	C			100% recovery						
						(1.50)				
3.00-3.45	SPT N=9			2,2/2,2,2,3			 at 3.00m : low strength			
3.00-3.45	D			3.00m to 4.00m -						
3.00-4.00	C			100% recovery						
					54.13	3.50	Firm high strength occasionally laminated light grey slightly gravelly silty CLAY with occasional mudstone lithorelicts (completely weathered mudstone).			
						(1.00)				
4.00-4.45	SPT N=19			3,3/4,4,5,6						
4.00-4.45	D			4.00m to 5.00m -						
4.00-5.00	C			100% recovery						
					53.13	4.50	Extremely weak laminated grey highly weathered MUDSTONE (completely weathered to clay in places).			
						(0.50)				
5.00-5.42	SPT 56/265			6,9/12,16,18,10						
Remarks Hand dug inspection pit from GL to 0.38m to check for services. C = Plastic lined core sample HV = Hand Shear Vane test Core diameter : 83mm to 1.00m, 73mm to 2.00m, 73mm to 3.00m, 66mm to 4.00m and 66mm to 5.00m On completion backfilled with arisings and installed a 50mm dia slotted standpipe with a gas valve and a gravel surround to 5.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.								Scale (approx) 1:25	Logged By DF/SJ	
								Figure No. NE3625.M6		

 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE			Borehole Number M6	
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD) 57.63		Client BARNSELY METROPOLITAN BOROUGH COUNCIL			Job Number NE3625	
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH			Sheet 2/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
5.00-5.45	D			10/07/2017: DRY	52.63	5.00 (0.42)	Dark grey vitreous COAL.			
					52.21	5.42	Complete at 5.42m			
Remarks								Scale (approx) 1:25	Logged By DF/SJ	
								Figure No. NE3625.M6		



S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907		Nominal Section		
Site BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE	Date Drawn 17/08/2017	Date Checked	Sheet 1/1	Job Number NE3625
Client BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By	Checked By	Scale 1:50[V]	Figure No. NE3625.1

ROTARY BOREHOLE RECORD SHEETS

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site		Borehole Number				
BADEN STREET, WORSBOROUGH, BARNSELEY, SOUTH YORKSHIRE						R1						
Machine : BERETTA T44			Casing Diameter			Ground Level (mOD)		Client		Job Number		
Flush : MIST/WATER			120mm to 1.50m			62.98		BARNSELEY METROPOLITAN BOROUGH COUNCIL		NE3625		
Core Dia: NONE mm			Location			Dates		Engineer		Sheet		
Method : ROTARY OPEN HOLE			AS PLAN			13/07/2017		HAMSON BARRON SMITH		1/2		
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
					Open holing (100mm dia) GL to 30.00m	62.78	0.20 (0.70)	MADE GROUND: tarmac.				
						62.08	0.90	MADE GROUND: slag, black soil and brick.				
							(2.50)	Weak yellow brown and grey sandy CLAY with rock fragments (possibly disturbed gravel/made ground).				
						59.58	3.40 (0.60)	Weak to moderately strong yellow shaley SILTSTONE.				
						58.98	4.00	Moderately strong to strong yellow shaley SILTSTONE.				
							(11.60)					
					Water Inflow(1) at 14.50m.	47.38	15.60 (0.40)	Moderately strong grey MUDSTONE.				
						46.98	16.00	COAL.				
							(1.60)					
						45.38	17.60 (1.40)	Moderately strong light grey MUDSTONE.				
						43.98	19.00	Strong greyish brown MUDSTONE.				
Remarks Descriptions based upon foreman drillers records of water flush returns. Foreman driller recorded no voids, broken ground or loss of flush returns. On completion backfilled with bentonite pellets/grout.									Scale (approx)		Logged By	
									1:100		DS/SJ	
									Figure No.			
									NE3625.R1			

