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OCTOBER 2014

GEOENVIRONMENTAL APPRAISAL

of land at
BARUGH GREEN, BARNSLEY

prepared for
HALLAM LAND MANAGEMENT LTD & COMMERCIAL ESTATES PROJECTS

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EXECUTIVE SUMMARY

Introduction	Sirius Geotechnical and Environmental Ltd (Sirius) were commissioned by Hallam Land Management Ltd and Commercial Estates Projects to undertake a geoenvironmental appraisal of located at Barugh Green, Barnsley (the "site"). It is understood that consideration is being given to the redevelopment of the property for a low rise residential end-use, with associated gardens/landscaping, roads and areas of public open space. Sirius has previously undertaken a Preliminary Investigation Report (desk study) for the site (Report Ref: C4855R2, dated November 2013). This report was commissioned as result of recommendations made in the desk study and should be read in conjunction.
Site Details	The site is an irregular shaped plot of land, covering an area of approximately 9.9 hectares. The majority of the site is currently occupied by agricultural fields, with the exception of an area of rough grassland within the south east and a small pond within the north eastern part. An embankment, between approximately 2m and 5m high, is located within the southern part of the site. The embankment was noted to be heavily vegetated with semi-mature trees and low lying shrubs. The far south western area of the site is occupied by two residential properties with private gardens and a small gravel surfaced car park associated with a neighbouring church which fronts onto Barnsley Road.
Site History	Review of historical OS plans indicates that the majority of the site has predominantly remained undeveloped from at least 1854 to the present day, with the exception of a canal and manmade channel within the northern part of the site, cooling ponds within the southern part, and a railway cutting/embankment within the south western and south eastern parts, respectively. The canal, cooling ponds and railway cutting have subsequently been infilled. Within the south western part of the site the area has been occupied by residential properties from c. 1894.
Flood Risk	According to the Envirocheck Report and the Environment Agency website, the northern and eastern parts of the site lie within an indicative Zone 2 flood plain at risk of flooding from rivers and sea, without defences. A flood risk assessment should be undertaken to determine potential risk to the proposed development. The following preliminary recommendations assume that flooding will not affect the proposed development.
Anticipated/ Proven Ground Conditions	The Sirius ground investigations revealed the shallow soils across the majority of the site to comprise topsoil, over residual Middle Coal Measures strata typically comprising firm and stiff, clay and locally medium dense and dense sandy gravel/gravelly sand. The exception to this was within the far northern part of the site where soft, extremely to very low strength alluvial clay was encountered to a maximum proven depth of 4.0m bgl. Although it should be appreciated that made ground of variable thickness was encountered (up to 4.3m bgl in WS101) in the northern, southern and south western parts of the site, associated with the infilled canal, former railway cutting/embankments, and cooling ponds. The superficial deposits were found to be underlain by competent Middle Coal Measures bedrock, comprising mudstone, sandstone and coal. Rotary drilling undertaken as part of the ground investigations identified the Top and Low Haigh Moor coal seams to underlie the site at shallow depth. Voids and/or broken ground were encountered in rotary probeholes located in the southern-central part of the site, at depths of between 7.80m and 10.80m bgl, assumed to be associated with the working of the Top Haigh Moor coal seam.
Mining &	The depth and thickness of the workings encountered as part of the ground investigations, in the central southern part of the site, have the potential to affect surface stability and will therefore require consolidation through drilling and pressure grouting. Outside this localised

Quarrying	zone, the Top Haigh coal seam was found to be intact and no evidence of historic mineworkings (i.e. broken ground/void/soft ground) have been encountered. On this basis it is considered the possibility of unrecorded pillar and stall mineworkings being present within this coal seam at influencing depth beneath the site, out with the zone of identified workings, is low. The possibility of encountering unrecorded mine entries on site cannot be discounted. Following a topsoil strip the entire area should be inspected for evidence of mine entries (including bell pits). Inspection of historical OS plans has revealed no evidence of quarrying on the site.
Foundations	**The foundation recommendations provided below are based on the assumption that appropriate treatment of shallow mineworkings will be undertaken and that site levels remain broadly as exist at present.** Based on proven ground conditions, it is recommended that structural loads associated with the proposed residential development be supported on spread (reinforced strip/trench fill) foundations taken through the made ground and soft low strength alluvial clay into the underlying residual Middle Coal Measures strata (at least firm medium strength cohesive/medium dense granular deposits) and/or competent bedrock. Foundations will need to be designed to cater for residual movement following consolidation of mineworkings; this will typically comprise reinforcement, but could require raft foundations where very shallow workings are encountered. Within the northern, southern and south western parts of the site, made ground associated with the historical development of the site was encountered to a maximum proven depth of 4.30m bgl. Should these areas be redeveloped with residential properties, it is considered that conventional spread foundations are not feasible because of the excessive depth required for excavation. It is therefore recommended that piled foundations or vibro-replacement methods are adopted, terminating within the underlying competent bedrock. Suspended floor slabs will be required where soil swelling may occur, where the ground has insufficient bearing capacity or where made ground is found to be in excess of 600mm deep.
Sulphate Class	DS-3 and ACEC Class of AC-5 should be used for buried concrete structures in contact with made ground. For buried concrete in contact with natural soils only, DS-1 and an ACEC Class of AC-2z could be used.
Contamination	The made ground encountered within the northern and southern parts of the site exhibited elevated concentrations of arsenic and is considered to represent an unacceptable risk to future end users in gardens and areas of proposed soft landscaping. Where these materials underlie the development a 600mm and 450mm thick “clean” subsoil/topsoil “cap” will be required in areas of proposed gardens and soft landscaping, respectively. It is considered likely that further analysis and bioaccessibility testing of arsenic may demonstrate that the reported concentrations of arsenic detected within the shallow made ground, pose a low risk to end-users and eliminate the requirement of a subsoil/topsoil “cap” in private gardens/landscaped areas. Where combustible ash/clinker/coal rich fill is encountered the capping thickness in gardens/landscaped areas should also be increased to 1000mm. It is not considered that remedial works will be required in order to protect controlled waters.
Gas Risk	A preliminary gas risk assessment categorises the site as Amber 2. Radon protective measures are not required for the site. This assessment should be regarded as interim only, prior to completion of the monitoring programme.

The executive summary is an overview of the key findings and conclusions of the report. There may be other information contained in the body of the report which puts into context the findings of the executive summary. No reliance should be placed on the executive summary to determine abnormal costs, detailed design etc.

1. INTRODUCTION

Sirius Geotechnical and Environmental Ltd (Sirius) were commissioned by Hallam Land Management Ltd (HLM) and Commercial Estates Projects (CEP) to undertake a geoenvironmental appraisal of located at Barugh Green, Barnsley (the “site”).

It is understood that HLM and CEG jointly own the site and are proposing to redevelop the property for a residential end-use, comprising 164, two and three storey houses with private gardens, and associated areas of public open space (POS), hardstanding and highways. A proposed development layout was provided to Sirius by HLM and GEG, and is presented within Appendix A as Drawing No. C6045/01.

Sirius has previously undertaken a Preliminary Investigation Report (desk study) for the site on behalf of HLM and CEP (Report Ref: C4855R2, dated November 2013). The desk study included an assessment of information provided by Landmark Information Group (LIG), the British Geological Survey (BGS), the Coal Authority (CA) and Barnsley Metropolitan Borough Council (BMBC). In addition, the desk study included a review of information obtained as part of a geoenvironmental appraisal report undertaken by Sirius for the central and southern parts of the proposed development site (Report Ref: C1277, dated July 2006).

Based on the results of the preliminary investigation, an intrusive investigation was undertaken by Sirius. This report details the results of the intrusive investigation and makes recommendations relating to the proposed redevelopment. This report should be read in conjunction with the Sirius desk study, dated November 2013.

The objectives of this investigation were to:

- Investigate near surface soil and groundwater conditions within previously inaccessible areas of the site.
- Determine the potential risks posed by any ground contamination within previously inaccessible areas of the site and provide recommendations on remedial measures to manage such risks.
- To determine the lateral and vertical extent of contaminated soils identified in the previous investigation.

- Determine the potential risk to the proposed development from hazardous ground gas sources including radon.

- Confirm the extent of unrecorded shallow pillar and stall mineworkings identified as part of the previous ground investigations and determine whether past mining or other extractive industries could have an influence on the surface stability of previously inaccessible areas of the site. In addition, to providing recommendations for remedial measures where shallow mineworkings are encountered within influencing distance of the surface.

- To provide recommendations for foundation, floor slab and highway/pavement design for the proposed development and measures to deal with potential contamination (soils, water and gas).

Fieldwork forming part of this investigation was undertaken within two stages: the first stage was undertaken on 4th August 2014, with the second stage undertaken from 19th to 29th August 2014. Fieldworks comprised the drilling of 31 window sample boreholes and 45 rotary probeholes, in addition to the mechanical excavation of six trial trenches and six trial pits.

This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the defined objectives.

It has been assumed in the production of this report that the site is to be redeveloped for a low-rise residential with gardens end use. In addition, it is assumed that ground levels will not change significantly from those described in this report. If this is not the case, then amendments to the recommendations made in this report may be required.

Where the report refers to the potential presence of invasive plants (such as Japanese Knotweed) or asbestos-containing materials, such observations are for information only and should be verified by a suitably qualified expert.

The comments and opinions presented in this report are based on the findings of the previous desk study, ground conditions encountered during intrusive investigation works performed by Sirius and the results of tests carried out within one or more laboratories. There may be other conditions prevailing on the site which have not been revealed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for any conditions not revealed by this investigation. Any diagram or opinion on the possible configuration of strata, contamination or other spatially variable features between or beyond investigation positions is conjectural and given for guidance only. Confirmation of ground conditions between exploratory holes should be

undertaken if deemed necessary. Evaluation of ground gas and groundwater is based on observations made at the time of the investigation and monitoring visits. It should be noted that ground gas and groundwater levels and quality may vary due to seasonal and other effects.

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2. SITE DETAILS AND DESCRIPTION

Table 2.1 Current Site Overview

Location	The site is located to the south of Dearne Hall Road, within the suburb of Low Barugh, approximately 5km north west of Barnsley town centre. A site location plan is included as Drawing No. C6054/02 within Appendix A.
National Grid Reference	E 431690, N 408730.
Site Area	9.9 hectares.
Topography & Features	The site is irregular in shape with the long axis running north east/south west. The site slopes gently downwards from west to east, with an approximate elevation difference of up to 16m. Access to the property is gained via Barnsley Road to the south west of the site and Dearne Hall Road to the north. The majority of the site is occupied by agricultural fields, with the exception of an area of rough grassland within the south eastern area and a pond within the north eastern part. At the time of the first phase of intrusive works the agricultural land was planted with wheat, which was subsequently cropped on the first day of the second phase of the intrusive works. An embankment, between approximately 2m and 5m high, is located within the southern part of the site. The embankment was noted to be heavily vegetated with semi-mature trees and low lying shrubs. A row of sporadically spaced mature trees, aligned east/west, are located within the northern portion of the site. Overhead power lines, aligned approximately north west/south east and east/west, supported on several electricity pylons and telegraph poles were note within the eastern and southern parts of the site, respectively. At the time of the walkover survey the site was locally waterlogged, particularly within the area of rough grassland located in the south

	eastern part of the property and adjacent to the pond within the north eastern area. The far south western part of the site is occupied by two residential properties with private gardens and a small gravel surfaced car park associated with a neighbouring church which fronts onto Barnsley Road. At the time of the fieldworks the properties were unoccupied. The boundary of the site is generally delineated by either barbed wire or wooden fencing, interspersed with semi mature trees and shrubs. At the time of the walkover survey, access was limited locally within the south eastern and eastern parts of the site owing to the presence of dense vegetation and waterlogged ground.
Site Boundaries	The site is bordered to the north by Dearne Hall Road, beyond which are a number of residential properties, a public house and the River Dearne, flowing from west to east. To the north west the site is bordered by residential properties which front onto Dearne Hall Road. To the east the site is bordered by a heavily vegetated, steep railway embankment, approximately 3 to 4m high. Along the toe of the embankment is a drainage ditch which feeds into the pond located within the north eastern portion of the site. To the south east the site is bordered by a transformer station/electricity substation and large commercial/industrial estate, including a distribution centre, garage and a car sales forecourt. Several of the industrial/commercial premises, including the distribution centre, are constructed on an embankment, elevated approximately 3m to 4m above existing site levels. The elevation of the embankment becomes shallower as the level of the site increases westwards, and becomes level at a central point along the southern boundary.
Invasive Plant Species	None identified at the time of the investigation. Although, given access constraints within the south eastern and eastern parts of the site, due to dense vegetation, it is recommended that presence/absence of invasive plant species at the site are confirmed be a suitably qualified ecologist.

Protected Species	Review of an ecology report for the site, compiled by BSG Ecology on the behalf of HLM and CEP (Ref. 3568.02_R_APPR_060313, dated March 2013) indicates the potential presence of Great Crested Newts within the immediate vicinity of the pond, located within the north eastern part of the site.

The main site features are shown on Drawing No. C6054/03 within Appendix A.

3. PREVIOUS INVESTIGATION FINDINGS

3.1. Introduction

Sirius have previously compiled the following reports for the development site:

- Geoenvironmental Appraisal Report of land at Barugh Green, Barnsley (Report Ref: C1277), dated July 2006.
- Preliminary Investigation Report (Desk Study) of land at Barugh Green, Barnsley (Report Ref: C4855R2), dated November 2013.

The 2006 geoenvironmental appraisal was undertaken prior to HLM and CEP acquiring land immediately to the north and south west of the property, and therefore only targeted the central and southern parts of the development site. The 2006 report included a desk study (preliminary investigation) detailing the previous uses and the environmental setting of the site, presented the results of the Sirius site investigation, and provided preliminary recommendations for foundations, road pavement design, contamination remediation measures and gas protection measures. The report also included a mining risk assessment.

The 2012 desk study report expands on the 2006 geoenvironmental appraisal, following a review of then current search enquires for the entire development site, in addition to a review of the 2006 geoenvironmental appraisal report, with updated interpretation of chemical results and gas monitoring data.

This document should be read in conjunction with the above reports. Salient points of the previous ground investigation reports are summarised below.

3.2. Environmental Setting

The 2012 desk study included an assessment of information provided by the Landmark, the BGS, CA and BMBC. A summary of the environmental setting of the site is provided in Table 3.1.

Table 3.1 Summary of Environmental Setting

Site History	The majority of the site has predominantly remained undeveloped from at least 1854 to the present day, with the exception of a canal and manmade channel within the northern part of the site, cooling ponds within the southern part, and a railway cutting/embankment within the south western and south eastern parts, respectively. The canal, manmade channel, cooling ponds and railway cutting have subsequently been infilled. Within the south western part of the site the area has been occupied by residential properties from c. 1894. Significant features identified on historical OS plans, within approximately 250m radius of the site, include several depots, tanks, an industrial estate, reservoir (subsequently infilled), coalite works, coke & by-product works, electricity transformer station, slag heaps, refuse tips and Barugh Colliery.
Recorded Geology	Review of geological plans indicates the site to be underlain by a variable thickness of made ground (associated with an infilled canal/manmade channel, railway cutting and infilled ponds. Drift deposits are reported to be absent across the majority of the site with the exception of the northern part which is shown to be underlain by alluvium associated with the River Dearne and its zone of influence. The site is reported to be underlain by strata of the Middle Coal Measures (Carboniferous), dipping at approximately 3º to the north east. The Haigh Moor Rock (Sandstone) is shown below the majority of the site, with the exception of the south eastern part of the property, which is reported to be underlain by undifferentiated strata, comprising mudstone, siltstone, sandstone and coal. An east/west orientated fault, downthrowing to the north, is conjectured in the northern most part of the site.
Mining/ Quarrying	**Coal Seams:** The Top and Low Haigh Moor coal seams are conjectured to outcrop approximately 100m and 150m to the west of the site, respectively, dipping to the north east beneath the property. The Swallow Wood coal seam is conjectured to outcrop immediately to the east of the property. Review of the generalised vertical section provided with the 1:10,000 scale

	geological plan indicates the Top and Low Haigh Moor coal seams and the Swallow Wood coal seam to be 0.69m to 1.19m thick, 0.43m to 1.02m thick, and 0.30m to 1.15m thick, respectively. **Coal Mining:** The CA Mining Report states that: • *'The property is in the likely zone of influence from past workings in four seams of coal at shallow to 170m depth, and last worked in 1984'*. • *'There are no known coal mine entries within, or within 20 metres of, the boundary of the property'.* • *'The property is not within the boundary of an opencast site from which coal has been removed by opencast methods'.* A copy of the abandonment plan (obtained from the CA as part of the 2006 investigation) for the Top Haigh Moor coal seam confirms the location and extent of the Barugh Colliery and shows that mineworkings encroach into the central southern part of the property.
Landfilling	There is one historical landfill site recorded within boundary of the property. This relates to the infilled railway cutting located in the southern part of the property. The landfill waste is recorded as "deposited waste including inert waste". In addition, review of historical OS plans identified an infilled canal and manmade channel within the northern part of the site and two infilled cooling ponds within the southern part.
Hydrogeology and Hydrology	Both the superficial deposits (Alluvium) recorded beneath the northern most part of the site and the underlying bedrock (Middle Coal Measures) are classified as Secondary A Aquifers under the aquifer classification system developed by the EA. The River Dearne is located c. 25m to the north of the site. The Environmental Agency (EA) GQA grade of the River Dearne is classified as River Quality C – Fairly Good. A drainage ditch runs along the toe of the railway embankment, located immediately to the east of the site. The drainage ditch issues into the pond located within the north eastern part of the site.

	The northern and north eastern areas of the site are reported to lie within a Zone 2 Indicative Fluvial Floodplain, associated with the River Dearne.
Radon	The site lies within an area in which **radon protective measures are not required**.

3.3. Proven Ground Conditions

The fieldwork element of the 2006 geoenvironmental appraisal took place between 7th and 5th June 2006 and comprised the:

- Excavation of 49 machine dug trial pits (TP1 – TP49) to depths of between 1.00m and 4.10m bgl.
- Drilling of 31 rotary probeholes (R1 – R31) to depths of between 4.50m and 30.00m bgl.
- Drilling of seven window sample boreholes (WS1 – WS7) to depths of between 2.00m and 4.00m bgl.

Gas and groundwater monitoring wells were installed within selected window sample boreholes and rotary probeholes, including WS5 - WS7, R5, R6, R10, R11 and R13.

The locations of the exploratory holes undertaken as part of the 2006 ground investigation are shown on Drawing No. C6054/05 contained within Appendix A.

As stated earlier, the 2006 investigation was undertaken prior to HLM and CEG acquiring the northern and far south western parts of the site, subsequently no intrusive works were undertaken within these areas.

A copy of the engineers exploratory hole records forming part of the 2006 geoenvironmental appraisal are included within Appendix C.

The majority of the site was found to be underlain by a thin veneer of reworked topsoil, underlain by residual bedrock, described as firm and stiff, medium and high strength clay with gravel sized fragments of sandstone and mudstone, to depths of between 1.50m and 4.80m bgl. Within the central and northern areas of the site an upper layer of soft, low strength clay was encountered to depths typically between 0.50m and 1.90m bgl.

Within the window sample boreholes drilled along the existing embankment that housed the former railway line, located within the southern and south eastern parts of the site, made ground was encountered to depths between 0.15m and 2.80m bgl. The made ground typically comprised sand with gravel sized fragments of ash, sandstone and brick. The exception of this was localised pockets of ash rich fill.

Within trial pits TP1, TP4, TP7, TP8 (located adjacent to the south western site boundary) and TP44 (located adjacent to the southern boundary of the property), below the reworked topsoil, granular made ground, described as a fine to coarse gravel, was proven to depths of between 2.80m and 3.40m bgl.

Within trial pits TP43 – TP47 located along the southern site boundary, the reworked topsoil was found to be underlain by made ground, described as soft black organic clay with rare gravel, to depths of between 0.80m and 1.90m bgl. These exploratory locations are believed to have been excavated within the former railway cutting.

Trial pits TP48 and TP49 were excavated within the assumed location of the infilled cooling ponds, in the southern part of the site. Below the reworked topsoil, a clay fill was encountered to a depth of 0.90m, which in turn was overlying a gravel fill, described as gravel of sandstone and mudstone, to a proven depth of 2.70m bgl.

The superficial deposits were found to be underlain by sandstone and mudstone bedrock of the MCM strata at depths of between 1.50m and 4.80m bgl.

Two coal seams were encountered within the rotary probeholes, dipping toward the north east. The shallowest seam was encountered at 6.00m - 7.00m bgl in borehole R5 located in the western part of the site, and at 18.80m to 19.80m bgl in borehole R27 (the deepest this top seam was encountered) located within the eastern part. This seam is on average 1.00m thick (ranged between 0.20m and 1.50m).

A second seam was encountered in six of the rotary probeholes at depths of between 14.70m bgl in the western part of the site and 23.00m bgl in the central eastern part. This seam was recorded to have an average thickness of 0.56m (ranging between 0.30m and 0.80m thick). Intervening strata ranged between 5.50m and 8.50m (average 7.50m) in thickness. Triangulation of the borehole data indicates that the strata is dipping at approximately 3.5° to the north east.

Voids and/or broken ground were encountered in boreholes R14, R16, R30 and R31, located in the southern-central part of the site, at depths of between 9.00m and 10.80m bgl in the shallower (Top Haigh Moor) coal seam.

No significant visual/olfactory evidence of contamination was noted as part of the previous Sirius ground investigation. However, locally within TP43 and TP45 - TP47, located within the former railway cutting, a faint hydrogen sulphide odour was recorded within the cohesive made ground soils.

Rapid inflows of sub-artesian groundwater were recorded in rotary probeholes R14 and R16, located within the southern part of the site, at depths of 9.00m and 10.20m bgl, respectively. These inflows correlate with the voids/broken ground recorded within these probeholes, and are considered to be representative of flooded mineworkings.

Groundwater was encountered during the drilling of probeholes R1, R2, R4, R10 and R27 at depths of between 8.00m and 17.50m bgl.

Subsequent groundwater monitoring of the gas/groundwater monitoring wells installed within selected rotary probeholes and window sample boreholes indicated the groundwater level, where present, to be between 0.72m and 8.70m bgl.

Selected samples of soils and groundwater were taken during and post fieldworks and analysed for a range of determinants (including metals, organic compounds and polycyclic aromatic hydrocarbons (PAHs)) at a UKAS accredited chemical laboratory. A copy of the laboratory data obtained during the 2006 ground investigations is provided within Appendix D.

The results of the analytical data, when compared against current Generic Assessment Criteria (GAC) derived for a residential with gardens end-use, identified locally elevated levels of arsenic within the made ground encountered in the areas of the former railway cutting and on the toe of the former railway embankment, respectively. In addition, an elevated concentration of benzo(a)pyrene and marginally elevated calorific values were recorded in ash rich fill obtained from the former railway embankment.

Based on the laboratory testing undertaken as part of the 2006 ground investigation and in accordance with BRE Special Digest 1 (2005) it was recommended that concrete be designed for an ACEC Class of AC-2z and a design sulphate class of DS-1, assuming brownfield and mobile groundwater conditions. For concrete placed in the made ground encountered within the backfilled

railway cutting it was recommended that the design sulphate class should be changed to DS3 and the ACEC class to AC-3.

Analytical data from groundwater testing undertaken as part of the 2006 ground investigation identified an elevated concentration of zinc within the groundwater obtained from R6, with a recorded level of 510µg/l, in comparison to the EQS threshold value of 125µg/l.

The results of four ground gas monitoring visits undertaken over a 4 week period as part of the 2006 ground investigation revealed background concentrations of carbon dioxide (<5.0% v/v) and non-detectable concentrations of methane, coupled with locally low initial gas flow rates. No constant gas flow was detected.

In addition to the above, VOC concentrations were monitored with a photo-ionisation device (PID) during three of the monitoring visits. Locally elevated VOC concentrations (>1ppm) were detected within a number of monitoring wells, with a maximum reported concentration of 31.7ppm within WS5.

4. PRELIMINARY CONCEPTUAL MODEL

A combined preliminary conceptual site model and conceptual exposure model (PCSM) was developed for the proposed future land use (residential with gardens) as part of the November 2013 desk study.

The PCSM summarises the understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors in order to assess potential pollutant linkages. In assessing the likely contaminants present at the site, reference has been made to the Industry Profile report series issued by the Department of the Environment and other relevant supporting documentation.

A qualitative risk assessment has also been made of the likelihood of any pollutant linkage operating and its potential significance.

The preliminary conceptual model is presented in schematic form as Drawing No. C6054/04, presented in Appendix A.

In summary, the preliminary CSM has identified the following potential pollutant linkages which could result in an unacceptable risk to the proposed end-use, denoted as moderate or higher risk on the PCSM:

- Ingestion, inhalation and dermal contact with potential heavy metals, hydrocarbons (including TPH), within the made ground and shallow natural soils encountered within the northern and south western part of the site (acquired since the issue of the 2006 geoenvironmental appraisal report).

- Ingestion, inhalation and dermal contact with potential asbestos fibres, pesticides (associated with the agricultural use of the site) and PCBs (associated with former railway land) within the made ground and shallow natural soils encountered at the site.

- Ingestion, inhalation and dermal contact of locally marginally elevated concentrations of arsenic and individual PAH species detected within the shallow made ground encountered within the vicinity of the infilled railway cutting and former railway embankment.

- Leachable heavy metals, inorganic and organic contaminants in the made ground and/or shallow natural soils, encountered within northern and south western parts of the site (acquired since the issue of the 2006 geoenvironmental appraisal report) with the potential

to impact controlled waters (principally the River Dearne, pond feature on site and the underlying Secondary A Aquifers).

- Locally potentially combustible ash fill encountered within the shallow made ground encountered within the vicinity of the former railway embankment within the south eastern part of the site.

- Risk from hazardous gas sources, including areas of deep made ground both on-site and off-site (more specifically associated with the infilled railway cutting, cooling ponds, canal, and man-made channel located on site).

- Risk from naturally occurring hazardous gases (including marsh gasses arising from the natural organic alluvial soils underlying the northern portion of the site and mine gases from the underlying coal seams/workings recorded/identified across the site).

- Inhalation of vapours (VOCs) identified during the 2006 Sirius ground investigation.

- Asbestos containing materials (ACMs) within the infrastructure of the existing building located within the south western part of the site posing a **low** risk to construction/demolition workers and adjacent site users, **providing an appropriate method of removal/demolition is undertaken.**

- Concrete attack associated with elevated concentrations of sulphate within the shallow made ground encountered within the infilled railway cutting.

5. FIELDWORK

5.1. Scope of Investigation

The information contained in this report is limited to areas of land accessible during the investigation within the site boundary, as indicated on the site plan, presented in Appendix A as Drawing No. C6054/05.

The scope of this investigation was developed using recommendations outlined in the 2013 desk study undertaken by Sirius using guidance presented in BS 10175:2001, BS 8485:2007, the CLR series of documents (Defra and Environment Agency, 2002a-2002e) and BS EN 1997:2004 and 2007.

Fieldwork forming part of this investigation was supervised by a Sirius Geoenvironmental Engineer and was carried out in two stages; the initial phases of fieldworks was undertaken on 4th August 2014, with a second phase of works undertaken between 19th and 29th August 2014. The fieldworks comprised the:

- Excavation of six trial trenches (TT101 – TT106) to depths of between 1.30m and 1.80m bgl within the northern part of the site in order to determine location of the infilled canals.
- Excavation of six trial pits (TP101 – TP106) to depths of between 2.50m and 3.80m bgl.
- Drilling of 31 window sample boreholes (WS101 – WS131) to depths of between 1.00m and 6.30m bgl.
- Boring of 43 rotary probeholes (RO101 – RO103, RO103A, RO103B, RO105 – RO119, RO121 – RO125, RO127 – RO132, RO134 – RO142 and RO144 – RO146) to depths of between 3.00m and 30.00m bgl.

Gas and groundwater monitoring wells were installed within 29 selected window sample boreholes (WS101, WS104 - WS125 and WS127 - WS131).

It should be noted that the rotary probeholes were labelled prior to commencing the fieldworks and not all of the proposed rotary hole locations were undertaken due to either time or access constraints.

5.2. Strata Description

Detailed descriptions of strata and groundwater observations made during investigation works, together with samples recovered, are presented on the Engineer's exploratory hole records in Appendix B.

It should be noted that rotary open hole drilling techniques only recover small chip samples, brought to the surface by flush returns. Subsequently, the strata descriptions and depth to strata boundaries are based on field observations and are therefore limited and should be used as a guide only. Therefore the depth of strata boundaries within superficial deposits should be based primarily on the observations made during the excavation/drilling of the trial pits and window sample boreholes, undertaken as part of this and the 2006 investigations.

Standard strata descriptions are compliant with BS EN ISO 14688:2002 and 2004 and BS EN ISO 14689:2003. The depths of strata on the record sheets are recorded from current ground levels and Ordnance Datum at each location.

5.3. Exploratory Hole Locations

The exploratory hole locations were based on the findings of the PCSM in order to target specific areas of interest, characterise previously inaccessible areas of the site and achieve a general site coverage. Procedures and principals recommended in CLR4 and BS 10175:2001 were followed when determining exploratory hole locations.

The following table details the exploratory hole rationale:

Table 5.1 Exploratory Hole Rationale

Exploratory Hole	Rationale
RO101 – RO103, RO103A, RO103B, RO105 – RO119, RO121 – RO125, RO127 – RO132, RO134 – RO142 and RO144 – RO146	Confirm the extent of unrecorded shallow pillar and stall mineworkings identified as part of the previous ground investigations and determine whether past mining or other extractive industries could have an influence on the surface stability of previously inaccessible areas of the site.
WS101 – WS103	Located in order to target the south western part of the site, previously not investigated. In addition to allowing the installation of gas/groundwater

	monitoring wells in selected boreholes.
WS104 – WS111 and TP101 – TP106	Located in order to target the north western part of the site, previously not investigated. In addition to allowing the installation of gas/groundwater monitoring wells in the window sample boreholes.
TT101 – TT107	Trial trenches excavated in order to determine the locations of the infilled canals located within the northern part of the site.
WS121 – WS126	Window sample boreholes positioned in order to target the location of the former railway cutting/embankment. In addition to allowing the installation of gas/groundwater monitoring wells in selected boreholes.
WS112 – WS120, WS127 – WS129	To provide general site coverage and allow the installation of gas/groundwater monitoring wells.

Exploratory hole locations forming part of this current investigation are shown on Drawing No. C6054/05 in Appendix A of this report.

5.4. Access Constraints

At the time of this current investigation the south eastern part of the site was heavily waterlogged and occupied by dense vegetation, consequently access into this area of the site was restricted. .

In addition, the presence of the overhead electricity transmission lines within the eastern and southern parts of the site, and buried utilities (including a sewer within the central part), posed constraints to exploratory hole locations.

5.5. Geotechnical Testing

Geotechnical laboratory testing was carried out on selected samples in accordance with techniques outlined in BS 1377:1990 “Methods of Test for Soils for Civil Engineering Purposes” at the laboratory of Professional Soils Laboratory (PSL), a UKAS accredited laboratory.

Geotechnical and geochemical test results are included within Appendix C of this report.

5.6. Chemical Testing

Selected samples of the made ground, natural soils and groundwater were tested for a range of potential contaminants under subcontract with Derwentside Environmental Testing Services (DETS), a UKAS and MCERTS accredited laboratory.

The potential contaminants of concern identified by the PCSM were selected as the analytes for the samples recovered from the site. The results of soil, leachate and groundwater analysis, as received from the laboratory, are presented in Appendix C of this report.

6. GROUND CONDITIONS AND MATERIAL PROPERTIES

6.1. Strata Profile

A summary of the strata profile recorded during these works is provided in Table 6.1 below.

It should be noted that rotary open-hole drilling techniques only recover small chip samples, brought to the surface by the flush returns. Therefore the depth of strata boundaries and descriptions within shallow soils are based primarily on the observations made during the drilling/excavation of the window sample boreholes and trial pits.

Table 6.1 Strata Profile

Strata	Depth Range (Thickness Range)	Description and Comments
Natural Topsoil	Ground Level (0.20 - 0.40m)	Natural topsoil, described as soft sandy clay, was encountered within WS111 – WS120 and WS127 – WS131, located within the central part of the site.
Made Ground	Ground Level (0.20 - 5.40m)	The majority of the site was found to be covered by reworked topsoil to depths of between 0.20m and 0.55m bgl. The reworked topsoil was typically described as soft sandy clay, locally clayey sand, with occasional gravel of brick, sandstone, coal, ash, concrete, mudstone, glass, ceramics and plastic. Locally cobbles of brick and sandstone were noted. Within the northern part of the site the reworked topsoil was found to be underlain by a variable thickness of made ground to depths of between 0.50m and in excess of 3.20m bgl. The made ground was noted to predominantly comprise mixed cohesive fill described as soft sandy clay, locally silt, with occasional gravel sized fragments of brick, wood, plastic, coal, metal, glass, rubber, fabric and sandstone. Locally cobble sized fragments of wood and brick were noted. WS104 encountered an obstruction within the mixed cohesive fill at a depth of 3.20m bgl and subsequently did not prove the

Strata	Depth Range (Thickness Range)	Description and Comments
		true thickness of the material. Mixed granular fill, described as sandy gravel and gravelly sand, was encountered within TP106, WS105, WS106, WS108 and WS109, located within the northern part of the site. The gravel sized fragments were noted to include mudstone, coal, ash, concrete, sandstone, plastic, ceramic, wood and brick. The variable thickness of made ground encountered within the northern part of the site is assumed to be associated with the infilled channels of the former canals. The trial trenches (TT101 – TT06) were positioned in order to identify the location and alignment of the infilled canal. Sketches and trial pit logs are contained within Appendix B of this report. Window sample boreholes WS101, WS102 and WS121 – WS126 drilled within the footprint of the infilled railway cutting, located within south western part of the site, encountered made ground underlying the reworked topsoil to depths ranging between 0.90m and 5.40m bgl. The made ground was generally noted to become deep towards the south west. The made ground within this area was found to predominantly comprise mixed granular fill described as dark grey and brown clayey sandy gravel of sandstone, brick, ash, mudstone and clinker. Locally within WS123, WS125 and WS126 interbeds of mixed cohesive fill, described as sandy clay with gravel of brick, sandstone and coal, was encountered. A suspected zone of broken ground/void was noted between 1.20m and 2.00m bgl during the drilling of RO103 located within the infilled railway cutting. Subsequently, RO103A, RO103B and WS125 were drilled immediately adjacent to RO103 in order to investigate this suspected feature. The additional boreholes did not identify a void/zone of broken

Strata	Depth Range (Thickness Range)	Description and Comments
		ground, although the fill was noted to be very loose.
Alluvium	0.40 – 2.25m (0.60 - 2.70m)	Within the northern part of the site the made ground was found to be underlain by natural cohesive deposits, described as soft low strength clay, to depths of between 1.15m and 4.00m bgl, where the full thickness of the material was proven. This material is considered to be representative of alluvium.
Weathered Pennine Middle Coal Measures (MCM).	0.20 – 4.40m (0.10 – 4.55m)	The topsoil, made ground and alluvium (where encountered) was typically found to be underlain by natural cohesive deposits, considered representative of completely weathered/residual MCM strata, to depths of between 0.80m and a maximum proven depth of 5.45m bgl. These deposits were typically found to comprise firm to very stiff, medium and high strength yellow brown and mottled grey slightly silty clay with occasional gravel and cobbles of mudstone, sandstone and coal. Locally an upper layer, between 0.10m and 0.90m thick, of soft low strength residual clay was encountered. Within the central part of the site (more specifically WS105, WS117, WS119, WS128 - WS131) and locally within the northern part (WS105) interbeds, between 0.85 and 3.35m thick, of granular residual soils were encountered to depths of 0.85m and a maximum proven depth of 5.45m bgl. The residual granular soils were typically described as medium dense and dense gravelly sand/sandy gravel of mudstone and sandstone. The residual/completely weathered MCM strata was noted to be absent within TP02, WS107, WS121, WS124 and WS125.
Pennine Middle Coal	0.80 – >5.45m NR	Competent MCM bedrock was encountered at depths of between 0.80m and 5.40m bgl. WS105 was terminated within

Strata	Depth Range (Thickness Range)	Description and Comments
Measures (MCM) Bedrock		the residual granular deposits at a depth of 5.45m bgl and subsequently did not prove the depth to competent bedrock. The MCM strata were found to comprise variable bands of extremely weak to very weak mudstone and sandstone. Two seams of intact coal were encountered during the drilling of the rotary probeholes and are considered to represent the Top and Low Haigh Moor coal seams. The coal seams encountered are discussed in more detail within Section 6.2.

The ground profile encountered as part of this investigation generally concur with the strata recorded in the 2006 Sirius investigation.

6.2. Coal Seams Encountered

The ground investigation has identified two seams of coal at shallow depth beneath the site. The seams encountered are considered representative of the Top and Low Haigh Moor coal seams. The seams were generally noted to be dipping to the north-east.

The Top Haigh Moor coal seam was encountered at depths of between 5.45m and 18.20m bgl (approximately between 37.98m and 66.61m AOD) within 37 probeholes and WS101 drilled as part of this investigation. Where found to be intact the seam was recorded to be between 0.30m and 1.60m thick.

Evidence of potential mineworkings, recorded as broken ground, were encountered at the anticipated depth of the Top Haigh Moor coal seam within three rotary probeholes drilled as part of this investigation (R103B, RO109 and RO113). The depth to the base of the workings was recorded to be between 9.00m and 9.50m bgl (approximately between 53.03m AOD and 55.12m AOD).

Underlying the Top Haigh Moor coal seam within probeholes RO106, RO114, RO128 and RO141 a 0.20m to 0.50m thick coal seam was encountered at depths of between 16.20m and 23.20m bgl (approximately between 34.85m and 51.87m AOD). This coal seam is considered to be

representative of the Low Haigh Moor coal seam. No evidence of unrecorded mineworkings (voids, broken ground or soft push) was identified within this seam.

Triangulation of the borehole data indicates the Top and Low Haigh Moor coal seams to dip approximately 3° to the north east.

A 0.30m thick seam of coal was encountered within RO38 at a depth of 23.80m bgl. Correlation of the borehole data obtained as part of this and the previous ground investigations would suggest that this seam of coal is thin and inconsistent.

6.3. Material Properties

Made Ground

Standard penetration tests (SPT) undertaken within the granular made ground recorded uncorrected 'N' values ranging from 0 to 24 indicative of very loose to medium dense material.

SPTs undertaken within cohesive made ground recorded uncorrected N values ranging from 1 and 8, indicative of extremely low strength to medium strength material. An SPT undertaken within the cohesive made ground encountered within WS104 recorded an N value of 50 for 50mm penetration, indicating the presence of obstructions within the fill material.

Hand shear vane testing undertaken within excavated blocks of the cohesive made ground recorded undrained shear strengths of between 4kN/m^2 and 46kN/m^2, indicative of extremely low strength to medium strength material.

A particle size distribution (PSD) test was undertaken on one sample of cohesive made ground in order to confirm the field descriptions and enable categorisation of the fill material for compaction. The classification of the cohesive made ground in accordance with Highways Agency (HA) publication "Specification for Highway Works Series 600, Earthworks" is discussed in Section 9.

CBR testing was undertaken on one bulk sample of cohesive made ground obtained from TP102 1.00m bgl, following re-compaction in the laboratory using a 2.5kg rammer. The results of the laboratory testing indicate CBR values of 1.5% and 1.6% for the recompacted cohesive fill.

Water soluble sulphate (SO_4) concentrations recorded from samples taken in the made ground recorded concentrations of between 23 and 1800mg/l, together with pH conditions of 4.5 and 7.7. The results with regards concrete design are discussed in Section 9 of this report.

Alluvium

Atterberg Limit determinations undertaken on two samples of alluvium indicate the material to be clay of low and intermediate plasticity, with Liquid Limits 34% and 45%, Plastic Limits of 17% and 21%, and Plasticity Indices of 17% and 24%. Calculation of the modified Plasticity Index indicates that the cohesive deposits have a low to medium volume change potential.

Hand shear vane tests undertaken within excavated blocks/undisturbed samples of the alluvial deposits obtained from the trial pits and window samples, respectively, recorded undrained shear strengths ranging from 10kN/m^2 to 46kN/m^2, indicative of very low to medium strength material.

Two SPTs undertaken within the alluvium encountered within WS110, at depths of 2.00m and 3.00m bgl, recorded N values of 1 and 4, respectively. Indicative undrained shear strengths of cohesive soils can be derived by applying a correlation to SPT 'N' values according to the material's plasticity, after Stroud (1975)[1]. Based on the maximum reported Plasticity Index of 24% for the cohesive alluvial deposits a correlation factor of approximately 5 can be derived. Using Stroud's correlation the SPT N values indicate undrained shear strengths of 5kN/m^2 and 20kN/m^2 within the cohesive deposits, indicating extremely low to very low strength material.

A CBR test was undertaken on one bulk sample of the alluvium obtained from TP103 at 0.60m bgl, following re-compaction in the laboratory using a 2.5kg rammer. The results of the laboratory testing indicate CBR values of 13% and 17.7% for the recompacted alluvium.

Weathered Pennine Middle Coal Measures (MCM) Deposits

Cohesive

Atterberg Limit determinations within the residual cohesive MCM indicate the material to be clay of low and intermediate plasticity, with Liquid Limits in the range of 29% to 45%, Plastic Limits of between 16% and 19%, and Plasticity Indices in the range of 13% to 21%. Calculation of the modified Plasticity Index indicates that the cohesive deposits have a low to medium volume change potential.

Consistency Indices of the cohesive soils tested indicate Ic value in the range 0.95 to 1.5, indicative of stiff to very stiff consistency.

[1] Stroud, M. A. The standard penetration test in insensitive clays and soft rocks, *Proceedings of the European Symposium on Penetration Testing,* 2, 367 – 375 (1975)

Hand shear vane testing undertaken within excavated blocks/undisturbed samples of the residual cohesive deposits obtained from the trial pits and window samples, respectively, recorded undrained shear strengths ranging from 40kN/m^2 to 120kN/m^2, indicative of medium to high strength material.

SPTs undertaken during the drilling of the window sample boreholes within the residual clay of the MCM, typically returned uncorrected 'N' values of 13 to 43. Based on the reported Plasticity Indices and using Stroud's correlation the SPT N values indicate undrained shear strengths of between 65kN/m^2 and 215kN/m^2 within the residual cohesive deposits, indicative of medium to very high strength material.

A CBR test was undertaken on one bulk sample of the residual cohesive MCM obtained from TP101 at 0.50m bgl, following re-compaction in the laboratory using a 2.5kg rammer. The results of the laboratory testing indicate CBR values of 9.1% and 11.2% for the recompacted cohesive residual MCM.

Granular

Uncorrected SPT N values recorded within the residual granular MCM deposits ranged between 10 and 31, indicative of medium dense to dense material. The granular deposits were generally found to become denser with depth.

Water soluble sulphate (SO_4) concentrations recorded from samples taken in the MCM strata recorded concentrations of between 20 and 60mg/l, together with pH conditions of 5.8 and 7.7. The results with regards concrete design are discussed in Section 9 of this report.

Pennine Middle Coal Measures (MCM) Bedrock

SPTs undertaken within the bedrock returned uncorrected 'N' values ranging between 50 blows for 105mm and 290mm penetration, indicative of extremely weak to weak rock.

6.4. Stability

The majority of the trial pits excavated as part of this ground investigation were described as stable, i.e. did not collapse during excavation. The exception to this was TP103 and TP04 which were terminated at 2.60m and 3.80m bgl, respectively, due to the instability of the excavation side walls.

6.5. Visual/Olfactory Evidence of Contamination

An oily residue was noted to the granular fill encountered within WS121 and WS122, located within the vicinity of the infilled railway cutting, at depths of 0.30m and 0.25m bgl, respectively. In addition, a strong hydrogen sulphide odour was noted to the granular fill encountered at a depth of 0.30m bgl within WS124, also located within the footprint of the infilled railway cutting.

Made ground materials consisting of brick, wood, plastic, coal, ash, metal, glass, rubber, fabric and ceramic were encountered. These materials can often contain ACMs and elevated levels of metals and PAH, in addition to high calorific value.

6.6. Groundwater

Groundwater strikes encountered during the recent ground investigation are summarised in Table 6.2.

Table 6.2 Summary of Groundwater Encountered

Exploratory Hole	Depth Encountered (m bgl)	Description	Stratum
TP102	1.5	Groundwater seepage from southern face of excavation.	Residual MCM
	1.8	Groundwater seepage from northern face of excavation.	Residual MCM
TP105	2.3	Groundwater seepage.	MCM Bedrock
TP106	1.1	Perched groundwater strike, rising to 0.80m bgl after 20 minutes.	Made Ground/Residual MCM
WS104	1.1	Perched groundwater strike, rising to 0.3m bgl after 20 minutes.	Made ground
WS105	1.3	Perched groundwater strike, rising to 0.5m bgl after 20 minutes.	Made ground
WS107	2.8	Groundwater strike, rising to 2.4m bgl after 20 minutes.	Made ground/MCM Bedrock
WS109	2.3	Groundwater strike, rising to 2.1m bgl after 20 minutes.	Made Ground/Residual MCM
WS110	4.0	Groundwater strike, rising to 3.6m bgl after 20 minutes.	Residual MCM
WS117	1.3	Groundwater strike, rising to 1.10m bgl after 20 minutes.	Residual MCM
WS120	3.5	Groundwater strike	MCM Bedrock

Exploratory Hole	Depth Encountered (m bgl)	Description	Stratum
WS122	3.75	Groundwater strike	Made Ground
WS125	1.7	Groundwater strike, rising to 1.5m bgl after 20 minutes.	Made Ground
WS130	2.9	Groundwater strike, rising to 2.5m bgl after 20 minutes.	Residual MCM
WS131	2.3	Groundwater strike, rising to 2.10m bgl after 20 minutes.	Residual MCM
RO109	8.5	Groundwater strike	MCM Bedrock
RO110	9.0	Groundwater strike	MCM Bedrock
RO111	9.0	Groundwater strike	MCM Bedrock
RO114	27.0	Groundwater strike	MCM Bedrock
RO117	9.0	Groundwater strike	MCM Bedrock
RO124	12.0	Groundwater strike	MCM Bedrock
RO125	GL	Perched groundwater	Residual MCM
RO127	15.0	Groundwater strike	MCM Bedrock
RO128	15.0	Groundwater strike	MCM Bedrock
RO137	17.3	Groundwater strike	MCM Bedrock
RO139	15.00	Groundwater strike	MCM Bedrock
RO140	18.0	Groundwater strike	MCM Bedrock
RO141	12.0	Groundwater strike	MCM Bedrock
RO142	10.7	Groundwater strike	MCM Bedrock
RO144	GL	Perched groundwater strike	Residual MCM
RO144	GL	Perched groundwater strike	Residual MCM

Subsequent groundwater monitoring, undertaken by Sirius, of the standpipes installed within the selected window sample boreholes revealed the groundwater, where present, to be standing between 0.10m and 5.24m bgl.

6.7. Ground Gas

Ground gas monitoring has been carried out on two occasions to data. Full details of ground gas monitoring results are included in Appendix D.

The results of the gas monitoring has typically revealed elevated levels of carbon dioxide (maximum steady concentration of 11.1% v/v), and non-detectable concentrations of methane, coupled with non-detectable/low gas emission rates.

The exception to this is an elevated concentration of methane (peak concentration of 82.2% v/v) detected within WS105 during the second monitoring visit.

In addition to the above, non-detectable to very low concentrations of carbon monoxide and hydrogen sulphide have been detected.

Volatile organic compounds (VOCs) have been screened on one occasion to date with a photo-ionisation detector (PID) during return monitoring visits. A maximum recorded concentration of 8.2ppm was recorded in WS116.

The monitoring programme includes nine visits over a six month period (seven visits remaining over a two month period). On completion of the monitoring, a full set of results will be issued in an addendum letter.

7. RESULTS OF CHEMICAL TESTING

7.1. Assessment Methodology

The laboratory test data for the relevant soil strata were reviewed for completeness and consistency. Those determinands that represent potential contaminants of concern were subject to further evaluation.

Statistical testing was undertaken for the Planning Scenario by the methods described in CL:AIRE & CIEH "Guidance on Comparing Soil Contamination Data with a Critical Concentration", May 2008. This statistical testing was undertaken to determine whether there was sufficient evidence that the true mean concentration of each determinand was less than the relevant critical concentration for that component.

Data Below the Analytical Limit of Detection

The proportion of data below the analytical limit of detection ("non-detects") was reviewed for each determinand. The dataset for each site zone (where applicable) was considered separately.

Non-detect data were given a concentration of half of the relevant limit of detection (LoD) for calculation purposes. In cases where a contaminant dataset for a zone consisted of more than 10-15% of non-detect data, then professional judgement was applied in selecting and applying statistical tests and in interpreting the data.

Assessment of Outliers and Data Distribution

Assessment of data distribution and the identification of statistical outliers was performed iteratively, applying appropriate data distribution and outlier tests for the complete and outlier-censored datasets.

The presence of outliers was determined using Grubbs' test working with untransformed values for normally distributed data and natural log-transformed values for non-normally distributed data.

The data were tested for normality by at least two of the following methods:

- Probability histogram.
- Probability (q-q) plots.

- Shapiro-Wilk normality test.

Outliers were considered to form part of the overall site dataset *except* when there was clear evidence and justification for their exclusion.

Calculation of 95% Upper Confidence Limit of the Sample Mean

Based upon the normality and outlier tests, the 95% Upper Confidence Limit (US95) of each contaminant of concern was calculated by:

- One-sample t-test for datasets that are normally distributed or close to normal distribution.
- One-sided Chebyshev test for datasets that are significantly non-normal.

The calculated US95s are presented below and compared to the applicable Generic Assessment Criteria.

7.2. Soil Analysis

For completeness, the results of the laboratory testing obtained as part of this current and the 2006 investigations have been assessed. A full set of results for the chemical analysis is presented in Appendix C.

For this site, measured values were compared to Generic Assessment Criteria (GAC) derived for a residential with plant up take end use. Source data for all GACs are provided in Appendix E.

The chemical analysis results and screening criteria are summarised in Table 7.1.

Table 7.1 Summary of Total Soil Concentrations (2006 and 2014 laboratory test results)

Determinand	No. of Samples Tested	Range of Results (mg/kg unless specified)	GAC (1% SOM)	No. of Samples >GAC	Sample Exceeding GAC
Metals					
Arsenic (inorganic)	39	5 - 78	37	7	TP43 at 0.50m bgl WS101 at 0.10m bgl WS102 at 0.50m bgl WS107 at 0.80m bgl WS108 at 0.40m bgl WS122 at 1.00m bgl WS124 at 1.50m bgl
Cadmium	39	0.3 – 8.3	18	0	
Chromium (III)	39	4 – 61	4000	0	
Copper	39	14 – 1200	200	1	WS108 at 0.40m bgl

Determinand	No. of Samples Tested	Range of Results (mg/kg unless specified)	GAC (1% SOM)	No. of Samples >GAC	Sample Exceeding GAC
Lead	39	12 – 190	200	0	
Mercury (inorganic)	39	<0.3 – 1.1	170	0	
Nickel	39	3 – 120	180	0	
Selenium	39	<0.5 – 2.4	350	0	
Zinc	39	38 – 2400	450	3	WS104 at 0.80m bgl WS107 at 0.80m bgl WS108 at 0.40m bgl
Inorganics					
pH	39	4.5 – 7.7	<5 or >9	2	TP105 at 0.10m bgl TP106 at 0.50m bgl
Total Sulphate	39	<100 – 37,000	2400	6	WS101 at 0.10m bgl WS102 at 0.50m bgl TP 106 at 0.50m bgl WS122 at 1.00m bgl WS124 at 1.50m bgl WS107 at 0.80m bgl
Water Sol. Sulphate	39	10 – 1800mg/l	500mg/l	5	TP43 at 0.50m bgl WS101 at 0.10m bgl WS102 at 0.50m bgl WS122 at 1.00m bgl WS124 at 1.50m bgl
Speciated PAH					
Acenaphthene	39	<0.1 – 4.3	200	0	
Anthracene	39	<0.01 – 11	2300	0	
Acenaphthylene	39	<0.1 – 3.5	170	0	
*Benzo(a)anthracene**	39	<0.1 – 4.3	*b(a)p**	0	
*Benzo(b)fluoranthene**	39	<0.1 – 3.1	*b(a)p**	0	
*Benzo(k)fluoranthene**	39	<0.1 – 14	*b(a)p**	0	
*Benzo(g,h,i)perylene**	39	<0.1 – 5.4	*b(a)p**	0	
Benzo(a)pyrene	39	<0.1 – 9.8	4.9	1	WS5 at 1.80m bgl
*Chrysene**	39	<0.1 – 12	*b(a)p**	0	
*Dibenzo(a,h)anthracene**	39	<0.1 – 0.4	*b(a)p**	0	
Fluoranthene	39	<0.1 – 38	2300	0	
Fluorene	39	<0.1 – 6.8	280	0	
Indeno(1,2,3-cd)pyrene	39	<0.1 – 5.7	4.9*	1	WS5 at 1.80m bgl
Naphthalene	39	<0.1 – 16	1.0	4	TP43 at 0.50m bgl WS1 at 0.05m bgl WS4 at 0.20m bgl WS5 at 1.80m bgl
Pyrene	39	<0.1 – 28	620	0	
Phenanthrene	39	<0.1 – 46	95	0	
TPH					
Aliphatic EC 5-6	3	<0.01 – 0.03	24	0	
Aliphatic EC >6-8	3	<0.01 – 0.19	52	0	
Aliphatic EC >8-10	3	<0.01	61	0	
Aliphatic EC >10-12	3	<1.5	61	0	

Determinand	No. of Samples Tested	Range of Results (mg/kg unless specified)	GAC (1% SOM)	No. of Samples >GAC	Sample Exceeding GAC
Aliphatic EC >12-16	3	<1.2	500	0	
Aliphatic EC >16-35	3	<4.9 – 32.7	41000	0	
Aromatic EC 5-7	3	<0.01 – 0.01	53	0	
Aromatic EC >7-8	3	<0.01 – 0.01	100	0	
Aromatic EC >8-10	3	<0.01 – 0.04	19	0	
Aromatic EC >10-12	3	<0.9	63	0	
Aromatic EC >12-16	3	<0.5 – 6.8	500	0	
Aromatic EC >16-21	3	<0.6 – 14	260	0	
Aromatic EC >21-35	3	<1.4 – 8.6	1100	0	
BTEX					
Benzene	4	<0.01 – 0.01	0.13	0	
Toluene	4	<0.01 – 0.01	100	0	
Ethylbenzene	4	<0.01	50	0	
Xylenes (Total)	4	<0.01 – 0.02	27	0	
Others					
Phenol	39	<0.3 – 4.0	270	0	
MTBE	3	<0.01 – 0.03	31	0	
TOC	39	0.4 – 11 w/w%	3 w/w%	17	TP8 at 0.20m bgl TP13 at 0.20m bgl TP27 at 0.10m bgl TP31 at 0.10m bgl TP32 at 0.20m bgl TP40 at 0.10m bgl TP42 at 0.10m bgl TP43 at 0.10m & 0.50m bgl TP47 at 0.20m bgl WS1 at 0.05m bgl WS4 at 0.20m bgl WS5 at 1.80m bgl WS102 at 0.50m bgl WS107 at 0.80m bgl TP106 at 0.50m bgl WS124 at 1.50m bgl
Calorific Value	7	1.5 – 12.3MJ/kg	2MJ/kg	4	WS1 at 0.05m bgl WS4 at 0.20m bgl WS102 at 0.50m bgl WS107 at 0.80m bgl TP106 at 0.50m bgl WS122 at 1.0m bgl
Asbestos	7	NAD	Fibres present	0	
PCB	2	<0.01µg/kg	8µg/kg	0	
Organochlorine and Organophosphorus Pesticide Suite	3	<0.1	LoD	0	

Table based on a Residential with Gardens end-use.
* assessed using benzo(a)pyrene as a surrogate marker.
GAC -generic assessment criterion; NAD – No Asbestos Detected: NA - not applicable; LoD – Limit of detection.