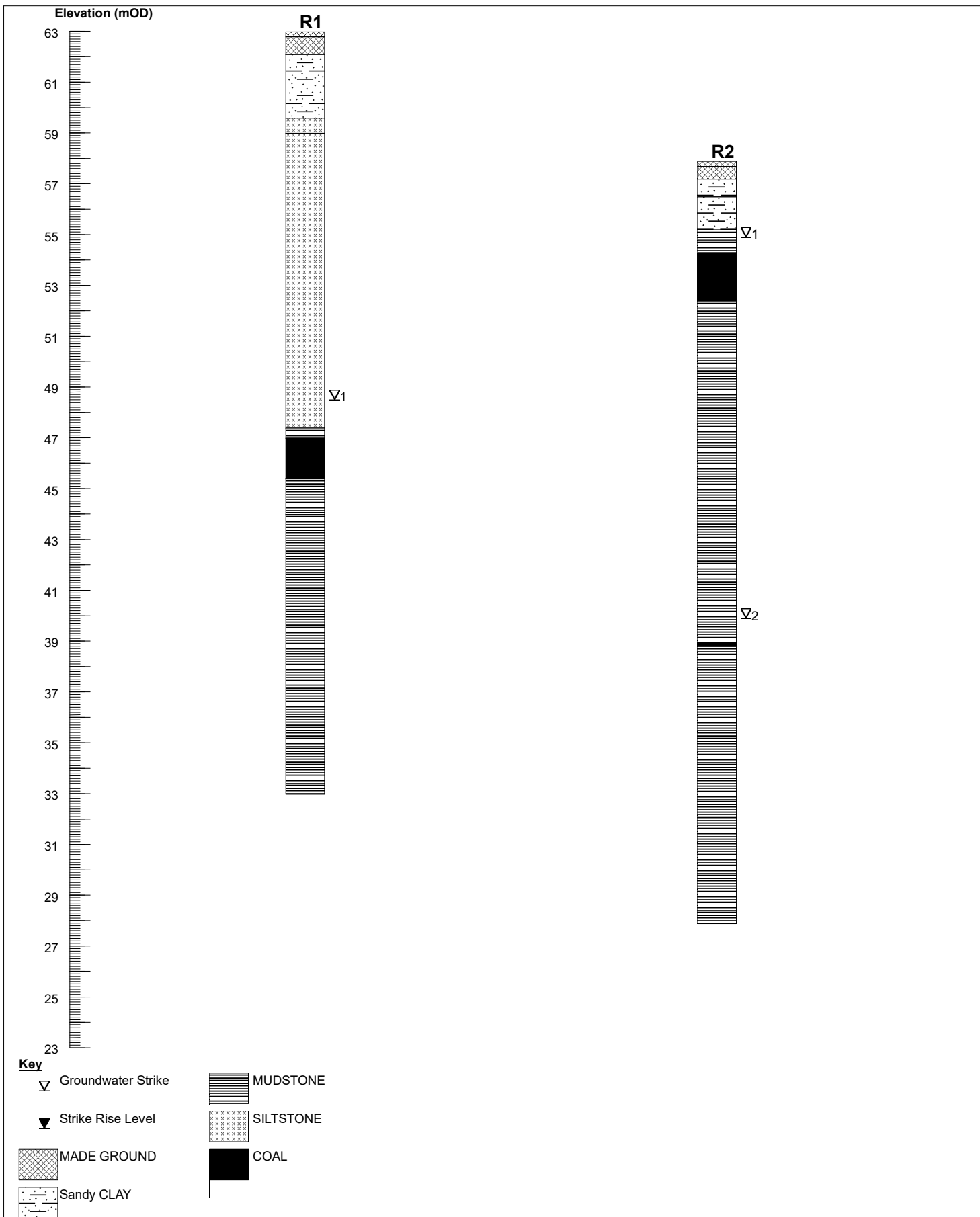
 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907								Site BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE		Borehole Number R1	
Machine : BERETTA T44 Flush : MIST/WATER Core Dia: NONE mm Method : ROTARY OPEN HOLE			Casing Diameter 120mm to 1.50m		Ground Level (mOD) 62.98		Client BARNSLEY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625		
			Location AS PLAN		Dates 13/07/2017		Engineer HAMSON BARRON SMITH		Sheet 2/2		
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
								Strong greyish brown MUDSTONE.			
					13/07/2017:	32.98	(11.00) 30.00	Complete at 30.00m			
Remarks								Scale (approx) 1:100		Logged By DS/SJ	
								Figure No. NE3625.R1			



BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH
YORKSHIRE

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Machine : BERETTA T44 Flush : MIST/WATER Core Dia: NONE mm Method : ROTARY OPEN HOLE			Casing Diameter 120mm to 1.50m		Ground Level (mOD) 57.88	Client BARNSLEY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625		
			Location AS PLAN		Dates 13/07/2017	Engineer HAMSON BARRON SMITH		Sheet 2/2		
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
								Strong light grey MUDSTONE.		
					13/07/2017:	27.88	30.00	Complete at 30.00m		
Remarks								Scale (approx) 1:100	Logged By DS/SJ	
								Figure No. NE3625.R2		