Metals and Metalloids

Elevated levels of arsenic, in comparison to the respective GAC assuming a residential with plant uptake, were detected within four samples of made ground obtained from the infilled railway cutting located within the southern part of the site, and three samples of made ground obtained from the infilled canals within the northern part. In addition, a sample of reworked topsoil obtained from WS101, located within the northern part of the site was also noted to contain an elevated level of arsenic.

Statistical analysis using USEPA ProUCL Software (version 5.0) indicates a US95 value or arsenic of 65.9mg/kg and 65.5mg/kg for the made ground soils encountered within infilled railway cutting and canals, respectively, which exceed the relevant GAC.

Statistical analysis of the arsenic concentrations recorded within the reworked topsoil indicates a US95 of 26.4mg/kg, below the relevant GAC of 37mg/kg, and is therefore considered to pose a low risk to human health.

Elevated levels of zinc were identified within three samples of made ground obtained from WS104, WS107 and WS108, located within the northern part of the site. The latter sample was also noted to contain an elevated level of copper.

The GAC applied to copper and zinc, derived from the Sludge (Use in Agriculture) regulations (SI 1263/1989), is derived for assessment of sewage sludge amended soils. The equivalent LQM/CIEH derived GAC for human health protection for copper and zinc are 2300mg/kg and 3700mg/kg, respectively. Consequently, the risk to human health from the concentrations of copper and zinc may be dismissed. With cognisance to the exceedance of the phytotoxic GAC, given that the northern part of the site is to be redeveloped as an area of POS, it is considered that the GACs for zinc and cooper, assuming a residential end use without plant uptake (7,200mg/kg and 40,000mg/kg, respectively) is more relevant, and therefore the risk to landscaped areas and plant growth is considered to be negligible/low and not discussed further.

Other Inorganic Analytes

Elevated concentrations of water soluble and total sulphate were recorded in several samples of made ground and reworked topsoil from across the site. Sulphate is not considered to pose a potential significant risk to human health under normal circumstances. Recommendations with regard to sulphate attack and buried concrete structures are given in Section 9 of this report.

Elevated concentrations of Total Organic Carbon (TOC) have been identified within several samples of made ground and reworked topsoil. TOC is not considered as a contaminant of concern for human health. However, the results should be considered further if it is proposed to dispose materials to landfill.

The calorific value GAC of 2MJ/kg was exceeded within three samples of made ground obtained from the northern part of the site and three samples of made ground obtained from the former railway cutting/embankment. The calorific value GAC is not an indication of chronic human health risk but may be useful in assessment of the potential fire risk posed by made ground soils containing elevated concentrations of potentially combustible organic matter. The samples tested were noted to contain ash, coal and / or clinker.

No other inorganics recorded concentrations above the relevant GAC.

Organics

Concentrations of naphthalene in exceedence of the GAC for a residential with plant uptake end use, assuming a soil organic matter (SOM) of 1%, were detected within four samples of made ground obtained from the former railway cutting/embankment, with recorded concentrations of 16mg/kg (WS5 at 1.80m), 1.5mg/kg (WS1 at 0.05m), 1.3mg/kg (WS4 at 0.20m) and 1.3mg/kg (TP43 – 0.50m).

However, taking into consideration the recorded SOM within each of the samples (ranging between 9.1 – 18.9%) the recorded concentrations of naphthalene, with the exception of WS5 at 1.80m bgl, do not exceed the respective GAC of 4.6mg/kg assuming an SOM of at least 5%. On this basis the marginally elevated levels of naphthalene detected within WS1, WS4 and TP43 are considered to pose a low risk to human health.

Statistical analysis using USEPA ProUCL Software (version 5.0) indicates a US95 value or naphthalene of 19.4mg/kg for the made ground soils encountered within railway cutting/embankment. However, the maximum reported concentration detected within WS5 is found to be a statistical outlier, and therefore considered to be representative of contamination hotpot.

The sample of made ground obtained from WS5 at 1.80m bgl was also noted to contain elevated levels of benzo(a)pyrene and indeno(1,2,3-cd)pyrene, with recorded concentrations of 16mg/kg and 5.7mg/kg, respectively. Statistical analysis indicates US95 values for benzo(a)pyrene and indeno(1,2,3-cd)pyrene of 9.8mg/kg and 1.9mg/kg, respectively, for the made ground soils encountered within railway cutting/embankment. However, the maximum reported concentrations

detected within WS5 are also found to be statistical outliers, and therefore considered to be representative of contamination hotpot.

The elevated levels of PAH detected within the made ground obtained from WS5 is assumed to be associated with a high ash content.

No inorganics recorded concentrations above the relevant GAC.

Organochlorine and Organophosphorus Pesticides

Three samples of topsoil were also tested for a suite of organochlorine and organophosphorous pesticide. The levels of individual determinands were typically found to be below the laboratory's limit of detection (LOD).

7.3. Leachability Testing

Given the environmental setting of the site, consideration has been taken of both groundwater and surface water as potential controlled water receptors of contamination at the site. Hence, the results of leachate and groundwater analysis have been evaluated against Drinking Water Standards (DWS) and Inland Waters Environmental Quality Standards (EQS) levels. For EQS levels where a threshold concentration is determined from the hardness of the receiving waters, the most conservative hardness value recorded within the groundwater samples (216mg/l within WS113) obtained as part of this and the 2006 investigation has been used.

The derivation of the GAC values is described in Appendix E.

The results of the soil leachate analyses obtained as part of this and the 2006 ground investigations, and the outcome of screening are summarised in Table 7.2 below.

Table 7.2 Summary of Leachate Analysis

Determinand	No. of Samples Tested	No. Samples Above Limit of Detection	Range of Results (μg/l unless specified)	GAC value (μg/l unless specified)		No. of Samples >GAC
Metals				**EQS (Note 1)**	**DWS (Note 2)**	
Arsenic	17	3	<0.16 – 0.98	50	10	0
Cadmium +	17	1	<0.03 – 0.04	0.25	5	0
Chromium	17	2	<0.25 – 0.31	4.7	50	0
Lead	17	2	<0.09 – 0.30	7.2	10	0
Mercury	17	0	<0.01	0.05	1	0
Copper +	17	4	<0.2 – 1.4	10	2000	0
Nickel	17	1	<0.5 – 0.7	20	20	0
Zinc +	17	14	<1.25 – 440	75	5000	13 (EQS)
Organics						
Naphthalene	17	5	<0.01 – 0.05	2.4	NA	0
Benzo(a)pyrene	17	3	<0.01 - 0.01	0.05	0.01	0
Anthracene	17	1	<0.01 - 0.02	0.1	NA	0
Fluoranthene	17	5	<0.01 – 0.08	0.1	NA	0
Sum of benzo(b)fluoranthene and benzo(k)fluoranthene	17	2	<0.02 – 0.03	0.03	NA	0

Determinand	No. of Samples Tested	No. Samples Above Limit of Detection	Range of Results (μg/l unless specified)	GAC value (μg/l unless specified)		No. of Samples >GAC
Sum of benzo(ghi)perylene and indeno(1,2,3-cd)pyrene	17	2	<0.02* - 0.01	0.002	NA	2 (EQS)
Sum of four PAHs (benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene	17	2	<0.04 – 0.03	NA	0.1	0
Phenol	17	5	<0.2 – 0.91	7.7	0.5	2 (EQS)

Based on Environment Agency Freshwater (Salmonid) EQS levels where available.
+ Hardness related – Based on a receiving water hardness of >200-250 mg/l CaCO3.

Metals and Metalloids

Concentrations of leachable zinc exceeding the respective EQS value have been recorded within several variable made ground samples tested. However, the leachable concentrations of zinc did not exceed the corresponding DWS threshold value.

No other leachable metals recorded concentrations above the relevant GAC.

Other Inorganic Analytes

No leachable inorganics recorded concentrations above the relevant GAC.

Organics

Levels of leachable phenol within three soil samples (including natural clay) exceeded the maximum admissible concentration specified in the Water Supply (Water Quality) Regulations 1989. A maximum concentration of 0.91ug/l within TP43 (0.50m) was detected, in comparison to a screening value of 0.5ug/l. All samples were well below the EQS threshold value for phenol.

The leachable sum of the two PAHs benzo(g,h,i)perylene and indeno(1,2,3-c,d)pyrene was found to marginally exceed the respective EQS GAC within two samples of made ground obtained from the railway embankment.

However, on the basis that the some of the site will be hardsurfaced, therefore limiting surface water infiltration and leachate generation, and the presence of impermeable cohesive strata underlying the site, hence reducing flow paths, it is considered that the elevated concentrations of leachable phenol, PAH and zinc are unlikely to pose a significant risk to controlled waters.

7.4. Groundwater Analysis

The analytical results for groundwater samples and the outcome of screening are summarised in Table 7.3.

Table 7.3 Summary of Groundwater Analysis

Determinand	No. of Samples Tested	No. Samples Above Limit of Detection	Range of Results (µg/l unless specified)	GAC value (µg/l unless specified)		No. of Samples >GAC
Metals				**EQS (Note 1)**	**DWS (Note 2)**	
Arsenic	10	7	0.43 – 2.0	50	10	0
Cadmium +	10	4	<0.03 – 0.14	0.25	5	0
Chromium	10	7	0.37 – 9.7	4.7	50	2 (EQS)
Lead	10	7	0.18 – 8.4	7.2	10	1 (EQS)
Mercury	10	3	<0.01 – 0.04	0.05	1	0
Copper +	10	6	<0.4 – 2.5	10	2000	0
Nickel	10	8	5.2 – 52	20	20	2 (EQS and DWS)
Zinc +	10	10	6.47 – 510	75	5000	5 (EQS)
Inorganics						
Sulphate	10	7	85 – 180mg/l	400mg/l	250mg/l	0
Ammonia (total, as N)	10	7	<15 – 200	300	NA	0
Total ammonia (as NH_4^+)	10	7	<19 - 257	NA	500	0
Organics						
Naphthalene	10	0	<0.01	2.4	NA	0
Benzo(a)pyrene	10	0	<0.01	0.05	0.01	0
Anthracene	10	0	<0.01	0.1	NA	0
Fluoranthene	10	2	<0.01 - 0.13	0.1	NA	1 (EQS)
Sum of benzo(b)fluoranthene and benzo(k)fluoranthene	10	0	<0.02	0.03	NA	0
Sum of benzo(ghi)perylene and indeno(1,2,3-cd)pyrene	10	0	<0.02	0.002	NA	0
Sum of four PAHs (benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene	10	0	<0.04	NA	0.1	0

Determinand	No. of Samples Tested	No. Samples Above Limit of Detection	Range of Results (μg/l unless specified)	GAC value (μg/l unless specified)		No. of Samples >GAC
Phenol	10	0	<0.50	7.7	0.5	0
Total TPH	7	0	<10	140	200	0
BTEX and MTBE compounds						
Benzene	7	0	<1.0	10	1	0
Toluene	7	0	<1.0	50	700	0
Xylene (sum)	7	0	<1.0	30	500	0
MTBE	7	0	<1.0	2600	200	0

+ – EQS is hardness related
1 – Inlands Waters EQS values
2 – DWS values
* – Laboratory detection limits are higher than EQS values

Metals and Metalloids

Metals including chromium, nickel, lead and zinc recorded concentrations above the EQS values within several groundwater samples. With the exception of nickel, the concentrations of metals did not exceed their corresponding DWS threshold values.

No other metals recorded concentrations above the relevant GAC within the groundwater samples tested.

Other Inorganic Analytes

No inorganics recorded concentrations above the relevant GAC.

Organics

A marginally elevated concentration of fluoranthene was recorded in the groundwater sample obtained from the monitoring well installed within WS113.

No other organics were recorded at concentrations above the relevant GAC within the groundwater samples tested.

Given the site environmental setting (i.e. no groundwater and surface water abstractions within 500m, in addition to the presence of low permeable natural soils underlying the majority of the site), and that no sources and/or significant concentrations of metals or PAH have been recorded within soils as part of this investigation, the recorded concentrations are not considered to pose a significant risk to controlled waters, and are therefore not discussed further.

8. REVISED CONCEPTUAL MODEL AND GENERIC QUANTITATIVE RISK ASSESSMENT OF POLLUTANT LINKAGES

The preliminary combined conceptual site model and conceptual exposure model, developed as part of the 2013 desk study, has been revised in light of the ground investigation and the chemical analysis results presented above.

The revised conceptual site model has been developed for the proposed future land use (residential with gardens). This summarises the understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors.

The revised conceptual site model is presented in schematic form in Appendix A, as Drawing No. C6504/06.

In summary, the revised CSM has identified the following potential pollutant linkages which could result in an unacceptable risk to the proposed end-use:

- Ingestion, inhalation and dermal contact of / with dust particles with elevated concentrations of arsenic and PAH in the made ground soils (more specifically within the areas of the former railway cutting and embankment within the southern part of the site and the infilled canal within the northern part), posing a **moderate** risk to future site end users (within private gardens and area of soft landscaping only) and construction workers.

- Locally potentially combustible/combustible ash fill encountered within the shallow made ground encountered within the vicinity of the former railway embankment/cutting within the southern and south eastern parts of the site, and the infilled canal within the northern part.

- Gas risk from hazardous gas sources, including VOCs, associated with areas of deep made ground located within the vicinity of the railway line and infilled canal area, posing a **moderate** risk to site end-users and construction workers. Although the full assessment of risk will be classified upon completion of the remaining monitoring visits and discussed within an addendum letter report.

- Asbestos containing materials (ACMs) within the existing properties located on site, posing a **low** risk to construction/demolition workers and adjacent site users, subject to a pre-demolition survey of the existing properties in the south of the site.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1. General

This geoenvironmental appraisal has been performed for land at Barugh Green, Barnsley.

It is understood that HLM and CEG jointly own the site and are proposing to redevelop the property for a residential end-use, comprising 164, two and three storey houses with private gardens, and associated areas of hardstanding and highways. A proposed development was provided to Sirius by HLM and GEG, and is presented within Appendix A as Drawing No. C6045/01.

In addition, it has been assumed that ground levels will not change significantly from those described in this report. If this is not the case, then amendments to the interpretation and conclusions in this report may be required.

9.2. Flood Risk

According to the Envirocheck Report and the Environment Agency website, the northern and eastern parts of the site lie within an indicative Zone 2 flood plain at risk of flooding from rivers.

A flood risk assessment should be compiled in order to assess the risk from flooding to the proposed development. It is recommended that consultation be undertaken with the Environment Agency to determine implications of potential flooding on the proposed development.

The following preliminary recommendations assume that flooding will not affect the proposed development.

9.3. Geotechnical

Mining and Quarrying

Based on published geological information and rotary drilling undertaken as part of the Sirius ground investigations, it is considered that a potential risk of surface instability, as a result of unrecorded shallow mining, exists at the site.

Rotary drilling undertaken as part of the Sirius ground investigations identified the Top and Low Haigh Moor coal seams to dip beneath the site to the north east. The shallowest seam was encountered at a depth of 5.45m bgl in the south western part of the property, and at 18.80m bgl (the deepest this top seam was encountered) within the north eastern area. This upper coal seam is recorded to be between 0.20m and 1.60m thick.

A second seam was encountered in 10 probeholes drilled as part of this and the 2006 ground investigations. This seam was encountered at 14.70m bgl in the western part of the site and 23.20m bgl in the central eastern part. The lower coal seam was recorded to be between 0.20m and 0.80m thick.

Voids and/or broken ground were encountered in rotary probeholes R14, R16, R30, R31, R103B, R109 and R113. These were located in the southern-central part of the site, at depths of between 7.80m and 10.80m bgl, assumed to be associated with the working of the Top Haigh Moor coal seam. The voids/broken ground found in the southern-central part of the site are consistent with the recorded extent of workings in the Top Haigh Moor coal seam from Barugh Colliery.

For typical Coal Measures strata, it is generally accepted that there is a risk of surface instability where the thickness of competent bedrock above the worked coal seam is less than 10 times the seam thickness.

The maximum recorded intact thickness of the Top Haigh Moor coal seam during this and the previous investigations is 1.6m. Using this thickness and the superficial soils thickness at each individual borehole, it is considered that insufficient rock cover exists above the Top Haigh Moor coal seam in the central and southern parts of the site. On this basis it is considered that the zone of potential mineworkings identified within the central southern part of the site has the potential to affect surface stability and will therefore require consolidation through drilling and pressure grouting. Outside this localised zone, the Top Haigh coal seam was found to be intact and no evidence of historic mineworkings (i.e. broken ground/void/soft ground) have been encountered as part of this or the previous ground investigations. On this basis it is considered the possibility of unrecorded pillar and stall mineworkings being present within this coal seam at influencing depth beneath the site, out with the zone of identified workings, is **low**.

Within the most northern and eastern parts of the site, it is considered that there is sufficient competent rock cover above the Top Haigh Moor coal seam to mitigate against any surface instability. Similarly, it is considered that sufficient competent rock cover exists, on a site wide basis, above the Low Haigh Moor coal seam to mitigate against any surface instability.

In view of this, it is considered that treatment of the areas of the shallow workings beneath the site is required. It is recommended that the ground below plots and adoptable highways, located within the area of the site where insufficient rock cover is present to mitigate against surface instability and has been worked, be stabilised by drilling and pressure grouting on a closely spaced grid. The grid should extend beyond the edge of the structures to cover an area delineated by a line

subtended at 15º upwards from the base of the worked seam. A drilling and grouting specification should be agreed with the regulators prior to commencement. A plan showing the approximate areas of working is attached as Drawing No. C6045/05, included within Appendix A.

No mine entries are known to exist on the site, however the possibility of encountering unrecorded mine entries or bell pits within shallow coal seams (particularly within the south eastern part of the site where the Top Haigh Moor coal seam is near to crop) cannot be discounted. Similarly, inspection of historical OS plans has not revealed any evidence of quarrying beneath the site; however the possibility of encountered surface workings cannot be discounted. It is therefore recommended that the footprints of proposed plots/highways be stripped back to natural strata in order to inspect for mine entries/features. If evidence of a mine entry, coal working or ground disturbance is suspected, advice regarding treatment / foundation precautions should be sought from a suitably qualified engineer.

Given the presence of shallow intact coal consideration could be given to the extraction of the coal by open cast methods prior to redevelopment. A cost appraisal should be undertaken in order to assess the viability of coal extraction with consideration to a likely increase in development costs associated with the requirement for deeper foundations post extraction and potential delays in development process from both a planning and operation prospective. In addition, the feasibility of coal extraction should be assessed with consideration to the logistics of the earthworks operation (i.e. potential of undermining neighbouring properties and infrastructure).

Wells

A well was noted on the historical OS plans within the southern part of the site. At this stage it is unknown whether the well has been infilled/treated. It is recommended that as part of the topsoil strip detailed above the location of the well is investigated, in order to determine the location/condition of the well (or at least its absence on site). Treatment will be dependent on the proven location/condition of the well.

The possibility of encountering unrecorded wells on site cannot be discounted. Following a topsoil strip the area should be inspected for evidence of wells. Additionally, it is recommended that all excavations be examined for evidence of wells. If a former well is suspected works should cease and the advice sought of a suitably qualified consultant.

Foundations

The recommendations provided below are based on the assumption that that appropriate treatment of shallow mine workings (i.e. drilling and pressure grouting) will be undertaken as detailed above, and that site levels remain broadly as exist at present.

The Sirius ground investigations revealed the shallow soils across the majority of the site to comprise topsoil, over residual MCM strata typically comprising firm and stiff, clay and locally medium dense and dense sandy gravel/gravelly sand. The exception to this was within the far northern part of the site where soft, extremely to very low strength alluvial clay was encountered to a maximum proven depth of 4.0m bgl.

The superficial deposits were found to be underlain by competent MCM bedrock comprising mudstone, sandstone and coal. Although it should be appreciated that made ground of variable thickness was encountered (up to 4.3m bgl in WS101) in the northern, southern and south western parts of the site, associated with the infilled canal, former railway cutting/embankment and cooling ponds.

The made ground, and soft low strength alluvium, are considered unsuitable to support structural loads associated with the proposed residential development due to their inherent variability, low consistency and strength giving rise to the potential for unacceptable total and differential settlements.

It is recommended that spread (reinforced strip/trench fill) foundations be taken through the made ground and soft low strength alluvial clay into the underlying residual MCM strata (at least firm medium strength cohesive/medium dense granular deposits) and/or competent bedrock at an anticipated minimum founding depth of 0.90m below existing or finished ground level, whichever is the lower of the two.

The natural cohesive deposits (at least firm, medium strength clay) can be assumed to have a characteristic undrained shear strength (Cu) of 50kN/m^2. By way of example, calculations indicate a 0.60m wide reinforced strip bearing on the residual cohesive MCM at a depth of 0.90m bgl, can impose a maximum line load of 70kN/m run. The application of such a pressure would keep settlements to 25mm or less.

Given the locally variable nature of the residual cohesive soil, it is recommended that all foundation excavations are inspected by a suitably qualified engineer to confirm the suitability of the natural residual soil as a bearing stratum.

The clay soils on this site have been found to be of medium shrinkability in accordance with NHBC Standards Chapter 4.2. Foundations placed into natural in-situ residual clay soils should be a minimum of 900mm deep (below finished or original ground levels, whichever is the lower of the two), locally deepened within the zone of influence of existing or proposed trees. A tree survey should be carried out prior to the production of a detailed plot-specific foundation schedule.

Locally residual granular soils were encountered. The settlement characteristics of clay and gravel/sand are different. It would be prudent for all foundations to bear upon one consistent stratum i.e. cohesive or granular residual MCM, in order to prevent differential settlements occurring between foundations.

For foundations constructed on medium dense soils, a minimum angle of shearing resistance (Φ') of 33º could be assumed. For preliminary foundation design a 0.60m wide strip footing at a depth of 0.90m bgl could support a design loading of 70kN/m run. Calculations indicate that for the above foundation size and loading scenario, settlement should be below 25mm.

It is anticipated that competent bedrock may be encountered at shallow depth. If foundation excavations encounter bedrock, all of the foundation should be placed onto this strata in order to limit the potential for unacceptable differential settlements. A design bearing pressure of 150kN/m^2 could be assumed for the sandstone or mudstone bedrock (at least extremely to very weak), assuming a 0.60m wide reinforced strip foundation. Should higher allowable bearing pressures be required, confirmatory testing should be undertaken.

The above calculations are based on theoretical foundations. Settlements of foundations upon granular and cohesive materials are dependent on foundation loading and dimensions. It is therefore recommended that foundation settlements are reviewed once final loading arrangements and foundation sizes are known.

Foundations will need to be designed to cater for residual movement following consolidation of mineworkings, this will typically comprise reinforcement, but could require raft foundations where very shallow workings are encountered.

Within the northern, southern and south western parts (in the vicinity of TP1, TP4, TP7 and TP8) of the site, made ground associated with the historical development of the site (including the railway cutting/embankment, infilled canal and cooling ponds) was encountered to a maximum proven depth of 4.30m bgl. Based on the proposed development layout plan it is understood that the majority of these areas are to be developed as areas of POS. However, should this not be the case, it is considered that conventional spread foundations are not feasible for residential

properties within these areas because of the excessive depth required for excavation. It is therefore recommended that piled foundations or vibro-replacement methods are adopted, terminating within the underlying competent bedrock (MCM).

Piling/vibro contractors have their own proprietary methods of working. It is therefore recommended that consultation with a specialist piling/vibro contractor takes place at an early stage in the construction process.

It must be ensured that piles/vibro columns do not introduce any preferential pathways for the migration of contaminants and the guidance given in the Environment Agency document 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention' should be followed and discussed with the Environment Agency prior to undertaking any piling/vibro operations.

Where pile foundations are proposed, consideration will have to be given to the thickness of competent cover above treated workings. Where insufficient competent rock cover is present piles will need to be extended through the treated seam.

The layout of foundations should consider any relic foundations, substructures or other potential obstructions that may be present within the site (more specifically within the south western part of the site which is currently occupied by residential properties). If any relic foundations/substructures are encountered foundations should be taken to a greater depth than the existing foundations into natural ground of adequate bearing capacity.

Foundations should be taken below a line drawn up at 45° from the base of any existing or proposed services or similar.

Floors

In accordance with NHBC Standards 2008 (Chapters 4.2, 4.6 and 5.1), suspended ground floor slabs are required in the following situations:

- Made Ground greater than 600mm thick.
- Where soil swelling may occur.
- Where vibratory ground improvement has been carried out.
- Where the ground has insufficient bearing capacity.

The provision of appropriate gas protection measures should be taken into consideration when assessing floor design.

Sulphate Attack

Based on the laboratory testing undertaken as part of the previous Sirius ground investigation, in accordance with BRE Special Digest 1 (2005) concrete should be designed for an ACEC Class of AC-2z and a design sulphate class of DS-1, assuming brownfield and mobile groundwater conditions. For concrete placed in the made ground encountered within the backfilled railway cutting and infilled canals and ponds the design sulphate class should be changed to DS3 and the ACEC class to AC-5.

Groundworks, Excavation Stability and Groundwater Dewatering

Based on limited laboratory test results, the disturbed sample of cohesive made ground is classified as "cohesive material 2A/2B" in accordance with Highways Agency (HA) publication "Specification for Highway Works Series 600, Earthworks".

Shallow excavations through made ground and natural soils should be assumed to be unstable and an allowance should be made for suitable temporary shoring. No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA 97 Trenching Practice should be made to establish suitable means of support or battering of excavation sides during construction.

Based on the results of this investigation, groundwater seepages/flows into shallow excavations should be expected (<2.00m). To control this groundwater, localised pumping from sumps should generally be adequate. To control the inflow of groundwater into deeper excavations (>2.00m bgl), it is considered trench support, accompanied with a dewatering well point system is likely to be required to maintain stability of the excavation and to control groundwater inflows, respectively. Disposal / discharge of water will require appropriate treatment/consent.

It is recommended that an adequate drainage system for surface water be installed by a competent contractor in order to prevent surface water ponding or collecting both during and post construction, as this may lead to deterioration of the founding stratum.

It is recommended that in order to reduce the possibility of softening or swelling of cohesive soils at the base of foundation trenches, it should be suitably blinded with concrete.

Should coal or ash rich fill be encountered in excavations for services such as electric cables (i.e. potential heat sources), then it should be removed for 1m in all directions of the excavation and be replaced with compacted inert fill.

Pavements and Highways

Based on visual assessment and laboratory testing a preliminary CBR value of <2% is suggested for the made ground and soft alluvial soils. Highways Agency document HD25 Interim Advice Note 73/06 Revision 1 (2009) states that where a subgrade has a CBR lower than 2.0%, it is considered unsuitable support for a pavement foundation since it would tend to deform under construction traffic, and must be improved.

Laboratory CBR tests undertaken on a remoulded/re-compacted sample of cohesive residual MCM recorded CBR values of 13% and 17.7%. It is recommended that based on the laboratory test results and an examination of the soils, a preliminary CBR design value of 5% be applied for the re-engineered residual MCM strata.

It is recommended that *in situ* CBR testing is carried out following completion of the enabling works, when final site levels will be known.

All road design should be discussed with the relevant local authority if highways are to be subject to a Section 38 agreement.

9.4. Contamination Constraints

Risk Evaluation for the Proposed Land Use (Residential with plant uptake)

The revised conceptual site model confirms significant pollutant linkages may exist to end-users and construction workers.

Human Health Receptors

Whilst significant contamination was not identified on the body of the site, elevated concentrations of both organic and inorganic contamination (i.e. elevated concentrations of PAH and arsenic) have been recorded locally within the made ground encountered within the vicinity of the former railway cutting and embankment, along the southern and south eastern boundary and in the made ground associated with the infilled canals in the northern end. These elevated levels of contaminants may pose a potentially unacceptable risk to site end-users.

Elevated calorific values were detected within the made ground encountered within infilled canals located within the northern part of the site and the railway embankment within the southern and southern eastern part. This poses a risk of spontaneous combustion in future garden areas in relation to bonfires. Protection of utilities from elevated calorific values is discussed below.

Ground gas is discussed separately below.

Controlled Waters Receptors

Based on the chemical test results obtained as part of this and the 2006 ground investigations, it is considered that the shallow made ground soils do not pose a significant risk to controlled waters.

Utilities

It is recommended that the results of the chemical testing undertaken as part of the investigations, in addition to details of the proposed enabling works, are provided to the appropriate utility companies to determine the necessity for service protection.

Locally elevated calorific values have been recorded within ash rich made ground, which poses a risk to proposed services. Guidance provided by ICRCL 61/84, indicates that where potentially combustible material is present below ground, there is a possibility that fires may start and propagate beneath the surface. The main hazards of underground fires are subsidence of the combusted soil and damage to buried structures and services. The ICRCL document indicates that there is an unacceptable risk of smouldering where the calorific value of soils 'en masse' exceeds 7MJ/kg. The maximum concentration recorded as part of this investigation is 12.3MJ/kg.

The guidance indicates that an appropriate remedial technique to protect the built development is by capping the potentially combustible material to prevent materials becoming exposed during and after development, in addition to laying all services in suitable fill (particularly electrical cables).

It is recommended that additional calorific value testing is undertaken during enabling works where ashy made ground soils predominate. If consistently elevated values are recorded in the vicinity of proposed service trenches, made ground should be removed for 1.00m in all directions and be replaced with suitable fill.

Construction and Maintenance Workers

Contamination may pose a short-term (acute) or long-term (chronic) risk to workers during construction and maintenance. The potential risks must be specifically assessed as part of the

health and safety evaluation for the works to be performed in accordance with prevailing legislation. Site practices must conform to the specific legislative requirements and follow appropriate guidance (e.g., HSE, 1991; CIRIA, 1996).

Outline Remediation Requirements

The ground investigations undertaken by Sirius have identified elevated levels of arsenic and PAH within the shallow made ground encountered within the vicinity of the former railway cutting and embankment in the southern part of the site, and the infilled canal within the northern part. It is understood that these areas are to be principally redeveloped as areas of POS, with the exception of access roads associated with the proposed development.

Based on the proven ground conditions and the results of the laboratory testing undertaken as part of this and the previous ground investigations it is considered that the elevated level of PAH detected is a statistical outlier and representative of a PAH hotspot associated with the high ash content of the fill. On this basis, and given that the ash rich fill is only localised and encountered at depths in excess of 0.60m bgl, and assuming that ground levels will not change significantly from that at the time of the ground investigation, it is considered that the elevated levels of PAH identified pose a low risk to proposed end-users and does not require remedial works.

In view of the locally elevated concentrations of arsenic detected within the shallow made ground it is considered that in areas of proposed hardstanding (whether it car parking/roadways) no further remedial action is necessary to protect end-users from direct contact with the identified contamination.

A subsoil/topsoil “cap” will be required in areas of proposed gardens and landscaping where made ground underlies the development. At this stage, it is recommended that 600mm of “clean” topsoil/subsoil be assumed in areas proposed for private gardens, and a thickness of 450mm for communal gardens, and areas of POS.

Where combustible ash/clinker/coal rich fill is encountered the capping thickness in gardens/landscaped areas should also be increased to 1000mm.

These thicknesses are subject to regulatory approval. Deep rooted plants would need to be “potted.”

It is considered likely that further analysis and bioaccessibility testing of arsenic may demonstrate that the reported concentrations of arsenic detected within the shallow made ground, pose a low

risk to end-users and eliminate the requirement of a subsoil/topsoil "cap" in private gardens/landscaped areas.

The above recommendations comprise a general outline of possible or likely works required. A remediation strategy report should be a produced and agreed with the regulatory authorities prior to commencement of remediation.

It is possible that areas of more significant contamination not previously identified may be encountered on site during redevelopment. As such, vigilance should be maintained during site clearance and construction works for any hotspots, not identified as part of the intrusive works. Should any hotspots be encountered, which have previously not been identified, they should be reported and appropriate advice sought.

It is recommended that dialogue be initiated with the Environment Agency and Local Authority to confirm that they are in agreement with this assessment.

Reuse of site won soils

At this stage, based on visual assessment and laboratory test results obtained as part of this and the 2006 ground investigations it is thought that the natural and reworked topsoil encountered on site is likely to be suitable for re-use within landscaped areas/gardens. However, it is recommended that any site-won topsoil should be stockpiled, sorted and further tested and assessed, as part of the enabling works, before being approved for re-use. Consultation with regulators may be required to confirm the reuse of reworked topsoil.

Glass fragments were encountered locally within the reworked topsoil in the northern part of the site (more specifically TP102 – TP104 and WS107 - WS110). Consequently, topsoil within this part of the site may not be texturally suitable for use within gardens/POS. Consideration could be given however, to re-use following screening (hand picking) to remove deleterious inclusions of glass and other anthropogenic materials, and subsequent validation.

Asbestos Containing Materials (ACMs)

It is understood that as part of the development works, the existing residential properties within the south western part of the site are to be demolished. It is recommended that a pre-demolition asbestos survey be undertaken prior to the demolition works.

No asbestos fibres have been identified in samples taken from within made ground soils on the site. However, it is considered that asbestos sheeting, used as shuttering, and/or fragments of

asbestos-containing materials within made ground or fill materials beneath concrete slabs cannot be entirely discounted.

9.5. Hazardous Ground Gases

Ground gas monitoring undertaken to date as part of this and the 2006 ground investigation has typically revealed elevated levels of carbon dioxide (maximum steady concentration of 11.1% v/v), and non-detectable concentrations of methane, coupled with non-detectable/low gas emission rates. The exception to this is an elevated concentration of methane (peak concentration of 82.2% v/v) detected within WS105 during the second monitoring visit.

The response zone of the monitoring well installed within WS105 is sealed within the infilled channel of the former canal. It is therefore considered that the source of the elevated concentration of methane detected within this monitoring well is associated with the deep made ground, and hence would appear to be isolated to this immediate area.

On the assumption that the northern part of the site is to be redeveloped as an area of POS, based on the gas monitoring results to date and the maximum recorded readings for each borehole located within the area of proposed residential development a worst case Gas Screening Value (GSV) of 0.49 litres/hour (l/h) for carbon dioxide has been derived.

As such, it is considered that the GSV is representative of “Green” conditions using the NHBC traffic light system for low rise housing with a ventilated 150mm void presented in CIRIA C665 (2007). However, based on the maximum ‘steady’ concentration of carbon dioxide it is considered that the ground gas regime of the site should be increased from ‘Green’ to **‘Amber 2’** conditions using the NHBC traffic light system.

Amber 2 classification is indicative of an intermediate to high ground gas regime, requiring high level gas protection measures, typically comprising a membrane and ventilated sub-floor void, in order to create a permeability contrast in order to prevent the ingress of gas into buildings. Membranes should be installed by a specialist contractor. Certification that ground gas protection measures have been correctly installed should also be provided.

Detailed design of gas protection measures should be undertaken in accordance with BS8485:2007; “Code of practice for the characterisation and remediation from ground gas in affected developments”.

VOC's have been detected at a maximum concentration of 8.2ppm. Based on interim results, specific protective measures are not likely to be required. However, a full assessment will be undertaken upon completion of monitoring.

Radon protection measures are not currently required for the proposed development on this site.

The above assessment should be regarded as interim only, prior to completion of the monitoring programme. Ground gas monitoring is on-going and the full results (along with updated conclusions) will be issued as an addendum letter on completion of the monitoring programme.

9.6. Invasive Plant Species

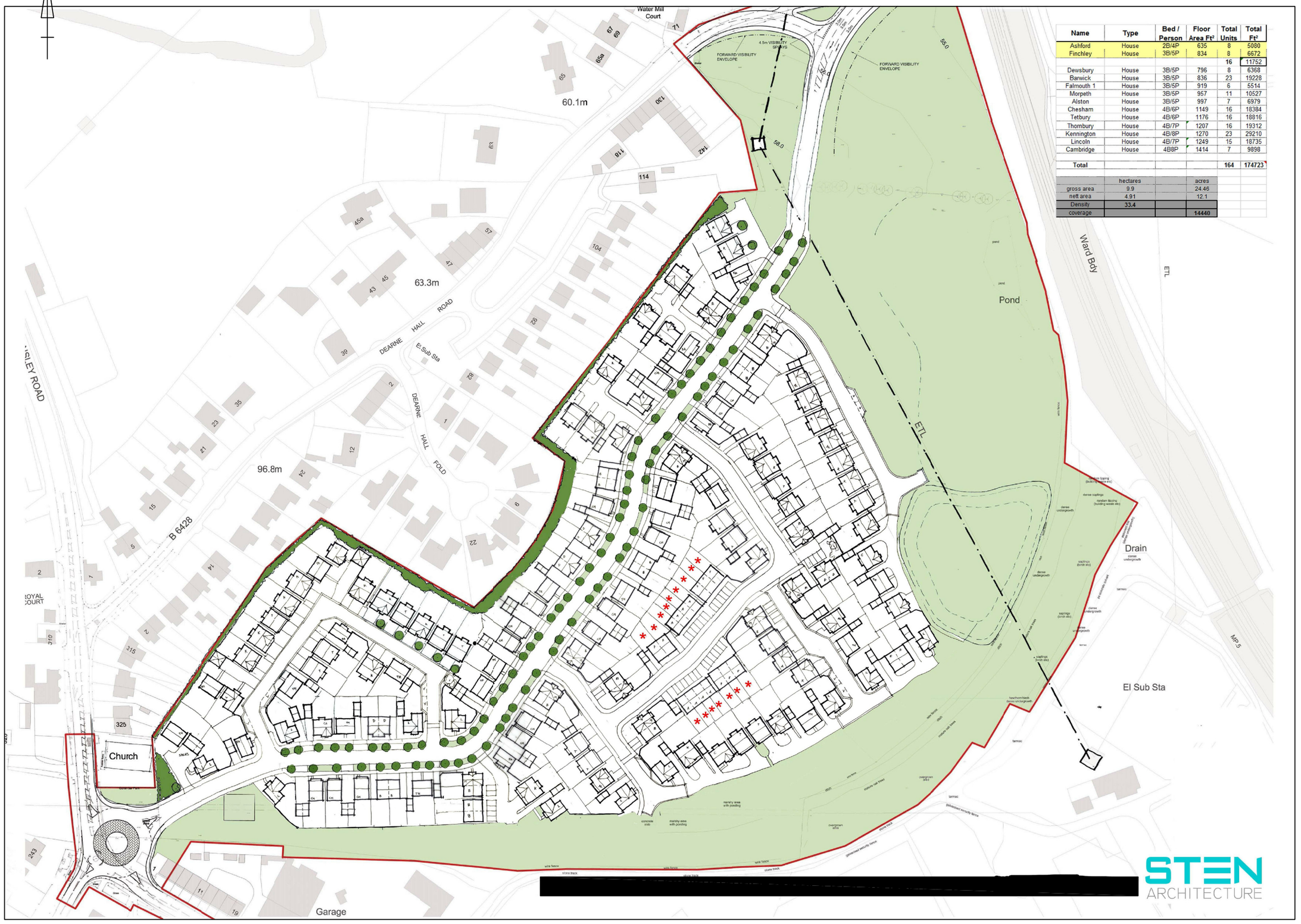
Invasive plant species were not observed on this site at the time of investigation. However, due to limited access in places and the fact that Sirius are not experts in this discipline, it is recommended that the presence/absence of invasive plant species is confirmed by a qualified consultant ecologist and their advice taken on appropriate treatment. The treatment of any invasive species should take place in advance of the proposed construction works.

10. REGULATORY APPROVALS

The conclusions and recommendations presented above are considered reasonable based on the findings of the site investigation. However, these cannot be guaranteed to gain regulatory approval and, therefore, the report should be passed to the appropriate regulatory authorities and/or other organisations for their comment and approval prior to undertaking any works on site.

APPENDIX A

FIGURES AND DRAWINGS



Name	Type	Bed / Person	Floor Area Ft²	Total Units	Total Ft²
Ashford	House	2B/4P	635	8	5080
Finchley	House	3B/5P	834	8	6672
				16	11752
Dewsbury	House	3B/5P	796	8	6368
Barwick	House	3B/5P	836	23	19228
Falmouth 1	House	3B/5P	919	6	5514
Morpeth	House	3B/5P	957	11	10527
Alston	House	3B/5P	997	7	6979
Chesham	House	4B/6P	1149	16	18384
Tetbury	House	4B/6P	1176	16	18816
Thornbury	House	4B/7P	1207	16	19312
Kennington	House	4B/8P	1270	23	29210
Lincoln	House	4B/7P	1249	15	18735
Cambridge	House	4B8P	1414	7	9898
Total				164	174723

	hectares		acres
gross area	9.9		24.46
nett area	4.91		12.1
Density	33.4		
coverage			14440

NOTES

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CLIENT

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SITE

Barugh Green, Barnsley

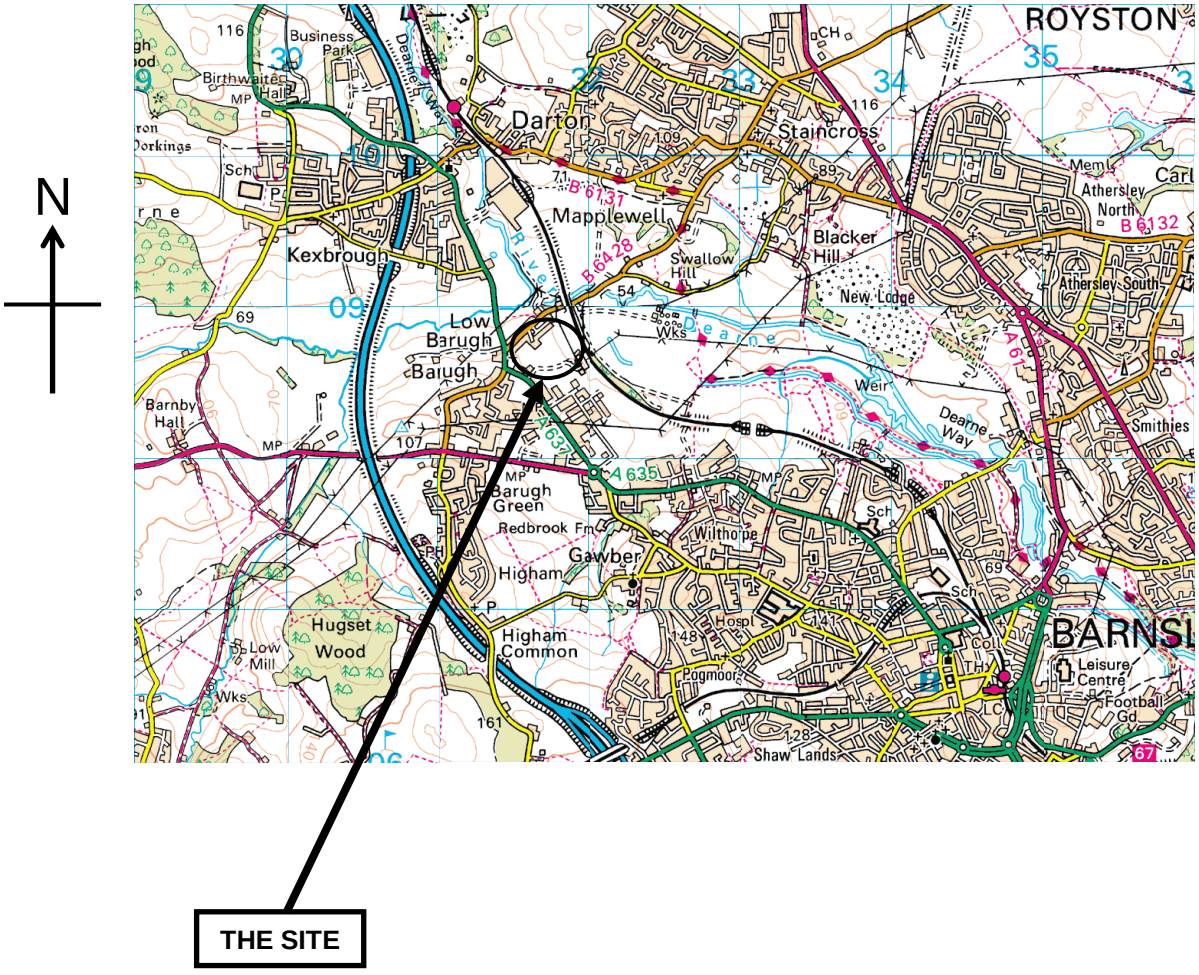
DRAWING TITLE

Proposed Development Plan

DRAWING NO.	REVISION NO.
C6054/01	1
DRAWN BY: RL	APPROVED BY: MB
DATE: October 2014	SCALE: NTS
	PAPER SIZE: A3

Site Location Plan

Contract Number	**C6054**
Contract	**Barugh Green, Barnsley**
Client	**Hallam Land Management Ltd & Commercial Estates Projects**



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Scale	1:50,000		
Drawn by	RL	**Approved**	MB
Drawing Number	C6054/02		

N

Dearne River

Barugh House Farm

Water Mill Court

A 637

B 6428

Pylon

Drainage ditch

Electricity Substation

Fuel Suppliers / Sales (Coal)

BARNSLEY ROAD

DEARNE HALL ROAD

Agricultural fields

Railway Line (Embankment)

Overhead lines

Residential

Former Coalite works

Royal Hotel (PH)

ROYAL COURT

Church

Telegraph Poles

Car Park

Residential dwelling and garden

MOT Garage

Transformer Station (former Coke and By Product works and latterly a refuse tip)

CLAYCLIFFE ROAD

Distribution Centre

WHALEY ROAD

LANGDALE ROAD

DERWENT DRIVE

DOVEDALE CROFT

LAKE BRIDGE ROAD



View of River Dearne to North



View to North



View to South West



View to East - Car Park



MOT Garage (Off-site) - South



View of waterlogged area - South



Transformer Station (Off-site) - East

NOTES

Current Features

- Area Investigated by Sirius in July 2006
- Site Boundary - Additional Areas (2012)
- Flow Direction
- Slope Direction
- Heavily Waterlogged
- Pond
- Heavily Vegetated (long grass, mature trees and low lying shrubs)
- Area of raised embankment
- Electricity substation

Historical Features

- Area of former railway cutting / embankment
- Location of former depot
- Former reservoir / infilled
- Former route of canal / infilled
- Former well
- Former pond features / infilled
- Former cooling ponds / infilled

All historical feature locations are approximate

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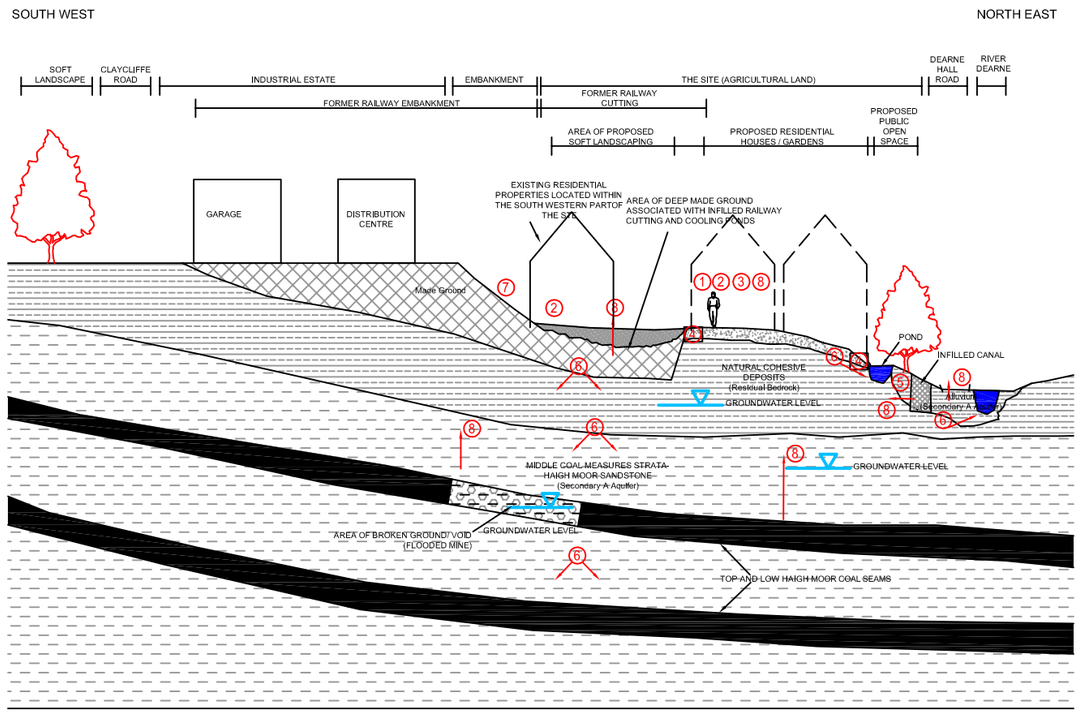
SITE

Barugh Green, Barnsley

DRAWING TITLE

Site Features Plan

DRAWING NO.	REVISION NO.
C6054/03	0
DRAWN BY: ST	APPROVED BY: MB
DATE: July 2012	SCALE: 1:1000
PAPER SIZE: A0	



Contamination Sources	Contamination Pathways	Potential receptors	Risk of significant pollutant linkage
Elevated concentrations of heavy metals, and hydrocarbons (including PAH/TPH) within made ground soils within the northern and south western parts of the site (acquired since the 2006 invstigation).	(1) Direct and indirect ingestion (2) Inhalation of contaminated particles/dust (3) Dermal contact (4) Sulphate attack (5) Plant uptake (proposed / existing)	Construction workers/end users/adjacent land users Construction workers/end users/adjacent land users Construction workers/end users/adjacent land users Built environment Landscaping (existing/proposed)	Moderate / High Moderate / High Moderate / High Low / Moderate Low / Moderate
Elevated concentrations of pesticides, PCBs and asbestos fibres within the made ground and shallow natural soils encountered on site.	(1) Direct and indirect ingestion (2) Inhalation of contaminated particles/dust (3) Dermal contact	Construction workers/end users/adjacent land users Construction workers/end users/ adjacent land users Construction workers/end users/adjacent land users	Low Low Low
Elevated concentrations of arsenic, copper zinc, sulphate and individual PAH species within the shallow made ground encountered within the vicinity of the infilled railway cutting, former railway embankment. and infilled ponds and canal.	(1) Direct and indirect ingestion (2) Inhalation of contaminated particles/dust (3) Dermal contact (4) Sulphate attack	Construction workers/end users/adjacent land users Construction workers/end users/adjacent land users Construction workers/end users/adjacent land users Built environment	Moderate / High Moderate / High Moderate / High Moderate
Elevated concentrations of leachable metals and hydrocarbons within made ground and shallow natural soils encountered within the northern and south western parts of the site.	(6) Migration via groundwater flow	Underlying Secondary A Aquifers Pond River Deame	Moderate / High Moderate / High Moderate / High
Locally marginally elevated calorific values in ashy made ground encountered within the vicinity of the former railway embankment within the south eastern part of the site.	(7) Exposure to heat	End users/construction workers	Moderate
Hazardous ground gases from on / off site sources, including areas of deep made ground, organic alluvial deposits, mines gas and volatile vapours from on site made ground soils.	(8) Gas migration	Construction workers / end users & buildings	Moderate / HIgh
Potential risk from ACM products within the infrastructure of the existing buildings on site, providing an appropriate method of removal/demolition is undertaken.	(2) Inhalation of contaminated particles/dust	Construction workers Adjacent land users	Low Low