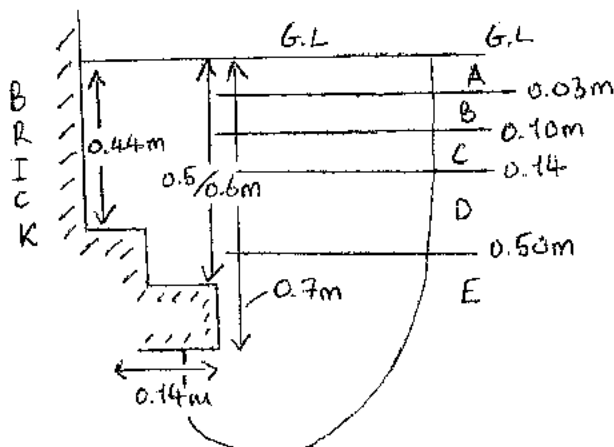


 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	Nominal Section			
Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE	Date Drawn 17/08/2017	Date Checked	Sheet 1/1	Job Number NE3625
Client BARNSELY METROPOLITAN BOROUGH COUNCIL	Drawn By	Checked By	Scale 1:200[V]	Figure No. NE3625.1

HAND DUG TRIAL PIT RECORD SHEETS

Excavation Method HAND DUG		Dimensions		Ground Level (mOD) 62.10		Client BARNSELY METROPOLITAN BOROUGH COUNCIL		Job Number NE3625	
		Location AS PLAN		Dates 10/07/2017		Engineer HAMSON BARRON SMITH		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.12	D			62.07 62.00 61.96	0.03 (0.07) 0.10 0.14	MADE GROUND: bituminous macadam surfacing. A			
						MADE GROUND: brick. B			
						MADE GROUND: ash and clinker. C			
0.40	D				(0.36)	Dark brown CLAY/SUBSOIL. D			
				61.60	0.50	Friable brown CLAY and lithorelicts of mudstone (possible made ground). E			
0.70	D				(0.30)				
				61.30	0.80	Complete at 0.80m			
			HV@0.75m, c=35kPa and q=130+kPa 10/07/2017:						

Plan



Remarks

Pit sides remained stable and vertical.
No groundwater encountered.
HV = Hand Shear Vane test
On completion backfilled with arisings.

Scale (approx)

1:25

Logged By

DS/SJ

Figure No.

NE3625,HD1



SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston. PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site

BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH YORKSHIRE

Trial Pit

Number
HD2

Excavation Method

HAND DUG

Dimensions

Location

AS PLAN

Ground Level (mOD)

61.50

Dates

10/07/2017

Client

BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer

HAMSON BARRON SMITH

Job

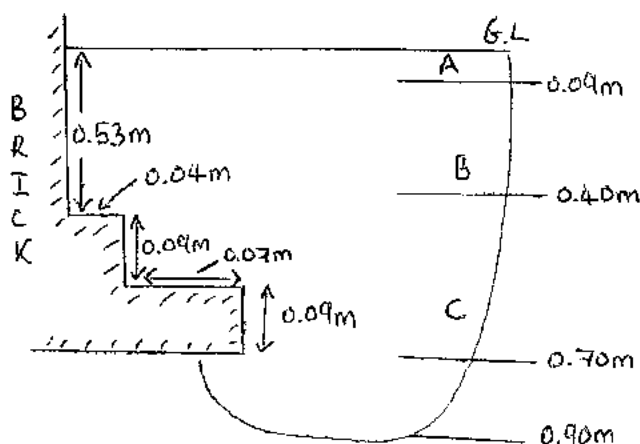
Number
NE3625

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	B			61.41	(0.08) 0.09	MADE GROUND: bituminous macadam surfacing. A		
0.50	D			61.10	(0.31) 0.40	MADE GROUND: dark grey sand, sand sized ash and slight topsoil. B		
0.80	D		HV@0.75m, c=58kPa 10/07/2017:	60.60	(0.50) 0.90	Firm medium strength light brown silty CLAY. C		
						Complete at 0.90m		

Plan



Remarks

Pit sides remained stable and vertical.
No groundwater encountered.
HV = Hand Shear Vane test
On completion backfilled with arisings.

Scale (approx)

1:25

Logged By

DS/SJ

Figure No.

NE3625.HD2



SUB SURFACE

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Site

BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH
YORKSHIRE

Trial Pit Number

HD3

Excavation Method
HAND DUG

Dimensions

Location

AS PLAN

Ground Level (mOD)

59.63

Client

BARNSLEY METROPOLITAN BOROUGH COUNCIL

Job Number

NE3625

Dates

10/07/2017

Engineer

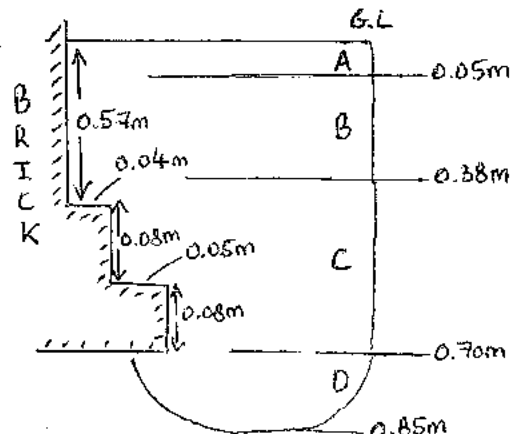
HAMSON BARRON SMITH

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	B			59.58	0.05 (0.33)	MADE GROUND: bituminous macadam surfacing. A		
						MADE GROUND: dark grey ash, brown clay, pipe and gravel. B		
				59.25	0.38 (0.32)	MADE GROUND: brown silty clay. C		
0.55	B			58.93	0.70 (0.20)	Soft to firm low to medium strength brown silty CLAY and weathered mudstone fragments (possibly made ground). D		
0.80	D		HV@0.75m, c=30kPa HV@0.90m, c=42kPa 10/07/2017:	58.73	0.90	Complete at 0.90m		

Plan



Remarks

Pit sides remained stable and vertical.
No groundwater encountered.
HV = Hand Shear Vane test
On completion backfilled with arisings.

Scale (approx)

1:25

Logged By

DS/SJ

Figure No.

NE3625.HD3



SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Prescot, PR2 2QS Tel. (01772) 501135 Fax (01772) 204907

Site

BADEN STREET, WORSBOROUGH, BARNSLEY, SOUTH
YORKSHIRE

Trial Pit Number

HD4

Excavation Method
HAND DUG

Dimensions

Location

AS PLAN

Ground Level (mOD)

57.80

Client

BARNSLEY METROPOLITAN BOROUGH COUNCIL

Job
Number
NE3625

Dates

10/07/2017

Engineer

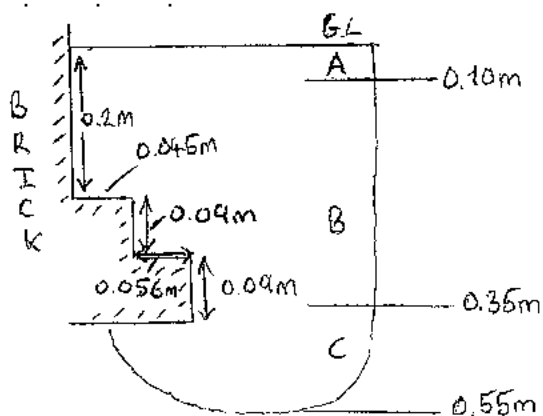
HAMSON BARRON SMITH

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.05	B			57.70	(0.10) 0.10	MADE GROUND: macadam over dark grey ash, gravel and clinker. A		
0.20	B				(0.25) 0.25	MADE GROUND: dark grey silty clay with brick and stone fragments. B		
				57.45	0.35			
0.45	D		HV@0.45m, c=85kPa 10/07/2017:	57.25	(0.20) 0.55	Stiff high strength brown and light grey silty CLAY. C		
						Complete at 0.55m		

Plan



Remarks

Pit sides remained stable and vertical.
No groundwater encountered.
HV = Hand Shear Vane test
On completion backfilled with arisings.

Scale (approx)