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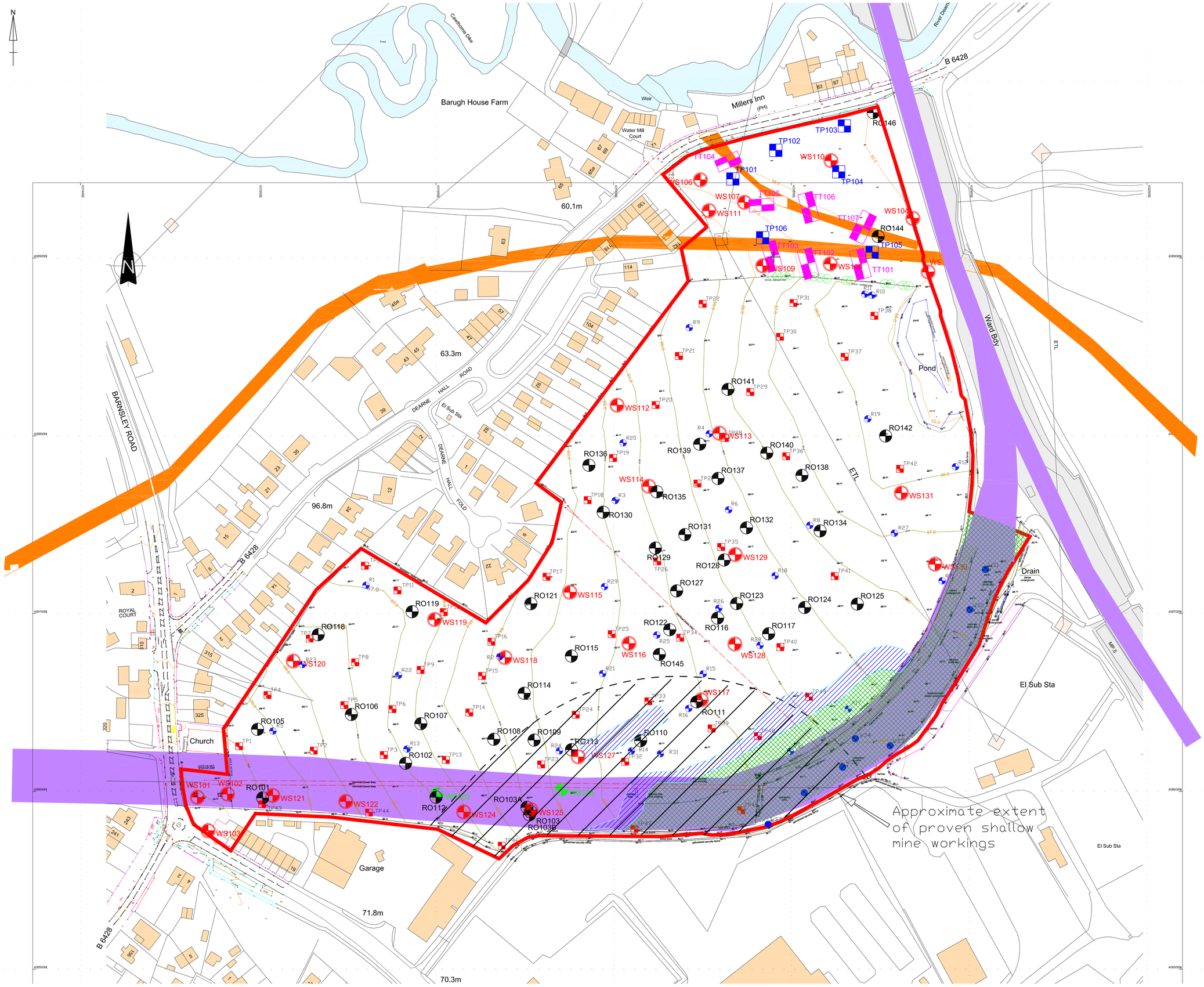
SITE

Barugh Green, Barnsley

DRAWING TITLE

Preliminary Conceptual Site Model

DRAWING NO.	REVISION NO.
C6054/04	0
DRAWN BY: S.T	APPROVED BY: R.L
DATE: October 2014	SCALE: NTS
PAPER SIZE: A3	



NOTES

- WS101 — Sirius Window Sample Borehole with install, August 2014
- WS123 — Sirius Window Sample Borehole, August 2014
- BH101 — Sirius Rotary Open Hole Borehole, August 2014
- TP101 — Sirius Trial Pit, August 2014
- TT101 — Sirius Trial Trench, August 2014
- Sirius Rotary Open Hole Borehole, 2006
- Sirius Window Sample Borehole, 2006
- Sirius Trial Pit, 2006
- Line of Former Canal
- Site Boundary
- Heavily Vegetated Area - access not available
- Waterlogged Area - access not available
- Former Railway
- Approximate Area of Identified Shallow Pillar and Stall Mineworksing

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CLIENT

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SITE

Low Barugh, Barnsley

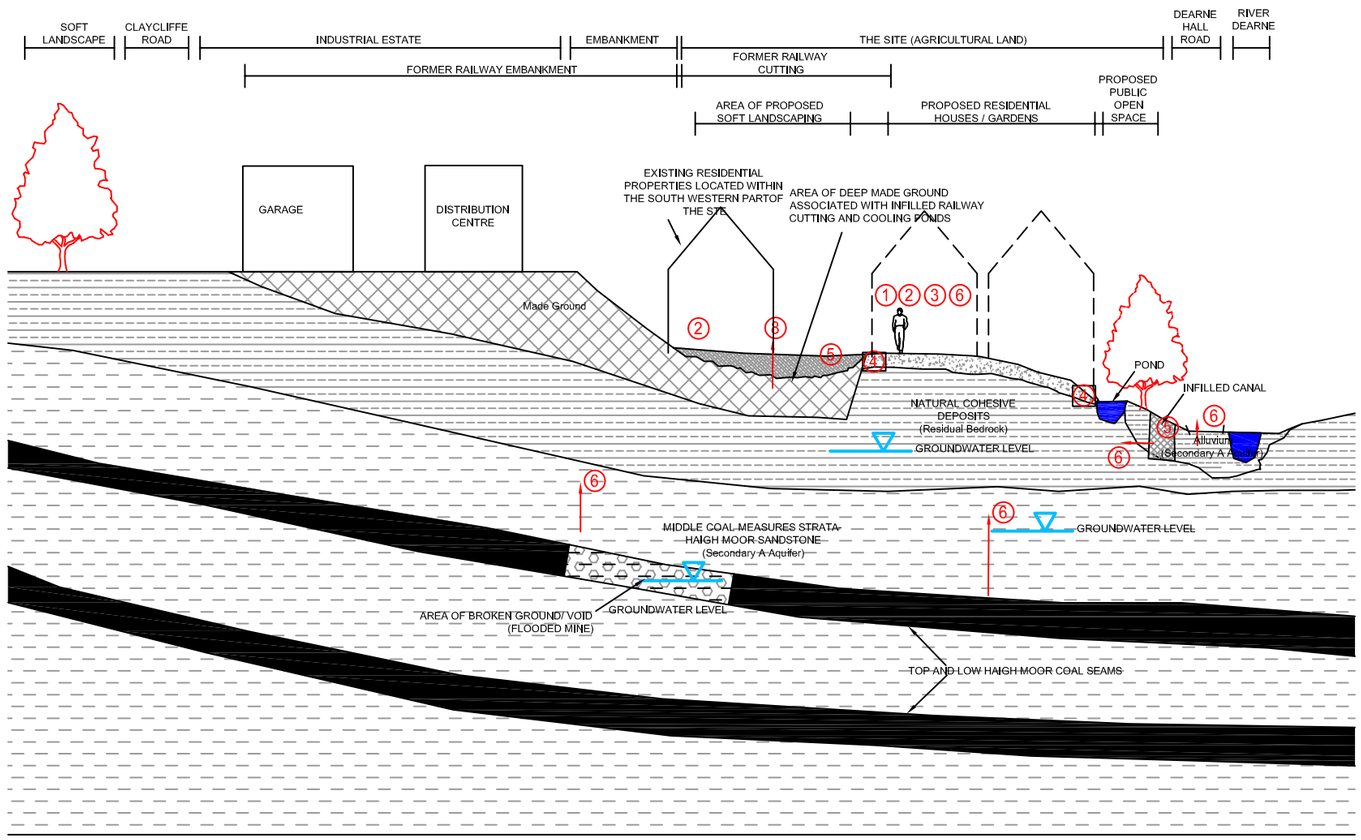
DRAWING TITLE

Exploratory Hole Location Plan (2006 and 2014)

DRAWING NO.	REVISION NO.
C6054/05	0
DRAWN BY	APPROVED BY
EC	RL
DATE	SCALE	PAPER SIZE
October 2014	1:1000	A1

SOUTH WEST

NORTH EAST



Contamination Sources	Contamination Pathways	Potential receptors	RIsk of sIgnIfIcant pollutant IInkage
Elevated concentrations of arsenic, sulphate and PAH within made ground soils within the northern and southern parts of the site	(1) Direct and indirect ingestion (2) Inhalation of contaminated particles/dust (3) Dermal contact (4) Sulphate attack	Construction workers/end users/adjacent land users Construction workers/end users/adjacent land users Construction workers/end users/adjacent land users Built environment	Moderate Moderate Moderate Low/Moderate
Locally marginally elevated calorific values in ashy made ground encountered within the vicinity of the former railway embankment/cutting within the southern part of the site and the infilled canal within the northern part.	(5) Exposure to heat	Built development/buried utilities	Moderate
Hazardous ground gases from potential on / off site sources, including areas of deep made ground, organic alluvial deposits, mines gas and volatile vapours from on site made ground soils.	(6) Gas migration	Construction workers / end users/built development	Moderate
Potential risk from ACM products within the infrastructure of the existing buildings on site, providing an appropriate method of removal/demolition is undertaken.	(2) Inhalation of contaminated particles/dust	Construction workers and adjacent site users	Low - Provided an appropriate method of removal/demolition is undertaken

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SITE

Barugh Green, Barnsley

DRAWING TITLE

Revised Conceptual Site Model

DRAWING NO.	REVISION NO.
C6054/06	0
DRAWN BY: R.L	APPROVED BY: M.B
DATE: October 2014	SCALE: NTS
PAPER SIZE: A3	

APPENDIX B

EXPLORATORY HOLE LOGS

EXPLORATORY HOLE RECORDS - 2014

TRIAL PIT RECORD

TP No. **TP101**
Sheet 1 of 1

Site : Low Barugh, Barnsley

Contract No: C6054

Client : CEP & HLM

Dates: 19/08/2014

Method : JCB 3CX with 600mm toothed bucket.

Scale 1:20

Logged By: EC

Checked By: RL

SAMPLE DETAILS			Groundwater	STRATA RECORD			
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend
		12.0		MADE GROUND: Grassed TOPSOIL comprising soft very low strength brown slightly gravelly sandy CLAY. Gravel sized fragments are angular to subrounded of brick, sandstone, coal, glass and mudstone.			
J	0.30m						
					0.45	55.61	
B	0.50m - 1.00m	82.0		Stiff high strength yellowish brown slightly gravelly slightly sandy CLAY. Intermediate plasticity. Low content of subangular to subrounded cobbles of sandstone. Gravel is subangular to subrounded of sandstone.			
D	1.00m	66.0		From 1.00m: Firm medium strength.			
				From 1.25m: Gravelly. Gravel is angular to subrounded of sandstone and mudstone.			
					1.70	54.36	
				Extremely weak to very weak grey and light brown weathered SANDSTONE recovered as gravelly subangular to subrounded cobbles.			
D	2.00m						
					2.10	53.96	
				Extremely weak grey and brown destructured MUDSTONE recovered as angular to subrounded fine to coarse gravel. Low content of subrounded cobbles.			
					3.00	53.06	
				End of Trial Pit at 3.00 m			

Remarks and Water Observations

1. Trial pit terminated at 3.00m due to bedrock.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Trial pit backfilled with arisings upon completion.

GL (m AOD) 56.06
Easting: 431765.76
Northing: 408944.25

Fig. No. TP101

TRIAL PIT RECORD

TP No. **TP102**
Sheet 1 of 1

Site : Low Barugh, Barnsley

Contract No: C6054

Client : CEP & HLM

Dates: 19/08/2014

Method : JCB 3CX with 600mm toothed bucket.

Scale 1:20

Logged By: EC

Checked By: RL

SAMPLE DETAILS			Groundwater	STRATA RECORD			
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend
		12.0		MADE GROUND: Grassed TOPSOIL comprising soft very low strength grey slightly gravelly sandy CLAY. Intermediate plasticity (field description). Low content of roots (50mm x 80mm). Low content of subrounded cobble sized fragments of glass, brick and sandstone. Gravel sized fragments are angular to subrounded of glass, ceramics, brick, sandstone and plastic.	0.40	56.26	
J	0.50m			Soft low strength brown slightly gravelly very sandy CLAY. HIgh plasticity (field description Sand is fine to coarse. Gravel is angular to subrounded of sandstone.			
D B	1.00m 1.00m - 1.50m						
		32.0	▽	Soft low strength brown slightly gravelly slightly sandy CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	1.45	55.21	
			▽				
D	2.00m	26.0					
		22.0					
				Extremely weak destructured light brown and yellowish brown MUDSTONE recovered as clayey angular to subrounded fine to coarse gravel.	2.60	54.06	
D	3.00m						
				End of Trial Pit at 3.50 m	3.50	53.16	

Remarks and Water Observations

1.Trial pit terminated at 3.50m due to bedrock.
2.Groundwater encountered as seepage at 1.50m from south face and strike at 1.80m from north face.
3.Hand shear vanes are an average of a set of three.
4.Trial pit backfilled with arisings upon completion.

GL (m AOD) 56.66
Easting: 431789.06
Northing: 408960.73

Fig. No. TP102

TRIAL PIT RECORD

TP No. **TP103**
Sheet 1 of 1

Site : Low Barugh, Barnsley

Contract No: C6054

Client : CEP & HLM

Dates: 19/08/2014

Method : JCB 3CX with 600mm toothed bucket.

Scale 1:20

Logged By: EC

Checked By: RL

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	
				MADE GROUND: Grey and brown slightly clayey gravelly fine to coarse SAND. Low content of roots (5mm x 80mm). Gravel sized fragments are angular to subrounded of brick, glass, ash, concrete, sandstone and ceramics.	0.30	57.06		
J	0.40m	12.0		MADE GROUND: Soft very low strength grey and brown gravelly CLAY. Low plasticity (field description). Gravel sized fragments are angular to subrounded of mudstone, coal, metal, brick, concrete, sandstone and glass.				
B	0.60m - 1.10m			Soft very low strength brown slightly gravelly very sandy CLAY. Low plasticity. Gravel is subrounded of sandstone.	0.60	56.76		
D	1.00m	16.0						
		18.0						
		12.0						
				Soft very low strength yellowish brown mottled grey silty CLAY. High plasticity (field description).	2.10	55.26		
D	2.50m	10.0						
				End of Trial Pit at 2.60 m	2.60	54.76		

Remarks and Water Observations

1.Trial pit terminated at 2.60m due to instability below 2.10m.
2.No groundwater encountered.
3.Hand shear vanes are an average of a set of three.
4.Trial pit backfilled with arisings upon completion.

GL (m AOD) 57.36
Easting: 431832.57
Northing: 408971.96

Fig. No. TP103

TRIAL PIT RECORD

TP No. **TP104**
Sheet 1 of 1

Site : Low Barugh, Barnsley

Contract No: C6054

Client : CEP & HLM

Dates: 19/08/2014

Method : JCB 3CX with 600mm toothed bucket.

Scale 1:20

Logged By: EC

Checked By: RL

SAMPLE DETAILS			Groundwater	STRATA RECORD			
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend
J	0.20m			MADE GROUND: Dark brown slightly gravelly clayey fine to coarse SAND. Low content of roots (10mm x 70mm). Gravel sized fragments are angular to subrounded of plastic, brick, glass and sandstone.			
					0.30	55.82	
				MADE GROUND: Soft low strength grey and brown sandy gravelly CLAY. Low plasticity (field description). Low content of subrounded cobble sized fragments of wood and brick. Gravel sized fragments are angular to subrounded of brick, glass, wood, plastic and sandstone.			
J	1.00m						
		34.0					
				Soft low strength greyish brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	1.50	54.62	
D	2.00m	36.0					
		32.0					
				Soft low strength grey mottled yellowish brown silty CLAY. High plasticity (field description).	2.60	53.52	
D	3.00m	26.0					
		22.0					
				End of Trial Pit at 3.80 m	3.80	52.32	

Remarks and Water Observations

1.Trial pit complete at 3.80m due to instability of trialpit faces.
2.No groundwater encountered.
3.Hand shear vanes are an average of a set of three.
4.Trial pit backfilled with arisings upon completion.

GL (m AOD) 56.12
Easting: 431826.39
Northing: 408948.51

Fig. No. TP104

TRIAL PIT RECORD

TP No. **TP105**
Sheet 1 of 1

Site : Low Barugh, Barnsley

Contract No: C6054

Client : CEP & HLM

Dates: 19/08/2014

Method : JCB 3CX with 600mm toothed bucket.

Scale 1:20

Logged By: EC

Checked By: RL

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	
J	0.10m	22.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown slightly gravelly slightly sandy CLAY. High plasticity (field description). Gravel is subrounded of brick and sandstone.	0.20	56.70		
J	0.30m	16.0		MADE GROUND: Soft very low strength brown gravelly sandy CLAY. High plasticity (field description). Medium content of subrounded cobbles of sandstone. Gravel sized fragments are subangular to subrounded of sandstone.	0.50	56.40		
		32.0		Soft low strength yellowish brown gravelly sandy CLAY. Low plasticity (field description). Gravel is subangular to subrounded of sandstone.				
D	1.00m							
				Stiff high strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is angular to subrounded of sandstone.	1.60	55.30		
D	1.80m	118.0		From 2.00m: Gravelly.				
			▽	Very weak yellowish brown, light brown and grey weathered SANDSTONE recovered as slightly clayey subangular to subrounded fine to coarse gravel. Low content of subangular cobbles.	2.10	54.80		
				End of Trial Pit at 2.50 m	2.50	54.40		

Remarks and Water Observations

1.Trial pit refused at 2.50m due to bedrock.
2.Groundwater encountered as seepage at 2.30m .
3.Hand shear vanes are an average of a set of three.
4.Trial pit backfilled with arisings upon completion.

GL (m AOD) 56.90
Easting: 431841.35
Northing: 408904.40

Fig. No. TP105

TRIAL PIT RECORD

TP No. **TP106**
Sheet 1 of 1

Site : Low Barugh, Barnsley

Contract No: C6054

Client : CEP & HLM

Dates: 19/08/2014

Method : JCB 3CX with 600mm toothed bucket.

Scale 1:20

Logged By: EC

Checked By: RL

SAMPLE DETAILS			Groundwater	STRATA RECORD			
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend
J	0.10m			MADE GROUND: Grassed TOPSOIL comprising brown slightly gravelly clayey fine to coarse SAND. Low content of roots (10mm x 80mm). Gravel sized fragments are subangular to subrounded of brick, mudstone and coal.	0.20	56.23	
J	0.50m			MADE GROUND: Grey and light brown angular to subrounded fine to coarse GRAVEL of mudstone, coal, ash and brick.	1.10	55.33	
J	1.20m	46.0		Firm medium strength greyish brown and brown CLAY. High plasticity (field description). From 1.10m to 2.30m: Slightly gravelly. Gravel is subrounded of sandstone.			
D	2.00m						
		16.0		From 2.30m to 2.70m: Soft very low strength.			
		24.0		From 2.70m: Low strength.			
D	3.00m						
				Very weak brown weathered SANDSTONE recovered as angular to subrounded fine to coarse gravel. High content of subangular to subrounded cobbles.	3.15	53.28	
				End of Trial Pit at 3.40 m	3.40	53.03	

Remarks and Water Observations

1.Trial pit terminated at 3.40m due to bedrock.
2.Groundwater encountered as strike at 1.10m, rising to 0.80m after 20 minutes from north face.
3.Hand shear vanes are an average of a set of three.
4.Trial pit backfilled with arisings upon completion.

GL (m AOD) 56.43
Easting: 431782.39
Northing: 408913.13

Fig. No. TP106

WINDOW SAMPLING RECORD

BH No. **WS101**
Sheet 1 of 2

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 04/08/2014

Method: Tracked window sample drilling rig.

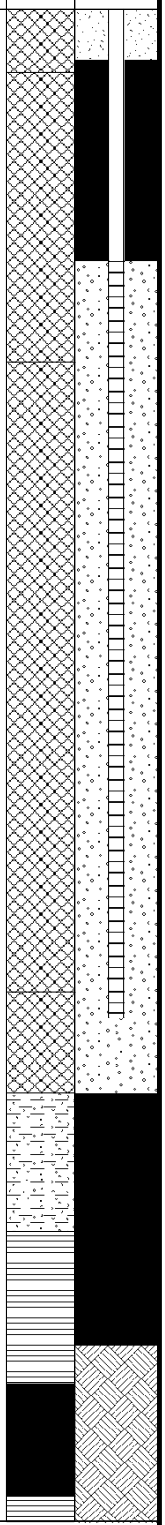
Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)
J	0.10m			MADE GROUND: Grassed TOPSOIL comprising brown slightly gravelly clayey fine to coarse SAND. Low content of roots (4mm x 70mm). Gravel sized fragments are subangular of brick, coal and concrete.	0.25	71.81
J	0.50m			MADE GROUND: Loose dark brown and grey slightly clayey gravelly fine to coarse SAND. Gravel sized fragments are angular to subangular of mudstone, ash, coal and sandstone.		
		N=6 (2,1,2,1,1,2)				
J	1.50m			MADE GROUND: Firm low strength grey and brown slightly sandy gravelly CLAY. Low plasticity (field description). Gravel sized fragments are angular to subrounded of brick, coal, sandstone and mudstone.	1.40	70.66
		V 34.0				
		N=5 (1,1,1,2,1,1)		From 2.00m: Soft.		
J	2.50m					
		V 28.0				
		N=4 (1,1,1,1,1,1)				
J	3.50m					
		V 22.0				
J	4.00m	N=20 (5,5,5,5,5,5)		MADE GROUND: Stiff high strength grey slightly gravelly sandy CLAY. Low plasticity (field description). Medium content of subangular coarse gravel sized fragments of wood. Gravel sized fragments are subrounded fine to medium of brick.	3.90 4.30	68.16 67.76
D	4.50m			Firm medium strength yellowish brown and light brown gravelly CLAY. High plasticity (field description). Gravel is subangular to subrounded of sandstone.		
		V 46.0				
D	5.00m	N=23 (3,2,4,6,6,7)		Extremely weak brown and bluish grey destructured MUDSTONE recovered as slightly gravelly clay. High plasticity (field description). Gravel is subrounded.	4.85	67.21
				Extremely weak black COAL recovered as slightly sandy subangular to subrounded fine to coarse gravel.	5.45	66.61
				Continued next sheet	5.90	66.16

Legend / Well



Remarks and Water Observations

1. Window sample complete at 6.30m.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 72.06
Easting: 431465.78
Northing: 408596.70

Fig. No. WS101

WINDOW SAMPLING RECORD

BH No. **WS101**
Sheet 2 of 2

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 04/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	(N) Shear vane		Description	Depth (m)	Level (mAOD)	Legend	Well
		50/135mm (6,15,24,26)		Very weak light brown and yellowish brown MUDSTONE recovered as slightly clayey subangular to subrounded fine to coarse gravel.				
				End of Window Sample at 6.30 m	6.30	65.76		

Remarks and Water Observations

1. Window sample complete at 6.30m.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD)
72.06
Easting:
431465.78
Northing:
408596.70

Fig. No.
WS101

WINDOW SAMPLING RECORD

BH No. **WS102**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 04/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
				MADE GROUND: Grassed TOPSOIL comprising brown slightly gravelly fine to coarse SAND. Low content of roots (8mm x 100mm). Gravel sized fragments are subangular to subrounded of brick, concrete and sandstone.	0.30	71.31		
J	0.50m			MADE GROUND: Medium dense dark brown and dark grey slightly clayey gravelly fine to coarse SAND. Gravel sized fragments are angular to subrounded of ash, brick, concrete, mudstone, sandstone and coal.				
		N=10 (3,3,3,3,2,2)						
J	1.50m							
		N=5 (1,1,1,2,1,1)		From 2.00m to 3.00m: Loose.				
J	2.50m							
		V 32.0 N=10 (3,3,2,3,2,3)		From 2.85m to 2.95m: 1no persistent thin (100mm thick) bed of firm low strength grey clay. High plasticity (field description).				
J	3.50m							
		N=13 (2,3,3,4,3,3)						
J	4.50m			Soft low strengh grey slightly gravelly CLAY. High plasticity (field description). Gravel is subangular to subrounded of sandstone and mudstone.	4.40	67.21		
		V 24.0 50/180mm (12,12,13,24,13)		Extremely weak grey and light brown destructured MUDSTONE recovered as angular to subrounded fine to coarse gravel.	4.70	66.91		
				End of Window Sample at 5.05 m	5.05	66.56		

Remarks and Water Observations

1. Window sample complete at 5.05m.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole backfilled with arisings upon completion.

GL (mAOD) 71.61
Easting: 431482.65
Northing: 408598.48

Fig. No. WS102

WINDOW SAMPLING RECORD

BH No. **WS103**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 04/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
J	0.30m			MADE GROUND: Grassed TOPSOIL comprising brown slightly gravelly fine to coarse SAND. Low content of roots (5mm x 80mm). Gravel sized fragments are subangular to subrounded of brick, mudstone and sandstone.				
					0.45	63.52		
				Very stiff high strength yellowish brown and brown sandy gravelly CLAY. Low plasticity. Low content of subangular to subrounded cobbles of sandstone. Gravel is subangular to subrounded of sandstone.				
D	1.00m	N=22 (4,3,4,6,6,6)						
D	2.00m	N=16 (4,4,3,3,4,6)						
D	3.00m	N=16 (4,4,3,4,4,5)						
				From 3.80m to 3.85m: 1no persistent very thin (50mm thick) bed of black angular to subangular fine to coarse gravel of coal.				
D	4.00m	N=19 (3,3,3,4,5,7)						
D	5.00m	50/225mm (4,4,12,16,22)		Extremely weak grey and light brown destructured SANDSTONE.	5.00	58.97		
				End of Window Sample at 5.40 m	5.40	58.57		

Remarks and Water Observations

1. Window sample complete at 5.40m.
2. No groundwater encountered.
3. Material too friable for hand shear vane.
4. Window sample borehole backfilled with arisings upon completion.

GL (mAOD) 63.97
Easting: 431471.83
Northing: 408577.85

Fig. No. WS103

WINDOW SAMPLING RECORD

BH No. **WS104**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 04/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 18.0	0R	MADE GROUND: TOPSOIL comprising soft very low strength grey slightly gravelly slightly sandy CLAY. High plasticity (field description). Gravel sized fragments are subangular to subrounded of sandstone and brick.	0.20	62.28		
J	0.80m	V 8.0 N=2 (1,0,1,0,1,0)	0S	MADE GROUND: Soft extremely low strength grey and brown slightly sandy gravelly CLAY. Low plasticity (field description). Low content of subangular cobble sized fragments of sandstone. Gravel sized fragments are angular to subrounded of brick, rubber, plastic, coal, sandstone, mudstone, wood and fabric.				
J	1.80m	V 4.0 N=1 (1,0,0,0,0,1)						
		V 4.0		MADE GROUND: Soft extremely low strength black slightly gravelly SILT. Very high plasticity (field description). Gravel sized fragments are subangular to subrounded of brick and sandstone.	2.30	60.18		
J	2.80m	50/50mm (12,13,50)		End of Window Sample at 3.20 m	3.20	59.28		

Remarks and Water Observations

1. Window sample terminated at 3.20m due to obstruction.
2. Groundwater strike encountered at 1.10m, rising to 0.30m after 20 minutes.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 62.48
Easting: 431868.29
Northing: 408922.34

Fig. No. WS104

WINDOW SAMPLING RECORD

BH No. **WS105**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 04/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
				MADE GROUND: TOPSOIL comprising brown slightly gravelly clayey fine to coarse SAND. Gravel sized fragments are subangular to subrounded of brick and sandstone.	0.20	62.09		
			0R	MADE GROUND: Very loose brown and grey slightly clayey gravelly fine to coarse SAND. Gravel sized fragments are angular to subrounded of brick, concrete, sandstone, mudstone, coal, plastic, ceramics and wood.				
J	0.80m	N=0 (1,0,0,0,0,0)	0S					
				MADE GROUND: Black sandy silty angular to subrounded fine to coarse GRAVEL of brick, plastic, ceramics and sandstone.	1.30	60.99		
J	1.80m	V 28.0		Soft low strength yellowish brown slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	1.70	60.59		
J	2.00m	N=23 (3,5,5,5,6,7)		Stiff high strength				
		N=13 (3,2,3,3,3,4)						
		V 68.0						
		N=11 (3,2,2,2,3,4)		Medium dense grey and brown subangular to subrounded fine to coarse GRAVEL of mudstone and sandstone.	3.80	58.49		
		N=10 (2,1,2,2,3,3)						
				End of Window Sample at 5.45 m	5.45	56.84		

Remarks and Water Observations

1. Window sample complete at 5.45m.
2. Groundwater strike encountered at 1.30m, rising to 0.50m after 20 minutes.
3. Hand shear vanes are an average of a set of three, too friable between 1.80m and 3.90m.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 62.29
Easting: 431876.91
Northing: 408892.18

Fig. No. WS105

WINDOW SAMPLING RECORD

BH No. **WS106**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
				MADE GROUND: Grassed TOPSOIL comprising brown clayey fine to coarse SAND. Low content of roots (5mm x 60mm).				
J	0.30m			MADE GROUND: Dark brown slightly gravelly clayey fine to coarse SAND. Gravel sized fragments are subangular to subrounded of sandstone, brick, glass and concrete.	0.25	56.34		
		V 72.0		Firm medium strength yellowish brown mottled light grey slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	0.60	55.99		
D	1.00m	N=17 (4,4,4,4,4,5)						
		V 62.0						
D	2.00m	N=30 (5,6,6,6,8,10)						
				Extremely weak brown destructured MUDSTONE recovered as angular to subrounded fine to coarse gravel.	2.55	54.04		
		50/260mm (8,10,12,13,16 ,9)		End of Window Sample at 3.00 m	3.00	53.59		

Remarks and Water Observations

1. Borehole refused due to bedrock at 3.00m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 56.59
Easting: 431748.80
Northing: 408944.00

Fig. No. WS106

WINDOW SAMPLING RECORD

BH No. **WS107**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 24.0		MADE GROUND: Soft low strength brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel sized fragments are angular to subrounded of brick and glass.	0.20	56.74		
		V 46.0		MADE GROUND: Firm medium strength brown and grey gravelly CLAY. Low plasticity (field description). Low content of subrounded cobble sized fragments of sandstone. Gravel sized fragments are subangular to subrounded of brick, ash, glass and sandstone.				
J	0.80m				1.20	55.74		
J	1.80m			MADE GROUND: Reddish brown and brown slightly sandy slightly clayey angular to subrounded fine to coarse GRAVEL of ash, brick, sandstone, metal and sandstone.				
				Extremely weak grey and brown destructured MUDSTONE recovered as clayey sub angular to subrounded fine to coarse gravel.	2.80	54.14		
				End of Window Sample at 3.00 m	3.00	53.94		

Remarks and Water Observations

1. Borehole refused due to bedrock at 3.00m.
2. Groundwater encountered at 2.80m, rising to 2.40m after 20 minutes.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 56.94
Easting: 431773.59
Northing: 408931.37

Fig. No. WS107

WINDOW SAMPLING RECORD

BH No. **WS108**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
				MADE GROUND: Grassed TOPSOIL comprising soft low strength brown slightly gravelly slightly sandy CLAY. High plasticity (field description). Gravel sized fragments are sub angular to subrounded of brick, sandstone and glass.	0.30	55.87		
J	0.40m			MADE GROUND: Brown and grey gravelly fine to coarse SAND. Gravel sized fragments are angular to subrounded of glass, wood, brick, sandstone, ash and coal. From 0.50m to 0.60m: 1no persistent thin (100mm thick) bed of firm medium strength grey clay. High plasticity (field description).	0.65	55.52		
J	0.80m							
		N=2 (0,0,0,0,1,1)		MADE GROUND: Grey, reddish brown and brown slightly sandy angular to subrounded fine to coarse GRAVEL of ash, brick, glass and sandstone.	1.30	54.87		
		V 8.0		MADE GROUND: Soft extremely low strength dark grey slightly sandy SILT. Sand is fine to medium.				
		V 42.0		Firm medium strength grey mottled brown slightly gravelly CLAY. High plasticity (field description). Gravel is sub angular to subrounded of sandstone.	1.70	54.47		
D	2.00m	50/285mm (12,13,50)		Extremely weak grey and light brown destructured SANDSTONE.	2.00	54.17		
				End of Window Sample at 2.20 m	2.20	53.97		

Remarks and Water Observations

1. Borehole refused due to bedrock at 2.20m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 56.17
Easting: 431821.85
Northing: 408896.73

Fig. No. WS108

WINDOW SAMPLING RECORD

BH No. **WS109**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 8.0		MADE GROUND: Grassed TOPSOIL comprising soft very low strength brown slightly gravelly CLAY. High plasticity (field description). Gravel sized fragments are sub angular to subrounded of brick, sandstone and glass.	0.30	57.52		
J	0.80m			MADE GROUND: Reddish brown and grey slightly sandy angular to subrounded fine to coarse GRAVEL of ash, clinker, brick, glass, coal and sandstone.				
J	1.80m							
		N=0	▼					
			▼	Very soft low strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	2.25	55.57		
		V 12.0						
		V 42.0		Firm medium strength				
				Very weak brown destructured MUDSTONE recovered as slightly clayey sub angular to subrounded fine to coarse gravel.	3.00	54.82		
				End of Window Sample at 3.30 m	3.30	54.52		

Remarks and Water Observations

1. Borehole Refused due to bedrock at 3.30m.
2. Groundwater encountered at 2.30m, rising to 2.10m after 20 minutes.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 57.82
Easting: 431783.84
Northing: 408895.66

Fig. No. WS109

WINDOW SAMPLING RECORD

BH No. **WS110**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 14.0		MADE GROUND: Grassed TOPSOIL comprising soft very low strength brown slightly gravelly CLAY. High plasticity (field description). Gravel sized fragments are sub angular to subrounded of brick, sandstone and glass.	0.20	54.99		
J	0.70m	V 42.0 N=8 (2,2,2,2,2,2)		MADE GROUND: Firm medium strength brown mottled grey slightly sandy slightly gravelly CLAY. High plasticity (field description). Gravel sized fragments are angular to subrounded of brick, ash, coal and sandstone.	1.30	53.89		
D	2.00m	V 24.0 N=1 (0,0,0,0,0,1)		Soft very low strength beoming very stiff very high strength brown mottled yellowish brown and grey slightly gravelly CLAY. Intermediate plasticity. Gravel is subrounded of sandstone.				
D	3.00m	V 12.0 N=4 (0,0,1,1,1,1)						
		V 14.0 N=28 (6,6,7,7,7,7)		Stiff high strength becoming very stiff very high strength brown mottled yellowish brown and grey slightly gravelly CLAY. Intermediate plasticity. Gravel is subrounded of sandstone.	4.00	51.19		
		N=43 (7,8,10,10,10,13)		End of Window Sample at 5.45 m	5.45	49.74		

Remarks and Water Observations

1. Borehole complete at 5.45m due to high strength soils.
2. Groundwater encountered at 4.00m, rising to 3.60m after 20 minutes.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 55.19
Easting: 431822.26
Northing: 408954.82

Fig. No. WS110

WINDOW SAMPLING RECORD

BH No. **WS111**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 22.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel sized fragments are sub angular to subrounded of brick, coal and sandstone.				
J	0.30m							
					0.55	57.10		
		V 32.0		Soft low strength yellowish brown mottled brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel is sub angular to subrounded of sandstone.				
D	1.00m							
					1.15	56.50		
		V 88.0		Stiff high strength yellowish brown slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.				
		V 120.0						
D	2.00m							
					2.05	55.60		
				Very weak brown destructured MUDSTONE recovered as sub angular to subrounded fine to coarse gravel.				
				End of Window Sample at 2.80 m	2.80	54.85		

Remarks and Water Observations

1. Borehole refused due to bedrock at 2.80m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 57.65
Easting: 431753.60
Northing: 408926.71

Fig. No. WS111

WINDOW SAMPLING RECORD

BH No. **WS112**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	(N) Shear vane		Description	Depth (m)	Level (mAOD)	Legend	Well
		V 12.0		Grassed TOPSOIL comprising soft very low strength brown sandy CLAY. High plasticity (field description).	0.20	61.45		
J	0.40m			Firm medium strength yellowish brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel is sub angular to subrounded of sandstone.				
		V 48.0						
D	0.80m			Very weak yellowish brown and brown weathered SANDSTONE recovered as slightly sandy angular to subrounded fine to coarse gravel.	0.80	60.85		
		50/265mm (25,27,23)			1.00	60.65		
				End of Window Sample at 1.00 m				

Remarks and Water Observations

1. Borehole refused due to bedrock at 1.00m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 61.65
Easting: 431701.92
Northing: 408817.24

Fig. No. WS112

WINDOW SAMPLING RECORD

BH No. **WS113**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By:

Driller:

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
J	0.10m	V 18.0		Grassed TOPSOIL comprising soft very low strength brown sandy CLAY. High plasticity (field description). Sand is fine to medium.	0.25	58.72		
		V 32.0		Firm low strength brown and yellowish brown slightly gravelly CLAY. Intermediate plasticity. Gravel is subrounded of sandstone. From 0.25m to 0.60m: Sandy.				
		V 60.0		From 0.80m: Medium strength.				
D	1.00m							
		V 84.0						
		V 92.0						
D	2.00m			Very weak light brown weathered SANDSTONE recovered as sub angular to subrounded fine to coarse gravel.	1.95 2.00	57.02 56.97		
				End of Window Sample at 2.00 m				

Remarks and Water Observations

1. Borehole terminated due to bedrock at 2.00m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 58.97
Easting: 431759.46
Northing: 408801.49

Fig. No. WS113

WINDOW SAMPLING RECORD

BH No. **WS114**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 10.0		Grassed TOPSOIL comprising soft very low strength brown sandy CLAY. High plasticity (field description).	0.20	60.69		
J	0.40m	V 24.0		Soft low strength brown slightly gravelly slightly sandy CLAY. High plasticity (field description). Gravel is sub angular to subrounded of sandstone.	0.70	60.19		
D	1.00m	V 60.0 N=21 (2,3,4,4,4,9)		Firm medium strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is sub angular to subrounded of sandstone.	1.50	59.39		
		50/245mm (25,50)		Very weak yellowish brown and brown destructured MUDSTONE recovered as angular to sub angular fine to coarse gravel.	2.00	58.89		
				End of Window Sample at 2.00 m				

Remarks and Water Observations

1. Borehole terminated due to bedrock at 2.00m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 60.89
Easting: 431719.67
Northing: 408771.62

Fig. No. WS114

WINDOW SAMPLING RECORD

BH No. **WS115**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
J	0.10m	V 16.0		Grassed TOPSOIL comprising soft very low strength brown sandy CLAY. High plasticity (field description).				
					0.25	62.56		
		V 68.0		Very stiff medium strength brown mottled grey slightly gravelly CLAY. Intermediate plasticity. Gravel is subrounded of sandstone.				
		V 70.0						
D	1.00m							
		V 74.0						
					1.50	61.31		
				Very weak brown and dark brown destructured MUDSTONE recovered as sub angular to subrounded fine to coarse gravel.				
D	1.80m				1.80	61.01		
				End of Window Sample at 1.80 m				

Remarks and Water Observations

1. Borehole terminated due to bedrock at 1.80m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 62.81
Easting: 431675.39
Northing: 408712.03

Fig. No. WS115

WINDOW SAMPLING RECORD

BH No. **WS116**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
J	0.10m	V 32.0		Grassed TOPSOIL comprising soft low strength brown slightly sandy CLAY. High plasticity (field description).				
		V 50.0		Firm medium strength brown mottled grey slightly sandy slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	0.30	61.48		
		V 84.0		Stiff high strength yellowish brown mottled grey gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	0.70	61.08		
D	1.00m	N=13 (3,3,3,3,3,4)						
		V 82.0						
D	2.00m	50/290mm (5,8,10,12,14, 14)		End of Window Sample at 2.00 m	2.00	59.78		

Remarks and Water Observations

1. Borehole refused due to bedrock at 2.00m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 61.78
Easting: 431708.57
Northing: 408683.20

Fig. No. WS116

WINDOW SAMPLING RECORD

BH No. **WS117**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
J	0.20m	V 18.0		Grassed TOPSOIL comprising soft very low strength grey slightly sandy CLAY. High plasticity (field description).				
		V 28.0		Very stiff low strength yellowish brown mottled grey slightly gravelly sandy CLAY. Low plasticity. Gravel is subrounded of sandstone.	0.40	60.68		
D	1.00m							
				Yellowish brown sandy sub angular to subrounded fine to coarse GRAVEL of sandstone.	1.20	59.88		
D	2.00m							
				End of Window Sample at 4.00 m	4.00	57.08		

Remarks and Water Observations

1. Borehole refused due to bedrock at 4.00m.
2. Groundwater encountered at 1.30m, rising to 1.10m after 20 minutes.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 61.08
Easting: 431749.28
Northing: 408651.49

Fig. No. WS117

WINDOW SAMPLING RECORD

BH No. **WS118**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 28.0		Grassed TOPSOIL comprising soft low strength brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel is sub angular to subrounded of coal and sandstone.	0.20	63.26		
J	0.40m	V 36.0		Soft low strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is sub angular to subrounded of sandstone and coal.	0.60	62.86		
		V 108.0		Stiff high strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.				
D	1.00m	N=20 (4,4,4,4,6,6)						
		V 92.0						
D	2.00m	N=35 (6,8,8,8,9,10)						
				Extremely weak grey and brown destructured MUDSTONE recovered as angular to subrounded fine to coarse gravel.	2.50	60.96		
		50/265mm (25,50)		End of Window Sample at 2.90 m	2.90	60.56		

Remarks and Water Observations

1. Borehole terminated due to bedrock at 2.90m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 63.46
Easting: 431638.88
Northing: 408675.28

Fig. No. WS118

WINDOW SAMPLING RECORD

BH No. **WS119**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 28/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By:

Driller:

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 14.0		Grassed TOPSOIL comprising soft very low strength brown sandy CLAY. High plasticity (field description).	0.20	65.95		
J	0.50m			Brown and yellowish brown sandy sub angular to subrounded fine to coarse GRAVEL of sandstone and coal.				
D	1.00m				1.05	65.10		
		V 84.0		Stiff high strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.				
		V 80.0						
				Extremely weak grey destructured MUDSTONE recovered as sub angular to subrounded fine to coarse gravel.	2.30	63.85		
D	3.00m			End of Window Sample at 3.00 m	3.00	63.15		

Remarks and Water Observations

1. Borehole terminated due to bedrock at 3.00m.
2. No groundwater encountered.
3. Hand shear vane results are an average of a set of three.
4. Borehole installed with 50mm diameter standpipe upon completion.

GL (mAOD) 66.15
Easting: 431599.24
Northing: 408696.69

Fig. No. WS119

WINDOW SAMPLING RECORD

BH No. **WS120**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 12.0		Grassed TOPSOIL comprising soft very low strength brown sandy CLAY. High plasticity (field description).				
					0.30	68.37		
J	0.50m			Soft low strength brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel is subangular to subrounded of sandstone and coal.				
		V 24.0						
		V 38.0			0.85	67.82		
D	1.00m	N=14 (1,2,3,4,3,4)		Soft low strength brown slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.				
					1.20	67.47		
				Firm medium strength yellowish brown gravelly CLAY. Low plasticity (field description). Gravel is subangular to subrounded of sandstone.				
		V 50.0						
D	2.00m	N=27 (4,4,6,6,8,7)		From 2.00m: Stiff high strength.				
				At 2.70m: 1no subrounded cobble of sandstone.				
		N=18 (4,4,4,4,5,5)						
			0S					
				Extremely weak to very weak grey destructured MUDSTONE recovered as angular to subrounded fine to coarse gravel.	3.50	65.17		
		50/145mm (9,12,22,28)						
				End of Window Sample at 4.30 m	4.30	64.37		

Remarks and Water Observations

1. Window sample borehole terminated at 4.30m due to refusal within bedrock.
2. Groundwater encountered at 3.50m.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 68.67
Easting: 431519.74
Northing: 408673.30

Fig. No. WS120

WINDOW SAMPLING RECORD

BH No. **WS121**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 24.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel sized fragments are subrounded of brick, coal and sandstone.	0.30	70.54		
J	0.50m			MADE GROUND: Dark grey and dark brown slightly clayey slightly sandy angular to subrounded fine to coarse GRAVEL of sandstone, brick, ash, mudstone and coal. From 0.80m: Clayey.				
J	2.50m							
D	3.00m							
D	4.00m							
D	5.00m			At 5.00m: 2no subangular cobble sized fragments of brick.				
				Very weak yellowish brown weathered SANDSTONE recovered as slightly sandy subangular to subrounded fine to coarse gravel.	5.40 5.50	65.44 65.34		
				End of Window Sample at 5.50 m				

Remarks and Water Observations

1. Window sample borehole refused at 5.50m.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 70.84
Easting: 431508.19
Northing: 408597.69

Fig. No. WS121

WINDOW SAMPLING RECORD

BH No. **WS122**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 24.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).				
				MADE GROUND: Medium dense dark grey and dark brown slightly clayey slightly sandy angular to subrounded fine to coarse GRAVEL of mudstone, brick, ash, sandstone and clinker.	0.25	68.86		
J	1.00m	N=24 (2,1,3,4,8,9)						
J	2.00m	N=7 (3,2,2,1,2,2)						
D	3.00m	N=6 (2,1,1,1,2,2)						
			0S	From 3.70m to 3.85m: Recovered as angular to subangular fine to coarse GRAVEL of ash and clinker. From 3.85m to 3.95m: Recovered as soft low strength brown CLAY. High plasticity (field description).				
D	4.00m	V 22.0 50/105mm (10,15,29,21)						
				Very weak yellowish brown weathered SANDSTONE recovered as slightly sandy subangular to subrounded fine to coarse gravel.	4.25	64.86		
				End of Window Sample at 4.50 m	4.50	64.61		

Remarks and Water Observations

1. Window sample borehole terminated at 4.25m due to refusal within bedrock.
2. Groundwater encountered at 3.75m.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 69.11
Easting: 431549.32
Northing: 408594.35

Fig. No. WS122

WINDOW SAMPLING RECORD

BH No. **WS123**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By:

Driller:

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 26.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).				
					0.30	66.41		
		V 38.0		MADE GROUND: Soft low strength brown slightly sandy gravelly CLAY. Low plasticity (field description). Gravel sized fragments are subangular to subrounded of brick, sandstone and coal.	0.65	66.06		
				MADE GROUND: Dark grey and brown slightly sandy clayey angular to subrounded fine to coarse GRAVEL of brick, mudstone, coal and ash.				
		V 16.0		Soft very low strength grey slightly sandy CLAY. High plasticity (field description).	2.50	64.21		
					2.60	64.11		
				Very weak yellowish brown weathered SANDSTONE recovered as subangular to subrounded fine to coarse gravel.	2.70	64.01		
				End of Window Sample at 2.70 m				

Remarks and Water Observations

1. Window sample borehole terminated at 2.70m due to refusal within bedrock.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole backfilled with arisings and bentonite seal upon completion.

GL (mAOD)
66.71
Easting:
431600.77
Northing:
408598.67

Fig. No.
WS123

WINDOW SAMPLING RECORD

BH No. **WS124**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 28.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).				
J	0.30m			MADE GROUND: Medium dense dark grey and dark brown slightly sandy clayey angular to subrounded fine to coarse GRAVEL of ash, brick, sandstone, mudstone and coal. At 0.30m: 1no subangular cobble sized fragment of clinker. Strong hydrogen sulphate odour.	0.30	65.84		
		N=12 (2,2,3,3,3,3)						
J	1.50m							
		N=13 (1,2,1,1,1,10)						
				Very weak yellowish brown weathered SANDSTONE recovered as subangular to subrounded fine to coarse gravel.	2.30	63.84		
		50/125mm (25,21,29)		End of Window Sample at 2.50 m	2.50	63.64		

Remarks and Water Observations

1. Window sample borehole terminated at 2.50m due to refusal within bedrock.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 66.14
Easting: 431615.58
Northing: 408588.42

Fig. No. WS124

WINDOW SAMPLING RECORD

BH No. **WS125**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 22.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).	0.20	63.77		
J	0.50m			MADE GROUND: Dark grey and grey slightly sandy clayey angular to subrounded fine to coarse GRAVEL of brick, sandstone, ash, coal and mudstone.				
					1.20	62.77		
J	1.50m		0R 0S	MADE GROUND: Dark grey angular to subangular fine to coarse GRAVEL of ash, brick, clinker and sandstone.				
		V 16.0		MADE GROUND: Soft very low strength grey CLAY. High plasticity (field description).	1.85	62.12		
				Very weak yellowish brown weathered SANDSTONE recovered as subangular to subrounded fine to coarse gravel.	1.95 2.00	62.02 61.97		
				End of Window Sample at 2.00 m				

Remarks and Water Observations

1. Window sample borehole terminated at 2.00m due to refusal within bedrock.
2. Groundwater strike encountered at 1.70m, rising to 1.50m after 20 minutes.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 63.97
Easting: 431653.48
Northing: 408589.66

Fig. No. WS125

WINDOW SAMPLING RECORD

BH No. **WS126**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 20.0		MADE GROUND: Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).				
					0.35	62.41		
		V 18.0		MADE GROUND: Soft very low strength brown slightly sandy slightly gravelly CLAY. High plasticity (field description). Gravel sized fragments are subrounded of brick and sandstone.				
					0.90	61.86		
		N=13 (2,4,3,3,4,3)		Soft becoming firm medium strength sandy CLAY. High plasticity (field description). Sand is fine to medium. From 1.50m: Firm medium strength. From 1.50m: Slightly gravelly. Gravel is subangular to subrounded of sandstone.				
					1.90	60.86		
		50/200mm (6,7,18,17,15)		Very weak yellowish brown weathered SANDSTONE recovered as subangular to subrounded fine to coarse gravel.				
				End of Window Sample at 2.35 m	2.35	60.41		

Remarks and Water Observations

1. Window sample borehole terminated at 2.35m due to refusal within bedrock.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole backfilled with arisings upon completion.

GL (mAOD) 62.76
Easting: 431670.72
Northing: 408600.91

Fig. No. WS126

WINDOW SAMPLING RECORD

BH No. **WS127**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
				Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).				
D	0.30m	V 28.0		Firm medium strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is subangular to subrounded of sandstone.	0.30	61.89		
		V 40.0						
D	1.00m			From 1.20m: Gravelly.				
D	1.70m							
		V 40.0		Very weak yellowish brown and grey weathered SANDSTONE recovered as sandy subrounded fine to coarse gravel.	1.80	60.39		
				End of Window Sample at 2.00 m	2.00	60.19		

Remarks and Water Observations

1. Window sample borehole terminated at 2.00m due to refusal within bedrock.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD)
62.19
Easting:
431682.90
Northing:
408621.80

Fig. No.
WS127

WINDOW SAMPLING RECORD

BH No. **WS128**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 12.0		Grassed TOPSOIL comprising soft very low strength brown sandy CLAY. High plasticity (field description).	0.20	60.05		
		V 60.0		Firm medium strength yellowish brown mottled brown gravelly CLAY. High plasticity (field description).				
		V 64.0						
D	1.00m	N=19 (2,2,3,5,5,6)		From 1.00m: Stiff high strength.				
		V 58.0			1.40	58.85		
				Dense yellowish brown and brown gravelly fine to coarse SAND. Gravel is subangular to subrounded of sandstone.				
D	2.00m	N=26 (7,7,6,6,7,7)						
					2.70	57.55		
		50/265mm (9,10,12,13,14 ,11)		Very weak yellowish brown weathered SANDSTONE recovered as slightly clayey sandy subangular to subrounded fine to coarse gravel.				
				End of Window Sample at 3.40 m	3.40	56.85		

Remarks and Water Observations

1. Window sample borehole refused at 3.40m within mudstone.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 60.25
Easting: 431768.19
Northing: 408682.90

Fig. No. WS128

WINDOW SAMPLING RECORD

BH No. **WS129**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
		V 22.0		Grassed TOPSOIL comprising soft low strength brown slightly sandy CLAY. High plasticity (field description).				
					0.25	59.36		
D	0.50m	V 52.0		Firm medium strength yellowish brown mottled grey slightly gravelly CLAY. High plasticity (field description). Gravel is subrounded of sandstone.				
					0.70	58.91		
				Brown and dark grey slightly clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, mudstone and coal.				
D	1.50m							
D	2.50m							
					2.90	56.71		
				Extremely weak grey destructured MUDSTONE recovered as slightly clayey subangular to subrounded fine to coarse gravel.				
					4.00	55.61		
				End of Window Sample at 4.00 m				

Remarks and Water Observations

1. Window sample borehole terminated at 4.00m due to refusal within bedrock.
2. No groundwater encountered.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 59.61
Easting: 431768.38
Northing: 408733.21

Fig. No. WS129

WINDOW SAMPLING RECORD

BH No. **WS130**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By: RL

Driller: RP Drilling

SAMPLE DETAILS Type	Depth From - To(m)	(N) Shear vane	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.10m	V 24.0		Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).	0.20	57.18		
		V 44.0		Firm medium strength yellowish brown mottled brown gravelly CLAY. High plasticity (field description). Gravel is subangular to subrounded of sandstone.	0.70	56.68		
D	1.00m	N=11 (3,3,3,2,3,3)		Medium dense brown and yellowish brown clayey gravelly fine to coarse SAND. Gravel is angular to subrounded of sandstone.				
D	2.00m	N=20 (4,5,4,4,5,7)	0R					
			0S					
		N=31 (7,6,7,7,8,9)		From 3.00m: Dense.				
D	4.00m	50/215mm (12,13,18,17,15)		Very weak yellowish brown weathered SANDSTONE recovered as subangular to subrounded fine to coarse gravel.	4.05	53.33		
				End of Window Sample at 4.35 m	4.35	53.03		

Remarks and Water Observations

1. Window sample borehole terminated at 4.35m due to refusal within bedrock.
2. Groundwater strike encountered at 2.90m, rising to 2.50m after 20 minutes.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 57.38
Easting: 431880.83
Northing: 408727.84

Fig. No. WS130

WINDOW SAMPLING RECORD

BH No. **WS131**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 29/08/2014

Method: Tracked window sample drilling rig.

Scale 1:30

Logged By: EC | Checked By:

Driller:

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	(N) Shear vane		Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.10m	V 24.0		Grassed TOPSOIL comprising soft low strength brown sandy CLAY. High plasticity (field description).				
D	0.40m	V 24.0		Soft low strength yellowish brown slightly gravelly sandy CLAY. High plasticity (field description). Gravel is subrounded of sandstone.	0.30	55.83		
D	0.80m			Brown and yellowish brown slightly clayey gravelly fine to coarse SAND. Gravel is subangular to subrounded of sandstone and coal.	0.65	55.48		
D	1.80m		▼					
			▼					
				Very weak dark grey destructured MUDSTONE recovered as angular to subrounded fine to coarse gravel.	3.70	52.43		
				End of Window Sample at 4.00 m	4.00	52.13		

Remarks and Water Observations

1. Window sample borehole terminated at 4.00m due to refusal within bedrock.
2. Groundwater strike encountered at 2.30m, rising to 2.10m after 20 minutes.
3. Hand shear vanes are an average of a set of three.
4. Window sample borehole installed with 50mm diameter standpipe as shown upon completion.