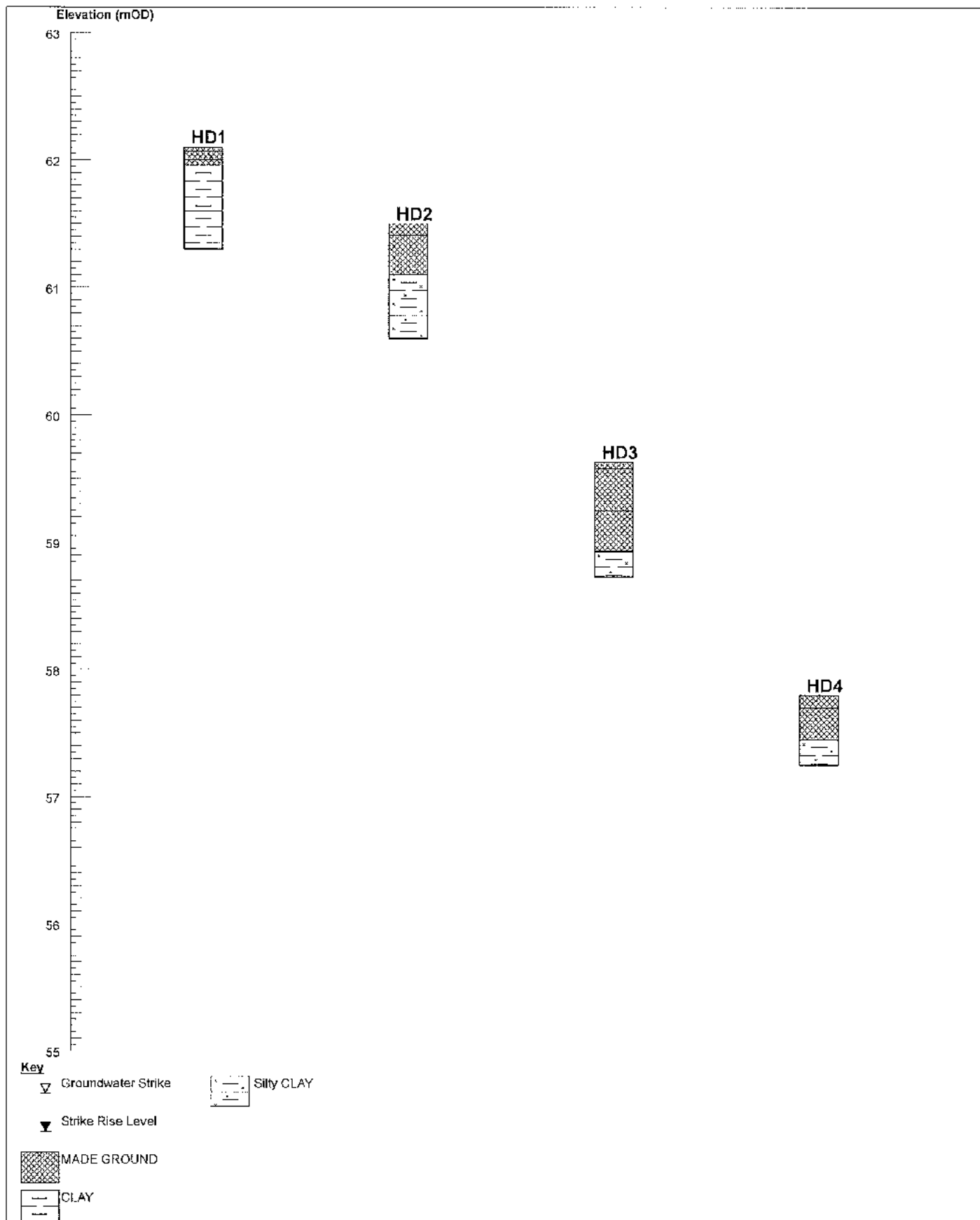
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Logged By

DS/SJ

Figure No.

NE3625.HD4



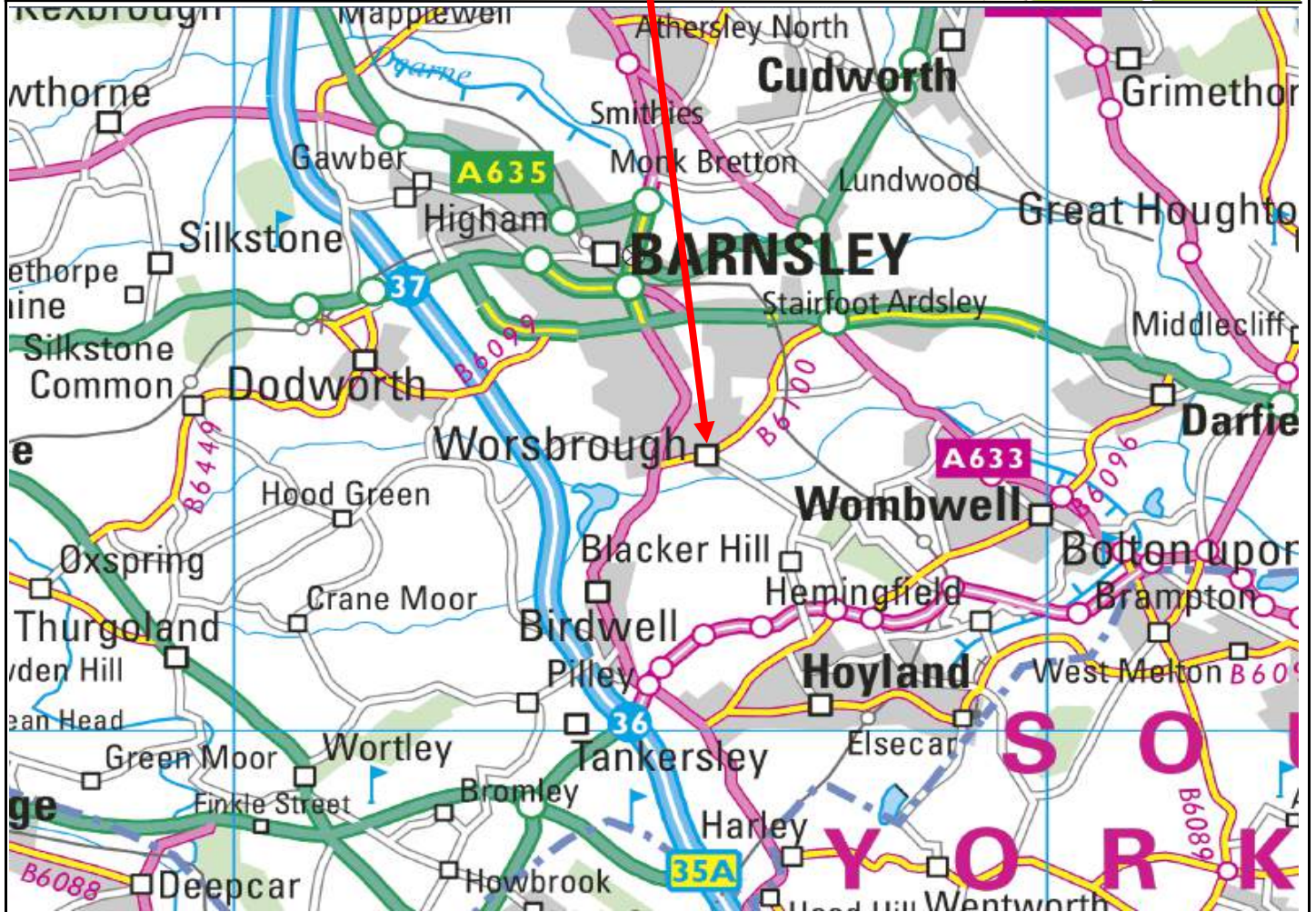
SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Nominal Section