GL (mAOD) 56.13
Easting: 431861.84
Northing: 408767.89

Fig. No. WS131

BOREHOLE RECORD

BH No. **RO101**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
MADE GROUND (Ash and coal)		
SANDSTONE AND MUDSTONE	5.00	66.06
COAL	6.30	64.76
SANDSTONE AND MUDSTONE	7.00	64.06
COAL	14.20	56.86
SANDSTONE AND MUDSTONE	14.70	56.36
End of Borehole at 18.00 m	18.00	53.06

Legend

Well

Remarks and Water Observations

1.Borehole complete at 18.0m
2 Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description

GL (m AOD) 71.06
Easting: 431502.47
Northing: 408596.32

Fig. No. RO101

BOREHOLE RECORD

BH No. **RO102**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							MADE GROUND (Overburden)				
								2.50	64.32		
							SANDSTONE AND MUDSTONE				
								6.60	60.22		
							COAL	7.00	59.82		
							MUDSTONE	7.40	59.42		
							COAL	8.00	58.82		
							MUDSTONE				
								12.00	54.82		
							End of Borehole at 12.00 m				

Remarks and Water Observations

1.Borehole complete at 12.00m
2 Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description

GL (m AOD)
66.82
Easting:
431582.91
Northing:
408615.82

Fig. No.
RO102

BOREHOLE RECORD

BH No. **RO103**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Overburden				
MADE GROUND: Very Loose granular material.	1.20	62.77		
Solid	2.00	61.97		
End of Borehole at 6.00 m	6.00	57.97		

Remarks and Water Observations

1.Borehole complete at 6.00m
2.No water strike
3.Borehole backfilled with arisings and bentonite upon completion
4.Broken ground present at 1.70m, solid reached at 2.0m
5. Descriptions based on drillers description

GL (m AOD)
63.97
Easting:
431653.32
Northing:
408588.46

Fig. No.
RO103

BOREHOLE RECORD

BH No. **RO103A**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	Soft Overburden				
	Mudstone	2.00	61.96		
	End of Borehole at 3.00 m	3.00	60.96		

Remarks and Water Observations

1.Borehole complete at 3m after proving mudstone
2.No water strike
3.Borehole backfilled with arisings and bentonite upon completion.
5. Descriptions based on drillers description

GL (m AOD) 63.96
Easting: 431651.19
Northing: 408591.06

Fig. No. RO103A

BOREHOLE RECORD

BH No. **RO103B**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
Soft Overburden with ash/coal traces		
SANDSTONE with MUDSTONE bands	2.00	62.12
Broken Ground	7.80	56.32
Solid	9.00	55.12
End of Borehole at 20.00 m	20.00	44.12

Legend

Well

Remarks and Water Observations

1.Borehole complete at 3m.
2.No water strike
3.Borehole backfilled with arisings and bentonite upon completion
4.Broken ground present at 7.80m, solid reached at 9.00m.
5. Descriptions based on drillers description

GL (m AOD)
64.12
Easting:
431652.62
Northing:
408586.85

Fig. No.
RO103B

BOREHOLE RECORD

BH No. **RO105**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							CLAY				
							SANDSTONE AND MUDSTONE	3.00	67.21		
							COAL	6.00	64.21		
								6.30	63.91		
							MUDSTONE	6.60	63.61		
							COAL	7.20	63.01		
							MUDSTONE				
							End of Borehole at 10.00 m	10.00	60.21		

Remarks and Water Observations

1.Borehole complete at 20.00m
2.Borehole backfilled with arisings upon completion.
3. Descriptions based on drillers description

GL (m AOD)
70.21
Easting:
431499.59
Northing:
408634.90

Fig. No.
RO105

BOREHOLE RECORD

BH No. **RO106**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Airf flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	67.87		
							Soft Sandy CLAY				
							SANDSTONE with MUDSTONE bands	2.40	65.67		
							COAL	6.50	61.57		
							SANDSTONE with MUDSTONE bands	7.50	60.57		
							COAL	16.20	51.87		
							SANDSTONE with MUDSTONE bands	16.60	51.47		
							End of Borehole at 21.00 m	21.00	47.07		

Remarks and Water Observations

1.Borehole complete at 21.00m
2.No water strike
3.Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description

GL (m AOD)
68.07
Easting:
431552.42
Northing:
408643.28

Fig. No.
RO106

BOREHOLE RECORD

BH No. **RO107**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	65.56		
							Soft Sandy CLAY				
							SANDSTONE with MUDSTONE bands	2.80	62.96		
							COAL	7.20	58.56		
							SANDSTONE with MUDSTONE bands	8.20	57.56		
							End of Borehole at 15.00 m	15.00	50.76		

Remarks and Water Observations

1.Borehole complete at 15.00m
2.No water strike
3.Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD)
65.76
Easting:
431591.51
Northing:
408638.07

Fig. No.
RO107

BOREHOLE RECORD

BH No. **RO108**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	64.14		
							Soft Sandy CLAY				
							SANDSTONE with MUDSTONE bands	3.00	61.34		
							COAL	8.50	55.84		
							SANDSTONE with MUDSTONE bands	9.30	55.04		
							End of Borehole at 15.00 m	15.00	49.34		

Remarks and Water Observations

1.Borehole complete at 15.00m
2.No water strike
3.Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD)
64.34
Easting:
431632.58
Northing:
408629.30

Fig. No.
RO108

BOREHOLE RECORD

BH No. **RO109**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	TOPSOIL	0.30	62.84		
	Sandy CLAY				
	SANDSTONE AND MUDSTONE	2.50	60.64		
▽		8.50	54.64		
	VOID				
	SOLID	9.50	53.64		
	End of Borehole at 15.00 m	15.00	48.14		

Remarks and Water Observations

1.Borehole complete at 15.00m
2.Heavy water strike from 8.5m
3.Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD)
63.14
Easting:
431655.23
Northing:
408628.84

Fig. No.
RO109

BOREHOLE RECORD

BH No. **RO110**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.30	61.12		
							Sandy CLAY				
							SANDSTONE	3.00	58.42		
								10.30	51.12		
							COAL	10.60	50.82		
							SANDSTONE AND MUDSTONE				
							End of Borehole at 20.00 m	20.00	41.42		

Remarks and Water Observations

1.Borehole complete at 9.00m
2.Heavy water strike from 9m
3.Borehole backfilled with arisings and bentonite upon completion
4. Descriptions based on drillers description

GL (m AOD)
61.42
Easting:
431675.87
Northing:
408623.50

Fig. No.
RO110

BOREHOLE RECORD

BH No. **RO111**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	TOPSOIL	0.20	61.01		
	CLAY				
	SANDSTONE	2.20	59.01		
	SANDSTONE with MUDSTONE bands	5.00	56.21		
▽ 9					
	COAL	11.80	49.41		
	SANDSTONE with MUDSTONE bands	12.30	48.91		
	End of Borehole at 20.00 m	20.00	41.21		

Remarks and Water Observations

1.Borehole complete at 18.00m
2.Groundwater strike from 9m
3 Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD)
61.21
Easting:
431715.17
Northing:
408628.54

Fig. No.
RO111

BOREHOLE RECORD

BH No. **RO112**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
Overburden clay with ash and coal fragments		
SANDSTONE AND MUDSTONE	3.00	63.78
COAL	7.00	59.78
MUDSTONE	7.80	58.98
End of Borehole at 12.00 m	12.00	54.78

Legend

Well

Remarks and Water Observations

1.Borehole complete at 20.00m
2 Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description

GL (m AOD)
66.78
Easting:
431600.05
Northing:
408596.74

Fig. No.
RO112

BOREHOLE RECORD

BH No. **RO113**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Overburden				
							SANDSTONE AND MUDSTONE	2.80	59.43		
							BROKEN GROUND	7.60	54.63		
							SOLID	9.20	53.03		
							End of Borehole at 12.00 m	12.00	50.23		

Remarks and Water Observations

1.Borehole complete at 12.00m 2..Borehole backfilled with arisings upon completion.
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD) 62.23
Easting: 431676.23
Northing: 408623.47

Fig. No. RO113

BOREHOLE RECORD

BH No. **RO114**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
TOPSOIL	0.30	62.86
Sandy CLAY		
SANDSTONE with MUDSTONE bands	2.80	60.36
COAL	9.00	54.16
	9.20	53.96
	9.40	53.76
MUDSTONE	9.80	53.36
COAL		
SANDSTONE with MUDSTONE bands		
COAL	17.80	45.36
	18.00	45.16
SANDSTONE with MUDSTONE bands		

Legend

Well

End of Borehole at 30.00 m

Remarks and Water Observations

1.Borehole complete at 30.00m
2.Wet on Rod change from surface
3.Heavy water at 27.00m
4 Borehole backfilled with arisings and bentonite upon completion.
5. Descriptions based on drillers description

GL (m AOD)
63.16
Easting:
431649.61
Northing:
408655.22

Fig. No.
RO114

BOREHOLE RECORD

BH No. **RO115**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.30	62.04		
							Sandy CLAY				
							SANDSTONE AND MUDSTONE	2.40	59.94		
							COAL	10.40	51.94		
							SANDSTONE AND MUDSTONE	11.00	51.34		
							End of Borehole at 20.00 m	20.00	42.34		

Remarks and Water Observations

1.Borehole complete at 20.00m
2.No groundwater strike
3 Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD)
62.34
Easting:
431676.22
Northing:
408676.15

Fig. No.
RO115

BOREHOLE RECORD

BH No. **RO116**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
TOPSOIL	0.30	60.18
Sandy CLAY		
SANDSTONE with MUDSTONE bands	3.00	57.48
COAL	13.00	47.48
	13.40	47.08
MUDSTONE	13.70	46.78
COAL	14.00	46.48
MUDSTONE		
End of Borehole at 17.00 m	17.00	43.48

Legend

Well

Remarks and Water Observations

1.Borehole complete at 17.00m
2.No water strike
3 Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
60.48
Easting:
431758.44
Northing:
408697.47

Fig. No.
RO116

BOREHOLE RECORD

BH No. **RO117**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	59.70		
							CLAY				
							SANDSTONE with MUDSTONE bands	2.50	57.40		
							COAL	13.80	46.10		
								14.30	45.60		
							SANDSTONE with MUDSTONE bands				
							End of Borehole at 20.00 m	20.00	39.90		

Remarks and Water Observations

1.Borehole complete at 20.00m
2.Groundwater strike from 9m
3 Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD) 59.90
Easting: 431787.15
Northing: 408688.65

Fig. No. RO117

BOREHOLE RECORD

BH No. **RO118**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	CLAY				
	SANDSTONE AND MUDSTONE	3.00	64.88		
	COAL	6.20	61.68		
		6.40	61.48		
	MUDSTONE	6.60	61.28		
	COAL	7.00	60.88		
	MUDSTONE				
	End of Borehole at 12.00 m	12.00	55.88		

Remarks and Water Observations

1.Borehole complete at 12.0m
2 Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description

GL (m AOD) 67.88
Easting: 431533.72
Northing: 408688.13

Fig. No. RO118

BOREHOLE RECORD

BH No. **RO119**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	CLAY				
	SANDSTONE	3.20	63.42		
	COAL	8.40	58.22		
	MUDSTONE	9.20	57.42		
	End of Borehole at 12.00 m	12.00	54.62		

Remarks and Water Observations

1.Borehole complete at 12.00m
2 Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description

GL (m AOD) 66.62
Easting: 431586.60
Northing: 408701.08

Fig. No. RO119

BOREHOLE RECORD

BH No. **RO121**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							Overburden				
							SANDSTONE AND MUDSTONE	2.30	61.24		
							COAL	9.50	54.04		
							MUDSTONE	10.30	53.24		
							End of Borehole at 15.00 m	15.00	48.54		

Remarks and Water Observations

1.Borehole complete at 20.00m
2 Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description

GL (m AOD) 63.54
Easting: 431653.40
Northing: 408705.58

Fig. No. RO121

BOREHOLE RECORD

BH No. **RO122**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	61.33		
							Sandy CLAY				
							Soft MUDSTONE	2.80	58.73		
							COAL	10.50	51.03		
							SANDSTONE with MUDSTONE bands	11.20	50.33		
							End of Borehole at 20.00 m	20.00	41.53		

Remarks and Water Observations

1.Borehole complete at 20.00m
2.No groundwater strike
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD)
61.53
Easting:
431725.70
Northing:
408677.02

Fig. No.
RO122

BOREHOLE RECORD

BH No. **RO123**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 22/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.30	59.72		
							Sandy CLAY				
							SANDSTONE with MUDSTONE bands	3.60	56.42		
							COAL	14.40	45.62		
							SANDSTONE with MUDSTONE bands	15.40	44.62		
							End of Borehole at 18.00 m	18.00	42.02		

Remarks and Water Observations

1.Borehole complete at 18.00m
2.No groundwater strike
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description

GL (m AOD)
60.02
Easting:
431769.19
Northing:
408705.66

Fig. No.
RO123

BOREHOLE RECORD

BH No. **RO124**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Airflush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	58.96		
							Sandy CLAY				
							SANDSTONE with MUDSTONE bands	3.20	55.96		
							COAL	15.20	43.96		
							SANDSTONE with MUDSTONE bands	16.20	42.96		
							End of Borehole at 30.00 m				

Remarks and Water Observations

1.Borehole complete at 30.00m
2.Heavy water from 12m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD) 59.16
Easting: 431807.43
Northing: 408703.43

Fig. No. RO124

BOREHOLE RECORD

BH No. **RO125**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 21/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.30	58.14		
							Soft Sandy CLAY				
							SANDSTONE with MUDSTONE bands	3.40	55.04		
							COAL	15.60	42.84		
							MUDSTONE	16.40	42.04		
							End of Borehole at 21.00 m	21.00	37.44		

Remarks and Water Observations

1.Borehole complete at 21.00m
2.Perched groundwater strike from surface
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD) 58.44
Easting: 431837.04
Northing: 408705.38

Fig. No. RO125

BOREHOLE RECORD

BH No. **RO127**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 19/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	60.60		
							CLAY				
							SANDSTONE with MUDSTONE bands	2.00	58.80		
							COAL	12.00	48.80		
								12.20	48.60		
								12.50	48.30		
							MUDSTONE	13.00	47.80		
							COAL				
							SANDSTONE with MUDSTONE bands				
							End of Borehole at 20.00 m	20.00	40.80		

Remarks and Water Observations

1.Borehole complete at 20.00m
2.Groundwater strike from 15m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
60.80
Easting:
431735.41
Northing:
408712.80

Fig. No.
RO127

BOREHOLE RECORD

BH No. **RO128**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 22/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.20	59.73		
							Soft Sandy CLAY				
							SANDSTONE with MUDSTONE bands	2.80	57.13		
							COAL	12.50	47.43		
								12.80	47.13		
							MUDSTONE	13.20	46.73		
							COAL	13.80	46.13		
							SANDSTONE with MUDSTONE bands				
							COAL	22.60	37.33		
							MUDSTONE	23.00	36.93		
							End of Borehole at 27.00 m	27.00	32.93		

Remarks and Water Observations

1.Borehole complete at 27.00m.
2.Groundwater strike at 15m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
59.93
Easting:
431774.71
Northing:
408748.28

Fig. No.
RO128

BOREHOLE RECORD

BH No. **RO129**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 22/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
TOPSOIL	0.20	60.84
Sandy CLAY		
SANDSTONE with MUDSTONE bands	2.20	58.84
COAL	11.90	49.14
MUDSTONE	12.70	48.34
End of Borehole at 15.00 m	15.00	46.04

Legend

Well

Remarks and Water Observations

1.Borehole complete at 15.00m.
2.No Groundwater Strike.
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
61.04
Easting:
431723.47
Northing:
408736.85

Fig. No.
RO129

BOREHOLE RECORD

BH No. **RO130**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 22/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	TOPSOIL	0.30	61.71		
	Sandy CLAY				
	SANDSTONE with MUDSTONE bands	2.30	59.71		
	COAL	12.00	50.01		
		12.30	49.71		
		12.60	49.41		
	MUDSTONE	13.00	49.01		
	COAL				
	MUDSTONE				
	End of Borehole at 16.00 m	16.00	46.01		

Remarks and Water Observations

1.Borehole complete at 16.00m
2. Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description.

GL (m AOD)
62.01
Easting:
431694.09
Northing:
408757.07

Fig. No.
RO130

BOREHOLE RECORD

BH No. **RO131**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	TOPSOIL	0.20	60.23		
	Sandy CLAY	1.80	58.63		
	SANDSTONE with MUDSTONE bands	12.50	47.93		
	COAL	12.80	47.63		
	MUDSTONE	13.00	47.43		
	COAL	13.50	46.93		
	SANDSTONE with MUDSTONE bands				
	End of Borehole at 18.00 m	18.00	42.43		

Remarks and Water Observations

1.Borehole complete at 18.00m
2.No water strike
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
60.43
Easting:
431740.03
Northing:
408744.44

Fig. No.
RO131

BOREHOLE RECORD

BH No. **RO132**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Airflush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
TOPSOIL	0.30	59.17
Soft Sandy CLAY		
SANDSTONE with MUDSTONE bands	3.00	56.47
COAL	13.20	46.27
SANDSTONE with MUDSTONE bands	14.20	45.27
End of Borehole at 18.00 m	18.00	41.47

Legend

Well

Remarks and Water Observations

1. Borehole complete at 18.00m
2. No water strike
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
59.47
Easting:
431758.71
Northing:
408776.04

Fig. No.
RO132

BOREHOLE RECORD

BH No. **RO134**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 21/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	TOPSOIL	0.30	58.94		
	Soft Sandy CLAY				
	SANDSTONE with MUDSTONE bands	3.40	55.84		
	COAL	14.80	44.44		
	MUDSTONE	15.80	43.44		
	End of Borehole at 18.00 m	18.00	41.24		

Remarks and Water Observations

1.Borehole complete at 18.00m
2.No water strike
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
59.24
Easting:
431774.92
Northing:
408748.36

Fig. No.
RO134

BOREHOLE RECORD

BH No. **RO135**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 20/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	TOPSOIL	0.30	60.40		
	Sandy CLAY				
	SANDSTONE with MUDSTONE bands	2.00	58.70		
	COAL	12.60	48.10		
	MUDSTONE	13.00	47.70		
	COAL	13.50	47.20		
	MUDSTONE	13.80	46.90		
	End of Borehole at 18.00 m	18.00	42.70		

Remarks and Water Observations

1.Borehole complete at 18.00m
2.No water strike
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
60.70
Easting:
431774.92
Northing:
408748.36

Fig. No.
RO135

BOREHOLE RECORD

BH No. **RO136**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	Overburden				
	SANDSTONE AND MUDSTONE	2.00	60.34		
	COAL	12.40	49.94		
		12.70	49.64		
	SANDSTONE AND MUDSTONE	13.40	48.94		
	MUDSTONE				
	End of Borehole at 15.00 m	15.00	47.34		

Remarks and Water Observations

1.Borehole complete at 15.00m
2. Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description.

GL (m AOD) 62.34
Easting: 431686.08
Northing: 408783.46

Fig. No. RO136

BOREHOLE RECORD

BH No. **RO137**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 21/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

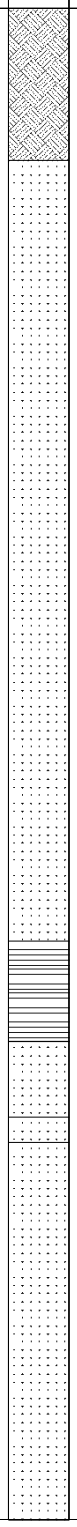
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
Overburden		
SANDSTONE with MUDSTONE bands	3.00	56.50
MUDSTONE	18.50	41.00
SANDSTONE with MUDSTONE bands	20.50	39.00
Very Weak Sandstone	22.00	37.50
	22.50	37.00
SANDSTONE with MUDSTONE bands		

Legend



Well

End of Borehole at 30.00 m

Remarks and Water Observations

1.Borehole complete at 27.00m
2.Waterstrike at 17.3m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD) 59.50
Easting: 431758.55
Northing: 408775.92

Fig. No. RO137

BOREHOLE RECORD

BH No. **RO138**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 21/08/2014

Method: Airflush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
	TOPSOIL	0.30	57.10		
	Sandy CLAY				
	SANDSTONE with MUDSTONE bands	3.00	54.40		
	COAL	23.80	33.60		
		24.10	33.30		
	SANDSTONE with MUDSTONE bands				
	End of Borehole at 27.00 m	27.00	30.40		

Remarks and Water Observations

1.Borehole complete at 27.00m
2.No water strike
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
57.40
Easting:
431805.90
Northing:
408777.76

Fig. No.
RO138

BOREHOLE RECORD

BH No. **RO139**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 21/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							Overburden				
							SANDSTONE with MUDSTONE bands	3.20	56.30		
							COAL	16.00	43.50		
							MUDSTONE	16.80	42.70		
							SANDSTONE AND MUDSTONE	21.00	38.50		
							End of Borehole at 30.00 m				

Remarks and Water Observations

1.Borehole complete at 30.00m
2.Waterstrike at 15.00m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
59.50
Easting:
431748.40
Northing:
408795.29

Fig. No.
RO139

BOREHOLE RECORD

BH No. **RO140**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 21/08/2014

Method: Airflush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

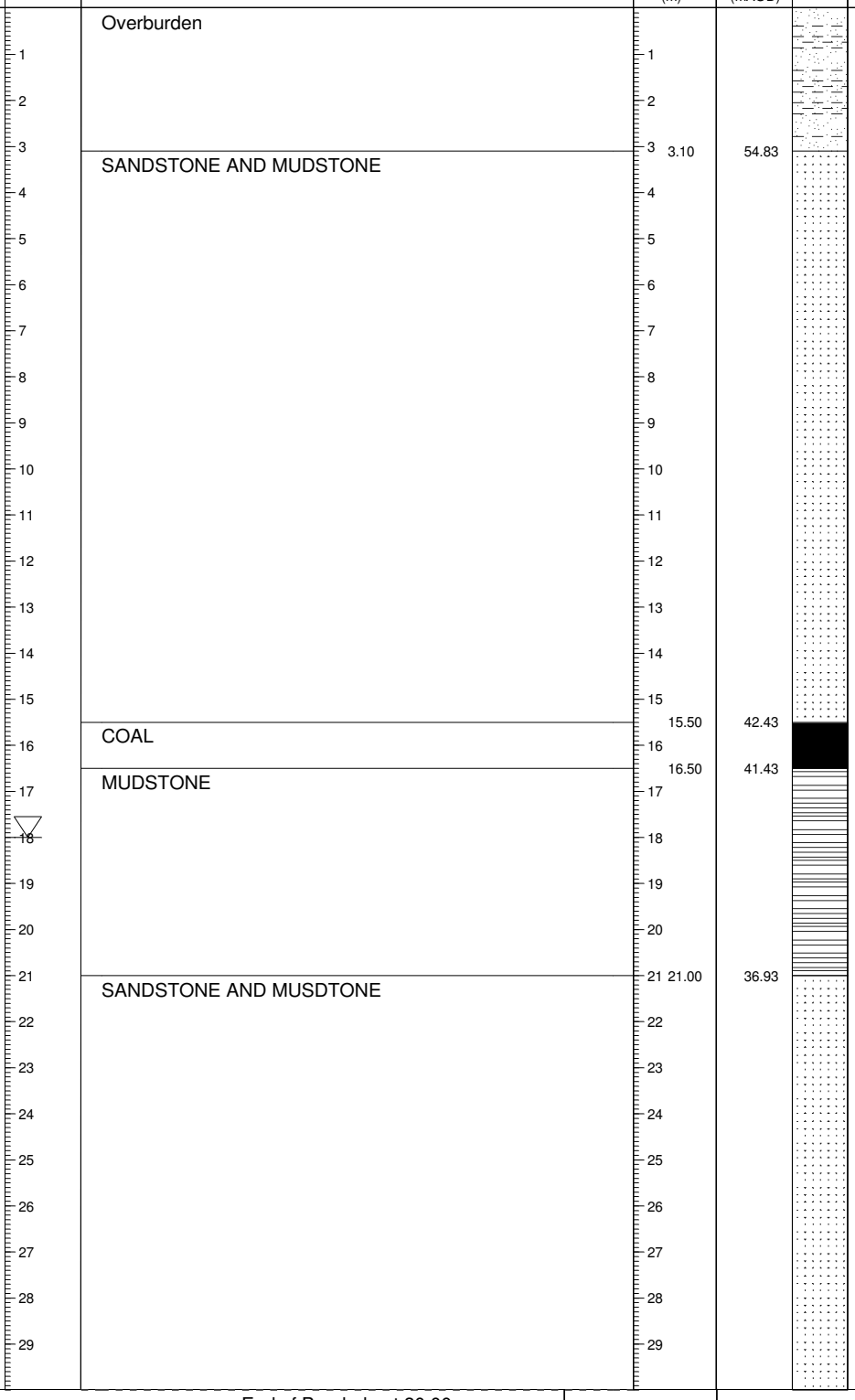
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

STRATA RECORD

Depth (m)	Level (mAOD)	Description
		Overburden
3.10	54.83	SANDSTONE AND MUDSTONE
15.50	42.43	COAL
16.50	41.43	MUDSTONE
21.00	36.93	SANDSTONE AND MUSDTONE
		End of Borehole at 30.00 m

Groundwater (Casing): ▽ 18

Legend / Well



Remarks and Water Observations

1.Borehole complete at 30.00m
2.Waterstrike at 18.00m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD) 57.93
Easting: 431786.14
Northing: 408790.29

Fig. No. RO140

BOREHOLE RECORD

BH No. **RO141**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 22/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.30	57.75		
							Soft Sandy Clay				
							SANDSTONE with MUDSTONE bands	3.30	54.75		
								15.70	42.35		
							COAL	16.40	41.65		
							SANDSTONE with MUDSTONE bands				
								23.20	34.85		
							COAL	23.70	34.35		
							MUDSTONE				
							End of Borehole at 27.00 m	27.00	31.05		

Remarks and Water Observations

1.Borehole complete at 27.00m.
2.Groundwater strike from 12m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
58.05
Easting:
431764.31
Northing:
408826.14

Fig. No.
RO141

BOREHOLE RECORD

BH No. **RO142**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 21/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS							STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)	Description	Depth (m)	Level (mAOD)	Legend	Well
							TOPSOIL	0.40	55.33		
							Soft Sandy CLAY				
							SANDSTONE with MUDSTONE bands	3.70	52.03		
							COAL	16.20	39.53		
							SANDSTONE with MUDSTONE bands	16.80	38.93		
							End of Borehole at 27.00 m	27.00	28.73		

Remarks and Water Observations

1.Borehole complete at 27.00m
2.Heavy Water from 10.70m
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD) 55.73
Easting: 431852.98
Northing: 408799.92

Fig. No. RO142

BOREHOLE RECORD

BH No. **RO144**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 22/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller:

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
Overburden / coal / shaley traces.		
Loose SANDSTONE.	2.80	53.19
SANDSTONE with MUDSTONE bands	6.00	49.99
COAL	17.60	38.39
SANDSTONE with MUDSTONE bands	18.20	37.79

Legend / Well

End of Borehole at 30.00 m

Remarks and Water Observations

1. Borehole complete at 30.00m.
2. Perched groundwater strike from surface.
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD) 55.99
Easting: 431848.80
Northing: 408912.13

Fig. No. RO144

BOREHOLE RECORD

BH No. **RO145**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Air flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
OVERBURDEN				
SANDSTONE AND MUDSTONE	4.00	52.59		
WEAK SANDSTONE	11.00	45.59		
MUDSTONE	12.00	44.59		
End of Borehole at 15.00 m	15.00	41.59		

Remarks and Water Observations

1.Borehole complete at 15.00m.
2.Groundwater strike from surface.
3. Borehole backfilled with arisings and bentonite upon completion.
4. Descriptions based on drillers description.

GL (m AOD)
56.59
Easting:
431853.28
Northing:
408798.82

Fig. No.
RO145

BOREHOLE RECORD

BH No. **RO146**
Sheet 1 of 1

Site: Low Barugh, Barnsley

Contract No: C6054

Client: CEP & HLM

Dates: 26/08/2014

Method: Water flush

Scale 1:150

Logged By: RE | Checked By: RL

Driller: SDS

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
OVERBURDEN with ash and coal fragments		
Soft gravelly CLAY	3.00	53.18
SANDSTONE AND MUDSTONE	6.00	50.18
COAL	18.20	37.98
MUDSTONE	18.80	37.38
End of Borehole at 21.00 m	21.00	35.18

Legend

Well

Remarks and Water Observations

1. Borehole complete at 21.00m.
2. Borehole backfilled with arisings and bentonite upon completion.
3. Descriptions based on drillers description.

GL (m AOD) 56.18
Easting: 431846.04
Northing: 408981.81

Fig. No. RO146

EXPLORATORY HOLE RECORDS - 2006

TRIAL PIT RECORD

TP No. **TP1**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).				
D	0.50m			MADE GROUND: Yellow brown fine to coarse subangular to angular GRAVEL of predominantly sandstone with occasional mudstone.	0.40			
D	1.30m							
D	2.00m							
D	3.00m							
D	3.50m			Firm grey sandy CLAY.	3.20			
				End of Trial Pit at 3.60 m	3.60			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated at the maximum reach of the JCB.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP1

TRIAL PIT RECORD

TP No. **TP2**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m	60		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.70			
D	1.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Compietely weathered mudstone).				
D	2.00m			Becoming thinly laminated and difficult to excavate from 2.00m. (Weathered mudstone)				
				End of Trial Pit at 2.40 m	2.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Becoming difficult to excavate below 2.00m, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP2

TRIAL PIT RECORD

TP No. **TP3**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.40m			Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.50			
D	1.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.50			
D	2.00m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.30			
				End of Trial Pit at 2.30 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP3

TRIAL PIT RECORD

TP No. **TP4**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.50m			MADE GROUND: Orange grey fine to coarse subangular GRAVEL of sandstone and mudstone, with rare coal and with occasional cobbles of sandstone.				
D	1.30m							
D	2.30m							
				Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	2.80			
				End of Trial Pit at 3.30 m	3.30			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Becoming difficult to excavate below 2.80m, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP4

TRIAL PIT RECORD

TP No. **TP5**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.50m			Orange grey fine to coarse subangular GRAVEL of sandstone and mudstone, with rare coal and with occasional cobbles of sandstone.	0.70			
D	1.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.90			
D	2.00m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.60			
				End of Trial Pit at 2.60 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP5

TRIAL PIT RECORD

TP No. **TP6**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (PPM)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m	64		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.60			
D	1.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.10			
D	2.30m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.80			
				End of Trial Pit at 2.80 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone: excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP6

TRIAL PIT RECORD

TP No. **TP7**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).				
					0.40			
D	0.80m			MADE GROUND: Orange grey fine to coarse subangular GRAVEL of sandstone and mudstone, with rare coal and with occasional cobbles of sandstone.				
D	1.90m							
D	2.90m							
				End of Trial Pit at 3.40 m	3.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated at the maximum reach of the excavator.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP7

TRIAL PIT RECORD

TP No. **TP8**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	1.00m			MADE GROUND: Orange grey fine to coarse subangular GRAVEL of sandstone and mudstone, with rare coal and with occasional cobbles of sandstone.				
D	2.00m							
D	3.00m	54		Firm friable grey sandy CLAY.	2.60			
				End of Trial Pit at 3.90 m	3.90			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated at the maximum reach of the excavator.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP8

TRIAL PIT RECORD

TP No. **TP9**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 12/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.30m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).				
		81		Stiff grey brown mottled sandy slightly gravelly CLAY. Gravel is fine to medium subangular of mudstone and sandstone.	0.40			
D	1.00m							
				Stiff grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.10			
D	2.00m							
D	3.00m							
				End of Trial Pit at 3.10 m	3.10			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated at maximum reach of excavator; difficult to penetrate below 3.00m.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP9

TRIAL PIT RECORD

TP No. **TP10**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.10			
D	0.60m	65		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.90			
D	1.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.00			
D	1.90m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular gravel of mudstone.	2.40			
D	2.30m			End of Trial Pit at 2.40 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP10

TRIAL PIT RECORD

TP No. **TP11**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.50m			Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.60			
D	1.10m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	1.90m							
D	2.40m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.10			
				End of Trial Pit at 2.60 m	2.60			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP11

TRIAL PIT RECORD

TP No. **TP12**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.70m	72		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	1.10			
		68		Firm friable grey sandy CLAY.				
D	1.50m							
		73						
D	2.50m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.40			
				End of Trial Pit at 3.10 m	3.10			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -
Easting: -
Northing: -

Fig. No. TP12

TRIAL PIT RECORD

TP No. **TP13**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m	-		MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.80m	66		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	1.40			
D	1.60m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.70			
D	2.50m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	3.40			
D	3.10m			End of Trial Pit at 3.40 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone. Excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP13

TRIAL PIT RECORD

TP No. **TP14**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
				MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.30m							
		52		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	0.70m							
		64						
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.30			
D	1.50m							
D	2.40m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.40			
D	3.00m							
				End of Trial Pit at 3.10 m	3.10			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP14

TRIAL PIT RECORD

TP No. **TP15**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.70m	58		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	1.20			
D	1.60m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.50			
D	2.50m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	3.10			
D	2.90m			End of Trial Pit at 3.10 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP15

TRIAL PIT RECORD

TP No. **TP16**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
				Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	0.80m							
				Firm friable grey sandy CLAY.	1.00			
		59						
D	1.60m							
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.00			
D	2.60m							
				End of Trial Pit at 2.90 m	2.90			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP16

TRIAL PIT RECORD

TP No. **TP17**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.80m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.				
		71		Firm friable grey sandy CLAY.	1.10			
D	1.70m							
D	2.00m			Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	2.00 2.10			
				End of Trial Pit at 2.10 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated on impenetrable sandstone.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP17

TRIAL PIT RECORD

TP No. **TP18**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.70m	32		Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	1.20			
D	1.60m	72		Firm friable grey sandy CLAY.	2.30			
D	2.20m			Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	2.40			
D	2.40m			End of Trial Pit at 2.40 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated on impenetrable sandstone.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP18

TRIAL PIT RECORD

TP No. **TP19**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.70m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.90			
D	1.30m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.80			
D	2.10m			End of Trial Pit at 1.80 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP19

TRIAL PIT RECORD

TP No. **TP20**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.80m	-		Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	1.10			
D	1.40m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.90			
				End of Trial Pit at 1.90 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP20

TRIAL PIT RECORD

TP No. **TP21**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.60m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.60			
		62		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	1.50m	74						
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.70			
D	2.10m							
				Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	2.30 2.40			
				End of Trial Pit at 2.40 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated on impenetrable sandstone.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP21

TRIAL PIT RECORD

TP No. **TP22**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
				MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.20m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.				
D	0.50m				0.70			
		66		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	1.40m							
		61			1.80			
D	2.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	2.30m				2.50			
				Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	2.60			
				End of Trial Pit at 2.60 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated on impenetrable sandstone.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP22

TRIAL PIT RECORD

TP No. **TP23**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.60m	-		Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	1.10			
D	1.40m	57		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	2.10			
D	2.30m	64		Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	2.40			
D	2.70m			Firm grey brown friable slightly gravelly slightly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	3.00			
				End of Trial Pit at 3.00 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP23

TRIAL PIT RECORD

TP No. **TP24**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS Type	Depth From - To(m)	Vane Results kN/m²	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.50m			Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.70			
D	1.10m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	1.50			
D	2.30m			Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	2.50			
				End of Trial Pit at 2.50 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in sandstone, excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP24

TRIAL PIT RECORD

TP No. **TP25**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).				
					0.30			
				Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	0.70m	68						
					1.30			
D	1.40m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	2.00m							
				End of Trial Pit at 2.10 m	2.10			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD)
-
Easting:
-
Northing:
-

Fig. No.
TP25

TRIAL PIT RECORD

TP No. **TP26**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).				
D	0.50m				0.70			
				Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	1.00			
D	1.30m	69		Firm friable grey sandy CLAY.				
D	1.60m				1.80			
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	2.30m				2.60			
				End of Trial Pit at 2.60 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP26

TRIAL PIT RECORD

TP No. **TP27**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.60m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.				
D	1.00m	48		Firm friable grey sandy CLAY.	0.90			
D	1.70m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	1.80			
D	2.30m			End of Trial Pit at 2.40 m	2.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone, excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP27

TRIAL PIT RECORD

TP No. **TP28**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 13/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS Type	Depth From - To(m)	Vane Results kN/m²	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.50m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.80			
D	0.90m	67		Firm friable grey sandy CLAY.				
D	1.50m							
D	2.10m	59			2.30			
D	3.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	3.10			
				End of Trial Pit at 3.10 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP28

TRIAL PIT RECORD

TP No. **TP29**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.40m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.60			
		73		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	1.10m							
		64						
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.40			
D	2.00m							
				End of Trial Pit at 2.20 m	2.20			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP29

TRIAL PIT RECORD

TP No. **TP30**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m			Firm friable brown grey sandy slightly gravelly CLAY. Gravel is fine to medium, subangular of sandstone with rare coal.	0.90			
D	1.30m	53		Firm friable grey sandy CLAY.				
D	2.30m	62		Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.70			
D	3.00m			End of Trial Pit at 3.40 m	3.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP30

TRIAL PIT RECORD

TP No. **TP31**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.60m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.80			
D	1.10m	55		Firm friable grey sandy CLAY.				
D	1.90m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.00			
D	2.60m			End of Trial Pit at 2.70 m	2.70			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP31

TRIAL PIT RECORD

TP No. **TP32**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
		47		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	0.60m							
					1.10			
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	1.40m							
D	2.20m							
					2.70			
				End of Trial Pit at 2.70 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP32

TRIAL PIT RECORD

TP No. **TP33**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).				
D	0.50m	61		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.40			
D	1.00m							
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.30			
D	2.00m							
				Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.50			
				End of Trial Pit at 3.10 m	3.10			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP33

TRIAL PIT RECORD

TP No. **TP34**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m			Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.70			
D	0.90m	51		Firm, stiff in places, grey friable slightly gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered Mudstone).				
D	2.00m	66		Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.10			
				End of Trial Pit at 3.50 m	3.50			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP34

TRIAL PIT RECORD

TP No. **TP35**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.10			
D	0.40m	70		Firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.				
D	1.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.00			
D	2.00m							
D	2.30m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.20			
				End of Trial Pit at 2.40 m	2.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP35

TRIAL PIT RECORD

TP No. **TP36**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.60m	37		Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.70			
D	1.30m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	2.00m							
D	2.80m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.30			
				End of Trial Pit at 3.50 m	3.50			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP36

TRIAL PIT RECORD

TP No. **TP37**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.60m	41		Firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.90			
D	1.30m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	2.20m							
D	3.10m			Weak grey MUDSTONE. Recovered as slightly clayey subangular coarse gravel of mudstone.	2.70			
				End of Trial Pit at 3.40 m	3.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP37

TRIAL PIT RECORD

TP No. **TP38**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.10			
		31						
D	0.40m			Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.50			
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
D	1.10m							
				Weak grey MUDSTONE. Recovered as friable slightly clayey subangular coarse gravel of mudstone.	1.90			
D	2.00m							
				End of Trial Pit at 2.60 m	2.60			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP38

TRIAL PIT RECORD

TP No. **TP39**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS Type	Depth From - To(m)	Vane Results kN/m²	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m	61		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
		59						
D	1.30m							
D	2.00m	-		Firm grey friable sandy slightly gravelly CLAY. Gravel is subangular fine to medium of mudstone. (Completely weathered mudstone).	1.90			
		-						
D	3.00m							
D	4.00m							
				End of Trial Pit at 4.10 m	4.10			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP39

TRIAL PIT RECORD

TP No. **TP40**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m	61		Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.70			
D	1.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.00			
D	2.00m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	2.50			
				End of Trial Pit at 2.50 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated in mudstone; excavator unable to penetrate easily.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP40

TRIAL PIT RECORD

TP No. **TP41**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
				Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.				
D	0.70m							
		32		Soft becoming firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.80			
D	1.30m							
		53						
				Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	1.90			
D	2.20m							
				End of Trial Pit at 2.90 m	2.90			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP41

TRIAL PIT RECORD

TP No. **TP42**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m			Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	0.60			
D	1.20m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.10			
D	2.00m			Weak grey brown MUDSTONE. Recovered as fine to coarse subangular to angular tabular gravel of mudstone.	3.50			
D	3.00m			End of Trial Pit at 3.50 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP42

TRIAL PIT RECORD

TP No. **TP43**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
J	0.50m			MADE GROUND: Soft, firm in places black CLAY, with rare gravel of sandstone and rare timber pieces. Faint hydrogen sulphide odour noted.				
J	1.00m							
J	1.80m							
				Firm friable grey sandy CLAY.	1.90			
J	2.30m							
				Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse subangular tabular gravel and cobbles of sandstone.	2.40			
				End of Trial Pit at 2.70 m	2.70			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated on impenetrable sandstone.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP43

TRIAL PIT RECORD

TP No. **TP44**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.50m			MADE GROUND: Yellow brown fine to coarse subangular to angular GRAVEL of predominantly sandstone with occasional mudstone.				
D	1.30m							
D	2.30m							
D	2.90m							
				End of Trial Pit at 3.40 m	3.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated at the maximum reach of the excavator.

GL (m AOD)
-
Easting:
-
Northing:
-

Fig. No.
TP44

TRIAL PIT RECORD

TP No. **TP45**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.70m			MADE GROUND: Soft, firm in places black CLAY, with rare gravel of sandstone and rare timber pieces. Faint hydrogen sulphide odour noted.	1.20			
D	1.50m			Firm grey mottled brown sandy CLAY with occasional cobbles and gravel of sandstone.	2.00			
D	2.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.40			
				End of Trial Pit at 2.40 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP45

TRIAL PIT RECORD

TP No. **TP46**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.30m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).				
					0.40			
D	1.00m			MADE GROUND: Soft, firm in places black CLAY, with rare gravel of sandstone and rare timber pieces. Faint hydrogen sulphide odour noted.				
					1.40			
D	2.00m	63		Firm friable grey sandy CLAY.				
					2.40			
D	2.50m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).				
					2.80			
				End of Trial Pit at 2.80 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Excavator unable to penetrate easily, trial pit terminated.

GL (m AOD) -
Easting: -
Northing: -

Fig. No. TP46

TRIAL PIT RECORD

TP No. **TP47**

Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.20m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.30			
D	0.60m			MADE GROUND: Soft, firm in places black CLAY, with rare gravel of sandstone and rare timber pieces. Faint hydrogen sulphide odour noted.	0.80			
				Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	1.00			
				End of Trial Pit at 1.00 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated on impenetrable sandstone.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP47

TRIAL PIT RECORD

TP No. **TP48**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.20			
D	0.50m			MADE GROUND: Firm friable grey sandy CLAY.				
D	1.30m			MADE GROUND: Grey-brown fine to medium rarely coarse subrounded GRAVEL of sandstone and mudstone, with occasional cobbles of sandstone.	0.90			
D	2.30m							
D	3.00m			Firm grey brown friable very gravelly sandy CLAY. Gravel is fine to coarse subangular of mudstone. (Completely weathered mudstone).	2.70			
				End of Trial Pit at 3.40 m	3.40			

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit terminated due to poor stability.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP48

TRIAL PIT RECORD

TP No. **TP49**
Sheet 1 of 1

Site : Barugh Green, Barnsley

Contract No: C1277

Client : Hallam Land Management Ltd.

Dates: 14/06/2006

Method : JCB 3CX with a 0.60m wide toothed bucket.

Scale 1:25

Logged By: JC

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD) PID (ppm)	Legend	Well
D	0.10m			MADE GROUND: Soft greyish brown sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium subangular to subrounded of sandstone with some brick. (Topsoil).	0.20			
D	0.60m			MADE GROUND: Soft occasionally firm grey brown very sandy occasionally gravelly CLAY. Gravel is fine to medium of sandstone and rare coal.	0.90			
D	1.30m			MADE GROUND: Grey-brown fine to medium rarely coarse subrounded GRAVEL of sandstone and mudstone, with occasional cobbles of sandstone.	2.70			
D	2.20m			Moderately strong thinly bedded yellow brown SANDSTONE. Recovered as coarse tabular gravel and cobbles of sandstone.	3.40			
D	3.10m			End of Trial Pit at 3.40 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Trial pit stable.
3. Trial pit terminated on impenetrable sandstone.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. TP49

WINDOW SAMPLING RECORD

BH No. **WS1**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 15/06/2006

Method: Premier tracked window sampling machine.

Scale 1:25

Driller: TG/VL

Logged By: SA

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.05m			MADE GROUND: Brown gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of sandstone and ash.	0.10			
D	0.15m			MADE GROUND: Dark grey gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of ash.	0.30			
D	0.45m			MADE GROUND: Orange brown gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of sandstone.	0.60			
D	0.80m			Stiff orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone, siltstone and mudstone.				
D	1.80m							
D	2.80m							
				End of Window Sample at 3.00 m	3.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Window sampling complete at 3.00m.

GL (mAOD)
-
Easting:
-
Northing:
-

Fig. No.
WS1

WINDOW SAMPLING RECORD

BH No. **WS2**

Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 15/06/2006

Method: Premier tracked window sampling machine.

Scale 1:25

Driller: TG/VL

Logged By: SA

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.05m			MADE GROUND: Brown gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of sandstone and ash.	0.10			
D	0.15m			MADE GROUND: Dark grey gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of ash, brick and sandstone.	0.30			
D	0.50m			Stiff orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone and siltstone.				
D	1.50m							
				End of Window Sample at 2.00 m	2.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Window sampling complete at 2.00m.

GL (mAOD)
-
Easting:
-
Northing:
-

Fig. No.
WS2

WINDOW SAMPLING RECORD

BH No. **WS3**

Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 15/06/2006

Method: Premier tracked window sampling machine.

Scale 1:25

Driller: TG/VL

Logged By: SA

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.05m			MADE GROUND: Brown gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of sandstone and ash.	0.09			
D	0.10m				0.15			
				MADE GROUND: Dark grey gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of ash, brick and sandstone.				
D	0.50m							
				Stiff orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of siltstone and occasionally sandstone.				
D	1.50m							
				End of Window Sample at 2.00 m	2.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Window sampling complete at 2.00m.

GL (mAOD)
-
Easting:
-
Northing:
-

Fig. No.
WS3

WINDOW SAMPLING RECORD

BH No. **WS4**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 15/06/2006

Method: Premier tracked window sampling machine.

Scale 1:25

Driller: TG/VL

Logged By: SA

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.20m			MADE GROUND: Brown gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of sandstone and ash.	0.05			
D	0.50m			MADE GROUND: Dark grey gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of ash, brick and sandstone.	0.40			
D	0.90m			MADE GROUND: Brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone.	0.70			
D	1.80m			Stiff orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of siltstone and occasionally sandstone.				
				End of Window Sample at 2.00 m	2.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Window sampling complete at 2.00m.

GL (mAOD)
-
Easting:
-
Northing:
-

Fig. No.
WS4

WINDOW SAMPLING RECORD

BH No. **WS5**

Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 15/06/2006

Method: Premier tracked window sampling machine.

Scale 1:25

Driller: TG/VL

Logged By: SA

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.05m			MADE GROUND: Brown gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of sandstone and ash.	0.10			
D	0.20m			MADE GROUND: Dark grey gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of ash, brick and sandstone.	0.35			
D	0.50m			MADE GROUND: Grey clayey angular to subangular fine to coarse GRAVEL of siltstone.	0.70			
D	0.80m			MADE GROUND: Firm orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of siltstone and mudstone.	0.85			
D	0.90m			MADE GROUND: Dark grey fine to coarse SAND and angular to subangular fine to medium GRAVEL of ash and clinker.				
D	1.30m							
D	1.80m							
D	2.50m							
D	2.75m			MADE GROUND: Orange brown clayey angular to subangular fine to coarse GRAVEL of sandstone.	2.70 2.80			
D	2.90m			Black shiny COAL. (Recovered as angular gravel).	2.95			
				Soft brown CLAY. (Seat earth).	3.00			
D	3.20m			Firm dark grey mottled light grey slightly sandy slightly gravelly CLAY. Gravel is of coal and sandstone.				
D	3.50m			Stiff orange brown mottled light grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of siltstone and mudstone.	3.35			
				End of Window Sample at 4.00 m	4.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Window sampling complete at 4.00m.
3. Standpipe installed, slotted from 0.50m to 2.50m.

GL (mAOD) -

Easting: -

Northing: -

Fig. No. WS5

WINDOW SAMPLING RECORD

BH No. **WS6**

Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 15/06/2006

Method: Premier tracked window sampling machine.

Scale 1:25

Driller: TG/VL

Logged By: SA

SAMPLE DETAILS Type	Depth From - To(m)	Vane Results kN/m²	Groundwater	STRATA RECORD Description	Depth (m)	Level (mAOD)	Legend	Well
D	0.10m			MADE GROUND: Brown gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of sandstone and ash. (Topsoil).	0.20			
D	0.30m			MADE GROUND: Lean mix CONCRETE.	0.42			
D	0.50m			MADE GROUND: Dark grey gravelly fine to coarse SAND. Gravel size fragments are angular to subangular fine to coarse of ash, brick and sandstone.	0.80			
				MADE GROUND: Brown clayey sandy angular to subangular fine to coarse GRAVEL of sandstone	1.00			
D	1.10m			MADE GROUND: Firm dark brown slightly sandy slightly gravelly CLAY. Gravel size fragments are angular to subangular fine to coarse of brick, ash, sandstone and coal.	1.70			
D	1.80m			Weak grey SILTSTONE. Highly weathered. (Recovered as clayey angular to subangular fine to coarse gravel). (Possibly made ground).	1.95			
D	2.00m			Black shiny COAL. (Recovered as angular gravel).	2.00			
D	2.15m			Firm orange brown slightly gravelly slightly sandy locally sandy CLAY. Gravel is angular to subangular fine to coarse of sandstone and coal.	2.30			
D	2.45m			Firm dark grey mottled grey slightly sandy CLAY. Slight peat odour.	2.60			
D	2.80m			Firm grey mottled orange brown slightly sandy CLAY.	3.00			
				End of Window Sample at 3.00 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Window sampling complete at 3.00m.
3. Standpipe installed, slotted from 0.50m to 1.70m.

GL (mAOD) -

Easting: -

Northing: -

Fig. No. WS6

WINDOW SAMPLING RECORD

BH No. **WS7**

Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 15/06/2006

Method: Premier tracked window sampling machine.

Scale 1:25

Driller: TG/VL

Logged By: SA

SAMPLE DETAILS			Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m²		Description	Depth (m)	Level (mAOD)	Legend	Well
				MADE GROUND: Light grey angular fine to coarse GRAVEL of limestone.				
D	0.30m			MADE GROUND: Brown clayey sandy angular to subangular fine to coarse GRAVEL of limestone and sandstone.	0.20			
D	0.60m			MADE GROUND: Light grey subrounded coarse GRAVEL of sandstone.	0.50			
				MADE GROUND: Stiff brown grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone.	0.70			
D	1.10m							
D	1.45m			Firm orange brown mottled light grey slightly sandy CLAY.	1.40			
D	1.60m			Firm dark grey slightly sandy CLAY. Slight peat odour.	1.55			
D	1.95m			Stiff orange brown mottled light grey slightly sandy CLAY.	1.90			
				End of Window Sample at 2.00 m	2.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Window sampling complete at 2.00m.
3. Standpipe installed, slotted from 0.50m to 1.40m.

GL (mAOD) -

Easting: -

Northing: -

Fig. No. WS7

BOREHOLE RECORD

BH No. **R1**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 07/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Brown-grey CLAY.				
Grey MUDSTONE with thin coal bands.	4.80			
Black COAL.	17.00			
Grey MUDSTONE.	17.30			
With bands of grey SANDSTONE between 24.50m and 26.00m.				