Site BADEN STREET, WORSBOROUGH, BARNSELY, SOUTH YORKSHIRE	Date Drawn 17/08/2017	Date Checked	Sheet 1/1	Job Number NE3625
Client BARNSELY METROPOLITAN BOROUGH COUNCIL	Drawn By	Checked By	Scale 1:40[V]	Figure No. NE3625.1

FIGURES



SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

General Site Location Plan

Site BADEN STREET, WORSBOROUGH, SOUTH YORKSHIRE	Date Drawn 15-Aug-17	Date Checked	Orientation 	Job No. NE3625
Client BARNESLEY METROPOLITAN BOROUGH COUNCIL	Drawn By D.I	Checked By	Scale -	Figure No. 1



SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Borehole and Trial Pit Location Plan

Date Drawn

15-Aug-17

Date Checked



Job No

NE3625

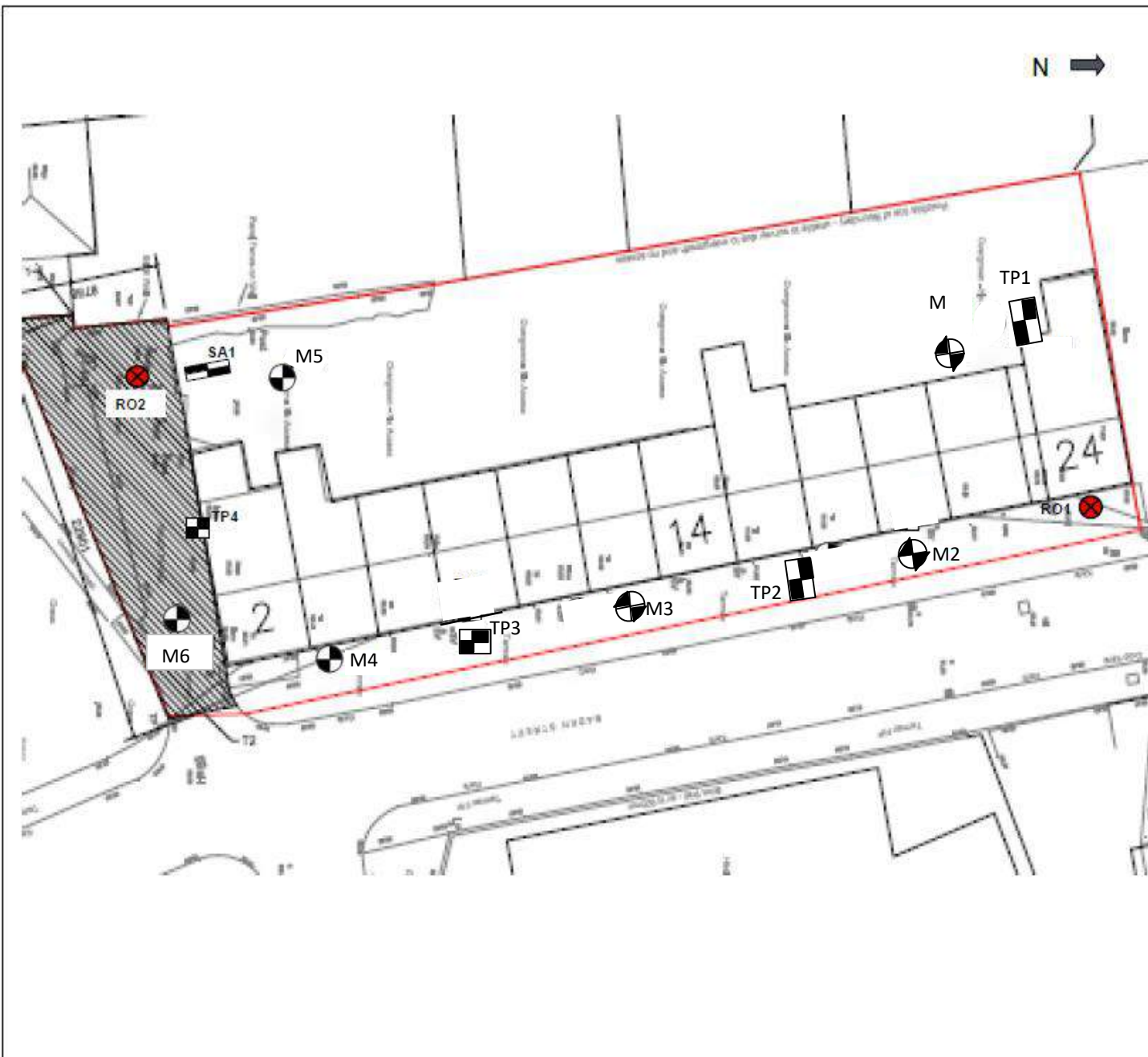
Drawn By

Checked By

Scale

Figure No. _____

Client
BARNSELEY METROPOLITAN BOROUGH COUNCIL



Project:	Baden Street Redevelopment
Client:	Barnsley Metropolitan Borough Council
Title:	Exploratory Hole Location Plan
Drawing:	23-24-18-1-8004 D01
Date:	04 Jul 2017

Notes:
Hole Locations Approximate.

Key



Windowless Sampler
Borehole & Dynamic Probe



Machine Excavated Trial Pit For BRE testing



Hand Excavated
Foundation Exposure Pit



Rotary Borehole

**Hamson
Barron
Smith**

Appendix E

Statistical Analysis - Inputs and Outputs

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	23-24-18-1-6004
Site ref	Baden Street
Data description	Preliminary Ground Investigation.
Contaminant(s)	Metals
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	25 August 2017
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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[illegible]

Client ref: Barnsley Metropolitan Borough Council
Project ref: 23-24-18-1-4004
Site ref: Baden Street
Data description: Preliminary Ground Investigation
Contaminant(s): Metals
Test scenario: Planning
Metal(s) Assay: wet

	Arsenic	Boron (Hot Water Soluble)	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Selenium	Zinc									
Critical concentration, C _c	37	290	11	910	6	2400	200	11	130	250	3700									
Notes	LQM GAC	LQM GAC	LQM GAC	LQM GAC	LQM GAC	LQM GAC	Delta CASL	LQM GAC	LQM GAC	LQM GAC	LQM GAC									
Full dataset size	7	7	7	7	7	7	7	7	7	7	7	0	0	0	0	0	0	0	0	0
Outliers present?	No	No	Yes	Yes	No	No	Yes	No	Yes	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	7	7	7	7	7	7	7	7	7	7	7	0	0	0	0	0	0	0	0	0
Sample mean, $\bar{X}$	19.214286	0.4342857	0.5471429	49.285714	0.25	53.571429	95.714286	0.1285714	30.857143	0.1	194	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s	6.7073165	0.2460256	0.4321926	66.153141	0	35.491112	89.583693	0.0686607	14.814729	1.499E-17	90.987179									
Number of non-detects	0	3	1	0	7	0	0	2	0	7	0	0	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 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	Normal	Non-normal	Single value	Normal	Non-normal	Normal	Normal	Non-normal	Normal									
Statistical approach	Auto One-sample	Auto One-sample	Auto One-sample	Auto Chebychev	Auto Chebychev	Auto One-sample	Auto Chebychev	Auto One-sample	Auto One-sample	Auto Chebychev	Auto One-sample	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?				Evidence level required: 95%		Use Normal distribution to test for outliers													
t statistic, t ₀ (or k ₀)	-7.015708379	-3113.980914	-63.9891985	-34.42370094	N/A	-174.9189044	-3.079958587	-418.9167126	-17.7058485	-4.41084E+19	-101.9484749									
Upper confidence limit (on true mean concentration, μ)	24.140495	0.6149799	0.8645681	158.27361	0.25	79.637986	243.30422	0.1789995	41.737867	0.1	260.82582									
Evidence level	100%	100%	100%	100%	100%	100%	90%	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									
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \geq C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$									
Select dataset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Back to data	Go to outlier test		Go to normality test		Show individual summary															

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	23-24-18-1-6004
Site ref	Baden Street
Data description	Preliminary Ground Investigation.
Contaminant(s)	PAH
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	25 August 2017
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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Clericlist ref: Barnsley Metropolitan Borough Council
Project ref: 23-24-18-1-0004
Site ref: Baden Street
Data description: Preliminary Ground Investigation
Contaminant(s): PAH
Test scenario: Planning
Model: Auto One-sample