End of Borehole at 30.00 m

Remarks and Water Observations

1. Borehole noted to be wet from 17m.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R1

BOREHOLE RECORD

BH No. **R2**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 07/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
Grey brown CLAY.		
Grey MUDSTONE.	3.00	
Black COAL.	8.50	
Grey MUDSTONE.	9.00	
Black COAL.	17.50	
Grey MUDSTONE.	17.90	

Legend

Well

End of Borehole at 30.00 m

Remarks and Water Observations

1. Borehole noted to be wet from 17.5m.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-
Easting:
-
Northing:
-

Fig. No.
R2

BOREHOLE RECORD

BH No. **R3**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 07/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey MUDSTONE.	2.60			
Black COAL.	12.00			
Grey MUDSTONE.	13.00			
Black COAL.	21.00			
Grey MUDSTONE.	21.80			

End of Borehole at 30.00 m

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R3

BOREHOLE RECORD

BH No. **R4**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 07/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE.	3.00			
							Black COAL.	14.00			
							Grey MUDSTONE.	15.00			
							Black COAL.	23.00			
							Grey MUDSTONE.	23.50			
							End of Borehole at 30.00 m				

Remarks and Water Observations

1. Borehole noted to be wet from 8.00m.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R4

BOREHOLE RECORD

BH No. **R5**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE.	4.80			
							Black COAL.	6.00			
							Grey MUDSTONE.	7.00			
							Black COAL.	14.70			
							Grey MUDSTONE.	15.00			
							End of Borehole at 30.00 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Gas and groundwater monitoring well installed as shown above.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R5

BOREHOLE RECORD

BH No. **R6**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey MUDSTONE.	3.00			
Black COAL.	12.50			
Grey MUDSTONE.	14.00			

End of Borehole at 30.00 m

Remarks and Water Observations

1. No groundwater encountered.
2. Gas and groundwater monitoring well installed as shown above.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R6

BOREHOLE RECORD

BH No. **R7**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey Weathered SANDSTONE.	3.00			
Black COAL.	15.00			
Grey MUDSTONE.	16.50			
End of Borehole at 30.00 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R7

BOREHOLE RECORD

BH No. **R8**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY				
Grey MUDSTONE.	3.00			
Black COAL.	15.00			
Grey MUDSTONE.	16.30			
End of Borehole at 30.00 m	30			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R8

BOREHOLE RECORD

BH No. **R9**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey MUDSTONE.	3.00			
Black COAL.	13.50			
Grey MUDSTONE.	14.50			
Black COAL.	20.00			
Grey MUDSTONE.	20.80			
End of Borehole at 30.00 m	30			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R9

BOREHOLE RECORD

BH No. **R10**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)
Grey brown CLAY.		
Grey MUDSTONE.	3.50	
Black COAL.	16.00	
Grey MUDSTONE and grey SANDSTONE.	17.00	

Legend

Well

End of Borehole at 30.00 m

Remarks and Water Observations

1. No groundwater encountered.
2. Gas and groundwater monitoring well installed as shown above.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R10

BOREHOLE RECORD

BH No. **R11**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD					
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE.	3.50			
							End of Borehole at 4.50 m	4.50			

Remarks and Water Observations

1. No groundwater encountered.
2. Gas and groundwater monitoring well installed as shown above.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R11

BOREHOLE RECORD

BH No. **R12**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 08/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey weathered SANDSTONE.	4.80			
Black COAL.	17.00			
Grey MUDSTONE with grey SANDSTONE bands.	18.20			

End of Borehole at 30.00 m

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R12

BOREHOLE RECORD

BH No. **R13**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 09/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

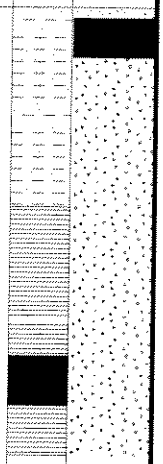
SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey MUDSTONE.	4.00			
Black COAL.	7.00			
Grey MUDSTONE.	8.00			
End of Borehole at 9.00 m	9.00			



Remarks and Water Observations

1. No groundwater encountered.
2. Gas and groundwater monitoring well installed as shown above.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R13

BOREHOLE RECORD

BH No. **R14**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 09/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD					
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE and grey SANDSTONE.	4.00			
							Broken ground, with artesian water.	9.00			
							Hard strata. No recognisable returns.	11.00			
							End of Borehole at 15.00 m	15.00			

Remarks and Water Observations

1. Artesian water encountered at 9.0m.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R14

BOREHOLE RECORD

BH No. **R15**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 09/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE and grey SANDSTONE.	3.00			
							Black COAL.	11.50			
							Grey MUDSTONE and grey SANDSTONE.	12.50			
							End of Borehole at 30.00 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R15

BOREHOLE RECORD

BH No. **R16**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 09/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey MUDSTONE and grey SANDSTONE.	4.00			
Broken ground, with artesian water.	10.20			
Hard strata. No recognisable returns.	12.20			
End of Borehole at 15.00 m	15.00			

Remarks and Water Observations

1. Artesian water encountered at 10.2m.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R16

BOREHOLE RECORD

BH No. **R17**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 09/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD					
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY				
							Grey MUDSTONE and grey SANDSTONE.	3.50			
							Black COAL.	13.20			
							Grey SANDSTONE.	14.20			
							End of Borehole at 15.20 m	15.20			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-
Easting:
-
Northing:
-

Fig. No.
R17

BOREHOLE RECORD

BH No. **R18**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 09/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD					
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE and grey SANDSTONE.	3.30			
							Black COAL.	14.50			
							Grey SANDSTONE.	15.50			
							End of Borehole at 16.50 m	16.50			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R18

BOREHOLE RECORD

BH No. **R19**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 09/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC
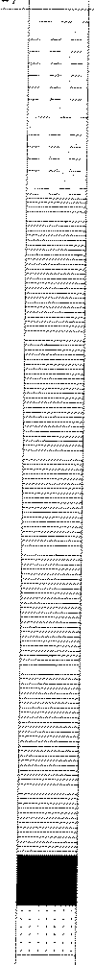
SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey MUDSTONE.	3.80			
Black COAL.	17.00			
Grey SANDSTONE.	18.00			
End of Borehole at 19.00 m	19.00			



Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R19

BOREHOLE RECORD

BH No. **R20**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.	1.50			
Grey SANDSTONE.	5.00			
Grey MUDSTONE.	13.00			
Black COAL.	14.00			
Grey MUDSTONE.	15.00			
End of Borehole at 15.00 m				

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R20

BOREHOLE RECORD

BH No. **R21**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey Brown CLAY.				
							Grey MUDSTONE.	2.50			
							Black COAL.	10.00			
							Grey MUDSTONE.	11.00			
							End of Borehole at 12.00 m	12.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R21

BOREHOLE RECORD

BH No. **R22**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD					
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE.	4.80			
							Black COAL.	7.00			
							Grey MUDSTONE.	8.00			
							End of Borehole at 9.00 m	9.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R22

BOREHOLE RECORD

BH No. **R23**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD					
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Grey brown CLAY.				
							Grey MUDSTONE.	4.80			
							Black COAL.	6.80			
							Grey MUDSTONE.	7.80			
							End of Borehole at 9.00 m	9.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R23

BOREHOLE RECORD

BH No. **R24**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.	0.00 – 3.00			
Grey MUDSTONE.	3.00 – 8.00			
Black COAL.	8.00 – 9.00			
Grey MUDSTONE.	9.00 – 10.00			
End of Borehole at 10.00 m	10.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R24

BOREHOLE RECORD

BH No. **R25**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.				
Grey MUDSTONE.	4.00			
Black COAL.	10.80			
Grey MUDSTONE.	11.80			
End of Borehole at 13.00 m	13.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R25

BOREHOLE RECORD

BH No. **R26**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)	Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey Brown CLAY.				
Grey MUDSTONE and SANDSTONE.	3.50			
Black COAL.	11.70			
Grey MUDSTONE.	12.70			
End of Borehole at 14.00 m	14.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R26

BOREHOLE RECORD

BH No. **R27**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Grey brown CLAY.	0.00			
Grey MUDSTONE and grey SANDSTONE.	4.00			
Black COAL.	18.80			
Grey MUDSTONE.	19.80			
End of Borehole at 21.00 m	21.00			

Remarks and Water Observations

1. No groundwater encountered at 16m.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R27

BOREHOLE RECORD

BH No. **R28**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Brown grey CLAY.				
Grey MUDSTONE and grey SANDSTONE.	3.50			
Black COAL.	13.70			
Grey MUDSTONE.	14.70			
End of Borehole at 16.00 m	16.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R28

BOREHOLE RECORD

BH No. **R29**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS						Groundwater (Casing)	STRATA RECORD				
Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)		Description	Depth (m)	Level (mAOD)	Legend	Well
							Brown grey CLAY.				
							Grey MUDSTONE and grey SANDSTONE.	2.90			
							Black COAL.	10.80			
							Grey MUDSTONE.	11.80			
							End of Borehole at 13.00 m	13.00			

Remarks and Water Observations

1. No groundwater encountered.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-
Easting:
-
Northing:
-

Fig. No.
R29

BOREHOLE RECORD

BH No. **R30**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Brown grey CLAY.	1 2 3			
Grey MUDSTONE.	3.80 4 5 6 7 8 9 10			
Void, with artesian water.	10.80 11			
Hard strata, no recognisable returns.	11.70 12 13 14			
End of Borehole at 15.00 m	15.00 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30			

Remarks and Water Observations

1. Artesian groundwater encountered at 10.80m.
2. Borehole backfilled with arisings on completion.

GL (m AOD) -

Easting: -

Northing: -

Fig. No. R30

BOREHOLE RECORD

BH No. **R31**
Sheet 1 of 1

Site: Barugh Green, Barnsley

Contract No: C1277

Client: Hallam Land Management Ltd.

Dates: 12/06/2006

Method: Casagrande C6 with 600 Compressor (using air as the flushing medium).

Scale 1:150

Driller: DCE

Logged By: JC

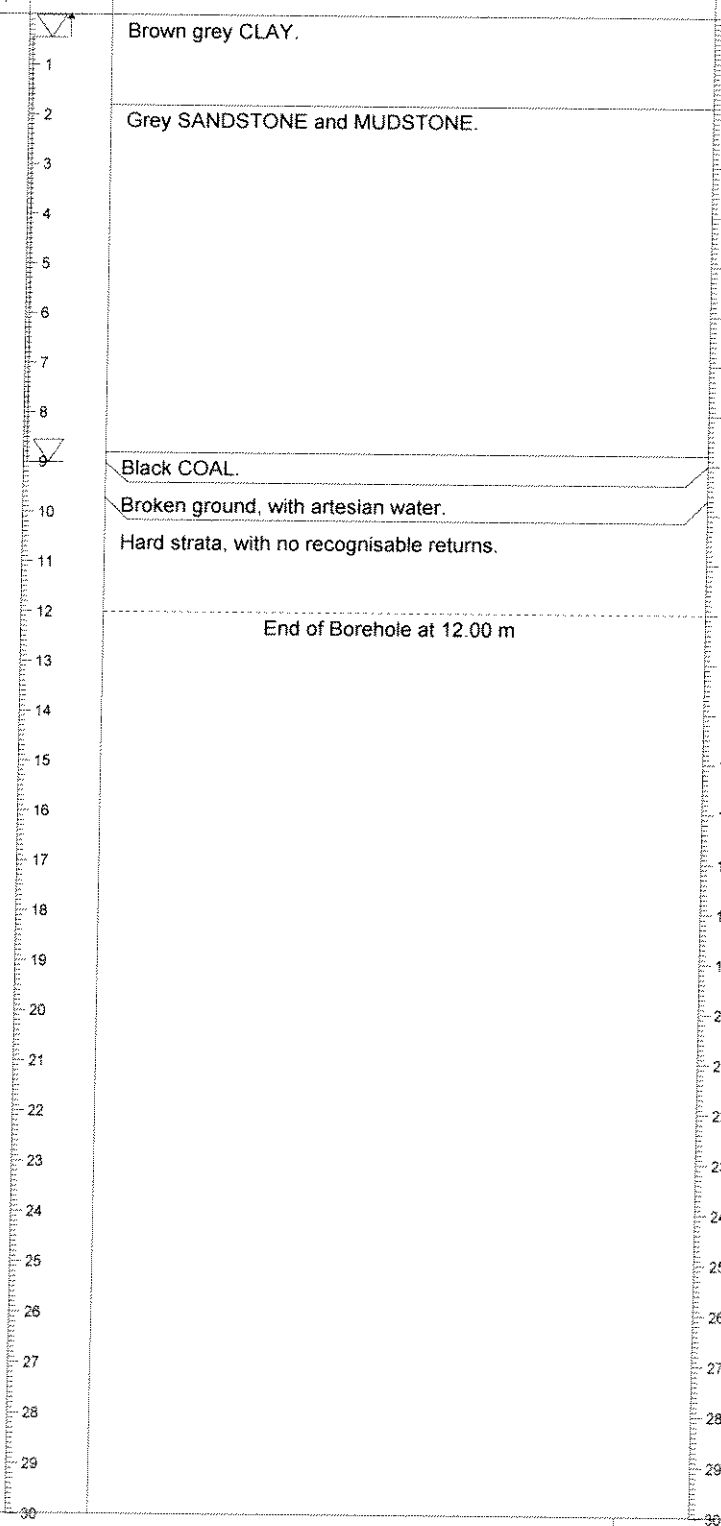
SAMPLE DETAILS

Type	Depth From - To (m)	TCR (%)	SCR (%)	RQD (%)	N (FI)

Groundwater (Casing)

STRATA RECORD

Description	Depth (m)	Level (mAOD)	Legend	Well
Brown grey CLAY.				
Grey SANDSTONE and MUDSTONE.	1.80			
Black COAL.	8.80			
	9.00			
Broken ground, with artesian water.	9.70			
Hard strata, with no recognisable returns.				
End of Borehole at 12.00 m	12.00			



Remarks and Water Observations

1. Artesian groundwater encountered at 9.00m.
2. Borehole backfilled with arisings on completion.

GL (m AOD)
-

Easting:
-

Northing:
-

Fig. No.
R31

APPENDIX C

LABORATORY TEST RESULTS

LABORATORY TEST RESULTS

- 2014

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL14/4644

Client's Reference: Report Date: 01 October 2014

Client Name: Sirius Leeds
4245 Park Approach
Century Way
Thorpe Park
Leeds
LS15 8GB

For the attention of: Mark Brennan / Ed Collings

Contract Title: Low Barugh, Barnsley

Date Received: 15/9/2014
Date Commenced: 15/9/2014
Date Completed: 1/10/2014

Notes: Observations and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson (Director)
A Watkins (Director)
M Beastall (Laboratory Manager)

D Lambe (Senior Technician)
S Royle (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
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fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP101		B	0.50	Brown slightly gravelly sandy CLAY.
TP102		B	1.00	MADE GROUND brown gravelly very sandy CLAY.
TP103		B	0.60	Brown gravelly very sandy CLAY.
WS103		D	1.00	Brown gravelly very sandy CLAY.
WS110		D	2.00	Brown sandy CLAY.
WS113		D	1.00	Brown slightly gravelly sandy CLAY.
WS115		D	1.00	Brown gravelly sandy CLAY.
WS117		D	1.00	Brown very gravelly very sandy CLAY.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	01/10/14		01/10/14		01/10/14

LOW BARUGH, BARNSLEY.

Contract No: PSL14/4644

Client Ref: C6054

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	% Passing .425mm	Remarks
TP101		B	0.50	18				35	18	17	91	Intermediate plasticity CI.
TP103		B	0.60	19				34	17	17	82	Low plasticity CL.
WS103		D	1.00	10				31	17	14	84	Low plasticity CL.
WS110		D	2.00	28				45	21	24	100	Intermediate plasticity CI.
WS113		D	1.00	20				40	19	21	94	Intermediate plasticity CI.
WS115		D	1.00	17				39	19	20	89	Intermediate plasticity CI.
WS117		D	1.00	14				29	16	13	70	Low plasticity CL.

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

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Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	01/10/14		01/10/14		01/10/14

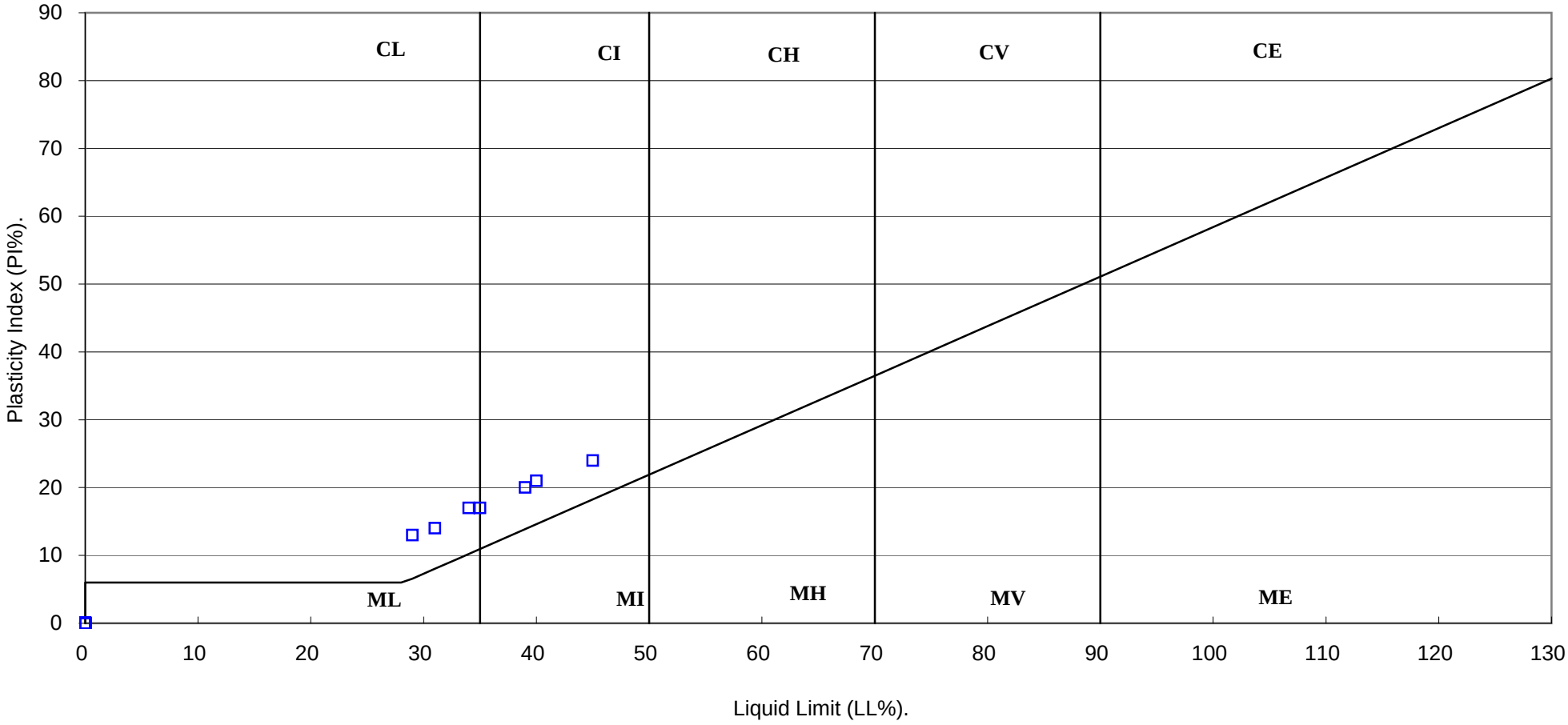
LOW BARUGH, BARNSLEY.

Contract No: **PSL14/4644**

Client Ref: **C6054**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		01/10/14		01/10/14		01/10/14
	LOW BARUGH, BARNSLEY.				Contract No:	PSL14/4644
					Client Ref:	C6054

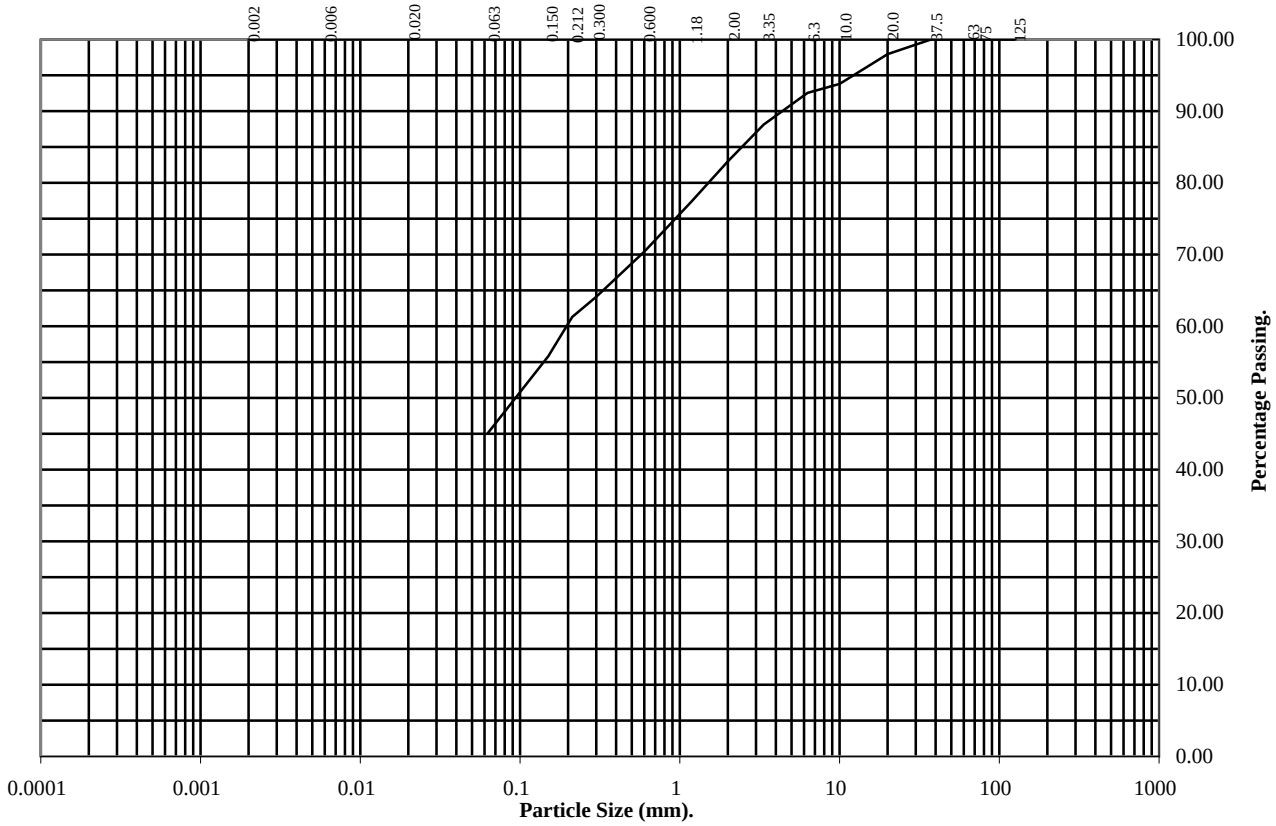
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP102** **Depth (m):** **1.00**

Sample Number: **Sample Type:** **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	94
6.3	93
3.35	88
2	83
1.18	77
0.6	70
0.3	64
0.212	61
0.15	56
0.063	45

Soil Fraction	Total Percentage
Cobbles	0
Gravel	17
Sand	38
Silt / Clay	45

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	01/10/14		01/10/14

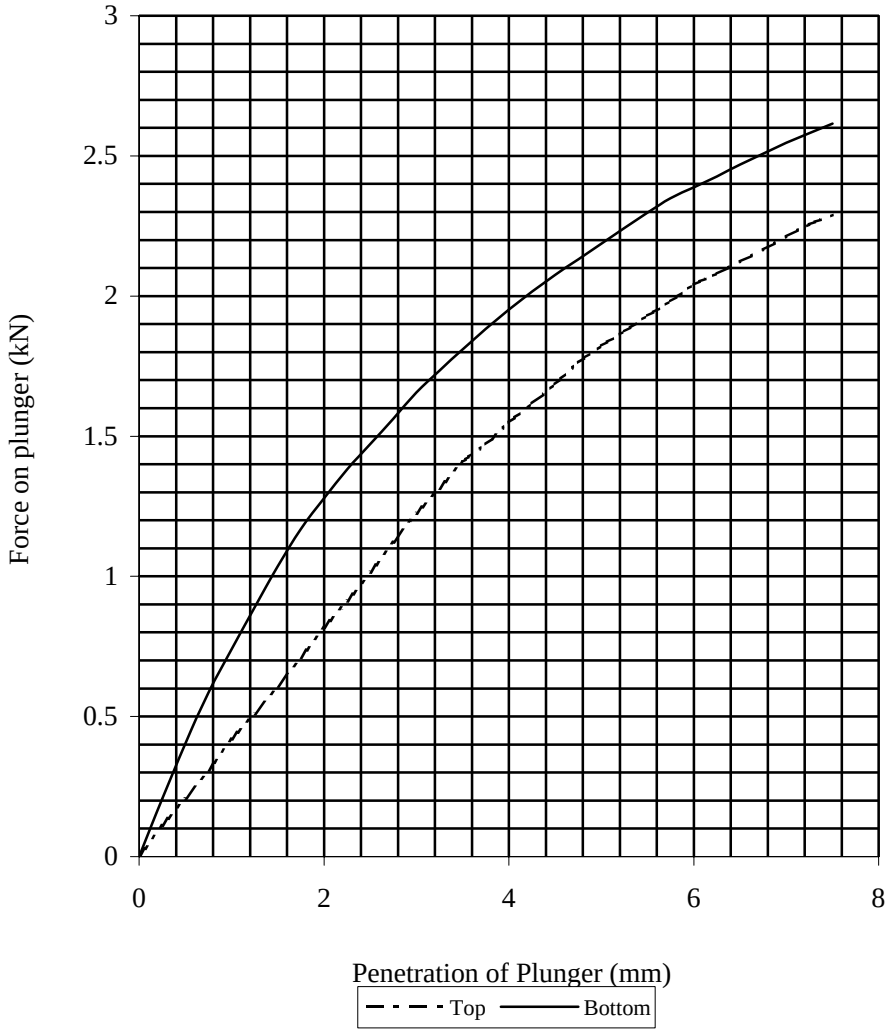
PSL Professional Soils Laboratory	**LOW BARUGH, BARNSLEY.**	**Contract No.: PSL14/4644**

California Bearing Ratio Test.

BS 1377 : Part 4 : 1990

Hole Number: **TP101** **Depth (m):** **0.50**

Sample Number: **Sample Type:** **B**



Initial Sample Conditions		Test Conditions		Method of compaction		2.5Kg Rammer	
Moisture Content:	18	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	2.10	Soaking Time hrs	0	Sample Top	18	Sample Top	9.1
Dry Density Mg/m3:	1.79	Swelling mm:	0	Sample Bottom	17	Sample Bottom	11.2
Percentage retained on 20mm BS test sieve:	2	Remarks:	See Summary of Soil Description.				

Checked by	Date	Approved By	Date
	1/10/14		1/10/14

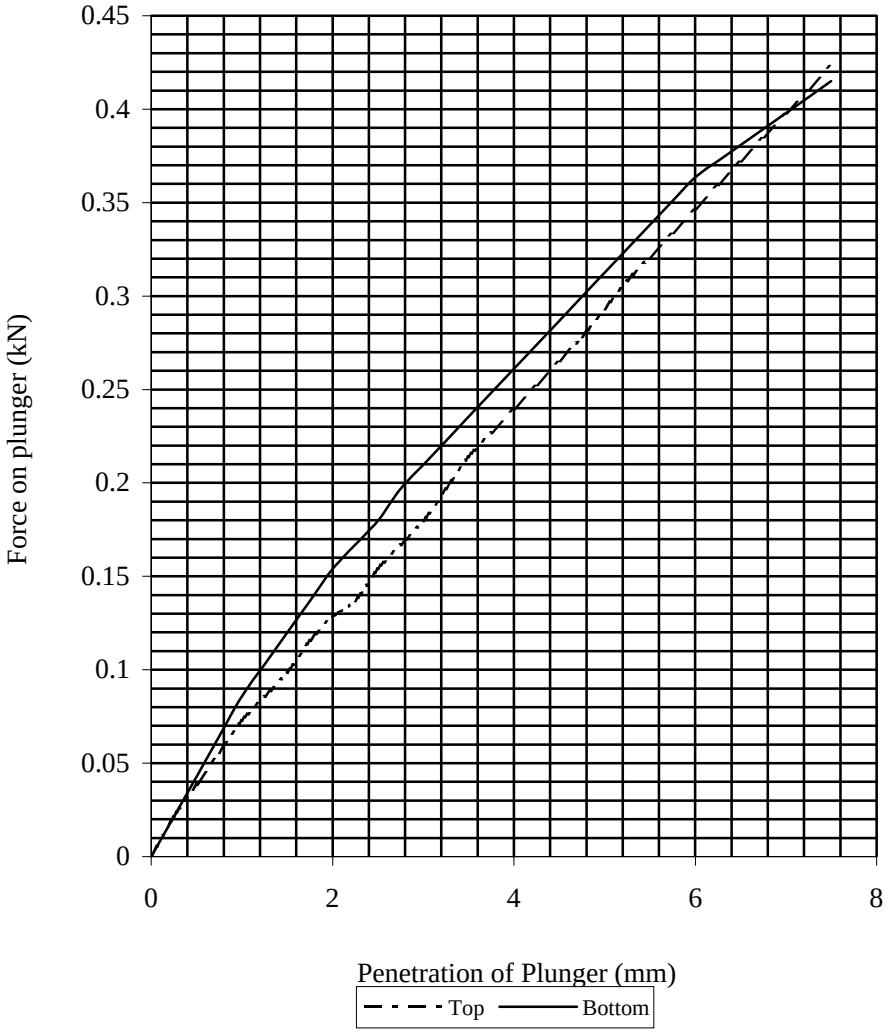
PSL Professional Soils Laboratory	**LOW BARUGH, BARNSLEY.**	**Contract No. PSL14/4644**

California Bearing Ratio Test.

BS 1377 : Part 4 : 1990

Hole Number: **TP102** **Depth (m):** **1.00**

Sample Number: **Sample Type:** **B**



Initial Sample Conditions		Test Conditions		Method of compaction	2.5Kg Rammer		
Moisture Content:	28	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	1.93	Soaking Time hrs	0	Sample Top	28	Sample Top	1.5
Dry Density Mg/m3:	1.50	Swelling mm:	0	Sample Bottom	28	Sample Bottom	1.6
Percentage retained on 20mm BS test sieve:	2	Remarks:	See Summary of Soil Description.				

Checked by	Date	Approved By	Date
	1/10/14		1/10/14

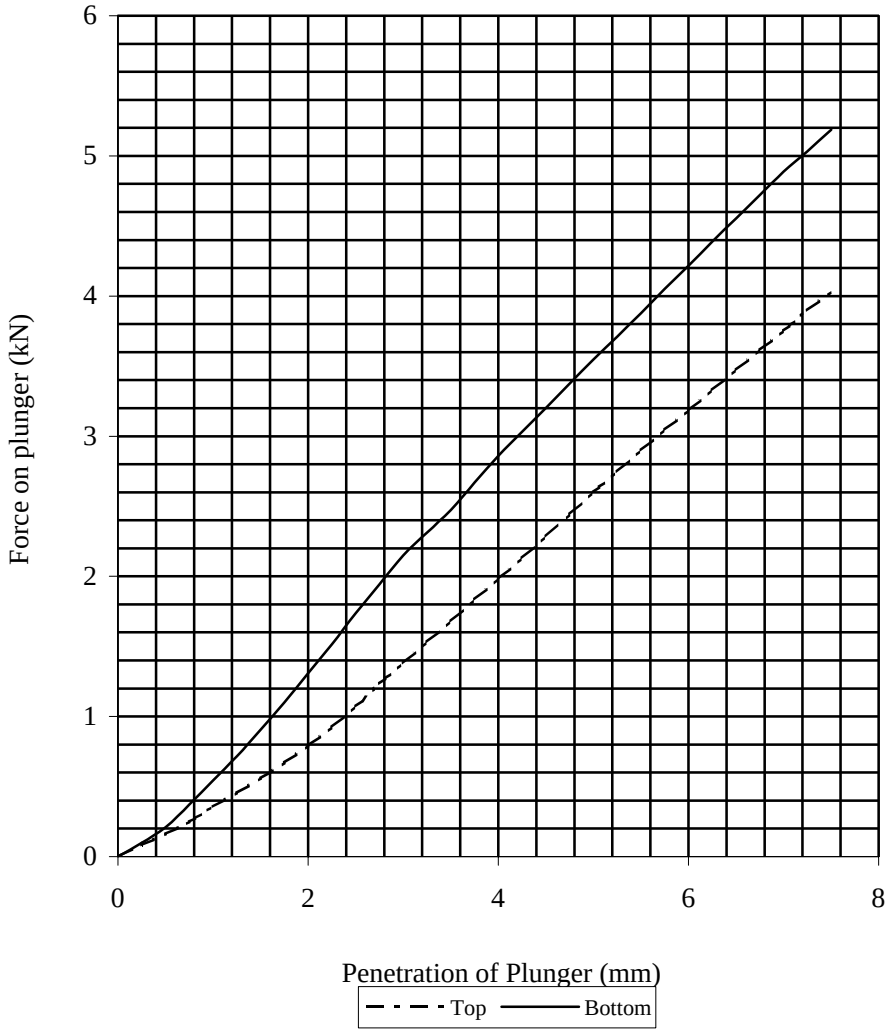
PSL Professional Soils Laboratory	**LOW BARUGH, BARNSLEY.**	**Contract No. PSL14/4644**

California Bearing Ratio Test.

BS 1377 : Part 4 : 1990

Hole Number: **TP103** **Depth (m):** **0.60**

Sample Number: **Sample Type:** **B**



Initial Sample Conditions		Test Conditions		Method of compaction	2.5Kg Rammer		
Moisture Content:	19	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	1.97	Soaking Time hrs	0	Sample Top	20	Sample Top	13.0
Dry Density Mg/m3:	1.65	Swelling mm:	0	Sample Bottom	19	Sample Bottom	17.7
Percentage retained on 20mm BS test sieve:	9	Remarks:	See Summary of Soil Description.				

Checked by	Date	Approved By	Date
	1/10/14		1/10/14

PSL Professional Soils Laboratory	**LOW BARUGH, BARNSLEY.**	**Contract No. PSL14/4644**

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-15674

25-Sep-14

Client Sirius Geotechnical & Environmental
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Our Reference 14-15674

Client Reference C6054

Contract Title Low Barugh

Description 12 Soil samples, 4 Leachate samples.

Date Received 15-Sep-14

Date Started 16-Sep-14

Date Completed 25-Sep-14

Test Procedures Identified by prefix DETSn (details on request), Asbestos Analysis DETSC 1101.

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

MCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

Sample ID	Depth	Lab No	Completed	Matrix Description
WS101	0.1	699907	25/09/2014	Dark brown gravelly clayey SAND with numerous rootlets (made ground includes brick)
WS102	0.5	699908	25/09/2014	Dark grey gravelly sandy CLAY
TP101	0.3	699909	25/09/2014	Brown gravelly sandy CLAY (made ground includes brick)
TP105	0.1	699910	25/09/2014	Brown gravelly sandy CLAY with numerous rootlets
TP106	0.5	699911	25/09/2014	Dark grey gravelly sandy CLAY with odd rootlets
WS122	1	699912	25/09/2014	Dark brown gravelly sandy CLAY
WS124	1.5	699913	25/09/2014	Dark grey gravelly sandy CLAY
WS104	0.8	699914	25/09/2014	Brown gravelly sandy CLAY (made ground includes glass)
WS107	0.8	699915	25/09/2014	Dark brown gravelly sandy CLAY (made ground includes slag)
WS115	0.1	699916	25/09/2014	Brown gravelly sandy CLAY with odd rootlets
WS108	0.4	699918	25/09/2014	Dark brown gravelly very clayey SAND

Summary of Chemical Analysis
Soil Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

				Lab No	699907	699908	699909	699910	699911	699912
				Sample ID	WS101	WS102	TP101	TP105	TP106	WS122
				Depth	0.10	0.50	0.30	0.10	0.50	1.00
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	03/09/14	03/09/14	19/08/14	19/08/14	19/08/14	n/s
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	54	72	17	27	32	72
Cadmium	DETSC 2301#	0.1	mg/kg	1.0	0.9	0.7	0.7	0.3	0.9
Chromium	DETSC 2301#	0.15	mg/kg	36	21	42	39	37	25
Copper	DETSC 2301#	0.2	mg/kg	54	80	34	45	33	79
Lead	DETSC 2301#	0.3	mg/kg	70	41	41	41	39	74
Mercury	DETSC 2325#	0.05	mg/kg	0.38	0.33	0.10	0.10	0.27	0.29
Nickel	DETSC 2301#	1	mg/kg	37	31	30	26	15	38
Selenium	DETSC 2301#	0.5	mg/kg	1.9	2.4	1.4	< 0.5	1.1	2.3
Zinc	DETSC 2301#	1	mg/kg	140	96	130	92	38	110
Inorganics										
pH	DETSC 2008#			7.2	7.5	7.5	4.5	4.9	7.5
Calorific Value	DETSC 5008	1	MJ/kg		6.4			12.3	6.3
Total Organic Carbon	DETSC 2002	0.1	%	2.7	3.0	1.6	2.4	4.3	1.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	640	1700	96	34	83	1300
Total Sulphate as SO4	DETSC 2321#	0.01	%	0.45	2.5	0.05	0.21	1.3	2.9
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		0.03				< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		0.19				0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01				< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		< 1.5				< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		< 1.2				< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		< 1.5				4.7
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		< 3.4				28
Aliphatic C5-C35	DETSC 3072*	10	mg/kg		< 10				32
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		0.01				< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		0.01				< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		0.04				< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		< 0.9				< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		6.8				< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		14				< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		8.6				< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg		30				< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg		30				32
Benzene	DETSC 3321#	0.01	mg/kg		0.01				< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg		< 0.01				< 0.01
Toluene	DETSC 3321#	0.01	mg/kg		0.01				< 0.01
Xylene	DETSC 3321#	0.01	mg/kg		0.02				< 0.01
MTBE	DETSC 3321	0.01	mg/kg		0.03				< 0.01

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

				Lab No	699907	699908	699909	699910	699911	699912
				Sample ID	WS101	WS102	TP101	TP105	TP106	WS122
				Depth	0.10	0.50	0.30	0.10	0.50	1.00
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	03/09/14	03/09/14	19/08/14	19/08/14	19/08/14	n/s
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	0.6	0.9	< 0.1	< 0.1	0.2	0.3
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.2	1.2	< 0.1	< 0.1	< 0.1	0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1	0.4	0.1
Fluorene	DETSC 3301	0.1	mg/kg	0.2	1.9	< 0.1	< 0.1	0.3	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	1.4	8.9	0.4	< 0.1	0.3	0.5
Anthracene	DETSC 3301	0.1	mg/kg	0.5	2.4	0.2	< 0.1	0.3	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	1.9	6.1	1.0	< 0.1	0.1	0.4
Pyrene	DETSC 3301	0.1	mg/kg	1.9	5.5	0.8	< 0.1	0.3	0.4
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	1.2	2.4	0.5	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	1.3	2.3	0.5	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	1.2	1.3	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.8	0.9	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	1.3	1.7	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	0.8	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.4	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	1.0	1.0	< 0.1	< 0.1	< 0.1	< 0.1
PAH	DETSC 3301	1.6	mg/kg	14	38	3.4	< 1.6	1.9	2.0
PCBs										
PCB	DETSC 3401#	0.01	mg/kg		< 0.01				< 0.01
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
OCPs										
alpha-BHC	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
beta-BHC	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
delta-BHC	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Heptachlor	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Aldrin	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
gamma-Chlordane	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
4,4-DDE	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Dieldrin	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Endrin	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Endrin aldehyde	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
4,4-DDT	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Methoxychlor	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		
Endrin ketone	DETSC 3441*	0.1	mg/kg			< 0.1	< 0.1		

Summary of Chemical Analysis
Soil Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

	Lab No	699907	699908	699909	699910	699911	699912
	Sample ID	WS101	WS102	TP101	TP105	TP106	WS122
	Depth	0.10	0.50	0.30	0.10	0.50	1.00
	Other ID						
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampling Date	03/09/14	03/09/14	19/08/14	19/08/14	19/08/14	n/s
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
OPPs							
Dichlorvos	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Mevinphos	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Demeton-O	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Ethoprop	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Naled	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Phorate	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Demeton-S	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Diazinon	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Disulfoton	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Methylparathion	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Ronnel	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Fenthion	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Chlopyrifos	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Trichlorinate	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Merphos	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Stirofos	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Tokuthion	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Fensulfothion	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Bolstar	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Azinphos methyl	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		
Coumaphos	DETSC 3443*	0.1	mg/kg			< 0.1	< 0.1		

Summary of Chemical Analysis
Soil Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

			Lab No	699913	699914	699915	699916	699917	699918
			Sample ID	WS124	WS104	WS107	WS115	WS107	WS108
			Depth	1.50	0.80	0.80	0.10	1.80	0.40
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	03/08/14	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	74	36	52	20		75
Cadmium	DETSC 2301#	0.1	mg/kg	0.7	8.3	1.3	0.9		1.6
Chromium	DETSC 2301#	0.15	mg/kg	23	61	47	31		44
Copper	DETSC 2301#	0.2	mg/kg	54	170	110	40		1200
Lead	DETSC 2301#	0.3	mg/kg	70	190	82	57		120
Mercury	DETSC 2325#	0.05	mg/kg	0.33	0.16	0.16	0.24		0.16
Nickel	DETSC 2301#	1	mg/kg	30	120	45	25		66
Selenium	DETSC 2301#	0.5	mg/kg	1.6	< 0.5	1.2	0.7		< 0.5
Zinc	DETSC 2301#	1	mg/kg	74	2400	550	130		630
Inorganics									
pH	DETSC 2008#			7.4	7.6	7.2	6.2		7.7
Calorific Value	DETSC 5008	1	MJ/kg					9.4	
Total Organic Carbon	DETSC 2002	0.1	%	3.7	1.9	0.4	2.8		2.9
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1400	270	80	23		80
Total Sulphate as SO4	DETSC 2321#	0.01	%	1.9	0.15	0.34	0.08		0.12
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg						< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg						< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg						< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg						< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg						< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg						< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg						< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg						< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg						< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg						< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg						< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg						< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg						< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg						1.7
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg						3.7
Aromatic C5-C35	DETSC 3072*	10	mg/kg						< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg						< 10
Benzene	DETSC 3321#	0.01	mg/kg			< 0.01			< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg			< 0.01			< 0.01
Toluene	DETSC 3321#	0.01	mg/kg			< 0.01			< 0.01
Xylene	DETSC 3321#	0.01	mg/kg			< 0.01			< 0.01
MTBE	DETSC 3321	0.01	mg/kg						< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

				Lab No	699913	699914	699915	699916	699917	699918
				Sample ID	WS124	WS104	WS107	WS115	WS107	WS108
				Depth	1.50	0.80	0.80	0.10	1.80	0.40
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	n/s	03/08/14	n/s	n/s	n/s	n/s
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	0.9	< 0.1	< 0.1	< 0.1		< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1		< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	0.4	< 0.1		0.2
Fluorene	DETSC 3301	0.1	mg/kg	0.4	< 0.1	0.6	< 0.1		0.3
Phenanthrene	DETSC 3301	0.1	mg/kg	0.5	0.2	4.9	< 0.1		1.9
Anthracene	DETSC 3301	0.1	mg/kg	0.4	< 0.1	1.4	< 0.1		0.5
Fluoranthene	DETSC 3301	0.1	mg/kg	0.2	0.4	9.0	< 0.1		2.6
Pyrene	DETSC 3301	0.1	mg/kg	0.3	0.3	8.2	< 0.1		2.5
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	4.3	< 0.1		1.3
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	4.4	< 0.1		1.3
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	3.1	< 0.1		1.0
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	1.9	< 0.1		0.6
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	3.7	< 0.1		1.6
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	2.1	< 0.1		< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.4	< 0.1		< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	2.6	< 0.1		< 0.1
PAH	DETSC 3301	1.6	mg/kg	3.1	< 1.6	47	< 1.6		14
PCBs										
PCB	DETSC 3401#	0.01	mg/kg						
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3		< 0.3
OCPs										
alpha-BHC	DETSC 3441*	0.1	mg/kg				< 0.1		
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg				< 0.1		
beta-BHC	DETSC 3441*	0.1	mg/kg				< 0.1		
delta-BHC	DETSC 3441*	0.1	mg/kg				< 0.1		
Heptachlor	DETSC 3441*	0.1	mg/kg				< 0.1		
Aldrin	DETSC 3441*	0.1	mg/kg				< 0.1		
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg				< 0.1		
gamma-Chlordane	DETSC 3441*	0.1	mg/kg				< 0.1		
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg				< 0.1		
4,4-DDE	DETSC 3441*	0.1	mg/kg				< 0.1		
Dieldrin	DETSC 3441*	0.1	mg/kg				< 0.1		
Endrin	DETSC 3441*	0.1	mg/kg				< 0.1		
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg				< 0.1		
Endrin aldehyde	DETSC 3441*	0.1	mg/kg				< 0.1		
4,4-DDT	DETSC 3441*	0.1	mg/kg				< 0.1		
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg				< 0.1		
Methoxychlor	DETSC 3441*	0.1	mg/kg				< 0.1		
Endrin ketone	DETSC 3441*	0.1	mg/kg				< 0.1		

Summary of Chemical Analysis
Soil Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

	Lab No	699913	699914	699915	699916	699917	699918
	Sample ID	WS124	WS104	WS107	WS115	WS107	WS108
	Depth	1.50	0.80	0.80	0.10	1.80	0.40
	Other ID						
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampling Date	n/s	03/08/14	n/s	n/s	n/s	n/s
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
OPPs							
Dichlorvos	DETSC 3443*	0.1	mg/kg				< 0.1		
Mevinphos	DETSC 3443*	0.1	mg/kg				< 0.1		
Demeton-O	DETSC 3443*	0.1	mg/kg				< 0.1		
Ethoprop	DETSC 3443*	0.1	mg/kg				< 0.1		
Naled	DETSC 3443*	0.1	mg/kg				< 0.1		
Phorate	DETSC 3443*	0.1	mg/kg				< 0.1		
Demeton-S	DETSC 3443*	0.1	mg/kg				< 0.1		
Diazinon	DETSC 3443*	0.1	mg/kg				< 0.1		
Disulfoton	DETSC 3443*	0.1	mg/kg				< 0.1		
Methylparathion	DETSC 3443*	0.1	mg/kg				< 0.1		
Ronnel	DETSC 3443*	0.1	mg/kg				< 0.1		
Fenthion	DETSC 3443*	0.1	mg/kg				< 0.1		
Chlopyrifos	DETSC 3443*	0.1	mg/kg				< 0.1		
Trichlorinate	DETSC 3443*	0.1	mg/kg				< 0.1		
Merphos	DETSC 3443*	0.1	mg/kg				< 0.1		
Stirofos	DETSC 3443*	0.1	mg/kg				< 0.1		
Tokuthion	DETSC 3443*	0.1	mg/kg				< 0.1		
Fensulfothion	DETSC 3443*	0.1	mg/kg				< 0.1		
Bolstar	DETSC 3443*	0.1	mg/kg				< 0.1		
Azinphos methyl	DETSC 3443*	0.1	mg/kg				< 0.1		
Coumaphos	DETSC 3443*	0.1	mg/kg				< 0.1		

Summary of Chemical Analysis
Leachate Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

			Lab No	699919	699920	699921	699922
			Sample ID	WS102	WS122	WS104	WS108
			Depth	0.50	1.00	0.80	0.40
			Other ID				
			Sample Type	LEACHATE	LEACHATE	LEACHATE	LEACHATE
			Sampling Date	03/09/14	n/s	03/08/14	n/s
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Preparation							
BS EN 12457 10:1	DETS 036*			Y	Y	Y	Y
Metals							
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.20	< 0.16	0.21	0.98
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.04	< 0.03	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25	0.26	0.31
Copper, Dissolved	DETSC 2306	0.4	ug/l	< 0.4	< 0.4	0.4	1.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09	< 0.09	0.12	0.30
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.7	< 0.5	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.8	0.77	0.46	0.53
Zinc, Dissolved	DETSC 2306	1.25	ug/l	< 1.25	< 1.25	< 1.25	1.30
Inorganics							
pH	DETSC 2008			7.5	7.4	7.7	7.8
PAHs							
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	0.10	< 0.01	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	0.02	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	0.08	< 0.01	< 0.01	< 0.01
Pyrene	DETS 074*	0.01	ug/l	0.06	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	0.02	< 0.01	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l	0.32	< 0.20	< 0.20	< 0.20
Phenols							
Phenol	*	0.5	ug/l	< 0.50	< 0.50	< 0.50	< 0.50

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis

Soil Samples

Our Ref 14-15674
Client Ref C6054
Contract Title Low Barugh

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
699907	WS101 0.10	SOIL	NAD	none	Jeff Cruddas
699908	WS102 0.50	SOIL	NAD	none	Jeff Cruddas
699909	TP101 0.30	SOIL	NAD	none	Jeff Cruddas
699910	TP105 0.10	SOIL	NAD	none	Jeff Cruddas
699912	WS122 1.00	SOIL	NAD	none	Jeff Cruddas
699914	WS104 0.80	SOIL	NAD	none	Jeff Cruddas
699915	WS107 0.80	SOIL	NAD	none	Jeff Cruddas

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 14-15674
Client Ref C6054
Contract Low Barugh

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
699907	WS101 0.10 SOIL	03/09/14	GJ 1L		
699908	WS102 0.50 SOIL	03/09/14	GJ 1L		
699909	TP101 0.30 SOIL	19/08/14	GJ 1L		
699910	TP105 0.10 SOIL	19/08/14	GJ 1L		
699911	TP106 0.50 SOIL	19/08/14	GJ 1L		
699912	WS122 1.00 SOIL		GJ 1L		
699913	WS124 1.50 SOIL		GJ 1L		
699914	WS104 0.80 SOIL	03/08/14	GJ 1L		
699915	WS107 0.80 SOIL		GJ 1L		
699916	WS115 0.10 SOIL		GJ 1L		
699917	WS107 1.80 SOIL		GJ 60ml		
699918	WS108 0.40 SOIL		GJ 1L		
699919	WS102 0.50 LEACHATE	03/09/14	GJ 1L		
699920	WS122 1.00 LEACHATE		GJ 1L		
699921	WS104 0.80 LEACHATE	03/08/14	GJ 1L		
699922	WS108 0.40 LEACHATE		GJ 1L		

Key: G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-16022

25-Sep-14

Client Sirius Geotechnical & Environmental
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Our Reference	14-16022
Client Reference	C6054
Contract Title	Low Barugh, Barnsley
Description	5 Water samples.
Date Received	19-Sep-14
Date Started	19-Sep-14
Date Completed	25-Sep-14
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Water Samples

Our Ref 14-16022
Client Ref C6054
Contract Title Low Barugh, Barnsley

			Lab No	701751	701753	701754	701755	701756
			Sample ID	WS118	WS120	WS127	WS128	WS108
			Depth					
			Other ID					
			Sample Type	WATER	WATER	WATER	WATER	WATER
			Sampling Date	17/09/14	17/09/14	17/09/14	17/09/14	17/09/14
			Sampling Time	1500	1640	1550	1430	1330
Test	**Method**	**LOD**	**Units**					
Metals								
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.5	0.58	1.5	0.43	0.79
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.14	0.03	0.04	0.09	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	6.8	3.7	0.37	9.7	0.61
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.5	1.2	1.7	2.0	< 0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	8.4	0.44	0.96	0.84	0.30
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	52	8.3	9.2	21	5.7
Selenium, Dissolved	DETSC 2306	0.25	ug/l	7.9	2.2	2.1	1.1	0.71
Zinc, Dissolved	DETSC 2306	1.25	ug/l	30.7	6.47	7.32	9.36	6.89
Inorganics								
Conductivity	DETSC 2009	1	uS/cm	1450	889	983	867	850
pH	DETSC 2008			7.2	7.5	7.4	7.3	7.1
Hardness	DETSC 2303	0.1	mg/l	375	302	332	292	288
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	< 0.015	0.074	0.19	< 0.015	0.20
Sulphate as SO4	DETSC 2055	0.1	mg/l	150	96	180	120	120
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited.

Summary of Chemical Analysis
Water Samples

Our Ref 14-16022
Client Ref C6054
Contract Title Low Barugh, Barnsley

			Lab No	701751	701753	701754	701755	701756
			Sample ID	WS118	WS120	WS127	WS128	WS108
			Depth					
			Other ID					
			Sample Type	WATER	WATER	WATER	WATER	WATER
			Sampling Date	17/09/14	17/09/14	17/09/14	17/09/14	17/09/14
			Sampling Time	1500	1640	1550	1430	1330
Test	**Method**	**LOD**	**Units**					
PAHs								
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenols								
Phenol	*	0.5	ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Key: * -not accredited.

Information in Support of the Analytical Results

Our Ref 14-16022
Client Ref C6054
Contract Low Barugh, Barnsley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
701751	WS118 WATER	17/09/14	GB 1L x3, GV x2		
701752	WS113 WATER	17/09/14	GB 1L, GV x2		
701753	WS120 WATER	17/09/14	GB 1L x3, GV x2		
701754	WS127 WATER	17/09/14	GB 1L x6, GV x3		
701755	WS128 WATER	17/09/14	GB 1L x4, GV x2		
701756	WS108 WATER	17/09/14	GB 1L x3, GV x2		

Key: G-Glass B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-16603

02-Oct-14

Client Sirius Geotechnical & Environmental
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Our Reference	14-16603
Client Reference	C6054
Contract Title	Barugh Green
Description	2 Water samples.
Date Received	26-Sep-14
Date Started	26-Sep-14
Date Completed	02-Oct-14
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Water Samples

Our Ref 14-16603
Client Ref C6054
Contract Title Barugh Green

			Lab No	705035	705036
			Sample ID	WS110	WS113
			Depth		
			Other ID		
			Sample Type	WATER	WATER
			Sampling Date	23/09/14	23/09/14
			Sampling Time	1409	1430
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	2.0	0.70
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.93	1.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.9	1.3
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.18	0.41
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.04	0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	5.2	6.2
Selenium, Dissolved	DETSC 2306	0.25	ug/l	5.8	2.4
Zinc, Dissolved	DETSC 2306	1.25	ug/l	171	83.6
Inorganics					
Conductivity	DETSC 2009	1	uS/cm	815	718
pH	DETSC 2008			6.9	7.1
Hardness	DETSC 2303	0.1	mg/l	359	216
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.10	< 0.015
Sulphate as SO4	DETSC 2055	0.1	mg/l	85	86
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0
MTBE	DETSC 3322	1	ug/l	< 1.0	< 1.0

Key: * -not accredited.

Summary of Chemical Analysis
Water Samples

Our Ref 14-16603
Client Ref C6054
Contract Title Barugh Green

			Lab No	705035	705036
			Sample ID	WS110	WS113
			Depth		
			Other ID		
			Sample Type	WATER	WATER
			Sampling Date	23/09/14	23/09/14
			Sampling Time	1409	1430
Test	**Method**	**LOD**	**Units**		
PAHs					
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	0.02	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	0.09	0.52
Anthracene	DETS 074*	0.01	ug/l	0.03	0.08
Fluoranthene	DETS 074*	0.01	ug/l	0.06	0.13
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l	< 0.20	0.74
Phenols					
Phenol	*	0.5	ug/l	< 0.50	< 0.50

Key: * -not accredited.

Information in Support of the Analytical Results

Our Ref 14-16603
Client Ref C6054
Contract Barugh Green

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
705035	WS110 WATER	23/09/14	GB 1L x3, GV x2		
705036	WS113 WATER	23/09/14	GB 1L x3, GV x2		

Key: G-Glass B-Bottle V-Vial

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Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

LABORATORY TEST RESULTS

- 2006

2139

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number : 06-06152_M01

Client Reference:	C1277	**Date of issue:**	19/07/2006
Our Reference:	06-06152		
Clients Name:	Sirius Geotechnical & Environmental		
Clients Address:	Suite 3 Bowcliffe Grange Bowcliffe Hall Estate Bramham LS23 6LP		



Contract Title:	Barough Green
Description:	11 leachate samples, 23 soil samples
Date Received:	12/07/2006
Date Commenced:	12/07/2006
Date Completed:	19/07/2006

Notes:

Test procedures are identified by prefix DETSn (details available upon request)
Observations and Interpretations are outside the UKAS Accreditation
* Denotes test not included in laboratory scope of accreditation
$ Denotes test carried out by approved subcontractor
I/S Denotes insufficient sample to carry out test
N/S Denotes that the sample is not suitable for testing
Samples will be disposed of 1 month after the date of issue of this test

Approved By:

R Bennett	R Brown	M Hopgood
Director	Business Manager	Technical Manager

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.