	Acenaphthen e	Acenaphthyle ne	Anthracene	Benzo[a]anthr acene	Benzo[a]pyre ne	Benzo[b]fluor anthene	Benzo[g,h,i]p erylene	Benzo[k]fluor anthene	Chrysene	Dibenz[a,h]An thracene	Fluoranthene	Fluorene	Indeno[1,2,3- c,d]Pyrene	Phenanthrene	Pyrene	Naphthalene				
Critical concentration, C _c	1100	920	11000	13	3	3.7	350	100	27	0.3	890	860	41	440	2000	13				
Notes	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM	LOM GAC 6% SOM					
Full dataset size	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	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	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	0	0	0	0
Sample mean, $\bar{X}$	0.8271429	6.2857143	10.261429	42.292857	38.764286	48.892857	21.807143	19.55	44.278571	7.32	60.617143	2.4714286	24.564286	21.921429	61.162857	1.2185714	No Data	No Data	No Data	No Data
Standard deviation, s	0.7691925	8.4822714	12.231956	49.202307	45.072171	56.703413	23.301796	22.811273	52.172006	7.9343998	69.929331	2.5360102	28.415382	24.03518	70.66726	0.6216223				
Number of non-detects	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	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	Non-normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal				
Statistical approach	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto One-sample	Auto	Auto	Auto	Auto
Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)? Evidence level required: 95% Use Normal distribution to test for outliers																			
t statistic, t ₀ (or k ₀)	-3780.767399	-285.0015812	-2377.06179	1.575162218	2.099375375	2.10867486	-37.26393825	-9.330943295	0.876232418	2.34084174	-31.37940457	-894.6365289	-1.530326524	-46.02137056	-72.58921461	-50.14416313				
Upper confidence limit (on true mean concentration, μ)	1.3920787	20.260332	19.245227	78.429645	71.867682	90.538855	38.921219	36.30381	82.596464	13.147445	111.97696	4.3340091	45.434051	39.574141	113.06465	1.6751239				
Evidence level	100%	100%	100%	8%	4%	4%	100%	100%	21%	3%	100%	100%	91%	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	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \geq C_c$	$\mu \geq C_c$	$\mu \geq C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \geq C_c$	$\mu \geq C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \approx C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$				
Select dataset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Back to data	Go to outlier testGo to normality testShow individual summary																			

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	23-24-18-1-6004
Site ref	Baden Street
Data description	Preliminary Ground Investigation.
Contaminant(s)	TPH
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	25 August 2017
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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Client ref: Barnsley Metropolitan Borough Council
Project ref: 23-24-18-1-4004
Site ref: Baden Street
Data description: Preliminary Ground Investigation
Contaminant(s): TPH
Test scenario: Planning
Model: Auto-Chezychev

	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	160	530	150	760	4300	110000	110000	300	660	190	380	660	930	1700	1700	0.37	660	260	310	330
Notes	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM	LOW GAC 6% SOM					
Full dataset size	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Outliers present?	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	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	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Sample mean, $\bar{X}$	0.5	0.5	0.7857143	1.9428571	22	163.12857	30.385714	0.5	0.5	2.5714286	6.6285714	85.185714	530.24286	2196.0714	223.14286	0.0005	0.0005	0.0005	0.0005	0.0005
Standard deviation, s	0	0	0.7559289	3.5598957	47.935721	251.9708	46.92183	0	0	5.4804849	12.713735	168.18281	875.33427	3353.6497	357.96924	0	0	0	0	0
Number of non-detects	7	7	6	5	4	1	3	7	7	6	4	3	1	1	4	7	7	7	7	7
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	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Single value	Single value	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Single value	Single value	Single value	Single value	Single value
Statistical approach	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev	Auto-Chezychev
Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?					Evidence level required:		95%	Use Normal distribution to test for outliers											
t statistic, t ₀ (or k ₀)	N/A	N/A	-522.25	-563.3959162	-236.1187838	-1153.312409	-6200.786574	N/A	N/A	-90.48275862	-77.69927384	-9.042634239	-1.208290392	0.391359195	-10.91545388	N/A	N/A	N/A	N/A	N/A
Upper confidence limit (on true mean concentration, μ)	0.5	0.5	2.031114	7.8078171	100.97453	578.25271	107.68985	0.5	0.5	11.600576	27.574563	362.2684	1972.3639	7721.2392	812.90038	0.0005	0.0005	0.0005	0.0005	0.0005
Evidence level	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	59%	0%	99%	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	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \geq C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$
Select dataset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Back to data Go to outlier test Go to normality test Show individual summary																				