Derwentside Environmental Testing Services Limited.
Unit 2a/2b, Park Road Industrial Estate South, Consett, Co Durham. DH8 5PY
Tel: 01207 582333 • Fax: 01207 582444 • Email: info@dets.co.uk • www.dets.co.uk
Registered in England No. 370 5645 • VAT No. 708 978 678

Sample Details

Sample ID	Number	Dets Ref	Matrix Description	Date Sampled	Time Sampled	Preservation	Analysis Complete
TP8		40714	Stiff brown gravelly sandy CLAY (with frequent	Not Provided	Not Provided	None	19/07/2006
TP13		40715	Soft brown gravelly sandy CLAY (with odd rootlets)	Not Provided	Not Provided	None	19/07/2006
TP16		40716	Soft brown sandy CLAY (with frequent rootlets)	Not Provided	Not Provided	None	19/07/2006
TP32		40717	Stiff brown gravelly CLAY (with odd rootlets)	Not Provided	Not Provided	None	19/07/2006
TP40		40718	Soft brown sandy CLAY (with odd rootlets and	Not Provided	Not Provided	None	19/07/2006
TP42		40719	Stiff brown gravelly sandy CLAY	Not Provided	Not Provided	None	19/07/2006
TP31		40720	Stiff brown sandy gravelly CLAY (with frequent	Not Provided	Not Provided	None	19/07/2006
TP27		40721	Very stiff brown sandy CLAY (with odd rootlets)	Not Provided	Not Provided	None	19/07/2006
TP43		40722	Very stiff brown sandy CLAY (with odd rootlets)	Not Provided	Not Provided	None	19/07/2006
TP47		40723	Soft brown sandy CLAY (with frequent rootlets)	Not Provided	Not Provided	None	19/07/2006
TP1		40724	Very stiff brown sandy GRAVEL	Not Provided	Not Provided	None	19/07/2006
TP8		40725	Stiff brown gravelly sandy CLAY	Not Provided	Not Provided	None	19/07/2006
TP43		40726	Loose brown sandy GRAVEL	Not Provided	Not Provided	None	19/07/2006
TP46		40727	Stiff brown gravelly sandy CLAY	Not Provided	Not Provided	None	19/07/2006
TP45		40728	Soft brown gravelly sandy CLAY	Not Provided	Not Provided	None	19/07/2006
TP43		40729	Stiff brown sandy GRAVEL	Not Provided	Not Provided	None	19/07/2006
TP2		40730	Loose brown sandy GRAVEL	Not Provided	Not Provided	None	19/07/2006
TP15		40731	Soft brown sandy CLAY	Not Provided	Not Provided	None	19/07/2006
TP15		40732	Soft brown gravelly sandy CLAY	Not Provided	Not Provided	None	19/07/2006

Sample Details

Sample ID	Number	Dets Ref	Matrix Description	Date Sampled	Time Sampled	Preservation	Analysis Complete
TP18		40733	Soft brown sandy CLAY	Not Provided	Not Provided	None	19/07/2006
TP35		40734	Loose brown sandy GRAVEL	Not Provided	Not Provided	None	19/07/2006
TP35		40735	Loose brown sandy GRAVEL	Not Provided	Not Provided	None	19/07/2006
TP38		40736	Very stiff brown sandy CLAY	Not Provided	Not Provided	None	19/07/2006
TP16		40737		Not Provided	Not Provided	None	18/07/2006
TP40		40738		Not Provided	Not Provided	None	18/07/2006
TP31		40739		Not Provided	Not Provided	None	18/07/2006
TP47		40740		Not Provided	Not Provided	None	18/07/2006
TP1		40741		Not Provided	Not Provided	None	18/07/2006
TP43		40742		Not Provided	Not Provided	None	18/07/2006
TP45		40743		Not Provided	Not Provided	None	18/07/2006
TP2		40744		Not Provided	Not Provided	None	18/07/2006
TP15		40745		Not Provided	Not Provided	None	18/07/2006
TP35		40746		Not Provided	Not Provided	None	18/07/2006
TP35		40747		Not Provided	Not Provided	None	18/07/2006

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole	TP8	TP13	TP16	TP32	TP40	TP42	TP31	TP27	TP43	TP47
			Depth	0.20	0.20	0.10	0.20	0.10	0.10	0.20	0.10	0.10	0.20
			Sample No										
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Lab Ref No	40714	40715	40716	40717	40718	40719	40720	40721	40722	40723
Arsenic	DETS 042	mg/kg		16	15	13	19	19	18	15	17	19	19
Cadmium	DETS 042	mg/kg		1.3	0.8	1.3	1.2	1.2	1.1	1.1	1.1	1.2	1.0
Chromium	DETS 042	mg/kg		60	40	48	48	54	40	35	30	38	39
Copper	DETS 042	mg/kg		35	37	25	41	42	40	25	34	43	43
Lead	DETS 042	mg/kg		43	39	32	44	47	42	39	45	46	47
Mercury	DETS 015	mg/kg		1.1	0.7	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel	DETS 042	mg/kg		9	4	7	6	7	6	7	4	7	6
Selenium	DETS 042	mg/kg		1.5	1.7	1.4	1.5	1.6	1.8	1.8	1.4	1.8	1.6
Zinc	DETS 042	mg/kg		110	80	92	100	100	100	100	82	120	99
Total Sulphate as SO4	DETS 075	%		0.06	0.06	0.06	0.08	0.08	0.07	0.14	0.07	0.06	0.08
Sulphate Aqueous Extract	DETS 076	g/l as SO4		0.05	0.03	0.03	0.05	0.05	0.04	0.05	0.04	0.03	0.04
Total Organic Carbon	DETS 002	%		3.3	3.3	2.6	4.1	4.1	3.4	4.4	3.1	3.5	3.6
pH	DETS 008			7.1	7.0	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.7
Acenaphthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenapthylene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	TP8 0.20 SOIL 40714	TP13 0.20 SOIL 40715	TP16 0.10 SOIL 40716	TP32 0.20 SOIL 40717	TP40 0.10 SOIL 40718	TP42 0.10 SOIL 40719	TP31 0.20 SOIL 40720	TP27 0.10 SOIL 40721	TP43 0.10 SOIL 40722	TP47 0.20 SOIL 40723
Benzo(g,h,i)perylene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Naphthalene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenol - Monohydric	DETS 067	mg/kg		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Arsenic	DETS 010	ug/l		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Cadmium	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chromium	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Copper	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lead	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mercury	DETS 078*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Nickel	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Selenium	DETS 012	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Zinc	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole	TP8	TP13	TP16	TP32	TP40	TP42	TP31	TP27	TP43	TP47
			Depth	0.20	0.20	0.10	0.20	0.10	0.10	0.20	0.10	0.10	0.20
			Sample No										
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Lab Ref No	40714	40715	40716	40717	40718	40719	40720	40721	40722	40723
pH	DETS 008			-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Acenaphthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Acenapthylene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(a)anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(a)pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(b)fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(k)fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(g,h,i)perylene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chrysene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Dibenzo(a,h)anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fluorene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Indeno(1,2,3-c,d)pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Naphthalene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Phenanthrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PAH	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Phenol HPLC	DETS 054*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole	TP1	TP8	TP43	TP46	TP45	TP43	TP2	TP15	TP15	TP18
			Depth	1.30	1.00	0.50	1.00	0.70	2.30	1.00	0.70	1.60	0.70
			Sample No										
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Lab Ref No	40724	40725	40726	40727	40728	40729	40730	40731	40732	40733
Arsenic	DETS 042	mg/kg		9	13	78	6	10	23	8	9	5	9
Cadmium	DETS 042	mg/kg		0.5	1.9	1.0	0.8	1.9	0.6	0.5	0.8	0.7	0.8
Chromium	DETS 042	mg/kg		18	23	4	12	17	11	11	27	15	20
Copper	DETS 042	mg/kg		19	27	40	18	18	20	16	14	23	23
Lead	DETS 042	mg/kg		9	25	38	12	14	15	7	14	17	10
Mercury	DETS 015	mg/kg		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel	DETS 042	mg/kg		13	20	12	10	19	17	8	3	17	23
Selenium	DETS 042	mg/kg		1.3	0.5	3.1	1.3	0.6	1.1	1.4	1.4	0.5	0.6
Zinc	DETS 042	mg/kg		61	110	95	68	91	90	57	62	89	100
Total Sulphate as SO4	DETS 075	%		< 0.01	0.03	3.7	0.04	0.02	< 0.01	0.02	0.02	0.02	0.01
Sulphate Aqueous Extract	DETS 076	g/l as SO4		0.04	0.06	1.8	0.15	0.06	0.03	0.05	0.03	0.04	0.02
Total Organic Carbon	DETS 002	%		0.4	1.4	11	0.4	0.2	0.6	0.2	0.5	0.3	0.4
pH	DETS 008			7.1	6.6	7.4	6.7	7.1	6.5	6.1	7.3	6.0	6.4
Acenaphthene	DETS 050	mg/kg		< 0.1	< 0.1	1.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenapthylene	DETS 050	mg/kg		< 0.1	< 0.1	1.6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	TP1 1.30 SOIL 40724	TP8 1.00 SOIL 40725	TP43 0.50 SOIL 40726	TP46 1.00 SOIL 40727	TP45 0.70 SOIL 40728	TP43 2.30 SOIL 40729	TP2 1.00 SOIL 40730	TP15 0.70 SOIL 40731	TP15 1.60 SOIL 40732	TP18 0.70 SOIL 40733
Benzo(g,h,i)perylene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETS 050	mg/kg		< 0.1	< 0.1	1.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Naphthalene	DETS 050	mg/kg		< 0.1	< 0.1	1.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETS 050	mg/kg		< 0.1	< 0.1	1.4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH	DETS 050	mg/kg		< 5.0	< 5.0	6.8	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Phenol - Monohydric	DETS 067	mg/kg		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Arsenic	DETS 010	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Cadmium	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chromium	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Copper	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lead	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mercury	DETS 078*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Nickel	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Selenium	DETS 012	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Zinc	DETS 042	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	TP1 1.30 SOIL 40724	TP8 1.00 SOIL 40725	TP43 0.50 SOIL 40726	TP46 1.00 SOIL 40727	TP45 0.70 SOIL 40728	TP43 2.30 SOIL 40729	TP2 1.00 SOIL 40730	TP15 0.70 SOIL 40731	TP15 1.60 SOIL 40732	TP18 0.70 SOIL 40733
pH	DETS 008			-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Acenaphthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Acenapthylene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(a)anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(a)pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(b)fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(k)fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(g,h,i)perylene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chrysene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Dibenzo(a,h)anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fluorene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Indeno(1,2,3-c,d)pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Naphthalene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Phenanthrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PAH	DETS 050*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Phenol HPLC	DETS 054*	ug/l		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	TP35 0.40 SOIL 40734	TP35 2.00 SOIL 40735	TP38 1.10 SOIL 40736	TP16 0.10 LEACHATE	TP40 0.10 LEACHATE	TP31 0.20 LEACHATE	TP47 0.20 LEACHATE	TP1 1.30 LEACHATE	TP43 0.50 LEACHATE	TP45 0.70 LEACHATE
Arsenic	DETS 042	mg/kg		9	10	10	-----	-----	-----	-----	-----	-----	-----
Cadmium	DETS 042	mg/kg		0.8	0.9	0.6	-----	-----	-----	-----	-----	-----	-----
Chromium	DETS 042	mg/kg		18	16	22	-----	-----	-----	-----	-----	-----	-----
Copper	DETS 042	mg/kg		14	24	21	-----	-----	-----	-----	-----	-----	-----
Lead	DETS 042	mg/kg		15	14	13	-----	-----	-----	-----	-----	-----	-----
Mercury	DETS 015	mg/kg		< 0.3	< 0.3	< 0.3	-----	-----	-----	-----	-----	-----	-----
Nickel	DETS 042	mg/kg		12	23	19	-----	-----	-----	-----	-----	-----	-----
Selenium	DETS 042	mg/kg		0.9	0.3	0.6	-----	-----	-----	-----	-----	-----	-----
Zinc	DETS 042	mg/kg		54	100	86	-----	-----	-----	-----	-----	-----	-----
Total Sulphate as SO4	DETS 075	%		0.02	0.01	0.01	-----	-----	-----	-----	-----	-----	-----
Sulphate Aqueous Extract	DETS 076	g/l as SO4		0.06	0.02	0.02	-----	-----	-----	-----	-----	-----	-----
Total Organic Carbon	DETS 002	%		0.3	0.4	0.6	-----	-----	-----	-----	-----	-----	-----
pH	DETS 008			7.2	5.8	6.4	-----	-----	-----	-----	-----	-----	-----
Acenaphthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Acenapthylene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Benzo(a)anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Benzo(a)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Benzo(b)fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Benzo(k)fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	TP35 0.40 SOIL 40734	TP35 2.00 SOIL 40735	TP38 1.10 SOIL 40736	TP16 0.10 LEACHATE	TP40 0.10 LEACHATE	TP31 0.20 LEACHATE	TP47 0.20 LEACHATE	TP1 1.30 LEACHATE	TP43 0.50 LEACHATE	TP45 0.70 LEACHATE
Benzo(g,h,i)perylene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Chrysene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Dibenzo(a,h)anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Fluorene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Indeno(1,2,3-c,d)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Naphthalene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Phenanthrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
PAH	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	-----	-----	-----	-----	-----	-----	-----
Phenol - Monohydric	DETS 067	mg/kg		< 5.0	< 5.0	< 5.0	-----	-----	-----	-----	-----	-----	-----
Arsenic	DETS 010	ug/l		< 0.3	< 0.3	< 0.3	-----	-----	-----	-----	-----	-----	-----
Cadmium	DETS 042	ug/l		-----	-----	-----	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chromium	DETS 042	ug/l		-----	-----	-----	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Copper	DETS 042	ug/l		-----	-----	-----	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Lead	DETS 042	ug/l		-----	-----	-----	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Mercury	DETS 078*	ug/l		-----	-----	-----	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Nickel	DETS 042	ug/l		-----	-----	-----	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Selenium	DETS 012	ug/l		-----	-----	-----	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Zinc	DETS 042	ug/l		-----	-----	-----	< 3	< 3	< 3	< 3	< 3	< 3	< 3
				-----	-----	-----	130	220	200	220	180	120	160

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole	TP35	TP35	TP38	TP16	TP40	TP31	TP47	TP1	TP43	TP45
			Depth	0.40	2.00	1.10	0.10	0.10	0.20	0.20	1.30	0.50	0.70
			Sample No										
			Sample Type	SOIL	SOIL	SOIL	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE
			Lab Ref No	40734	40735	40736							
pH	DETS 008			-----	-----	-----	6.2	6.4	6.3	6.4	6.5	6.4	6.5
Acenaphthene	DETS 050*	ug/l		-----	-----	-----	0.02	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01
Acenapthylene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 050*	ug/l		-----	-----	-----	0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 050*	ug/l		-----	-----	-----	0.03	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
Naphthalene	DETS 050*	ug/l		-----	-----	-----	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 050*	ug/l		-----	-----	-----	0.01	< 0.01	0.02	0.01	0.05	0.01	< 0.01
Pyrene	DETS 050*	ug/l		-----	-----	-----	0.04	0.02	0.02	0.02	0.03	0.02	0.02
PAH	DETS 050*	ug/l		-----	-----	-----	0.04	0.03	0.01	0.04	0.03	0.03	0.03
Phenol HPLC	DETS 054*	ug/l		-----	-----	-----	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
				-----	-----	-----	< 0.50	< 0.50	0.54	< 0.50	0.50	0.91	< 0.50

Client Reference C1277

Laboratory Reference 06-06152

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole	TP2	TP15	TP35	TP35
			Depth	1.00	0.70	0.40	2.00
			Sample No				
			Sample Type	LEACHATE	LEACHATE	LEACHATE	LEACHATE
			Lab Ref No				
Arsenic	DETS 042	mg/kg		-----	-----	-----	-----
Cadmium	DETS 042	mg/kg		-----	-----	-----	-----
Chromium	DETS 042	mg/kg		-----	-----	-----	-----
Copper	DETS 042	mg/kg		-----	-----	-----	-----
Lead	DETS 042	mg/kg		-----	-----	-----	-----
Mercury	DETS 015	mg/kg		-----	-----	-----	-----
Nickel	DETS 042	mg/kg		-----	-----	-----	-----
Selenium	DETS 042	mg/kg		-----	-----	-----	-----
Zinc	DETS 042	mg/kg		-----	-----	-----	-----
Total Sulphate as SO4	DETS 075	%		-----	-----	-----	-----
Sulphate Aqueous Extract	DETS 076	g/l as		-----	-----	-----	-----
Total Organic Carbon	DETS 002	%		-----	-----	-----	-----
pH	DETS 008			-----	-----	-----	-----
Acenaphthene	DETS 050	mg/kg		-----	-----	-----	-----
Acenapthylene	DETS 050	mg/kg		-----	-----	-----	-----
Anthracene	DETS 050	mg/kg		-----	-----	-----	-----
Benzo(a)anthracene	DETS 050	mg/kg		-----	-----	-----	-----
Benzo(a)pyrene	DETS 050	mg/kg		-----	-----	-----	-----
Benzo(b)fluoranthene	DETS 050	mg/kg		-----	-----	-----	-----
Benzo(k)fluoranthene	DETS 050	mg/kg		-----	-----	-----	-----

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Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole	TP2	TP15	TP35	TP35
			Depth	1.00	0.70	0.40	2.00
			Sample No				
			Sample Type	LEACHATE	LEACHATE	LEACHATE	LEACHATE
			Lab Ref No				
Benzo(g,h,i)perylene	DETS 050	mg/kg		-----	-----	-----	-----
Chrysene	DETS 050	mg/kg		-----	-----	-----	-----
Dibenzo(a,h)anthracene	DETS 050	mg/kg		-----	-----	-----	-----
Fluoranthene	DETS 050	mg/kg		-----	-----	-----	-----
Fluorene	DETS 050	mg/kg		-----	-----	-----	-----
Indeno(1,2,3-c,d)pyrene	DETS 050	mg/kg		-----	-----	-----	-----
Naphthalene	DETS 050	mg/kg		-----	-----	-----	-----
Phenanthrene	DETS 050	mg/kg		-----	-----	-----	-----
Pyrene	DETS 050	mg/kg		-----	-----	-----	-----
PAH	DETS 050	mg/kg		-----	-----	-----	-----
Phenol - Monohydric	DETS 067	mg/kg		-----	-----	-----	-----
Arsenic	DETS 010	ug/l		< 1	< 1	< 1	< 1
Cadmium	DETS 042	ug/l		< 2	< 2	< 2	< 2
Chromium	DETS 042	ug/l		< 10	< 10	< 10	< 10
Copper	DETS 042	ug/l		< 2	< 2	< 2	< 2
Lead	DETS 042	ug/l		< 5	< 5	< 5	< 5
Mercury	DETS 078*	ug/l		< 0.2	< 0.2	< 0.2	< 0.2
Nickel	DETS 042	ug/l		< 10	< 10	< 10	< 10
Selenium	DETS 012	ug/l		< 3	< 3	< 3	< 3
Zinc	DETS 042	ug/l		270	210	290	360

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	TP2 1.00 LEACHATE	TP15 0.70 LEACHATE	TP35 0.40 LEACHATE	TP35 2.00 LEACHATE
pH	DETS 008			5.1	6.6	6.3	6.1
Acenaphthene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Acenapthylene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 050*	ug/l		< 0.01	0.01	< 0.01	< 0.01
Naphthalene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 050*	ug/l		< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETS 050*	ug/l		0.02	0.03	0.02	0.02
PAH	DETS 050*	ug/l		0.01	0.03	< 0.01	< 0.01
Phenol HPLC	DETS 054*	ug/l		< 0.20	< 0.20	< 0.20	< 0.20
				< 0.50	< 0.50	0.58	< 0.50

Appendix A - Details of Analysis

Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 003	Loss On Ignition	%	0.01	Air Dried	No	Yes	No
DETS 004	Sulphate	%	0.01	Air Dried	No	Yes	Yes
DETS 006	Chloride	mg/kg	0.01	Air Dried	No	Yes	No
DETS 008	pH	pH Units	0.10	Air Dried	No	Yes	Yes
DETS 017	Selenium	mg/kg	0.30	Air Dried	No	Yes	No
DETS 019	Ammonia	mg/kg	0.02	Air Dried	No	Yes	No
DETS 020	Boron (water soluble)	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 024	Sulphide	mg/kg	10.00	Air Dried	No	Yes	Yes
DETS 042	Antimony	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Arsenic	mg/kg	1.00	Air Dried	No	Yes	Yes
DETS 042	Barium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Beryllium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Cadmium	mg/kg	0.20	Air Dried	No	Yes	No
DETS 042	Cobalt	mg/kg	0.20	Air Dried	No	No	No
DETS 042	Copper	mg/kg	1.00	Air Dried	No	Yes	No
DETS 042	Chromium	mg/kg	1.00	Air Dried	No	Yes	No

Methods details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS

Full method statements are available on request.

Appendix A - Details of Analysis

Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 042	Iron	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Lead	mg/kg	1.00	Air Dried	No	Yes	No
DETS 042	Manganese	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Mercury	mg/kg	0.30	Air Dried	No	Yes	No
DETS 042	Molybdenum	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Nickel	mg/kg	1.00	Air Dried	No	Yes	No
DETS 042	Thallium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Vanadium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Zinc	mg/kg	1.00	Air Dried	No	Yes	Yes
DETS 049	Sulphur (free)	mg/kg	0.50	As Recieved	No	Yes	Yes
DETS 050	PAH's	mg/kg	0.10	As Recieved	No	Yes	No
DETS 051	TPH's	mg/kg	20.00	As Recieved	No	Yes	Yes
DETS 052	PCB's	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Recieved	No	Yes	Yes

Methods details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS

Full method statements are available on request.

Appendix A - Details of Analysis

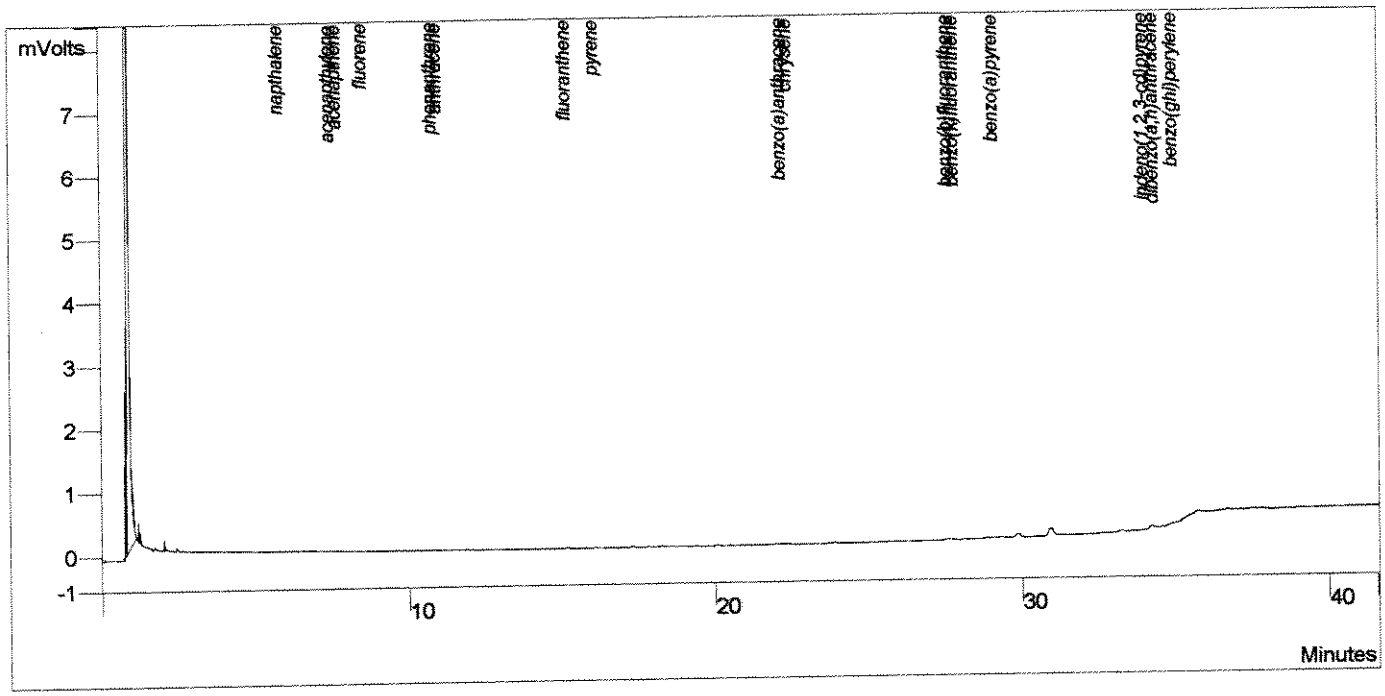
Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 062	Xylene	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 067	Phenol - Monohydric	mg/kg	0.30	Air Dried	No	Yes	Yes
DETS 067	Easily Liberatable Cyanide	mg/kg	0.10	Air Dried	No	Yes	Yes
DETS 067	Complex Cyanide	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 067	Total Cyanide	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 067	Thiocyanate	mg/kg	0.60	Air Dried	No	Yes	Yes
DETS 068	VOC's	mg/kg	0.01	As Recieved	No	No	No

Methods details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS

Full method statements are available on request.

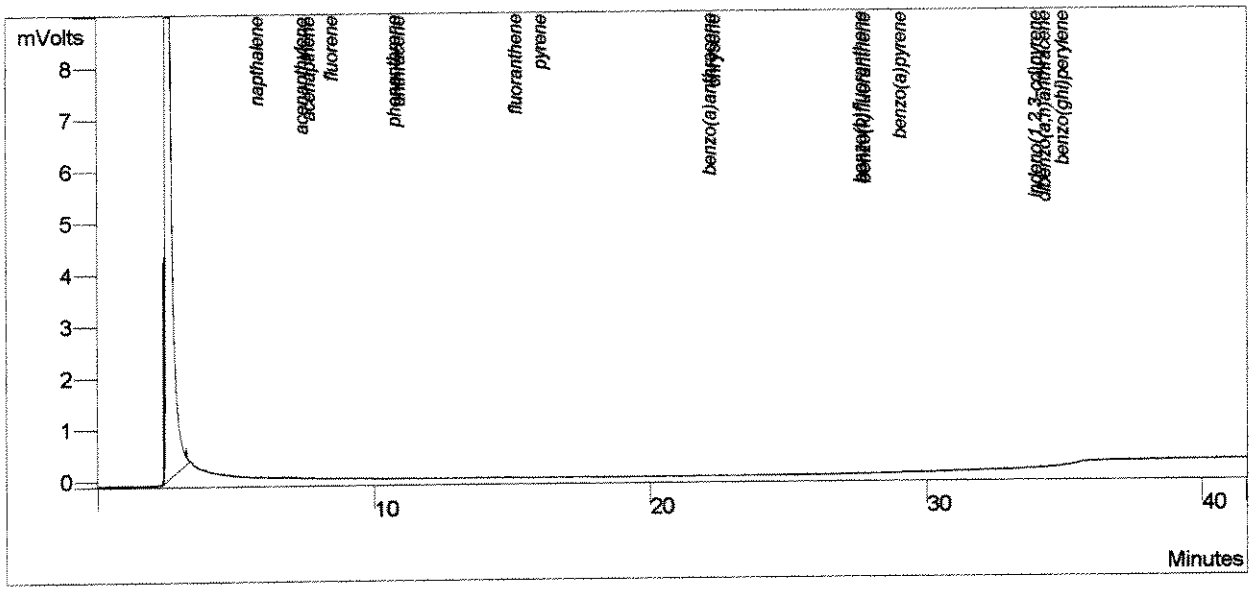
DETS 050 - PAH by GC-FID

Sample ID: **6152-40714**



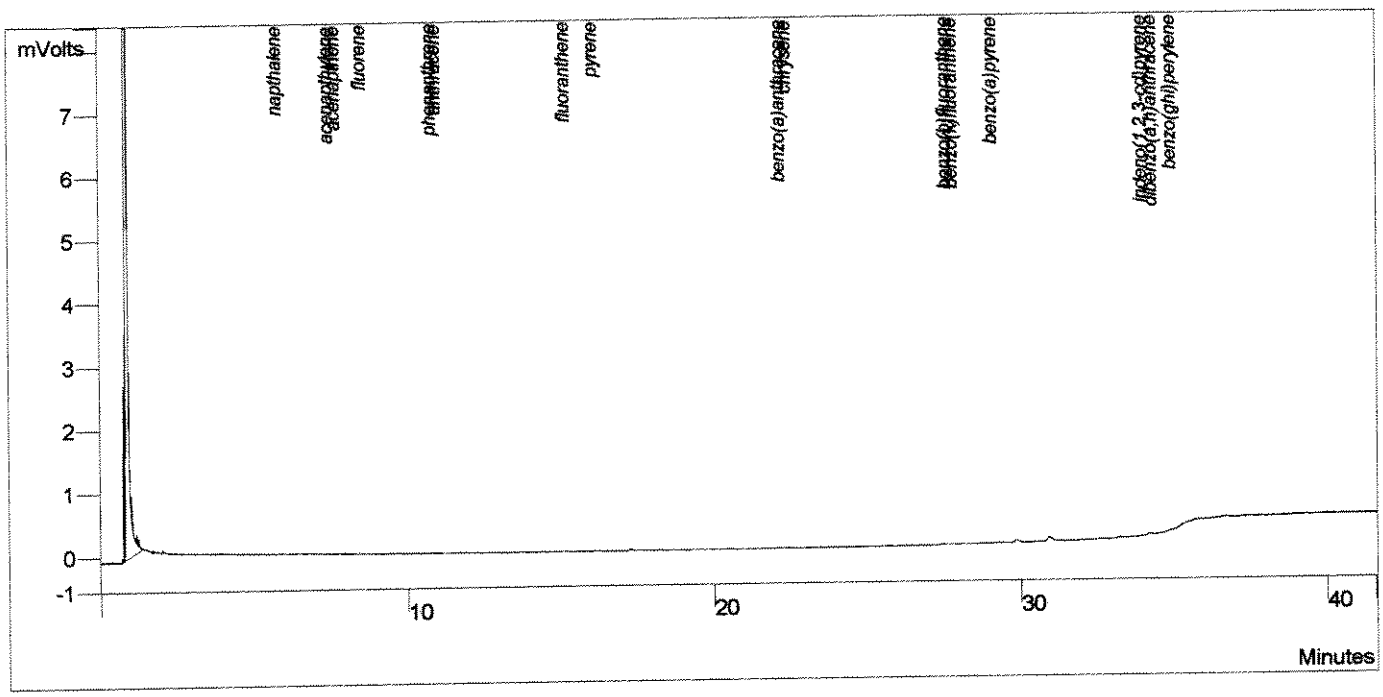
DETS 050 - PAH by GC-FID

Sample ID: **6152-40715**



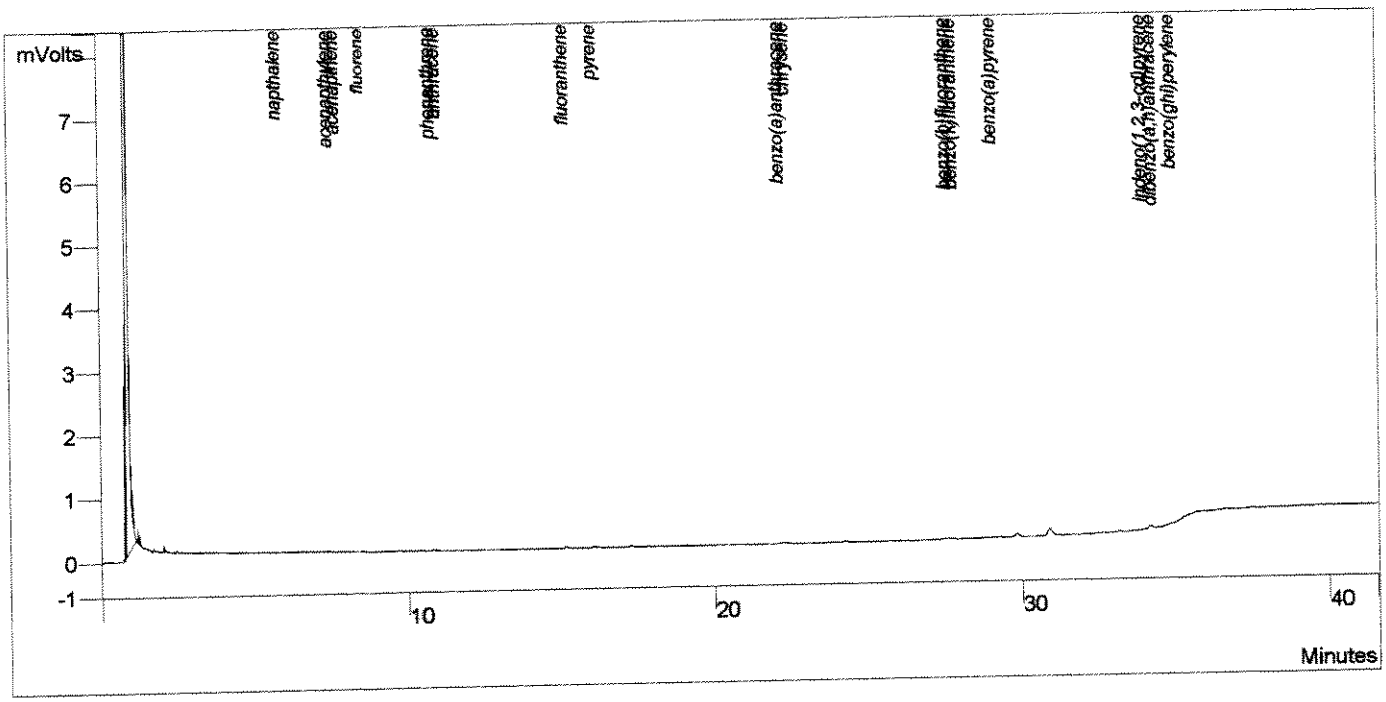
DETS 050 - PAH by GC-FID

Sample ID: **6152-40716**



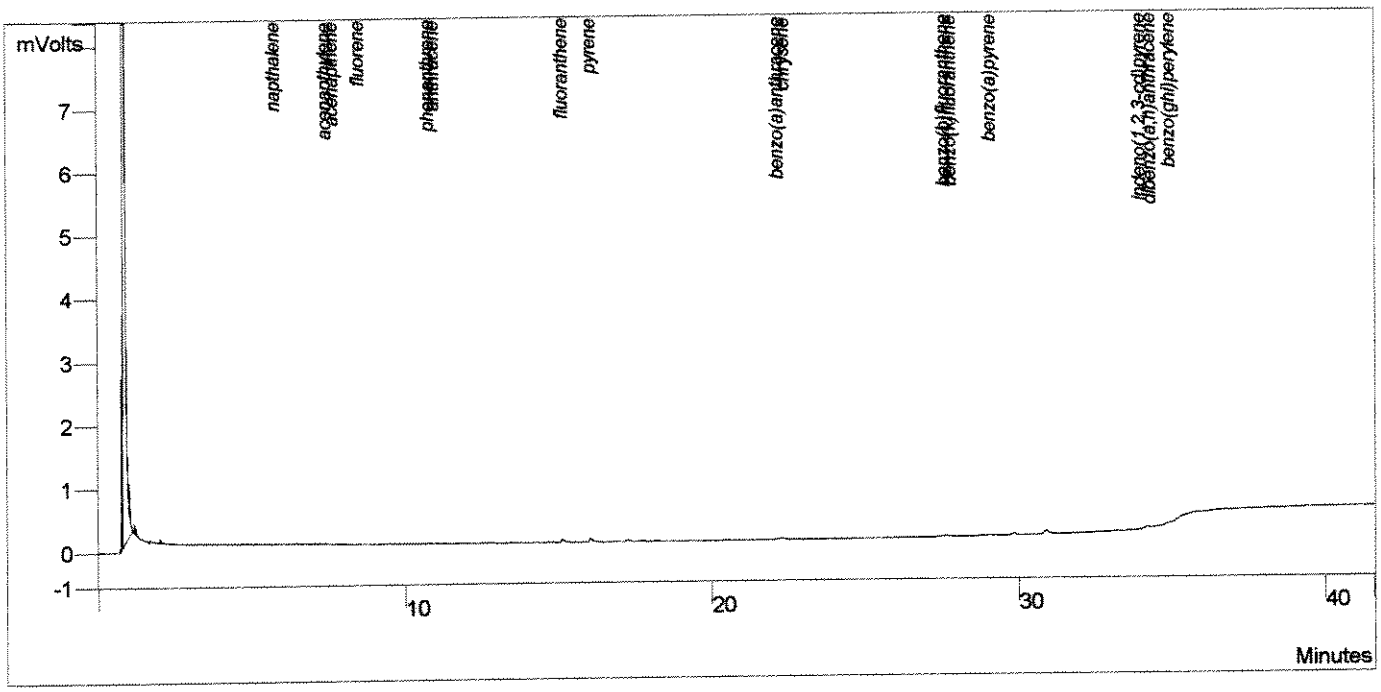
DETS 050 - PAH by GC-FID

Sample ID: **6152-40717**



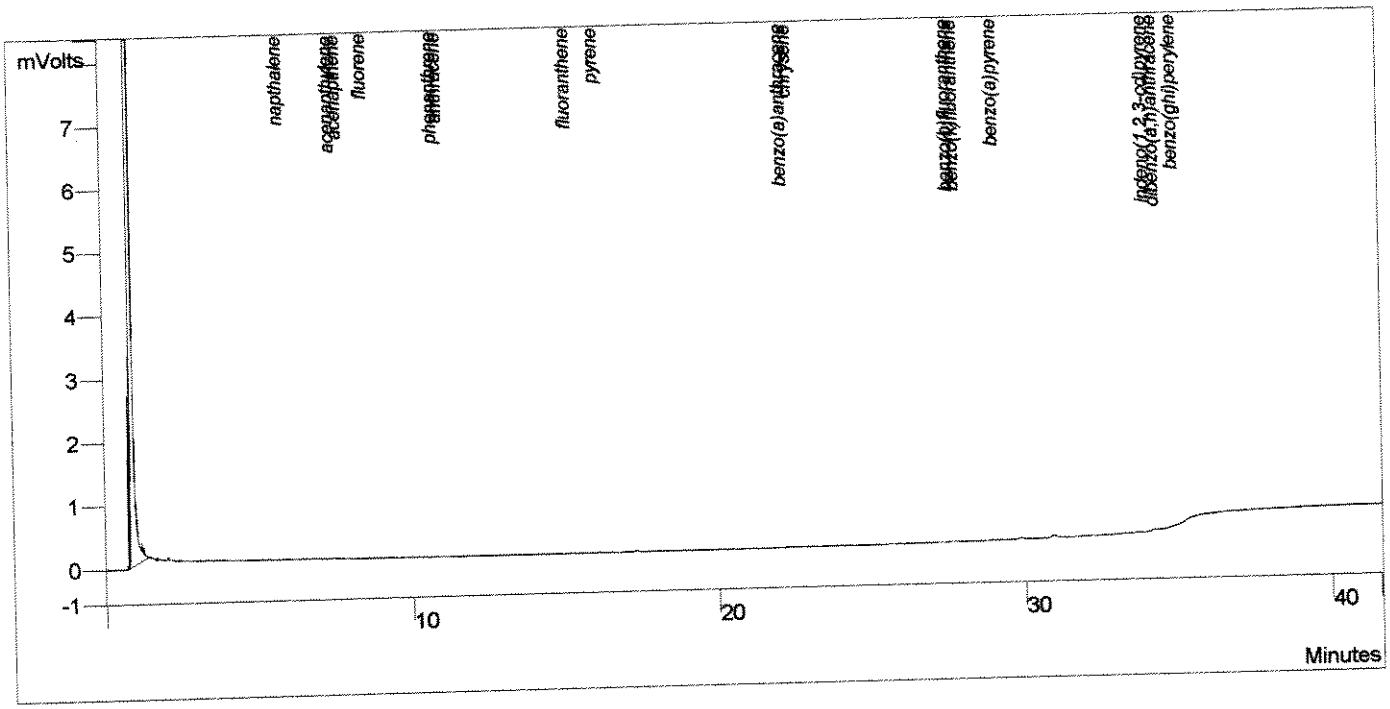
DETS 050 - PAH by GC-FID

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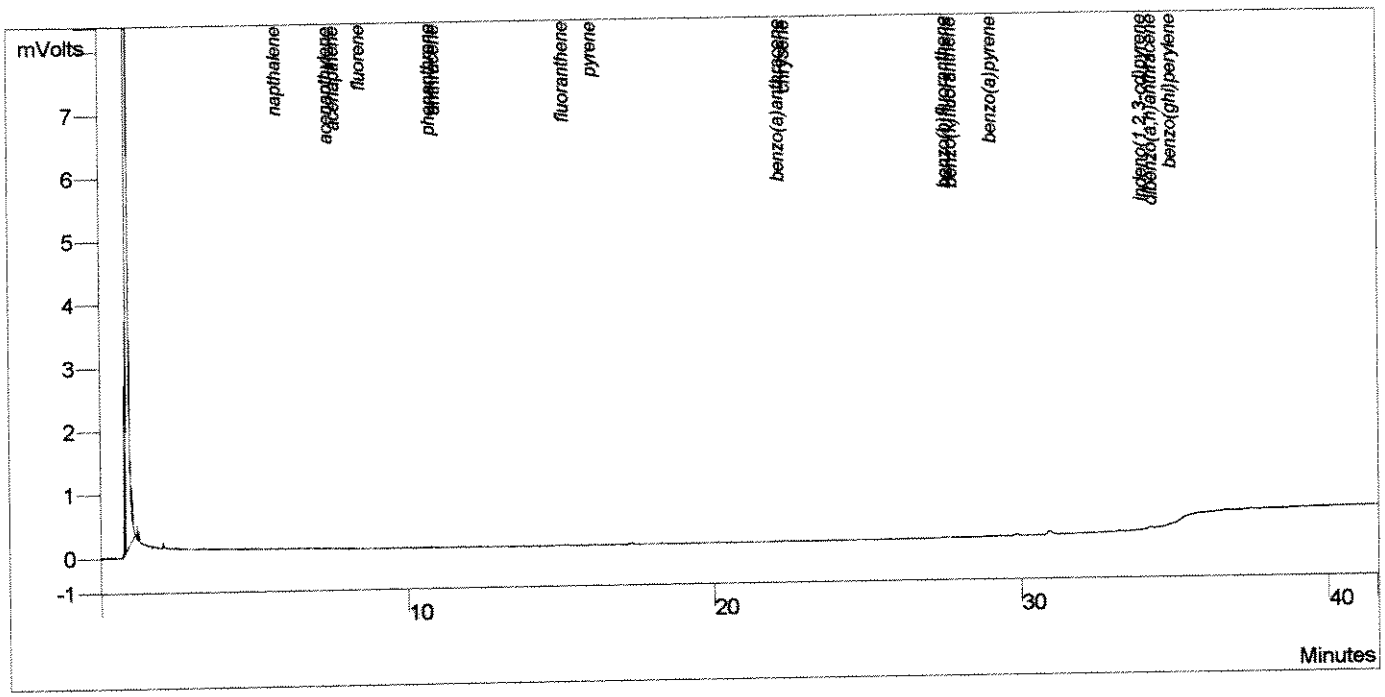
DETS 050 - PAH by GC-FID

Sample ID: **6152-40719**



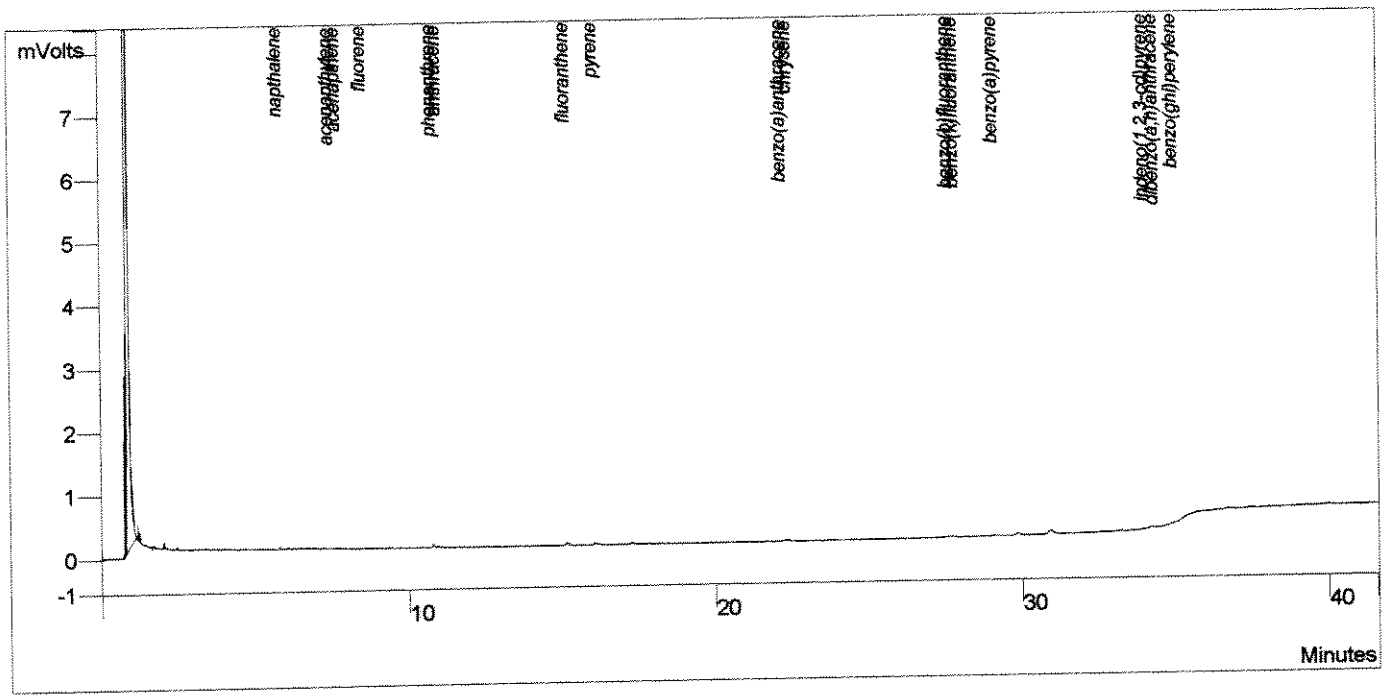
DETS 050 - PAH by GC-FID

Sample ID: **6152-40720**



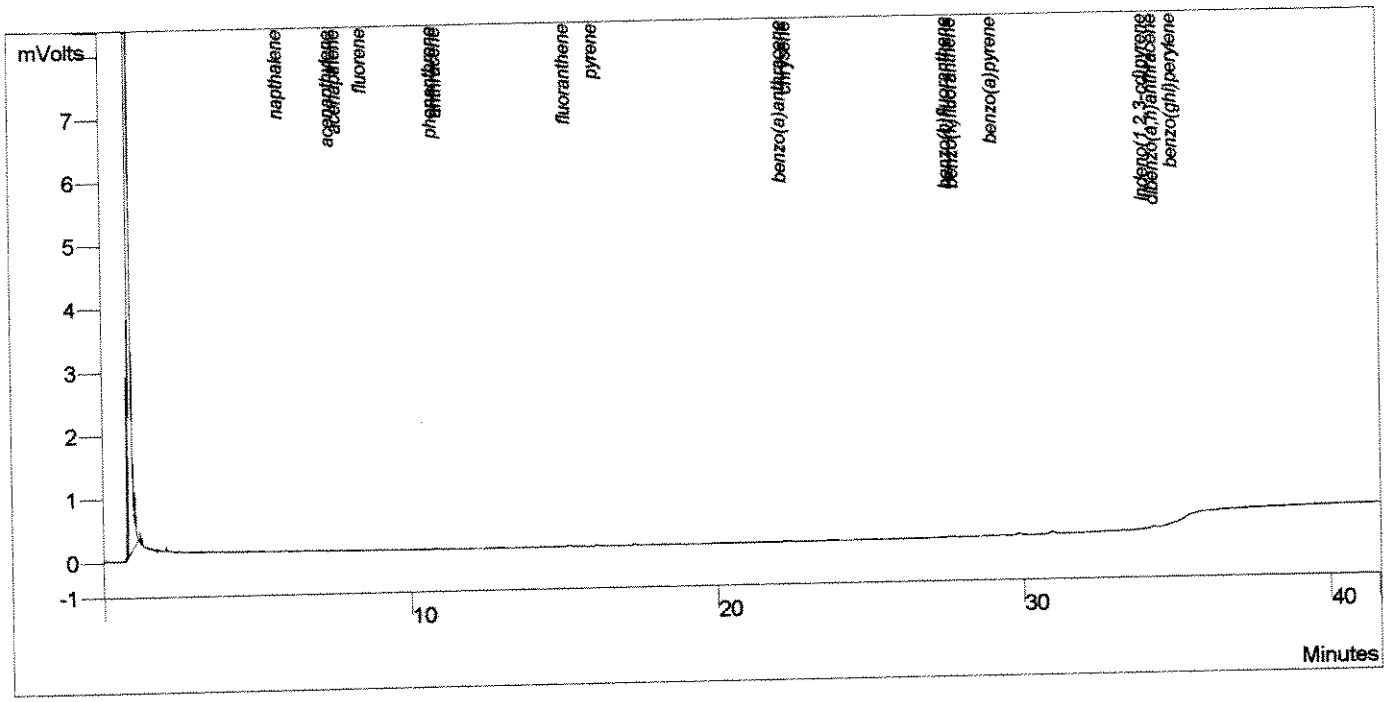
DETS 050 - PAH by GC-FID

Sample ID: **6152-40721**



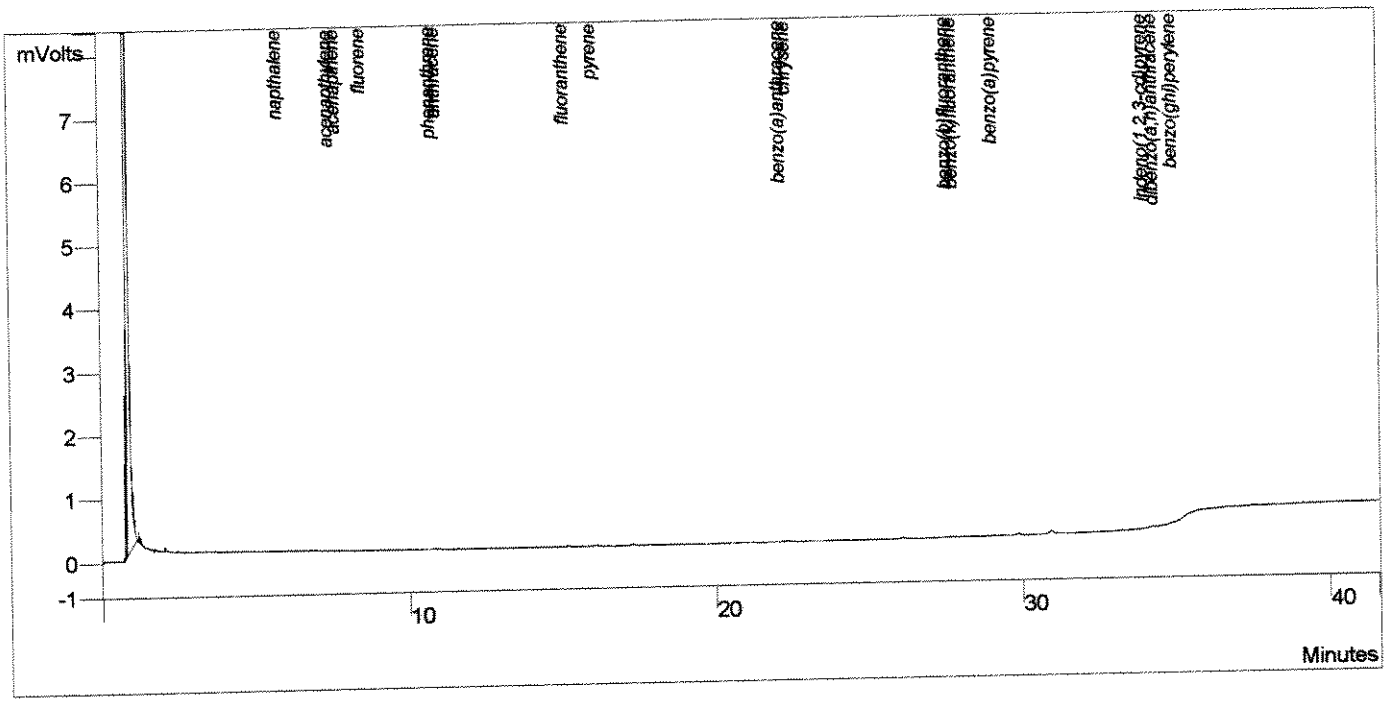
DETS 050 - PAH by GC-FID

Sample ID: **6152-40722**



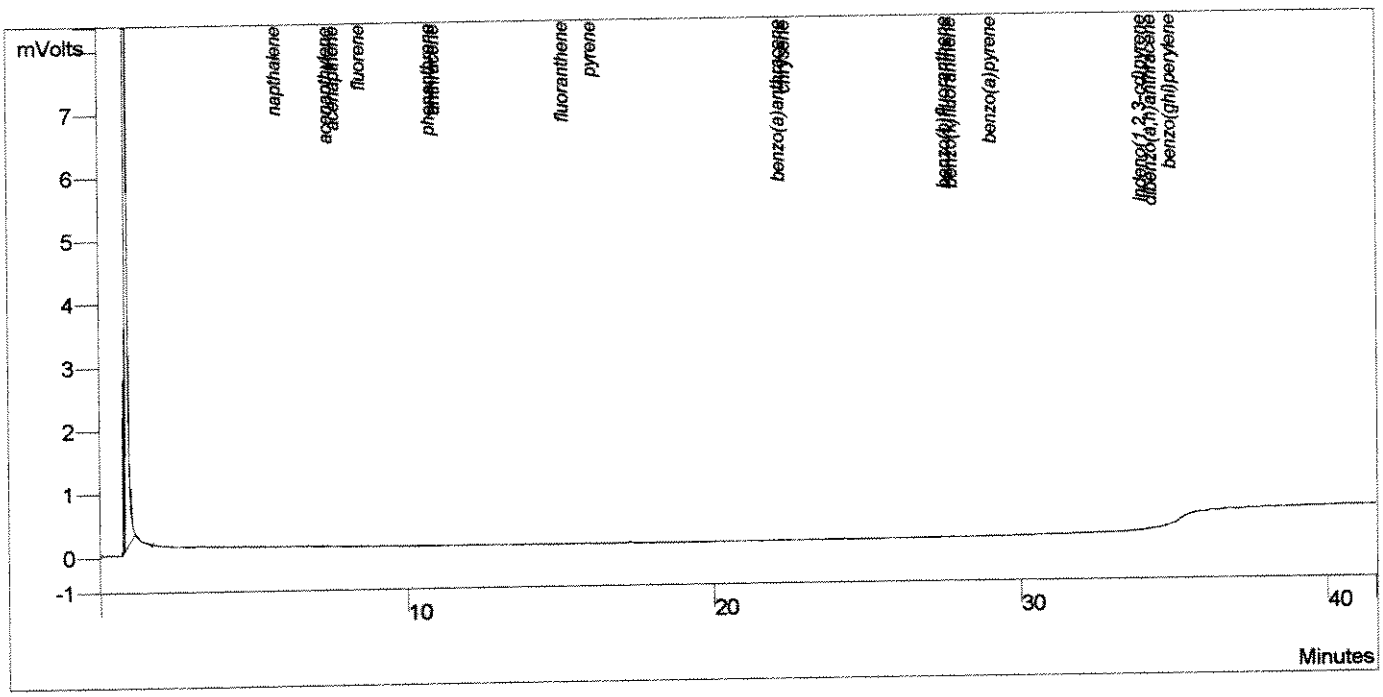
DETS 050 - PAH by GC-FID

Sample ID: **6152-40723**



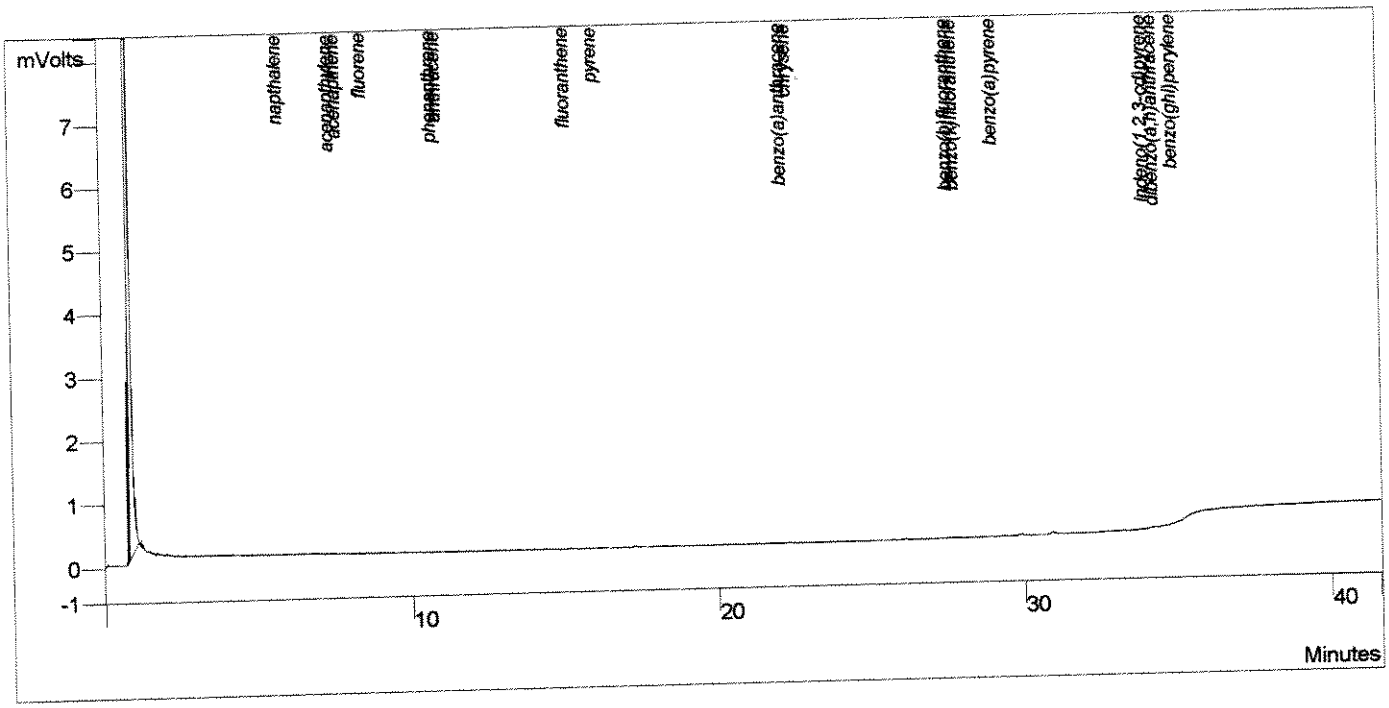
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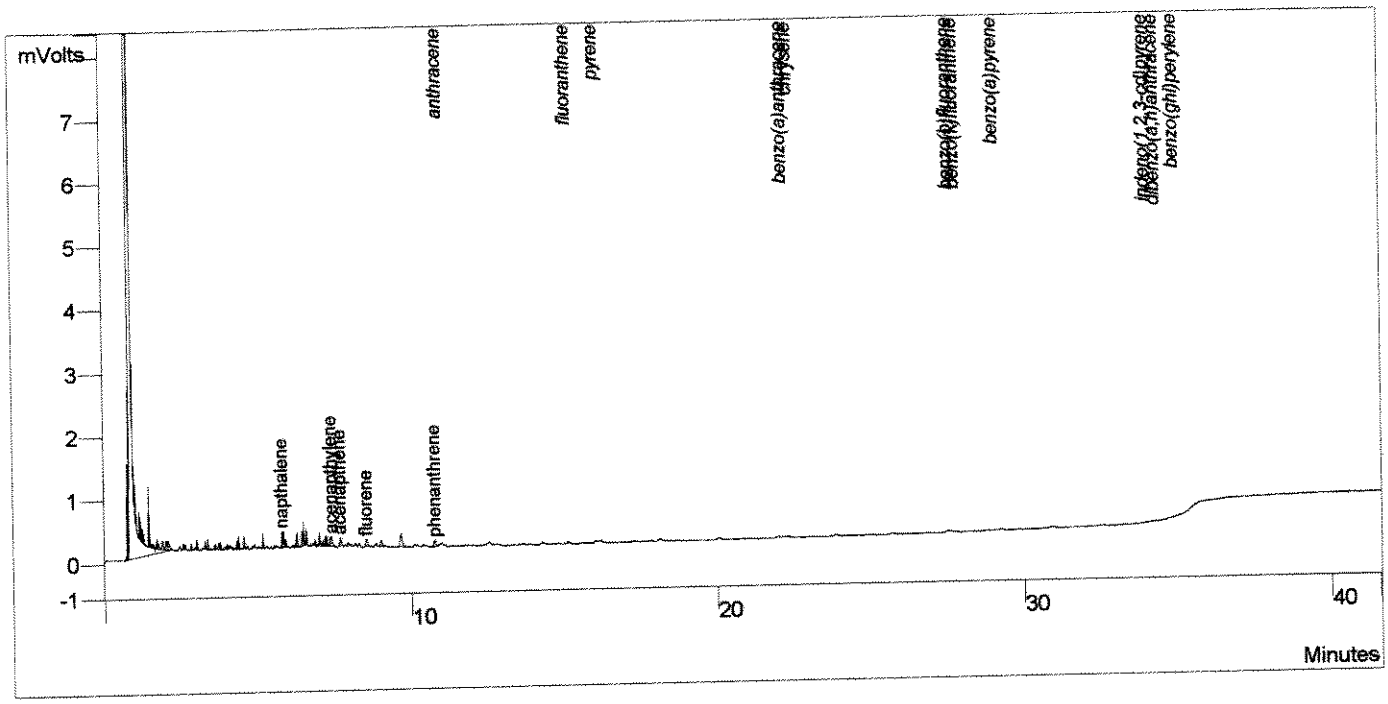
DETS 050 - PAH by GC-FID

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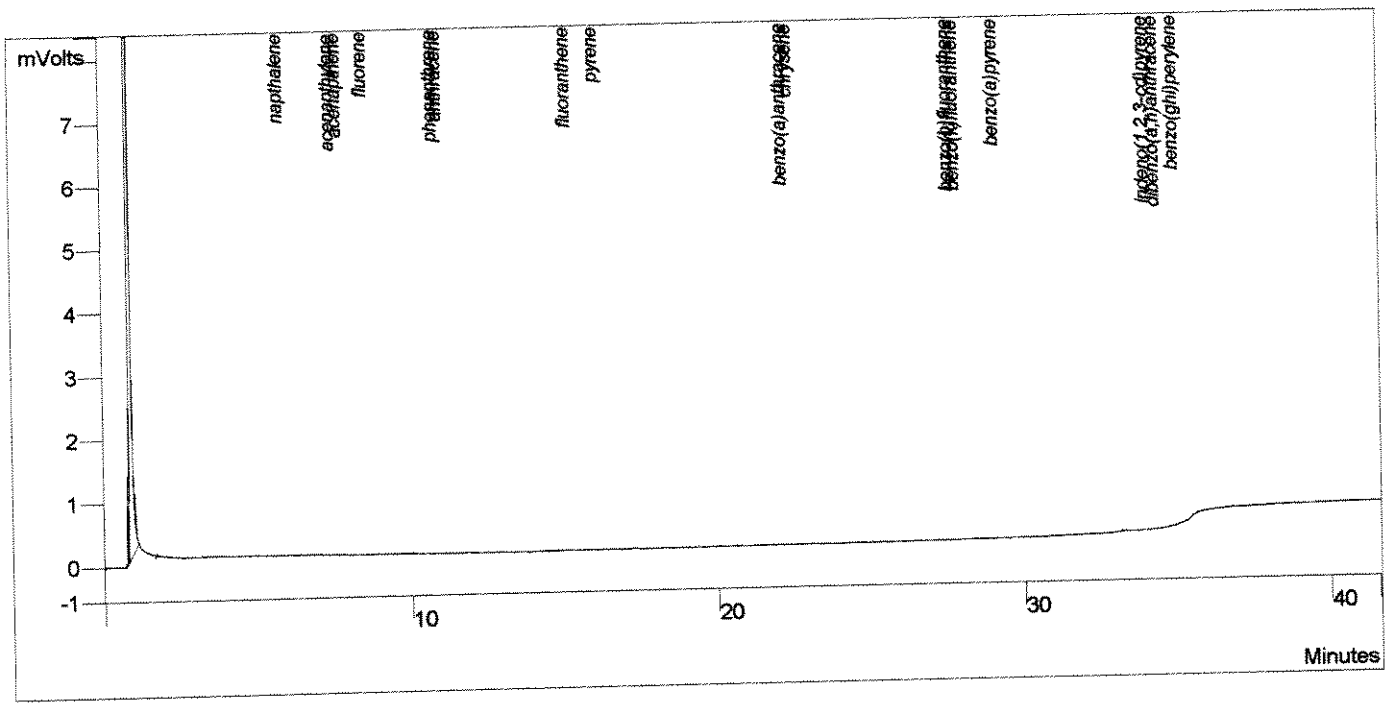
DETS 050 - PAH by GC-FID

Sample ID: **6152-40726**



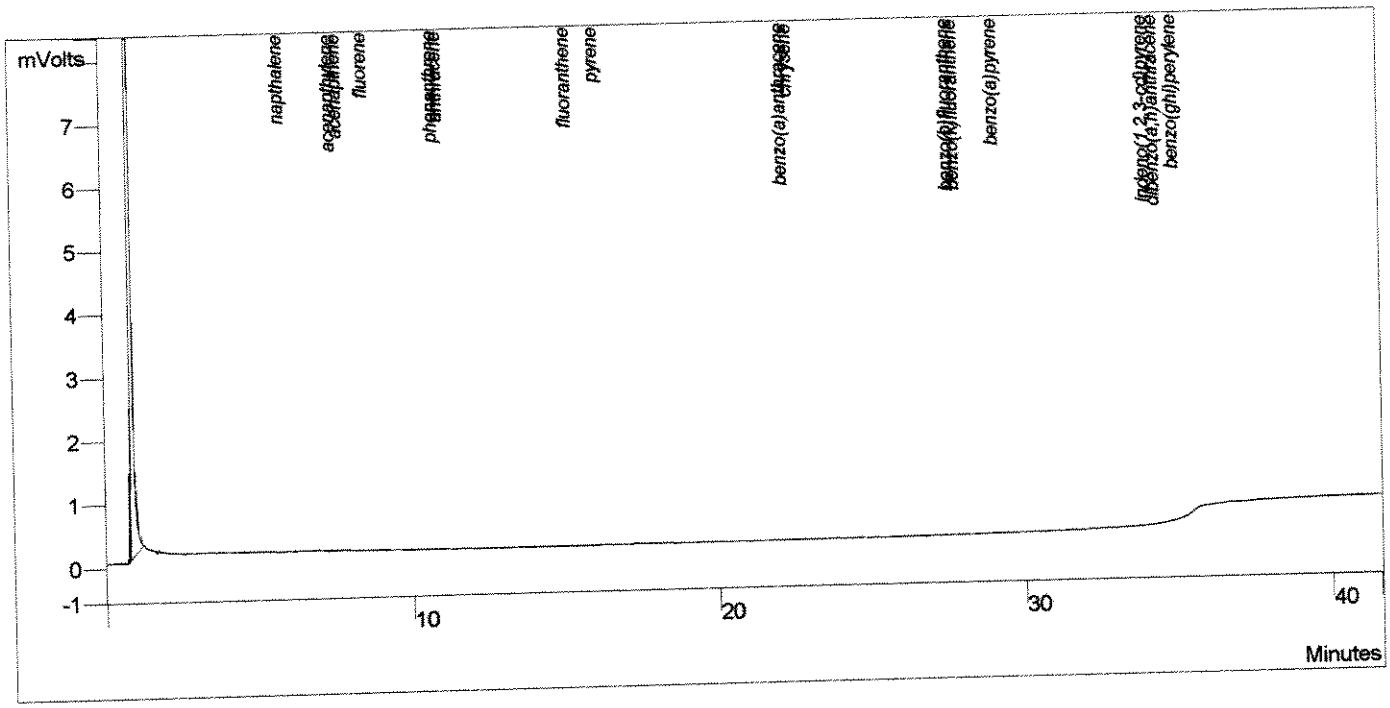
DETS 050 - PAH by GC-FID

Sample ID: **6152-40727**



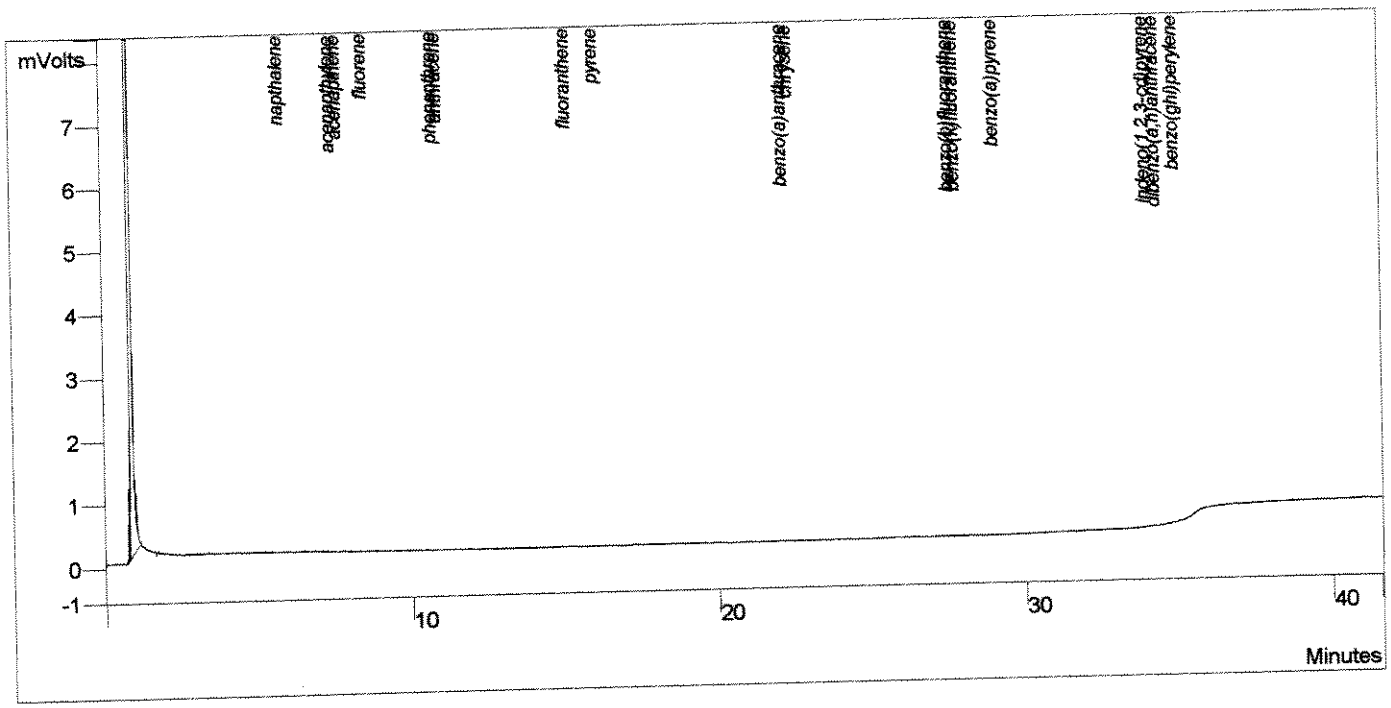
DETS 050 - PAH by GC-FID

Sample ID: **6152-40728**



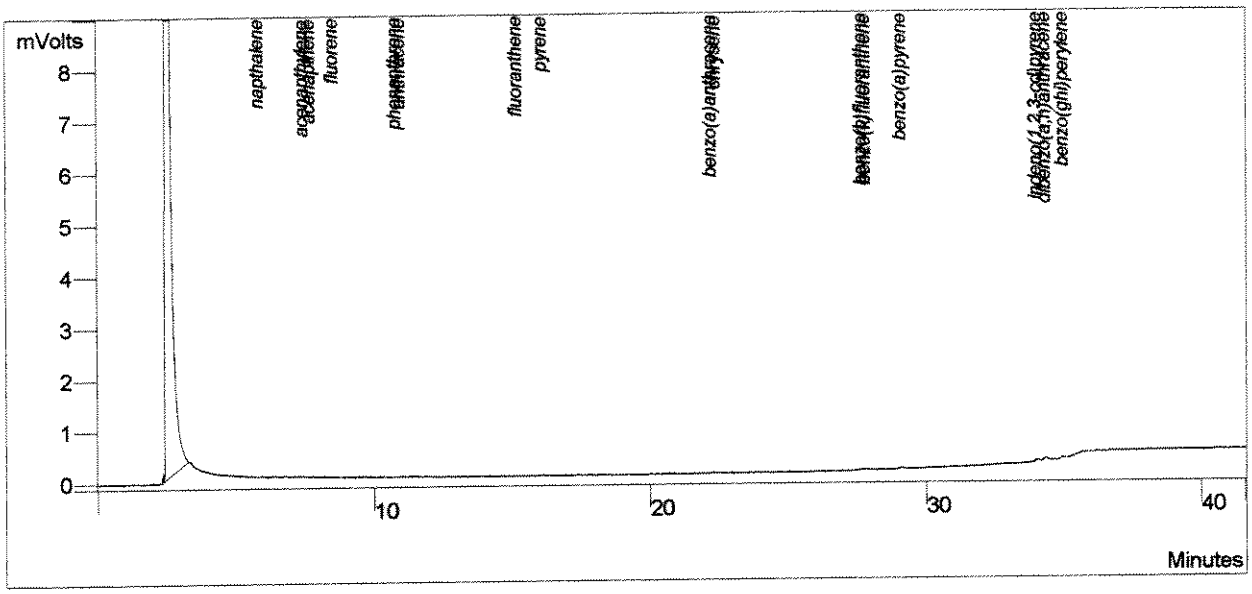
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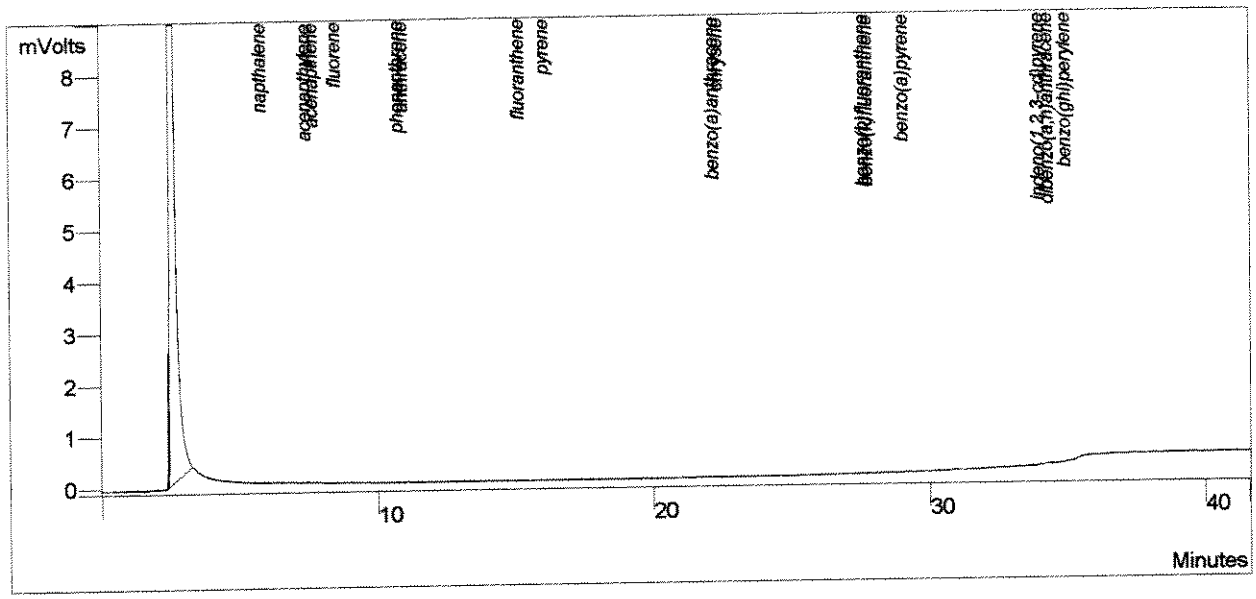
DETS 050 - PAH by GC-FID

Sample ID: **6152-40730**



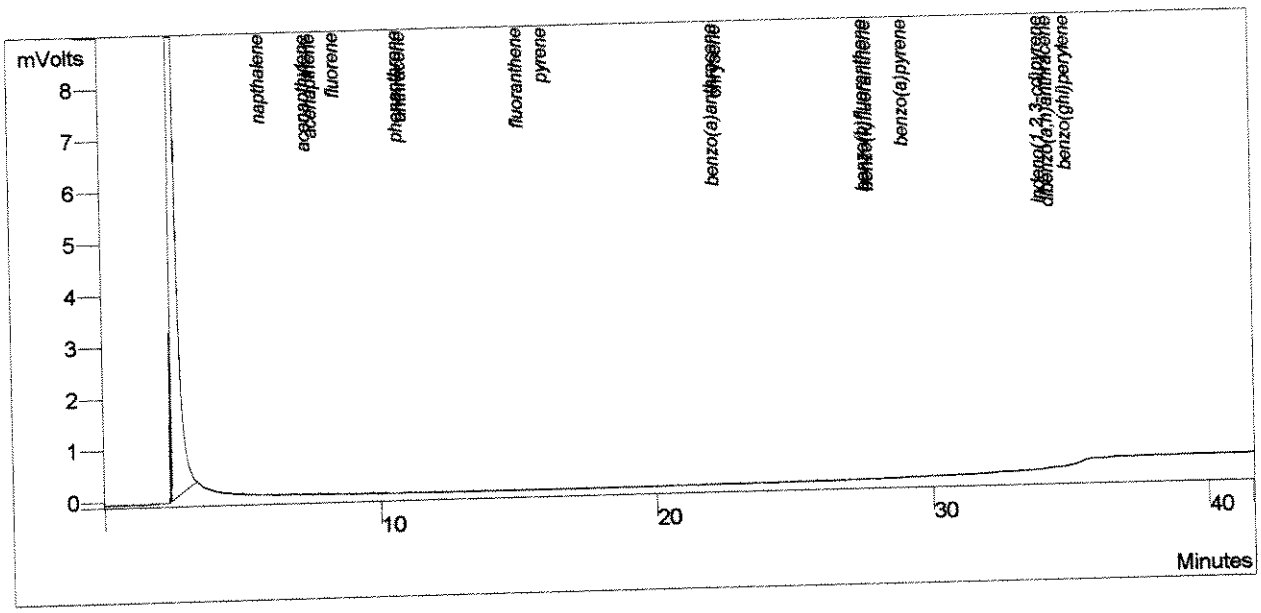
DETS 050 - PAH by GC-FID

Sample ID: **6152-40731**



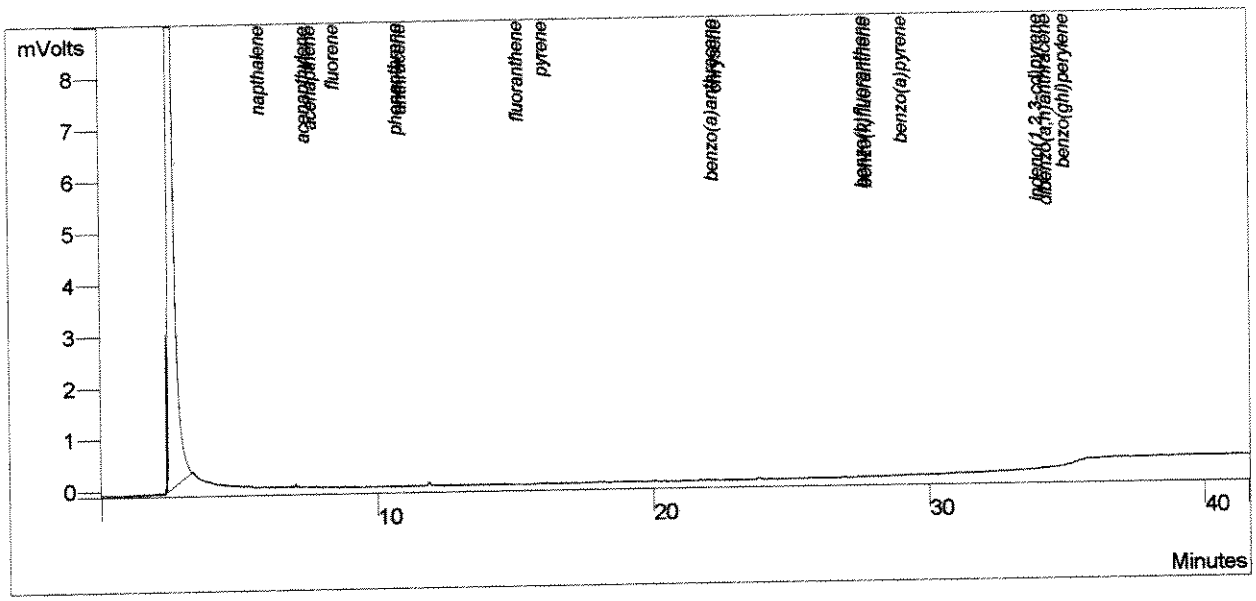
DETS 050 - PAH by GC-FID

Sample ID: **6152-40732**



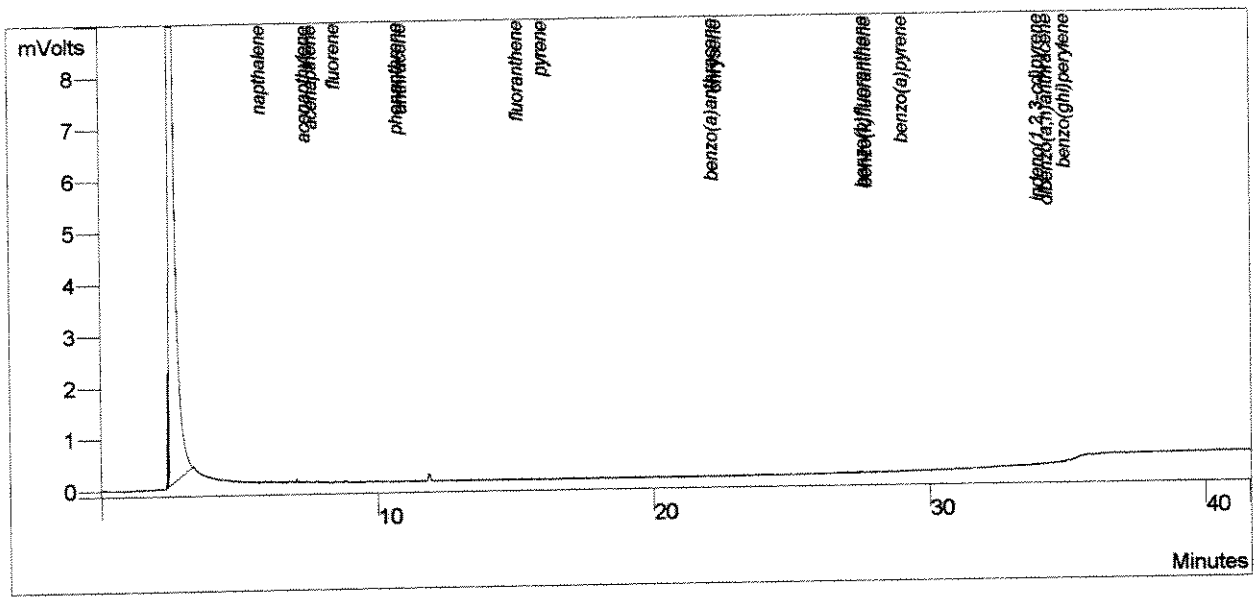
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Sample ID: **6152-40733**



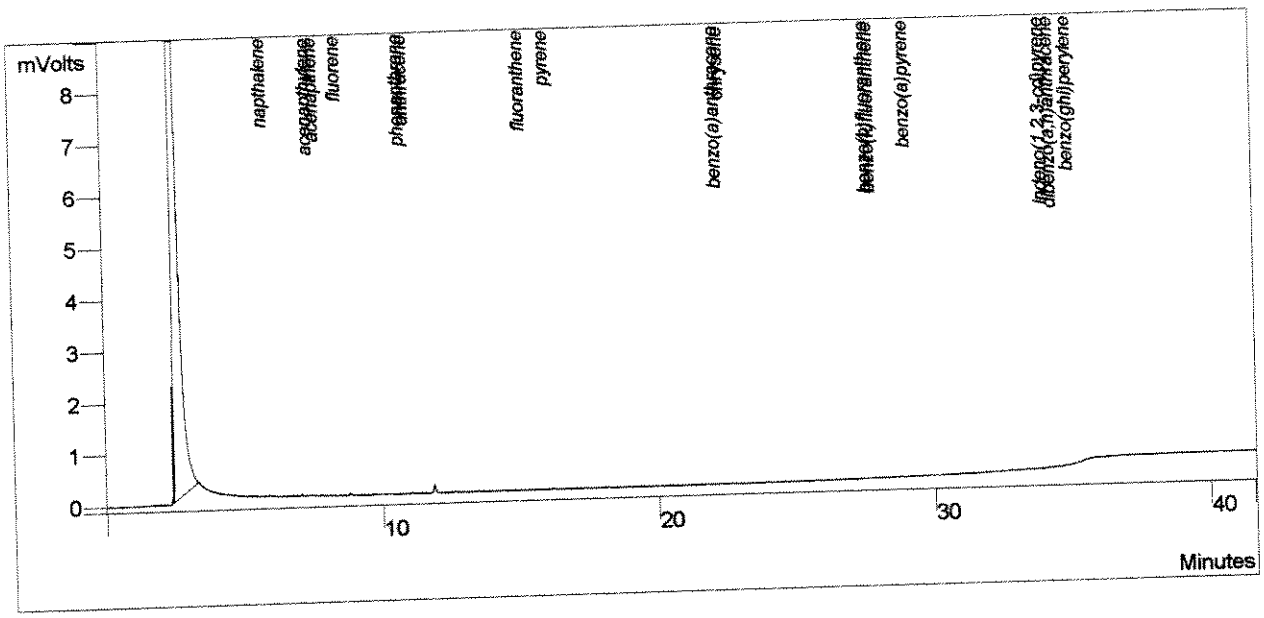
DETS 050 - PAH by GC-FID

Sample ID: **6152-40734**



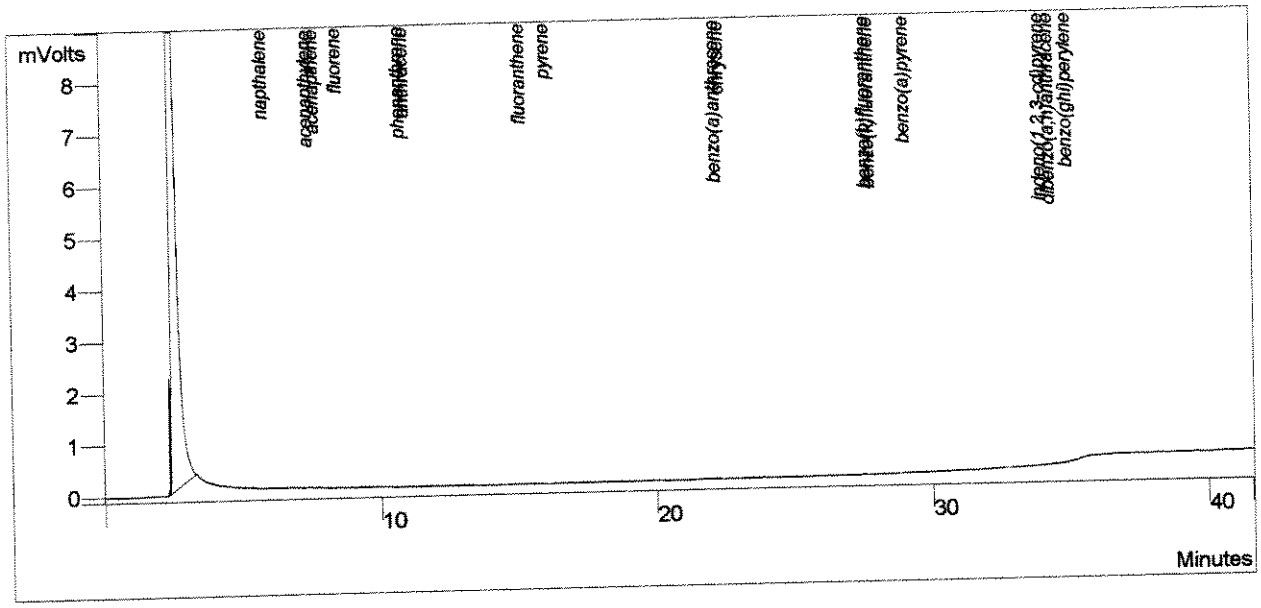
DETS 050 - PAH by GC-FID

Sample ID: **6152-40735**



DETS 050 - PAH by GC-FID

Sample ID: **6152-40736**



2139

Derwentside Environmental Testing Services

Certificate of Analysis

RECEIVED
19 JUL 2006

Certificate Number : 06-06146_M01

Client Reference:	C1277	**Date of issue:**	17/07/2006
Our Reference:	06-06146		
Clients Name:	Sirius Geotechnical & Environmental		
Clients Address:	Suite 3 Bowcliffe Grange Bowcliffe Hall Estate Bramham LS23 6LP		
Contract Title:	Barough Green		
Description:	2 leachate samples, 5 soil samples		
Date Received:	11/07/2006		
Date Commenced:	11/07/2006		
Date Completed:	17/07/2006		

Notes:

Test procedures are identified by prefix DETSn (details available upon request)
Observations and Interpretations are outside the UKAS Accreditation
* Denotes test not included in laboratory scope of accreditation
$ Denotes test carried out by approved subcontractor
I/S Denotes insufficient sample to carry out test
N/S Denotes that the sample is not suitable for testing
Samples will be disposed of 1 month after the date of issue of this test

Approved By:

R Bennett	R Brown	M Hopgood
Director	Business Manager	Technical Manager

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.

Derwentside Environmental Testing Services Limited.
Unit 2a/2b, Park Road Industrial Estate South, Consett, Co Durham. DH8 5PY
Tel: 01207 582333 • Fax: 01207 582444 • Email: info@dets.co.uk • www.dets.co.uk
Registered in England No. 370 5645 • VAT No. 708 978 678

Sample Details

Sample ID	Number	Dets Ref	Matrix Description	Date Sampled	Time Sampled	Preservation	Analysis Complete
WS1		40688		Not Provided	Not Provided	None	17/07/2006
WS1		40689		Not Provided	Not Provided	None	17/07/2006
WS4		40690		Not Provided	Not Provided	None	17/07/2006
WS4		40691		Not Provided	Not Provided	None	17/07/2006
WS5		40692		Not Provided	Not Provided	None	17/07/2006
WS1		40693		Not Provided	Not Provided	None	17/07/2006
WS4		40694		Not Provided	Not Provided	None	17/07/2006

Client Reference C1277

Laboratory Reference 06-06146

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	WS1 0.05 SOIL 40688	WS1 0.80 SOIL 40689	WS4 0.20 SOIL 40690	WS4 0.90 SOIL 40691	WS5 1.80 SOIL 40692	WS1 0.05 LEACHATE	WS4 0.20 LEACHATE
Arsenic	DETS 042	mg/kg		30	8	37	9	31	-----	-----
Cadmium	DETS 042	mg/kg		1.1	0.8	1.5	0.7	1.3	-----	-----
Chromium	DETS 042	mg/kg		45	22	44	12	48	-----	-----
Copper	DETS 042	mg/kg		93	21	170	23	81	-----	-----
Lead	DETS 042	mg/kg		64	12	67	18	68	-----	-----
Mercury	DETS 015	mg/kg		0.5	< 0.3	< 0.3	< 0.3	0.5	-----	-----
Nickel	DETS 042	mg/kg		16	15	26	16	26	-----	-----
Selenium	DETS 042	mg/kg		1.6	1.2	1.6	1.3	1.4	-----	-----
Zinc	DETS 042	mg/kg		86	85	92	95	85	-----	-----
Calorific Value	DETS 037*	KJ/kg		2900	-----	2100	-----	1500	-----	-----
Total Sulphate as SO4	DETS 075	%		0.12	0.03	0.11	0.01	0.12	-----	-----
Sulphate Aqueous Extract	DETS 076	g/l as SO4		0.05	0.02	0.08	0.03	0.23	-----	-----
Total Organic Carbon	DETS 002	%		6.2	0.4	6.7	0.5	5.3	-----	-----
pH	DETS 008			7.2	7.4	5.8	6.1	7.7	-----	-----
Acenaphthene	DETS 050	mg/kg		0.7	< 0.1	0.4	< 0.1	4.3	-----	-----
Acenapthylene	DETS 050	mg/kg		1.4	< 0.1	1.5	< 0.1	3.5	-----	-----
Anthracene	DETS 050	mg/kg		0.8	< 0.1	0.5	< 0.1	11	-----	-----
Benzo(a)anthracene	DETS 050	mg/kg		2.6	< 0.1	1.8	< 0.1	12	-----	-----
Benzo(a)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	9.8	-----	-----
Benzo(b)fluoranthene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	14	-----	-----

Client Reference C1277

Laboratory Reference 06-06146

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	WS1 0.05 SOIL 40688	WS1 0.80 SOIL 40689	WS4 0.20 SOIL 40690	WS4 0.90 SOIL 40691	WS5 1.80 SOIL 40692	WS1 0.05 LEACHATE	WS4 0.20 LEACHATE
Benzo(k)fluoranthene	DETS 050	mg/kg		4.8	< 0.1	< 0.1	< 0.1	5.4	-----	-----
Benzo(g,h,i)perylene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	5.4	-----	-----
Chrysene	DETS 050	mg/kg		1.2	< 0.1	< 0.1	< 0.1	12	-----	-----
Dibenzo(a,h)anthracene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-----	-----
Fluoranthene	DETS 050	mg/kg		4.8	< 0.1	2.6	< 0.1	38	-----	-----
Fluorene	DETS 050	mg/kg		1.1	< 0.1	0.7	< 0.1	6.8	-----	-----
Indeno(1,2,3-c,d)pyrene	DETS 050	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	5.7	-----	-----
Naphthalene	DETS 050	mg/kg		1.5	< 0.1	1.3	< 0.1	16	-----	-----
Phenanthrene	DETS 050	mg/kg		3.8	< 0.1	2.1	< 0.1	46	-----	-----
Pyrene	DETS 050	mg/kg		3.8	< 0.1	2.3	< 0.1	28	-----	-----
PAH	DETS 050	mg/kg		27	< 5.0	13	< 5.0	220	-----	-----
Phenol - Monohydric	DETS 067	mg/kg		0.3	< 0.3	< 0.3	< 0.3	4.0	-----	-----
Arsenic	DETS 010	ug/l		-----	-----	-----	-----	-----	< 1	< 1
Cadmium	DETS 042	ug/l		-----	-----	-----	-----	-----	< 2	< 2
Chromium	DETS 042	ug/l		-----	-----	-----	-----	-----	< 10	< 10
Copper	DETS 042	ug/l		-----	-----	-----	-----	-----	2	3
Lead	DETS 042	ug/l		-----	-----	-----	-----	-----	< 5	< 5
Mercury	DETS 078*	ug/l		-----	-----	-----	-----	-----	< 0.2	< 0.2
Nickel	DETS 042	ug/l		-----	-----	-----	-----	-----	< 10	< 10
Selenium	DETS 012	ug/l		-----	-----	-----	-----	-----	< 3	< 3

Client Reference C1277

Laboratory Reference 06-06146

Barough Green

Summary of Chemical Analysis

Determination		Units	Borehole Depth Sample No Sample Type Lab Ref No	WS1 0.05 SOIL 40688	WS1 0.80 SOIL 40689	WS4 0.20 SOIL 40690	WS4 0.90 SOIL 40691	WS5 1.80 SOIL 40692	WS1 0.05 LEACHATE	WS4 0.20 LEACHATE
Zinc	DETS 042	ug/l		-----	-----	-----	-----	-----	280	440
pH	DETS 008			-----	-----	-----	-----	-----	6.4	5.9
Acenaphthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Acenapthylene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Benzo(a)anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.01	< 0.01
Benzo(a)pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.01	0.01
Benzo(b)fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.02	0.02
Benzo(k)fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.01	0.01
Chrysene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.02	0.02
Dibenzo(a,h)anthracene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Fluoranthene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.01	0.01
Fluorene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Naphthalene	DETS 050*	ug/l		-----	-----	-----	-----	-----	< 0.01	< 0.01
Phenanthrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.01	0.01
Pyrene	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.10	0.09
PAH	DETS 050*	ug/l		-----	-----	-----	-----	-----	0.21	< 0.20
Phenol HPLC	DETS 054*	ug/l		-----	-----	-----	-----	-----	< 0.50	< 0.50

Appendix A - Details of Analysis

Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 003	Loss On Ignition	%	0.01	Air Dried	No	Yes	No
DETS 004	Sulphate	%	0.01	Air Dried	No	Yes	Yes
DETS 006	Chloride	mg/kg	0.01	Air Dried	No	Yes	No
DETS 008	pH	pH Units	0.10	Air Dried	No	Yes	Yes
DETS 017	Selenium	mg/kg	0.30	Air Dried	No	Yes	No
DETS 019	Ammonia	mg/kg	0.02	Air Dried	No	Yes	No
DETS 020	Boron (water soluble)	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 024	Sulphide	mg/kg	10.00	Air Dried	No	Yes	Yes
DETS 042	Antimony	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Arsenic	mg/kg	1.00	Air Dried	No	Yes	Yes
DETS 042	Barium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Beryllium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Cadmium	mg/kg	0.20	Air Dried	No	Yes	No
DETS 042	Cobalt	mg/kg	0.20	Air Dried	No	No	No
DETS 042	Copper	mg/kg	1.00	Air Dried	No	Yes	No
DETS 042	Chromium	mg/kg	1.00	Air Dried	No	Yes	No

Methods details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS

Full method statements are available on request.

Appendix A - Details of Analysis

Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 042	Iron	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Lead	mg/kg	1.00	Air Dried	No	Yes	No
DETS 042	Manganese	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Mercury	mg/kg	0.30	Air Dried	No	Yes	No
DETS 042	Molybdenum	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Nickel	mg/kg	1.00	Air Dried	No	Yes	No
DETS 042	Thallium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Vanadium	mg/kg	1.00	Air Dried	No	No	No
DETS 042	Zinc	mg/kg	1.00	Air Dried	No	Yes	Yes
DETS 049	Sulphur (free)	mg/kg	0.50	As Recieved	No	Yes	Yes
DETS 050	PAH's	mg/kg	0.10	As Recieved	No	Yes	No
DETS 051	TPH's	mg/kg	20.00	As Recieved	No	Yes	Yes
DETS 052	PCB's	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Recieved	No	Yes	Yes

Methods details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS

Full method statements are available on request.

Appendix A - Details of Analysis

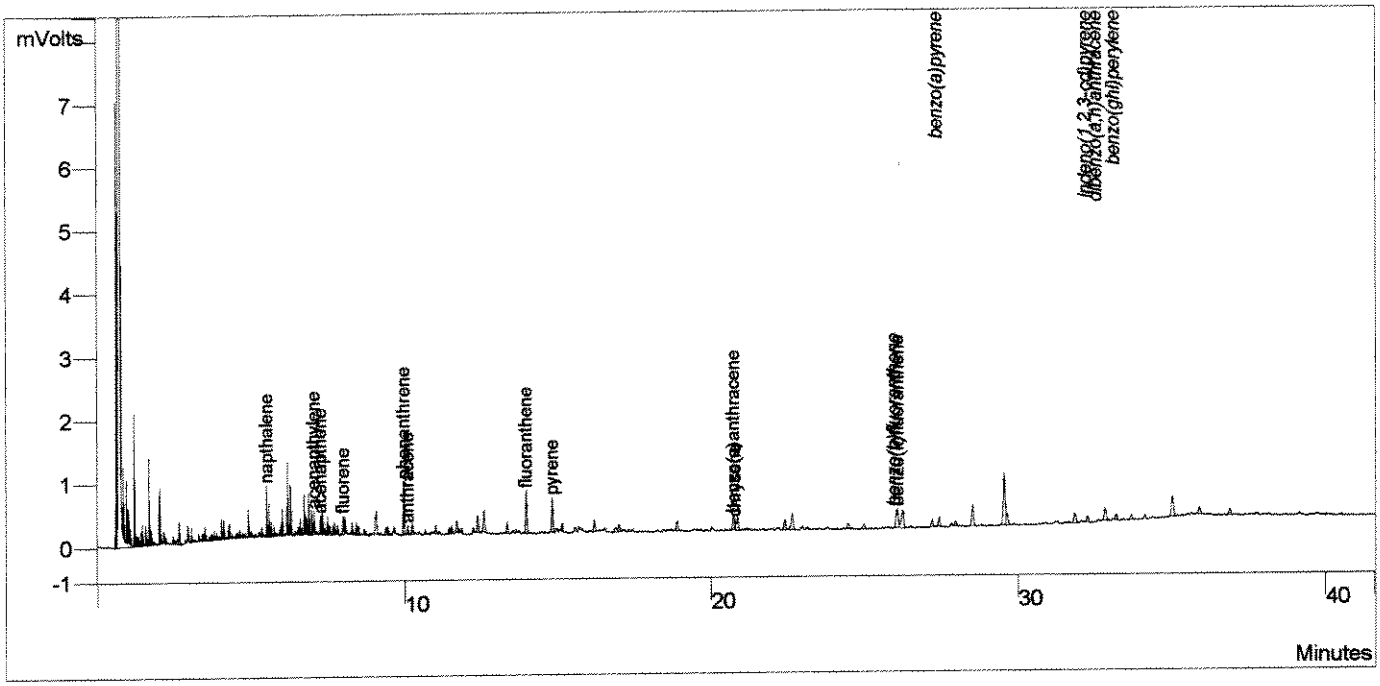
Method	Name of Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 062	Xylene	mg/kg	0.01	As Recieved	No	Yes	Yes
DETS 067	Phenol - Monohydric	mg/kg	0.30	Air Dried	No	Yes	Yes
DETS 067	Easily Liberatable Cyanide	mg/kg	0.10	Air Dried	No	Yes	Yes
DETS 067	Complex Cyanide	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 067	Total Cyanide	mg/kg	0.20	Air Dried	No	Yes	Yes
DETS 067	Thiocyanate	mg/kg	0.60	Air Dried	No	Yes	Yes
DETS 068	VOC's	mg/kg	0.01	As Recieved	No	No	No

Methods details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS

Full method statements are available on request.

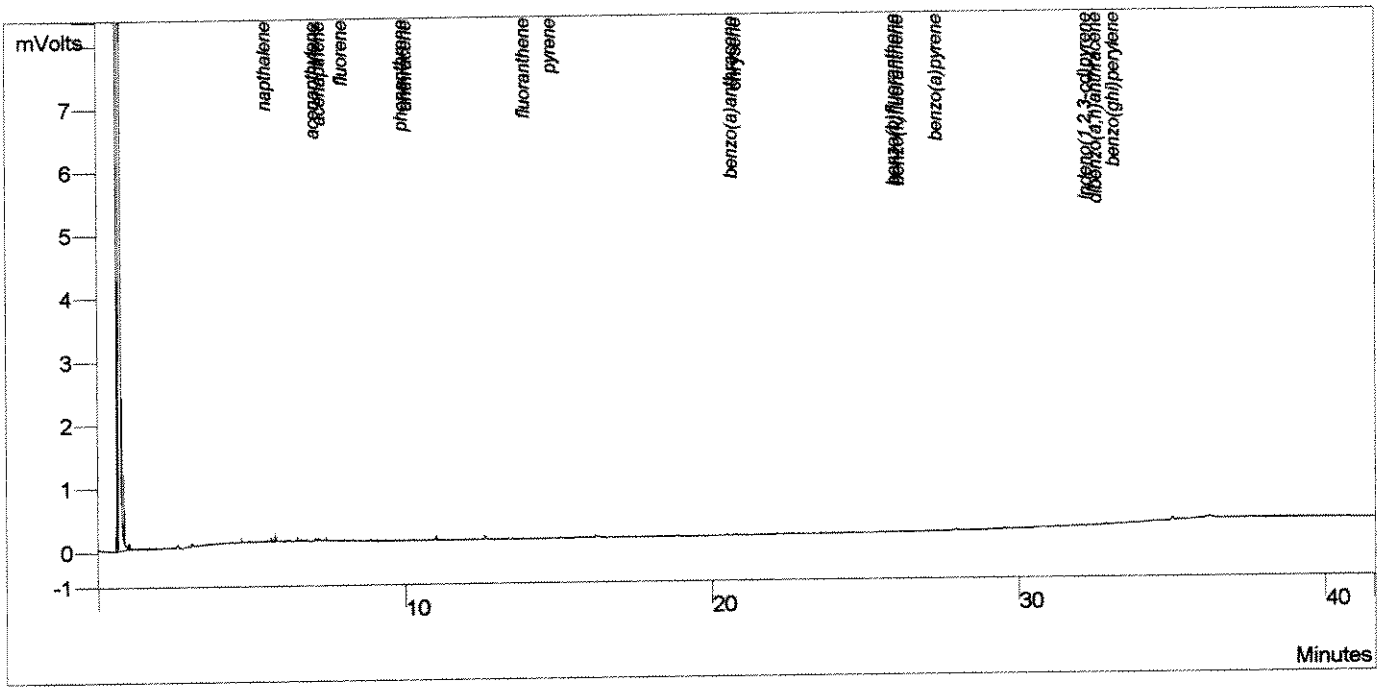
DETS 050 - PAH by GC-FID

Sample ID: **6146-40688**



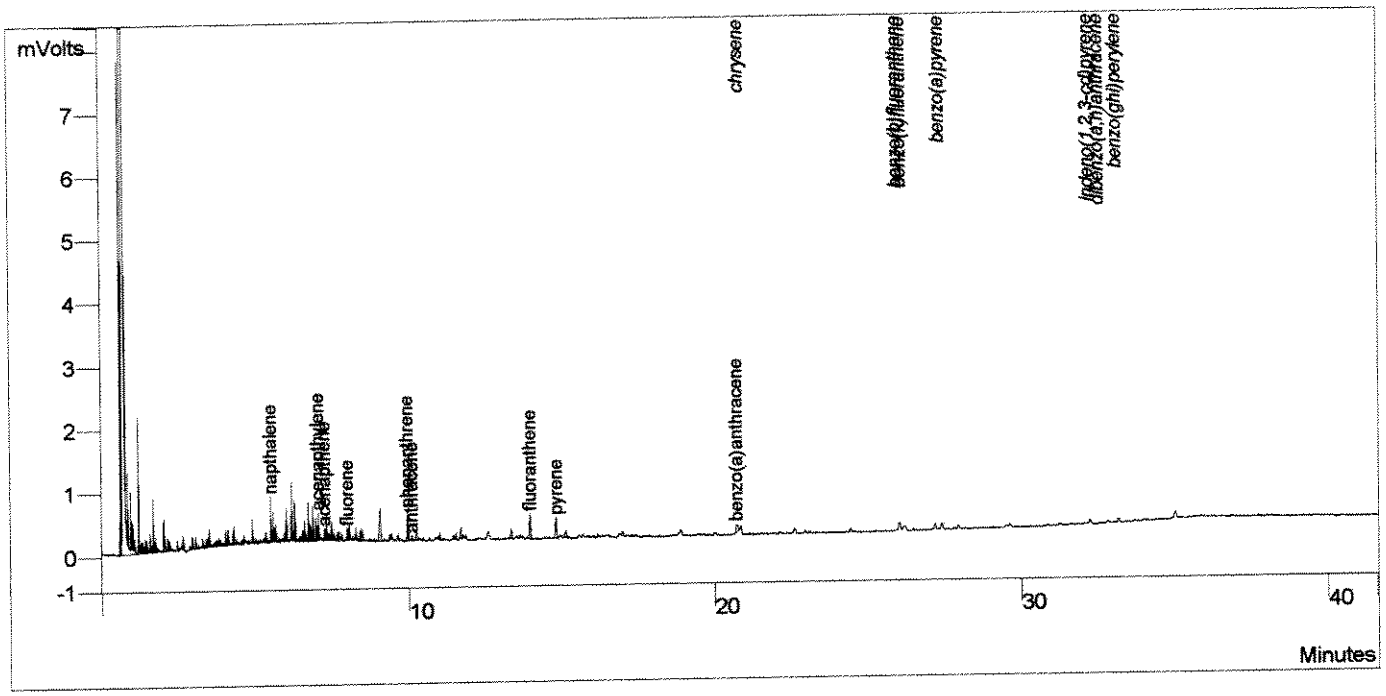
DETS 050 - PAH by GC-FID

Sample ID: **6146-40689**



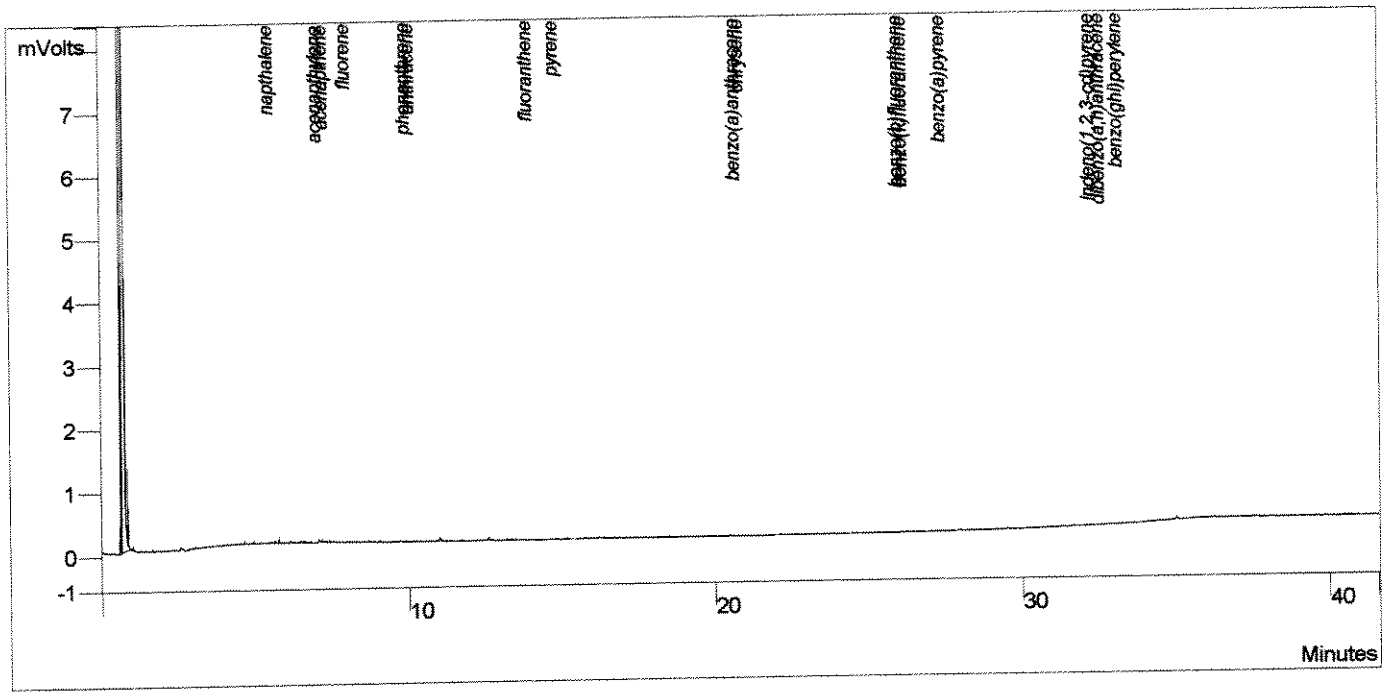
DETS 050 - PAH by GC-FID

Sample ID: **6146-40690**



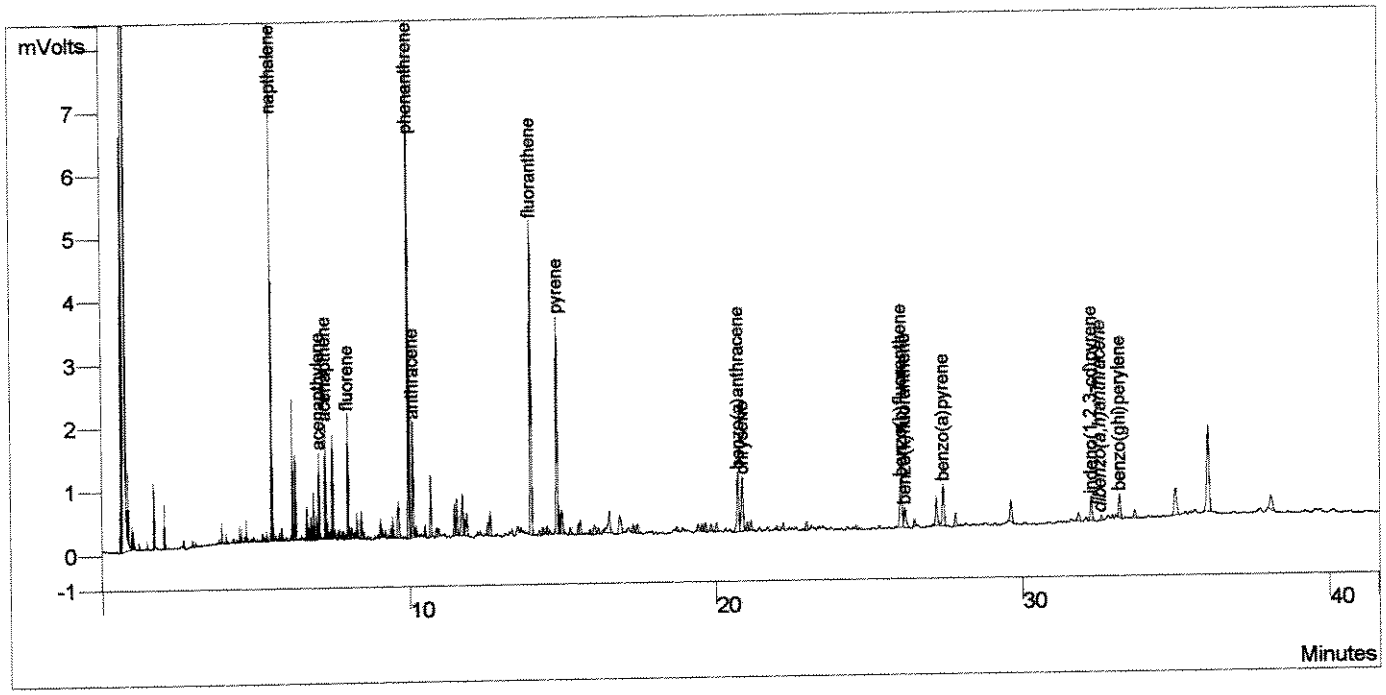
DETS 050 - PAH by GC-FID

Sample ID: **6146-40691**



DETS 050 - PAH by GC-FID

Sample ID: **6146-40692**



2139

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number : 06-06147_M01

Client Reference:		**Date of issue:**	17/07/2006
Our Reference:	06-06147	**Report no:**	06-06147_M01
Clients Name:	Sirius Geotechnical & Environmental		
Clients Address:	Suite 3 Bowcliffe Grange Bowcliffe Hall Estate Bramham LS23 6LP		

Contract Title:	Barough Green
Description:	3 water samples
Date Received:	11/07/2006
Date Commenced:	11/07/2006
Date Completed:	17/07/2006

RECEIVED
19 JUL 2006
RHBMB

Notes:

Test procedures are identified by prefix DETSn (details available upon request)
Observations and Interpretations are outside the UKAS Accreditation Scope
* Denotes test not included in laboratory scope of accreditation
$ Denotes test carried out by approved subcontractor
I/S Denotes insufficient sample to carry out test
N/S Denotes that the sample is not suitable for testing
Samples will be disposed of 1 month after the date of issue of this test Certificate.

Approved By:

R Bennett	R Brown	M Hopgood
Director	Business Manager	Technical Manager

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.

Derwentside Environmental Testing Services Limited.
Unit 2a/2b, Park Road Industrial Estate South, Consett, Co Durham. DH8 5PY
Tel: 01207 582333 • Fax: 01207 582444 • Email: info@dets.co.uk • www.dets.co.uk
Registered in England No. 370 5645 • VAT No. 708 978 678

Client Reference Barough Green

Laboratory Reference 06-06147

Summary of Chemical Analysis

Borehole or Trial Pit	Depth	Sample No	Sample Type	Lab Ref No	DETS 010 Arsenic ug/l	DETS 042 Cadmium Dissolved ug/l	DETS 042 Chromium Dissolved ug/l	DETS 042 Copper Dissolved ug/l	DETS 042 Lead Dissolved ug/l	DETS 078* Mercury ug/l	DETS 042 Nickel Dissolved ug/l	DETS 012 Selenium ug/l	DETS 042 Zinc Dissolved ug/l	DETS 055 Sulphate mg/l
BH6			Water	40701	< 1	< 2	< 10	< 2	< 5	< 0.2	< 10	< 3	510	19
BH10			Water	40702	< 1	< 2	< 10	< 2	< 5	< 0.2	< 10	< 3	260	17
BH5			Water	40703	< 1	< 2	< 10	< 2	< 5	< 0.2	21	< 3	190	18

Client Reference

Laboratory Reference 06-06147

Barough Green

Summary of Chemical Analysis

Borehole or Trial Pit	Depth	Sample No	Sample Type	Lab Ref No	DETS 009 Conductivity uS/cm	DETS 042 Hardness mg/l	DETS 019 Ammoniacal Nitrogen as N mg/l	DETS 008 pH	DETS 050* Acenaphthlene ug/l	DETS 050* Acenapthylene ug/l	DETS 050* Anthracene ug/l	DETS 050* Benzo(a)anthracene ug/l	DETS 050* Benzo(a)pyrene ug/l	DETS 050* Benzo(b)fluoranthene ug/l
BH6			Water	40701	670	410	0.82	6.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH10			Water	40702	1500	600	0.79	6.7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH5			Water	40703	1400	430	0.12	5.7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Client Reference

Laboratory Reference 06-06147

Barough Green

Summary of Chemical Analysis

Borehole or Trial Pit	Depth	Sample No	Sample Type	Lab Ref No	DETS 050* Benzo(k)fluoranthene ug/l	DETS 050* Benzo(g,h,i)perylene ug/l	DETS 050* Chrysene ug/l	DETS 050* Dibenzo(a,h)anthracene ug/l	DETS 050* Flouranthene ug/l	DETS 050* Fluorene ug/l	DETS 050* Indeno(1,2,3-c,d)pyrene ug/l	DETS 050* Napthalene ug/l	DETS 050* Phenanthrene ug/l	DETS 050* Pyrene ug/l
BH6			Water	40701	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH10			Water	40702	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH5			Water	40703	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Client Reference

Laboratory Reference 06-06147

Barough Green

Summary of Chemical Analysis

Borehole or Trial Pit	Depth	Sample No	Sample Type	Lab Ref No	DETS 050* PAH ug/l	DETS 054* Phenol ug/l
BH6			Water	40701	< 0.20	< 0.50
BH10			Water	40702	< 0.20	< 0.50
BH5			Water	40703	< 0.20	< 0.50

APPENDIX D

GROUND GAS & GROUNDWATER MONITORING

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS:

Client: Hallam Land Management & Commercial Estates Project **Job No:** C6054
Site: Barugh Green, Barnsley **Visit No:** 1 **of** 9 (over 6 months)
Date: 15.09.14 **Operator:** AS **Project Manager:** RL

Monitoring Point	GAS CONCENTRATIONS: Methane (%v/v) Peak	Methane (%v/v) Steady	%LEL Peak	%LEL Steady	Carbon dioxide (%v/v) Peak	Carbon dioxide (%v/v) Steady	Carbon monoxide (ppmv) Peak	Carbon monoxide (ppmv) Steady	Hydrogen sulphide (ppmv) Peak	Hydrogen sulphide (ppmv) Steady	Oxygen (%v/v) Min.	Oxygen (%v/v) Steady	VOLATILES: PID Peak (ppm)	Product thickness (mm)	FLOW DATA: Flow rate (l/hr) Peak	Flow rate (l/hr) Steady	Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Worst-credible GSVs: Methane (l/hr)	CO2 (l/hr)	WELL AND WATER DATA: Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	Comments
WS101	ND	ND	ND	ND	6.1	6.1	ND	ND	ND	ND	7.0	7.0	NA	NA	ND	ND	0.15	30	NA	0.0061	ND	3.98	72.06	NA	1.0 - 4.3m bgl - Made Ground	
WS104	ND	ND	ND	ND	0.6	0.3	ND	ND	ND	ND	20.1	20.3	NA	NA	ND	ND	-0.08	30	NA	0.0003	0.58	1.94	62.48	61.90	1.0 - 3.0m bgl - Made Ground	
WS105	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	NR	NR	NR	NR	NR	NR	0.10	2.92	62.29	62.19	0.50 - 2.0m bgl- Made Ground /Residual MCM	Unable to gas due to very high water level
WS106	ND	ND	ND	ND	4.0	4.0	ND	ND	ND	ND	11.6	11.7	NA	NA	ND	ND	0.08	30	NA	0.0040	1.36	2.98	56.59	55.23	1.0 - 3.0m bgl - Residual MCM/Bedrock	
WS107	ND	ND	ND	ND	9.4	9.4	ND	ND	ND	ND	4.6	4.6	NA	NA	ND	ND	0.01	30	NA	0.0094	1.67	3.88	56.94	55.27	0.50 - 2.0m bgl - Made Ground/Residual MCM	
WS108	ND	ND	ND	ND	6.0	6.0	ND	ND	ND	ND	5.0	5.0	NA	NA	-0.1	-0.1	-0.14	30	NA	0.0060	0.72	1.96	56.17	55.45	0.50 - 2.0m bgl - Made Ground/MCM	
WS109	ND	ND	ND	ND	4.6	4.6	ND	ND	ND	ND	13.5	13.4	NA	NA	-0.1	-0.1	-0.15	30	NA	0.0046	1.90	2.94	57.82	55.92	0.5 - 3.0m bgl - Made Ground/MCM	
WS110	ND	ND	ND	ND	2.8	2.8	ND	ND	ND	ND	17.0	17.0	NA	NA	-0.1	-0.1	-0.03	30	NA	0.0028	1.58	4.56	55.19	53.61	1.0 - 5.0m bgl - Made Ground/Residual MCM	
WS111	ND	ND	ND	ND	1.7	1.7	ND	ND	ND	ND	19.5	19.5	NA	NA	ND	ND	0.07	30	NA	0.0017	2.54	2.73	57.65	55.11	0.80 - 2.80m bgl - Residual MCM/Bedrock	
WS112	ND	ND	ND	ND	3.7	3.7	ND	ND	ND	ND	11.3	11.3	NA	NA	ND	ND	-0.15	30	NA	0.0037	ND	0.96	61.65	NA	0.5 - 1.0m bgl - Residual MCM/Bedrock	Dry or blocked
WS113	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	20.8	20.8	NA	NA	ND	ND	-0.33	30	NA	NA	0.68	2.79	58.97	58.29	0.8 - 2.0m bgl - Residual MCM/Bedrock	
WS114	ND	ND	ND	ND	1.9	1.9	ND	ND	ND	ND	17.9	17.9	NA	NA	0.1	0.1	-0.16	30	NA	0.0019	1.94	1.97	60.89	58.95	1.0 - 2.0m bgl - Residual MCM/Bedrock	
WS115	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.8	20.9	NA	NA	ND	ND	-0.17	30	NA	ND	0.38	1.96	62.81	62.43	1.0 - 2.0m bgl - Residual MCM/Bedrock	
WS116	ND	ND	ND	ND	0.9	0.9	ND	ND	ND	ND	20.4	20.4	NA	NA	0.1	0.1	-0.17	30	NA	0.0009	1.14	1.94	61.78	60.64	1.0 - 2.0m bgl - Residual MCM	
WS117	ND	ND	ND	ND	0.1	0.1	ND	ND	ND	ND	20.6	20.6	NA	NA	ND	ND	0.39	30	NA	0.0001	0.69	3.58	61.08	60.39	0.8 - 4.0m bgl - Residual MCM	
WS118	ND	ND	ND	ND	1.3	1.3	ND	ND	ND	ND	20.2	20.2	NA	NA	ND	ND	-0.17	30	NA	0.0013	1.20	2.72	63.46	62.26	1.0 - 2.9m bgl - Residual MCM/Bedrock	
WS119	ND	ND	ND	ND	2.4	2.3	1	1	ND	ND	18.2	18.3	NA	NA	-0.1	-0.1	0.24	30	NA	0.0023	1.02	2.97	66.15	65.13	1.0 - 3.0m bgl - Residual MCM/Bedrock	
WS120	ND	ND	ND	ND	2.5	2.5	ND	ND	ND	ND	16.7	16.7	NA	NA	ND	ND	-0.17	30	NA	0.0025	1.44	3.93	68.67	67.23	1.0 - 4.0m bgl - Residual MCM/Bedrock	
WS121	ND	ND	ND	ND	1.4	1.4	ND	ND	ND	ND	16.6	16.6	NA	NA	-0.2	-0.2	-0.22	30	NA	0.0028	5.01	5.31	70.84	65.83	1.0 - 5.5m bgl - Made Ground/Residual MCM	
WS122	ND	ND	ND	ND	0.3	0.3	ND	ND	ND	ND	19.7	20.3	NA	NA	ND	ND	-0.23	30	NA	0.0003	3.85	3.98	69.11	65.26	1.0 - 4.0m bgl - Made Ground	
WS124	ND	ND	ND	ND	5.4	5.4	ND	ND	ND	ND	5.4	5.3	NA	NA	-0.1	-0.1	-0.24	30	NA	0.0054	2.28	2.46	66.14	63.86	0.5 - 2.5m bgl - Made Ground/MCM	
WS125	ND	ND	ND	ND	6.6	6.6	ND	ND	ND	ND	6.4	6.4	NA	NA	ND	ND	-0.23	30	NA	0.0066	1.63	1.88	63.97	62.34	0.5 - 2.0m bgl - Made Ground/Bedrock	
WS127	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.7	20.7	NA	NA	-0.1	-0.1	0.07	30	NA	0.0001	0.47	1.92	62.19	61.72	0.5 - 2.0m bgl - Made Ground/Bedrock	
WS128	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	NR	NR	NR	NR	NR	NR	0.10	2.95	60.25	60.15	1.0 - 3.0m bgl - Residual MCM/Bedrock	Unable to gas due to very high water level
WS129	ND	ND	ND	ND	0.2	0.1	ND	ND	ND	ND	20.5	20.6	NA	NA	ND	ND	-0.2	30	NA	0.0001	0.27	3.88	59.61	59.34	1.0 - 4.0m bgl - Residual MCM/Bedrock	
WS130	ND	ND	ND	ND	1.7	1.7	ND	ND	ND	ND	19.1	19.1	NA	NA	ND	ND	-0.19	30	NA	0.0017	2.52	2.99	57.38	54.86	1.0 - 4.0m bgl - Residual MCM/Bedrock	
WS131	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.6	20.6	NA	NA	-4.5	-4.5	0.46	30	NA	0.0045	0.64	3.55	56.13	55.49	0.5 - 4.35m - Residual MCM/Bedrock	
Max	**ND**	**ND**	**ND**	**ND**	**9.4**	**9.4**	**1**	**1**	**ND**	**ND**	**20.8**	**20.9**	**NA**	**NA**	**0.1**	**0.1**	**0.5**	**30**	**NA**	**0.0094**	**5.01**	**5.31**	**72.06**	**67.23**		
Min	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**4.6**	**4.6**	**NA**	**NA**	**4.5**	**-4.5**	**-0.3**	**NR**	**NA**	**NA**	**0.10**	**0.96**	**55.19**	**53.61**		

Worst-possible GSVs	
NA	**0.423**

ND - Not detected
NR - Not recorded
NA - Non applicable

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:	X	Dry		Moist		Wet		Snow		Frozen		
Wind:	X	Calm		Light		Moderate		Strong				
Cloud cover:		None		Slight	X	Cloudy		Overcast				
Precipitation:		None		Slight	X	Moderate		Heavy				
Time monitoring performed:			09:00	Start			13:00	End				
Barometric pressure (mbar):			1013	Start			1016	End				
Pressure trend (Daily):			x	Falling		Steady		Rising				
Source:	www.wunderground.com											
Air Temperature (Deg. C):			14	Before			17	After				

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA11114
Gas Range: **CH_4** 0-100% **CO_2** 0-100% **O_2** 0-25%
Gas Flow range: 0-20l/hr
Differential Pressure: +/-500mb
Date of last calibration: 25/07/2014
Date of next calibration: 25/01/2015

Ambient air check: **CH_4** 0.0 **CO_2** 0.0 **O_2** 20.7

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS:

Client: Hallam Land Management & Commercial Estates Project **Job No:** C6054
Site: Barugh Green, Barnsley **Visit No:** 2 **of** 9 (over 6 months)
Date: 15.09.14 **Operator:** AS **Project Manager:** RL

Monitoring Point	GAS CONCENTRATIONS: Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		VOLATILES: PID Peak (ppm)	Product thickness (mm)	FLOW DATA: Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Worst-credible GSVs: Methane (l/hr)	CO2 (l/hr)	WELL AND WATER DATA: Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	Comments
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS101	ND	ND	ND	ND	9.4	9.2	ND	ND	ND	ND	10.2	10.1	6.1	NA	ND	ND	0.09	30	ND	0.0092	ND	3.98	72.06		1.0 - 4.3m bgl - Made Ground	Dry
WS104	ND	ND	ND	ND	3.2	2.8	ND	ND	ND	ND	9.5	9.5	1.3	NA	ND	ND	-2.42	30	ND	0.0028	0.74	1.95	62.48	61.74	1.0 - 3.0m bgl - Made Ground	
WS105	82.2	82.2	ND	ND	ND	ND	ND	ND	ND	ND	0.8	1.1	0.5	NA	-0.1	-0.1	-0.18	ND	0.0822	NA	0.34	2.92	62.29	61.95	0.50 - 2.0m bgl- Made Ground /Residual MCM	GA sucks water from the borehole, gas reading interrupted
WS106	ND	ND	ND	ND	3.8	3.7	ND	ND	ND	ND	7.9	7.9	2	NA	ND	ND	0.08	30	ND	0.0037	1.51	2.98	56.59	55.08	1.0 - 3.0m bgl - Residual MCM/Bedrock	
WS107	ND	ND	ND	ND	11.2	11.1	ND	ND	ND	ND	7.6	7.6	2.3	NA	ND	ND	-0.35	30	ND	0.0111	1.84	3.89	56.94	55.10	0.50 - 2.0m bgl - Made Ground/Residual MCM	
WS108	ND	ND	ND	ND	5.7	5.7	ND	ND	ND	ND	14.1	14.1	2.4	NA	0.1	0.1	-0.14	30	ND	0.0057	0.93	1.96	56.17	55.24	0.50 - 2.0m bgl - Made Ground/MCM	
WS109	ND	ND	ND	ND	3.9	3.9	ND	ND	ND	ND	ND	ND	1.5	NA	ND	ND	-0.13	30	ND	0.0039	2.18	2.94	57.82	55.64	0.5 - 3.0m bgl - Made Ground/MCM	
WS110	ND	ND	ND	ND	3.1	3.1	ND	ND	ND	ND	ND	ND	2.3	NA	-0.1	-0.1	-0.03	30	ND	0.0031	1.90	4.56	55.19	53.29	1.0 - 5.0m bgl - Made Ground/Residual MCM	
WS111	ND	ND	ND	ND	2.3	2.2	ND	ND	ND	ND	9.9	19.4	1	NA	ND	ND	0.12	30	ND	0.0022	2.64	2.73	57.65	55.01	0.80 - 2.80m bgl - Residual MCM/Bedrock	
WS112	ND	ND	ND	ND	2.9	2.9	ND	ND	ND	ND	17.0	17.0	2.8	NA	ND	ND	-0.11	30	ND	0.0029	ND	0.96	61.65	NA	0.5 - 1.0m bgl - Residual MCM/Bedrock	Dry or blocked
WS113	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.8	20.8	1.4	NA	ND	ND	-0.25	30	ND	NA	0.70	1.84	58.97	58.27	0.8 - 2.0m bgl - Residual MCM/Bedrock	
WS114	ND	ND	ND	ND	2.4	2.4	ND	ND	ND	ND	18.2	18.1	3.4	NA	0.1	0.1	-0.21	30	ND	0.0024	ND	1.97	60.89	NA	1.0 - 2.0m bgl - Residual MCM/Bedrock	
WS115	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.8	20.8	0.6	NA	ND	ND	-0.17	30	ND	NA	0.68	1.96	62.81	62.13	1.0 - 2.0m bgl - Residual MCM/Bedrock	
WS116	ND	ND	ND	ND	1.5	1.5	ND	ND	ND	ND	20.8	20.8	8.2	NA	0.1	0.1	-0.14	30	ND	0.0015	1.27	1.94	61.78	60.51	1.0 - 2.0m bgl - Residual MCM	
WS117	ND	ND	ND	ND	0.6	0.6	ND	ND	ND	ND	20.6	20.6	2.6	NA	ND	ND	0.21	30	ND	0.0006	0.69	3.55	61.08	60.39	0.8 - 4.0m bgl - Residual MCM	
WS118	ND	ND	ND	ND	0.9	0.9	ND	ND	ND	ND	20.7	20.7	4.4	NA	ND	ND	-0.11	30	ND	0.0009	1.85	2.77	63.46	61.61	1.0 - 2.9m bgl - Residual MCM/Bedrock	
WS119	ND	ND	ND	ND	2.1	2.0	1	1	ND	ND	18.6	18.5	1.1	NA	-0.1	-0.1	-0.18	30	ND	0.0020	1.07	2.98	66.15	65.08	1.0 - 3.0m bgl - Residual MCM/Bedrock	
WS120	ND	ND	ND	ND	1.9	1.9	ND	ND	ND	ND	18.8	18.8	7	NA	ND	ND	-0.23	30	ND	0.0019	1.52	3.93	68.67	67.15	1.0 - 4.0m bgl - Residual MCM/Bedrock	
WS121	ND	ND	ND	ND	1.3	1.1	ND	ND	ND	ND	18.5	18.5	3	NA	-0.1	-0.1	-0.19	30	ND	0.0011	5.24	5.31	70.84	65.60	1.0 - 5.5m bgl - Made Ground/Residual MCM	
WS122	ND	ND	ND	ND	1.2	1.0	ND	ND	ND	ND	19.2	19.2	3.4	NA	ND	ND	-0.35	30	ND	0.0010	ND	3.97	69.11	NA	1.0 - 4.0m bgl - Made Ground	
WS124	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	NR	NR	NR	NR	NR	NR	NR	NR	66.14	NA	0.5 - 2.5m bgl - Made Ground/MCM	BH missing outside casing just hole in ground
WS125	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NA	NA	NR	NR	NR	NR	NR	NR	NR	NR	63.97	NA	0.5 - 2.0m bgl - Made Ground/Bedrock	BH missing outside casing and filled with soil.
WS127	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.8	20.8	0.7	NA	-0.1	-0.1	0.04	30	ND	0.0001	0.49	1.92	62.19	61.70	0.5 - 2.0m bgl - Made Ground/Bedrock	
WS128	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.2	NA	NR	NR	NR	NR	NR	NR	0.14	2.95	60.25	60.11	1.0 - 3.0m bgl - Residual MCM/Bedrock	Unable to gas due to very high water level
WS129	ND	ND	ND	ND	0.2	0.1	ND	ND	ND	ND	20.6	20.7	1.8	NA	ND	ND	-0.12	30	ND	0.0001	0.39	3.88	59.61	59.22	1.0 - 4.0m bgl - Residual MCM/Bedrock	
WS130	ND	ND	ND	ND	1.7	1.7	ND	ND	ND	ND	19.5	19.5	1.5	NA	ND	ND	-0.26	30	ND	0.0017	2.74	2.99	57.38	54.64	1.0 - 4.0m bgl - Residual MCM/Bedrock	
WS131	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.8	20.8	0.6	NA	-2.0	-2.0	0.1	30	ND	0.0020	0.74	3.53	56.13	55.39	0.5 - 4.35m - Residual MCM/Bedrock	
Max	82.2	82.2	ND	ND	11.2	11.1	1	1	ND	ND	20.8	20.8	8.2	NA	0.1	0.1	0.1	30	0.0822	0.0111	5.24	5.31	72.06	67.15		
Min	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	-2.0	-2.0	-2.4	ND	ND	NA	ND	0.96	55.19	53.29		
																			Worst-possible GSVs:						
																			1.64	0.22						

ND - Not detected
NR - Not recorded
NA - Non applicable

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:		Dry	X	Moist		Wet		Snow		Frozen
Wind:	X	Calm		Light		Moderate		Strong	
Cloud cover:		None		Slight	X	Cloudy		Overcast	
Precipitation:	X	None		Slight		Moderate		Heavy	
Time monitoring performed:			09:00	Start			13:00	End	
Barometric pressure (mbar):			1119	Start			1021	End	
Pressure trend (Daily):				Falling		Steady	X	Rising	
Source:	www.wunderground.com								
Air Temperature (Deg. C):			16	Before			18	After	

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA11114
Gas Range: **CH_4** 0-100% **CO_2** 0-100% **O_2** 0-25%
Gas Flow range: 0-20l/hr
Differential Pressure: +/-500mb
Date of last calibration: 25/07/2014
Date of next calibration: 25/01/2015

Ambient air check: **CH_4** 0.0 **CO_2** 0.0 **O_2** 20.8

PID: PGM7350, SN:595-000881
Calibrated range:
Calibration gas: Isobutylene @100ppm
Response time:
Accuracy:
Date of last calibration: 25/07/2014
Date of next calibration: 25/01/2015

APPENDIX F

SIRIUS GENERIC ASSESSMENT CRITERIA

The Sirius Group
Generic Assessment Criteria for Soils

Revision: 1 June 2014 (B)

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	
Metals/Metalloids										
Arsenic (inorganic)	37			40			630			[1]
Cadmium	18			150			410			[2]
Chromium (III)	4000			4000			28000			
Chromium (VI)	21			21			49			[3]
Copper	200			7200			68000			[4]
Lead	200			310			2330			[5]
Mercury (inorganic)	170			240			3600			[6]
Nickel	180			180			1700			[7]
Selenium	350			600			13000			
Vanadium	76			200			3000			
Zinc	450			40000			600000			[4]
Other Inorganics										
pH	<5 or >9			<5 or >9			<5 or >9			
Total Sulphate	2400			2400			2400			[8]
Water-Soluble Sulphate	0.5 g/l			0.5 g/l			0.5 g/l			[8]
Free Cyanide	34			34			1400			[9]
Organics										
PAHs										
Acenaphthene	200	490	920	2000	3500	4800	75000	92000	100000	
Acenaphthylene	170	400	760	2000	3600	4900	75000	92000	100000	
Anthracene	2300	5300	9300	29000	34000	36000	500000	500000	500000	[10]
Benzo(a)anthracene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(a)pyrene	4.9	4.9	4.9	5.3	5.3	5.3	76	76	76	[11]
Benzo(b)fluoranthene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(k)fluoranthene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(g,h,i)perylene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Chrysene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Dibenzo(a,h)anthracene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Fluoranthene	2300	5300	9300	29000	34000	36000	500000	500000	500000	
Fluorene	280	560	820	1500	1500	1500	22000	22000	22000	
Indeno(1,2,3-c,d)pyrene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Naphthalene	1.0	2.3	4.6	1.0	2.4	4.7	100	260	500	
Phenanthrene	95	220	380	1200	1400	1500	22000	22000	22000	
Pyrene	620	1200	1800	3600	3700	3700	54000	54000	54000	
BTEX and related										
Benzene	0.13	0.27	0.50	0.37	0.71	1.30	15	29	51	[12]
Toluene	100	230	460	360	810	1500	56000	100000	160000	
Ethylbenzene	50	120	240	100	230	450	16000	33000	56000	
Xylenes (total)	27	64	120	31	75	140	5800	13000	25000	[13]
1,2,4-trimethylbenzene	0.2	0.5	1.1	0.2	0.6	1.2	39	93	170	
Iso-propylbenzene	6.6	16	32	6.8	17	33	1300	3100	6100	
Propylbenzene	21	51	100	23	57	110	3800	9100	17000	
Styrene	6.9	16	32	21	49	93	3100	6100	9500	
TPH										
Aliphatic EC 5-6	24	40	67	24	40	67	3100	5700	10000	
Aliphatic EC >6-8	52	110	200	52	110	200	7500	17000	32000	
Aliphatic EC >8-10	13	30	60	13	30	60	1900	4700	9200	
Aliphatic EC >10-12	61	150	300	61	150	300	9400	22000	40000	
Aliphatic EC >12-16	500	1200	2200	500	1200	2200	58000	81000	88000	
Aliphatic EC >16-35	41000	69000	89000	41000	69000	90000	>1E6	>1E6	>1E6	[14]
Aromatic EC >5-7	53	110	200	150	300	540	26000	46000	75000	
Aromatic EC >7-8	100	240	460	370	810	1500	56000	100000	160000	
Aromatic EC >8-10	19	47	93	22	53	100	3300	7900	14000	
Aromatic EC >10-12	63	150	280	110	280	550	15000	27000	33000	
Aromatic EC >12-16	500	1200	2200	500	1200	2200	58000	81000	88000	
Aromatic EC >16-21	260	540	840	1800	1800	1900	28000	28000	28000	
Aromatic EC >21-35	1100	1500	1600	1900	1900	1900	28000	28000	28000	

The Sirius Group
Generic Assessment Criteria for Soils

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	
Chlorinated Organics										
Chlorobenzene	0.19	0.44	0.86	0.19	0.45	0.87	56	120	240	
Dichloromethane (DCM)	0.47	0.78	1.2	1.2	1.7	2.4	250	340	470	
1,1-dichloroethane (DCA)	1.4	2.4	4.0	1.4	2.4	4.1	260	420	690	
1,2-dichloroethane (DCA)	0.0031	0.0048	0.0076	0.0035	0.0053	0.0084	0.67	0.97	1.5	
1,1-dichloroethene (DCE)	0.15	0.26	0.45	0.15	0.26	0.46	24	43	74	
cis-1,2-dichloroethene (DCE)	0.066	0.12	0.20	0.069	0.12	0.21	14	23	38	
trans-1,2-dichloroethene (DCE)	0.11	0.21	0.38	0.12	0.22	0.39	21	37	65	
Pentachlorophenol	0.55	1.3	2.6	38	58	68	1200	1300	1300	
1,1,1,2-tetrachloroethane	0.56	1.3	2.6	0.63	1.5	2.9	100	240	470	
1,1,2,2-tetrachloroethane	0.98	2.1	4.0	1.6	3.4	6.3	270	540	970	
Tetrachloroethene (PCE)	0.57	1.3	2.5	0.61	1.4	2.7	120	270	520	
Tetrachloromethane (CT)	0.011	0.024	0.046	0.011	0.024	0.046	2.9	6.3	12	
1,1,1-trichloroethane (TCA)	3.7	7.8	15	3.8	7.9	15	660	1300	2500	
1,1,2-trichloroethane (TCA)	0.39	0.85	1.6	0.51	1.1	2.0	89	180	320	
Trichloroethene (TCE)	0.064	0.14	0.26	0.065	0.14	0.26	11	23	44	
Trichloromethane (CF)	0.46	0.86	1.5	0.52	0.97	1.7	101	170	300	
Vinyl Chloride	0.00034	0.00045	0.00062	0.00037	0.00048	0.00066	0.059	0.077	0.11	
Miscellaneous Organics										
Carbon disulphide	0.066	0.13	0.25	0.066	0.13	0.25	11	22	40	
Di-(2-ethylhexyl)-phthalate	290	660	1100	3900	4000	4100	85000	85000	8600	
MTBE	31	55	94	39	68	120	7400	12000	19000	
Phenol	270	550	950	740	1300	2100	3200			[15]
Methylphenols (cresols), total	78	170	330	5600	8200	9900	160000	170000	18000	[16]
2,4-dimethylphenol (m-xylenol)	18	43	82	200	430	720	15000	23000	28000	
Other Parameters										
TOC	3% w/w			3% w/w			3% w/w			[17]
Calorific Value	2 MJ/kg			2 MJ/kg			2 MJ/kg			[18]
Asbestos	Fibres present			Fibres present			Fibres present			

All concentration-based criteria are rounded to 1 or 2 significant figures.

The criteria assume a sandy soil type, which will be conservative for the great majority of soils (including made ground) encountered on historically contaminated sites.

Except where otherwise stated, criteria have been derived by Sirius using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children and plant uptake concentration factors given in CL:AIRE (2013) "Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination", report SP1010. No correction has been made for the "Top Two" crop types in the Residential with Homegrown Produce land use and the criteria will therefore be conservative in this regard.

Unless specifically noted, chemical properties and Health Criteria Values (HCVs) were obtained from:
- Environment Agency Science Report SC050021 Series;
- Nathanail et al. (2009) "The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment", 2nd edition, Land Quality Press, Nottingham;
- CL:AIRE - AGS - EIC (2010) "Soil Generic Assessment Criteria for Human Health Risk Assessment". CL:AIRE, London.

Footnotes

[1] Determined using LLTC value and plant uptake concentration factors given in CL:AIRE (2013). The oral GAC is adopted as this is the lower value and reflects a cancer risk many orders of magnitude greater than for inhalation.

[2] Determined for lifetime exposure using the LLTC value and plant uptake concentration factors given in CL:AIRE (2013). The GAC values are based on data for soils having a pH value in the range 6-8; caution should be applied in applying them at pH values outside this range, especially at pH values <5.

[3] Determined using LLTC value and plant uptake concentration factors given in CL:AIRE (2013). Both oral and inhalation LLTCs are based on local toxicological effects and therefore the lowest (oral) GAC value is adopted.

[4] For the Residential with Homegrown Produce land use, the GAC values for Cu and Zn are based on potential phytotoxic effects and have been set at the maximum allowable concentrations for sewage sludge-amended soils presented in the "Sludge (Use in Agriculture) Regulations" (SI 1263/1989); these criteria may also be applied in any land use where plants are to be grown. The equivalent GAC values for human health protection in the Residential with Homegrown Produce land use are: Cu, 2400 mg/kg; Zn, 3700 mg/kg. The GAC values for the other land uses presented were derived by Sirius as described above.

[5] The Category 4 Screening Levels for lead defined in CL:AIRE (2013) have been adopted directly to provide an acceptable basis for initial assessment of data. Where background concentrations of lead exceed the GAC value, then site-specific evaluation will be required.

[6] The SGV for mercury is based on inorganic mercury which represents the most common form encountered within the environment. This is considered appropriate for most sites as: "…the SGV for inorganic mercury can normally be compared with chemical analysis for total mercury content because the equilibrium concentrations of elemental and methylmercury compounds are likely to be very low" (SC050021/Mercury SGV). Analysis and specific assessment for elemental or methylated forms of mercury will need to be considered if historical land use or site-specific factors indicate that these forms of mercury are likely to be present.

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	

[7] Toxicological effects by inhalation are localised; consistent with the SGV for nickel, the lower of the GAC values for oral and inhalation HCVs have been adopted in each case.

[8] BRE (2005) Special Digest 1, 3rd Edition "Concrete in aggressive ground". Sulphate is not considered to pose a potential risk to human health under normal circumstances – this GAC

[9] GAC calculated for acute risk. Further information can be provided upon request.

[10] The genotoxic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene) are routinely assessed using benzo(a)pyrene as a surrogate (HPA (2010) "Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)", version 5). Separate information on this approach is provided.

[11] Determined using oral LLTC value (CL:AIRE, 2013) for assessment of all pathways to determine systemic carcinogenic effect; inhalation HCV and LLTC values are based on local pulmonary effects only and result in a less conservative GAC. Specific plant uptake concentration factors given in CL:AIRE (2013) have been applied in model parameterisation.

[12] Calculated using LLTC value (CL:AIRE, 2013).

[13] For screening purposes, a single GAC has been set for total xylene. This is the lowest of the values calculated for the three individual xylene isomers.

[14] "No GAC" indicates that no value has been specified for this land use as the HCV cannot be exceeded at achievable soil concentrations.

[15] The GAC for Commercial/Industrial land use is based on the threshold protective for direct skin contact with phenol (See SR050021/Phenol SGV).

[16] For screening purposes, a single GAC has been set for total methylphenol. This is the lowest of the values calculated for the three individual methylphenol isomers.

[17] The Hazardous Waste (England and Wales) Regulations 2005. TOC content in itself does not represent a potential risk to human health. This GAC is provided for indicative assessment of disposal options, in the case that off-site landfill of soil is undertaken. This GAC is specified at the 'Inert' waste threshold and should be considered as for information purposes only.

[18] ICRCL (1986) Guidance Note 61/84, 2nd Edition, Notes on the Fire Hazards of Contaminated Land. Calorific value is not an indication of direct human health risk but may be useful in assessment of the potential fire risk posed by made ground or natural soils containing elevated concentrations of potentially combustible organic matter.

Revision no.: 7.1
Last edited by: PM
Last revision date: 31-Mar-14

GAC VALUES FOR CONTROLLED WATERS IN ENGLAND AND WALES

Parameter	GAC (µg/l, unless stated)			Notes
	Inland waters		Coastal and transition waters	
	EQS	DWS	EQS	
Metals and metalloids				
Arsenic	50	10	25	1
Cadmium	See separate table	5	0.2	1, 2
Chromium (total)	4.7	50	4.7	1, 3
Copper	See separate table	2000	5	1, 2
Lead	7.2	10	7.2	1
Mercury	0.05	1	0.05	1
Nickel	20	20	20	1
Zinc	See separate table	5000	40	1, 2
Misc. inorganics				
Ammonia (total, as N)	See separate table	N.A.	N.A.	2, 4
Ammonia (total, as $NH4^+$)	N.A.	500	N.A.	
Ammonia (un-ionised (NH3), as N)	N.A.	N.A.	21	
Sulphate	400 mg/l	250 mg/l	N.A.	5
Petroleum hydrocarbons and related				
TPH	See notes	See notes	See notes	6, 7
Benzene	10	1	8	
Toluene	50	700	40	8
Xylenes (sum)	30	500	30	8
MTBE	2600	200	2600	9, 10
PAHs				
Anthracene	0.1	N.A.	0.1	
Benzo(b)fluoranthene + Benzo(k)fluoranthene (sum)	0.03	Sum of 4 = 0.1	0.03	
Benzo(g,h,i)perylene + indeno(1,2,3-c,d)pyrene (sum)	0.002		0.002	
Benzo(a)pyrene	0.05	0.01	0.05	
Fluoranthene	0.1	N.A.	0.1	
Naphthalene	2.4	N.A.	1.2	
Phenol				
Phenol	7.7	0.5	7.7	

Cadmium - inland waters EQS	
Hardness (as mg/l CaCO3)	EQS (µg/l)
<40	0.08
40-50	0.08
50-100	0.09
100-200	0.15
>=200	0.25

Copper & zinc - inland waters EQS		
Hardness (as mg/l CaCO3)	EQS (µg/l)	
	Cu	Zn
0-50	1	8
50-100	6	50
100-250	10	75
>250	28	125

Ammonia - inland waters EQS		
Alkalinity (as mg/l CaCO3)	Altitude	EQS (µg/l)
<10	Any	300
10-50	Any	300
50-100	<80m	600
50-100	>80m	300
100-200	<80m	600
100-200	>80m	300
>200	Any	600

Parameter	GAC (µg/l, unless stated)			Notes
	Inland waters		Coastal and transition waters	
	EQS	DWS	EQS	
Chlorinated organics				
Dichloromethane	20	N.A.	20	
Trichloromethane (chloroform)	2.5	100	2.5	11
Tetrachloromethane (carbon tetrachloride)	12	3	12	
1,2-dichloroethane (1,2-DCA)	10	N.A.	10	
1,1,1-trichloroethane (1,1,1-TCA)	100	N.A.	100	
1,1,2-trichloroethane (1,1,2-TCA)	400	N.A.	300	
Trichloroethene (TCE)	10	Sum of 2 = 10	10	
Tetrachloroethene (PCE)	10		10	
Vinyl chloride	N.A.	0.5	N.A.	

Notes referenced in table:

1. Metals and metalloid EQS relate to dissolved contamination only (i.e. analysis of filtered samples).
2. Inland waters EQS for these parameters is dependent upon hardness or alkalinity of the *receiving water* . See separate tables.
3. Separate EQS standards exist for Cr III and CrVI in fresh water. Cr III value adopted as screening purposes for total Cr analysis as it is normally the predominant form in solution. Specific EQS for Cr VI (3.4µg/l in freshwater; 0.6µg/l in transition and coastal waters) must be applied where relevant.
4. EQS for ammonia in inland waters also depends on altitude of receptor water body. See separate table.
5. Inland waters EQS for sulphate is non-statutory.
6. No concentration based EQS exists for TPH. Hydrocarbons must not: form a visible film on the surface of the water; form coatings on the beds of water bodies: impart a detectable 'hydrocarbon' taste to fish; or, produce harmful effects in fish.
7. No concentration based DWS exists for TPH. Subject to justification on a case-specific basis, it may be appropriate to apply 200 µg/l TPH as a GAC on the basis that this is the DW2 Class threshold limit specified in the Surface Water (Abstraction for Drinking Water) (Classification) Regulations 1996. DW2 waters are generally suitable for abstraction as drinking water supplies, subject to standard filtration and chemical treatment.
8. World Health Organisation (WHO) Guidelines for Drinking Water Quality, 1984 - health value.
9. EQS for MTBE is the PNEC value for fresh and sea water life given in: EU Risk Assessment Report (2002) MTBE, 3rd Priority List, volume 19.
10. DWS for MTBE is a 5-fold dilution of the USEPA (1997) Drinking Water Advisory value for taint, EPA-822-F-97-009. Toxicological thresholds are significantly higher.
11. Sum trihalomethanes limit is 100µg/l but chloroform is only compound of this class normally encountered at contaminated sites.

Sources and general comments

Unless otherwise stated, EQS-based GACs relate to "Good Standard" annual average surface water quality criteria as given in: The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010.

Unless otherwise stated, drinking water standard-based GACs are taken from the Water Supply (Water Quality) (Amendment) Regulations 2000, 2001 and 2007 and relate to concentration at the supply point and/or consumers' taps.

This list presents recommended GAC values for commonly monitored analytes but is not exhaustive. A comprehensive database of criteria is available at: http://evidence.environment-agency.gov.uk/ChemicalStandards/home.aspx.

Other EQS-based criteria may apply in specific cases and regulatory guidance should be sought in case of doubt.

SIRIUS GENERIC ASSESSMENT CRITERIA

Context

The framework for conducting site investigations, risk assessments and undertaking any necessary remedial works in the UK is provided by Environment Agency report CLR11 "Model Procedures for the Management of Contaminated Land". This presents a phased approach to risk assessment, involving: identification and qualitative assessment of potential pollutant linkages (source-pathway-receptor relationships) by means of a Conceptual Site Model; Generic Quantitative Risk Assessment (GQRA) of potentially significant pollutant links by comparing contaminant concentrations with appropriate Generic Assessment Criteria (GAC) values; and, if required, a Detailed Quantitative Risk Assessment (DQRA) based on site-specific conditions.

Assessment of Risk to Human Health

Except where otherwise stated, GACs have been derived by Sirius using CLEA version 1.06.

The GAC values have been derived for a sandy soil type will be conservative for the majority of soils (including made ground) encountered on historically contaminated sites. For organic contaminants of concern, criteria have been derived for a number of Soil Organic Matter (SOM) contents.

Genotoxic PAHs are assessed by the "Surrogate Method" using benzo(a)pyrene. Further information on this approach is appended.

The parameter values for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but have been updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children and plant uptake concentration factors in line with CL:AIRE (2013) "Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination", report SP1010. The respiration rates replace the original values used in the original development of CLEA version 1.06, as the guidance on which they were based has been superseded by a later version; the other parameter changes incorporate consensus expert opinion on reasonable exposure parameters based on review of the scientific literature and receptor behaviour. However, no correction has been made in deriving the GACs for the "Top Two" crop types in the Residential with Homegrown Produce land use; the criteria will therefore be conservative in this regard.

Unless specifically stated, chemical properties and Health Criteria Values (HCVs) were obtained from:

- Environment Agency Science Report SC050021 series;
- Nathanail *et al*. (2009) "The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment", 2nd edition, Land Quality Press, Nottingham;
- CL:AIRE - AGS - EIC (2010) "Soil Generic Assessment Criteria for Human Health Risk Assessment". CL:AIRE, London.

GACs for arsenic, benzene, benzo(a)pyrene, cadmium and chromium (VI) have been derived using the Low Level of Toxicological Concern (LLTC) criteria given in CL:AIRE (2013). These criteria are considered a reasonable basis for assessment as they are still highly precautionary and definitely do not approach an intake level that could be defined as approaching Significant Possibility of Significant Harm to human health in the context of Part 2A of the Environmental Protection Act 1990. It must be further understood that the GACs derived will still incorporate a residual level of conservatism resulting from the exposure parameters used and the assumptions inherent in the model algorithms.

For the specific case of lead, the Category 4 Screening Level criteria given in CL:AIRE (2013) have been adopted directly as GACs and are considered to provide a reasonable level of protection for initial data screening as they are based on expert interpretation of current toxicological evidence. In some areas, background lead concentrations may exceed the GACs and it may therefore be appropriate to consider relative site and background concentration data as part of a more detailed assessment of the data.

Controlled Waters

The Environment Agency's "Remedial Targets Methodology" (2006) provides a framework for assessing the potential for pollution of controlled waters and for deriving remedial target concentrations in soil and groundwater.

There are no generic groundwater or surface water quality standards that are applicable to all sites. However, legislative Drinking Water Standards and the Environment Agency's Environmental Quality Standards (EQS) are considered appropriate assessment criteria for many cases and these are therefore used by Sirius where appropriate to the potential pollutant linkages under consideration.

Soil Leachability

The Environment Agency's Remedial Targets Methodology recommends the use of the BS EN 12475 leachate methods and this is the standard test specified by Sirius.

The results of the leachate analysis are compared to the relevant GAC values for controlled waters.

Other Criteria

Sulphate, TOC and calorific value to not pose a potential risk to human health and therefore exceedance of the GACs for these does not indicate a human health risk.

A generic assessment is made in relation to the potential impact of soil pH and sulphate content on buried concrete by reference to BRE Special Digest No. 1; 3rd Edition (2005) "Concrete in Aggressive Ground".

The GAC for TOC content is provided for indicative assessment of disposal options in the case that off-site landfill of soil is considered. This GAC is set at the 'Inert' waste threshold and should be considered as for information purposes only.

The GAC for calorific value is set to assist in initial assessment of the potential fire risk posed by made ground or natural soils containing elevated concentrations of potentially combustible organic matter.

Assessment of Genotoxic PAHs

The use of benzo(a)pyrene as a surrogate marker for genotoxic PAHs is consistent with the recommendations given in HPA (2010) "Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)", version 5. The approach enables land contamination risk assessors to consider the combined carcinogenic risk associated with all genotoxic PAHs[1] that might be present at a site, despite the absence of detailed toxicological information for many of them on an individual basis.

The approach estimates the toxicity of the mixture of genotoxic PAHs in an environmental matrix by using toxicity data for a PAH mixture of known composition. Exposure to the surrogate marker is taken to represent exposure to all genotoxic PAHs in that matrix and therefore it represents the toxicity of the mixture.

To use the GAC for benzo(a)pyrene as a surrogate marker for genotoxic PAHs a number of requirements must be met (HPA, 2010):

- Benzo(a)pyrene must be present in all soil samples from the site at which this method of assessment is being used;
- A similar profile of the genotoxic PAHs relative to benzo(a)pyrene should be present in all of the samples being assessed;
- The PAH profile of PAHs in the soil samples should be similar to that present in the pivotal toxicity study on which toxicological criterion for benzo(a)pyrene was based (the Culp study). Table 1, overleaf, provides the basis for defining the acceptable range.

Data indicate that UK soils generally meet these criteria (Bull, S. & Collins, C. (2013) *Environ. Geochem. Health*, **31**, 101-109) but the assessor must review their dataset before adopting this approach. If the above criteria are not met, then the surrogate marker approach must not be adopted and individual GAC or SSAC values are to be applied[2].

[1] The genotoxic PAHs included in the USEPA PAH 16 analysis reported by analytical labs are: benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo(a)pyrene, chrysene, dibenz[a,h]anthracene and indeno[1,2,3-c,d]pyrene.

[2] For all genotoxic PAHs, CL:AIRE (2013) recommends assessment of oral, inhalation and dermal exposures as additive since these compounds are systemic carcinogens; the inhalation HCV or LLTC will be based on local pulmonary effects only. Where a combination of these exposure pathways operates, then the lower of the GACs derived on this basis will provide a conservative assessment of the risk from both systemic and local effects.

Table 1. Profile of Genotoxic PAHs Relative to Benzo(a)pyrene that are Considered Acceptable for Application of Benzo(a) pyrene as a Surrogate Marker.

PAH	Acceptable Ratio of PAH Concentration to Benzo(a)pyrene for Application of Surrogate Marker Assessment	
	Lower Limit	Upper Limit
Benz[a]anthracene	0.12	12.43
Benzo[b]fluoranthene	0.11	10.85
Benzo[k]fluoranthene	0.04	3.72
Benzo[g,h,i]perylene	0.08	8.22
Chrysene	0.12	11.61
Dibenz[a,h]anthracene	0.01	1.38
Indeno[1,2,3-c,d]pyrene	0.07	7.27

For further information see: HPA (2010) and CL:AIRE (2013).

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